



BDNF

BANGLADESH NATIONAL FORMULARY 2019

Published by
Directorate General of Drug Administration
Ministry Of Health & Family Welfare
Health Services Division
In Association with
Bangladesh Medical Association
Bangladesh Pharmaceutical Society

BDNF

BANGLADESH NATIONAL FORMULARY

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- **Bangladesh Pharmaceutical Society**

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Bangladesh

BDNF

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BDNF 2019

An official publication about drugs and related items officially used in Bangladesh for rapid reference and includes all the available information for prescribing and dispensing.

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Preface

The Bangladesh National Formulary (BDNF) is an official publication of Directorate General of Drug Administration (DGDA), Ministry of Health and Family Welfare (MoHFW), Government of the People Republic of Bangladesh. The BDNF aims to provide prescribers, pharmacists, and other healthcare professionals with sound up-to-date information about the use of medicines.

The BDNF includes key information on the selection, prescribing, dispensing and administration of medicines that are generally prescribed and available in the local market that support the health care providers to offer the most effective drug therapy. The 5th edition of BDNF comprises sound and updated information about the use of drugs with their properties such as presentation, dosage and administration, side effects, cautions, indications, contraindications, proprietary preparations etc. to physicians, pharmacists and other healthcare professionals. Such a comprehensive information is very important and inevitable for public health care and will help physicians to know the efficacy, price, risks and other information about a drug before prescribing. The latest edition includes a comprehensive list of temperature sensitive drugs, drug-food interactions and side effects of some common drugs.

Bangladesh is conscious of the growing concerns over antimicrobial resistance (AMR) and DGDA is committed to take necessary steps towards combating it. DGDA has a major role in the National Action Plan (NAP) to control AMR. Fighting AMR requires the collaboration of many stakeholders working in the human and animal health sectors. From DGDA side, additional vigilance is exercised over the quality and use of antimicrobial drugs. To promote better prescribing practices, the WHO Access, Watch and Reserve (AWaRe) classification of antibiotics as per 20th WHO model list of essential medicines has been incorporated into the 5th version of BDNF. The relevant section of the WHO model essential medicines list has been included (*Appendix 21*) for reference and to promote better understanding and awareness to combat AMR.

The Information in the BDNF is composed from Directorate General of Drug Administration, Directorate General of Health Services, the manufacturers' product literature, medical and pharmaceutical literature, and professional bodies. Advice is constructed from clinical literature and reflects, as far as possible, an evaluation of the evidence from diverse sources. The BDNF also takes account of authoritative national guidelines and emerging safety concerns. The editorial team receives advice on all therapeutic areas from expert clinicians on respective areas; this ensures that the BDNF's recommendations are relevant to practice.

PREFACE

Bangladesh is now considered as a global hub of manufacturing generic drugs and is currently exporting to 145 countries all over the world. At present a total of 271 allopathic medicine manufacturing companies are producing and marketing around 1516 types of Generic Products and 29475 kinds of Brands which worth more than 20000 Crore taka per year in the country.

I express my sincere thanks and appreciations to the World Health Organization (WHO) for their generous financial and technical support in publishing the fifth edition. We are also grateful to the Honorable Minister and the Honorable Secretary, Ministry of Health & Family Welfare, Government of the People's Republic of Bangladesh, the Conveners and Members of the various Committees and the contributing Authors for their active support and help, without which this document of national importance would not have seen the light of the day.

Directorate General of Drug Administration welcomes comments from healthcare professionals. Constructive criticism, useful information and suggestions for improving the quality and contents of BDNF will be examined and considered for inclusion in the subsequent editions.



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User's Guide

While compiling the Bangladesh National Formulary (BNF), the Editorial Board has tried to follow the style in which the British National Formulary (BNF) has been arranged. This is because of the fact that the target users of the BDNF, i.e., the physicians, pharmacists, dentists and other interested groups of Bangladesh, are already used to making use of the BNF.

All the drugs (both locally manufactured and imported), which are registered with the Directorate of Drug Administration up to 30th June, 2019 and are in current use in Bangladesh, are included in the BDNF. Each of them is described individually. They are first grouped into Chapters according to their pharmacological or physiological or other medical category. This edition of the BDNF has such 17 Chapters. Each Chapter is again sub-divided into Sections using numerical proceeds according to more distinct co-relations between the items included in each Section. Each of these Sections begins with a brief description of the subject matter, i.e., the drug or its group, which is expected to be useful for the target users. Description of the drug is followed by brief notes on its indications, side-effects, cautions, contra-indications, warnings, drug interactions, doses, names of the proprietary preparations containing the said drug, names of the manufacturers, the available dosage forms of the drug and their strengths.

The opening Chapter of the BDNF includes a Guideline on Prescriptions, which highlights various aspects of prescription writing, prescribing for children and the elderly and prescribing in terminal illness. It also includes notes on the concept of essential drugs and control of narcotics.

This issue of the BDNF also includes Chapters on Abbreviations used in the Formulary, Dental Practitioners Formulary, Index of Manufacturers, Adverse Drug Reactions Monitoring, a General Index and 21 Appendices.

For readers convenience the body of the text and index is composed in double columns with no colours in the main captions, but the sub-heads and sub-sub-heads in the body are printed in colours. Rulers are used above all sub-heads, thickness of which are varied using black colour depending on the importance of the heads. Separate superscript symbols are used to denote essential drugs ^(ED), controlled drugs ^(CD), and imported drugs ^(I). Names of the microorganisms are printed in *Italics*. Names of the generic drugs are printed in bold letters. Proprietary names are kept in bold regular but the Company names are in *Italics*.

Indications, Cautions, Contra-indications, Side-effects, Interactions and Doses are printed in regular and bold types. Generic items are printed in capital and bold letter.

It should be noted here that the price of the individual drug, which is sold and used in Bangladesh is also mentioned in this issue.

Guidance on Prescribing

GENERAL GUIDANCE

Appropriate prescribing implies the choice of medicines based on efficacy, safety, suitability and cost relative to other drugs or treatments that may be available. Medicines should be prescribed only when they are necessary. Taking time to explain to patient (and relatives) the treatment options, as well as the rationale and potential risks of chosen treatment regimen encourages the patient to take the medicines as prescribed. Successful therapy comprises much more than choosing an appropriate drug; it requires knowledge, judgment, skill, wisdom, responsibility, and above all, patient and doctor compliance.

COMPLIANCE

Patient compliance means adherence to a prescribed treatment schedule. Patient non-compliance is a major factor in therapeutic failure.

Reasons for patient non-compliance include: (a) poor patient-doctor relationship with resultant failure to follow the instructions; (b) lack of adequate information about the medications; (c) frequency and complexity of drug regimen; (d) forgetfulness; and (e) fear or anxiety about drug reactions.

Discussing the rationale and possible adverse effects of treatment to the patient or relatives improves compliance. Simplifying the regimen may also help. The patient should know the nature of the disease and reasons for drug therapy including expected benefits; how and when to take the medicine(s) with special instructions, if any; how long a drug needs to be taken; what to do if a dose is missed; how to recognize possible adverse effects; and when to report back to the doctor.

Doctor compliance is no less important and relates to his/her professional obligations and responsibilities. A doctor should have full knowledge about the drugs he/she prescribes, and be very careful and accurate in prescribing and telling the patients what they need to know.

DRUG INFORMATION: ROLE OF BDNF

Most physicians recognize that they need unbiased drug information to choose from the various medicines available in the market, which are often seductively promoted to them by pharmaceutical companies.

Bangladesh National Formulary (BDNF) aims to provide prescribers, pharmacists, and other healthcare professionals with up-to-date information about use of medicines.

It provides key information necessary for the selection, prescribing, dispensing and administration of medicines, registered and approved by the Directorate General of Drug Administration, Bangladesh.

Information on medicines provided in BDNF has been drawn from manufacturer's product literature, verified by professional experts with standard medical and pharmaceutical literature like BNF, BP, USP, Martindale, and national guidelines. Generic and International Non-proprietary Names (INN) where applicable have been provided. Proprietary or brand names are as registered by the Drug Administration. The doses mentioned are intended for general guidance only. The BDNF advocates

GUIDANCE ON PRESCRIBING

caution that 'prescription-only drugs' and 'controlled drugs' need to be prescribed only by a qualified and registered physician or dental surgeon.

ESSENTIAL DRUG CONCEPT: IMPORTANCE IN PRESCRIBING

The essential drugs (EDs) concept was first promoted in 1977 by World Health Organization (WHO); encouraged each of the member countries the need to compile and regularly update a list of a minimal number of appropriate (effective, safe, suitable and least costly) drugs that will satisfy the healthcare needs of its majority population. The Govt. should then ensure that the listed essential drugs be available at all times, in adequate amounts, in appropriate dosage forms and in affordable prices; and doctors be encouraged to prescribe from the list of essential drugs. In 1977 WHO compiled its first model list of essential drugs, updated regularly since then, the most recent list contains about 560 items.

The National Drug Policy (NDP) of 1982 was the first determined effort to implement WHO concept of essential drugs in Bangladesh. Essential drugs have been marked by symbol ^(ED) in BDNF. The essential drug list following NDP of 1982 have been revised and updated in 2016 which contain 285 items (see *Appendix-9*).

Prescribing from the list of essential drugs is considered to be relatively effective and safe and of acceptable quality and most cost-effective. .

PRESCRIPTION WRITING

Prescription should be legible and dated containing the name, age and address of the patient, and should be signed in ink by the prescriber.

The age of the patient should always be mentioned in cases of 'prescription-only drugs' for children under 12 years.

A prescription ordering 'controlled drugs' must in addition specify the prescriber's address, the formulation and strength of the preparation, and the total quantity of the preparation to be supplied (or the number of dose units) in both words and figures. A prescription ordering a 'controlled drug' should clearly mention that it can be dispensed only once and its refilling is not permitted.

DRUG NAMES IN PRESCRIPTION

Names of drugs or medicinal products should be written clearly and not abbreviated. Drugs prescribed may be either in non-proprietary (generic) or in proprietary (brand) names.

There is growing awareness for using generic names in prescribing for obvious advantages—uniformity, convenience, economy, and better comprehension. Prescribing in non-proprietary (generic) names is also less taxing on the memory of the prescriber.

However, when it is considered important to ensure consistency of a product in respect of its quality or bioavailability, and when it is thought that the control over the quality relative to other manufactured products may not be as rigorous as one would expect, a doctor may opt to prescribe by proprietary names.

GUIDANCE ON PRESCRIBING

In the prescription, unit dose strength should be clearly stated

- Avoid unnecessary use of decimal point; e.g. 5 mg and not 5.0 mg.
- Quantities in grams should be written as 1 g or 1.2 g etc.
- Quantities less than 1 gram should always be written in milligrams; e.g. 500 mg and not 0.5 g.
- Quantities less than 1 mg should be written in micrograms; e.g. 100 micrograms and not as 0.1 mg
- Micrograms or nanograms should not generally be abbreviated, because it may create confusion with milligrams.
- ml (for milliliter) should only be written and not cc (for cubic centimeter).
- When decimals are unavoidable for quantities less than one, a zero should be written before the decimal; e.g. 0.5 g and not .5 g.

The quantity to be supplied may be specified in numbers or volume; it may also be stated by indicating the number of days of treatment required.

The directions for use should preferably be in a language that is understood by the patient and should be without any abbreviations.

PRESCRIBING FOR THE ELDERLY

Prescribing for elderly patients especially very old requires special consideration. They are usually more vulnerable to adverse effects. Factors responsible include multiple therapy (poly pharmacy) and alteration of pharmacokinetic or dynamic parameters.

Elderly patients often receive multiple drugs for their multiple diseases or symptoms, which greatly increases the risk of adverse effects and/or drug interactions. Elderly patients' medicines should be reviewed regularly and those that are not of benefit should be stopped. Prophylactic medicines are inappropriate if they complicate treatment or produce side-effects. Non-pharmacological means are more appropriate for symptoms like headache, sleeplessness, light-headedness particularly when associated with social stress.

In the very old, manifestations of normal ageing may be mistaken for diseases, leading to inappropriate prescribing. Age related muscle weakness, difficulty in maintaining balance etc. are often confused with neurological diseases. Nervous system of the elderly patients is more sensitive to many commonly used drugs like opioids, benzodiazepines, anti-psychotics, anti-Parkinson drugs which when used need caution and regular monitoring.

Pharmacokinetic changes in the elderly can greatly reduce renal clearance and markedly increase tissue concentration, resulting in slow excretion of drugs particularly of nephrotoxic drugs. Acute illness can lead to rapid reduction in renal clearance especially if accompanied by dehydration. Bleeding associated with aspirin and other NSAIDs are more likely to have serious outcomes in elderly patients with renal impairment or cardiac diseases.

Hepatic metabolism of lipid soluble drugs particularly with narrow therapeutic window is reduced in elderly patients because of reduction in liver volume.

Very old patients may have difficulty in swallowing tablets or capsules and in case of drugs like NSAIDs if left in the mouth may lead to ulceration. Elderly patients should therefore be advised to take tablets/capsules with enough fluid, and in upright position. Liquid formulation if available may be preferable.

Simple treatment regimen is always better for the elderly patients. Once or twice daily preparation is preferable. Full instructions must be written on the prescription. It is also

GUIDANCE ON PRESCRIBING

important to check the patient's compliance by counting the remaining tablets or capsules. Stopping a drug at the right time is as important as starting it.

PRESCRIBING FOR CHILDREN

Responses to drugs in neonates (first 1m), infants (up to 1yr) and children (upto 12yrs) are not the same as in adults. The risk of adverse effects are more due to relative deficiency of drug metabolizing enzymes, differing sensitivity of target organs, inefficient renal filtration, and inadequate detoxifying systems. Special care should be taken while prescribing for children and neonates.

Liquid preparations are particularly suitable for infants. Sugar-free liquid preparations are preferable for long term treatment to avoid risk of dental caries. Many children are able to swallow tablets or capsules and may prefer a solid dosage form. Whenever possible, painful intramuscular injections should be avoided. Strength of the tablet or capsule should be clearly mentioned in the prescription.

Inclusion of age of the child or infant in the prescription is a legal requirement while ordering 'prescription-only drugs' for them; in fact it is advisable to mention the age while prescribing any drug for children or infants

PRESCRIBING IN PALLIATIVE CARE

Palliative care is the 'total care' needed for a terminally ill patient whose disease is not responsive to any curative treatment. Aim of the 'total care' is to provide the best quality of life for the patient and family. Control of pain and other symptoms, management of complications, maintenance of nutrition, and psychological support of the patient and family are the main stay of the palliative care

For a total care plan, it is important to make careful assessment of symptoms and the needs of the patient preferably by multidisciplinary team. Many patients wish to remain and managed at home with their families, but should be admitted in specialized palliative care hospital if the family cannot cope.

While prescribing drugs, the number should be as few as possible. Oral administration is the route of choice unless the symptoms are severe enough, in which case drugs may be administered parentally.

Control of Common symptoms:

Pain: Non-opioids (paracetamol, NSAIDs) opioids (codeine, morphine) analgesics; and adjuvant (antidepressants, antiepileptics) are used alone or in combination according to type of pain and response. In mild cases, **paracetamol** may be enough. Moderate pain may be treated by aspirin or other NSAIDs. In some cases, **codeine** may be added for better relief. NSAIDs' induced gastric upset may be relieved by PPIs (ranitidine 150 mg twice daily). If these measures fail, **morphine** (orally or parentally) is the most useful analgesic. The dose should be adjusted carefully with assessment of the pain. Laxatives should be prescribed to prevent morphine-induced constipation. Bowel colic may be relieved by **loperamide** or **hyoscine hydrobromide**. Pain due to muscle spasm usually responds to **Diazepam**. Pain due to nerve compression may be reduced by **dexamethasone**. Patients with neuropathic pain may benefit from a trial of a tricyclic antidepressant. An antiepileptic (gabapentine or pregabalin) may be added or substituted if pain persists.

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Nausea and vomiting: may be due to disease itself, its treatment or concurrent medical or surgical conditions. The cause should be identified before prescribing any anti-emetic. **Metoclopramide**, anti-emetic with pro-kinetic action is the drug of choice. Anti-emetic therapy should be reviewed every 24hrs and if necessary, a substitute anti-emetic (haloperidol, cyclizine, levomepromazine) may be prescribed.

Hiccup: An antacid with an anti-flatulent may be prescribed. If this does not work well, **metoclopramide** orally or i.m can be added. Alternately **chlorpromazine** may be tried.

Dyspnea: Breathlessness at rest may be relieved by carefully titrated doses of **morphine**, starting at 5mg every 4 hours. **Diazepam** 5-10 mg daily may be helpful. If there is bronchospasm or partial obstruction, **dexamethasone** 4-8 mg daily may be tried.

Anorexia: Anorexia may be due to a tumor or its complication, treatment by radiotherapy or chemotherapy, oral ulceration, depression or anxiety. The approach to treatment is by removing the cause if possible, alteration of diet and the use of appetite stimulants. **Prednisolone** 10-30 mg daily or **dexamethasone** 2-4 mg daily may improve appetite.

Dysphagia: Dysphagia may be due to a tumor itself, treatment, neurological damage or concurrent illness or a combination of these factors. If patient cannot swallow a solid diet, a liquid diet is advised. If liquid diet also cannot be taken, endo-esophageal tube may be needed. **Dexamethasone** 8 mg daily may help. Dry mouth associated with candidiasis can be treated with oral preparation of **Nystatin** or **miconazole**.

Convulsions: Convulsions are common in patients with cerebral tumor or uraemia. **Phenytoin** or **carbamazepine** may be prescribed as prophylaxis. If oral medication is not possible, **Diazepam** given as suppository (10-20 mg every 4-8 hours) or Phenobarbitone injection (50-200 mg twice daily) is continued as prophylaxis.

PRESCRIBING CONTROLLED DRUGS

Narcotic and psychotropic drugs, which are under dual control of Directorate of Drug Administration and Department of Narcotics Control (under The Narcotics Control Act, 1990; Act no. XX of 1990) and are permissible for use as medicinal products in Bangladesh, are included as monographs in the BDNF. Such drugs are distinguished throughout in the BDNF by the symbol ^[CD], meaning "Controlled Drugs". A list of controlled drugs is shown in *Appendix-11*.

Prescription requirements in respect of controlled drugs are as follows:

1. A registered medical practitioner or a dentist as per clause (m) and (e) of section 2 of the Bangladesh Medical and Dental Council Act, 1980 (XVI of 1980) only shall prescribe any of the controlled drugs.
2. Prescription for controlled drugs must be written, signed and dated in prescriber's own handwriting; and specifies prescriber's full address.
3. The prescription must state patient's name and address, the total quantity prescribed and the number of dose units in both words and figures.
4. It should be stated that the prescription is not refillable, and shall not be dispensed more than once.

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5. If a patient under care of a physician becomes an addict requiring treatment, shall be referred to a narcotics addiction treatment/rehabilitation centre, and as per section 17(2) of the Narcotics Control Act, 1990 shall inform the Director General, Department of Narcotics Control, President's Secretariat, 1 Segun Bagicha, GPO Box No. 3169, Dhaka-1000.

STORAGE AND DISPENSING OF CONTROLLED DRUGS

1. Controlled Drugs, especially A-Class and B-Class narcotics and psychotropic drugs (see *Appendix-11*), should be stored in pharmacies and in hospitals or health centers or clinics in a secured place under lock and key.
2. The name and address of the seller/dispenser and the date on which the prescription is dispensed must be recorded on the prescription by the pharmacist/dispenser.
3. The prescription for a controlled drug shall not be dispensed more than once (see *Section 13(3) of Narcotics Control Act, 1990*).
4. It is recommended that pharmacies maintain a separate register for dispensing of all A-Class and B-Class narcotics and psychotropic drugs (see *Appendix-11*), wherein the name and address of both the prescriber and the patient, and name and quantity of the drug dispensed along with the date of dispensing are recorded.
5. A pharmacist is not allowed to dispense a controlled drug unless all the required information is given on the prescription.

ADVERSE REACTIONS TO DRUGS

Any drug may produce unwanted or unexpected adverse reactions. Rapid detection, management and reporting of adverse drug reaction is of utmost importance. Some reactions like nausea, vomiting, headache, allergic rashes, convulsions etc. may appear soon enough after the administration of a drug. Some other reactions like malignancy, agranulocytosis, retinopathy, retroperitoneal fibrosis, etc. may appear months or years after the exposure. Any suspicion of such an association should be carefully investigated and reported.

When an infant is born with some congenital abnormality or there is an abortion of a malformed fetus, doctors should consider whether this might be an adverse reaction to a drug taken by the mother during pregnancy. Doctors should be particularly careful and alert about adverse reactions to drugs in the elderly and in infants.

To prevent adverse drug reactions—

1. Do not prescribe a drug unless there is a good indication. If the patient is an infant or an elderly or a pregnant woman, do not use a drug unless the need for it is imperative.
2. Specially be careful in prescribing drugs for a person with previous history of allergy or any adverse drug reactions.
3. Find out whether the patient is already taking some other medicines and avoid possible drug interactions (see *Appendix-2*) while prescribing.
4. Age and hepatic or renal disease may alter metabolism and excretion of drugs, so that much smaller doses may be needed to avoid adverse side effects.

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5. Prescribe as few drugs as possible. Simplify the drug regimen and provide clear instructions so that the patient (especially the elderly) has no difficulty in understanding.
6. Whenever possible, use a familiar or established drug which is already included in an official pharmacopoeia. Be especially careful in prescribing 'new drugs'.
7. If serious adverse reactions are known to be associated with a drug, warn the patient while prescribing it.

Reporting Adverse Drug Reactions:

Doctors working in public hospitals or health complexes or in private hospitals/clinics or engaged in private practice have a special responsibility of reporting suspected adverse reactions to any therapeutic agents including drugs, blood products, vaccines, contrast medias, herbal products; and all cases of adverse reactions that were fatal, life-threatening, hospitalization or prolongation of hospitalization, disability or permanent damage, congenital anomaly/birth defect or any other serious issues.

Detection, management and reporting of adverse drug events (ADE), especially those in respect of 'new drugs', is of vital importance.

There is an Adverse Drug Reactions Monitoring (ADRM) cell in the office of the Directorate General of Drug Administration, which works in collaboration with WHO. Details about the ADRM cell and a Yellow Card for ADE reporting to ADRM cell are included at the end of the BDNF.

Chapter 1

ANTI-INFECTIVES

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1. ANTI-INFECTIVE DRUGS

- 1.1 ANTIBACTERIALS
 - 1.2 ANTIFUNGALS
 - 1.3 ANTIPROTOZOALS
 - 1.4 ANTIVIRALS
 - 1.5 ANTHELMINTICS
-

ANTI-INFECTIVE DRUG THERAPY:

Anti-infective (antimicrobial) drugs are used for the treatment and prophylaxis of infections. Nowadays, healthcare professionals are increasingly more presented with scenarios in which infecting microbes that are resistant to all but a handful of antimicrobials. Infections secondary to drug-resistant pathogens

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continue to present therapeutic challenges to clinicians. A number of the historically most active antimicrobials have undergone widespread susceptibility diminution. Particularly problematic pathogens include gram-positive microbes such as *Staphylococcus aureus* and *Enterococcus* species; extended-spectrum, and metallo-beta-lactamase-producing *Enterobacteriaceae*; and nonfermentative gram-negative species such as *Acinetobacter* species and *Pseudomonas aeruginosa*.

SELECTING AN ANTIMICROBIAL: Ideally, the selection should be based on identification of the causative organism(s) and their susceptibility to antimicrobials (Definitive therapy). In practice, however, the choice often follows from clinical diagnosis defining as precisely as possible, the sites and nature of infection, responsible pathogen(s) and known sensitivity to drugs (Empiric therapy). Samples (blood, pus, urine, sputum, CSF, etc.) should be collected *before* starting any 'blind' antimicrobial therapy to confirm clinical diagnosis and drug sensitivity. Removing barriers such as draining an abscess, obstruction in urinary or respiratory tract, etc. is important to facilitate entry of antimicrobials to site(s) of infection.

Patients who receive Empiric antimicrobial therapy, to which the causative pathogen is resistant, suffer significantly. This underscores the importance of selecting an empiric antimicrobial that possesses activity against the range of suspected pathogens. One or more antimicrobials, suggested by knowledge of likely organism and its sensitivity pattern, is then judged by the drug's specificity, safety (risk-benefit ratio), kinetic considerations and cost effectiveness in respect to the patient factors to make the final choice. Factors related to patient include history of drug allergy, renal and hepatic function, susceptibility to infection (i.e. whether immunocompromised), severity of illness, ability to tolerate drugs, concomitant use of other drugs, ethnic origin, age and sex; and if female,

whether pregnant or breast-feeding or taking oral contraceptives.

Choice of appropriate route of administration, dosage formulation, and duration of therapy will depend on ability to tolerate drugs orally, site, type and severity of infection and kinetic consideration of drugs. Life threatening infections often require intravenous therapy. Painful intramuscular injections should better be avoided in children. The dose of an antibacterial will vary on such factors such as age, weight, renal and hepatic functions and the severity of infection. Duration of therapy depends on nature of infection and the response to treatment. In most cases a 5-7 days course is sufficient, and should not be unduly prolonged as the drugs are costly, encourage resistance and may lead to side-effects. In certain infections like chronic, it is necessary to continue treatment for longer periods.

CHEMOPROPHYLAXIS: The basis of chemoprophylaxis is use of an antimicrobial agent in a healthy person to prevent infection but in practice it also includes suppression of existing infection.

The main categories of chemoprophylaxis are: (i) prevention of infections like rheumatic fever, recurrent urinary tract infections, etc.; (ii) prevention of opportunistic infections like bacterial endocarditis after dentistry or peritonitis after bowel surgery; (iii) suppression of existing infection before overt diseases result e.g. tuberculosis, malaria, animal bites, trauma; and (iv) prevention of exacerbation of a chronic infection like bronchitis.

Chemoprophylaxis in surgery is justified when risk of infection is high (such as presence of large number of organisms in organs being operated or in colorectal and gynecological surgery); when risk of infection is low but consequence of infection could be disastrous (e.g. insertion of prosthetic joints or valves etc.); or when patient is immunocompromised and is especially susceptible to infection. Antimicrobials should be selected on the basis of the knowledge of the likely pathogens at the

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sites of surgery and their prevailing antimicrobial susceptibility.

Antimicrobials should preferably be given intravenously (IV) or intramuscularly (IM) at the beginning of surgery and for no more than 72 hours.

COMBINATION THERAPY: In most cases treatment with a single drug is sufficient. But in some special cases, two or more antimicrobials are indicated, for example: (i) to prevent development of resistance in tuberculosis or leprosy; (ii) to broaden antibacterial spectrum in case of mixed infection e.g. peritonitis; (iii) to obtain potentiation e.g. penicillin with gentamicin.

CONTROL OF ANTI MICROBIAL RESISTANCE: Development of resistance may be limited by avoidance of indiscriminate use of antimicrobial drugs, controlling Access, Watch and Reserve classess antibiotics for rational use, ensuring proper quality of antimicrobial drugs, appropriate selection of such drugs, constant monitoring of resistance pattern in community, and *restricting use of newer antimicrobial drugs* as long as currently used drugs are effective. To assist in the development of tools for antibiotic stewardship at local, national and global levels and to reduce antimicrobial resistance, three different categories were developed by WHO—ACCESS, WATCH and RESERVE groups. A publicly sponsored antimicrobial policy should incorporate prevention of indiscriminate use; appropriate combination to be used only when essential; sensitivity pattern to be monitored at the community level; indiscriminate use of newer antimicrobial drugs to be restricted. ACCESS, WATCH and RESERVE groups classification is available in **Appendix-21**.

Note:

[ED] - Essential Drug

[A] - Key Access Antibiotics

* - Watch group antibiotics included in the EML/EMLc only for specific, limited indications

[W] - Watch group antibiotics

[R] - Reserve group antibiotics

[C] - Complementary list - signifies that the medicine(s) require(s) specialist diagnostic or monitoring facilities, **[Appendix-21]**

[OTC] - Over The Counter

1.1. ANTIBACTERIAL DRUGS

- 1.1.1 PENICILLINS
- 1.1.2 CEPHALOSPORINS
- 1.1.3 OTHER BETA-LACTAMS
 - 1.1.3.1 CARBAPENEMS
 - 1.1.3.2 MONOBACTAM
- 1.1.4 AMINOGLYCOSIDES
- 1.1.5 MACROLIDES
- 1.1.6 TETRACYCLINES
- 1.1.7 QUINOLONES AND FLUOROQUINOLONES
- 1.1.8 SULFONAMIDES AND TRIMETHOPRIM
- 1.1.9 METRONIDAZOLE
- 1.1.10 ANTIMYCOBACTERIAL DRUGS
 - 1.1.10.1 ANTI-TUBERCULOSIS DRUGS
 - 1.1.10.2 ANTI-LEPROSIS DRUGS
 - 1.1.11 DRUGS USED IN SEXUALLY TRANSMITTED DISEASES
 - 1.1.12 OTHER ANTIBACTERIALS

1.1.1. PENICILLINS

- 1.1.1.1 NARROW-SPECTRUM PENICILLINS
- 1.1.1.2 BROAD-SPECTRUM PENICILLINS
- 1.1.1.3 EXTENDED SPECTRUM (ANTIPSEUDOMONAL) PENICILLINS
- 1.1.1.4 MECILLINAMS

1.1.1.1 NARROW SPECTRUM PENICILLINS

- 1.1.1.1.1 PENICILLINASE-SENSITIVE

1. ANTI-INFECTIVES

1.1.1.1.2 PENICILLINASE-RESISTANT NARROW SPECTRUM PENICILLINS

1.1.1.1.1 PENICILLINASE-SENSITIVE NARROW SPECTRUM PENICILLINS

These penicillins are effective against non-betalactamase (penicillinase) producing streptococci, meningococci, enterococci, pneumococci, staphylococci, treponema pallidum, bacillus anthracis, clostridium species, actinomyces and other gram positive rods and non-betalactamase producing gram negative anaerobic organisms.

BENZYL PENICILLIN^[A]

(Penicillin G)

Indications: Streptococcal pharyngitis, arthritis, meningitis, endocarditis; meningococcal diseases; pneumococcal pneumonia, meningitis; anthrax, syphilis, gonorrhea, actinomycosis, gas gangrene, carbuncle, to eliminate carrier state in diphtheria, with or without gentamicin for *listeria*; surgical prophylaxis in limb amputation; intrapartum prophylaxis against group B streptococcal infection; prophylaxis against recurrence of rheumatic fever and streptococcal infections

Cautions: Dose reduction in renal impairment, (estimated GFR 10–50 ml/min/1.73 m², use normal dose every 8–12 hours; estimated GFR less than 10 ml/min/1.73 m² use normal dose every 12 hours);

Contraindications: Penicillin hypersensitivity

Interactions: See Appendix-2

Side-effects: Urticaria, fever, joint pain, rashes, angioedema, serum sickness like reactions, neutropenia, hemolytic anemia and nephritis; diarrhea and antibiotic-associated colitis, neutropenia, thrombocytopenia, coagulation disorders and CNS toxicity.

Dose: IM inj. or slow IV inj. or Infusion: ADULT, 1.2 g daily in 4 divided doses, if

necessary increase to 2.4 g daily or more according to severity of infections

(single dose over 1.2 g IV route only); PREMATURE INFANT AND NEONATE, 50 mg/kg body weight daily in 2 divided doses; in meningococcal meningitis, 100 mg/kg daily in 2 divided doses; INFANT, 1–4 weeks, 75 mg/kg daily in 3 divided doses. CHILD, 1 month to 12-years, 100 mg/kg daily in 4 divided doses; *bacterial endocarditis*, 7.2 g daily in 4–6 divided doses; *meningococcal meningitis*, 2.4 g every 4–6 hours; CHILD, 1 month to 12 years, 180–300 mg/kg daily in 4–6 divided doses;

Proprietary Preparation

Pen G (Opsonin), Inj., 10 Lac IU, Tk. 16.74/vial, 5 Lac IU, Tk. 11.29/vial

BENZATHINE PENICILLIN^[ED] [A]

Benzathine penicillin has a very long duration of action (2–3 weeks). It is used to provide a prolonged coverage of penicillin in rheumatic fever and is especially suitable for the treatment of all stages of syphilis.

Indications: Rheumatic fever, upper respiratory tract infections, gonococcal infections and syphilis

Contra-indications: Penicillin hypersensitivity

Interactions: See Appendix -2

Side-effects: See under Penicillins

Dose: Deep IM inj. (in the buttock): rheumatic fever, ADULT, 600,000 units per week or 12,00,000 units monthly; CHILD, 3 lac to 6 lac units; *primary or secondary syphilis*, a total of 24 lac units (12 lac units in each buttock) once; larger doses and longer courses may be needed for late syphilis or neurosyphilis

Proprietary Preparations

Benzapen (Square), Inj., 12 Lac Units/Vial, Tk. 28.04/vial.

G-Benzathine Penicillin (Gonosasthaya), Inj., 12 Lac Units / Vial, Tk. 22.00/Amp.; Inj., 6 Lac Units/Vial, Tk. 15.00/Amp.

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PHENOXYMETHYL PENICILLIN ^[ED] ^[A]

(Penicillin V)

Indications: Tonsillitis, otitis media, erysipelas; prophylaxis in rheumatic fever and pneumococcal infection

Cautions, Contraindications: See under benzylpenicillin

Interactions: See Appendix -2

Dose :oral: ADULT, 500mg every 6 hours; CHILD, up to 1 year 62.5 mg every 6 hours, 1-5 years 125 mg every 6 hours, 6-12 years 250 mg every 6 hours

Prophylaxis in rheumatic fever or pneumococcal infection, 250 mg twice daily; CHILD under 5 years 125 mg twice daily

Proprietary Preparations

Biopen(Biopharma), 125 mg/5 ml, Tk. 18.28/50ml, Tk. 28.91/100ml.;Tab., 250 mg, Tk. 2.28/Tab.

G-Penicillin V(Gonoshashtaya), Susp., 125 mg/5 ml, Tk. 19.76/50 ml;Tab., 500 mg, Tk. 2.00/Tab.

Open(Opsonin), 125 mg/5ml, Tk. 24.73/50ml.;Tab. , 250 mg , Tk. 2.28/Tab., 500 mg , Tk. 4.59/Tab.

Oracyn-K(Sanofi), Susp., 125 mg/5ml, Tk. 18.46/50 ml.;Tab. , 250mg, Tk. 2.30/Tab.

Pacin(Zenith), Tab. 2,50 mg, Tk. 2.16/Tab.

Penco(Supreme), Tab. , 250 mg, Tk. 1.45/Tab.

Penvik(Square), Susp., 250 mg/5 ml, Tk. 58.64/100ml.;Tab., 250 mg, Tk. 2.30/Tab., 500 mg, Tk. 4.44/Tab.

PROCAINE PENICILLIN ^[ED] ^[A]

(Procaine benzylpenicillin)

Procaine penicillin is a salt of procaine and benzylpenicillin, which is poorly soluble in water. It is used as intramuscular (IM) depot injections, which provide therapeutic tissue concentrations of penicillin for up to 24 hours.

Indications: Preferred choice for the treatment of yaws and syphilis; neurosyphilis requires special consideration, penicillin sensitive all other infections (See under Benzylpenicillin)

Caution, Contraindication and Side-effects: Same as in Benzylpenicillin;

Procaine penicillin NOT suitable for intravenous (IV) route

Dose: IM inj., 300,000 units with 100,000 units of benzylpenicillin once every 12-24 hours;

Primary syphilis, IM inj., procaine penicillin 900 mg with benzylpenicillin sodium 180 mg daily for 10 days (14 days for secondary or latent syphilis)

Proprietary Preparations

Combipen(Acme), Inj., 4 LacTk. 14.05/Vial; 8 Lac Tk. 13.55/Vial

Pronapen(Renata), Inj., 8 Lac Tk. 9.10/Vial;Inj., 4 Lac, Tk. 14.05/Vial

1.1.1.1.2 PENICILLINASE-RESISTANT NARROW SPECTRUM PENICILLINS

Cloxacillin, Dicloxacillin, Fucloxacillin, Nafcillin, Oxacillin comprise this group of penicillins that are resistant to inactivating activity of penicillinases and exhibit antibacterial spectrum, similar to those of narrow spectrum drugs. Antibacterial activity against betalactamases producing organisms also is achieved by combining enzyme inhibitors like clavulanic acid, tazobactam, sulbactam with penicillins not resistant to betalactamases.

As they are acid stable, they can be given orally as well as by injection. Flucloxacillin is better and well absorbed from the gut than cloxacillin. Staphylococcus aureus strains resistant to flucloxacillin have also arisen, and may be treated by vancomycin or by teicoplanin. Other alternatives may include rifampicin and solium fusidate.

CLOXACILLIN ^[ED] ^[A]

Indications: Same as that of Flucloxacillin

Cautions: See under Flucloxacillin.

Contraindications: See under Benzylpenicillin

Interactions: See under Benzylpenicillin.

Side-effects: See under Benzylpenicillin.

Dose: oral: 500 mg every 6 hours, at least 30 minutes before food; CHILD

1. ANTI-INFECTIVES

under 2 years, quarter of adult dose; 2-10 years, half of adult dose

By IM injection, 250 mg every 4-6 hours; CHILD under 2 years quarter of adult dose; 2-10 years half of adult dose

By slow IV injection or by intravenous infusion, 500 mg over 3 to 4 minutes every 4 to 6 hours; CHILD under 2 years quarter of adult dose; 2-10 years half of adult dose

All systemic doses may be doubled in severe infections

Proprietary Preparations

Clobex(Beximco), Cap., 500 mg, Tk. 5.98/Cap.; Susp 125 mg/5ml, Tk.43.98/100 ml
Cloxin(Opsonin), Susp., 125 mg /5 ml, Tk. 44.84/100 ml.;Cap., 500 mg , Tk. 5.92/Cap.;Inj., 500 mg , Tk. 25.31/Vial

Ficlox(Sanofi), Cap., 500mg, Tk. 5.98/Cap.

G-Cloxacillin(Gonoshashtaya), Susp.,125 mg/5 ml, Tk. 42.25/100 ml;Cap., 500 mg, Tk. 4.50/Cap.;Inj., 500 mg/Vial, Tk. 20/Vial

Loxa(Albion), Susp., 125 mg/5 ml, Tk. 43.00/100 ml; Cap. 500 mg, Tk. 5.94/Cap.

Navaclo (Navana), Cap., 500 mg, Tk. 6.76/Cap.;Susp.,125 mg/5 ml,Tk. 43.33/100ml
Sinaclox(Ibn Sina), Cap. , 500 mg, Tk. 5.75/Cap.; Susp., 125 mg/5 ml, Tk. 43/100ml

Tyclox(Astra Bio), Cap.,500 mg, Tk. 5.95/Cap.; Susp.,125 mg/5 ml, Tk. 40/100 ml

DICLOXACILLIN^[A]

Indications: Treatment of staphylococcal infection resistant to benzylpenicillin

Side-effect and Cautions: Same as that of flucloxacillin

Dose: 125 to 250 mg every 6 hours,CHILD: 12.5 to 25mg/kg daily in divided doses. Doses may be increased in severe infections
Dicloxacillin sodium has also been given parenterally

Generic Preparation

Capsule, 500mg; 250 mg

FLUCLOXACILLIN^[ED] ^[A]

Indications: Beta-lactamase-producing staphylococci infections including otitis externa; adjunct in pneumonia, impetigo, cellulitis, osteomyelitis and in staphylococcal endocarditis

Cautions: See under Benzylpenicillin

Cholestatic Jaundice may occur up to several weeks after treatment with flucloxacillin; in that case treatment with flucloxacillin should be stopped.

Contraindications: See under Benzylpenicillin

Side-effects: See under Benzylpenicillin; also hepatitis and cholestatic jaundice reported

Dose: *By mouth*, 250–500 mg every 6 hours, at least 30 minutes before food; CHILD under 2 years, quarter of adult dose; 2-10 years, half of adult dose

By IM injection, 250-500 mg every 6 hours; CHILD under 2 years quarter adult dose; 2-10 years half of adult dose

By slow IV injection or by IV infusion, 0.25-1 g every 6 hours; doses may be doubled in severe infections. CHILD: under 2 years 1/4th the adult dose; 2-10 years 1/2 of adult dose

Endocarditis: 12 g daily in 6 divided doses for 4 weeks

Osteomyelitis: up to 8 g daily in 3-4 divided doses

Proprietary Preparations

Adflox(Team), Cap., 500 mg, Tk. 9/Cap.

A-Flox(Acme), Cap.,250.00 mg, Tk.5.66/Cap.,500.00 mg, Tk. 10.58/Cap.; Inj., 250 mg/Vial, Tk. 35.25/Vial.; 500 mg/Vial, Tk. 45.30/Vial.;; suspn., 125 mg/5 ml, Tk. 61.61/100ml

CloxF(Asiatic), Cap., 250 mg, Tk. 5/Cap.; 500mg, Tk. 10/Cap.;Susp.,125 mg/5 ml, Tk. 60/100ml,250 mg/5 ml, Tk. 110/100ml

FCX(G.A.Co), Susp., 125 mg/5ml, Tk.60.00/100 ml

Floxapen(General), Cap., 250mg, Tk.5.78/Cap.; Tk. 10.57/Cap.; Susp., 125 mg/5 ml, Tk. 61.41/100ml

Flubac(Popular), Cap. , 250 mg, Tk.5.77/Cap.; 500 mg, Tk. 10.04/Cap.; Susp., 250 mg/5 ml, Tk. 110.42/100 ml.,125 mg/5 ml, Tk. 61.23/60 ml

Flubex(Beximco), Cap., 250 mg, Tk.5.50/Cap.; 500 mg, Tk. 10.50/Cap.; Susp., 250 mg/5 ml, Tk. 110/100 ml.,125mg/5 ml, Tk. 60.00/100 ml

Fluc(Astra), Cap. , 250 mg, Tk. 5.50/Cap.; 500 mg, Tk. 10.00/Cap.; Susp., 125 mg/5 ml, Tk. 60.00/100ml

Fluclox(ACI), Cap., 250mg, Tk. 5.79/Cap.,500mg, Tk. 10.57/Cap.; Inj., 250mg/Vial, Tk. 35.24/Vial,500mg/Vial, Tk. 45.28/Vial.; Susp. , 125mg/5ml, Tk. 61.41/100ml,250mg/5ml, Tk. 110.74/100ml

Flucloxin(Eskayef), Cap, 250mg , Tk. 5.77/Cap.; 500mg , Tk. 10.50/Cap.;Inj,

500mg/vial, Tk. 45.28/Vial.; Susp.;125 mg/5 ml, Tk. 61.00/100ml
Flucocin(Euro), Cap., 500 mg, Tk. 10.52/Cap.
Flucopen(Somatec), Cap., 250 mg, Tk. 5.53/Cap.; 500 mg, Tk. 10.03/Cap.; Susp., 125 mg/5 ml, Tk. 60.23/100ml
FLU-K(Kemiko), Cap., 250 mg, Tk. 6.65/Cap.; 500 mg, Tk. 10.53/Cap.
Flupen(Drug Intl), Cap., 250mg, Tk. 5.05/Cap., 500mg, Tk. 10.55/Cap.;Susp, 125mg/5ml, Tk. 60.20/100ml;
Flurif, (Sharif), Cap.,500 mg, Tk. 10.52/Cap.
Flustar(Renata), suspn., 125 mg/5 ml, Tk. 60.00/100ml
Flux(Opsonin), Cap., 250 mg , Tk. 5.77/Cap.; 500 mg, Tk. 10.57/Cap.; Susp., 125 mg/5 ml, Tk. 61.42/100 ml , Tk. 110.42/100 ml ;, Inj., 500 mg/Vial , Tk. 45.30/Vial
Fluxi(Ziska), Susp., 125 mg/5 ml, Tk. 60.00/100ml
Fluxicap(Ziska), Cap. , 250 mg, Tk. 4.60/Cap.; 500 mg, Tk. 10.00/Cap
Flxzen(Zenith), Cap, 250 mg, Tk. 5.02/Cap.; 500 mg , Tk. 8.03/Cap .; Susp., 125 mg/5 ml, Tk. 60.23/100ml
Fucil(Nipa), Cap, 500 mg , Tk. 10.00/Cap.; Susp., 125 mg/5ml , Tk. 60.00/100ml
Fulcin(Supreme), Cap, 250 mg, Tk. 5.50/Cap.; 500 mg, Tk. 10.50/Cap.; suspn., 125 mg/5 ml, Tk. 60.00/100ml
Halopen(Nipro JMI), Susp., 125 mg/5 ml, Tk. 60.41 Tk /100 ml; Cap., 250 mg, Tk. 5.55 Tk /Cap.; 500 mg, Tk.10.03/Ta
Inclox(Incepta), Cap,250 mg, Tk. 5.50/Cap.; 500 mg, Tk. 10.00/Cap.
Isoclox(Globe), Cap., 250 mg,Tk. 5.50/Cap.; 500 mg, Tk. 10.00/Cap.;Susp.,125 mg /5 ml, Tk. 60.00/100ml
Monaclox-F(Amico), Cap., 250mg , Tk. 5.50/Cap.; 500mg , Tk. 10.00/Cap.; Susp., 125mg/5ml, Tk. 65.00/100ml
Murein(One Pharma), Cap.,500 mg ,Tk. 10.00/Cap.
Orgaflu (Organic), Cap.,250 mg,Tk. 5.58/Cap. ; 500 mg, Tk. 10.53/Cap.
Phylophen(Square), Cap.,250 mg, Tk. 5.54/Cap.,500 mg, Tk. 10.57/Cap.; Inj., 500 mg, Tk. 45.30/Vial ; Susp.,125 mg/5 ml, Tk. 60.4/100ml.; 250 mg/5 ml, Tk. 110.75/100ml
Revistar(Biopharma), Cap., 250 mg, Tk. 5.52/Cap; 500 mg, Tk. 10.04/Cap.; suspn., 125 mg/5 ml, Tk. 60.23/100ml
Silox(Silva), Cap., 250mg,Tk. 5.77/Cap. ,500mg, Tk. 10.03/Cap.
Sinaflox(Ibn Sina), Cap., 250mg, Tk. 5.60/Cap. ,500mg, Tk. 10.50/Cap.; suspn., 125 mg/5 ml, Tk. 65.00/100ml
Skilox(Healthcare), Cap., 250mg , Tk. 10.00/Cap.; 500mg ,Tk. 16.66/Cap.; suspn., 125 mg/5 ml, Tk. 62.00/100 ml

1. ANTI-INFECTIVES

Staflu(Alco), Cap.,250 mg,Tk. 5.79/Cap.; 500 mg, Tk. 10.57/Cap.;Susp.,125 mg / 5ml, Tk. 65.20/100ml.; 250 mg / 5ml, Tk. 110.75/100ml
Stafoxin(Aristo), Cap., 250 mg, Tk. 5.50/Cap.; 500 mg, Tk. 10.00/Tab.; suspn.,125 mg/5 ml, Tk. 60.00/100ml
Stapkil(Pacific), Susp.,125mg/5ml, Tk. 46/100ml.; Cap.,250 mg,Tk. 5.50/Cap.,500 mg, Tk. 10.00/Cap.

1.1.1.2 BROAD SPECTRUM PENICILLINS

1.1.1.2.1 PENICILLINASE-SENSITIVE BROAD SPECTRUM PENICILLINS

1.1.1.2.2 PENICILLINASE-RESISTANT BROAD SPECTRUM PENICILLINS

Broad-spectrum penicillins (**Ampicillin**, **Amoxicillin**, **Bacampicillin**) retain the antibacterial activity of narrow spectrum with additional bactericidal activity against *E. coli*, *H. influenzae*, *Salmonella* species, *Listeria monocytogenes* and *Helicobacter pylori*.

1.1.1.2.1 PENICILLINASE-SENSITIVE BROAD SPECTRUM PENICILLINS

These drugs are subjected to the destruction by the penicillinase produced by organisms **Ampicillin** is particularly valuable for the treatment of respiratory tract infections (RTI) by mixed organisms that include *Haemophilus influenzae*.

Amoxicillin It is a derivative of ampicillin and has the same antibacterial spectrum. Orally given it is better absorbed than ampicillin and produces higher plasma and tissue concentrations. Besides, its absorption is not affected by the presence of food in the stomach.

AMOXICILLIN^[A]

(Amoxycillin)

Indications: As under *Ampicillin*; also endocarditis prophylaxis, meningococcal disease and adjunct in listeria meningitis
Cautions, Contra-indications, Side-effects: See under *Ampicillin*.

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Dose: *oral:* ADULT 250 mg every 8 hours, doubled in severe infections; CHILD up to 10 years, 125 mg every 8 hours, doubled in severe infections
Severe or recurrent purulent respiratory infection, 3 g every 12 hours

Short course oral therapy

Dental abscess, 3 g repeated after 8 hours. UTI 3 g repeated after 10-12 hours. Otitis media: CHILD 3-10 years, 750 mg twice daily for two days

IM inj.: 500 mg every 8 hours; CHILD, 50-100 mg/kg daily in divided doses

IV inj. or infusion; 500 mg every 8 hours increased to 1 g every 6 hours; CHILD, 50-100 mg/kg daily in divided doses

Meningitis (if necessary, in combination with another antibiotic), *by IV infusion*, 2g every 4 hours for 5 days in meningococcal disease or for 10-14 days in listerial meningitis

Proprietary Preparations

Admox(Team), Cap., 500 mg, Tk. 6.79/Cap.;
Susp., 125mg/5ml, Tk. 47.60/100ml;

Amocin(Pacific), Cap., 250 mg, Tk. 3.30/Cap.
; 500 mg, Tk. 6.70/Cap.; Susp., 125mg/5ml,
Tk. 40.00/100ml

Amotid(Biopharma), Cap., 250mg, Tk.
3.61/Cap.; 500mg, Tk. 6.02/Cap.; Paed.
drop, 125 mg/1.25 ml, Tk. 30.11/15ml.; Susp.,
125 mg/5 ml, Tk. 46.17/100ml.;

Amoxizen(Zenith), Cap, 250 mg, Tk. 3.52/Cap.
; 500 mg, Tk. 6.11/Cap.

Amx(Nipro JMI), Cap., 250mg, Tk. 3.60/Cap.;
500mg, Tk. 6.78 /Cap.; Susp., 125mg/5ml, Tk.
47.61 /100 ml ; 250mg/5ml 78.0

Aristomox(Aristo), Cap., 250mg, Tk.
3.50/Cap, 500mg, Tk. 6.75/Cap.; Susp.,
125mg/5ml Tk. 45.00/100ml

Avlomox(ACI), Cap, 250mg, Tk. 3.45/Cap.;
500mg, Tk. 6.12/Cap.; Inj, 500mg, TK.
32.10/Vial; Susp. TK. 125 mg/5 ml,
TK. 46.18/100ml.; 250mg/5ml, TK.

65.45/100ml.; Tk. 49.73/60ml.; Paed. drop,
125mg/1.25ml, TK. 30.29/15ml

Bactamox(Renata), Tab., 250 mg, Tk.
3.38/Tab.; 500 mg, Tk. 5.81/Tab.; paed. drop.
125 mg/1.25 ml, Tk. 28.32/15ml.; Susp., 125
mg/5 ml, Tk. 45.52/100ml

Demoxil(Drug Intl), Tab, 250mg, Tk.
3.52/Tab., 500mg, Tk. 6.27/Tab. Susp.,
250mg/5ml, Tk. 65.20/100ml, 125mg/5ml, Tk.
47.15/100ml

Fimox(Popular), Cap., 250, Tk. 3.62/Cap.;
500mg, Tk. 6.78/Cap.; Susp., 125mg/5ml, Tk.
47.60/60 ml.; Paed. drops, 125 mg/1.25 ml, Tk.
30.28/10 ml

Fimoxyl(Sanofi), Cap., 250mg, Tk. 3.61/Cap.;
500mg, Tk. 6.76/Cap.; Inj., 250mg, Tk.
19.19/Vial; 500mg, Tk. 26.29/Vial; Paed. drop,
125mg/1.25ml, Tk. 30.20/15ml; Susp.,
125mg/5ml, Tk. 47.46/100ml; 250mg/5ml, Tk.
68.26/100ml; Tab., 250 mg, Tk. 3.48/Tab.;
500mg, Tk. 6.02/Tab.

Genamox(General), Cap., 250mg, Tk.
3.61/Cap.; 500mg, Tk. 6.76/Cap.; Paed. drop.,
125 mg/1.25 ml, Tk. 30.11/15ml.; Susp., 125
mg/5 ml, Tk. 47.45/100ml

Hi-mox(Hudson), Cap., 250mg, Tk. 3.50/Cap.

Kamox(Kemiko), Cap., 250 mg, Tk.
3.60/Cap., 500 mg, Tk. 6.78/Cap.; Susp., 125
mg / 5ml.; Tk. 47.60/100ml.;

Loxyl(Asiatic), Cap., 250mg,
Tk. 3.61/Cap.; Susp., 125mg/5ml, Tk.
47.46/100ml

Loxyl(Asiatic), Cap.; 500 mg, Tk. 6.76/Cap.

Monamox(Amico), Cap., 250mg, TK.
3.00/Cap.; 500mg, TK. 6.00/Cap.; Paed. drop.
125mg/1.25ml, TK. 28.00/15ml.;

Mox(Astra Bio), Cap., 250 mg, Tk. 3.60
/Cap., 500 mg, Tk. 6.00/Cap.; Susp., 125
mg/5 ml, Tk. 47.00/100ml.; Paed. drop, 125
mg/1.25 ml, Tk. 30.00/15ml

Moxacil(Square), Cap., 250 mg, Tk.
3.61/Cap., 500 mg, Tk. 6.79/Cap.; Tab., 250
mg, Tk. 3.50/Tab.; Inj., 500 mg/vial, Tk.
32.88/Vial.; Paed. drop, 125 mg/1.25 ml, Tk.
30.2/15ml.; Susp., 125 mg/5 ml, Tk.

47.61/100ml.; 250 mg/5 ml, Tk. 65.45/100ml.;

Moxapen(Nipa), Cap., 500 mg, Tk. 6.00/Cap.

Moxarif(Sharif), Cap., 500 mg, Tk. 6.00/Cap.

Moxico(Supreme), Cap, 500 mg, Tk.
6.00/Cap., 250 mg, Tk. 3.60/Cap.; Susp.,
250g/5ml, Tk. 65.00/100ml., 125 mg/5ml, Tk.
47.00/100ml

Mimox(Albion), Cap., 250 mg, Tk. 3.54; Susp.,
125 mg/5 ml, Tk. 46.00/100ml

Moxin(Opsonin), Tab., 250 mg, Tk. 3.48/Tab.;
Cap., 500 mg, Tk. 6.74/Cap.; Inj., 250 mg,
Tk. 19.07/Vial., 500 mg, Tk. 26.17/Vial.;
Susp., 125mg/5ml, Tk. 47.61/100ml.;
Paed. drop 125mg / 1.25 ml, Tk. 30.20/15

Orgamox(Organic), Cap., 250 mg, Tk.
3.54/Cap.; 500mg, Tk. 6.76/Cap.

Sapox(Alco), Cap., 500 mg, Tk. 6.78/Cap.;
Paed drop., 125 mg / 1.25ml, Tk. 30.29/15ml.;
Susp., 125 mg / 5ml, Tk. 47.61/100ml, 250
mg / 5ml, Tk. 69.21/100ml

Sinamox(Ibn Sina), Cap., 250 mg, Tk.
3.60/Cap.; 500 mg, Tk. 6.75Cap.; Paed.
drops. 125 mg/1.25 ml.; Tk. 30.00/15ml.;
Susp., 125 mg/5 ml, Tk. 47.46/100ml.;
250mg/5ml, Tk. 69.00/100ml

SK-Mox(Eskayef), Cap, 250 mg, Tk. 3.55/Cap.;
500 mg, Tk. 6.09/Cap.; Susp., 250 mg/5 ml,
Tk. 68.20/100ml.; Susp., 125 mg/5 ml, Tk.
47.60/100ml.; paed drop., 125 mg/1.25 ml, Tk.
30.20/15ml

Tycil(Beximco), Cap., 500 mg, Tk. 6.79/Cap., 250 mg, Tk. 3.62/Cap; Susp., 250 mg/5 ml, Tk. 65.45/100 ml
Tymox(Somatec), Susp., 125 mg/5 ml, Tk. 47.14/100ml.; Paed. drop, 125 mg/1.25 ml, Tk. 30.20/15ml.; Cap., 500 mg, Tk. 6.04/Cap.
Ultramox(Globe), Cap., 250 mg, Tk. 3.50/Cap., 500 mg, Tk. 6.07/Cap.; Susp., 125 mg /5 ml, Tk. 47.29/100 ml

AMPICILLIN^[ED] [A]

Indications: UTI, otitis media, sinusitis, chronic bronchitis, *Haemophilus influenzae* infections, invasive salmonellosis, meningococcal disease, listerial meningitis, *H pylori* infection, prophylaxis and treatment of endocarditis
Cautions: Allergy to penicillin, renal impairment requires dose reduction, erythematous rashes common in glandular fever and chronic lymphatic leukemia

Contra-indications: Penicillin hypersensitivity

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, diarrhea; rarely rashes (discontinue treatment), antibiotic-associated colitis

Dose: ORAL: 0.25-1g every 6 hours, at least 30 minutes before food; CHILD under 10 years, ½ ADULT dose

By IM or IV injection or infusion, 500 mg every 4-6 hours; CHILD under 10 years, ½ of adult dose.

UTI 500 mg every 8 hours

Meningitis (if necessary, in combination with another antibiotic), by intravenous infusion 2 g every 4 hours for 5 days in meningococcal disease or for 10-14 days in listerial meningitis

Proprietary Preparations

Ampexin(Opsonin), Inj., 250 mg/vial, Tk.17.89/Vial; 500 mg/vial, Tk. 24.00/Vial
Pen-A(Reneta), Inj., 500 mg/vial, Tk. 20.43/Vial
Acmeclin(Acme), Cap., 250 mg, Tk. 3.34/Cap.; Susp., 125 gm/5 ml, Tk. 39.71/100 ml; Inj., 250mg/Vial, Tk. 19.43 /Vial; 500 mg/vial, Tk. 27.32 /Vial
Ampexin(Opsonin), Inj., 250 mg/vial, Tk.17.89/Vial; 500 mg/vial, Tk. 24.00/Vial
Ampirex(Jayson), Cap., 250 mg, Tk 2.04.;Inj., 500 mg/vial, Tk. 22.49/Vial.; Susp., 125mg/5ml, Tk.33.89/100 ml

1.1.1.2.2 PENICILLINASE-RESISTANT BROAD SPECTRUM PENICILLINS

CO-AMOXICLAV^[A]

Co-amoxiclav is a combined preparation of **Amoxicillin** (as the trihydrate or as the sodium salt) and betalactamase inhibitor **Clavulanic acid** (as potassium clavulanate).

Indications: Infections due to beta-lactamase producing strains including RTI, genitourinary and abdominal infections, cellulitis, animal bites, severe dental infection with spreading cellulitis.

Cautions: See under *Ampicillin*; in hepatic impairment and in pregnancy. CHOLESTATIC JAUNDICE has been identified as an adverse reaction occurring either during, or shortly after, the use of co-amoxiclav. An epidemiological study has shown that the risk of acute liver toxicity was about 6 times greater with co-amoxiclav than with amoxicillin

Contraindications: Hypersensitivity, history of penicillin or co-amoxiclav associated jaundice; hepatic dysfunction

Side-effects: See under *Ampicillin*, also hepatitis, cholestatic jaundice, erythema multiforme, toxic epidermal necrolysis, exfoliative dermatitis, vasculitis, dizziness, headache, convulsions (particularly with high doses or in renal impairment); superficial staining of teeth with suspension, phlebitis at injection site; see also *cautions above*.

Dose: oral: Amoxicillin, 250mg every 8 hours, doubled in severe infections; CHILD up to 10 years, 125 mg every 8 hours, doubled in severe infections; severe or recurrent purulent respiratory infection, 3 g every 12 hours

Severe dental infections, expressed as amoxicillin, 250 mg every 8 hours for 5 days.

By IV injection over 3-4 minutes or by IV infusion, expressed as amoxicillin, 1 g every 8 hours increased to 1 g every 6

1. ANTI-INFECTIVES

hours in more serious infections; INFANTS up to 3 months 25 mg/kg every 8 hours (every 12 hours in the perinatal period and in premature infants); CHILD 3 months-12 years, 25 mg/kg every 8 hours increased to 25 mg/kg every 6 hours in more serious infections; surgical prophylaxis, 1 g at induction; for high risk procedures (e.g. colorectal surgery) a further 2-3 doses may be given every 8 hours in first 24 hours (longer if significantly increased risk of infection)

Proprietary Preparations

Augment(Eskayef), Inj., 1 gm + 200 mg, Tk. 275.00/vial.; suspn 125 mg + 31.25 mg/5 ml, Tk. 175.00/100ml.; Tab., 875 mg + 125 mg, Tk. 30.00/Tab., 250 mg + 125 mg, Tk. 20.00/Tab., 500 mg + 125 mg, Tk. 25.00/Tab
Avloclav(ACI), Tab., 250mg +125mg, TK. 25.00/Tab.; 875mg + 125mg , TK. 45/Tab.; 500mg + 125mg , TK. 32.00/Tab. ; Susp., 125mg + 31.25mg / 5ml , TK.220.00/100ml , 400mg + 57.5mg /5ml , TK. 195.00/50ml. ;Inj., 1gm + 200mg , TK. 300.00/vial; 500mg +100mg , Tk.150/vial
Clamox(Opsonin), Inj. 1 gm + 200 mg, Tk. 276.05/ vial;500 mg + 100 mg ,Tk. 140.53/ vial.;Susp.,125 mg + 31.25 mg /5 ml, Tk. 151.02/100 ml.;Tab. 250 mg + 125 mg Tk. 16.56/Tab., 875 mg + 125 mg, Tk. 25.10/Tab.,500 mg + 125 mg , Tk. 20.14/Tab
Demoxyclave(Drug Intl), Susp.,125mg+ 31.25mg/5ml, Tk. 150.45/100ml., 400mg+ 57.5mg/5ml, Tk. 90.30/35ml.; Tab., 250mg+ 125mg, Tk. 16.05/Tab. ; 500mg+ 125mg, Tk. 24.10/Tab.;Inj., 1gm+ 200mg, Tk. 300.90/vial.,500mg+ 100mg, Tk. 150.45/Vial,
Fimoxyclav(Sanofi), Inj., 500mg+100mg/Vial, Tk. 150.45/Vial; 1gm+200mg, Tk. 300.90 /Vial; Tab., 250mg + 125mg, Tk. 25.08 Tk/Tab.; 500mg+125mg,Tk. 32.10 Tk/Tab.; 875mg+125mg, Tk. 45.13Tab.; Susp., 400mg+57.5mg/5ml, Tk. 245.74/50 ml; 125mg+31.25mg/5ml, Tk.245.74/100 ml
Moxaclav (Square), Inj.,1gm + 200 mg, Tk. 300.00/vial., 500 mg + 100 mg , Tk. 150.00/vial.; Susp., 125 mg + 31.25 mg/5 ml, Tk. 175.53/100ml., Tk. 135.92/60ml,400 mg + 57.5 mg/5 ml , Tk. 90.61/35ml.; Tab. , 250 mg + 125 mg, Tk. 25.00/Tab., 500 mg + 125 mg, Tk. 32.00/Tab. ,875 mg + 125 mg, Tk. 45.00/Tab.
Tyclav(Beximco), Inj., 1g + 200mg, Tk. 300.00/vial, 500mg + 100mg, Tk. 150.00/vial.; Susp., 125mg + 31.25mg/5ml, Tk. 220.00/100ml., 400mg + 57.5mg/5ml, Tk. 230.00/50ml.;Tab. 500mg + 125mg, Tk. 32.00/Tab., 250mg + 125mg, Tk. 25.00/Tab., 875mg + 125mg, Tk. 45.00/Tab.;

Ultraclav(Globe), Tab., 500 mg + 125 mg, Tk. 25.00Tab.

1.1.1.3 EXTENDED SPECTRUM (ANTIPSEUDOMONAL) PENICILLINS

This group consists of extended-spectrum drugs that exhibit the antimicrobial activity of broad-spectrum penicillins and also are effective against *Psuedomonas aeruginosa*, *Klebsiella pneumonia*, *Proteus sp.* and *Bacteroids fragilis*. The **Carboxypenicillin**, **Ticarcillin**, is principally indicated for serious infections due to *P aeruginosa* and also has activity against certain other Gram-negative bacilli including *Proteus spp.* and *B fragilis*. The ureidopenicillin, piperacillin is more active than ticarcillin against *Ps. aeruginosa*.

PIPERICILLIN WITH TAZOBACTAM^[A]

Indications: *P. aeruginosa* infections, surgical prophylaxis, also see under *Dose*

Cautions: See under *Benzyl penicillin*

Contra-indications: See under *Benzyl penicillin*

Side-effects: See under *Benzyl penicillin*; also nausea, vomiting, diarrhea, less commonly stomatitis, dyspepsia, constipation, jaundice, hypotension, headache, insomnia; rarely abdominal pain, hepatitis, edema; very rarely hypoglycemia, hypokalemia, pancytopenia, Stevens-Johnson syndrome, toxic epidermal necrolysis.

Dose: Lower respiratory tract, urinary tract, intra-abdominal, and skin infections, and septicemia: ADULT and CHILD over 12 years, by IV inj. over 3-5 minutes or by IV infusion: 100-150 mg/kg daily in divided doses, or increased to 200-300 mg/kg daily in severe infections and at least 16 g daily in life-threatening infections. NEONATES IV injection over 3-5 minutes or IV infusion, aged up to 7 days or over 7 days but under 20 kg, 150 mg/kg daily in 3 divided doses, aged over 7 days and over 20 kg, 300 mg/kg/d in 3-4 divided doses; CHILD 1 month-12 years: 100-200 mg/kg daily in 3-4 divided

doses, increased to 200-300 mg/kg daily in 3-4 divided doses for severe infections; *surgical prophylaxis*: 2 g just before surgery followed by at least 2 doses of 2 g at 4/6 hours intervals within 24 hours of surgery.

Proprietary Preparations

Brodactam(Sanofi), IV., Infusion., 4g + 0.5g./vial Tk. 1003.01/Vial
Megacilin(Popular), IV., Infusion 4 gm + 0.5 gm/vial, Tk. 1003.77Vial
Tazocilin(Square), IV., Infusion 4 gm + 0.5 gm/vial, Tk. 1003.01/Vial
Tazopen(Renata), IV., Infusion 2gm + 0.25gm/vial, Tk. 550.00/Vial; 4 gm + 0.5 gm/vial, Tk. 1000.00/Vial
Tazosyn(ACI), IV., Infusion 4 gm + 0.5 gm/vial, Tk. 1003.01/Vial; 2gm + 0.25gm/vial , Tk. 601.80/Vial

1.1.1.4 MECILLINAMS^[A]

PIVMECILLINAM HYDROCHLORIDE^[A]

Pivmecillinam has significant activity against many Gram-negative bacteria including *E. coli*, *Klebsiella*, *Enterobacter* and *Salmonellae*. It is not active against *Pseudomonas aeruginosa* or *Enterococci*. Pivmecillinam is hydrolyzed to mecillinam, which is the active drug.

Indications: Acute uncomplicated cystitis, chronic or recurrent bacteriuria, UTI

Cautions: See under *Benzylpenicillin*; liver and renal function tests required in long term use; pregnancy; avoid in acute porphyria

Contraindications: See under *Benzylpenicillin*; also carnitine deficiency, esophageal strictures, gastrointestinal obstruction; not recommended for infants under 3 months

Interactions: See Appendix-2

Side-effects: See under *Benzylpenicillin*; also nausea, vomiting, dyspepsia; and reduced serum and total body carnitine (during repeated or long term use)

Dose : *oral*: acute uncomplicated cystitis, ADULT and CHILD over 40 kg, initially 400 mg then 200 mg every 8 hours for 3 days; *chronic or recurrent bacteriuria*,

ADULT and CHILD over 40 kg, 400 mg every 6-8 hours; *UTI*, CHILD under 40 kg, 20-40 mg/kg daily in 3-4 divided doses

Note: Tablets should be swallowed whole with plenty of fluid during meals while sitting or standing

Proprietary Preparations

Alexid(Aristo), Tab., 200mg, Tk. 15/Tab.
Emcil(Square), Tab., 200 mg, Tk.15.05/Tab.
Pivcil(General), Tab., 200 mg, Tk.12.09/Tab.,
V-cillin(Asiatic), Tab., 200mg, Tk. 12/Tab

1.1.2 CEPHALOSPORINS

1.1.2.1	FIRST-GENERATION DRUGS
1.1.2.2	SECOND-GENERATION DRUGS
1.1.2.3	THIRD-GENERATION DRUGS
1.1.2.4	FOURTH-GENERATION DRUGS

Cephalosporins are broad-spectrum, bactericidal antibiotics and are classified into "generations" on the basis of general features of antimicrobial activity.

Of the first generation, **Cefazolin** is more susceptible to hydrolysis by betalactamase from *S. aureus* than is cephalothin. Second generation **Cefoxitin** and **cefuroxime** and third generation drugs are more resistant than first generation agents to betalactamases produced by gram-negative bacteria. Third generation drugs are susceptible to hydrolysis by chromosomally encoded type 1 beta-lactamases induced by treatment of infections due to aerobic gram-negative bacilli with second- or third-generation drugs and/or imipenem. Fourth generation agents such as **cefipime**, are poor inducers of type 1 beta-lactamases and are less susceptible than third generation drugs to hydrolysis by type 1 beta-lactamases.

Cautions: Great caution should be taken before administration of a cephalosporin in patients who have had a recent severe, immediate reaction to penicillin, impaired renal function, pregnancy and breast-feeding.

Side-effects: Anaphylaxis, bronchospasm, and urticaria are seen.

1. ANTI-INFECTIVES

Cephalosporins are potentially nephrotoxic drugs. Gastrointestinal upset in the form of diarrhea can result after cephalosporins and may be more frequent with **cefoperazone** and **ceftipamide** because of their greater biliary excretion.

1.1.2.1.1 FIRST-GENERATION CEPHALOSPORINS

First generation drugs (cefadroxil, cephalixin, cephadrine etc.) are very active against gram-positive cocci including pneumococci, streptococci and staphylococci and have modest activity against gram-negative microorganisms. Most oral cavity microbes, except *B. fragilis* group are sensitive. Activity against *Moraxella catarrhalis*, *E. coli*, *K. pneumonia* and *P. mirabilis* is good. They are not effective against enterococci, methicillin-resistant *S. aureus* and *S. epidermidis*, *P. aeruginosa*.

CEFADROXIL^[A]

Indications: Urinary tract infections, minor polymicrobial infections, i.e. cellulites, soft tissue abscess, otitis media, sinusitis

Cautions: See notes above

Contra-indications: Hypersensitivity, porphyria

Interactions: See Appendix-2

Side-effects: Diarrhea, nausea and vomiting, abdominal discomfort, headache, rashes, pruritus, urticaria, serum-sickness like reactions with rash, fever and arthralgia and anaphylaxis, erythema multiforme, toxic epidermal necrolysis, hepatic enzymes disturbances, transient hepatitis and cholestatic jaundice;

Dose: : *Oral* *1*: patients weighing > 40 kg: 0.5-1 g twice daily; CHILD < 1 year 25 mg/kg daily in 2-3 divided doses; 1-6 years 250 mg twice daily; > 6 years 500 mg twice daily

Proprietary Preparations

Adocil(Kemiko), Susp., 125 mg / 5ml, Tk. 80.24/100ml; Cap. 500 mg, Tk. 12.00/Cap.

Adora(Incepta), Paed. drops, 125 mg/1.25 ml, Tk. 50.00/15ml; Susp. 125 mg/5 ml, Tk. 90.00/100ml, 5gm/100ml, Tk. 120.00/100ml; Tk.60/60ml; Cap., 500mg, Tk. 18/Cap.

Arocef(Eskayef), Cap, 500mg , Tk. 15.00/Cap.; 500mg , Tk. 15.00/Cap.; Susp. , 125 mg/5 ml, Tk. 70.00/100ml.; Paed. drops, 125 mg/1.25 ml, Tk. 50.00/15ml

Bexen(Nipro JMI), Cap. 500 mg, Tk. 12.07/Cap.; Susp. 125 mg/5 ml Tk. 70.26/100 ml

Cedril(ACI), Susp., 125 mg/5 ml, TK. 70.47/100ml.; Cap., 500mg, TK. 12.09/Tab.

Ficef(UniMed) Cap. 500 mg Tk. 12.00/Cap; Paed. drops 125 mg/5 ml, Tk. 50.00/15 ml; Susp. 125 mg/5 ml Tk. 70.20/100 ml

Fodexil(Square), Cap., 500 mg, Tk. 15.05/Cap. ; Tab. , 1 gm, Tk. 25.00/Tab.

Licet(Asiatic), Susp. 125 mg/5 ml, Tk. 82.00/100ml,

Sefanid(Drug Intl), Susp., 125mg/5ml, Tk. 70.25/100ml.; Cap., 500mg, Tk. 12.05/Cap.

Trubid(Opsorin), Susp., 125 mg/5 ml, Tk. 70.26/ 100 ml.; Tk. 50.19/ 60 ml.; Cap. 500 mg, Tk. 15.00/Cap.

Twicet(Acme), Susp., 250mg/5ml , Tk. 120.82/100ml.; , 125 mg/5 ml, Tk. 70.47/100ml.; Cap., 500 mg , Tk. 12.09/Cap.;

Paed. drops, 125 mg/1.25 ml, Tk. 50.20/15ml

CEFOPERAZONE^[A]

Indication: Used in the treatment of susceptible infection especially those due to *Pseudomonas spp.* It is slightly less active against some *Enterobacterae*.

Cautions: See notes above; not recommended for the treatment of meningitis because of its poor penetration into the C. S. F.

Contraindications and Side-effects: See under Cefadroxil

Interaction: See Appendix -2

Dose and Administration: The usual dose is 2 to 4 g daily in two divided dose. In severe infections up to 12g daily in two to four divided dose may be given. In general the dose should not exceed 4g daily in patient with liver disease or biliary obstruction or 1 to 2g daily in those both liver and kidney impairments; if higher dose are used plasma concentration of cefoperazone should be monitored

Proprietary Preparations

Cefopen(Square), Inj., 1 gm, Tk. 250.00/Vial.; 500mg, Tk.150.00/Vial

1. ANTI-INFECTIVES

CEPHALEXIN^{[ED][A]}

(Cefalexin)

Indications: Prophylaxis of recurrent UTI; also see under cefadroxil

Cautions, Contraindications and Side-effects: See notes above and under cefadroxil

Interactions: See Appendix-2

Dose: oral: ADULT 250-500 mg every 8-12 hours for mild to moderate infections; for severe infections increased to 1-1.5 g every 6-8 hours, as prophylactic in recurrent urinary tract infections, 125 mg at night; CHILD 25 mg/kg daily in 2-3 divided doses, doubled for severe infections, max. 100 mg/kg daily in divided doses; under 1 year, 125 mg every 12 hours; 1-5 years, 125 mg every 8 hours; 6-12 years, 250mg every 8 hours

Proprietary Preparations

Acelex(Acme), Cap., 250.00 mg, Tk. 6.65/Cap.; 500.00 mg, Tk. 12.58/Cap.; Paed. drop., 125mg/1.25 ml, Tk. 42.66/15ml.; Susp., 125 mg/5 ml, Tk. 77.52/100ml
Avloxin(ACI), Susp., 125mg/5ml, Tk. 69.47/100ml.; Cap., 500mg, Tk. 10.57/Cap
Ceporex(GSK), Cap., 500 mg, Tk. 12.73/Cap.; Susp., 125 mg/5 ml, Tk. 84.27/100ml
Lexin(Astra Bio), Cap., 250 mg, Tk. 6.60/Cap.; 500 mg, Tk. 12.73/Cap.; Susp., 125 mg/5 ml, Tk. 77.52/100 ml
Neorex(Eskayef), Cap, 500mg, Tk. 12.50/Cap.; 250mg, Tk. 6.60/Cap.; 500mg, Tk.12.50/Cap.; Susp., 125mg/5ml, Tk. 83.50/100ml
Nufex(General), Susp., 125 mg/5 ml, Tk. 78.52/100ml; Cap., 500mg, Tk. 9.06/Cap.

CEPHRADINE CILASTATIN^[W]

Indications: Surgical prophylaxis, also see under cefadroxil

Cautions, Contraindications and Side-effects: See notes above and under cefadroxil

Interactions: See Appendix-2

Dose: oral: ADULT 250-500 mg every 6 hours or 0.5-1 g every 12 hours for mild to moderate infections; for severe infections increased to 1 g every 6 hours; CHILD 25-50 mg/kg daily in 2-4 divided doses; deep IM inj. or IV inj. over 3-5

minutes or IV infusion 0.5-1 g every 6 hours for mild to moderate infections; for severe infections increased to 8 g daily; CHILD 50-100 mg/kg daily in 4 divided doses; in surgical prophylaxis: 1-2 g by deep IM inj. or by IV inj. over 5 minutes.

Proprietary Preparations

Adecef(Supreme), Cap, 500mg, Tk. 12.50/Cap. ; Paed. drops, 125 mg/1.25 ml, Tk. 50.00/15ml.; Susp., 125mg / 5ml, Tk. 80.25/100ml.; 250 mg/5 ml, Tk. 120.00/100ml
Ancef(UniMed), Cap, 250mg, Tk. 6.50/Cap. ; 500mg, Tk. 12.50/Cap. ; Paed. drops, 125 mg/1.25 ml, Tk. 50.00/15ml.; Susp., 250mg/5ml, Tk. 120.00/100ml.; 125mg/5ml, Tk. 85.00/100ml
Avlosef(ACI), Cap., 250mg, TK. 8.02/Cap. ; 500mg, TK. 15.05/Cap.; Inj, 1gm/vial, TK. 95.29/Vial.; 500mg/vial, TK. 65.20/ Vial.; Paed. drops, 125mg/1.25ml, TK. 65.20/15ml ;; Susp., 125mg / 5ml, TK. 90.27/100ml ,250mg/5ml TK. 135.41/100ml ,TK. 80.54/60ml
Bactokil(Virgo), Cap., 250 mg, Tk. 156.00/Cap. ; 500 mg, Tk. 262.50/Cap. ; Susp., 125mg / 5ml, Tk. 80.00/100ml
Belocet(Amico), Cap., 250mg, Tki. 6.50/Cap.; 500mg, TK. 12.50/Cap.; Paed. drops, 125mg/1.25ml, Tk. 50.00/15ml.; Susp., 125mg/5ml, TK. 80.00/100ml
Betasef(Alco), Cap., 250 mg, Tk. 8.00/Cap. ; 500 mg, Tk. 15.00/Cap.; Paed. drops 125 mg/1.25 ml, Tk. 65.00/15ml.; Susp. 250mg/5ml Tk. 90.00/100ml ,250 mg / 5 ml, Tk. 120.35/100ml
Cefadin(Ziska), Cap., 500 mg, Tk. 12.00/Cap.; Inj., 1g/vial, Tk. 80.00/ Vial.; 500 mg, Tk. 50.00/ Vial ;; Susp., 125 mg/5 ml, Tk. 80.00/100ml
Ceflin(Nipa), Cap., 500 mg, Tk. 12.66/Cap.; Susp., 125 mg/5ml, Tk. 80.00/100ml
Cephid(Zenith), Cap., 250mg, Tk. 6.52/Cap. ; 500 mg, Tk. 12.55/Cap.; Susp., 125 mg/5 ml, Tk. 80.30/100ml
Cephacap(Euro), Cap., 500mg, Tk. 15.00/Cap.
Cephran(Opsonin), Cap., 500 mg, Tk. 15.05/Cap. ; Inj, 500 mg/vial, Tk. 54.20/Via.; 1 gm/vial, Tk. 80.30/Vial.; Paed. drops, 125 mg/1.25 ml, Tk. 65.00/15ml
Dicef(Drug Intl), Cap., 250mg, Tk. 7.05/Cap. ; 500mg, Tk. 13.05/Cap.; Paed. drops, 125mg/1.25ml, Tk. 50.20/15ml.; Susp., 125mg/5ml, Tk. 81.25/100ml.; 250mg/5ml, Tk. 120.40/100ml
Eusef(Globe), Cap., 500 mg, Tk. 12.00/Cap. ; Inj, 1 gm/vial, Tk. 80.00/ Vial, 500 mg/vial, Tk. 50.00/ Vial.; Paed. drop, 125 mg/1.25 ml, Tk.

1. ANTI-INFECTIVES

50.00/15ml.; Suspn, 125 mg /5 ml, Tk. 80.00/100ml.; 250 mg /5 ml, Tk. 140.00/100ml
Extracef(Aristo), Cap., 250mg , Tk. 6.50/Cap.; 500mg , Tk. 15.00/Cap. ; Paed. drops, 125 mg/1.25 ml, Tk. 62.00/15ml,Suspn, 125mg / 5ml , Tk. 90.00/100ml.; 250 mg/5 ml, Tk. 125.00/60ml,
Gigacef(Pacific), Cap.,500 mg, Tk. 15.00/Cap. ; Paed. drops, 125 mg/1.25 ml, Tk. 46.00/15ml ;, Suspn, 125mg/5ml, Tk. 64.00/100ml
Intracef(Beximco), Cap., 250mg , Tk. 6.50/Cap.; 500mg, Tk.12.50/cap ;,Paed. drop, 125 mg/1.25 ml, Tk., 50.00/15ml.; Suspn, 125mg/5ml, Tk. 80.00/100ml.; 250mg/5ml, Tk. 120.00/100ml
Lebac(Square), Cap.,250 mg, Tk. 8.03/Cap. ; 500 mg, Tk. 15.05/Cap. ; Inj, 1 gm/vial, Tk. 95.29/Vial ;, Inj, 500 mg/vial, Tk. 65.19/Vial.; Paed. drop, 125 mg/1.25 ml, Tk. 65.19/15ml.; Suspn, 125 mg/5 ml, Tk. 90.27/100ml.; 250 mg/5 ml, Tk. 135.4/100ml
Polycef(Renata), Cap., 250 mg, Tk. 6.52/Cap. ; 500 mg, Tk. 12.54/Cap. ; Inj,1 gm/vial,Tk.; 90.00/ Vial.;250mg/vial, Tk. 38.10/ Vial,500 mg/vial, Tk. 65.00/ Vial.; Paed. drop, 125 mg/1.25 ml, Tk. 62.00/15ml.; Suspn, 125 mg/5 ml, Tk. 90.00/100ml.; 250 mg/5 ml, Tk. 132.00/100ml
Procef(Incepta), Cap. , 500 mg, Tk. 12.50/Cap. ; 250 mg, Tk. 6.50/Cap. ; Inj, 1 gm/vial, Tk. 80.00/ Vial.; 500 mg/vial, Tk. 50.00/ Vial. ;, Paed. drops, 125 mg/1.25 ml, Tk. 50.00/15ml.; Suspn, 250 mg/5 ml, Tk. 120.00/100ml.; 125 mg/5 ml, Tk. 80.00/100ml
Roccef(Healthcare), Cap.,250mg , Tk. 6.50/Cap. ; 500mg , Tk. 12.50/Cap. ; Suspn, 125mg/5ml , Tk. 95.00/100 ml.; 250mg/5ml , Tk. 140.00/100 ml
Roxiccef(Popular), Cap., 500 mg, Tk. 12.55/Cap. ;Suspn, 250 mg/5 ml, Tk. 120.45/200 ml.; 125mg / 5ml, Tk. 80.30/100 ml
Sefin(Orion), Cap., 250 mg, Tk. 6.55/Cap. ; 500 mg, Tk. 12.59/Cap. ; Inj, 1 gm/vial, Tk. 80.55/ Vial.; 500 mg/vial, Tk. 35.23/ Vial.; Paed. drop, 125 mg/1.25 ml, Tk. 50.35/15ml.; Suspn, 250 mg/5ml, Tk. 120.81/100ml, Tk. 60.42/50ml.; 125mg / 5ml , Tk. 80.55/100ml.; Cap., 250mg, Tk. 6.50/Cap. 500mg , Tk. 12.50/Cap.
Sefrad(Sanofi), Cap., 250mg, Tk. 10.03/Cap. ; 500mg, Tk. 16.05/Cap. ; Inj., 500mg/vial, Tk. 60.18/Vial.; Paed. drops, 100mg/ml, Tk. 65.20/15 ml.; Suspn, 125 mg/ 5 ml, Tk. 95.29/100 ml.,250 mg/5 ml, Tk.130.39/100 ml.;
Sefril(Acme), Cap. , 250mg., Tk. 8.03/Cap. ,500 mg., Tk. 15.04/Cap. ; Inj.,1 gm/vial, Tk. 90.27/ Vial ,500mg/vial, Tk. 65.19/ Vial.; Paed. drops, 125 mg/1.25 ml, Tk. 62.19/15ml., Suspn, 125mg / 5ml , Tk. 90.27/100ml.; 250 mg/5 ml, Tk. 120.82/100ml
Sefty(Astra Bio), Cap. , 250 mg, Tk. 6.50/Cap., 500 mg, Tk. 15.00/Cap. ; Paed.drop, 125

mg/1.25 ml, Suspn, 125 mg/5 ml, Tk. 80.00/100 ml
Sicef(Silva), Cap.,500mg, Tk. 12.55/Cap. ; Suspn.,125 mg/5 ml, Tk. 80.30/100ml
Sinaceph(Ibn Sina), Cap., 250 mg, Tk. 6.80/Cap. ;500 mg, Tk. 15.00/Cap. ; Inj., 500 mg/vial, Tk. 55.00/ Vial.; 1 gm/vial, Tk. 85.00/ Vial.; Paed. drops, 125 mg/1.25 ml,Tk.55.00/15ml.;Suspn, 125 mg/5 ml, Tk. 95.00/100ml,
SK Cef(Eskayef), Inj, 1gm/vial, Tk. 80.00/ Vial.; 500mg/vial, Tk. 50.00/ Vial.; Cap, 250mg , Tk. 8.00/Cap. ,500mg , Tk. 15.00/Cap. ,Paed. drops, 125 mg/1.25 ml, Tk. 65.00/15ml ;, Suspn, 250 mg/5 ml, Tk. 140.00/100ml.; 125 mg/5 ml, Tk. 90.00/100ml,Tk. 80.00/60ml
Supracef(Biopharma), Cap., 250mg , Tk. 6.52/Cap.; 500mg , Tk. 12.05/Cap. ; Paed. drops, 125 mg/1.25 ml, Tk. 50.19/15ml.; Suspn, 250 mg/ 5ml, Tk. 120.45/100ml; 125 mg/5 ml, Tk. 80.30/100ml
Tydin(Somatec), Cap., 500 mg, Tk. 14.68/cap. ; Paed. drops, 125 mg/1.25 ml, Tk. 50.00/15ml.; Suspn., 125mg/5 ml, Tk. 82.00/100ml; 250 mg/5 ml, Tk. 120.46/100ml
Veccef(Asiatic), Cap., 500mg , Tk. 12.50/Cap. ; Inj., 1gm/vial , Tk. 80.00/Vial.; 500mg/vial , Tk. 50.00/ Vial.; Paed. drops, 125 mg/1.25 ml, Tk. 50.00/15ml.; Suspn, 125 mg/5 ml, Tk. 80.00/100ml; 250mg/5ml, Tk. 120.00/100ml
Velogen(General), Cap. , 250mg, Tk. 6.54/Cap.;500mg, Tk. 12.59/Cap. ; Paed. drops, 125 mg/1.25 ml, Tk. 50.34/15ml.; Suspn, 125 mg/5 ml, Tk. 82.56/100ml
Velox(Kemiko), Cap., 250 mg, Tk. 7.02/Cap.; 500 mg, Tk. 13.04/Cap.;Paed.drop,125 mg/1.25 ml,Tk. 50.15/15ml;125 mg / 5 ml,Tk. 80.24/100ml
Zeccef(GACO), Cap.,500 mg,Tk. 12.54/Cap.; Suspn.,125 mg/5ml, Tk. 80.24/100 ml

1.1.2.1.2 SECOND-GENERATION CEPHALOSPORINS

Compared to first generation, second generation cephalosporins are more active against gram-negative microorganisms but such activity is less than third generation agents. A subset of second generation i.e. Cefoxitin, Cefotetan and Cefmetazole also is active against *B. fragilis*.

1. ANTI-INFECTIVES

CEFACLOR^[A]

Indications: Sinusitis, otitis and lower respiratory infections caused by beta-lactamase producing *H. influenza* or *B. catarrhalis*, also see under *cefadroxil*

Cautions: Penicillin hypersensitivity, pregnancy, breast-feeding, renal impairment; false positive urinary glucose test and false positive Coombs' test

Contraindications and Side-effects: See under *cefadroxil*

Interactions: See appendix-2

Dose: oral: ADULT 250 mg every 8 hour for mild to moderate infections; for severe infections increased to 500 mg every 8 hour up to a max. of 4 g daily in 3 divided doses; CHILD > 1 month, 20 mg/kg daily in 3 divided doses for mild to moderate infections; for severe infections increased to 40 mg/kg every 8 hour up to a max. of 1 g daily in 3 divided doses

Proprietary Preparations

Abaclor(ACI), Cap., 250 mg, Tk. 21.14/Cap.; 500 mg, Tk. 40.27/Tab.; 375 mg, Tk. 30.09/Tab.; Paed. drops, 125mg/1.25ml, Tk. 125.85/15 ml.; Susp., 125 mg/5 ml, Tk. 201.35/100 ml
Alclor(Acme), Paed. drop, 100mg/ ml, Tk. 125.37/15ml.; Susp., 125 mg/5 ml, Tk. 190.58/100ml; Cap., 500 mg, Tk. 40.12/Cap.
Ceflon(Eskayef), Cap., 250mg, Tk. 16.00/Cap.; 500 mg, Tk. 30.00/Cap.; Susp., 125 mg/5 ml, Tk. 200.00/100ml.; Paed. drop, 125 mg/1.25 ml, Tk. 125.00/15ml
Cfl(Sharif), Paed. drops, 125 mg/1.25 ml, Tk. 125.37/15ml.; Susp., 125 mg/5 ml, Tk. 190.58/100ml
Clobac(Opsonin), Susp., 125 mg /5 ml, Tk. 180.68/100 ml.; 500 mg /5 m, Tk. 125.47/15ml.; 125mg/5ml, Tk. 175/100ml
Clocef(Amico), Cap., 500mg, Tk. 22/Cap.
Clorocéf(Ibn Sina), Susp., 125mg/5ml, Tk. 205.00/100ml.; Paed. drop, 125 mg/1.25 ml, Tk. 130.00/15ml
Efaclor(Astra Bio), Susp., 125 mg/5 ml, Tk. 180.00/100 ml
Loracef(Square), Cap., 500 mg, Tk. 38.26/Cap.; Paed. drops, 125 mg/1.25 ml, Tk. 125.85/15ml.; Susp., 125 mg/5 ml, Tk. 191.3/100ml
Oticef(Alco), Paed. drops, 125 mg / 1.25 ml, Tk. 125.38/15ml.; Susp., Tk. 200.60/100ml
Cap., 500 mg, Tk. 40.12/Cap.
Oticlor(Incepta), Cap., 500 mg, Tk. 40.00/Cap.; Paed. drops, 125 mg/1.25 ml, Tk.

125.00/15ml.; Susp., 125 mg/5 ml, Tk. 180.00/100ml
Xclor(Orion), Susp., 125 mg/5ml, Tk. 190.57/100ml

CEFOXITIN^[A]

Indications: As prophylactic against intestinal anaerobes in colorectal surgery, mixed anaerobic infections, i.e. peritonitis, diverticulitis, infections due to facultative gram-negative bacteria, i.e. pelvic inflammatory disease, diabetic foot infection; also see under *Cefadroxil*

Cautions, Contra-indications, Side-effects: See notes above and under *cefadroxil*

Interactions: See Appendix-2

(probenecid reduces the renal clearance of Cefoxitin)
Dose: By deep IM or slow IV inj. or IV infusion 1-2 g every 6-8 hours for mild to moderate infections; increased up to 12 g daily in 3-4 divided doses for severe infections; CHILD recommended route IV; up to 1 week, 20-40 mg/kg every 12 hours, 1-4 weeks 20-40 mg/kg every 8 hours in mild to moderate infections, increased to 200 mg/kg daily in 3-4 divided doses up to a max. of 12 g daily in severe infections; surgical prophylaxis: by deep IM or slow IV inj. or IV infusion 2 g, 30-60 minutes before surgery, repeated every 6 hours for 24 hours; CHILD 30-40 mg/kg 30-60 minutes before surgery, repeated every 6 hours for 24 hours (second and third doses every 8-12 hours in neonates); uncomplicated UTI, Cefoxitin 1 g twice daily has been given intramuscularly

Proprietary Preparations

Cefot(ACI), Inj., 1gm /vial, Tk. 132.40/ Vial, 500mg/vial, Tk. 76.23/ Vial, 250mg/vial, Tk. 50.15/ Vial, 2gm/vial, Tk. 250.75/ Vial
Cefotax(Renata), Inj., 250 mg/vial, Tk. 75.00/ Vial, 500 mg/vial, Tk. 180.00/ Vial, 1 gm/vial, Tk. 100.00/ Vial
Cefotime(Incepta), Inj., 1 gm/vial, Tk. 132.00/ Vial.; 250 mg/vial, Tk. 50.00/ Vial.; 500 mg/vial, Tk. 76.00/ Vial
Ceftax(Opsonin), Inj., 1 gm/vial, Tk. 132.50/ Vial, 250 mg/vial, Tk. 50.19/ Vial, 500 mg/vial, Tk. 76.29/ Vial

1. ANTI-INFECTIVES

Maxcef(Square), Inj., 1 gm/vial, Tk. 140.42/
Vial, 250 mg/vial, Tk. 70.21/ Vial, 500 mg/vial,
Tk. 90.27/ Vial
Taxceph(Ibn Sina), Inj., 1 gm/vial, Tk. 140.00/
Vial, 250mg/vial, Tk. 52.00/ Vial, 500mg/vial, Tk.
76.00/ Vial
Taxim(Acme), Inj., 1 gm/vial, Tk. 150.44/ Vial
, 250 mg/vial, Tk. 75.22/ Vial., 500 mg/Vial, Tk.
100.30/ Vial
Torped(Orion), Inj., 1 gm/vial, Tk. 130.88/
Vial, 250 mg/vial, Tk. 50.35/ Vial , 500 mg/vial,
Tk. 75.50/ Vial

CEFPROZIL^[A]

Indications: Upper Respiratory tract infection, Skin and Soft tissue infections

Cautions: See notes above

Contra-indications, Side-effects: See under Cefadroxil

Dose: URTI and Skin and Soft tissue infections, 500 mg once daily usually for 10 days; CHILD 6 months – 12 years; 20 mg/kg (Max 500 mg) once daily. Acute exacerbations of chronic bronchitis, 500 mg every 12 hours usually for 10 days. Otitis media, CHILD 6 months-12 years, 20 mg/kg (max 500 mg) every 12 hours

Proprietary Preparations

Cefozil(Popular), Tab., 250mg, Tk. 30.11/Tab.; 500mg, Tk. 55.21/Tab.; Susp., 125 mg/5 ml, Tk.230.87/50 ml

CEFUROXIME^[A]

Indications: Surgical prophylaxis, Lyme disease, community acquired pneumonia especially where beta-lactamase producing *H influenza* or *K pneumonia* is a consideration, gonorrhea, also see under cefadroxil

Cautions: See notes above; also pregnancy, breast-feeding and renal impairment (Appendix-4)

Interactions: See Appendix-2

Contraindications and Side-effects: See under cefadroxil

Dose: Oral :as cefuroxime axetil, 250 mg twice daily for mild to moderate infections, increased to 500 mg twice daily for severe infections and for pneumonia; for urinary tract infections 125 mg twice daily, doubled in pyelonephritis; for gonorrhea, 1 g as a

single dose; CHILD > 3 months, 125 mg twice daily, can be doubled in CHILD > 2 years with otitis media; Lyme disease: ADULT and CHILD > 12 years, 500 mg twice daily for 20 days; by IM inj. or IV inj. or infusion, 750 mg every 6-8 hours for mild to moderate infections; increased to 1.5 g every 6-8 hours for severe infections, single doses over 750 mg IV only; CHILD 60-mg/kg daily (range 30-100 mg/kg daily) in 3-4 divided doses; for gonorrhea, 1.5 g as a single dose by IM inj; surgical prophylaxis, 1.5 g by IV inj. at induction of anesthesia, may be supplemented with 750 mg IM inj. 8 and 16 hours later in abdominal, pelvic and orthopedic operations or followed by 750 mg by IM inj. every 8 hours for further 24-48 hours in cardiac, pulmonary, esophageal and vascular surgery

Proprietary Preparations

Adetil(Supreme), suspn, 125mg/5ml, Tk.198.00/70ml.; Tab., 250mg, Tk. 25.00/Tab.; 500mg, Tk. 45.00/Tab.

Axet(Orion), Inj , 750mg/vial, Tk. 125.85/Vial.; 250 mg/vial, Tk. 60.41/Vial.; Tab., 125mg, Tk. 15.10/Tab., 250 mg, Tk. 25.18/Tab., 500 mg, Tk. 45.30/Tab. ; suspn., 125mg/5ml, Tk. 216.46/70ml

Axetil(Alco), suspn., 125mg/5ml, Tk. 190.57/70ml.; Tab., 125 mg, Tk. 12.04/Tab., 500 mg, Tk. 45.14/Tab, 250 mg, Tk. 25.08/Tab.

Axicef(UniMed), suspn, 125mg/5ml, Tk. 200.00/70ml.; Inj., 500mg/vial, Tk. 45.00/Vial.; Tab , 250mg, Tk. 25.00/Tab.

Axim(Aristo), Inj., 750mg/vial , Tk. 125.00/Vial, 1.5g/vial, Tk. 200.00/vial.; Tab., 125mg, Tk. 15.00/Tab.; 250mg , Tk. 25.00/Tab.; 500mg , Tk. 45.00/Tab. Susp., 125 mg/5 ml, Tk. 225.00/70 ml;

C-2(Astra Bio), Tab. , 250 mg, Tk. 25.00/Tab. ; 500 mg, Tk. 45.00/Tab. ; suspn, 125mg/5ml, Tk. 198.00/5ml

Cefobac(Popular), Tab. , 250mg, Tk. 25.09/Tab., 500mg, Tk. 45.17/Tab.; Inj., 750 mg/vial, Tk. 125.47/Vial, 1.5 gm/vial, Tk. 200.75/Vial

Cefotil(Square), Inj., 750 mg/vial, Tk. 125.85/Vial ., 1.5 gm/vial, Tk. 201.35/vial.; Tab., 500 mg, Tk. 45.29/Tab, 250 mg, Tk. 25.17/Tab. ; suspn, 125mg/5ml, Tk. 199.34/70ml.;

Cefunix(Virgo), Tab. , 250mg, Tk. 25.00/Tab., 500mg, Tk. 40.00/Tab.

Cefurim(Somatec), suspn, 125mg/5ml, Tk., 200.00/70ml.; Tab., 500 mg , Tk. 45.17/Tab., 250 mg, Tk. 25.10/Tab.

1. ANTI-INFECTIVES

Cerox(ACI), Inj., 1.5gm, TK. 201.35/vial.; 250 mg, TK. 55.38/vial.; 750mg,TK. 126.12/vial.;susp, 125mg/5ml, TK. 199.35/70ml.;250mg/5ml, TK.250.75/50mlTab., 250mg, TK. 25.17/Tab., 500mg, TK. 45.31/Tab. 125mg, TK. 15.11/Tab.

Ceroxime(Asiatic), Tab., 125mg, Tk. 15.00/Tab.; Inj., 750mg/vial, Tk. 125.00/vial.; suspn, 125mg/5ml, Tk. 198.00/70ml.; Tab.,250mg, Tk. 25.00/Tab.; 500mg, Tk. 45.00/Tab.

Famicef(Acme),Tab., 250 mg, Tk. 25.17/Tab., 500 mg, Tk. 45.29/Tab.; Inj.1.5 gm/vial, Tk. 201.35/vial, 750 mg/vial, Tk. 120.82/vial.; suspn, 250 mg/5 ml, Tk. 186.25/35ml,Tk. 199.34/70ml.

Furex(Drug Intl), Inj.,1.5gm/vial, Tk. 200.65/vial, 750mg/vial, Tk. 125.40/vial.; Susp.,125mg/5ml, Tk. 225.75/70ml.; Tab., 250mg, Tk. 25.10/Tab.; 500mg, Tk. 45.15/Tab.

Furocef(Renata), Inj.,1.5 gm./vial Tk. 200.75/vial.; 750mg/vial, Tk. 125.47/vial, 250mg/vial, Tk. 55.21/vial ;Susp, 125mg/5ml, Tk. 198.75/70ml. ; 250mg/5ml ,Tk.250.00/50ml.;Tab.,125 mg, Tk. 15.06/Tab., 250 mg, Tk. 25.09/Tab. 500mg, Tk. 45.17/Tab. ,

Furoget(Getwell), Susp., 125mg/5ml, Tk. 195.00/70ml.; Tab. ,500mg,Tk. 44.00/Tab. ;250mg, Tk. 24.00/Tab.

Furotil(Healthcare), Inj.,1.5gm/vial, Tk. 275.00/vial, 750mg/vial, Tk. 175.00/vial.; suspn, 125mg/5ml, Tk. 200.00/70ml. ;Tab., 125mg, Tk. 15.00/Tab.,250mg, Tk. 25.00/Tab., 500mg, Tk. 45.00/Tab.

Furotixol(Sharif), suspn, 125 mg /5 ml, Tk. 198.59/70ml.;Tab.,250 mg, Tk. 25.09/Tab. 500 mg, Tk. 45.13/Tab.

Kfore(Kemiko), Tab., 250 mg, Tk. 25.07/Tab. , 500 mg, Tk. 45.13/Tab.

Kilbac(Incepta), suspn., 125mg/5ml, Tk. 198.00/70ml.; ;250mg/5ml, Tk.250.00/50ml Inj.,1.5 gm/vial, Tk. 200.00/vial.; 250 mg/vial, Tk. 55.00/vial.; 750 mg/vial, Tk. 125.00/vial. ;Tab., 125 mg, Tk. 15.00/Tab.;250 mg, Tk. 25.00/Tab. , 500 mg, Tk. 45.00/Tab.

Kilmax(Eskayef), Inj., 750mg/vial, Tk. 125.00/Vial.; 1.5gm/vial ,Tk. 200.00/vial, 250mg /vial, Tk. 55.00/vial.; ;susp,125mg/5ml, Tk. 198.00/70ml.;250mg/5ml Tk.250.00/50mlTab, 125mg, Tk. 15.00/Tab.,250mg, Tk. 25.00/Tab.,500mg, Tk. 45.00/Tab

Lepath(Amico), Tab., 250mg, TK. 22.00/Tab.

Merocef(Ibn Sina), suspn, 125mg/5ml, Tk. 200.00/70ml.; Inj., 750 mg/vial, Tk. 130.00/vial.; Tab.,500 mg, Tk. 46.00/Tab. ; 250mg, Tk. 26.00/Tab.

Mextil(Biopharma), suspn, 125mg/5ml, Tk. 200.75/70ml.;250mg/5ml

250.94/50ml.;Inj.,750mg/vial ,Tk. 125.00/Vial.; Tab., 500 mg, Tk. 45.17/Tab.

Orextil(Monico), Tab., 500mg, Tk. 45.00/Tab.;250 mg, Tk. 25.00/Tab.

Primocef(Novo), Inj.,1.5 gm/vial, Tk. 200.00/vial.;750 mg/vial, Tk. 125.00/vial.;Tab., 250 mg, Tk. 25.00/Tab.; 500 mg, Tk. 45.00/Tab.; suspn, 125mg/5ml, Tk. 198.00/70ml

Probac(Silva),susp, 125mg/5ml, Tk. 198.74/70ml. ;Tab.,250mg,Tk. 25.10/Tab.

Rofurox(Radiant), Tab., 250mg, Tk. 40.00/Tab., 500mg, Tk. 60.00/Tab.;susp, 125mg/5ml, Tk. 325.00/70

Roxicil(Pharmacil), Inj.,750mg/vial ,Tk. 170.51/Vial. ;Tab, 250mg ,Tk. 30.09/Tab.;500mg , Tk. 50.15/Tab.

Roxcef(Nipro JMI), Tab., 250 mg, Tk. 25.08/Tab.; 500mg, Tk. 45.14/Tab. Inj.,750 mg/vial,Tk.125.00/vial ,1gm/viai Tk.200.00/vial

Secomax(General),Tab., 250mg, Tk. 25.16/Tab., 500mg, Tk. 45.31/Tab.; suspn., 250mg/5ml, Tk. 201.35/70ml

Sefur(Opsonin), suspn, 250mg/5ml, Tk. 250.94/ 50 ml., Inj., 1.5 gm /vial, Tk. 200.75/vial, Inj.,750 mg/vial, Tk. 125.47/Vial.; Tab. , 125 mg, Tk. 15.06/Tab. ,250 mg, Tk. 25.16/Tab. ,500 mg , Tk. 45.30/Tab.

Sefurox(Sanofi), Inj.,1.5g/vial, Tk. 200.60/Vial, Inj., 750mg/vial, Tk. 125.85/Vial.;susp, 125mg/5ml, Tk. 199.34/Vial.; Tab.,500mg, Tk. 45.31/Tab.,250mg, Tk. 25.17/Tab.;

Segorin(Pacific), Tab. , 250 mg,Tk. 25.00/Tab. , 125 mg, Tk. 15.00/Tab. , 500 mg, Tk. 45.00/Tab. ;susp,125mg/5ml, Tk. 150.00/70ml .

Sharpkil(One Pharma),Tab., 250 mg, Tk. 25.00/Tab.,500 mg, Tk. 45.00/Tab.

Turbocef(Beximco), Inj., 750mg/vial, Tk. 125.00/vial.; 1.5gm/vial, Tk. 200.00/vial.; suspn, 250mg/5ml, Tk. 240.00/Susp.;Tab., 250mg, Tk. 25.00/Tab.; 500mg, Tk. 45.00/Tab.

Uroxime(Euro), suspn, 125mg/5ml, Tk.198.00/70ml. ;Tab., 301.25mg, Tk. 25.00/Tab.;500mg,Tk. 45.00/Tab.

Vexotil(Organic), Tab.,250 mg, Tk. 25.08/Tab.,500 mg,Tk. 45.13/Tab. ;susp,125mg/5ml, Tk. 198.60/70ml

Xefrim(Beacon), suspn, 125mg/5ml, Tk. 199.35/70ml.; Tab. , 250mg , Tk. 25.08/Tab.

Ximetil(Globe), Inj. ,1.5 gm/vial, Tk. 200.00/vial.; 750 mg/vial Tk. 125.00/Vial.; Tab. , 250 mg, Tk. 25.00/Tab.;500 mg, Tk. 45.00/Tab.; suspn., 125mg/5ml, Tk.198.00/70ml

Xitil(Ziska), suspn, 125mg/5ml, Tk. 198.00/70ml.;Tab.250 mg, Tk. 25.00/Tab.,500 mg, Tk. 45.00/Tab.

1. ANTI-INFECTIVES

Zenifor(*Zenith*), suspn, 125mg/5ml, Tk. 198.00/50ml.;Tab., 500 mg, Tk. 45.00/Tab.
Zinnat(*GSK*), Tab. , 250 mg, Tk. 30.00/Tab., 500 mg, Tk. 55.00/Tab

Cefuroxime + Clavulanic Acid

Axeclav(*Alco*), Susp. 125 mg + 31.25 mg/5 ml, Tk. 250.00/70ml.; Tab., 500 mg + 125 mg, Tk. 50.00/Tab. ,250 mg +62.5 mg, Tk. 30.00/Tab.

Axim(*Aristo*), Susp., 125 mg + 31.25 mg/5ml,Tk.250.00/70ml.; 125 mg + 31.25 mg/5 ml, Tk. 225.00/70mlTab., 250 mg +62.5 mg, Tk. 30.00/Tab. ; 500 mg + 125 mg, Tk. 50.00/Tab.

Ceclav(*Sharif*), Tab., 500 mg+ 125mg, Tk. 50.00/Tab.; 250 mg+ 62.5 mg, Tk.30.00/Tab.

Cefaclav(*Incepta*), Susp. , 125 mg + 31.25 mg/5 ml, Tk. 250.00/70ml.; Tab.,500 mg+ 125mg, Tk. 50.00/Tab.,250 mg+ 62.5 mg, Tk. 18.00/Tab.; 250 mg+ 62.5 mg, Tk.

30.00/Tab.,500 mg+ 125mg, Tk. 50.00/Tab.

Cefobac(*Popular*), Susp. 125 mg + 31.25 mg/5 ml, Tk. 198.75/70 ml

Cefotil(*Square*), Susp.,125 mg + 31.25 mg/5 ml, Tk. 250.00/70ml.;Tab. , 250 mg + 62.5 mg , Tk. 30.10/Tab. ; 500 mg + 125 mg , Tk. 50.15/Tab.

Cefurim(*Somatec*), Tab., 250 mg + 62.50 mg , Tk. 30.00/Tab.; Susp. , 125 mg + 31.25 mg/5 ml, Tk. 250.00/70ml.; Tab., 500 mg + 125 mg, Tk. 50.00/Tab.

Cerox(*ACI*), Tab., 125mg + 31.25mg , Tk. 21.06/Tab. ; 500mg + 125mg, TK. 50.15/Tab. ; 125 mg + 31.25 mg/5 ml, Tk.

225.00/70ml.;Susp., 125 mg + 31.25 mg/5 ml, TK. 250.75/70ml

Clavurox(*Popular*), Tab., 500mg + 125mg, Tk. 50.00/Tab.; suspn.,125 mg + 31.25 mg/5 ml, Tk. 250.00/70 ml

Clavusef(*Opsonin*), Susp., 125 mg + 31.25 mg/5 ml, Tk. 252.75/70 ml.; Tab. , 125 mg + 31.25 mg , Tk. 18.05/Tab.; 250 mg + 62.5 mg ,Tk. 30.10/Tab.; 500 mg + 125 mg , Tk. 50.15/Tab.

Cloavurox(*Popular*), Tab.,250 mg + 62.5 mg , Tk. 30.00/Tab.

Co-Axet(*Orion*), Tab.,250 mg+ 62.5 mg, Tk. 30.09/Tab.; 500 mg +125 mg,Tk. 50.15/Tab.

Famiclav(*Acme*), Susp. , 125 mg + 31.25 mg/5 ml, Tk. 252.00/70ml.; Tab. , 250 mg + 62.50 mg , Tk. 30.00/Tab. ; 500 mg + 125 mg , Tk. 50.00/Tab.

Fuclav, (*Drug Intl*), Susp. 125 mg + 31.25 mg/5 ml, Tk. 250.75/70ml.; 125mg+ 31.25mg, Tk. 18.10/Tab. ; 250mg+ 62.50mg, Tk.

30.10/Tab. ; 500mg+ 125mg, Tk. 50.20/Tab.

Furoclav(*Renata*), Tab. , 250mg+ 62.50mg, Tk. 30.00/Tab. ; 500 mg + 125 mg , Tk. 50.00/Tab.

Furoget(*Getwell*), Tab. , 250mg +2.50 mg, Tk. 28.00/Tab. ; 500mg + 125mg, Tk.

48.00/Tab.;Susp., 125 mg + 31.25 mg/5 ml, Tk. 250.00/70ml

Kefuclav(*Eskayef*), Susp., 125 mg + 31.25 mg/5 ml, Tk. 250.00/70ml.; Tab, 500 mg + 125 mg, Tk. 50.00/Tab.; 250 mg +62.5 mg, Tk. 30.00/Tab.; 250mg+ 62.50mg, Tk. 30.00/Tab.; 500mg + 125mg, Tk. 50.00/Tab.; 500mg + 125mg, Tk. 50.00/Tab.; 250mg+ 62.50mg, Tk. 30.00/Tab.

Mexclav(*Biopharma*), Tab., 250mg+ 62.50mg, Tk. 30.00/Tab.; 500mg + 125mg, Tk. 50.00/Tab.

Rofuclav(*Radiant*), Tab. , 250mg+ 62.50mg, Tk., 50.00/Tab.; 500 mg + 125 mg, Tk.

0.00/Tab.; 500 mg + 125 mg, Tk. 50.00/Tab.

Secoclav(*General*), Tab. , 500mg + 125mg, Tk. 50.00/Tab.; 250mg + 62.50mg, Tk. 30.00/Tab.

Sefur(*Opsonin*),Susp.,125 mg + 31.25 mg/5 ml, Tk.198.75/70 ml

Sharpkil(*One Pharma*), Tab., 250 mg + 62.5 mg, Tk. 30.00/Tab.; 500 mg+ 125 mg, Tk. 50.00/Tab.

Xiclav(*Ziska*), Susp., 125 mg + 31.25 mg/5 ml, Tk. 250.00/70 ml.; Tab, 250 mg + 62.5 mg, Tk. 300.00/Tab.; 500 mg + 125 mg, Tk. 400.00/Tab.

Ximeclav(*Globe*), Susp. 125 mg + 31.25 mg/5 ml, Tk. 250.00/Vial.; Tab. , 250 mg + 62.5 mg, Tk. 30.00/Tab.; 500 mg + 125 mg, Tk. 50.00/Tab.

1.1.2.3 THIRD-GENERATION CEPHALOSPORINS

Third generation agents (**Cefotaxime**, **Ceftriaxone**, **Ceftibuten** etc.) generally are less active than first generation drugs against gram-positive cocci, but they are much more active against the *Enterobacteriaceae*, including beta-lactamase producing strains. Among third generation drugs ceftazidime and cefoperazone also are effective in *P. aeruginosa* infection but are less active than other third generation agents against gram-positive cocci.

CEFDINIR^[W]

Indications: Gonorrhea, otitis media, pharyngitis, lower RTI such as bronchitis and UTI

Caution: Renal Impairment

Side effects: See under *Cefadroxil*

Interactions: See Appendix-2

Dose: Oral:ADULT, 600 mg daily as a single dose on in two divided doses

1. ANTI-INFECTIVES

CHILD may be given 14 mg/kg body weight daily

Proprietary Preparations

Cednir(Eskayef), Cap, 300mg, Tk. 40.00/Cap.; Susp., 125 mg/5 ml, Tk. 160.00/30ml
Cefexta(UniMed), Susp., 125 mg/5 ml, Tk. 225.00/60ml.; Cap., 300mg, Tk. 57.00/Cap.; Susp., 250 mg/5 ml, Tk. 210.00/30ml
Efdinir(Incepta), Cap., 300 mg, Tk. 45.00/Cap.; Susp., 125 mg/5 ml, Tk. 175.00/60ml

CEFDITOREN^[W]

Indications: Sinusitis, otitis media, skin and soft tissue infections caused by *Enterobacteriaceae* and *betalactamase* producing *H. influenzae*, *Morexella catarrhalis* and *N. gonorrhea*

Cautions: See notes above; also carnitine deficiency

Contra-indications: See under *Cefadroxil*

Interactions: See Appendix -2

Side-effects: See under *Cefadroxil*

Dose: Oral: ADULT and CHILD > 10 years: 200-400 mg twice daily; in patients with renal insufficiency: creatinine clearance (CC) < 30ml/min, 200 mg once daily, CC 30-49 ml/min, 200 mg twice daily

Proprietary Preparations

Cefditor(Orion), Tab., 200mg, Tk. 100.30/Tab.
Ceftoren(ACI), Tab., 200mg, Tk. 150.00/Tab.

CEFETAMET PIVOXIL HCl^[W]

This member of third-generation cephalosporins has therapeutic profile similar to that of cefixime. However, it may precipitate carnitine deficiency. The usual administration is per oral in a dose of 500 mg twice daily.

Proprietary Preparation

Tenafet(Incepta), Tab., 250mg, Tk. 20/Tab; 500mg, Tk. 35/Tab.; Susp., 250mg/5ml, Tk. 120/50 ml

CEFIXIME^{[A*][W]}

Indications: Sinusitis, otitis media, skin and soft tissue infections caused by *Enterobacteriaceae* and *betalactamase* producing *H. influenzae*, *Morexella catarrhalis* and *N. gonorrhea*

Cautions, Contra-indications and Side-effects: See notes above and under *cefadroxil*

Interactions: See Appendix -2

Dose: Oral: ADULT and CHILD > 10 years: 200-400 mg twice/once daily; CHILD > 6 months: 8 mg/kg daily in 1-2 divided doses

Proprietary Preparations

Adexim(Supreme), Cap, 200mg, Tk. 30.00/Cap.; Susp., 100 mg/5 ml, Tk. 160.00/50ml
Afix(Aristo), Susp., 200 mg/5 ml, Tk. 195.00/30ml, Tk. 280.00/50ml.; 100 mg/5 ml, Tk. 195.00/50ml, Tk. 120.00/30ml Tk. Cap., 400mg, Tk. 50.00/Cap.; 200mg, Tk. 3.00/Cap.; Tab., 200mg, Tk. 35.00/Tab.; 400mg, Tk. 50.00/Tab.
Afixime(Asiatic), Cap., 200mg, Tk. 30.00/Cap., 400mg, Tk. 50.00/Cap.; Susp., 100 mg/5 ml, 130.00/37.5ml, Tk. 210.00/50ml
Bestcef(Biopharma), Cap., 200mg, Tk. 35.00/Cap.; 400mg, Tk. 50.19/Cap.; Susp., 100mg/5ml, Tk. 130.49/37.5ml, Tk. 210.00/50ml
Bioxim(Sharif), Cap., 400 mg, Tk. 50.14/Cap.; 200 mg, Tk. 30.10/Cap. Susp., 100 mg/5 ml, Tk. 120.37/30ml, Tk. 175.00/50ml, Tk. 280.00/50ml.;
C-3(Astra Bio), Cap., 400 mg, Tk. 50.00/Cap.; 200 mg, Tk. 35.00/Cap., Tk. 30.00/Cap.; Susp., 100 mg/5 ml, Tk. 195.00/5ml
Cebex(Novo), Susp., 100 mg/5 ml, Tk. 195.00/50ml.; Cap., 200 mg, Tk. 35.00/Cap., 400 mg, Tk. 50.00/Cap.
Cef-3(Square), Cap., 200 mg, Tk. 35.11/Cap., 400 mg, Tk. 50.35/Cap.; paed.drop, 125 mg/1.25ml, Tk. 100.3/21ml.; Susp., 100 mg/5 ml, Tk. 135.4/30ml, Tk. 210.63/50ml, Tk. 250/75ml.; 200 mg/5 ml, Tk. 280.85/50ml.; Tab., 200 mg, Tk. 35.11/Tab.
Cefcil(Pharmacil), Cap., 200mg, Tk. 34.10/Cap.; Susp., 100 mg/5 ml, Tk. 200.60/50ml
Ceficap(Euro), Susp., 100 mg/5 ml, Tk. 195/50ml.; Cap., 224mg, Tk. 35.00/Cap., 400mg, Tk. 50.00/Cap.
Cefiget(Getwell), Susp., 100 mg/5 ml, Tk. 205.00/50ml, Tk. 245.00/100ml, Tk.

1. ANTI-INFECTIVES

90.00/20ml; Cap., 400mg, Tk. 49.00/Cap., 200mg, Tk. 34.00/Cap.
Cefim, (ACI), Cap., 200mg, Tk. 35.11/Cap., 400mg, Tk. 50.34/Cap.; Paed. drops, 125 mg/1.25ml, Tk. 100.00/21ml; Susp., 200 mg/5 ml, Tk. 300.90/50ml; Susp., 100 mg/5 ml, Tk. 241.62/75ml; Tk. 130.39/30ml, Tk. 210.63/50ml; Tab., 200 mg, Tk. 30.90/Tab.; 400mg, Tk. 50.15/Tab.
Cefix(Globe), Cap., 200 mg, Tk. 35.00/Cap.; 400 mg, Tk. 50.00/Cap.; Susp., 100 mg /5 ml, Tk. 195.00/50ml,
Cefixim(Ibn Sina), Cap., 200 mg, Tk. 35.00/Cap.; Paed. drop, 125mg/1.25ml, Tk. 100.00/21ml; Susp., 100mg /5ml, Tk. 180.00/40ml, Tk. 130.00/30ml, Tk. 210.00/50ml; 200mg /5ml, Tk. 280.00/50ml; Cap., 400 mg, Tk. 55.00/Cap.;
Ceftid(Opsonin), Cap., 400 mg, Tk. 50.35/Cap., 200 mg, Tk. 35.11/Cap.; Paed drops, 125mg/1.25ml, Tk. 98.00/21ml; Susp., 100 mg/5 ml, Tk. 210.63/50 ml, Tk. 130.49/ 37.5 ml, Tk. 321.21/ 50 ml; Tab., 400 mg, Tk. 50.19/Tab.; 200 mg, Tk. 35.00/Tab.;
Cexime(GSK), Cap., 200 mg, Tk. 35.11/Cap.; 400 mg, Tk. 50.15/Cap.; 100 mg/5 ml, Tk. 200.00/50ml
Denvar(Healthcare), Cap., 200mg, Tk. 35.00/Cap., 400mg, Tk. 50.00/Cap.; Susp., 200mg/5ml, Tk. 320.00/50 ml; 225.00/37.5 ml; 100mg/5ml, Tk. 145.00/30 ml, Tk. 210.00/50 ml
Emixef(Incepta), Susp., 200 mg/5 ml, Tk. 280.00/50ml; Susp., 100 mg/5 ml, Tk. 130.00/30ml, Tk. 170.00/40ml, Tk. 195.00/50ml; Cap., 200 mg, Tk. 35.00/Cap.; 400 mg, Tk. 50.00/Cap.
Erafix(Virgo), Cap., 200 mg, Tk. 36.00/Cap.
Fix-A(Acme), Cap., 200 mg, Tk. 35.00/Cap.; 400 mg, Tk. 50.35/Cap.; Susp., 100 mg/5 ml, Tk. 210.63/50ml, Tk. 130.88/37.5ml, Tk. 240.72/75ml; 200mg/5ml, Tk. 280.84/50ml; Paed. drops, 125 mg/1.25ml, Tk. 100.30/21ml
Gen-3(Amico), Cap., 200mg, 30.00/Cap.; Susp., 100mg/5ml, Tk. 175.00/50ml
G-FIX(G.A.Co), Cap., 200 mg, Tk. 35.11/Cap.; 400 mg, Tk. 48.00/Cap., Susp., 100 mg/5ml, Tk. 195.59/50 ml
Kefim(Kemiko), Cap., 400 mg, Tk. 55.16/Cap.; 200 mg, Tk. 30.09/Cap., Susp., 100 mg/5 ml, Tk. 130.39/37.5ml, Tk. 195.59/50ml
Kuracef(Sanofi), Susp., 100 mg/5 ml, Tk. 135.00/30 ml, Tk. 215.00/50 ml; Tab., 200mg, Tk. 40.00/Tab.; 400mg, Tk. 55.00/Tab.
Odacef(UniMed), Cap., 200mg, Tk. 30.00/Cap.; 400mg, Tk. 50.00/Cap.; Susp., 100 mg/5 ml, Tk. 195.00/50ml, Tk. 120.00/30ml
Onefix(One Pharma), Cap., 200 mg, Tk. 34.99/Cap.; 400 mg, Tk. 49.99/Cap.; Susp., 100 mg/5 ml, Tk. 135.00/30ml, Tk. 195.00/50ml
Orcef(Renata), Susp., 200 mg/5 ml, Tk. 280.00/50 ml; Susp., 100 mg/5 ml, Tk. 135.51/30ml, Tk. 155.58/40ml, Tk. 195.74/50ml, Tk. 225.00/70ml; Tab., 400 mg, Tk. 50.00/Tab.; 200 mg, Tk. 35.00/Tab.; Cap., 200 mg, Tk. 35.00/Cap.; 400 mg, Tk. 50.00/Cap
Orgaxim(Organic), Cap., 200mg, Tk. 30.10/Cap.; 500mg, Tk. 50.15/Cap.; Susp., 100 mg/50ml, Tk. 195.59/5ml, Tk. 240.72/75ml
Prexim(Ziska), Cap., 400 mg, Tk. 45.00/Cap. 200 mg, Tk. 30.00/Cap.; Susp., 100 mg/5 ml, Tk. 120.00/30ml, Tk. 195.00/50ml;
Rofixim(Radiant), Cap., 500mg, Tk. 45.00/Cap., 400mg, Tk. 65.00/Cap.; Susp., 100 mg/5 ml, Tk. 250.00/50ml, 200mg/5 ml, Tk. 395.00/50ml,
Roxim(Eskayef), Cap. 200mg, Tk. 30.00/Cap., 400mg, Tk. 50.00/Cap. Susp., 200 mg/5 ml, Tk. 320.00/37.5ml, Tk. 320/60ml; 100 mg/5 ml, Tk. 135.00/30ml, Tk. 195.00/50ml
Paed. drop, 125 mg/1.25ml, Tk. 85.00/15ml; Tab., 200mg, Tk. 30.00/Tab., 400mg, Tk. 50.00/Tab.
Saver(Alco), Susp., 100 mg / 5 ml, Tk. 120.36/30ml, Tk. 150.45/40ml, Tk. 195.59/50ml; Cap., 200 mg, Tk. 30.09/Cap.; 400 mg, Tk. 50.15/Cap.
Starcef(Beacon), Cap., 400mg, Tk. 50.00/Cap.; 200mg, Tk. 35.11/Cap.; Susp., 100 mg/5 ml, Tk. 196.33/50ml
Supraxim(Silva), Cap., 200mg, Tk. 35.00/Cap.; Susp., 100 mg/5 ml, Tk. 200.00/50ml, Tk. 140.00/30ml
T-cef(Drug Intl), Cap., 400mg, Tk. 50.20/Cap.; 200mg, Tk. 30.10/Cap.; Susp., 200mg/5ml, Tk. 280.85/50ml; 100mg/5ml, Tk. 135.45/30ml; 195.60/50ml; Paed. drops, 125mg/1.25ml, Tk. 100.30/21ml
Tgocef(Somatec), Susp., 100 mg/5 ml, Tk. 130.00/30ml; Tk. 195.00/50ml; Cap., 200 mg, Tk. 35.00/Cap.; 400 mg, Tk. 50.00/Cap.
Toccef(General), Susp., 100 mg/5 ml, Tk. 130.88/37.5ml, 196.33/50ml; 200 mg/5 ml, Tk. 280.00/50ml; Cap., 200mg, Tk. 35.00/Cap.; 400mg, Tk. 50.34/Cap.
Trifix(Pacific), Susp., 200 mg/5 ml, Tk. 240.00/50ml; Cap., 200 mg, Tk. 35.00/Cap.; 400 mg, Tk. 50.00/Cap.
Trioccef(Nipa), Cap., 200 mg, Tk. 30.00/Cap.; Susp., 100 mg/5 ml, Tk. 135.00/37.5ml, Tk. 195.00/50ml
Triocim(Beximco), Cap., 200mg, Tk. 35.00/Cap.; 400mg, Tk. 50.00/Cap.; Susp., 100mg/5ml, Tk. 210.00/50ml; 200 mg/5 ml, Tk. 320.00/50ml
Truso(Orion), Cap., Tk. 35.11/Cap.; Susp., 200 mg/5 ml, Tk. 280.84/50ml; 100 mg/5 ml, Tk. 130.89/37.5ml; Tk. 195.59/50ml Paed. drops, 125 mg/1.25ml, Tk. 80.24/15ml
Zemicef(Popular), Cap., 200mg, Tk. 35/Cap.; Susp., 200 mg/5 ml, 100mg/5 ml, Tk. 120.45/30ml, Tk. 150.57/40ml, Tk. 195.74/50ml

CEFOTAXIME^[W]

Indications: As part of 3-drug combination with vancomycin and Ampicillin in meningitis due to *H. influenzae*, penicillin-sensitive *S. pneumonia*, *N. meningitidis* and gram-negative enteric bacteria, gonorrhea, *Hemophilus epiglottitis*; also see under cefadroxil

Cautions, Contraindications: **Side-effects:**

Interactions: See Appendix-2

Side-effects: Rare events of cardiac arrhythmias after rapid inj. also see under cefadroxil

Dose: By IM or slow IV inj. or IV infusion 1 g every 12 hours for mild to moderate infections; increased to 8 g daily in 4 divided doses for severe meningitis, up to a max. of 12 g daily in 3-4 divided doses; CHILD 100-150 mg/kg/day in 2 to 4 divided doses in mild to moderate infections, increased to 200 mg/kg daily in severe infections; NEONATES 50 mg/kg/day in 2 to 4 divided doses for mild to moderate infections; increased to 150-200 mg/kg/day 4 divided doses for severe infections; for gonorrhea, a single dose of 500 mg

Proprietary Preparations

Cefot(ACI), Inj., 1 gm/vial, Tk. 132.40/ Vial, 500 mg/vial, Tk. 76.23/ Vial, 250mg, Tk. 50.15/ Vial, 2gm, Tk. 250.75/Vial

Cefotax(Renata), Inj., 250 mg/vial, Tk. 75.00/ Vial, 500 mg, Tk. 180.00/Vial, 1 gm/vial, Tk. 100.00/Vial,

Cefotime(Incepta), Inj., 1 gm/vial, Tk. 132.00/ Vial, 250 mg/vial, Tk. 50.00/ Vial, 500 mg/vial, Tk. 76.00/ Vial

Ceftax(Opsonin), Inj., 1 gm/vial, Tk. 132.50/ Vial, 250 mg/vial, Tk. 50.19/Vial, 500 mg/vial, Tk. 76.29/ Vial

Maxcef(Square), Inj., 1 gm/vial, Tk. 140.42/Vial, 250 mg/vial, Tk. 70.21/Vial, 500 mg/vial, Tk. 90.27/ Vial

Taxceph(Ibn Sina), Inj., 1 gm/vial, Tk. 140.00/Vial, 250mg/vial, Tk. 52.00/ Vial, 500mg, Tk. 76.00/ Vial

Taxim(Acme), Inj., 1 gm/vial, Tk. 150.44/Vial, 250 mg/vial, Tk. 75.22/ Vial, 500 mg/Vial, Tk. 100.30/ Vial

Torped(Orion), Inj., 1 gm/vial, Tk. 130.88/ Vial, 250 mg/vial, Tk. 50.35/ Vial, 500 mg/vial, Tk. 75.50/ Vial

CEFPODOXIME^[W]

Indications: Upper respiratory-tract infections, particularly those that are recurrent and resistant to other antibiotics; lower respiratory-tract infections including bronchitis and pneumonia; skin and soft tissue infections; uncomplicated UTI and gonorrhea; also effective against penicillin-resistant strains of *Streptococcus pneumonia*

Caution, Contraindications and Side-effects: See notes above and under cefadroxil

Interactions: See Appendix -2

Dose: Oral: as cefpodoxime proxetil: upper respiratory-tract infections (in pharyngitis and tonsillitis only in infections which are recurrent, chronic, or resistant to other antibacterial), 100 mg twice daily, 200 mg twice daily in sinusitis; lower respiratory tract infections including bronchitis and pneumonia, 100-200 mg twice daily; skin and soft tissue infections, 200 mg twice daily; uncomplicated urinary-tract infections, 100-200 mg twice daily; uncomplicated gonorrhea, 200 mg as a single dose; CHILD 15 days-6 months 4 mg/kg every 12 hours; 6 months-2 years 40 mg every 12 hours; 3-8 years 80 mg every 12 hours; > 9 years 100 mg every 12 hours

Proprietary Preparations

Cefdox(ACI), Susp., 40 mg/5 ml, Tk. 98.67/50ml, 80 mg/5 ml, Tk. 176.19/50ml; Tab., 200mg, Tk. 42.29/Tab.; Cap., 100mg, Tk. 22.13/Cap., 200mg, Tk. 25.00/Cap.; Paed. drops 20 mg/ml, Tk. 60.41/15ml

Cefipod(Asiatic), Susp., 40 mg/5 ml, Tk. 195.00/100ml, 80 mg/5 ml, Tk. 175.00/50ml; Cap., 100mg, Tk. 14.00/Cap.; Paed. drops, 20 mg/ml, Tk. 60.00/15ml

Cefobid(UniMed), Cap., 200mg, Tk. 42.00/Cap.; Susp., 40mg/5ml, Tk. 98.00/50ml

Cefodim(Pacific), Cap., 100 mg, Tk. 22.00/Cap.; 200 mg, Tk. 40.00/Cap.; Susp., 40mg/5ml, Tk. 80.00/50ml

Cefokid(Euro), Susp., 80 mg/5 ml, Tk. 98.00/50ml

Cefomin(Popular), Tab., 100mg, Tk. 20.08/Tab.; 200.00mg, Tk. 38.14/Tab. Susp., 40mg/5 ml, Tk. 96.36/50ml

1. ANTI-INFECTIVES

Ceforan(*Drug Intl*), Tab., 200mg, Tk. 28.10/Tab. ; 100mg, Tk. 17.05/Tab. ; Susp., 40mg/5ml, Tk. 120.40/100ml, Tk. 75.25/50ml, 80mg/5ml, Tk. 175.55/50ml
Cefpod(*Zenith*), Tab., 100 mg , Tk. 22.00/Tab.
Cepdioxim(*Alco*), Cap., 100 mg, Tk. 20.06/Cap.; 200 mg, Tk. 30.09/Cap. Susp., 40 mg/ 5ml, Tk. 175.53/100ml ;, Tk. 90.27/50ml ;,
CP(*Acme*), Tab., 200 mg, Tk. 42.29/Tab. ; Susp., 40 mg/5 ml, Tk. 98.65/50ml.; 80mg/5 ml, Tk. 175.52/50ml.; Paed. drops, 120 mg/1.25ml, Tk. 60.40/15ml
Desbac(*General*), Cap., 100mg, Tk. 22.13/Cap.; Susp., 40 mg/5ml, Tk. 98.67/50ml
Dofixim(*Ibn Sina*), Cap., 100mg, Tk. 168.00/Cap.; Susp., 40 mg/ 5ml, Tk. 100.00/50ml
DxProxil(*Monico*), Susp., 40mg/5ml, Tk. 98.00/50ml
Emiprox(*Virgo*), Susp., 40 mg/5 ml, Tk. 90.00/50ml, 80 mg/5 ml, Tk. 170.00/50ml
Instina(*Ziska*), Susp., 40 mg/5 ml, Tk. 98.00/50ml
Kidcef(*Beacon*), Susp., 40mg/5ml, Tk. 98.67/50ml
Leproxx(*Amico*), Susp., 40mg/5ml, Tk. 98.00/50ml.; 80mg/5ml, Tk. 175.00/50ml
Neoproxx(*Somatec*), Susp., 40 mg/5 ml, Tk. 98.37/50ml.; Paed. drops, 20 mg/ml, Tk. 60.23/15ml
Pedicef(*Orion*), Paed. drops , 20mg/ml, Tk. 60.39/15ml.; Susp., 40mg/5ml, Tk. 98.66/50ml.; 80mg/5ml, Tk. 176.19/50ml
Podo(*Kemiko*) Susp., 40 mg / 5ml, Tk. 98.29/50ml
Rovantin(*Opsonin*), Susp., 40 mg /5 ml, Tk. 98.66/50ml, 80 mg /5 ml, Tk. 175.66/50ml, 20 mg /5 ml, Tk. 60.42/5ml.; Tab., 100 mg , Tk. 14.05/Tab., 200 mg , Tk. 25.09/Tab.
Roxetil(*Healthcare*), Cap., 100mg , Tk. 352.00/Cap. , 200mg, Tk. 504.00/Cap. ; Susp., 40mg/5ml, Tk. 95.00/50 ml
Sarelox(*Sanofi*), Susp., 80mg/ml, Tk. 98.67/50 ml
Starin(*Eskayef*), Susp., 40 mg/ 5ml, Tk. 98.00/50ml, 80 mg/5 ml, Tk. 150/50ml.; Cap., 100mg , Tk. 22.00/Cap. , 200mg , Tk. 40.00/Cap.; Paed. drops , 20mg/ml, Tk. 60.00/15ml
Taxetil(*Aristo*), Susp., 80 mg/5 ml, Tk. 175.00/50ml.; 40 mg/5 ml, Tk. 99.00/50ml, Tk. 195.00/100ml.; Cap., 100mg , Tk. 22.00/Cap.; 200mg , Tk. 40.00/Cap.; Paed. drops, 20 mg/ml, Tk. 62.00/15ml
Trioclav(*Eskayef*), Tab, 200mg, Tk. 40.00/Tab.; 200mg , Tk. 40.00/Tab.
Trucef(*Renata*), Paed. drops, 20 mg/ml, Tk. 60.23/15ml.; Susp., 40 mg/ 5ml, Tk. 98.37/50ml.; 80 mg/ 5ml, Tk. 175.66/50ml

Vanprox(*Square*), Paed. drops, 20 mg/ml, Tk. 60.4/15ml.; Susp., 40 mg/5 ml, Tk. 98.65/50ml.; Cap., 200 mg, Tk. 42.29/Cap.
Vercef(*Beximco*), Paed. drops, 20 mg/ml, Tk. 60.00/15ml.; Susp., 40mg/5ml, Tk. 98.00/50ml.; 80mg/5ml, Tk. 175.00/50ml
Victorin(*Novo Health*), Cap., 200 mg, Tk. 40.00/Cap. ; Paed. drops, 20 mg/ml, Tk. 60.00/15ml.; Susp., 40mg/5ml, Tk. 98.00/50ml
Ximeprox(*Incepta*), Paed. drops, 20 mg/ml, Tk. 60.00/15ml.; Susp., 40 mg/ 5ml, Tk. 175.00/50ml.; Tk. 195.00/100ml.; 80 mg/5 ml, Tk. 98.00/50ml.; Tab., 100 mg, Tk. 17.00/Tab. ; 200 mg, Tk. 28.00/Tab.
Zedoxim(*Globe*), Cap., 100 mg, Tk. 20.00/Cap. , 200 mg, Tk. 40.00/Cap. ; Paed. drop , 20 mg/ml, Tk. 60.00/Vial.; Susp., 40 mg/5 ml, Tk. 95.00/50 ml;

Cefpodoxime + Clavulanic Acid

Clavuran(*Drug Intl*), Tab., 100mg+ 62.5mg, Tk. 22.10/Tab.; 200mg+ 125mg, Tk. 35.15/Tab.
Combocef(*ACI*), Tab., 200mg +125mg Tk. 50.15/Tab.; 100mg + 62.5mg, Tk. 30.09/Tab.
Duo(*Incepta*), Tab, 100mg+ 62.5mg, Tk. 25.00/Tab.; 200 mg + 125 mg, Tk. 40.00/Tab.
Xtabac(*Opsonin*), Tab. , 200 mg + 125 mg , Tk. 35.00/Tab.; 100 mg + 62.50 mg, Tk. 20.00/Tab.

CEFTAZIDIME^[w]

Indications: With an aminoglycoside treatment of choice for *Pseudomonas meningitis*, surgical prophylaxis, *also see under Cefixime*

Cautions, Contra-indications, Side-effects: See notes above and under *cefadroxil*

Interactions: See Appendix-2

Dose: IM or slow IV inj. or IV infusion: 1 g every 8 hours for mild to moderate infections, increased to 2 g every 8-12 hours for severe infections, single dose over 1 g IV route only, up to a max. of 3 g daily; CHILD up to 2 months 25-60 mg/kg daily in 2 divided doses, > 2 months 30-100 mg/kg daily in 2-3 divided doses; up to 150 mg/kg daily in 3 divided doses (max. 6 g daily) if immunocompromised or meningitis; IV route recommended for children; urinary tract and less serious infections: 0.5-1 g every 12 hours; *Pseudomonas lung infection in cystic fibrosis*: ADULT with normal renal function 100-150 mg/kg daily in 3 divided doses; CHILD up to 150 mg/kg daily (max. 6 g daily) in 3 divided doses; IV

route recommended for children; surgical prophylaxis, prostatic surgery, 1 g at induction of anesthesia repeated if necessary when catheter removed

Proprietary Preparations

Asizime(*Asiatic*), Inj , 1gm/vial, Tk. 240.00/Vial, Inj , 250mg/vial , Tk. 85.00/Vial,500mg/vial , Tk. 130.00/ Vial
Cefazid(*Renata*), Inj, 1 gm/vial, Tk. 240.00/Vial,250 mg/vial, Tk. 85.00/ Vial,500 mg/vial, Tk. 130.00/ Vial
Ceftazim(*Aristo*), Inj , 1g/vial, Tk. 240.00/Vial,250mg/vial , Tk. 85.00/ Vial,500mg/vial , Tk. 130.00/Vial
Lesero(*Ziska*), Inj , 1g/vial, Tk. 215.00/ Vial,500 mg/vial, Tk. 115.00/Vial ,250 mg/vial, Tk. 70.00/ Vial
Maxidim(*Beximco*), Inj , 250mg/vial, Tk. 85.00/ Vial.; 500mg/vial, Tk. 130.00/ Vial,1gm/vial, Tk. 240.00/ Vial
Serozid(*Opsonin*), Inj , 500 mg/vial , Tk. 130.39/ Vial,1 gm/vial, Tk. 240.00/ Vial ,250 mg/vial , Tk. 85.00/ Vial
Sidobac(*Incepta*), Inj , 1 gm/vial, Tk. 215.00/ Vial , 250 mg/vial, Tk. 70.00/ Vial,500 mg/vial, Tk. 115.00/ Vial
Tazicef(*Novo Health*), Inj , 250 mg/vial, Tk. 70.00/ Vial ,1.0 gm/vial, Tk. 215.00/ Vial,500 mg/vial, Tk. 115.00/ Vial
Tazid(*Square*), Inj , 1 gm/vial, Tk. 240.72/ Vial.; 250 mg/vial, Tk. 85.26/ Vial,500 mg/vial, Tk. 130.39/ Vial
Tazimax(*Eskayef*), Inj, 1gm, Tk. 240.00/ Vial.; 250mg , Tk. 85.00/ Vial,1gm/vial, Tk. 240.00/Vial,250mg/vial, Tk. 85.00/ Vial
Tizime(*Globe*), Inj , 1 gm/vial, Tk. 210.00/Vial.; 250 mg/vial,Tk. 70.00/Vial,500 mg/vial, Tk. 115.00/Vial
Trizidim(*Acme*), Inj , 250 mg/vial, Tk. 70.47/ Vial.; 1 gm, Tk. 216.45/ Vial,500 mg, Tk. 115.78/ Vial
Trum(*Drug Intl*), Inj , 1gm, Tk. 225.70/ Vial.; 250mg/vial, Tk. 70.25/ Vial.; 500mg/vial, Tk. 120.40/ Vial
Zidicef(*Popular*), Inj , 1 gm/vial, Tk. 215.81/ Vial.; 250mg/vial, Tk. 70.26/ Vial.; 500 mg/vial, Tk.115.43/ Vial,2 gm, Tk. 361.36/ Vial
Zidim(*Orion*), Inj , 500 mg, Tk. 115.78/ Vial , 1 gm/vial, Tk. 216.45/Vial,250 mg/vial, Tk. 70.48/ Vial
Zidimax(*Biopharma*), Inj , 250mg/vial , Tk. 70.00/ Vial,500mg/vial, Tk. 115.00/ Vial
Zitum(*ACI*), Inj , 250mg/vial,Tk. 70.47/ Vial,500mg/vial, Tk. 115.78/ Vial,1gm/vial,Tk. 226.53/ Vial

1. ANTI-INFECTIVES

CEFTIBUTEN^[W]

Ceftibuten is an oral 3rd generation cephalosporin used similarly to cefixime in the treatment of urinary tract infection and respiratory tract infection.

Indications: See under *Cefixime*

Cautions, Contra-indications, Side-effects: See notes above and under *cefadroxil*

Interactions: See Appendix-2

Dose: Oral: ADULT and CHILD > 10 years: 400 mg once daily; CHILD > 6 months: 8 mg/kg once daily

Proprietary Preparations

Butibac(*Drug Intl*), Cap., 400 mg, Tk. 120.00/Cap. ; Susp., 90 mg/5 ml, Tk. 480.00/60ml
Buticef(*Ibn Sina*), Susp., 90 mg/5 ml, Tk. 480.00/60ml ; Cap., 400 mg, Tk. 1200.00/Cap.
Cebumax(*General*), Cap. , 400 mg, Tk. 120.00/Cap.; Susp., 90 mg/5 ml, Tk. 480.00/60ml
Cebuten(*Renata*), Cap., 400 mg, Tk. 120.00/Cap. ; 400 mg, Tk. 120.00/Cap.
Cefamax(*Incepta*), Susp., 90 mg/5 ml, Tk. 480.00/60ml.; Cap. , 400 mg, Tk. 120.00/Cap.
Cefaten(*Eskayef*), Cap. , 400 mg, Tk. 120.00/Cap., 400 mg, Susp., 90 mg/5 ml, Tk. 465.00/60ml., 90 mg/5 ml, Tk. 775.00/100ml
Cefteria(*ACI*), Susp., 90 mg/5 ml, TK. 481.00/60ml ,90 mg/5 ml, TK. 802.00/120ml ;Cap., 400 mg, TK. 120.00/Cap.
Ceftiben(*Square*), Cap., 400 mg, Tk. 120.00/Cap. ; Susp., 90 mg/5 ml, Tk. 480.00/60ml
Inbuten(*Pharmacil*), Cap. , 400 mg, Tk. 120.00/Cap.; Susp., 90 mg/5 ml, Tk. 480.00/60 ml
Logibac(*Acme*), Susp., 90 mg/5 ml, Tk. 480.00/60ml.; Cap., 400 mg, Tk. 120.00/Cap.
Maxbuten(*Sanofi*), Susp., 180mg/ml, Tk. 800.00/60ml,90 mg/5 ml, Tk. 480.00/60ml.; Tab., 400mg, Tk. 120.00/Tab.;
Oditen(*Opsonin*), Cap., 400 mg, Tk. 120.37/Cap.; Susp., 90 mg/5 ml, Tk. 481.44/60 ml ,Tk. 800.00/120 ml
Roin(*Ziska*), Cap. , 400 mg, Tk. 120.00/Cap. ; Susp., 90 mg/5 ml, Tk. 400.00/60ml
Tibucef(*Globe*), Susp., 90 mg/5 ml, Tk. 465.00/60 ml.; Cap., 400 mg, Tk. 120.00/Cap.
Zoventa(*Healthcare*), Susp., 180mg/5ml, Tk. 800.00/60 ml ,90mg/5ml ,Tk. 480.00/60 ml,Cap.,200 mg ;Cap Tk. 70.00/Cap.,400 mg,Tk. 120.00/Cap.

1. ANTI-INFECTIVES

CEFTRIAXONE^[W]

Indications: Surgical prophylaxis; also see under *Cefotaxime*

Cautions: See notes above ; also hepatic impairment, in premature neonates may displace bilirubin from binding sites of albumin

Contra-indications: Neonates with jaundice, hypoalbuminemia, acidosis or impaired bilirubin binding; also see under *Cefadroxil*

Interactions: See Appendix -2

Side-effects: See under *Cefadroxil*; also pancreatitis, rarely prolongation of prothrombin time

Dose: By IM or slow IV inj. over at least 2-4 minutes or IV infusion 1 g daily for mild to moderate infections, increased to 2-4 g daily for severe infections; INFANT and CHILD 20-50 mg/kg daily in mild to moderate infections, up to 80 mg/kg daily in severe infections; doses of 50 mg/kg and over by IV infusion only; NEONATES by IV infusion over 60 minutes, 20-50 mg/kg daily up to a max. of 50 mg/kg daily; uncomplicated gonorrhea: by deep IM inj. of 250 mg as a single dose; surgical prophylaxis: by deep IM inj. or IV inj. over at least 2-4 minutes, 1 g a single dose; colorectal surgery deep IM inj. or inj. over at least 2-4 minutes or by IV infusion, 2 g as a single dose; IM doses over 1 g should be divided between more than one site

Proprietary Preparations

Aciphin(ACI), Inj., IM 1g/vial, Tk. 191.29/Vial, 500mg/vial , Tk. 130.39/vial, 250mg , Tk. 100.30/vial ,Inj., IV 2gm/vial, TK. 302.04/Vial, 1g/vial, Tk. 191.29/Vial.; 500mg/vial, Tk. 130.39/vial, 250mg/vial, Tk. 100.30/Vial.;
Arixon(Beximco), Inj., IM 1g/vial,Tk.190.00/vial,500mg/vial, Tk. 130.00/vial; 250mg/vial, Tk. 100.00/vial.;Inj.,IV 2g/vial, Tk. 300.00/vial, 1g/vial.; Tk. 190.00/vial.;500mg/vial, Tk. 300.00/vial.;250mg/vial , Tk. 100.00/vial
Asixone(Asiatic), Inj., IM 1g/vial, Tk. 190.00/vial.; 500mg/vial , Tk. 130.00/vial.;250mg/vial , Tk. 100.00/vial.; Inj., IV 2g/vial, Tk. 300.00/vial.; 1g/vial, Tk. 190.00/vial.; 500mg/vial , Tk. 130.00/vial.; 250mg/vial , Tk. 100.00/vial.;
Axon(Aristo),Inj., IM 1g/vial, Tk. 200/vial,500mg/vial , Tk. 130.00/vial,250mg/vial

, Tk. 100.00/vial,Inj., IV 2g/vial, Tk. 300.00/vial,1g/vial, Tk. 200.00/vial,500mg/vial , Tk. 130.00/vial, 250mg/vial , Tk. 100.00/vial
Axosin(Ibn Sina), Inj., IM 1g/vial, Tk. 180.00/vial.; 500mg/vial, Tk. 120.46/vial,250mg/vial , Tk. 90.00/vial.; Inj., IV 2g/vial, Tk. 290.00/vial.; 1g/vial, Tk. 180.00/vial.; 500mg/vial , Tk. 120.46/vial, 250mg/vial , Tk. 90.00/vial
Cefaz(Astra Bio), Inj., IM 1g/vial, 250mg/vial,Tk. 100.00/vial.; Inj., IV 2g/vial, Tk. 300.00/vial, 1g/vial, Tk. 190.00/vial.;
Cefone(Sharif), Inj., IM 500mg/vial,Tk.120.37/vial.;250mg/vial , Tk. 90.28/vial.; Inj., IV 2g/vial, Tk. 200.79/vial,1g/vial, Tk. 180.58/vial.;
Ceftizone(Renata),Inj., IM 1g/vial, Tk. 200.75/vial.; 500mg/vial , Tk. 140.53/vial.; 250mg/vial , Tk. 100.38/vial.; Inj., IV 2g,Tk. 341.28/vial.; Tk. 500mg/vial , Tk. 140.53/vial.; 250mg/vial , Tk. 100.38/vial.;
Ceftobac(Organic), Inj., IM 1g/vial, Tk. 160.00/vial.; 500mg/vial , Tk. 120.00/vial.; Inj., IV 2g/vial, Tk. 300.00/vial.;
Ceftriax(Novo Healthcare), Inj., IM 1g/vial, TK. 191.29/Vial.;500mg/vial ,Tk. 130.39/vial.;250mg/vial, Tk. 100.30/vial; Inj., IV 2gm/vial, Tk. 302.04/Vial.;1g/vial, Tk. 191.29/Vial,Inj., 500mg/vial, Tk. 130.39/vial.; 250mg/vial, Tk. 100.30/Vial.;
Ceftron(Square), Inj., IM., 1g/100vial, Tk. 190.58/Vial.; 500mg/vial, Tk. 130.39/vial.; 250mg/vial , Tk. 100.30/vial; Inj., IV 2gm/vial, Tk. 302.04/Vial.; 1g/vial, Tk. 190.58/Vial.; 500mg/vial, Tk. 130.39/vial.;250mg/vial,Tk. 100.30/Vial.;
Cetaxone(Euro), Inj., IM 1g/vial, TK. 190.00/Vial.; 500mg , TK. 130.00/vial.; 250mg , TK. 100.30/vial
Inj., IV 2gm/vial,TK. 300.00/Vial.; 1g/vial, TK. 190.00/Vial.; 500mg/vial, TK. 130.00/vial,250mg/via, TK. 100.30/Vial.;
Dicephin(Drug Intl),Inj., IM.; 1g/vial, TK. 190.60/Vial.; 500mg/vial , Tk. 130.45/vial.; 250mg/vial , Tk. 100.30/vial ; Inj., IV 2gm/vial,Tk. 301.00/Vial.; 1g/vial, Tk. 190.60/Vial.; 500mg/vial, Tk. 130.45/vial.,250mg/vial, Tk. 100.30/Vial.;
Enocef(Sanofi), Inj., IM 1g/vial, Tk. 201.35/Vial,
Exephin(Incepta), IM Inj. , 1 gm/vial, Tk. 190.00/vial.; 250 mg/vial, Tk. 100.00/vial.; 500 mg/vial, Tk. 130.00/vial.;Inj.,IV.,2 gm/vial, Tk. 300.00/vial.; 1 gm/vial, Tk. 190.00/Vial.; 250 mg/vial, Tk. 100/vial ; 500 mg/vial, Tk. 130.00/vial
Imacef(General),Inj., IM 1g/vial, Tk. 190.00/Vial.; 500mg , Tk. 130.00/vial.; Inj., IV 2gm, Tk. 302.04/Vial.;1g/vial, Tk. 161.08/Vial.; 500mg/vial, Tk.130.00/vial
Infecel(Alco), Inj.,IM 1g, Tk. 190.57/Vial.; 500mg , Tk. 130.39/vial.;250mg, Tk.

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100.39/vial; Inj., IV 2gm, Tk. , 300.90/Vial;
1g/vial, Tk. 190.57/Vial; 500mg/vial, Tk.
130.39/vial, 250mg/vial, Tk. 100.30/Vial;
Maxzon(One Pharma), IM Inj. , 250 mg/vial,
Tk. 100.00/vial; 500 mg/vial , Tk. 130.00/vial;
Inj., IV., 1 gm/vial, Tk.1190.00/vial; 2 gm/vial ,
Tk. 300.00/vial
Odatrix(UniMed), Inj., IM 1g/vial, Tk.
160.00/Vial; 500mg/vial , Tk. 120.00/vial;
Inj., IV 2gm/vial, Tk. 300.00/Vial; 1g/vial, Tk.
160.00/Vial;
Oricef(Healthcare), IM Inj. , 1gm/vial , Tk.
320.00/vial; 250mg/vial , Tk. 130.00/vial;
500mg/vial , Tk. 200.00/vial; IV Inj., 1gm/vial ,
Tk. 320.00/vial; 250mg/vial, Tk. 130.00/vial;
2gm/vial, Tk. 490.00/vial; 500mg/vial , Tk.
200.00/vial
Orizone(Pharmacil), IV Inj. , 1 gm/vial, Tk.
290.87/Vial ; 2gm/vial, Tk. 501.05/Vial ;
500mg , Tk. 200.60/Vial
Perix(Monico),
Inj., IM 250mg/vial, Tk. 90.00/Vial;
Rit(Kemiko), Inj., IM 1g/vial, Tk. 190.58/Vial;
500mg/vial, Tk. 120.35/vial, 250mg/vial, Tk.
95.29/vial, Inj., IV Inj., 2g/vial, Tk. 300.00/Vial;
Inj., 1g/vial, Tk. 190.58/Vial; Inj., 500mg/vial,
Tk. 120.35/vial, 250mg/vial, Tk. 95.29/vial
Rofecin(Radiant), IM Inj. 250mg, Tk.
150.45/vial; 1 gm/vial, Tk. 361.08/vial;
500mg, Tk. 220.66/vial; Inj., IV. 500mg/vial, Tk.
220.66/vial; 2.0g/vial , Tk. 682.05/vial; 1
gm/vial, Tk. 361.08/vial; 250mg, Tk.
150.45/vial
Traxef(Beacon), Inj., 1gm , Tk. 320.96/vial
Traxon(Opsonin), IM. Inj. , 1gm/vial , Tk.
190.00/vial; 250 mg/vial , Tk. 100.00/vial;
500 mg/vial, Tk. 130.00/vial; IV Inj., 500
mg/Vial , Tk. 130.00/vial ; 1gm/Vial , Tk.
190.58/vil; 250 mg/Vial , Tk. 100.00/vial
2 gm/vial , Tk. 302.03/vial;
Tribac(Globe), IM Inj. , 1 gm/vial, Tk.
180.00/Vial; 250 mg/vial, Tk. 90.00/Vial; 500
mg/Vial, Tk. 120.00/Vial; IV Inj., 2 gm/vial, Tk.
300.00/Vial; 1 gm/vial, Tk. 180.00/Vial; 250
mg/vial, Tk. 90.00/Vial; 500 mg/vial, Tk.
120.00/Vial
Triject(Eskayef), IM., Inj, 1 gm/vial, Tk.
190.00/Vial; 500mg/vial, Tk. 130.00/Vial ;
250mg/vial, Tk. 100.00/Vial; 500mg/vial, Tk.
130.00/Vial; IV .Inj., 2 gm/vial, Tk.
300.00/Vial; 250mg/vial, Tk. 100.00/Vial; 1
gm/vial, Tk. 190.00/Vial; 500mg/vial, Tk.
130.00/Vial; 250mg/vial, Tk. 100.00/vial
Triphin(Ziska), IM Inj. , 1 gm/Vial, Tk.
160.00/vial; 250 mg/Vial, Tk. 80.00/vial; 500
mg/Vial, Tk. 120.00/vial; IV, Inj. , 2 gm/vial, Tk.
250.00/vial; 1 gm/vial, Tk. 160.00/vial; 250
mg/vial, Tk. 80.00/vial; 500 mg/vial, Tk.
120.00/vial

Trizon(Acme), IM Inj., 1 g/Vial, Tk. 190.58/vial;
250 mg/Vial, Tk. 100.30/vial; 500 mg/Vial, Tk.
130.39/vial; 1 g/Vial, Tk.
190.58/vial; IV Inj., 2gm/vial, Tk. 300.90/vial;
250 mg/vial, Tk. 100.30/vial ; 500 mg/vial, Tk.
130.39/vial
Vertex(Orion), IM Inj , 1 gm/vial, Tk.
190.21/Vial; 250 mg/vial, Tk. 100.3/Vial;
500 mg/vial, Tk. 130.39/Vial; IV Inj., 2
gm/vial, Tk. 302.04/Vial ; 1 gm/vial, Tk.
190.21/Vial; 250 mg/vial, Tk. 100.30/Vial.
500 mg/vial, Tk. 130.39/Vial
Winner(Biopharma), IM Inj. , 1 gm/vial, Tk.
180.68/vial; 500mg/vial , Tk. 120.45/vial;
IV Inj., 500mg/vial , Tk. 120.45/vial; 1 gm/vial,
Tk. 180.68/vial; 2gm/vial, Tk. 300.00/vial

1.1.2.2 FOURTH-GENERATION CEPHALOSPORINS^[R]

Fourth generation drugs have an extended spectrum of activity compared to third generation and have increased stability against betalactamases. They are considered to be particularly useful in infections caused by aerobic gram-negative organisms resistant to third generation cephalosporins.

CEFEPIME^[R]

Indications: Drug of choice for the empirical treatment of nosocomial infections, i.e. nosocomial isolates of *enterobacter*, *citrobacter* and *serratia*; also see under *Cefixime*
Cautions, Contra-indications, Side-effects: See notes above and under *cefadroxil*

Interactions: See Appendix-2

Dose: By slow IV inj. over at least 2-4 minutes or IV infusion 0.5-1 g 12 hourly for mild to moderate infections; increased to 2 g daily every 12 hours for severe infections; INFANT and CHILD 75-120 mg/kg/day in 2-3 divided doses

Proprietary Preparations

Ceftipime(Renata), Inj, 1 gm/vial, Tk. 552.08/
Vial; 2 gm/vial, Tk. 1104.15/ Vial, 500 mg, Tk.
301.13/ Vial
Efepime(Ziska), Inj, 1 g/vial, Tk. 550.00/Vial, 2
g/vial, Tk. 1100.00/Vial, 500 mg/vial, Tk.
300.00/ Vial

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Forgen(Aristo), Inj, 1 gm/vial, Tk. 550.00/ Vial, 2gm/vial , Tk. 1100.00/ Vial,500mg/vial , Tk. 300.00/ Vial
Gen-4(Ibn Sina), Inj, 500 mg/vial, Tk. 555.00/ Vial,2gm/vial, Tk. 1010.00/ Vial,500mg, Tk. 305.00/ Vial
Magnova , (Orion), Inj, 1mg/vial , Tk. 551.65/ Vial,2 gm/vial , Tk. 1103.31/ Vial ,500mg , Tk. 300.90/ Vial
Maxpime(Square), Inj, 1 gm/vial, Tk. 551.65/ Vial,500 mg, Tk. 300.90/ Vial,2gm/vial , Tk. 1100.00/ Vial
Pime(ACI), Inj, 1gm/vial, Tk. 553.73/ Vial,; 2gm/vial, Tk. 1107.47/ Vial,; 500mg, Tk. 302.04/ Vial
Superpime(Acme), Inj, 1 gm/vial, Tk. 551.64/ Vial, 2 gm/vial, Tk. 1103.31/ Vial, 500 mg/vial , Tk. 300.90/ Vial
Tetracef(Beximco), Inj, 1gm/vial, Tk. 550.00/ Vial, 500mg, Tk. 300/Vial
Tupime(Kemiko), Inj, 1 gm/vial, Tk. 551.65/Vial
Ultrapime(Incepta), Inj, 1 gm/vial, Tk. 550.00/ Vial, 500 mg, Tk. 300.00/ Vial
Unipim(Drug Intl), Inj, 1gm/vial, Tk. 501.50/ Vial, 500mg, Tk. 301.10/ Vial
Winnipime(Sanofi), Inj, 1g/vial, Tk. 551.65/ Vial ,2g/vial, Tk. 1103.31/ Vial
Xenim(Opsonin), Inj., 1 gm/vial, Tk. 552.08/ Vial,; 500 mg/vial , Tk. 301.13/ Vial
Ximepime(Globe), Inj., 1 gm/vial, 550.00/ Vial,; 2 gm/vial, 1100.00/ Vial,; 500 mg/vial , 300.00/Vial,; 1gm/vial , Tk. 550.00/ Vial, 2gm/vial , Tk. 1100.00/ Vial, 500mg , Tk. 300.00/ Vial
Zopime(Healthcare), Inj., 1gm/vial , Tk. 550.00/ Vial, 500mg/vial, Tk. 300.00/ Vial

CEFTIPIROME^[R]

Indications: infections due to sensitive Gram positive and Gram-negative bacteria

Cautions, Contra-indications, Side-effects: See notes above and under cefadroxil

Interactions: See Appendix -2

Dose: IV inj. or infusion: complicated upper and lower UTI, Skin and Soft tissue infections, 1 g every 12 hours, increased to 2 g every 12 hours in very severe infections;
 Lower Respiratory Tract Infection, 1-2 g every 12 hours;
 Severe infections including bacteremia and septicemia and infections in neutropenic patients, 2 g every 12 hours
 CHILD less than 12 years not recommended

Proprietary Preparation

Force(Square), IV Inj. 1 gm/Vial, Tk. 401.51/Vial

1.1.3 OTHER BETA-LACTAMS

1.1.3.1 CARBAPENEMS^[W]

1.1.3.2 MONOBACTAM^[W]

Besides Penicillins and Cephalosporins, Carbapenems (Doripenem, Ertapenem, Imipenem, Meropenem) and monobactam (Aztreonam) are important therapeutic agents with a beta lactam structure. They are bactericidal and act by inhibiting cell wall synthesis of susceptible organisms.

1.1.3.1. CARBAPENEMS^[W]

The carbapenems have wide spectrum of activity, being active against many aerobic and anaerobic gram-positive and gram-negative organisms, including *Listeria*, *Pseudomonas* and most *Enterobacteriaceae*. Carbapenems are resistant to wide spectrum of betalactamases.

DORIPENEM^[W]

Doripenem is the newest of the carbapenems with a broad spectrum and enhanced gram-negative antimicrobial activity particularly against *P. aeruginosa*. institutional susceptibility patterns and cost may be the 2 factors that will carry the most weight in prescribing decisions.

Indications: Treatment of complicated intra-abdominal infections and complicated urinary tract infections, including pyelonephritis;

Cautions: Hypersensitivity to beta lactams, pregnancy, CNS disorders, renal impairment

Contra-indications: Hypersensitivity;

Interactions: See Appendix-2

Side-effects: See under Cefadroxil, also seizures, convulsions, confusion and mental disturbances

Dose: Complicated Intra-abdominal Infection: 500 mg IV infusion over 1 hour 8 hourly x 5-14 days, at least 3 days IV, may switch to an appropriate oral

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treatment if clinical improvement Noted;
Complicated UTI
500 mg IV infusion over 1 hour 8 hourly x
10 days can be extended up to 14 days if
concurrent bacteremia; *treatment of*
bronchopulmonary infection in patients
with cystic fibrosis who are colonized with
P aeruginosa

Proprietary Preparations

Dionem(Opsonin), Inj., 500 mg , Tk.
2000.00/Vial
Doriject(Popular), Inj., 500 mg Tk.
2000.00/Vial
Dorinem(ACI), Inj., 500 mg, Tk. 2006.02/Vial
Doripen(Eskayef), Inj., 500 mg, Tk.
2000.00/Vial, 250 mg, Tk. 1300.00/Vial,
Perinem(Drug Intl), Inj., 500 mg, Tk.
2000.00/Vial

ERTAPENEM^[W]

Ertapenem is considered a narrower
spectrum agent, as it has limited activity
against certain pathogens of concern
such as *P aeruginosa*.

Indications:Infection against *P*
aeruginosa.

Cautions: Hypersensitivity to other beta-
lactams, pregnancy, CNS disorders,
renal impairment

Interactions: See Appendix-2

Side-effects:See under Cefadroxil

Dose :1 gram IV or IM once daily for 5 to
14 days

Proprietary Preparation

Ertopen(Techno)Inj.,1 gm/vial,Tk.3400/vial

IMIPENEM WITH CILASTATIN^[W]

Indications: Drug of choice for infections
caused by cephalosporin-resistant
nosocomial bacteria, such as *Citrobacter*
freundii and *Enterobacter* spp; good
choice for empiric treatment of serious
infections in hospitalized patients who
have recently received other beta-lactam
drugs, urinary tract and lower respiratory
infections, septicemia particularly of renal
origin, intraabdominal and gynecological
infections, skin, soft-tissue, bone and
joint infections, surgical prophylaxis; also
see Notes above

Cautions: Hypersensitivity to other beta-
lactams, pregnancy, CNS disorders,
renal impairment

Contra-indications: Hypersensitivity to
imipenem or cilastatin, breast-feeding

Interactions: See Appendix -2

Side-effects:See under Cefadroxil, also
seizures, convulsions, confusion and
mental disturbances, increases in serum
creatinine and blood urea, tooth or
tongue discoloration, red coloration of
urine in children

Dose:Deep IM inj.: 500-750 mg 12
hourly; *gonococcal urethritis or cervicitis*,
500 mg a single dose;IV infusion, 1-2 g
daily in 3-4 divided doses, may be
increased to 50 mg/kg up to a max. of 4 g
daily; CHILD > 3 months, 60 mg/kg/day
in 4 divided doses; *surgical*
prophylaxis:IV infusion: 1 g at induction
of anesthesia repeated after 3 hours,
supplemented in colorectal, cardiac
surgery by doses of 500 mg 8 and 16
hours after induction

Proprietary Preparations

Cispenam(Incepta), Inj., 250 mg+250 mg, Tk.
650.00/Vial, 500 mg+ 500 mg , Tk. 1195/Vial.
Imbac(Popular), Inj. , 500 mg + 500 mg , Tk.
1199.51/Vial
Iminem(ACI), Inj., 500 mg + 500 mg , Tk.
1203.12/Vial ;, 250 mg + 250 mg , Tk.
650.00/Vial
Iropen(Renata),Inj., 500 mg + 500 mg , Tk.
1295.00/Vial
Maxipen(Opsonin), Inj., 500 mg + 500 mg ,
Tk. 1295.00/Vial

MEROPENEM^[W]

Indications: Aerobic and anaerobic
Gram-positive and Gram-negative
infections, septicemia; see also notes
above

Cautions: Hypersensitivity to beta-
lactam antibiotics; hepatic impairment
(Appendix-3); renal impairment
(appendix-4); pregnancy (appendix-5);
and breast-feeding(appendix-6);

Interactions: See Appendix-2

Contra indications: Hypersensitivity to
meropenem.

Side-effects: Gastrointestinal
disturbances such as nausea, vomiting,

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diarrhoea, abdominal pain; disturbance of liver function tests; hypersensitivity reaction such as skin rash, pruritus, urticaria, thrombocytopenia, positive Coombs test; eosinophilia, neutropenia, leucopenia; headache, paraesthesia; also reported convulsion, Steven-Johnson syndrome and toxic epidermal necrolysis; local reactions including pain and thrombophlebitis at injection site

Dose: By intravenous injection over 3 to 5 minutes or by intravenous infusion over 15 to 30 minutes in a usual dose of 0.5 to 1g every 8 hours; dose may be doubled in hospital-acquired pneumonia, peritonitis, septicemia and infections in neutropenic patients. 2g every 8 hours for meningitis; dose of up to 2 g every 8 hours also been used in cystic fibrosis. Dose should be reduced in patients with renal impairment; CHILD over 3 months of age and weighing less than of 50kg, 10-20mg/kg every 8 hours (not recommended for infection in neutropenia)

For meningitis, 2g every 8 hours; CHILD 3 months to 12 years 40mg/kg every 8 hours; over 50 kg body weight adult dose Exacerbations of chronic lower respiratory-tract infection in cystic fibrosis, up to 2g every 8 hours; CHILD 4-18 years 25-40mg/kg every 8 hours

Proprietary Preparations

Aronem(ACI), Inj., 1gm, Tk. 1208.14/Vial.; 500mg, Tk. 654.41/Vial

Aropen(Aristo), Inj., 1gm, Tk. 1200.00/Vial

Betanem (Kemiko), Inj., 1 gm/vial, Tk. 1250.00/Vial.; 500 mg/vial, Tk. 700.00/Vial

Carbanem(Sanofi), Inj., 1gm/vial, Tk. 1303.91/Vial.; 500mg, Tk. 702.11/Vial

Fulspec(Acme), Inj., 250 mg/vial, Tk. 400.00/Vial.; 1 gm/vial, Tk. 1208.15/Vial.;

500.00 mg/vial, Tk. 654.42/Vial

Intrapen(General), Inj., 1 gm/vial, Tk. 1303.90/Vial.; 500 mg, Tk. 702.11/Vial

I-Penam(Incepta), Inj., 1gm/vial, Tk. 1300.00/Vial.; 500 mg, Tk. 700.00/Vial

Menem(Astra Bio), Inj., 1 gm/vial, Tk. 1300.00/Vial.; 500 mg/vial, Tk. 700.00/Vial

Mepen(Biopharma), Inj., 1gm/vial, Tk. 1200.00/Vial.; 500mg/vial, Tk. 650.00/Vial

Merobac(Popular), Inj., 1gm/vial, Tk. 1204.53/Vial.; 750 mg, Tk. 652.45/Vial

Merocar(Globe), Inj., 1 gm/vial, Tk. 1200.00/Vial.; 500 mg, Tk. 650.00/Vial

Merocon(Beacon), Inj., 1 gm/vial, Tk. 1303.91/Vial.; 500 mg, Tk. 702.11/Vial

Meroject(Eskayef), Inj, 500mg, Tk. 700.00/Vial.; 1 gm/vial, Tk. 1300.00/Vial.;

500mg/vial, Tk. 700.00/Vial.; 1gm/vial, Tk. 1300.00/Vial.

Meromax(Orion), Inj., 500 mg/vial, Tk. 654.41/Vial.; 1 gm/vial, Tk. 1208.07/Vial

Meronex(Novo Health), Inj., 1gm/vial, Tk. 1300.00/Vial.; 500 mg/vial, Tk. 700.00/Vial

Meropen(Renata), Inj., 1 gm/vial, Tk. 1300.00/Vial.; 250 mg/Vial, Tk. 400.00/Vial.;

500 mg/vial, Tk. 700.00/Vial

Merotrax(Ibn Sina), Inj., 1gm/vial, Tk. 1300.00/Vial.; 500mg, Tk. 700.00/Vial

Neopenem(Healthcare), Inj, 1gm/vial, Tk. 1350.00/Vial.; 250mg/vial, Tk. 450.00/Vial.;

500mg/vial, Tk. 750.00/Vial

Penomer(Beximco), Inj., 500mg/vial, Tk. 700.00/Vial.; 1gm/vial, Tk. 1300.00/Vial

Ronem(Opsonin), Inj., 500 mg/vial, Tk. 700.00/Vial.; 1 gm/vial, Tk. 1300.00/Vial

Ropenem(Drug Intl), Inj., 1gm/vial, Tk. 1003.00/Vial.; 500mg, Tk. 503.15/Vial

Specbac(Square), Inj., 1 gm/vial, Tk. 1300.00/Vial.; 250 mg/vial, Tk. 400.00/Vial;

500 mg/vial, Tk. 700.00/Vial

Merocil(Pharmacil), IV Inj., 1 gm/Vial, Tk. 1594.78/Vial; 500mg/Vial, Tk. 852.56/Vial

1.1.3.2 MONOBACTAM^[W]

AZTREONAM^[W]

Indications: Gram negative infections caused by *Pseudomonas aeruginosa*, *Hemophilus influenzae*, *Neisseria meningitidis* and *N. gonorrhea*

Cautions: Hepatic impairment, breast-feeding; penicillins- and/or cephalosporins-allergic patients tolerate aztreonam without reaction

Contra-indications: Aztreonam hypersensitivity; pregnancy

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, diarrhea, abdominal cramps, mouth ulcers, altered taste, jaundice and hepatitis, blood disorders including thrombocytopenia and neutropenia, urticaria and rashes

Dose: Deep IM or slow IV inj. over at least 2-4 minutes or IV infusion: 1 g every 8 hours for mild to moderate infections;

increased to 2 g every 6-8 hours for severe infections; CHILD > 1 week, IV inj. or infusion: 30 mg/kg every 6-8 hours,

increased for severe infections in child > 2 years, to 50 mg/kg every 6-8 hours up to a max. of 8 g/day; for urinary tract infections, 0.5-1 g 8-12 hourly; for gonorrhea or cystitis, 1 g by IM inj. as a single dose

Proprietary Preparations

Atreon(Square), Inj., 500 mg/Vial, Tk. 300/Vial; 2 gm/Vial, Tk. 650/Vial; 1 gm/Vial, Tk. 450/Vial
Azonam(Incepta), Inj., 1 gm/Vial, Tk. 400/Vial

1.1.4. AMINOGLYCOSIDES^[A]

(See also section 12 and 10)

These drugs are primarily active against aerobic, gram-negative bacilli. Because of limited spectrum compared with other aminoglycosides, **Kanamycin** and **Streptomycin** are not recommended for infections caused by *P. aeruginosa* and *Serratia*. **Streptomycin** is active against *Mycobacterium tuberculosis*, for which it is now entirely reserved. **Gentamicin** and **Tobramycin** exhibit similar activity but against *P. aeruginosa* and some strains of *Proteus* species **Tobramycin** is considered to be superior. Aminoglycosides have limited activity against gram-positive bacteria. *S. aureus* and *Strep. viridans* appear to be sensitive while other gram-positive organisms and anaerobes are resistant.

Cautions: Patients with renal impairment may require earlier and more frequent concentration measurement. Patients with creatinine clearance value less than 80-100 ml/min. needs dose adjustment. Monitoring for ototoxicity by careful audiometric examination also is required in patients receiving high dosed and/or prolonged courses of aminoglycosides. Cautions are also required in pregnancy and in nursing mothers.

Use of aminoglycosides in second and third trimesters of pregnancy carries the risk of auditory or vestibular nerve damage. **Streptomycin** has the greatest risk and with **Gentamicin** and **Tobramycin** the risk is probably very small but should not be used unless

essential (if given, serum concentration must be monitored).

Side-effects: All aminoglycosides are ototoxic and nephrotoxic. Ototoxicity is largely irreversible. Concurrent use of frusemide, ethacrynic acid potentiates ototoxicity. Cochlear toxicity initiates as a high-pitched tinnitus followed by auditory impairment. Vestibular toxicity starts as moderately intense headache which is rapidly followed by an acute stage of nausea, vomiting and difficulty with equilibrium. All aminoglycosides are capable of affecting both cochlear and vestibular function. **Tobramycin** affects both functions, whereas **Amikacin**, **Neomycin** and **kanamycin** primarily affect auditory function and streptomycin and gentamicin are primarily vestibulotoxic. Nephrotoxicity of aminoglycosides is almost always reversible and starts as a defect in renal concentrating ability, mild proteinuria and appearance of hyaline and granular casts in urine. Most common significant finding is mild rise in serum creatinine. The most important result of nephrotoxicity is the reduced excretion of drug which, in turn, predisposes to ototoxicity. Other potentially nephrotoxic drugs such as **Amphotericin B**, **Vancomycin**, **Cisplatin**, **Cyclosporine**, **Cephalothin** aggravate aminoglycosides induced nephrotoxicity. In very high doses, these drugs can produce curare-like neuromuscular blockade and may cause respiratory paralysis.

AMIKACIN^{[A] [C]}

Indications: Preferred choice for initial treatment of serious nosocomial gram-negative bacillary infections resistant to gentamicin and tobramycin; also see under *Gentamicin*

Cautions, Contra-indications, Side-effects: See notes above

Dose: IM or slow IV inj. or IV infusion, 15 mg/kg daily divided doses every 12 hours

Proprietary Preparations

Amibac(Popular), Inj., 100 mg/2 ml, Tk. 16.06/2 ml; 500 mg/2ml, Tk. 48.18/2 ml

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Amikin(*Incepta*), Inj., 100 mg/2 ml, Tk. 16.00/2m l, 500 mg/2 ml, Tk. 48.00/2 ml
Amistar(*Square*), Inj., 100 mg/2 ml, Tk. 16.05/2 ml, 500 mg/2 ml, Tk. 48.14/2 ml
Kacin(*ACI*), Inj., 100mg/2ml, Tk. 16.11/2 ml,; 500mg/2ml, Tk. 48.32/2ml
Mikacin(*Aristo*), Inj., 500mg/2ml, Tk. 45.00/2 ml,; 100mg/2ml Tk. 15.00/2 ml
Pseudonil(*Drug Intl*), Inj., 100mg/2ml, Tk. 16.05/2 ml,; 250mg/2ml, Tk. 30.10/2 ml,; 500mg/2ml, Tk. 45.15/2 ml

GENTAMICIN^[ED] [A]

Indications: Urinary tract infections, bacteremia, infected burns, osteomyelitis, sepsis, pneumonia, peritonitis, biliary tract infections, acute pyelonephritis or prostatitis, otitis, meningitis, ocular infections caused by susceptible organisms (see notes above); with an antipseudomonal penicillin for sepsis in granulocytopenic patients, concurrently with penicillin G for bacterial endocarditis due to viridans *streptococci* or *enterococci*; in combination with nafcillin in selected cases of *staphylococcal endocarditis*; in combination with a penicillin and/or metronidazole for surgical chemoprophylaxis, and in undiagnosed serious infections

Cautions: See notes above

Contra-indications: Myasthenia gravis; also see notes above

Side-effects See notes above; also hypomagnesaemia on prolonged therapy

Dose: IM or slow IV inj. over at least 3 minutes, initially 2 mg/kg, then 3-5 mg/kg daily in divided doses every 8 hours, or as once-daily dose by IV infusion, 5 mg/kg given over 30-60 minutes; CHILD up to 2 weeks 3 mg/kg every 12 hours; 2 weeks-12 years 2 mg/kg every 8 hours; by intrathecal inj. 1-10 mg daily; ear and eye infections, 3-4 drops 3-4 times daily

Note: one-hour ("peak") concentration should not exceed 10 mg/litre (5 mg/litre in endocarditis); pre-dose ("trough") concentration should be less than 2 mg/litre (less than 1mg /litre in endocarditis)

Proprietary Preparations

Genacyn(*Square*), Inj., 80 mg /2 ml, Tk. 10.18/Amp; 20 mg /2 ml, Tk. 6.11/Amp

Gentabac(*Popular*), Inj., 80 mg /2 ml, Tk. 10.15/Amp; 20 mg /2 ml, Tk. 6.07/Amp
Gentanix(*Novo Health*), Inj., 80 mg/2 ml, Tk. 10.00/Amp

Gentin(*Opsonin*), Inj. 20 mg /2 ml, Tk. 6.08/ 2 ml /Amp,; Inj., 80 mg/2 ml, Tk. 14/2ml amp
Intamycin (*Incepta*), Inj. , 80 mg/2 ml, Tk. 10.00/Amp., 20 mg /2 ml, Tk. 6.00/Amp

Optimycin (*Aristo*) Inj. , 80 mg/2 ml, Tk. 14.00/Amp.

Invigen (*Beximco*), Inj. (IV. infusion). 80mg/100ml

Tk.47.22/100ml

G-Gentamycin(*Gonoshasthaya*) Inj. , 80 mg/2 ml, Tk. 12.00/Amp.,

NEOMYCIN SULPHATE^[ED] [A]

Indications: Bowel sterilization before surgery, with polymyxins for bladder irrigation to prevent bacteremia and bacteriuria associated with the use of indwelling catheters, infections associated with burns, wounds, ulcers, dermatoses caused by susceptible organisms, as an adjunct to the therapy of hepatic coma

Cautions: Too toxic for systemic use; because severe renal insufficiency may develop in the late stages of hepatic coma, great cautions should be taken when neomycin is utilized as an adjunct and should be stopped if there is ototoxicity or evidence of renal injury; also see notes above

Contra-indications: Intestinal obstruction; also see notes above

Side-effects: See notes above; also increased salivation, stomatitis

Interactions: See Appendix-2

Dose: Oral: Preoperative bowel sterilization, 1 g every 4 hours, for 2-3 days; hepatic coma, up to 4 g daily in divided doses usually for max.14 days

Side-effects: Increased salivation, stomatitis; see also under *Aminoglycosides*

Proprietary Preparations

See section 12.2.&10.2.(for skin and eye preparation)

STREPTOMYCIN^[ED] [A]

Indications: Tuberculosis in combination with other drugs; plague, tularemia, adjunct to doxycycline in brucellosis, enterococci endocarditis

Cautions, Contra-indications, Side-effects: See notes above

Interactions: See Appendix-2

Dose: Deep IM inj. or IV inj. ADULT tuberculosis, 15 mg/kg/d, CHILD 20-40 mg/kg/d, not to exceed 1-1.5 g/d; for intermittent supervised therapy 1-1.5 g twice or thrice weekly; bacterial endocarditis, 0.5 g twice daily; the dose is reduced in those under 50kg or those over 40 years or those with renal impairment

Note: one-hour ("peak") concentration should not exceed 40mg/litre; pre-dose ("trough") concentration should be less than 5 mg/litre (less than 1 mg/litre in renal impairment or in those over 50 years of age)

Generic Preparation

Injection, 1gm/vial

TOBRAMYCIN^[A]

Indications: See under Gentamicin

Cautions: See notes above; For inhalation treatment: other inhaled drugs should be given before,

Contraindications, Side-effects: See notes above

Interactions: See Appendix-2

Dose: IM or slow IV inj. over 3-5 minutes or IV infusion, 5-6 mg/kg daily in divided doses every 8 hours; NEONATES 2 mg/kg every 12 hours; CHILD > 1 week 2-2.5 mg/kg every 8 hours; for chronic pulmonary *Pseudomonas aeruginosa* infection in cystic fibrosis patients, by inhalation of nebulized solution, ADULT & CHILD over 6 years, 300 mg every 12 hours for 28 days, courses repeated after 28-day interval

Note: one-hour ("peak") concentration should not exceed 10 mg/litre; pre-dose ("trough") concentration should be less than 2 mg/litre

Proprietary Preparation

See section 10.2.1 (For Eye preparation only)

1.1.5 MACROLIDES**AZITHROMYCIN^[W]**

Indications: Same as that of Clarithromycin

Cautions, Contra-indications, Side-effects: See under Erythromycin; also anorexia, dyspepsia, photosensitivity, interstitial nephritis, acute renal failure, asthenia, paraesthesia, convulsions, Stevens-Johnson syndrome, toxic epidermal necrolysis and taste disturbances

Interactions: See Appendix -2

Dose: Oral & IV: ADULT should be given 1 hour before or 2 hours after meal when administered orally, 500 mg on first day, then 250 mg/d for days 2 through 5; uncomplicated genital chlamydial infections and non-gonococcal urethritis: 1 g as a single dose; M. avium-intracellulare infection in AIDS patients, for treatment 500 mg daily and for prevention 1200 mg once weekly; CHILD 10 mg/kg (max. 500 mg) on first day, then 5 mg/kg (max. 250 mg) for days 2 through 5

Proprietary Preparations

Acos (Radiant), Susp., 200ml/5ml, Tk.

175.53/30ml.; Tab., 500mg, Tk. 55.17/Tab.

Adiz (Euro), Cap., 250 mg, Tk. 25.00/Cap., 500 mg, Tk. 35.00/Cap.

Asizith (Asiatic), Susp., 200ml/5ml., Tk. 130.00/30ml, Tk. 85.00/15ml.; Tab., 250mg, Tk. 20.00/Tab., 500mg, Tk. 35.00/Tab.

AZ (Aristo), Susp., 200ml/5ml, Tk. 100.00/15ml, Cap., 500mg, Tk. 35.00/Cap.; Tab., 250mg, Tk. 25.00/Tab., 500mg, Tk. 35.00/Tab.

Azalid (Orion), Tab., 500 mg, Tk. 35.11/Tab.; Cap., 500 mg, Tk. 25.00/Cap.; Susp, 200ml/5ml, Tk. 85.58/15ml., Tk. 130.88/35ml

Azaltic (Nipro JMI), Susp., 200mg/5ml, Tk. 85.00/15ml; Tk. 130.39/35 ml; Tab., 500 mg, Tk. 35.00/Tab.

Azasite (Sharif), Susp., 200 mg/5 ml, Tk. 85.26/20ml, Tk. 130.39/35ml, Tk. 185.56/50ml, Tab. 500 mg, Tk. 35.11/Tab.

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Azicin(*Opsonin*), Cap., 500 mg, Tk. 30.00/Cap., 250 mg, Tk. 20.08/Cap. ; Susp., 200 mg /5 ml, Tk. 100.00/20 ml, Tk. 140.00/35 ml ; Tab. , 250 mg, Tk. 25.00/Tab., 500 mg, Tk. 35.11/Tab.; Sachet 1 gm, Tk. 80.00/sachet

Aziget(*Getwell*), Susp., 200 mg/5 ml, Tk. 140.00/35ml, Tk. 185.00/50ml, Tk. 85.00/15ml, Tab., 500mg, Tk. 34.00/Tab.;

Azikil(*One Pharma*), Susp., 200 mg/5ml, Tk. 100.00/20ml, Tk. 140.00/35ml, Tk. 185.00/50ml, Tab., 500 mg, Tk. 35.00/Tab.

Azimex(*Drug Intl*), Susp., 200mg/5ml, Tk. 130.45/30ml, Tk. 185.55/50ml, Tk. 90.30/15ml; Tab., 250mg, Tk. 25.10/Tab. ; 500mg, Tk. 35.15/Tab.

Azimon(*Monico*), Susp., 200mg/5ml, Tk. 90.0015ml; Tab., 500mg, Tk. 35.00/Tab.

Azih(*Acme*), Cap. , 250.00 mg, Tk. 25.08/Cap.; Tab. , 500.00 mg, Tk. 35.11/Tab.; Susp., 200 mg/5ml., Tk. 140.42/30ml, Tk. 185.56/50ml, Tk. 95.29/15ml

Azinaaf(*Naafco*), Susp., 200mg/5ml, Tk. 130.00/35ml; Tab., 500 mg, 33.00/Tab.

Azithral(*Globex*), Tab., 500mg, Tk. 12.00/Tab.; Cap, 250 mg, Tk. 20.00/Cap.

Azithro(*Astra Bio*), Tab. , 250 mg, Tk. 20.00/Tab. ; 500 mg, Tk. 30.00/Tab., Tk. 35.00/Tab. ; Susp., 200 mg/5 ml, Tk. 140.00/25ml

Azithrocin(*Beximco*), Inj., 500 mg/vial., 460.00/vial ; Susp., 200mg / 5ml, Tk. 185.00/50, Tk. 85.00/15ml, Tk. 130.00/30ml, Tab., 250mg , Tk. 25.00/Tab., 500mg, Tk. 30.00/Tab.; Cap., 250mg , Tk. 25.00/Cap

Azithrogen(*Biogen*), Tab., 500mg, Tk. 30.00/Tab.

Azithromax(*Ziska*), Susp., 200 mg/5 ml, Tk. 130.00/35ml, Tk. 185.00/50ml, Tk. 85.00/15ml; Tab. , 500 mg, Tk. 300.00/Tab.

Azix(*Amico*), Susp., 200gm/5ml, Tk. 85.00/15ml ; Tab., 500mg, Tk. 30.00 /Tab.

Azmin(*Modern*), Susp., 200gm/5ml Tk. 130.00/35ml, Tk. 85.00/15ml, Tab., 524.05 mg , Tk. 35.00/Tab.

Azomac(*General*), Pead. drop, Tk. 85.57/15ml ; Susp., 200gm/5ml., Tk. 100.30/20ml, Tk. 185.55/50ml.; Tk. 130.88/35ml, Tk. 140.43/35ml, Tab., 500mg, Tk. 35.00/Tab.

Azro(*Nipa*), Susp., 200 mg/5ml, Tk. 85.00/15ml, Tk. 130.00/30ml, Tk. 180.00/50ml, Tab., 500 mg, Tk. 30.00/Tab.

Curazith(*Sanofi*), Susp., 200gm/5ml, Tk. 85.26/15ml, Tab., 500mg, Tk. 35.11/Tab.; 250mg, Tk. 20.06/Tab.

Demacro(*Decent*), Susp., 200gm/5ml., Tk. 85.00/15ml; Tab., 500mg, Tk. 30.00/Tab.

Macazi(*Pacific*), Tab., 500 mg, Tk. 35.00/Tab. ; Susp., 200mg/5ml, Tk. 118.00/35ml , Tk. 64.00/15ml

Macrozith(*Silva*), Cap., 250mg, Tk. 20.08/Cap. ; Susp., 200gm/5ml Tk. 135.00/35ml, Tk. 90.00/15ml ;, Tk. 115.78/25ml; Tab. , 500mg, Tk. 34.00/Tab.

Maczith(*Biopharma*), Cap., 250mg, Tk. 25.00/Cap.; Susp., 200gm/5ml, Tk. 160.00/35ml, Tk. 95.00/15ml, Tk. 180.00/50ml, Tab., 500mg , Tk. 35.00/Tab. , 250mg Tk. 25.09/Tab.

Odaz(*UniMed*), Susp., 200mg/5m, Tk. 100.00/15ml, Tk. 150.00/30ml

Odazyth(*ACI*), Inj., 500mg/vial. Tk. 251.69/vial, Susp., 200mg/5ml, Tk. 250.75/75ml, Tk. 186.26/50ml, Tk. 85.58/15ml , Tk. 130.88/30ml Tab., 500mg, Tk. 35.11/Tab. ; Cap., 250mg, Tk. 25.08/Cap

Orgazith(*Organic*), Cap., 250 mg, Tk. 20.06/Cap., Susp., 200 mg / 5ml, Tk. 85.26/20ml, Tk. 130.39/35ml , Tk. 185.56/50ml,

Respazit(*Somatec*), Susp., 200 mg / 5 ml, Tk. 140.00/35ml, Tk. 185.00/50ml; Cap., 250 mg, Tk. 25.00/Cap.; Tab., 500 mg, Tk. 35.00/Tab.

Romycin(*lbn Sina*), Susp., 200 mg / 5 ml, Tk. 140.00/35ml, Tk. 190.00/50ml, Tk. 90.00/15ml; Cap., 500mg Tk. 35.00/Cap.; Tab., 250mg Tk. 2500/Tab.

Rozith(*Healthcare*), Inj., 500 mg/vial., Tk. 460.00/lvial.; Susp., 200mg /5ml, Tk. 95.00/15ml, Tk. 185.00/50ml; Tab., 250mg , Tk. 25.00/Tab., 500mg , Tk. 35.00/Tab.

SB-Azit(*Sunman-Bardem*), Tab., 500 mg, Tk. 35.00/Tab.

Simpli(*Beacon*), Inj., 500 mg/vial, Tk. 461.38/vial. ; Susp., 200 mg / 5 ml, Tk. 85.57/20ml; Tab, 500mg , Tk. 35.11/Tab.

Telide(*Team*), Susp., 200mg/5ml, Tk. 135.00/35ml, Tk. 180.00/50ml, Tk. 83.00/15ml ; Tab., 500 mg, Tk. 33.00/Tab.

Thromax(*Novo Health*), Susp., 200mg/5ml Tk. 120.00/25ml; Tab., 250 mg, Tk. 20.00/Tab.; 500 mg, Tk. 35.00/Tab.

Virzith(*Virgo*), Susp., 200mg/5ml, Tk. 130.00/30ml, Tk. 180.00/50ml, Tk. 90.00/15ml; Tab. , 500mg, Tk. 36.00/Tab.

Xolide(*Radiant*), Cap. , 250mg , Tk. 27.08/Cap. ; 500mg , Tk. 40.12/Cap.

Zemycin(*GACO*), Susp., 200mg/5ml, Tk. 85.26/15 ml, Tk. 128.00/35 ml, Tk. 172.00/50 ml; Tab., 500 mg, Tk. 30.09/Tab.

Zenicin(*Zenith*), Susp., 200mg/5ml, Tk. 126.00/30ml, Tk. 180.00/50ml, Tk. 80.00/15ml, Tab., 500 mg , Tk. 30.00/Tab.

Zibac(*Popular*), Tab. , 500mg, Tk. 35.00/Tab.; 250mg, Tk. 20.08/Tab., Inj., 500 mg/vial, Tk. 250.94/vial; Susp., 200mg/5ml, Tk. 100.00/20ml,

Zimax(*Square*), Susp., 200mg/5ml, Tk. 85.58/15ml; Tab. , 500 mg, Tk. 35.11/Tab.; 500 mg, Tk. 35.11/Tab.; Cap. , 250 mg, Tk. 25.08/Cap. ; Inj., 500 mg/vial, Tk. 461.38/vial

Zinex(*Alco*), Susp., 200 mg / 5ml, Tk. 130.39/30ml ; Tk. 185.56/50ml , Tk. 85.26/15ml ; Tab., 250 mg, Tk. 20.06/Tab.; 500 mg, Tk. 35.00/Tab.

Zita(Kemiko), Susp., 200 mg / 5 ml, Tk. 130.39/30ml, Tk. 185.56/50ml, Tk. 85.26/15ml, Tab., 500 mg, Tk. 35.00/Tab.
Zithracin(Supreme), Tab., 500mg, Tk. 35.00/Tab.; Susp., 200 mg / 5 ml, Tk. 85.25/15ml,
Zithrin(Renata), Cap., 250mg, Tk. 20.00/Cap.; Susp., 200 mg / 5 ml, Tk. 125.00/30ml, Tk. 130.00/35ml, Tk. 80.30/15ml, Tk. 85.32/20ml, Tk. 185.00/50ml; Tab., 250mg, Tk. 25.00/Tab., 500mg, Tk. 35.00/Tab.; Inj., 500 mg/vial, Tk. 460.00/vial.
Zithrox(Eskayef), Susp., 200 mg / 5 ml, Tk. 96.00/15ml, Tk. 90.00/20ml, Tk. 186.00/50ml, 130.00/30ml, Tk. 140.00/35ml; Tab, 250mg, Tk. 25.00/Tab.; 500mg, Tk. 35.00/Tab.; Susp., 200 mg / 5 ml, Tk. 140.00/35ml; Tk. 186.00/50ml;
Zycin(Globe), Susp., 200 mg/5 ml, Tk. 130.00/30ml; Tk. 185.00/50ml, 85.00/15ml; Tab., 500 mg, Tk. 35.00/Tab

CLARITHROMYCIN^[W]

Indications: Eradication of *H. pylori*, first-line therapy for prophylaxis and treatment of disseminated infection caused by *M. avium-intracellulare* in AIDS patients and for treatment of pulmonary infections in non-HIV-infected patients, toxoplasmosis encephalitis; also see under *Erythromycin*

Cautions: See under *Erythromycin*; dose reduction required in renal impairment

Contra-indications: See under *Erythromycin*

Interactions: See Appendix-2

Side-effects: See under *Erythromycin*, also reported headache, taste disturbances, tooth and tongue discoloration, stomatitis, glossitis, hepatitis and Stevens-Johnson syndrome; on IV infusion, local tenderness, phlebitis; less commonly, arthralgia and myalgia; rarely tinnitus; very rarely, dizziness, insomnia, nightmare, paraesthesia, convulsions, hypoglycemia, renal failure

Dose: Oral : ADULT & CHILD > 12 years, 250 mg every 12 hours, increased in severe infections to 500 mg every 12 hours; CHILD < 12 years, 7.5 mg/kg twice daily; by IV infusion into larger

proximal vein, 500 mg twice daily, CHILD not recommended.

Proprietary Preparations

Claricin(Acme), Tab., 250 mg., Tk. 25.17/Tab.; 500 mg., Tk. 40.27/Tab.; Susp., 125 mg/5 ml, Tk. 395.00/60ml
Clarlin(Drug Intl), Tab., 250mg, Tk. 25.10/Tab.; 500mg, Tk. 40.15/Tab.
Clarith(Ibn Sina), Susp., 125 mg/5 ml, Tk. 350.00/70ml; Tab., 250 mg, Tk. 30.00/Tab.
ClaroX(Renata), Tab. 250mg, Tk. 25.00/Tab.; 500mg Tk. 40.00/Tab.
Klabex(Opsonin), Tab., 500 mg, Tk. 40.00/Tab.
Klabid(UniMed), Tab., 250mg, Tk. 30.00/Tab.; 500mg, Tk. 50.00/Tab.; ER Tab., 500 mg, Tk. 65.00/Tab.
Klaricid^(®)(Abbott), Inj. 500mg/vial Tk. 623.73
Klarix(Incepta), Susp., 125 mg/5 ml, Tk. 340.00/60ml; Tab., 250mg Tk. 25.00/Tab., 500mg Tk. 40.00/Tab.
Macrobid(General), Tab., 500mg, Tk. 50.34/Tab.
Remac(Square), Susp., 125 mg/5 ml, Tk. 395/60ml; Tab 500 mg, Tk. 40.27/Tab.

ERYTHROMYCIN^[ED] ^[W]

Indications: Mycoplasma pneumonia infections, campylobacter enteritis, first line drug for chlamydial urogenital infections in pregnant women, chlamydial pneumonia, diphtheria, pertussis, legionnaires' disease, acne vulgaris (topical erythromycin preparations are used to treat acne); effective alternative to penicillins in hypersensitive patients for pharyngitis, scarlet fever, erysipelas and cellulitis due to *S. pyogenes*, for tetanus and for prophylaxis against recurrences of rheumatic fever

Cautions: Hepatic and renal impairment; concomitant therapy with pimozide or terfenadine should be avoided; porphyria; in patients with a predisposition to QT interval prolongation; small amount secreted into breast milk, potential problems for nursing infant: modification of bowel flora,

Contra-indications: Liver disease hypersensitivity

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, abdominal discomfort, diarrhea, antibiotic

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associated colitis, hypersensitivity reactions including urticaria, rashes, cholestatic jaundice and other reactions, reversible hearing loss after large doses, chest pain and arrhythmias including prolongation of QT interval and ventricular tachycardia

Dose Oral ADULT & CHILD > 8 years, 250-500 mg every 6 hours or 0.5-1 g every 12 hours, up to 4 g daily in severe infections; CHILD up to 2 years, 125 mg every 6 hours, 2-8 years, 250 mg every 6 hours, doses doubled for severe infections; early syphilis, 500 mg 4 times daily for 14 days; uncomplicated genital chlamydia, non-gonococcal urethritis, 500 mg twice daily for 14 days; by IV infusion: ADULT & CHILD in severe infections, 50 mg/kg daily by continuous infusion or in divided doses every 6 hours; for mild infections when oral therapy not possible, 25 mg/kg daily

Proprietary Preparations

Acryth(Monico), Susp., 125 mg /5 ml, Tk. 60.00/100ml
Adethro(Supreme), Susp., 125 mg /5 ml, Tk. 60.00/100ml.; Tab., 500mg, Tk. 8.00/Tab.
A-Mycin(Aristo), Paed. drops, 50 mg/1.25 ml, Tk. 60.00/25ml.; Susp., 125 mg /5 ml, Tk. 84.75/100ml.; 125 mg /5 ml, Tk. 100.00/50ml,Tab., 250mg , Tk. 5.15/Tab. ; 500mg , Tk. 9.00/Tab.
Azmin(Modern), Tab., 500 mg, Tk. 35.00/Tab.; Susp., 250 mg /5 ml, Tk. 130.00/35ml.,Tk.85.00/15ml
Erixin(Amico), Susp., 125 mg /5 ml, Tk. 60.00/100ml
Ermac(Opsonin), Susp., 125 mg /5 ml, Tk. 84.74/100 ml
Eromycin(Square), Paed. drops, 200 mg/5 ml, Tk. 60.4/60ml.; Susp., 125 mg /5 ml, Tk. 69.53/100ml.; Tab. , 250 mg, Tk. 5.18/Tab.500 mg, Tk. 10.35/Tab.
Eronix(Ziska), Susp., 125 mg /5 ml, Tk. 60.00/100ml
Erosa(Biopharma), Susp., 125 mg /5 ml, Tk. 67.00/100ml.; Tab., 250mg , Tk. 4.52/Tab.; 500mg , Tk. 8.03/Tab.
Erosite(Sharif), Susp., 125 mg /5 ml, Tk. 69.32/100ml
Errin(Radiant), Susp., 125 mg /5 ml, Tk. 60.18/100 ml
Ery(Alco), Susp., 125 mg /5 ml, Tk. 69.53/100ml.; Tab., 250 mg, Tk. 5.17/Tab. ; 500 mg, Tk. 10.33/Tab.
Erybac(Drug Intl), Susp., 125 mg /5 ml, Tk. 60.20/100 ml.; Tab., 250mg, Tk. 4.05/Tab.;500mg, Tk. 8.05/Tab.

Erymex(Ibn Sina), Susp., 125 mg/5 ml, Tk. 84.50/100ml.; Tab.,500mg, Tk. 10.25/Tab.
Erythin(ACI), Susp., 125 mg /5 ml, Tk. 60.41/60ml,Tk. 61.47/100ml.;Tab., 500mg, Tk. 8.06/Tab.
Ertyhrox(Renata), Susp., 125 mg /5 ml, Tk. 69.32/100ml.; Tab. , 250 mg, Tk. 5.15/Tab., 500 mg, Tk. 10.30/Tab.
Eryzen(Zenith), Susp., 125 mg /5 ml, Tk. 57.02/100ml.; Tab., 250 mg, Tk. 4.38/Tab.,500 mg, Tk. 8.66/Tab.
Etrocin(Beximco), Susp., 125 mg /5 ml, Tk. 84.75/100ml.; Tab., 500mg, Tk. 9.03/Tab.
Firmac(Incepta), Susp., 125 mg /5 ml, Tk. 60.00/100ml
Mac(Orion), Susp., 125 mg /5 ml, Tk. 60.46/100ml,Tk. 103.71/100ml,Tk. 74.49/70ml
Macas(Asiatic), Susp., 125 mg /5 ml, Tk. 56.85/100ml.; Tab., 500mg , Tk. 8.12/Tab.
Macery(Pacific), Susp., 125 mg /5 ml, Tk. 46.00/100ml. ; Tab., 250 mg, Tk. 5.00/Tab.,500 mg, Tk. 10.00/Tab.
Macro(Astra Bio), Susp., 125 mg /5 ml, Tk. 60.00/100ml
Priocin(Eskayef), Susp., 125 mg/5 ml , Tk. 61.42/100ml.; Tab., 500mg , Tk. 7.00/Tab.
Throcin(Globe), Tab. , 500 mg, Tk. 8.00/Tab.; Susp., 125 mg /5 ml, Tk. 56.00/100 ml
G-Erythromycin(Gonosasthaya), Tab., 500 mg, Tk.15.00/Tab.
Ero(Hudson), Susp., 125mg/5ml, Tk.60.00/100 ml
Erocin(Acme), Susp., 125 mg/5 ml, Tk. 69.32/100 ml ; Tab., 250 mg, Tk. 5.16/Tab. ;500 mg, Tk. 10.32/Tab.
Erom(Kemiko), Susp., 125 mg/5 ml, Tk. 60/100 ml ;Tab., 250 mg, Tk. 4.85/Tab. ; 500 mg, Tk. 8.60/Tab.
Eromac(General), Susp.,125 mg/5 ml,Tk. 61.23/100 ml
Eryrox DS(Navana), Susp, 125 mg/5 ml, Tk. 60.22/100 ml
Erythromycin DS(Albion), Susp., 125 mg/5 ml, Tk. 60.00/100 ml; DSTab., 500 mg, Tk. 7.50/Tab.
Macrocin(Sanofi), Tab., 250 mg, Tk. 4.88/Tab.; Tab., 500 mg, Tk. 8.66/Tab.; Susp., 125 mg/5 ml, Tk. 61.00/100 ml ;

ROXITHROMYCIN^[W]

Indications: As for erythromycin

Cautions: As for erythromycin

Interactions: See Appendix -2

Contra indication: Liver disease

Side-effects: Gastrointestinal disturbances, Increase in liver enzyme values and hepatitis; rashes and other hypersensitivity reactions; headache,

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dizziness, weakness, reversible pancreatitis, eosinophilia

Dose: By mouth, ADULT 150mg twice daily, or sometimes 300mg once daily, before meals, in the treatment of susceptible infections. CHILD up to 40kg bodyweight, a dose of 5-8mg per kg daily before meals may be used

Proprietary Preparations

A-Rox(Ambee), Susp., 50 mg/5 ml, Tk. 45.17/50ml; Tab., 150 mg, Tk. 6.53/Tab; 300 mg, Tk. 11.04/Tab

Pedilid(Incepta), Susp., 50mg/5 ml, Tk. 50.00/50 ml; Tab., 150 mg, Tk. 7.00/Tab.; 300 mg, Tk. 14.00/Tab.

Rocky(Amico), Susp., 50 mg/5 ml, Tk. 40.00/50 ml; Tab. 150 mg, Tk. 7.00/Tab.; 300 mg, Tk. 12.00/Tab.

Rolid(Globe), Tab., 300 mg, Tk. 14.00/Tab; 150 mg, Tk. 7.00/Tab.; Susp., 50 mg/5 ml, Tk. 45.00/50 ml

Rotomycin(Kemiko), Tab., 300 mg, Tk. 14.00/Tab.

Roxcin(Alco), Tab., 150 mg, Tk. 7.00/Tab.; 300 mg, Tk. 14.00/Tab.; Susp., 50 mg/5 ml Tk. 50.00/50 ml

Ryth(Navana), Tab., 150 mg, Tk. 7.03/Tab.; 300 mg, Tk. 14.05/Tab.; Susp., 50 mg/5 ml, Tk. 50.19/50 ml; Tk. 100.38/100 ml

SPIRAMYCIN^[W]

Spiramycin is a macrolide antibiotic with actions similar to those of erythromycin.

Indications: Respiratory tract infections, genital infections, skin and soft tissue infections caused by *streptococci*, *pneumococci* and *meningococci*, diphtheria, prophylaxis of fetus against transmission of maternal toxoplasmosis in pregnancy

Caution: Breast-feeding

Contra-indications: known hypersensitivity to macrolides

Side-effects: Nausea, vomiting, diarrhea, allergic skin reactions

Dose: Oral: ADULTS 6 to 9 million IU/day in 2 to 3 divided doses. CHILD weighing more than 20kg, 0.15 million IU per kg body weight per day, to be divided into 2 to 3 doses.

Proprietary Preparation

Rovamycin(Sanofi), Tab., Tk. 20.00/Tab.

1.1.6 TETRACYCLINES^[A]

(See also section 12.2,10)

They are broad-spectrum bacteriostatic antibiotics with activity against wide range of aerobic and anaerobic gram-positive and gram-negative bacteria, *rickettsiae*, *chlamydia*, *legionella*, *mycoplasma*, atypical mycobacteria, and spirochaetes and against some protozoa. But their use has decreased because of increasing emergence of resistance. In general, they are more active against gram-positive than gram-negative organisms.

These drugs distribute widely into prostate, bone marrow, bone, dentine, enamel of unerupted teeth and reticuloendothelial cells of liver. Penetration into CSF, synovial fluid, mucosa of maxillary sinus, and fetal circulation is excellent. Relatively high concentrations also are found in breast milk. Primary route of elimination of these drugs except that of doxycycline, is the kidney.

Cautions: Gastrointestinal distress, nausea and vomiting can be minimized by giving these drugs with food but should not be ingested with dairy products, antacids containing **Calcium, Aluminum, Zinc, Magnesium or Silicate**, **Vitamins with iron, Sucralfate, Bismuth subsalicylate, Cholestyramine and Colestipol**; unused supplies of these antibiotics should be discarded.

Contra-indications: Pregnant patients and to patients with renal insufficiency (doxycycline may be given). Neither they are recommended for lactating mother and for treatment of common infections in children under the age of 8 years.

Side-effects: Epigastric burning and distress, abdominal discomfort, nausea, vomiting and diarrhea may occur. Esophagitis, esophageal ulcers and pancreatitis have been reported. Photosensitivity particularly with demeclocycline and doxycycline also is seen. Children may develop permanent brown discoloration of teeth. This risk is highest when tetracycline is given to

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neonates, babies prior to first dentition and to pregnant mothers. Fanconi syndrome, has been Therapy with tetracyclines may lead to the superinfections that result in intestinal functional disturbances, anal pruritus, vaginal or oral candidiasis or enterocolitis with shock and death. Pseudomembranous colitis due to an overgrowth of toxin producing *C. difficile* is particularly relevant.

DOXYCYCLINE^[ED] [A]

Indications: Chronic prostatitis, sinusitis, malaria treatment and prophylaxis, pelvic inflammatory disease (with metronidazole); brucellosis (with rifampicin), adjunct to gingival scaling and root planning for periodontitis; also see under tetracycline (except eye infections)
Cautions, Contra-indications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above; also vestibular reactions including anorexia, dizziness, tinnitus and vertigo

Dose :Oral : 200 mg on first day, then 100 mg daily; severe infections including refractory urinary tract infections, 200 mg daily; early syphilis, 200 mg daily in 1-2 divided doses for 14 days; late latent syphilis, 100-200 mg twice daily for 28 days; uncomplicated genital chlamydia, non-gonococcal urethritis, 100 mg twice daily for 7 days; by IV infusion: 200 mg in one or two infusions on first day followed by 100-200 mg on subsequent days

Proprietary Preparations

Asidox(Asiatic), Cap., 100mg, Tk. 2/Cap.
Dopac(Pacific), Cap., 100 mg, Tk. 2/Cap.
Dox P(Astra Bio), Cap., 100mg,Tk.2/Cap.
Doxicap(Renata), Cap. , 100 mg, Tk. 2.20/Cap. ; 50 mg, Tk. 1.42/Cap.
Doxicline(Ziska), Cap.,100 mg, Tk.2.00/Cap.
Doxico(Supreme), Cap.,100mg, Tk.2.15/Cap.
Doxigen(General),Cap.,100 mg, Tk.2.16/Cap.
Doxin(Opsonin), Cap. , 100 mg, Tk. 2.21/Cap.; 50 mg, Tk. 1.43/Cap.
Doxizen(Zenith), Cap., 100 mg, Tk. 2.16/Cap.
Doxy(Acme), Cap. , 100 mg, Tk. 2.20/Cap.
Doxycycline(Popular), Cap., 100 mg, Tk. 2.00/Cap.
Doxysina(Ibn Sina), Cap., 100 mg, Tk. 2.03/Cap.

Impedox(ACI), Cap, 100mg, Tk. 2.17/Cap.
Monadox(Amico), Cap., 100 mg, Tk. 2.50/Cap.
Oriodox(Orion), Cap., 100 mg, Tk. 2.12/Cap.
Unidox(Globe), Cap., 100 mg, Tk. 2.50/Cap.

OXYTETRACYCLINE^[ED] [A]

Indications: See under Tetracycline

Cautions: See notes above; also porphyria

Contra-indications, Side-effects:See notes above

Dose: Oral: 250-500 mg every 6 hours; acne, 500 mg twice daily for 4-6 months, up to 2 years or longer in severe cases

Proprietary Preparations

Oxecylin(Acme), Cap., 250 mg, Tk. 2/Cap.
Renamycin(Renata), Cap., 250mg,Tk. 2/Cap.
Teramycin(Ziska), Tab. , 500 mg, Tk. 3/Tab.

TETRACYCLINE^[ED] [A]

Indications:*Mycoplasma pneumoniae*, *chlamydial pneumoniae*, *lymphogranuloma venereum*, *trachoma*, *rickettsial* infections (epidemic typhus, scrub typhus, rickettsial pox, Q fever), uncomplicated gonococcal infections, syphilis, brucellosis, exacerbations of chronic bronchitis, acne, actinomycosis, lyme disease, tularemia, cholera, eye infections (conjunctivitis, blepharitis)

Cautions, Contra-indications: See notes above; also hepatic impairment

Side-effects: See notes above

Interactions: See Appendix-2

Dose:Oral: 250 mg every 6 hours for mild to moderate infections, increased in severe infections to 500 mg every 6-8 hours; primary, secondary, or early latent syphilis, 500 mg every 6 hours for 14 days; non-gonococcal urethritis, 500 mg every 6 hours for 7-14 days (21 days if failure or relapse after first course); acne, 500 mg twice daily for 4-6 months, up to 2 years or longer in severe cases; topical: 1% solution, 2-4 drops 4-6 hourly, every hourly in severe cases

Proprietary Preparations

Tetclin(Pacific), Cap. , 250 mg, Tk. 1.00/Cap.
Tetramycin(Asiatic), Cap., 250mg, Tk. 1.30/Cap.

Tetrasina(*Ibn Sina*), Cap. , 250mg, Tk. 1.75/Cap. ; 500 mg, Tk. 3.30/Cap.
Tetrax(*Square*), Cap., 500 mg, Tk. 2.29/Cap.
Titacin(*Supreme*),Cap, 500mg, Tk. 2.00/Cap.; Tab., 250 mg, Tk. 1.30/ Tab
A-Tetra(*Acme*),Tab.,500 mg, Tk. 2.29/Tab.;Cap., 500mg, Tk. 2.03/Cap.
G-Tetracycline(*Gonoshasthaya*), Cap., 250 mg, Tk.1.00/Cap.;
Jmycin(*Jayson*), Cap., 250 mg, Tk. 1.31/Cap.
Monatrex(*Amico*), Cap., 250 mg, Tk. 1.20/Cap.; DS Cap., 500 mg, Tk. 2.00/Cap.
Tetracycline-H(*Hudson*), Cap. 250 mg, Tk. 1.00/Cap.

1.1.7.1. QUINOLONES AND FLUOROQUINOLONES(See section 10.2,11.1)

The older agents are 4-quinolones (**Nalidixic acid, Cinoxacin**) with narrower spectrum of antimicrobial activity and the newer drugs are fluorinated analogs with broad spectrum of activity and much wider tissue distribution. The quinolones are effective against enteric gram-negative bacilli; *P. aeruginosa* is resistant. Fluorinated analogs have greatly improved antibacterial activity against many gram-positive and gram-negative organisms. Fluoroquinolones also are active against agents of atypical pneumonia like mycoplasmas, *Chlamydia* and intracellular pathogens, such as legionella and some mycobacteria. Resistance to one fluoroquinolone usually confers cross-resistance to all other members of this class.

Cautions and Contra-indications: Dose adjustment in patients with creatinine clearance less than 50 ml/min. is required for cinoxacin, norfloxacin, ciprofloxacin, ofloxacin, enoxacin and lomefloxacin but not for nalidixic acid, trovafloxacin and pefloxacin. Cautions are required in pregnancy, nursing mother and the non-renally cleared fluoroquinolones in patients with hepatic failure. These drugs are not generally recommended for use in prepubertal children, although in some cases the benefits may outweigh the risks and requires careful assessment. Quinolones

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are contra-indicated in patients with history of tendon disorders related to quinolones. In presence of epilepsy and myasthenia gravis cautious administration is required. These drugs should be withdrawn if psychiatric, neurological, tendinitis or hypersensitivity reactions occur.

Side-effects: Gastrointestinal upset in the form of mild nausea, vomiting, and/or abdominal discomfort, rarely diarrhea and antibiotic-associated colitis. Central nervous system side effects including headache, dizziness have been reported, photosensitivity with lomefloxacin and pefloxacin. Reversible arthropathy and joint swelling have developed in children receiving fluoroquinolones. Tendinitis, a rare complication seen in adults. Risk of retinal detachment.

CIPROFLOXACIN^[ED] [A*][W]

Indications: Urinary tract infections, pseudomonal lower respiratory infections except pneumococcal pneumonia, enteric fever, shigellosis, gonorrhea, chancroid, prostatitis, septicemia, bone, joints and soft tissue infections, traveler's diarrhea, superficial bacterial infections of eye caused by sensitive organisms, second line drug for legionellosis, with an anti-anaerobic (clindamycin or metronidazole) for pelvic inflammatory disease, part of multidrug therapy for multidrug-resistant tuberculosis, with amoxicillin-clavulanate as an oral empiric therapy for fever in low-risk patients with granulocytopenia secondary to cancer chemotherapy, eradication of meningococci from carriers, surgical prophylaxis and prophylaxis of infection in neutropenic patients

Cautions and Contra-indications: Excessive alkalinity of urine should be avoided, adequate fluid intake required to avoid crystalluria, performance of skilled tasks like driving may be impaired (effects enhanced by alcohol); also see notes above

Side-effects: See notes above; also flatulence, dysphagia, hyperglycemia, alerted prothrombin concentration,

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vasculitis, erythema nodosum, petechiae, hemorrhagic bullae, tinnitus, tenosynovitis, tachycardia, edema, syncope, hot flushes and sweating; pain and phlebitis at injection site

Interactions: See Appendix-2

Dose: Oral: Urinary-tract infections, 250-500 mg twice daily; 100 mg twice daily for 3 days in acute uncomplicated cystitis in women; chronic prostatitis, 500 mg twice daily for 28 days; gonorrhea, 500 mg as a single dose; pseudomonal lower respiratory-tract infection in cystic fibrosis, 750 mg twice daily; most other infections, 500-750 mg twice daily; surgical prophylaxis, 750 mg 60-90 minutes before procedure; CHILD (not recommended but where benefit outweighs risk), 5-17 years, up to 20 mg/kg twice daily, max. 1.5 g daily; IV infusion, over 30-60 minutes; 200-400 mg twice daily; pseudomonal lower respiratory tract infection in cystic fibrosis, 400 mg twice daily; CHILD 5-17 years, up to 10 mg/kg 3 times daily, max. 1.2 g daily; urinary-tract infections, 100 mg twice daily; gonorrhea, 100 mg as a single dose;

IV infusion: over 30-60 minutes, 200–400mg twice daily.

Proprietary Preparations

Adecin(Supreme), Susp, 250 mg/5 ml, Tk. 90.25/100ml.; Tab., 500 mg, Tk. 14.00/Tab.
Amiflox(Amico), Tab., 250 mg, Tk. 6.00/Tab.; Tab., 500 mg, Tk. 14.00/Tab.; Susp, 250 mg/5 ml, Tk. 85.00/60ml
Ancipro(UniMed), Tab., 250mg, Tk. 8.50/Tab., 500mg, Tk. 14.00/Tab.; 750mg, Tk. 18.00/Tab.
Aprocin(Aristo), Susp.,250mg/5ml,Tk. 100/60ml; Tab., 500mg , Tk. 14.00/Tab. ; 750mg , Tk. 18.00/Tab.
Bactin(Ibn Sina), Inj.,(IV.Infusion), 0.20%, Tk. 145.00/100ml.; Susp, 250 mg/5 ml, Tk. 110.00/60ml.; Tab.,250 mg, Tk. 8.54/Tab. ; 500 mg, Tk. 15.00/Tab. ; 750 mg, Tk. 18.06/Tab.
Beuflox(Incepta), Inj.,(IV.Infusion), 0.20%, Tk. 47.85/100ml.; Tab., 250 mg, Tk. 8.00/Tab. ,250 mg, Tk. 8.50/Tab.; 500 mg, Tk. 15.00/Tab.; 750 mg, Tk. 18.00/Tab.; Susp, 250 mg/5 ml , Tk. 100.00/60ml.;
Cero(G.A.Co), Tab., 500 mg, Tk. 14.05/Tab.
Cibact(Euro), Susp, 250 mg/5 ml, Tk. 100.00/60ml.; Tab., 500 mg, Tk. 14.00/Tab.
Ciflocin(Astra Bio), Tab., 500 mg, Tk. 12.00/Tab.;

Cilocin(Pacific), Susp, 250mg/5ml, Tk. 100.00/60ml.; Tab., 500 mg, Tk. 12.00/Tab. ; 500 mg, Tk. 8.00/Tab.
CIP(Asiatic), Tab., 500mg , Tk. 14.00/Tab., 750mg , Tk. 18.00/Tab.
Cipcin(Biopharma), Inj.,(IV.Infusion), 0.20%, Tk. 140.00/100ml.; Susp, 250 mg/5 ml, Tk. 100.00/60ml.; Tab., 750 mg , Tk. 18.07/Tab., 250 mg , Tk. 8.53/Tab., 500 mg , Tk. 15.06/Tab.
Ciprin(Nipa), Tab., 500 mg, Tk. 12.00/Tab.
Cipro(Acme), Inj.,(IV.Infusion), 0.20%, Tk. 146.94/100ml.; Susp, 250 mg/5 ml, Tk. 100.30/60ml.; Tab, 250 mg., Tk. 8.56/Tab.; 500.00 mg , Tk. 14.06/Tab.; 750 mg, Tk. 18.11/Tab
Ciprobey(Sharif), Susp, 250 mg/5 ml, Tk. 90.28/60ml.; Tab., 500 mg, Tk. 14.04/Tab.
Ciprocin(Square), Inj.,(IV.Infusion), 0.20%, Tk. 146/100ml.; Susp, 250 mg/5 ml, Tk. 100.3/60ml.; Tab, 250 mg, Tk. 8.56/Tab.; 500 mg, Tk. 15.05/Tab.; 750 mg, Tk. 18.12/Tab.
Cipronaat(Naafco), Tab., 500 mg, Tk. 14.00/Tab.
Cipronil(Silva), Susp, 250 mg/5 ml, Tk. 95.00/60ml.; Tab., 500mg, Tk. 14.05/Tab.
Ciprox(Opsonin), Susp, 125 mg/5 ml, Tk. 90.34/60 ml; 250 mg/5 ml, Tk. 100.00/60ml.; Tab.XR,1 gm , Tk. 20.14/Tab.; 250 mg , Tk. 8.53/Tab.; 500 mg , Tk. 15.05/Tab.; 750 mg , Tk. 18.13/Tab.
Ciproxy(Opso Saline), Inj., (IV Infusion), 0.20%,Tk. 52.83/100 ml
Ciprozen(Zenith), Susp, 250 mg/5 ml, Tk. 75.25/60ml.;Tab., 250 mg, Tk. 8.03/Tab.; 500 mg, Tk. 14.06/Tab.
Ciprozid(Drug Intl), Susp, 250mg/5ml, Tk. 90.30/60ml.; Tab., 250mg, Tk. 8.05/Tab.; 500mg, Tk. 15.05/Tab.; 1000mg, Tk. 20.10/Tab.; 750mg, Tk. 16.05/Tab.
Cipwell(Getwell), Susp, 250 mg/5 ml, Tk. 95.00/60ml.; Tab., 500mg, Tk. 14.00/Tab.
Civox(Popular), Tab., 500mg, Tk. 14.05/Tab.; Inj.,(IV.Infusion), 0.20%, Tk. 100.38/100ml.; Susp, 250 mg/5 ml, Tk. 90.34/60 ml.; Tk. 90.34/60 ml
Dumaflox(Alco), Susp, 250 mg/5 ml, Tk. 100.00/60ml.; Tab., 250 mg, Tk. 7.52/Tab.; 500 mg, Tk. 10.03/Tab. ; 750 mg, Tk. 12.04/Tab.
Fiprox(Sanofi), Tab., 500mg, Tk. 14.09/Tab.
Flontin(Renata), Inj.,(IV.Infusion), 0.20%, Tk. 145.54/100ml.; Susp, 250 mg/5 ml, Tk. 100.00/60ml; 250 mg, Tk. 8.53/Tab.; 750 mg, Tk. 18.06/Tab.; 500 mg, Tk. 15.00/Tab.
Floxibid(ACI), Inj.,(IV.Infusion), 0.20%, Tk. 146.44/100ml; Tab., 100mg, Tk. 20.13/Tab.; 250mg, Tk. 8.56/Tab.; 500mg, Tk. 15.05/Tab.; 750mg, Tk. 18.12/Tab.; Susp, 250 mg/5 ml, Tk. 100.30/60ml
Floxy(Team), Tab., 500 mg, Tk. 13.00/Tab.

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Geflox(General), Inj.,(IV.Infusion), , 0.20%, Tk. 70.21/100ml.; Suspn, 250 mg/5 ml, Tk. 100.00/60ml.; Tab., 500mg , Tk. 14.09/Tab.; 250mg, Tk. 8.52/Tab.
Glaxipro(GSK), Tab. , 500 mg, Tk. 15.00/Tab
Kapron(Globe), Inj.,(IV.Infusion), , 0.20%,Tk. 90.00/100ml; Suspn, 250 mg/5 ml, Tk. 90.00/60ml.; Tab., 250 mg, Tk. 8.00/Tab.; 500 mg, Tk. 15.00/Tab.; 750 mg, Tk. 18.00/Tab.;
Libracin(Libra), Inj.,(IV.Infusion), , 0.20%, Tk. 70.48/100ml
Maprocin(Orion), Suspn, 250 mg/5 ml, Tk. 90.61/60ml.; Tab., 500 mg, Tk. 15.00/Tab.; 750mg, Tk. 18.16/Tab.
Monipro(Monico), Suspn, 250 mg/5 ml, Tk. 90.00/60ml; Tab., 500mg, Tk. 14.00/Tab.
Neofloxin(Beximco), Inj.,(IV.Infusion), , 0.20%, Tk. 146.50/100ml.; Suspn, 250 mg/5 ml, 100.00/27/60ml.; sachet, Tk. 11.9966/Schet.; 250 mg/5 ml, Tk. Tab., 250mg, Tk. 8.50/Tab.; 500mg, Tk. 15.00/Tab.; 750mg, Tk. 18.00/Tab.
Ocimax(One Pharma), Suspn, 250 mg/5ml, Tk.99.99/60ml.; Tab., 500 mg, Tk. 13.99/Tab.
Orcipro(Organic),Tab., 500 mg,Tk. 14.05/Tab
Procin(Kemiko), Suspn, 250 mg/5 ml, Tk. 90.27/60ml.; Tab., 250 mg, Tk. 8.52/Tab.; 500 mg, Tk. 14.05/Tab.; 750 mg, Tk. 18.00/Tab.
Q-Nol(Decent), Tab., 500mg, Tk. 11.00/Tab.
Quinox(Eskayef), Suspn, 250 mg/5 ml, Tk. 100.00/100ml.; Tab, 500 ng, Tk. 15.00/Tab.; 250mg, Tk. 8.50/Tab.; 750mg , Tk. 18.00/Tab
Quintor(Ziska), Suspn, 250 mg/5 ml, Tk. 60.00/60ml.; 500 mg, Tk. 10.00/Tab.
Rocipro(Healthcare), Tab., 500mg, Tk. 14.00/Tab.
Tyfloxx(Somatec), Suspn, 250 mg/5 ml, Tk. 100.00/60ml; Tab., 500 mg, Tk. 14.00/Tab.
Virfloxx(Virgo), Suspn, 250 mg/5 ml, Tk. 90.00/60ml; Tab., 500 mg, Tk. 700.00/Tab.
Winbac(Radiant), Tab. , 500mg, Tk. 16.05/Tab.
Xbac(Beacon), Inj.,(IV.Infusion), 200 mg/100 ml, Tk. 145.99/Infusion.; Suspn, 250 mg/5 ml, Tk. 90.60/60ml.; Tab., 500mg , Tk. 14.09/Tab.; 750mg , Tk. 18.11/Tab.
Xirocip(Novo Healthcare), IVInfusion,0.2%, Tk. 70.00/100ml.; 0.4%, Tk. 120.00/100ml; Suspn, 250 mg/5 ml, Tk. 90.00/60ml; Tab., 1000 mg, Tk. 25.00/Tab.; 500 mg, Tk. 14.00/Tab.

GEMIFLOXACIN^[W]

Indications:Treatment of community-acquired pneumonia (CAP) due to multidrug-resistant *Streptococcus pneumoniae*

Cautions and Contra-indications: Should be avoided in patients with a

history of prolongation of the QT interval, patients with uncorrected electrolyte disorders, and patients receiving Class IA or III antiarrhythmic agents;safety and efficacy has not been evaluated in pregnant or lactating women or in individuals <18 years of age

Side-effects: See notes above

Interactions: See Appendix-2

Dose: *Oral:* Treatment of mild-to-moderate Cap, 320 mg once daily for 7 days

Note: For patients with creatinine clearance <40 mL/min, the dose should be adjusted to 160 mg daily. Gemifloxacin can be taken with or without food and should be swallowed whole with a liberal amount of liquid.

Proprietary Preparations

Asiflocin(Asiatic), Tab., 320 mg, Tk. 65.00/Tab.
Facticin(Square), Tab., 320 mg, Tk. 65.19/Tab.
Factiq(Monico), Tab., 320 mg, Tk. 65.00/Tab.
Flogem(Opsonin), Tab., 320 mg, Tk. 65.25/Tab.
Gefcin(Biopharma), Tab., 320 mg, Tk. 65.20/Tab.
Geloxin(Euro), Tab., 320 mg, Tk. 65.00/Tab.
Gemicin(Healthcare), Cap, 320 mg, Tk. 65.00/Cap.
Gemif(Beacon), Tab., 320 mg, Tk. 65.20/Tab.
Gemifloxx(Popular), Tab., 320 mg, Tk. 65.25/Tab.
Geminiox(Eskayef), Tab., 320 mg, Tk. 65.00/Tab.; 320 mg, Tk. 65.00/Tab.
Gemitab(Ibn Sina), Tab. ,320 mg, Tk. 350.00/Tab.
Geofloxx(Sharif), Tab., 320 mg, Tk. 65.19/Tab.
Kmi(kemiko), Tab., 320 mg, Tk. 65.00/Tab.
Orasquin(Incepta), Tab. , 320 mg, Tk. 65.00/Tab.
Toplon(Renata), Tab., 320 mg, Tk. 65.00/Tab.
Xemi(Orion), Tab., 320 mg, Tk. 50.15/Tab.

LEVOFLOXACIN^[W]

Indications: See under dose

Cautions: See notes above; renal impairment; may impair performance of skilled tasks, history of psychiatric illness

Interactions : See Appendix-2

Side-effects: See notes above; also asthenia, anxiety, tachycardia, hypotension, hypoglycemia, pneumonitis,

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local reactions and transient hypotension reported with infusion

Dose:*Oral* :acute sinusitis, 500mg daily for 10-14 days

Exacerbation of chronic bronchitis, 250-500mg daily for 7-10 days

Community-acquired pneumonia, 500mg once or twice daily for 7-14 days

Complicated UTIs, 250mg daily for 7-10 days

Skin and soft tissue infections, 250 mg daily or 500mg once or twice daily for 7-14 daysby *intravenous infusion* (over at least 60 minutes for 500mg), community-acquired pneumonia, 500mg once or twice daily

Complicated UTIs, 250mg daily, increased in severe infections

Skin and soft tissue infections, 500mg twice daily

Proprietary Preparations

Adelev(*Supreme*), Tab. , 250mg, Tk. 8.00/Tab.; 500mg, Tk. 15.00/Tab.

Asilee(*Asiatic*), Tab., 500mg , Tk. 15.00/Tab.

Corbic(*Novo Health*), Tab. , 500 mg, Tk. 15.00/Tab.

Evo(*Beximco*), Inj.,(IV.Infusion), 0.5%, Tk. 100.00/100ml.; Tab., 500mg, Tk. 16.00/Tab.; 750mg, Tk. 20.00/Tab.; 250mg , Tk. 9.00/Tab.

Flovo(*Decent*), Tab., 500mg, Tk. 15.00/Tab.

Floxaget(*Getwell*), Tab. , 500mg, Tk. 15.00/Tab.

Genolev(*General*), Tab., 250mg, Tk. 8.05/Tab.; 500mg, Tk. 15.11/Tab.

Leflox(*ACI*), Tab., 500mg, Tk. 15.11/Tab. ; 750mg, Tk. 20.13/Tab.

Leo(*Acme*), Inj.,(IV.Infusion), 0.5%, Tk. 100.30/100ml.; Tab. , 250.00 mg , Tk. 8.07/Tab. ; 500 mg, Tk. 15.10/Tab. ; 750 mg , Tk. 20.13/Tab.

Leoflox(*Alco*), Tab. , 500 mg, Tk. 15.05/Tab. ; 250 mg, Tk. 7.02/Tab.

Levin(*Amico*), Tab., 500mg , Tk. 14.00/Tab.

Levo(*Astra Bio*), Tab. , 500 mg, Tk. 15.00/Tab.

Levobac(*Popular*), Tab. , 500 mg, Tk. 15.06/Tab.; 750 mg, Tk. 20.08/Tab.; I

Inj.,(IV.Infusion), 0.5%, Tk. 100.38/100ml.;

Levoflox(*Drug Intl*), Tab., 500mg, Tk. 15.05/Tab.; 750mg, Tk. 20.10/Tab.

Levoking(*Renata*), Tab. , 250 mg, Tk. 8.03/Tab. ; 500 mg, Tk. 15.06/Tab. ; 750 mg, Tk. 20.07/Tab.

Levolo(*Pacific*), Tab., 500 mg, Tk. 15.00/Tab.

Levomax(*Eskayef*), Susp., 125 mg/5 ml, Tk. 90.00/5ml, 250mg/5ml, Tk. 130.00/5ml ; Tab, 750mg , Tk. 20.00/Tab.; 500mg, Tk. 15.00/Tab.; 750mg, Tk. 20.00/Tab.;

Levonix(*Ziska*), Tab. , 500 mg, Tk. 14.00/Tab.

Levora(*Somatec*), Tab., 500 mg, Tk. 14.05/Tab.

Levosina(*Ibn Sina*)Tab. ,500mg, Tk. 15.50/Tab.; 750 mg, Tk. 21.00/Tab.

Levox(*Opsonin*), Susp., 125 mg/5 ml, Tk. 75.28/100 ml; Tab., 250 mg, Tk. 8.03/Tab. ; 750 mg , Tk. 20.08/Tab.; 500 mg , Tk. 15.10/Tab.; Inj.,(IV.Infusion), 0.5%, Tk.100.38/100 ml;

Levoxin(*Incepta*), Susp., 125 mg/5 ml, Tk. 80.00/100ml.; Tab., 250 mg, Tk. 8.00/Tab. ; 500 mg, Tk. 15.00/Tab. ; 750 mg, Tk. 20.00/Tab. ; IV.Infusion 0.5%, Tk. 100.00/100ml

Lexazen(*Zenith*), Tab. , 250 mg, Tk. 8.03/Tab.; 500 mg, Tk. 14.06/Tab.

Lexvo(*Modern*), Tab. , 500 mg, Tk. 15.00/Tab.

Lezon(*Euro*), Tab., 500 mg, Tk. 15.00/Tab.

Lifcin(*Biopharma*), Inj.,(IV.Infusion), 0.5%, Tk. 100.00/100ml.; Susp., 125 mg/5 ml, Tk. 75.28/100ml.; Tab., 500 mg, Tk. 15.06/Tab.

Lin(*Kemiko*), Tab., 250 mg, Tk. 10.00/Tab. ; 500 mg, Tk. 15.05/Tab.

Livacin(*G.A.Co*), Tab., 500 mg, Tk.15.00/Tab.

Locin(*Globe*), Tab., 250 mg, Tk. 11.00/Tab. ; 500 mg, Tk. 14.00/Tab.

Lovicin(*Nipa*), Tab., 500 mg , Tk. 15.00/Tab.

Orgalev, (*Organic*), Tab. , 500 mg, Tk. 15.05/Tab.

Orlev(*Orion*), Tab, 500 mg, Tk. 15.10/Tab.

Ovel(*Aristo*), Tab., 500mg, Tk. 15.00/Tab.

Quilev(*Monico*), Tab., 500mg, Tk. 15.00/Tab.

Quixin(*Beacon*), Tab. , 500mg , Tk. 15.10/Tab.

Resquin(*Healthcare*), Tab., 250mg , Tk. 8.00/Tab.; 500mg, Tk.15.00/Tab.; 750mg, Tk. 20.00/Tab.

Trevox(*Square*), Susp., 125 mg/5 ml, Tk. 80.24/100ml.; Inj.,(IV.Infusion), 0.5%, Tk. 100.3/100ml.; Tab. , 500 mg, Tk. 15.10/Tab. ; 750 mg, Tk. 20.13/Tab.

Xenolev(*Virgo*), Tab. , 500mg , Tk. 15.00/Tab.

LOMEFLOXACIN HYDROCHLORIDE^[W]

Indications: *See under Ciprofloxacin*

Cautions: *See under Ciprofloxacin*

Contra-indications: *See under Ciprofloxacin*

Side-effects: *See notes above*

Dose:*Oral*: 400 mg once/twice daily; topical for Eye infections: *see under Ciprofloxacin*

Note. evening administration may minimize the phototoxicity reactions

Proprietary Preparations

Lomeflox(*Aristo*), Tab., 400mg, Tk. 15/Tab.

Mexlo(*Square*), Tab., 400 mg, Tk. 15.10/Tab.

Omeflox(*ACI*)Tab., 400 mg, Tk. 15.11/Tab.

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MOXIFLOXACIN^{[W] [C]}

Indications: Sinusitis, community-acquired pneumonia, complicated skin and soft-tissue infections not responding to other antibacterials

Cautions: See notes above; also conditions predisposing to arrhythmias including myocardial ischemia

Contra-indications: See notes above; also electrolyte disturbances, heart failure with reduced left ventricular ejection fraction

Interactions: See Appendix-2

Side effect: See notes above; also flatulence, gastritis; amnesia; very rarely, rhabdomyolysis, potentially life-threatening hepatic failure

Dose: Oral, IV infusion, over 60 minutes, 400mg once daily

Proprietary Preparations

Cubimox(Acme), Tab., 400 mg, Tk. 40.00/Tab

Flomox(Opso Saline), Inj.(IV Infusion), 400 mg/250 ml, Tk. 90.23/250 ml

Iventi(Square), Inj.(IV Infusion), 400 mg/250ml, Tk. 350/250ml Vial.; Tab., 400 mg, Tk. 40.00/Tab.

Lomeflox (Aristo), Tab., 400 mg, Tk.15.00/Tab.

Maxiflox(ACI), Tab., 400 mg, Tk. 40.00/Tab.

Mexlo (Square), Tk. 70.21/5ml.; Tab., 400 mg, Tk. 15.10/Tab.

Moxibac(Popular), Inj.(IV Infusion), 400 mg/250ml, Tk. 350.00/250 ml Vial.; Tab., 400mg, Tk. 70.00/Tab.

Moxiflox(Alco), Tab., 400 mg, Tk. 50.15/Tab.

Moxilacin(Opsonin), Tab. 400 mg, Tk.40/Tab.

Moxiquin(Incepta), Tab. 400 mg, Tk. 40/Tab.

Omeflox(ACI), Tab., 400 mg, Tk. 15.11/Tab.

Optimox(Aristo), Tab., 400 mg, Tk. 40.00/Tab.;

Respamox(Somatec), Tab. 400mg, Tk. 40.00/Tab.

(For Eye preparation see section 10.2)

NALIDIXIC ACID^{[ED] [W]}

Indications: urinary tract infections, shigellosis

Cautions & Contra-indications: See notes above; also porphyria; monitoring of blood count, renal and hepatic functions required if given for more than

2 weeks, false positive urinary glucose test

Side-effects: See notes above; also reported weakness, increased intracranial pressure, cranial nerve palsy, toxic psychosis, metabolic acidosis

Dose: oral: 1 g every 6 hours for 7 days, reduced to 500 mg every 6 hours in chronic therapy; CHILD > 3 months max. 50 mg/kg daily in divided doses, reduced in prolonged therapy to 30 mg/kg daily

Proprietary Preparations

Dixicon(Jayson), Susp., 300 mg/5 ml, Tk. 30.45/50 ml

Nalid(Square), Susp., 300 mg/5 ml, Tk. 41.74/50 ml; Tab. 500 mg, Tk. 4.87/Tab.

Naligram(Acme), Susp., 300 mg/5 ml, Tk. 41.73/50 ml; 300 mg/5 ml, Tk. 86.10/100 ml; Tab., 500 mg, Tk.4.87/Tab.

Nalidex (Ambee), Susp., 300mg/5ml, Tk. 30.46/50 ml; Tab., 500 mg, Tk. 4.07/Tab.

OFLOXACIN^[W]

Indications: See under Ciprofloxacin

Cautions: See under Ciprofloxacin

Contra-indications: See under Ciprofloxacin

Interactions: See Appendix-2

Side-effects: See notes above; also eye irritation; hot flushes; change in blood sugar; myopathy, rhabdomyolysis

Dose: Oral: for mild to moderate infections, 200-400 mg twice daily for 7-10 days, may be increased to 400-800 mg twice daily in severe cases; for uncomplicated gonorrhea, 400 mg as a single dose; for PID & chronic prostatitis therapy with ofloxacin needs to be continued for 14 & 28 days respectively; IV infusion: over at least 30 minutes 200-400 mg twice daily in mild to moderate infections, for severe or complicated infections, dose may be increased to 400 mg twice daily

Proprietary Preparations

Flocet(Opsonin), Tab., 200 mg, Tk. 12.05/Tab.; 400 mg, Tk. 22.08/Tab.;

Inj.(IV Infusion) 0.2%, Tk. 120.37/100ml

Oflacin(Drug Intl), Tab., 200mg, Tk. 12.05/Tab.; 400mg, Tk. 20.10/Tab.

Rutix(Square), Tab., 200 mg, Tk. 12.09/Tab. ; 400 mg, Tk. 22.14/Tab.

1. ANTI-INFECTIVES

PEFLOXACIN MESYLATE^[W]

Indications: See under Ciprofloxacin
Cautions, Contra-indications: See under Ciprofloxacin; also hepatic impairment
Side-effects: See notes above;
Dose: Oral & IV infusion 400 mg twice daily
Interactions: See Appendix -2

Proprietary Preparations

Nobac(Ibn Sina), Tab., 400mg, Tk.12/Tab.
Peflox(Drug Intl), Tab., 400mg, Tk.11.05/Tab.

SPARFLOXACIN^[W]

Indications: See under Ciprofloxacin; also for respiratory infections caused by S. pneumonia
Cautions, Contra-indications: See under Ciprofloxacin; also hepatic impairment
Interactions: See Appendix-2
Side-effects: See notes above; also cardiac rhythm disturbances and prolongation of QT interval are in reports
Dose: Oral 200-400 mg once daily

Proprietary Preparations

Aciflox(ACI), Tab., 200mg, TK. 12.00/Tab.
Asaf(Asiatic), Tab., 200mg, Tk. 18.75/Tab.
Floxipar(Acme), Tab., 200.00 mg., Tk. 15.61/Tab.
Omniflox(Aristo), Tab., 200mg, Tk. 18/Tab.
Parlox(Eskayef), Tab., 200 mg, Tk. 15/Tab.
Quinoflox(Healthcare), Tab., 200mg, Tk. 150.00/Tab.
Saga(Square), Tab., 200 mg, Tk. 15.05/Tab.
Salocin(Kemiko), Tab., 200 mg, Tk. 17/Tab.
Spar(Globe), Tab., 200 mg, Tk. 20.00/Tab.
Sparflox(Alco), Tab., 200 mg, Tk. 16.05/Tab.
Sparlin(Beximco), Tab., 200mg, Tk. 15.06/Tab.
Sparonex(Drug Intl), Tab., 200mg, Tk. 18.10/Tab.

1.1.8 SULPHONAMIDES AND TRIMETHOPRIM^[A]

A few of them are used topically such as in eye infections and in infected wound and burn injury. In combination with trimethoprim as **Co-trimoxazole**,

Cautions: All sulfonamides and their derivatives, including carbonic anhydrase inhibitors, thiazides, frusemide, bumetanide, torsemide, diazoxide, and sulfonylurea hypoglycemic drugs, are cross-allergic. Plenty of fluid is to be taken and monitoring of blood count is required in prolonged therapy. Hepatic function monitoring also is required in AIDS patients receiving co-trimoxazole. Dose adjustment is needed in renal insufficiency and therapy with sulfonamides and/or trimethoprim in pregnancy and in breast-feeding requires careful assessment of risks in the baby. Sulfonamides and cotrimoxazole are not recommended for use in infants below 6 weeks except for treatment or prophylaxis of pneumocystis pneumonia.
Side-effects: Fever, skin rashes, exfoliative dermatitis, photosensitivity, urticaria, nausea, vomiting, diarrhea, crystalluria, various types of nephrosis and allergic nephritis. Stevens-Johnson syndrome and toxic epidermal necrolysis, although rare, is a particularly serious and potentially fatal type of reaction associated with use of sulfonamides. Hemolytic anemia, particularly in glucose-6-phosphate-dehydrogenase deficient patients, aplastic anemia, granulocytopenia, thrombocytopenia, or leukemoid reactions also are reported after sulfonamides therapy; risk of kernicterus in newborns if taken near the end of pregnancy. Trimethoprim may produce megaloblastic anemia, leucopenia and granulocytopenia. Nausea and vomiting, drug fever, vasculitis, renal damage and central nervous system disturbances occasionally occur.

CO-TRIMOXAZOLE^[ED] [A]

Indications: Urinary tract infections, acute exacerbation of chronic bronchitis, typhoid fever, shigellosis, pneumocystis carinii pneumonia, acute otitis media in children, toxoplasmosis, nocardiasis
Cautions: Monitoring of blood counts is required in prolonged therapy; adequate fluid intake is to be maintained; also see notes above

Contra-indication: Porphyrria

Interactions: See Appendix-2

Side-effects: See notes above;

Dose Oral: ADULT 480-960 mg every 12 hours; CHILD 6 weeks-5 months 120 mg every 12 hours; 6 months-5 years 240 mg every 12 hours; 6-12 years, 480 mg every 12 hours;

By IV infusion: ADULT 960 mg every 12 hours increased to 1.44 g every 12 hours in severe infections; CHILD 36 mg/kg daily in 2 divided doses increased to 54 mg/kg daily in severe infections; pneumocystis carinii infections: for treatment oral or IV infusion, ADULT & CHILD over 4 weeks 120 mg/kg daily in 2-4 divided doses for 14 days, for prophylaxis: Oral: ADULT 960 mg once daily or 960 mg on alternate days or 960 mg twice daily on alternate days; CHILD 6 weeks-5 months 120 mg twice daily on 3 consecutive days or 7 days/week; 6 months-5 years 240 mg 6-12 years 480 mg

Proprietary Preparations

Actrim(Globe), Susp., 200 mg+ 40 mg /5 ml., Tk.22.00/60ml

Actrim-DS(Globe), Tab., 800 mg + 160 mg, Tk. 2.00/Tab.

Alcot(Pacific), Susp., 200 mg+ 40 mg /5 ml., Tk. 20.00/60ml ; Tab., 400 mg + 80 mg, Tk. 1.00/Tab. ; 400 mg + 80 mg, Tk. 2.00/Tab.

Avlotrin(ACI), Susp., 200 mg+ 40 mg /5 ml., Tk. 22.21/60ml. ; Tab., 400mg +80mg , TK. 1.5/Tab. ; 800mg + 160mg , TK. 2.01/Tab.

Biotrim(Biopharma), Susp., 200 mg+ 40 mg /5 ml., Tk. 21.56/60ml; Tab., 800mg + 160mg , Tk. 2.01/Tab.

Cosat(Eskayef), Susp., 200 mg+ 40 mg /5 ml., Tk. 22.07/60ml, Tab., 800 mg + 160 mg , Tk. 2.55/

Cotrazen(Zenith), Susp., 200 mg+ 40 mg /5 ml., Tk. 21.36/60ml; Tab., 400 mg + 80 mg, Tk. 1.40/Tab.; 800 mg + 160 mg, Tk. 2.02/Tab.

Cotrim(Square), Susp., 200 mg+ 40 mg /5 ml., Tk. 21.64/60ml; Tab. , 400 mg + 80 mg, Tk. 1.49/Tab. ,Tab, 800 mg + 160 mg, Tk. 2.04/Tab.

Co-trimoxazole(Popular), Tab. , 400mg + 80mg , Tk. 1.48/Tab.

Cots (Opsonin), Susp., 200 mg+40mg/5 ml., Tk. 22.14./60 ml

Gentrim(General), Tab. , 400mg + 80mg, Tk. 1.49/Tab.

G-Cotrimoxazole(Gonoshasthaya), Susp, 200 mg+40 mg/5 ml, Tk. 28.00/100 ml;

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Tk.19.60/50ml; Tab., 400 mg + 80 mg, Tk.

1.20/Tab.

Megatrim(Beximco), Susp., 200 mg+ 40 mg /5 ml., Tk. 22.17/60ml; Tab., 800mg + 160mg, Tk. 2.65.00/Tab.

M-Trim(Modern), Susp., 200 mg+ 40 mg /5 ml., Tk. 23.96/60ml; Tab., 800 mg+160 mg. , Tk. 2.65/Tab.

Octrim(Orion), Susp., 200 mg+ 40 mg /5 ml., Tk. 21.08/60ml

Ptrim(Astra Bio), Susp., 200 mg+ 40 mg /5 ml., Tk. 22.00/60ml; Tab., 80 mg + 160 mg, Tk. 2.50/Tab.

Septra(Asiatic), Susp., 200 mg+ 40 mg /5 ml., Tk., 21.57/60ml; Tab., 400mg + 80mg , Tk. 1.49/Tab. ; 800mg+160mg, Tk. 2.03/Tab.

Sinatrim(Ibn Sina), Susp., 200 mg+ 40 mg /5 ml., Tk. 22.00/60ml; Tab., 800mg + 160mg, Tk. 210.00/Tab.

Sulphatrim(Amico), Susp., 200 mg+ 40 mg/5 ml., TK. 22.10/60ml; Tab., 400 mg + 80mg , TK. 1.49/Tab. ; 800mg + 160mg , TK. 2.50/Tab. ; 100 mg + 20mg , TK. 0.58/Tab.

Triprim(Supreme), Cap. , 400mg +80mg, Tk. 1.48/Cap. ; Susp., 200 mg+ 40 mg /5 ml., Tk. 21.00/60ml; Tab., 800mg + 160mg , Tk. 2.00/Tab.

Jasotrim(Jayson), Susp., 200 mg + 40 mg/5 ml , Tk. 21.61/60 ml; Tab., 400 mg + 80 mg, Tk. 1.49/Tab.

1.1.9 METRONIDAZOLE, TINIDAZOLE AND ORDINAZOLE

See section 1.3.2

1.1.10ANTI-MYCOBACTERIAL DRUGS

1.1.10.1 ANTI-TUBERCULOSIS DRUGS

1.1.10.2ANTI-LEPROSY DRUGS

1.1.10.1ANTI-TUBERCULOSIS DRUGS

FIRST LINE DRUGS

ETHAMBUTOL HYDROCHLORIDE^[E]

Ethambutol is effective against most strains of M tuberculosis and M kansasii and good number of strains of M. avium complex. No other bacteria are sensitive to ethambutol. Cleared by both renal and nonrenal routes, renal being more prominent.

Indications: Tuberculosis in combination with other drug (see under chemotherapy for tuberculosis)

Cautions: Dose reduction required in renal impairment, also monitoring of plasma concentration if creatinine

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clearance less than 30 ml/min; tests of visual acuity and red-green discrimination prior to therapy and routine ophthalmological monitoring during therapy recommended, patients should be warned to report any visual change; cautions for elderly, young children and pregnant patients

Contra-indications: Optic neuritis, poor vision

Interactions: See Appendix-2

Side-effects: Optic neuritis leading to loss of red/green discrimination ability, pruritus, joint pain, GIT upset, abdominal pain, malaise, headache, dizziness, mental confusion, disorientation, hallucination; numbness and tingling of fingers due to peripheral neuritis infrequently; rarely anaphylaxis, thrombocytopenia and leucopenia

Dose: Oral: ADULT & CHILD > 12 years 15 mg/kg once daily; for recurrent cases, 25 mg/kg/d for 60 days then 15 mg/kg/d; CHILD 6-12 years, 10-15 mg/kg/d; for intermittent supervised therapy, ADULT & CHILD > 12 years, 30 mg/kg thrice weekly or 50 mg/kg twice weekly (not recommended for children under 5 years)

Proprietary Preparations

(For Combined Preparations of Ethambutol, see under Isoniazid)

ISONIAZID^[ED]

Isoniazid is effective selectively against *M. tuberculosis* and *M. kansasii*. Hepatic clearance by genetically determined acetylation is the principal mode of elimination.

Indications: Tuberculosis in combination with other drug (see under chemotherapy for tuberculosis)

Cautions: Monthly evaluation of patients for symptoms of hepatitis has been advised, one-third to one-half of normal dose is recommended in moderate to severe hepatic insufficiency; other conditions that require cautious therapy with isoniazid are epilepsy, history of psychosis, alcohol dependence, malnutrition, diabetes mellitus, slow acetylator status, porphyria, pregnancy, breast-feeding and HIV infection

Contra-indications: Drug induced liver disease

Interactions: See Appendix-2

Side-effects: Rash, fever, jaundice, peripheral neuritis leading to numbness, tingling of the feet particularly in slow acetylators, diabetic, HIV infected and malnourished or anemic patients; allergic reactions including hepatitis, skin eruptions and morbilliform eruptions, maculopapular, purpuric and urticarial rashes; hematological reactions like agranulocytosis, eosinophilia, thrombocytopenia, hemolytic anemia; convulsions, insomnia, muscle twitching, ataxia, paraesthesia, stupor, toxic encephalopathy; optic neuritis and atrophy

Dose: Oral or IM inj: treatment and prophylaxis, ADULT 300 mg once daily; CHILD 10-20 mg/kg (max. 300 mg) once daily; for intermittent supervised therapy, 10 mg/kg thrice or 15 mg twice weekly; pyridoxine, 15-50 mg/d particularly in high risk patients for peripheral neuropathy

Proprietary Preparations

Rifampicin + Isoniazid

Rimactazid(Novartis), Tab. , 300 mg + 150 mg, Tk. 8.37/Tab. ;150 mg+ 75 mg, Tk. 4.00/Tab.;, 450 mg + 300 mg, Tk. 11.71/Tab.

Isoniazid + Thiacetazone

Rifampicin+Isoniazid+Pyrazinamide

Rifampicin+Isoniazid+Pyrazinamide+ Ethambutol HCl

Rimstar 4-FDC(Novartis), Tab. , 150 mg +75 mg + 400 mg + 275 mg, Tk. 10.00/Tab.

RIFAMPICIN^[ED]

Rifampicin exerts broad-spectrum antibacterial effect and is effective against most gram-positive as well as many gram-negative organisms. *S. aureus*, coagulase-negative staphylococci, *E. coli*, *Pseudomonas*, indole-positive and indole-negative *Proteus*, and *Klebsiella*, *N. meningitidis*, *H. influenzae* are particularly susceptible. Of the mycobacteria, *M. tuberculosis*, *M. kansasii*, *M. scrofulaceum*, *M. intracellulare* are sensitive, while *M. fortuitum* is highly resistant.

1. ANTI-INFECTIVES

After absorption from gastrointestinal tract, it is eliminated rapidly in the bile and exhibits an enterohepatic recycling.

Rifampicin is a potent inducer of hepatic drug metabolizing enzymes and eliminates principally in feces.

Indications: Treatment of tuberculosis in combination with other drug (see *under chemotherapy for tuberculosis*), an alternative to isoniazid as prophylactic in close contacts to a case of isoniazid-resistant tuberculosis provided that the index case is susceptible to this drug; Leprosy, brucellosis, hemophilus influenzae infection, legionnaires disease, prophylaxis of meningococcal meningitis; in combination with ceftriaxone or vancomycin for treatment of meningitis caused by penicillin-resistant strains of pneumococci, in combined therapy against serious staphylococcal infections such as osteomyelitis and prosthetic valve endocarditis

Cautions: Patients with hepatic impairment need hepatic function and blood counts monitoring, alcoholism, during concomitant use of oral contraceptives, patients should be advised to use additional means of contraception, pregnancy, breast-feeding, porphyria; patients should be warned about harmless orange-red color to urine, feces, saliva, sputum, tears, and sweat

Contra-indications: Jaundice, liver damage

Interactions: See Appendix-2

Side-effects: Gastrointestinal symptoms including anorexia, nausea, vomiting, diarrhea; cholestatic jaundice and occasionally hepatitis; light-chain proteinuria commonly and acute renal failure rarely, thrombocytopenic purpura, urticaria, rashes; a flu-like syndrome characterized by fever, chills, myalgias, anemia, and sometimes associated with acute tubular necrosis

Dose: Tuberculosis treatment and prophylaxis, ADULT < 50 kg, 450 mg once daily, 50 kg and over 600mg once daily or as 10 mg/kg/d; CHILD 10 mg/kg (max. 600 mg) daily; for intermittent

supervised therapy, 600 mg twice or thrice weekly;

Leprosy, supervised therapy of 600 mg once in a month, 450 mg for patients weighing less than 35 kg; Brucellosis, legionnaires disease and serious staphylococcal infections, in combination with other drugs, orally or by IV infusion, 0.6-1.2g daily in 2-4 divided dose

Proprietary Preparations

(For Combined Preparations of Rifampicin, see under Isoniazid)

PYRAZINAMIDE^[ED]

This is an important front-line anti-tuberculosis drug and is used in combination with isoniazid and rifampicin in short-course, 6 months regimen as a 'sterilizing' agent active against residual intracellular organisms responsible for relapse. Pyrazinamide produces selective bactericidal effect against *M. tuberculosis*, but not effective against *M. bovis*.

The drug is taken up by macrophages and is converted to active pyrazinoic acid by mycobacterial pyrazinamidase. The drug eliminates principally by renal route.

Indications: Treatment of tuberculosis in combination with other drugs in combination with ciprofloxacin or ofloxacin as prophylactic in close contacts to a case of multidrug-resistant tuberculosis provided that the index case is susceptible to these drugs

Cautions: Hepatic insufficiency, monitoring of liver function is advised; therapy should be stopped if there is evidence of hepatotoxicity (elevation of plasma alanine and aspartate aminotransferases are the earliest features of drug hepatotoxicity); diabetes, gout

Contra-indications: Liver damage, porphyria

Interactions: See Appendix-2

Side-effects: Most serious is the hepatotoxicity; liver tenderness, hepatomegaly, jaundice and fulminating liver failure that can be fatal; hyperuricemia and gouty arthritis occur

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uniformly and not considered to be a reason to halt therapy; also anorexia, nausea and vomiting, dysuria, occasional mild fever, malaise

Dose Oral: Treatment and prophylaxis, ADULT & CHILD 15-30 mg/kg daily as a single dose, max. 2 g/d; for intermittent supervised therapy, 35-40 mg/kg twice or thrice weekly, max. 3 g/occasion

Proprietary Preparations

(For Combined Preparations of Pyrazinamide, see under Isoniazid)

STREPTOMYCIN^[ED] [C]

See section 1.1.4

THIACETAZONE

Thiacetazone is bacteriostatic against many strains of *M. tuberculosis* and *M. leprae*. Thiacetazone containing regimens are less effective than the short-course regimens recommended by WHO, but are used with isoniazid in long-term regimens principally because of its low cost. WHO does not recommend its use in leprosy.

Dose: See standard treatment Guidelines (Appendix-1)

Generic Preparation

Isoniazid 300 mg + Thiacetazone 150 mg Tablet

SECOND LINE ANTI-TUBERCULOSIS DRUGS:

AMIKACIN^[C]

See under Aminoglycosides (Sec 1.1.4.)

CAPREOMYCIN

Indications: In combination with other drugs for tuberculosis resistant to first-line drugs

Cautions: Renal, hepatic, or auditory impairment, monitoring of renal, hepatic, auditory, vestibular function and electrolytes are advised; pregnancy (teratogenic in animals) and breast-feeding

Interactions: See Appendix-2

Side-effects: Hearing loss, tinnitus, transient proteinuria, cylindruria, electrolyte disturbances and nitrogen retention, severe renal failure, urticaria and rashes; leukocytosis or leucopenia rarely thrombocytopenia; change in liver function tests, neuromuscular block after large doses, pain and induration at injection site

Dose: Deep IM inj. 15-30 mg/kg/d or up to 1 g daily for 2-4 months then 1 g, 2-3 times weekly

Generic Preparation

Capsule, 250mg

CYCLOSERINE

This drug is inhibitory to many gram-positive and gram-negative organisms but is used exclusively to treat tuberculosis caused by strains of *M. tuberculosis* resistant to first-line drugs. The drug has adequate oral bioavailability and achieves antibacterial concentrations in many tissues including central nervous system and CSF.

Indications: In combination with other, drugs, tuberculosis resistant to first-line

Cautions: Dose reduction is necessary in renal impairment; monitoring of blood counts, renal and hepatic function; pregnancy and breast-feeding; neurological toxicities are common above the dose of 0.75 g/d

Contra-indications: Severe renal impairment, epilepsy, depression, porphyria

Interactions: See Appendix-2

Side-effects: Most serious toxicities are peripheral neuropathy and central nervous system dysfunction including headache, dizziness, vertigo, drowsiness, tremor, convulsions, confusion, depression, and psychotic reactions, (dose reduction & pyridoxine 150 mg/d are recommended); rashes, allergic dermatitis megaloblastic anemia; changes in liver function tests; heart failure at high doses reported

Dose: Oral: Initially 250 mg every 12 hours for 2 weeks, then increased to maximum 500 mg every 12 hours; CHILD

initially 10 mg/kg daily adjusted according to blood concentration and response

Generic Preparation

Capsule, 250 mg

ETHIONAMIDE

Ethionamide has selective antimycobacterial activity including *M tuberculosis*, *M kansasii*, *M leprae* and some strains of *M avium* complex.

Indications: In combination with other drugs for tuberculosis resistant to first-line drugs or when first line drugs cannot be given because of toxicity; alternative to Clofazimine in regimens for leprosy

Cautions: Hepatic impairment (should not be used in severe impairment), monitoring of hepatic function before and during treatment; unsafe in porphyria; psychiatric disorders; monitoring of blood glucose, thyroid function and of visual acuity

Interactions: See Appendix-2

Side-effects: GI disturbances, mental disturbances including anxiety, depression, psychotic disorders; headache, dizziness, postural hypotension; hepatotoxicity; hypersensitivity reactions including thrombocytopenia, purpura, alopecia, dermatitis

Dose: *Oral resistant tuberculosis:* ADULT, 15-20 mg/kg daily (max. 1 g daily); CHILD, 10-20 mg/kg (max. 750 mg) daily; in single or divided doses

Generic Preparation

Tablet, 250mg

PARA-AMINOSALICYLIC ACID

This is bacteriostatic against *M tuberculosis*, while other mycobacteria are usually resistant.

Indications: in combination with other drugs for tuberculosis resistant to first-line drugs or when first line drugs cannot be given; ulcerative colitis

Cautions: Renal and hepatic impairment (should not be used in severe

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impairment); gastric ulcer; G6PD deficiency; pregnancy, breast-feeding

Interactions: See Appendix-2

Side-effects: GI disturbances including nausea, vomiting, abdominal pain, gastric irritation and ulcer; hypersensitivity reactions including skin rashes, arthralgia, lymphadenopathy, syndrome like infectious mononucleosis; hemolytic anemia

Dose: *Oral tuberculosis:* ADULT, 12 g daily in 3 divided doses; *ulcerative colitis:* 2 g once daily

RIFABUTIN

It exerts antibacterial activity similar to that of rifampicin. It is both a substrate and inducer of cytochrome P 450 enzymes.

Indications: See under Dose

Cautions: See under rifampicin

Contra-indications: jaundice, liver damage (not recommended for use in children)

Interactions: See Appendix -2

Side-effects: Nausea, vomiting; leucopenia, thrombocytopenia, anemia, raised liver enzymes, jaundice, uveitis following high doses or administration with drugs which raise plasma concentration; arthralgia, myalgia, influenzae-like syndrome, dyspnea; also hypersensitivity reactions including fever, rash, eosinophilia, bronchospasm; urine, saliva and other body secretions colored orange-red;

Dose: *Oral:* prophylaxis of mycobacterium avium complex infections in HIV-infected patients, 300 mg daily as a single dose; treatment of non-tuberculous mycobacterial disease, in combination with clarithromycin and ethambutol, 450-600 mg daily as a single dose;

alternative to rifampicin for treatment of tuberculosis in HIV-infected patients (as it has less interactions than rifampicin with indinavir and nelfinavir), 150-450 mg daily as a single dose for at least 6 months; for preventive therapy of tuberculosis, either alone, in a 6-month regimen or with pyrazinamide in a 2-

1. ANTI-INFECTIVES

month regimen, 150-450 mg daily as a single dose; treatment of pulmonary tuberculosis, 150-450 mg daily as a single dose for 6 months

Generic Preparation

Capsule, 150 mg

CHEMOTHERAPY OF TUBERCULOSIS

Mycobacteria are slowly growing organisms, can remain dormant for long time and a substantial proportion reside within macrophages inaccessible to many drugs and can rapidly develop resistance to any single drug. As such, combinations of drugs are employed to overcome these obstacles and to prevent emergence of resistance. Another problem, to prevent disease relapse, required therapy is of long duration which most patients fail to comply. To overcome this problem, supervised short-course therapy with intermittent administration of drugs has been formulated and adopted by many national anti-tuberculosis programmes. Followings are recommended regimens for treatment and prophylaxis of tuberculosis:

1.1.10.2 DRUGS FOR LEPROSY

(See Appendix-1c)

Leprosy is a slowly progressive chronic infectious granulomatous disease caused by *Mycobacterium leprae* affecting mostly the skin and peripheral nerves resulting in anaesthetic hypopigmented patches in skin, and sometimes trophic changes producing deformities in certain other tissues notably oral/nasal mucosa, the eye, muscle and bone. Multidrug treatment (MDT) for leprosy as recommended by the Bangladesh National TB and Leprosy Control Programme is shown in Appendix-1

CLOFAZIMINE^[ED]

Clofazimine is active against both dapsone-sensitive and dapsone-resistant bacilli and against *M. intracellulare*. Variable absorption from gut and a major

portion of drug is excreted in feces. Clofazimine is stored widely in reticuloendothelial tissues and skin.

Indications: Leprosy in combination with other drug, chronic skin ulcers (Buruli ulcer) produced by *M. ulcerans*, prophylaxis against erythema nodosum leprosum

Cautions: Hepatic and renal impairment; pregnancy and breast-feeding; may discolor soft lenses; best to avoid if persistent abdominal pain and diarrhea

Interactions: See Appendix-2

Side-effects: Nausea, vomiting (hospitalize if persistent), abdominal pain; headache; tiredness; brownish-black discoloration of lesions and skin including areas exposed to light, reversible hair discoloration; dry skin; red discoloration of feces, urine and other body fluids; also rash; pruritus, acne-like eruptions, anorexia, eosinophilic enteritis, bowel obstruction, dry eyes, dimmed vision, macular and subepithelial corneal pigmentation; elevated blood sugar, weight loss, spinal infarction, lymphadenopathy

Dose: Oral: leprosy, 50-100 mg daily, in lepromatous lepra reactions, dose increased to 300 mg daily for maximum of 3 months

Generic Preparation

Capsule, 50mg

DAPSONE^[ED]

Like sulfonamides, it acts by inhibiting microbial folate synthesis; well absorbed after oral administration and widely distributed throughout body fluids and tissues and tends to accumulate in skin, muscle, liver, and kidney. Dapsone is principally cleared through kidney after acetylation.

Indications: Leprosy, treatment and prophylaxis of pneumocystis carinii pneumonia, dermatitis herpetiformis

Cautions: Dose adjustment required in renal failure, cardiac or pulmonary disease; anemia; hemolysis in G-6PD deficient patients, during long-term treatment, patients and their attendants should be told how to recognize signs of blood disorders; they should be advised

to get admission into hospitals if symptoms such as fever, sore throat, rash, mouth ulcers, purpura, bruising or bleeding develop; breast-feeding, pregnancy; best to avoid in porphyria;

Contraindications: Blood dyscrasia, hypersensitivity to dapsone

Interactions: See Appendix-2

Side-effects: Dose-related and not common at dose used for leprosy, hemolysis in G-6PD deficient patients, methemoglobinemia rather common; neuropathy, allergic dermatitis anorexia, nausea, vomiting, pruritus, tachycardia, headache, insomnia, psychosis during therapy of lepromatous leprosy; erythema nodosum leprosum often develops

Dose: Oral: leprosy, 100 mg daily or 1-2 mg/kg daily,

Generic Preparation

Tablet, 100mg

RIFAMPICIN^[ED]

see under Drugs for tuberculosis

1.1.11 DRUGS USED IN SEXUALLY TRANSMITTED DISEASES

Sexually transmitted diseases (STDs) are a group of communicable diseases that are transmitted predominantly by sexual contact and caused by a wide range of bacterial, viral, protozoal and fungal agents, and also by different ectoparasites.

The highest incidence of STDs is observed in 20–24 years age group. Certain socio-demographic factors such as population explosion, rapid urbanization and industrialization, rural to urban migration, prostitution, broken homes, sexual disharmony, social disruption and alcoholism undoubtedly contribute towards the increase of STDs in a developing country like Bangladesh. Over 20 pathogens have been found to spread commonly by sexual contact. The most common of these pathogens with usual clinical manifestations are *Treponema pallidum*, *Neisseria*

gonorrhoea, *Haemophilus ducreyi* and *Chlamydia trachomatis*; though AIDS caused by the human immunodeficiency virus (HIV) is not yet a very common STD in Bangladesh, there are special reasons for awareness against this new global menace. Syphilis and gonorrhoea being the two most prevalent STDs, the drug treatments regimens for these two diseases are described.

1.1.12 OTHER ANTIBACTERIALS

CHLORAMPHENICOL^[ED] [OTC] [A]

(See section 10.2 & 11.1.1)

Chloramphenicol was found to have a serious (often fatal) bone marrow depression. However, it is still the drug of choice for enteric fever when other antibiotics are resistant. For *H. influenzae* infections, especially meningitis, emergence of ampicillin resistant strains led to a reappraisal of the use of chloramphenicol.

Indications: Severe rickettsial infections such as typhus or rocky mountain fever in children, alternative to a beta-lactam for bacterial meningitis due to penicillin-resistant strain of pneumo- or meningococcus and in penicillin-allergic patients, alternative to tetracyclines for acute and chronic brucellosis, eye and ear infections caused by susceptible organisms

Cautions: Dose must be reduced in hepatic impairment, in newborns less than a week old and in premature infants; repeated courses & prolonged treatment are not recommended; periodic blood counts and monitoring of plasma concentration (in neonates) are required

Contra-indications: Pregnancy, breast-feeding, porphyria

Interactions: See Appendix-2

Side-effects: Blood dyscrasia such as leucopenia, thrombocytopenia, dose-related reversible suppression of red-cell production, idiosyncratic irreversible aplastic anemia; also peripheral neuritis, optic neuritis; erythema multiforme; nausea, vomiting, diarrhea, grey baby

1. ANTI-INFECTIVES

syndrome (abdominal distension, pallid cyanosis, circulatory collapse) usually after excessive doses in neonates with immature hepatic function

Dose: *Oral IV inj. or infusion:* ADULT & CHILD, 50-100 mg/kg/d in 4 divided doses; INFANTS < 2 weeks, 25 mg/kg/d in 4 divided doses; topical (as 0.5% solution and 1% ointment); 2-3 drops/in thin layer 2-3 times or more

Proprietary Preparation

Chloramphenicol(Hudson), Cap., 250mg, Tk.2.50/Cap.

(See also section 10.2&11.1., For skin and ENT preparation)

CLINDAMYCIN

Indications: Severe anaerobic infection caused by bacteroids and other anaerobes, septic abortion, pelvic abscesses, with an aminoglycosides or cephalosporin to treat penetrating wound of gut, with primaquine as an alternative to co-trimoxazole in pneumocystis pneumonia in AIDS patients and with pyrimethamine in AIDS-related toxoplasma encephalitis; topically in acne.

Cautions: Should be discontinued if there is diarrhea or colitis, requires monitoring of renal and hepatic functions in prolonged therapy and in neonates and infants; renal or hepatic impairment, pregnancy and breast-feeding

Contra-indications: Diarrheal states

Interactions: See Appendix-2

Side-effects: Diarrhea, nausea, vomiting, pseudomembranous colitis, impaired liver function, jaundice, neutropenia, eosinophilia, agranulocytosis, thrombocytopenia, rash, urticaria, erythema multiforme, exfoliative and vesiculobullous dermatitis

Dose: *Oral:* 150-300 mg every 6 hours; up to 500 mg every 6 hours in severe infections; CHILD 10-20 mg/kg/d in 4 divided doses; deep IM inj. or IV infusion: 0.6-2.7 g daily in 2-4 divided doses; life-threatening infection, up to 4.8 g daily; CHILD > 1 month, 15-40 mg/kg daily in 3-

4 divided doses; severe infections, at least 300 mg daily regardless of weight

Proprietary Preparations

Anobac(Globe), Cap., 300 mg, Tk. 15.00/Cap.

Asiclin(Asiatic), Cap., 150mg , Tk. 8.00/Cap. ,300mg , Tk. 15.00/Cap.; Inj., 300mg /2ml, Tk. 39.00/2ml, 600mg/4ml, Tk. 69.00/4ml

Cinamycin(Ibn Sina), Cap. , 150mg, Tk. 8/Cap.; 300mg, Tk. 15/Cap.;Inj., 300mg/2ml, Tk. 200.00/2ml.; 600mg/4ml , Tk. 350.00/4ml

Cleocin(Healthcare), Cap., 150mg, Tk. 300.00/Cap.; 300mg , Tk. 448.00/Cap.

Cleodin(General), Cap., 150mg, Tk. 6.00/Cap.; 300mg, Tk. 15.04/Cap.; Inj., 300mg/2ml, Tk. 40.12/2ml,600mg/4ml, Tk. 70.21/4ml

Climycin(Square), Cap, 150 mg, Tk. 8.06/Cap.300 mg, Tk. 15.10/Cap.

Clinacyn(Beximco), Cap., 150mg, Tk. 8.00/Cap.; 300mg, Tk. 15.00/Cap.

Clincin (Navana), Cap., 150 mg, Tk. 8.00/Cap.; 300mg, Tk. 15.00/Cap.;Syrup, 75 mg/5 ml, Tk. 250/100 ml

Clinda(Astra Bio), Cap. , 150 mg, Tk. 8.00/Cap.; 300 mg, Tk. 15.00/Cap.

Clindabac(Popular), Cap.,150 mg, Tk. 8.00/Cap.; 300 mg, Tk. 15.00/Cap.

Clindacin(Incepta), Cap. ,150 mg, Tk. 8.00/Cap., 300 mg, Tk. 15.00/Cap.;

Inj.,300mg/2ml, Tk. 40.00/2ml. ; 600mg/4ml, TK.. 70.00/4ml.; Susp., 75 mg /5 ml, Tk. 280.00/100 ml

Clindamet(Somatec), Cap., 150 mg, Tk. 8.00/Cap.; 300 mg, Tk. 15.00/Cap.

Clindaver (Veritas), Cap., 300 mg, Tk. 15.00/Cap.

Clindax(Opsonin), Inj., 300 mg/2 ml, Tk. 40.15/ 2 ml, 600 mg/4 ml, Tk.70.26/4ml.;Cap.,150 mg, Tk. 8.03/ Cap., 300 mg , Tk. 15.06/Cap.;

Susp., 75 mg /5 ml, Tk. 250.94/ 100 ml

Clinex(Aristo), Cap., 150mg , Tk. 8.00/Cap.; 300mg, Tk.15.00/cap

Daclin(ACI), Cap.,150mg, Tk. 8.02/Cap.,300mg, Tk.15.05/Cap

Dalacin(Drug Intl), Cap.,300mg, Tk. 15.05/Cap.; Inj.,300mg/2ml, Tk. 40.15/2ml. ; 600mg/4ml, Tk. 70.25/4ml.

Endamycin(Euro), Cap., 150mg, Tk. 15.00/Cap.; 300mg, Tk. 8.00/Cap.

Fortior(Pharmacil), Cap.,300mg, Tk. 22.00/cap.

Linacin(Sharif), Cap. , 150 mg , Tk. 8.03/Cap.; 300 mg , Tk. 15.04/Cap.

Lincocin(Acme), Cap. ,300 mg , Tk. 15.04/Cap.

Lindamax(Eskayef), Cap, 150mg, Tk. 8.00/Cap.; 300mg , Tk. 15.00/Cap. ;

Maxclin(Alco), Tab., 150 mg, Tk. 8.00/Tab.; 300 mg, Tk. 15.00/Tab.

Qcin (Renata), Inj., 300 mg/2 ml, Tk. 40.00/2 ml; 600 mg/4 ml, Tk. 70.00/4 ml; Cap. 150 mg, Tk. 8.00/Cap.; 300 mg, Tk. 15.00/Cap.
Xindal (Orion), Cap., 150 mg, Tk. 8.00/Cap.; 300 mg, Tk. 15.00/Cap.

LINEZOLID^[C]

Indications: Pneumonia, complicated skin and soft tissue infections caused by Gram-positive bacteria including those due to vancomycin-resistant enterococci and methicillin resistant *S aureus*

Cautions: Blood count including platelet count requires weekly monitoring; if significant myelosuppression, treatment should be stopped; visual function monitoring is required in long therapy (more than 28 days), patients should be warned to report symptoms of visual impairment immediately; history of seizures, hepatic impairment, renal impairment, pregnancy; tyramine-rich foods

Interactions: See Appendix -2

Contra-indications: Breast-feeding; patients using MAO-inhibitor drugs

Side-effects: Diarrhea, nausea, and vomiting, metallic taste, dizziness and abnormal liver function test; reversible myelosuppression including anemia; leucopenia, pancytopenia, and in particular, thrombocytopenia has been reported

Dose: Oral or IV infusion over 30-120 minutes: ADULT over 18 years 600mg every 12 hours for 10-14 days

Proprietary Preparations

Arlin (Beximco), Inj., 600 mg/300 ml, Tk. 450.00/ Vial.; Suspn., 100mg/5ml, Tk. 280.00/100ml.; Tab., 400mg, Tk. 60.00/Tab.; 600mg, Tk. 85.00/3/Tab.

Ezolid (ACI), Tab., 400mg, Tk. 60.00/Tab.; 600mg, Tk. 85.00/Tab.

Linexil (Opsonin), Inj., 600 mg/300 ml, Tk. 451.36/ Vial.; Suspn., 100 mg /5 ml, Tk. 280.00/100 ml.

Linolid (Incepta), Inj., 600 mg/300 ml, Tk. 450.00/ Vial.; Suspn. 100 mg/5 ml, Tk. 280.00/100 ml; Tab., 400 mg, Tk. 60.00/Tab.; 600 mg, Tk. 85.00/Tab.

1. ANTI-INFECTIVES

FOSFOMYCIN^[R/C]

Indications: Uncomplicated urinary tract infections (acute cystitis) in women due to susceptible strains of *Escherichia coli* and *Enterococcus faecalis*

Cautions: Breast feeding, Pregnancy, Renal Impairment

Contra-indications: Patients with severe renal insufficiency (CLcr < 10 ml/min), patients undergoing haemodialysis

Interactions: Concomitant administration of metoclopramide has been shown to lower serum and urinary concentrations and should be avoided.

Side-effects: Headache dizziness dyspepsia vulvovaginitis dizziness

Dose: Oral: ADULT: Uncomplicated lower urinary tract infections: one sachet (3g)

Child: not recommended under the age of 12 years

Note: Fosfomycin is for oral administration and should be taken on an empty stomach, either 1 hour before or at least 2 hours after meals and preferably before bedtime after emptying the bladder. The contents of a sachet should be dissolved in a glass of water and taken immediately after its preparation.

Proprietary Preparation

Fosamin (Beximco), Granules for Oral Solution, 3mg, Tk. 350.00/sachet

NITROFURANTOIN^{[ED] [A] [C]}

Indications: For long-term suppression and treatment of uncomplicated lower urinary tract infections

Cautions: Hepatic insufficiency; elderly patients (risk of acute pulmonary reactions); anemia; diabetes mellitus; electrolyte imbalance; vitamin B and folate deficiency; pulmonary disease; urine may be colored yellow or brown;

Contra-indications: Known hypersensitivity, renal impairment, pregnancy (at term) and breast-feeding; infants less than 3 months old, G6PD deficiency; acute porphyria

Interactions: See Appendix-2

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Side-effects: Diarrhea, nausea, and vomiting; neurological disturbances including dizziness, headache, vertigo, nystagmus, benign intracranial hypertension, severe and sometimes irreversible peripheral polyneuropathy; hypersensitivity reactions including skin rashes, urticaria, pruritus, fever, erythema multiforme, Steven-Johnson syndrome, exfoliative dermatitis, pancreatitis, blood disorders (including agranulocytosis, thrombocytopenia, and aplastic anemia); acute pulmonary sensitivity reactions characterized by sudden onset of fever, chills, eosinophilia, cough, chest pain, dyspnea, pleural effusion, chronic symptoms include interstitial pneumonitis and pulmonary fibrosis

Dose: *Oral: acute uncomplicated infection*, ADULT, 50 mg every 6 hours with food for 7 days (3 days usually adequate in women); CHILD, over 3 months, 750 micrograms/kg every 6 hours; *severe chronic recurrent infection*, 100 mg every 6 hours with food for 7 days (dose reduced or discontinued if severe nausea); *prophylaxis*, 50–100 mg at night; CHILD over 3 months, 1 mg/kg at night

Proprietary Preparations

Nintoin(*Incepta*), Susp., 25 mg/5 ml, Tk. 80.00/100ml.; Cap., 100 mg, Tk. 20.00/Cap. ; 100 mg, Tk. 4.00/Cap. ; Tab., 100 mg, Tk. 6.00/Tab.
Nitrofur, (*ACI*), Susp., 25mg/5ml, Tk. 80.00/100ml
Ofuran(*Pacific*), Tab., 100 mg, Tk. 20/Tab.
Rantoin(*Drug Intl*), Tab., 100mg, Tk. 6/Tab.
Urobak(*Opsonin*), suspn., 25 mg/5 ml, Tk. 60.00/ 100 ml ; Tab, 100 mg , Tk. 6.00/Tab.
Urocure(*Square*), Cap., 100 mg, Tk. 20.06/Cap. ; Susp., 25 mg/5 ml, Tk. 80.24/100ml

RIFAXIMIN

Indications: *See under Dose*

Caution: Hepatic impairment

Contra-indications: hypersensitivity; intestinal obstruction; pregnancy and breast-feeding

Interactions: *See Appendix -2*

Side-effects: Nausea, vomiting, abdominal pain, flatulence, diarrhea,

dyspnea, headache, depression, dizziness, muscle spasm, rash, pruritus; *less commonly* anorexia, taste disturbances, dry mouth, peripheral edema, sleep disturbances, anxiety, memory impairment, convulsions, hypoesthesia, paraesthesia, antibiotic-associated colitis, influenza-like symptoms, dysuria, polyuria, glycosuria, polymenorrhoea, blood disorders, hyperkalemia; *rarely* blood pressure changes, constipation

Dose: *Oral: travellers' diarrhea* not associated with fever, bloody diarrhea, blood or leucocytes in the stool, or 8 or more unformed stools in the previous 24 hours: ADULT over 18 years, 200 mg every 8 hours for 3 days; reduction in recurrence of hepatic encephalopathy, ADULT over 18 years, 550 mg twice daily

Proprietary Preparations

Aximin(*Acme*), Tab., 200 mg, Tk. 20.07/Tab., 550 mg, Tk. 45.13/Tab.
Efaxim(*Square*), Tab., 200 mg, Tk. 20.00/Tab., 550 mg, Tk. 45.00/Tab.
Faxan(*Drug Intl*), Tab., 200mg, Tk. 20.10/Tab., 550mg, Tk. 40.15/Tab.
Henlix(*ACI*), Tab., 200mg, Tk. 25.00/Tab., 550mg, Tk. 45.00/Tab.
Hepatab(*Ibn Sina*), Tab., 200mg, Tk. 20.00/Tab., 550mg, Tk. 50.00/Tab.
Hepaximin(*Aristo*), Tab., 200mg, Tk. 20.00/Tab., 550mg, Tk. 45.00/Tab.
Rifabac(*Popular*), Tab., 200mg, Tk. 25.00/Tab., 550mg, Tk. 65.00/Tab.
Rifacol(*Sharif*), Tab., 200 mg, Tk. 20.07/Tab., 550 mg, Tk. 45.13/Tab.
Rifagut(*Opsonin*), Tab., 200 mg, Tk. 20.06/Tab., 550 mg, Tk. 45.00/Tab., 200 mg, Tk. 20.00/Tab.
Rifagyl(*Globe*), Tab., 550 mg, Tk. 45.00/Tab.
Rifamax(*Incepta*), Tab., 200 mg, Tk. 25.00/Tab., 550 mg, Tk. 65.00/Tab.
Rifaxin(*Ziska*), Tab., 200 mg, Tk. 20.00/Tab., 550 mg, Tk. 45.00/Tab.
Rixmin(*Astra Bio*), Tab., 200 mg, Tk. 20/Tab.
Xifaxin(*Nipro JMI*), Tab., 200 mg, Tk.20/Tab.

SODIUM FUSIDATE

Fusidic acid and its salts are effective against *Staphylococci*, notably *Staph. aureus* and *Staph. epidermidis* including methicillin-resistant strains. *Neisseria B. fragilis* and many clostridial are used mainly in the treatment of staphylococcal

1. ANTI-INFECTIVES

infection They have been used in the treatment of abscess including brain abscess, in bones and joint infections, and topically in the treatment of in eye infections and infections of the skin (see also section 10.2&12.2)

Indications: See notes above

Cautions: Liver function tests required

Side-effects: Nausea, vomiting, abdominal pain, reversible jaundice, especially after rapid intravenous injection or infusion; altered liver function tests; neutropenia, eosinophilia, urticaria, rash, thrombophlebitis

Interactions: See Appendix-2

Dose: See section 10.2.&12.2

Proprietary Preparations

Facid (*Eskayef*), Tab, 250mg, Tk. 65.00/Tab

Fusidin Leo^(L) (Leo), Tab.111.02/Tab

(See section 10.2. for Eye and 12.2 for Skin preparation)

SPECTINOMYCIN^[A]

This is a narrow-spectrum bacteriostatic antibiotic structurally related to aminoglycosides and is effective against a number of gram-negative organisms but is inferior to other drugs to which such organisms are susceptible.

Indications: Recommended as alternative treatment for uncomplicated gonococcal infection in patients who are intolerant or allergic to beta-lactam drugs and fluoroquinolones

Cautions: Renal and hepatic impairment

Interactions: See Appendix-2

Side-effects: Nausea, dizziness, urticaria, fever; rarely nephrotoxicity and anemia

Dose: deep IM inj. a single dose of 2 g or 40 mg/kg

Proprietary Preparation

Tinobac (*Incepta*), Inj., 2 gm/vial, Tk. 250.00/Vial

TEICOPLANIN^[W]

Indications: Treatment of serious Gram-positive infection including endocarditis, dialysis-associated peritonitis;

prophylaxis in orthopedic surgery at risk of infection with Gram-positive organisms

Cautions: Blood count, kidney and liver function tests required; vancomycin sensitivity; monitoring of auditory function if other nephrotoxic or neurotoxic drugs given; pregnancy

Interactions: See Appendix -2

Side-effects: Rush, pruritus; rarely, nausea, vomiting, diarrhea, dizziness, bronchospasm, mild hearing loss, vestibular disorders; renal failure, Stevens-Johnson syndrome, toxic epidermal necrolysis

Dose: Loading dose of 6mg/kg IV 12hrly for 3doses, then maintenance dose of 6mg/kg IV once daily. In severe infections, higher doses have been used; 12mg/kg IV 12hrly for 3 doses, then 12mg/kg daily.

IV inj. or infusion, ADULT > 70 kg body weight, initially 400 mg 12 hourly for 3 doses, then (may be given by IM inj.) 400 mg once daily; CHILD over 2 months, IV inj. or infusion, initially 10 mg/kg (max. 400 mg) 12 hourly for 3 doses, then 6 mg/kg (max. 200 mg) once daily

Proprietary Preparations

Targocid^(G) (*Gruppo*), Inj., 200 mg/Vial, Tk. 872.08/Vial; 400 mg/Vial, Tk. 1568.62/Vial

Tergocin (*Incepta*), Inj., 200mg/vial, Tk.1600/vial

TIGECYCLINE^[R]

Tigecycline should be reserved for the treatment of complicated skin and soft-tissue infections and complicated abdominal infections caused by multiple-antibacterial resistant organisms when other antibacterials cannot be used; it is not recommended for the treatment of foot infections in patients with diabetes.

Indications: See notes above

Cautions: Cholestasis; dose reduction in hepatic impairment; also see under tetracyclines

Contra-indications: hypersensitivity to Tetracyclines

Interactions: See Appendix -2

Side-effects: Nausea, vomiting, abdominal pain, dyspepsia, diarrhea, anorexia, bilirubinaemia, dizziness,

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headache, hypoglycaemia, prolonged prothrombin time, prolonged activated partial thromboplastin time, rash, pruritus, and injection-site reactions; *less commonly* pancreatitis, cholestatic jaundice, and hypoproteinaemia; also reported, antibiotic-associated colitis, hepatic failure, thrombocytopenia, Stevens-Johnson syndrome

Dose: *IV infusion:* ADULT, over 18 years, initially 100 mg, then 50 mg every 12 hours for 5–14 days; initially 100 mg then 25 mg every 12 hours in severe hepatic impairment

Proprietary Preparations

Widebac(Incepta), IV. Infusion, 50 mg/vial, Tk. 600.00/vial

Tygacil[®](Wyeth), IV. Infusion 50 mg/Vial, Tk. 4120/Vial

VANCOMYCIN^[W]

Indications: For the treatment of serious Staphylococcal or other Gram-positive infections where other drugs such as the penicillins cannot be used because of resistance or patient intolerance. It is used in the prophylaxis and treatment of endocarditis by intravenous route; (added to dialysis fluid and used for the treatment of peritonitis associated with continuous ambulatory, peritoneal dialysis, antibiotic associated colitis

Cautions: Hypersensitive to it; should not be given intramuscularly; avoid rapid infusion; rotate infusion site; renal impairment; elderly; avoid if history of deafness; all patients require plasma vancomycin measurement (after 3 or 4 doses if renal function normal, earlier if renal impairment), blood counts, urinalysis, and renal functions test; monitor auditory function in elderly or if renal impairment; pregnancy and breast feeding; systemic absorption may follow oral administration especially in inflammatory bowel disorders or following multiple doses

Interactions: See Appendix-2

Side-effects: Ototoxicity (discontinue if tinnitus occurs); flushing of the upper body ("red man" syndrome); nephrotoxicity including renal failure and

interstitial nephritis; blood disorders including neutropenia (usually after receiving dose of 25g); rarely agranulocytosis; and thrombocytopenia; nausea; eosinophilia; anaphylaxis, rashes including, exfoliative dermatitis; and toxic epidermal necrolysis; phlebitis; on rapid infusion, severe hypotension (including shock and cardiac arrest); wheezing, dyspnea; urticaria, pruritus

Dose: *Oral:* in antibiotic associated colitis, 125mg every 6 hours for 7 to 10 days; dose may be increased if infection is severe or fails to respond. CHILD, 5mg/kg every 6 hours, over 5 years half adult dose; *By intravenous infusion,* 500mg over at least 60 minutes every 12 hours, ELDERLY, over 65 years, IV. Infusion 500mg every 12 hours or 1g once daily; NEONATE up to 1 week, 15mg/kg initially then 10mg/kg every 12 hours; INFANT 1-4 weeks, 15mg/kg initially then 10mg/kg every 8 hours; CHILD over 1 month, 10mg/kg every 6 hours

Note: plasma concentration monitoring required; pre-dose concentration should be 5-10mg/L

Proprietary Preparations

Covan(Renata), IV. Infusion, 1 gm/Vial, Tk. 480.00/vial; 500 mg/vial, Tk. 250.00/vial

Vancard(Techno), IV. Infusion., 1 gm/Vial, Tk. 850.00/Vial; 500 mg/Vial, Tk. 470.00/Vial

Vancobac(Popular), IV. Infusion 1 gm/vial, Tk. 552.08/vial; 500mg/vial, Tk. 321.21/vial

Vancomin(Opsonin), IV. Infusion Vial, 500 mg/Vial, Tk. 250.94/vial; 1 gm/Vial, Tk. 481.81/vial

Vanmycin(Incepta), IV. Infusion 1 gm/Vial, Tk. 480.00/vial; 500 mg/vial, Tk. 250.00/vial

1.2 ANTIFUNGALS

(See section 12.2&10.2)

1.2.1 FOR SYSTEMIC FUNGAL INFECTIONS

1.2.2 FOR MUCOCUTANEOUS INFECTIONS

1.2.3 TOPICAL ANTIFUNGALS

1.2.1 FOR SYSTEMIC FUNGAL INFECTIONS

AMPHOTERICIN B (See section 1.3.5) is an amphoteric polyene macrolide nearly insoluble in water and exhibits broad-spectrum fungicidal activity. The drug is effective against clinically significant yeasts, including *C. albicans* and *Cryptococcus neoformans*, the organisms causing endemic mycoses including *Histoplasma capsulatum*, *Blastomyces dermatitidis* and *Coccidioides immitis* and the pathogenic molds, such as *Aspergillus fumigatus* and *Mucor*. It has limited activity against the protozoa *L. braziliensis* and *Naegleria fowleri*.

Indications: Drug of choice for initial induction regimen for life-threatening mycotic infections such as severe fungal pneumonia, cryptococcal meningitis, sepsis syndrome, for empiric therapy in cancer patients with neutropenia, mycotic corneal ulcers and keratitis, fungal arthritis, candiduria.

Cautions: Renal impairment; hepatic and renal function tests, blood counts, and plasma electrolyte monitoring required, if any abnormality therapy should be discontinued; pregnancy and breast-feeding; when given parenterally, toxicity common (close supervision necessary and test dose required); rapid infusion (risk of arrhythmias) and concurrent corticosteroids therapy need to be avoided.

Contra-indications: Hypersensitivity
Interactions: See Appendix -2

Side-effects: when given parenterally, anorexia, nausea and vomiting, diarrhea, epigastric pain; febrile reactions, headache, muscle and joint pain; anemia; disturbances in renal function with renal tubular acidosis, hypokalemia and hypomagnesemia; cardiovascular toxicity including arrhythmias; blood disorders; neurological disorders including hearing loss, diplopia, convulsions, peripheral neuropathy, abnormal liver function; rash, anaphylactoid reactions; pain and

thrombophlebitis at injection site; encephalopathy rarely

Dose: By slow IV infusion, 0.5-1 mg/kg/d, continued to a total dose of 1-2 g;
Oral: intestinal candidiasis, 100-200 mg every 6 hours; INFANT and CHILD 100 mg 4 times daily, oral and perioral infections, Amphotericin 10 mg lozenges, 1 lozenge to dissolve slowly in the mouth 4 times daily for 10-15 days or 100 mg suspension placed in the mouth after food and retain near lesions 4 times daily for 14 days, therapy should be continued for 48 hours after lesions have resolved.

Proprietary Preparation

Tericin (Beacon), Inj., 50mg, Tk. 15045.11/Vial

FLUCONAZOLE^[ED]

Indications: See under Dose

Cautions: Renal insufficiency, in severe form dose interval should be increased from 24 to 48 or 72 hours; breast-feeding; monitoring of liver function is required in prolonged and or high dose therapy, drug should be stopped if evidence of hepatic necrosis

Contra-indications: Pregnancy, severe liver disease, acute porphyria

Interactions: See Appendix-2

Side-effects: Nausea, abdominal discomfort, diarrhea, and flatulence, occasionally abnormalities of liver enzymes, rarely rash, angioedema, anaphylaxis, Stevens-Johnson syndrome and fixed drug eruption; skeletal and cardiac deformities in infants born to women taking high doses during pregnancy has also been reported

Dose: Candidiasis: oropharyngeal candidiasis, orally, 200 mg on the first day then 100 mg daily for 2 weeks; esophageal candidiasis, orally, 100-200 mg daily; vaginal candidiasis and candidal balanitis, orally, 150 mg as a single dose; deep candidiasis in allogeneic bone marrow transplant recipients and candidemia in non-immunocompromised patients, orally, 400 mg daily; CHILD oral or IV infusion, 3-6 mg/kg on first day then 3 mg/kg daily, every 72 hours in

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NEONATE up to 2 weeks old, every 48 hours in NEONATE 2-4 weeks old; Tinea pedis, corporis, cruris, pityriasis versicolor, and dermal candidiasis, orally, 50 mg daily for 2-4 weeks for up to 6 weeks in tinea pedis; cryptococcosis including meningitis, oral or IV infusion, 400 mg daily for initial 8 weeks, then 200 mg daily; CHILD 6-12 mg/kg daily, every 72 hours in NEONATE up to 2 weeks old, every 48 hours in NEOANTE 2-4 weeks old, max. 400 mg daily; prevention of relapse of *cryptococcal meningitis* in AIDS patients after completion of primary therapy, 100-200 mg daily; coccidioidomycosis including meningitis, oral or by IV infusion, 200-400 mg daily; prevention of fungal infections in immunocompromised patients following cytotoxic chemotherapy or radiotherapy, oral or by IV infusion, 50-400 mg daily adjusted according to risk; CHILD according to extent and duration of neutropenia, 3-12 mg/kg daily, every 72 hours in NEONATE up to 2 weeks old, every 48 hours in NEONATE 2-4 weeks old, max. 400 mg daily

Proprietary Preparations

See section 12.2

ITRACONAZOLE

This is a synthetic triazole having mechanism and antifungal spectrum of activity similar to those of fluconazole.

Indications: See under Dose

Cautions: Absorption is impaired in AIDS patients, neutropenia and when gastric acidity is reduced; the drug should be administered at least two hours after antacid or a full meal; monitoring of liver function in prolonged therapy, dose adjustment in renal impairment, liver disease, risk of heart failure with high dose, drug should be discontinued if peripheral neuropathy;

Contra-indications: Severe hepatic impairment, acute porphyria; pregnancy

Interactions: See Appendix-2

Side-effects: See under fluconazole; also heart failure, hypertriglyceridemia, hypertension, peripheral neuropathy; in prolonged therapy hypokalemia, edema,

and hair loss; rhabdomyolysis is also reported

Dose: Oral : oropharyngeal candidiasis, 100 mg daily, 200 mg daily in AIDS or neutropenia for 15 days; vulvovaginal candidiasis, 200 mg twice daily for 1 day; pityriasis versicolor, 200 mg daily for 7 days; tinea corporis and tinea cruris, 100 mg/d for 15 days or 200 mg/d for 7 days; tinea pedis and manuum, 100 mg daily for 30 days or 200 mg twice daily for 7 days; onychomycosis, 200 mg daily for 3 months; histoplasmosis, 200 mg 1-2 times daily; systemic aspergillosis, candidiasis and cryptococcosis including cryptococcal meningitis, histoplasmosis where other antifungal drugs inappropriate or ineffective, 200 mg once daily, IV infusion: 200 mg every 12 hours for 2 days, then 200 mg once daily for max. 12 days; maintenance in AIDS patients to prevent relapse of underlying fungal infection and prophylaxis in neutropenia when standard therapy inappropriate, 200 mg once daily

Proprietary Preparations

Itra(Square), Cap., 100 mg, Tk. 15.10/Cap.

Trec(Team), Cap., 100 mg, Tk. 14/Cap.

Iconal(Kemiko), Cap., 100mg, Tk. 15.04/Cap.

KETOCONAZOLE

Indications: Systemic mycoses, serious chronic resistant mucocutaneous candidiasis, serious mycoses of gut not responsive to other therapy, chronic vaginal candidiasis not responsive to other therapy, dermatophytes infections not responsive to other therapy excluding infection of the toe nails, prophylaxis of mycoses in patients with reduced immune responses

Cautions: See notes above; liver function tests before, during and after treatment; porphyria

Contra-indications: Hepatic impairment, pregnancy, breast-feeding

Interactions: See Appendix-2

Side-effects: Nausea, anorexia, vomiting, rashes, pruritus, hepatitis; gynaecomastia, decreased libido in males, at high doses azospermia has been reported; also hypertension, fluid

retention, asymptomatic elevation of aminotransferase

Dose: *Oral:* ADULT 200 mg once daily, increased to 400 mg if required; CHILD 3.3-6.6 mg/kg daily; duration of therapy: 5 days for candida vulvovaginitis, 2 weeks for candida esophagitis and 6-12 months for deep mycoses; prophylaxis and maintenance treatment in immunosuppressed patients, 200 mg daily

Proprietary Preparations

Ketocon(Opsonin), Tab., Tk. 8.06/Tab.

Ketofun(Amico), Tab., TK. 8.30/Tab.

(See section 12.2 for skin preparation)

VORICONAZOLE

Indications: Invasive aspergillosis, invasive fluconazole-resistant *Candida* spp. Including *C. krusei*, serious infection caused by *Scedosporium* spp., *Fusarium* spp.

Cautions: Monitoring of hepatic and renal function and skin cancer surveillance required; also see notes above

Contraindications: Acute porphyria

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, diarrhea, jaundice, edema, hypotension, chest pain, respiratory distress syndrome, headache, dizziness, anxiety, hallucination, paraesthesia, tremor, hypoglycemia, hematuria, blood disorders, acute renal failure, hypokalemia, visual disturbances; less commonly, hepatitis, cholecystitis, pancreatitis, arrhythmias, ataxia, nystagmus, adrenocortical insufficiency;

Dose: *Oral:* ADULT and CHILD over 12 years, body-weight over 40 kg, 400 mg 12 hourly for 2 doses then reduced to 200 mg; body-weight under 40 kg, 200 mg 12 hourly for 2 doses then reduced to 100 mg; IV infusion: 6 mg/kg 12 hourly for 2 doses then reduced to 4 mg/kg

Generic Preparation

Tablet, 200mg; 50mg; Syrup, 200mg/5ml

ECHINOCANDINS

The echinocandin antifungals include **Anidulafungin, Caspofungin** and **Micafungin**. They are only active against *Aspergillus* spp. and *Candida* spp.; however, anidulafungin and micafungin are not used for the treatment of aspergillosis. Echinocandins are not effective against fungal infections of the CNS. For the role of echinocandin antifungals in the prevention and systemic treatment of fungal infections

ANIDULAFUNGIN

Indications: Oesophageal candidiasis, Candidemia and other complicated *Candida* infections.

Side-effects: Nausea, Vomiting, Hypomagnesaemia, Hypokalemia and Headache.

Dose: For candidemia, 200mg IV on day 1, followed by 100mg IV daily. For oesophageal candidiasis, 100mg IV on day 1, followed by 50mg IV daily.

CHILDREN: Age > 28 days, 1.5-3mg/kg loading dose, then 0.75-1.5mg/kg/ day (once daily).

Proprietary Preparations

Eraxis[®](Pharmacia & Upjohn), Inj., 100ml/vial Tk. 11245.25/vial.

CAPSOFUNGIN

Indications: 1st line of drug for candidemia, candidal intra-abdominal abscesses, peritonitis and pleural spaces infections; Oesophageal candidiasis; Empiric therapy for febrile, neutropenic patients; Invasive aspergillosis in patients refractory to or intolerant of other therapeutics.

Cautions: As it is metabolized in liver, so reduce dose to 35mg/day IV in moderate hepatic insufficiency. Interactions include Cyclosporine (Hepatic toxicity) and tacrolimus (Drug level Monitoring)

Side-effects: Pruritus at infusion site; and headache, Fever, Chills, Vomiting and Diarrhoea associated with infusion.

1. ANTI-INFECTIVES

Dose: 70mg IV on 1st day, followed by 50mg IV daily.

CHILD: 70mg/m² IV on 1st day, followed by 50mg/m² IV daily (max dose 70mg/day)

Proprietary Preparations

Candidas⁽¹⁾(MSD), IV. Infusion, 50mg/Vial Tk. 16640.48/vial, 70mg/vial Tk.16640.48/vial

1.2.2 FOR MUCOCUTANEOUS INFECTIONS

(see section 12.2.2)

GRISEOFULVIN^[ED]

This is a narrow-spectrum fungistatic drug given orally and is the choice of treatment for extensive and intractable fungal infections

Indications: Fungal infections of skin, hair, nails and scalp where topical therapy is inappropriate or failed

Cautions: May impair performance of skilled tasks, aggravation of systemic lupus erythematosus; breast-feeding, pregnancy should be avoided during therapy and for 1 month after treatment, men should not father children within 6 months of treatment

Contra-indications: Severe liver disease, lupus erythematosus rashes, mental confusion, peripheral neuritis, headache, nausea, vomiting, vertigo, gastric discomfort, augmentation of alcohol effects, transient macular edema

Interactions: See Appendix-2

Side-effects: Hepatotoxicity, photosensitivity, urticaria, erythematous rashes, mental confusion, peripheral neuritis, headache, nausea, vomiting, vertigo, gastric discomfort, augmentation of alcohol effects, transient macular edema

Dose: Oral: 500 mg daily, in divided doses or as a single dose, in severe infection dose may be doubled; CHILD 10 mg/kg daily in divided doses or as a single dose

Proprietary Preparations

Fulcinex(ACI), Suspn, 2.5gm/100ml, Tk.

23.49/60ml; Tab., 500mg, Tk. 5.60/Tab.

Grisovin FP(GSK), Tab., 500mg, Tk. 5.88/Tab

Grisozen(Zenith), Tab., 500 mg, Tk. 6.68/Tab.

TERBINAFINE

Indications: Fungal infections of the skin and nails; ringworm infections including tinea pedis, cruris and corporis

Cautions: Pregnant and breast-feeding women; hepatic and renal impairment; psoriasis, autoimmune disease

Contra-indications: Hypersensitivity

Interactions: See Appendix-2

Side-effects: Gastrointestinal distress, mild abdominal pain, skin reactions (rash, urticaria), headache; rarely hepatotoxicity, severe neutropenia, Stevens-Johnson syndrome or toxic epidermal necrolysis may occur; very rarely, psychiatric disturbance, blood disorders

Dose: Oral: onychomycosis of nails, 250 mg daily for 3 months; duration of oral therapy for ringworm infections is 2-6 weeks with local application of cream twice daily

Proprietary Preparations

Infud(General), Tab.250mg, Tk. 50.00/Tab.

Mycofin(Eskayef), Tab, 250mg, Tk. 40/Tab.

Mycofree(Drug Intl), Tab., 250mg, Tk. 25/Tab.

Skinabin(ACI), Tab., 250mg, Tk. 40.27/Tab.

Telfin(UniMed), Tab., 250mg, Tk. 50.00/Tab.

(See section12.2 for skin preparation)

1.2.3 TOPICAL ANTIFUNGALS

(See section12.2)

Superficial fungal infections including dermatophytosis (ringworm), candidiasis, tinea versicolor, piedra, tinea nigra and fungal keratitis are treated successfully by topical antifungals with or without concomitant administration of systemic antifungal drugs. Topical administration of antifungal is usually not successful for mycoses of the nails (onychomycosis) and hair (tinea capitis) and not recommended for subcutaneous mycoses (sporotrichosis and chromomycosis). Besides the type of lesion and mechanism of drug's action, viscosity, hydrophobicity and acidity of the formulation are important determinants of the efficacy of topical agents in superficial mycoses. Because

of the poor penetration of the topical drugs into hyperkeratotic lesions, removal of the thick keratin is a useful adjunct to therapy.
(See section 12.2.2)

CLOTRIMAZOLE^[ED]

(See section 12.2.2 & 6.2.2)

ECONAZOLE

(See section 12.2.2 & 6.2.2)

MICONAZOLE^[ED]

(See section 12.2.2)

NYSTATIN^[ED]

(See section 12.2.2 & 6.2.2)

Indications: Candidiasis of mouth, esophagus or intestinal tract, vaginal candidiasis, skin infection, perineal pruritus

Cautions: If irritation or sensitization develops, treatment should be discontinued, pregnancy

Contra-indications: Hypersensitivity
Interactions: See Appendix-2

Side-effects: Nausea, vomiting, diarrhea, local irritation or burning sensation may occur

Dose: oral: Intestinal candidiasis 500,000 units every 6 hours, doubled in severe infections; CHILD 100,000 units every 6 hours; prophylaxis, 1 million units once daily; NEONATE 100,000 units once daily

Proprietary Preparations

See section 12.2.2 & 6.2.2

TIOCONAZOLE

(See section 12.2.2 & 6.2.2)

Tioconazole, an imidazole, is used for the treatment of Candida vulvovaginitis. A single 4.6 g dose of ointment containing 6.5% drug is given at bedtime.

1. ANTI-INFECTIVES

1.3 ANTIPROTOZOAL DRUGS

- 1.3.1 ANTIMALARIALS
- 1.3.2 AMEBICIDES
- 1.3.3 TRICHOMONOCIDES
- 1.3.4 ANTIGIARDIAL DRUGS
- 1.3.5 LEISHMANIACIDES

1.3.1 ANTIMALARIA DRUGS

CHEMOTHERAPY OF MALARIA

(see also Appendix-1h)

Chemoprophylaxis: As no antimalarial drug kills sporozoites, which initiate infection in humans, it is not truly possible to prevent infection. Drugs can only prevent the development of symptomatic malaria either by clinical suppression (keeping the parasite count in blood below threshold level of clinical attack) or by causal prophylaxis (destroying pre-erythrocytic intrahepatic forms of parasites).

Prophylaxis for infections with chloroquine-sensitive *P. falciparum*, *P. vivax*, *P. malariae*, and *P. ovale*.

ADULT 500 mg of chloroquine phosphate (300 mg of base) weekly starting one week before entering an endemic area and continuing until 4 weeks after leaving; **CHILD**, 8.3 mg/kg of chloroquine phosphate (5 mg base per kg) taken orally by the same schedule; in pregnant women chloroquine be maintained in adult dose until delivery; *Prophylaxis for infections with chloroquine-resistant or multidrug-resistant strains of P. falciparum:* Regimens:

ADULT & CHILD > 45 kg body weight: mefloquine 250 mg tablet weekly starting 1 week before entering an endemic area and ending 4 weeks after leaving; pediatric doses taken by the same schedule are, **CHILD** weighing 5-9 kg 31.25 mg, 10-19 kg 62.5 mg, 20-30 kg 125 mg; and for those weighing 31-45 kg 187.5 mg; OR

ADULT doxycycline 100 mg daily; **CHILD** over 8 years of age, the dosage is 2 mg/kg given once daily, increasing up to

1. ANTI-INFECTIVES

the daily adult dose. Prophylaxis with doxycycline should begin 1 day before travel to an endemic area and end 4 weeks after leaving.

Note: doxycycline use for malaria prophylaxis should not exceed 4 months; it should not be given to children less than 8 years of age or to pregnant women

ARTEMISININS

Artemisinin has three major semisynthetic derivatives in clinical use, **Dihydroartemisinin**, **Artemether** and **Artesunate**. The short plasma $t_{1/2}$ of these drugs often leads to treatment failure when artemisinins are used as monotherapy. Combining an artemisinin derivative with a longer-lasting partner drug ensures sustained antimalarial activity.

ARTEMETHER^[ED]

This lipid soluble analog of artemisinin is a potent blood schizontocides against all human malaria parasites but not effective against dormant hepatic forms. Artemether also exhibit antiparasitic activity against several other protozoa including *Leishmania* major and *Toxoplasma gondii* and against *schistosomes*, but not used clinically to treat these infections

Indications: Treatment of severe malaria including infections due to chloroquine and multidrug-resistant strains of *P. falciparum*.

Cautions: Cardiac diseases

Contra-indications: First trimester of pregnancy

Interactions: See Appendix -2

Side-effects: Headache, nausea, vomiting, abdominal pain, dizziness, tinnitus, neutropenia, elevated liver enzyme values; cardiotoxicity (after high dose).

Dose: Treatment of *P.falciparum* malaria (in areas of quinine resistance), by IM inj. ADULT & CHILD > 6 month, loading dose of 3.2 mg/kg daily until patient can tolerate oral medication or to maximum 7 days; this is followed by a single dose of

mefloquine 15 mg/kg (or 25 mg/kg) to affect a radical cure

Generic Preparation

Injection 80 mg/ml

ARTEMETHER PLUS LUMEFANTRINE

(Tablet, artemether 20 mg with lumefantrine 120 mg)

Indications: Treatment of acute uncomplicated malaria due to *Plasmodium falciparum* mixed infections including *P. falciparum* in areas with significant drug resistance.

Cautions: ECG required before and during treatment in cardiac disorder including bradycardia, heart failure, history of arrhythmias, QT interval prolongation, electrolyte disturbances, concomitant administration of drugs that prolonged QT interval; patients unable to take food require monitoring (greater risk of recrudescence); severe renal impairment or hepatic impairment, avoid in acute porphyria; dizziness may affect performance of skilled tasks (e.g. driving); pregnancy, breast-feeding.

Contra-indications: Family history of sudden death, congenital prolongation of QT interval, history of arrhythmias, of clinically relevant bradycardia, and of congestive heart failure accompanied by reduced left ventricular ejection fraction

Interactions: See Appendix-2

Side-effects: Abdominal pain, anorexia, diarrhea, nausea and vomiting, headache, dizziness, sleep disorders; palpitations, arthralgia, myalgia; cough, asthenia, fatigue; pruritus, rash. **Dose: oral:** treatment of uncomplicated falciparum malaria, ADULT & CHILD > 12 years and body weight > 35 kg, initially 4 tablets followed by 5 doses of 4 tablets each after 8, 24, 36, 48 and 60 hours (total 24 tablets over 60 hours); CHILD body-weight 10-14 kg initially 1 tablet followed by 5 doses of 1 tablet each after 8, 24, 36, 48 and 60 hours (total 6 tablets over 60 hours); body-weight 15-24 kg initially 2 tablets followed by 5 doses of 2 tablet each after 8, 24, 36, 48 and 60 hours (total 12 tablets over 60 hours); body-weight 25-

1. ANTI-INFECTIVES

34 kg, initially 3 tablets followed by 5 doses of 3 tablet each after 8, 24, 36, 48 and 60 hours (total 18 tablets over 60 hours)

Proprietary Preparations

Artemet(Incepta), Tab., 20 mg +120 mg, Tk. 20.00/Tab.

Lumertam(Square), Tab, 20 mg + 120 mg, Tk. 20.13/Tab.

Coavlon(ACI), Tab., 20mg+120mg, Tk. 20.14/Tab.

Arexel(Jayson), Tab. 20 mg + 120 mg, Tk. 17.06/Tab.

ARTESUNATE^[ED]

This water-soluble analog of artemisinin is useful for oral, IV, IM and rectal administration. The drug exhibits similar pharmacological profile like that of artemether (see above).

Indications: Treatment of uncomplicated *P. falciparum* malaria in areas of multiple-drug resistance

Cautions: Risk of recurrence if used alone in non-immune patients; also see under artemether

Contra-indications: First trimester of pregnancy.

Interactions: See Appendix-2

Side-effects: Headache, nausea, vomiting, abdominal pain, diarrhea, dizziness, tinnitus, neutropenia, elevated liver enzyme values; ECG abnormalities, including prolongation of QT interval; temporary suppression of reticulocyte response and induction of black-water fever,

Dose: Oral: treatment of uncomplicated *P. falciparum* malaria (in an areas of multiple-drug resistance), ADULT & CHILD > 6 months, 4 mg/kg daily for 3 days; a single dose of mefloquine 15 mg/kg (or 25 mg/kg,) is given on day 2 or 3 to affect a radical cure; if artesunate used alone, treatment should be continued for 7 days

Proprietary Preparation

Artex(Jayson), Tab. 50 mg, Tk. 12.05/Tab.

CHLOROQUINE^[ED]

Indications: Chemoprophylaxis and treatment of malarial rheumatoid arthritis, lupus erythematosus, adjunct to metronidazole in extra-intestinal amebiasis

Cautions: Impaired renal and hepatic functions (avoid concurrent therapy with hepatotoxic drugs); neurologic or hepatologic disorders, G6PD deficiency; may aggravate myasthenia gravis, psoriasis.

Contra-indications: Psoriasis, porphyria, retinal or visual field abnormalities, myopathy

Interactions: See Appendix -2

Side-effects: Pruritus, anorexia, malaise, headache, nausea, vomiting, abdominal pain, diarrhea, blurring of vision, rashes, urticaria; rarely psychotic episodes, convulsions, depigmentation and loss of hair, impaired hearing, hemolysis in G-6PD deficient patients, agranulocytosis, exfoliative dermatitis, hypotension, QRS widening and T wave abnormalities in ECG; long-term administration of high doses for rheumatologic diseases can result in irreversible ototoxicity, retinopathy, myopathy and peripheral neuropathy; large IM inj. or rapid IV infusion can cause severe hypotension and respiratory and cardiac arrest

Dose: Oral: Treatment of non-falciparum malaria, ADULT initial dose of 620 mg of base then a single dose of 310 mg of base after 6 to 8 hours then a single dose of 310 mg of base daily for 2 days (approximate total cumulative dose of 25 mg/kg of base); CHILD initial dose of 10 mg base/kg then a single dose of 5 mg base /kg after 6-8 hours followed by single dose of 5 mg base/kg daily for 2 days; rheumatic disease, 150 mg base daily, max. 2.5 mg base/kg daily; CHILD up to 3 mg base/kg daily; *Prophylaxis of malaria*, started 1 week before entering endemic area and continued for 4 weeks after leaving, 310 mg once weekly; child up to 6 weeks body-weight under 4.5 kg, 25 mg once weekly; 6 weeks–6 months body-weight 4.5–8 kg, 50 mg once weekly; 6 months–

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1 year body-weight 8–11 kg, 75 mg once weekly; 1–3 years body-weight 11–15 kg, 100 mg once weekly; 3–4 years body-weight 15–16.5 kg, 125 mg once weekly; 4–8 years body-weight 16.5–25 kg, 150 mg once weekly (or 155 mg once weekly if tablets used); 8–13 years body-weight 25–45 kg, 225 mg once weekly (or 232.5 mg once weekly if tablets used); over 13 years, body-weight over 45 kg, adult dose

Proprietary Preparations

Avloquin(ACI), Syrup 80mg/5mlml, Tk. 14.91/60ml; Tab., 250mg, Tk. 1.22/Tab
Clit(Hudson), Syrup, 125mg/5ml, Tk.12.00/60 ml; Tab., 250mg, Tk.1.20/Tab.
Jasochlor(Jayson), Tab. , 250 mg, Tk. 1.21/Tab.; Syrup, 80 mg/5 ml, Tk.14.87/60ml
Quinolex(Globe), Syrup, 80 mg / 5 ml, Tk. 20/60 ml; Tab. , 250 mg, Tk. 1/Tab.
Supraquin(Supreme), Syrup, 80mg/5ml,, Tk. 14.00/60ml; Tab., 250 mg, Tk. 14.40/Tab.
Zenoquine(Zenith), Syrup, 80mg/5ml, , Tk. 14.65/60ml; Tab., 150 mg+ 250mg, Tk. 1.30/Tab.

MEFLOQUINE^[ED]

Indications: Prophylaxis of malaria in areas where there is a high risk of chloroquine-resistant falciparum malaria;

Cautions: Severe hepatic and renal impairment; traumatic brain injury; may impair fine motor skills like airplane piloting or car driving (may occur and persist up to several months after stopping the drug); patient counseling to discontinue mefloquine and to seek immediate medical attention if neuropsychiatric symptoms appear

Contra-indications: Should not be used for treatment if it has been used for prophylaxis; epilepsy, psychiatric disorders and history thereof including depression or convulsions (for prophylaxis); cardiac arrhythmia and conduction defects; hypersensitivity to quinine; also not recommended for use in first trimester of pregnancy and in children weighing less than 5 kg and / or < 3 months

Interactions: See Appendix -2

Side-effects: Nausea, vomiting, diarrhea, abdominal pain, dizziness, loss of balance, headache, somnolence,

sleep disorders; neuropsychiatric reactions like depression, (suicidal ideation and suicide reported), confusion, acute psychosis or seizures; tinnitus, vestibular disorders, visual disturbances, circulatory disorders, bradycardia, cardiac conduction disorders, muscle weakness, myalgia, arthralgia, rash, urticaria, pruritus, alopecia, asthenia, malaise, fatigue, fever, loss of appetite, leucopenia or leukocytosis, thrombocytopenia. Side effects may occur and persist up to several months after discontinuation

Dose : *Oral:* prophylaxis starting 2–3 weeks before entering endemic area and continued for 4 weeks after leaving: ADULT and CHILD body-weight over 45 kg, 250 mg once weekly; body-weight 5–16 kg, 62.5 mg once weekly; body-weight 16–25 kg, 125 mg once weekly; body-weight 25–45 kg, 187.5 mg once weekly; for treatment, ADULT & CHILD 20 mg base/kg (max. 1.5 g) as a single or preferably in 2 divided doses 6-8 hours apart daily for 3 days; also see Notes above

Proprietary Preparations

Meflon(ACI), Tab., 250 mg, Tk. 39.61/Tab.
Larimef(Healthcare), Tab., 250 mg , Tk. 39.60/Tab.

PRIMAQUINE^[ED]

Indications:Radical cure of *P. vivax* and *P. ovale* malaria; with clindamycin an alternative to co-trimoxazole for pneumocystis carinii infection.

Cautions:Pregnancy (risk of neonatal hemolysis and methemoglobinemias in third trimester); breast-feeding, G-6PD deficiency (See notes above), diseases associated with granulocytopenia i.e. rheumatoid arthritis, lupus erythematosus

Contra-indications:Hemolytic anemia

Interactions:See Appendix-2

Side-effects:Anorexia, nausea, vomiting, jaundice, less commonly, mild diarrhea, methemoglobinemias, hemolytic anemia especially in G6PD deficiency, agranulocytosis, cardiac arrhythmia

Dose: *Oral:* ADULT 15 mg daily for 14-21 days following a course of

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chloroquine; CHILD, over 6 months of age: (specialist advice should be sought for children under 6 months of age); in *P. vivax* infection, 500 micrograms/kg (max. 30 mg) daily for 14 days, and for *P. ovale*, 250 micrograms/kg (max. 15 mg) daily for 14 days;

PREGNENCY: the radical cure with primaquine should be postponed until the pregnancy is over; instead chloroquine should be continued at a dose of 310 mg each week during the pregnancy

Proprietary Preparations

Jasoprim (Jayson), Tab., 15mg, Tk. 1.26/Tab.
Kanaprim (Globe), Tab., 15 mg, Tk. 0.62/Tab.
P-Phos, (Hudson), Tab., 15mg, Tk. 0.62/Tab.
Remaquin (ACI), Tab., 15mg, Tk. 1.51/Tab.

PYRIMETHAMINE^[ED]

Indications: with sulfadoxine for treatment of Falciparum malaria with (or following) quinine; with sulfadiazine for treatment of toxoplasmosis in immunocompromised patients;

Cautions: Renal or hepatic insufficiency, folate supplements required in pregnancy, breast-feeding blood count monitoring required in prolonged therapy; history of seizures (avoid large loading doses)

Interactions: See Appendix-2

Side-effects: Depression of hematopoiesis with prolonged treatment; nausea, vomiting, diarrhea; headache, dizziness, rashes; less commonly fever, abnormal skin pigmentation; very rarely colic, buccal ulceration, convulsions

Dose: See Pyrimethamine with Sulfadoxine below

Proprietary Preparations

See under Pyrimethamine with Sulfadoxine below

PYRIMETHAMINE WITH SULFADOXINE^[ED]

Indications: Adjunct to quinine in the treatment of *P. falciparum* malaria

Cautions: See under Pyrimethamine and under Co-trimoxazole; not recommended for prophylaxis because of severe side-effects on long-term use; possible teratogenic risk in first trimester (pyrimethamine a folate antagonist); in third trimester risk of neonatal hemolysis and methemoglobinemias; discontinue if cough or shortness of breath

Contra-indications: See under Co-trimoxazole; sulfonamide allergy

Interactions: See Appendix -2

Side-effects: See under Pyrimethamine and under Co-trimoxazole (section 1.1.8.); pulmonary infiltrates (e.g. eosinophilic or allergic alveolitis) reported

Dose: Oral: ADULT, pyrimethamine 75 mg with sulfadoxine 1.5 g as a single dose together with, or after, a course of quinine: CHILD, up to 4 years and body-weight over 5 kg, pyrimethamine 12.5 mg with sulfadoxine 250 mg; 5–6 years, pyrimethamine 25 mg with sulfadoxine 500 mg; 7–9 years, pyrimethamine 37.5 mg with sulfadoxine 750 mg; 10–14 years, pyrimethamine 50 mg with sulfadoxine 1 g; 14–18 years, pyrimethamine 75mg with sulfadoxine 1.5g

Proprietary Preparations

Malacide (Square), Tab., 500 mg+25 mg, Tk. 4.43/Tab.
Sulfamin (Jayson), Tab., 500 mg+25 mg, Tk. 4.43/Tab.

QUININE^[ED]

Indications: First-line drug for treatment of severe, uncomplicated falciparum malaria in an area with documented chloroquine-resistant malaria, with clindamycin first-line therapy for babesial infections; nocturnal leg cramps

Cautions: Great cautions required in patients with underlying cardiac abnormalities (including atrial fibrillation, conduction defects, heart block), elderly, monitor ECG during parenteral treatment; monitor blood glucose and electrolyte during parenteral treatment; G6PD deficiency; renal and hepatic insufficiency

1. ANTI-INFECTIVES

require dose adjustment, therapy should be discontinued if signs of cinchonism, hemolysis or hypersensitivity; high doses are teratogenic in *first trimester*; but in malaria benefit of treatment considered to outweighs risk

Contra-indications: Visual and auditory problems; hemoglobinuria; myasthenia gravis

Interactions: See Appendix-2

Side-effects: Cinchonism, including tinnitus, headache, nausea, dizziness, flushing and visual disturbances, abdominal pain, blindness; hypersensitivity reactions including rashes, angioneurotic edema, bronchospasm; hematologic abnormalities like hemolysis particularly in G-6PD deficient patients, leucopenia, agranulocytosis, thrombocytopenia; may cause hypoglycemia, severe hypotension and ECG abnormalities like QT prolongation after rapid IV infusion, rarely black water fever that includes marked hemolysis and hemoglobinuria

Dose: treatment of falciparum malaria:

Oral: ADULT, 600 mg of quinine salt every 8 hours for 5–7 days together with or followed by either doxycycline 200 mg once daily for 7 days or clindamycin 450 mg every 8 hours for 7 days; if the parasite is likely to be sensitive, pyrimethamine 75 mg with sulfadoxine 1.5 g as a single dose (instead of either clindamycin or doxycycline) together with, or after, a course of quinine 600 mg every 8 hours for 7 days; CHILD, 10 mg/kg (of quinine salt, max. 600 mg) every 8 hours for 7 days *together with or followed by* Clindamycin 7–13 mg/kg (max. 450 mg) every 8 hours for 7 days *or* in children over 12 years, doxycycline 200 mg once daily for 7 days

or if the parasite is likely to be sensitive, pyrimethamine with sulfadoxine as a single dose: up to 4 years and body-weight over 5 kg, pyrimethamine 12.5 mg with sulfadoxine 250 mg; 5–6 years, pyrimethamine 25 mg with sulfadoxine 500 mg; 7–9 years, pyrimethamine 37.5 mg with sulfadoxine 750 mg; 10–14 years, pyrimethamine 50 mg with sulfadoxine 1 g; 14–18 years,

pyrimethamine 75 mg with sulfadoxine 1.5 g; IV quinine 20 mg/kg infuse over 4 hours, then 10 mg/kg infuse over 4 hours, every 8–12 hourly followed by oral quinine;

In nocturnal leg cramps: 200–300 mg of quinine salt at bedtime for at least 4 weeks, if improvement, continue

Proprietary Preparations

Albiquin(Albion), Tab., 300 mg, Tk. 6.40/Tab.

Aloquin(Alco), Tab., 300 mg, Tk. 3.40/Tab.

Jasoquin(Jayson), Inj., 300 mg/5 ml, Tk.

20.59/Amp. Tab., 300 mg, Tk. 6.42/Tab.

1.3.2 ANTIAMEBIC DRUGS

METRONIDAZOLE^[ED] [OTC] ^[A]

Metronidazole is effective against trophozoites of *E. histolytica*, *G. lamblia*, *T. vaginalis*, all anaerobic cocci and both anaerobic gram-negative bacilli, including *Bacteroides* species, and anaerobic spore-forming gram-positive bacilli. Non-sporulating gram-positive bacilli, aerobic and facultative anaerobic bacteria as well as the cysts of *E. histolytica* are not sensitive. The drug is completely and promptly absorbed after oral intake and with the exception of placenta, penetrates well into body tissues and fluids, including CSF, vaginal secretions, seminal fluids, and saliva and breast milk. It is eliminated in the urine largely as metabolites.

Indications: See under Dose

Cautions: Disulfiram-like reaction with alcohol, repeated therapy requires leukocyte count before, during and after each course of treatment; pregnancy, lactation; great caution in patients with central nervous system disease, drug should be withdrawn if numbness or paraesthesia of the extremities occur

Contra-indications: First trimester pregnancy

Interactions: See Appendix-2

Side-effects: Dry mouth, metallic taste, furred tongue, stomatitis, nausea, diarrhea, rashes; headache, dizziness, ataxia, erythema multiforme, darkening of urine, pruritus, urticaria, angioedema, anaphylaxis, abnormal liver function

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tests, hepatitis, jaundice, thrombocytopenia, aplastic anemia, myalgia, arthralgia, peripheral neuropathy in prolonged treatment, ataxia and transient epileptic seizures with high doses; dysuria, cystitis and a sense of pelvic pressure also have been reported

Dose: *Urogenital trichomoniasis*, oral: ADULT 2 g as a single dose or 250 mg thrice daily or 375 mg twice daily for 7 days; CHILD 1-3 years 50 mg every 8 hours; 3-7 years 100 mg twice daily, 7-10 years 100 mg thrice daily; *amebiasis*, oral: ADULT 500-750 mg thrice daily for 10 days; CHILD 35-50 mg/kg/d in three divided doses for 10 days; *giardiasis*, oral: ADULT 250 mg thrice daily for 5 days; CHILD, 15 mg/kg thrice daily for 5 days; *anaerobic infections*, IV infusion: ADULT 15 mg/kg followed 6 hours later by 7.5 mg/kg every 6 hours for 7-10 days; CHILD 7.5 mg/kg every 8 hours; orally, ADULT 800 mg initially then 400-500 mg every 8 hours; CHILD 7.5 mg/kg every 8 hours; rectally, 1g every 8 hours for 3 days, then 1g every 12 hours for 7-10 days; *leg ulcers and pressure sores*, orally: 400 mg every 8 hours for 7 days; *bacterial vaginosis*, orally: 400-500 mg twice daily for 5-7 days or 2 g as a single dose; *pelvic inflammatory disease*, orally, 400 mg twice daily for 14 days; *acute ulcerative gingivitis*, orally: ADULT 200-250 mg every 8 hours for 3 days; CHILD 1-3 years, 50 mg every 8 hours for 3 days; 3-7 years, 100 mg every 12 hours; 7-10 years, 100 mg every 8 hours; *acute dental infections*, oral: 200 mg every 8 hours for 3-7 days; *Helicobacter pylori eradication*, oral: 400 mg twice/thrice daily;

surgical prophylaxis, oral: 400 mg every 8 hours started 24 hours before surgery, then continued postoperatively by IV infusion or by rectum until oral administration can be resumed; CHILD 7.5 mg/kg every 8 hours; through rectum: 1 g every 8 hours; CHILD 5-10 years, 500 mg every 8 hours; IV infusion: 500 mg shortly before surgery then every 8 hours until oral administration can be started; CHILD 7.5 mg/kg every 8 hours

Proprietary Preparations

Amodis(Square), Susp, 200 mg/5ml, Tk. 29.89/60ml; Tab., 500 mg, Tk. 1.91/Tab.; 400 mg, Tk. 1.27/Tab. Inj., (IV Infusion), 500 mg/100 ml, Tk. 53.56/Vial;
Amotrex(ACI), Inj., (IV Infusion), 500 mg/100 ml, Tk. 85.26/Vial; Susp, 200 mg/5ml, Tk. 29.9/60ml; Tab., 200mg, Tk. 0.69/Tab.; 400mg, Tk. 1.27/Tab.; 800mg, Tk. 2.02/Tab.
Anzole(Monico), Susp, 200 mg/5ml, Tk. 25.00/60ml; Tab., 400mg, Tk. 1.14/Tab.
Benmet(Pacific), Tab., 400 mg, Tk. 1.26/Tab.
Biozyl(Biopharma), Inj., (IV Infusion), 500 mg/100 ml, Tk. 75.00/100ml Vial; Susp, 200 mg/5ml, Tk. 25.09/60ml; Tab., 400mg, Tk. 1.00/Tab.
Decagyl(Decent), Tab., 400mg, Tk. 1.00/Tab.
Dirozyl(Acme), Supp., 500mg., Tk. 12.09/Supp,
Filmet(Beximco), Susp, 200 mg/5ml, Tk. 29.89/60ml; Tab., 400mg, Tk. 1.52/Tab.; 200mg, Tk. 0.68/Tab.; 800mg, Tk. 2.01/Tab.; Inj., (IV Infusion), 500 mg/100 ml, Tk. 54.00/Vial
Flagyl(Sanofi), Susp., 40mg/ml, Tk. 29.89/Susp.; Tab., 200mg, Tk. 0.67/Tab.; 400mg, Tk. 1.58/Tab.
Flamyd(Incepta), Susp, 200 mg/5ml, Tk. 29.50/60ml; Tab., 400 mg, Tk. 1.05/Tab.; 500mg, Tk. 1.92/Tab.; Vaginal Gel, 750mg/100gm, Tk. 50.00/30gm.; Inj., (IV Infusion), 500 mg/100 ml, Tk. 53.40/100ml Vial
Gly(Astra Bio), Susp, 200 mg/5ml, Tk. 25.00/5ml
Kemet(Kemiko), Tab., 400 mg, Tk. 1.26/Tab.
Librazol(Libra), Inj., (IV Infusion), 500 mg/100 ml, Tk. 49.90/100ml Vial
M-Dazole(Modern), Tab., 400 mg, Tk. 1.20/Tab.
Mecozol(Amico), Susp, 200 mg/5ml, Tk. 25.00/60ml; Tab., 400mg, Tk. 1.50/Tab.
Menilet(Alco), Tab., 400 mg, Tk. 1.57/Tab.
Menol(Supreme), Susp, 200 mg/5ml, Tk. 25.75/60ml; Tab., 400 mg, Tk. 1.14/Tab.
Metco(Eskayef), Inj., (IV Infusion), 500 mg/100 ml, Tk. 60.18/ 100ml Vial.; , Susp, 200 mg/5ml, Tk. 29.89/60ml; Tab., 400mg, Tk. 1.26/Tab.;
Metfil(Bristol), Tab., 400mg , Tk. 1.00/Tab.
Metonid(Popular), Tab., 400mg, Tk. 1.14/Tab.; Inj., (IV Infusion), 500 mg/100 ml, Tk. 52.95/100ml Vial
Metrion(General), Inj., (IV Infusion), 500 mg/100 ml, Tk. 80.24/100ml Vial.; Tab., 400mg, Tk. 1.14/Tab.; Susp, 200 mg/5ml, Tk. 25.76/60ml
Metro(Ziska), Susp, 200 mg/5ml, Tk. 25.00/60ml; Tab, 400 mg, Tk. 1.05/Tab.
Metrobac(Ziska), Inj., (IV Infusion), 500 mg/100 ml, Tk. 53.00/100 ml Vial

1. ANTI-INFECTIVES

Metromax(Novo), Tab. , 250 mg, Tk. 0.78/Tab.; 500 mg, Tk. 1.35/Tab.; IV Infusion, 500 mg/100 ml, Tk. 52.00/100ml Vial
Metrozen(Zenith), Susp., 200 mg/5ml, Tk. 21.44/60 ml.; Tab., 400 mg, Tk. 1.07/Tab.
Metryl(Opsonin), Inj., (IV Infusion),, 500 mg , Tk. 53.57/100 ml Vial.; Tab., 200 mg , Tk. 0.67/Tab. ; 400 mg , Tk. 1.27/Tab. ; 500 mg , Tk. 1.91/Tab. ; Suspen, 200 mg/5ml, Tk. 29.59/ 60 ml.;
Metsina(Ibn Sina), Inj., (IV Infusion),, 500 mg/100 ml, Tk. 75.00/100ml Vial.; Tab., 400 mg, Tk. 155.00/Tab.
Mez iv(Renata), Inj., (IV Infusion),, 500 mg/100 ml, Tk. 70.00/100 ml Vial
Micogyl(Globe), Tab. , 400 mg, Tk. 1.20/Tab.; IV Infusion, 500 mg/100 ml, Tk. 53.41/100 ml Vial
Nidazyl(Orion), Susp., 200 mg/5ml, Tk. 29.89/60ml.; Tab. , 400 mg, Tk. 1.05/Tab.
Straizyl(Asiatic), Susp., 4gm/100ml, Tk. 24.84/60ml.; Tab., 200mg, Tk. 0.66/Tab. ; 400mg , Tk. 1.02/Tab.

ORNIDAZOLE

Indications: Treatment of susceptible protozoal infections and treatment and prophylaxis of anaerobic bacterial infections

Cautions: See under metronidazole; also blood dyscrasia; doses should be reduced in patients with severe liver disease

Interactions: See Appendix-2

Side-effects: See under metronidazole

Dose: IV infusion: severe amoebic dysentery and amoebic liver abscess: 0.5 to 1 gm initially, followed by 500mg every 12 hours for 3 to 6 days;

Oral: amebiasis: ADULT: 500mg twice daily for 5-10 days; CHILD :25 mg/kg daily 500mg as a single dose 5-10 days; **giardiasis,** ADULT: 1 or 1.5 g as a single daily dose for 1 or 2 days; CHILD :500mg as a single dose; **trichomoniasis,** a single dose of 1.5 g or 1 gm together with 500 mg vaginally; 5 day course of 500 mg twice daily are also used, (sexual partners should be treated concomitantly)

Proprietary Preparations

OR-500(Zenith), Tab. 500 mg, Tk. 6.52/Tab.
Ornid(Drug Intl), Tab., 500 mg, Tk. 7.05/Tab.
Ornil(Opsonin), Tab., 500 mg, Tk. 7.00/Tab.
Ornizol(Alco), Tab., 500 mg, Tk. 6.02/Tab.
Robic(Square), Tab., 500 mg, Tk. 7.02/Tab.
Troniz(UniMed), Tab , 500 mg, Tk. 6.50/Tab.

Xynor(Beximco), Tab., 500 mg, Tk. 6.50/Tab.

SECNIDAZOLE

Indications: Amebiasis, and has also been tried in giardiasis, and trichomoniasis.

Cautions, Contraindications & Side-effect: See under Metronidazole

Dose: Oral: **Giardiasis:** ADULT, single dose of 2g; CHILD, 30mg/kg; **invasive hepatic amebiasis** ADULT, 1.5g single dose or in divided doses for 5 days

Proprietary Preparations

Pronil(Acme), Tab., 1 gm., Tk. 16.11/Tab., 500 mg., Tk. 8.66/Tab.
Secnid(Square), Tab., 1 gm, Tk. 20.06/Tab.
Secnidol(Sanofi), Tab., 1 gm, Tk. 25.46/Tab.
Secnizol(Incepta), Tab., 1 gm, Tk. 16.00/Tab.
Sezol(ACI), Tab., 1 gm, Tk. 17.05/Tab.

TINIDAZOLE

Indications: See under Dose

Cautions: See under Metronidazole; also avoid breast-feeding during and for 3 days after stopping treatment

Contra-indications: Acute porphyria; also see under Metronidazole

Interactions: See Appendix-2

Side-effects: See under Metronidazole

Dose: Oral: **intestinal amebiasis:** ADULT and CHILD 12-18 years, 2 g daily in a single dose for 3 days, CHILD, 1 month-12 years, 50-60 mg/kg (max. 2 g) once daily for 3 days; **hepatic amebiasis:** ADULT and CHILD 12-18 years, 1.5-2 g once daily for 3-6 days, CHILD, 1 month-12 years, 50-60 mg/kg (max. 2 g) once daily for 5 days; **giardiasis** and **trichomoniasis,** , ADULT and CHILD 12-18 years, 2 g as a single dose (repeat once if required) , CHILD 1 month-12 years single dose of 50-75 mg/kg (max. 2 g) (repeat once if necessary)

anaerobic infections, oral: treatment, 2 g initially then 1 g daily for minimum 5-6 days; prophylaxis 2 g as a single dose; by slow IV infusion: treatment, 800 mg daily, prophylaxis, 1600 mg as a single dose;

bacterial vaginosis and **acute ulcerative gingivitis,** 2 g as a single dose;

abdominal surgery prophylaxis, a single 2 g dose approximately 12 hours before surgery; CHILD 50-60 mg/kg/d.

1. ANTI-INFECTIVES

Proprietary Preparations

Tinizol DS(Beacon), Tab. , 1 gm, Tk. 5.72/Tab.
T-Zol(Popular), Tab. , 500 mg, Tk. 2.77/Tab.; 1 gm, Tk. 5.75/Tab.

1.3.3.DRUGS FOR TRICHOMONIASIS

1.3.4 ANTIGIARDIAL DRUGS

Giardiasis, caused by the flagellated protozoan *Giardia lamblia*, can be successfully treated by metronidazole and related nitroimidazoles like tinidazole and scenidazole. Other than these, paromomycin and nitazoxanide are also used for clinical cure.

NITAZOXANIDE

Indications: Treatment of G intestinalis infections and treatment of diarrhea caused by cryptosporidia

Cautions: Pregnancy, breast-feeding; greenish discoloration of urine

Interactions: See Appendix-2

Side-effects: GI disturbances: abdominal pain, nausea, vomiting, iarrhea; headache; rarely, fever, malaise, pruritus, dizziness, rhinitis

Dose: Oral: ADULT, 500 mg twice daily for 3 days; CHILD, 12-47 months, 100 mg twice daily for 3 days; 4-11 years, 200 mg twice daily for 3 days

Proprietary Preparations

Adnix(Alco), Susp., 100 mg/5 ml, Tk. 35.11/30ml.; Tab. , 500 mg, Tk. 10.03/Tab.

Albizox(Albion), Susp., 100 mg/ 5 ml, Tk. 50.00/60 ml

Alinix(Healthcare), Susp., 100 mg/5 ml, Tk. 35.00/30 ml.; Tk. 50.00/60 ml.; Tab., 500mg , Tk. 300.00/Tab.

Antizoa(RAK), Susp., 100 mg/ 5 ml, Tk. 35.00/30 ml; Tab. 500 mg, Tk. 10.00/Tab.

Atinid(Biopharma), Susp., 100 mg/5 ml, Tk. 35.13/30ml.; Tk. 50.19/60 ml.; Tab., 500 mg, Tk. 10.04/Tab.

Dianide(General), Tab. 500mg, Tk. 10.07/Tab.; Susp., 100 mg/5 ml, Tk. 50.34/60ml.; Tk. 35.25/30ml

Diar(ACI), Susp., 100 mg/5 ml, Tk. 35.24/30ml.; Tk. 50.34/60ml.; Tab., 500mg, Tk. 10.07/Tab.

Nicud, (Monico), Susp., 100 mg/5 ml, Tk. 35.00/30ml

Nidor(Pharmasia), Susp., 100 mg/ 5 ml, Tk. 50.00/60 ml; Tab., 500 mg, Tk. 10.04/Tab.

Nidozox(Acme), Susp., 100 mg/5 ml, Tk. 40.12/30ml.; Tab., 500.00 mg, Tk. 10.07/Tab.

Nitalet(Amulet), Tab., 500 mg, Tk. 10.00/Tab.

Nitanid(Drug Intl), Susp., 100 mg/5 ml, Tk. 50.20/60ml.; Tab., 500mg, Tk. 10.05/Tab.

Nitasis(Navana), Susp., 100 mg/ 5 ml, Tk. 35.00/30 ml, Tk. 10.00/Tab.

Nitasol(Ibn Sina), Susp., 100 mg/5 ml, Tk. 36.00/30ml.; Tk. 50.00/60ml.; Tab., 500mg, Tk. 132.00/Tab.

Nitax(Delta), Tab., 500 mg, Tk. 8.00/Tab.

Nitaxen(Leon), Susp., 100 mg/ 5 ml, Tk. 35.00/30 ml; 500 mg, Tk. 10.00/Tab.

Nitaxide(Beximco), Tab., 500mg, Tk. 10.00/Tab.; Susp., 100 mg/5 ml, Tk. 35.00/30ml.;Tk. 50.00/60ml

Nitazet(Organic), Tab. , 500 mg, Tk. 10.03/Tab. ; Susp., 100 mg/5 ml, Tk. 35.11/30ml , 100 mg/5 ml, Tk. 50.15/60ml

Nitazox(Incepta), Susp., 100 mg/5 ml, Tk. 50.00/60ml.; Tk. 1.167/30ml.; Tab.,Tk. 10.00/Tab.

Nitide(Nipro JMI), Susp., 100 mg/ 5 ml, Tk. 35.00/30 ml; Tk. 50.00/60 ml; Tab., 500mg , Tk. 10.00/Tab.

Nitoxin(Aristo), Susp., 100 mg/5 ml, Tk. 36.00/30ml, Tk. 50.00/60ml.; Tab., 500mg , Tk. 10.00/Tab.

Nixar(Sharif), Susp., 100 mg/ 5 ml, Tk. 35.00/30 ml; Tab. 500 mg, Tk. 10.00/Tab.

Nizox(Somatec), Susp., 100 mg/5 ml, Tk. 35.00/30ml.; Tab., 500 mg, Tk. 10.03/Tab.

Ntz(Asiatic), Susp., 100 mg/5 ml, Tk. 35.00/30ml,Tk. 50.00/60ml

Proxa-A(Ad-din), Tab., 500 mg, Tk. 9.00/Tab.; Susp. , 100 mg/5 ml, Tk. 35/30 ml

Tazonid(Popular), Susp., 100 mg/5 ml, Tk. 32.12/30ml

Tazox(Novo Health), Susp., 100 mg/5 ml, Tk. 35.00/30ml.; Tab. , 500 mg, Tk. 10.00/Tab.

Toza(Eskayef), Susp., 100 mg/5 ml, Tk. 35.00/30ml.; Tk. 50.00/60ml.; Tab, 500mg, Tk. 10.00/Tab.; Tk. 10.00/Tab.

Xanide(Globe), Susp., 100 mg/5 ml, Tk. 35.00/30 ml.; Tk. 50.00/60 ml.; Tab. , 500 mg, 10.00/Tab

Xanita(Renata), Susp., 100 mg/5 ml, Tk. 40.00/30ml.; Tk. 58.00/60ml.; Tab. , 500mg, Tk. 10.04/Tab.

Zoana(Orion),Susp., 100 mg/5 ml, Tk. 50.24/62ml.; Tk. 35.24/32ml.; Tab. , 500mg, Tk. 10.07/Tab.

Zonan(MST), Susp. , 100 mg/5 ml, Tk. 35/30 ml; Tk.50/60 ml ; Tab., 500 mg, Tk. 10/Tab.

Zox(Square), Tab. , 500 mg, Tk. 10.07/Tab.; Susp., 100 mg/5 ml, Tk.35.24/30gm; Tk. . 50.35/60 ml

1. ANTI-INFECTIVES

Zoxan(Opsonin), Susp., 100 mg/5 ml, Tk. 50.19/ 60 ml ;, Tk. 35.13/30 ml; Tab., 500 mg, Tk. 10.07/Tab.
Zoxanid(Silva), Tab., 500mg, Tk. 10.04/Tab.; Susp., 100 mg/5 ml, Tk. 35.13/ 30 ml; Tk. 50.19/60ml

1.3.5 DRUGS FOR LEISHMANIASIS

(See section 1.2)

The classic therapy for all species of Leishmania is pentavalent antimony (sodium antimony gluconate, sodium stibogluconate). As an alternative, **Liposomal amphotericin B** is a highly effective agent for visceral leishmaniasis and currently drug of choice in antimony-resistant disease. Pentamidine isetionate can be also used in antimony-resistant leishmaniasis. Other drugs include **Paromomycin**, parenterally for visceral disease and topical formulation for cutaneous form, and the orally active agent **Miltefosine**, both for visceral and cutaneous diseases.

SODIUM STIBOGLUCONATE^[ED]

This pentavalent antimonial is effective against cutaneous as well as visceral leishmaniasis (kala-azar). It is rapidly absorbed after parenteral (IM or IV inj.) administration and exhibits two phase-elimination, i.e. with short (about 2 hours) and long (> 24 hours) half-life.

Indications: Leishmaniasis

Cautions: Renal and hepatic impairment, pregnancy; protein-rich diet should be provided through out treatment period, iron and other nutritional deficiencies and intercurrent infections required to be corrected; monitoring of cardiac, renal and hepatic functions, dose reduction or withdrawal of therapy if any abnormality; IV injections must be given slowly over 5 minutes (to reduce the risk of local thrombosis) and stopped if coughing or substernal pain; treatment of mucocutaneous leishmaniasis may induce severe inflammation around the lesions (may be life-threatening if pharyngeal or tracheal involvement, may require corticosteroid); heart disease (withdraw if conduction disturbance-occurs); monitor ECG before and during

treatment; predisposition to QT interval prolongation, concomitant use with drugs that prolong the QT interval

Contra-indication: Significant renal impairment

Interactions: See Appendix-2

Side-effects: Anorexia, nausea, vomiting, abdominal pain; ECG changes; headache, lethargy, myalgia; raised liver enzymes; coughing and substernal pain; rarely anaphylaxis; and also reported, fever, sweating, flashing, vertigo, bleeding from nose and gum, jaundice, rash; pain and thrombosis on IV administration, intramuscular injection also painful

Dose: *Visceral leishmaniasis:* IM or IV inj. (injection should be filtered immediately before administration using a filter of 5 microns or less), ADULT and CHILD, 20 mg/kg/d for 28 days; *cutaneous leishmaniasis:* except *L. aethiopica*, *L. braziliensis*, *L. amazonensis*, by intralesional inj. ADULT and CHILD 100-300 mg into base of lesion, repeated if required, once or twice at intervals of 1-2 days; by IM inj. ADULT and CHILD 10-20 mg/kg daily until a few days after clinical cure and negative slit-skin smear; in cutaneous lesion due to, *L. braziliensis* and *L. amazonensis*, dose is 20 mg/kg daily; *mucocutaneous leishmaniasis due to L. braziliensis:* IM inj. ADULT and CHILD 20 mg/kg daily until negative slit-skin smear or for at least 4 weeks; if relapse or unresponsive treatment with pentamidine isetionate or amphotericin-B

Generic Preparation

Injection, 100mg/ml

MILTEFOSIN

Indications: Visceral and cutaneous leishmaniasis

Cautions: Pregnancy and breastfeeding

Side-effects: Nausea and vomiting,

Contra-indication: Pregnancy

Dose: ADULT- >25kg: 100mg/day, twice a day, for 28days;<25kg: 50mg/day, twice a day, for 28 days.

Proprietary Preparation

Miltefos(Popular), Cap., 10mg, Tk. 60.23/Tab.; 50mg , Tk. 160.60/Tab.

1. ANTI-INFECTIVES

1.4	ANTIVIRAL DRUGS
1.4.1	DRUGS FOR HERPES VIRUS INFECTIONS
1.4.2	DRUGS FOR VIRAL HEPATITIS
1.4.3	DRUGS FOR INFLUENZA AND RESPIRATORY SYNCYTIAL VIRUS
1.4.4	DRUGS FOR HIV INFECTION

Antiviral agents, similar to the antibacterials, are most active when viruses are replicating. Antiviral drugs inhibit virus replication in different ways: by directly acting on virus-specific proteins and by modulating host immune system. The first category drugs are: Aciclovir, Cidofovir, Famciclovir, Idoxuridine, Valaciclovir, Adefovir, Dipivoxil, Entecavir, Telbivudine, Tenofovir, Disoproxil, Amantadine, Rimantadine, Oseltamivir, zanamavir, Lamivudine, Zidovudine, Didanosine, Zalcitabine, Stavudine, Ganciclovir, Tribavirine. The second category includes Interferons and Inosinepranobex.

1.4.1	DRUGS FOR HERPES VIRUS INFECTIONS
1.4.1.1	DRUGS FOR HERPES SIMPLEX AND VARICELLA-ZOSTER
1.4.1.2	DRUGS FOR CYTOMEGALOVIRUS
1.4.1.1	DRUGS FOR HERPES SIMPLEX AND VARICELLA-ZOSTER INFECTIONS

Herpes Infection of the mouth, lips and eye is generally associated with herpes virus serotype 1 (HSV-1) and genital infection is most often associated with HSV-2 and also with HSV-1. Mild infection of the eye (ocular herpes) and of the lips (herpes labialis) in immunocompetent individuals is treated with a topical antiviral whereas severe infection, neonatal herpes, infection in immunocompromised individuals, and

primary or recurrent genital herpes infection requires administration of systemic antiviral drug. Treatment should start as early as possible and usually within 5 days of the appearance.

Varicella-zoster infection (chicken pox) in healthy children between 1 month and 12 years is usually mild and does not require treatment.

ACICLOVIR

(Acyclovir)

Indications: Herpes simplex encephalitis, primary and recurrent genital herpes, herpes simplex skin infections, including initial and recurrent labial and genital herpes (as a cream), disseminated varicella-zoster in immunocompromised patients, neonatal herpes simplex infection

Cautions: Maintain adequate hydration; renal impairment requires dose reduction; pregnancy, breast-feeding, the ophthalmic ointment causes a mild transient stinging sensation and a diffuse superficial punctate keratopathy which clears when the drug is stopped

Contra-indications: Hypersensitivity

Interactions: See Appendix-2

Side-effects: Rashes, gastrointestinal disturbances; rises in bilirubin and liver enzymes, increases in blood urea and creatinine, decreases in hematological indices, headache, neurological reactions, dizziness; also confusion, hallucinations, agitation, tremors, somnolence, psychosis, convulsions and coma; extravasation of intravenous infusion fluid may cause severe local inflammation sometimes leading to ulceration

Dose: By mouth Herpes simplex (treatment) 200 mg (400 mg in the immunocompromised or if absorption is impaired) 5 times daily, usually for 5 days; CHILD under 2 years, half of adult dose, over 2 years, adult dose

Herpes simplex (prevention or recurrence) 200mg 4 times daily or 400mg twice daily possibly reduced to 200 mg 2 or 3 times daily and interrupted every 6-12 months

1. ANTI-INFECTIVES

Herpes simplex (*prophylaxis*) in the immunocompromised, 200-400mg 4 times daily; CHILD under 2 years, half of adult dose, over 2 years, adult dose; Varicella and herpes zoster (*treatment*) ADULTS 800mg 5 times daily for 7 days; CHILD 20 mg/kg (max. 800 mg) 4 times daily; 2-5 years 400mg 4 times daily over 6 years, 800 mg 4 times daily

By *intravenous infusion* (treatment of herpes simplex in the immunocompromised, severe initial genital herpes, and varicella-zoster) 5mg/kg every 8 hours usually for 5 days, doubled to 10 mg/kg every 8 hours in varicella-zoster in the immunocompromised and in simplex encephalitis (usually given for 10 days in encephalitis); prophylaxis of herpes simplex in the immunocompromised, 5mg/kg every 8 hours

NEONATE: up to 3 months, herpes simplex, 10mg/kg every 8 hours usually for ten days; CHILD 3 months-12 years; herpes simplex or varicella-zoster, 250 mg/m² every 8 hours usually for 5 days, doubled to 500 mg/m² every 8 hours for varicella-zoster in the immunocompromised and in simplex encephalitis (given for 10 days in encephalitis) (See sec.10.2.3&12.2.3.)

Proprietary Preparations

Acerux(Oposonin), Inj.(IV, Infusion), 250 mg/100 ml, Tk. 400.00/100 ml; 500 mg/100 ml, Tk. 700.00/100 ml; Susp 200 mg /5ml, Tk. 125.47/70 ml; Tab. , 200 mg, Tk. 14.05/Tab.; 400 mg , Tk. 22.00/Tab.

Acyvir(Aristo), Inj.(IV, Infusion), 250mg/100 ml, Tk. 400.00/Vial, 500 mg/100 ml, Tk. 700.00/Vial

Novirax(Drug Intf), Tk. 40.15/Tab.; 200mg, Tk. 14.05/Tab.; 400mg, Tk. 22.10/Tab.

Simplexvir(Incepta), Inj.(IV, Infusion),, 250mg/100 mlTk. 400.00/vial;500 mg/100 ml, Tk. 700.00/Vial;Tk. 1000.00/100ml;Tab. Tk. 22.00/Tab. ,Tk. 14.00/Tab.

Viroxi(Eskayef), Tab., 200mg, Tk. 14.00/Tab.

Virunil(Globe), Inj.(IV, Infusion), 250 mg/100ml,Tk. 400.00/Vial; 500 mg/100ml, Tk. 700.00/Vial

Virux(Square), Inj.(IV, Infusion), 250 mg/100ml, Tk. 401.20/vial.; 500 mg/100ml, Tk.702.11/vial.;Susp, 200 mg/5 ml, Tk.125.85/70ml;Tab., 200

mg,Tk.14.1/Tab.;Tab. , 400 mg, Tk. 22.14/Tab.

Xovir(Beacon), Inj.(IV, Infusion), 250mg/100mlml ,Tk. 401.2/vial.; 500mg/100ml , Tk. 702.11/vial.

VALACICLOVIR

Indications:See *under acyclovir*; also prevention of cytomegalovirus (CMV) disease following solid organ transplantation when valganciclovir or ganciclovir cannot be used

Cautions, Contra-indications:See *under acyclovir*

Interactions:See *Appendix-2*

Side-effects: See *under acyclovir*; neurological reactions more frequent in high doses

Dose: *Oral:*Herpes simplex (*treatment*) 500 mg twice daily for 5 days (1 g twice daily in immunocompromised or HIV patients); CHILD under 2 years, half of adult dose, over 2 years, adult dose Herpes labialis, treatment, ADULT and CHILD over 12 years, 2 g 12 hourly Herpes simplex, suppression, 500 mg daily in 1-2 divided doses in immunocompromised or HIV patients,500mg twice daily; herpes zoster treatment, 1 g three times daily for 7 days Prevention of CMV disease following solid organ transplantation, 2 g 4 times daily usually for 90 days

Proprietary Preparations

Alaclov(ACI), Tab., 500mg , Tk. 40.15/Tab.

Revira(Square), Tab., 1 gm, Tk.75.00/Tab., 500 mg , Tk. 40.15/Tab.

Valovir(Incepta), Tab., 1 mg, Tk. 75.00/Tab; 500 mg, Tk. 40.00/Tab.

1.4.1.2 DRUGS FOR CYTOMEGALOVIRUS (CMV) INFECTIONS

GANCICLOVIR

(See section 10.2.3)

Indications: life-threatening or sight-threatening CMV infections in immunocompromised patients only; prevention of CMV disease during immunosuppressive therapy following organ transplantation; local treatment of CMV retinitis; congenital cytomegalovirus infection of the CNS

1. ANTI-INFECTIVES

Cautions: history of cytopenia; radiotherapy; ensure adequate hydration during intravenous administration; infuse into vein with adequate flow preferably using plastic cannula; children, renal insufficiency, potential carcinogen and teratogen

Contra-indications: Hypersensitivity to valganciclovir, ganciclovir, aciclovir, or valaciclovir; abnormally low hemoglobin, neutrophil, or platelet counts; pregnancy, breast-feeding (until 72 hours after last dose)

Interactions: See Appendix -2

Side-effects: Leucopenia, thrombocytopenia; GI disturbances, hepatic dysfunction, peripheral neuropathy, depression, anxiety, confusion, anorexia, night sweats; myalgia, arthralgia; macular edema, retinal detachment, vitreous floaters, pruritus, disturbances in hearing and vision, and alopecia

Dose: *IV infusion:* initially 5 mg/kg every 12 hours for 14–21 days for treatment or for 7–14 days for prevention; maintenance (for patients at risk of relapse of retinitis) 6 mg/kg daily on 5 days per week or 5 mg/kg daily until adequate recovery of immunity; if retinitis progresses initial induction treatment may be repeated; *Maintenance treatment in AIDS patients* where retinitis stable (following at least 3 weeks of intravenous ganciclovir), *oral:* 1g 3 times daily with food or 500mg 6 times daily with food in renal impairment; CHILD, 1 month–18 years initially (induction) 5 mg/kg every 12 hours for 14–21 days for treatment or for 7–14 days for prevention; maintenance (for patients at risk of relapse of retinitis), 6 mg/kg daily on 5 days per week or 5 mg/kg daily until adequate recovery of immunity; if retinitis progresses initial induction treatment may be repeated;

Congenital cytomegalovirus infection of the CNS: IV infusion: NEONATE, 6 mg/kg every 12 hours for 6 weeks

Proprietary Preparation

Cymevene[®] (Roche), IV infusion) 500mg/Vial, Tk. 3,981.00/Vial

(See section 10.2.3 for Eye preparation)

1.4.2.1 DRUGS FOR VIRAL HEPATITIS

Use of drugs for treatment and/or prophylaxis of viral hepatitis demands advice of a specialist. The management of acute viral hepatitis is largely symptomatic. Chronic hepatitis is mainly due to infections caused by hepatitis B (HBV) and hepatitis C (HCV) viruses and a number of drugs are available for treating those infections.

Treatment of Chronic hepatitis: In contrast to hepatitis C which is supposed to be curable in all affected individual, hepatitis B is capable of establishing lifelong chronic infection in ~10% of patients. Blood is the main source of infection and spread may follow transfusion of infected blood or blood products or result from injections with contaminated needle (most common among parenteral drug abusers who share needles). Products such as albumin solution and gammaglobulins, which are pasteurized, are wholly free of risk. Patients with chronic HBV may develop active hepatitis that can lead to fibrosis and cirrhosis and all such individuals have a greatly increased incidence of hepatocellular carcinoma. Interferon (IFN) alone or in combination with ribavirin can cure patients with chronic infection but is associated with high rates of side effects, often leading to premature treatment withdrawal. Drugs like entecavir, adefovir dipivoxil, lamivudine, and telbivudine and tenofovir disoproxil with potent anti-HBV activity are much better tolerated than IFN-containing regimens but are not usually curative. Tenofovir disoproxil or its combination with either emtricitabine or lamivudine may be used with other antiretrovirals in patients who require treatment for both HIV and chronic hepatitis B.

1. ANTI-INFECTIVES

ADEFOVIR DIPIVOXIL

Indication: Chronic hepatitis B infection with either compensated liver disease with evidence of viral replication and histologically documented active liver inflammation and fibrosis or decomposed liver disease

Cautions: Monitor renal function in every 3 months, more frequently in renal impairment and in patient receiving nephrotoxic drugs; monitor liver function and viral and serological markers for hepatitis B every 6 months; discontinue if deterioration in liver function, hepatic steatosis, progressive hepatomegaly or unexplained lactic acidosis; pregnancy

Contraindication: Breast feeding

Side-effects: Abdominal pain, nausea, vomiting, dyspepsia, flatulence, diarrhoea, asthenia, headache, renal failure; hypophosphatemia

Dose: ADULT over 18 years, 10mg/day

Proprietary Preparations

Antiva(Square), Tab. 10 mg, Tk. 35.14/Tab.

Adfovir(Sun), Tab. 10 mg, Tk. 25.17/Tab.

Infovir(Incepta), Tab. 10 mg, Tk. 35.00/Tab.

Rezoven(Beximco), Tab., 10mg, Tk. 35.00/Tab

DACLATASVIR

Indications: In combination with Sofosbuvir for the treatment of chronic hepatitis C virus (HCV) infection in adults.

Caution

&Contraindications: Hypersensitivity to the active substance or to any of the excipients, should not be used during pregnancy or in women of childbearing, breast feeding. Contraindicated in combination with medicinal products that strongly induce CYP3A4 and P-gp,

Side-effects: Weakness, tiredness, headache, nausea, skin rash, diarrhea. Sleep disturbances, anemian combination with sofosbuvir- fatigue, headache, and nausea

Dosage: The recommended dose of Daclatasvir is 60 mg once daily, to be taken orally with or without meals. Daclatasvir must be administered in combination with other medicinal products. Consult product literature

Proprietary Preparations

Virodacla(Incepta), Tab., 60 mg, Tk.400/Tab.

Dakovir(Beximco), Tab., 60mg, Tk. 300/Tab.

Dakla(Healthcare), Tab., 60mg, Tk. 400/Tab.

Daclavir(Beacon), Tab., 60mg, Tk.400/Tab.

ENTECAVIR

Indications: Treatment of chronic HBV infection with active viral replication and either evidence of persistence elevations in serum aminotransferases or histologically active disease

Caution: Monitoring of hepatic function every 3 months and viral and serological markers for HBV infection every 3-6 months during treatment (monitoring continued for at least 1 year after discontinuation), therapy discontinue if deterioration in liver function, hepatic steatosis, progressive hepatomegaly or unexplained lactic acidosis; dose reduction if GFR < 50 ml/min/1.73²; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: headache, fatigue, dizziness, nausea, vomiting, dyspepsia, diarrhea, raised serum amylase and lipase; less commonly, thrombocytopenia, rash, alopecia

Dose: Oral: adult over 18 years: not previously treated with nucleoside analogue, 500 micrograms once daily, lamivudine-resistant chronic hepatitis B, 1 mg once daily

Proprietary Preparations

Barcavir(Incepta), Tab., 1mg, Tk.90/Tab.; 500 mcg, Tk. 48.00/Tab.

Cavir(Square), Tab., 1 mg, Tk. 90.27/Tab.; 500 mcg, Tk. 48.14/Tab.

Caviral(Beacon), Tab., 500 mcg, Tk. 60.18/Tab.

Encavir(Popular), Tab., 0.5 mg, Tk. 65.25/Tab.; 1 mg Tk. 120.45/Tab.

Entavir(Drug Intl), Tab., 500 mcg, Tk. 45.15/Tab.; 1mg, Tk. 90.30/Tab.

Entavir(Opsonin), Tab., 1 mg, Tk. 79.47/Tab.; 0.5 mg, Tk. 42.38/Tab.

Enteca(Renata), Tab, 500 mcg, Tk. 48.00/Tab.

Enviral(Opsonin), Tab., 500 mcg, Tk. 48.18/Tab.; 1 mg, Tk. 90.34/Tab.

Genevir(General), Tab., 1mg, Tk. 90.27/Tab.; 500 mcg, Tk. 48.14/Tab.

Tecavir(Aristo), Tab., 1mg, Tk. 90.00/Tab.; 500 mcg, Tk. 3.00/Tab.

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Tecavir(Aristo), Tab., 0.5 mg, Tk. 48.00/Tab.; 1 mg, Tk. 90.00/Tab.
Teviral(ACI), Tab., 500 mcg , Tk. 3.00/Tab.; 1mg , Tk. 100.30/Tab .; Syrup, 5mg/100ml, Tk. 220.00/70ml;
Teviral(ACI), Tab., 5mg, Tk. 48.18/Tab.; 1 mg, Tk. 90/Tab.
Vir(Acme), Tab. , 500 mcg, Tk. 48.14/Tab.
Virenta(Eskayef), Tab, 500 mcg, Tk. 48.00/Tab.

SOFOSBUVIR

Indications: For the treatment of chronic hepatitis C (CHC) infection as a component of a combination antiviral treatment regimen

Caution: Not recommended for administration as monotherapy; special monitoring required in liver problems ,current or previous infection with the hepatitis B virus,kidney problems ,blood tests is must before, during and after your treatment with Sofosbuvir

Contra-indications: When used in combination with peginterferon alfa/ribavirin or ribavirin alone, all contraindications to peginterferon alfa and/or ribavirin also apply to its combination therapy. Because ribavirin may cause birth defects and fetal death, Sofosbuvir 400mg tablet in combination with peginterferon alfa/ribavirin or ribavirin is contraindicated in pregnancy and in men whose female partners are pregnant. avoid in breast feeding.

Side-effects: Most common adverse events observed with it in combination with peginterferon alfa and ribavirin were fatigue, headache, nausea, insomnia and anemia; anxiety, blurred vision , memory loss, loss of concentration, weight loss , stomach discomfort, constipation, dry mouth, indigestion, acid reflux ,hair loss and dry skin, back pain, muscle spasms , chest pain, feeling weak, nasopharyngitis.

Dose: For Adults and Paediatric Population is one 400 mg tablet, taken orally, once daily with food. Consideration should be given to potentially extending the duration of therapy according to different genotypes of CHC beyond 12 weeks and up to 24 weeks ;

Proprietary Preparations

Buviren(Renata), Tab. , 400mg, Tk. 600/Tab.
Hopetavir(Incepta), Tab., 400mg, Tk. 600.00/Tab.
Hopso(Drug Intl), Tab. , 400mg, Tk. 450.00/Tab.
Sofa(Aristopharma), Tab., 400mg , Tk. 600.00/Tab.
Sofomax(ACI), Tab., 400mg , Tk. 700.00/Tab.
Soforal(Beacon), Tab. , 400mg , Tk. 600.00/Tab.
Sofovir(Beximco), Tab., 400mg, Tk. 350.00/Tab.
Sovalvir(Healthcare), Tab., 400mg, Tk. 6031.97/Tab.
Soventa(Eskayef), Tab, 400mg, Tk. 600.00/Tab.
Suvirux(Square), Tab. , 400 mg, Tk. 600.00/Tab.

Sofosbuvir 400mg and Velpatasvir 100mg

Fixvel(Beacon), Tab., Tk.1000.00/Tab.
Panovir(Incepta), Tab., Tk.1000.00/Tab.

INTERFERONS (IFNs)

INTERFERON ALFA

Indications: IFN alfa-2a and alfa 2b: chronic hepatitis B and chronic hepatitis C ideally in combination with ribavirin; chronic myelogenous and hairy cell leukemia, follicular lymphoma, adjunct to surgery in malignant melanoma; IFN alfa-2a: AIDS-related Kaposi's sarcoma, progressive cutaneous T-cell lymphoma

IFN alfa-2b: lymph or liver metastases of carcinoid tumor, maintenance of remission in multiple myeloma

Cautions: See notes above; monitoring of lipid profile

Contra-indications: Avoid injections containing benzyl alcohol in neonates

Interactions: See Appendix-2

Side-effects: Influenza like syndrome fatigue and depression which disappear on lowering the dose; other effects are anorexia, convulsions, hypotension, hypertension, cardiac dysrhythmias and bone marrow depression; also reported nephrotoxicity, hepatotoxicity and severe hypertriglyceridemia

Dose: See section 14.2.4.

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Hepatitis B: IFN-2b, 5-10 mU in ADULT and 6 mU/m² in CHILD thrice weekly for 4-6 weeks, Hepatitis C: 3 mU thrice weekly

Proprietary Preparations

See section 14.2.4

1.4.2.2 DRUGS FOR INFLUENZA AND RESPIRATORY SYNCYTIAL VIRUS

AMANTADINE HYDROCHLORIDE

Indications: Prevention and treatment of influenza A virus infections, Parkinson's disease

Cautions: Renal and hepatic insufficiency, congestive heart failure, confused or hallucinatory states, elderly, gradual withdrawal required in Parkinson's disease

Contra-indications: Pregnancy, breast-feeding, epilepsy, gastric ulceration, and severe renal impairment

Side-effects: anorexia, nausea, nervousness, difficulty in concentrating, light headedness, hallucination, dizziness, convulsions, blurred vision, edema

Dose: Oral: Influenza A, ADULT & CHILD > 10 years, treatment 100 mg daily for 4-5 days; prophylaxis, 100 mg daily usually for 6 weeks or with influenza vaccination for 2-3 weeks after vaccination; Parkinson's disease, 100 mg/d initially then increased after 1 week to 100 mg twice daily (max. 400 mg/d), ELDERLY 100 mg daily

Proprietary Preparation

Amantril (ACI), Cap., 100mg, Tk. 10.00/Cap.

Altrip (NIPRO JMI), Tab., 6.25 mg, Tk. 35.08/Tab.

OSELTAMIVIR^{ED}

Because of the need of metabolism into active form, which may not be proper in children particularly in neonates, this drug is not recommended for use under 1 year of age unless there is a pandemic.

Indications: See under Dose.

Caution: Dose adjustment required in renal insufficiency; pregnancy, breast-feeding; also see notes above

Interactions: See Appendix-2

Dose: prevention of influenza (should be started within 48 hours of exposure): ADULT and CHILD over 13 years, 75 mg once daily for 10 days for post-exposure prophylaxis and for upto 6 weeks during an endemic;

Treatment of influenza: ADULT and CHILD over 13 years, 75 mg 12 hourly for 5 days

Proprietary Preparations

G-Osetamivir (Gonoshasthaya), Susp, 30 mg/25ml, Tk. 350.00/25 ml; Cap. 75 mg, Tk. 75.00/Cap.

Oselta (Popular), Cap., 75 mg, Tk. 150.57/Cap.

Pandeflu (ACI), Cap., 75 mg, Tk. 151.02/Cap.

Tamiflu[®] (Roche) Cap., 75 mg, Tk. 199.85/Cap.

RIBAVIRIN

Indications: Severe respiratory syncytial virus bronchiolitis in infants and children; in combination with peginterferon alfa or interferon alfa for chronic hepatitis B and C in patients without liver decompensation and who have fibrosis or high inflammatory activity or for relapse following previous response to interferon alfa

Cautions: For inhalation therapy: pregnancy should be excluded before treatment, effective contraception essential during treatment and for 6 months after treatment in women and in men;

Contra-indications: Pregnancy, breast-feeding; Specific contraindications for oral treatment: Severe cardiac disease, haemoglobinopathies; severe debilitating medical conditions; severe hepatic dysfunction or decompensated cirrhosis; autoimmune disease, history of severe psychiatric condition

Interactions: See Appendix -2

Side-effects: Specific for inhalation therapy: Worsening respiration, bacterial pneumonia and pneumothorax reported; rarely non-specific anemia and hemolysis

Dose: Respiratory syncytial virus bronchitis in infants and children: by

1. ANTI-INFECTIVES

aerosol inhalation or nebulization of a solution containing 20mg/ml for 12-18 hours for at least 3 days, maximum 7 days; chronic hepatitis C (in combination with interferon alfa or peginterferon alfa): ADULT over 18 years body weight under 75 kg, 400mg in morning and 600mg in the evening; body-weight 75 kg and over, 600mg twice daily

Proprietary Preparations

Celbarin(Incepta), Cap., 200 mg, Tk. 35/Cap.
Chrocee(ACI), Cap., 200 mg, Tk. 35.00/Cap.
Copeg(Beacon), Cap., 200 mg, Tk. 35/Cap.
Opegus(Drug Intl), Cap., 200 mg, Tk. 25/Cap.
Rivarin(Healthcare), Cap., 200 mg, Tk. 35/Cap.
Viracin(Beximco), Cap., 200 mg, Tk. 35.00/Cap.

1.4.4 DRUGS FOR HUMAN IMMUNODEFICIENCY VIRUS (HIV) INFECTION

- 1.4.4.1 NUCLEOSIDE AND NUCLEOTIDE REVERSE TRANSCRIPTASE INHIBITORS
- 1.4.4.2 NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS
- 1.4.4.3 PROTEASE INHIBITOR
- 1.4.4.4 INTEGRASE INHIBITORS
- 1.4.4.5 ENTRY INHIBITORS

Currently available drugs provide suppressive therapy for HIV infection rather than a curative one. The goal of therapy is to reduce plasma viral load through suppression of replication as much as possible for as long as possible and expected outcome of initial therapy in a previously untreated patient is an undetectable viral load (plasma HIV RNA <50 copies /ml) within 24 weeks of treatment initiation.

Cautions: Metabolic effects associated with antiretroviral treatment include fat redistribution, insulin resistance, and dyslipidemia; (collectively termed **lipodystrophy syndrome**); fat redistribution (with loss of subcutaneous fat, increased abdominal fat, 'buffalo hump' and breast enlargement) is associated with regimens containing **protease inhibitors** and **nucleoside reverse transcriptase inhibitors**; the

usual risk factors for cardiovascular disease should be taken into account before starting antiretroviral therapy and patients should be advised about lifestyle changes to reduce their cardiovascular risk; plasma lipids and blood glucose should be measured before starting antiretroviral therapy, after 3–6 months of treatment, and then annually; reports of **osteonecrosis** in patients with advanced HIV disease or following long-term exposure to combination ART; improvement in immune function as a result of antiretroviral treatment may provoke a marked inflammatory reaction against residual opportunistic organisms; these reactions may occur within the first few weeks or months of initiating treatment; reports of **autoimmune disorders** (such as Graves' disease) many months after initiation of treatment.

1.4.4.1 NUCLEOSIDE AND NUCLEOTIDE REVERSE TRANSCRIPTASE INHIBITORS

ABACAVIR^[ED]

Indications: Treatment of HIV-infection in combination with other antiretroviral drugs

Cautions: Potentially fatal hypersensitivity syndrome mostly linked with HLA-B*5701 allele; test for that allele before use; counsel patient about how to recognize hypersensitivity and to seek immediate medical attention if symptoms develop ; heavily loaded HIV-infection (> 100 000 copies/ml); patients with chronic hepatic B and C, hepatic impairment, lactic acidosis; patients at high risk of cardiovascular disease; alcoholic patients;

Contraindications: History of hypersensitivity

Interactions: See Appendix-2

Side-effects: Fatal hypersensitivity characterized by fever, rash, abdominal pain and other GI complaints, cough, phengitis, dyspnea, sore throat, acute respiratory distress syndrome, myalgia,

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headache, paraesthesia, mouth ulceration, edema, hypotension, renal failure; rarely myolysis

Dose: *Oral:* ADULT, 600 mg in 1-2 doses; CHILD, 3 months-12 years, 8 mg/kg 12 hourly adjusted to body weight (max. 600 mg)

Generic Preparations

(Tablet, Abacavir 300 mg+ Lamivudine 150 mg + Zidovudine 300 mg)

LAMIVUDINE^[ED]

Indications: HIV infection in combination with at least two other antiretroviral drugs, chronic hepatitis B infection

Cautions: Pregnancy, breast-feeding, renal and hepatic impairment; monitoring of hepatic function is required, drug should be discontinued if deterioration, hepatic steatosis, hepatomegaly or unexplained lactic acidosis

Contraindications: Breast-feeding

Side-effects: Tiredness, respiratory tract infections, throat discomfort, headache, abdominal discomfort, nausea, vomiting, diarrhea, hypersensitivity reactions, peripheral neuropathy, lactic acidosis, raised liver enzymes and serum amylase

Dose: *oral:* HIV infection in combination with other antiretroviral drugs, 150 mg every 12 hours or 300 mg once daily; INFANT < 1 month 2 mg/kg twice daily; CHILD 3 months-12 years 4 mg/kg every 12 hours; max. 300 mg daily; chronic hepatitis B, ADULT 100 mg daily

Proprietary Preparations

Lamivudine

Hepavir(Square), Tab., 100 mg, Tk. 25.17/Tab.

Lamidin(Eskayef), Tab., 100mg, Tk. 25.30/Tab.

Lamivir(Incepta), Tab., 100 mg, Tk. 25.00/Tab.

Viradin(Healthcare), Tab., 100mg, Tk. 25.00/Tab.

Lamivudine + Zidovudine

Diavix(Beximco), Tab. 150 mg + 300 mg, Tk. 45.00/Tab.

Lamivudine + Zidovudine + Nevirapine

Triovix(Beximco), Tab. 150 mg + 300 mg + 200 mg, Tk. 70.00/Tab.

TENOFOVIR DISOPROXIL^[ED]

Indications: HIV infection in combination with other antiretroviral drugs; chronic hepatitis B infection with *either* compensated liver disease or decompensated liver disease

Cautions: See notes above; also test renal function and serum phosphate before treatment, then every 4 weeks (more frequently if at increased risk of renal impairment) for 1 year and then every 3 months, interrupt treatment if renal function deteriorates or serum phosphate decreases; concomitant or recent use of nephrotoxic drugs; for use in chronic hepatitis B, monitor liver function tests every 3 months and viral markers for hepatitis B every 3–6 months during treatment (continue monitoring for at least 1 year after discontinuation, recurrent hepatitis may occur on discontinuation); If a dose is more than 12 hours late, the missed dose should not be taken and the next dose should be taken at the normal time

Interactions: See Appendix -2

Side-effects: See notes above; also hypophosphatemia; rarely renal failure, proximal renal tubulopathy, nephrogenic diabetes insipidus; reduced bone density

Dose: *Oral:* ADULT, over 18 years, 245 mg once daily; CHILD 2–18 years: HIV infection in combination with other ARDs when first-line NRTIs cannot be used because of resistance or contra-

indications, CHILD 2–18 years, 6.5 mg/kg (max. 245 mg) once daily or Body-weight 17–22 kg 123 mg once daily; body-weight 22–28 kg 163 mg once daily; body-weight 28–35 kg 204 mg once daily; body-weight over 35 kg 245 mg once daily; Chronic hepatitis B infection with compensated liver disease (with evidence of viral replication, and histology of active liver inflammation or fibrosis): Child 12–18 years, body-weight > 35kg 245 mg once daily

Proprietary Preparations

Becovir(Beacon), Tab., 300mg, Tk. 85.26/Tab.

Foviral(ACI), Tab., 300mg, Tk. 85.26/Tab.

Proxivir(Square), Tab., 300mg, Tk. 85.26/Tab.

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Tenoviral(Opsonin), Tab., 300mg, Tk. 85.26/Tab.
Tenvira(Aristo), Tab., 300mg, Tk. 85.00/Tab.
T-fovir(Drug Intl), Tab., 300mg, Tk. 85.30/Tab.
Vironil(UniMed), Tab., 300mg, Tk. 95.00/Tab.
Xynovir(Incepta), Tab., 300mg, Tk. 85.00/Tab.

TENOFOVIR ALAFENAMIDE

Hepatitis B virus (HBV) nucleoside analog reverse transcriptase inhibitor.

Indications: Chronic hepatitis B virus infection in adults with compensated liver disease.

Cautions & Side-effect: See under *Tenofovir disoproxil*

Dose: 25 mg (one tablet) taken orally once with food

Proprietary Preparation

Tafecta (Beacon), Tab. 25mg, Tk. 160.00/Tab.

ZIDOVUDINE^[ED]

Indications: HIV infection in combination with other antiretroviral drugs, alone for prevention of maternal-fetal HIV transmission; AIDS or AIDS-related complex, to reduce the frequency of opportunistic infections and for prolonging survival

Cautions: See under *lamivudine*; also hematological disorders, vitamin B12 deficiency; associated with higher risk of lipodystrophy

Contra-indications: Abnormally low neutrophil counts or hemoglobin concentration, neonates with hyperbilirubinemia requiring treatment other than phototherapy, or with raised transaminase

Interactions: See *Appendix-2*

Side-effects: Anemia, leucopenia, neutropenia, nausea, vomiting, abdominal discomfort, diarrhea, taste disturbance, pancreatitis, liver disorders including fatty change and raised bilirubin and liver enzyme, chest pain, dyspnea, cough, influenza-like symptoms, headache, fever, neuropathy, convulsions, dizziness, anxiety, depression, asthenia, myopathy, pancytopenia, thrombocytopenia,

hypersensitivity reactions, pigmentation of nails, skin and mucosa

Dose: *Oral:* ADULT 500-600 mg daily in 2-3 divided doses; INFANT < 4 weeks 4 mg/kg twice daily; CHILD > 3 months 180-360 mg/m² daily in 3-4 divided doses; max. 200 mg every 6 hours; patients temporarily unable to take zidovudine by mouth, by IV infusion over 1 hour 1-2 mg/kg every 4 hours (approximating to 1.5-3 mg/kg every 4 hours by mouth) usually for not more than 2 weeks; CHILD 80-160 mg/m² every 6 hours (120 mg/m² every 6 hours approximates to 180 mg/m² every 6 hours by mouth); prevention of maternal-fetal HIV transmission, oral, between 14 and 34 weeks of gestation, 100 mg 5 times daily, IV during labor, 2 mg/kg over 1 hour, then 1 mg/kg/h by continuous infusion, followed by syrup to neonate from birth through 6 weeks of age, 2 mg/kg every 6 hours

Proprietary Preparation

(For co-formulation with abacavir and lamivudine see under abacavir and that with lamivudine see under lamivudine)

ZALCITABINE

Indications: Advanced HIV infection in combination with other antiretroviral drugs

Cautions: Peripheral neuropathy pancreatitis (monitor serum amylase in those with history of elevated serum amylase); cardiomyopathy, history of congestive cardiac failure; hepatotoxicity (potentially life threatening lactic acidosis with hepatomegaly reported); pregnancy (women of childbearing age should use effective contraception during treatment); renal impairment

PERIPHERAL NEUROPATHY: discontinue immediately if peripheral neuropathy develops characterized by numbness and burning dysaesthesia possibly followed by sharp shooting pains or severe continuous burning and potentially irreversible pain; extreme caution and close monitoring required in those at risk of peripheral neuropathy

1. ANTI-INFECTIVES

(especially those with low CD4 cell count for whom risk is greater)

PANCREATITIS: discontinue permanently if clinical pancreatitis develops; suspend if raised serum amylase associated with glucose intolerance rising triglyceride, decreasing serum calcium or other signs of impending pancreatitis until pancreatitis excluded

Contraindications: Peripheral neuropathy; breast-feeding

Interactions: See Appendix-2

Side-effects: Peripheral neuropathy (discontinue immediately); oral ulcers, nausea, vomiting, dysphagia, anorexia, diarrhoea, abdominal pain, constipation; pharyngitis; headache, dizziness; myalgia, arthralgia; rash, pruritus, sweating, weight loss, fatigue, fever, rigors, chest pain, anemia, leucopenia, neutropenia, thrombocytopenia, disorders of liver function; less frequently pancreatitis, esophageal jaundice and hepatocellular damage;

Dose: 750 micrograms 3 times daily; ELDERLY and CHILD under 13 years, not recommended (safety and efficacy not established)

Generic Preparation

Tablet, 75 micrograms; 750 micrograms

1.4.4.2 NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS

EFAVIRENZ^[ED]

Indications: HIV infection in combination with other antiretroviral drugs

Cautions: See notes above; also hepatic impairment; severe renal impairment; pregnancy and breast-feeding; elderly; history of mental illness or substance abuse; patient on other hepatotoxic drug needs monitoring of liver function; discontinue if severe rash with blistering, desquamation, mucosal involvement or fever;

Contra-indications: Porphyria, pregnancy

Interactions: See Appendix-2

Side-effects: Rash, usually in the first 2 weeks; Stevens-Johnson syndrome; headache, dizziness, insomnia, abnormal dreams, fatigue, impaired concentration (administration at bed time in the first 2-4 weeks reduces CNS effects); nausea, less frequently vomiting, diarrhea, hepatitis, depression, anxiety, psychosis, amnesia, ataxia, stupor, vertigo, also reported raised serum cholesterol, elevated liver enzymes (especially if seropositive for hepatitis B and C), pancreatitis

Dose: Oral: HIV infection in combination with other antiretroviral drugs, ADULT 600 mg once daily; CHILD, 3-18 years: body weight 13-15 kg 200 mg once daily; body weight 15-20 kg 250 mg once daily; body weight 20-25 kg 300 mg once daily; body weight 25-32 kg 350 mg once daily; body weight 33-40 kg 400 mg once daily; body weight 40 kg and over adult dose

Proprietary Preparations

Avifanz(Beximco), Tab. 600 mg, Tk. 140/Tab.

Delfavir(Delta), Tab. 600 mg, Tk. 50 /Tab

Adiva(Sqaure), Tab. 600 mg Tk.201.35/Tab.

NEVIRAPINE^[ED]

Indications: HIV infection in combination with other antiretroviral drugs; prevention of maternal-fetal HIV transmission

Cautions: Hepatic impairment (chronic hepatitis B or C); severe renal impairment; pregnancy and breast-feeding; high CD4 cell count; close liver function monitoring required during first 18 weeks; monitor before treatment then every 2 weeks for 2 months then after 1 month and then regularly; monitor closely for skin reactions during first 18 weeks discontinue permanently if abnormalities in liver function tests accompanied by hypersensitivity reaction;

Counseling: Patients should be told how to recognize hypersensitivity reactions and advised to discontinue treatment and seek immediate medical attention if severe skin reaction, hypersensitivity reactions, or symptoms of hepatitis develop

Contra-indications: Acute porphyria; post-exposure prophylaxis

Interactions: See Appendix-2

Side-effects: Rash including Stevens-Johnson syndrome and rarely, toxic epidermal necrolysis; hepatitis and jaundice reported; nausea, vomiting, abdominal pain, diarrhea, headache, drowsiness, fatigue, fever; hypersensitivity reactions (may involve hepatic reactions and rash) anaphylaxis, angioedema, urticaria, also reported

Dose: *Oral:* HIV infection in combination with other antiretroviral drugs, ADULT, 200 mg once daily of 'immediate-release' preparation for first 14 days then (if no rash present) 200 mg twice daily of 'immediate-release' preparation or 400 mg once daily of modified-release preparation; CHILD, 1 month–3 years 150–200 mg/m² (max. 200 mg) once daily of 'immediate-release' preparation for first 14 days, then (if no rash present) 150–200 mg/m² (max. 200 mg) twice daily or 300–400 mg/m² (max. 400 mg) once daily of 'immediate-release' preparation; 3–18 years 150–200 mg/m² (max. 200 mg) once daily of 'immediate-release' preparation for first 14 days, then (if no rash present after initial dose titration) 150–200 mg/m² (max. 200 mg) twice daily of 'immediate-release' preparation

prevention of maternal-fetal HIV transmission, 200 mg orally as a single dose to the woman at onset of labor followed by a 2 mg/kg oral dose to the neonate within 3 days after delivery

Note: Initial dose titration using 'immediate-release' preparation should not exceed 28 days; if rash not resolved within 28 days, alternative treatment should be sought; If a dose is more than 8 hours late with the 'immediate-release' preparation (or more than 12 hours late with the modified-release preparation), the missed dose should not be taken and the next dose should be taken at the usual time

Proprietary Preparation

(For co-formulation with lamivudine and zidovudine see under lamivudine)

1.4.4.3 PROTEASE INHIBITORS

INDINAVIR^[ED]

Indications: HIV infection in combination with nucleoside reverse transcriptase inhibitors and usually with low-dose ritonavir

Cautions: Hepatic impairment; adequate hydration, at least 2 L daily to reduce risk of nephrolithiasis (more frequent in children; may require interruption or discontinuation) ; solubility decreases at higher pH, antacids or other buffering agents should not be taken at the same time;

hemophilia; pregnancy and breast-feeding;

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, diarrhea, abdominal discomfort, dyspepsia, flatulence pancreatitis, dry mouth, taste disturbances; headache, dizziness, insomnia; myalgia, myositis, rhabdomyolysis, asthenia, paraesthesia; hyperglycemia: anaphylactoid reactions, rash (including Stevens-Johnson syndrome), pruritus, dry skin, hyperpigmentation, alopecia, paronychia; interstitial nephritis, nephrolithiasis, dysuria, hematuria, crystalluria, proteinuria, pyuria (in children), hepatitis, transient hyperbilirubinemia; blood disorders including neutropenia, hemolytic anemia; lipodystrophy

Dose: *Oral:* HIV infection, in combination with two NRTIs and low-dose ritonavir booster, ADULT, indinavir 800 mg and ritonavir 100 mg both twice daily; in combination with two NRTIs but without ritonavir booster ADULT, 800 mg every 8 hours; CHILD & ADOLESCENT 4-17 years 500 mg/m² every 8 hours (maximum 800 mg every 8 hours); CHILD < 4 years safety and efficacy not established

Generic Preparation

Capsule, 200 mg,

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NELFINAVIR^[ED]

Indications: HIV infection in combination with other antiretroviral drugs

Cautions: See notes above; also hepatic and renal impairment, diabetes mellitus, hemophilia, pregnancy and breast-feeding

Interactions: See Appendix -2

Side-effects: Diarrhea, nausea, vomiting, flatulence, abdominal pain; rash; reports of elevated creatinine kinase, hepatitis and pancreatitis, neutropenia, hypersensitivity reactions including bronchospasm, fever, pruritus and facial edema, lipodystrophy and metabolic effects

Dose : Oral: HIV infection in combination with other antiretroviral drugs, ADULT 1.25 g twice daily or 750 mg 3 times daily; CHILD, 3-13 years, initially 50-55mg/kg twice daily (max 1.25g twice daily) or 25-30mg/kg 3 times daily (max.750 mg 3 times daily)

Proprietary Preparation

Avifex(Beximco), Tab. 250 mg, Tk. 45.00/Tab

SAQUINAVIR

Indications: HIV infection in combination with other antiretroviral drugs and usually with low-dose ritonavir

Cautions: See notes above; also monitor ECG before starting treatment and then on day 3 or 4 of treatment, discontinue if QT interval over 480 milliseconds, if QT interval more than 20 milliseconds above baseline, or if prolongation of PR interval, patients should be told how to recognize signs of arrhythmia and advised to seek medical attention if symptoms such as palpitation or syncope develop; concomitant use of garlic reduces plasma concentration; hepatic and renal impairment; diabetes mellitus; hemophilia; pregnancy and breast-feeding;

Contra-indications: Severe hepatic impairment; predisposition to cardiac arrhythmias (including congenital QT prolongation, bradycardia, history of symptomatic arrhythmias, heart failure with reduced left ventricular ejection

fraction, electrolyte disturbances, concomitant use of drugs that prolong QT or PR interval);

Interactions: See Appendix-2

Side-effects: Diarrhea, buccal and mucosal ulceration, abdominal discomfort, nausea, vomiting, headache, peripheral neuropathy, paraesthesia, dizziness, insomnia, mood changes, ataxia, musculoskeletal pain, asthenia; fever, pruritus, rash and other skin eruptions, rarely Stevens-Johnson syndrome; other rare adverse effects include thrombocytopenia and blood disorders, seizures, liver damage, pancreatitis and nephrolithiasis, elevated creatinine kinase, raised liver enzymes and neutropenia, when used in combination therapy, lipodystrophy and metabolic effects

Dose: Oral:HIV infection in combination with nucleoside reverse transcriptase inhibitors and with low-dose ritonavir booster, ADULT, previously treated with ART, saquinavir 1 g and ritonavir 100 mg both twice daily and not previously treated with ART, 500 mg 12 hourly for 7 days then 1 g 12 hourly ; without ritonavir booster, ADULT 1.2 g every 8 hours after meal; CHILD < 16 years safety and efficacy not established

Generic Preparation

Tablet, 500 mg

1.4.4.4 INTEGRASE INHIBITORS

HIV-retrovirus DNA remains in the host cell nucleus for a prolonged period of inactivity or latency because of its ability of chromosomal integration through activity of the viral integrase enzyme. Raltegravir inhibits this enzyme and prevents the formation of covalent bonds between host and virus DNA.

RALTEGRAVIR

Indications: HIV infection in combination with other antiretroviral drugs

Cautions: Myopathy or rhabdomyolysis; chronic hepatitis B or C; psychiatric illness; discontinue if severe rash or rash with fever, malaise, arthralgia, myalgia, blistering, mouth ulceration,

conjunctivitis, angioedema, hepatitis, or eosinophilia; severe hepatic impairment, pregnancy, breast-feeding

Interactions: See Appendix -2

Side-effects: GI disturbances, abdominal pain, flatulence, hypertriglyceridemia, dizziness, headache, depression, insomnia, abnormal dreams, hyperactivity, asthenia, rash (including Stevens-Johnson syndrome); *less commonly*, gastritis, hepatitis, pancreatitis, dry mouth, taste disturbances, pain on swallowing, peptic ulcer, constipation, rectal bleeding, lipodystrophy, palpitation, ventricular extrasystoles, bradycardia, hypertension, flushing, chest pain, edema, dysphonia, epistaxis, nasal congestion, drowsiness, anxiety, appetite changes, confusion, impaired memory and attention, suicidal ideation, pyrexia, chills, carpal tunnel syndrome, tremor, peripheral neuropathy, erectile dysfunction, gynaecomastia, menopausal symptoms, osteopenia, renal failure, nocturia, polydipsia, anemia, thrombocytopenia, neutropenia, arthralgia, myalgia, rhabdomyolysis, visual disturbances, tinnitus, gingivitis, glossitis, acne, pruritus, hyperhidrosis, dry skin, skin papilloma, alopecia;

Dose: *Oral:* ADULT, 400 mg twice daily; CHILD, 2–18 years:(in combination with other antiretroviral drugs for HIV infection resistant to multiple antiretrovirals): body-weight 12–14 kg 75 mg twice daily; body-weight 14–20 kg 100 mg twice daily; body-weight 20–28 kg 150 mg twice daily; body-weight 28–40 kg 200 mg twice daily; body-weight over 40 kg 300 mg twice daily

Generic Preparation

Tablet, 400 mg

1.4.4.5 ENTRY INHIBITORS

Entry inhibitor drugs prevent entry into host cell of the retrovirus in two different ways: inhibiting fusion of viral cell membranes mediated by gp41 and CD4 interactions (enfuvirtide) and blocking host cell CCR5 receptor to block binding of viral gp 120 (maraviroc).

ENFUVIRTIDE

Indications: HIV infection in combination with other antiretroviral drugs for resistant infection or for patients intolerant to other antiretroviral regimens

Cautions: Discontinue immediately if any signs or symptoms of systemic hypersensitivity develop and do not rechallenge; patients should be told how to recognize signs of hypersensitivity, and advised to discontinue treatment and seek immediate medical attention if symptoms develop; hepatic impairment, chronic hepatitis B or C; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects Injection-site reactions; pancreatitis, gastro-esophageal reflux disease, anorexia, weight loss; hypertriglyceridemia; peripheral neuropathy, asthenia, tremor, anxiety, nightmares, impaired concentration, vertigo; pneumonia, sinusitis, influenza-like illness; diabetes mellitus; hematuria; renal calculi, lymphadenopathy; myalgia; conjunctivitis; dry skin, acne, erythema, skin papilloma; *less commonly* hypersensitivity reactions, including rash, fever, nausea, vomiting, chills, rigors, low blood pressure, respiratory distress, glomerulonephritis, and raised liver enzymes reported;

Dose: *Subcutaneous injection:* reconstitute with 1.1 mL water for Injections and allow to stand (for up to 45 minutes) to dissolve; do **not** shake or invert vial;

ADULT, 90 mg twice daily; CHILD, 6–16 years 2 mg/kg (max. 90 mg) twice daily, 16–18 years 90 mg twice daily

Generic Preparation

Injection, 90 mg/ml

MARAVIROC

Indications: HIV infected adults in combination with other antiretroviral drugs previously treated with antiretrovirals who have base line

1. ANTI-INFECTIVES

evidence of predominantly CCR5-tropic virus

Cautions: Cardiovascular disease; hepatic impairment, chronic hepatitis B or C; pregnancy, breast-feeding

Interactions: See Appendix -2

Side-effects: GI disturbances; depression, insomnia, malaise, headache, anemia, rash; *less commonly*, seizures, renal failure, proteinuria, myositis; *rarely* hepatitis, angina, pancytopenia, granulocytopenia, Stevens-Johnson syndrome, toxic epidermal necrolysis; also reported hypersensitivity reactions including rash, fever, eosinophilia, and hepatic reactions;

Dose: *Oral:* ADULT, over 18 years, 300 mg twice daily

Generic Preparation

Tablet, 150 mg,

1.5 ANTHELMINTICS

1.5.1 DRUGS FOR NEMATODE INFECTIONS

1.5.2 DRUGS FOR CESTODE INFECTIONS

1.5.1 DRUGS FOR NEMATODE INFECTIONS

1.5.1.1 ASCARIDES : DRUGS FOR COMMON ROUNDWORMS

1.5.1.2 DRUGS FOR HOOKWORMS (ANCYLOSTOMIASIS, NECATORIASIS)

1.5.1.3 DRUGS FOR THREADWORMS/ PINWORMS(ENTEROBIASIS)

1.5.1.4 DRUGS FOR DWARF THREAD-WORMS (STRONGYLOIDIASIS)

1.5.1.5 DRUGS FOR WHIPWORMS (TRICHURIASIS)

1.5.1.6 DRUGS FOR LYMPHATIC FILARIASIS(WUCHERIA INFECTIONS)

1.5.1.1 ASCARIDES: DRUGS FOR COMMON ROUNDWORMS

The preferred agents are the benzimidazoles, mebendazole and albendazole and the broad-spectrum drug pyrantel pamoate. Levamisole is an alternate choice.

1.5.1.2 DRUGS FOR HOOKWORMS (ANCYLOSTOMIASIS, NECATORIASIS)

Hookworms (Ancylostomiasis) are located in the upper small intestine and suck blood from their point of attachment; anemia may thereby be produced. Effective treatment needs not only expulsion of the worms but treatment of the anemia. Albendazole is the drug of first choice against both species and mebendazole is the next. Dog and cat hookworm larvae may enter human skin where they produce slowly extending itching tracks usually on the foot (cutaneous larva migrans or creeping eruption). Single tracks can be treated with topical thiabendazole and multiple infections respond to oral ivermectin, albendazole or thiabendazole

1.5.1.3 DRUGS FOR THREADWORMS/ PINWORMS

The adult threadworms do not live for longer than 6 weeks. Adult female worms lay ova on the perianal skin which causes pruritus; scratching the area then leads to ova being transmitted on fingers to the mouth, often via food eaten with unwashed hands. Pruritus in the perianal, perineal region can be severe, scratching may cause secondary infection. Mebendazole is the drug of choice. Albendazole and pyrantel pamoate also are highly effective.

1.5.1.4 DRUGS FOR DWARF THREAD-WORMS (STRONGYLOIDIASIS)

Strongyloides stercoralis also called Dwarf threadworm is capable to complete its life-cycle within human host. It lives in the gut and produce larvae, which penetrate the gut wall and invade the tissues, setting up a cycle of auto-infection. Ivermectin is the treatment of choice for chronic *Strongyloides* infection. Albendazole is an alternative.

1.5.1.5 DRUGS FOR WHIPWORMS (TRICHURIASIS)

Although rarely causes serious complication heavy *Trichuris* burdens in children can lead to colitis, dysentery syndrome and rectal prolapse. Mebendazole and albendazole are the most effective drugs.

ALBENDAZOLE^[ED] [OTC]

Albendazole, a broad-spectrum benzimidazole carbamate has anthelmintic activity similar to that of mebendazole (see also under mebendazole) and is more effective against strongyloidiasis, cystic hydatid disease caused by *Echinococcus granulosus* and neurocysticercosis caused by larval forms of *Taenia solium*. Certain microsporidial species that cause intestinal infections in AIDS patients respond partially or completely. The drug also has some efficacy against anaerobic protozoa such as *Trichomonas vaginalis* and *Giardia lamblia*.

Indications: See under Dose

Cautions: liver disease; monitoring of liver function and for bone marrow toxicities required in prolonged use; in neurocysticercosis sought neurologist / neurosurgeon advice

Contra-indications: pregnancy

Interactions: See Appendix-2

Side-effects: Gastrointestinal disturbances, headache, dizziness, changes in liver enzymes

Dose: Oral: roundworm & hookworm infections: ADULT & CHILD > 2 years 400 mg as a single dose; threadworm infections 400 mg as a single dose for 3 days, repeated after 3 weeks if necessary; *echinococcus granulosus* (cystic hydatid disease): adjunct in surgical treatment: pre-surgery, 800 mg daily in divided doses for 28 days followed by 14 tablet-free days, cycle repeated once before surgery; post-surgery, 800 mg daily in divided doses for 28 days followed by 14 tablet-free days, cycle repeated once; as primary

treatment in inoperable cases, ADULT > 60 kg, 800 mg daily in divided doses for 28 days followed by 14 tablet-free days, may be given up to 3 cycles; for alveolar echinococcosis caused by *E. multilocularis*, above drug treatment needs to be continued for months or years; neurocysticercosis, ADULT > 60 kg 800 mg daily in 2 divided doses for 8-30 days, ADULT < 60 kg 15 mg/kg, max. 800 mg/d in 2 divided doses for 8-30 days; cutaneous larva migrans, 400 mg as a single dose; intestinal capillariasis, 200-400 mg twice daily for 10 days; trichinosis, 200-400 mg twice daily for 15 days; *Strongyloides stercoralis*, as an alternative to ivermectin, 400 mg twice daily for 3 days, repeated after 3 weeks if necessary

Proprietary Preparations

Aben(Team), 400 mg, Tab. Tk. 4.50/Tab.

Abentel(Aristo), Tab., 400mg, Tk. 5.00/Tab.

Adze(Kemiko), Tab., 400 mg, Tk. 4.01/Tab.

AH(Drug Intl), Susp., 200mg/5ml, 20.10/10ml, ; Tab., 400mg, Tk. 5.05/Tab.

Alarm(Decent), Tab., 400mg, Tk. 4.00/Tab.

AlbamaxDS(Ziska), Tab., 400 mg, Tk. 4.00/Tab.

Alben(Eskayef), Susp., 200mg/5 ml, Tk. 20.00/10ml.; Tab., 400 mg, Tk. 5.00/Tab.;

Albendol(Globex), Susp., 200mg/ 5 ml, Tk. 15.00/10ml Tab., 400mg, Tk. 3.50/Tab

Albezen(Zenith), 400 mg, Tab., Tk. 3.01/Tab.

Alda(Supreme), Susp., 200mg/ 5 ml, Tk. 15.00/10ml.; Tab., 400 mg, Tk. 4.00/Tab.

Aldex(G.A co), Susp., 200 mg/5ml, Tk. 15.05/10 ml.; Tab., 400 mg, Tk. 4.02/Tab.

AL-DS(Globe), Tab., 400 mg, Tk. 5.00/Tab.

Almex(Square), Susp., 200 mg/5 ml, Tk. 20/10ml.; Tab., 400 mg, Tk. 5.02/Tab.

Alphin(Beximco), Tab., 400mg, Tk. 5.00/Tab.

Alzed(General), Tab, 400mg, Tk. 3.32/Tab.

Anbendazole(Popular), Tab., 400mg, Tk. 4.01/Tab.

Asiben(Asiatic), Susp., 200mg/5ml, Tk. 14.00/10ml.; Tab., 400mg, Tk. 3.80/Tab.

Azole(Biopharma), Tab., 400mg, Tk. 4.02/Tab.;

Susp., 200mg/5ml, Tk. 18.00/10ml

Ben-A(Acme), Tab., 400.00 mg., Tk. 5.01/Tab.;

Susp., 200mg/5ml, Tk. 20.07/10ml

Benda(Bristol), Tab., 400mg, Tk. 175.00/Tab.

Benfast(Novo Healthcare), Tab., 200 mg, Tk. 2.00/Tab.;

400 mg, Tk. 4.00/Tab.

Chuben(Alco), Tab., 400 mg, Tk. 3.86/Tab.

Estazol(Ibn Sina), Susp., 200mg/5ml, Tk. 20.00/10ml.; Tab., Tk. 200.00/Tab.

1. ANTI-INFECTIVES

Helben(Modern), Tab., 400 mg., Tk. 5.00/Tab.
Parnil DS(Euro), Tab., 400mg, Tk. 5.00/Tab.
Sintel(ACI), Tab., 400mg, Tk. 5.02/Tab.;
 Tab.,(dispersible) 400mg, Tk. 6.02/Tab.;
 Susp., 200mg/5ml, Tk. 20.06/10ml,
Verben(Astra Bio), Susp., 200 mg/5 ml, Tk.
 15.00 /5ml.; Tab., 400 mg, Tk. 4.00/Tab.
Vermid(Somatec), Tab., 400 mg, Tk. 5.00/Tab.
Vermin DS(Nipa), Tab., 400 mg, Tk. 4.50/Tab.
Zoben(Amico), Tab., 400mg, TK. 4.50/Tab.;
 Susp., 200 mg/5 ml., TK. 20.00/10ml

LEVAMISOLE^[ED]

Indications: Ascariasis, hookworm and mixed ascariasis with hookworm infections, as an adjunct with fluorouracil after surgical resection in patients with Dukes stage C colon cancer

Cautions: Pregnancy, concomitant alcohol

Contra-indications: Severe liver and kidney disease, breast-feeding

Interactions: See Appendix-2

Side-effects: Abdominal pain, nausea, vomiting, headache, dizziness, disulfiram-like adverse effects when taken concomitantly with alcohol

Dose: Oral: ADULT & CHILD > 12 years 2.5 mg/kg, CHILD 5-12 years 80 mg and 1-4 years 40 mg as a single dose, in severe hookworm infection second dose in 3-7 day

Proprietary Preparations

Asitrax(Asiatic), Syrup, 40 mg/5ml, Tk.

12.00/30ml.; Tk. 8.00/15ml

Biotrex(Biopharma), Syrup, 40 mg/5ml, Tk. 15.00/30ml

Etrax(ACI), Syrup, 40mg/5ml, Tk. 24.07/30ml.; Tab., 40mg, Tk. 1.00/Tab.

Helmisole(G.A.Co), Syrup, 40 mg/5ml, Tk. 15.05/30 ml.; Tab., 40 mg, Tk. 0.41/Tab.

Neotrax(Acme), Syrup, 40 mg/5ml, Tk. 24.00/30ml.; Tk. 70.47/460ml.; Tab., 40mg, Tk. 0.43/Tab.

Vermicom(Opsonin), Syrup, Tk. 9.28/ 30 ml

MEBENDAZOLE^[ED] [OTC]

Indications: See under Dose

Cautions: Pregnancy, lactation

Interactions: See Appendix -2

Side-effects: Rarely abdominal pain, diarrhea; rarely hepatitis, convulsions, dizziness, neutropenia, urticaria, alopecia, rash including Stevens-

Johnson syndrome and toxic epidermal necrolysis

Dose: Oral: pinworms/ threadworms (enterobiasis), ADULT & CHILD >6 months, 100 mg as a single dose; repeat dose at 2 and 4 weeks if necessary; roundworm (Ascaris lumbricoides), hookworm (Ankylostoma duodenale, Necator americanus), whipworm (Trichuris trichiura) and Trichostrongylus infections, ADULT & CHILD > 2 years, 100 mg twice daily for 3 days or 500 mg as a single dose, may be repeated in 2-3 weeks, CHILD < 2 years single dose administration not allowed; intestinal capillariasis, 400 mg/d in divided doses for 21 or more days; trichinosis, 600 mg initially, increasing stepwise over 3 days to 1200-1500 mg daily in 3 divided doses for 10 days

Proprietary Preparations

Bendex(G.A.Co), Tab., 100 mg, Tk. 1.15/Tab.; 500 mg, Tk. 3.50/Tab.

Misole(Albion), Susp., 100 mg/5 ml, Tk. 14.83/30ml

Panamox(Jayson), Tab., 100 mg, Tk. 0.74/Tab.; Susp., 100 mg/5 ml, Tk. 14.75/30 ml

Solas(Opsonin), Tab. 100 mg, Tk. 1.15/Tab.; Susp. 100 mg/5ml, Tk. 18.25/ 30 ml

Vermizol(Zenith), Tab. 100 mg, Tk. 0.74/Tab.

PYRANTEL PAMOATE

Indications: Roundworm (Ascaris lumbricoides), pinworm (Enterobius vermicularis), hookworm (Ankylostoma duodenale), trichostrongyliasis and trichinosis infections

Cautions: Impaired liver function, pregnancy, lactation

Interactions: See Appendix -2

Side-effects: Anorexia, nausea, vomiting, abdominal pain, headache, dizziness, drowsiness, insomnia, rashes and raised SGOT levels

Dose: Oral: 10 mg/kg in a single dose (for hookworm same dose is repeated on 3 successive days and for trichinosis treatment for 5 days)

Proprietary Preparations

Delentin(Renata), Susp., 50mg/ml, Tk. 16.05/10 ml

Melphin(Beximco), Susp., 50mg/ml, Tk. 16.00/10 ml

1. ANTI-INFECTIVES

Minisol(Albion), Susp., 50 mg/ml, Tk. 12.00/30 ml

1.5.1.6 DRUGS FOR LYMPHATIC FILARIASIS (WUCHERIA INFECTIONS)

In lymphatic filariasis (LF) host reaction to the adult worm initially causes lymphatic inflammation that can progress through stages of lymphatic obstruction and secondary attacks of bacterial cellulitis leading to lymphedema manifested by hydrocele and elephantiasis. Global program recommends that all at-risk individuals be treated once yearly orally with two drug combination: **Diethylcarbamazine** (DEC) and **Albendazole** (most countries) or DEC and ivermectin (parts of sub-Saharan Africa, Yemen).

DIETHYL CARBAMAZINE^[ED]

Indications: Lymphatic filariasis, treatment and prophylaxis of loiasis in temporary residents in endemic areas, visceral larva migrans

Cautions: in heavy infections there may be febrile reaction, and in heavy *Loa loa* infection there is a small risk of encephalopathy, in such case treatment must be given under careful in-patient supervision and stopped at the first sign of cerebral involvement; renal impairment requires dose reduction, cardiac disorders

Contra-indications: Pregnancy, infants, elderly, debilitated patients

Interactions: See Appendix -2

Side-effects: Fever, headache, anorexia, malaise, urticaria, vomiting, asthmatic attacks following the first dose are due to products of destruction of the parasite, microencephalitis, reversible proteinuria

Dose: Oral: 1 mg/kg on the first day, then increased gradually > 3 days to 6 mg/kg daily in divided doses and maintained for 21 days; *loiasis prophylaxis*, 300 mg weekly for as long as exposure occurs

Proprietary Preparation

Carbamazine(Amico), Tab., 100mg, Tk. 1.30/Tab.

Filazine(Hudson), Tab. 100 mg, Tk. 1.30/Tab.

Lafil(Supreme), Tab, 100mg, Tk. 1.00/Tab.

IVERMECTIN

It has efficacy in ascariasis, stroglyoidosis, cutaneous larva migrans and lymphatic filariasis. Pinworm and whipworm infections are variably responsive and hookworm infection is unresponsive.

Indications: See under Dose

Cautions, Contra-indications: Pregnancy; mass treatment withheld from pregnant women, children < 15 kg body weight and in the seriously ill

Interactions: See Appendix -2

Side-effects: In LF therapy, Mazzotti-like reaction to dying microfilariae: usually mild itching and swollen, tender lymph nodes; rarely, rarely abdominal pain, diarrhea; rarely severe reactions including high fever, tachycardia, hypotension, prostration, dizziness, headache, arthralgia, myalgia, diarrhea, edema and in patients with high parasite burdens, encephalopathies; mild ocular irritation, somnolence, transient eosinophilia, raised liver enzymes also are reported

Dose: Oral: control of LF (in combination with albendazole 400 mg), 200 micrograms/kg as a single annual dose for at least 5 years; *treatment of: onchocerciasis (O. volvulus), ascariasis, trichuriasis, enterobiasis, stroglyoidiasis, ADULT & CHILD ≥ 5 years*, 150-200 microgm/kg, single dose; *cutaneous larva migrans*, 200 micrograms/kg single dose; *treatment of hyperkeratotic scabies*, 200 micrograms/kg in combination with topical drugs

Proprietary Preparations

Ivactin(Aristo), Tab., 3mg, Tk. 6.00/Tab.

Scabo(Delta), Tab., 6 mg, Tk. 5.00/Tab.

1.5.2 DRUGS FOR CESTODE INFECTIONS

1. ANTI-INFECTIVES

1.5.2.1 DRUGS FOR TAPEWORMS (TAENIASIS: BEEF AND PORK TAPEWORMS)

1.5.2.2 DRUGS FOR HYDATID DISEASE

1.5.2.1 DRUGS FOR TAPEWORMS

Beef tapeworm (*Taenia saginata*) rarely produces serious infection and is preventable by cooking beef at 60° C for > 5 minutes. Praziquantel is the first choice whereas niclosamide stands next. *Taenia solium* or pork tapeworm causes two types of infections: the intestinal form caused by the adult worm and the far more dangerous systemic form of cysticercosis, which usually co-exist, caused by the invasive larval form of the parasite. Invasion of the brain is common and dangerous: epilepsy, meningitis and raised intracranial pressure may ensue. **Albendazole** is choice of treatment for cysticercosis (treatment of neurocysticercosis demands supports of neurologist/neurosurgeon), and niclosamide is preferred for intestinal infection.

1.5.2.2 DRUGS FOR HYDATID DISEASE (ECHINOCOCCOSIS)

Echinococcus granulosus produces unilocular, slowly growing cyst usually in liver and lung whereas *E. multilocularis* causes multilocular invasive cysts also in the same organs. The disease may remain asymptomatic: cysts are frequently found on routine chest X-rays. Rupture of a cyst is associated with formation of localized or generalized secondary echinococcosis. Asymptomatic patients do not always require treatment. Surgical treatment remains the method of choice in many situations. Albendazole is used in conjunction with surgery to reduce the risk of recurrence or as primary treatment in inoperable cases. Alveolar echinococcosis due to *E. multilocularis* is usually fatal if untreated. Surgical removal with albendazole cover is the treatment of choice, but where effective surgery is impossible, repeated cycles of albendazole (for a year or more) may help. Careful monitoring of liver function is particularly important during drug treatment

1.6 ANTIMICROBIAL OPTIONS FOR MEDICALLY IMPORTANT ORGANISMS

Organism	Category of isolates	Name of antibiotic
<i>Staphylococcus aureus</i>	Penicillin sensitive isolates	Penicillin G Amoxicillin Cephalexin
	Penicillin resistant isolates	Cloxacillin Flucloxacillin Clindamycin Erythromycin
	MRSA	Clindamycin Vancomycin Linezolid Daptomycin Tetracycline Cotrimoxazole
	D test positive (clindamycin resistance)	Cloxacillin Flucloxacillin Vancomycin (according to c/s)

1. ANTI-INFECTIVES

<i>Staphylococcus epidermidis</i>	Penicillin sensitive isolates	Penicillin G Amoxicillin Cephalexin
	MRSE	Vancomycin plus aminoglycoside
<i>Streptococcus pyogenes</i> (Group A)	All isolates are penicillin sensitive	Penicillin G Amoxicillin Ampicillin
<i>Streptococcus agalactiae</i> (Group B)		Penicillin G Ampicillin
<i>Enterococcus faecalis</i>	Penicillin sensitive	Penicillin Ampicillin
	High level gentamycin resistant (HLGRE)	Penicillin plus aminoglycoside or Vancomycin plus aminoglycoside
	Vancomycin resistant	Linezolid Quinopristin-dalfopristin daptomycin
<i>Streptococcus pneumoniae</i>	Penicillin sensitive strain	Penicillin G Erythromycin
	Penicillin resistant strain	Ceftriaxone Levofloxacin Vancomycin
<i>Streptococci viridians group</i>		Penicillin G with or without aminoglycosides
<i>Neisseria meningitidis</i>		Penicillin G Ceftriaxone/cefotaxime Chloramphenical
<i>Neisseria gonorrhoeae</i>	Penicillin sensitive	Cefixime Ceftriaxone Spectinomycin
<i>Neisseria gonorrhoeae</i>	Penicillin resistant (PPNG)	Ciprofloxacin
	Quinolone resistant	Spectinomycin
<i>Bacillus anthracis</i>		Penicillin G
<i>Corynebacterium diphtheriae</i>		Penicillin G Erythromycin
<i>Listeria monocytogenes</i>		Cotrimoxazole Ampicillin with or without gentamycin
<i>Escherichia coli</i>	Non beta lactamase	Ampicillin Amoxyclav Cephalosporin Cotrimoxazole

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	ESBLs	Aminoglycoside Carbapenem Cotrimoxazole Nitrofurantoin (UTI) Ciprofloxacin Tigecycline Piperacillin-Tazobactam (choice according to c/s report)
<i>Salmonella typhi</i>	Nalidixic acid sensitive	Quinolone Ampicillin Azithromycin
	Nalidixic acid resistant	Ceftriaxone Cefixime Azithromycin (choice according to c/s)
<i>Shigella sp.</i>		Ciprofloxacin
<i>Vibrio cholerae</i>		Tetracycline
<i>Haemophilus spp</i>		Amoxicillin, Co-amoxiclav Cephalosporin, Ciprofloxacin, Macrolid
<i>Helicobacter pylori</i>		Amoxicillin Metronidazole Bismuth
<i>Campylobacter jejuni</i>		Erythromycin
<i>Klebsiella spp</i> <i>Enterobacter spp</i> <i>Serratia spp</i> <i>Proteus spp</i> <i>Morganella spp</i> <i>Providenciaspp</i>	Non beta lactamase	Cephalosporins Aminoglycosides Quinolones
<i>Klebsiella spp</i> <i>Enterobacter spp</i> <i>Serratia spp</i> <i>Proteus sp</i> <i>Morganella spp</i> <i>Providenciaspp</i>	ESBLs	Aminoglycoside Carbapenem Cotrimoxazole Nitrofurantoin (UTI) Quinolones (choice according to c/s report)
<i>Pseudomonas aeruginosa</i>		Piperacillin-tazobactam Ceftazidime, cefepime Quinolones Carbapenem Aztreonam (choice according to c/s report)
<i>Burkholderia pseudomallei</i>		Ceftazidime Carbapenem Cotrimoxazole Amoxycylav
<i>Leginella</i>		Azithromycin, Levofloxacin, doxycycline

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<i>Chlamydia trachomatis</i>		Azythromycin, doxycycline
<i>Rickettsia</i>		Tetracycline
<i>Treponema pallidum</i>		Penicillin, Doxycyclin
<i>Nocardia</i>		Cotrimoxazole
<i>Mycoplasma</i>		Erythromycin, Tetracyclin
<i>Bacteroides</i>		Metronidazole, Coamoxyclav Clindamycin Carbapenem
<i>Clostridium tetani</i>		Penicillin
<i>Clostridium difficile</i>		Metronidazole Vancomycin
<i>Actinomyces</i>		PenicillinG
<i>Herpes Simplex Virus</i>		Acyclovir
<i>Varicella Zoster Virus</i>		No antiviral therapy needed
<i>Cytomegalovirus</i>		Gancyclovir
<i>Human papilloma virus</i>		Podophyllin Liquid Nitrogen Alpha interferon
<i>Influenza virus</i>		Oseltamivir Zanamivir
<i>Hepatitis B virus</i>		Pegylated α -IFN Lumivudin
<i>Hepatitis C virus</i>		Pegylated α -IFN Plus ribavirin
<i>HIV virus</i>		Zidovudin Lamivudin Nevirapine Indinavir
<i>Dermatophytes</i>		Miconazole Clotrimazole
<i>Histoplasma capsulatum</i>		Itraconazole Amphotericin B
<i>Coccidioides immitis</i>		Itraconazole Amphotericin B
<i>Blastomyces dermatitidis</i>		Itraconazole
<i>Candida albicans</i>		Topical nystatin or clotrimazole Fluconazole Ketoconazole Amphotericin B
<i>Cryptococcus neoformans</i>		Amphotericin B plus flucytosine
<i>Aspergillus sp</i>		Amphotericin B
<i>Mucor & Rhizopus sp</i>		Amphotericin B
<i>Entamoeba histolytica</i>		Metronidazole Tinidazole Ornidazole

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		Secnidazole Diloxanide furate
<i>Giardia lamblia</i>		Metronidazole Nitoxoxanide
<i>Trichomonas vaginalis</i>		Metronidazole
<i>Plasmodium sp.</i>	Chloroquine sensitive strain	Chloroquine phosphate
	Chloroquine resistant strain	Artemether Artemether with lumefantrine Artesunate Quinine Mefloquine
<i>Toxoplasma gondii</i>		Sulfadiazine plus pyrimethamine
<i>Pneumocystis jiroveci</i>		Cotrimoxazole
<i>Leishmania donovani</i>		Sodium stibogluconate Liposomal Amphotericin B Miltefosin
<i>Echinococcus</i>		Albendazole
<i>Taenia sp</i>		Praziquantel
<i>Schistosoma</i>		Praziquantel
<i>Ascaris lumbricoides</i>		Mebendazole Pyrantel pamoat
		Mebendazole Pyrantel pamoat
<i>Hook worm</i>		Mebendazole Pyrantel pamoat
<i>Pinworm</i>		Mebendazole Pyrantel pamoat
<i>Strongyloides stercoralis</i>		Ivermectin
<i>Trichuris trichiura</i>		Mebendazole
<i>Wuchereria bancrofti</i>		Diethylcarbamazine
<i>Dracunculus medinensis</i>		Thiabendazole Metronidazole
<i>Onchocerca volvulus</i>		Ivermectin

Chapter 2

GASTRO-INTESTINAL SYSTEM

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2.1 DRUGS FOR DISPEPSIA AND GASTRO-OESOPHEGAL REFLUX

Pregnant woman with gastro-oesophageal reflux is managed by dietary and lifestyle changes; if no improvement of symptoms, an antacid (section 2.1.1) or an alginate may be given. If this is ineffective, ranitidine (section 2.3.1) may be advised. However, omeprazole (section 2.3.3) is reserved for women with severe or complicated reflux disease. Domperidone can be added with caution.

Children with gastro-oesophageal reflux disease is common in infancy. However, most symptoms resolve without treatment between 12 and 18 months of age. Infants with mild or moderate reflux

without complications can be managed initially by changing the frequency and volume of feed. A thickened formula feed can be used upon advice of a dietitian. If necessary, a suitable alginate-containing preparation can be used instead of thickened feeds. Older children with reflux may be managed by life-style changes; if necessary by treatment with an alginate-containing preparation.

Non-responsive children to the above measures or who have problems such as respiratory disorders or suspected oesophagitis need to be referred to hospital; an H₂-receptor antagonist (section 2.3.1) may be tried to reduce acid secretion. If the oesophagitis is resistant to H₂-receptor antagonists, the proton pump inhibitor

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omeprazole(section 2.3.3) can be advised.

Hepatic and renal impairment: Patients with fluid retention should avoid antacids containing large amounts of sodium.

Interactions: Antacids should preferably not be taken at the same time as other drugs since they may impair absorption. It may also damage enteric coatings designed to prevent dissolution in the stomach.

2.1.1 ALUMINIUM-AND MAGNESIUM-CONTAINING ANTACIDS

2.1.2 COMPOUND ANTACID PREPARATIONS

Antacids are basic compounds, which neutralize hydrochloric acid in the gastric secretions; they often relieve symptoms of gastrointestinal disorders associated with gastric hyperacidity such as ulcer dyspepsia, non-erosive gastro-oesophageal reflux disease and peptic ulcer. Antacids, sometimes also used in functional (non-ulcer) dyspepsia but the evidence of benefit is uncertain. They are best given usually between meals and at bedtime when symptoms occur or are expected. Liquid preparations are more effective than solids and relatively insoluble antacids are longer acting. Presence of foods in the stomach can prolong the neutralizing activity. Antacids may interact with many other drugs affecting the rate and extent of their absorption (see Appendix-2). For this reason, antacids should preferably not be taken at the same time with other drugs.

2.1.1 ALUMINIUM AND MAGNESIUM CONTAINING ANTACIDS

Salts of Aluminium (**Aluminium hydroxide gel**) and Magnesium (**Magnesium hydroxide, Magnesium trisilicate and Magnesium carbonate**), being relatively insoluble in water, are long-acting and are suitable for use as antacid. Magnesium-containing antacids tend to cause diarrhoea and aluminium

salts cause constipation; so mixtures of these two preserve normal bowel function. Some of these preparations contain high concentration of sodium and should not be given to patients on sodium restricted diet.

PREPARATIONS CONTAINING MIXTURES OF ALUMINIUM HYDROXIDE AND MAGNESIUM HYDROXIDE^{[ED][OTC]}

Proprietary Preparations

Alimag(*Asiatic*), Tab. Tk. 0.52/Tab.
Alucil-S(*Opsonin*), Susp.Tk. 56.39/200ml Tab.Tk. 1.50/Tab.
Antacid(*Popular*), Tab. Tk. 0.53/Tab.
Antameal(*Alco*), Tab. Tk. 0.50/Tab.
Antanil(*Ibn Sina*), Susp.Tk. 33/200 ml Tab. Tk. 0.52/Tab.
Apcocid(*Supreme*), Tab. Tk. 0.50/Tab.
Apedrox(*APC*), Susp. Tk. 30/200ml
Biocid(*Biopharma*), Tab. Tk. 0.50/Tab.
Biocid MH(*Biopharma*), Susp.Tk.32.42/200 ml
Cytocid(*Central*), Susp. Tk.32/200 ml
Entacyd(*Square*), Susp. Tk. 55/200 ml Tab. Tk. 0.80/Tab.
G-Antacid MH(*Gonoshasthaya*), Tab. Tk.0.53/Tab
Gascon(*Popular*), Tab. Tk. 1.20/Tab.
Jpdrox(*Jayson*), Susp. Tk. 57/200 ml; Tab. Tk. 0.73/Tab.
Lactameal(*Beximco*), Tab. Tk. 0.53/Tab.; Susp. Tk. 33.00/200 ml
Magnogel(*Amico*), Tab. Tk. 0.52/Tab.; Susp. Tk.32.00/200 ml
Oxecone(*Acme*), Susp.Tk. 57.33/200 ml; Tab. Tk. 0.73/Tab.
Sugel(*Pacific*), Susp. Tk. 24.06/200 ml; Tab. Tk. 0.38/Tab.

MAGNESIUM TRISILICATE

Indications: used as an antacid in dose upto 2 g by mouth; usually in combination with aluminium-containing antacids.

Cautions: see notes above; patients with impaired renal functions.

Contraindications: see notes above

Interactions: see Appendix-2

Side-effects: diarrhoea.

Proprietary Preparation

Mixtures of 250mg of Dried Aluminium Hydroxide Gel and 500mg of Magnesium Trisilicate

G-Antacid(*Gonoshasthaya*), Susp.
Tk.32.00/200ml;Tab. Tk. 0.53/Tab.

2.1.2 COMPOUND ANTACID, SIMETHICONE AND ALGINATE PREPARATIONS

Compound preparations have no clear advantages over simpler preparations; their neutralising capacity may be the same. Complexes containing both aluminium and magnesium such as **magaldrate** and **almasilate** have been used.

MAGALDRATE

Magaldrate (Aluminium Magnesium Hydroxide Sulfate) is a synthetic combination of aluminium and magnesium hydroxides and sulphates. It reacts initially rapidly with acid and releases aluminium hydroxide, which then reacts more slowly to provide sustained neutralizing action. Magaldrate may be given in doses of up to 2 g by mouth.

Proprietary Preparations

Marlox(*Incepta*), Tab. , 400 mg, Tk. 1.00/Tab.; Susp. 400 mg/5 ml, Tk. 50.00/200 ml
Oxecone(*Acme*), Susp. 400 mg/5 ml, Tk. 54.36/200ml; Tab. , 400 mg , Tk. 1.00/Tab.
Magacil(*Opsonin*), Tab., 400 mg, Tk. 0.75/Tab.; Susp., 400 mg/5 ml , Tk. 37.74/200ml
Magaplus(*Kemiko*), Susp., 400 mg/5 ml, Tk. 54.20/200 ml

Magaldrate 480mg + Simethicone 20mg/Tab
Magaldrate 480mg + Simethicone 20mg/5ml suspension

Avlocid MS(*ACI*), Tab., , Tk. 3.00/Tab.; Susp., Tk. 100.00/200 ml
Digecid Plus(*Beximco*), Tk. 2.00/Tab.; Susp., Tk. 110.00/200 ml
Gastid(*Eskayef*), Tab., Tk. 3.00/Tab.; Susp., Tk. 100.00/200 ml
Magacil Plus(*Opsonin*), Susp. Tk. 75.19/200ml
Magalrat Plus(*Ibn Sina*), Tab., Tk. 3.00/Tab.; Susp., Tk. 100.00/200 ml
Maganta Plus(*Square*), Tab., Tk. 3.00/Tab.; Susp., Tk. 100.00/200 ml
Magaplus-X(*Kemiko*), Susp. Tk. 55.00/100 ml; Tk. 100.00/200 ml

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Marlox Plus(*Incepta*), Tab. Tk. 3.00/Tab.; Susp., Tk. 100.00/200 ml
Novelta(*Orion*), Tab. Tk. 3.00/Tab.; Tk. 65.00/100 ml; Tk. 100.00/200 ml
Oxecone-MS(*Acme*), Susp. Tk. 100.00/200 ml

ALUMINIUM -AND MAGNESIUM- CONTAINING ANTACIDS WITH ADDITIONAL INGREDIENTS

Simethicone which acts as a defoaming agent has been combined with an antacid formulation to relieve flatulence.

ALGINATES

Alginate an anionic polysaccharide is obtained from brown algae. Alginates containing antacids form a viscous gel (raft) that floats on the surface of stomach contents which impedes reflux and protects oesophageal mucosa from acid attack. Compound antacid preparations contain alginic acid or sodium alginates with sodium bicarbonate/potassium bicarbonate, calcium carbonate. Some compounds preparations also contain alginate/alginic acid with dried aluminium hydroxide, magnesium trisilicate and sodium bicarbonate.

Proprietary Preparations

Sodium Alginate + Potassium Bicarbonate
Algicid(*Incepta*), Susp., 500 mg + 100 mg /5ml, Tk. 125.00/200 ml ;Tab. , 500 mg + 100 mg, Tk. 3.50/Tab.
Algicon(*Leon*), Tab. , 500 mg + 100 mg, Tk. 3.00/Tab. ;Susp., 500 mg + 100 mg /5ml, Tk. 125.00/200 ml
Asynta(*Square*), Susp., 500 mg + 100 mg/5 ml, Tk. 125.00/200 ml
Gastrocon(*Unimed*), Tab., 500 mg+100 mg, Tk. 4.50/Tab.; Susp., 500mg+100 mg/5ml, Tk. 155.00/200 ml
Viscoid(*Beximco*), Susp. 500 mg+100 mg /5ml, Tk. 150.00/200 ml

SIMETHICONE

(Activated Dimethicone)

Simethicone which is also known as Activated Dimethicone has been used for the relief of the painful symptoms of excess gas in the digestive tract. Such gas is frequently caused by excessive

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swallowing of air while eating foods that disagree, and this may also lead to indigestion. It has also been used in infantile colic but evidence of benefit is uncertain.

Indications: flatulence, Abdominal distension, gas and windy colic. Simethicone drops are particularly indicated in infantile colic

Cautions; Contraindications; Side-effects: Simethicone is an inert substance and no adverse effects have been reported after oral administration

Proprietary Preparations

Aeropac(Amico), Paed. drops, 67 mg/ml, Tk. 25.00/15 ml
Bloatstop(Acme), Emulsion, 1 gm/100 ml, Tk. 70.00/100 ml
Flacol(Square), Paed. drops, 67 mg/ml, Tk. 30.11/15 ml; Tab., 40mg, Tk.1.50/Tab.
Fiatulex(Opsonin), Paed. drops, 67 mg/ml, 67 mg/ml, Tk. 22.64/15 ml
Flatunil(Acme), Paed. drops, 67 mg/ml, 67 mg/ml, Tk. 30.00/15 ml
Gasnil(Eskayef), Paed. drops 67 mg/ml, Tk. 30.00/15 ml
Lefoam(Incepta), Paed. drops, 67 mg/ml, Tk. 30.00/15 ml
Neodrop(Beximco), Paed. drops, 67 mg/ml, Tk. 30.00/15 ml
Pedicon(Orion), Paed. drops, 67 mg/ml, Tk. 25.09/10 ml; Paed. drops, 67 mg/ml, Tk. 30.11/15 ml
Semecon(Drug Int.), Paed. drops, 67 mg/ml, Tk. 35.00/15 ml
Simecol(Alco), Paed. drops, 67 mg/ml, Tk. 28.00/15 ml
Simet(ACI), Paed. drops, 67 mg/ml, Tk. 30.11/15 ml

Aluminium hydroxide and magnesium hydroxide with simethicone

Antacid MAX(Beximco), Tab. Tk. 2/Tab.
Antanil Plus(Ibn Sina), Susp.Tk. 65/200 ml; Tab., Tk. 1.50/Tab.
Avlocid Plus(ACI), Tab. Tk. 2/Tab. ;Susp., Tk. 75/200 ml
Blocid Plus(Biopharma), Susp. Tk. 75/200ml; Tab. Tk. 2/Tab.
Entacyd Plus(Square), Susp.Tk. 75/200 ml; Tab. Tk. 2.00/Tab.
Flatameal DS(Beximco), Susp. Tk. 75/200 ml
Kdrox Plus(Kemiko), Tab. Tk. 2/Tab.
Makcid Plus(Maks), Susp. Tk. 64/200 ml
Oxecone-S(Acme), Susp.Tk. 75/200 ml; Tab., Tk. 2.00/Tab.
Peptacid(Amico), Tab., Tk.1/Tab., Tk.55/200 ml
Recocid Plus(Rephco), Susp., Tk. 75/200 ml; Tab. Tk. 2/Tab.

2.2 ANTISPASMODICS AND OTHER DRUGS ALTERING GUT MOTILITY

Gastrointestinal pain and discomfort may be due to spasm of the smooth muscles which may be associated with dyspepsia irritable bowel syndrome or diverticular disease. Antispasmodic drugs may be useful as adjunctive treatment and are of two types: a) antimuscarinics; and b) direct smooth muscle relaxant.

ANTIMUSCARINICS

(See also section 8.1.2)

The antimuscarinics reduce intestinal spasm, motility and gastric secretions, and may be useful in some forms of dyspepsia, irritable bowel syndrome and diverticular disease. Antimuscarinics used in gastrointestinal muscle spasm include the tertiary amines **Atropine sulphate**, **Dicycloverine hydrochloride** and **Oxyphenycyclimine hydrochloride**. **Trimebutine** is a drug with antimuscarinic and opioid agonist effects. Quaternary ammonium compounds **Hyoscine butylbromide**, **Propantheline bromide**, **oxyphenonium bromide**, and **Tiemonium methylsulphate**.

Dicycloverine hydrochloride has much less antimuscarinic action than atropine and may also have some direct action on smooth muscle. Hyoscine butylbromide is advised as a gastro-intestinal antispasmodic, but it is poorly absorbed. Quaternary ammonium compounds are less lipid soluble and so are less likely to cross the blood-brain barrier; they are also less well absorbed. Although central atropine like side-effects, such as confusion, are thereby reduced, peripheral atropine-like side-effects still remain common. The elderly are particularly susceptible to glaucoma and urinary retention.

Antimuscarinics are contraindicated in myasthenia gravis (but may be used to decrease muscarinic side-effects of anticholinesterases), pyloric stenosis, paralytic ileus, toxic megacolon, and prostatic enlargement. It should be used

with caution in children and in the elderly; in Down's syndrome, reflux oesophagitis, diarrhoea, conditions associated with cardiac insufficiency and tachycardia, hypertension, ulcerative colitis, autonomic neuropathy, acute myocardial infarction, pyrexia, individuals susceptible to angle-closure glaucoma.

Side-effects of antimuscarinic drug (especially with high doses) include constipation, transient bradycardia (followed by tachycardia, palpitations and arrhythmias), reduced bronchial secretions, urinary retention, dilatation of the pupils with loss of accommodation, photophobia, dryness of the mouth and skin, occasional confusion (particularly in the elderly), nausea, vomiting and giddiness.

ATROPINE SULPHATE^[ED]

Indications: Aid in peptic ulcer treatment, gastrointestinal spasm, renal and biliary colic, pre-medication (see sec. 8.1.3)

Cautions; Contraindications; Side-effects: See notes above

Interactions: See Appendix-2

Dose: See section 8.1.2

Proprietary Preparations

Atropine(Chemist), Inj., 1mg/ml, Tk. 2.52/1ml Amp

Atropine-Jayson(Jayson), Inj. 0.6 mg/1ml, Tk. 5.00/1 ml Amp.

G-Atropine(Gonoshasthaya), Inj. 0.6 mg/1ml, Tk. 3.01/1ml Amp.

DICYCLOVERINE HYDROCHLORIDE (Dicyclomine hydrochloride)

Indications: Symptomatic relief of gastro-intestinal disorders characterised by smooth muscle spasm

Side effects: See notes above

Cautions: See notes above

Contra-indications: See notes above; also infants under 6 months

Pregnancy: Use only if essential

Breast-feeding: Should be avoided, present in milk; apnoea reported in infant

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Dose: 10–20 mg 3 times daily; INFANT 6–24 months 5–10mg 3–4 times daily, 15 minutes before feeds;

CHILD 2–12 years 10mg 3 times daily

Proprietary Preparations

Abdorin(Opsonin), Syrup, 10 mg /5 ml, Tk. 30.11/50 ml.; Tab., 10 mg, Tk. 2.01/Tab.

Colicon(Square), Syrup, 10 mg/5 ml, Tk. 30.2/50ml.; Tab., 10 mg, Tk. 2.01/Tab.

Cyclopan(Incepta), Inj., 20 mg/2 ml, Tk. 8.00/2ml.; Syrup, 10 mg/5 ml, Tk. 30.00/50ml.; Tab., 10 mg, Tk. 2.00/Tab.

Dirin(Alco), Tab., 10 mg, Tk. 2.01/Tab.;

Syrup, 10 mg / 5ml, Tk. 40.12/50ml

Diverin(ACI), Syrup, 10mg/5ml, Tk. 30.2/50ml.; Tab., 10mg, Tk. 2.02/Tab.; 20mg, Tk. 3.52/Tab.

Ibspa(Pacfic), Tab., 10mg/5 ml, Tk.

25.00/50ml.; 10 mg, Tk. 2.00/Tab.

Loverin(Beximco), Tab., 10mg, Tk. 2.01/Tab.

Robentyl(Healthcare), Syrup, 50ml, Tk.

40.00/Syrup.; 10mg, Tk. 200.00/Tab.

Cyclovin(Somatec), Tab., 10 mg, Tk.

2.01/Tab.; 10 mg/5 ml, Tk. 30.11/50 ml

Eraspa(MST), Tab. 10 mg, Tk. 2/Tab.

Spalax(Navana), Syrup, 10 mg/5 ml, Tk.

30.11/50 ml

HYOSCINE BUTYLBROMIDE^[ED]

Indications: symptomatic relief of gastro-intestinal, biliary or genitourinary colic (spasmodic pain) and irritable bowel syndrome; dysmenorrhoea; as antispasmodic in endoscopy and radiological procedures of gut; as an adjunct in the treatment of peptic ulcer..

Cautions; Contraindications; Side-effects: see notes above

Interactions: see Appendix-2

Dose: by mouth, 10-20 mg 4 times daily; CHILD 6-12 years, 10 mg 3 times daily.

By intramuscular or intravenous injection (acute spasm), 20 mg, repeated after 30 minutes if necessary. CHILD not recommended

Proprietary Preparations

Asipan(Asiatic), Tab., 20mg, Tk. 3.00/Tab.

Buscon(Ibn Sina), Tab., 10 mg, Tk.

3.00/Tab.; Inj., 20mg/ml, Tk. 29.50/ml Amp

Butapan(Sanofi), Tab., 10mg, Tk. 6.90/Tab.;

20mg, Tk. 13.64/Tab.

Colik(ACI), Tab., 10mg, Tk. 6.90/Tab.; 20mg,

Tk. 6.72/Tab., Inj., 20 mg/ml, Tk. 29.90/Amp,

Eziride(Opsonin), Tab. 150 mcg, Tk.

5.00/Tab.

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Hybucin(Supreme), Tab. 10 mg, Tk. 3.40/Tab.
Hybut(Amico), Tab., 10mg, Tk. 3.43/Tab.
Hysomide(Opsonin), Inj., 20 mg/ml, Tk. 29.90/Amp.; Tab. , 10 mg, Tk. 6.90/Tab.; 20 mg , Tk. 13.64/Tab.
Spanil(Beximco), Tab., 10mg, Tk. 6.90/Tab.
Spasmozen (Zenith), Tab. 10 mg , Tk. 3.44/Tab.
Typan(Astra Biopharma), Tab. , 10 mg, Tk. 3.43/Tab.
Altapan(Albion), Tab., 10 mg, Tk.1.80/Tab.
Asipan(Asiatic), Tab., 20 mg, Tk. 3.00/Tab.
Butapan(Sanofi), Tab., 10 mg, Tk. 3.42/Tab.; 20 mg, Tk. 6.00/Tab.;Inj., 20 mg/ml , Tk.7.89/Amp.
Butason(Hudson), Tab., 10mg, Tk.1.75/Tab.
Colipan(Medime), Inj., 1 mg/ml, Tk.7.85/1 ml Amp.; Tab., 10mg, Tk.3.00/Tab.; 20mg, Tk.5.65/Tab.
G-Hyoscine(Gonoshasthaya), Tab. 10 mg, Tk.3.35/Tab.; Inj., 20 mg/ml, Tk.7.75/Amp.
Spasmoson(Jayson), Tab., 10 mg, Tk. 3.40/Tab.; Inj., 20 mg/ml, Tk. 7.88/Amp.

OXYPHENONIUM BROMIDE

Indications: symptomatic relief of gastro-intestinal, biliary or genitourinary colic; as an adjunct in the treatment of peptic ulcer.

Cautions; Contraindications; Side-effects:see notes above

Interactions: see Appendix-2

Dose:by mouth, 5-10 mg 3 times daily

Proprietary Preparations

Antrenex(Opsonin), Tab., 5 mg, Tk. 1.25/Tab.
Antrenyl(Novartis), Tab., 5 mg, Tk. 4.00/Tab.
A-Spasm(Acme), Tab., 5 mg, Tk. 1.44/Tab.
Isonil(Amico), Tab., 5 mg, Tk. 1.41/Tab.

PROPANTHELINE BROMIDE

Indications: symptomatic relief of gastrointestinal colic, as an adjunct in the treatment of peptic ulcer; adult enuresis and urinary incontinence

Cautions; Contra indications; Side-effects: see notes above

Interactions: see Appendix-2

Dose: 15 mg 3 times daily 1 hour before meals and 30 mg at night, max. 120mg daily CHILD not recommended

Proprietary Preparation

Prokind(Beacon), Tab. 15 mg, Tk. 8.02/Tab.

TIEMONIUM METHYLSULPHATE

Indications: symptomatic relief of gastrointestinal, biliary, renal and genitourinary colic

Cautions;Contraindications; Side-effects: see notes above.

Interactions: see Appendix-2

Dose:by mouth 100-300 mg daily in divided doses; by intramuscular or slow intravenous injection, 10 mg 2-3 times daily

Proprietary Preparations

Algin(Renata), Inj., 5 mg/2 ml, Tk. 25.00/2 ml Amp., Tab. , 50 mg, Tk. 6.00/Tab., Syrup, 10mg/5 ml, Tk. 90.00/100ml
Aspasom (Kemiko), Tab., 50 mg, Tk. 5.00/Tab., Syrup, 10mg/5 ml, Tk. 90.00/100ml
Dysma(Rangs), Tab., 50 mg, Tk. 5/Tab.
Emogin(Somatec), Tab., 50 mg, Tk. 5.00/Tab.
Emonium(Beximco), Inj., 5 mg/2 ml, Tk. 75.00/2ml Amp., Tab., 50mg, Tk. 5.00/Tab.
Monivis(Organic), Tab. , 50 mg, Tk. 6.02/Tab.
Norvis(Square), Inj., 5 mg/2 ml, Tk. 25.00/2 ml Amp., Syrup, 10mg/5 ml, Tk. 87.26/100ml; Tab. , 50 mg, Tk. 6.02/Tab.
Onium(Orion), Syrup, 10mg/5 ml, Tk. 50.15/50ml; 10mg/5 ml, Tk. 85.26/100ml; Tab. , 50 mg, Tk. 6.02/Tab., Inj, 5 mg/2 ml, Tk. 25.08/2 ml Amp.
Panium(Navana), Tab., 50 mg, Tk. 5.00/Tab.;Inj., 5 mg/2 ml, Tk. 20.00/amp.
Previp(Genera), Tab., 50 mg, Tk. 4.02/Tab.
Relvis(Biopharma), Inj. , 5 mg/2 ml, Tk. 15.00/2 ml Amp., Tab., 50mg, Tk. 5.00/Tab.
Spadyl(SMC Enterprise), Tab., 50 mg, Tk. 5.00/Tab.
Spanium(Ziska), Inj., 5 mg/2 ml, Tk. 15/2ml Amp.; 50 mg, Tk. 4/Tab.
Spason(Astra Biopharma), Tab. , 50 mg,
Spazin (Euro), Tab., 50mg, Tk. 5.00/Tab.
Tiemo (Alco), Tab. , 50 mg, Tk. 4.01/Tab.
Tienum(Chemist), Inj. , 2 ml, Tk. 15/2 ml Amp; Tab. , 50 mg, Tk. 4/Tab.
Timem(Silva), Tab. , 50mg, Tk. 4.02/Tab.
Timoben(Benham), Tab., 50 mg, Tk. 5/Tab.
Timonac(Julpher), Inj., 5 mg/2 ml , Tk. 20.00/amp.;Tab., 50 mg, Tk. 6.00/Tab.
Timonate(Pacific), Inj. , 5 mg/2 ml, Tk. 25.00/2 ml Amp; Tab., 50 mg, Tk. 6.00/Tab.
Timonil(Popular), Tab. , 50 mg, Tk. 4.02/Tab., Inj, 5 mg/2 ml, Tk. 15.06/2 ml amp.
Timothy(Eskayef), Inj. , 5 mg/2 ml, Tk. 15.00/2 ml Amp., Tab, 50 mg, Tk. 4.00/Tab., 50 mg, Tk. 4.00/Tab.

Timozin(*Incepta*), Tab. , 50 mg, Tk. 6.00/Tab., Inj., 5 mg/2 ml, Tk. 15.00/2 ml Amp.
Tinilux(*Sharif*), Tab. 50mg, Tk. 6.00/Tab., 50mg, Tk. 6.00/Tab.
Tinimet (*Rephco*), Inj.,5 mg/2 ml,Tk.20/amp.; 5mg/2ml, Tk. 25/amp.;Tab., 50 mg, Tk. 5/Tab.
Tinium(*Acme*), Inj., 5 mg/2 ml, Tk. 20.07/2 ml Amp., Tab., 50 mg, Tk. 6.00/Tab.
Tino(*Delta*), Tab. , 50 mg, Tk. 4.00/Tab.
Tispa(*Concord*), Tab. , 50 mg, Tk. 5.00/Tab.
Titos(*Novo Health*), Tab. , 50 mg, Tk. 5.00/Tab.
Tium(*Ad-din*), Tab., 50 mg, Tk. 3.50/Tab.
Tivis(*Beacon*), Tab. , 50 mg, Tk. 5.00/Tab.; Inj., 5 mg/2 ml, Tk. 16.00/amp.
Tivis(*Beacon*), Tab. , 50mg , Tk. 5.04/Tab., Inj., 5 mg/2 ml, Tk. 16.05/2 ml Amp.
Tynium(*ACI*), Tab., 50mg , Tk. 6.02/Tab., Inj., 5 mg/2 ml, Tk. 15.11/2ml amp., Syrup, 10mg/5 ml, Tk. 56.17/50ml; 10mg/5 ml, Tk. 85.26/100ml
Veralgin(*Aristo*), Inj. , 5 mg/2 ml, Tk. 25.00/2 ml Amp., 50mg , Tk. 6.00/Tab.
Visarin(*Pharmasia*), Tab., 50 mg, Tk. 4/Tab.
Viscer(*Techno*), Inj., 5 mg/2 ml, Tk. 12/amp.
Visceral(*Ibn Sina*), Tab., 50mg, Tk. 8.00/Tab., Inj. , 5 mg/2 ml, Tk. 160.00/2 ml Amp.
Visegin(*UniMed*), Tab.,50mg,Tk. 5/Tab.
Viset(*Healthcare*), Syrup, 10mg/5 ml, Tk. 55.00/Syrup., 10mg/5 ml, Tk. 90.00/Syrup; Tab., 50mg, Tk. 7.00/Tab., Inj. , 5 mg/2 ml, Tk. 250.00/2 ml Amp
Visnil(*Nipro JMI*),Tab., 50 mg, Tk. 4/Tab.
Visnor(*Apex*), Inj., 5 mg/2 ml, Tk. 15.00/amp; Tab., 50 mg, Tk. 4.00/Tab.
Visonium(*Drug Intl*), Inj., 5 mg/2 ml, Tk. 25.02/2 ml Amp.; Tab., 50mg, Tk. 5.00/Tab.
Vispazin(*Globe*), Susp., 10mg/5 ml, Tk. 90.00/100ml; Inj. , 5 mg/2 ml, Tk. 15.00/2 ml Amp.; Tab. , 50 mg, Tk. 5.00/Tab.
Visral(*Opsonin*), Supp. 20 mg , Tk. 8.00/Supp., Syrup, 10mg/5 ml, Tk. 80.00/100ml; Tab. , 50 mg , Tk. 6.00/Tab., Inj., 5 mg /2 ml, Tk. 15.10/2ml Amp.
Xelcom(*Radiant*), Tab. , 50mg, Tk. 8.00/Tab., Inj, 5 mg/2 ml, Tk. 35.00/2 ml Amp
Zeum(*Novartis*), Tab., 50 mg, Tk. 6.50/Tab.

TRIMEBUTINE MALEATE

Indication: Irritable bowel Syndrome
Cautions:Pregnancy,breast feeding,children
Contraindication: Should not be taken by anyone who is allergic to trimebutine
Side effects: Abdominal pain,constipation,diarrhoea,dry mouth,fatigue, foul taste, headaches, hot or cold sensations,indigestion nausea, rash

2. GASTRO-INTESTINAL SYSTEM

Dose:200 mg 3 times daily before meals.

Proprietary Preparations

Timotor(*Square*), Tab.,100 mg, Tk. 5.01/Tab.
Trimotil(*Incepta*), Tab.,100 mg, Tk. 5.00/Tab.

OTHER ANTISPASMODICS

Alverine, drotaverine, Mebeverine, and peppermint oil are believed to directly relax intestinal smooth muscle and may relieve spasm and pain in irritable bowel syndrome and diverticular disease. They have no serious adverse effects but like all antispasmodics should be avoided in paralytic ileus.

ALVERINE CITRATE

Indications:as an adjunct in gastro-intestinal disorders characterised by smooth muscle spasm; dysmenorrhoea

Contra-indications: paralytic ileus,breast-feeding

Caution: pregnancy,

Side-effects: nausea; dyspnoea; headache, dizziness;pruritus, rash; hepatitis also reported

Dose:ADULT and CHILD over 12 years, 60–120mg 1–3 times daily.

Proprietary Preparations

Alve(*Orion*), Tab., 60 mg, Tk. 5.01/Tab.
Alverate(*Ibn Sina*), Tab., 60mg, Tk. 5.02/Tab.
Dismonal(*Opsonin*), Tab., 60 mg, Tk. 5.00/Tab.
Pelverin(*Popular*), Tab., 60mg, Tk. 5.02/Tab.
Spasverin(*Beacon*), Tab. , 60mg , Tk. 5.02/Tab.

DROTAVERINE HYDROCHLORIDE

Indications: as an antispasmodic in gastro-intestinal colic,biliary and genitourinary colic; tenesmus in dysentery; dysmenorrhoea

Cautions and Contraindications: pregnancy and lactation; impairment of liver or kidney (*Appendix 3 & 4*)

Interactions: see *Appendix-2*

Side-effects: flushing, perspiration, palpitation and vertigo are reported

Dose:by mouth 40-80 mg 3 times daily.

2. GASTRO-INTESTINAL SYSTEM

by subcutaneous or intramuscular injection, 40-80 mg up to three times daily

by slow intravenous injection in acute renal colic, 40-80 mg

Proprietary Preparations

Dot(Acme), Tab., 40 mg, Tk. 1.76/Tab.; Inj., 40 mg./2 ml, Tk. 7.04/2ml
Dotarin(Popular), Tab., 40 mg, Tk. 1.76/Tab.; Inj., 40mg/2ml, Tk. 7.03/Amp.
Dover(Nipa), Tab. 40 mg, Tk. 1.75/Tab.
Drotapan(Incepta), Tab. 40 mg, Tk. 1.75/Tab.
Drovin(ACI), Inj., 40mg/2ml, Tk.10.07/2ml; Tab., 40 mg, Tk. 1.77/Tab.
Espa(Square), Inj., 40 mg/2 ml, Tk. 7.02/Amp., 40 mg, Tk.1.75/Tab.
N-Aspa(Albion), Tab., 40 mg, Tk. 1.81/Tab.
No-Spa(Ambee), Tab., 40 mg, Tk. 1.82/Tab., Inj. 40 mg/2 ml, Tk. 7.98/2 ml amp.
Rova(Kemiko), Tab., 40 mg, Tk. 2.00/Tab.
Span(Opsonin), Tab., 40 mg, Tk. 1.76/Tab.
Tav(Organic), Tab., 40 mg, Tk. 1.76/Tab.
Taverin(Beximco), Tab., 40 mg, Tk. 2.20/Tab.

MEBEVERINE HYDROCHLORIDE

Indications: as an adjunct in the treatment of symptomatic relief of gastrointestinal colic, irritable bowel syndrome

Cautions; Contraindications: paralytic ileus, pregnancy and breast-feeding, porphyria; should be used with care in patients with cardiac disorder, hepatic or renal insufficiency

Interactions: see Appendix-2

Side-effects: anorexia, dizziness, headache, insomnia, tachycardia have been reported

Dose: ADULT and CHILD above 12 years 135 mg 3 times daily, preferably 20 mins before meals

Proprietary Preparations

A-Meb(Acme), Tab. 135 mg., Tk. 6.01/Tab.
Evarin(Delta), Tab. 135 mg, Tk. 6.00/Tab.
Iriban(Incepta), Tab., 200 mg, Tk. 10.00/Tab.; 135 mg, Tk. 6.00/Tab.
Irisyn(Ibn Sina), Tab., 135 mg, Tk. 7.00/Tab.
Mave(Opsonin), Cap., 200 mg, Tk. 10.07/Cap.; Tab., 135 mg, Tk. 7.00/Tab.
Mebeverine(Albion), Tab., 135 mg, Tk. 6/Tab.
Mebiz(Sun), SR Cap., 200 mg, Tk.10/Cap.
Mespa(Ambee), Tab. 135 mg, Tk. 6.02/Tab.
Meverine(Drug Intl), Tab., 135 mg, Tk. 6.05/Tab.; Cap., 200 mg, Tk. 10.05/Cap.

Mevin(Square), Tab., 135 mg, Tk. 6.02/Tab.; Cap., 200 mg, Tk.10.03/Cap.

Rostil(Beximco), SR Cap., 200 mg, Tk. 10.00/Cap.; Tab., 135 mg, Tk. 7.00/Tab.

Veripel(Beacon), Cap., 200mg, Tk. 9.03/Cap.

Veron(Eskayef), Tab., 135 mg, Tk. 6.00/Tab.; 135 mg, Tk. 6.08/Tab.

OTHER DRUGS ALTERING GUT MOTILITY

(See section 7.8)

Gut smooth muscle exhibits intrinsic motor activity which is modified by autonomic innervation, local reflexes and gut hormones to produce peristalsis. Prokinetic drugs which include **domperidone** and **metoclopramide** stimulate the motility of the gut by acting at various points within this complex system to enhance gut movement.

APREPITANT

It is an antiemetic drug mediates its effect by blocking the neurokinin 1 (NK₁) receptor.

Indications: as an adjunct to dexamethasone and a 5HT₃-receptor antagonist in preventing nausea and vomiting associated with moderately and highly emetogenic chemotherapy

Cautions: should not be used concurrently with pimozide, terfenadine, astemizole, or cisapride. Taking aprepitant with these medications could result in **serious or life-threatening problems**

Contra-indications: acute porphyria, hepatic impairment; pregnancy; breast-feeding, child under 18 years of age.

Side-effects: hiccups, dyspepsia, diarrhoea, constipation, anorexia; asthenia, headache, dizziness; less commonly weight changes, dry mouth, colitis, flatulence, stomatitis, abdominal pain, duodenal ulcer, taste disturbance, oedema, bradycardia, palpitations, cough, euphoria, anxiety, confusion, drowsiness, thirst, abnormal dreams, chills, hyperglycaemia, polyuria, anaemia, dysuria, haematuria, hyponatraemia, neutropenia, myalgia, conjunctivitis, pharyngitis, sneezing, tinnitus, sweating, pruritus, rash, acne,

photosensitivity, and flushing; dyspnoea, insomnia, visual disturbances, dysarthria, urticaria, and Stevens-Johnson syndrome also reported.

Dose: ADULT over 18 years 125 mg 1 hour before chemotherapy, then 80mg daily as a single dose for the next 2 days; consult product literature for dose of concomitant corticosteroid and 5HT3-receptor antagonist.

Proprietary Preparations

Emend(Opsonin), Cap., 40 mg , Tk. 45.13/Cap.

Emestop (Incepta), Cap., 40 mg, Tk. 50.00/Cap. ; 125 mg, Tk. 150.00/Cap.

DOMPERIDONE

Indications:nausea and vomiting associated with Levodopa therapy and Bromocriptine, functional dyspepsia, acute Migraine attack

Cautions:renal impairment, pregnancy and breast-feeding; not recommended for routine prophylaxis of postoperative vomiting or for chronic administration

Interactions:see Appendix-2

Side-effects:raised prolactin concentrations (possible galactorrhoea and gynaecomastia), reduced libido reported; rashes and other allergic reactions; acute dystonic reactions reported

Dose: 10-20 mg 3 times daily according to the requirement. CHILD: Not recommended except nausea and vomiting after cytotoxic therapy, 200-400 micrograms/kg every 4-8 hours

Proprietary Preparations

Adegut(Supreme), Susp.,100mg/100ml, Tk. 28/60ml; Tab., 10mg, Tk. 2.00/Tab.

Anet (Kemiko), Tab.,10 mg, Tk. 2/Tab.

Apidone(Team), Susp., 5mg/5 ml, Tk. 33.00/60ml; Tab., 10 mg, Tk. 2.20/Tab.

Apuldon(Aristo), Paed Drops, 5mg/5ml, Tk. 25.00/15ml,30ml; Supp, 15mg , Tk. 6.00/Supp.; 30mg, Tk. 9.00/Supp.; Susp., 5mg/5ml, Tk. 35.00/60ml; Tab. , 10mg, Tk. 2.50/Tab.

Atidon(Asiatic), Susp., 5mg/5ml, Tk. 28.00/60ml; Tab., 10 mg, Tk. 2.00/Tab.

Bpdon(Bristol), Tab.,10mg, Tk.100/Tab

Cosy(Orion), Tab., 10 mg, Tk. 2.50/Tab.;

Syrup, 5mg/5ml, Tk. 28.19/60ml; Syrup,

5mg/5ml, Tk. 38.26/100ml

2. GASTRO-INTESTINAL SYSTEM

Dedom(Decent), Susp. , 5mg/5ml, Tk.

28.00/60 ml; Tab., 10mg, Tk. 1.90/Tab.

Deflux(Beximco), Dispersible Tab., 10mg, Tk.

2.50/Tab.; Paed Drops, 5mg/5ml; Susp.,

5mg/5ml, Tk. 38.00/100ml; Tab., 10mg, Tk.

2.50/Tab.

Doma(Pacific), Susp. , 5 mg/5 ml, Tk.

40/100ml ; 5 mg/5 ml, Tk. 25/60ml ; Tab., 10

mg, Tk. 3.00/Tab.

Dometic(One Pharma), Tab., 10 mg , Tk.

2.00/Tab.

Domidon(Ziska), Susp., 5 mg/5 ml, Tk.

28/60ml; Tab., 10 mg, Tk. 2/Tab.

Domilin(General), Susp, 5mg/5ml, Tk.

40.27/100ml; Tab., 10mg, Tk. 2.01/Tab.

Domilux(Popular), Tab., 10 mg, Tk. 2.00/Tab.;

Susp., 5mg/5ml, Tk. 35/ 60ml

Domin(Opsonin), Supp, 15 mg , Tk.

5.02/15gm; Susp., 5mg/5ml, Tk. 28.11/60

ml; Tab., 10 mg, Tk. 2.50/Tab.; Supp, 30 mg ,

Tk. 8.03/ 30 mg ; Susp., 5mg/5ml, Tk.

20.08/15 ml

Dominaaf(Naafco), Sunpn., 5 mg/5 ml, Tk.

30.00/60ml; Tab., 10 mg, Tk. 2/Tab.

Dominat(Nipa), Tab., 10 mg, Tk.2/Tab.

Domiren(Renata), Paed. Drops, 5mg/5ml, Tk.

25.00/15 ml; Susp., 5mg/5ml, Tk.

35.00/Susp; 5mg/5ml, Tk. 38.00/Susp.;

Tab., 10 mg, Tk. 2/Tab.

Domperon(Astra Bio, Susp., 5 mg/5 ml, Tk.

28.00/60 ml; Tab, 10 mg, Tk. 2.00/Tab.

Dompi(Alco), Susp., 5mg / 5ml, Tk.

40.12/60ml ; Tab. , 10 mg, Tk. 2.01/Tab.;

10mg, Tk. 2.25/Tab.

Don-A(Acme), Paed Drops, 5mg/5ml, Tk.

20.13/15ml; 5mg/5ml, Tk. 25.17/30ml; Supp,

15 mg., Tk. 5.03/Supp.; 30 mg., Tk.

8.07/Supp.; 5mg/5ml, Tk. 35.11/60ml; Tab. ,

10 mg, Tk. 2.01/Tab.

Dopadon(Ibn Sina), Paed. Drops, 5mg/5ml,

Tk. 25.00/15ml; Susp., 5mg/5ml, Tk.

30.00/60ml; Tab., 10mg, Tk. 2.50/Tab.

Dysnov(UniMed), Tab , 10mg, Tk. 2.50/Tab.;

Paed Drop, 5mg/5ml, Tk. 20.00/15ml; Susp.,

5mg/5ml, Tk. 38.00/100ml

Edone(Zenith), Susp.; 5mg/5ml, Tk.

28.11/60ml; 5mg/5ml, Tk. 38.14/100ml; Tab.,

10 mg, Tk. 2.01/Tab.; 10 mg, Tk. 5.00/Tab.

Efodio(Radiant), Tab. , 10mg, Tk. 4.00/Tab.

Egut(Euro), Syrup, 5mg/5ml, Tk.

35.00/100ml; Tab., 10 mg, Tk. 2.5/Tab.

Emidom(Somatec), Susp., 5mg/5ml, Tk.

28.11/60ml; Tab., 10 mg, Tk. 2.50/Tab.

Esogut(Biopharma), Paed Drops, 5mg/5ml,

Tk. 25.00/15ml; Susp., 5mg/5ml, Tk.

28.11/60ml; Tab., 10mg, Tk. 2.50/Tab.

Loridon(Modern), Susp., 5mg/5ml, Tk.

20.00/15ml; 5mg/5ml, Tk. 28.00/60ml; Tab. ,

10 mg , Tk. 2.50/Tab.

Motifast(Square), Dispersible Tab., 10mg, Tk.

2.51/Tab.

2. GASTRO-INTESTINAL SYSTEM

Motigen(Novo Health), Tab., 10mg, Tk. 2.00/Tab.; Susp., 5mg/5ml, Tk. 38.00/100ml
Motigut(Square), Paed. Drops, 5mg/5ml, Tk. 25.08/15ml.; Susp., 5 mg/5 ml, Tk. 35.11/60ml.; Tab., 10 mg, Tk. 2.51/Tab.
Motinorm(Sharif), Tab., 10 mg, Tk.2.00/Tab.
Motistat(Globex), Susp., 5mg/5ml, Tk. 40.12/60ml.; Tab., 10 mg, Tk. 2.00/Tab.
Noburn(Beacon), Tab., 10mg, Tk. 2.01/Tab.
Nudon (Organic), Tab., 10 mg, Tk. 2.00/Tab.
Omidon(Incepta), Paed. Drops, 5mg/5ml, Tk. 25.00/15ml.; Susp., 5mg/5ml, Tk. 35.00/60ml.; Tab., 10mg, Tk. 2.00/Tab.; Susp., 5mg/5ml, Tk. 38.00/100ml.; Tab., 10 mg, Tk. 2.00/Tab.
Paridon(Drug Intl), Tab., 10mg, Tk. 2.05/Tab.; Susp., 5mg/5ml, Tk. 32.10/100ml
Perion(Globe), Susp., 5 mg /5 ml, Tk. 30.00/60 ml.; 5 mg /5 ml, Tk. 38.00/100 ml.; Tab, 10 mg, Tk. 2.00/Tab.
Ridon(Eskayef), Sachet, 10mg , Tk. 6.00/Sachet.; Syrup, 5mg/5ml, Tk. 20.00/15ml.; 5mg/5ml, Tk. 30.00/60ml.; Tab, 10 mg, Tk. 2.50/Tab.
Sagdon(Nuvista), Tab., 10 mg, Tk. 2.00/Tab.
Sandom(Sanofi), Susp., 5mg/5ml, Tk. 28.18/Vial.; Tab, 10mg, Tk. 2.02/Tab.; Paed Drop, 5mg/ml, Tk. 20.13/Vial.
Vave(ACI), Susp., 5mg/5ml, Tk. 35.11/60ml.; 5mg/5ml, Tk. 40.12/100ml.; Tab., 10mg , Tk. 5.02/Tab.; Paed Drops, 5mg /ml, Tk. 25.08/15ml.; Tab., 10mg , Tk. 2.50/Tab.
Virdon(Virgo), Paed Drops, 5mg/5ml, Tk. 20.00/15ml.; Susp., 5mg/5ml, Tk. 28.00/60ml.; Tab., 10 mg, Tk.200/Tab.
Vomino(Monico), Tab., 10mg, Tk. 2.00/Tab.; Susp., 5mg/5ml, Tk. 28.00/60ml
Xepadon(Amico), Paed Drop, 5mg/ml, Tk.18.00/15ml.; Susp., 5mg/5ml, Tk. 25.00/60ml.; Tab., 10mg , Tk. 2.00/Tab.

METOCLOPRAMIDE HYDROCHLORIDE^(ED)

(See section 7.8)

Indications: See notes above and see section 7.8

Cautions and Side-effects: See section 7.8

Interactions: See Appendix-2

Dose: By mouth 10 mg 3 times daily; IM/IV 10 mg 3 times daily over 1-2 minutes. CHILD 1-5 mg 3 times daily.

Proprietary Preparations

Maxocol(Medimet), Syrup, 5mg/5ml, Tk.15.77/100ml; Tab., 10mg, Tk.0.34/Tab.
Meclid(Jayson), Inj., 10 mg/2 ml, Tk. 3.55/2 ml Amp.

Metocol(Opsonin), Syrup, 5mg/5ml, Tk.15.83/100 ml; 5mg/5ml, Tk.10.65/15 ml
Migen(Albion), Syrup, 100 mg/100 ml, Tk. 13.70/100 ml
Motilon(Sanofi), Tab. 10mg, Tk. 0.34/Tab.
Nutramid(Acme), Tab., 10 mg, Tk. 0.34/Tab.; Syrup, 100 mg/100 ml, Tk. 10.65/60 ml

2.3 ULCER HEALING DRUGS

- 2.3.1 H₂ RECEPTOR ANTAGONISTS
- 2.3.2 SELECTIVE ANTIMUSCARINICS
- 2.3.3 PROTON PUMP INHIBITORS
- 2.3.4 CHELATES AND COMPLEXES
- 2.3.5 PROSTAGLAND ANALOGUES
- 2.3.6 DRUGS FOR ERADICATION OF HELICOBACTER PYLORI

2.3.1 H₂-RECEPTOR ANTAGONISTS

H₂-receptor antagonists reduce gastric acid (both basal and food stimulated) and pepsin output as a result of H₂-receptor blockade. They have been used in peptic ulcer, gastrointestinal reflux diseases and in selected cases of persistent dyspepsia. High doses of H₂-receptor antagonists have been used in the Zollinger-Ellison syndrome, though a proton pump inhibitor (see sec 2.3.3) is now preferred.

FAMOTIDINE

Indications: see under Dose

Cautions: see under ranitidine; does not inhibit hepatic microsomal drug metabolism

Side-effects: see under ranitidine; dry mouth and anorexia also reported

Dose: benign gastric and duodenal ulceration; 20 mg twice daily or 40 mg at night for 4-8 weeks; maintenance 20 mg at night. In Zollinger-Ellison syndrome, 20 mg every 6 hours (higher dose in those who have previously been receiving another H₂-antagonist)

Proprietary Preparations

Famodin(Acme), Tab. 20.00 mg., Tk. 2.00/Tab.; 40 mg., Tk. 4.01/Tab.

2. GASTRO-INTESTINAL SYSTEM

Famotack(Square), Tab. 20 mg, Tk. 2.00/Tab.; 20mg, Tk. 2.05/Tab.
Famotid(Drug Intl), Tab., 40mg, Tk. 4.05/Tab.
Famotidine(Albion), Tab., 20 mg, Tk.1.50/Tab.; 40 mg, Tk. 3/Tab.
Novatac(ACI), Tab.,40mg, Tk. 4.13/Tab.; 20mg, Tk. 2.27/Tab.
Servepep(Novartis), Tab., 20 mg, Tk. 4/Tab.; 40 mg, Tk. 6/Tab.
Yamadin(Beximco), Tab., 20 mg, Tk. 1.90/Tab.; Tab., 40 mg, Tk. 3.82/Tab.

NIZATIDINE

Indications: see under Dose

Cautions: also avoid rapid intravenous injection (risk of arrhythmias and postural hypotension); hepatic impairment

Interactions: see Appendix-2(histamine H2-antagonists) and notes above

Pregnancy: avoid unless essential

Breast-feeding: amount too small to be harmful

Side-effects: see notes above; also sweating; rarely nausea, fever, vasculitis, hyperuricaemia

Dose: benign gastric, duodenal or NSAID-associated ulceration, treatment, 300 mg in the evening or 150 mg twice daily for 4–8 weeks; maintenance, 150mg at night

Gastro-oesophageal reflux disease, 150–300 mg twice daily for up to 12 weeks. CHILD not recommended

Renal impairment: use half normal dose if eGFR 20–50 mL/minute/1.73m²; use one-quarter normal dose if eGFR less than 20 mL/minute/1.73m²

Generic Preparation

Capsule, 150mg

RANITIDINE^{[ED][OTC]}

Indications: benign gastric and duodenal ulceration stomal ulcer, reflux oesophagitis, Zollinger-Ellison syndrome, other conditions where reduction of gastric acidity is beneficial.(see notes above)

Cautions: renal and hepatic impairment (reduce dose); pregnancy and breast-feeding. Avoid intravenous injection in high dosage (may rarely cause

arrhythmias) and in cardiovascular impairment, does not significantly inhibit hepatic micro-somal drug metabolism.

Side-effects: altered bowel habit, dizziness, rash, tiredness; occasionally, gynaecomastia (cimetidine only, and usually only in high dosage), reversible confusional states, reversible liver damage, headache; rare reports of breast swelling and tenderness in men; bradycardia, AV block and asystole.

Dose: by mouth, 150 mg twice daily (morning and night), or for patients with gastric and duodenal ulceration; 300 mg as a single daily dose at night for 4 to 8 weeks, up to 6 weeks in chronic episodic dyspepsia, and up to 8 to 12 weeks in reflux oesophagitis and NSAID associated ulceration; Zollinger-Ellison syndrome, 150 mg 3 times daily, increased if necessary to 6 g daily in divided doses.

For maintenance, 150 mg at night. CHILD, 8-18 years, up to 150 mg twice daily. Gastric acid reduction (prophylaxis of acid aspiration) in obstetrics, by mouth, 150 mg at onset of labour, then every 6 hours.

By intramuscular injection, 50 mg every 6-8 hours.

By slow intravenous injection, 50 mg diluted to 20 ml and given over at least 2 minutes; may be repeated every 6-8 hours.

By intravenous injection, 25 mg/hour for 2 hours; may be repeated every 6-8 hours.

Surgical procedures, by intramuscular or slow intravenous injection, 50 mg 45-60 minutes before induction (intravenous injection diluted to 20 ml and given over at least 2 minutes), or by mouth, 150 mg 2 hours before induction, and also, when possible on the preceding evening.

Proprietary Preparations

Aceptin-R(Asiatic), Inj., 50 mg/2 ml, Tk. 10.00/2 ml Amp; Tab., 150 mg, Tk. 2.00/Tab.
Acin(Biopharma), Syrup, 75 mg/5 ml, Tk. 45.17/100ml; Tab., 150 mg, Tk. 2.50/Tab.
Alin(Rephco), Tab.,150 mg, Tk. 2.50/Tab.
Amurun (Amulet), Tab.,150 mg, Tk. 2/Tab.
Anitid(Team), Tab., 150 mg, Tk. 2.00/Tab.

2. GASTRO-INTESTINAL SYSTEM

Antac(Ambee), Syrup, 75mg/5ml, Tk 40.15/100 ml; Tab., 150 mg, Tk. 1.81/Tab.; Inj. , 50 mg / 2 ml , Tk. 5.32/2ml Amp
Asinar(Sanofi), Tab., 150mg, Tk. 2.51/Tab.
Astac(Astra Bio), Tab. , 150 mg, Tk. 2.00/Tab.
Bentid(Benham), Tab.,150 mg, Tk.2.00/Tab.;150 mg, Tk.2.00/Tab.
Bristol Neoset(Bristol), Tab. , 150mg , Tk. 1.500/Tab.
Duran(Techno), Tab., 300 mg , Tk.4.00/Tab.; Syrup, 75 mg/5 ml, Tk. 40/100 ml; IV/Infusion, 50 mg/100 ml, Tk. 60.00/100 ml
Eucon(Pacific), Inj., 50 mg/2 ml, Tk. 10.00/2 ml Amp.; Tab., 150 mg, Tk. 1.90/Tab.
Gastab(Nipro JMI), Syrup, 75 mg/5 ml, Tk. 45.17/100 ml; Tab., 150 mg, Tk. 2.00/Tab.
Gastroloc(Beacon), Tab. , 150mg , Tk. 2.00/Tab.
Gepin(General), Tab. , 150mg, Tk. 2.01/Tab., Syrup, 75 mg/5 ml, Tk. 50.00/100ml; 75 mg/5 ml, Tk. 95.00/200ml; Inj., 50 mg/2 ml, Tk. 10.00/2ml Amp
G-Ranitidine(Gonoshasthaya), Tab.,150 mg, Tk. 1.40/Tab.
Hi-Tac(Hudson), Tab., 150mg, Tk.2.00/Tab.
Inran(Monico), Inj., 50 mg/2 ml, Tk. 6.00/2 ml Amp; Tab., 150mg, Tk. 2.00/Tab.
Inseac(Ibn Sina), Syrup, 75 mg/5 ml, Tk. 55.00/100ml; Tab., 300 mg, Tk. 4.00/Tab, 100 mg, Tk. 2.50/Tab.
Libret(Libra),Inj.,(IV Infusion), 50 mg/100 ml, Tk. 55.21/100 ml
Lumeran(Aristo), Tab., 150mg, Tk. 2.00/Tab.
Neoeptin(Beximco), Inj., 50 mg/2 ml, Tk. 10.00/2 ml Amp; Infusion, 0.05%, Tk. 101.00/100 ml; Syrup, 75 mg/5 ml, Tk. 50.00/100ml; Tab., 150mg, Tk. 2.50/Tab.
Neotack(Square), Inj., 50 mg/2 ml, Tk. 10.03/2ml Amp; Syrup, 75 mg/5 ml, Tk.50.15/100ml; 150 mg, Tk.2.51/Tab.
Neotin(Nipa), Tab., 150mg, Tk. 2.50/Tab.
Normacid(Kemiko), Tab., 150 mg, Tk. 2.51/Tab., Inj., 50 mg/2 ml, Tk. 6.02/2 ml Amp., Syrup, 75 mg/5 ml, Tk. 45.13/100ml
Norma-H(Renata), Tab.,150 mg, Tk.2.50/Tab.
Off-H(Organic), Tab.,150mg, Tk.2.51/Tab.
Ortac(Orion), Inj., 50 mg/2 ml, Tk. 6.04/2ml Amp; Tab., Tk. 2.01/Tab.
Peptil H(Eskayef), Inj., 50 mg/2 ml, Tk. 6.00/2 ml Amp; 50 mg/2 ml, Tk. 6.00/2 ml Amp; Liq, 100ml, Tk. 45.00/100ml; Tab., 150mg , Tk. 1.80/Tab., 150mg , Tk. 2.00/Tab., 150mg, Tk. 2.00/Tab., Liq, 100ml, Tk. 45.00/100ml
Peptosol(Opso Saline), IV Infusion, 50 mg/100 ml, Tk. 26.41/100 ml
Protec-R(Globex),Tab.,150mg,Tk.1/Tab.
Ranbex(Novo),Tab.,150mg,Tk. 1.25/Tab.
Rani (Alco), Tab., 150 mg, Tk. 2.01/Tab.
Ranid(Ziska),Tab.,150mg, Tk. 1.20/Tab.
Ranidin(Acme), Inj., 50 mg/1 ml , Tk. 10/Amp.; Syrup, 75 mg/5 ml, Tk. 45.16/100 ml.; Tab., 150 mg, Tk.2.01/Tab.; 300 mg , Tk.4.01/Tab.

Ranidin(Acme), Inj., 50 mg/2 ml, Tk. 10.03/2 ml Amp; Syrup, 75 mg/5 ml, Tk. 45.29/100ml; Tab., 300 mg , Tk. 4.03/Tab., 50 mg , Tk. 2.51/Tab.
Ranison(Jayson), Inj., 50 mg/1 ml , Tk. 10.00/Amp.;Tab. ,150 mg, Tk.1.73/Tab.
Ranisyn(MST), Tab., 150 mg, Tk. 2.10/Tab.
Ranitid(Opsonin), Syrup, 75 mg/5 ml, Tk. 50.15/100 ml; Inj., 50 mg/2 ml, Tk. 10.00/2 ml Amp; Tab. , 150 mg , Tk. 2.51/Tab., 150 mg , Tk. 2.51/Tab., 300 mg , Tk. 4.02/Tab.
Ranitidine(Albion), Syrup, 75 mg/5 ml, Tk. 40.00/100ml; Tk. 70.00/200ml .;Tab., 150 mg, Tk.2.00/Tab.
Ranitidine-R(Doctor TIMS), Tab. , 150 mg, Tk.2.50/Tab.
Ranitor(Popular), Tab. , 150 mg, Tk. 2.00/Tab.
Ranix(Chemist), Inj.,50mg/ 2 ml, Tk. 25.00/2 ml Amp.
Rantec(Medimet), Tab., 150mg, Tk.2.00/Tab.; 300mg, Tk.3.50/Tab.
Ranul(Apex), Tab., 150 mg, Tk. 1.00/Tab.
Ravia(Pharmasia), Tab.,150 mg, Tk.1.00/Tab.
Recodin(Concord),Tab.,150 mg, Tk.1.50/Tab.
Reetac-R(Navana),Tab.,150 mg, Tk.1.50/Tab.
Renete(Euro), Tab., 150 mg, Tk. 2.50/Tab.
Resectin(SMC Enterprise), Tab. , 150 mg, Tk. 2.50/Tab.
Rhine(Healthcare), Tab., 150mg , Tk. 3.00/Tab.
Sutac(Supreme), Tab. , 150 mg, Tk. 2.00/Tab.
Tinadin(Delta),Tab.150mg,Tk.2.00 /Tab.
Ulcara(Drug Intl), Tab., 150mg, Tk. 2.55/Tab., 300mg, Tk. 8.05/Tab.
Ultradin(Globe), Tab. , 150 mg, Tk. 2.50/Tab.
Unitac(G.A.Co), Tab., 150 mg, Tk. 1.81/Tab.
Veridin(Veritas), Tab., 150 mg, Tk.2.50/Tab.
Virdin(Virgo), Tab. , 150 mg , Tk. 2.00/Tab.
Wintack(White Horse), Tab., 150 mg, Tk.2.00/Tab.
Xantid(ACI), Inj., 50 mg/2 ml, Tk. 7.55/2ml Amp; Tab., 150mg, Tk. 2.51/Tab., 300mg, Tk. 4.03/Tab., 150 mg, Tk. 1.51/Tab.
Zantac(GSK), Tab.,150 mg, Tk.4.07/Tab
Zenidine(Zenith), Tab.,150mg,Tk. 2/Tab.
Zenil(Rangs), Tab., 150mg, Tk. 2/Tab.
Zodin(Somatec), Syrup, 75 mg/5 ml, Tk. 40.15/100ml; Tab., 150mg, Tk. 2.01/Tab.
Zorep(Amico), Tab., 150mg, Tk. 2/Tab.

2.3.2 SELECTIVE ANTIMUSCARINICS

M₁ selective antimuscarinic **pirenzepine** blocks cholinergic stimulation of gastric acid secretion but has some anticholinergic adverse effects. It had been tried

2. GASTRO-INTESTINAL SYSTEM

in the treatment of peptic ulcer but has now been discontinued.

2.3.3 PROTON PUMP INHIBITORS

These include **Omeprazole, Lansoprazole, Pantoprazole, Rabeprazole and Esmoprazole**. They produce profound and sustained inhibition of gastric acid secretion by blocking the hydrogen-potassium-adenosine triphosphate enzyme system (the 'proton pump') of the gastric parietal cell. They are effective short-term treatments for gastric and duodenal ulcers. The response is rapid and sustained (a single daily dose of omeprazole is sufficient to provide effective suppression of gastric acid for a 24 hour period), and thus promotes better compliance than with other anti ulcer drugs. **Lansoprazole and pantoprazole** appear to be comparable with omeprazole in efficacy.

Cautions: Proton pump inhibitors should be used with caution in patients with liver disease, in pregnancy and in breast-feeding; they may mask the symptoms of gastric cancer.

Side-effects: These include gastrointestinal disturbances (nausea, vomiting, diarrhoea, flatulence, abdominal pain), hypersensitivity reactions (rash, urticaria, pruritus, angioedema); occasional headache, malaise, muscle and joint pain, blurred vision and dry mouth.

DEXLANSOPRAZOLE

Indications: acid reflux, heartburn, difficulty swallowing, persistent cough, stomach ulcers (occasional use)

Cautions: See notes above; liver disease, bone fracture, shoulder pain, elderly

Side effects: See notes above; diarrhea, a low magnesium level, persistent muscle spasms, seizures, abdominal or stomach pain, cramping, fever

Dose: 30 mg/60 mg once daily with or without food

Proprietary Preparation

Delanix(Incepta), Cap., 30 mg, Tk. 9.00/Tab.; 60 mg, Tk. 16.00/Cap.

Desopra(Alco), Cap., 30 mg, Tk. 10.00/cap.

Dexilant(Ziska), Cap. 30 mg, Tk. 9/Cap.; 60mg, Tk. 16/Cap.

Dexlan(Ibn Sina), Cap., 60 mg, Tk. 18.00/Cap.; 30 mg, Tk. 10.00/Cap.

Dexogut(Popular), Cap., 31.500mg, Tk. 10.00/Cap.; 63.00mg, Tk. 18.00/Cap.

LANSOPRAZOLE

Indications: Gastric ulcer, duodenal ulcer, reflux oesophagitis Zollinger-Ellison syndrome; also used in conjunction with other drugs in triple therapy for eradication of *H. pylori*

Cautions: See notes above; avoid in pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: See notes above

Dose: Benign gastric ulcer 30 mg daily in the morning before breakfast for a period of 4 to 8 weeks. For gastric or duodenal ulcer associated with *H. pylori* in triple therapy for eradication of *H. pylori*, see section 2.3.6

Proprietary Preparations

Enso(Kemiko), Cap., 15 mg, Tk. 3.01/Cap.; 30 mg, Tk. 5.02/Cap.

Lanozole(Medimet), Cap., 30 mg, Tk. 5.00/Cap.; 5 mg, Tk. 3.00/Cap.

Lansec(Drug Intl), Cap., 30mg, Tk. 6.05/Cap.; 15 mg, Tk. 3.55/Cap.

Lansina(Ibn Sina), Cap., 30 mg, Tk. 6.00/Cap.

Lanso(Square), Cap., 30 mg, Tk. 6.04/Cap.

Lansocon(Biopharma), Cap., 30 mg, Tk. 6.00/Cap.

Lansodin(Acme), Cap., 15 mg, Tk. 3.52/Cap.; 30 mg, Tk. 6.04/Cap.

Lansoprazole(Albion), Cap., 15 mg, Tk. 3.50/Cap.; 30 mg, Tk. 6.00/Cap.

Lansopril(Amico), Cap., 30 mg, Tk. 5.00/Cap.

Lansoprol(Ziska), Cap., 30 mg, Tk. 80.00/Cap.

Lantid(Opsonin), Cap., 15 mg, Tk. 3.01/Cap.; 30 mg, Tk. 5.02/Cap.

Lanz(ACI), Cap., 15mg, Tk. 3.03/Cap.; 30mg, Tk. 5.04/Cap.

Lap(Ambee), Cap., 30 mg, Tk. 5.01/Cap.

Lasocon(Biopharma), Cap., 30 mg, Tk. 6.00/Cap.

Protolon(Beximco), Cap., 30mg, Tk. 6.00/Cap.

2. GASTRO-INTESTINAL SYSTEM

Zoton(General), Cap. , 30mg, Tk. 6.04/Cap.

ESOMEPRAZOLE

Indications: listed in dosage

Caution: see notes above; exclude gastric malignancy before treatment; severe hepatic impairment

Interactions: see Appendix-2

Side-effects: headache, abdominal pain, diarrhoea, nausea, vomiting, pruritus, dizziness

Dose: erosive reflux esophagitis: 20-40 mg once daily for 4-8 weeks; maintenance, 20 mg once daily

Symptomatic gastro-esophageal reflux: 20 mg once daily for 4 weeks

Triple therapy for eradication of *H. pylori*
20 mg twice daily (with 1 g amoxycillin twice daily and 500mg clarithromycin twice daily for 7 days

Proprietary Preparations

Alton(General), Tab. , 20 mg, Tk. 5.01/Tab;
40 mg, Tk. 8.03/Tab.Inj., 40mg/Vial, Tk. 100.30/Vial;

Asector(Novo Healthcare), Cap., 20 mg, Tk. 7.00/cap.; 40 mg, Tk. 9.00/Cap.; Inj. , 40 mg/Vial, Tk. 90.00/Vial

Asozit(White Horse), Cap., 20 mg, Tk. 7/Cap.
Curacid(Rangs), Cap., 20mg, Tk. 6.00/Cap.; 40mg, Tk. 9.00/Cap.

Ema(Globe), Cap., 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 3.00/Cap.; Inj. , 40 mg/Vial, Tk. 3.00/Inj.; Tab. , 20 mg, Tk. 4.75/Tab.; 40 mg, Tk. 8.00/Tab.

Emep(Aristopharma), Cap. , 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 9.00/Cap.; Injection, 40 mg/Vial, Tk. 90.00/Vial.; Tab., 20mg , Tk. 5.00/Tab.

Epa(Zenith), Tab., 20 mg, Tk. 4.01/Tab.

Epizol(Nipa), Cap. , 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 9.00/Cap.

Eprazol(Labaid), Cap., 20 mg, Tk. 7/Cap.

E-Proton(Doctor TIMS), Cap., 20 mg, Tk. 7.00/Cap.

Erazole(Kemiko), Cap. , 40 mg, Tk. 10.03/Cap.; 20 mg, Tk. 7.02/Cap. ; Tab., 20 mg, Tk. 5.02/Tab.; 40 mg, Tk. 8.03/Tab.

Escap(Sanofi), Cap., 40mg, Tk. 12.00/Cap.; 20mg, Tk. 8.00/Cap.

Eslo(Bristol), Cap., 20mg , Tk. 390.00/Cap. ; Tab, 40mg , Tk. 335.00/Tab.; 20mg , Tk. 225.00/Tab.; 20mg , Tk. 450.00/Tab.

Esmas(Concord), Cap., 20 mg, Tk. 6/Cap.; 40mg, Tk. 8/Cap; Tab., 20 mg, Tk. 5/Tab.

Esmogel(Biogen), Cap., 20mg , Tk. 6.50/Cap.

Esmosec(Techno), Tab., 20 mg, Tk. 5/Tab.; 40 mg, Tk. 8/Tab.

Esmotac(G.A.Co), Tab., 20 mg , Tk. 4.02/Tab.; 40 mg , Tk. 7.03/Tab.

ESO(Asiatic), Tab., 40 mg, TK. 8.00/Tab.; 20 mg , Tk. 5.00/Tab.

Esobest(Sharif), Tab. , 40 mg, Tk. 8.00/Tab.; 20 mg, Tk. 10.00/Tab.; Cap, 20 mg , Tk. 7.00/Cap.; 40 mg , Tk. 10.00/Cap.

Esocon(Biopharma), Cap., 40 mg, Tk. 9.50/Cap.; 20 mg, Tk. 7.00/Cap.; Inj, 40mg/Vial, Tk. 65.00/Vial

Esofour(Albion), Cap., 20 mg, Tk. 6/Cap.; 20mg, Tk. 6/Cap. Tab., 20 mg, Tk. 5/Tab.; 40mg, Tk. 7/Tab.

Esogap(Euro), Inj. , 40 mg/Vial, Tk. 100.00/Vial.; Tab., 20 mg, Tk. 5.00/Tab.; 450 mg, Tk. 8.00/Tab.

Esoge(Organic), Cap. , 20 mg, Tk. 6.50/Cap.; 40 mg, Tk. 8.03/Cap.

Esoking(Globex), Cap., 20 mg, Tk. 6.00/Cap.

Esofin(Rephco), Tab. 40 mg, Tk. 8.00/Tab. ; 20 mg, Tk. 4.00/Tab.

Esolok(Ibn Sina), Inj. , 40 mg/vial, Tk. 100.00/Inj.; Cap., 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 8.00/Cap. Tab., 20 mg, Tk. 5.00/Tab. ; 40 mg, Tk. 8.00/Tab.

Esomenta(Jupher), Cap., 20 mg, Tk. 7.00/Cap.; Cap., 40 mg, Tk. 10.0/Cap.

Esomep(ACI), Inj., 40mg, Tk. 90.27/40mg.; Cap., 20 mg, Tk. 7.02/Cap.; 40mg, Tk. 9.03/Cap.; Tab., 20mg, Tk. 5.02/Tab.; 40mg, Tk. 8.02/Tab.

Esomium(SMC Enterprise), Cap., 40 mg, Tk. 9.00/Cap.; 20 mg, Tk. 6.00/Cap.

Esomo(Amulet), Cap., 20 mg, Tk. 6.00/Cap.; 40 mg, Tk. 8.00/Cap.

Esonaaf(Naafco), Cap., 20 mg, Tk. 2.00/Cap.

Esonix(Incepta), Cap., 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 9.00/Cap.; Inj., 40 mg/Vial, Tk. 70.00/Vial.; 40 mg/Vial, Tk. 90.00/Vial.; Powder for Susp., 20 mg/Sachet, Tk. 7.00/Sachet.; Tab, 20 mg, Tk. 5.00/Tab.; 40 mg, Tk. 8.00/Tab.

Esopra(Alco), Cap., 20 mg, Tk. 6.02/Cap.; 40 mg, Tk. 9.03/Cap.; Tab, 20 mg, Tk. 4.01/Tab.; 40 mg, Tk. 7.02/Tab.

Esoprex(Beacon), Cap., 40mg , Tk. 9.03/Cap.; 20mg , Tk. 7.02/Cap.; Inj., 40mg/Vial.; Tk. 100.30/Vial.;

Esoprol(Ziska), Cap., 20mg, Tk. 5.00/Cap; 40mg, Tk. 8.00/Cap.

Esoral(Eskayef), Cap. , 20mg , Tk. 7.00/Cap.; Inj. , 40mg, Tk. 90.00/Inj. ; Tab, 20mg, Tk. 10.00/Tab.; 20mg , Tk. 5.00/Tab.; 20mg, Tk. 5.00/Tab.; 20mg , Tk. 10.00/Tab.; 20mg , Tk. 4.01/Tab.; 20mg , Tk. 5.00/Tab.; 40mg , Tk. 14.00/Tab.; 40mg, Tk. 7.00/Tab.; 40mg , Tk. 8.00/Tab.;

Esorant(Supreme), Cap, 20mg, Tk. 6.00/Cap.; 40mg, Tk. 8.00/Cap.

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Esotac(Navana), Tab., 40 mg, Tk. 7.03/Tab.;Cap., 20 mg, Tk. 6.00/Cap. 40 mg, Tk. 8.00/Cap.
Esotem(Team), Cap., 40 mg, Tk. 9.00/Cap. ; 20 mg, Tk. 6.50/cap.
Esotid(Opsonin), Cap. , 20 mg , Tk. 6.04/Cap.; Tab. 20 mg , Tk. 5.03/Tab.; Cap., 40 mg , Tk. 9.06/Cap. Tab. , 40 mg , Tk. 8.00/Tab.; Vial, 40 mg , Tk. 90.27/ 40 mg
Esotor(Nipro JMI), Tab. , 20 mg, Tk. 5.00/Tab. ; 40 mg, Tk. 8.00/Tab.
Esover(Veritas), Cap. , 20 mg, Tk. 7.00/Cap.;40 mg, Tk. 9.00/Cap.
Esovir(Virgo), Cap., 20 mg, Tk. 700.00/Cap.
Esoz(Astra Biopharma), Cap. , 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 8.00/Cap.; Tab. , 20 mg, Tk. 5.00/Tab. 40 mg , Tk. 8.03/Tab..
Esprazo(Pacific), Cap., 20 mg, Tk. 7.00/Cap.
Exium(Radiant), Cap., 20mg , Tk. 10.00/Cap.; 40mg , Tk. 14.00/Cap.; 20mg , Tk. 8.50/Cap.; 40 mg, Tk. 12.00/Cap. ; Inj., 40mg/Vial, Tk. 120.00/Vial.
Exmart(MST), Tab., 20 mg, Tk. 5/Cap.; 40 mg, Tk. 8/Tab.
Exome(Chemist), Tab., 20 mg, Tk. 5.00/Tab.
Exor(Orion), Inj, 40 mg, Tk. 100.30/Inj.; Cap., 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 10.00/Cap.
EZ(Modern), Cap. , 20 mg, Tk. 7.00/Cap.
Gerdo(Nuvista), Cap., 20 mg, Tk. 7.02/Cap.
iMAX(Delta), Cap. , 20 mg, Tk. 5.00/Cap.
Maxima(Acme), Cap., 40 mg , Tk. 10.00/Cap.; 20 mg , Tk. 7.00/Cap.; Inj., 40 mg, Tk. 90.27/Inj.; Tab., 20 mg, Tk. 5.00/Tab.; 40 mg, Tk. 8.00/Tab.
Maxpro(Renata), Cap., 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 10.00/Cap.; Tab., 20 mg, Tk. 5.00/Tab.; 40 mg, Tk. 8.00/Tab.; Inj., 40 mg/vial, Tk. 90.00/Inj.
Naspro(Popular), Tab. , 20 mg, Tk. 10.00/Tab.; 40 mg, Tk. 8.00/Tab.
Neptor(Novartis), Cap. , 20 mg, Tk. 8.00/Cap.; Cap., 40 mg, Tk. 12.00/Cap.
Nexcap(UniMed), Cap., 20mg , Tk. 7.00/Cap.; 40mg, Tk. 9.00/Cap.
Nexcap(Unimed), Cap. , 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 9.00/Cap.
Nexe(Apex), Tab. , 20 mg, Tk. 5.00/Tab.; 40 mg, Tk. 8.00/Tab.; Cap., 20 mg, Tk. 6.00/Cap.
Nexum(Square), Cap, 20 mg, Tk. 7.02/Cap.; 40 mg, Tk. 10.03/Cap.; Inj., 40 mg/vial, Tk. 90.27/Inj.; Tab. , 20 mg , Tk. 10.00/Tab. ; 40 mg , Tk. 14.00/Tab. ; 40 mg, Tk. 8.07/Tab.
Nuloc(Monico), Tab., 20mg, Tk. 5.00/Tab.; 40mg, Tk. 90.00/Tab.
Onepro(One Pharma), Cap., 20 mg, Tk. 6.99/Cap.; 40 mg, Tk. 9.00/Cap.; Tab., 20 mg, Tk. 5.00/Tab.; 40 mg, Tk. 7.99/Tab.
Opton(Beximco), Cap., 20mg, Tk. 7.00/Cap. ; 40mg, Tk. 10.00/Cap.; Inj., 40mg, Tk. 110.00/Inj.; Tab., 40mg, Tk. 8.00/Tab.; 20mg, Tk. 5.00/Tab.

Prazia(Amico), Cap., 20mg , TK. 7.00/Cap.; 40mg , TK. 10.00/Cap.; Tab., 20mg, TK. 5.00/Tab.; 40mg , TK. 8.00/Tab.
Progut(Popular), Cap. , 20mg , Tk. 7.00/Cap. ; , 40 mg, Tk. 9.00/Cap.; Powder for Suspn., 20 mg/Sachet; Tab. , 20 mg, Tk. 5.00/Tab.;
Inj., (Popular), Inj. , 40 mg/Vial, Tk. 90.00/Vial
Pronex(Drug Intl), Tab., 20mg, Tk. 5.05/Tab.; 40mg, Tk. 8.05/Tab.; Cap., 20mg, Tk. 6.00/Cap.; 40mg, Tk. 8.00/Cap.; Inj., 40mg, Tk. 90.30/Inj.;
SB-Emec(Sunman-Bardem), Cap., 20 mg, Tk. 7.00/Cap.; 40 mg, Tk. 9.00/Cap.
Sergel(Healthcare), Cap., 20mg , Tk. 700.00/Cap.; 40mg , Tk. 500.00/Cap.; Tab., 20mg, Tk. 210.00/Tab.; Inj, 40mg , Tk. 100.00/Inj. ; 40mg/Vial, Tk. 100.00/Vial.; Tab., 40mg , Tk. 270.00/Tab.
Sompraz(Sun), Tab. , 20 mg, Tk. 6.00/Tab;40 mg, Tk. 9.00/Tab..
Somprazol(Sharif), Cap. , 20 mg, Tk. 6.00/Cap. ; 40 mg, Tk. 9.00/Cap.

Esomeprazole + Naproxen

Anaflex(ACI), Tab., 20mg+375mg, TK. 8.02/Tab.; 20 mg + 500 mg, TK. 10.03/Tab.
Demovo(Delta), Tab. , 20 mg + 375 mg, Tk. 8.00/Tab. ; 20 mg + 500 mg, Tk. 10/Tab.
Dinovo(Beximco), Tab., 375mg + 20mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Emaprox(Globe), Tab. , 375 mg + 20 mg, Tk. 3.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Emaprox(Globe), Tab.,20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg , Tk. 10.00/Tab.
Esona(Navana), Tab., 20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Eso-Plus(Asiatic), Tab., 500mg + 20mg, Tk. 10.00/Tab.; , 20 mg + 375mg, Tk. 8.00/Tab.
Esoxen (Organic), Tab. 20 mg + 375mg, mg, Tk. 8.03/Tab.; 20 mg + 500 mg, Tk. 10.03/Tab.
Inflect (Kemiko), Tab., 20 mg + 375mg, mg, Tk. 8.02/Tab.; 20 mg + 500 mg Tk. 10.03/Tab.
Locin(Globe), Tab., 20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Nameso(Opsonin), Tab, 20 mg + 375mg,, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Napexa (UniMed), Tab , 20 mg + 375mg, Tk. 12.00/Tab.; 20 mg + 500 mg, Tk. 16.00/Tab.
Napren ES(Alco), Tab. , 20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Napreso(Euro), Tab., 20 mg + 500 mg, Tk. 10.00/Tab.
Napro-A Plus(Acme), Tab20 mg + 375mg,, Tk. 8.03/Tab.; 20 mg + 500 mg mg, Tk. 10.03/Tab.
Naproflex(Somatec), Tab., 20 mg + 375mg,, Tk. 8.00/Tab.; 375 mg + 20 mg, Tk. 10.00/Tab.
Naprosyn Plus(Radiant), Tab., 20 mg + 375mg,, Tk. 16.05/Tab.; 20 mg + 500 mg, Tk. 20.06/Tab.

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Naprotec(Sharif), Tab., 20 mg + 375mg, mg, Tk. 8.03/Tab.; 500mg + 20 mg, Tk. 10.30/Tab.
Naprox Plus(Eskayef), Tab., 20 mg + 500 mg, Tk. 10.00/Tab.; 20 mg + 375mg., Tk. 8.00/Tab.
Naproxen(Zenith), Tab., 20 mg + 375mg., Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.; (Bristol), Tab., 20 mg + 500 mg, Tk. 10.00/Tab.
Naproxen Plus(Albion), Tab., 20 mg + 500 mg, Tk. 6.89/Tab.
Naproxzia(Amico), Tab., 500mg + 20mg, Tk. 10.00/Tab.
Naprozol(General), Tab., 20 mg + 375 mg, Tk. 8.00/Tab.; Tab., 20 mg + 500 mg, Tk. 10.00/Tab.
Napsec(Drug Intl), Tab., 20 mg + 375mg., Tk. 8.05/Tab.; 20 mg + 500 mg Tk. 10.05/Tab.
Napxon(Ziska), Tab., 20 mg + 375mg, mg, Tk. 256.00/Tab.; 500 mg + 20 mg, Tk. 320.00/Tab.
Nasopain(Julpher), Tab., 20 mg + 375 mg, Tk. 10.0/Tab.; 20 mg + 500 mg, Tk. 12.0/Tab.
Neso(Aristopharma), Tab., 20 mg + 375mg, , Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Nesotem(Team), Tab., 20 mg + 500 mg mg, Tk. 9.50/Tab.; 20 mg + 375mg, Tk. 7.50/Tab.
Novoxen(Orion), Tab., 20 mg + 375mg., Tk. 8.02/Tab.; 20 mg + 500 mg Tk. 15.03/Tab.
Nupralgin(Ibn Sina), Tab., 20 mg + 500 mg, Tk. 300.00/Tab.; 20 mg + 375mg., Tk. 80.00/Tab.
Progesic(Incepta), Tab., 20 mg + 375mg., Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Progut-N(Popular), Tab., 20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Ranoxen Plus(Rangs), Tab., 20 mg + 500 mg, Tk. 10.00/Tab.
Solivo(Healthcare), Tab., 20 mg + 375mg., Tk. 390.00/Tab.; 20 mg + 500 mg, Tk. 450.00/Tab.
Twist(Chemist), Tab., 20 mg + 500 mg, Tk. 10.00/Tab.
Xenap(Astra Biopharma), Tab., 20 mg + 500 mg.; 375mg + 20mg, Tk. 8.02/Tab.
Xenole(Square), Tab., 20 mg + 375mg., Tk. 8.03/Tab.; 20 mg + 500 mg Tk.10.03/Tab.

OMEPRAZOLE^{[ED][OTC]}

Indications: See notes above

Cautions: See notes above; exclude malignancy.

Interactions: See Appendix-2

Side-effects: See notes above

Dose: Benign gastric and duodenal ulcers, 20 mg once daily for 4 weeks in duodenal ulceration or 8 weeks in gastric ulceration; in severe cases increase to 40 mg daily; long term use not recommended

Benign gastric or duodenal ulcer associated with *H. pylori*, see section 2.3.6 for eradication therapy.

Zollinger-Ellison syndrome, initially 60 mg once daily; usual range 20-120 mg daily (above 80 mg in 2 divided doses). Erosive reflux oesophagitis, 20 mg daily for 4 weeks, followed by a further 4 weeks if not fully healed; 40 mg daily has been given for 8 weeks in reflux oesophagitis refractory to other treatment.

Proprietary Preparations

Anasec(Novo Healthcare), Cap., 40 mg, Tk. 7.00/Cap.; 20 mg, Tk. 5.00/Cap.; Inj., 40mg/Vial, Tk. 70.00/Vial
Aspra(Apex), Cap., 20 mg, Tk. 4.00/Cap.;
AU-20(Decent), Cap., 20mg, Tk. 4.50/Cap.
Cosec(Drug Intl), Cap., 20mg, Tk. 5.05/Cap.; 40mg, Tk. 8.05/Cap.; Inj., 40mg/Vial, Tk. 90.30/Vial
Curacid(Rangs), Cap., 20mg, Tk. 6.00/Cap.; 40mg, Tk. 9.00/Cap.
Deu(Monico), Cap., 20mg, Tk. 5.00/Cap.; Inj., 40mg/Vial, Tk. 80.00/Vial
Ema(Globe), Cap., 20 mg, Tk. 7.00/Cap; 40 mg, Tk. 9.00/Cap.; Tab., 20 mg, k. 4.75/Tab.; 40 mg, Tk. 8.00/Tab.; IV Inj., 40 mg/vial, Tk. 80.00/Vial
Esoprol(Ziska), Cap., 20mg, Tk. 5.00/Cap; 40mg, Tk. 8.00/Cap.
Eupi(Pharmasia), Inj., 40 mg/vial, Tk. 80.00/Vial; Cap., 20 mg, Tk. 5.00/Cap.
Exmart(MST), Tab., 20 mg, Tk. 5/Cap.; 40 mg, Tk. 8/Tab.
Exome(Chemist), Tab., 20 mg, Tk. 5.00/Tab.
Gap(Euro), Inj., 40mg/Vial, Tk. 9.00/Vial; Cap., 20 mg, Tk. 5.00/Cap.; 40mg, Tk. 8.00/Cap.
G-Omeprazole(Gonoshasthaya), Cap., 20mg, Tk 3.00/Cap.; Inj., 40 mg/vial, Tk. 65.00/Vial
Healer(Amico), Cap., 20mg , TK. 4.00/Cap.;
Inhibita(Delta), Cap., 20 mg, Tk. 4.00/Cap.; 40 mg, Tk. 7.00/Cap.
Inpro(Biopharma), Cap., 20 mg, Tk. 5.00/Cap.; 40 mg , Tk.7.03/Cap.; Inj., 40 mg/vial, Tk. 70.00/Vial
Inpro(Biopharma), Cap., 20mg, Tk. 5.00/Cap.; 40mg , Tk. 7.03/Cap.; Inj., 40mg/Vial, Tk. 70.00/Vial
I-Proton(Doctor TIMS), Cap., 20 mg, Tk. 5.00/Cap.
Losectil(Eskayef), Tab., 20mg , Tk. 4.00/Tab.; 10mg, Tk. 2.00/Cap.; 40mg , Tk. 7.00/Cap. ; Inj, 40mg/vial , Tk. 90.00/Vial; Powder forSusp., 20mg/Sachet , Tk. 5.00/Sachet; 40mg/Sachet , Tk. 8.00/Sachet; Cap, 20mg, Tk. 4.99/Cap.; 40mg , Tk. 7.00/Cap. ; Inj. , 40mg/Vial, Tk. 90.00/Vial

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Losek(Bristol), Cap., 20mg , Tk. 3.50/Cap.; 40mg, Tk. 7.00/Cap.
Lotil(Albion), Cap., 20 mg, Tk. 2.95/Cap.; 40 mg, Tk. 4.00/ Tab.
Neopra(Supreme), Cap, 20mg, Tk. 5.00/Cap.;
Norain(GSK), Cap., 20 mg, Tk. 5.01/Cap.
Nuprazol(Nuvista), Cap. , 20 mg, Tk. 5.00/Cap.
O-20(Asiatic), Cap., 20 mg , Tk. 5.00/Cap.; 40mg , Tk. 7.00/Cap.
Ome(Somatec), Cap., 20 mg, Tk. 5.00/Cap.; 40 mg, Tk. 8.00/Cap.
Omeben(Benham), Cap. , 20 mg, Tk.5/Cap.
Omepron(Nipro JMI), Cap., 20 mg, Tk. 6.00/Cap.; 40 mg, Tk. 8.00/Cap.
Omegut(Popular), Cap., 20mg, Tk. 5.00/Tab.; 40 mg, Tk. 7.03/Cap.; Inj., 40mg/Vial, Tk. 80.00/Vial
Omelet(Amulet), Cap., 40 mg, Tk. 7.00/Cap.; Cap., 20 mg, Tk. 5.00/Cap.
Omelock(One Pharma), Cap., 20 mg, Tk. 5.00/Cap.; 40 mg , Tk. 7.99/Cap.
Omenaaf(Naafco), Cap., 20 mg, Tk. 5.00/Cap.; 40 mg, Tk. 8.00/Cap.
Omenix(Incepta), Inj., 40 mg/vial, Tk. 90.00/Vial; Susp., 40 mg, Tk. 10.00/Sachet; Cap. , 20 mg, Tk. 5.00/Cap.; 20mg/Sachet , Tk. 6.00/Sachet
Omenta(Junphar), Cap., 20 mg, Tk.5.0/Cap.; Inj., 40 mg/vial, Tk. 90.00/Vial
Omep(Arist), Inj., 40mg/Vial, Tk. 80.00/Vial; Cap., 10mg , Tk. 2.00/Cap.; 20mg , Tk. 5.00/Cap.; 40mg , Tk. 7.00/Cap.
Omeptra(Alco), Cap., 20mg, Tk. 4.01/Cap. ; 40 mg, Tk. 7.02/Cap.
Omeprazole(APC), Cap., 20 mg, Tk. 2.50/Cap.
Omeprol(Ziska), Cap., 20 mg, Tk. 4.00/Cap.; 40 mg, Tk. 6.12/Cap.; Inj., 40mg/Vial, Tk. 70.00/Vial
Omesil(Silva), Cap., 20mg, Tk. 5.02/Cap.; 40 mg, Tk. 7.02/Cap.
Ometac(Navana), Cap., 20 mg, Tk. 4.02/Cap.; 40 mg, Tk. 6.02/Cap.
Ometem(Team), Cap., 20 mg, Tk. 4.75/Cap.; 40 mg, Tk. 7.50/Cap.
Ometid(Opsonin), Cap., 20 mg, Tk. 5.02/Cap.; 40 mg , Tk. 7.03/Cap.; Inj., 40mg/Vial, Tk. 90.27/Vial
Ometor(Astra Bio), Cap., 20 mg, Tk. 4.00/Cap.; 40 mg, Tk. 8.00/Cap.; Inj. , 40 mg/vial, Tk. 80.00/Vial
Ometor(Astra), Cap., 20 mg, Tk. 4.00/Cap.
Omevir(Virgo), Cap., 20 mg, Tk. 5.00/Cap.
Omex(Kemiko), Cap., 20 mg, Tk. 5.02/Cap.; 40 mg, Tk. 7.02/Cap.; Inj., 40mg/Vial, Tk. 87.00/Vial
Omex(Kemiko), Cap., 20 mg, Tk. 5.00/Cap.; 40 mg, Tk. 7.00/Cap.
Omidex(Modern), Cap., 20 mg. , Tk. 5.00Cap.
Omirex(Jayson), Cap., 20 mg, Tk. 5.00/Cap.; Cap., 40 mg, Tk. 8.00/Cap.
Omitac(G.A.Co), Cap., 20 mg, Tk. 5.00/Cap.
Omitin(Nipa), Cap., 40 mg, Tk. 7.00/Cap.; 20 mg, Tk. 4.00/Cap.
Omizit(White Horse), Cap., 20 mg, Tk. 4.00/Cap.
Omsec(Techno), Cap. , 20 mg, Tk. 4.00/Cap.; Inj., 40 mg/vial, Tk. 70.00/Vial
OP(Globe), Cap., 20 mg, Tk. 4.75/Cap.; 40 mg, Tk. 8.00/Cap.; Inj. , 40 mg/vial, Tk.70.00/Vial
OP max(Concord), Cap., 20 mg, Tk. 4.00/Cap.; Cap. , 40 mg, Tk. 7.00/Cap.
Opal(Healthcare), Cap., 20mg , Tk. 10.00/Cap.; 40mg , Tk. 8.00/Cap.; Inj., 40mg/Vial, Tk. 95.00/Vial
Opezen(Zenith), Cap., 20 mg.; 40 mg, Tk. 7.02/Cap.; Tk. 4.01/Cap.; Powder forSusp., 20mg/Sachet, Tk. 5.00/Sachet
Peptral(Labaid), Cap., 20 mg, Tk. 5.00/Cap.
Piazol(Globex), Cap., 20 mg, Tk. 4.00/Cap.
PPI(Acme), Inj., 40mg/Vial, Tk. 90.00/Vial; 20 mg, Tk. 5.01/Cap.; 40mg, Tk. 8.03/Cap.
Prazo(Pacific), Cap., 40 mg, Tk. 7.00/Cap.; 20 mg, Tk. 5.00/Cap. ; Tab., 20 mg, Tk. 2.50/Tab.
Prazole(Renata), Cap., 20 mg, Tk. 4.02/Cap.
Prazomax(SMC Enterprise), Cap., 20 mg, Tk. 4.00/Cap; 40 mg, Tk. 6.00/Cap.
Prazover(Veritas), Cap., 20 mg, Tk. 5/Cap.
Prazple(Renata), Cap., 20 mg, Tk. 5.00/Cap.
Presec(UniMed), Cap., 20mg, Tk. 4.00/Cap.; 40 mg, Tk. 7.00/Cap.
Prevas(General), Cap., 20mg; 40mg, Tk. 8.00/Cap.; Tk. 5.00/Cap. ; Inj., 40mg/Vial, Tk. 80.24/Vial
Probitor(Novartis), Cap., 20 mg, Tk 7.00/Cap.; 40 mg, Tk. 10.00/Cap.
Procap(Orion), Inj , 40 mg/vial, Tk. 90.27/Vial; Cap., 20 mg, Tk. 5.01/Cap.; 40mg, Tk. 8.02/Cap.
Proceptins(Beximco), Cap., 20mg, Tk. 5.00/Cap.; Cap., 40mg, Tk. 8.00/Cap.; Inj., 40mg/Vial, Tk. 100.00/Vial
Prolok(Ibn Sina), Cap. , 20mg, Tk. 5.00/Cap.; Inj., 40mg/Vial, Tk. 90.00/Vial; 40mg, Tk. 240.00/Cap.
Promezol(Sharif), Cap. , 20 mg, Tk.5.00/Cap.; 40 mg, Tk. 8.00/Cap.
Prosectil(Pharmacil), Cap. , 20 mg, Tk. 5.00/Cap.; Inj., 40 mg/vial, Tk. 90.00/Vial
Regerd(Organic), Cap. , 20 mg, Tk. 5.00/Cap.; 40 mg , Tk. 7.00/Cap.
Rome(Rephco), Cap. , 20 mg, Tk. 5.00/Cap.
Seclo(Square), Inj., 40mg/Vial, Tk. 80.24/Vial; Tab. , 20 mg, Tk. 5.02/Tab. ; 40 mg, Tk. 7.00/Tab. ; Cap., 20 mg, Tk. 5.02/Cap.; Cap., 40 mg, Tk. 8.03/Cap.
Seclogen(Biogen), Cap., 20 mg, Tk. 5.00/Cap.
Stosec(Opso Saline), Inj., 40 mg/vial, Tk. 52.83/Vial
Xeldrin(ACI), Cap., 10mg, Tk. 2.02/Cap; Cap., 20mg, Tk. 5.02/Cap.; Cap., 40mg, Tk.

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8.02/Cap; Inj., 40mg/Vial, Tk. 80.24/Vial; Tab., 20mg, Tk. 4.03/Tab.;
Xelopes(Beacon), Cap., 20mg, Tk. 5.02/Cap.; 40mg, Tk. 7.02/Cap.; Inj., 40mg/Vial, Tk. 90.27/Vial
Xerosec(Sanofi), Cap., 10 mg, Tk. 2.51/Cap.; 20 mg, Tk.5.00/Cap.; 40 mg, Tk.8.00/Cap.
Zilon(Radiant), Cap., 20 mg, Tk.5.00/Cap.; 40 mg, Tk. 7.50/Cap.

PANTOPRAZOLE

Indications: for suppression of acid secretion in gastric or duodenal ulcer, reflux oesophagitis Zollinger-Ellison syndrome; prophylaxis against acid aspiration syndrome during induction of anaesthesia. In conjunction with other drugs, for the eradication of *H. pylori*

Interactions: see Appendix-2

Side-effects: see notes above

Dose: by mouth in benign gastric ulcer or gastroesophageal reflux disease, 40 mg daily in the morning for 4 weeks, followed by further 4 weeks if not fully healed.

Duodenal ulcer or gastritis associated with *H. pylori*, 40 mg twice daily (with clarithromycin 250mg twice daily and metronidazole 400mg twice daily) for 7 days. CHILD not recommended.

Proprietary Preparations

Aup(Decent), Tab. 20mg, Tk. 3.00/Tab.; 40mg, Tk. 5.00/Tab.

Europant(Globe), Inj. 40 mg/Vial, Tk. 70.00/Vial; Tab. 20 mg, Tk. 4.00/Tab.; 40 mg, Tk. 6.00/Tab.

Exipro(Leon), Tab., 20 mg, Tk. 4.00/Tab.; 40 mg, Tk. 6.00/Tab.

Neopanta(Supreme), Tab., 20mg, Tk., 4.00/Tab., 40mg, Tk. 6.00/Tab.

Nixpan(Ad-din), Tab., 20 mg, Tk. 3.00/Tab.; 40 mg, Tk. 5.00/Tab.

P-20 & 40(Asiatic), Tab., 20mg, Tk. 4.00/Tab., 40mg, Tk. 6.00/Tab.

Pagerd(Organic), Tab, 20 mg, Tk. 4.02/Tab., 40 mg, Tk. 6.02/Tab.

Panfast(Monico), Inj., 40mg/Vial, Tk. 90.00/Vial

Panoral(Eskayef), Tab, 20 mg, Tk. 5.00/Tab., 20 mg, Tk. 5.00/Tab., 40 mg, Tk. 7.00/Tab., 40 mg, Tk. 7.00/Tab.

Panotem(Team), Tab., 40 mg, Tk. 6.50/Tab., 20 mg, Tk. 4.50/Tab.

Panoz(Astra Biop), Tab., 20 mg, Tk. 4.00/Tab., 40 mg, Tk. 7.00/Tab.

Panprazo(Pacific), Tab., 20 mg, Tk. 4.00/Tab.

Panpro(Biopharma), Tab., 40mg, Tk. 6.00/Tab., Inj., 40mg/Vial, Tk. 70.00/Vial, 20mg, Tk. 5.00/Tab.

Pansec(Drug Intl), Tab., 20mg, Tk. 5.05/Tab., Tab., 40mg, Tk. 7.05/Tab., Inj., 40mg/Vial, Tk. 90.30/Vial,

Pansec(Drug Intl), Tab., 20mg, Tk.5.00/Tab.; 40 mg, Tk. 7.00/Tab.; Inj., 40 mg/Vial, Tk. 90.00/Vial

Pansiv(MST), Tab., 20 mg, Tk. 4/Tab.; 40 mg, Tk. 6/Tab.

Pansos(Nipro JMI), Tab., 20mg, Tk. 3.00/Tab.; 40 mg, Tk. 5.00/Tab.

Pantac(Navana), Tab., 20 mg, Tk. 4.00/Tab.; 40 mg, Tk. 6.00/Tab.

Pantex(ACI), Inj., 40mg/Vial, Tk. 70.47/Vial, Cap., 20mg, Tk. 4.01/Cap., 40mg, Tk. 6.02/Cap., Tab., 20mg, Tk. 5.02/Tab., 40mg, Tk. 7.02/Tab.

Pantid(Opsonin), Inj., 40 mg/Vial, Tk. 90.27/Vial, Tab, 20 mg, Tk. 5.02/Tab., 40 mg, Tk. 7.02/Tab.

Pantium(Radiant), Tab, 40mg, Tk. 10.03/Tab., 20mg, Tk. 7.02/Tab.

Panto(Somatec), Tab., 20 mg, Tk. 4.00/Tab., 40 mg, Tk. 6.00/Tab.

Pantoid(Novo Health), Tab., 20 mg, Tk. 5.00/Tab.

Pantobex(Beximco), Inj., 40mg/Vial, Tk. 110.00/Vial, Tab., 20mg, Tk. 5.00/Tab., 40mg, Tk. 7.00/Tab.

Pantochem(Chemist), Tab., 20 mg, Tk. 3.00/Tab.; 40 mg, Tk. 5.00/Tab.

Pantodac(Ziska), Tab., 20 mg, Tk. 4.00/Tab., 40 mg, Tk. 6.00/Tab.

Pantogen(General), Tab., 20mg, Tk. 5.01/Tab., 40mg, Tk. 7.03/Tab.

Pantogut(Popular), Tab., 20mg, Tk. 5.00/Tab.; 40 mg, Tk. 7.00/Tab., Inj., 40 mg/Vial, Tk. 70.26/Vial

Pantolok(Ibn Sina), Inj., 40mg/Vial, Tk. 80.00/Vial, Tab., 20mg, Tk. 5.00/Tab., 40mg, Tk. 7.00/Tab.

Pantomax(Pharmacil), Inj., 40mg/Vial, Tk. 90.27/Vial

Panton(Bristol Tab, 20mg, Tk. 3.00/Tab., 40mg, Tk. 5.00/Tab.

Pantonix(Incepta), Inj., 40 mg/Vial, Tk. 90.00/Vial, Tab, Tk. 5.00/Tab, Tk. 7.00/Tab.

Pantopra(Alco), Tab., 40mg, Tk. 5.02/Tab., 20mg, Tk. 3.01/Tab.

Pantoprazole(Albion), Tab., 20 mg, Tk. 3.00/Tab.; 40 mg, Tk. 5.00/Tab.

Pantoprox(SMC Enterprise), Tab., 20 mg, Tk. 5.00/Tab.

Pantosec(Techno), Inj., 40 mg/Vial, Tk. 70.00/Vial

Pantosil(Silva), Tab., 40mg, Tk. 5.01/Tab., 20mg, Tk. 4.50/Tab.

Pantover(Veritas), Tab., 20 mg, Tk. 4.00/Tab.; Inj., 40 mg/Vial, Tk. 70.00/Vial
Pantozol(G.A.Co), Tab., 20 mg , Tk. 3.01/Tab., 40 mg , Tk. 5.02/Tab.
Pantrol(Apex), Tab., 20 mg, Tk. 3.00/Tab.
Panzer(Sun), Tab., 20 mg, Tk. 4.00/Tab.; 40 mg, Tk. 6.00/Tab.
Panzol(Amico), Tab., 20mg , Tk. 3.50/Tab., 40mg , Tk. 5.50/Tab.
Patanix(Nipa), Tab. , 20 mg, Tk. 4.60/Tab.
Pentosa(Pharmasia), Tab., 20 mg, Tk. 4.00/Tab.; 40 mg, Tk. 6.00/Tab.
P-Lock(One Pharma), Tab, 20 mg, Tk. 5.00/Tab., 40 mg, Tk. 6.99/Tab.
Pramax(Concord), Tab., 20 mg, Tk. 4.00/Tab.; 40 mg, Tk. 6.00/Tab.
Prazolin(Rephco), Tab., 20 mg, Tk. 4.00/Tab.; 40 mg, Tk. 6.00/Tab.
Pregel(Healthcare), Tab., 40mg, Tk. 7.00/Tab., 20mg , Tk.5.00/Tab., Inj, 40mg/Vial, Tk. 90.00/Vial,
Protium(UniMed), Tab , 20mg, Tk. 5.00/Tab., 40mg, Tk. 9.00/Tab.
Protocid(Acme), Inj., 40 mg/Vial, Tk. 90.00/ Vial, Tab, 20 mg, Tk. 5.00/Tab., Tab, 40 mg , Tk. 7.00/Tab.
Protoloc(Beacon), Tab., 20mg , Tk. .00/Tab., 40mg , Tk. 7.00/Tab.
Proton(Aristo), Inj., 40mg/Vial, Tk. 80.00/ Vial, Tab. 45.10g+ 40mg , Tk. 7.00/Tab.
Protonil(Renata), Tab., 20mg, Tk. 4.00/Tab., 40mg, Tk. 6.00/Tab.
Proton-P(Aristo), Tab., 20mg , Tk. 5.00/Tab.
Protozin(Euro), Tab., 20mg, Tk. 5.00/Tab., 40mg, Tk. 7.00/Tab.
Pz(Modern), Tab., 20 mg, Tk. 4.00/Tab., 45.10 mg, Tk. 6.00/Tab.
Topra(Jayson), Tab., 20 mg, Tk.3.00/Tab.; 40 mg, Tk.5.02/Tab.
Trupan(Square), Inj. , 40 mg/vial, Tk.80.24/ Vial, Tab, 20 mg, Tk.5.02/Tab., 40 mg, Tk.7.02/Tab.
Zenopan(Zenith), Tab. , 20 mg, Tk. 5.00/Tab.
Zopan(Kemiko), Tab., 20 mg, Tk. 4.01/Tab., 40 mg, Tk. 6.02/Tab.

RABEPRAZOLE SODIUM

Indications: listed in dose
Cautions: see notes above;exclude gastric malignancy before starting treatment
Contra-indications:pregnancy and breast-feedings
Interactions:see Appendix-2
Side-effects: chest pain, neck rigidity, Hypertension, Abnormal ECG, GI diturbances, anxiety, insomnia.

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Dose: erosive or ulcerative gastroesophageal reflux disease, 20 mg daily for 4-8 weeks; may be extended for further 8 weeks if necessary; maintenance, 20 mg daily.

Duodenal ulcer, 20mg daily for 4 weeks. Pathological hypersecretory conditions including Zollinger-Ellison syndrome, initially 60 mg once daily, may be increased to 100-120 mg daily.

Proprietary Preparations

Acifix(Beximco), Tab., 20mg , Tk. 5.00/Tab.
Finix(Opsonin), Tab., 20 mg , Tk. 5.03/Tab.
Nexrab(UniMed), Tab., Tk. 8.00/Tab.
Paricel(ACI), Cap., 20mg, Tk. 8.00/Cap., Tab., 20mg, Tk. 5.04/Tab., 10mg, Tk. 3.51/Tab.
Profast(Renata), Tab. , 20mg Tk. 5.00/Tab.
Prompton(Radiant), Cap. , 20mg , Tk. 8.02/cap.
R- 20(Asiatic), Tab., 20mg , Tk. 5.00/Tab.
Rabe(Aristopharma), Tab., 20mg , Tk. 5.00/Tab.
Rabeca(Square), Tab. , 20 mg, Tk. 5.02/Tab.
Rabecon(Biopharma), Tab., 20mg, Tk. 5.00/Tab.
Rabemax(General), Tab. , 20mg, Tk.5.00/Tab.
Rabepes(Beacon), Cap., 20mg , Tk. 8.00/Cap., Tab., 20mg, Tk. 5.02/Tab.
Rabeptra(Euro), Tab., 20mg, Tk. 5.00/Tab.
Rabesec(Drug Intl), Tab., 20mg, Tk. 5.05/Tab.
Rabetem(Team), Tab., 20 mg, Tk. 4.50/Tab.
Rabifast(Eskayef), Tab., 20 mg., Tk. 5.00/Tab., 20mg, Tk. 5.00/Tab., 20 mg., Tk. 5.00/Tab., 20mg, Tk. 5.00/Tab.
Rabigut(Popular), Tab., 20mg, Tk. 5/Tab.
Rabipep(Organic), Tab.,20 mg, Tk. 5/Tab.
Rabizol(Acme), Tab., 20.00 mg, Tk. 5.01/Tab.
Rabonac(Sharif), Tab., 20 mg, Tk. 5.01/Tab.
Rabprazo(Pacific), Tab., 20 mg, Tk. 5/Tab.
Rasonix(Incepta), Cap., 20 mg, Tk. 3.50/Cap., 30 mg, Tk. 8.00/Cap., Tab., 20mg, Tk. 5.00/Tab.,
Rasoz(Astra Biopharma), Tab., 20 mg, Tk. 5.00/Tab.
Razole(Kemiko), Tab., 20 mg, Tk. 5.00/Tab.
Respate(Sanofi), Tab. , 20mg, Tk. 6.02/Tab.
RP-20(Globe), Tab., 20 mg, Tk. 5.00/Tab.
Xorel(Ibn Sina), Cap. , 20mg, Tk. 4.00/Cap., Tab., 20mg, Tk. 3.00/Tab.

2.3.4 CHELATES AND COMPLEXES

Tripotassium dicitratobismuthate is a bismuth chelate, which promotes healing of gastric and duodenal ulcers. It may act by coating the ulcer or by stimulating bicarbonate secretion. As it is also likely

2. GASTRO-INTESTINAL SYSTEM

to adhere to food rather than to the top the surface of the ulcer, patients should be advised to avoid large food, antacids, and large quantities of milk when taking bismuth chelate.

Sucralfate is a complex of aluminium hydroxide and sulphated sucrose and has minimal antacid properties. It has been used for gastric and duodenal ulcers and may act by protecting the mucosa from acid pepsin attack. Long term use needs further assessment because some aluminium may be absorbed.

SUCRALFATE

Indications: palliative treatment of benign gastric and duodenal ulceration; chronic gastritis

Cautions: renal disease

Interactions: see Appendix-2; antacids should not be taken half an hour before or after a dose

Side-effects: constipation; gastric discomfort reported.

Dose: 2g twice daily (on rising and at bedtime) or 1g 4 times daily 1 hour before meals and at bedtime, taken for 4 weeks or in resistant cases up to 8 weeks; max. 8g daily.

Proprietary Preparations

Antepsin(Kemiko), Tab., 1000 mg, Tk. 5.52/Tab.

Gastalfet(Beximco), Tab., 1000 mg, Tk. 6.00/Tab., 500 mg, Tk. 4.02/Tab.

Ulsec(Asiatic), Tab., 1000 mg, Tk. 5.50/Tab.

2.3.5 PROSTAGALNDIN ANALOGUES

Misoprostol, a synthetic analogue of prostaglandin E1 (alprostadi) inhibits gastric acid secretion promoting healing of gastric and duodenal ulcer. It can protect against NSAID associated gastric ulcers but not dyspepsia.

MISOPROSTOL^[ED]

Indications: see notes above and under dose

Cautions: conditions where hypotension might precipitate severe complications (e.g. cerebrovascular disease, cardiovascular disease)

Contraindications: pregnancy or planning pregnancy (increases uterine tone). Should not be used in women of child-bearing age unless the patient requires NSAID therapy and is at high risk of NSAID induced ulceration; *patient must be advised of the risks of taking misoprostol if pregnant*

Interactions: see Appendix-2

Side-effects: diarrhoea (may be severe, reduced by giving single dose not exceeding 200 micrograms and by avoiding magnesium containing antacids); also reported: abdominal pain, dyspepsia, flatulence, nausea and vomiting, abnormal vaginal bleeding (including intermenstrual bleeding, menorrhagia, and post menopausal bleeding)

Dose: benign gastric and duodenal ulceration, 800 micrograms daily (in 2-4 divided doses) with breakfast (or main meals) and at bedtime; treatment should be continued for at least 4 weeks and may be continued for up to 8 weeks if required. Prophylaxis of NSAID induced peptic ulcer, 200 micrograms 2-4 times daily according to condition of patient.

Proprietary Preparations

Cytomis(Incepta), Tab., 200 mcg, Tk. 15.00/Tab.

G-Misoprostol(Gonoshasthaya), Tab., 200 mcg, Tk.10.00 /Tab.

Indula(Renata), Tab., 200 mcg, Tk. 15.00/Tab.

Isovent(Square), Tab., 200 mcg, Tk. 15.10/Tab. ; 600 mcg, Tk. 40.13/Tab.

Misoclear(Acme), Tab., 200 mcg, Tk. 15.04/Tab.

Misoclear(Acme), Tab., 200 mcg, Tk. 15.00/Tab.

Misopa(Beximco), Tab., 200mcg, Tk. 15.00/Tab.

Misopil(General), Tab., 200mcg, Tk. 15.00/Tab.

Misoprostol(Amico), Tab., 200mcg, Tk. 15.00/Tab.

Misotab(Euro), Tab., 200mcg, Tk. 15.00/Tab.

Misotec(Sharif), Tab., 200 mcg, Tk. 15.04/Tab.

Misotol(Ziska), Tab., 200 mcg, Tk. 15.00/Tab.

2. GASTRO-INTESTINAL SYSTEM

2.3.6 DRUGS FOR ERADICATION OF *HELICOBACTER PYLORI*

The causal role of *H. pylori* in gastric and duodenal ulcer is now widely accepted. Long-term healing of gastric and duodenal ulcers can be achieved by eradicating *H. pylori*, and after such eradication the incidence of relapse decreases. Studies have shown that with *H. pylori* eradication only 5-10% patients experienced relapse within a year compared to 85% of patients who do not have *H. pylori* eradication, and the benefit appeared to continue for about 7 years. It is recommended that the presence of *H. pylori* be confirmed before starting eradication treatment.

One week's triple therapy containing a proton pump inhibitor (omeprazole) and clarithromycin with either metronidazole or amoxicillin produces eradication in over 90% of patients. Clarithromycin may be substituted with both metronidazole and amoxicillin. Ranitidine or bismuth chelate may be used in place of omeprazole. **Two weeks' triple therapy** regimen may give higher eradication rate but adverse effects are common and compliance is poor.

Recommended regimens for *H. pylori* eradication (7-day course)

Omeprazole 20 mg twice daily +
Clarithromycin 500 mg twice daily +
Amoxicillin 1 g twice daily

Lansoprazole 30 mg twice daily +
Clarithromycin 500 mg twice daily +
Amoxicillin 1 g twice daily

Omeprazole 20 mg twice daily +
Clarithromycin 500 mg twice daily +
Metronidazole 400 mg twice daily

Lansoprazole 30 mg twice daily +
Clarithromycin 500 mg twice daily +
Metronidazole 400 mg twice daily

Lansoprazole 30 mg twice daily +
Metronidazole 400 mg twice daily +
Amoxicillin 1 g twice daily

Omeprazole 20 mg twice daily +
Metronidazole 400 mg thrice daily +
Amoxicillin 500 mg thrice daily

Pantoprazole 40mg twice daily +
Clarithromycin 500mg twice daily +
Amoxicillin 1g twice daily

Ranitidine bismuth citrate 400 mg twice daily +
Clarithromycin 500mg twice daily +
Amoxicillin 1 g twice daily

TRIPLE THERAPY COMBINED PREPARATIONS

Proprietary Preparations

Lansoprazole 30 mg + Clarithromycin 500 mg + Amoxicillin 1 g

H.Pylori (Acme), Cap. , Tk. 55.16/Cap.

Helicon kit (General), Cap., Tk. 55.37/Cap

Pylopac (Beximco), Tab., Tk.45.00/blister strip

Pylotrip (Square), Cap. , Tk. 55.16/Cap.

Omeprazole 20 mg + Clarithromycin 500mg + Metronidazole 500mg

Neo Kit (Beximco), Tab. Tk.55.00/ blister strip

Amoxicillin + Clarithromycin + Rabeprazole Sodium

Pylocure (Opsonin), Kit, Tk. 55.36/Tab.

Esomeperazole 20mg Cap. 1pc+Amoxacillin 50mg tab 2 pcs. + Clarithromycin 500mg tab.

Maxpro (Renata), Tk. 13.75/Kit

2.4 DRUGS FOR ACUTE DIARRHOEA

Diarrhoea is characterized by increased volume and frequency of liquid stools. It is commonly associated with infection, but may result from accumulation of non-absorbed osmotically active solute in gut such as in lactose deficiency, or when intestinal motility or morphology is altered. Diarrhoea is a symptom of gastroenteritis and of most intestinal infections. The first line of treatment in acute diarrhoea is **oral rehydration therapy (ORT)**.

ORAL REHYDRATION SALTS^[ED] [OTC]

Each sachet of the proprietary preparations contains: sodium chloride 1.75 g, potassium chloride 0.75 g, trisodium citrate dihydrate 1.45 g and anhydrous dextrose 10 g. This is the WHO approved formulation for ORS.

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Contents of one sachet are dissolved in 500 ml of drinking water for ready use.

Proprietary Preparations

ACI ORS(ACI), ORS, Tk. 5.00/Sachet; Tk. 4.60/Sachet
Asaline(Apex), ORS, Tk. 4.58/Sachet
Easy ORS(Central), ORS, Tk. 4.58/Sachet
G-ORS(Gonoshasthaya), ORS, Tk. 4/Sachet
K-SALINE FRUITY(Kemiko), ORS, Tk. 5.00/Sachet
K-SALINE N (Kemiko), ORS, Tk. 4.58/Sachet
Naafco ORS(Naafco), ORS, Tk.5.00/Sachet
Neorice ORS(Eskayef), ORS, Tk. 12.00/Sachet
Neosaline(Eskayef), ORS, Tk. 5.00/ Sachet; Tk. 5.00/Sachet; Tk. 5.00/Sachet; Tk. 5.00/Sachet
O Fruity(Zenith), ORS, Tk. 4.58/Sachet
O Saline(Zenith), ORS, Tk. 3.44/Sachet; Tk. 3.22/Sachet
OR Saline(Popular), ORS, Tk. 5.00/ Sachet
Oralsaline(Albion), ORS, Tk. 5/Sachet
Oralsaline Sweet(Albion) ORS, Tk. 5/Sachet
Orasol(Sonear), ORS, Tk. 3.20/Sachet
ORS(Popular), ORS, Tk. 4.58/Sachet
Rice ORS(General), ORS, Tk. 10.00/Sachet; Tk. 15.05/Sachet; Tk. 9.03/Sachet; Tk. 17.00/Sachet
R-Saline(Rephco), ORS, Tk. 3.20/Sachet
R-Saline N(Rephco), ORS, Tk. 4.50/Sachet
Saline(Renata), ORS, Tk. 5.00/Sachet
Saline R(Renata), ORS, Tk. 4.58/Sachet
SOS(Supreme), ORS, Tk. 4.58/Sachet
SOS(Supreme), ORS, Tk. 5.00/Sachet; Tk. 5.00/Sachet
SOS Plus Mango(Supreme), ORS, Tk. 5.00/Sachet
Super (Amico), ORS, Tk. 4.60/Sachet
Super Saline(Amico), ORS, Tk. 4.57/Sachet
Unisal(Ibn Sina), ORS, Tk. 5.00/Sachet; Tk. 5.00/Sachet; Tk. 5.00/Sachet; Tk. 5.00/Sachet
Unisal Fruity(Ibn Sina), ORS, Tk. 5.00/Sachet
Virgos(Virgo), ORS, Tk. 4.58/Sachet
Zenith(Zenith), ORS, Tk. 5.00/Sachet
Zeosaline(Sharif), ORS, Tk. 4.58/Sachet
Ziska(Ziska), ORS, Tk. 5.00/ Sachet

IV REHYDRATION THERAPY

Proprietary Preparations

Cholera Saline:
Usual strength for IV infusion, potassium chloride 0.1% sodium chloride 0.5% ;and sodium acetate 0.393%
Cholenak (Square), IV Infusion, Tk. 92/1000ml; , Tk. 70.15/500ml

Cholera Saline (Opsosaline), IV Infusion Tk.69.94/500ml; Tk. 91.72/1000ml
Dianak(Orion), IV Infusion Tk.49.78/500ml Tk. 65.50/1000 ml
Diasol(Libra), IV Infusion Tk. 52.60 /500ml; Tk. 65.74/100ml
Koloride(Beximco), IV Infusion Tk. 70.14/500ml; Tk. 91.99/1000ml
Kolosal (Popular), IV Infusion, Tk. 70.14/500ml, Tk. 92.00/1000ml

CEREAL BASED ORS

It contains sodium chloride 3.5 g, potassium chloride 1.5 g, sodium bicarbonate 2.5 g and 50 g boiled rice powder to be dissolved in 1 litre of boiled drinking water.

Proprietary Preparations

Easy ORS Plus Saline(Central), ORS, Tk. 12.00/Sachet
Rice ORS(Square), ORS, Tk. 10/500 ml Sachet ;Tk. 6.00/250ml Sachet
Rice Saline(General), ORS, Tk. 15/500ml Sachet, Tk. 9.00/250ml Sachet
Neorice(Eskayef), ORS, Tk. 12.00/Sachet

ANTIDIARRHOEAL DRUGS WHICH REDUCE MOTILITY

LOPERAMIDE HYDROCHLORIDE

Indications: acute diarrhoea in adults and children over 4 years (see notes above); chronic diarrhoea in adults only
Side-effects: occasional rashes
Dose: acute diarrhoea, 4 mg initially followed by 2 mg after each loose stool for up to 5 days; usual dose 6-8 mg daily, max. 16 mg daily; CHILD 4-8 years 1 mg 4 times daily for up to 3 days only, 9-12 years 2 mg 4 times daily for up to 5 days
Chronic diarrhoea in adults, initially, 4-8 mg daily in divided doses, subsequently adjusted according to response and given in 2 divided doses for maintenance

Proprietary Preparations

Imotil(Square), Cap., 2 mg, Tk.1/Cap.
Lopamid(Acme), Cap., 2 mg, Tk. 1/Cap.
Loperin, (Opsonin), Cap., 2 mg, Tk. 1/Cap.
Nomotil(Ziska), Cap, 2mg, Tk.0.60/Cap.

RACECADOTRIL

Indications: is used in the treatment of diarrhoea. It is used, when fluid and dietary measures are not sufficiently effective to control diarrhoea.

Cautions and Contraindications:

hypersensitivity to the Racecadotril, blood in stools, breastfeeding, diarrhoea, pregnancy, Renal insufficiency Severe liver or kidney disease Uncontrolled vomiting

Side Effects: nausea, headache, angioedema, rashes, Pain, Swelling of the eyelid, Skin redness, Vomiting, Constipation, Chronic diarrhoea

Dose: In infant less than 9 kg: one 10 mg sachet 3 times daily.

In infant from 9 kg to 13: kg two 10 mg sachets 3 times daily

Proprietary Preparations

Racetril (*Incepta*), Cap., 100 mg, Tk. 6.00/Cap.,
Suspn., 10 mg, Tk. 7.00/Suspn., 30 mg, Tk.
10.00/Suspn.

Racedot (*Square*), Cap., 100 mg, Tk. 8.03/Cap.

Rehydriol (*Ibn Sina*), Cap., 100mg, Tk.
195.00/Cap.

Radola (*ACI*), Cap., 100mg, Tk. 6.00/Cap.

2.5 DRUGS FOR CHRONIC DIARRHOEAS

Chronic diarrhoea may be associated with underlying diseases and therefore symptomatic relief is less appropriate than treatment of disease itself. Where the disease process responsible for chronic diarrhoea can not be satisfactorily suppressed, symptomatic relief with antimotility drugs such as **loperamide** or diphenoxylate with atropine may be appropriate. Bulk laxatives such as ispaghula (*Isop gul*), methylcellulose bran etc. have also been used for symptomatic treatment because of their absorptive capacity. Opioids with a central action (e.g. codeine) are better avoided because of the risk of dependence.

IRRITABLE BOWEL SYNDROME: This can present with pain, constipation, or diarrhoea, all of which may benefit from a high fibre diet with bran or other agents

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which increase stool bulk, if necessary. In some patients there may be important psychological aggravating factors, which respond to reassurance. Anti-diarrhoeal drugs such as loperamide may sometimes be necessary but prolonged use may aggravate the condition. Anti-spasmodics may relieve the pain.

INFLAMMATORY BOWEL DISEASES

Chronic inflammatory bowel diseases include ulcerative colitis and Crohn's disease. Drug treatment consists of **aminosalicylates** (**sulphasalazine, mesalazine, balsalazine, olsalazine**) and corticosteroids (hydrocortisone, budesonide and prednisolone). Maintenance of nutrition is important. Severe chronic active disease may require surgery.

MALABSORPTION SYNDROME : individual conditions need specific treatment and also general nutritional consideration. Thus coeliac disease (gluten enteropathy) usually needs a gluten free diet and pancreatic insufficiency needs pancreatic supplements.

ULCERATIVE COLITIS : for acute mild to moderate diseases affecting rectum or sigmoid colon, topical corticosteroid treatment such as prednisolone enemas or suppositories will induce remission; foam preparations are especially useful where patients have difficulty retaining liquid enemas. More extensive diseases may be treated with an aminosalicylate but may require oral corticosteroid treatment. Severe extensive or fulminant disease may need hospital admission, intravenous corticosteroid administration, intravenous fluid and electrolyte replacement and/or blood transfusion, parenteral nutrition and antibiotics.

Corticosteroids are unsuitable for maintenance treatment because of side-effects. **Sulphasalazine mesalazine and olsalazine** all have value in preventing relapse and choice is related in part to their different side-effects. In resistant cases **azathioprine** (see section 14.2.1) 2 mg/kg daily, given under close supervision may be helpful.

Laxatives are required to facilitate bowel movement when proctitis is present but a

2. GASTRO-INTESTINAL SYSTEM

high fibre diet and bulk forming drugs such as methylcellulose or ispaghula (*Isop gul*) are more useful in adjusting faecal consistency.

Symptoms of mild ulcerative colitis may be relieved with antidiarrhoeal drugs such as codeine or loperamide but they should be used with caution in severe cases as paralytic ileus and toxic megacolon may be precipitated. For similar reasons antispasmodics should not be used in ulcerative colitis.

CROHN'S DISEASE: Treatment particularly of colonic diseases is similar to that for ulcerative colitis. In small bowel disease sulphasalazine is of doubtful value. Oral corticosteroids (e.g. prednisolone) suppress inflammation, and metronidazole may be beneficial possibly through antibacterial activity. Other antibacterials should be given if specifically indicated and for managing bacterial overgrowth in the small bowel. Infliximab, a monoclonal antibody inhibiting pro-inflammatory cytokines, and TNF-alpha has recently been indicated for severe Crohn's disease refractory to corticosteroids, but may be associated with development of extrapulmonary tuberculosis.

In both colitis and Crohn's disease general nutritional care and appropriate supplements are essential. Cholestyramine and aluminium hydroxide mixture, bind unabsorbed bile salts and provide symptomatic relief of diarrhoea following ileal disease or resection, in bacterial colonisation of the small bowel and in post-vagotomy diarrhoea.

PSEUDOMEMBRANOUS COLITIS: This is due to colonisation of the colon with *Clostridium difficile* that may develop after antibiotic therapy. Ampicillin, clindamycin and lincomycin have been implicated most frequently but few antibiotics are free of this side-effect. It is usually of acute onset, but may run a chronic course. Oral vancomycin or metronidazole has been advocated as specific treatment.

DIVERTICULAR DISEASE: This is treated with a high fibre diet, bran supplements and bulk forming laxatives.

Antispasmodics may provide symptomatic relief when colic is a problem. Antibiotics should be used only when the diverticula in the intestinal wall become infected. Antidiarrhoeal drugs which slow the intestinal motility (e.g. codeine, diphen-oxylate and loperamide) could possibly exacerbate the symptoms of diverticular disease and are therefore contra-indicated.

AMINOSALICYLATES

MESALAZINE

Indications: maintenance of remission in ulcerative colitis

Cautions: elderly, renal impairment, pregnancy and breast-feeding; avoid administration with lactulose.

Contraindications: salicylate hypersensitivity; severe renal impairment.

Side-effects: nausea, diarrhoea, and abdominal pain; headache; exacerbation of symptoms of colitis; rarely reversible pancreatitis; reversible myocarditis also reported

Dose: by mouth, 1.2-2.4 g daily in divided doses.

Proprietary Preparations

Canasa(Drug Intl), Tab., 400mg, Tk. 5/Tab.

Mesagut(Aristo), Tab., 400mg, Tk. 7.60/Tab.

Pentasa⁽¹⁾(Feering), Sachet, 1gm, Tk. 69.19/Sachet, 2gm, Tk. 131/Sachet

SULPHASALAZINE^[ED]

Indications: induction and maintenance of remission in ulcerative colitis; treatment of active Crohn's disease

Cautions: pregnancy; hepatic and renal disease, glucose 6-phosphate dehydrogenase (G6PD) deficiency including breast-feeding of affected infants; slow acetylator status; withdraw treatment if blood disorders, hypersensitivity reactions, or other serious disorders occur; upper gastrointestinal side-effects are common with doses over 4g daily; blood counts, liver function, and rheumatoid arthritis, see section 9.1.3

2. GASTRO-INTESTINAL SYSTEM

Contraindications: salicylate and sulphonamide hypersensitivity; porphyria
Interactions: see Appendix-2

Side-effects: nausea, vomiting, epigastric discomfort, headache, rashes; occasionally, fever, minor haematological abnormalities such as Heinz body anaemia, reversible neutropenia, folate deficiency; reversible azospermia; rarely: pancreatitis, exacerbation of colitis, thrombo-cytopenia, agranulo-cytosis, Steven's-Johnson syndrome, neurotoxicity, photo-sensitisation, lupus erythematosus like syndrome, and pneumonitis; proteinuria and crystalluria; urine may be orange coloured; soft contact lenses may be stained

Dose: by mouth, acute attack 1-2 g 4 times daily (but see Cautions) until remission occurs (if necessary, corticosteroids may also be given), reducing to a maintenance dose of 500 mg 4 times daily; CHILD over 2 years, acute attack 40-60 mg/kg daily, maintenance dose 20-30 mg/kg daily.

By rectum, as suppositories, alone or in conjunction with oral treatment 0.5-1 g morning and night after a bowel movement. As an enema, 3 g at night, retained for at least 1 hour.

Proprietary Preparations

Reumazin(Aristo), Tab., 500 mg, Tk. 5.20/Tab.

Salazine(Opsonin), Suppository, 500 mg, Tk. 10.00/Supp.; Tab., 500 mg, Tk. 5.23/Tab.

Sulfacol(Drug Intl), Tab., 500 mg, Tk. 5.05/Tab.

Sulfazin(Popular), Tab., 500 mg, Tk. 5.22/Tab.

Zulfidin(UniMed), Tab, 500 mg, Tk. 7.00/Tab

2.6 LAXATIVES

- 2.6.1 Bulk forming drugs
- 2.6.2 Stimulant laxatives
- 2.6.3 Faecal softeners
- 2.6.4 Osmotic laxatives

2.6.1 BULK FORMING LAXATIVES

These relieve constipation by increasing faecal mass which stimulates peristalsis, but patients should be told that the full

effect may take some days to develop. They are useful in the management of patients with colostomy, ileostomy, haemorrhoids, anal fissure, chronic diarrhoea associated with diverticular disease, irritable bowel syndrome, and ulcerative colitis. Adequate fluid intake must be maintained to avoid intestinal obstruction.

Methylcellulose ispaghula (*Isop gul*), and **sterculia** are useful in patients who cannot tolerate bran. Methylcellulose also acts as a faecal softener.

ISPAGHULA HUSK

(*Isop Gul husk* or '*bhushi*')

Indications: See notes above

Cautions: adequate fluid intake should be maintained to avoid intestinal obstruction; ulcerative colitis.

Contraindications: Intestinal obstruction, colonic atony, faecal impaction

Side-effects: Flatulence, rarely abdominal distension

Dose: ADULT 3.5g in water twice daily preferably after meals; CHILD over 6 years half the adult dose

COUNSELING: Preparations that swell in contact with liquid should always be carefully swallowed with water and should not be taken immediately before going to bed

Proprietary Preparation

Albi-Tasty Ispaghul(Albion), Powder 3.5 gm, Tk. 4.00/Sachet

Fiberlax(Incepta), Effervescent Granules Tk. 400.00/20 gm Container

Ispergul(Square), Powder, 0, Tk. 395/120gm Container

LUBIPROSTONE

Indications: chronic constipation in adults, irritable bowel syndrome

Side effects: nausea, diarrhea, headache, flatulence

Contraindications: liver and kidney disease; chronic diarrhea, bowel obstruction, diarrhea-predominant IBS

Dose: 25 microgram twice daily to treat constipation; 8 microgram twice daily to

2. GASTRO-INTESTINAL SYSTEM

treat IBS in women 18 years of age and older

Proprietary Preparation

Lubistone(Incepta), Cap. , 8 mcg, Tk. 15.00/Cap. ; 24 mcg, Tk. 40.00/Cap.
Lubilax(Beacon), Cap., 24 mcg, Tk. 40.12/Cap.; 8 mcg, Tk. 15.05/Cap

METHYL CELLULOSE

Indications: *see notes above*

Cautions; Contraindications; Side-effects; Counseling: *see under Ispaghula Husk*

Dose: 800-1600g twice daily with at least 300 ml water

Proprietary Preparation

Celulose(Acme), Tk.0.82/Tab.

2.6.2 STIMULANT LAXATIVES

BISACODYL

Indications: *see under Dose*; tablets act in 10-12 hours; suppositories act in 20-60 minutes

Cautions; Contraindications; Side-effects: *see notes on stimulant laxatives*; tablets, griping; suppositories, local irritation

Interactions: *see Appendix-2*

Dose: *By mouth* for constipation, 10 mg at night; occasionally necessary to increase to 15-20 mg; CHILD 5 mg
By rectal suppositories, for constipation 10 mg in the morning; CHILD 5 mg.
Before radiological procedures and surgery, 10 mg by mouth at bedtime for 2 days before examination, and if necessary, a 10 mg suppository 1 hour before examination.

Proprietary Preparations

Bisacodyl(Albion), Tab. , 5 mg, Tk. 0.70/Tab.
Duralax(Opsonin), Tab., 5 mg, Tk. 0.71/Tab.

SENNA^[ED]

Indications: Constipation; bowel evacuation before abdominal radiological procedures, endoscopy, and surgery; acts in 8-12 hours.

Cautions; Contraindications and Side-effects: *See notes on stimulant laxatives*

Proprietary Preparation

Laxenna(GSK), Tab. 12mg, Tk. 1.25/Tab.

SALINE LAXATIVE

Proprietary Preparation

Fleetenema^(®)(CB Fleet) Tk.214.24/133ml., Tk.214.24/66ml

2.6.3 FAECAL SOFTENERS

Liquid paraffin the classical lubricating agent, has disadvantages (see below). Bulk laxatives, non-ionic surfactant "wetting" agents e.g. docusate sodium, and glycerol suppositories also have softening properties. Such drugs are useful in the management of haemorrhoids and anal fissure. Enemas containing 130 ml of **arachis oil** (ground-nut oil) would lubricate and soften impacted faeces and promote bowel movement. For children above 6 years, the dose has to be reduced in proportion to body-weight; not recommended for children under 6 years.

LIQUID PARAFFIN

Indication: constipation

Cautions: avoid prolonged use; should not be taken immediately before going to bed

Side-effects: anal seepage of paraffin and consequent anal irritation after prolonged use, granulomatous reactions caused by absorption of small quantities of liquid paraffin (especially from the emulsion), lipoid pneumonia, and interference with the absorption of fat-soluble vitamins

Dose: *by mouth* 10-30 ml of the oral emulsion (see below) as required

Generic Preparation

Liquid Paraffin Oral Emulsion BP, Oral Emulsion, contains liquid paraffin 5 ml, vanillin 5 mg, chloroform 0.025 ml, benzoic acid solution 0.2 ml,

methylcellulose-20 200 mg, saccharin sodium 500 micrograms, water to 10 ml.
Liquid Paraffin and Magnesium Hydroxide Oral Emulsion BP, Oral Emulsion, 25% liquid paraffin in aqueous suspension containing 6% hydrated magnesium oxide. **Dose:** for constipation, 5-20 ml as and when required.

Proprietary Preparations

Frelax (Beximco), Oral emulsion, Tk. 95/100ml
Magfin (Incepta), Oral emulsion Tk. 95/100ml
Nesifin (Opsonin), Oral emulsion, Tk. 83.57/100ml

2.6.4 OSMOTIC LAXATIVES

Osmotic laxatives are drugs, which act by retaining fluid in the bowel by the mechanism of osmosis. They may also act by changing the pattern of water distribution in the faces.

LACTITOL

Indications : to promote gut motility in chronic constipation

Proprietary Preparations

Fibolac (Radiant), Powder, 10 gm/Sachet, Tk. 40.00/10 gm Sachet
Lacticon (ACI), Powder, 10 gm/Sachet, Tk. 25.00/10gm Sachet
Laxitol (Eskayef), Liquid, 3.3335 gm /5 ml, Tk. 120.00/100ml; Powder, 10 gm/Sachet, Tk. 12.00/10 gm Sachet; 3.3335 gm /5 ml, Tk. 120.00/100ml; 3.3335 gm /5 ml, Tk. 65.00/50ml; Powder, 10 gm/Sachet, Tk. 12.00/10 gm Sachet
Maxilax (Opsonin), Liquid, 3.3335 gm /5 ml, Tk. 120.00/100 ml; 3.3335 gm /5 ml, Tk. 65.00/50 ml; Powder, 10 gm/Sachet, Tk. 12.00/10gm Sachet
Sinalax (Ibn Sina), Powder, 10 gm/Sachet, Tk. 13.00/10 gm Sachet

LACTULOSE^[ED]

Indications: Constipation (may take up to 48 hours to act), hepatic (portal systemic) encephalopathy.

Contraindications: Galactosaemia, intestinal obstruction.

Interactions: See Appendix-2

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Side-effects: Flatulence, cramps, and abdominal discomfort.

Dose: Expressed in terms of an oral solution containing lactulose 3.35 g/5ml
 Constipation, ADULT initially 15 ml twice daily, gradually reduced according to patient's needs; CHILD under 1 year 2.5 ml, 1-5 years 5 ml, 6-12 years 10 ml twice daily, gradually reduced.
 Hepatic encephalopathy, 30-50 ml 3 times daily, subsequently adjusted to produce 2-3 soft stools daily.

Proprietary Preparations

Actilac (Healthcare), Oral Solution, 68%, Tk. 230.00/5ml; 68%, Tk. 125.00/5ml
Asilac (Asiatic), Oral Solution, 68%, Tk. 120.00/100ml; 68%, Tk. 230.00/200ml
Avolac (Aristopharma), Oral Solution, 68%, Tk. 140.00/100ml, Tk. 250.00/200ml
Avolose (Team), Oral Solution, 68%, Tk. 135.00/100ml; 68%, Tk. 245.00/200ml
Conlax (UniMed), Oral Solution, 68%, Tk. 140.00/100ml
Diac (Drug Intl), Oral Solution, 68%, Tk. 120.40/100ml; 68%, Tk. 220.70/200ml; 68%, Tk. 70.25/50ml
Ezylax (Orion), Oral Solution, 68%, Tk. 140.00/100ml; 68%, Tk. 65.00/50ml
Glovolac (Globex), Oral Solu., 3.40 gm/5 ml, Tk. 120.00/100 ml
Hepalac (Supreme), Oral Solution, 67%, Tk. 120.00/100ml & Tk. 230.00/200ml
Inolac (Incepta), Oral Solution, 68%, Tk. 120.00/100ml
Laclose (Opsonin), Oral Solution, 68%, Tk. 120.37/100ml
Lactolax (Pharmasia), Oral Solu., 3.40 gm/5 ml, Tk. 100.00/100 ml
Lactomose (Monico), Oral Solution, 68%, Tk. 140.00/100ml
Lactu (Biopharma), Oral Solution, 68%, Tk. 140.00/100ml; 68%, Tk. 250.00/200ml
Lactulose-H (Hudson), Oral Solu., 3.35gm/5ml, Tk. 110.00/100 ml
Laxativ (Rangs), Oral Solu., 3.35gm/5ml, Tk. 100/100ml, Tk. 200/200ml
Laxol (Navana), Oral Solu., 3.40 gm/5 ml, Tk. 50.19/50 ml; Tk. 120.00/100 ml; Tk. 200.75/200 ml
Laxolac (Globe), Oral Solution, 68%, Tk. 140.00/100ml
Leaxe (Alco), Oral Solution, 68%, Tk. 140.42/100ml; 68%, Tk. 250.75/200ml
Livax (Pacific), Oral Solution, 68%, Tk. 140.00/100ml; 68%, Tk. 250.00/200ml
Livoton (Kemika), Oral Solution, 68%, Tk. 120.00/100ml; 68%, Tk. 70.21/50ml
Loctoz (Amico), Oral Solution, 68%, Tk. 100.00/100ml

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Niprolac(Nipro JMI), Oral Solu., 3.40 gm/5 ml, Tk. 120.00/100 ml
Onlac(One Pharma), Oral Solution, 68%, Tk. 140.00/100ml
Oralax(Somatec), Oral Solution, 68%, Tk. 140.00/100ml
Osmolax(Square), Oral Solution, 68%, Tk. 250/200ml;; Tk. 140/100ml
Premesis(Globe), Oral Solu., 3.40 gm/5 ml, Tk. 15.00/100 ml
Regulose(General), Oral Solution, 67%, Tk. 201.35/200ml;; 67%, Tk. 120.36/100ml
Relacs(ACI), Oral Solution, 68%, Tk. 65.45/100ml.
Serelose(Beximco), Oral Solution, 70%, Tk. 130.00/100ml
Sinalac(Ibn Sina), Oral Solution, 68%, Tk. 140.00/100ml;; 68%, Tk. 230.00/200ml;; 68%, Tk. 70.00/60ml
Sivolac(Sharif), Oral Solution, 68%, Tk. 120.37/100ml
Softner(Rephco), Oral Solu., 3.40 gm/5 ml, Tk. 75.00/100 ml; Tk. 125.00/200 ml
Tulac(Eskayef), Oral Solution, 68%, Tk. 140.00/100ml;; Tk. 230.00/200ml;; , Tk. 65.00/50ml,
Tulac(Eskayef), Oral Solu., 3.40 gm/5 ml, Tk. 65.00/50 ml; Tk. 120/100 ml; Tk. 230/200 ml
Tulos(Acme), Oral Solution, 68%, Tk. 230.69/200ml;; Tk. 120.37/100ml
Veelac(Albion), Oral Solu., 3.40 gm/5 ml, Tk. 100.00/100ml; Tk. 195.00/200ml
Xylose(Delta), Oral Solu., 3.40 gm/5 ml, Tk. 120.00/100 ml
Zenilac(Zenith), Oral Solution, 68%, Tk. 120.00/100ml

MAGNESIUM HYDROXIDE

Indications: Mild constipation (acts in 2-4 hours)
Cautions: Use only occasionally; the elderly; renal impairment; hepatic impairment
Contraindication: Intestinal obstruction
Interactions: See Appendix-2 (Antacids and absorbents)
Dose: Aqueous suspension containing about 8% hydrated magnesium oxide, 25-50 ml as and when required.

Proprietary Preparations

Acme's Milk of Magnesia(Acme), Suspen., 400 mg /5 ml, Tk. 60.18/114ml;; (Orion), Suspen., 400 mg /5 ml, Tk. 50.15/100ml
Modern Milk of Magnesia(Modern), Suspen., 400 mg /5 ml, Tk. 60.00/100ml
Mom(Opsonin), Suspen., 400 mg /5 ml, Tk. 60.18/100 ml

Magmil(Pacific), Suspn. , 400 mg /5 ml, Tk. 80.00/100ml ;; 400 mg /5 ml, Tk. 120.00/200ml
Magnason(Jayson), Susp.,Tk. 50.00/100 ml

MAGNESIUM SULPHATE^[ED]

Indications: Rapid bowel evacuation (acts in 24 hours when given by mouth); injection preparation is used in *eclampsia and pre eclampsia*.
(See section 16.2.2.3)

Cautions; Contraindications: See under *Magnesium Hydroxide*; hepatic impairment.

Side-effects: Nausea, bloating, abdominal cramps (usually transient reduced by taking more slowly); rarely vomiting, anal irritation; urticaria, rhinorrhoea and dermatitis reported.

Dose: For rapid bowel evacuation (in 2-4 hours), 5-10 g in a glassful of water preferably before breakfast.

Proprietary Preparation

Mag Sulph(Gonoshasthaya), Inj. 4% Tk 3.00/5ml,
Nlepsin(Beximco), I.V. Infusion, Mag.sulph 4%+NaCl 0.45%+Dextrose 5%, Tk. 70.8/100ml
Magsum (Renata) Inj. 2.5g/5ml, Tk. 18.06

POLY ETHYLENE GLYCOL (Macrogol)

Indications: chronic constipation
Caution, Contraindications: see under *Magnesium hydroxide*; breast feeding, pregnancy; cardiovascular impairment

Side-effects: flatulence, cramps, and abdominal discomfort

Dose: chronic constipation, ADULT and CHILD over 12 years, 25mL 1–3 times daily usually for up to 2 weeks; maintenance, 25mL 1–2 times daily

Proprietary Preparation

Aqualax(Incepta), Susp., 17g/240ml, Tk. 120/240ml

2. GASTRO-INTESTINAL SYSTEM

2.7 PREPARATIONS FOR HAEMORRHOIDS

2.7.1 SOOTHING HAEMORRHOIDAL PREPARATIONS

2.7.2 COMPOUND HAEMORRHOIDAL PREPARATIONS WITH CORTICOSTEROIDS

2.7.3 RECTAL SCLEROSANTS

2.7.4 OTHER PREPARATIONS

2.7.5 RECTAL SCLEROSANTS

Anal and perianal pruritus, soreness, and excoriation are best treated by application of bland ointments, suppositories or dusting powders. These conditions occur commonly in patients suffering from haemorrhoids, fistulas, and proctitis. Careful local toilet, as well as, adjustment of the diet to avoid hard stools, taking of bulk forming materials such as bran (section 2.6.1) and a high residue diet are also helpful. In proctitis these measures may supplement treatment with corticosteroids or sulphasalazine.

When necessary topical preparations containing local anaesthetics or corticosteroids are used provided perianal thrush has been excluded. Perianal thrush is best treated with nystatin by mouth and by local application.

2.7.1 SOOTHING HAEMORRHOIDAL PREPARATIONS

Bland soothing preparations containing mild astringents such as bismuth subgallate zinc oxide and hamamelis may give symptomatic relief in haemorrhoids. Many proprietary preparations also contain lubricants vasoconstrictors or mild antiseptics. Prolonged application of preparations containing resorcinol should be avoided because it may interfere with thyroid function. Heparinoids are claimed to promote the resorption of local oedema and extravasated blood.

Local anaesthetics are used to relieve pain associated with haemorrhoids anal

fissure, and pruritus but good evidence is lacking. Lignocaine gel and ointment are best applied on a plastic dilator which ensures contact with the base of the fissure. Alternative local anaesthetics include amethocaine, cinchocaine, and pramoxine, but they are more irritant.

Local anaesthetics should be used for short periods only (no longer than 1-2 weeks) since they may cause sensitisation of the anal skin.

ADMINISTRATION. Unless otherwise indicated a suppository is usually inserted into the rectum at night and morning or after a bowel movement. Rectal ointments and creams are applied at night and morning or after a bowel movement, externally by rectum using a rectal nozzle.

Note. Local anaesthetic ointments can be absorbed through the rectal mucosa therefore excessive application should be avoided, particularly in infants and children.

2.7.2 COMPOUND PREPARATIONS WITH CORTICOSTEROIDS

Corticosteroids are often combined with antiseptics, antibiotics, local anaesthetics and soothing agents. They are suitable for occasional short term use after exclusion of infections, such as herpes simplex; see section 12.3 for general comments on topical corticosteroids.

Antibiotics may do little more than encourage the growth of resistant bacteria and should be avoided.

Proprietary Preparations

Cinchocaine HCl 0.5% + Hydrocortisone 0.5% + Neomycin sulphate 1% + Esculin 1%;

Anustat(Beximco), RectalOint., Tk.70.00/15g.

Anorel(Popular), RectalOint., Tk.80.30/15g

Erian (Square), Supp

Tk.8/supp;RectalOintment, Tk. 68.00/15g

Methovate(Gaco), Rectal Ointment,

Betametthasone Valerate0.05 %++Lignocain

Hydrochloride 2.5%Tk.30.00/15gm

2. GASTRO-INTESTINAL SYSTEM

2.7.3 RECTAL SCLEROSANTS

Oily phenol injection is used to inject haemorrhoids particularly when those are unprolapsed.

PHENOL

Indications: injection of hemorrhoids
Side-effects: irritation, tissue necrosis
Dose: 2-3 ml of oily phenol injection into the submucosal layer at the base of the pile; several injections may be given at different sites, max. total injected 10 ml at any one time

Generic Preparation

Oily Phenol Injection BP, contains phenol 5% in a suitable fixed oil

2.7.4 OTHER PREPARATIONS

DIOSMIN WITH HESPERIDIN

Indications: treatment of organic and idiopathic chronic venous insufficiency of the lower limbs with the following symptoms: heavy legs; pain; nocturnal cramps. Treatment of hemorrhoids and acute hemorrhoidal attacks

Side effects: some cases of minor gastrointestinal and autonomic disorders have been reported, but these never required cessation of treatment

Dose: in venous disease: 2 tablets daily. In acute hemorrhoidal attacks: the dosage can be increased up to 6 tablets daily as prescribing information may vary from country to country.

Proprietary Preparations

Diosmin 450mg with Hesperidin 50mg
Alvenor(Beacon), Tab. Tk. 10.00/Tab.
Ardium(Drug Intl), Tab. Tk. 8.00/Tab.
Avonoid(UniMed), Tab. Tk. 8.00/Tab.
Daflon(ACI), Tab., Tk. 13.00/Tab.
Diohes(Opsonin), Tab. Tk. 8.06/Tab.
Diorin(Incepta), Tab. Tk. 8.00/Tab.
Hemoral(Aristopharma), Tab. Tk. 8.00/Tab.
Hemorif(Square), Tab. Tk. 8.06/Tab.
Normanal(Renata), Tab. Tk. 8.03/Tab.
Pilestop(Acme), Tab. Tk. 8.07/Tab.
Sangril(Healthcare), Tab. Tk. 10.00/Tab.
Daflon[®](Servier), Tab. Tk. 12/Tab

2.8 DRUGS AFFECTING INTESTINAL SECRETIONS

2.8.1 DRUGS ACTING ON THE GALL BLADDER

2.8.2 PANCREATIN

2.8.1 DRUGS ACTING ON THE GALL BLADDER

The bile acids **chenodeoxycholic acid** and **ursodeoxycholic acid** are used in selected patients to dissolve cholesterol gallstones as an alternative to surgery.

URSODEOXYCHOLIC ACID

Indication: dissolution of cholesterol rich gallstone, primary biliary cirrhosis.

Cautions: see notes above

Contra-indications: chronic liver disease, peptic ulcer disease, non-functioning gall bladder, inflammatory bowel disease, pregnancy, radio-opaque stone and other conditions of the small intestine, colon and liver which interfere with entero-hepatic circulation of bile salts

Interactions: see Appendix-2

Side-effects: nausea, vomiting, diarrhea and other gastrointestinal disturbance, gallstone calcification; pruritus.

Dose: dissolution of gallstone, 8-12mg/kg daily as a single dose at bedtime or in two divided doses; for up to 2 years; treatment is continued for 3-4 months after stones dissolve. Primary biliary cirrhosis 10-15mg/kg daily in 2-4 divided doses.

Proprietary Preparations

Antigall(Incepta), Tab., 150 mg, Tk. 13.00/Tab., 300 mg, Tk. 22.00/Tab.
Bilicir(ACI), Tab., 150mg, TK. 11.00/Tab., 300mg, TK. 20.00/Tab.
Liconor(Opsonin), Liquid, 250 mg/5 ml, Tk. 180.68/50ml; Tab, 150 mg, Tk. 11.04/Tab., 300 mg, Tk. 21.00/Tab.
Livacor(Albion), Tab., 150 mg, Tk. 10.00/Tab.; 300 mg, Tk. 20.00/Tab.
Liveric(Beximco), Tab., 150mg, Tk. 11.00/Tab., 300mg, Tk. 20.00/Tab.
Oxycol(UniMed), Tab, 300mg, Tk. 36.00/Tab.; 150mg, Tk. 20.00/Tab.
Stener(Healthcare), Tab., 150mg, Tk. 15.00/Tab.; 300mg, Tk. 25.00/Tab.
Udca(Biopharma), Tab., 300mg, Tk. 20.00/Tab.

Udihep(Mundipharma), Tab. , 150 mg, Tk. 12.67/Tab.; S.R Tab. 300 mg, Tk. 23.50/Tab.
Uliv(Acme), Tab. , 150.00 mg , Tk. 12.09/Tab. ; 300 mg, Tk. 20.13/Tab.
Urso(Square), Tab. , 150 mg, Tk. 15.00/Tab., 300 mg, Tk. 25.00/Tab.
Ursocol(Sun), Tab., 150 mg, Tk. 11.05/Tab.; Tab., Tk. 20.10/Tab.
Ursodil(General), Tab. , 300mg, Tk. 25.00/Tab., 150mg, Tk. 15.00/Tab.
Ursolic(Drug Intl), Susp., 250mg/5 ml, Tk. 180.55/50ml; Tab., Tk. 11.05/Tab.; 300mg, Tk. 20.10/Tab.

2.8.2 PANCREATIN

Supplements of pancreatin are given by mouth to compensate for reduced or absent exocrine secretion in cystic fibrosis, and following pancreatectomy, total gastrectomy, or chronic pancreatitis. They assist the digestion of starch, fat, and protein.

Pancreatin is inactivated by gastric acid; therefore pancreatin preparations are best taken with food (or immediately before or after food). Gastric acid secretion may be reduced by giving cimetidine or ranitidine an hour beforehand. Con-current use of antacids also reduces gastric acidity. The newer enteric coated preparations enclosing enteric coated granules (or minitabets) can deliver a higher enzyme concentration in the duodenum provided these are swallowed whole without chewing.

2. GASTRO-INTESTINAL SYSTEM

Pancreatin may irritate the skin around mouth and anus, particularly if preparations are retained in the mouth or dosage is excessive. Hypersensitivity reactions occur occasionally and may affect those handling the powder.

Dosage is adjusted according to size, needs and number/consistency of stools, so that the patient thrives; extra allowance may be needed if heavy snacks are taken between meals.

Proprietary Preparations

A-Zyme(Acme), Tab., 325mg, Tk. 3.51/Tab.

Crezyme(Opsonin), Tab., 325mg, Tk.3.50/Tab

Suzyme(Square), Tab., 325mg, Tk. 3.51/Tab.

Zymet(Beximco), Tab., 325mg, Tk. 3.50/Tab.

Chapter-3

CARDIOVASCULAR SYSTEM

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3. CARDIOVASCULAR SYSTEM

3.1 BETA-ADRENOCEPTOR BLOCKING DRUGS

Beta-adrenoceptor blocking drugs (beta-blockers) are effective as antihypertensive, antiarrhythmic and antianginal (with exception of Prinzmetal's angina) agents by blocking the beta-adrenoreceptors in the heart. Beta-blockers decrease mortality in acute phase of myocardial infarction and in post infarction period.

Acebutolol, Pindolol, Propranolol, Penbutolol and Celiprolol have intrinsic sympathomimetic activity and they tend to cause less bradycardia than the other beta-blockers and may also cause less coldness of the extremities. The water-soluble beta-blockers are excreted by the renal route. So these drugs should be used with caution in renal impairment.

Beta-blockers may precipitate or aggravate heart failure. However, **Bisoprolol, Carvedilol** and **Metoprolol** are known to reduce mortality in patients having stable chronic heart diseases.

A cardio selective beta-blocker may be prescribed with extreme caution under specialist supervision in patients who have been suffering from bronchial asthma or chronic obstructive airways disease.

Atenolol, Bisoprolol, Metoprolol and **Nebivolol** are relatively cardioselective, but they are not cardiospecific. Ultra short acting, highly cardioselective beta blockers are **Esomolol** and **Landirolol**.

HYPERTENSION. Beta-blockers reduce cardiac output, change baroreceptor's reflex sensitivity and block peripheral adrenoceptors. Some beta-blockers decrease plasma renin secretion. Some central effect may also contribute to their antihypertensive effect.

ANGINA. Beta-blockers improve exercise tolerance by reducing cardiac work and relieve symptoms in patients with angina.

MYOCARDIAL INFARCTION. **Atenolol** and **Metoprolol** may reduce early mortality after intravenous and subsequent oral administration in the acute phase.

ARRHYTHMIA. Beta-blockers act as anti-arrhythmic drugs by blocking sympathetic effects on the heart.

HEART FAILURE. **Bisoprolol** and **carvedilol** reduce mortality in any grade of stable heart failure; **nebivolol** is licensed for stable mild to moderate heart failure in patients over 70 year.

THYROTOXICOSIS. Beta-blockers are also used before operation for the preparation for thyroidectomy. The thyroid gland becomes less vascular which makes surgery easier.

OTHER USES. Beta-blockers have been used to relieve symptoms of anxiety in patients with palpitations, tremor and tachycardia. Beta-blockers are also used in the prophylaxis of migraine.

ATENOLOL^[ED]

Indications : See under dose

Cautions: See under *propranolol hydrochloride*; reduce dose in renal impairment

Contraindications: See under *propranolol hydrochloride*

Interactions: See Appendix-2

Side-effects: See under *propranolol hydrochloride*

Dose: By mouth, Hypertension, 50-100 mg daily (higher doses rarely necessary) Angina, 50-100 mg daily in 1 or 2 doses

Proprietary Preparations

Apicard (APC), Tab., 50 mg, Tk. 0.75/Tab.

Atebit (Asiatic), Tab., 50 mg, Tk. 0.77/Tab.; 100 mg, Tk. 1.38/Tab.

Ateloc (Popular), Tab., 50 mg, Tk. 0.77/Tab.

Atenolol (Albion), Tab., 50 mg, Tk. 0.77/Tab.; 100 mg, Tk. 1.38/Tab.;

Atenolol (Amico), Tab., 100mg, Tk. 1.38/Tab.; 50mg, Tk. 0.77/Tab.

Atezen (Zenith), Tab., 100 mg, Tk. 1.37/Tab.; 50 mg, Tk. 0.77/Tab.

Atin (Jayson), Tab., 50mg, Tk. 0.76/Tab.

B-card (Nipa), Tab., 50 mg, Tk. 0.77/Tab.

Betanol (Sanofi), Tab., 100mg, Tk. 1.37/Tab.; 25mg, Tk. 0.45/Tab.; 50mg, Tk. 0.77/Tab.

Betasec (Opsonin), Tab., 50 mg, Tk. 0.77/Tab.

Cardilock (Alco), Tab., 50 mg, Tk. 0.77/Tab.

Cardipro (Square), Tab., 50 mg, Tk. 0.77/Tab.

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Cardisef (*Supreme*), Tab. , 50 mg, Tk. 0.77/Tab.; 100 mg, Tk. 1.36/Tab.
Carsec (*Medimet*), Tab., 100mg, Tk. 1.35/Tab.; 50mg, Tk. 0.75/Tab.
Etnol (*Biopharma*), Tab., 50 mg, Tk.0.77/Tab.; 100 mg, Tk. 1.38/Tab.
Lonet (*Beximco*), Tab., 50 mg, Tk. 0.77/Tab.
Lopres, (*Orion*), Tab. , 50 mg, Tk. 0.71/Tab.
Normaten (*Navana*), Tab., 50 mg, Tk.0.76/Tab.
Norpress (*Kemiko*), Tab., 50 mg, Tk.0.75/Tab.
Tenocard (*Aristo*), Tab., 50 mg, Tk. 0.75/Tab.
Tenoloc (*Acme*), Tab., 50 mg, Tk. 0.77/Tab.; 100 mg, Tk. 1.37/Tab.
Tenomin (*Pacific*), Tab. , 50 mg, Tk. 0.77/Tab.
Tenoren (*ACI*), Tab., 25mg, Tk. 0.45/Tab.; 50mg, Tk. 0.77/Tab., Tab., 100mg, Tk. 1.38/Tab.
Tenovir (*Virgo*), Tab., 50 mg, Tk. 75.00/Tab.

Atenolol + Chlorthalidone

Atechlor, (*Silva*), Tab, 50 mg + 25 mg, Tk. 2.51/Tab.,Tab., 100 mg + 25 mg, Tk. 3.01/Tab.
Tenoren Plus(*ACI*), Tab., 50 mg+25 mg, Tk. 3.02/Tab.

BISOPROLOL FUMARATE

Indications: Hypertension, angina, myocardial infarction, arrhythmias, heart failure

Cautions: See under *Propranolol Hydrochloride*; dose max. 10 mg daily could be reduced; if GFR less than 20 mL/minute/1.73m² (max. 10 mg daily)

Contra-indications: See under *Propranolol Hydrochloride*; also acute or decompensated heart failure; sino-atrial block

Interactions: See *Appedix -2*

Side-effects: See under *Propranolol Hydrochloride*, muscle weakness and cramp

Dose: Hypertension and angina, usually 5-10 mg once daily max 20 mg daily. Adjunct in heart failure, initially 1.25 mg once daily (in the morning) for 1 week then, if well tolerated, increased to 2.5 mg/ 4 weeks, upto max. 10 mg daily

Proprietary Preparations

Ancor (*Aristo*), Tab. 2.5 mg, Tk.6.00/Tab.; 5mg, Tk.10.00/Tab.; 10 mg, Tk.16.00/Tab.
Betabis (*Acme*), Tab. 2.5 mg, Tk.6.01/Tab.; 5mg, Tk.10.003Tab.

Betacor (*Popular*), Tab. 2.5mg, Tk.6.00/Tab.; 5mg, Tk.10.00/Tab.
Betafix, (*Healthcare*), Tab, 2.5mg, Tk. 180.00/Tab.; 5mg, Tk. 300.00/Tab.
Betapro (*Beximco*), Tab., 10mg, Tk. 16.00/Tab.; 2.5mg, Tk. 6.00/Tab.; 5mg, Tk. 10.00/Tab.
Bislol (*Opsonin*), Tab., 5 mg, Tk. 10.07/Tab.; 2.5 mg, Tk. 6.04/Tab.; 10 mg, Tk. 16.11/Tab.
Bisocor (*Square*), Tab., 2.5 mg, Tk. 6.04/Tab. 5 mg, Tk. 10.07/Tab.
Bisoloc (*Orion*), Tab., 2.5 mg, Tk. 6.02/Tab.; 5 mg, Tk. 10.03/Tab.
Bisopress (*NIPRO JMI*), Tab., 2.5 mg, Tk. 6.02/Tab.; 5 mg, Tk. 10.03/Tab.
Bisopro (*Incepta*), Tab. 2.5 mg, Tk.6.00/Tab.; 5 mg, Tk.10.00/Tab.
Bisoren (*Renata*), Tab. 2.5 mg, Tk.6.00/Tab.; 5 mg, Tk.10.00/Tab.
B-prolol (*Sharif*), Tab., 2.5 mg, Tk. 6.01/Tab., 5 mg, Tk. 10.03/Tab.
Cardicor (*UniMed*), Tab. 2.5 mg, Tk.6.00/Tab.; 5 mg, Tk.10.00/Tab.
Cardinor (*Labaid*), Tab. 2.5 mg, Tk.6.00/Tab.; 5 mg, Tk.10.00/Tab.
Cardobis (*Eskayef*), Tab, 2.5 mg, Tk. 6.00/Tab.; 5 mg, Tk. 10.00/Tab.
Conbis (*RAK*), Tab. 2.5 mg, Tk.6.00/Tab.; 5mg, Tk.10.00/Tab.
Myocard (*General*), Tab., 2.5mg, Tk. 6.02/Tab.; 5mg, Tk. 10.03/Tab.
Myocor (*Biopharma*), Tab.2.5mg, Tk. 10.00/Tab.; 2.50mg, Tk. 6.00/Tab.
Nubis (*Nuvista*), Tab. , 2.5 mg, Tk. 6.00/Tab.; 5 mg, Tk. 10.00/Tab.
Orabis (*Ibn Sina*), Tab. , 2.5mg, Tk. 180.00/Tab. ; 5mg, Tk. 300.00/Tab.
Probis, (*ACI*), Tab., 2.5mg, Tk. 6.02/Tab.; 5mg, Tk. 10.03/Tab.
Tabis (*Navana*), Tab., 2.5 mg, Tk. 6.02/Tab.; 5 mg, Tk. 10.03/Tab.
Tenobis- (*Drug Intl*), Tab., 2.5mg, Tk. 6.05/Tab.; 5mg, Tk. 10.05/Tab.
Tibeta (*Doctor TIMS*), Tab. 2.5 mg, Tk.6/Tab.
Bisoprolol Fumarate + Hydrochlorothiazide

Ancor Plus (*Aristo*), Tab. 2.5 mg + 6.25 mg, Tk.6.00/Tab.; 5 mg + 6.25 mg, Tk.10.00/Tab.
Betacor (*Popular*), Tab., 2.5mg + 6.25mg Tab., Tk. 6.00/Tab.; 5.00mg + 6.25mg, Tk. 10.00/Tab.
Betafix (*Healthcare*), Tab., 2.5mg + 6.25mg, Tk. 6.00/Tab.; 5mg + 6.25mg, Tk. 10.00/Tab.
Bislol Plus (*Opsonin*), Tab., 10 mg + 6.25 mg , Tk. 16.00/Tab.; 2.5 mg + 6.25 mg, Tk. 6.02/Tab.
Bisocor (*Square*), Tab. 2.5 mg + 6.25 mg, Tk. 6.04/Tab.; 5 mg + 6.25 mg, Tk. 10.03/Tab.
Bisopro (*Incepta*), Tab. 2.5 mg + 6.25 mg, 10.00/Tab.; 5 mg + 6.25 mg, Tk.6.00/Tab.

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Probis (ACI), Tab., 2.5mg + 6.25, Tk. 6.02/Tab.; 5mg + 6.25, Tk. 10.03/Tab.
Tabis Plus (Navana), Tab., 2.5 mg+6.25 mg, Tk. 6.00/Tab.; 5 mg+6.25 mg, Tk. 10.00/Tab.
TenobisPlus(DrugIntl), Tab., 10mg+6.25mg, Tk. 16.05/Tab., 2.5mg+6.25mg, Tk. 6.45/Tab.; 5mg+6.25mg, Tk. 10.05/Tab.

Bisoprolol + Amlodipine

Bisopro-A 2.5/5(Incepta), Tab. 2.5mg+ 5mg, Tk. 6.00/Tab.

CARVEDILOL

Indications: Hypertension, angina, adjunct in symptomatic chronic heart failure

Cautions: See under *propranolol hydrochloride*, acute or decompensated heart failure requiring intravenous inotropics

Contraindication: See under *propranolol hydrochloride*; hepatic impairment

Interactions: See Appendix-2

Side-effects: Postural hypotension, dizziness, headache, fatigue, gastrointestinal disturbances, bradycardia, painful extremities, peripheral edema, dry mouth, dry eyes, impotence, disturbances of micturition, AV block, exacerbation of intermittent claudication, worsening of psoriasis, heart failure,

Dose: Hypertension, initially 6.25 mg twice daily, increase gradually to usual dose of 25 mg twice daily; ELDERLY initial dose of 12.5 mg daily may provide satisfactory control

Proprietary Preparations

Arilol (Pacific), Tab, 12.5 mg, Tk. 5/Tab; 25mg, Tk. 8./Tab; 6.25mg, Tk. 3/Tab.
Avidol (Ad-din), Tab., 6.25 mg, Tk. 3.00/Tab.
Cardex (Opsonin), Tab, 12.5mg, Tk. 5.02/Tab; 3.125mg, Tk. 1.51/Tab, 6.25mg, Tk. 3.01/Tab.
Cardivas (Sun), Tab., 6.25 mg, Tk. 4.55/Tab.; 12.50 mg, Tk. 6.55/Tab.
Carved (Biopharma), Tab, 6.25mg, Tk. 4.50/Tab.
Carvetab (Medimet), Tab., 12.5 mg, Tk. 5.00/Tab.; 6.25 mg, Tk. 3.00/Tab.
Carvicard (Novo), Tab, 12.5mg, Tk. 5/Tab; 6.2mg, Tk. 3.00/Tab.
Carvipress (Acme), Tab; 12.50 mg, Tk. 5.03/Tab; 25mg, Tk. 8.07/Tab; 6.25 mg, Tk. 3.01/Tab.

Carvista (Incepta), Tab. 6.25mg, Tk. 3.00/Tab; 25mg, Tk. 8.00/Tab; 12.5mg, Tk. 5.00/Tab.
Cavelon (Drug Intl), Tab, 12.5mg, Tk. 6.05/Tab; 6.25mg, Tk. 3.05/Tab.
Dilapress (Beximco), Tab, 6.25mg, Tk. 3/Tab.
Dilatrend (Radiant), Tab., 25mg, Tk. 22.07/Tab.; 6.25mg, Tk. 11.03/Tab.
Dilgard (General), Tab., 12.5mg, Tk. 5.04/Tab.; 25mg, Tk. 8.05/Tab.; 6.25mg, Tk. 3.02/Tab.
Dilocard (White Horse), Tab., 6.25 mg, Tk. 3.00/Tab.; 12.5 mg, Tk. 5.00/Tab.
Diola (Novartis), Tab., 6.25 mg, Tk. 6.25/Tab.; 12.50 mg, Tk. 9.50/Tab.
Durol (Square), Tab. 6.25 mg, Tk. 3.01/Tab.
Exepress (Opsonin), Tab., 3.125 mg, Tk. 1.14/Tab.; 6.25 mg, Tk. 2.26/Tab.; 12.50mg, Tk. 3.77/Tab.; 25 mg, Tk. 6.04/Tab.
Karvedil (ACI), Tab., 12.5mg, Tk. 4.03/Tab.; 25mg, Tk. 8.05/Tab.; 6.25mg, Tk. 3.02/Tab.
Revodil (Ibn Sina), Tab., 6.25 mg, Tk. 3/Tab.
Rovedilol (Healthcare), Tab., 12.5mg, Tk. 7.00/Tab.; 6.5mg, Tk. 4.00/Tab.;
Ucardol (UniMed), Tab, 12.5mg, Tk. 5.00/Tab.; 25mg, Tk. 9.00/Tab.; 6.25mg, Tk. 3.00/Tab.
Vedilol (Eskayef), Tab, 12.50mg, Tk. 5/Tab.; 25mg, Tk. 8/Tab. 6.25mg, Tk. 3.00/Tab.
Vesodil (Rangs), Tab., 12.5 mg, Tk. 5.00/Tab.; 25mg, Tk. 8.00/Tab.; 6.25 mg, Tk. 3.00/Tab.

LABETALOL HYDROCHLORIDE

(Both alpha and beta adrenergic blocker)

Indications: Hypertension in pregnancy, hypertension with angina, and hypertension following acute myocardial infarction; hypertensive crisis, controlled hypotension in anaesthesia

Cautions: See under *Propranolol Hydrochloride*; renal impairment- dose reduction may be required; if severe hepatocellular damage labetalol should be stopped and not restarted

Contra-indications: See under *Propranolol Hydrochloride*

Interactions: See Appendix-2

Side-effects: Postural hypotension tiredness, weakness, headache, rashes, scalp tingling, difficulty in micturition, epigastric pain, nausea, vomiting; liver damage

Dose: By mouth, initially 100 mg twice daily with food, increased at intervals of 14 days to usual dose of 200 mg twice daily;

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By intravenous injection, 50 mg over at least 1 minute, repeated after 5 minutes if necessary; max. dose 200 mg
By intravenous infusion, 2 mg/minute until satisfactory response then discontinue; Hypertension in pregnancy, 20 mg/hour, doubled every 30 minutes; usual max. 160 mg/hour
 Hypertension following myocardial infarction, 15 mg/hour, gradually increased to max. 120 mg/hour

Proprietary Preparations

Labecard (*Popular*), Tab., 200 mg, Tk. 10.04/Tab.; 100mg, Tk. 6.02/Tab.; Inj, 5 mg/ml, Tk. 100.38/Vial
Labegest (*Incepta*), Tab., 100mg, Tk. 6.00/Tab.; 200 mg, Tk. 10.00/Tab.;
Labeta (*Beximco*), Tab., 200 mg, Tk. 9.00/Tab.

METOPROLOL TARTARATE^[ED] (Selective beta₁ blocker)

Indications: See under Dose

Cautions: See under propranolol hydrochloride

Interactions: See Appendix-2

Side-effects: See under propranolol hydrochloride

Dose: *By mouth*; hypertension, initially 25-100 mg daily, main-tenance 100-200 mg daily in 2 divided doses;
 Angina, 50-100 mg 2-3 times daily;
 Arrhythmias, usually 50mg 2-3 times daily, up to 300 mg daily in divided doses if necessary;
 Migraine prophylaxis, 100-200mg daily in divided dose; Hyperthyroidism (adjunct), 50mg 4 times daily.

By intravenous injection, Arrhythmias, up to 5 mg at rate 1-2 mg/minute, repeated after 5 minutes if necessary, total dose 10-15 mg.

Proprietary Preparations

Angilat (*ACI*), Inj, 1mg/ml, Tk.120.36/vial; Tab., 25mg, Tk.1/Tab; 50 mg, Tk.1.5/Tab.
Betacard (*Aristo*), Tab., 50mg, Tk. 2.00/Tab.
Betaloc (*Drug Intl*), Tab. 50mg, Tk. 2.04/Tab.; 25mg, Tk.1.55/Tab.; 100mg, Tk.6.05/Tab. 50mg, Tk.4.05/Tab.
Betaone (*Acme*), Tab. 25 mg, Tk. 1.51/Tab.; 50 mg, Tk.2.00/Tab.
Metocard (*Popular*), Inj.1 mg/ml, Tk.120.45/vial

Metoprol (*Beximco*), XR Tab., 50mg, Tk. 3.00/Tab.

M-Loc (*Sharif*), Tab. 50 mg, Tk.2/Tab.

Preloc (*Opsonin*), Tab., 50 mg, Tk. 2.00/Tab.

Presonil (*Incepta*), Tab. 25 mg, Tk. 1.30/Tab.

Selomet (*UniMed*), Tab. 50mg, Tk.4/Tab.; 50mg, Tk.2/Tab.; 25mg, Tk.1.50/Tab.

Topress (*Eskayef*), Tab., 50mg, Tk. 2.00/Tab.

NEBIVOLOL (dilate bold vessels in addition to cardiac effect)

Indications: Essential hypertension; adjunct in stable mild to moderate heart failure in patients over 70 years

Cautions: See under Propranolol Hydrochloride, renal impairment avoid if serum creatinine greater than 250 micromol/litre

Contra-indications: See under Propranolol Hydrochloride; also acute or decompensated heart failure requiring intravenous inotropes

Interactions: See Appendix-2

Side-effects: See under Propranolol Hydrochloride; also oedema and depression, fatigue, exercise intolerance

Dose: Hypertension, 5 mg daily; ELDERLY initially 2.5 mg daily, increased if necessary to 5 mg daily
 Adjunct in heart failure, initially 1.25 mg once daily, then if tolerated increased at intervals of 1-2 weeks to 2.5 mg once daily, then to 5 mg once daily, then to max. 10 mg once daily
 Renal impairment for hypertension, initially 2.5 mg once daily, increased to 5 mg once daily if required; for heart failure

Proprietary Preparations

Bipinor (*ACI*), Tab. 5mg, Tk.8.05/Tab.; 2.5mg, Tk.5.04/Tab.

Cardoneb (*Eskayef*), Tab., 5 mg, Tk. 10.00/Tab.; 2.5mg, Tk.7.00/Tab.

Maxineb (*Aristo*), Tab., 2.5mg, Tk.7.00/Tab.; 5mg, Tk.10.00/Tab.

Nebicard (*UniMed*), Tab, 5 mg, Tk.12.00/Tab.; 2.5mg, Tk.7.00/Tab.

Nebifast (*Drug Intl*), Tab. 2.5mg, Tk.6.00/Tab.; 5mg, Tk.8.00/Tab.

Nebilol (*Opsonin*), Tab.5 mg, Tk. 8.03/Tab.; 2.5 mg,Tk.5.02/Tab.
Nebita (*Square*), Tab.5 mg, Tk. 10.03/Tab.; 2.5 mg,Tk.7.02/Tab.
Nebivas (*Asiatic*), Tab., 2.5mg, Tk.5.00/Tab.;5mg, Tk.10.00/Tab.

PROPRANOLOL HYDROCHLORIDE^[EP]

Indications: *See under dose*

Cautions: Pregnancy and breast-feeding, avoid abrupt withdrawal in angina, first-degree AV block, hepatic impairment, renal impairment, diabetes, myasthenia gravis

Contraindications: Asthma or history of obstructive airways disease important: *see bronchospasm below*; uncontrolled heart failure, Prinzmetal's angina, marked brady-cardia, hypotension, sick sinus syndrome, second or third degree AV block, cardiogenic shock, metabolic acidosis, severe peripheral arterial disease, pheochromocytoma

Interactions: *See Appendix-2*

Side-effects: Bradycardia, heart failure, hypotension, conduction disorders, bronchospasm, exacerbation of intermittent claudication and Raynaud's phenomenon, gastrointestinal disturbances, sleep disturbances

Dose: *By mouth*, hypertension, initially 80 mg twice daily, increased at weekly intervals as required; maintenance 160-320 mg daily;

Portal hypertension, initially 40 mg twice daily, increased to 80 mg twice daily according to heart rate; max. 160 mg twice daily;

Pheochromocytoma (only with an alpha-blocker), 60 mg daily for 3 days before surgery or 30 mg daily in patients unsuitable for surgery;

Angina, initially 40 mg 2-3 times daily; maintenance 120-240 mg daily;

Arrhythmias, hypertrophic obstructive cardiomyopathy, anxiety tachycardia, and thyrotoxicosis (adjunct), 10 mg to 40 mg 3-4 times daily;

Anxiety with symptoms such as palpitations, sweating, tremor, 40 mg once daily increased to 40 mg 3 times daily if necessary;

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Prophylaxis after myocardial infarction, 40 mg 4 times daily for 2-3 days, then 80 mg twice daily, beginning 5 to 21 days after infarction;

Migraine prophylaxis and essential tremor, initially, 40 mg 2-3 times daily, maintenance 80-160 mg daily

Proprietary Preparations

Beta (*Sun*), TR Cap., 40 mg, Tk.2.50/Cap.

G-propranolol (*Gonoshasthaya*), Tab., 40 mg, Tk. 0.35 /Tab.

Indever (*ACI*), SR Cap., 40mg, Tk. 0.92/Cap., 80mg, Tk.1.55/Cap., Tab., 10mg, Tk. 0.51/Tab., 40mg,Tk. 3.00/Tab.

Propranol (*Opsonin*), Tab.10 mg , Tk. 0.51/Tab., 40 mg , Tk. 1.51/Tab.

Propranolol (*Albion*), Tab., 10 mg, Tk.0.24/Tab.; 40 mg, Tk. 0.34/Tab.

SOTALOL HYDROCHLORIDE

Indications: Life threatening arrhythmias including ventricular tachyarrhythmias, paroxysmal, supraventricular tachycardia after cardiac surgery

Cautions: *See under propranolol hydrochloride*; when stopping sotalol the dose should be reduced gradually

Contraindications: Congenital or acquired long QT syndrom, renal failure, angina, hypertension, and thyrotoxicosis

Interactions: *See Appendix-2*

Side-effects: *See under propranolol hydrochloride*

Dose: *By mouth* with ECG monitoring and measurement of corrected QT interval, arrhythmias, initially, 80mg daily in divided dose; higher doses of 480-640mg daily for life threatening ventricular arrhythmias under special supervision

Proprietary Preparation

Sotalax (*Unimed*), Tab. 80 mg, Tk. 10/Tab.

3.2 DRUGS AFFECTING THE RENIN-ANGIOTENSIN SYSTEM AND SOME OTHER ANTIHYPERTENSIVE DRUGS

3.2.1 ANGIOTENSIN CONVERTING
ENZYME INHIBITOR

3.2.2. ANGIOTENSIN-II RECEPTOR
ANTAGONISTS

3.2.3. RENIN INHIBITORS

3. CARDIOVASCULAR SYSTEM

- 3.2.4 ALPHA-ADRENOCEPTOR
BLOCKING DRUGS
- 3.2.5 ANGIOTENSIN II RECEPTOR
BLOCKER NEPRILYSIN
INHIBITOR (ARNI)
- 3.2.6 VASODILATOR ANTI-
HYPERTENSIVE DRUGS
- 3.2.7 CENTRALLY ACTING
ANTI-HYPERTENSIVE DRUGS

3.2.1 **ANGIOTENSIN-CONVERTING ENZYME INHIBITORS** (ACE inhibitors)

ACE inhibitors inhibit the conversion of angiotensin I to angiotensin II. They are effective and well tolerated.

Heart Failure. ACE inhibitors are very useful in all grades of heart failure, combined when appropriate with a diuretic and digoxin. Potassium supplements and potassium-sparing diuretics should be withdrawn before introducing an ACE inhibitor because of the risk of hyperkalaemia. First-dose phenomenon may occur when ACE inhibitors are introduced to patients with heart failure who are already taking a loop diuretic (e.g. furosemide 80 mg daily or more). At the start of treatment the ACE Inhibitor should therefore be at a very low dosage (e.g. captopril 6.25mg) with the patient recumbent and under close medical supervision.

Hypertension. ACE inhibitors are recommended for hypertension when thiazides and beta-blockers are contraindicated, not tolerated, or fail to control blood pressure. They are particularly indicated for hypertension in insulin-dependent diabetics with nephropathy. ACE inhibitors may cause very rapid fall of blood pressure in some patients who are taking diuretic. The first dose should preferably be at bed time.

Myocardial Infarction. ACE inhibitors are indicated for immediate and long-term management of patients who have had myocardial infarction.

Hospital Management. ACE inhibitor therapy for severe heart failure should be started in hospital.

Renal effects. In patients with severe stenosis of the artery supplying a single

functioning kidney ACE inhibitors are likely to cause severe and progressive renal failure; they are contraindicated in patients who have critical renovascular disease. Glomerular filtration is likely to be reduced in the affected kidney with the treatment by ACE inhibitor. Therefore, ACE inhibitors are not to be prescribed in patients with known or suspected renovascular disease, unless the blood pressure uncontrollable by other drugs. If they are used in these situations renal function tests are to be done regularly.

Renal function and electrolytes should be measured before initiating ACE inhibitors and monitored during treatment. Although ACE inhibitors now have some special role in some forms of renal disease they can occasionally cause renal impairment, which may lead to renal failure. The elderly are at particular risk. Concomitant treatment with NSAIDs increases the risk of renal damage, and the use of potassium sparing diuretics increase the risk of hyperkalaemia.

Cautions : May cause sharp fall of blood pressure especially in patients taking diuretics, on a low-sodium diet, on dialysis, dehydrated or with heart failure. They should also be given with caution in peripheral vascular disease or generalised atherosclerosis owing to risk of clinically silent renovascular disease. Renal function tests should be carried out before and during treatment and the dose should be reduced in renal impairment. The risk of agranulocytosis is possibly increased in collagen vascular disease. ACE inhibitors should be avoided in patients with a history of idiopathic or hereditary angioedema. ACE inhibitors should be prescribed with caution in breast-feeding. ACE inhibitors should also be given with caution in patients with peripheral vascular disease or those with severe generalised atherosclerosis.

Anaphylactoid Reactions. ACE inhibitors should be avoided during dialysis with dextran sulphate to prevent anaphylactoid reactions. They should also be withheld before desensitization

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with bee venom. In the volume depleted patients diuretic should be discontinued or the dose should be reduced significantly 2-3 days before initiation of an ACE inhibitor. If diuretic therapy cannot be stopped, clinical supervision is recommended for at least 2 hours after administration of the first dose of the ACE inhibitor or until the blood pressure has stabilized.

Contra-indications: ACE inhibitors are contraindicated in patients with hypersensitivity to ACE inhibitors (including angioedema) and in known or suspected renovascular disease, aortic stenosis or other outflow tract obstruction. ACE inhibitors should not be used in pregnancy

Side-effects: ACE inhibitors can cause profound hypotension and renal impairment. They may also cause angioedema, rashes, pruritus, urticaria, persistent dry cough, pancreatitis and upper respiratory tract symptoms such as sinusitis, rhinitis and sore throat. Gastrointestinal effects reported with ACE inhibitors include nausea, vomiting, dyspepsia, diarrhoea and constipation. Altered liver function tests, chlostatic jaundice and hepatitis have been reported. Blood dyscrasias including thrombocytopenia, leucopenia, neutropenia and haemolytic anemia have also been reported.

CAPTOPRIL^[ED]

Indications: Mild to moderate essential hypertension alone or with thiazide therapy and severe hypertension resistant to other treatment; congestive cardiac failure; following myocardial infarction, diabetic nephropathy (microalbuminuria greater than 30mg/ day) in insulin-dependent diabetes

Cautions: See notes above

Contra-indications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above; also tachycardia, serum sickness, weight loss, stomatitis, maculopapular rash, photosensitivity, flushing and acidosis

Dose: Hypertension, used alone, initially 12.5 mg twice daily; if used in addition to diuretic, or in elderly, initially 6.25 mg two times daily (first dose at bedtime); usual maintenance dose 25 mg twice daily, max. 50 mg twice daily (rarely 3 times daily in severe hypertension)

Heart failure, initially 6.25-12.5 mg under close medical supervision (see notes above); usual maintenance dose 25mg 2-3 times daily, usual max. 150mg daily
Prophylaxis after infarction in clinically stable patients with asymptomatic or symptomatic left ventricular dysfunction, initially 6.25mg starting as early as 1 day after infarction, then increased over several weeks to maximum tolerated level in divided doses

Diabetic nephropathy, 50-100mg daily in divided doses; if further blood pressure reduction required, other antihypertensives may be used in conjunction with captopril; in severe renal impairment, initially 12.5mg twice daily (if concomitant rather than thiazide should be chosen)

Proprietary Preparations

Acetor (Drug Int), Tab., 25 mg Tk. 3.05/Tab.

Capotril (Alco), Tab., 25 mg Tk. 3.00/Tab.

Captopril (Albion), Tab., 25 mg Tk. 3.00/Tab.

Cardopril (Beximco), Tab. 25 mg, Tk. 3.01/Tab.

Catopil (Zenith), Tab., 25 mg, Tk. 3.00/Tab.

ENALAPRIL MALEATE^[ED]

Indications: Essential and renovascular hypertension congestive heart failure, prevention of symptomatic heart failure and prevention of coronary ischaemic events in patients with left ventricular dysfunction

Cautions: See notes above

Contra-indications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above; also palpitation, arrhythmias, angina, chest pain, syncope, cerebrovascular accident, myocardial infarction, anorexia, stomatitis, hepatic failure, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis and pemphigus, confusion, depression, nervousness, asthenia,

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drowsiness, insomnia, blurred vision, tinnitus, sweating, flushing, impotence, alopecia, dyspnoea and muscle cramps

Dose: Hypertension, used alone, initially 5mg once daily; if used in addition to diuretic, in ELDERLY patients, or in renal impairment, initially 2.5mg daily; usual maintenance dose 10-20mg once daily; in severe hypertension the dose may be increased to max. 40mg once daily. Heart failure (adjunct), asymptomatic left ventricular dysfunction, initially 2.5mg daily under close medical supervision; usual maintenance dose 20mg daily in 1-2 divided doses

Proprietary Preparations

Anapril (*Eskayef*), Tab, 5 mg, Tk. 1.51/Tab.; 10 mg, Tk. 2.70/Tab.

Enalapril (*Albion*), Tab., 5 mg, Tk. 1.52/Tab.; 10 mg, Tk. 2.78/Tab.

Enaril (*Beximco*), Tab., 5 mg, Tk. 1.00/Tab.

Vasopril (*Square*), Tab., 5 mg, Tk. 1.25/Tab.; 10 mg, Tk. 2.26/Tab.

LISINAPRIL

Indications: Essential and renovascular hypertension, congestive heart failure, following myocardial infarction in haemodynamically stable patients, diabetic nephropathy in normotensive insulin dependent and hypertensive noninsulin dependent diabetes mellitus

Cautions: See notes above

Contraindications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above; tachycardia, cerebrovascular accident, myocardial infarction, dry mouth, confusion, mood change, asthenia, sweating, impotence and alopecia

Dose: Hypertension, initially 2.5 mg daily, usual maintenance dose 10-20 mg daily, max. 40 mg daily, if used in addition to diuretic; See notes above
Heart failure (adjunct), initially 2.5 mg daily under close medical supervision, usual maintenance dose 5-20 mg daily
Prophylaxis after myocardial infarction, systolic blood pressure over 120 mmHg, 5mg within 24 hours followed by further 5mg, 24 hours later, then 10 mg after a

further 24 hours, and continuing with 10 mg once daily for 6 weeks or continued; systolic blood pressure 100-120 mmHg initially 2.5 mg increasing to maintenance dose of 5mg once daily

Diabetic nephropathy, initially 2.5 mg daily adjusted to achieve a sitting diastolic blood pressure below 75 mmHg in normotensive insulin dependent diabetes and below 90 mmHg in hypertensive non-insulin dependent diabetes; usual dose, 10-20 mg daily

Proprietary Preparations

Acepril (*Drug Intl*), Tab., 10mg, Tk.7.05/Tab.; 5 mg, Tk. 4.05/Tab.

Lipril (*Acme*), Tab., 10 mg, Tk. 5.53/Tab.; 5 mg, Tk. 3.01/Tab.

Lispril (*Medimet*), Tab., 5 mg, Tk.2.25/Tab.

Nop (*Ambee*), Tab., 5 mg, Tk.3.55/ Tab

Stril (*ACI*), Tab., 5 mg, Tk. 3.02/Tab

PERINDOPRIL

Indications: Essential and renovascular hypertension, congestive heart failure

Cautions: Inform the physician when there is swelling of the lips, face, tongue, and when there is difficulty in breathing and swallowing

Contraindications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above; asthenia, flushing mood and sleep disturbances

Dose: Hypertension, initially 2 mg daily (before food); usual maintenance dosage is 4mg once daily orally in the morning, max. 8mg daily, if necessary, after 1 month of treatment

Congestive heart failure: treatment should be under closed medical supervision, recommended initial dose is 2 mg daily orally in the morning which may be increased to 4 mg daily (once blood pressure acceptability has been demonstrated). In case of renal failure, the dosage of perindopril must be adjusted according to the degree of renal failure; periodic determination of serum potassium and creatinine levels recommended

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Proprietary Preparations

Pendoril (*Renata*), Tab., 2 mg, Tk. 9.00/Tab., 4 mg, Tk. 14.00/Tab., 8 mg, Tk. 24.09/Tab.
Pericard (*Asiatic*), Tab., 2mg, Tk. 7.00/Tab., 4mg, Tk. 12.00/Tab.
Versil (*Acme*), Tab., 4 mg., Tk. 12.09/Tab.
Cadnyl (*Square*), Tab., 4 mg, Tk.12.05/Tab.
Coversyl (*Servier*), Tab., 4mg, 16tk/Tab; 8mg, Tk. 25.00/Tab.

Perindopril Erbumine + Indapamide

Coversyl plus (*Servier*), Tab., 4mg+1.5mg, Tk. 21.00/Tab.

Indapa-plus (*Drug Intl*), Tab., 625 mcg + 2 mg, Tk. 6.05/Tab.; 1.25 mg+ 4mg, Tk. 12.05/Tab.

Indapril (*Incepta*), Tab., 625 mcg + 2 mg, Tk. 12.00/Tab.; 1.25 mg + 4 mg, Tk. 7.00/Tab.

Midopril (*General*), Tab., 2 mg + 0.625 mg, Tk. 7.00/Tab.; 4 mg + 1.25 mg, Tk. 12.00/Tab.

Pendoril (*Renata*), Tab., 625 mcg + 2 mg, Tk. 10.00/Tab.; 1.25 mg + 4 mg, Tk. 15.00/Tab.

Pericard Plus (*Asiatic*), Tab., 625 mcg + 2 mg, Tk. 7.00/Tab.; 1.25mg + 4mg, Tk. 12.00/Tab.

Perindal (*Opsonin*), Tab., 1.25 mg + 4 mg, Tk. 12.05/Tab.; 625 mcg + 2 mg, Tk. 7.03/Tab.

Repres Plus (*Square*), Tab., 4 mg + 1.25 mg, Tk. 12.05/Tab.; 2 mg + 0.625 mg, Tk.7.02/Tab.

Perindopril erbumine+ Amlodipine

Coveram (*Servier*), Tab. 4mg+5mg, Tk. 21.00/Tab, 4mg+ 10mg, Tk. 21.00/Tab.

RAMIPRIL

Indications: Mild to moderate hypertension, congestive heart failure (adjunct); following myocardial infarction in patients with clinical evidence of heart failure; prevention of myocardial infarction

Cautions: See notes above

Contraindications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above; arrhythmias, angina, syncope, stomatitis, dry mouth, erythema multiforme and pemphigoid exanthema, precipitation or exacerbation or Raynaud's syndrome, conjunctivitis, confusion, impotence, alopecia, bronchitis and muscle cramps

Dose: Hypertension, initially 1.25 mg daily, increased at intervals of 1-2 weeks; usual 2.5-5 mg once daily; max. 10 mg daily; for use along with diuretics see notes above

Heart failure (adjunct), initially 1.25 mg once daily under close medical supervision, increased if necessary at

intervals of 1-2 weeks; max. 10 mg daily in single or 2 divided doses.

Prophylaxis after myocardial infarction initially 2.5 mg twice daily, increased after 2 days to 5 mg daily, maintenance 2.5-5 mg twice daily.

Note. If initial 2.5 mg dose is not tolerated, give 1.25 mg twice daily for 2 days before increasing to 2.5 mg twice daily, then 5mg twice daily; withdraw if 2.5 mg twice daily not tolerated.

Proprietary Preparations

Accecard (*Healthcare*), Tab. 1.25 mg, Tk.3.00/Tab.; 2.5 mg, Tk. 5.00/Tab.; 5 mg, Tk.8.00/Tab.

Aceon (*Novo Health*), Tab., 5 mg, Tk. 8.00/Tab., 2.5 mg, Tk. 5.00/Tab.

Aceril (*Ibn Sina*), Tab., 2.5mg, Tk. 5.00/Tab., 5mg, Tk. 240.00/Tab.

Cartace (*Ad-din*), Tab., 2.5mg, Tk. 4.60/Tab.

Gepiril (*Globe*), Tab., 5 mg, Tk. 8.00/Tab.

G-Ramipril (*Gonoshasthaya*), Tab., 2.5 mg, Tk. 2.50/Tab.; 5 mg, Tk. 4.00/Tab.

Mypril (*Eskayef*), Tab. 2.5 mg, Tk.5.00/Tab.; 5mg, Tk. 8.00/Tab.

Nuvace (*Orion*), Tab., 2.5 mg, Tk. 5.02/Tab., 5 mg, Tk. 8.02/Tab.

Nuvace (*Orion*), Tab., 2.5 mg, Tk.5.00/Tab.; 5mg, Tk. 8.00/Tab.

Piramil (*Novartis*), Tab., 2.5 mg, Tk. 7.00/Tab.; 5 mg, Tk. 10.00/Tab.

Pricard (*White Horse*), Tab., 2.5 mg, Tk.4.00/Tab.;

Primace (*Beximco*), Tab., 2.5 mg, Tk.5.00/Tab.; 5 mg, Tk. 8.00 /Tab.

Protace (*UniMed*), Tab., 2.5 mg, Tk.5.00/Tab.; 5 mg, Tk. 8.00/Tab.

Racard (*Pacific*), Tab., 1.25 mg, Tk. 1.88/Tab.; 2.5 mg, Tk. 3.46/Tab.; 5 mg, Tk. 6.02/Tab.

Ramace (*Opsonin*), Tab., 5 mg, Tk. 8.03/Tab., 1.25 mg, Tk. 2.52/Tab., 2.5 mg, Tk. 5.02/Tab.

Ramicard (*Drug Intl*), Tab., 1.25mg, Tk. 2.56/Tab., 2.5mg, Tk. 5.05/Tab., 5mg, Tk. 8.05/Tab.

Ramil (*Popular*), Tab., 1.25 mg, Tk. 2.50/Tab., 5.00mg, Tk. 8.03/Tab., 2.5mg, Tk. 5.02/Tab.

Ramilok (*Aristo*), Tab., 2.5 mg, Tk.5.00/Tab.; 5mg, Tk.8.00/Tab.

Ramilon (*Virgo*), Tab., 2.5 mg, Tk. 4.00/Tab., 5 mg, Tk. 6.00/Tab., 5mg, Tk. 8.05/Tab.

Ramipro (*General*), Tab., 2.5mg, Tk. 5.04/Tab.

Ramoril (*Incepta*), Tab., 1.25 mg, Tk. 2.50/Tab., 10 mg, Tk. 12.00/Tab., 2.5 mg, Tk. 5.00/Tab., 5 mg, Tk. 8.00/Tab.

Rampril (*Rangs*), Tab., 2.5mg, Tk. 4.00/Tab.; 5 mg, Tk. 6.00/Tab.

Ripril (*Square*), Tab., 2.5 mg, Tk. 5.00/Tab., 5 mg, Tk. 8.00/Tab., 1.25 mg, Tk. 2.52/Tab.

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R-PIL (*Biopharma*), Tab., 2.5mg, Tk. 5.02/Tab., 5mg, Tk. 8.03/Tab., 1.25 mg, Tk. 3.01/Tab.
Tritace (*Sanofi*), Tab., 2.5mg, Tk. 9.53/Tab., 5mg, Tk. 14.04/Tab.
Unipril (*Acme*), Tab., 1.25 mg, Tk. 2.51/Tab.; 2.5 mg, Tk. 5.03/Tab.; 5 mg, Tk. 8.07/Tab.

Ramipril + Hydrochlorothiazide

Ramicard Plus (*Drug Intl*), Tab., 2.5 mg + 12.5 mg, Tk 3.00/Tab.; 5 mg + 25 mg, Tk. 5.00/Tab.
Ramiril Plus (*Incepta*), Tab., 2.5 mg + 12.50mg, Tk. 5.00/Tab.; 5 mg + 25 mg, Tk. 8.00/Tab.
Protace H (*Unimed*), Tab., 2.5 mg + 12.50 mg, Tk. 5.00/Tab.

3.2.2 ANGIOTENSIN II RECEPTOR ANTAGONISTS (ARB)

Azilsartan, Losartan, Olmesartan, and valsartan are specific angiotension-II receptor antagonists; their properties are similar to those of the ACE inhibitors. **Candesartan, Eprosartan, Irbesartan** and **Telmisartan** have been introduced more recently. However, unlike ACE inhibitors, they do not cause the persistent dry cough, which is common with ACE inhibitors. They are useful alternatives for patients who have to discontinue an ACE inhibitor because of persistent cough.

Cautions: Angiotension-II receptor antagonists are to be used with caution in renal artery stenosis. It is advised that plasma-potassium concentration be monitored in the elderly and in patients with renal insufficiency; lower initial doses may be suitable in these patients. Angiotension II receptor antagonists should be avoided in pregnancy and bilateral renal artery stenosis.

Side-effects: Hypotension, hyperkalemia and angioedema.

AZILSARTAN

Indication: Hypertension alone and in combination with other anti hypertensive

Cautions: See notes above; lactation

Side-effects: See notes above

Dose: 80 mg once daily

Proprietary Preparations:

Adarbi (*NIPRO JMI*), Tab., 40 mg, Tk. 12.00/Tab.; 80 mg, Tk. 22.00/Tab.
Azisan (*Renata*), Tab., 40 mg, Tk. 12/Tab.; 80 mg, Tk. 22.00/Tab.
Tanzil (*Drug Intl*), Tab., 40 mg, Tk. 12/Tab.
Zilsart (*Acme*), Tab., 40 mg, Tk. 12.00/Tab.

CANDESARTAN CILEXETIL

Indication: Hypertension

Cautions: See notes above, mild to moderate hepatic impairment and renal impairment

Contraindications: See notes above; severe hepatic and renal impairment, cholestasis, breast-feeding and pregnancy

Interactions: See Appendix-2

Side-effects: See notes above; dizziness, myalgia, headache, nausea, abdominal pain, back pain, peripheral edema, rash and blood disorder

Dose: Initial dose is 4mg once daily. A lower initial dose of 2mg once daily is suggested for patient with renal impairment. The dose should be adjusted according to response. The usual maintenance dose 4mg once daily with a maximum dose of 16mg once daily

Proprietary Preparations

Giran (*Aristo*), Tab., 8 mg, Tk. 6.00/Tab.; 16 mg, Tk. 11.00/Tab.
Candesa (*General*), Tab., 4 mg, Tk. 3.51/Tab.; 8 mg, Tk. 6.02/Tab.
Vesotan (*Rangs*), Tab. 16 mg, Tk. 11.00/Tab.; 8 mg, Tk. 6.00/Tab.
[Candesartan cilexetil 8 mg + Hydrochlorothiazide 12.50mg.](#)
Giran (*Aristopharma*), Tab., Tk. 6.00/Tab.

IRBESARTAN

Indications: Hypertension, diabetic nephropathy

Cautions: See notes above;

Contraindications: See notes above; breast-feeding and pregnancy

Interactions: See Appendix-2

Side-effects: See notes above; diarrhoea, dyspepsia, dizziness, myalgia, asthenia, tinnitus, tachycardia, cough, rash, urticaria reported

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Dose: Initially 150mg once daily in hypertension, increased, if necessary, 300mg once daily

Proprietary Preparations

Arbitan (*Opsonin*), Tab., 150 mg, Tk. 12.05/Tab.; 75 mg, Tk. 6.02/Tab.
Cavapro (*UniMed*), Tab., 75 mg, Tk. 6.00/Tab.; 150 mg, Tk. 12.00/Tab.; 300 mg, Tk. 24.00/Tab.
Irbes (*Eskayef*), Tab., 150 mg, Tk. 9.00/Tab.; 150 mg, Tk. 9.00/Tab.; 75mg, Tk. 5.00/Tab.
Isart (*ACI*), Tab., 150 mg, Tk. 9.06/Tab.

Irbesartan+ Hydrochlorothiazide

Arbitan (*Opsonin*), Tab., 150 mg+12.5mg , Tk. 12.05/Tab.; 75 mg+12.50, Tk. 6.03/Tab.
Cavazide (*UniMed*), Tab., 150mg+12.5mg, Tk. 12.00/Tab.; 300mg+12.5mg, Tk. 24.00/Tab.; 75mg+12.5mg, Tk. 6.00/Tab.

LOSARTAN POTASSIUM

Indication: Hypertension

Cautions: See notes above; hepatic and renal impairment

Contraindications: See notes above; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Diarrhoea, dizziness, taste disturbance, myalgia, migrane, urticaria, pruritus, rash, altered liver function tests

Dose: Usually 50mg once daily (elderly over 75 years, moderate to severe renal impairment, intravascular volume depletion, initially 25mg once daily); if necessary increase after several weeks to 100mg once daily

Proprietary Preparations

Angilock (*Square*), Tab., 50 mg, Tk. 8.03/Tab.; 100 mg, Tk. 12.03/Tab.; 25mg, Tk. 4.51/Tab.
Anreb (*General*), Tab., 50mg, Tk. 8.03/Tab.; 25mg, Tk. 4.51/Tab.
Araten (*UniMed*), Tab, 50mg, Tk. 8.00/Tab.
Arbium (*Asiatic*), Tab., 100mg ,Tk. 12.00/Tab.; 25mg, Tk. 3.50/Tab.; 50mg , Tk. 8.00/Tab.
Cardisan (*Beacon*), Tab. 50mg ,Tk. 8.02/Tab.
Cardon (*Eskayef*), Tab, 50mg ,Tk. 8.00/Tab.; 25mg, Tk. 4.50/Tab.; 50mg, Tk. 8.00/Tab.; 25mg , Tk. 4.50/Tab.
G-losartan (*Gonoshasthaya*), Tab., 50 mg, Tk. 5.00/Tab.; 25 mg, Tk. 3.00 /Tab.
Larb (*Opsonin*), Tab., 100 mg , Tk. 12.00/Tab.; 50 mg , Tk. 8.03/Tab. ; 25 mg , Tk. 4.51/Tab.

LK (*Pacific*), Tab., 25 mg, Tk. 4.50/Tab. ; 50 mg, Tk. 8.00/Tab. ; 50 mg, Tk. 8.00/Tab.
Lopo (*Biopharma*), Tab., 25mg, Tk. 4.50/Tab.; 100mg, Tk. 10.00/Tab.; 50mg, Tk. 8.00/Tab.
Lopos (*Zenith*), Tab., 25 mg, Tk. 3.51/Tab.; 50 mg, Tk. 6.02/Tab.
Lopoten (*Euro*), Tab., 25mg, Tk. 3.5/Tab.; 50mg, Tk. 6.00/Tab.
Loril (*Astra Bio*), Tab., 100 mg, Tk. 10.00/Tab.; 25 mg, Tk. 4.50/Tab.; 50 mg, Tk. 6.00/Tab.
Losa (*Alco*), Tab., 25 mg, Tk. 3.51/Tab.; 50 mg, Tk. 6.02/Tab.
Losacard (*Novo Health*), Tab., 50 mg, Tk. 8.00/Tab.; 25 mg, Tk. 4.50/Tab.
Losacor (*Healthcare*), Tab., 50mg, Tk. 8.00/Tab.
Losan (*Orion*), Tab. 100mg, Tk. 12.04/Tab.; 25 mg, Tk. 4.51/Tab.; 50 mg, Tk. 8.02/Tab.
Losapot (*Somatec*), Tab., 50mg, Tk. 8.00/Tab.
Losapress (*Benham*), Tab., 25 mg, Tk. 4.05/Tab.; 50 mg, Tk. 8.00/Tab.
Losar (*Nipa*), Tab.; 50 mg, Tk. 8.00/Tab.
Losarcar (*Medimet*), Tab., 50mg, Tk. 6.00/Tab.; 25mg, Tk. 3.50/Tab.
Losardil (*Drug Intl*), Tab., 25mg,
Losaron (*Amico*), Tab., 50mg , Tk. 5.00/Tab.
Losart (*Acme*), Tab.; 25 mg., Tk. 4.51/Tab.; 100 mg., Tk. 12.03/Tab.; 50 mg., Tk. 8.03/Tab.
Losarva (*NIPRO JMI*), Tab., 25 mg, Tk. 3.00/Tab.; 50mg, Tk. 4.00/Tab.
Losatan (*Popular*), Tab. , 50mg, Tk. 8.00/Tab.; 25mg, Tk. 4.50/Tab.
Losium (*Ibn Sina*), Tab. , 50mg, Tk. 8.50/Tab.
Parten (*Jayson*), Tab., 50mg, Tk. 5.03/Tab.
Pertilos (*Navana*), Tab., 50 mg, Tk. 8.03/Tab.

Losartan Potassium + Hydrochlorothiazide

Angilock Plus (*Square*), Tab., 100 mg + 12.5 mg, Tk. 12.00/Tab.; 100 mg + 25 mg, Tk. 12.03/Tab.; 50 mg + 12.5 mg, Tk. 8.03/Tab.
Anreb (*General*), Tab., 100mg + 12.50mg, Tk. 12.04/Tab.; 50mg + 12.50mg, Tk. 8.03/Tab.
Araten (*UniMed*), Tab., 50mg + 12.5mg, Tk. 8.00/Tab.
Arbium (*Asiatic*), Tab., 100mg + 25mg , Tk. 10.00/Tab.; 100mg + 12.50mg , Tk. 10.00/Tab.; 50mg + 12.50mg , Tk. 8.00/Tab.
Cardisan (*Beacon*), Tab., 50mg +12.50mg , Tk. 8.02/Tab.
Cardoplus (*Eskayef*), Tab., 50mg + 12.50 mg, Tk. 8.00/Tab.; 50mg+12.50 mg, Tk. 8.00/Tab.;
Larb (*Opsonin*), Tab. , 12.5 mg + 100 mg , Tk. 12.00/Tab. ; 25 mg + 100 mg , Tk. 12.00/Tab. ; 12.5 mg + 50 mg , Tk. 8.00/Tab.
LK (*Pacific*), Tab., 50 mg+ 12.5 mg, Tk. 8/Tab.
Lok (*Globe*), Tab., 50 mg +12.50 mg, Tk. 8/Tab.
Lopo (*Biopharma*), Tab., 50mg + 12.500mg, Tk. 8.00/Tab.
Lopos (*Zenith*), Tab. , 100 mg, +25 mg, Tk. 10.04/Tab.

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Losa (*Alco*), Tab., 50 mg + 12.5 mg, Tk. 8.02/Tab.
Losacard (*Novo Health*), Tab., 50 mg + 12.5 mg, Tk. 8.00/Tab.
Losacor (*Healthcare*), Tab., 50mg + 12.50 mg, Tk. 8.00/Tab.
Losan (*Orion*), Tab., 50mg + 12.50 mg, Tk. 8.02/Tab.
Losapot (*Somatec*), Tab., 50 mg +12.50 mg, Tk. 8.00/Tab.; 100 mg +12.50 mg, Tk. 12.00/Tab.
Losardil (*Drug Intl*), Tab., 25+12.5mg, Tk. 5.05/Tab.; 50 mg+12.5mg, Tk.8.05/Tab.; 100+12.50mg, Tk 12.05/Tab.; 100+25mg, Tk. 12.05/Tab.
Losart (*Acme*), Tab., 100 mg + 12.50 mg, Tk. 12.03/Tab.; 100 mg + 25.00 mg, Tk. 12.03/Tab.; 50 mg + 12.50 mg, Tk. 8.03/Tab.
Losarva (*NIPRO JMI*), Tab., 50 mg + 12.5 mg, Tk. 6.00/Tab.
Losatan (*Popular*), Tab., 50.00mg + 12.50mg, Tk. 8.00/Tab.
Losium (*Ibn Sina*), Tab., 50mg+ 12.5mg, Tk. 8.50/Tab.
Nusartan (*Nuvista*), Tab., 50mg + 12.5mg, Tk. 7.50/Tab.
Osartan (*Aristo*), Tab., 50mg +12.50mg, Tk. 8.00/Tab/
Osartil (*Incepta*), Tab., 100 mg + 12.50 mg, Tk. 12.00/Tab.; 100 mg + 25 mg, Tk. 12.00/Tab.; 50 mg +12.50 mg, Tk. 8.00/Tab.
Oscard (*Sharif*), Tab., 50 mg + 12.5 mg, Tk. 6.01/Tab.
Parten (*Jayson*), Tab., 50 mg + 12.5 mg, Tk. 6.04/Tab.
Pertilos Plus (*Navana*), Tab., 50 mg + 12.5 mg, Tk. 8.03/Tab.
Precon (*Radiant*), Tab., 50mg BP + 12.5mg, Tk. 10.50/Tab.; 50mg + 12.5mg, Tk. 8.00/Tab.
Rosatan (*ACI*), Tab., 25mg + 12.5mg, Tk. 4.03/Tab.; 50mg +12.5mg, Tk. 6.04/Tab.

OLMESARTAN MEDOXOMIL

Indication: Hypertension

Cautions: Hepatic impairment-dose should not exceed 20mg daily in moderate impairment

Contra-indications: Biliary obstruction, severe renal impairment

Interactions: See Appendix- 2

Side-effects: See notes above; also gastro-intestinal disturbances, chest pain, peripheral oedema, hypertriglyceridaemia, fatigue, flue like symptoms, cough, pharyngitis, urinary tract infection, haematuria, hyperuricaemia, arthritis, myalgia, pruritis, urticaria,

Dose: Initially 10 mg once daily; if necessary increased to 20 mg once daily; max. 40 mg daily.

Renal impairment-max. 20mg daily if eGFR 20-60mL/minutes/1.73m³; avoid if eGFR less than 20mL/minutes/1.73m³

Proprietary Preparations

Abetis (*ACI*), Tab., 10 mg, Tk. 5.04/Tab.; 20 mg, Tk. 8.05/Tab.; 40 mg, Tk. 15.11/Tab.
Olmecar (*Square*), Tab., 20 mg, Tk. 8.03/Tab.; 40 mg, Tk. 15.05/Tab.
Olmepres (*General*), Tab., 20 mg, Tk. 8.00/Tab.; 40 mg, Tk. 15.00/Tab.
Olmesan (*Beximco*), Tab., 10 mg, Tk. 5.00/Tab.; 20 mg, Tk. 8.00/Tab.; 40 mg, Tk. 15.00/Tab.
Olmesart (*Sharif*), Tab., 40 mg, Tk. 15.04/Tab.; 20 mg, Tk. 8.03/Tab.
Olmesta (*Eskayef*), Tab., 40 mg, Tk. 15.00/Tab.; 20 mg, Tk. 8.00/Tab.; 10 mg, Tk. 5.00/Tab.; 40 mg, Tk. 15.00/Tab.; 20 mg, Tk. 8.00/Tab.; 10 mg, Tk. 5.00/Tab.;
Olmestic (*Drug Intl*), Tab., 20 mg, Tk. 8.05/Tab.
Olmepas (*Popular*), Tab., 10 mg, Tk. 8.03/Tab.; 20 mg, Tk. 8.00/Tab.
Olsart (*Opsonin*), Tab., 10 mg, Tk. 5.00/Tab.; 20 mg, Tk. 8.03/Tab.; 40 mg, Tk. 15.00/Tab.
Orbas (*Acme*), Tab., 20 mg, Tk. 8.03/Tab.; 40 mg, Tk. 15.04/Tab.
Presulock (*Aristo*), Tab., 20 mg, Tk. 8.00/Tab.
Ransys (*Healthcare*), Tab., 10 mg, Tk. 5.00/Tab.; 20 mg, Tk. 8.00/Tab.; 40 mg, Tk. 15.00/Tab.
Sevitan (*Radiant*), Tab., 20 mg, Tk. 10.00/Tab.
Tenicar (*UniMed*), Tab., 40 mg, Tk. 15.00/Tab.; 20 mg, Tk. 8.00/Tab.
Xyotil (*Incepta*), Tab., 20 mg, Tk. 8.00/Tab.; 40 mg, Tk. 15.00/Tab.

Olmesartan Medoxomil + Hydrochlorothiazide

Abetis Plus (*ACI*), Tab., 12.5 mg + 20 mg, Tk. 8.05/Tab.; 12.5 mg + 40 mg, Tk. 15.00/Tab.
Olmecar (*Square*), Tab., 12.5 mg + 20 mg, Tk. 8.03/Tab.; 12.5 mg + 20 mg, Tk. 8.00/Tab.
Olmestic -plus (*Drug Intl*), Tab., 12.5 mg + 20 mg, Tk. 8.05/Tab.
Olsart (*Opsonin*), Tab., 12.5 mg + 20 mg, Tk. 8.00/Tab.; 12.5 mg + 40 mg, Tk. 15.06/Tab.;
Orbas (*Acme*), Tab., 12.5 mg + 20 mg, Tk. 8.03/Tab.
Ransys (*Healthcare*), Tab., 12.5 mg + 20 mg, Tk. 8.00/Tab.
Sevitan-HTZ (*Radiant*), Tab., 12.5 mg + 20 mg, Tk. 10.50/Tab.

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Tenizide (*UniMed*), Tab, 12.5 mg + 20 mg, Tk. 8.00/Tab.
Xyotil (*Incepta*), Tab., 12.5 mg + 20 mg, Tk. 8.00/Tab.

TELMISARTAN

Indication: Hypertension

Cautions: See notes above; mild to moderate hepatic impairment and renal impairment

Contraindications: See notes above; biliary obstruction, breast-feeding

Interactions: See Appendix-2

Side-effects: See notes above, influenza like symptom, flatulence, anxiety, vertigo, increased sweating, blood disorder, increase in uric acid

Dose: Usually 40mg once daily, increased if necessary after at least 4 weeks, to max. 80mg once daily

Proprietary Preparations

Arbitel (*ACI*), Tab., 20mg, Tk. 7/Tab.; 40mg,

Tk.12.5/Tab.; 80mg, Tk. 20/Tab.

Telcardis (*Unimed*), Tab., 40 mg, Tk.12.50/Tab.; 80 mg, Tk. 20.00/Tab.

Mitosan (*Novartis*), Tab., 40 mg, Tk.13.00/Tab.; 80 mg, Tk. 21.00/Tab.

Telmisartan + Hydrochlorothiazide

Arbitel (*ACI*), Tab., 40mg + 12.5mg, Tk.12.5/Tab.; 80mg +12.5 mg, Tk. 20.00/Tab.

Mitosan Plus (*Novartis*), Tab., 40 mg + 12.50 mg, Tk. 13.00/Tab.; 80 mg + 12.50 mg, Tk. 21.00/Tab.

Telcardis Plus (*UniMed*), Tab., 80 mg + 12.50 mg, Tk. 20.00/Tab.; 40 mg + 12.50 mg, Tk. 12.50/Tab.

VALSARTAN

Indications: Hypertension

Cautions: See notes above; mild to moderate hepatic impairment and renal impairment

Contraindications: See notes above; severe hepatic impairment, cirrhosis, biliary obstruction, breast-feeding

Interactions: See Appendix-2

Side-effects: See notes above; fatigue, neutropenia reported

Dose: usually 80 mg once daily ;(elderly over 75 years, severe renal impairment, initially 40 mg once daily)

Proprietary Preparations

Arovan (*Aristo*), Cap., 80 mg, Tk. 10.00/Tab.

Cardival (*Drug Intl*), Tab., 80mg, Tk. 10.05/Tab.

Cardovan (*Eskayef*), Tab, 160mg. Tk.

16.00/Tab.; 80mg, Tk. 10.00/Tab.;

Diovan ⁽¹⁾ (*Novartis*), Tab., 160 mg, Tk.

74.00/Tab.; 320 mg, Tk. 70.00/Tab.; 40 mg, Tk.

34.10/Tab.; 80 mg, Tk. 54.00/Tab.

Disys (*Healthcare*), Tab., 80 mg, Tk.10.00/Tab.; 160 mg, Tk. 18.00/Tab.

Valpress (*Silva*), Cap., 80mg, Tk. 8.03/Cap.

Valsartil (*Incepta*), Tab., 160 mg, Tk. 66/Tab.; 40 mg, Tk. 5.00/Tab.; 80 mg, Tk. 9.00/Tab.

Valset (*Orion*), Tab., 80 mg, Tk. 6.04/Tab.

Valtin (*Acme*), Tab., 160.00 mg, Tk. 16.04/Tab.; 80.00 mg, Tk. 9.03/Tab.

Valsartan + Hydrochlorothiazide

Cardival Plus (*Drug Intl*), Tab., 160 mg + 12.50 mg, Tk. 16.00/Tab.

Cardovan (*Eskayef*), Tab, 160 mg + 12.50 mg, Tk. 16.00/Tab.; 80 mg + 12.50 mg, Tk. 10.00/Tab.;

Co-Diovan (*Novartis*), Tab. , 80 mg + 12.50 mg, Tk. 48.14/Tab.; 160 mg + 12.50 mg, Tk. 66.20/Tab.; 160 mg + 25 mg, Tk. 66.20/Tab.

Disys (*Healthcare*), Tab., 80 mg + 12.50 mg, Tk.10.00/Tab.

Valsartil (*Incepta*), Tab., 160 mg + 12.50 mg, Tk. 8.00/Tab.; 80 mg +12.50 mg, Tk. 6/Tab.

Valzide (*Renata*), Tab., 160 mg + 25 mg, Tk. 20.00/Tab.; 80 mg + 12.50 mg, Tk. 11/Tab.

Amlodipine + Valsartan

Amlosartan (*Incepta*), Tab., 5 mg +160 mg, Tk. 8.00/Tab.; 5 mg+320 mg, Tk. 9.00/Tab.; 5mg + 80 mg, Tk. 6.00/Tab.

Amlovas (*Popular*), Tab., 5 mg + 80 mg, Tk. 9.03/Tab.; 5 mg + 160 mg, Tk. 16.06/Tab.; 5 mg + 160 mg, Tk. 16.06/Tab.

AV (*Drug Intl*), Tab., 10mg +160mg, Tk. 13.00/Tab.; 5mg +160mg, Tk. 10.00/Tab.; 5 mg + 80 mg, Tk. 7.00/Tab.

Avodil VI (*Opsonin*), Tab., 10 mg + 320 mg, Tk. 32.00/Tab.

Camoval (*Square*), Tab., 5 mg + 160 mg, Tk. 16.11/Tab.; 5 mg + 80 mg, Tk. 9.06/Tab.

Co-Disys (*Healthcare*), Tab., 5 mg + 160 mg, Tk. 18.00/Tab.; 5 mg + 160 mg, Tk.

18.00/Tab.; 5 mg + 80 mg, Tk. 10.00/Tab.; 5 mg + 80 mg, Tk. 10.00/Tab.

Co-Valtin (*Acme*), Tab.,5 mg + 80 mg, Tk.

9.03/Tab.; 5 mg + 160 mg , Tk. 16.04/Tab.

Exforge ⁽¹⁾(*Novartis*), Tab., 10 mg+160 mg, Tk. 79.09/Tab.; 5 mg + 80 mg, Tk. 50.50/Tab.; 5 mg+ 160 mg, Tk. 70.75/Tab.

Sacubitril + Valsartan

Arnigen (*General*), Tab., 97mg + 103mg, Tk. 160.00/Tab.; 49mg + 51mg, Tk. 85.00/Tab.; 24mg + 26mg, Tk. 45.00/Tab.

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Entresto[®] (Novartis), Tab., 24.3 mg + 25.7 mg, Tk. 134.00/Tab.; 48.6 mg + 50.4 mg, Tk. 134.00/Tab.; 97.2 mg + 102.8 mg, Tk. 134.00/Tab.

Sabitar (Incepta), Tab., 24.3 mg + 25.7 mg, Tk. 45.00/Tab.; 48.6 mg + 50.4 mg, Tk. 80.00/Tab.; 97.2 mg + 102.8 mg, Tk. 120.00/Tab.

3.2.3 RENIN INHIBITORS

Renin inhibitors inhibit renin directly; renin converts angiotensinogen to angiotensin.

Aliskiren is the first in the class of renin blockers.

It may be preferred in renal disease. Aliskiren also neutralizes any compensatory increase in plasma renin activity even during combined therapy with a thiazide diuretic, an ACE inhibitor, or ARB

ALISKIREN

Indication: Essential hypertension

Cautions: Patients taking concomitant diuretics, on a low-sodium diet, or who are dehydrated (first doses may cause hypotension initiate with care); renal artery stenosis, renal impairment; monitor plasma-potassium concentration and renal function in diabetes mellitus and heart failure, pregnancy and breast feeding

Contra-indications: Concomitant use with ACE inhibitors or ARBs in patients with diabetes, pregnancy and lactation

Interactions: See Appendix-2

Side-effects: Diarrhea, angioedema acute renal failure (reversible on discontinuation of treatment), anaemia, and hyperkalaemia also reported

Dose: ADULT over 18 years, 150 mg once daily

Proprietary Preparations

Rasilez[®] (Novartis), Tab. 150 mg, Tk. 62.50/Tab.; Tab., 300 mg, Tk. 78.00/Tab.

Aliskiren + Hydrochlorothiazide

Rasilez HCT[®] (Novartis), Tab., 150 mg + 12.5 mg, Tk. 62.50/Tab.

3.2.4 ALPHA ADRENOCEPTOR BLOCKING DRUGS

Prazosin which has post-synaptic alpha-blocking and vasodilator properties, causes a rapid reduction in blood pressure after the first dose and should be prescribed carefully; it rarely causes tachycardia. **Doxazosin**, **indoramin**, and **terazosin** have properties similar to those of prazosin. **Alfuzosin**, **Doxazosin**, **Indoramin**, **Prazosin**, **Tamsulosin** and **Terazosin** are indicated for benign prostatic hyperplasia (see also section 6.4.5).

Phenoxybenzamine a powerful alpha-blocker with many side effects can be used with a beta-blocker for the short-term management of severe hypertensive emergencies associated with phaeochromocytoma.

Phentolamine is a short-acting alpha-blocking drug used on rare occasions for a suppression test for phaeochromocytoma.

PRAZOSIN

Indications: See under dose

Cautions: First dose may cause collapse due to hypotension (therefore should be taken on retiring to bed), elderly, renal impairment, hepatic impairment, pregnancy and breast feeding

Contraindications: Not recommended for congestive heart failure due to mechanical obstruction (e.g. aortic stenosis)

Interactions: See Appendix-2

Side-effects: Postural hypotension, drowsiness, weakness, dizziness, headache, lack of energy, nausea, palpitations, leucopenia, hepatitis, jaundice, urinary incontinence; cases of priapism and impotence reported

Dose: Hypertension, 1 mg daily at bedtime ;usual maintenance dose 2-10 mg daily

Proprietary Preparations

Alphapress (Renata), Tab, 1 mg, Tk. 4.00/Tab., 2 mg, Tk. 6.00/Tab.

G-prazosin (*Gonoshasthaya*), Tab., 1 mg, Tk. 2.00/Tab.; 2 mg, Tk. 3.00/Tab.; 5 mg, Tk. 7.00/Tab.

MinipressXL [®] (*Pfizer*) Tab., 2.5 mg, Tk. 12.71/Tab.; 5 mg, Tk. 21.18 Tk. . . .

Prazololol (*Square*), Tab., 1 mg, Tk. 4.00/Tab.; 2 mg, Tk. 6.00/Tab.

Prazopress (*UniMed*), ERTab, 2.5mg, Tk. 10.00/Tab.; 5mg, Tk. 15.00/Tab., 2mg, Tk. 6.00/Tab.; 1mg, Tk. 4.00/Tab.

TERAZOSIN

Indications: Mild to moderate hypertension; benign prostatic hyperplasia

Cautions: First dose may cause collapse due to hypotension (within 30-90 minutes, therefore should be taken on retiring to bed) (may also occur with rapid dose increase), cataract surgery and breast feeding

Contraindications: History of postural hypotension and micturition syncope

Interactions: See Appendix- 2

Side-effects: Drowsiness, postural hypotension, syncope, asthenia, headache, dry mouth, gastro-intestinal disturbances, oedema, blurred vision, intra-operative floppy iris syndrome, rhinitis, erectile disorders, tachycardia, and palpitations, rash, pruritus and angioedema; also reported weight gain, dyspnoea, paraesthesia, thrombocytopenia and pain in extremities

Dose: Hypertension, 1 mg at bed time; usual maintenance dose 2–10 mg once daily;

Proprietary Preparation

Terazon (*Incepta*), Tab. 2 mg, Tk. 5.00/Tab.; 5mg, Tk. 8.00/Tab.

3.2.5 Angiotensin II receptor blocker Nephilysin Inhibitor (ARNI)

Sacubitril (Nephilysin inhibitor) and Valsartan

Indication: Reduce the risk of cardiovascular death and hospitalization for heart failure in patients with chronic heart failure (NYHA Class II-IV) and reduced ejection fraction (LVEF≤35%).

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Caution: Concomitant use with ACE inhibitor, hypotension, dose titration in renal failure patients (eGFR <30 mL/min/1.73 m²)

Contraindication: Hypersensitivity to any component, pregnancy, Concomitant use with ACE inhibitors. History of angioedema related to previous ACE inhibitor or ARB therapy, aliskiren in patients with diabetes, severe hepatic impairment

Side Effects: Angioedema, hypotension, impaired renal function, hyperkalemia, Cough

Dose: Starting dose is 49/51 mg (Sacubitril/Valsartan) twice-daily. Double the dose after 2 to 4 weeks to the target maintenance dose of 97/103 mg (sacubitril/valsartan) twice-daily, as tolerated by the patient. Reduce the starting dose to 24/26 mg (sacubitril/valsartan) twice-daily for: patients with severe renal impairment (eGFR <30 mL/min/1.73 m²), patients with moderate hepatic impairment

Proprietary Preparations:

Arnigen (*General*), Tab.; 97mg+103mg, Tk.160.00/Tab.; 49mg+51mg, Tk. 85.00/Tab.; 24mg+26mg, Tk.45.00/Tab.

Entresto [®] (*Novartis*), Tab.; 24.3mg+25.7 mg, Tk.134.00/Tab.; 48.6mg+50.4mg, Tk.134.00/Tab.; 97.2mg+102.8 mg, Tk. 134.00/Tab.

Sabitar (*Incepta*), Tab.; 24.3mg+25.7mg, Tk.45.00/Tab.; 48.6 mg + 50.4 mg, Tk.80/Tab.; 97.2mg+102.8 mg, Tk. 120/Tab.

3.2.6 VASODILATOR ANTIHYPERTENSIVE DRUGS

Vasodialator, especially when used in combination with beta blocker and a thiazide may cause rapid fall in blood pressure precipitating a hypotensive crisis.

Intravenous injection of **Diazoxide** can be prescribed in hypertensive emergencies. **Hydralazine** given by mouth is a useful adjunct to other treatment;

Intravenous infusion of **Sodium nitroprusside** is given in hypertensive

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emergencies on rare occasions when parenteral treatment is essential. **Minoxidil** should be given when other antihypertensive drugs have failed to control severe hypertension; it can cause tachycardia and fluid retention. Because of this a beta-blocker and frusemide in high dosage must be given in combination with this vasodilator. Prazosin, Doxazosin and Terasozin (see section 3.2.3) have alpha-blocking, as well as vasodilator properties.

3.2.7 CENTRALLY ACTING ANTI-HYPERTENSIVE DRUGS

Methyldopa which is a centrally acting antihypertensive is safe in pregnancy, in asthmatics and in heart failure. The daily dose is to be kept below 1 g to minimize side-effects. **Clonidine** has the disadvantage that if suddenly withdrawn, it may cause a hypertensive crisis. Reserpine is no longer used because of adverse side-effects. **Moxonidine** a recently introduced centrally acting drug may have a role when thiazides, beta-blockers, ACE inhibitors and calcium-channel blockers are not suitable or have failed to control blood pressure.

CLONIDINE HYDROCHLORIDE

Indications: Hypertension, migraine, menopausal flushing

Cautions: Must be withdrawn gradually to avoid severe rebound hypertension; Raynaud's syndrome; history of depression, pregnancy and breast feeding; Driving-Drowsiness may affect performance of skilled tasks

Contraindications: Hypersensitivity to clonidine and avoid intravenous injection

Interactions: See Appendix- 2

Side-effects: Dry mouth, sedation, depression, fluid retention, bradycardia, Raynaud's phenomenon, headache, dizziness, euphoria, nocturnal unrest, rash, nausea, constipation, impotence

Dose: By mouth, 50–100 micrograms 3 times daily, increased every second or third day; usual max. dose 1.2 mg daily

Proprietary Preparation

Catapres (Navana), Tab. 0.1mg, Tk.8.03/Tab

METHYLDOPA [ED]

Indications: Hypertension, along with diuretics

Cautions: History of liver impairment; renal impairment; blood counts and liver function tests are advised; history of depression; positive direct Coombs' test in up to 20% of patients (may affect blood crossmatching)

Note. Drowsiness may affect performance of skilled tasks (e.g. driving);

Contraindications: Depression, active liver disease, phaeochromocytoma

Interactions: See Appendix-2

Side-effects: Dry mouth, stomatitis, bradycardia, exacerbation of angina, postural hypotension, sedation, dizziness, myalgia, arthralgia, paraesthesia, nightmares, mild psychosis, Parkinsonism

Dose: By mouth, Initially 250 mg 2-3 times daily, increased gradually at intervals of 2 or more days; max. 2 g daily; ELDERLY initially 125 mg twice daily, increased gradually; max. 2 g daily

Proprietary Preparations

Dopamet (Opsonin), Tab., 250 mg, Tk. 3.08/Tab.

Dopegyt (Ambee), Tab. 250 mg, Tk. 3.09/Tab.

Sardopa (Incepta), Tab., 250 mg, Tk. 3.080/Tab.; 500 mg, Tk. 5.90/Tab.

3.3 NITRATES, CALCIUM-CHANNEL BLOCKERS AND OTHER ANTIANGINAL DRUGS

3.3.1 NITRATES

3.3.2 CALCIUM-CHANNEL BLOCKERS

3.3.3 OTHER ANTIANGINAL DRUGS

3.3.4 PERIPHERAL AND CEREBRAL VASODILATORS & NEURO-SENSORY OXYGENATOR DRUGS

3.3.1 NITRATES

Nitrates as vasodilators play a beneficial role in angina. They are potent coronary vasodilators, but their main benefit is

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due to reduction in venous return, which reduces left ventricular work. Flushing, headache, and postural hypotension are the main unwanted side-effects of nitrate preparations.

GLYCERYL TRINITRATE ^[ED]

Indications: Prophylaxis and treatment of angina, left ventricular failure

Cautions: Severe hepatic or renal impairment, hypothyroidism, malnutrition, or hypothermia, recent history of myocardial infarction,

Contraindications: Hypersensitivity to nitrates, hypotensive conditions and hypovolaemia, head trauma, cerebral haemorrhage, closed angle glaucoma

Interactions: See Appendix-2

Side-effects: Throbbing headache, flushing, dizziness, postural hypotension, tachycardia Prolonged administration has been associated with methaemoglobinemia

Dose: Sublingually, 0.3-1 mg repeated as required

By intravenous infusion, 10-2000 micrograms/minute.

Proprietary Preparations

Angicard (*Drug Intl*), Tab., 0.5mg, Tk. 3.05/Tab

Angist (*Acme*), Tab., 2.6mg, Tk. 4.03/Tab.

Anril (*Square*), Spray, 0.40mg/Puff, Tk. 216.45/200 Puff.; Tab., 2.6 mg, Tk. 5.00/Tab.; 0.5 mg, Tk. 3.01/Tab.; Inj., 5 mg/ml, Tk. 75.5/Vial

Glytrin (*Novo Health*), Cap., 2.6mg, Tk. 4.00/Cap.

GTN (*Eskayef*), Tab., 2.6 mg, Tk. 5.00/Tab.; 2.6mg, Tk. 5.00/Tab.

Nidocard (*Drug Intl*), Inj. 5mg/ml, Tk. 100.30/Amp.; Tab., 2.6mg, Tk. 5.00/Tab.; 6.4mg, Tk. 7.04/Tab.; Tk. 250.75/200Puff

Nitrin (*Healthcare*), Spray, Tk. 270.00/200puff.; Tab., 2.6mg, Tk. 5.00/Tab.

Nitro (*UniMed*), Tab., 2.6mg, Tk. 4.00/Tab.; Cap., 2.6 mg, Tk. 5.03/Cap.

Nitrocard (*Aristo*), Spray, Tk. 250.00/200puff, Tab., 2.6mg, Tk. 5.00/Tab.

Nitrocontin (*Mundipharma*), CR Tab, 2.6 mg, Tk. 5.36/Tab.; CR Tab., 6.4 mg, Tk. 8.00/Tab.

Nitrodil (*Medimet*), Cap. 2.6 mg, Tk. 4.65/Cap.

Nitrofix (*Opsonin*), Tab., 2.6 mg, Tk. 4.00/Tab.

Nitrogina (*NIPRO JMI*), SR Tab., 50 mg, Tk. 4.00/Tab.,

Nitrosol (*Beximco*), Spray, Tk. 225.00/200

Puff.; Tab., 2.6mg, Tk. 5.00/Tab.

Nitromint ^(*Egis*) Spray, Tk. 206.22/Can

Nitrovas (*Popular*), Oint., 0.4%, Tk.

130.49/30g.; Tab., 2.6mg, Tk. 4.02/Tab.

Pactorin (*ACI*), Spray, 0.40mg/Puff, Tk.

250.00/200 Puff.; Tab., 2.60mg, Tk. 5.00/Tab.

Rectocare (*Square*), Oint., 0.4%, Tk.

65.45/15gm

Trocer (*Incepta*), Spray, Tk. 225.00/200 Puff.; Tab., 2.6 mg, Tk. 4.00/Tab.

Xynocard (*White Horse*), SR Tab., 2.6 mg, Tk. 3.00/Tab.

ISOSORBIDE MONONITRATE ^[ED]

Indications: Prophylaxis of angina, adjunct in congestive heart failure

Cautions: See under *Glyceryl Trinitrate*

Contraindications, Side-effect: See under *Glyceryl Trinitrate*

Interactions: See Appendix-2

Side-effects: See under *Glyceryl Trinitrate*

Dose: Initially 20 mg 2-3 times daily or 40 mg twice daily (10 mg twice daily in those who have not previously received nitrates); up to 120 mg daily in divided doses if required

Proprietary Preparations

A-Card (*Acme*), Tab., 20 mg, Tk. 1.42/Tab.

Angifix (*Incepta*), Tab., 20 mg, Tk. 1.42/Tab

Esmo (*Square*), Tab., 20 mg, Tk. 1.43/Tab.

Ism (*Aristo*), Tab., 20mg, Tk. 1.20/Tab.

Moniten (*ACI*), Tab., 20mg, Tk. 1.42/Tab.

Monocard (*Drug Intl*), Tab., 20mg, Tk.

1.43/Tab.; Cap., 50mg, Tk. 7.05/Cap.

Monotrate (*Sun*), Tab. 20 mg, Tk. 1.42/Tab.

OD Tab. 50 mg, Tk. 4.13/Tab.

3.3.2 CALCIUM-CHANNEL BLOCKERS

These drugs depress the contractility of myocardium, the formation and propagation of electrical impulses within the heart, and diminish coronary or systemic vascular tone. **Verapamil** is a negatively inotropic calcium channel-blocker indicated in angina, hypertension and arrhythmias; decreases cardiac output, slows the heart rate, and impairs atrioventricular conduction. It may precipitate heart failure, and should not

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be used with beta-blokkers. Constipation is a common side effect.

AMLODIPINE BESYLATE

Indications: Hypertension, prophylaxis of angina

Caution: Hepatic impairment

Contraindications: Cardiogenic shock, significant aortic stenosis, pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Headache, edema, fatigue, nausea, flushing, dizziness, gum hyper-plasia, rashes, dry mouth, palpitations, dyspnoea, muscle cramps, myalgia, arthralgia,

Dose: Hypertension or angina, initially 5 mg once daily, max. 10 mg once daily

Proprietary Preparations

Amdin (Alco), Tab., 10mg, Tk.6.02/Tab.; 5 mg, Tk.4.01/Tab.

Amdocal (Beximco), Tab., 10mg, Tk. 7.00/Tab.;5mg, Tk.5.00/Tab.

Amlocard (Drug Int.),Tab.,10mg,Tk. 7.05/Tab.; 5mg,Tk.4.55/Tab.

Amlopip (Acme),Tab.,10mg,Tk. 7.02/Tab.;5.00 mg.,Tk.5.01/Tab.

AmloTab (Incepta) Tab., 10 mg, Tk. 7.00/Tab.; 5 mg, Tk. 5.00/Tab.

Amlovas (Popular),Tab.,10mg,Tk.

6.02/Tab.;5mg,Tk.16.06/Tab.

Amlowide (Beacon),Tab.,5mg,Tk. 3.02/Tab.

Amocal (Opsonin),Tab.5 mg,Tk. 5.00/Tab.;10 mg,Tk.6.02/Tab.

Ampress (Benham), Tab., 5 mg, Tk. 5/Tab.

Amtenol (Euro) Tab., 5 mg,Tk. 4.00/Tab.

Cab (ACI),Tab.,5mg,Tk.5.02/Tab.

Calchek (General),Tab.,5mg,Tk. 5.01/Tab.

Calock (Medimet), Tab., 5mg, Tk. 3.50/Tab.; 10mg, Tk. 3.75/Tab.

Calpin (Globe),Tab.,5 mg,Tk.4.50/Tab.

Calpress (Asiatic),Tab.,10mg,Tk.

7.00/Tab.;5mg,Tk.5.00/Tab.

Calvasc (UniMed), Tab, 10mg, Tk. 8/Tab.; 5mg, Tk.5.00/Tab.

Camlodin (Square), Tab.,5 mg,Tk. 5.02/Tab.

Cardifort (Nuvista), Tab., 5 mg, Tk. 5.00/Tab.

Cardipin (Renata), Tab., 5 mg, Tk. 5.00/Tab.

CCB (Orion), Tab, 5 mg, Tk. 3.01/Tab.

Cvnor (Navana), Tab., 5 mg, Tk. 5.02/Tab.

Dipinol (Supreme),Tab 5mg, Tk. 3.50/Tab.

Diplor (Ibn Sina),Tab.,10 mg,Tk. 7.00/Tab.

Emlon (Biopharma),Tab., 5mg ,Tk. 5/Tab.

G-amlo (Gonoshasthaya), Tab., 10 mg, Tk. 4.00 /Tab.; 5mg, Tk. 2.50 /Tab.

Hipre (Pacific),Tab., 5 mg, Tk. 5.00/Tab.;10 mg, Tk.7.00/Tab.

Locard (Jayson), Tab., 5mg, Tk. 3.05/Tab.

Lodical (Somatec),Tab.,5 mg,Tk. 5.00/Tab.

Lodipin (Aristo),Tab.,5 mg , Tk. 5.00/Tab.

Lovapress (NIPRO JMI), Tab., 5mg, Tk. 5.00/Tab.

M-Card (Zenith),Tab.,5mg,Tk.4.01/Tab.

Nelod (Kemiko),Tab. 5 mg,Tk.5.02/Tab.

Pristin (Novo Health), Tab.,5 mg, Tk. 4.50/Tab.

SB-Amlod (Sunman-Bardem),Tab .5 mg, Tk.5.00/Tab.

Sidopin (Eskayef), Tab., 5 mg,Tk. 5.00/Tab.

Vasopin (Silva) Tab., 10mg, Tk. 5.01/Tab.; 5mg, Tk. 4.02/Tab.

Virlon (Virgo), Tab.5mg, Tk. 4.00/Tab.

Xelcard (Healthcare), Tab., 10mg, Tk.7.00/Tab.; 5mg, Tk. 5.00/Tab.

Amlodipine + Atenolol

Aloten (Kemiko), Tab., 5mg + 50mg, Tk. 4.51/Tab.

Aloten Forte (Kemiko), 5 mg + 25 mg, Tk. 4.24/Tab.

Amdin (Alco), Tab., 5 mg + 50 mg, Tk. 4.51/Tab.

Amdocal (Beximco), Tab., 5mg + 25mg, Tk. 5.25/Tab.; 5mg + 50mg, Tk. 6.00/Tab.

Amlocard Plus (Drug Intl), Tab., 5mg+25mg, Tk. 5.05/Tab.; 5mg+50mg, Tk. 6.05/Tab.

Amlocom (Beacon), Tab., 50mg +5mg, Tk. 4.52/Tab.

Amloten (Acme), Tab. , 5 mg + 25 mg, Tk. 5.27/Tab.; 5mg + 50 mg., Tk. 6.01/Tab.

Amlovas (Popular), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.

Amocal (Opsonin), Tab., 5 mg + 50 mg , Tk. 6.02/Tab.

Amtenol (Euro), Tab., 5 mg + 50 mg, Tk. 5.5/Tab.

Betacal (Orion), Tab., 50 mg + 5 mg, Tk. 6.02/Tab.

Calbeta (UniMed), Tab., 5mg+1 50m, Tk. 6.00/Tab.

Calchek (General), Tab. , 5mg + 50mg, Tk. 6.02/Tab.

Calpin (Globe), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.

Camlodin (Square), Tab., 5 mg + 25 mg, Tk. 5.02/Tab.; 5 mg + 50 mg, Tk. 6.02/Tab.

Cardifort (Nuvista), Tab. , 5 mg + 25mg, Tk. 5.25/Tab.; 5 mg + 50 mg, Tk. 6.00/Tab.

Cardipin (Renata), Tab., 5mg + 50mg, Tk. 6.00/Tab.

Combicard (Healthcare), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.

Fixocard (Incepta), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.; 5 mg + 25 mg, Tk. 5.25/Tab.

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Hipre (*Pacific*), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.
Lodical (*Somatec*), Tab., 50 mg, Tk. 6.00/Tab.
Lodicard (*Aristo*), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.
Pristin-all (*Novo Health*), Tab., 5 mg + 50 mg, Tk. 5.00/Tab.
Sidoplus (*Eskayef*), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.; 5 mg + 25 mg, Tk. 5.25/Tab.
Tenocab (*ACI*), Tab., 5mg +50mg, Tk. 6.02/Tab.; 5mg+25mg, Tk. 5.27/Tab.
Tenodin (*Asiatic*), Tab., 5mg + 50mg, Tk. 6.00/Tab.; 5mg + 25mg, Tk. 4.20/Tab.
Tenopin (*Sharif*), Tab., 5 mg + 50 mg, Tk. 4.51/Tab.
Vasopin (*Silva*), Tab., 5mg + 50mg, Tk. 4.52/Tab.
Cvnor-A (*Navana*), Tab., 5 mg + 50 mg, Tk. 6.02/Tab.
Calock Plus (*Medimet*), Tab., 5 mg + 50mg, Tk. 4.50/Tab.
Ampress (*Benham*), Tab., 5 mg + 50 mg, Tk. 6.00/Tab.
Locard (*Jayson*), Tab., 5mg+50mg, Tk. 3.02/Tab.
Amlodipine + Telmisartan
Arbitel (*ACI*), Tab., 5 mg+40 mg, Tk. 12.50/Tab.; Tab., 5 mg+80 mg, Tk. 18.00/Tab.
Telamlo (*UniMed*), Tab., 5 mg+40 mg, Tk. 12.50/Tab.
Amlodipine + Olmesartan Medoxomil
Abecab (*ACI*), Tab., 5 mg + 20 mg, Tk. 10.00/Tab.; 5 mg + 40 mg, Tk. 15.05/Tab.
Bizoran (*Beximco*), Tab., 5mg + 40mg, Tk. 15.00/Tab.; 5mg + 20mg , Tk. 10.00/Tab.
Calnor (*Opsonin*), Tab., 5 mg + 20 mg , Tk. 8.03/Tab.; 5 mg + 40 mg , Tk. 15.00/Tab.
Calsart (*Globe*), Tab., 5 mg +20 mg, Tk. 8.00/Tab.
Camlosart (*Square*), Tab., 5 mg + 20 mg, Tk. 10.00/Tab.; 5 mg + 40 mg, Tk. 15.05/Tab.
Disartan (*Drug Intl*), Tab., 5 mg +20 mg, Tk. 5.95/Tab.; 5 mg + 40 mg, Tk. 12.00/Tab.
Duoblock (*Aristo*), Tab., 5mg + 20 mg, Tk. 8.00/Tab.; 5 mg + 40mg , Tk. 15.00/Tab.
Duopres (*Incepta*), Tab., 5 mg +20 mg, Tk. 8.00/Tab.; 5 mg + 40 mg, Tk. 14.00/Tab.
Duovas (*Radiant*), Tab., 5mg + 20mg , Tk. 10.00/Tab.
Olmesta (*Eskayef*), Tab., 5mg + 20 mg, Tk. 8.00/Tab.;
Olmevas (*Popular*), Tab., 5 mg + 40mg, Tk. 15.00/Tab.; 5mg + 20 mg, Tk. 8.00/Tab.
Olmezest AM (*Sun*), Tab. 5 mg + 20 mg, Tk. 8.50/Tab.
Orbapin (*Acme*), Tab., 5 mg + 20.00 mg, Tk. 8.03/Tab.; 5 mg + 40 mg, Tk. 15.00/Tab.
Ransys (*Healthcare*), Tab., 5 mg + 20 mg , Tk. 8.00/Tab.; 5 mg + 40 mg , Tk. 15.00/Tab.
Tenivasc (*UniMed*), Tab. 5 mg +20 mg, Tk. 8.00/Tab.

Valdipin (*Renata*), Tab., 5 mg + 40 mg, Tk. 16.00/Tab.; Tab., 5 mg + 20 mg, Tk. 9.00/Tab.

Amlodipine + Benazepril

Amlozep (*Beacon*), Cap., 5 mg+10mg, Tk. 6.04/Cap.
Amocal (*Opsonin*), Cap., 5 mg+10mg, Tk. 6.02/Cap.
Benadip (*Incepta*), Cap., 5 mg+10mg, Tk. 6.00/Cap.; 2.5 mg + 10 mg, Tk. 4.00/Tab.; 5 mg + 20 mg, Tk. 8.00/Tab.
Caceter (*ACI*), Cap., 2.5 mg+10mg, Tk. 4.03/Cap.; 5 mg+10 mg, Tk. 6.04/Cap.; 5 mg+20 mg, Tk. 8.05/Cap.
Camlopril (*Square*), Cap., 5mg+10 mg, Tk. 6.04/Cap.
Lodiben (*Eskayef*), Cap., 5 mg+20mg, Tk. 8.00/Cap.; 2.5 mg + 10mg, Tk. 6.00/Cap.; 5 mg + 10mg, Tk. 4.00/Cap.

CILNIDIPINE

Indications: Hypertension with diabetic nephropathy and hypertriglyceridemia.

Contraindications and side effects: See notes above

Dose: Antihypertensive at doses 10-20mg/daily

Note: Produce less ankle edema

Proprietary preparations:

Cildip (*Opsonin*), Tab., 10 mg, Tk. 8.00/Tab.; 5 mg, Tk. 5.00/Tab.
Duocard (*Acme*), Tab., 10 mg, Tk. 9.00/Tab.; 5 mg, Tk. 7.00/Tab.

DILTIAZEM HYDROCHLORIDE

Indications: Prophylaxis and treatment of angina; hypertension

Cautions: Reduce dose in hepatic and renal impairment, heart failure or significantly impaired left ventricular function, bradycardia, first degree AV block or prolonged PR interval

Contraindications: Severe bradycardia, left ventricular failure, second-or third-degree AV block (unless pacemaker fitted) sick sinus syndrome, pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Bradycardia, sino-atrial block, AV block, palpitations, asthenia, headache, hot flushes, gastrointestinal disturbances, ankle edema, photosensitivity,

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Dose: Angina, 30 to 60 mg 3 times daily (elderly initially twice daily); increased if necessary max of 360 mg daily

Proprietary Preparations

Cardil (*Ibn Sina*), Tab., 30 mg, Tk. 2.25/Tab.
Cardisef (*Supreme*), Tab., 30mg, Tk. 2.00/Tab.; 60mg, Tk. 3.90/Tab.
Cardizem (*Drug Intl*), SR Tab., 120mg, Tk. 8.05/Tab.; 90mg, Tk. 6.05/Tab.; Tab., 30mg, Tk. 3.05/Tab.; 60mg, Tk. 5.05/Tab.
Diltiazem (*Albion*), Tab., 30 mg, Tk. 2.00/Tab. Tab., 60 mg, Tk. 3.80/Tab.; SR Tab., 90 mg, Tk. 5.61/Tab.
Diltizem (*Square*), SR Tab., 90 mg, Tk. 5.63/Tab.

LACIDIPINE

Indication: Hypertension

Cautions: Cardiac conduction abnormalities, poor cardiac reserve, hepatic impairment; withdraw if ischaemic pain occurs shortly after initiating treatment or if cardiogenic shock develops

Contraindications: Aortic stenosis, pregnancy and breast-feeding; avoid within 1 month of myocardial infarction.

Interactions: See Appendix-2

Side-effects: Headache, flushing, edema, dizziness, palpitations, gum hyperplasia, muscle cramps, polyuria, chest pain, mood disturbances

Dose: Initially 2 mg as a single daily dose, preferably in the morning, increased after 3-4 weeks to 4 mg daily, then if necessary to 6 mg daily

Proprietary Preparations

Lacocard (*Aristo*), Tab., 2 mg, Tk. 4.00/Tab.; 4 mg, Tk. 6.00/Tab.
Lacidip (*Incepta*), Tab., 2 mg, Tk. 4.03/Tab.; 4mg, Tk. 6.04/Tab.
Lacitab (*Acme*), Tab., 2 mg, Tk. 4.03/Tab.; 4 mg, Tk. 6.04/Tab.
Laciten (*Square*), Tab., 4 mg, Tk. 6.04/Tab.; 2mg, Tk. 4.03/Tab.
L-cardin (*Drug Int.*) Tab., 2 mg, Tk. 4.03/Tab

LERCANIDIPINE HYDROCHLORIDE

Indications: Mild to moderate essential hypertension

Cautions: Sick sinus syndrom (if pacemaker not fitted) hepatic and renal impairment, left ventricular dysfunction

Contraindications: Aortic stenosis, pregnancy and breast-feeding, avoid within 1 month of myocardial infarction unstable angina, uncontrolled heart failure

Interactions: See Appendix-2

Side-effects: Headache, flushing, edema, dizziness, palpitations, rash, gum hyperplasia, muscle cramps, polyuria, chest pain, mood disturbances

Dose: Initially 10 mg as once daily before food, increased if necessary after at least 2 weeks to 20mg daily

Proprietary Preparations

Canider (*ACI*), Tab., 10 mg, Tk. 5.04/Tab.
Larcadip (*Incepta*), Tab., 10 mg, Tk. 5.00/Tab.
Lotensyl (*Sun*), Tab., 10 mg, Tk. 5.55/Tab.

NIFEDIPINE [ED]

Indications: Hypertension, prophylaxis of angina, Raynaud's phenomenon

Cautions: Heart failure or significantly impaired left ventricular function, hepatic impairment, diabetes mellitus; pregnancy; breast-feeding

Contraindications: Cardiogenic shock, advanced aortic stenosis; within 1 month of myocardial infarction; unstable or acute attacks of angina

Interactions: See Appendix-2

Side-effects: Headache, flushing, dizziness, tachycardia, palpitation, increased frequency of micturition, visual disturbances, gum hyperplasia, paraesthesia, myalgia,

Dose: Mild to moderate hypertension, 10 to 20 mg twice daily adjusted according to response to 20 mg 3 times daily.

Proprietary Preparations

Nidipine SR (*Square*), SR Tab., 20 mg, Tk.0.64/Tab.
Nifecap (*Drug Intl*), Cap., 10 mg, Tk. 2.10/Cap.
Nifedipine (*Albion*), Tab., 10 mg, Tk.0.34/Tab.
Nifin (*Acme*), Tab., 10 mg, Tk. 0.34/Tab.

NIMODIPINE

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Indications: Prevention and treatment of ischaemic neurological deficits following aneurysmal subarachnoid haemorrhage

Cautions: Cerebral oedema or severely raised intracranial pressure; hypotension; renal impairment, pregnancy and breast feeding.

Contra-indications: within 1 month of myocardial infarction; unstable angina; acute porphyria

Interactions: See Appendix-2

Side-effects: Hypotension, variation in heart-rate, flushing, headache, nausea, sweating and feeling of warmth, thrombocytopenia

Dose: Prevention, *by mouth*, 60 mg every 4 hours, starting within 4 days of aneurysmal subarachnoid haemorrhage and continued for 21 days. Treatment, *by intravenous infusion via central catheter*, initially 1 mg/hour (up to 500 micrograms/hour if body-weight less than 70 kg or if blood pressure unstable), increased after 2 hours to 2 mg/hour if no severe fall in blood pressure; continue for at least 5 days (max. 14 days); if surgical intervention during treatment, continue for at least 5 days after surgery; max. total duration of nimodipine use 21 days

Proprietary Preparations

Nimocal (*Square*), Tab., 30 mg, Tk. 5.03/Tab.

Nimodi (*Eskayef*), Tab., 30 mg, Tk. 5.00/Tab.

VERAPAMIL HYDROCHLORIDE^[ED]

Indications: See under dose and preparation

Cautions: First-degree AV block, acute phase of myocardial infarction (avoid if bradycardia, hypotension, left ventricular failure), patients taking beta-blockers, hepatic impairment and breast-feeding

Contraindications: Hypotension, bradycardia, second and third degree AV block, sick sinus syndrome, cardiogenic shock, sinoatrial block, history of heart failure or significantly impaired left ventricular function, atrial flutter or fibrillation complicating Wolff-Parkinson-White syndrome, porphyria, patient recently treated with beta blockers.

Interactions: See Appendix-2

Side-effects: Constipation, less commonly nausea, vomiting, flushing, headache, dizziness, fatigue, ankle edema, erythema, pruritus, urticaria, angioedema, Stevens-Johnson syndrome, myalgia, arthralgia, paraesthesia, increased prolactin concentration, hypotension, bradycardia, heart block and asystole

Dose: *By mouth*, supraventricular arrhythmias (but see also Contraindications), 40-120 mg 3 times daily

Angina, 80-120 mg times daily

Hypertension, 240-480 mg daily in 2-3 divided doses or once daily with sustained release preparations

By slow intravenous injection over 2 minutes (3 minutes in elderly), 5-10 mg (preferably with ECG monitoring); in paroxysmal tachyarrhythmias a further 5 mg after 5-10 minutes, every 4-6 hr interval if required

Note: Verapamil injection has to be given fast, and interval of 30 minutes before giving a beta blocker.

Proprietary Preparations

Angimil (*Medimet*), SR Tab., 240 mg, Tk.

7.00/Tab.; Tab., 40 mg, Tk. 2.25/Tab.; 80 mg, Tk. 4.25/Tab.

Veracal (*Incepta*), Inj., 5 mg/2 ml, Tk.

30.00/Inj.; Tab, 180 mg, Tk. 6.00/Tab., 240 mg, Tk. 7.00/Tab., 80 mg, Tk. 3.00/Tab.

Veramil (*Rangs*), SR Tab., 240 mg, Tk.

7.00/Tab.; Tab., 80 mg, Tk. 3.00/Tab.

Verapamil (*Albion*), Tab. 80 mg, Tk. 3.00/Tab

3.3.3 OTHER ANTIANGINAL DRUGS

Nicorandil, a potassium-channel activator, has both arterial and venous vasodilating properties and is indicated for the prevention and long-term treatment of angina. When added to other antianginal drugs in refractory unstable angina,

Ivabradine selectively inhibits the pacemaker; reduces cardiac pacemaker activity, slowing the heart rate and allowing more time for blood to flow to the myocardium.

Ranolazine is used as adjunctive therapy in patients who are inadequately

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controlled or intolerant of first line antianginal drugs. It may be used in combination with amlodipine, beta-blockers, or nitrates.

Trimetazidine is a partial inhibitor of fatty acid oxidation without hemodynamic effects.

NICORANDIL

Indications: Prophylaxis and treatment of angina

Cautions: Hypovolaemia, acute pulmonary edema, acute myocardial infarction with acute left ventricular failure, pregnancy and breast-feeding

DRIVING: patients should be warned not to drive or operate machinery until it is established that their performance is unimpaired

Contraindications: Cardiogenic shock, left ventricular failure with low filling pressures, hypotension

Interactions: See Appendix-2

Side-effects: Headache, flushing, nausea, dizziness, weakness, reduction in blood pressure and/or increase in heart rate; angioedema, hepatic dysfunction also reported

Dose: Initially 10 mg twice daily (if susceptible to headache 5 mg twice daily) usual dose 10-20 mg twice daily, up to 30 mg twice daily may be used

Proprietary Preparations

Corangi (UniMed), Tab, 10mg, Tk. 6.00/Tab.

Nicor (Orion), Tab. 10mg, Tk. 6.00/Tab

IVABRADINE

Indications: In Chronic stable angina pectoris in patients with normal sinus rhythm, who have a contraindication to or intolerance to beta blockers, In chronic heart failure patients with reduced ejection fraction (LVEF≤35%) with normal sinus rhythm with resting heart rate ≥ 70 beats/ min who have a contraindication to or intolerance to beta blockers, inappropriate sinus tachycardia

Cautions: Mild heart failure including asymptomatic left ventricular dysfunction; monitor for atrial fibrillation

or other arrhythmias (treatment ineffective), hypotension, retinitis pigmentosa; pregnancy and breast-feeding

Contra-indications: For angina, if heart rate below 60 beats per minute; for heart failure, if heart rate below 70 beats per minute; unstable or acute heart failure; cardiogenic shock; acute myocardial infarction; unstable angina; immediately after cerebrovascular accident; sick-sinus syndrome; sino-atrial block; patients dependent on pacemaker; second- and third-degree heart block; congenital QT syndrome, hepatic and renal impairment
Interactions: See Appendix- 2

Side-effects: Bradycardia, first-degree heart block, ventricular extrasystoles, headache, dizziness, visual disturbances, nausea, palpitations, supraventricular extrasystoles, dyspnoea, vertigo, muscle cramps, eosinophilia, hyperuricaemia, and raised plasma-creatinine concentration

Dose: Initially 5 mg twice daily, increased if necessary after 3–4 weeks to 7.5 mg twice daily (if not tolerated reduce dose to 2.5–5 mg twice daily); ELDERLY initially 2.5 mg twice daily

Note. Ventricular rate at rest should not be allowed to fall below 50 beats per minute

Proprietary Preparations

Corabid (UniMed), Tab, 5mg, Tk. 35/Tab.; 7.5mg, Tk. 50.00/Tab.

Delpino (Healthcare), Tab., 5mg, Tk.

25.00/Tab.; 7.5mg, Tk. 35.00/Tab.

Ivanor (Square), Tab., 7.5 mg, Tk. 35.11/Tab. ; 5 mg, Tk. 25.08/Tab.

Ivaprex (Incepta), Tab., 7.5 mg, Tk.

45.00/Tab.; 5 mg, Tk. 30.00/Tab.

Ivaten (Drug Intl), Tab., 5mg, Tk. 25.10/Tab. ; 7.5mg, Tk. 35.15/Tab.

RANOLAZINE

Indications: As adjunctive therapy in the treatment of stable angina in patients inadequately controlled or intolerant of first-line antianginal therapies; also in atrial fibrillation and SVT

Cautions: Moderate to severe congestive heart failure; QT interval

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prolongation; elderly; renal impairment; pregnancy and breast-feeding; renal impairment use with caution if eGFR 30–80 mL/minute/ 1.73m² ; avoid if eGFR less than 30 mL /minute/1.73m²

Interactions: See Appendix- 2

Side-effects: Flatulence, hot flush, hypotension, prolonged QT interval, peripheral oedema, epistaxis, anxiety, anorexia, dysuria, haematuria, dehydration, pain in extremities, muscle cramp, joint swelling, visual disturbance, tinnitus, pruritus, sweating, cold extremities, disorientation, erectile dysfunction, parosmia, urticaria, rash

Dose: ADULT over 18 years, initially 375 mg twice daily, increased after 2–4 weeks to 500 mg twice daily and then adjusted according to response to max. 750 mg twice daily (reduce dose to 375–500 mg twice daily if not tolerated)

Proprietary Preparations

Ralozine (*Incepta*), Tab., 500 mg, Tk. 16.00/Tab.

Ranola (*General*), Tab., 500 mg, Tk. 16.05/Tab.

Ranolin (*Square*), Tab., 500 mg, Tk. 16.05/Tab.

TRIMETAZIDINE

Indication: Angina pectoris

Cautions: Pregnancy and breast feeding

Contraindication: Hypersensitivity to trimetazidine

Interactions: See Appendix-2

Side-effects: Gastrointestinal disturbance, nausea, vertigo

Dose: 40 to 60mg given daily by mouth in divided doses. 35 mgMR tablet preparations at meal times in the morning and evening

Proprietary Preparations

Angimet (*Orion*), Tab., 20 mg, Tk. 3.01/Tab., 35 mg, Tk. 6.00/Tab.

Anginox (*General*), Tab., 20mg, Tk. 3.01/Tab., 35mg, Tk. 6.00/Tab.

Angirid (*Acme*), Tab., 35mg, Tk. 5.03/Tab.

Angitrim (*Globe*), Tab., 35 mg, Tk. 6.00/Tab.

Angivas (*Popular*), Tab., 35mg, Tk. 5.00/Tab.

Angivent (*Square*)Tab., 35mg, Tk. 6.02/Tab.

Antoris (*Opsonin*), Tab., 35 mg, Tk. 6.02/Tab.

Cardimet (*Eskayef*), Tab, 35mg , Tk. 6/Tab.

Feelnor (*Incepta*), Tab., 35 mg, Tk. 6.00/Tab.

Metacard (*Aristo*), Tab., 35mg, Tk. 6.00/Tab.

Metavas (*NIPRO JMI*), MR Tab., 35mg, Tk. 5.02/Tab.

Metazine (*Beximco*), Tab., 35mg, Tk. 6/Tab.

Trimet (*Drug Intl*), Tab., 20mg, Tk. 3.05/Tab., 35mg, Tk. 5.05/Tab.

Vastadin (*Sharif*), Tab., 35 mg, Tk. 5.00/Tab.

Vestar (*Healthcare*), Tab., 35mg, Tk. 6/Tab.

3.3.4 PERIPHERAL AND CEREBRAL VASODILATORS & NEUROSENSORY OXYGENATOR DRUGS

Intermittent claudication, a serious peripheral vascular complication is due to occlusion of vessels. Cessation of smoking and exercise are conservative measures in the management of intermittent claudication. Low-dose aspirin (75-300 mg daily) may be considered if serum total cholesterol is elevated. **Naftidrofuryl** 200 mg 3 times daily may improve moderate intermittent claudication; but the effect of the drug on the outcome of the disease is uncertain. Patients receiving naftidrofuryl should be assessed for improvement after 3-6 months. *Naftidrofuryl may also producesymptomatic improvment* **Cilostazole** is used in Intermittent claudication to improve walking **Nifedipine** is useful for reducing the frequency and severity of vasopastic attacks.

ALMITRINE & RAUBASINE

Indications: Disorders of memory, lack of concentration, hearing loss, dizziness, buzzing sounds in the ear

Cautions: Abnormal sensation in the lower limbs, weight loss

Contraindications: Known allergy to the drug; severe liver disease

Side-effects: Nausea, sensations of heaviness and burning in the stomach, diarrhea, or constipation, agitation, dizziness; palpitations; sensation of 'pins and needles', stinging, weight loss

Dose: 1 tablet once or twice daily. In case of missing dose, the next dose at the normal time

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Proprietary Preparations

Albasine (*Drug Intl*), Tab., 30+10mg, Tk. 12.05/Tab.
Aruxil (*Opsonin*), Tab., 30 mg + 10 mg, Tk. 10.00/Tab.
Duxil (*ACI*) Tab., 30mg + 10 mg, Tk. 10.05/Tab.
Truxil (*Square*) Tab., 30 mg + 10 mg, Tk.10.03/Tab.

CILOSTAZOL

Indication: Intermittent claudication in patients without rest pain and no peripheral tissue necrosis

Cautions: Atrial or ventricular ectopy, atrial fibrillation, atrial flutter; diabetes mellitus (higher risk of intra-ocular bleeding)

Interactions: See Appendix -2

Contraindications: Active peptic ulcer, haemorrhagic stroke in previous 6 months, surgery in previous 3 months, proliferative diabetic retinopathy, poorly controlled hypertension

Side-effects: Diarrhoea, headache, nausea, vomiting, dyspepsia, flatulence, abdominal pain, tachycardia, palpitation, angina, arrhythmia, dizziness, ecchymosis, pruritus, edema, asthenia

Dose: 100 mg twice daily (30 minutes before or 2 hours after food)

Proprietary Preparations

Cilosta (*Square*), Tab., 100 mg, Tk.12.09/Tab.
Includ (*ACI*), Tab., 100mg, Tk. 10.00/Tab.
Vasocil (*Ibn Sina*), Tab., 100mg, Tk. 12.00/Tab.; 50 mg, Tk.7.00/Tab.

INOSITOL NICOTINATE

Indications: Peripheral vascular disease, hyperlipidaemia

Cautions: Cerebrovascular insufficiency and unstable angina

Contraindications: Recent myocardial infarction, acute phase of cerebrovascular accident, pregnancy

Interactions: See Appendix-2

Side-effects: Flushing, dizziness, nausea, vomiting

Dose: 3g daily in 2-3 divided doses; max 4g daily

Proprietary Preparation

Inosit (*ACI*), Tab., 500mg, Tk.5.04/Tab. ; 750mg, Tk. 7.55/Tab.
Nicosit (*Incepta*), Tab., 500 mg, Tk. 5.00/Tab.; 750 mg, Tk.7.00/Tab.

EXPENTIFYLLINE / PENTOXIFYLLINE

Indication: Peripheral vascular disease

Cautions: Hypotension, coronary artery disease, renal impairment, severe hepatic impairment

Contraindications: Cerebral haemorrhage, extensive retinal haemorrhage, acute myocardial infarction, pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Gastrointestinal disturbances, headache, sleep disturbances, headache, tachycardia, angina, hypotension, thrombocytopenia, intrahepatic cholestasis, hypersensitivity reactions.

Dose: 400 mg 2-3 times daily

Proprietary Preparations

Oxifyl CR (*Square*), Tab., 400 mg, Tk. 7.04/Tab.
Trental (*Sanofi*), Tab., 400 mg, Tk. 15.11/Tab.

VINPOCETINE

Indications: Acute ischaemic stroke due to cerebral thrombosis, cerebral embolism; acute circulatory disorder, hypertensive crisis, the acute cerebrovascular disorder, ischemic neurological deficit, multi infarct dementia, cerebral arteriosclerosis, hypertensive encephalopathy

Contraindication: Pregnancy

Interactions: See Appendix-2

Side-effects: Transient hypotension and tachycardia

Dose: 15mg-30mg in divided dose

Proprietary Preparations

Avintol (*ACI*), Tab., 5mg, Tk. 3.00/Tab.
Camiton (*Drug Intl*), Tab., 5 mg, Tk. 4.05/Tab.
Cavinton (*Opsonin*), Tab., 5 mg, Tk. 3.01/Tab., Inj., 10mg/2 ml, Tk. 40.12/2ml Vial
Cavinton ⁽¹⁾ (*Richtor*) Tab., 5 mg, Tk. 9.78/Tab., Inj., 10mg/2ml, Tk.53.34/2ml
Cerenin (*Ambee*), Tab. 5 mg, Tk. 3.55/Tab.

Cereton (General), Tab., 5 mg, Tk. 4.04/Tab.Inj., 10mg/2 ml, Tk. 40.00/2 ml
Cerevas (Square), Tab., 5 mg, Tk. 4.03/Tab.
Cerivin (Beximco), Tab., 5 mg, Tk. 4.02/Tab.
Cognitol (Sun), Tab., 5 mg, Tk. 4.05/Tab.
Vincet (Eskayef), Tab., 5mg , Tk. 4.00/Tab.,
Vinsetine (Incepta), Tab., 5 mg, Tk. 4.00/Tab.
Vinton (Aristo), Tab., 5mg, Tk. 4.00/Tab.
Vinpoton (Acme), Tab. , 5mg., Tk. 4.01/Tab.

3.4 POSITIVE INOTROPIC DRUGS

Cardiac Glycosides, phosphodiesterase inhibitors and sympathomimetics with inotropic activity are positive inotropic drugs.

DIGOXIN [ED]

Indications: Heart failure, supraventricular arrhythmia (particularly in atrial fibrillation)

Cautions: Recent infarction; sick sinus syndrome; thyroid disease; elderly, pregnancy

Contra-indications: Renal impairment, rapid intravenous administration, heart block, hypokalaemia

Side-effects: Usually associated with excessive dosage; anorexia, nausea, vomiting, headache, fatigue, drowsiness, confusion, delirium, hallucination, depression, arrhythmia, heart block, intestinal ischaemia; gynaecomastia on long-term use; thrombocytopenia reported

Interactions: See Appendix-2

Dose: By mouth, rapid digitalization, 1-1.5 mg in divided doses over 24 hours; less urgent digitalization, 250-500 micrograms daily (higher dose may be divided)

Maintenance, 62.5-500 micrograms daily (higher dose may be divided) according to renal function and, in atrial fibrillation, on heart-rate response; usual range, 125-250 micrograms daily (lower dose may be appropriate in elderly).

Emergency loading dose by intravenous infusion, total dose of 0.5-1 mg given in divided doses with about half of the total dose given over 10-20 minutes, followed by further fractions of the total dose (also given over 10-20 minutes) at

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intervals of 4-8 hours according to response

Proprietary Preparations

Agoxin (Aristo), Tab., 250 mcg, Tk. 1.09/Tab.

Centoxin (Opsonin), Tab., 250 mcg, Tk.

1.09/Tab.; Syrup, 250 mcg/5 ml, Tk.

75.28/60ml

Digoxen (Drug Int.), Cap. 0.1mg, Tk.0.94/Cap;

0.2mg,Tk.1.34/Cap.

3.5 DIURETICS

3.5.1 THIAZIDES AND RELATED DIURETICS

3.5.2 LOOP DIURETICS

3.5.3 POTASSIUM-SPARING DIURETICS

3.5.4 OSMOTIC DIURETICS

3.5.5 CARBONIC ANHYDRASE INHIBITORS

3.5.1 THIAZIDES AND RELATED DIURETICS

Thiazides and related diuretics are moderately potent. The onset of action of diuresis of this group starts within 1 to 2 hours of oral administration and the action lasts for 12 to 24 hours. They are to be given early in the morning so that the diuresis does not interfere with normal sleep pattern.

Bendroflumethiazide (Bendrofluazide), a thiazide diuretic is widely used; a low dose of 2.5 mg daily is routinely prescribed in the treatment of hypertension. Higher doses of thiazides cause increased level in plasma uric acid, glucose, and lipids and decreased level in plasma potassium. Bendroflumethiazide (Bendrofluazide) is randomly used for heart failure and for the treatment of mild hypertension or with other drugs in severe hypertension.

Chlorthalidone, a thiazide related compound may be given on alternate day to relieve edema. It is also useful if acute retention is liable to be precipitated by a more rapid diuresis.

Other thiazides and related diuretics (including **Benzthiazide**, **Clopamide**, **Cyclopenthiazide**, **Hydrochlorothiazide**, **Hydroflumethiazide** and **Polythiazide**)

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are more expensive than the longer established thiazides, but have no special advantages.

Metolazone is especially effective when combined with a loop diuretic; it can be given even in renal failure. The patient needs to be monitored carefully due to profound diuresis.

Xipamide and **Indapamide** are structurally similar to chlorthalidone. Indapamide can cause less metabolic disturbances, particularly less impairment of glucose intolerance.

HYDROCHLOROTHIAZIDE [ED]

Indication: Edema, hypertension

Cautions: See under benedrofluazide.

Contraindications: See under benedrofluazide

Interactions: See Appendix-2

Side-effects: See under benedrofluazide

Dose: Hypertension, 25 mg daily, increased to 50 mg daily if necessary
ELDERLY: in some elderly patients an initial dose of 12.5 mg daily may be sufficient

Proprietary Preparations

Acuren (*Incepta*), Tab. 50mg, Tk. 1.00/Tab.; 25mg, Tk. 0.70/Tab.

Hypezide (*Pacific*), Tab., 50mg, Tk. 1.00/Tab.

HTZ (*UniMed*), Tab, 25mg, Tk.0.70/Tab.

INDAPAMIDE

Indication: Essential hypertension

Cautions: Renal impairment, gout, hyperparathyroidism (discontinue if hypercalcaemia); hyperaldosteronism; pregnancy and breast-feeding

Contraindications: Recent cerebrovascular accident, severe liver disease

Interactions: See Appendix-2

Side-effects: Hypokalaemia, , dizziness, fatigue, muscular cramps, anorexia, dyspepsia, rashes, increase in liver enzymes, blood disorder, hyponatraemia, metabolic alkalosis, hyperglycemia, increased plasma urate concentrations, paraesthesia, photosensitivity, impotence, renal impairment

Dose: 2.5 mg daily in the morning

Proprietary Preparations

Dihert (*Novartis*), SR Tab., 1.5 mg, Tk.8.00/Tab.

Hypen (*Opsonin*), Tab.,1.5 mg,Tk. 5.03/Tab.

Idatix (*Incepta*), SR Tab., 1.5 mg, Tk.5.00/Tab.

Indamid (*Sharif*), SR Tab., 1.5 mg, Tk.5.01/Tab.

Indapa (*Drug Intl*), SR Tab.,1.5 mg,Tk. 5.05/Tab.

Indelix (*Beximco*), SR Tab.,1.5 mg,Tk. 6.00/Tab.

Indimide (*Healthcare*), SR Tab., 1.5 mg, Tk.6.50/Tab.

Ipide (*Renata*), Tab., 1.5 mg, Tk. 5.00/Tab.

Natrilix (*ACI*), SR Tab.,1.5 mg,Tk. 9.00/Tab.

Repres (*Square*), SR Tab.,1.5 mg,Tk. 5.03/Tab.

Trilix (*Silva*), SR Tab.,1.5 mg,Tk. 5.01/Tab.

Xelix (*Aristo*), SR Tab.,1.5 mg,Tk. 5.00/Tab.

METOLAZONE

Indications: Oedema, hypertension

Cautions: Electrolytes should be monitored, particularly with high doses, long-term use, or in renal impairment; may exacerbate diabetes, gout, and systemic lupus erythematosus; nephrotic syndrome, hyperaldosteronism, and malnourishment; avoid in severe liver disease, hypokalaemia pregnancy and breast feeding

Contraindications: Refractory hypokalaemia, hyponatraemia and hypercalcaemia, symptomatic hyperuricaemia and Addison's disease.

Interactions: See Appendix-2

Side-effects: Mild gastrointestinal disturbances, postural hypotension, altered plasma-lipid concentrations, metabolic and electrolyte disturbances including hypokalaemia, hyponatraemia, hypomagnesaemia, hypercalcaemia, hyperglycaemia, hypochloraeic alkalosis, hyperuricaemia and gout

Dose: Oedema, 5-10 mg daily in the morning, increased if necessary to 20 mg daily in resistant oedema, max. 80 mg daily. Hypertension, initially 5 mg daily in the morning; maintenance 5 mg on alternate days

Proprietary Preparations

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Merozolyn (*UniMed*), Tab., 500 mcg, Tk.5.00/Tab., 5 mg, Tk.25.00/Tab

3.5.2 LOOP DIURETICS

Loop diuretics are the most efficacious oral diuretic agent; useful for the treatment of acute episodes of pulmonary edema due to left ventricular failure;

BUMETANIDE

Indication: Oedema

Cautions: Hypovolaemia and hypotension should be corrected before initiation of treatment; electrolytes should be monitored during treatment; can exacerbate diabetes mellitus and gout and prostate enlargement

Contra-indications: Severe hypokalaemia, severe hyponatraemia, anuria, comatose and precomatose states associated with liver cirrhosis and in renal failure

Interactions: See Appendix-2

Side-effects: See under Furosemide; also gynaecomastia, breast pain, musculoskeletal pain

Dose: By mouth, 1 mg in the morning, repeated after 6–8 hours if necessary; severe cases, 5 mg daily increased by 5 mg every 12–24 hours according to response;

By IM injection, 1 mg initially then adjusted according to response;

Proprietary Preparations

Bumecard (*Incepta*), Inj., 2 mg/4 ml, Tk. 30.00/4 ml Vial.; Tab, 1 mg, Tk. 5.00/Tab.; 5 mg, Tk. 8.00/Tab.

Conart (*ACI*), Tab., 1 mg, Tk. 5.02/Tab.

Urinide (*Navana*), Tab., 1 mg, Tk. 10.00/Tab.

FRUSEMIDE/ FUROSEMIDE^[ED]

Indications: Edema, oliguria due to renal failure

Cautions: Pregnancy and breast-feeding, hypotension, liver failure, enlarged prostate; hypovolaemia to be corrected before using in oliguria

Contraindications: Precoma state associated with liver cirrhosis and renal failure with anuria

Interactions: See Appendix-2

Side-effects: Hyponatraemia, hypokalaemia and hypomagnesaemia, hypochlorhaemic alkalosis, increased calcium excretion, hypotension, hyperuricaemia; temporary increase in plasma cholesterol and triglyceride concentrations and bone marrow depression, pancreatitis, deafness and myalgia

Dose : By mouth, edema, initially 40 mg in the morning; maintenance 20 mg daily or 40 mg on alternate days, increased in resistant edema to 80 mg daily or 40 mg on alternate days; increased in resistant edema to 80 mg daily or more

In oliguria, initially 250 mg daily; if necessary larger doses, increasing in steps of 250 mg, may be given every 4-6 hours to a maximum of a single dose of 2 g (rarely used)

CHILD: 1-3 mg/kg daily, max, 40 mg daily.

By intramuscular injection or slow intravenous injection initially 20-50mg

CHILD: 0.5-1.5 mg/kg to a max. daily dose of 20 mg

By intravenous infusion (by syringe pump if necessary), in oliguria, initially 250 mg over hour (rate not exceeding 4 mg/min). If satisfactory urine output not obtained in the subsequent hour further 500 mg over 2 hours, then if no satisfactory response within subsequent hour, further 1 g over 4 hours; if no response obtained dialysis probably required; effective dose (up to 1 g) can be repeated every 24 hours

Proprietary Preparations

Frudema (*Pacific*), Tab., 40 mg, Tk. 0.53/Tab.

Frunep (*UniMed*), Tab., 40mg, Tk. 3.20/Tab.

Frusemide (*Albion*), Tab., 40 mg, Tk.0.53/Tab.

Frusin (*Opsonin*) Inj., 20 mg /2 ml, Tk.

8.00/2ml amp.; Syrup, 40 mg /5 ml, Tk. 85.32/60 ml.; Tab., 40 mg, Tk. 0.53/Tab.

Fusid (*Square*), Tab., 40 mg, Tk.

0.64/Tab.; Inj., 20 mg/2 ml, Tk. 8.03/2 ml amp

G-Furosemide (*Gonoshasthaya*), Inj., 20mg/2ml, Tk. 3.00/Amp.; Tab., 40 mg, Tk.0.50/Tab.

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Lasix (*Sanofi*), Tab., 40mg, Tk. 0.64/Tab.; Inj., 20 mg/2 ml, Tk. 8.02/2 ml Amp
Trofurit (*Ambee*), Inj., 20 mg / 2ml, Tk. 5.53 / 2 ml Amp; Tab., 40 mg, Tk. 0.53/Tab.

TORASEMIDE

Indications: A loop diuretic edema associated with heart failure including pulmonary edema with renal and hepatic disorder, hypertension

Cautions: See under *Furosemide*, hepatic impairment, renal impairment, pregnancy, diabetes, gout.

Contra-indications: See under *Furosemide*

Interactions: See *Appendix-2*

Side-effects: See under *Furosemide*, also dry mouth, paraesthesia

Dose: edema, usual dose 5mg once daily, increased according to response to 20mg once daily; usual max.40mg daily

Proprietary Preparations

Dilast (*Incepta*), Tab. 5mg, Tk.8.00/Tab.

Dytor (*Unimed*), Tab.2.5 mg, Tk. 6.00/Tab.; 5mg, Tk. 11.00/Tab.

Luretic (*Drug Int.*) Tab. 2.5 mg, Tk. 2.00/Tab.; 5mg, Tk. 3.50/Tab.

3.5.3 POTASSIUM-SPARING DIURETICS

Triamterene and **Amiloride** are used in combination with other diuretics for the treatment of hypertension. They cause retention of potassium and are therefore used as a more convenient alternative to giving potassium supplements along with thiazides or loop diuretics.

Spironolactone is a potassium-sparing diuretic and a competitive antagonist of aldosterone which is effective in the treatment of the edema due to cirrhosis of liver.

AMILORIDE HYDROCHLORIDE

Indications: Edema, potassium conservation with thiazide and loop diuretics

Cautions: Pregnancy and breast-feeding, monitor in renal impairment diabetes mellitus, elderly

Contraindications: Hyperkalaemia, renal failure

Interactions: See *Appendix-2*

Side-effects: Gastrointestinal disturbances, rashes, confusion, postural hypotension, hyperkalaemia, hyponatraemia

Dose: Used alone, initially 10 mg daily, adjusted according to response; max. 20 mg daily

With other diuretics, congestive heart failure and hypertension, initially 5-10 mg daily; cirrhosis with ascites, initially 5 mg daily

Proprietary Preparation

See under *hydrochlorothiazide*

ALDOSTERONE ANTAGONISTS

EPLERENONE (Selective aldosterone antagonist)

Indications: Adjunct in stable patients with left ventricular dysfunction with evidence of heart failure, following myocardial infarction (start therapy within 3–14 days of event)

Cautions: Elderly, hepatic impairment-renal impairment- increased risk of hyperkalaemia—close monitoring required; avoid if eGFR less than 50 mL/minute/ 1.73m²; pregnancy

Interactions: See *Appendix-2*

Contra-indications: Hyperkalaemia; concomitant use of potassium-sparing diuretics or potassium supplements

Side-effects: Diarrhea, nausea, hypotension; dizziness; hyperkalaemia; rash; flatulence, vomiting, atrial fibrillation, postural hypotension, arterial thrombosis, dyslipidaemia, gynaecomastia, pyelonephritis, hyponatraemia, dehydration, eosinophilia, asthenia, leg cramps, azotaemia, sweating and pruritus

Dose initially 25 mg once daily, increased within 4 weeks to 50 mg once daily; CHILD not recommended

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Proprietary Preparations

Aldonist (*UniMed*), Tab, 50 mg, Tk. 85.00/Tab.; 25 mg, Tk.45.00/Tab.
Epleron (*Incepta*), Tab.,25 mg, Tk. 30.00/Tab.; 50 mg,Tk. 50.00/Tab.

SPIRONOLACTONE [ED]

Indications: It is used as an adjunct to other diuretics to reduce the loss of potassium in the management of refractory edema such as that associated with ascites in cirrhosis of the liver, malignant ascites and nephrotic syndrome. The drug is also indicated in congestive heart failure, primary hyperaldosteronism

Cautions: Hepatic and severe renal impairment, and electrolytes to be monitored to prevent hyperkalaemia

Contraindications: Acute renal insufficiency, hyperkalaemia, pregnancy and breast-feeding; Addison's disease; the drug should not be given in combination with another potassium sparing diuretic

Interactions: See Appendix-2

Side-effects: Diarrhoea, gynaecomastia, menstrual irregularities, hirsutism, lethargy, mental confusion, hyperkalaemia, hyponatraemia

Dose: 100-200 mg daily, increased up to 400 mg if required. CHILD: initially 3 mg/kg daily in divided doses

Proprietary Preparations

Inospiron (*Incepta*), Tab., 25 mg , Tk. 5.00/Tab.
Spirotic (*Drug Intl*), Tab., 25 mg, Tk. 5.05/Tab.
Spirocard (*Popular*), Tab. , 100 mg, Tk. 18.07/Tab.; 25 mg, Tk. 5.02/Tab.

Furosemide + Spironolactone

Dilup (*ACI*),Tab.,40mg +50mg, Tk. 8.05/Tab.;20mg + 50mg,Tk. 6.04/Tab.
Diuretic (*Drug Intl*),Tab.,20 mg+50 mg, Tk. 6.05/Tab.;40 mg + 50 mg, Tk. 8.05/Tab.
Edeloss (*Incepta*),Tab. ,20 mg+50 mg, Tk. 8.00/Tab.; 40 mg + 50 mg, Tk. 10.00/Tab.
Edemide (*Acme*), Tab., 40 mg+50 mg, Tk. 10.03/Tab.;20 mg+50 mg,Tk.8.03/Tab.
Edenil (*Eskayef*), Tab, 20 mg + 50 mg, Tk. 8.00/Tab.;40 mg + 50 mg ,Tk. 10.00/Tab.
Frulac (*Orion*), Tab., 20 mg+50 mg, Tk. 8.03/Tab.; 40 mg + 50 mg, Tk.10.03/Tab.

Fruselac (*Aristo*), Tab.,20 mg + 50 mg,Tk.5.00/Tab.
Frusin (*Opsonin*), Tab., 20 mg + 50 mg, Tk. 6.02/Tab.;40 mg + 50 mg, Tk. 8.03/Tab.
Frusiton (*Globe*), Tab., 20 mg+50 mg, Tk. 6.00/Tab.;40 mg+50 mg, Tk. 8.00/Tab.
Fruspa (*Zenith*), Tab., 20 mg + 50 mg, Tk. 6.00/Tab.
Furo (*Beacon*), Tab., 20mg +50mg, Tk. 6.02/Tab.
Furotone (*Novo Health*),Tab.,20 mg + 50 mg,Tk.6.00/Tab.
Fusid (*Square*),Tab.,20 mg+50 mg, Tk. 8.03/Tab.; 40 mg + 50 mg, Tk. 10.03/Tab.
Lactone (*General*),Tab.,20 mg+50 mg, Tk. 6.04/Tab.
Lasilactone (*Sanofi*),Tab.,20 mg+50 mg, Tk. 6.04/Tab.
Laxur (*Healthcare*),Tab., 20 mg+50 mg, Tk. 240.00/Tab.
Spirocard (*Popular*),Tab.,20 mg+50 mg, Tk. 6.02/Tab.
Tonemide (*Pacific*), Tab.,20 mg+50 mg, Tk. 6.00/Tab.
Uritone (*Renata*),Tab. ,20 mg+50 mg, Tk. 8.00/Tab.;40 mg + 50 mg , Tk. 10.00/Tab.

3.5.4 OSMOTIC DIURETICS

Osmotic diuretics are used to reduce cerebrospinal fluid (CSF) pressure causing cerebral edema; these drugs are filtered at the glomerulus, which do not markedly influence sodium and chloride excretion. Osmotic diuretics are not used in heart failure as they may expand the blood volume.

MANNITOL [ED]

Indications: Cerebral edema, This diuretic is indicated prophylactically for acute renal failure in situations treatment with nephrotoxic injury and management of haemolytic transfusion reactions.

Cautions: Extravasation causes inflammation and thrombophlebitis

Contraindications: Congestive cardiac failure, pulmonary edema

Side-effects: Chills, fever, hyperosmolality and hyponatremia may occur during treatment of renal failure

Interactions: See Appendix-2

Dose: By intravenous infusion for diuresis, 50-200 g over 24 hours,

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preceded by a test dose of 200 mg/kg by slow intravenous injection; in cerebral edema (see notes above)

Note: 1gm/kg as a 20% solution given by rapid intravenous infusion

Proprietary Preparations

Osmosol (Beximco), IV Infusion, 20%, Tk. 155.00/500ml

Acme IV Infusion (Acme), IV Infusion, 20%, Tk. 155.47/500ml

Manisol (Orion Infusion), I.V. Infusion, 20%, Tk. 125/500ml

Mannisol A⁽ⁱ⁾ (Human Serum Ins), I.V. Infusion 10%, Tk. 142.64/500ml

3.5.5 CARBONIC ANHYDRASE INHIBITORS

Acetazolamide and eye drops of **Dorzolamide** inhibit the formation aqueous humour and are used in glaucoma (see section 10.4.3); also used in petit mal epilepsy as an anticonvulsant; in the treatment of salicylates or barbiturate poisoning to alkalinize the urine; side-effects include drowsiness, paraesthesia, blood dyscrasias and allergic skin rashes.

3.6 ANTIARRHYTHMIC DRUGS.

Drugs for **Supraventricular arrhythmias** include adenosine, cardiac glycosides and verapamil. **Adenosine** is usually the treatment of choice of paroxysmal supraventricular tachycardia. It has a very short duration of action, but prolonged in those who are taking dipyridamole. **Verapamil** is preferred to adenosine in asthma. Verapamil is very much effective for supraventricular tachycardia. An initial intravenous dose may be followed by oral treatment. Hypotension may occur with larger doses. It should not be used for tachyarrhythmias where the QRS complex is a broad complex. It is also contra-indicated in Wolff-Parkinson-White syndrome. It is contraindicated in CHILD. Some supra-ventricular arrhythmias in childhood can be

accelerated by verapamil with fatal consequences.

Oral administration of **Digoxin** is the treatment of choice in cases of atrial fibrillation and atrial flutter. Drugs for **both supraventricular and ventricular arrhythmias** include amiodarone, beta-blockers, disopyramide, flecainide, procainamide, propafenone and quinidine.

Beta-blockers act as anti-arrhythmic drugs principally by attenuating the effects of the sympathetic system on automaticity and conductivity within the heart. Intravenous administration of a beta-blocker such as **Esmolol** or **Propranolol**, can achieve rapid control of ventricular rate.

Disopyramide may be given by intravenous injection to control arrhythmias after myocardial infarction (including those not responding to lidocaine but it impairs cardiac contractility. Oral administration of disopyramide is useful but it has an antimuscarinic effect, which limits its use in patients with glaucoma or prostatic hypertrophy.

Flecainide belongs to the same general class as lidocaine. It may be of value in serious symptomatic ventricular arrhythmias. It may also be indicated for junctional re-entry tachycardias and for paroxysmal atrial fibrillation. As with quinidine it may precipitate serious arrhythmias in a small minority of patients.

Procainamide can be given by intravenous injection to control ventricular arrhythmias, but prolonged oral use can cause a syndrome resembling systemic lupus erythematosus.

Propafenone is used for the prophylaxis and treatment of ventricular arrhythmias and also for some supraventricular arrhythmias and it has a complex mechanism of action, including weak beta-blocking activity (therefore caution is needed in obstructive airways diseases; contra-indicated if severe).

Quinidine may be effective in suppressing supraventricular and ventricular

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arrhythmias. It may itself precipitate rhythm disorders, and is better if used on specialist advice only. It can cause hypersensitivity reactions and gastrointestinal upsets.

Drugs for ventricular arrhythmias include **Bretylium**, **Lidocaine**, **Mexiletine** and **Phenytoin**. Bretylium is only used as an antiarrhythmic drug in resuscitation; it can cause severe hypotension. **Mexiletine** may be given as a slow intravenous injection if lignocaine is ineffective, it has a similar action. Adverse cardiovascular and central nervous system effects may limit the dose; nausea and vomiting may prevent an effective dose being given by mouth.

ADENOSINE

Indications: Rapid reversion to sinus rhythm of paroxysmal supraventricular tachycardias, including those associated with accessory conducting pathways (e.g. Wolff-Parkinson-White syndrome); aid to diagnosis of broad or narrow complex supraventricular tachycardias

Cautions: Monitor ECG and have resuscitation facilities available; atrial fibrillation or flutter with accessory pathway (conduction down anomalous pathway may increase); first-degree AV block; bundle branch block; left main coronary artery stenosis; uncorrected hypovolaemia; stenotic valvular heart disease; left to right shunt; pericarditis; pericardial effusion; autonomic dysfunction; stenotic carotid artery disease with cerebrovascular insufficiency; recent myocardial infarction; heart failure; heart transplant;

Contra-indications: Second- or third-degree AV block and sick sinus syndrome (unless pacemaker fitted); long QT syndrome; severe hypotension; decompensated heart failure; chronic obstructive lung disease (including asthma) and pregnancy

Interactions: See Appendix-2

Side-effects: Nausea; arrhythmia (discontinue if asystole or severe bradycardia occur), sinus pause, AV block, flushing, angina (discontinue),

dizziness; dyspnoea; headache; less commonly metallic taste; palpitation, hyperventilation, weakness, blurred vision, sweating; very rarely transient worsening of intracranial hypertension, bronchospasm, injection-site reactions; also reported vomiting, syncope, hypotension (discontinue if severe), cardiac arrest, respiratory failure (discontinue), and convulsions

Dose: By rapid intravenous injection into central or large peripheral vein, 6 mg over 2 seconds with cardiac monitoring; if necessary followed by 12 mg after 1–2 minutes, and then by 12 mg after a further 1–2 minutes; increments should not be given if high level AV block develops at any particular dose. Important: Patients with a heart transplant are very sensitive to effects of adenosine and should receive initial dose of 3 mg over 2 seconds, followed if necessary by 6 mg after 1–2 minutes, and then by 12 mg after a further 1–2 minutes. Also, if essential to give with dipyridamole reduce adenosine dose to a quarter of the usual dose

Proprietary Preparation

Adecard (Popular) Inj., 6mg/2ml, Tk 150/Amp

AMIODARONE HYDROCHLORIDE (Broad spectrum action)

Indications: To suppress atrial and ventricular reentrant rhythms and is the drug of choice for the treatment of life threatening ventricular tachycardia (should be initiated in hospital or under specialist supervision)

Cautions: Liver function and thyroid function tests required before treatment and then every 6 months (see notes above for tests of thyroid function); chest x-ray required before treatment; heart failure; renal impairment; elderly; severe bradycardia and conduction disturbances in excessive dosage; intravenous use may cause moderate and transient fall in blood pressure

Contraindications: Sinus bradycardia, sino-atrial heart block, unless pacemaker fitted, avoid in severe conduction disturbances or sinus node

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disease, history of thyroid dysfunction, pregnancy and breast-feeding, avoid intravenous use in severe respiratory failure, circulatory collapse, severe arterial hypotension

Interactions: See Appendix-2

Side-effects: Accumulation in tissues causing extra cardiac adverse effects; reversible corneal micro-deposits, peripheral neuropathy and myopathy, phototoxicity, skin discoloration, hypothyroidism, hyperthyroidism, diffuse pulmonary, alveolitis, pneumonitis and fibrosis, jaundice, hepatitis and cirrhosis reported, tremor, nightmares, vertigo headache, sleeplessness, fatigue, alopecia, paraesthesia, benign raised intracranial pressure, impotence, epididymo-orchitis, ataxia, vasculitis, renal involvement and thrombocytopenia, anaphylaxis on rapid injection, also bronchospasm or apnoea

Dose: By mouth, 200 mg 3 times daily for 1 week reduced to 200 mg twice daily for a further week; maintenance, usually 200 mg daily or the minimum required to control the arrhythmia by intravenous infusion, 5 mg/kg over 20-120 minutes with ECG monitoring, max. 1.2 g in 24 hours

Doses may need to be reduced to avoid convulsion, depression of the central nervous system or depression of the cardiovascular system

Proprietary Preparations

Amidron (ACI), Tab., 100mg, Tk. 5.02/Tab.; 200mg, Tk. 10.03/Tab.

Cardiron (Drug Int.), Tab., 200mg, Tk. 7.05/Tab.

Pacet (Beximco), Tab., 100mg, Tk. 5.02/Tab.; 200mg, Tk. 10.04/Tab.

DISOPYRAMIDE [ED]

Indications: Management of supraventricular and ventricular arrhythmias.

Cautions: Discontinue if ventricular tachycardia, ventricular fibrillation, hypotension, hypoglycemia develop; atrial flutter or tachycardia with partial block, bundle branch block, heart failure (avoid if severe); prostatic enlargement;

glaucoma; hepatic and renal impairment (see Appendix-4); pregnancy and breast-feeding (see Appendix-5 & 6)

Interactions: See Appendix-2

Contra-indications: Complete heart block or cardiogenic shock and sinus node dysfunction (unless pacemaker fitted)

Side-effects: Dry mouth, blurred vision, urinary retention; gastrointestinal irritation other side effects include psychosis, cholestatic jaundice, hypoglycemia, elevated liver enzyme. It also has cardiac depressant properties and may induce cardiac arrhythmias particularly tachycardia and ventricular fibrillation, heart block, heart failure, and hypotension (see caution above)

Dose: By mouth 300-800mg daily in divided dose.

By slow intravenous injection, 2mg/kg over at least 5 minutes to a max of 150mg, at a rate not exceeding 30 mg per minute; with ECG monitoring, followed immediately either by 200mg by mouth, then 200mg every 8 hours for 24 hours or 400 microgram/kg/hour by intravenous infusion; max. 300mg in first hour and 800mg daily

Proprietary Preparation

Norbit (Incepta), Cap. 100 mg. Tk. 8/Cap.

LIDOCAINE HYDROCHLORIDE/ LIGNOCAINE HYDROCHLORIDE (ED)

Indications: Ventricular arrhythmias, especially after myocardial infarction, complete heart block

Cautions: Congestive cardiac failure, in hepatic failure and following cardiac surgery; elderly

Contraindications: Sino-atrial disorders, all grades of atrioventricular block, severe myocardial depression

Side-effects: Dizziness, paraesthesia or drowsiness, confusion, respiratory depression and convulsions; hypotension and bradycardia (may lead to cardiac arrest)

Dose: By intravenous injection, in patients without gross circulatory

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impairment 100 mg as a bolus over a few minutes (50 mg in lighter patients or those whose circulation is severely impaired), followed immediately by infusion of 4 mg/minute for 30 minutes; 2 mg/minute for 2 hours, then 1 mg/minute;

If an intravenous infusion is not immediately available the initial intravenous injection of 50-100 mg can be repeated if necessary once or twice at intervals of not less than 10 minutes (see also section 8.2)

Proprietary Preparations

Jasocaine (Jayson), Inj. 4%, Tk. 3.54/2ml amp; Inj. 1%, Tk. 16.88/50ml; 2%, Tk. 28.65/50ml

PROPAFENONE HYDROCHLORIDE

(structurally similar to propranolol acts like quinidine)

Indications: Ventricular arrhythmias; paroxysmal supraventricular tachyarrhythmias which include paroxysmal atrial flutter or fibrillation and paroxysmal re-entrant tachycardias involving the AV node or accessory pathway, where standard therapy ineffective or contra-indicated

Cautions: Heart failure; elderly; pacemaker patients; paroxysmal atrial fibrillation pregnancy, breast-feeding, driving

Contra-indications: Congestive heart failure, cardiogenic shock severe bradycardia, electrolyte disturbances, severe obstructive pulmonary disease, conduction defects, second degree or greater AV block, bundle branch block or distal block

Interactions: See Appendix-2

Side-effects: QRS prolongation; gastrointestinal disturbances, dry mouth, cholestasis, bradycardia, sino-atrial, atrioventricular, or intraventricular blocks, hypotension, syncope, proarrhythmic effects; anxiety, restlessness, paraesthesia, fatigue, seizures, extrapyramidal symptoms; impotence, reduced sperm count, blood disorders, lupus syndrome; blurred vision; hypersensitivity

Dose: Body-weight 70 kg and over, initially 150 mg 3 times daily after food under direct hospital supervision with ECG monitoring and blood pressure control (if QRS interval prolonged by more than 20%, reduce dose or discontinue until ECG returns to normal limits); may be increased at intervals of at least 3 days to 300 mg twice daily and, if necessary, to max. 300 mg 3 times daily; body-weight under 70 kg, reduce dose; ELDERLY may respond to lower doses

Proprietary Preparation

Rythmosin (UniMed), Tab. 150mg, Tk. 15/Tab.

3.7 SYMPATHOMIMETICS

- 3.7.1 INOTROPIC SYMPATHOMIMETICS
- 3.7.2 VASOCONSTRICTOR SYMPATHOMIMETICS
- 3.7.3 DRUGS USED IN CARDIOPULMONARY RESUSCITATION

3.7.1 INOTROPIC SYMPATHOMIMETICS

DOBUTAMINE

Indications: Inotropic support in infarction, cardiac surgery, cardiomyopathies, septic shock and cardiogenic shock

Caution: Severe hypotension complicating cardiogenic shock

Interactions: See Appendix-2

Side-effects: Tachycardia and marked increase in systolic blood pressure indicate overdosage

Dose: By intravenous infusion, 2.5-10 micrograms/kg/minute, adjusted according to response

Proprietary Preparations

Dobuject[®] (Bayer) Inj., 250mg/amp, Tk. 278.49/Vial

Dobumin (ACI), Inj., 250 mg/20 ml, Tk. 251.69/20ml Vial

Dobutin (Incepta), Inj., 250 mg/20 ml, Tk. 250.00/20 ml Vial

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DOPAMINE HYDROCHLORIDE [ED]

Indications: Cardiogenic shock in infarction or cardiac surgery

Cautions: Hypovolaemia, low dose in shock due to acute myocardial infarction, *see notes above*

Contraindications: Tachyarrhythmia, phaeochromocytoma

Interactions: *See Appendix-2*

Side-effects: Nausea and vomiting, peripheral vasoconstriction, hypotension, hypertension, tachycardia

Dose: By intravenous infusion, 2–5 micrograms/kg/minute initially,

Proprietary Preparations

Cardopa (ACI), Inj., 200mg/5ml, Tk. 45.31/5ml

D-Dopamine (Drug Intl), Inj., 200mg/5ml, Tk. 45.05/5 ml

Dopamin HC[®] (Rotex medica) Inj., (IV

Infusion), 40 mg/ml, Tk. 63.40/5ml Vial

Myomine (Incepta), Inj., (IV Infusion), 40mg/ml, Tk. 45.00/5ml Vial

ISOPRENALINE HYDROCHLORIDE

Indications: Heart block, severe bradycardia

Cautions: Ischaemic heart disease, diabetes mellitus, hyperthyroidism

Interactions: *See Appendix-2*

Side-effects: Tachycardia, arrhythmias, hypotension, sweating, tremor, headache

Dose: By intravenous infusion, 0.5-10 micrograms/minute

Generic Preparations

Injection, 0.2%; Tab. 30 mg; 20 mg

3.7.2 VASOCONSTRICTOR SYMPATHOMIMETICS

Vasoconstrictor sympathomimetics raise blood pressure transiently by constricting peripheral blood vessels acting on alphaadrenergic receptor. They are sometimes used as an emergency method of elevating blood pressure where other measures have failed.

EPHEDRINE HYDROCHLORIDE [ED]

Indications: Reversal of hypotension from spinal or epidural anaesthesia

Cautions: Hyperthyroidism, diabetes mellitus, ischaemic heart disease, hypertension, angle-closure glaucoma, elderly, pregnancy; may cause acute urine retention in prostatic hypertrophy

Contraindications: Breast-feeding

Interactions: *See Appendix-2*

Side-effects: Anorexia, tachycardia, arrhythmias, anginal pain, vasoconstriction with hypertension, vasodilation with hypotension, dizziness and flushing, dyspnoea, headache, anxiety, confusion, psychoses, tremor, urine retention, sweating, hypersalivation;

Dose: Reversal of hypotension from spinal or epidural anaesthesia, by slow intravenous injection of a solution containing ephedrine hydrochloride 3 mg/ml, 3-6 mg (max. 9 mg) repeated every 3-4 minutes to max. 30 mg. (*see also section 4.7.3*)

Proprietary Preparations

Ephedrine hydrochloride 25 mg/5 ml

Ephidin (Popular), Inj., Tk. 12.05/Amp.

Epidron (Renata), Inj., Tk. 12.05/Amp.

Fedrin (Jayson), Inj., Tk. 12.06/Amp.

G-Ephedrine (Gonoshasthaya), Inj., Tk. 12.00/Amp.

Nordrine (Incepta), Inj., Tk. 12.00/Amp.

NORADRENALINE/NOREPINEPHRINE

Indications: *See under dose*

Cautions: Coronary, mesenteric, or peripheral vascular thrombosis; following myocardial infarction,

Contra-indications: Hypertension (monitor blood pressure and rate of flow frequently)

2 Cardiovascular system

Pregnancy

Side-effects: Anorexia, nausea, vomiting, hypoxia, arrhythmias, peripheral ischaemia, palpitation, hypertension, bradycardia, tachycardia, dyspnoea, headache, insomnia, confusion, anxiety, psychosis, weakness, tremor, urinary retention, angle-closure glaucoma

Dose : Acute hypotension, by intravenous infusion, via central venous catheter, of a solution containing noradrenaline

40micrograms (base)/mL at an initial rate of 0.16–0.33mL/minute, adjusted according to response Note 1mg of noradrenaline base is equivalent to 2mg of noradrenaline acid tartrate. Dose expressed as the base

Proprietary Preparations

Levofed (*Beacon*), Inj., 2mg/2ml, Tk. 250.00/2 ml Amp.

Norline (*Radiant*), Inj., 2mg/2ml, Tk. 250.00/2 ml Amp

3.7.3 DRUGS USED IN CARDIOPULMONARY RESUSCITATION

Cessation of cardiac function results in rapid depletion of oxygen in vital organs. After 6 minutes of pulseness, brain damage can be expected to occur. For this reason early cardiopulmonary resuscitation (CPR) within 4 minutes and rapid cardiac life support (ACLS) with attempted defibrillation within 8 minutes are essential for improving survival and neurological recovery rates. The sequence of steps in the performance of CPR is recommended as the ABC's: Airway, Breathing and Circulation.

The AHA's (American Heart Association) 2000 guideline for CPR and emergency cardiac care adopted a new classification for therapeutic recommendation.

Drug Therapy during CPR

Catecholamines are used in cardiac arrest to: (1) increase arterial and coronary perfusion during and following CPR, (2) stimulate contraction during asystole, and (3) act as an inotropic agent.

Epinephrine increases brain and heart blood flow by two mechanisms : (1) it prevents carotid artery collapse and raises arterial pressure. During both chest compression and release phase of chest compression (i.e. systole and diastole). (2) It preferentially reduces blood flow to the external carotid, renal and splanchnic beds thereby redirecting flow toward brain and heart. In cardiac arrest **Adrenaline (epinephrine)** 1 in 10000 (1 mg per 10 ml) is recommended in a dose of 10 ml by intravenous injection through a central vein or in an

upper extremity and should be repeated every 5 minutes.

If the peripheral line is used, the drug should be used rapidly, then flushed with 20 ml **Sodium chloride** 0.9% injection (to expedite entry into the circulation). It should not be administered in same IV line as that use of alkaline solution.

If IV line has not been established, the endotracheal route may be used. Intracardiac route should be avoided because it may cause serious complication such as intramyocardial damage, coronary perforation and pneumothorax.

Other drugs used in **cardiopulmonary** resuscitation include **Norepinephrine**, **Sodium bicarbonate**, **Atropine** and **Calcium chloride**.

Norepinephrine (see also section 3.7.1) is a potent vasoconstrictor and generally produces a rise in blood pressure. Its disadvantage is renal and mesenteric vasoconstriction. It should not be used in initial phase of resuscitation

Atropine is no longer recommended in the treatment of asystole or pulse less electrical activity.

Calcium chloride (5 to 10 mg/kg) enhances the contractile state of the heart and is indicated in treating severe hypotension due to overdose of **calcium channel blocker** or **hyperkalemia**. It is no longer recommended for use in asystole or electromechanical dissociation.

Anti-arrhythmic drugs are used in the treatment of various arrhythmias during cardiac arrest.

ADRENALINE/ EPINEPHRINE [ED]

Indications: See notes above

Cautions: heart disease, diabetes mellitus, hyperthyroidism, hypertension, arrhythmias, cerebrovascular disease, angle-closure glaucoma, second stage of labour

Interactions: See Appendix-2

Side-effects: anxiety, tremor, tachycardia, headache, cold extremities; in over dosage arrhythmias, cerebral haemorrhage, pulmonary edema;

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nausea vomiting, sweating, weakness, dizziness and hyperglycaemia also reported

Dose : See notes above

Proprietary Preparations

Adrin (Gaco), Inj., 1 mg/ml, Tk. 25/Amp

Adrinor (Incepta), Inj. 1 mg/ml, Tk. 25.08/Amp.

ATROPINE SULPHATE [ED]

Indications: Bradycardia, cardiopulmonary resuscitation, premedication, intra-operative bradycardia; with anticholinesterases for reversal of nondepolarising neuromuscular block; antidote to organophosphorous poisoning; symptomatic relief of gastrointestinal disorders characterised by smooth muscle spasm; cycloplegia, anterior uveitis

Cautions: Should be used with caution in children and in the elderly; gastro-oesophageal reflux disease, diarrhoea, ulcerative colitis, autonomic neuropathy, acute myocardial infarction, hypertension, tachycardia (including hyperthyroidism, cardiac insufficiency, cardiac surgery), pyrexia, and in individuals susceptible to angle-closure glaucoma; pregnancy

Contra-indications: Paralytic ileus, pyloric stenosis, toxic megacolon, and prostatic enlargement.

Interactions: See Appendix-2.

Side-effects: Constipation, transient bradycardia reduced bronchial secretions, urinary urgency and retention, dilatation of the pupils with loss of accommodation, photophobia, dry mouth, flushing and dryness of the skin. Confusion, giddiness, angle-closure glaucoma may occur

Dose: Arrhythmias after myocardial infarction, 500 micrograms of atropine sulfate given intravenously; the dose may be repeated every 3–5 minutes if necessary up to a maximum total dose of 3 mg.

Premedication, by intravenous injection, 300–600 micrograms immediately before induction of anaesthesia;

By subcutaneous or intramuscular injection, 300–600 micrograms 30–60 minutes before induction of anaesthesia; Intra-operative bradycardia, by intravenous injection, 300–600 micrograms (larger doses in emergencies);

Control of muscarinic side-effects of neostigmine in reversal of competitive neuromuscular block, by intravenous injection, 0.6–1.2 mg;

Proprietary Preparations

Atropine (Chemist), Inj., 1mg/ml, Tk. 2.52/1 ml Amp

Atropine (Jayson), Inj. 0.6 mg/ml, Tk. 5.60/1 ml Amp.

G-atropine (Gonoshashaya), Inj., 0.6 mg/ml, Tk. 5.00 /1 ml Amp

3.8 ANTICOAGULANTS AND PROTAMINE

3.8.1 PARENTERAL

ANTICOAGULANTS

3.8.2 ORAL ANTICOAGULANTS

3.8.3 PROTAMINE SULFATE

Anticoagulants are indicated for prophylaxis and treatment of deep vein thrombosis in the legs; they are also used to prevent thrombi forming on prosthetic heart valves. Anticoagulants prevent the formation of thrombus in the venous circulation and are not useful for preventing thrombus formation in arteries.

3.8.1 PARENTERAL ANTICOAGULANTS

HEPARIN [ED]

Indications: Prophylaxis and treatment of venous thrombosis and pulmonary embolism; treatment of myocardial infarction and arterial embolism; cerebral and venous thrombosis; as anticoagulant in blood transfusions; extracorporeal circulation and dialysis

Cautions: Elderly, pregnancy, post surgical patients, advanced hepatic and renal disease, jaundice, hypersensitivity

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to heparins; spinal or epidural anaesthesia

Interactions: See Appendix-2

Contraindications: Haemorrhagic diseases, thrombocytopenia, haemophilia, subacute bacterial endocarditis, peptic ulcer, severe hypertension; patient who has recently undergone surgery at site where hemorrhage is special risk

Side-effects: Bleeding, thrombocytopenia, hyperkalaemia, transient alopecia, diarrhoea; osteoporosis, occasionally hypersensitivity reactions

Dose: For the treatment of deep vein thrombosis and pulmonary embolism, by intravenous injection of loading dose of 5000 units (10,000 units in severe pulmonary embolism) followed by continuous infusion of 1000-2000 units/hour 25 units /kg/hour or by subcutaneous injection of 15000 units every 12 hours (laboratory monitoring essential, preferably on a daily basis, and dose adjusted accordingly)

In unstable angina and in acute peripheral arterial occlusion, intravenous regimen as for the treatment of deep vein thrombosis and pulmonary embolism to be followed.

For acute myocardial infarction or unstable angina: 5000 units intravenous bolus, followed by 1000 unit/hour in patients weighing, > 80kg and 800 units/hour in < 80kg, maintained for 48 hours or more, with adjustment according to the APTT

Haemodialysis: loading intravenous dose of 5000 units at the commencement of dialysis, followed by further continuous infusion to be completed 1 hour before completion of dialysis

Low dose prophylaxis : In high risk patients who are undergoing surgery intravenous injection or by subcutaneous injection of 5000 units 8-12 hours before operation, and to be continued post operatively for 7 days until patient is mobile to prevent post-operative deep vein thrombosis or pulmonary embolism; in this regimen laboratory monitoring is not required

CHILD: the loading dose to be lower; 15-25 units/kg/hour by Intravenous infusion

NOTE: daily laboratory monitoring of activated partial thromboplastin time (APTT) is essential

Proprietary Preparations

G-heparin (Gonosasthaya), Inj., 5000 units/ml, Tk. 275.00 /5 ml Vial

Heparin Leo ⁽¹⁾ (Leo), Inj., 5000 IU/ml. Tk. 704.00/5ml Vial

Heparin ⁽¹⁾ (Rotexmedica), Inj., 5000 IU/ml. Tk. 325.33/5ml Vial

Heparon (Beacon), Inj. 5000 IU/ml, Tk. 397.72/5 ml Vial

Multiparin ⁽¹⁾ (CP), Inj. 5000 IU/ml, Tk. 300/vial

BIVALIRUDIN (direct thrombin inhibitor)

Indications: Angina, Unstable angina, undergoing PTCA

Contraindications: Active bleeding, hypersensitivity

Side effects: Headache, thrombocytopenia, bleeding

Dose: IV bolus of 0.75mg/kg, followed by infusion of 1.75mg/kg/hour

Proprietary Preparation

Biva (Healthcare), Inj., 250mg/vial, Tk. 10000.00/Vial

LOW MOLECULAR WEIGHT HEPARINS

Low molecular weight Heparins are salts of fragments of heparin produced by chemical or enzymatic depolymerisation of the heparin molecule. Common low molecular weight heparins are: **Enoxaparin**, **Dalteparine** and **Tinzaparin**.

Note: Coagulation monitoring is not required,

DALTEPARIN SODIUM

Indication : See under dose

Side effects, Contraindications and

Caution: See under Heparin

Dose: In unstable angina and Non Q wave myocardial infarction, given subcutaneously in a dose of 200 units/kg 12 hourly for 5-8 days (max. 10,000 units every 12 hours) and

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low dose aspirin should be given concomitantly

For treatment of deep vein thrombosis and pulmonary embolism, *subcutaneously*, in a dose of 200 units /kg daily for at least 5 days (max 18000 units daily).

For prophylaxis of venous thromboembolism during surgical procedure, started pre-operatively for patients at moderate risk, 25,000 units given subcutaneously 1 to 2 hours before the procedure, followed by 2500 units once daily for 5-7 days or until the patient is ambulant; for those at high risk, 2500 units are given 1 to 2 hours before procedure and 8-10 hours after procedure followed by 5000 units daily

For prevention of clotting in the extracorporeal circulation during haemodialysis or haemofiltration in adult with chronic renal failure an intravenous injection of dalteparin 30 to 40 unit per kg followed by an intravenous infusion of 10 to 15 unit/kg/hour

Note: long-term use may accumulate in renal failure, and it has no antidote

Proprietary Preparations

Fragmin[®] (Pfizer), Inj. 5000 IU/0.2 ml, Tk. 337.50/0.2 ml Syringe; 7500 IU Tk. 631.48/0.3 ml Syringe

ENOXAPARIN SODIUM

Indications: See under dose

Side-effects; cautions & contraindications: See under Heparin

Dose: In unstable angina and non Q

wave myocardial infarction, given *subcutaneously* in a dose of 1mg (100 units) per kg 12 hourly for 5-8 days; low dose aspirin should be given concomitantly

In the prophylaxis of venous thrombosis during surgical procedures, given *subcutaneously*; patients with mild to moderate risk are given 20mg (2000 units) 2 hours pre-operatively and then 20mg (2000 units) once daily for 7-10 days. Patients at high risk are given 40mg (4000 units) 12 hours before operation and then 40mg (4000 units) once daily for 7-10 days.

For the treatment of deep vein thrombosis enoxaparin is given *subcutaneously* in a dose of 1mg (100 units) per kg body weight 12 hourly or 1.5mg (150 units) per kg once daily for 5 days or until oral anti-coagulation is established.

For the prophylaxis of thromboembolism in immobilized patients, the dose is 40mg (4000 units) once daily for at least 6 days. Treatment should be continued (max. 14 days) until patients are ambulant.

Proprietary Preparations

Alexa (Healthcare), Inj., (P.F Syringe), 80 mg/0.80 ml, Tk. 725.00/ Syringe.; 40 mg/0.40 ml, Tk. 425.00/ Syringe.; 60 mg/0.60 ml, Tk. 600.00/ Syringe.;

Cardinex (Drug Intl) Inj., (P.F Syringe).; 40mg/0.4 ml, Tk. 351.10/ Syringe.; 60mg/0.6 ml, Tk. 526.60/ Syringe, 80mg/0.8 ml, Tk. 577.00/ Syringe

Claxo (General), Inj., (P.F Syringe)., 40mg/0.4 ml, Tk. 351.06/ Syringe, 60mg/0.6 ml, Tk. 575.00/ Syringe

Claxo (Beximco), Inj., (P.F Syringe), 20mg/0.2 ml, Tk. 200.00/ Syringe, 40mg/0.4 ml, Tk. 350.00/ Syringe.; 60mg/0.6 ml, Tk. 500.00/ Syringe.; 80mg/0.8 ml, Tk. 550.00/ Syringe

Clexane (Sanofi), Inj., (P.F Syringe) 20mg/0.2 ml, Tk. 270.81/ Syringe.; 40mg/0.4 ml, Tk. 461.38/ Syringe, 60mg/0.6 ml, Tk. 651.95/ Syringe, 80mg/0.8 ml, Tk. 802.41/ Syringe.;

Clotinex (Square), Inj., (P.F Syringe) 40 mg/0.4 ml, Tk. 451.36/ Syringe, 60 mg/0.6 ml, Tk. 576.73/ Syringe

Enoparin (Popular), Inj., (P.F Syringe), 40 mg/0.4 ml, Tk. 450.00/ Syringe.; 60 mg/0.6 ml, Tk. 500.00/ Syringe.; 80 mg/0.8 ml, Tk. 550.00/ Syringe

Eparin (Beacon), Inj., (P.F Syringe), 60mg/0.6 ml, Tk. 576.73/ Syringe

Intravas (Aristo), Inj., (P.F Syringe) 80mg/0.8 ml, Tk. 550.00/ Syringe.; 40mg/0.4 ml, Tk. 350.00/ Syringe, 60mg/0.6 ml, Tk. 525.00/ Syringe

Parinox (Incepta), Inj., (P.F Syringe), 20 mg/0.2 ml, Tk. 200/ Syringe, 40 mg/0.4 ml, Tk. 450.00/ Syringe.; 60 mg/0.6 ml, Tk. 575.00/ Syringe.; 80 mg/0.8 ml Tk. 650.00/ Syringe

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3.8.2 ORAL ANTICOAGULANTS

RIVAROXABAN (Highly selective Xa inhibitor)

Indications: Prophylaxis of thromboembolism in Nonvalvular Atrial Fibrillation, Prophylaxis of Venous Thromboembolism following Hip/knee surgery, Deep vein Thrombosis (DVT), Reduce risk of recurrent DVT or Pulmonary embolism.

Cautions: Bleeding disorders; concomitant use of drugs that increase risk of bleeding;; active or recent gastrointestinal ulceration; vascular retinopathy; anaesthesia with postoperative indwelling epidural catheter recent surgery; hepatic impairment; pregnancy and breast feeding moderate hepatic and renal impairment; renal impairment avoid if eGFR less than 15 mL/minute/1.73m²; pregnancy and breast feeding

Contra-indications: Active bleeding

Interactions: See Appendix-2

Side-effects: Nausea; haemorrhage (see notes above); dyspepsia, dry mouth, vomiting, hypotension, oedema, tachycardia, thrombocythaemia, syncope, dizziness, headache, renal impairment, pain in extremities, pruritus, and rash; jaundice also reported

Dose: DVT prophylaxis: knee

replacement: Adult over 18 years 10mg PO once daily for 2 weeks starting 6-10 hours after surgery. **Hip replacement:** adult over 18 years 10mg once daily for 5 weeks starting 6-10 hours after surgery.

DVT or Pulmonary embolism

treatment: 15 mg PO 12hourly for 21 days, then 20 mg PO once daily for 6 months.

In Nonvalvular Atrial Fibrillation: 20mg PO once daily

Proprietary preparations

Rivaban (ACI), Tab., 10mg, Tk. 25.00/Tab., 2.5mg, Tk. 8.00/Tab., 20mg, Tk. 45.00/Tab.

Rivarox (Eskayef), Tab, 10mg, Tk. 25.00/Tab., 15mg, Tk. 35.00/Tab., 20mg, Tk. 45.00/Tab., 2.5mg, Tk. 8.00/Tab.

Rivaxa (Square), Tab., 2.5 mg, Tk. 8.0/Tab., 10 mg, Tk. 25.00/Tab.

Roxarel (Incepta), Tab., 10 mg, Tk. 25/Tab., 15 mg, Tk. 35.00/Tab., 2.5 mg, Tk. 8.00/Tab.
Varox (Drug Intl), Tab., 2.5mg, Tk. 6.00/Tab.

DABIGATRAN (directly inhibit thrombin)

Indications: Atrial fibrillation, prophylaxis of deep vein thrombosis, PE treatment, hip replacement surgery

Cautions, contraindications & side effects: See under Rivaroxaban

Dose: AF: 20mg, DVT and PE: 15mg, hip surgery: 10mg daily.

Proprietary Preparation

Danoxta (UniMed), Cap. 75 mg, Tk. 25.00/Cap., 110 mg, Tk. 35.00/Cap.

WARFARIN^[ED]

Indications: Deep vein thrombosis, pulmonary embolism, in patient with atrial fibrillation, in rheumatic heart disease and transient ischaemic attack.

Cautions: Hepatic or renal disease, recent surgery

Contra-indications: Pregnancy, peptic ulcer, severe hypertension, bacterial endocarditis

Interactions: See Appendix-2

Side-effects: Haemorrhage; alopecia, hypersensitivity, hepatic dysfunction, rashes

Dose: ADULT dose is 10 mg daily for 2 days at the start of treatment. Afterwards the dose is adjusted according to the prothrombin time; the maintenance dose is 3 to 9 mg daily

Proprietary Preparations

Farevan (Gaco) Tab., 5 mg, Tk. 3.04/Tab.

Warin (Incepta), Tab., 5 mg, Tk. 3.00/Tab., 2mg, Tk. 2.00/Tab.

3.8.3 PROTAMINE SULFATE^[ED]

Indications: To stop bleeding in case of heparin overdosage

Contraindications: History of allergic reactions to protamine insulin; infertility in men; men who have had a vasectomy

Interactions: See Appendix-2

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Side-effects: Hypersensitivity reactions, vomiting, dyspnoea, and bradycardia

Dose: By intravenous injection for about 3 minutes, 1 mg neutralizes 80-100 units heparin when given within 15 minutes of heparin; if longer time, less protamine needed because heparin is rapidly excreted; max. 50 mg

Proprietary Preparations

Prosulf ⁽¹⁾ (Wockhardt) Inj., 50mg/Amp, Tk.140.21/Amp.

3.9. ANTIPLATELET DRUGS

These drugs inhibit thrombus formation by decreasing platelet aggregation. **Aspirin** 75-300 mg daily may be given routinely to prevent recurrent attack of thrombotic cerebrovascular or cardiovascular disease. Aspirin 300 mg should be given immediately after the diagnosis of ischaemic heart disease. Aspirin decreases mortality after myocardial infarction. Low doses of aspirin (75 mg or 100 mg) are to be prescribed following bypass surgery and post myocardial infarction. Aspirin has also been used in atrial fibrillation, stable angina and for intermittent claudication.

Ticlopidine inhibits platelet aggregation and clot retraction; it has currently been used for prevention of thrombosis in cerebral vascular and coronary heart disease. **Clopidogrel** is an analogue of ticlopidine with similar action and uses.

Dipyridamole inhibits embolization from prosthetic heart valves in combination with warfarin, and reduces thrombosis in patients with thrombotic disease.

Ticlopidine is limited by the need to take the drug twice daily, by poor tolerability, notably gastrointestinal distress, but most important by severe side effects, including bone marrow aplasia. The antiplatelet effects of clopidogrel have a delayed onset (several hours after ingestion), and there is substantial variability in response among patients. **Prasugrel** is a novel third-generation thienopyridine that irreversibly inhibits the P2Y₁₂ receptor at the same site as clopidogrel. Compared

with clopidogrel, prasugrel is more potent, faster in onset, and more consistent in inhibiting platelets- but at a price of more bleeding.

Glycoprotein IIb/IIIa inhibitors prevent platelet aggregation by blocking the binding of fibrinogen to receptors on platelets. **Abciximab** is a monoclonal antibody which binds to glycoprotein IIb/IIIa receptors and to other related sites; it is licensed as an adjunct to unfractionated heparin and aspirin for the prevention of ischaemic complications in high-risk patients undergoing percutaneous transluminal coronary intervention. Abciximab should be used once only (to avoid additional risk of thrombocytopenia). **Eptifibatide** and **Tirofiban** also inhibit glycoprotein IIb/IIIa receptors; they are licensed for use with unfractionated heparin and aspirin to prevent early myocardial infarction in patients with unstable angina or non-ST-segment-elevation myocardial infarction. Abciximab, Eptifibatide and Tirofiban should be used by specialists only.

ASPIRIN^[ED]

Indications: Prophylaxis against arterial thrombotic events including cerebrovascular disease and myocardial infarction (see also section 7.5.2.2)

Cautions: Asthma, uncontrolled hypertension, renal and hepatic impairment; pregnancy

Contraindications: Active peptic ulcer; haemophilia, gout, asthma or history of bronchospasm, children below 12 years and in breast-feeding

Interactions: See Appendix-2

Side-effects: Bronchospasm, gastrointestinal bleeding, Rey's syndrome

Dose: See notes above

Proprietary Preparations

See section 7.5.2.2

CLOPIDOGREL^[ED]

Indications: Myocardial infarction, ischaemic stroke, or established peripheral arterial disease

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Cautions: See under Ticlopidine

Contraindications: Presence of active bleeding and hypersensitivity to the drug

Interactions: See Appendix-2

Side-effects: See under Ticlopidine. The incidence of blood dyscrasia (neutropenia) is reported to be lower with Clopidogrel.

Dose: By mouth 75 mg once daily with or without fail. In acute coronary syndromes, initial dose is 300 mg and then 75 mg once daily. In coronary stenting, the combination of clopidogrel with aspirin is as effective as ticlopidine with aspirin, except that non cardiac events are better reduced by clopidogrel

Proprietary Preparations

Anclog (Square), Tab., 75 mg, Tk. 12.03/Tab.

Anlet (Globe), Tab., 75 mg, Tk. 11.00/Tab.

AP (Sharif), Tab., 75 mg, Tk. 10.03/Tab.

Asclap (Biopharma), Tab., 75 mg, Tk. 12.50/Tab.

Clogfree (Asiatic), Tab., 75 mg, Tk. 12.0/Tab.

Clognil (Orion), Tab. 75 mg, Tk. 12.00/Tab.

Clont (Opsonin), Tab., 75 mg, Tk. 12.03/Tab.

Clopid (Drug Intl), Tab., 75mg, Tk. 12.05/Tab.

Clopidol (Alco), Tab., 75 mg, Tk. 10.03/Tab.

Clopigrel (Pacific), Tab., 75 mg, Tk. 9.10/Tab.

Clopirel (Novo Healthcare), Tab., 75 mg, Tk. 10.00/Tab.

Cloplet (Nuvista), Tab., 75 mg, Tk. 12.00/Tab.

Clorel (ACI), Tab., 75mg, Tk. 12.04/Tab.

Dclot (Acme), Tab., 75.00 mg, Tk. 11.00/Tab.

Dogrel (Astra Bio), Tab., 75 mg, Tk. 10.00/Tab.

Dorel (General), Tab., 75mg, Tk. 10.07/Tab.

Lirel (Silva), Tab., 75mg, Tk. 10.04/Tab.

Lopirel (Incepta), Tab., 75mg, Tk. 12.00/Tab.

Loplate (Kemiko), Tab., 75 mg, Tk. 10/Tab.

Navix (Navana), Clopidogrel 75 mg, Tab., 75 mg, Tk. 11.00/Tab.

Noclog (Eskayef), Tab., 75mg, Tk. 12.0/Tab.

Odrel (Beximco), Tab., 75mg, Tk. 12.00/Tab.

Pidogrel (Radiant), Tab., 75mg, Tk. 15/Tab.

Pladex (UniMed), Tab, 75mg, Tk. 12.00/Tab.

Plagrin (Renata), Tab., 75mg, Tk. 11.00/Tab.

Preclot (Popular), Tab., 75mg, Tk. 12.0/Tab.

Replet (Healthcare), Tab., 75mg, Tk. 12/Tab.

Clopidogrel 75mg + Aspirin 75mg

Anclog (Square), Tab., Tk. 12.03/Tab.

Anlet (Globe), Tab., Tk. 12.00/Tab.

Asclap (Biopharma), Tab., Tk.12.50/Tab.

Aspin Plus (Aristo), Tab., Tk. 11.00/Tab.

Aspirel (Ibn Sina), Tab., Tk. 360.00/Tab.

Cias (Delta), Tab., Tk. 8.00/Tab.

Clognil (Orion), Tab., Tk. 12.04/Tab.

Clontas (Opsonin), Tab., Tk. 12.00/Tab.

Clopicard Plus (Veritas), Tab., Tk.12.00/Tab.

Clopid-AS (Drug Intl), Tab., Tk. 12.05/Tab.

Clopidol Plus (Alco), Tab., Tk. 12.04/Tab.

Clopigrel Plus (Pacific), Tab., Tk. 10.00/Tab.

Clopilet A (Sun), Tab., Tk.11.00/Tab.

Clopiwas (Novo), Tab., Tk. 11.00/Tab.

Clorel-A (ACI), Tab., Tk. 12.04/Tab.

Combiplat (Beacon), Tab., Tk. 11.07/Tab.

Dogrel Plus (Astra), Tab., Tk. 11.00/Tab.

Dorel Plus (General), Tab., Tk. 12.00/Tab.

Ecosprin Plus (Acme), Tab., Tk. 12.00/Tab.

G-Co-aspirin (Gonoshasthaya), Tab., Tk. 5.00/Tab.

Lirel (Silva), Tab., Tk. 11.04/Tab.

Lopirel (Incepta), Tab., Tk. 12.00/Tab.

Loplate Plus (Kemiko), Tab., Tk.11.00/Tab.

Navix Plus (Navana), Tab., Tk. 12.08/Tab.

Noclog (Eskayef), Tab., Tk. 12.00/Tab.;

Odrel (Beximco), Tab., Tk. 12.00/Tab.

Pladex-A (UniMed), Tab., Tk. 12.50/Tab.

Plagrin Plus (Renata), Tab., Tk. 12.00/Tab.

Plavix-Plus (Navana), Tab., Tk.12.05/Tab.

Preclot AS (Popular), Tab., Tk.12.00/Tab.

Replet Plus (Healthcare), Tab., Tk. 11.0/Tab.

Zesprin (Zenith), Tab., Tk. 11.00/Tab.

DIPYRIDAMOLE

Indications: See notes above

Cautions: Recent myocardial infarction, severe angina and heart failure

Side-effects: Throbbing headache, increasing bleeding during or after surgery, hot flushes, tachycardia and gastro-intestinal effects

Interactions: See Appendix-2

Dose: By mouth 300-600 mg daily in 3-4 divided doses before food

By Intravenous injection, for diagnostic use only

Proprietary Preparation

Santinal MR (UniMed), Tab. 200mg, Tk.10.00/Tab.

EPTIFIBATIDE

Indications: Coronary angioplasty, non-ST-segment elevation myocardial infarction

Cautions: Measure baseline prothrombin time, activated partial thromboplastin time, platelet count, haemoglobin, haematocrit and platelets within 6 hours after start of treatment

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then at least once daily; discontinue if thrombolytic therapy, intra-aortic balloon pump, hepatic impairment, renal impairment; reduce infusion to 1 microgram/kg/minute; avoid if eGFR less than 30 mL/minute/1.73m²; pregnancy and breast-feeding

Contra-indications: Abnormal bleeding within 30 days, major surgery or severe trauma within 6 weeks, stroke within last 30 days or any history of haemorrhagic stroke, intracranial disease (aneurysm, neoplasm or arteriovenous malformation), severe hypertension, haemorrhagic diathesis, increased prothrombin time or INR, thrombocytopenia, significant hepatic impairment; if serum creatinine > 4 mg/dl.

Interactions: See Appendix-2

Side-effects: Bleeding manifestations; anaphylaxis and rash

Dose: Initially by intravenous injection, 180 micrograms/kg, then by intravenous infusion, 2 micrograms/kg/minute for up to 72 hours (up to 96 hours) if percutaneous coronary intervention during treatment

Proprietary Preparation

Integril (Incepta), Inj., 2 mg/ml, Tk. 3000.00/10ml vial; 75 mg/100 ml, Tk. 9000.00/100 ml Vial

PRASUGREL

Indications: Prevention of atherothrombotic events in patients with ACS undergoing primary or delayed coronary angioplasty

Cautions: Recent trauma, surgery, gastro-intestinal bleeding, or active peptic ulcer disease, concomitant use of drugs that increase risk of bleeding; discontinue at least 7 days before elective surgery if antiplatelet effect not desirable;

Contra-indications: Active pathological bleeding, history of stroke or transient ischaemic attack, severe hepatic impairment and hypersensitivity to drug

Interactions: See Appendix -2

Side-effects: Haemorrhage (including gastro-intestinal and intracranial), haematoma, haematuria, anaemia, rash

Dose: Acute coronary syndrome :loading dose 60mg, then 10mg/day if body weight over 60kg or 5mg /day if body weight under 60kg or age over 75 years.

Proprietary Preparations

Apagrel (Healthcare), Tab., 10mg, Tk. 20.00/Tab., 5mg, Tk. 12.00/Tab.

Appras (UniMed), Tab., 10mg, Tk. 25.00/Tab., 5mg, Tk. 14.00/Tab.

Asurel (Navana), Tab., 5 mg, Tk. 20.00/Tab.;

Efigrel (Square), Tab., 10 mg, Tk. 20.06/Tab.

Efirel (Opsonin), Tab., 10 mg, Tk. 20.00/Tab., 5 mg, Tk. 12.00/Tab.

Hemagrel (ACI), Tab., 10mg, Tk. 20.06/Tab., 5mg, Tk. 12.04/Tab.

Opagrel (Orion), Tab., 5 mg, Tk. 8.02/Tab.,

10 mg, Tk. 15.04/Tab.

Prapid (Drug Intl), Tab., 10mg, Tk. 20.10/Tab., 5mg, Tk. 12.05/Tab.

Prasugen (Acme), Tab., 10 mg, Tk. 20.07/Tab., 5 mg, Tk. 12.03/Tab.

Prasulet (Beacon), Tab., 10mg, Tk. 20.06/Tab.,

5mg, Tk. 12.04/Tab.

Prasurel (Incepta), Tab., 10mg, Tk. 20.00/Tab., 5 mg, Tk. 12.00/Tab.

Prasuva (Beximco), Tab., 5 mg, Tk. 12.0/Tab.

TICLOPIDINE HYDROCHLORIDE

Indications: It has currently been used for prevention of thrombosis in cerebral vascular and coronary heart disease

Cautions: Renal impairment, hepatic impairment; there is an increased risk of bleeding due to concomitant administration of other drugs; to be withdrawn immediately if there is serious bleeding

Interactions: See Appendix-2

Side-effects: Bleeding, nausea, diarrhoea, severe neutropenia

Dose: 250mg twice daily

Generic Preparation

Tablet, 250mg

TICAGRELOR (interact with platelet P2Y₁₂ ADP receptor, prevent platelet activation)

Indications: Acute coronary syndrome in combination with aspirin

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Side-effects: Allergic reaction, cough, headache,

Cautions, contraindications: See notes above

Dose: As loading dose 180mg, then 90 mg twice daily.

Proprietary preparations

Acora (ACI), Tab., 90mg, Tk. 75.00/Tab.

Brilinta (Ziska), Tab., 90 mg, Tk. 480.00/Tab.

Ticacard (Aristo), Tab., 90mg, Tk. 75.00/Tab.

Ticalog (Square), Tab., 90 mg, Tk. 75.00/Tab.

Ticarel (Incepta), Tab., 90mg, Tk. 75.00/Tab.

Tigarol (Drug Intl), Tab., 90mg, Tk. 75.00/Tab.

3.10 FIBRINOLYTIC DRUGS

Fibrinolytic drugs act as thrombolytics by activating plasminogen to form plasmin, which degrades fibrin and so breaks up thrombi. Fibrinolytic agents, sometimes referred as plasminogen activators, are divided in to 2 categories:

Fibrin-specific agents: **Alteplase, Reteplase, Tenecteplase, Urokinase.**

Non fibrin specific agents: **Streptokinase, Anistreplase.**

Indications: Acute ST elevation Myocardial infarction (STEMI) within 12 hours of symptom onset, Acute Ischemic stroke within 4.5 hours, acute massive pulmonary embolism, Prosthetic valve thrombosis. Deep vein thrombosis, acute peripheral arterial occlusion, occluded intravenous catheters.

Cautions: Thrombolytic drugs should be used with caution if there is a risk of bleeding including that from venepuncture or invasive procedures. They should also be used with caution in external chest compression, elderly, hypertension, conditions in which thrombolysis might give rise to embolic complications such as enlarged left atrium with atrial fibrillation (risk of dissolution of clot and subsequent embolisation), and recent or concurrent use of drugs that increase the risk of bleeding.

Contraindications: any prior Intracranial Hemorrhage, Ischemic stroke within 6 months(except acute ischemic stroke within 4.5 hours), known structural cerebral vascular lesion

(Arteriovenous malformation) , known malignant intracranial malformation, Active bleeding or bleeding disorder(except menstruation), GI bleeding within the past month, recent major trauma/surgery/ head injury (within preceding month), aortic dissection, Non-compressible puncture within last 24 hours(liver biopsy, lumbar puncture). For streptokinase, prior treatment within the previous 6 months.

Prolonged persistence of antibodies to streptokinase and anistreplase (no longer available) can reduce the effectiveness of subsequent treatment; therefore, streptokinase should not be used again beyond 4 days of first administration of either streptokinase or anistreplase.

previous allergic reactions to either streptokinase or anistreplase (no longer available).

Hepatic impairment Thrombolytic drugs should be avoided in severe hepatic impairment as there is an increased risk of bleeding.

Pregnancy:Thrombolytic drugs can possibly lead to premature separation of the placenta in the first 18 weeks of pregnancy. There is also a risk of maternal haemorrhage throughout pregnancy and post-partum, and also a theoretical risk of fetal haemorrhage throughout pregnancy.

Side-effects: Nausea and vomiting and bleeding. When thrombolytics are used in myocardial infarction, reperfusion arrhythmias and recurrent ischaemia and angina may occur. Reperfusion may also cause cerebral and pulmonary oedema. Hypotension can also occur and can usually be controlled by elevating the patient's legs, or by reducing the rate of infusion or stopping it temporarily. Back pain, fever, and convulsions have been reported. Bleeding is usually limited to the site of injection, but intracerebral haemorrhage or bleeding from other sites can occur. Serious bleeding calls for discontinuation of the thrombolytic and may require administration of coagulation factors and antifibrinolytic drugs (e.g. tranexamic acid). Rarely further embolism may

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occur (either due to clots that break away from the original thrombus or to cholesterol crystal emboli). Thrombolytics can cause allergic reactions (including rash, flushing and uveitis) and anaphylaxis has been reported. Guillain-Barre' syndrome has been reported rarely after streptokinase treatment.

ALTEPLASE

Indications: Acute ST elevation Myocardial infarction (STEMI) within 12 hours of symptom onset, acute Ischemic stroke within 4.5 hours, acute massive pulmonary embolism.

Cautions: See notes above

Contra-indications: See notes above

Interactions: See notes above

Side effects: See notes above

Dose: Acute Myocardial Infarction: dose not exceeding 100mg 15-mg IV bolus followed by 0.75 mg/kg (up to 50 mg) IV over 30 minutes then 0.5 mg/kg (up to 35 mg) IV over 60 minutes.

Pulmonary embolism: 100 mg I/v infused over 2 hour.

Acute Ischemic stroke: 0.9mg/kg I/V; not to exceed 90mg total dose.

Administer 10% of the total dose as an initial I/v bolus over 1 minute and the remainder infused over 60 minutes.

Proprietary preparation

Actilyse[®] (Boehringer), Inj. 50 mg/Vial
Tk46,000/vial

STREPTOKINASE

Indications: Acute myocardial infarction; deep-vein thrombosis, pulmonary embolism, acute arterial thromboembolism, and central retinal venous or arterial thrombosis

Cautions: See notes above; hepatic impairment, pregnancy

Contra-indications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above

Dose: Myocardial infarction (initiated within 12 hours of symptom onset), by

intravenous infusion, 1.5 million units over 60 minutes. Deep-vein thrombosis, pulmonary embolism, acute arterial thromboembolism, central retinal venous or arterial thrombosis, by intravenous infusion, 250 000 units over 30 minutes, then 100 000 units every hour for up to 12–72 hours according to condition with monitoring of clotting parameters

Proprietary Preparations

Eptase (Beacon), Inj., 1500000IU, Tk.

4500.00/Vial

STK (Incepta), Inj., 1500000IU, Tk. 4500.00/Vial

Streptase[®] (CSL Behring), Inj. 1.5 MIU, Tk.

5250.00/Vial

TENECTEPLASE

Indications: Acute ST elevation Myocardial infarction (STEMI) within 12 hours of symptom onset.

Cautions: See notes above

Contraindications: See notes above

Interactions: See notes above

Side effects: See notes above

Dose: In Acute Myocardial Infarction: Single I/ V bolus

To **reconstitute** tenecteplase, mix the 50-mg vial in 10 mL sterile water (5 mg/mL). Tenecteplase is administered in a **30-50 mg IV over 5-10 seconds**. The dosage is calculated on the basis of the patient's weight, as follows:

Below 60 kg - 30 mg (6000 IU)

60 to 69 kg - 35 mg (7000 IU)

70 to 79 kg - 40 mg (8000 IU)

80 to 89 kg - 45 mg (9000 IU)

At or above 90 kg - 50 mg (10000 IU)

It is recommended to reduce to half of the usual dose in patient's ≥75 years of age.

Proprietary Preparation

Metalyse[®] (Boehringer), Inj. 50 mg/Vial

UROKINASE

Indications: Acute myocardial infarction; thromboembolic occlusive vascular disease including deep-vein

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thrombosis, pulmonary embolism, and occlusive peripheral arterial disease; occluded arteriovenous haemodialysis shunts, and intravenous catheters and cannulas blocked by fibrin clots

Cautions: See notes above

Contra-indications: See notes above; hepatic impairment- dose reduction may be required; renal impairment-dose reduction may be required; pregnancy; breast-feeding

Side-effects: See notes above

Dose: Deep-vein thrombosis, by intravenous infusion, initially 4400 units/kg over 10–20 minutes, followed by 100 000 units/hour for 2–3 days.

Pulmonary embolism, by intravenous infusion, initially 4400 units/kg over 10–20 minutes, followed by 4400 units/kg/hour for 12 hours.

Occlusive peripheral arterial disease, consult product literature

Occluded central venous catheters, by injection directly into catheter, dissolve in sodium chloride 0.9% to a concentration of 5000 units/mL; use a volume sufficient to fill the catheter lumen; leave for 20–60 minutes then aspirate the lysate; repeat if necessary. Occluded arteriovenous haemodialysis shunts, consult product literature.

Proprietary Preparation

Uronase (Beacon), Inj., 500000 IU, Tk. 3523.77/Vial

3.11 ANTI-FIBRINOLYTIC DRUGS AND HAEMOSTATICS

Tranexamic acid, a synthetic amino acid, has strong antifibrinolytic activity. The anti-haemorrhagic action of this acid is due to an inhibition of the plasminogen activation of both exogenous activator like streptokinase and endogenous activators like urokinase and the plasminogen tissue activators.

AMINOCAPROIC ACID (EPSILON

AMINOCAPROIC ACID) (inhibit plasminogen activation)

Indications: All haemorrhagic syndromes due to enhanced fibrinolysis

Contraindications: Thromboembolic disease, arterial and venous thrombosis.

Interactions: See Appendix-2

Side-effects: Fatigue, conjunctival irritation, pruritus, skin rashes after oral administration, nausea, diarrhoea, dizziness, hypersensitization

Dose: 8–16 g a day orally and is to be given as 2–4 grams (diluted in sugared water) 6 hourly

Proprietary Preparations

Caprox (Techno), Inj, 1gm/5ml, Tk.35/10 ml Vial; Tk. 14.50/5 ml Vial

Caprolycin (Pacific), Inj., 2gm/10ml, Tk. 50/10ml

Minocap (ACI), Inj., 2gm/10ml, Tk.50.34/10 ml; 2 gm/10 ml, Tk. 25.17/5 ml

TRANEXAMIC ACID (analogue of EACA)

Indications: Hereditary angioedema. In prophylaxis and therapy of digestive haemorrhages, haemorrhagic syndromes in leukemia, cirrhosis of liver, hemophilia, thrombocytopenic purpura, accidents during thrombolytic therapy and transfusion surgical prophylaxis: anti-haemorrhagic therapy during operations, particularly in pulmonary, cardiovascular and abdominal surgery

In urology: Prophylaxis and anti haemorrhagic therapy of prostatic, vesical, renal surgery and haematurias. In obstetrics: postpartum and puerperal haemorrhages; menorrhagias

Cautions: Renal impairment, massive haematuria, disturbances in colour vision, pregnancy

Contraindications: Known individual hypersensitivity to the product, thromboembolic disease, endocavity haemorrhages, serious kidney failure

Interactions: See Appendix-2

Side-effects: Sense of fatigue, conjunctival irritation, nasal blockade, itching, skin reddening, nausea, diarrhoea

Dose: Loading dose of 15mg/kg, followed by 30 mg /kg every 6 hourly

By mouth in menorrhagias, 1–1.5 g 2–4 times daily for 3–4 days

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By mouth in local fibrinolysis 15-25 mg/kg 2-3 times daily.

By slow intravenous injection in case of local fibrinolysis 0.5-1 g 3 times daily.

Proprietary Preparations

Anaxyl (ACI), Cap., 500mg, Tk. 15.11/Cap.,
Inj., 500mg/5ml, Tk. 50.34/5 ml Amp; Tab.,
500mg, Tk. 20.06/Tab.
Bionex (Biopharma), Cap., 500mg, Tk.
16.00/Cap.
Enclot (Opsonin), Cap., 500 mg, Tk.
15.06/Cap., Inj., 500mg/5 ml, Tk. 50.19/Amp
Fibrino (Eskayef), Cap, 500mg, Tk.
15.00/Cap., 500mg, Tk. 15.00/Cap., Inj. ,
500mg/5ml , Tk. 50.00/Amp
Fibrostat (Globe), Cap., 500 mg, Tk.
20.00/Cap., Inj, 500 mg/5 ml, Tk. 45.00/ Amp
Frabex (Square), Cap., 500 mg, Tk.
20.00/Cap., Inj., 500 mg/5 ml, Tk. 50.00/Amp
Hemostat (Aristo), Inj., 250g/5ml, Tk. 25.00/5
ml Amp; Cap., 500mg, Tk.15.00/Cap.
Hemotrax (UniMed), Tab., Tk. 20.00/Tab
Intrax (Incepta), Cap., 500 mg, Tk. 16.00/Cap.,
Inj., 500mg/5ml, Tk. 50.00/Amp
Nexyl (Ibn Sina), Cap., 500mg, Tk.15.00/Cap.
Oranex (Orion), Cap., 500 mg, Tk.15.04/Cap.
Taxiclot (One Pharma), Cap., 500 mg, Tk.
15.00/Cap.
Tracid (Acme), Inj., 500mg/5ml , Tk. 50.35/5
ml Amp; Tab., 500.00 mg, Tk. 15.10/Tab.
Tramic (Pacific), Inj., 500mg/5ml, Tk. 80.00/5
ml Amp; Cap, 500 mg, Tk. 23.00/Cap.
Tranexil (Beximco), Cap., 500mg, Tk.
15.00/Cap., Inj., 500mg/5ml, Tk. 50.00/Amp
Traxyl (Nuvista), Cap.,500mg,Tk. 23.44/Cap.
Trexam (Healthcare), Inj., 250mg/5ml , Tk.
40.00/5 ml Amp; 500mg/5ml, Tk. 80.00/Amp;
Tab., 500mg, Tk. 20.00/Tab.
Xamic (Renata), Cap., 500 mg, Tk. 20/Cap.;
Inj., 500mg/5ml, Tk. 50.00/Amp

3.12 LIPID LOWERING DRUGS

Lipoprotein disorders or dyslipidaemias are among the commonest metabolic disorders seen in clinical practice. They may lead to a number of sequelae including coronary heart disease, dermatological manifestations like xanthelasmata and xanthomata, pancreatitis, and neurological and ocular anomalies.

In Type 2 hyperlipoproteinaemic patients present with elevated plasma LDL cholesterol levels. Treatment is aimed at maximizing the efficiency of functional

LDL receptors using bile acid sequestrant resins like **Cholestyramine** (up to 24 g/day) or HMGCoA Reductase inhibitors like **Pravastatin** or **Simvastatin** (10-40 g/day).

In Type 3 hyperlipoproteinaemic patients accumulate IDL in plasma. This Type responds well to diet and drug therapy, particularly with the new generation of **Clofibrate**, **Benzafibrate** and **Gemfibrozil**. These agents are very effective in reducing the high circulating IDL levels.

Type 4 hyperlipoproteinaemia is associated with accumulation in the plasma of VLDL of normal composition, which appears to be oversynthesized in some individuals. Dietary modification is the first line of treatment of Type 4 hyperlipo-proteinaemic subjects. Carbohydrate and alcohol restriction achieves satisfactory control of their plasma TG level. Where the response is inadequate, it may be necessary to add nicotinic acid (3-4 g/day).

There is evidence that lowering LDL-cholesterol by 25-30% is effective in both primary and secondary prevention of coronary heart disease. Treatment with **statins** (see Statins below) has been shown to reduce myocardial infarction, coronary deaths and overall mortality. However, any drug therapy must be combined with strict diet control, maintenance of ideal body weight and cessation of smoking.

CAUTION: Severe hyperlipidaemia often requires combination of lipid lowering drugs such as anion exchange resin with a fibrate, a statin, or nicotinic acid. Combinations of a statin with nicotinic acid or a fibrate or carry an increased risk of side-effects including rhabdomyolysis and should be used with caution. Concomitant treatment of a statin with cyclosporin may also increase the risk of muscle toxicity

3.12.1 ANION EXCHANGE RESINS

Cholestyramine and **Cholestipol** are anion exchange resins. These resins

prevent the reabsorption of bile acids by binding it.

Cautions: Interfere with the absorption of fat-soluble vitamins

Interactions: See Appendix-2

Side-effects: Constipation is common but diarrhoea may occur; gastrointestinal discomfort and increased bleeding tendency have been reported

3.12.2 FIBRATES

Clofibrate, Benzafibrate, Cipro-fibrate, Fenofibrate, and Gemfibrozil. can decrease mainly serum triglycerides; they also tend to decrease LDL-cholesterol and increase HDL-cholesterol.

FENOFIBRATE

Indications: For types 2, 3, 4 and 5 hyperlipoproteinaemias in patient who do not respond adequately to diet and other appropriate measure

Cautions: Renal impairment; liver function test recommended every 3 months for first year, discontinue treatment if significantly raised

Contraindications: severe hepatic and renal impairment; pregnancy and breast-feeding; existing gall bladder disease

Interactions: See Appendix-2

Side-effects: nausea, anorexia, gastric pain; pruritus, urticaria; impotence; also headache, dizziness, vertigo, hair-loss; myotoxicity; photosensitivity, raised serum transaminase; renal impairment

Dose: initially 200 mg daily in divided dose with food, then adjusted according to response to between 200 mg and 400 mg daily (dose form not appropriate for children or in renal impairment)

Proprietary Preparations

Atorvast (Medimet), Tab., 10mg, Tk.8/Tab.

Fenatrol (Drug Intl), Tab., 145mg, Tk. 8.05/Tab.

Fenobate (Renata), Cap., 200 mg, Tk. 7.00/Cap.

Fenocap (Orion), Cap, 200 mg, Tk. 7.06/Cap.

Fenolid (General), Cap., 200mg, Tk. 7.05/Cap.

Fenorat (Pacific), Cap., 200 mg, Tk. 7.00/Cap.

Fibre (White Horse), Cap., 200 mg, Tk.7.00/Cap.

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Lipicut (Rangs), Tab., 10mg, Tk. 10.00/Tab.; 20mg, Tk. 18.00/Tab.

Lipidof (Acme), Cap., 200.00 mg, Tk. 7.04/Cap.

Lipired (Square), Cap., 200 mg, Tk. 7.04/Cap.; Tab., 160 mg, Tk. 5.02/Tab.

Liplo (Globe), Tab., 20 mg, Tk. 15.00/Tab.; 10 mg, Tk. 10.00/Tab.

Lofat (Beximco), Cap., 200mg, Tk. 7/Cap.

Nofiate (Incepta), Cap., 200 mg, Tk. 7/Cap.

Noficon (Eskayef), Cap, 200mg, Tk. 7.00/Cap.; 200mg, Tk. 7.00/Cap

Tigicon (Aristo), Cap., 200mg, Tk. 7.00/Cap.

Tigirate (Opsonin), Cap., 200 mg, Tk. 7.06/Cpa.

Tizabet (ACI), Cap., 200mg, Tk. 7.02Cap.

Trigent (UniMed), Tab., 200mg, Tk. 7/Tab.

Vastor (Ad-din), Tab.,10mg, Tk. 10.00/Tab.

GEMFIBROZIL

Indications: For the prevention of coronary heart disease in patients with hyperlipidaemias of types 2, 3 and 4 who do not respond well to dietary restrictions

Contraindications: Biliary obstructions, chronic liver disease, pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Nausea, diarrhoea, pruritus, rashes, blurred vision, impotence, cholestatic jaundice, myopathy, laryngeal edema

Dose: 1-2 g daily in 2 divided doses

Proprietary Preparations

Delipid (Square), Cap., 300mg, Tk. 7.03/Cap.

Fibril (Beximco), Cap. 300 mg, Tk.7/Cap

Gelicon (Eskayef), Cap., 300mg, Tk. 7.00/Cap.

Gemfil (Aristo), Cap. 300 mg, Tk. 7/Cap

Lipigem (ACI), Cap., 300mg,Tk. 7.05/Cap.

Lipozil (Rephco), Cap. 300 mg, Tk. 6.50/Cap

3.12.3 STATINS

Statins include **Atorvastatin, Cerivastatin, Fluvastatin, Pravastatin, Simvastatin, Rosuvastatin, and Pitavastatin.** These drugs inhibit HMGCoA reductase an enzyme involved in cholesterol synthesis, especially in the liver.. These drugs are very effective in lowering LDL-Cholesterol but less effective than the fibrates in reducing

3. CARDIOVASCULAR SYSTEM

triglycerides and raising HDL-cholesterol.

Cautions: Statins should be used with caution in those with a history of liver disease or with a high alcohol intake (use should be avoided in active liver disease). Hyperthyroidism should be managed adequately before starting treatment. Liver function tests to be carried out before and within 1-3 months of starting treatment and such tests should be repeated at intervals of 6 months for about 1 year. Treatment should be discontinued if serum transaminase concentration rises to, and persists at, 3 times the upper limit of the reference range. Patient should be advised to report unexplained muscle pain. Statin should be avoided in porphyria.

Contra-indications: are contraindicated in active liver diseases (or persistently abnormal liver function test); in pregnancy; in breast feeding

Side effect: The most common side effect is gastrointestinal disturbance. Other side effects reported include headache, altered liver function tests and paraesthesia. Reversible myositis is a rare but significant side effect of the statins. Rash and hypersensitivity reaction (including angioedema and anaphylaxis) have been reported rarely. Effects on muscle: Myalgia, myositis and myopathy have been reported with statin; if myopathy is suspected and certain kinase is markedly elevated (more than 5 times upper limit of normal), treatment should be discontinued; in patients at high risk of muscle effects a statin should not be started if creatine kinase is elevated. There is an increased incidence of myopathy if the statins are given at high doses or given with a fibrate, with lipid-lowering doses of nicotinic acid, or with immuno-suppressants such as ciclosporin; close monitoring of liver function and if symptomatic, of creatine kinase estimation is required in patients receiving these drugs. Rhabdomyolysis with acute renal impairment secondary to myoglobinuria has also been reported.

ATORVASTATIN

Indications: Treatment of hypercholesterolaemias and mixed hyperlipidaemia

Side-effects; Cautions; Contra-indications: As for fluvastatin

Interactions: See Appendix-2

Dose: By mouth as calcium salt; initial dose is 10 mg daily which may be adjusted at intervals of 4 weeks up to a maximum of 80 mg daily

Proprietary Preparations

Anzitor (Square), Tab., 10 mg, Tk. 12/Tab.; 20 mg, Tk. 20.00/Tab.; 40 mg, Tk. 28.00/Tab.
Aster (Euro), Tab., 20 mg, Tk. 8.00/Tab.; 10 mg, Tk. 15.00/Tab.
Astin (Jayson), Tab., 10mg, Tk. 8.06/Tab.; Tab., 20mg, Tk.15.10/Tab.
Astiva (Supreme), Tab., 10mg, Tk. 10.00/Tab.; 20mg, Tk. 18.00/Tab.
Atasin (ACI), Tab., 10mg, Tk. 10.07/Tab.; 20mg, Tk. 18.12/Tab.; 40mg, Tk. 24.16/Tab.; 80 mg, Tk. 40.12/Tab.
Atonor (Asiatic), Tab., 10mg, Tk.10.00/Tab.; 20mg, Tk. 18.00/Tab.
Atostin (Somatec), Tab., 10 mg, Tk. 10/Tab.
Atova (Beximco), Tab., 10mg, Tk. 10.00/Tab.; 20mg, Tk. 18.00/Tab.; 40mg, Tk. 24.00/Tab.
Atovin (Alco), Tab., 10 mg, Tk. 10.03/Tab.; 20 mg, Tk. 15.05/Tab.
Atrovast (Nuvista), Tab., 10 mg, Tk. 12.04/Tab.; 20 mg, Tk. 18.05/Tab.
Avas (Opsonin), Tab., 40 mg, Tk. 24.16/Tab.; 10 mg, Tk. 10.04/Tab.; 20 mg, Tk. 18.13/Tab.
Avator (NIPRO JMI), Tab., 10mg, Tk. 10.03/Tab.; Tab., 20mg, Tk. 18.05/Tab.
Colostat (Ibn Sina), Tab., 10mg, Tk. 10.0/Tab.
Divastin (Drug Intl), Tab., 10mg, Tk. 11/Tab.; 40mg, Tk. 24.10/Tab.; 20mg, Tk. 18.10/Tab.
Frenvas (Radiant), Tab., 10mg, Tk. 12.04/Tab.; 20mg, Tk. 20.06/Tab.
G-atorvast (Gonoshasthaya), Tab., 10 mg, Tk. 7.00 /Tab.; Tab., 20 mg, Tk.12.50 /Tab.
Lipex (Orion), Tab., 20 mg, Tk. 15.10/Tab.; 10 mg, Tk. 9.06/Tab.
Lipicon (Eskayef), Tab, 10mg, Tk. 10.00/Tab.; 20mg, Tk. 18.00/Tab.; 40mg, Tk. 24.00/Tab.
Lipigent (Pacific), Tab., 10 mg, Tk. 10/Tab.; 20 mg, Tk. 18.00/Tab.
Lipitin (General), Tab., 10mg, Tk. 10.07/Tab.; 20mg, Tk. 18.12/Tab.; 40mg, Tk. 24.07/Tab.
Liplo (Globe), Tab., 10 mg, Tk. 10.00/Tab.; 20 mg, Tk. 18.00/Tab.
Lipobi (Nipa), Tab., 10 mg, Tk. 10.00/Tab.

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Lipostat (Navana), Tab., 10 mg, Tk. 10.03/Tab.
Lipovast (Sharif), Tab, 10 mg , Tk.10.03/Tab.;20 mg , Tk. 15.04/Tab.
Liptor (Acme), Tab., 10 mg, Tk. 10.07/Tab.; 20 mg, Tk. 18.11/Tab.; 40 mg, Tk. 24.16/Tab.
Locol (Popular), Tab., 10 mg, Tk.10.04/Tab.; 20 mg, Tk. 18.07/Tab.
Orva (Sanofi), Tab., 10mg, Tk. 12.04/Tab. ; 20mg, Tk. 20.01/Tab.
Orvatin (Kemiko), Tab., 10mg, Tk. 10.03/Tab.
SB-Ator (Sunman-Bardem), Tab., 10 mg, Tk. 12.00/Tab.; 20 mg, Tk. 20.00/Tab.
Stacor (UniMed), Tab , 10mg, Tk. 10.00/Tab.; 20mg, Tk. 18.00/Tab. ; 40mg , Tk. 24.0/Tab.
Taven (Renata), Tab., 10mg, Tk. 10.04/Tab.; 20mg, Tk. 18.06/Tab. ; 40mg, Tk. 24.00/Tab.
TCL-R (Aristo), Tab., 10mg , Tk. 10.00/Tab. ; 20mg, Tk. 18.00/Tab.; 40mg , Tk. 24.00/Tab.
Tiginor (Incepta), Tab., 40 mg, Tk. 24.0/Tab.; 20 mg, Tk. 18.00/Tab.; 10 mg, Tk. 10.00/Tab.
Trova (Biopharma), Tab., 40 mg , Tk. 18.00/Tab. ; 10 mg, Tk. 10.00Tab.; 20 mg, Tk. 6.02/Tab.
Xelitor (Novo Health), Tab., 20 mg, Tk. 18.00/Tab. ; 10 mg, Tk. 10.00/Tab.
Xelpid (Healthcare), Tab., 20mg, Tk. 18.00/Tab. ; 40mg , Tk. 24.00/Tab.
Xerova (Beacon), Tab. , 10mg , Tk. 10.06/Tab. ; 20mg , Tk. 18.11/Tab.
Zuvas (Benham), Tab., 10 mg, Tk. 10.00/Tab.; Tab., 20 mg, Tk. 18.00/Tab.
Atorvastatin + Olmesartan
Olmepris (General), Tab., 5 mg + 20 mg, Tk. 8.00/Tab.
Amlodipine 5mg+ Atorvastatin 10 mg
Amovast (Beacon), Tab. Tk. 11.07/Tab.
Amdova (Beximco), Tab.,, Tk. 11.00/Tab.
Amlip (Eskayef), Tab.,, Tk. 11.00/Tab.
Cardual (ACI), Tab., Tk. 11.07/Tab.
Lipigent (Pacific), Tab., Tk. 11.00/Tab.
SB-Amloator 5/10 (Sunman-Bardem), Tab., Tk. 11.00/Tab.

FLUVASTATIN

Indications: Type 2 hyperlipidaemia; retardation of coronary atherosclerosis in patients not responding adequately to dietary control

Contraindications: Primary biliary cirrhosis, chronic liver disease; pregnancy and breast-feeding; nephrotic syndrome

Cautions: Liver function tests to be carried out before starting treatment and such tests should be repeated at intervals of 6 months for about 1 year

Interactions: See Appendix-2

Side-effcets: Altered liver function tests, dyspepsia, nausea, abdominal pain, rash, urticaria, insomnia and headache

Dose: 20-40 mg daily in the evening

Proprietary Preparations

Fluvas (Silva), Cap., 20mg, Tk.12.04/Cap.

Lescol (Novartis), Cap., 20 mg, Tk. 37.50/Cap.; 40 mg, Tk. 57/Cap.; 80 mg, Tk. 58.50/Tab.

Lesterol (Opsonin), Cap., 20 mg, Tk. 12.05/Cap.

LOVASTATIN

Indications: Hypercholesterolaemia (plasma cholesterol level > 5.5 mmol/l); to halt the progression of coronary heart disease

Contraindications: Active liver disease, pregnancy and breast-feeding

Cautions: Alcoholics, history of liver disease

Interactions: See Appendix-2

Side-effcets: Chest pain, acid reflux, alopecia, pruritus and dry mouth

Dose: Primary hypercholesterol-aemia, combined hyperlipidaemia, 20 mg daily to be taken with the evening meal

Proprietary Preparations

Loplaqor (Novartis), Tab.10mg; 20mg; 40mg

Lovatin (Ambee), Tab. 20 mg, 40 mg

Ultracor (Beximco), Tab. 20 mg, 40 mg

PITAVASTATIN

Indications: It is indicated as an adjunct to diet in patients with primary hyperlipidemia or mixed dyslipidemia to reduce elevated total cholesterol, LDL-C, apo B, and TG levels and to increase HDL-C.

Cautions; Contraindications; Side-effects: As for fluvastatin

Interactions: See appendix-2

Dose: Usual starting dose is 2 mg/day taken at any time of day and a maximum of 4 mg/day. For patients with renal disease, the recommended starting dose is 1 mg/day up to a maximum of 2 mg/day.

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Proprietary Preparations

Liploss (*Drug Intl*), Tab., 2mg, Tk. 10.50/Tab.
Pavigard (*Acme*), Tab., 2mg, Tk. 10.03/Tab.
Pitavas (*Aristo*), Tab., 2mg, Tk. 10.00/Tab.
Pivalo (*Square*), Tab., 2mg, Tk. 10.03/Tab.
Pivasta (*Eskayef*), Tab, 2mg, Tk. 10.00/Tab.,

ROSUVASTATIN CALCIUM

Indications: Increase HDL-C in patient with primary hyper cholesterolaemia (heterozygous familial and non familial) and mixed dyslipidemia (Type IIa and lib).or homozygous familial hypercholesterolaemia in patient who have not responded adequately to diet and other appropriate measure

Cautions: See notes above. Patient of Asian origin max 20mg dose daily

Contra-indications: See notes above

Interactions: See Appendix-2

Dose: By mouth as calcium salt; initial dose is 10 mg daily which may be adjusted at intervals of 4 weeks up to a maximum of 20 mg once daily; max 20mg daily

Note. 20mg daily with concomitant fibrate

Proprietary Preparations

Bestcol (*Biopharma*), Tab., 10 mg, Tk. 25.00/Tab.
Cholcut (*Ziska*), Tab., 10 mg, Tk. 20/Tab.; 5 mg, Tk. 10.00/Tab.
Corestin (*UniMed*), Tab , 10 mg, Tk. 25.00/Tab., 5 mg, Tk. 12.50/Tab., 20 mg, Tk. 50.00/Tab.
Creston (*Eskayef*), Tab, 5 mg, Tk. 10.00/Tab., 10 mg, Tk. 20.00/Tab.
Creva (*Radiant*), Tab., 10mg, Tk. 27.00/Tab., 5mg, Tk. 14.00/Tab.
Nestor (*Navana*), Tab., 10 mg, Tk. 20.06/Tab.; 5 mg, Tk. 10.03/Tab.
Restat (*Ibn Sina*), Tab. , 10 mg, Tk. 20.00/Tab., 5mg, Tk. 10.00/Tab.
Rocovas (*Incepta*), Tab. , 10 mg, Tk. 15.00/Tab., 20 mg, Tk. 25.00/Tab., 5 mg, Tk. 8.00/Tab.
Rolip (*Renata*), Tab., 10 mg, Tk. 20.00/Tab.
Ropitor (*Opsonin*), Tab., 5 mg, Tk. 10.03/Tab., 10 mg, Tk. 20.00/Tab., 20 mg , Tk. 30/Tab.
Rosetor (*ACI*), Tab., 5mg, Tk.10.03/Tab., 10mg, Tk. 18.05/Tab.
Rostab (*Acme*), Tab., 20 mg , Tk. 25.08/Tab., 10 mg, Tk. 20.07/Tab., 5 mg, Tk. 10.03/Tab.

Rostatin (*Drug Intl*), Tab., 20 mg, Tk. 10.00/Tab., 10 mg, Tk. 8.00/Tab., 5mg, Tk. 6.00/Tab.
Rosu (*Popular*), Tab., 10 mg, Tk. 18.00/Tab., 20 mg, Tk.30.00/Tab., 5mg, Tk. 10.00/Tab.
Rosugen (*General*), Tab. , 10mg, Tk. 20.06/Tab.; 5mg, Tk. 10.03/Tab.
Rosunor (*Asiatic*), Tab., 10 mg , Tk. 20.00/Tab., 5mg, Tk. 10.00/Tab.
Rosutin (*Beximco*), Tab., 10 mg, Tk. 20.00/Tab., 20 mg, Tk. 30.00/Tab., 5 mg, Tk. 10.00/Tab.
Rosuva (*Square*), Tab., 10 mg, Tk. 20.13/Tab., 20 mg, Tk. 30.10/Tab., 5 mg, Tk. 10.03/Tab.,
Rosvin (*Alco*), Tab., 10 mg, Tk. 20.00/Tab.
Rovast (*Healthcare*), Tab., 10 mg , Tk. 20.00/Tab., 20 mg , Tk. 30.00/Tab., 5 mg, Tk. 10.00/Tab.
Rovex (*Orion*), Tab., 10 mg, Tk. 20.00/Tab., 5 mg, Tk. 10.00/Tab.
Ruvastin (*Aristo*), Tab. , 10 mg , Tk. 20.00/Tab., 5mg , Tk. 10.00/Tab.
SB-Rostin (*Sunman-Bardem*), Tab. , 10 mg, Tk. 20.00/Tab., 20 mg, Tk. 30.00/Tab.

SIMVASTATIN^[ED]

Indications : In patients with type 2 hyperlipidaemia who does not respond to diet control adequately; patients having coronary heart disease with plasma cholesterol level 5.5 mmol/l or higher; concomitant therapy with immunosuppressives

Contra-indications: Active liver disease; pregnancy and breast-feeding

Cautions: Same as that of fluvastatin

Interactions: See Appendix-2

Side-effcets: same as that of fluvastatin

Dose: Primary hypercholesterol-aemia, combined hyperlipidaemia, 10 mg daily at night, to be adjusted at intervals of 4 weeks; coronary heart disease, 20 mg once daily at night, to be adjusted at intervals of 4 weeks; max. 80 mg once daily

Proprietary Preparations

Novastin (*Drug Int.*) Tab., 10 mg, Tk. 10.07/Tab.
Recol (*ACI*), Tab., 10 mg, Tk. 10.07/Tab.
Simacor (*Square*), Tab., 10 mg, Tk. 10.07/Tab.
Simvatin (*Acme*), Tab., 10 mg, Tk.11.04/Tab.; 20 mg, Tk. 18.06/Tab.
Vastocor (*Incepta*), Tab., 10 mg, Tk. 12/Tab.

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3.12.4 EZETIMIBE

Ezetimibe inhibits intestinal absorption of cholesterol.

EZETIMIBE

Indications: Adjunct to dietary measures and statin treatment in primary hypercholesterolaemia and homozygous familial hypercholesterolaemia (ezetimibe alone in primary hypercholesterolaemia if statin inappropriate or not tolerated); adjunct to dietary measures in homozygous sitosterolaemia

Cautions: Hepatic impairment- avoid in moderate and severe impairment may accumulate; pregnancy manufacturer advises use only if potential benefit outweighs risk

Contraindications: The combination of Ezetimibe with statin is contraindicated in patients with active liver disease or unexplained persistent elevations in serum transaminases.

Interactions: See Appendix-2

Side-effects: Gastro-intestinal

disturbances; headache, fatigue; myalgia; rarely arthralgia, hypersensitivity reactions (including rash, angioedema, and anaphylaxis), hepatitis; very rarely pancreatitis, cholelithiasis, cholecystitis, thrombocytopenia, raised creatine kinase, myopathy, and rhabdomyolysis

Dose ADULT and CHILD over 10 years, 10 mg once daily

Proprietary Preparations

Ezeta (Beximco), Tab. 10 mg, Tk. 10.04/Tab.

Ezetrol (Unimed), Tab. 10 mg, Tk. 10.00/Tab.

Ezetim (Incepta), Tab. 10 mg, Tk. 10.00/Tab.

3.12.5 OMEGA-3 FATTY ACID COMPOUNDS

The omega-3 fatty acid compounds comprise omega-3-acid ethyl esters and omega-3-marine triglycerides. Omega-3 fatty acid compounds may be used to reduce triglycerides, as an alternative to a fibrate and in addition to a statin, in patients with combined (mixed)

hyperlipidaemia not adequately controlled with a statin alone. A triglyceride concentration exceeding 10 mmol/litre is associated with acute pancreatitis and lowering the concentration reduces this risk. The fat content of omega-3 fatty acid compounds (including excipients in the preparations) should be taken in to consideration when treating hypertriglyceridaemia. There is little clinical trial evidence that the triglyceride lowering effect decreases the risk of cardiovascular disease.

OMEGA-3-ACID ETHYL ESTERS

Indications: Adjunct to diet and statin in type IIb or III hypertriglyceridaemia; adjunct to diet in type IV hypertriglyceridaemia; adjunct in secondary prevention in those who have had a myocardial infarction in the preceding 3 months

Cautions: Haemorrhagic disorders, anticoagulant treatment (bleeding time increased); hepatic impairment and breast-feeding

Side-effects: Gastrointestinal disturbances; less commonly taste disturbances, dizziness, and hypersensitivity reactions; rarely hepatic disorders, headache, hyperglycaemia, acne, and rash; very rarely hypotension, nasal dryness, urticaria, and increased white cell count

Dose: Hypertriglyceridaemia, initially 2 capsules daily with food, increased if necessary to 4 capsules daily. Secondary prevention after myocardial infarction, 1 capsule daily with food.

Proprietary Preparations

Maxomega (UniMed), Cap., 1 gm, Tk. 10/Cap.

Omesoft (Pacific), Cap., 1 gm, Tk. 10/Cap.

OMG-3 (Drug Intl), Soft Cap., 1 gm, Tk. 6.05/Cap.

3.12.6 NICOTINIC ACID DERIVATIVES

Indications: For prevention and treatment of pellagra, hypercholesterolaemia, hypertriglyceridaemia

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Contraindications: pregnancy, breast-feeding, active peptic ulcer disease

Cautions: diabetes mellitus, gout, peptic ulcer and liver disease, acute myocardial infarction

Interactions: See Appendix-2

Side-effects: flushing, dizziness, palpitation, pruritus, nausea, vomiting.

Dose: 100-200 mg 3 times daily; it is better to take the drug with meals

Proprietary Preparations

Niapid (*Drug Int*), Tab., 500 mg, Tk. 6/Tab.

Niconic (*Pacific*), Tab., 50 mg, Tk. 2/Tab.

Ridel (*Incepta*), ER Tab., 500 mg, Tk. 8/Tab.

INOSITOL NICOTINATE (see section 3.3.4.)

3.13 DRUGS FOR THE MANAGEMENT OF PULMONARY HYPERTENSION

There is no cure for PAH, but treatment options include prostanoids, PDE-5 inhibitors, and ET-receptor antagonists.

Ambrisentan, Bosentan, Iloprost, Sildenafil, Sitaxentan, Tadalafil, and Treprostinil are indicated for the treatment of pulmonary arterial hypertension and should be used under specialist supervision.

Epoprostenol (prostanoid) can be used in patients with primary pulmonary hypertension resistant to other treatments. Phosphodiesterase-

5-inhibitors (**Sildenafil, Tadalafil**) vasodilate by acting on PDE-5 in the pulmonary and systemic vasculature. Furthermore, vascular remodeling can be promoted by decreased proliferation and increased apoptosis of pulmonary artery smooth muscle cells. RV inotropy also increases. There is also a direct action on the lungs, in which expression of PDE-5 is suppressed. Thus sildenafil also preferentially improves blood flow to well-ventilated regions of the lung in patients with lung disease such as idiopathic pulmonary fibrosis

The first oral therapy approved for therapy of PAH was **Bosentan** (endothelin receptor antagonists). Bosentan gives combined ET_A/ET_B

receptor antagonism. Selective ET_A antagonists

(**Sitaxentan; Ambrisentan**) theoretically preserve the vasodilatory action of the ET_B receptor. However, no trial data show whether selective ET_A antagonism is better than combined ET_A and ET_B antagonism. Bosentan is also licensed to reduce the number of new digital ulcers in patients with systemic sclerosis and ongoing digital ulcer disease.

AMBRISENTAN

Indication: Pulmonary arterial hypertension

Cautions: Not to be initiated in significant anaemia, monitor haemoglobin concentration or haematocrit after 1 month and 3 months of starting treatment, and periodically thereafter, hepatic and renal impairment, pregnancy and breast-feeding, renal impairment use with caution if eGFR less than 30 mL/minute/ 1.73m²;

Side-effects: Abdominal pain, constipation; palpitation, flushing, peripheral oedema, headache; anaemia; decrease haemoglobin

Dose: ADULT over 18 years, 5 mg once daily, increased if necessary to 10 mg once daily.

Proprietary preparation:

Ambrisentan (*Square*), Tab., 5 mg, Tk. 40.13/Tab.

BOSENTAN

Indications: Pulmonary arterial hypertension; systemic sclerosis with ongoing digital ulcer disease (to reduce number of new digital ulcers).

Cautions: Not to be initiated if systemic systolic blood pressure is below 85 mmHg; monitor haemoglobin before and during treatment (monthly for first 4 months, then 3-monthly), avoid abrupt withdrawal, monitor liver function before treatment, at monthly intervals during

3. CARDIOVASCULAR SYSTEM

treatment, and 2 weeks after dose increase (reduce dose or suspend treatment if liver enzymes raised significantly)-discontinue if symptoms of liver impairment, hepatic impairment-avoid in moderate and severe impairment; pregnancy avoid (teratogenic in animal studies); effective contraception required during and for at least 3 months after administration (hormonal contraception not considered effective), monthly pregnancy tests advised; breast-feeding.

Contra-indication: acute porphyria

Interactions: See Appendix -2

Side-effects: GI disturbances, dry mouth, rectal haemorrhage, flushing, hypotension, palpitation, oedema, dyspnea, dizziness, fatigue, back pain and pain in extremities, anaemia, hypersensitivity reactions, elevation of liver enzyme, decrease hemoglobin

Dose: Pulmonary arterial hypertension, initially 62.5 mg twice daily increased after 4 weeks to 125 mg twice daily; max. 250 mg twice daily. Systemic sclerosis with ongoing digital ulcer disease, initially 62.5 mg twice daily increased after 4 weeks to 125 mg twice daily

Proprietary Preparation

Pulmoten(Unimed), Tab., 62.5mg, Tk.150/Tab.

SILDENAFIL

Indications, Cautions

Side-effects: See notes above & section 6.4.4

Dose: By mouth, 20 mg 3 times daily; CHILD under 18 years not recommended.

By intravenous injection, when oral route not appropriate, 10 mg three times daily

Proprietary Preparations

See section 6.4.4

TADALAFIL

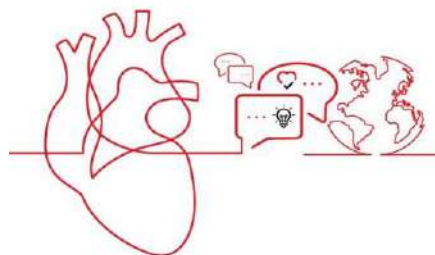
Indications, Cautions

Side-effects: See notes above & section 6.4.4

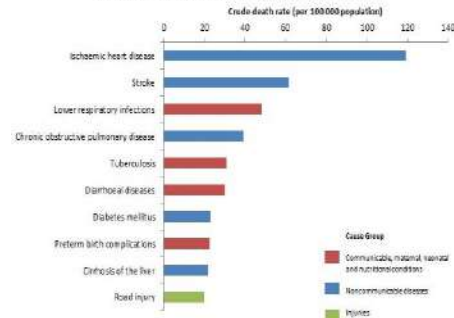
Dose: By mouth, 40 mg orally once a day. Dividing the 40 mg dose over the course of the day is not recommended.

Proprietary Preparations

See section 6.4.4



Top 10 causes of deaths
in lower-middle-income countries in 2016



Source: World Health Statistics 2018. Data by Cause, Sex, Age, Risk Factors and by Region. WHO 2018. <https://www.who.int/news-room/fact-sheets/detail/global-trends-in-causes-of-death>

Chapter 4

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4.1 BRONCHODILATOR	REGULAR TREATMENT: Short-acting beta2-adrenoceptor stimulants (such as salbutamol and terbutaline) should not be prescribed on a regular basis in patients with chronic asthma since several studies have shown that regular treatment with them provides no clinical benefit. Longer acting beta2 adrenoceptor stimulants such as Salmeterol , Formoterol (eformoterol), Indacaterol when taken regularly have shown clear benefit compared to placebo or to regular treatment with short-acting beta2 adrenoceptor stimulants.
4.1.1 SELECTIVE BETA₂ ADRENOCEPTOR STIMULANTS	
4.1.2 ANTIMUSCARINIC BRONCHODILATORS	
4.1.3 XANTHINE BRONCHODILATORS	
4.1.1 SELECTIVE BETA₂ ADRENOCEPTOR STIMULANTS	INHALATION. Administration by inhalation delivers the drug directly to the bronchi and therefore effective in smaller doses, provides relief more rapidly and causes fewer side-effects.

A short-acting selective beta2 adrenoceptor stimulant such as **Salbutamol** or **Terbutaline** (preferably given by aerosol inhalation) is the safest and a most effective treatment for mild to moderate acute symptoms of asthma. If **beta2 adrenoceptor stimulant** inhalation is needed more than once daily, prophylactic treatment should be considered. However, in more severe exacerbation a short course of an oral corticosteroid may also be necessary to bring the asthma under control. Treatment of patient with acute severe asthma or airways obstruction is safer in hospital where oxygen and resuscitation facilities are immediately available.

ORAL: Oral preparations are available for patients who cannot manage the inhaled route, particularly children. Oral preparations have a slower onset but a slightly more prolonged action than the aerosol inhalers. The longer acting preparations may be of value in nocturnal asthma as an alternative to modified-release theophylline preparation.

4. RESPIRATORY SYSTEM

PARENTERAL:Intravenous injections of **Salbutamol** and **Terbutaline** are given for severe bronchospasm.

CHILD. Selective **beta2-adrenoceptor** stimulants are useful even in children under the age of 18 months. They are most effective by the inhalation route, but an inhalation device may be needed. They may also be administered as tablets or oral liquids although administration by inhalation is preferred. In severe attacks nebulization using a selective beta2-adrenoceptor stimulant or ipratropium is advisable.

PREGNANCY AND LACTATION. See general notes under Asthma.

BAMBUTEROL HYDROCHLORIDE

Indications: See under *Salbutamol*

Cautions: Renal impairment hepatic impairment (avoid if severe), pregnancy

Interactions: See *Appendix-2*

Side-effects: See under *salbutamol*

Dose: 20mg once daily at bedtime if patient has previously tolerated beta2 agonist, other patient, initially 10mg once daily at bedtime, increased if necessary after 1-2 weeks to 20mg once daily; **CHILD** not recommended

Proprietary Preparations

Aerodyl (*Silva*), Tab., 10mg, Tk. 1.51/Tab.; Syrup, 5mg/ml, Tk. 20.0697/60ml

Bambelor (*Incepta*), Syrup, 5mg/ml, Tk. 25.00/60ml.; Tab, 10 mg, Tk. 1.50/Tab.; 20 mg, Tk. 3.00/Tab.

Buterol (*ACI*), Syrup, 5 mg/5 ml,Tk. 35.24/100 ml; Tab., 10mg, Tk. 1.51/Tab.

Dilator (*Eskayef*), Syrup, 5 mg/5 ml, Tk. 30.00/60 ml ;Tab, 10 mg, Tk. 3.00/Tab.; 20mg, Tk. 4.00/Tab.

Muterol (*Acme*), Syrup , 5mg/ml, Tk. 20.13/60ml, Tab. , 10.00 mg, Tk. 1.51/Tab. ; 20mg, Tk. 3.01/Tab.

Venterol (*Ibn Sina*), Tab. ,10 mg, Tk. 1.50/Tab.;Tab. , 20 mg,Tk.3.01/Tab.,Syrup, 5 mg/5 ml, Tk. 35.14/60 ml

FORMOTEROL FUMARATE

(Eformoterol Fumarate)

Formoterol (or **eformoterol**) is a longer-acting beta-2-adrenoceptor stimulant which is administered by inhalation on a

once or twice-daily basis. It is not indicated for the relief of an acute attack.

Indications: Reversible airways obstructions including nocturnal asthma and prevention of exercise-induced bronchospasm in patients requiring long-term regular bronchodilator

Cautions: See under *Salbutamol* and notes above

Interactions: See *Appendix-2*

Side-effects: See under *Salbutamol* significant incidence of paradoxical bronchospasm may be clinically important in severe or deteriorating asthma

Dose: By inhalation of powder, 6-12 micrograms (1-2 times daily); **CHILD** under 12 years, not recommended

Proprietary preparations

Efo Cozycap (*Square*), Inhaler, Cap., 12 microgram (for use with a inhaler device) Tk. 3.33/Cap

SALBUTAMOL^{[ED][OTC]}

Indications: Asthma and other conditions associated with reversible airways obstruction; premature labour

Cautions: Hyperthyroidism, myocardial insufficiency, and susceptibility to QT-interval prolongation, hypertension, pregnancy and breast-feeding, diabetes -especially intravenous administration to diabetics

Interactions: See *Appendix-2*

Side-effects: Fine tremor headache, peripheral vasodilatation, tachycardia, sleep and behavioral disturbances in children; urticaria

Dose: By mouth, 4 mg (elderly and sensitive patients initially 2 mg) 3-4 times daily; max. single dose 8 mg (but unlikely to provide extra benefit or to be tolerated); **CHILD** under 2 years 100 micrograms/kg 4 times daily; 2-6 years 1-2 mg 3-4 times daily, 6-12 years 2 mg By aerosol inhalation, 100-200 micrograms (1-2 puffs), for persistence symptoms up to 3-4 times daily; **CHILD:** 100 micrograms, increased to 200 micrograms if necessary; for persistent symptoms up to 3-4 times daily; **CHILD:** 100 micrograms, increased to 200

4. RESPIRATORY SYSTEM

micrograms if necessary. Prophylaxis in exercise-induced bronchospasm, 200 micrograms, CHILD 100 micrograms
By inhalation of powder, 200-400 micrograms; for persistent symptoms up to 3-4 times daily; CHILD: 200 micrograms. Prophylaxis in exercise induced bronchospasm 400 micrograms; CHILD 200 micrograms
By inhalation of a nebulised solution, chronic bronchospasm unresponsive to conventional therapy and severe acute asthma, ADULT and CHILD over 18 months 2.5 mg, repeated up to 4 times daily; may be increased to 5 mg if necessary, but medical assessment should be considered since alternative therapy may be indicated; CHILD under 18 months, clinical efficacy uncertain consider supplemental oxygen.

Proprietary Preparations

Actolin (*Globe*), Syrup, 2 mg/5 ml, Tk. 23.00/100ml; Tab, 4 mg, Tk. 0.40/Tab.
Alvolex (*Silva*), Syrup, 2 mg/5 ml, Tk. 16.0664/100ml
Asmalin (*Aristo*), Inhaler, 100 microgram/Puff, Tk. 195.00/ can; Syrup, 2 mg/5 ml, Tk. 22.92/100 ml
Asul (*Asiatic*), Syrup, 2 mg/5ml, Tk. 22.92/100ml; Tab, 4 mg, Tk. 0.34/Tab.
Azmasol (*Beximco*), Inhaler, 100 microgram/puff, Tk. 230.00/200 doses; Tk. 198.00/200 doses (Refil Pack) , Tk. 170.00/200 doses; Resp., Solun., 5 mg/ml, Tk. 120.00/20 ml ;Tab. , 2 mg, Tk. 0.26/Tab. ; 4 mg, Tk. 0.40/Tab. ,Cap., (for use with a inhaler device), 200 microgram/cap., Tk. 2.50/ Cap.
Brodil (*ACI*), Resp., Solun., 5 mg/ml, Tk. 120.36/20 ml ;2.5 mg/2.5 ml Tk. TK. 15.05/2.5ml; Syrup, 2 mg/5 ml Tk. 23/100ml, Tk. 14.53/60ml., Tab., 2 mg , Tk. 0.26/Tab.; 4mg., Tk. 0.46/Tab., SR.Cap., 8mg, Tk. 2.42/ Cap Inhaler, Cap., (for use with a inhaler device) 200 microgram./cap, Tk. 2.51/ Cap. Inhaler, HFA 100 microgram/puff , Tk. 230.02/200 puffs (with device); Tk. 198.00/200 puffs (without device); Tk. 161.08/200puffs
Broncotrol (*Pacific*), Syrup, 2mg/5 ml, Tk. 22.93/100ml; Tab., 4mg, Tk. 0.45/Tab.
Decabutamol (*Decent*), Syrup, 2mg/5ml., Tk. 21.83/100ml
Dilatol (*Kemiko*), Syrup, 2 mg/5 ml, Tk. 22.84/100 ml
G-salbutamol (*Gonoshasthaya*), Syrup, 2mg/5 ml, Tk. 20.00 /100ml; Tab., 4 mg , Tk. 0.46 /Tab.; Resp. Solun, 5mg/ml, Tk. 80/20ml

H-selax (*Hudson*), Syrup, 2mg/5 ml, Tk. 23.00/100ml; Tk. 14.52/60ml; Tab., 4 mg, Tk. 0.34/Tab.;
Orsal (*Orion*), Syrup 2mg/5ml, Tk. 22.92/100ml
Pulmocare (*Healthcare*), Inhaler, 100 microgram/puff, Tk. 230.00/200puff; Tk. 198.00/200 puffs (refill pack), Cap. 200 microgram /cap., Tk. 3.00/ Cap; Cap., 200mcg, Tk. 330.00/ Cap., (With device)
Pulmolin (*Opsonin*), Tab., 4 mg, Tk. 0.46/Tab.; Syrup, 2 mg/5 ml , Tk. Tk. 22.93/ 100 ml; Tk. 10.45/60 ml; Resp., Solun., 5 mg/ml, Tk. 120.37/20ml;
Respolin (*Jayson*), Syrup, 2 mg/5 ml , Tk. 22.99/100ml; Tab. , 4mg , Tk. 0.45/Tab.
Salbu (*Biopharma*), Tab., 2mg, Tk. 0.26/Tab., 4mg, Tk. 0.34/Tab., Syrup, 2 mg/5 ml., Tk. 22.93/100ml
Salbut (*General*), Tab., 4 mg, Tk. 0.34/Tab.; Syrup, 2 mg/5 ml, Tk. 22.90/100 ml
Salbutal (*Sanofi*), Syrup, 2mg/5ml, Tk. 22.96/100ml, Tab, 4mg, Tk. 0.46/Tab., 2mg, Tk. 0.26/Tab.
Salbutamol (*Albion*), Syrup, 2 mg/5 ml, Tk. 17.00/100 ml; 2 mg, Tk. 0.26/Tab.; 4 mg, Tk. 0.34/Tab.
Salbutamol (*Amico*), Syrup, 2 mg/5 ml, Tk. 21.75/100 ml ;
Salbutamol (*Popular*), Tab., 4mg, Tk. 0.40/Tab.
Salix (*Modern*), Syrup, 2 mg/5 ml., Tk. 14.47/60ml, Tk. 22.90/100ml
Salmol (*Medimet*), Syrup, 100ml, Tk. 23.00/100ml; Tk. 13.80/60ml; Tab., 4mg, Tk. 0.45/Tab.
Salmolin (*Acme*), Inhaler, 100 microgram/puff, Tk. 195.59/200puffs; Tk. 181.23/200puffs, Tk. 170.51/200puff, Cap., (for use with a inhaler device) 200 microgram/ Cap., Tk. 2.50/ Cap.
Salomax (*Eskayef*), Inhaler, 100 mcg/puff, Tk. 160.00/200 Puff; , Tk. 170.51/200puff; Tk. 195.59/200 puff; Tab, 4mg, Tk. 0.46/Tab.
Sultolin (*Square*), Inhaler, cap., (for use with a inhaler device) 200 microgram/ Cap, Tk. 2.51/ Cap., Resp., Solun., 5 mg/ml, Tk. 120.82/20ml.; Syrup, 2 mg/5 ml, Tk. 23/100ml; Tab., 8 mg, Tk. 0.92/Tab. Inhaler 100 microgram/puff, Tk. 195.59/200puffs ,Tk. 170.51/200 puffs (Refill Pack)
Venol (*G.A.Co*), Syrup, 8 mg/5ml, Tk. 10.78/60 ml
Ventil (*Drug Intl*), Inhaler, 100microgram/puff, Tk. 190.00/200 puffs
Ventisal (*Ibn Sina*), Syrup, 2 mg/5 ml, Tk. 22.92/100 ml; Tab. , 4 mg, Tk. 0.34/Tab.
Ventol (*Central*), Syrup, 2 mg/5 ml, Tk. 15.00/100 ml ;Tk. 10.50/60 ml
Ventolin (*GSK*), Tab. , 4 mg, Tk. 0.46/Tab., Resp. Solun., 5 mg/ml, Tk. 173.42/20ml; 2.5 mg/2.5 ml, Tk. 23.92/ 2.5ml

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Ventolin Evohaler(GSK), Inhalation, 100 mcg/ Puff, Tk. 230.69/200 doses
Windel (*Incepta*), Inhaler ,Cap.,(for use with a inhaler device)200 microgram/Cap.; Tk. 2.50/Cap. Nebuliser Solun, 2.5 mg/2.5 ml, Tk. 14.00/2.5ml; 5 mg/ml, Tk. 120.00/20 ml; Syrup, 2 mg/5 ml, Tk. 22.90/100 ml; Tab. , 2 mg, Tk.0.26/Tab.; Tab. , 4 mg, Tk. 0.34/Tab
Zentolin (*Zenith*), Syrup, 2 mg / 5 ml, Tk. 16.00/100ml; Tk. 10.00/60ml

SALMETEROL

Indications: Reversible airways obstructions including nocturnal asthma and prevention of exercise-induced bronchospasm in patients requiring long-regular bronchodilator *See notes above*

Cautions: *See under Salbutamol and above note*

Interactions: *See Appendix-2*

Side-effects: *See under Salbutamol*; significant incidence of paradoxical bronchospasm may be clinically important in severe or deteriorating asthma

Dose: ADULT & CHILD over 4 years, *by inhalation*, 50 micrograms (2 puffs) twice daily; CHILD under 4 years not recommended

Note: Salmeterol is not for immediate relief of acute attacks and existing corticosteroid therapy should not be reduced or withdrawn

Proprietary Preparations

Axinat (*Acme*), Inhaler, 25 mcg/puf, Tk. 191.29/200 Puff

Seravent (*Drug Intl*), Inhaler, 25mcg/puff, Tk. 200.00/200 Puff

TERBUTALINE SULPHATE

Indications: *See under Salbutamol*

Cautions: *See under Salbutamol*

Interactions: *See Appendix-2*

Side-effects: *See under Salbutamol*

Dose: *By mouth*, initially 2.5 mg 3 times daily for 1-2 weeks, then up to 5 mg 3 times daily; CHILD 75 micrograms/kg 3 times daily; 7-15 years 2.5 mg 2-3 times daily

By subcutaneous, intramuscular or intravenous injection, 250–500 micrograms up to 4 times daily. CHILD 2–15

years 10 micrograms/kg to a max. of 300 micro-grams

By aerosol inhalation, ADULT and CHILD, 250-500 micrograms (1-2 puffs); for persistent symptoms up to 3-4 times daily

Proprietary Preparations

Samisil (*Supreme*), Syrup, 1.5mg/5ml, Tk. 20.00/100ml; Tab. , 2.50 mg, Tk. 0.50/Tab.

Tervent (*UniMed*), Syrup, 1.5mg/5ml , Tk. 25.00/100ml; Tab , 2.5mg , Tk. 0.50/Tab.

4.1.2 ANTIMUSCARINIC BRONCHODILATORS

IPRATROPIUM BROMIDE

Indications: Relative airways obstruction, particularly in chronic cases.

Cautions: Glaucoma, prostatic hypertrophy, pregnancy

Side-effects: Dry mouth, urine retention, constipation

Dose: *By aerosol inhaler*, 20-40 micrograms in early treatment up to 80 micrograms at a time, 3-4 times daily.

By inhalation of nebulized solution, 100-500 micrograms up to 4 times daily.

Proprietary Preparations

G-Ipra (*Gonoshasthaya*), Resp. Solu., 250 microgram/ml, Tk. 60.00/20 ml

Ipramid (*Beximco*), Resp.Solun, 250microgram/ml., Tk.130.00/20 ml

Ipratop (*Incepta*), Nebuliser Solun 250 microgram/ml., Tk. 130.00/20ml

Iprex (*Square*), Aerosol Inhaler 20 mcg/puff, Tk. 250.75/200puff.; Resp. Solun., 250 microgram/ml., Tk. 130.88/20ml

Rinase (*ACI*), Resp.Solun, 250 microgram/ml., Tk. 130.39/20ml ,Tk. 14.04/2ml,;

Ipratropium Bromide + Salbutamol

Combair (*ACI*), Inhaler, 20 microgram + 100microgram/puff, TK. 230.69/200puff (refill pack), TK. 250.75/200puff .; Resp. Solun, 0.5mg +2.5mg/ml, TK. 226.38/20ml , 0.02gm +0.10gm/100ml, TK. 15.05/20 ml

Combiver (*Healthcare*), Inhaler 20 microgram + 100microgram/Puff Tk. 270.00/200puff

Ipralin (*Aristo*), Inhaler, 20 microgram + 100microgram /puff, Tk. 250.00/200 Puff

Iprasol (*Beximco*), Inhaler,20 microgram + 100microgram, Tk. 250.00/200 Puff, Tk. 230.00/200 Puff (Refil Pack); Resp. Solutn, 0.5mg +2.5mg/ml, Tk. 225.00/20ml

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Salpium (*Acme*), Resp., Solutn, 0.5 mg + 2.5 mg/2.5 ml, Tk. 15.00/2.5ml, Inhaler , 20 microgram + 100microgram, /puff, Tk. 250.76/200puff, Tk. 231.55/puff Tk. 230.69/200 puff,
Ventil (*Drug Intl*), Inhaler, 20 microgram + 100microgram /puff, Tk. 250.00/200 Puff

4.1.3 XANTHINE BRONCHODILATOR

AMINOPHYLLINE^[ED]

Indications: Treatment of severe acute attacks of bronchial asthma that do not respond to a nebulized beta2 adrenoceptor stimulant

Cautions: See under Theophylline

Interactions: See Appendix-2

Side-effects: See under Theophylline

Dose: By mouth, initially 100-300 mg twice daily for one week, then 200-600 mg twice daily; CHILD over 3 years, initially 6 mg/kg twice daily, may be increased after a week to 12 mg/kg

By slow intravenous injection over at least 20 minutes, 250-500 mg usually given in 5% dextrose in aqua or normal saline

Proprietary Preparations

Aminophylline (*Ambee*) , Tab., 100 mg, Tk. 4.75/Tab; Inj., 125mg/ 5ml, Tk. 5.46/5 ml

Filin (*Opsonin*), Tab., 100 mg, Tk. 0.39/Tab.;

Inj., 125 mg /5 ml, Tk. 5.45/5ml

Minomal (*Pacific*), Tab., 175 mg, Tk.

1.23/Tab.; 350 mg, Tk. 2.20/Tab.; 600 mg, Tk. 3.59/Tab.

THEOPHYLLINE

Theophylline modified-release preparations are usually able to produce adequate plasma concentrations for up to 12 hours. When given as a single dose at night they have a useful role in controlling nocturnal asthma and early morning wheezing.

Indications: Theophylline is a bronchodilator used for reversible airways obstruction. It may have an additive effect when used in conjunction with small doses of beta 2 adrenoceptor stimulants , severe asthma

Cautions: Hypertension, hyperthyroidism, peptic ulcer, hepatic impairment, epilepsy, pregnancy and breast-feeding, elderly, fever,

Interactions: See Appendix-2

Side-effects: Tachycardia, palpitation, nausea, headache, insomnia, arrhythmia, hypokalaemia and convulsions especially if given by intravenous injection

Dose: 125 mg 3-4 times daily after food, increased up to 250 mg if required; CHILD, 7-12 years 62.5 mg 3-4 times daily

Proprietary Preparations

Arofil (*Incepta*), SR Tab., 400 mg, Tk.

2.98/Tab., 200 mg, Tk. 1.60/Tab., 400mg, Tk.

2.35/Tab.

Asmacon (*Pacific*), SR Tab., 400 mg, Tk.

2.67/Tab.

Asmaloc (*Sharif*), Syrup, 120mg /5ml, Tk.

30.00/100ml; SR Tab, 400 mg, Tk. 2.98/Tab.,

SR, Tab., 300 mg, Tk. 2.35/Tab.

Breathlin (*Beximco*), Tab., 200mg, Tk.

1.60/Tab.

Contifil (*Square*), SR Tab. , 400 mg, Tk.

2.99/Tab.

Contine (*Aristo*), CR Tab. , 200mg , Tk.

1.60/Tab., CR., 300mg, Tk. 2.35/Tab.; CR.,

400mg, Tk. 2.98/3gm Syrup, 120mg/5ml, Tk.

30.95/50ml

G-theophylline (*Gonoshasthaya*), Syrup, 120

mg/5 ml, Tk. 15.00 /50ml; Tab., 300 mg, Tk.

1.20 /Tab.

Jasophyllin (*Jayson*), Syrup, 120mg/5ml, Tk.

25.17/100ml

Neulyn (*Orion*), SR Tab., 400mg, Tk.

2.52/Tab.

OD Phylline (*Sun*), SR Tab., 400 mg, Tk.

2.67/Tab.

Teolex (*ACI*), CR Cap., 300mg, Tk.

3.52/Cap., Cap., 400mg , Tk. 4.25/Cap.,

Tab., SR 200mg, Tk. 1.50/Tab., SR 300mg,

Tk. 2.01/Tab., SR 400mg, Tk. 2.68/Tab.,

Syrup, 120 mg/5ml, Tk. 31.04/100ml

Thenglate (*Acme*), SR Tab., 250 mg, Tk.

1.76/Tab.; SR Tab., 400 mg, Tk. 2.68/Tab.;

Syrup, 120mg/5ml, Tk. 30.95/100 ml

Theofast (*Globe*), Syrup, 120mg/5 ml, Tk.

30.95/100 ml

Theovent (*Drug Intl*), SR Tab., 400mg, Tk.

2.70/Tab., SR 200mg, Tk. 1.60/Tab., SR

300mg, Tk. 2.05/Tab.

Unikon (*Ibn Sina*), SR Tab., 400mg, Tk.

2.98/Tab.

Unilin (*Opsonin*), CR Tab., 200 mg , Tk.

1.60/Tab., CR 300 mg , Tk. 2.35/Tab., CR 400

mg, Tk. 2.99/Tab., Syrup, 120 mg/5 ml, Tk.

15.30/ 50 ml ; Tk. 30.95/ 100 ml

4.2 CORTICOSTEROIDS

Corticosteroids are very effective in asthma. They reduce airways inflammation (and thus reduce oedema and secretion of mucus into the airway). **INHALATION.** Inhaled corticosteroids are recommended for prophylactic treatment of asthma when patients are using a beta 2-adrenoceptor more than once daily. Corticosteroid inhalation must be used regularly to obtain maximum benefit; alleviation of symptoms usually occurs 3 to 7 days after initiation. **Beclomethasone Dipropionate, Budesonide and Fluticasone propionate** appear to be equally effective.

AEROSOL INHALATION. Corticosteroids are preferably inhaled from aerosol inhalers using large-volume spacer devices, particularly if high doses are required. **Budesonide** is also available as a suspension for nebulization. **Corticosteroids** May also be taken orally or parenterally. Inhaled corticosteroids have considerably fewer systemic side-effects than oral corticosteroids.

ORAL. Acute attacks of asthma should be treated with short course of oral corticosteroids starting with high dose, e.g. prednisolone 30–60 mg daily for a few days, gradually reducing once the attack has been controlled.

PARENTERAL. Hydrocortisone injection is used in the emergency treatment of acute severe asthma (see Table 4B).

BECLOMETHASONE DIPROPIONATE

(Beclometasone Dipropionate)

Indications: Treatment of airway inflammation in chronic asthma

Cautions: Active or quiescent tuberculosis, systemic therapy may be required during periods of stress or when airways are obstructed or mucus prevent drug access to smaller airways

Side-effects: Hoarseness and candidiasis of mouth or throat; rarely hypersensitivity reactions including rash and angioedema

Dose: By aerosol inhalation, standard dose inhalers, 200 micrograms twice daily or 100 micrograms 3-4 times daily; CHILD 50-100 micrograms 2–4 times daily

By aerosol inhalation, high dose inhalers 500 micrograms twice daily or 250 micrograms 4 times daily; if necessary may be increased 500 micrograms 4 times daily

Proprietary Preparations

Ascon (Acme), Inhaler, 100microgram/puff, Tk. 270.81/200puff.; 250microgram/puff, Tk. 320.96/200puff

Azbec (Eskayef) Inhaler, 100 microgram/puff, Tk. 270.00/200puff.; 250microgram/puff, Tk. 320.00/200puff

Beclocort (Aristo), Inhale, 100 microgram/Puff Tk. 270.00/200puff

Beclomin (Square), Inhaler, 100 microgram/puff, Tk. 270.82/200 Puffs; 250 microgram/puff, Tk. 320.96/200 Puffs

Becovent (Drug Intl), Inhaler, 100microgram/puff, Tk. 250.00/200dose

Decomit (Beximco), Inhaler, 100 microgram/puff, Tk. 270.00/200 puffs; 50 microgram/puff, Tk. 220.00/200 puffs

Steradin (ACI), Inhaler, 100microgram/puff, Tk. 271.84/200 Puffs; 250microgram/puff Tk. 352.38/200 Puffs

BUDESONIDE

Indications: Chronic asthma not controlled by short acting beta2-stimulants

Cautions: Active or quiescent tuberculosis, systemic therapy may be required during periods of distress or when airways obstruction or mucus prevent drug access to smaller airways

Side-effects: Hoarseness and candidiasis of mouth or throat

Dose: By aerosol inhalation, standard dose inhalers, 200-400 micrograms twice daily, in severe asthma dose may be increased to 800 micrograms twice daily; CHILD, 50-200 micrograms twice daily, in severe cases may be increased to 400 micrograms twice daily

By inhalation of powder, 200-800 micrograms daily, in severe asthma may be up to 1600 micrograms daily in divided doses; CHILD, 200-800

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micrograms daily in divided doses in severe asthma

Proprietary Preparations

Aeronid (*Beximco*), Inhaler, 200 microgram/Puff, Tk. 410.00/120 MD
Budicort (*Incepta*), Nebuliser Susp., 0.5mg/2ml Amp, Tk. 40.00/2ml Amp

Formoterol fumarate + Budesonide

Budemet (*Incepta*), Inhaler, Cap., 6 microgram+100 microgram, Tk. 7.00/Cap.; 6 microgram+200 microgram, Tk. 9.00/Cap.; 12 microgram+400 microgram Tk. 14.00/Cap.
Budison (*Aristo*), Inhaler, 4.5 microgram + 80 microgram, Tk. 400.00/60puff.; 4.5 microgram + 160 microgram, Tk. 500.00/60puff.
Bufocort (*Square*), Inhaler, Cap. 12 microgram + 400 microgram, Tk. 14.05/Cap.; 6 microgram + 200 microgram, Tk. 9.03/Cap.
Symbion (*Beximco*), Inhaler, Cap., 6 microgram + 0.1 mg, Tk. 9.00/Cap. Cap., 6 microgram + 0.2 mg, Tk. 12.00/Cap.
Oxycort (*ACI*), Inhaler, 4.5 microgram + 80microgram/ puff, Tk. 601.80/ 120puff, 4.5microgram+ 160microgram/puff, Tk. 802.41/120puff ;
(Inhaler,Cap are use with a device)

CICLESONIDE

Indications: Asthma and allergic rhinitis
Side effects: Headache, burning or irritation in the nose, painful white patches in nose or throat, flu-like symptoms, rash, itching, hoarseness

Contraindications: Allergy to ciclesonide aerosol; recent open sore in nose, nasal surgery, or a nasal injury and it has not healed yet.

Dose: By aerosol inhalation, 160 micrograms daily as a single dose reduced to 80 micrograms daily if control maintained; dose may be increased to max. 320 micrograms twice daily.

Proprietary Preparations

Cesonide (*Beximco*), Inhaler, 160 mcg/puff, Tk. 375.00/120 dose
Ezonide (*Square*), Inhaler, 80 mcg/puff, Tk. 275.00/120 Puffs ;160 mcg/puff, Tk. 375.00/120 Puffs

FLUTICASONE PROPIONATE

Indication: Chronic asthma not controlled by short-acting beta2-stimulants

Cautions: See Beclomethasone

Side-effects: See Beclomethasone

Dose: By inhalation, ADULT & CHILD over 16 years, 100 to 250 micrograms twice daily, increased according to severity of asthma to up to 1 mg twice daily. CHILD 4-16 years, 50-100 micrograms twice daily adjusted as necessary

Proprietary Preparation

Flomyst (*Beximco*), Resp. Suspn., 2mg/2ml, Tk. 70.00/2 ml.; 0.5mg/2ml, Tk. 40.00/2 ml
Fluticon (*Acme*), Inhaler. Cap., 0.25 mg., Tk. 8.07/Cap. ; 0.50 mg., Tk. 13.09/Cap.
Lutisone (*Incepta*), Nebuliser, Solun 2mg/2ml, Tk. 100.00/2 ml; 0.5mg/2ml, Tk. 45.00/2 ml

4.3 COMBINED THERAPY

SALMETEROL plus FLUTICASONE

Indication: Chronic asthma not controlled by long acting beta2-agonist or corticosteroid individually

Cautions: See Fluticasone & Salmeterol

Side-effects: See Fluticasone and Salmeterol

Dose: Product is available in different fixed combinations of salmeterol and fluticasone propionate to meet individual requirements as CFC Free aerosol inhaler (*Evohaler*) and Dry Powder for inhalation (*Accuhaler*)

ADULT & CHILD over 12 years, 1 aerosol inhalation (*Accuhaler*) or 2 dry powder inhalations (*Evohaler*) twice daily as per severity of asthma

Proprietary Preparations

Aroflo (*Aristo*), Inhaler, 25 microgram + 250microgram/Puff, Tk. 795.00/120puff, Tk. 430.00/200puff, 25 microgram +125microgram/Puff, Tk. 595.00/Can
Arotide (*Eskayef*), Inhaler, 25 microgram + 250 microgram/puff, Tk. 795.00/ 120dose; 25 microgram + 125 microgram/puff, Tk. 595.00/120dose
Bexitrol (*Beximco*), Inhaler, 25 microgram + 125 microgram/puff, Tk. 595.00/120 doses ; 25 microgram + 250 microgram/puff, Tk. 750.00/120doses; Tk. 430.00/60doses, 25 microgram + 50 microgram/puff, Tk. 520.00/120doses
Inhaler, Cap., 50microgram +100microgram

Tk. 6.50/Cap. 50 microgram., + 250 microgram
 Tk. 12.00/Cap + 50 microgram +
 500microgram,Tk.17.00/Cap.;

Flumetol(Healthcare), Inhaler,Cap., 50
 microgram +100 microgram , Tk. 6.00/Cap.;

Tk.420.00/Cap.(Cap+device)
 50microgram+250microgram, Cap Tk.
 10.67/Cap .,Tk.560.00/Cap. (Cap+device);
 Inhaler, 25 microgram +125 microgram
 Tk.640.00/120Puffs.; 25 microgram +250 mg,
 Tk. 850.00/Puffs

Flutisal (Incepta),Inhaler, Cap., (for use with a
 inhaler device) 50 microgram + 100
 microgramTk. 5.00/Cap. ; 50 microgram + 250
 microgram, Tk. 12.00/Cap. ; 50 microgram +
 500 microgram, Tk.15.00/Cap.

Salfu (Acme), Inhaler ,Cap., (for use with a
 inhaler device), 50 microgram + 250
 microgram, Tk. 10.50/Cap.; 50 microgram +
 100 microgram, Tk. Tk. 6.50/Cap.; .; 50
 microgram + 500 microgram, Tk. 16.00/Cap.;

Inhaler,
 25microgram + 125 microgram/puff, Tk.
 596.79/can; 25 microgram + 250
 microgram/puff, Tk. 797.39/120dose
 25 microgram + 50 microgram/puff, Tk.
 521.57/can

Seretide Accuhaler[®](GSK), Inhaler, disk 50
 microgram +100 microgram, Tk. 1086.51/60
 doses.; 50 microgram +250 microgram, Tk.
 1136.00/60 doses 50 microgram + 500
 microgram, Tk. 1,240.50/60 doses

Seretide Evohaler[®](GSK), Inhaler, 25
 microgram + 125 microgram, 1357.00/120
 doses;

Ticamet (Square), Inhaler 25 microgram +
 250 microgram/ puff, Tk.;

797.39/120puff 25 microgram + 125
 microgrampuff, Tk. 596.79/120puff; Cap.,(for
 use with a inhaler device) 50 microgram + 100
 microgram, Tk. 6.52/Cap.; 50microgram + 250
 microgram, Tk. 12.03/Cap.

Protide(UniMed), Inhaler,Cap., 50microgram+
 100 microgram, Tk. 6.50/Cap,50
 microgram+250 microgram, Tk. 12.00/Cap;
 50microgram+500microgram, Tk. 17.00/Cap.;

Inhaler,25 microgram, +125 microgram, Tk.
 595.00/120puffs.
 25 microgram+ 250 microgram, Tk.
 795.00/120puffs

Seraflo(Drug Intl), Inhaler, 25microgram+ 125
 microgram Tk. 575.00/120 Puff.; 25
 microgram + 250 microgram, Tk.
 780.00/120puff

Seroxyn (ACI), Inhaler, 25microgram + 250
 microgram/Puff , Tk. Tk.755.09/120puffs
 Tk.700.00/120puffs (Refill Pack); 25
 microgram + 125 microgram/Puff, Tk.
 596.79/120 puffs , Tk. 578.91/120puffs,
 Tk.500/10puff (Refill Pack); 25 microgram + 50
 microgram/Puff , Tk. 528.56/120puffs
 Tk.520.00/120Puffs (Refil Pack);Inhaler ,

Cap.,(for use with a device), 50 microgram +
 500 microgram, Tk. 15.05/Cap., 50 microgram
 + 250microgram , Tk. Tk. 9.23/Cap.; 50
 microgram + 100microgram , Tk. 4.86/Cap.

4. RESPIRATORY SYSTEM

4.4 CROMOGLYCATES , RELATED THERAPY AND LEUKOTRIENE RECEPTOR ANTAGONISTS

4.4.1 CROMOGLYCATES

4.4.2 RELATED THERAPY

4.4.3 LEUKOTRIEN RECEPTOR ANTAGONISTS

4.4.4 Phosphodiesterase type-4 inhibitors

4.4.1 CROMOGLYCATES

SODIUM CROMOGLYCATE

Indications: Prophylaxis of asthma; food
 allergy; allergic conjunctivitis; allergic
 rhinitis

Side-effects: Coughing, transient
 bronchospasm, and throat irritation due
 to inhalation of powder

Dose: *By aerosol inhalation*, ADULT
 and CHILD, 10 mg (2 puffs) 4 times
 daily, increased in severe cases or
 during periods of risk to 6–8 times daily;
 additional dose may also be taken
 before exercise; maintenance 5 mg (1
 puff) 4 times daily

By inhalation of nebulised solution,
 ADULT & CHILD 20 mg 4 times daily,
 increased in severe cases up to 6 times
 daily

Note: Sodium cromoglycate is of value in
 the prevention of exercise-induced
 asthma, a single dose being inhaled half-
 an-hour before. It is not effective in acute
 asthma

Proprietary Preparations

(For ENT preparation See section 11.2)

NEDOCROMIL SODIUM

Indication: Prophylaxis of asthma

Side-effects: See under sodium
 cromoglycate; also nausea, vomiting,
 dyspepsia, headache, abdominal pain,
 bitter taste

4. RESPIRATORY SYSTEM

Dose: By aerosol inhaler, ADULT and CHILD over 6 years, 4 mg (2 puffs) 4 times daily; when control achieved, may reduce to twice daily

Generic Preparation

Aerosol inhalation, 2mg/metered dose

4.4.2 RELATED THERAPY

Antihistamines are of no value in the treatment of bronchial asthma. **Ketotifen** is an antihistamine with an action said to resemble that of Sodium cromoglycate, but it has not proved encouraging.

KETOTIFEN

Indications: See notes above

Cautions: Previous anti-asthmatic treatment should be continued for a minimum of 2 weeks after initiation of ketotifen treatment; pregnancy and lactation

Side-effects: Drowsiness, dry mouth, slight dizziness; CNS stimulation

Interactions: See Appendix-2

Dose: ADULT: 1 mg twice daily with food increased if necessary to 2 mg twice daily; initial treatment in readily sedated patients 0.5-1 mg at night; CHILD over 2 years 1 mg twice daily

Proprietary Preparations

Aerofen (Silva), Syrup, 1 mg/5 ml, Tk. 45.00/100ml, Tab., 1 mg, Tk. 1.51/Tab.

Airnaaf (Naafco), Syrup, 1 mg/5 ml, Tk. 50.00/100ml

Alafen (Supreme), Syrup, 1 mg/5 ml, Tk. 40.00/100ml; Tab., 1 mg, Tk. 1.50/Tab.

Alarid (Square), Syrup, 1 mg/5 ml, Tk. 55/100ml; Tab., 1 mg, Tk. 2.50/Tab.

Allerkit (Monico), Syrup, 1 mg/5 ml, Tk. 40.00/100ml

Asfen (Virgo), Syrup, 1 mg/5 ml, Tk. 45.00/100ml

Asmafen (Globe), Syrup, 1 mg/5 ml, Tk. 50.00/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Broket (Orion), Syrup, 1 mg/5 ml, Tk. 45.00/100ml; Tab., 1 mg, Tk. 1.52/Tab.

Fenat (Drug Intl), Tab., 1 mg, Tk. 2.05/Tab.; Syrup, 1 mg/5 ml, Tk. 45.00/100ml, Tk. 75.00/200ml;

Kefton (Zenith), Syrup, 1 mg/5 ml, Tk. 40.00/100ml; Tab., 1 mg, Tk. 1.15/Tab.

Ketifen (Acme), Syrup, 1 mg/5 ml, Tk. 50.00/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Ketocure (Benham), Syrup, 1 mg/5 ml, Tk. 50.00/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Ketof (Ibn Sina), Syrup, 1 mg/5 ml, Tk. 55.00/100ml; Tab., 1 mg, Tk. 250.00/Tab.

Ketomar (Incepta), Syrup, 1 mg/5 ml, Tk. 50.00/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Ketopac (Pacific), Syrup, 1 mg/5 ml, Tk. 40.00/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Ketorif (Biopharma), Syrup, 1 mg/5 ml, Tk. 52.00/100ml; Tab., 1 mg, Tk. 2.25/Tab.

Kofen (Opsonin), Tab., 1 mg, Tk. 2.00/Tab.; Syrup, 1 mg/5 ml, Tk. 45.13/100 ml

Ktin (Kemiko), Syrup, 1 mg/5 ml, Tk. 50.14/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Minia (Novo Health), Syrup, 1 mg/5 ml, Tk. 45.00/100ml

Orotifen (General), Syrup, 1 mg/5 ml, Tk. 40.12/100ml; Tab., 1 mg, Tk. 1.51/Tab.

Prosuma (ACI), Syrup, 1 mg/5 ml, 55.00/100ml; Tab., 1 mg, Tk. 2.50/Tab.

S-Kit (Sharif), Syrup, 1 mg/5 ml, Tk. 45.13/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Stafen (Aristo), Syrup, 1 mg/5 ml, Tk. 55.00/50ml, 100ml, 200ml; Tab., 1 mg, Tk. 2.50/Tab.

Tifen (Somatec), Tab., 1 mg, Tk. 2.00/Tab.; Syrup, 1 mg/5 ml, Tk. 45.00/100ml

Tofen (Beximco), Syrup, 1 mg/5 ml, Tk. 55.00/100ml; Tab., 1 mg, Tk. 2.50/Tab.

Toma (Navana), Syrup, 1 mg/5 ml, Tk. 30.00/50ml; Tk. 50.00/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Toti (Eskayef), Syrup, 1 mg/5 ml, Tk. 55.00/100ml; Tab., 1 mg, Tk. 2.50/Tab.

Totifen (Renata), Syrup, 1 mg/5 ml, Tk. 45.00/100ml; Tab., 1 mg, Tk. 2.00/Tab.

Zadifen (UniMed), Tab., 1 mg, Tk. 1.50/Tab.; Syrup, 1 mg/5 ml, Tk. 35.00/100ml

Zadit (Popular), Tab., 1 mg, Tk. 1.51/Tab.; Syrup, 1 mg/5 ml, Tk. 40.15/100ml

4.4.3 LEUKOTRIENE RECEPTOR ANTAGONISTS

MONTELUKAST

Indication: Prevention of asthma or anti inflammatory

Cautions: Pregnancy and lactation

Side-effects: Gastrointestinal disturbances, dry mouth, dizziness, irritability, restlessness,

Dose: ADULT 10 mg daily at bedtime. CHILD 2-5 years 4 mg daily at bedtime, 6-14 years 5 mg daily at bedtime

Proprietary Preparations

Aeron (Healthcare), Tab., 5mg, Tk. 8.00/Tab.; 4mg, Tk. 6.00/Tab.; 10mg, Tk. 15.00/Tab.

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- Aeron FT** (*Healthcare*), Tab., 4 mg, Tk. 6/Tab.; 5 mg, Tk. 8/Tab.; 10 mg, Tk. 15/Tab.
- Airway** (*One Pharma*), Tab., 10 mg, Tk. 15.00/Tab.; 5 mg, Tk. 7.95/Tab.
- Amekast** (*Beacon*), Tab., 10mg, Tk. 15.05/Tab.; 4mg, Tk. 6.02/Tab.; 5mg, Tk. 8.02/Tab.
- Amikast** (*Amico*), Tab., 10mg, TK. 15.00/Tab.; 5mg, TK. 8.00/Tab.
- Arokast** (*Navana*), Chewable Tab., 4 mg, Tk. 7.00/Tab.; Tab., 10 mg, Tk. 15.00/Tab.; 4 mg, Tk. 6.00/Tab.; 5 mg, Tk. 8.00/Tab.
- Arovent** (*Orion*), Tab., 10 mg, Tk. 15.04/Tab.; 5 mg, Tk. 8.02/Tab.
- Asmatab** (*Veritas*), Tab., Tk. 10/Tab.
- Asmont** (*Somatec*), Tab., 4 mg, Tk. 6.00/Tab.; 5 mg, Tk. 7.00/Tab.; 10 mg, Tk. 12.00/Tab.
- Brocast** (*Concord*), Tab., 10 mg, Tk. 15/Tab.
- Croma** (*Sharif*), Tab., 4 mg, Tk. 6.01/Tab.; 5 mg, Tk. 8.03/Tab.; 10 mg, Tk. 12.03/Tab.
- Ezair** (*Novo*), Tab., 10 mg, Tk. 15.00/Tab.
- Ezevent** (*SMC Enterprise*), Tab., 10 mg, Tk. 10.00/Tab.
- Flomont** (*Nipa*), Tab., 10 mg, Tk. 12.00/Tab.
- Freegest** (*Biopharma*), Tab., 10mg, Tk. 15.00/Tab.; 4mg, Tk. 6.00/Tab.; 5mg, Tk. 8.00/Tab.
- Liam** (*Asiatic*), Tab., 5mg, Tk. 8.00/Tab.; 10mg, Tk. 12.50/Tab.
- Lumenta** (*Novartis*), Tab, 10 mg, Tk. 16/Tab.; Tab., 5 mg, Tk. 9/Tab.
- Lumona** (*Eskayef*), Powder, 4mg, Tk. 8.00/Sachet.; 2mg, Tk. 6.00/Sachet.; Tab, 10mg, Tk. 12.00/Tab.; Tab, 4 mg, Tk. 5.99/Tab.; 5mg, Tk. 7.00/Tab.; 10mg, Tk. 10.00/Tab.
- Maxair** (*Julphar*), Tab., 10 mg, Tk. 15/Tab.; Tab., 5 mg, Tk. 8/Tab.
- Medikast** (*Leon*), Tab., 10 mg, Tk. 15/Tab.
- Metok** (*MST*), Tab., 10 mg, TK. 13.00/Tab.
- M-Kast** (*Drug Intl*), Tab., 10mg, Tk. 13/Tab., 4mg, Tk. 5.05/Tab., 5mg, Tk. 7.05/Tab.
- M-Lucas** (*Popular*), Tab., 5 mg, Tk. 8.00/Tab.; 4 mg, Tk. 6.00/Tab.; 10mg, Tk. 15.00/Tab.
- Mokast** (*Alco*), Tab., 10 mg, Tk. 10.03/Tab.; 4 mg, Tk. 6.02/Tab.
- Molukat** (*Kemiko*), Tab., 10 mg, Tk. 12.04/Tab.; 5 mg, Tk. 8.00/Tab.; 4 mg, Tk. 6.02/Tab.
- Mon** (*Benham*), Tab., 10 mg, Tk. 15.00/Tab.; 5 mg, Tk. 8.00/Tab.
- Monalast** (*Ziska*), Tab., 10 mg, Tk. 15.00/Tab.; 5 mg, Tk. 8.00/Tab.
- Monas** (*Acme*), Tab., 4 mg, Tk. 6.04/Tab.; 10 mg, Tk. 15.05/Tab.; 5 mg, Tk. 8.07/Tab.
- Monkast** (*Pharmasia*), Tab., 10 mg, Tk. 14.50/Tab.; 5 mg, Tk. 7.50/Tab.
- Monkon** (*Albion*), Tab., 4 mg, Tk. 7.00/Tab.
- Monocast** (*Beximco*), Powder, 4mg, Tk. 8.00/Sachet.; Tab., 10mg, Tk. 15.00/Tab.; 4mg, Tk. 6.00/Tab.; 5mg, Tk. 8.00/Tab.
- Monovas** (*White Horse*), Tab., 10 mg, Tk. 12/Tab.
- Monprox** (*Rangs*), Tab., 10 mg, Tk. 15/Tab.; 5 mg, Tk. 7.50/Tab.;
- Montair** (*Incepta*), Tab., 10 mg, Tk. 15/Tab.; 4mg, Tk. 6/Tab.; 5 mg, Tk. 8/Tab.
- Montek** (*Sun*), Tab., 10 mg, Tk. 15/Tab.; 4 mg, Tk. 6/Tab.
- Montekast** (*Pacific*), Tab., 10 mg, Tk. 15.00/Tab.; 5 mg, Tk. 7.00/Tab.
- Montela** (*Delta*), Tab., 10 mg, Tk. 10.00/Tab.; Tab., 5 mg, Tk. 6.00/Tab.
- Montelon** (*Apex*), Tab., 10 mg, Tk. 15.00/Tab.
- Monteluk** (*Astra Bio*), Tab., 10 mg, Tk. 15.00/Tab.; 5 mg, Tk. 8.00/Tab.
- Montemax** (*Doctor TIMS*), Tab., 10 mg, Tk. 16.00/Tab.; 5 mg, Tk. 8.00/Tab.
- Montenaaf** (*Naafco*), Tab., 10 mg, Tk. 14.00/Tab.
- Montene** (*Square*), Chewable Tab., 4 mg, Tk. 6.02/Tab.; 10 mg, Tk. 15.05/Tab.; 5 mg, Tk. 8.03/Tab.
- Montex** (*Ibn Sina*), Tab., 10mg, Tk. 16.00/Tab.; 5mg, Tk. 8.00/Tab.;
- Montica** (*Euro*), Tab., 4 mg, Tk. 6.00/Tab.; 10 mg, Tk. 14.00/Tab.; 4 mg, Tk. 8.00/Tab.
- Monti Fast** (*Globe*), Tab., 10 mg, Tk. 15.00/Tab.; 4 mg, Tk. 7.00/Tab.; 5 mg, Tk. 7.50/Tab.
- Montilab** (*Labaid*), Tab., 10 mg, Tk. 15/Tab.
- Montilet** (*Amulet*), Tab., 10 mg, Tk. 15/Tab.
- Montiluk** (*Rephco*), Tab., 10 mg, Tk. 15/Tab.; 4 mg, Tk. 6/Tab.
- Montiva** (*NIPRO JMI*), Tab., 10 mg, Tk. 15.00/Tab.; 4 mg, Tk. 6.00/Tab.; 5 mg, Tk. 8.00/Tab.
- Montril** (*Aristo*), Tab., 10mg, Tk. 15.00/Tab.; 5mg, Tk. 8.00/Tab.; 4mg, Tk. 7.00/Tab.
- Nozma** (*Organic*), Tab., 10 mg, Tk. 10.00/Tab.
- Odmon** (*Renata*), Tab., 10 mg, Tk. 15/Tab.; Tab., 10 mg, Tk. 15/Tab.; 5 mg, Tk. 8/Tab.
- Provair** (*UniMed*), Powder, 4mg, Tk. 8.00/Sachet.; Tab., 5mg, Tk. 8.00/Tab.; 10mg, Tk. 15.00/Tab.; 4mg, Tk. 6.00/Tab.
- Pulmont** (*Nuvista*), Tab., 5 mg, Tk. 8.00/Tab.; 10 mg, Tk. 15.05/Tab.
- Recast** (*Monico*), Tab., 10mg, Tk. 15.00/Tab.; 4mg, Tk. 6.00/Tab.; 5mg, Tk. 8.00/Tab.
- Reversair** (*ACI*), Tab., 10 mg, Tk. 15.06/Tab.; 4 mg, Tk. 7.03/Tab.; 5 mg, Tk. 8.03/Tab.
- SB-Monec** (*Sunman-Bardem*), Tab. 10 mg, Tk. 15.00/Tab.
- Tab., 5 mg, Tk. 7.50/Tab.
- Tekast** (*Team*), Tab., 5 mg, Tk. 7.00/Tab.; 10 mg, Tk. 14.00/Tab.
- Telukast** (*General*), Tab., 4mg, Tk. 5.52/Tab.; 10mg, Tk. 5.00/Tab.; 5mg, Tk. 7.56/Tab.

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Trilock (*Opsonin*), Powder, 4 mg, Tk. 8.06/Sachet.; 10 mg, Tk. 15.10/Tab.; 4 mg, Tk. 6.04/Tab., Tab., 5 mg, Tk. 8.03/Tab.
Xyflo (*Radiant*), Tab., 5mg, Tk. 10.00/Tab.; 10mg, Tk. 16.00/Tab

4.4.4 Phosphodiesterase type-4 inhibitors

ROFLUMILAST

Indication: As an adjunct to bronchodilators for the maintenance treatment of patients with severe chronic obstructive pulmonary disease associated with chronic bronchitis and a history of frequent exacerbations.

Cautions: Should not be used for the treatment of a sudden attack of breathlessness; weight should be monitored regularly; should be given with caution in patients with severe immunological diseases severe acute infectious diseases cancer, severe impairment of the heart function; hepatic impairment; Pregnancy and Breast-feeding

Side-effects: Weight decrease, decreased appetite, sleeplessness, headache, diarrhoea, nausea, stomach ache

Dose: ADULT over 18 years, 500micrograms once daily

Proprietary Preparations

Adair (*ACI*), Tab., 500microgram, Tk. 15/Tab.

Dilarof (*UniMed*), Tab, microgram Tk. 20.00/Tab.

Lumast (*Square*), Tab., 500 microgram, Tk. 15.05/Tab.

Milast (*Acme*), Tab., 500 microgram, Tk. 15.04/Tab.

Roflast (*Beacon*), Tab., 500 microgram, Tk. 15.05/Tab.

Roflu (*Eskayef*), Tab, 500 microgram, Tk. 15.00/Tab.

Rofumil (*Drug Intl*), Tab., 500 microgram, Tk. 10.05/Tab.

Roxair (*Incepta*), Tab., 500 microgram, Tk. 15.00/Tab.

4.5 PEAK FLOW METERS, AND NEBULISER

PEAK FLOW METERS

It is particularly helpful to measure the peak flow for patients who are 'poor perceivers' and hence slow to detect deterioration in their asthma, and for those with moderate or severe asthma. Patients must be given clear guidelines as to the action they should take if their peak flow falls below a certain level.

NEBULISERS

A nebuliser is a converter of a solution of a drug into an aerosol for inhalation to deliver higher doses of drugs to the airways than is usual with standard inhalers. The main purpose for use of nebuliser are:

□ To deliver **beta-adrenoreceptor** stimulant or **Ipratropium** to a patient with an acute exacerbation of asthma.

□ To deliver the drugs on regular basis to a patient with severe asthma.

The proportion of a nebuliser solution that reaches the lungs depends on the type of nebuliser. It can be as high as 30%, it is more frequently close to 10% and sometimes below 10%.

JET NEBULISERS. Most jet nebulisers require an optimum gas flow 6-8 litre/minute and in hospital can be driven by piped air or oxygen.

NEBULISER DILUENT. Nebulisation may be carried out using an undiluted nebuliser solution or it may require dilution beforehand. The usual diluent is sterile sodium chloride 0.9%.

4.6 OXYGEN THERAPY IN ASTHMA AND COPD

Oxygen should be regarded as a drug. It is prescribed for hypoxaemic patients to increase alveolar oxygen tension and decrease the work of breathing necessary to maintain a given arterial oxygen tension.

HIGH CONCENTRATION OXYGEN THERAPY. In acute severe asthma, the arterial carbon dioxide (pCO₂) is usually sub normal, but as asthma deteriorates it may rise steeply, particularly in children. These patients require high concentration of oxygen, and 35% to

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50% oxygen delivered through a conventional mask is recommended. If arterial carbon dioxide (pCO₂) remains high despite other treatment, intermittent positive pressure ventilation may be needed urgently. Acute asthma with long history of chronic bronchitis and probable respiratory failure may require a lower concentration (24% to 28%) oxygen to limit oxygen induced reduction of respiratory drive.

LOW CONCENTRATION OXYGEN THERAPY. Controlled low concentration oxygen therapy is reserved for patients with ventilatory failure due to chronic obstructive pulmonary diseases (COPD) or other causes. In such cases, the oxygen concentration should not exceed 28% and in some patients a concentration above 24% may be excessive. The aim is to provide the patient with just enough oxygen to improve hypoxaemia without worsening pre-existing carbon dioxide retention and respiratory acidosis. Treatment should be initial in hospital as repeated.

INTERMITTENT OXYGEN THERAPY. Oxygen is occasionally prescribed for episodes of hypoxaemia of short duration, for example in asthma and in chronic COPD to ease discomfort of breathing. It is important, however, that the patient does not rely on oxygen instead of obtaining medical help or taking more specific treatment. Oxygen is supplied through refillable cylinders. Oxygen flow can be controlled with attached oxygen flow meter (2-4 l/min).

PORTABLE OXYGEN CYLINDERS. Bangladesh Oxygen Company (BOC) supplies portable oxygen cylinders which have bull-nose fittings as normal domiciliary headsets. The cylinder holds about 300 litres of oxygen which last approximately 2 hours at a standard flow rate of two litres/minute.

4.7 PULMONARY SURFACTANTS

BERACTANT

Indications: (specialist use only); Treatment of respiratory distress syndrome in preterm neonates over

700g; prophylaxis of respiratory distress syndrome in preterm neonates less than 32 weeks post-menstrual age

Cautions: Consult product literature

Side-effects: Pulmonary surfactants have been associated with intracranial haemorrhage. Bradycardia, pulmonary haemorrhage, hyperoxia and obstruction of the endotracheal tube by mucous secretions have also been reported.

Dose: Consult Physician and product literature

Proprietary Preparations

Survanta ⁽¹⁾ (AbbVie) A Suspension, beractant providing phospholipid 25mg/ml, with lipids and proteins, Tk.33000/8ml vial; 27500/4ml vial

4.8 COUGH PREPARATIONS

The use of cough suppressants containing codeine or similar opioid cough suppressants is not generally recommended in children and should be avoided altogether in those under 1 year of age.

AMBROXOL HYDROCHLORIDE

Indications : Acute & chronic diseases of respiratory tracts associated with viscid mucus including acute and chronic bronchitis; Asthmatic bronchitis; Bronchiectasis,

Cautions: It should be given cautiously to patients with gastric or duodenal ulceration, hepatic and renal impairment

Contraindications: Contraindicated in known hypersensitivity to ambroxol or bromhexine

Interactions: See Appendix -2

Side-effects: Epigastria pain, gastric fullness may occur occasionally

Dose: 10 years & ADULT 10ml (2 teaspoonful) 3 times a day; 5-10 yrs. CHILD 5ml (1 teaspoonful) 2-3 times a day

Proprietary Preparations

Acorex (Apex), Syrup, 15mg/5ml, Tk.40/100 ml
Acticol (GSK), Syrup 15 mg/5 ml, Tk. 35.19/100 ml

Adebrox (Supreme), Syrup, 15 mg / 5 ml., Tk. 40.00/100ml

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Ambix (*Modern*), Syrup, 15 mg / 5 ml., Tk. 40.00/100ml
Ambolin (*Virgo*), Paed. drops, 6mg/ml Tk. 40.00/15ml.; Syrup, 15 mg / 5 ml.,Tk. 40.00/100ml
Ambolyt (*Incepta*), Paed. drops, 6mg/ml, Tk. 30.00/15ml.; Syrup, 15mg/5ml, Tk. 40.00/100ml, Tk. 75.00/200ml
Ambosil (*Silva*), Syrup, 15mg/5ml, Tk. 40.00/100ml
Amboten (*Eskayef*), Syrup, 15mg/5ml, Tk. 45.00/100ml; Paed. drops, 6mg/ml, Tk. 35.00/15ml
Ambosin (*Rephco*), Syrup, 15mg/5ml, Tk. 40/100 ml; SRCap. 75 mg, Tk. 5/Cap.
Ambonaaf (*Naafco*), Syrup, 15mg/5ml ml, Tk. 40.00/100ml
Ambrotil (*Orion*), Syrup, 15 mg/ 5 ml Tk. 40.12/100ml.; Paed. drops, 6 mg / ml, Tk. 25.05/15ml
Ambrosol (*Popular*), Syrup, 15 mg/ 5 ml, Tk. 40.00/100ml
Ambrotil (*Amico*), Syrup, 15mg/5ml, Tk. 40.00/100ml
Ambroton (*Organic*), Syrup, 15 mg/5ml, Tk. 40.13/100ml
Ambrox (*Square*), Syrup, 15 mg/5 ml, Tk. 45/100ml.; Paed. drops, 6 mg/ml, Tk. 35/15ml.; SR Cap., 75 mg, Tk. 5.50/Cap.
Ambroxol (*Albion*), Paed. drops, 6mg/ml, 20.07/15ml; Syrup, 15mg/5ml, Tk. 30.00/100ml
Ambroxol (*Biopharma*), Syrup, 15mg/5ml., Tk. 40/100 ml; SR Cap. 75 mg, Tk. 5.00/Cap.
Ambryl (*Julphar*), Syrup, 15mg/5ml, Tk. 40/100 ml; Paed. drops, 6 mg/ ml, 30.00/15ml
Amsiv (*Delta*), Syrup, 15mg/5ml, Tk. 40.00/100 ml
Aroxol (*Healthcare*), Paed. drops, 6 mg/ ml., Tk. 35.00/15 ml; Syrup 15mg/5ml, Tk. 45.00/100 ml
Axsol (*Nipa*), Syrup 15mg/5ml, Tk. 40.00/100ml
Boxol (*Opsonin*), Syrup, 15mg/5ml, , Tk. 40.13/100 ml.; Paed. drops, 6mg/ml., Tk. 30.10/ 15 ml.; SR.Cap., 75 mg, Tk. 5.01/Cap.
Broculyt (*NIPRO JMI*), Syrup, 15mg/5ml, Tk. 40.12/15mg
Brox (*Navana*) , Paed Drops, 6 mg/ ml, Tk. 30.10/15ml, Syrup, 15 mg/ 5 ml, Tk. 40.13/100ml
Broxidil (*Ziska*), Syrup, 15 mg/5 ml, Tk. 40.00/100ml
Broxolin (*Jayson*), Syrup, 15 mg/5 ml, 1 Tk. 40.12/100ml
Broxolit (*Pacific*), Syrup, 15mg/5ml, Tk. 40.00/100ml.; Paed. drops, 6mg/ml, Tk. 19.00/15ml
Dilyt (*Novo Health*), Syrup, 15mg/5ml , Tk. 40.00/100ml
Emulyt (*Alco*), Syrup, 15mg/5ml Tk. 45.14/100ml

Femex (*Globe*), Syrup, 15 mg /5 ml, Tk. 40.00/100 ml
Hybrox (*Kemiko*), syrup, 15 mg / 5 ml, Tk. 40.12/100ml.; Paed. drops, 6 mg / ml, Tk. 30.09/15ml
Leucofil (*Leon*), Syrup, 15mg/5ml, Tk. 40.00/100 ml
Lytex (*Ibn Sina*), Syrup, 15mg/5ml, Tk. 50.00/100ml.; SR Cap., 75mg, Tk. 165.00/Cap.; Paed.drop, 6 mg/ml, Tk. 35.00/15ml
M Boss (*Central*), Syrup, 15mg/5ml, Tk.40.00/100 ml
Maxof (*MST*), Syrup, 15mg/5ml, Tk. 40/100 ml
Mbroxol (*Benham*), Syrup, 15 mg/5 ml, Tk. 40.00/100ml
Mucobrox (*Somatec*), Syrup, 15mg/5ml, Tk.40.00/100 ml; Paed. drops, 6 mg/ ml, Tk. 30.00/15ml
Mucosol (*Beximco*), Syrup, 15mg/5ml, Tk.40.00/100 ml; Paed. drops, 6 mg/ ml, Tk. 30.00/15ml
Mucovan (*Ad-din*), Syrup, 15mg/5ml, Tk. 30.00/100 ml
Mukofix (*Asiatic*), Syrup, 15mg/5ml, Tk. 30.00/100ml
Mutex, (*Astra Biopharma*), Syrup, 15 mg/5 ml, Tk. 40.00/100ml
Myrox (*ACI*), Syrup, 15mg/5ml, Tk. 40.12/100 ml; Paed. drops, 6 mg/ ml, Tk. 30.09/15ml; SR Cap., 75mg, Tk. 5.04/Cap.
Nexol (*Aristo*), Syrup, 15mg/5ml, Tk.40.00/100 ml; Paed. drops, 6 mg/ ml, Tk. 30.00/15ml
Onecof (*One Pharma*), Syrup, 15 mg/5 ml , Tk. 40.00/100ml
Recof (*Renata*), Syrup, 15mg/5ml, Tk.40.00/100 ml; Paed. drops, 6 mg/ ml, Tk. 30.00/15ml
Remap (*Monico*), Syrup, 15mg/5ml, Tk. 40.00/100ml
Resol (*Sharif*), Syrup, 15 mg / 5 ml, Tk. 40.12/100ml
Safoxol (*Beacon*), Syrup, 15mg/5ml, Tk. 45.14/100ml.; SRCap., 75mg , Tk. 5.02/Cap.
Winkof (*Chemist*), Syrup 15mg/5ml, Tk. 40.00/100 ml
X-Cold (*Acme*), Syrup, 15mg/5ml, Tk.40.12/100 ml; Paed. drops, 6 mg/ ml, Tk. 30.10/15ml
Xerokof (*Pharmasia*), Syrup, 15mg/5ml, Tk. 40.00/100 ml

BROMHEXINE HYDROCHLORIDE

Indications: Respiratory disorder associated with productive cough and dry eye syndromes (For local use).
Side-effects: Headache, dizziness, skin rash, gastro-intestinal discomfort

4. RESPIRATORY SYSTEM

Dose: ADULT 8-16 mg tds, CHILD more than 3 years 8mg three times daily, 1-3 years 4mg three times daily

Proprietary Preparations

A-Cold(Acme), Syrup, 4 mg/5 ml, Tk. 40.12/100ml

Brolyt (Alco), Syrup, 4 mg/5 ml, Tk. 40.12/100ml; Tab., 4 mg, Tk. 0.70/Tab.; 8 mg, Tk. 1.00/Tab.

Bromotex (Ibn Sina), Syrup, 4 mg/5 ml, Tk. 40.00/100ml

Bromoxol (Healthcare), Syrup, 4 mg/5 ml, Tk. 45.00/100 ml, 8 mg/5 ml, Tk. 65.00/100 ml

Bronchodex (Organic), Syrup, 4 mg/5 ml, Tk. 40.13/100ml

Brostin (Rephco), Syrup, 4 mg/5 ml, Tk. 40.00/100ml; Tab., 8 mg, Tk. 2.00/Tab.

Broxine(General), Syrup, 4 mg/5 ml, Tk. 30.20/100ml

Clod-B (Medimet), Tab., 4 mg, Tk.0.70/Tab.

Coflyt (Asiatic), Syrup, 4 mg/5 ml, Tk. 30.00/100 ml

Expecto (Aristo), Syrup, 4 mg/5 ml, Tk. 20.00/50ml,

Mucodil (NIPRO JMI), Syrup, 4mg/5ml, Tk. 40.12/100 ml

Mucola (Amico), Syrup, 4 mg/5 ml, Tk. 25.00/100 ml

Mucolyt (Incepta), Syrup, 4 mg/5 ml, Tk. 40.00/100ml.; 8 mg/5 ml, Tk. 75.00/200ml.;

Tab., 8 mg, Tk. 2.00/Tab.

Muconil (Ziska), Syrup, 4 mg/5 ml, Tk. 30.00/100ml

Mucospel (Square), Tab., 8 mg, Tk. 2.01/Tab.; Syrup, 4 mg/5 ml, Tk. 40.13/100ml

Mucoten (Eskayef), Syrup, 4 mg/5 ml, Tk. 40.00/100ml

Mucut (Biopharma), Syrup, 4 mg/5 ml Tk. 40.00/100ml

Mulyt (G.A.Co), Syrup, 4 mg/5 ml, Tk. 40.12/100 ml

Munil (Opsonin), Syrup, 4 mg/5 ml, Tk. 40.00/100 ml

Mute(Astra Bio), Syrup, 4 mg/5 ml, Tk. 40.00/5ml

Mytil (Albion), Syrup, 4 mg/5 ml, Tk. 30.00/100ml

Spulyt (Beximco), Syrup, 4 mg/5 ml, Tk. 40.00/100ml

Sputen (Silva), Syrup, 4 mg/5 ml, Tk. 30.1112/100ml

Topsil (Zenith), Tab., 4 mg, Tk. 0.70/Tab.; Syrup., 4 mg/5 ml, Tk. 30.00/100ml

X-pectoran (Rangs), Syrup, 4 mg/5 ml, Tk. 40.00/100 ml; Tab., 8 mg, Tk. 2.00/Tab.

CARBOCISTEINE

Indication: For respiratory tract disorders when too much mucus is made or the mucus is too sticky.

Cautions: Elderly, ulcer in stomach or gut, pregnancy and breast-feeding, Skin rashes not recommended for children

Side-effects: Anaphylactic reactions and fixed drug eruption gastrointestinal bleeding, skin rashes and allergic skin eruptions. and erythema multiforme have also been reported.

Dose: Adult: Initially, 2.25 g daily in divided doses, then 1.5 g daily in divided doses as condition improves.

Child: 2-5 year: 62.5-125 mg 4 times daily; 6-12 year 250 mg tid.

Proprietary Preparations

Carbolin (Eskayef), Syrup, 125 mg/5 ml, Tk. 30.00/100ml.; 250 mg/ 5 ml, Tk. 40.00/100ml.; Tab., 375 mg, Tk. 2.50/Tab.

Carboten DS(Amico), Syrup, 250 mg/5 ml, Tk. 40.00/100ml

Carin (Supreme), Syrup, 125 mg/5 ml, Tk. 30.00/100ml.; Cap., 375mg, Tk. 2.50/Cap.

Castin (ACI), Cap., 375mg, TK. 2.52/Cap.; Syrup, 125mg/5ml, TK. 30.20/100ml.;

250mg/5ml, TK. 40.27/100ml

Flegnil (Orion), Syrup, 125 mg/5 ml, Tk. 30.20/100ml.;

250 mg/5 ml, Tk. 40.27/100ml

Tulsi (Euro), Syrup, 125 mg/5 ml, Tk. 40.00/100ml

DEXTROMETHORPHAN ^[CD]

Indication: Unproductive cough

Cautions: Asthma, hepatic and renal impairments; history of drug abuse

Interactions: See Appendix-2

Side-effects: Nausea, dizziness, respiratory depression in sensitive patients or if given large doses

Dose: ADULTS 10-15 ml (dextromethorphen as hydrobromide) 3 times daily

Proprietary Preparations

Brofex (Square), Syrup, 10mg/5ml, Tk. 40.13/100ml

Coldflu (Amico), Syrup., 10 mg/5 ml, Tk. 23.00/100 ml

D-Cough (Opsonin), Syrup, 10mg/5ml, Tk. 35.11/ 100 ml

Delkof (Popular), Syrup, 10mg/5ml, Tk. 70.00/100ml

Dexpofen (Eskayef), Syrup, 10mg/5ml, Tk. 40.00/100ml

Dexsol (G.A.Co), Syrup, 10mg/5ml, Tk. 35.11/100 ml

Dextromethorphan (Albion), Syrup., 10 mg/5 ml, Tk. 18.75/100 ml

4. RESPIRATORY SYSTEM

Dextromethorphan (*Beximco*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml
Dixar (*ACI*), Syrup, 10mg/5ml, Tk. 40.00/100ml
Tomephen (*Incepta*), Syrup, 10mg/5ml, Tk. 40.00/100ml

4.9 ANTIHISTAMINES AND ALLERGIC EMERGENCIES

- 4.9.1 Antihistamines
- 4.9.2 Allergic emergencies

4.9.1 ANTIHISTAMINES

(See also section 12.5 and 11.2.1)

The older antihistamines such as **Diphenhydramine**, **Pheniramine** and **promethazine** are short-acting and have unwanted sedative action.

Newer antihistamines such as **Acrivastine**, **Cetirizine**, **Levocetirizine** (an iso-mer of cetirizine), **Loratadine** and **Desloratadine** are longer acting (once-daily dose); they cause less sedation and psychomotor impairment. **Fexofenadine** has been introduced recently.

NON-SEDATIVE ANTIHISTAMINES

ACRIVASTINE

Indications: Symptomatic relief of allergy such as hay fever, urticaria

Side-effects: Incidence of sedation and antimuscurinic effects low

Interactions: See Appendix-2.

Dose: 8 mg three times daily

Proprietary Preparation

Semprex ⁽ⁱ⁾ (*GSK*), Cap. 8 mg, Tk. 7.65/Cap

CETIRIZINE HYDROCHLORIDE

Indications: Symptomatic relief of allergy such as hay fever, urticaria

Cautions: Renal impairment

Interactions: See Appendix-2

Side-effects: Incidence of sedation and antimuscurinic effects low

Dose : ADULT and CHILD over 6 years, 10 mg daily or 5 mg twice daily. CHILD 2-6 years 5 mg daily or 2.5 mg twice daily

Proprietary Preparation

See section 12.5

DESLOLATADINE

Indications: Symptomatic relief of allergic rhinitis (seasonal and perineal), chronic idiopathic urticaria

Cautions: Pregnancy, lactation, elderly, renal or hepatic impairment

Contraindications: Hypersensitivity to loratadine, pregnancy, breast-feeding, elderly

Side-effects: Fatigue, dry mouth, headache;

Proprietary Preparation

See section 12.5

FEXOFENADINE HYDROCHLORIDE

Indications: Relief of symptoms associated with seasonal allergic rhinitis, uncomplicated skin manifestations of chronic idiopathic urticaria in ADULT and CHILD above 12 years

Cautions: Elderly, liver disease, renal impaired patients, pregnancy and lactation.

Interactions: See Appendix-2

Side-effects: Dyspepsia, drowsiness, dizziness, nausea, chest tightness and

Proprietary Preparations

See section 12.5

LEVOCETIRIZINE DIHYDROCHLORIDE

Indications: Symptomatic relief of allergy such as hay fever, urticaria

Cautions; Interaction & Side-effects:

See under Cetirizine Hydrochloride

Dose: ADULT and CHILD over 6 years, 5 mg daily

Proprietary Preparations

See section 12.5

LORATADINE

Indications: Symptomatic relief of allergy like hay fever and urticaria

Interactions: See Appendix-2

Side-effects: Sedation and antimuscurinic effects low

4. RESPIRATORY SYSTEM

Dose: ADULT and CHILD over 12 years, 10 mg daily; CHILD 2-12 years 5mg daily

Proprietary Preparations
See also section 12.5

MIZOLASTINE

Indications: symptomatic relief of allergy such as hay fever, urticaria

Cautions & Contra-indications: Hepatic impairment Pregnancy and Breast-feeding

Side-effects: weight gain; anxiety, asthenia; less commonly arthralgia and myalgia

Dose: ADULT and CHILD over 12 years, 10mg once daily

Proprietary Preparations

Mastel (ACI), Tab., 10mg, Tk. 6.52/Tab.
Rhinor (Opsonin), Tab., 10 mg, Tk. 5.02/Tab.

MEBHYDROLIN NAPADYSYLATE

Indications: Allergic disease or symptoms, such as urticaria pruritus of different origins, eczema, drug rash, allergic conjunctivitis, dermatitis of nutritional origin, hay fever, vasomotor rhinitis, allergic asthma

Cautions: driving or operating machinery

Contra-indications: Patient to whom Mebhydrolin has previously been proved to cause agranulocytosis and neutropenia; 1st trimester of pregnancy

Side-effects: sleepiness, drowsiness, mild gastro-intestinal disturbances

Dose: ADULT and CHILD above 12 years 50-100 mg 2-3 times daily; CHILD below 12 years 50-100 mg daily in divided doses

Proprietary Preparations

Aexidal (Albion), Tab., 50 mg, Tk. 1.50/Tab.
Bexidal (Beximco), Tab., 50mg, Tk. 3.00/Tab.
Dayhista (Medimet), Tab., 50mg, Tk. 2.00/Tab.
Mebastin (Incepta), Tab., 50 mg, Tk. 2/Tab.
Mebidal (Eskayef), Tab, 50 mg, Tk. 3/Tab.
Mebolin (Acme), Tab., 50 mg, Tk. 2.01/Tab.
Medrolin (Opsonin), Tab., 50mg, Tk. 1.51/Tab.

SEDATIVE ANTIHISTAMINES

CHLORPHENAMINE MALEATE

Indications: Symptomatic relief of allergy such as hay fever, urticaria; emergency treatment of anaphylactic reactions

Cautions: Injection may be irritant; drowsiness may affect skilled tasks such as driving

Interactions: See Appendix-2

Side-effects: Exfoliative dermatitis, tinnitus reported and injection may cause transient hypotension or CNS stimulation

Dose: *By mouth*, 4 mg every 4-6 hours, max. 24mg daily. CHILD 1-2 years, 1 mg twice daily; 2-5 years 1 mg every 4-6 hourly, max. 6 mg daily; 6-12 years 2 mg every 4-6 hours, max. 12 mg daily
By intramuscular injection, 10-20 mg, repeated if necessary up to 40 mg daily.
By intravenous injection, 10-20 mg over 1 minute.

Proprietary Preparations

Acira (ACI), Syrup, 2 mg/ 5 ml, TK. 14.09/100ml, TK. 14.94/60ml, Tab., 4mg, TK. 0.30/Tab.
Alerjess (Ad-din), Tab., 4mg, Tk. 0.20/Tab.; Syrup, 2mg/5ml, Tk. 20.00/100ml
Allermine (Renata), Syrup, 2 mg/ 5 ml, Tk. 14.14/100ml
Antista (Square), Syrup, 2 mg/ 5 ml, Tk. 21.85/100ml
Biocin (Biopharma), Syrup, 2 mg/ 5 ml, Tk. 21.78/100ml, Tab., 4mg, Tk. 0.20/Tab.
Centagan (Central), Syrup, 2 mg/5 ml, Tk. 9.50/60 ml, Tk. 12.00/100 ml
Chlorpheniramine (Popular), Tab., 4 mg, Tk. 0.20/Tab.
Clomin (Alco), Syrup, 2 mg/5 ml, Tk. 13.00/100 ml
Cloramin (Orion), Syrup, 2 mg/ 5 ml, Tk. 21.85/100ml
Cytacin (Albion), Tab., 4 mg, Tk. 0.20/Tab.
Expilin (G.A.Co), Tab., 4 mg, Tk. 0.20/Tab.; Syrup, 2 mg/5ml, Tk. 21.50/100 ml, Tk. 13.5/60 ml
G-antihistamine (Gonosasthaya), Syrup, 2 mg/5 ml, Tk. 12.00 /60ml; Tab., 4 mg, Tk. 0.25 /Tab.
Hisnul (Somatec), Syrup, 2 mg/ 5 ml, Tk. 21.85/100ml

4. RESPIRATORY SYSTEM

Histacin (Jayson), Syrup, 2mg/5ml, Tk. 14.94/60ml; Tk. 21.85/100ml; Inj., 10mg/1ml, Tk. 33.50/Amp.; Tab., 4mg, Tk. 0.29/Tab.
Histaco (Supreme), Syrup, 2 mg/ 5 ml, Tk. 11.70/60ml; Tab., 4 mg, Tk. 0.20/Tab.
Histal (Opsonin), Syrup, 2 mg /5 ml, Tk. 14.94/60 ml
Histalex (Acme), Syrup, 2 mg/5 ml, Tk. 21.78/100 ml; Tab., 4 mg, Tk. 0.3/Tab.
Histam (Maks), Syrup, 2 mg/5 ml, Tk. 11.70/60 ml ;Tk. 21.75/100 ml
Histanol (Chemist), Syrup, 2 mg/5 ml l, Tk. 13.30/100 ml; Tab., 4 mg, Tk. 0.21/Tab.
Histason (Hudson), Syrup, 2mg/5ml, Tk.18.00/100 ml; Tab., 4mg, Tk.0.22/Tab.
Histatab (Bristol), Tab., 4mg, Tk. 100.00/Tab.
Hitagen (General), Syrup, 2 mg/ 5 ml, Tk. 21.50/100ml Tk. 14.95/60ml; Tab., 4mg, Tk. 0.30/Tab.
Penamin (APC), Tab., 4 mg, Tk. 0.20/Tab.; Syrup, 2 mg/5 ml, Tk. 11.70/60 ml
Pheramin (Amico), Syrup, 2 mg/ 5 ml, Tk. 14.90/60ml; Tab., 4mg, TK. 0.10/Tab.
Piriton (GSK), Syrup, 2 mg/ 5 ml, Tk. 21.81/100ml; Tab., 4 mg, Tk. 0.27/Tab
Safamin (Benham), Syrup, 2mg/5mL, Tk. 21.50/100ml
Sedilux (Modern), Syrup, 2 mg/ 5 ml, Tk. 11.70/60ml;Tk. 21.70/100ml; Tab., 4 mg, Tk. 0.20/Tab.
Sinamin (Ibn Sina), Syrup, 2 mg/5 ml, Tk. 21.78/100 ml; Tab., 4 mg, Tk. 0.20/Tab.
Tymin (Astra Bio), Syrup, 2 mg/ 5 ml, Tk. 11.00/60ml; Tab., 4 mg, Tk. 0.20/Tab.
Winkol (Globe), Syrup, 2 mg /5 ml, Tk. 8.00/60 ml; Tk. 21.78/100 ml
Zistacin (Zenith), Syrup, 2 mg/ 5 ml, Tk. 14.00/100ml, Tk. 9.00/60ml; Tab., 4 mg, Tk. 0.28/Tab.

DIPHENHYDRAMINE HYDROCHLORIDE

Indications: See under *Chlorphenamine maleate*; also to aid relief of temporary sleep disturbance in adults

Cautions & Side-effects: See under *Chlorphenamine maleate*

Dose: ADULT 25 mg 3 times daily, 50 mg at bedtime for temporary relief of sleep disturbance; CHILD 6-12 years, 10-20 mg 2-3 times daily

Proprietary Preparations
See section 12.5

HYDROXYZINE HYDROCHLORIDE

Indications: Pruritus and other allergic conditions (chronic urticaria), atopic and contact dermatitis, anxiety (short-term)

Cautions: Pregnancy, lactation, glaucoma, difficulty in urination; caution required while driving or operating machinery

Interactions: See *Appendix-2*

Side-effects: Constipation, dry mouth drowsiness, visual disturbances, mental confusion in elderly patients

Proprietary Preparations
See section 12.5

PHENIRAMINE HYDROGEN MALEATE [ED][OTC]

Indications: Hay fever, sneezing attack, itching, running nose, conjunctivitis urticaria with pruritus, reddening and swelling of skin, eczema

Cautions: Pregnancy and lactation; drowsiness may affect skilled tasks such as driving; sedating effects enhanced by alcohol

Interactions: See *Appendix-2*

Side-effects: Occasionally drowsiness, Gastro-intestinal complaints, dry mouth, palpitations urinary retention, restlessness, confusion in high dose, agitation in small children, rise in intra-ocular pressure.

Proprietary Preparations

Aerovil (Beximco), Syrup, 15 mg/5 ml, Tk. 20.07/100 ml

Alervil (Incepta), Syrup, 15 mg/5 ml, Tk. 25.00/75ml

Amarin (Opsonin), Syrup, 15 mg/5 ml, Tk. 20.00/100 ml; Tab., 22.7 mg, Tk. 0.47/Tab., Inj., 45.5mg/2ml, Tk. 7.48/2ml Amp

Avil (Sanofi), Tab., 22.7 mg, Tk. 1.51/Tab; Tab., 22.7 mg, Tk. 1.51/Tab.; Syrup, 15 mg/5ml, Tk. 20.08/100 ml; Tk. 25.00/75 ml; Inj., 45.5 mg/2 ml, Tk. 7.53/amp.;SR Tab., 75 mg, Tk. 2.01/Tab.

Fenimex (Asiatic), Inj., 45.50mg /2ml, Tk. 7.50/2 ml Amp

Pevil (ACI), Tab., 22.7mg, Tk. 0.46/Tab.

4. RESPIRATORY SYSTEM

PROMETHAZINE HCL^[ED]

Indications:, Urticaria; emergency treatment of anaphylactic reactions

Cautions: Intramuscular injection may be painful; drowsiness may affect skilled tasks such as driving; sedating effects enhanced by alcohol

Dose: *By mouth*, 25 mg at night increased to 25 mg twice daily if necessary or 10-20 mg 2-3 times daily. CHILD, 2-5 years 5-15 mg daily in divided doses, 5-10 years 10-25 mg daily in 2 divided doses

By deep intramuscular injection, 25-50 mg, max. 100 mg; CHILD 5-10 years 6.25-12.5 mg.

By slow intravenous injection, 25-50 mg as a solution containing 2.5mg/ml in water for injection; max. 100 mg.

Proprietary Preparations

See section 12.5

4.9.2 ALLERGIC EMERGENCIES

Anaphylactic shock and conditions such as angioedema are medical emergencies that can result in cardiovascular collapse, and even death. Such conditions need immediate treatment of laryngeal oedema, bronchospasm and hypotension. Atopic individuals are susceptible. Insect bites and certain foods such as eggs, fish and some vegetables are also a risk for sensitized persons. Some therapeutic substances may cause anaphylaxis such as blood products, vaccines, hyposensitizing preparations like allergen, some antibiotic especially penicillins, iron injections, heparin, and neuromuscular blocking drugs. Anaphylaxis is more likely to occur after parenteral administration. Resuscitation facilities should always be available when injecting a drug associated with the risk of anaphylactic reactions.

First line treatment includes **Adrenaline** injection for keeping airway open and restoring blood pressure. Adrenaline should immediately be given by intramuscular injection and should be

repeated every 10 minutes until blood pressure and pulse have stabilized.

An antihistamine such as **Chlorpheniramine** is a useful adjunctive treatment given after adrenaline injection and continued for 24-48 hrs to reduce the severity and duration of symptoms and to prevent relapse. Intravenous corticosteroid such as **Dexamethasone** should be given to help to prevent later deterioration in severely affected patients.

Administration of **Oxygen** is of primary importance.

Further treatment of anaphylaxis may include **intravenous fluids**, intravenous vasopressor such as **Dopamine**, intravenous **Aminophylline** or a nebulized bronchodilator such as **Salbutamol**. If there is reversible airways obstruction, it may be necessary to give **Ephedrine**.

Adrenaline 1 in 1000 solution (1mg/ml) may be given by intramuscular or subcutaneous injection. The dose for an adult is 500 micrograms to 1 mg (0.5-1 ml); for children 6-12 years 500 micrograms (0.5ml); children 5 years 400 micrograms (0.4ml); infant 2 years 200 micrograms (0.2ml); 1 year 100 micrograms (0.1ml); and those under 1 year 50 micrograms (0.05ml). The above doses may be repeated several times if necessary at 10 minutes intervals, according to blood pressure, pulse, and respiratory function until improvement occurs (may be repeated several times).

Chlorpheniramine maleate given by slow intravenous injection (over 1 minute) in a dose of 10-20 mg is a useful adjunctive treatment after the adrenaline. It may be continued for 24 to 48 hours to prevent relapse (max. 40mg in 24 hours). It may also be given by slow subcutaneous or intramuscular injection over 1 minute

Dexamethasone Phosphate (sodium salt) 4 mg/ml may be given by slow intravenous injection or by infusion; the dose for ADULT is 0.5-20mg; CHILD 200-500 micrograms/kg. Alternately, hydro-cortisone (as sodium succinate) may be given by slow intravenous injection.

4. RESPIRATORY SYSTEM

ADRENALINE ^[ED]

Indications: Emergency treatment or acute anaphylaxis, angoedema, cardiopulmonary resuscitation

Cautions: Hyperthyroidism, diabetes mellitus, ischaemic heart disease, hypertension, elderly patients

Dose: Acute anaphylaxis, by intramuscular or subcutaneous injection of 1 in 1000 solution; See notes above and also section 3.7.3

Proprietary Preparations
See section 3.7.3

Chapter 5

ENDOCRINE SYSTEM

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5.1 THYROID HORMONES AND ANTITHYROID DRUGS

- 5.1.1 Thyroid hormones
- 5.1.2 Antithyroid drugs

5.1.1 THYROID HORMONES

Thyroid hormones are secreted from Thyroid Glands. They are thyroxine (T_4) and tri-iodothyronine (T_3). They are also produced synthetically. These include Levothyronine and Liothyronine. The principal effect of thyroid hormones is to increase the cellular metabolic rate in general and thus to increase the basal

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metabolic rate (BMR). They also exert a cardio-stimulatory effect which may be the result of direct action on the heart.

Deficiency of thyroid hormones leads to a generalized slowing down of metabolic processes. Infantile/congenital and childhood hypothyroidism affects growth and development, producing serious permanent consequences including mental retardation. Severe cases are short with very low IQ called cretinism. Myxedema in adults slows down metabolism leading to deposits of glycosaminoglycans in intercellular spaces particularly in skin and muscle; severe cases called myxedema.

Thyroid hormones are used mostly for replacement therapy in hypothyroidism; and thyroid nodule and thyroid carcinoma.

THYROXINE SODIUM ^[ED]

(Other names: Levothyroxine sodium; L-Thyroxine sodium)

Indication: Hypothyroidism

Cautions: Panhypopituitarism or predisposition to adrenal insufficiency from any cause (initiate corticosteroid therapy before starting thyroxine); elderly, cardiac ischemia, ECG evidence of myocardial infarction, diabetes insipidus. Start lower and go more slowly. Diabetes mellitus (increase dose may be needed for antidiabetic drugs including insulin)

Interactions: See Appendix-2

Initial dosage: A pre-therapy ECG is valuable as changes induced by hypothyroidism may be confused with evidence of ischaemia. Too rapid increase in dosage may increase metabolism that can cause vomiting, diarrhoea, nervousness, rapid pulse, insomnia, tremors and sometimes anginal pain; if such symptoms appear, reduce dose for 1-2 days before starting again at a lower dosage

Contraindication: Thyrotoxicosis

Side-effects: Usually at excess dosage (see *Initial dosage*), there may be anginal pain, cardiac arrhythmias, hyperactivity, mood swings, palpitations, skeletal muscle cramps, tachycardia,

diarrhoea, vomiting, tremors, restlessness, insomnia, headache, flushing, sweating and rapid weight loss

Dose: ADULTS, initially with a low dose of 25- 50 micrograms once daily orally in empty stomach and regular increment to a dose that keeps FT₄ at or near to the middle of the normal range and which also will keep TSH within normal range. Monitoring is done clinically as well as biochemically

CHILD, in congenital hypothyroidism, start with 6-8/μgm/kg/day and increase by 25 micrograms every 2-4 weeks until euthyroid or hypothyroidism symptoms appear, then reduce the dose slightly so that serum FT₄ is near upper limit of normal; in children above 1 year of age, start with 2.5 – 5 micro-grams/kg daily and then increase the dose stepwise to attain serum FT₄ at near upper limit of the normal

Proprietary Preparations

Eltroxin ^(GSK), Tab., 50 microgram, Tk. 2.56/Tab.

Euthycin ^(Incepta), Tab., 50 microgram, Tk. 1.20/Tab.

Leroxin ^(Popular), Tab., 50 microgram, Tk. 1.20/Tab.

Thynor ^(Eskayef), Tab., 50 microgram, Tk.1.50/Tab.

Thyrin ^(Square), Tab., 25 microgram, Tk.1.10/Tab.; 50 microgram, Tk.1.60/Tab.

Thyrolar ^(Acme), Tab., 25 microgram, Tk. 0.70/Tab.; 50 microgram, Tk. 1.20/Tab.

Thyrotab ^(Ibn Sina), Tab., 50 microgram, Tk. 2.00/Tab.

Thyrox ^(Renata), Tab., 50 microgram, Tk. 2.00/Tab.

Tyroid ^(ACI), Tab., 50 microgram, Tk. 1.35/Tab.

5.1.2 ANTITHYROID DRUGS

Anti-thyroid drugs are used in the treatment for hyperthyroidism with high uptake of iodine by the thyroid such as Graves' disease, multinodular toxic goiter and toxic thyroid nodule. Hyperthyroidism is defined as a clinical syndrome consisting of symptoms and signs reflecting peripheral response to excessive amount of thyroid hormone. Clinical manifestations of hyperthyroidism (thyrotoxicosis) include

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restlessness, tachycardia, weight loss, tremulousness etc. In hyperthyroidism, biochemically, there is TSH suppression along with rise of free T_3 and free T_4 levels. There are three modalities for the treatment of hyperthyroidism: Antithyroid drugs, radioablation and surgery.

Carbimazole is the most commonly used antithyroid drug. It is given in a daily dose of 15–45 mg and maintained at this dose until the patient become euthyroid, usually after 4–8 weeks; the dose is then gradually reduced to maintenance of between 5–15 mg daily; therapy is usually given for 18 months but may need longer. CHILD may be given an initial dose of 15 mg daily, and then adjusted according to response. Pruritus and rashes are common and can be treated with antihistamines without discontinuing therapy. Patients should be advised to report any sore throat immediately because of the rare but possible complication of agranulocytosis; for the same reason, routine blood counts during the course of therapy is also recommended. If side effects of **Carbimazole** are severe, propylthiouracil may be substituted with caution. **Propylthiouracil** is given in a daily dose of 100 to 300 mg and maintained on this dose until the patient become euthyroid; the dose may then be progressively reduced to a maintenance level between 50–150 mg daily. Saturation solution of potassium iodide (SSKI) Iodinated contrast and Lithium can be given.

Iodine may be given in the form of Aqueous Iodine Oral Solution (Lugol's Iodine) for 10–14 days in addition to **Carbimazole** or **Propylthiouracil** prior to partial thyroidectomy to assist control and reduce vascularity of the thyroid. Iodine should not be used for long-term treatment since its antithyroid action tends to diminish with time. Although antithyroid drugs have a short half-life they should only be given once daily because of their prolonged effect on the thyroid. Over treatment may lead to a rapid onset of hypothyroidism, and this should be avoided particularly during pregnancy since it can cause fetal goitre.

Radioablation of the thyroid gland is used in thyrotoxicosis when antithyroid drugs fail to produce desired results. Radioablation may cure hyperthyroidism due to a single hyperfunctioning nodule or control hyperthyroidism with multiple nodules. Radioactive sodium iodide solution is used for the treatment of thyrotoxicosis at all ages, particularly when medical therapy or compliance is a problem, in patient with cardiac disease, and in cases of relapse after thyroidectomy.

Propranolol (a beta-blocker) is useful for rapid relief of thyrotoxic symptoms and may be used as short term adjunct to antithyroid drugs or radioactive iodine to control severe sympathetic over-activity, such as in thyroid storm (see below). Beta-blockers are also useful in neonatal thyrotoxicosis and in supraventricular arrhythmias due to hyperthyroidism. Propranolol may be used in conjunction with iodine to prepare mild thyrotoxic patients for surgery. Laboratory thyroid function tests are not altered by beta-blockers. Use of beta blockers in mild to moderate hyperthyroidism is unnecessary.

Most cases of thyrotoxicosis do not require surgery. However, hyperfunctioning multinodular goitre requires debulking surgery if antithyroid drugs or radioablation fails to control. Patients must be informed that after surgery, follow up is needed for life long.

Thyrotoxic crisis ('thyroid storm') is a medical emergency arising out of an extreme accentuation of thyrotoxicosis. It is usually associated with toxic multinodular goitre or subtotal thyroidectomy, surgical cases inadequately prepared before the operation. Other precipitating factors are radiation thyroiditis, diabetic ketoacidosis, toxemia of pregnancy and parturition. Management of the crisis requires emergency treatment with intravenous fluids, propranolol (5mg) and hydrocortisone (100 mg every 6 hours, as sodium succinate), as well as oral iodine solution and carbimazole or propylthiouracil, which may need to be

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administered by nasogastric tube for which ICU support may be needed.

Pregnancy and breast-feeding: Radioactive iodine therapy is contraindicated during pregnancy. Propylthiouracil or carbimazole can be given, but the blocking-replacement regimen (see notes above) is not suitable. Both propylthiouracil and carbimazole cross the placenta and in high dose can cause foetal goitre and hypothyroidism; the lowest dose that control the hyperthyroid state should be used (requirements of antithyroid drugs tend to fall during pregnancy). Rarely carbimazole has been associated with 'aplasia cutis' of neonate. Carbimazole and propylthiouracil appear in the breast milk but this does not preclude breast-feeding as long as neonatal development is closely monitored and the lowest effective dose is used.

CARBIMAZOLE

Indications: Hyperthyroidism

Cautions: Large goiter, liver disorders, pregnancy, breast-feeding (see also Appendix-6)

Side-effects: Nausea, rashes, headache, pruritus, mild gastrointestinal disturbances, arthralgia; agranulocytosis; rarely alopecia, jaundice, etc

WARNING. A white blood cell count should be performed if there is any clinical evidence of infection, especially sore throat. Carbimazole should be stopped promptly if there is clinical or laboratory evidence of neutropenia.

Dose: See notes above

COUNSELING: Warn patient to report immediately if sore throat, mouth ulcers, fever, malaise, or non-specific illness develops. Recommend routine blood counts from time to time during therapy

Proprietary Preparations

Carbimazole (*Popular*), Tab. 5 mg, Tk. 3.00/Tab.

Carbizol (*Square*), Tab., 5 mg, Tk. 3.01/Tab.

Mercazole (*Renata*), Tab., 5 mg, Tk. 3.00/Tab.

IODINE AND IODIDE PREPARATION

Indications: Thyrotoxicosis

(preoperative)

Cautions: Pregnancy, children (not for long-term treatment)

Contraindications: Breast-feeding

Side-effects: Hypersensitivity reactions including headache, laryngitis, lachrymation, conjunctivitis, coryzalike symptoms, pain in the salivary glands, rashes; on prolong treatment depression, insomnia, impotence may occur; goiter in infants of mothers taking iodides

COUNSELING: warn patient to report immediately if sore throat, mouth ulcers, rashes, fever, malaise, or non-specific illness develops

Generic Preparation: Aqueous Iodine Oral solution (Lugol's Solution), iodine 5%, potassium iodide 10% in purified water, freshly boiled and cooled; total iodine 130 mg/ml

Dose: 0.1–0.3 ml, 3 times daily well diluted with milk or water

5.2 DRUGS USED IN DIABETES

5.2.1 INSULINS

5.2.1.1 SHORT ACTING INSULIN.

5.2.1.2 INTERMEDIATE AND LONG ACTING INSULIN

5.2 DRUGS USED IN DIABETES

DIABETES MELLITUS (DM)

Diabetes mellitus is defined as chronic/persistent hyperglycemia, due to deficiency of insulin secretion, or of insulin action, or both. At present time several other pathological processes are recognized in causing diabetes, especially type-2. Diabetes mellitus is classified on the basis of etiology into four types.

1. Type-1 diabetes mellitus (T1DM)
2. Type-2 diabetes mellitus (T2DM)
3. Other specific types.
4. Gestational diabetes mellitus (GDM)

Type-1 Diabetes mellitus (T1DM)

Type-1 diabetes (also previously called "insulin dependent diabetes/juvenile onset diabetes") occurs due to destruction of the insulin producing beta

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cells of the islets of Langerhans of pancreas by auto-immune mechanism. At the time of onset of diabetes, there is little or no insulin in the body. Some environmental factors trigger the autoimmune reaction in genetically susceptible individuals. This type of diabetes can affect people of any age, but usually occurs in children or young adults. The onset is often sudden and symptoms are florid.

Type-2 diabetes mellitus (T2DM)

Type-2 diabetes constitutes major portion of diabetic population. This type of diabetes occurs due to insulin resistance and relative insulin deficiency, usually develops with increasing age (previously called non-insulin dependent diabetes/maturity onset diabetes). Environmental factors like obesity and physical inactivity are known strong determinants in genetically susceptible individuals. This type of diabetes usually passes through pre-diabetic stage (Impaired Fasting Glucose-IFG and impaired Glucose Tolerance-1GT). At diagnosis a large number of cases of T2DM remain asymptomatic and often present with diabetic specific complications.

Other specific Types of diabetes:

Some specific diseases, drugs or genetic conditions/syndromes are associated with development of chronic hyperglycemia. These forms of diabetes are classified as specific types of diabetes mellitus.

Gestational diabetes mellitus (GDM)

GDM is glucose intolerance of any degree which starts or is recognized during pregnancy. Maintaining blood glucose very tightly reduces the risk to the mother and the baby.

Diabetic complications:

Uncontrolled diabetes mellitus sets in a abnormal state in metabolism in the body. Therefore all tissues/organs of the body are in threat of developing complications of diabetes. Long term complications are mediated by micro

vascular and macrovascular changes. A diabetic is at risk of development of coronary artery disease, stroke, blindness, renal failure, lower limb amputation etc. many times more than a non diabetes person. Children with uncontrolled diabetes may have problem in growth. Pregnancy in women with diabetes threatens both expectant mother and foetus. Acute metabolic derangement may lead to life threatening diabetic comas, such as diabetic ketoacidosis (DKA), hyperosmolar non-ketotic coma (HONK) etc.

Treatment of diabetes:

Goals of diabetes treatment is not only the control of high blood glucose but also disease conditions (hypertension, dyslipidemia) and modification of risk factors (obesity, physical inactivity), and screening for early detection of chronic complications. Treating to target provides effective prevention of diabetic complications. Two basic components of treatment are lifestyle modification (dietary measures and exercise) and medications. Modalities of drug treatment are expanding with time. Compliance to treatment regimen and better outcome is brightened by ensuring patient's participation in management, and can be achieved satisfactorily by providing diabetes education to the patients and their families.

ORAL GLUCOSE TOLERANCE TEST (OGTT):

The test should be done in the morning after 10-16 hours overnight fasting. The person should take at least previous 3 days unrestricted diet containing more than 150gram carbohydrates daily. A fasting blood sample is collected. Then an oral glucose load (for adult 75 g, for child 1.75 g/kg body weight up to maximum 75 g) is given in 250-300 ml of water over the course of 5 minutes. A blood sample is collected 2 hours after the test load. If glucose is not estimated immediately, the blood sample may be preserved with sodium fluoride (6 mg/ml whole blood) centrifuged and plasma frozen until estimation. Smoking, tea or

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physical stress is not allowed during the test. Values for diagnosis of diabetes mellitus and other categories of hyperglycaemia are tabled as follows:

Table 5.2 A. Diagnostic values for the oral glucose tolerance test OGTT (Glucose concentration mmol/L):

		Venous Plasma
DM	Fasting 2-hrs after glucose load	≥ 7.0 ≥ 11.1
IGT	Fasting 2-hrs after glucose load	< 6.1 and ≥ 7.8 to < 11.1
IFG	Fasting 2-hrs after glucose load	6.1 to 6.9 and < 7.8
Normal	Fasting 2-hrs after glucose load	< 6.1 and ≥ 7.8

MONITORING OF THERAPY

Monitoring of therapy is an integral part of management. Monitoring of blood glucose has generally superseded detection of urinary glucose. For adequate diabetic control the aim is to reduce fasting plasma glucose to below 5.6mmol/L and post prandial concentration below 10 mmol/L.

Measurement of total glycated or glycosylated haemoglobin (HbA_{1c}) provides a good indication for long term control of blood sugar. The ideal HbA_{1c} level is around 7%, which is often difficult to achieve without risk of hypoglycemia (Table 5.2B).

The value of self-monitoring of blood glucose in Type-2 diabetes is debatable and may be necessary for intensified insulin regimens, when tight control is required.

Table 5.2 B: Diagnostic values of HbA_{1c} for diabetes

HbA_{1c} (%)	Normal/Abnormal
4- 6.5	Normal for those without diabetes
6.5 – 7.5	Target ranges for those with

	diabetes
8.0 – 9.5	High diabetes
> 9.5	Very high diabetes

NB: Adult, uncomplicated should be $< 7.0\%$

DIABETES AND PREGNANCY

Adverse pregnancy outcomes like abortions and congenital malformations are more common in diabetics; improved management of diabetes particularly early in pregnancy lessens the incidence of such events.

Insulin is the preferred treatment in pregnancy even in Type-2 diabetes; patients on OHA should be switched to insulin. Insulin requirement may decrease in first trimester but then increases during later two, reaching about thrice pre-pregnancy requirement at term, then they decline once labour has begun and fall again after delivery. Pregnant diabetics are at risk of nocturnal hypoglycaemia due to continued foetal glucose consumption. They are prone to develop ketoacidosis, which need to be treated with urgency. Diabetes which develops during pregnancy (gestational diabetes) may simply be IGT and can be managed by diet alone or if necessary also with insulin.

DIABETES AND SURGERY

If blood glucose is not properly controlled, the outcome of surgery can be poor; there is chance of wound infection and delayed healing. Insulin is suitable for the treatment of diabetic patients during the perioperative period. There is debate, however, about the optimum route of insulin administration during surgeries. Although some clinicians advocate subcutaneous insulin administration; most of them now recommend intravenous insulin infusion. Most physicians give patients half of their normal dose of insulin as intermediate acting insulin subcutaneously on the morning before an operation, and then administer soluble insulin 16 units/litre added to the intravenous infusion of 5% dextrose containing potassium chloride 10

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mmol/litre (provided the patient is not hyperkalaemic), and the infusion is run to adjust the insulin dose. Blood-glucose concentration should be measured preoperatively and then every 2 hours.

5.2.1 INSULIN [ED]

Insulin is needed by all patients of Type-1 DM regardless of age, those with ketoacidosis, and most of those with rapid onset of symptoms or weight loss. Almost all children with diabetes require it. Type-2 DM cases where other methods fail or with frequent acute infection, tuberculosis, hepatitis, during surgery and with other complications like

nephropathy and retinopathy also need insulin. It is also indispensable in acute metabolic decompensated states in Type-2 DM (like diabetic ketoacidosis, hyperosmolar nonketotic coma, lactic acidosis, etc.). Insulin in Type-2 DM is also used as a combination therapy with OHA. The subcutaneous route is ideal in most cases. The dose of insulin is adjusted on an individual basis, by gradually increasing the dose but carefully avoiding hypoglycemic reactions. Based on the onset and duration of action, insulin preparations are of various types. **Short-acting insulins** (e.g. soluble insulin; insulin lispro)

Table 5.2 C Classification of injectable anti-diabetic agents

Class	Name	Onset of action	peak action	duration	Time with meals
A. Insulin					
1. Conventional					
Short acting	Regular	30-60 min	2-3 hr	6-8 hr	30.-60 min ac (higher the GB, more the interval)
Intermediate acting	NPH, Lente	2-4 hr	6-8 hr	12-18 hr	30.-60 min ac; or bed time
Intermediate acting	NPH, Lente	2-4hr	6-8hr	12-18hr.	30-60min ac; or bed time.
2. Analogues					
	Aspart, Lispro, Glulisine	5-15min	1-1.5hr	3-4hr	With meals (within 15 min ac/pc)
	Glargine, Detemir	2-4hr	No peak	24hr	No specific time
	degludec	0.5-1.5hr	No peak	40 hrs (half life 24 hrs)	No specific time

3. Premixed (biphasic)		
Conventional premixed	Short acting & intermediate acting in proportions of 30/70%, 50/50%, 25/75%	
Premixed analogues co formulation (Deglude 70% + Aspart 30%)	Rapid acting analogue & intermediate acting (protaminated rapid acting) analogue in proportions of 30/70%, 50/50%, 25/75%	
B. Other agents		
GLP-1 agonists	Exenatide	Type 2 DM; weight-friendly; 10microgram (in 2doses) ac within 1hr of meal; increase dose after 4 weeks (max.20microgram/day)
	Liraglutide	Type 2 DM; weight-friendly; 0.6mg daily, increase to 1.2mg after 1 week; max. dose 1.8mg.

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Amylin analogues	Pramlintide	Weight-friendly; use with insulin; immediate ac. Type 1 DM: 15microgram x 3; increase dose after 7 days (max .60 x 3) Type 2 DM: 60microgram x 3; increase dose after 7 days (max .120 x 3)

EXAMPLES OF INSULIN REGIMENS

An appropriate regimen of insulin therapy must be individualized. Usual regimens are one injection a day, two injections a day, and multiple (3to7) injections a day and insulin pump.

One injection a day: One injection of intermediate or long acting insulin is given either in morning or evening pre-meal time. It serves, as supplement/basal secretion. It may be effective in Type-2 DM as monotherapy or in combination with other oral hypoglycemic agents (OHA).

Two injections a day: This is the most commonly used regimen. It can be used in type-1 DM and type-2 DM. A short acting and an intermediate acting-insulin are mixed in proportion that is adjusted by trial and injected before breakfast and dinner. Alternatively, each injection can be either intermediate-acting insulin or biphasic insulin.

Multiple injections: As many as 3 to 7 injections per day may be needed where there is difficulty in achieving optimal control with other regimes. A dose of short-acting insulin is given before each meal, an intermediate-acting/ long acting insulin is given before bedtime and sometimes before breakfast as basal dose. This is very flexible and suitable for those who are very active and cannot comply with a rigid meal plan.

Insulin pump: Insulin pumps are available in two forms open or closed loop (Artificial Pancreas). The open loop system is composed of two parts a battery-operated pump and a computer programmed system for insulin delivery. The closed loop consists of three parts-a battery-operated pump, a computer controlled insulin delivery system and a glucose sensor giving feedback to the computer. These are portable and designed to deliver basal amount of regular insulin throughout the day as well as meal related boluses.

5.2.1.1 SHORT ACTING INSULIN

SOLUBLE INSULIN^[ED]

(Other names: Insulin Injection; Neutral Insulin)

Indications: Diabetes mellitus, diabetic ketoacidosis

Cautions: Reduce dose in renal impairment

Interactions: See Appendix-2

Side effects: Local reactions and fat hypertrophy at injection site; over dose causes hypoglycemia

Dose: By subcutaneous, intramuscular or intravenous injection or intravenous infusion, according to patient's requirement and response

Proprietary Preparations

Actrapid (Novo Nordisk), Inj., 40 IU/ml ; Tk.198.36/10mlvial

Actrapid (Novo Nordisk), Inj., 100 IU/ml Tk.422.15/10 ml vial vial; Cartridge; Tk.1855/box.

Ansulin R (Square), Inj., 100 IU/ml Tk. 422.15/10ml vial;40IU/ml Tk. 198.36/10 ml vial ;Cartridge Tk. 223.79/3 ml cartridge

Diasulin R (ACI), Inj.,100 IU/ml vial Tk.422.15/10ml;Inj.,40IU/ml Tk. 198.36/10 ml vial

Humulin-R ^(Eli Lilly), Inj. 100 IU/ml. Tk. 680.00/10 ml vial; Tk.265.00/4ml vial; Cartridge, Tk.,336.00/3ml

Insul R (Popular), Inj.40IU/ml, Tk. 195.00/10 ml vial;Inj.,100IU/ml Tk. 415.00/10 ml vial; Inj., Tk. 220.00/3 ml cartridge

Insulet R (Aristo), Inj.,vial100IU/ml Tk. 169.70/4 mlvial ;Tk. 422.00/10 ml;40IU/ml,Tk.195.00/10ml

Insuman Rapid ^(Aventis), Inj.vial 100 IU/ml. Tk. 281.7/5ml

Maxsulin R(Incepta) Inj. 100 IU/mlTk 415.00/10ml vial; 40IU/mlTK.195.00/10mlvial

INSULIN ASPART, INSULIN GLULISINE, INSULIN LISPRO

(Other name: Recombinant human insulin analogues)

Indication: Diabetes mellitus

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Cautions: See under Soluble Insulin; use in children if benefit as good as with Soluble Insulin

Side effects: See under Soluble Insulin

Interactions: See Appendix-2

Dose: By subcutaneous injection according to the patient's requirement and response

Proprietary Preparations

INSULIN ASPART

Acilog (ACI), Inj., 30% + 70%, TK. 450.00/3ml ;, 100IU/ml, TK. 450.00/ 3ml
Insulet (Aristo), Inj., 100IU/ml, Tk. 450.00/3ml; 100IU/ml, Tk. 450.00/3ml,4ml,5ml,10ml

Novo Rapid Penfill[®] (Novo Nordisk), 100 IU/ml, Inj. (Cartridge); TK.3875/pkt.

Novo Rapid FlexPen[®] (Novo Nordisk), 100 IU/ml, inj., pre-filled pen; TK.865/pen.

INSULIN GLULISINE

Apidra SoloStar[®] (Sanofi), Inj., Tk. 4,673.60/3 ml 5Pens ; Inj., Tk. 1,990.28/10 ml vial

INSULIN LISPRO

Humalog[®] (Eli Lilly), Inj.100IU/ml(P.F Pen) Tk.4,397/3ml pen

Humalog mix 50/50[®](Eli Lilly), Inj.100IU/ml(P.F Pen) Tk.4,397/3ml pen

Insul Lispro (Popular), Inj., cartridge100IU /ml Tk. 500.00/3 ml Cartridge

5.2.1.2 INTERMEDIATE AND LONG-ACTING INSULIN

BIPHASIC INSULINS^[ED]

(Other name: Biphasic Isophane Insulin)

A sterile buffered suspension of porcine insulin complexed with protamine sulphate in a solution of porcine insulin or a sterile buffered suspension of human insulin complexed with protamine sulphate in a solution of human insulin.

Indications: diabetes mellitus

Cautions; Side effects: See under soluble insulin; protamine may cause allergic reactions. *Should be dispensed under prescription only*

Dose: by subcutaneous injection, according to the patient's response

Proprietary Preparations

Humulin 70/30[®] (Eli Lilly), Inj. 100 IU/ml. Tk. 310.00/10ml vial; Tk.336.00/3ml cartridge

Insulin Mixtard 30 (Novo Nordisk), Inj. 100 IU/ml, Tk.422.15/10ml vial; 40IU/ml. Tk.198.36/10ml vial

Insulin Mixtard 30[®] (Novo Nordisk), Inj. (penfill)100 IU/ml.Tk.374.58/3ml cartridge;

Insulin Mixtard 50[®] (Novo Nordisk), Inj., (penfill)100 IU/ml.Tk.374.58/3ml cartridge

Ansulin 30/70 (Square), Inj., Cartridge 100 IU/ml Tk. 225.83/3ml cartridge; vial Tk. 422.15/10ml ;40IU/ml,Tk.198.36/10ml

Ansulin 50/50 (Square), Inj., Cartridge 100 IU/ml Tk. 225.83/3ml cartridge; vial 100IU/ml,Tk. 422.15/10 ml ;40IU/ml ,Tk. 198.36/10 ml

Diasulin 30/70 (ACI), Inj.,vial 100 IU/ml Tk. 422.15/10 ml ;Inj., 40 IU Tk. 198.36/10 ml

Diasulin 50/50 (ACI), Inj., 100 IU/ml Tk. 422.15/10 ml ; Inj.,40 IU /ml,Tk. 198.36/10 ml

Insulet 30/70 (Aristo), Inj.,vial 100 IU/ml.Tk. 169.70/4 ml ; Tk.415.00/10 ml

Insulet 50/50 (Aristo), Inj.,vial 100 IU/ml.Tk. 169.70/4 ml ;Tk. 415.00/10 ml

Insul 30/70 (Popular), Inj.,vial100IU/ml Tk. 415.00/10 ml; Tk. 210.00/5 ml;40IU Tk. 195.00/10 ml; 112.27/5 ml

Insul 50/50 (Popular), Inj., 100IU/ml Tk. 415.00/10 ml ;Inj., 40IU/mlTk. 195/10 ml

Maxsulin 30/70 (Incepta) Inj.,100IU/ml Tk. 357.73/10 ml; pen Tk.222.00/pen ; vial40IU/mlTk. 168.09/10ml

Maxsulin 50/50(Incepta) Inj.,vial100IU/ml Tk. 415.00/10ml; pen,Tk.222.00/pen

Insuman-Comb (Sanofi), Inj., Tk. 281.70/5 ml; Tk. 287.00/3 ml Cartridge

ISOPHANE INSULIN^[ED]

(Isophane Insulin-NPH):Neutral protamin Hagedorn

A sterile suspension of bovine or porcine insulin or of human insulin in the form of a complex obtained by the addition of protamine sulphate.

Indications: Diabetes mellitus (for intermediate action)

Cautions; Side effects: See under soluble insulin; protamine may cause allergic reactions

Interactions: See Appendix-2

Dose: By subcutaneous injection, according to the patient's response

Proprietary Preparations

Humulin N[®] (Eli Lilly), Inj.,100IU, Tk.680/10ml vial;Tk.310.00/4ml vial;Tk. Tk.336.00/3 ml cartridge

Insulin Insularated (NovoNordisk), Inj. 40IU/ml, Tk. 198.36/10ml vial; 100 IU/ml, Tk. 422.15/10ml vial

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Insuman basal ^(Aventis), Inj. 100 IU/ml, Tk. 259.69/10 ml

Insulatard Penfill ^(NovoNordisk) Inj. 374.58/3ml cartridge

Insul N ^(Popular), Inj., vial 100IU Tk. 415.00/10 ml ; 40 IUTk. 195.00/5 ml ; Cartridge 100IU/ml Tk. 222.00/3 ml

Ansulin N ^(Square), Inj., Cartridge 100 IU/ml Tk. 223.79/3 ml Cartridge; vial, 100 IU/ml Tk. 422.15/10 ml; 40IU Tk. 198.36/10 ml

Diasulin N ^(ACI), Inj., vial 100IU Tk. 422.15/10 ml ; 40IUTk. 198.36/10 ml

Insulet N ^(Aristo), Inj., vial, 40IU, Tk. 172.00/4ml; Tk. 195/10ml

100IUTk. 422.00/10 ml; Tk. 172.00/4 ml

Maxsulin ^(Incepta) Inj., vial 100IU Tk. 415.00/10 ml ; 40IUTk. 195.00/10 ml

INSULIN ZINC SUSPENSION

(Other names: Insulin Zinc suspension [Mixed]; I.Z.S.)

A sterile neutral suspension of bovine and/or porcine insulin or of human insulin in the form of a complex obtained by the addition of a zinc salt; may be amorphous or microcrystalline consisting of rhombohedral crystals.

Indications: diabetes mellitus (long-acting)

Cautions; Side effects: See under soluble insulin

Interactions: See Appendix-2

Dose: By subcutaneous injection, according to the patient's response

Generic Preparation

Injection, 100IU

INSULIN GLARGINE, DETEMIR

Indications: Diabetes mellitus

Cautions; Side effects: See under soluble insulin

Dose: By subcutaneous injection, ADULT and CHILD over 6 years, according to requirements

Note. Sustained 24 hour duration of action allows dosing independently of meals

Proprietary Preparations

Glargine ^(ACI), Inj., 10000IU/100ml, Tk. 600.00/ Inj.

Glargine ^(ACI), Inj., 100IU Tk. 610.34/3 ml vial

Insul Glargine ^(Popular), Inj., Cartridge, 100IU Tk. 600/3 ml

Insulet GN ^(Aristo), Inj., 100IU, Tk. 600/3 ml vial

Insulet ^(Aristo), , 100IU/ml, Tk. 600.00/Inj.

Lantus Cartridge ^(Sanofi), Inj., Cartridge, 100IU Tk. 711.20/3 ml

Lantus Optiset ^(Sanofi), Inj., 100IU Tk. 5395.75

Lantus SoloStar ^(Sanofi), Inj., 100IU Tk. 1117.54/3 ml

Lantus ^(Aventis), inj., 100IU/ml, Tk. 1,025.74/3ml cartridge

Levemir FlexPen ^(Novo Nordisk), Inj., (P.F.Pen) 100U/ml Tk. 1305/pen

Vibreanta Penset ^(Incepta), Inj., 100IU Tk. 600/Penset

Vibreanta ^(Incepta), Inj., 100 IU/ml , Tk. 600.00/3ml

INSULIN DEGLUDEC

Indications: Diabetes mellitus

Cautions; Side effects: See under soluble insulin

Dose: By subcutaneous injection, ADULT and CHILD over 6years, according to requirements

Note. Sustained 40 hour duration of action allows dosing independently of meals

Proprietary Preparation

Tresiba flex touch ^(Novo-nordisk), Inj. 100IU/ml, Tk. 2490.00/3ml pen

5.2.2 ORAL ANTIDIABETIC AGENTS

5.2.2.1 SULPHONYLUREAS

5.2.2.2 BIGUANIDES

5.2.2.3 MEGLITINIDE

5.2.2.4 THIAZOLIDINEDIONES

5.2.2.5 DIPEPTIDYL PEPTIDASE-4 (DPP-4) INHIBITORS

5.2.2.6 GLIFLOZIN

5.2.2.7 ALPHA GLUCOSIDASE INHIBITOR

A number of oral hypoglycaemic agents are used in the treatment of type 2 DM. These should be used to augment the effect of diet modification. They should not be prescribed until within three months it is seen that the patient does not respond adequately to diet control. Sulfonylureas and biguanides are the common oral antidiabetic drugs, though there are also other agents. They should

be avoided in patients with renal impairment and also in condition likely to predispose lactic acidosis, severe dehydration, infection, hepatic impairment, pregnancy and breast-feeding.

5.2.2.1 SULFONYLUREAS

The sulfonylureas act mainly by augmenting insulin secretion. They are effective only when some residual beta cell activity is present. During long-term administration they also have some extra-pancreatic effect. All may cause hypoglycemia though uncommon except with high dose; hypoglycemia may persist for several hours. There are several sulphonylureas, all being similar in effectiveness. **Chlorpropamide** has a very long duration of action but has more side effects including unpleasant flashes after alcohol consumption. Selection of an individual sulphonylurea depends on the age of the patient, renal function, or more generally on personal experience. Elderly patients are prone to develop severe hypoglycemia when taking long-acting drugs such as **Chlorpropamide** and **Glibenclamide**. They should be replaced by short acting oral hypoglycemic agents such as **Gliclazide** or **Tolbutamide**.

Cautions& Contra-indications: These drugs tend to encourage weight gain and should be prescribed after trial with appropriate diet control and exercise. They should not be used during breast-feeding. Caution is needed in elderly and those with hepatic and renal impairment because of hazards of hypoglycemia. The short-acting tolbutamide may be used in renal impairment, as may be gliclazide and gliquidone, which are metabolised and inactivated in the liver. Sulphonylureas should be avoided in porphyria. Insulin therapy should be introduced temporarily during inter-current illness (such as myocardial infarction, coma, infection, and trauma) and during surgery since control of diabetes with sulphonylureas is often inadequate in such circumstances.

Insulin therapy is also substituted during pregnancy. Sulphonylurea therapy is contraindicated in presence of ketoacidosis.

Side effects: These are generally mild and infrequent and include gastrointestinal disturbances and headache. Chlorpropamide may cause facial flushing after drinking alcohol. It may also enhance sensitivity of antidiuretic hormone and rarely cause hyponatraemia. Sensitivity reactions (usually in first 6-8 weeks of therapy) include transient rashes which rarely progress to erythema multiforme and exfoliative dermatitis, fever, and jaundice; photosensitivity has also been reported with chlorpropamide. Blood disorders are rare but include thrombocytopenia, agranulocytosis, and aplastic anemia.

GLIBENCLAMIDE^[ED]

Indications: Diabetes mellitus (Type 2 DM)

Cautions; Contraindications; Side-effects: See notes above

Interactions: See Appendix-2

Dose: Initially 5 mg daily (for elderly patients 2.5 mg, see note above), adjust according to response; maximum 15 mg daily; taken with breakfast

Proprietary Preparations

Dibenol (Square), Tab., 5mg, Tk. 0.35/Tab.

Gliden (Amico), Tab., 5mg, Tk. 0.28/Tab.

Glucon (Opsonin), Tab., 5mg, Tk. 0.34/Tab.

Dicon (Jayson), Tab., 5mg, Tk. 0.28/Tab.

Glibeno (Albion), Tab., 5mg, Tk. 0.30/Tab.

Gluconil (Acme), Tab., 5mg, Tk. 0.28/Tab.

GLICLAZIDE^[ED]

Indications: Diabetes mellitus (Type 2 DM)

Cautions; Contraindications; Side-effects: See notes above

Interactions: See Appendix-2

Dose: initially 40-80 mg daily, adjust according to response; up to 160 mg as a single dose, taken before breakfast; higher dose to be divided; maximum 320 mg daily

5. ENDOCRINE SYSTEM

Proprietary Preparations

Admira (UniMed), MR Tab, 30mg, Tk. 6.00/Tab.; 80mg, Tk. 6.00/Tab.
Claz (Astra Biopharma), Tab., 80 mg, Tk. 6.00/Tab.
Compid (Square), XRTab., 30 mg, Tk. 6.04/Tab.; 60 mg, Tk. 11.03/Tab.; 80 mg, Tk. 7.02/Tab.
Consucon (Incepta), MR Tab., 30 mg, Tk. 6.00/Tab.; 60 mg, Tk. 7.00/Tab.; 80 mg, Tk. 11.00/Tab.
Diab (Rephco), Tab., 80 mg, Tk. 6.00/Tab.
Diamicron (ACI), MR Tab., 30mg, Tk. 12.00/Tab.; 60mg, Tk. 18.50/Tab.
Diaprid (Alco), Tab., 80 mg, Tk. 6.02/Tab.
Diapro (Beximco), MR Tab., 30mg, Tk. 7.00/Tab.; 80mg, Tk. 7.00/Tab.; 60mg, Tk. 12.00/Tab.
Diatrol (Pacific), MR Tab., 30 mg, Tk. 8.00/Tab.; 60 mg, Tk. 15.00/Tab.; 80 mg, Tk. 8.00/Tab.; 80 mg, Tk. 8.00/Tab.
Diazid (Nipro JMI), Tab., 80 mg, Tk. 6.00/Tab.
Dimerol (Drug Intl), MR Tab., 30mg, Tk. 6.05/Tab.; 60mg, Tk. 10.00/Tab.; 80mg, Tk. 7.05/Tab.
Eucron (Euro), Tab., 80mg, Tk. 6.00/Tab.
G-gliclazide (Gonosasthaya), Tab. 80 mg, Tk. 4.00/Tab.
Gl (Central), Tab., 80 mg, Tk. 7.00/Tab.
Glad (Novartis), Tab., 80 mg, Tk. 7.00/Tab.
Gle (Asiatic), Tab., 80 mg, Tk. 11.00/Tab.
Gliclid (Acme), Tab., 80mg, Tk. 7.02/Tab.; MR Tab. 30 mg, Tk. 6.01/Tab.
Glicron (Renata), CR Cap., 80 mg, Tk. 7.00/Cap.; 60 mg, Tk. 7.00/Tab.
Glikazid (Eskayef), Tab, 30mg, Tk. 5.00/Tab.; 80mg, Tk. 5.00/Tab.; 80mg, Tk. 5.00/Tab.; 60mg, Tk. 10.00/Tab.
Glimicron (White Horse), Tab. 80 mg, Tk. 7.00/Tab.; MR Tab., 30 mg, Tk. 6.00/Tab.
Glirol (Albion), Tab., 80 mg, Tk. 6.00/Tab.
Glitab (Hudson), Tab., 80 mg, Tk. 4.50/Tab.
Glitz (Sharif), Tab., 80 mg, Tk. 7.02/Tab.
Glivir (Virgo), Tab., 80 mg, Tk. 5.00/Tab.
Glix (Navana), Tab., 80 mg, Tk. 8.00/Tab.
Glizid (Opsonin), Tab., 60 mg, Tk. 11.00/Tab.; 80 mg, Tk. 7.02/Tab.; 30 mg, Tk. 6.02/Tab.
Glucoact (Veritas), Tab., 80 mg, Tk. 6.00/Tab.
Glucocare (Doctor TIMS), Tab., 80 mg, Tk. 7.00/Tab.
Glucostat (Biopharma), Tab., 80mg, Tk. 7.00/Tab.
Glucosid (Aristo), Tab., 80mg, Tk. 7.00/Tab.
Gluzit (Popular), Tab., 80.00mg, Tk. 7.00/Tab.
Gored (General), Tab., 80mg, Tk. 7.03/Tab.; 30mg, Tk. 8.86/Tab.
Kezid (Kemiko), Tab., 80 mg, Tk. 8.02/Tab.; MR Tab. 30 mg, Tk. 8.00/Tab.
Likazid (Amico), Tab., 80 mg, Tk. 4.90/Tab.
Lozide (ACI), Tab., 80mg, Tk. 7.02/Tab.

Norglic (Monico), Tab., 80mg, Tk. 6.00/Tab.
Oclazid (Orion), MR Tab., 30mg, Tk. 6.04/Tab.; 80 mg, Tk. 7.02/Tab.
Onzid (Leon), Tab., 30 mg, Tk. 6.00/Tab.; Tab., 80 mg, Tk. 8.00/Tab.
Orazid (Somatec), Tab, 80 mg, Tk. 7.00/Tab.
Proglid (Supreme), Tab., 80mg, Tk. 8.00/Tab.
SB-Glic (Sunman-Bardem), Tab., 80 mg, Tk. 7.00/Tab.; 30 mg, Tk. 6.00/Tab.; 60 mg, Tk. 11.00/Tab.
Sinazid (Ibn Sina), Tab., 80 mg, Tk. 6.50/Tab.
Sucleer (Julphar), Tab., 80 mg, Tk. 8.0/Tab.; MR Tab., 30 mg, Tk. 8.00/Tab.
Sucotab (Globe), Tab., 80 mg, Tk. 7.00/Tab.
.Sugred (Ad-din), Tab., 80 mg, Tk. 6.00/Tab.
Xido (Delta), Tab., 80 mg, Tk. 7.00/Tab.
Zenzide (Zenith), Tab., 80mg, Tk. 6/Tab

GLIMEPIRIDE

Indication: Type 2 DM

Cautions: See notes above

Contra-indications: See notes above

Interactions: See Appendix-2

Side-effects: See notes above

Dose: Initially 1 mg daily; adjusted according to response in 1mg steps at 1-2 week intervals; usual max 4mg daily (exceptionally up to 6mg daily may be used); taken shortly before or with first meal

Proprietary Preparations

Adglim (uniMed), Tab, 1mg, Tk. 3.00/Tab.; 2mg, Tk. 5.00/Tab.
Amaryl (Sanofi), Tab., 1mg, Tk. 6.92/Tab.; 2mg, Tk. 12.94/Tab.; 3mg, Tk. 16.55/Tab.; 4mg, Tk. 21.06/Tab.
Condia (Julphar), Tab., 1 mg, Tk. 4.50/Tab.; Tab., 2 mg, Tk. 8/Tab.; 3mg, Tk. 10/Tab.
Dactus (Acme), Tab., 2 mg., Tk. 6.50/Tab.; 3 mg., Tk. 8.50/Tab.; 1 mg., Tk. 4.00/Tab.
Dialon (Eskayef), Tab, 3mg, Tk. 12.00/Tab.; 3mg, Tk. 10.00/Tab.; 2mg, Tk. 8.00/Tab.; 1mg, Tk. 4.50/Tab.; 2 mg, Tk. 12.00/Tab.
Diaryl (Beximco), Tab., 3mg, Tk. 12.00/Tab.; 1mg, Tk. 6.00/Tab.; 2mg, Tk. 9.00/Tab.
Diavir (Virgo), Tab., 1 mg, Tk. 150.00/Tab.; 2 mg, Tk. 5.00/Tab.
Dieta (Pacific), Tab., 1 mg, Tk. 6.00/Tab.; 2 mg, Tk. 9.00/Tab.; 3 mg, Tk. 12.00/Tab.; 4 mg, Tk. 15.00/Tab.
Gifon (Monico), Tab., 2mg, Tk. 5.00/Tab.; 1mg, Tk. 3.00/Tab.
Gipid (Alco), Tab., 1 mg, Tk. 5.02/Tab.; 1mg, Tk. 3.01/Tab.
Glemep (Healthcare), Tab., 1mg, Tk. 3.00/Tab.; 2mg, Tk. 5.00/Tab.

5. ENDOCRINE SYSTEM

Glimepiride (*Albion*), Tab., 1 mg, Tk. 3.00/Tab.; 2 mg, Tk. 5.01/Tab.
Glimirid (*ACI*), Tab., 2mg, Tk. 9.00/Tab.; 1mg, Tk. 6.00/Tab.; 3mg, Tk. 12.00/Tab.; 4mg, Tk. 15.00/Tab.
Glims (*Opsonin*), Tab., 2 mg, Tk. 8.03/Tab.; 1 mg, Tk. 4.50/Tab.
Glirid (*General*), Tab., 1mg, Tk. 6.00/Tab.; 2mg, Tk. 9.00/Tab.
Gluconor (*Aristo*), Tab., 2mg, Tk. 8.00/Tab.
Gluconid (*Biopharma*), Tab., 2mg, Tk. 5.00/Tab.; 1mg, Tk. 3.00/Tab.
Limaryl (*Popular*), Tab., 1mg, Tk. 4.50/Tab.; 2mg, Tk. 8.00/Tab.; 3mg, Tk. 10.00/Tab.; 4 mg, Tk. 12.00/Tab.
Limerid (*Supreme*), Tab., 1mg, Tk. 3.00/Tab.; 2mg, Tk. 5.00/Tab.
Limpet (*Drug Intl*), Tab., 1mg, Tk. 3.05/Tab.; 2mg, Tk. 5.05/Tab.; 3mg, Tk. 7.05/Tab.; 4mg, Tk. 9.05/Tab.
Losucon (*Incepta*), Tab., 2mg, Tk. 9.00/Tab.; 3mg, Tk. 12.00/Tab.; 1mg, Tk. 6.00/Tab.; 4mg, Tk. 15.00/Tab.
Pride (*White Horse*), Tab., 1 mg, Tk. 3.30/Tab.; 2 mg, Tk. 5.00/Tab.
SB-Glim 1 (*Sunman-Bardem*), Tab., 1 mg, Tk. 6.00/Tab.; 2 mg, Tk. 9.00/Tab.; 3 mg, Tk. 12.00/Tab.; 4 mg, Tk. 15.00/Tab.
Secrin (*Square*), Tab., 1 mg, Tk. 6.00/Tab.; 2 mg, Tk. 9.00/Tab.; 3 mg, Tk. 12.00/Tab.; 4 mg, Tk. 15.00/Tab.
Stimulin (*Orion*), Tab., 1 mg Tk. 3.01/Tab.; 2 mg, 5.03/Tab.
Sucorid (*Globe*), Tab., 2 mg, Tk. 5.00/Tab. 4 mg, Tk. 8.00/Tab.
Glimepiride + Metformin HCl
Amaryl (*Sanofi*), Tab., 1mg+ 500mg, Tk. 12.00/Tab.; 2mg+ 500mg, Tk. 18.00/Tab.
Losucon (*Incepta*), Tab., 2mg+ 500mg, Tk. 9.00/Tab.
Dieta (*Pacific*), Tab., 1mg + 500mg, Tk. 12.00/Tab.

GLIPIZIDE

Indications: Type 2 DM
Cautions; Contraindications; Side-effects : See notes above
Interactions: See Appendix-2
Dose: Initially 2.5-5.0 mg daily, adjust according to response; up to 15 mg as a single dose, taken before breakfast; higher dose to be divided; maximum 40 mg daily

Proprietary Preparations

Diaplus (*Pacific*), Tab., 5 mg, Tk. 2.80/Tab.; 5 mg, Tk. 2.00/Tab.
Diactin (*Beximco*), Tab., 5mg, Tk. 1.50/Tab.
Diazipi (*Medimet*), Tab. 2.5 mg, Tk. 1.00/Tab.; 5 mg, Tk. 2.00/Tab.
Gipix (*Doctor TIMS*), Tab., 5 mg, Tk. 2.00/Tab.
Glimerol (*Drug Intl*), Tab., 5 mg, Tk. 1.50/Tab.
Glipizied (*Albion*), Tab., 5 mg, Tk. 2.00/Tab.
Glipizide + Metformin Hydrochloride
Mefoglip, (*Incepta*), Tab., 2.5 mg + 250 mg, Tk. 2.8.00/Tab.; 5 mg + 500 mg, Tk., 3.7.00/Tab.; 2.5 mg + 500 mg, Tk. 1.9.00/Tab.
Metglip, (*Pacific*), Tab., 500 mg + 2.5 mg, Tk. 4.00/Tab.; 500 mg + 5 mg, Tk. 5.00/Tab.; 250 mg + 2.5 mg, Tk. 2.50/Tab.

5.2.2.2 BIGUANIDES

Metformin is the only available biguanide for the treatment of diabetes mellitus. It acts by reducing the basal hepatic glucose output mainly by suppression gluconeogenesis. It also reduces gastro-intestinal absorption of glucose and increases glucose utilization in the cells by potentiating insulin action. Metformin is the drug of choice in obese patients, inadequately controlled with diet and/or sulphonylurea. The advantages include absence of hypoglycaemia and decrease in weight gain. Metformin may provoke lactic acidosis, which is most likely to occur in patients with kidney diseases, but the condition is very rare. If it occurs, 50 percent of the cases become fatal. Hypoglycaemia is not a problem with Metformin; it is therefore called an oral anti-hyperglycaemic agent rather than an oral hypoglycaemic agent. The advantages include lower incidence of hypoglycemia and weight gain. Gastrointestinal side effects are usually common and may persist in some patients. Metformin may provoke lactic acidosis, which is most likely to occur in patients with kidney diseases. Extended release formulation of metformin has now been developed to provide better glycaemic control over 24 hours. It is well-tolerated and gastrointestinal side-effects like nausea and diarrhoea are less marked than conventional metformin.

5. ENDOCRINE SYSTEM

METFORMIN HYDROCHLORIDE [ED]

Indications: Diabetes mellitus, especially in obese patients with TYPE 2 DM. It may be used alone or in combination with sulphonylurea or with insulin where resistance is dominant (as in acromegaly or Cushing's syndrome)

Cautions: is not recommended during pregnancy and should be used only if clearly needed while breast-feeding; it should not be used in patients with pre-existing liver disease, kidney disease or any allergies

Contraindications: See notes above

Interactions: See Appendix-2

Side-effects: Gastrointestinal upset like loss of appetite, nausea, abdominal discomfort and diarrhoea, lactic acidosis, metallic taste, vitamin B₁₂ and Folic acid deficiency with prolonged use

Dose: 500 or 850 mg daily 8 hourly; taken during meals; maximum 3 g daily

Proprietary Preparations

Bigmet (*Renata*), Tab., 500 mg, Tk. 5.00/Tab.; 850 mg, Tk. 6.00/Tab.

Comet (*Square*), Tab., 1 gm, Tk. 7.02/Tab.; XR 1 gm, Tk. 9.03/Tab.; 500 mg, Tk. 4.02/Tab.; XR500 mg, Tk. 6.02/Tab.; 850 mg, Tk. 6.02/Tab.

Daomin (*Acme*), Tab., 500 mg., Tk. 4.00/Tab.; 1gm Tk. 8.00/Tab.; XR500 mg, Tk. 6.00/Tab.; 850.00 mg., Tk. 6.00/Tab.;

Deformin (*Zenith*), Tab., 850 mg, Tk. 4.00/Tab.; 500 mg, Tk. 3.00/Tab.

D-Fo (*Decent*), Tab., 850mg, Tk. 4.00/Tab.

Dia-M (*Medimet*), Tab., 850mg, Tk. 2.50/Tab.; 500 mg, Tk. 1.10/Tab.

Diamin (*Virgo*), Tab., 500 mg, Tk. 2.50/Tab.; 850mg, Tk. 3.00/Tab.

Diout (*Asiatic*), Tab., 850mg, Tk. 2.25/Tab.

Etform (*Novartis*), Tab., 500 mg, Tk. 3.20/Tab.; 850 mg, Tk. 5.50/Tab.

Formet (*Biopharma*), Tab., XR 500mg, Tk. 6.00/Tab.; 500mg, Tk. 4.00/Tab.; 850mg, Tk. 6.00/Tab.

Glucomet (*Aristo*), Tab., 500mg Tk. 4.00/Tab.; XR500mg, Tk. 6.00/Tab.;

XR750mg, Tk. 9.00/Tab.; 850mg, Tk. 6.00/Tab.

Glucomin (*Nipro JMI*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 5.00/Tab.

Glunor (*Eskayef*), Tab., 500 mg, Tk. 4.00/Tab.; 850mg, Tk. 6.00/Tab.; XR 500 mg, Tk. 6.00/Tab.

Glymin (*Healthcare*), Tab., XR 500mg, Tk. 5.00/Tab.; 850mg, Tk. 4.00/Tab.; 500mg, Tk. 3.00/Tab.

G-Metformin (*Gonoshasthaya*), Tab., 500 mg, Tk. 2.50/Tab.; 850 mg, Tk. 4.25/Tab.

Guamin (*Ad-din*), Tab., 850 mg, Tk. 3.00/Tab.

Hi-Met (*Hudson*), Tab., 850 mg, Tk. 3.00/Tab.

Informat (*Beximco*), Tab., XR 500mg, Tk. 5.00/Tab.; 500mg, Tk. 3.00/Tab.; 850mg, Tk. 4.50/Tab.; XR750mg, Tk. 7.00/Tab.

Insimet (*Ibn Sina*), Tab., 500mg, Tk. 5.00/Tab.; 850mg, Tk. 4.00/Tab.; 500mg, Tk. 4.00/Tab.

Kemin (*Kemiko*), Tab., 500 mg, Tk. 5.00/Tab.; 500 mg, Tk. 2.50/Tab.; 850 mg, Tk. 4.01/Tab.

Meforex (*Jayson*), Tab., 500 mg, Tk. 2.00/Tab.; 850 mg, Tk. 3.00/Tab.

Meforin (*Julpher*), Tab., 500 mg, Tk. 4.00/Tab.; 850 mg, Tk. 6.00/Tab.; XRTab., 500 mg, Tk. 7.00/Tab.

Meformin (*Organic*), Tab., 500 mg, Tk. 2.00/Tab.; 850 mg, Tk. 3.01/Tab.

Meglu (*UniMed*), Tab., XR 500mg, Tk. 5.00/Tab.; XR 750mg, Tk. 7.00/Tab.; XR1gm, Tk. 8.00/Tab.; 850mg, Tk. 4.00/Tab.; 500mg, Tk. 3.00/Tab.

Met (*Opsonin*), Tab., XR 1 gm, Tk. 9.00/Tab.; XR500 mg, Tk. 6.00/Tab.; XR 750 mg, Tk. 8.00/Tab.; 850 mg, Tk. 6.00/Tab.; 500 mg, Tk. 4.00/Tab.

Metarin (*Popular*), Tab., 500mg, Tk. 3.00/Tab.; 850.00mg, Tk. 4.50/Tab.

Metarin (*Popular*), Tab., 500 mg, Tk. 2.51/Tab.; 850 mg, Tk. 4.02/Tab.

Metfar (*White Horse*), Tab., 500mg, Tk. 4.00/Tab.; 850 mg, Tk. 5.00/Tab.;

Metfo (*Pacific*), Tab., 500 mg, Tk. 4.00/Tab.; XR500mg, Tk. 7.00/Tab.; 850 mg, Tk. 6.00/Tab.; XR 1gm, Tk. 10.00/Tab.; 500 mg, Tk. 4.00/Tab.; XR750mg, Tk. 9.00/Tab.

Metfomin (*Astra Bio*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 4.00/Tab.

Metform (*ACI*), ER Tab., 500mg, Tk. 6.00/Tab.; 500mg, Tk. 4.00/Tab.; XR1gm, Tk. 9.00/Tab.; 850mg, Tk. 6.00/Tab.

Metin (*Supreme*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 4.96/Tab.

Metlife (*Silva*), Tab., 850mg, Tk. 4.02/Tab.; 500mg, Tk. 3.01/Tab.

Metmin (*Alco*), Tab., 500 mg, Tk. 3.01/Tab.; 850 mg, Tk. 4.01/Tab.

Metnor (*Monico*), Tab., 500mg, Tk. 3.00/Tab.

Metomin (*Somatec*), Tab., 850 mg, Tk. 5.00/Tab.; 500 mg, Tk. 3.00/Tab.

Metsa (*Sanofi*), Tab., 500mg, Tk. 3.01/Tab.; XR500mg, Tk. 6.02/Tab.; XR1gm Tk. 9.00/Tab.; 850mg, Tk. 5.02/Tab.

M-Form (*Central*), Tab., 850 mg, Tk. 5.50/Tab.

M-Fort (*Albion*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 4.00/Tab.; XR Tab., 500 mg, Tk. 5.00/Tab.

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M-Min (*Sharif*), Tab., 500 mg, Tk.3.01/Tab.; 850 mg, Tk. 4.51/Tab.
Nobesit (*Incepta*), Tab.,XR 1gm, Tk. 9.00/Tab.; 500 mg, Tk. 4.00/Tab.; 850 mg, Tk. 6.00/Tab.
Nvmet (*Navana*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 5.00/Tab.; SR Tab., 500 mg, Tk. 5.00/Tab.
Obemet (*Euro*), Tab., 500mg, Tk. 2.00/Tab.; 850mg, Tk. 4.00/Tab.
Obid (*Delta*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 5.00/Tab.
Onmet (*Leon*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 5.00/Tab.
Oramet (*Drug Intl*), Tab., XR 1gm, Tk. 7.05/Tab.; 500mg, Tk. 4.00/Tab.; XR500mg, Tk. 5.05/Tab.; 850mg, Tk. 5.00/Tab.
Ormin (*Orion*), Tab., 500 mg, Tk. 3.01/Tab.; 850 mg, Tk. 5.01/Tab.
Radimet (*Radiant*), Tab., 500mg, Tk. 4.00/Tab.; 850mg, Tk. 6.00/Tab.; 1gm, Tk. 9.00/Tab.; XR500mg, Tk. 7.00/Tab.
Ruzmet (*Amico*), Tab., 500 mg, Tk. 3.00/Tab.
SB-Met (*Sunman-Bardem*), Tab., 500 mg, Tk. 4.00/Tab.; 850 mg, Tk. 6.00/Tab.; XR1gm, Tk. 8.00/Tab.; XR500 mg, Tk. 6.00/Tab.
Sucomet (*Globe*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 4.50/Tab.;XR 850mg., Tk. 5.50/Tab.; XR500mg., Tk. 3.50/Tab.
Sugamet (*General*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, 4.50/Tab.
Verimet (*Veritas*), Tab., 500 mg, Tk. 3.00/Tab.; 850 mg, Tk. 4.00/Tab.

Metformin Hydrochloride + Glipizide
Mefoglip (*Incepta*), Tab.250 mg+., 2.5 mg +, Tk. 2.8.00/Tab.; 500 mg+5mg, Tk., 3.7.00/Tab.; 500 mg+2.5mg, Tk. 1.9.00/Tab.
Metglip (*Pacific*), Tab.,500 mg+2.5 mg, Tk. 4.00/Tab.; 500 mg + 5 mg, Tk. 5.00/Tab.; 250 mg +2.5 mg,Tk. 2.50/Tab
Metazid (*Popular*), Tab., 500 mg + 2.5 mg, Tk. 2.51/Tab.

5.2.2.3 MEGLITINIDE

Meglitinides (glinides) make up a class of drugs used to treat diabetes type 2.They bind to an ATP-dependent K⁺ (KATP) channel on the cell membrane of pancreatic beta cells in a similar manner to sulfonylureas but have a weaker binding affinity and faster dissociation from the SUR1 binding site. This increases the concentration of intracellular potassium, which causes the electric potential over the membrane to become more positive. This depolarization opens voltage-gated

Ca²⁺ channels. The rise in intracellular calcium leads to increased fusion of insulin granulae in the cell membrane, and therefore increased secretion of (pro) insulin.

Side effects: include weight gain and hypoglycemia. While the potential for hypoglycemia is less than for those on sulfonylureas, it is still a serious potential side effect that can be life-threatening. Patients on this medication should know the signs and symptoms of hypoglycemia and appropriate management.

NATEGLINIDE

Indications: Lowering blood sugar levels in patients with type 2 diabetes. It used along with diet and exercise

Cautions: Type 1 diabetes, diabetic ketoacidosis, pregnancy & breast feeding; elderly

Side Effects: Dizziness; flu-like symptoms (fever, chills, sore throat); joint pain; upper respiratory tract infection. : changes in vision; headache; increased hunger; loss of consciousness; nervousness; seizures; shakiness; sweating; tiredness.

Dose:120 mg orally three times daily before meals

Proprietary Preparations

Starlex[®] (*Novertis*), Tab., 120mg, Tk.28.68/Tab.

REPAGLINIDE

Indications: Diabetes mellitus as monotherapy or in combination with metformin

Cautions: Monitor liver function; not recommended for children/adolescent under 18 years and elderly over 70 years

Contra-indications and Side-effects: Diabetic ketoacidosis; renal or hepatic impairment; pregnancy and breast-feeding

Interactions: See Appendix-2

Side effects: Same as that of pioglitazone

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Dose: Initially 500 micrograms within 30 minutes before main meals, adjusted according to response at intervals of 1-2 weeks; maximum up to 15 mg daily

Proprietary Preparations

Glimet (*Drug Int*), Tab., 1 mg, Tk. 3/Tab.
Gluretor (*Pacific*), Tab., 1mg, Tk. 4/Tab., 2 mg, Tk. 6/Tab., 0.5 mg, Tk. 2.80/Tab.
Nomopil (*Incepta*), Tab., 0.5 mg, Tk. 2.00/Tab.; 1 mg, Tk. 3.00/Tab., 2 mg, Tk. 5.00/Tab.
Prandil (*UniMed*), Tab., 1 mg, Tk. 3.00/Tab.
Premil (*Beximco*), Tab., 0.5 mg, Tk. 2.00/Tab.; 1 mg, Tk. 3.00/Tab.; 2 mg, Tk. 5.00/Tab.
Prifid (*White Horse*), Tab., 1mg, Tk. 3.00/Tab.
Repaglid (*Alco*), Tab., 2 mg, Tk. 5.02/Tab.
Repanid (*Opsonin*), Tab, 1 mg, Tk. 3.01/Tab., 2 mg, Tk. 5.02/Tab.

5.2.2.4 THIAZOLIDINEDIONES

Thiazolidinediones abbreviated as TZDs also known as Glitazones—work on lowering your insulin resistance, which is the underlying problem for many people with type 2 diabetes. TZDs make your body produce new fat cells, and those cells are actually more sensitive to insulin—that is, they allow insulin to do its job. If you're insulin resistant, your cells don't allow insulin to do its job (which is to get glucose into the cells). The new fat cells, then, can eventually lower your blood glucose level by making your body use insulin and glucose better. The first-generation thiazolidinediones actually caused serious liver damage in a few people. The second-generation TZDs shouldn't do that, but it's still something to keep in mind, especially if you already have liver problems. Examples of TZDs: Pioglitazone, Rosiglitazone

PIOGLITAZONE

Indications: See notes above

Cautions: Liver function tests to be carried out. There is risk of heart failure; so the drug should be used with caution in cardio-vascular disease

Side effects: Gastro-intestinal disturbances, weight gain, edema, anemia, headache, visual disturbance,

dizziness, arthralgia, haematuria, impotence, risk of bladder cancer, less commonly hypoglycaemia, fatigue, sweating, altered blood lipids, proteinuria

Interactions: See Appendix 2

Dose: 15-30 mg once daily

Proprietary Preparations

Actose (*UniMed*), Tab, 15 mg, Tk. 8.00/Tab.
Adpas (*General*), Tab., 15 mg, Tk. 8.03/Tab.
Diaglit (*Beximco*), Tab., 15 mg, Tk. 8.00/Tab.
Diapiotab (*Medimet*), Tab., 15mg, Tk. 8.00/Tab.
Diatag (*ACI*), Tab., 15 mg, Tk. 8.05/Tab.
Glitazon (*Ibn Sina*), Tab., 15 mg, Tk. 8/Tab.
Glucoson (*Aristo*), Tab., 15 mg, Tk. 8.00/Tab.
Lit (*White Horse*), Tab., 15 mg, Tk. 8.00/Tab.
Pidus (*Acme*), Tab., 15 mg, Tk. 8.07/Tab.
Piglit (*Pacific*), Tab., 15 mg, Tk. 8/Tab.
Pigzon (*Sharif*), Tab., 15 mg, Tk. 8.03/Tab.
Piodar (*Incepta*), Tab., 15mg, Tk. 8/Tab.
Piol (*Opsonin*), Tab., 15 mg, Tk. 6.04/Tab.
Piolit (*Alco*), Tab., 15 mg, Tk. 8.02/Tab.
Saglit (*Sanofi*), Tab., 15 mg, Tk. 8.03/Tab.
Tos (*Square*), Tab., 15 mg, Tk. 8.04/Tab.

ROSIGLITAZONE

Indications: See notes above

Cautions: Congestive heart failure, heart attack, chest pain, discomfort; hepatic impairment, pregnancy and breast feeding.

Side effects: Same as that of pioglitazone

Proprietary Preparations

Rosiglitazone 1 mg + Metformin HCl 500 mg.
Sensimet (*Square*), Tab., Tk. 4.01/Tab.;
Metarin Plus (*Popular*), Tab. Tk. 4.02/Tab.

5.2.2.5 DIPEPTIDYL PEPTIDASE-4 (DPP-4) INHIBITORS

DPP-4 inhibitors work by blocking the action of DPP-4, an enzyme which destroys the hormone incretin. Incretins help the body produce more insulin only when it is needed and reduce the amount of glucose being produced by the liver when it is not needed. These hormones are released throughout the day and levels are increased at meal times.

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LINAGLIPTINE

Indications: Type 2 diabetes in patients who cannot control blood sugar levels by diet and exercise alone. It is used along with diet and exercise. It may be used alone or with other antidiabetic medicines.

Cautions: Type 1 diabetes & ketoacidosis; pregnancy & breast feeding

Side effects: Headache, joint pain, runny or stuffy nose, sore throat; severe stomach or back pain.

Dose: 5 mg orally once a day

Proprietary Preparations

Adlina (UniMed), Tab., 5 mg, Tk. 20.00/Tab.
Dialina (Biopharma), Tab., 5mg, Tk. 15/Tab.
Glitin (ACI), Tab., 5mg, Tk. 15.00/Tab.
Ligazid (Eskayef), Tab., 5mg, Tk. 15.00/Tab.; 5mg, Tk. 15.00/Tab.; 5mg, Tk. 15.00/Tab.; 5mg, Tk. 15.00/Tab.
Lijenta (Nipro JMI), Tab., 5 mg, Tk. 30.00/Tab.
Linadi (Pacific), Tab., 5 mg, Tk. 15.00/Tab.
Linadus (Opsonin), Tab, 5 mg, Tk. 15.00/Tab.
Linaglip (Aristo), Tab., 5mg, Tk. 20.00/Tab.
Linajen (Popular), Tab., 5mg, Tk. 15.00/Tab.
Linaptin (General), Tab., 5mg, Tk. 18.00/Tab.
Linarol (Drug Intl), Tab., 5mg, Tk. 15.05/Tab.
Linatab (Incepta), Tab., Tk. 15.00/Tab.
Linax (Ibn Sina), Tab., 5mg, Tk. 210.00/Tab.; 5mg, Tk. 7.00/Tab.
Linita (Square), Tab., 5 mg, Tk. 15.00/Tab.
Lino (Acme), Tab., 5 mg, Tk. 15.00/Tab.
Lintin (Kemiko), Tab., 5 mg, Tk. 20.00/Tab.
SB-Lina (Sunman-Bardem), Tab., 5 mg, Tk. 15.00/Tab.
Traneta (Beximco), Tab., 5mg, Tk. 18/Tab.

OTHER INCRETIN MIMETICS

Indications: Diabetes mellitus inadequately controlled by diet with or without other antidiabetic agent

Cautions: Drug allergy

Contraindications and Side-effects: Impaired renal function (except linagliptin); GI upset, upper Respiratory Tract Infection and pancreatitis

Interactions: See Appendix-2

Dose: Sitagliptins (100 mg/day once; 50mg/day for CCR <50 ml/min, & 25 mg/day for CCR <30 ml/min), vildagliptin, (50 mg once or twice/;

50mg/day for CCR <50 ml/min), **Saxagliptin** (2.5 mg/day once or twice ; 2.5mg/day for CCR <50 ml/min).

Proprietary Preparations:

Saxagliptin

Glyza (Ibn Sina), Tab., 2.5 mg, Tk. 20.00/Tab., 5 mg, Tk. 35.00/Tab.
Sixtin (Drug Intl), Tab., 2.5 mg, Tk. 16.00/Tab., 5 mg, Tk. 30.00/Tab.

Sitagliptin

Glipita (Beximco), Tab., 100mg, Tk. 25.00/Tab., 50mg, Tk. 13.00/Tab.
Incrit (Sanofi), Tab., 100mg, Tk. 30.09 /Tab., 50 mg, Tk. 18.05/Tab.
Janvia (Acme), Tab., 100 mg, Tk. 28.08/Tab., 50 mg, Tk. 15.04/Tab.
Rediglip (Radiant), Tab., 50 mg, Tk. 16.00/Tab.
SB-Sita (Sunman-Bardem), Tab., 50 mg, Tk. 15.00/Tab., 100 mg, Tk. 28.00/Tab.
Sgn (Pacific), Tab., 100 mg, Tk. 28.00/Tab., 25 mg, Tk. 8.00/Tab., 50 mg, Tk. 15.00/Tab.
Siglita (Square), Tab., 100 mg, Tk. 25.00/Tab., 50 mg, Tk. 13.00/Tab.
Silinor (Healthcare), Tab., 100mg, Tk. 30.00/Tab., 50mg, Tk. 54.00/Tab., 25mg, Tk. 10.00/Tab.
Sitagil, (Incepta), Tab., 50 mg, Tk. 15.00/Tab., 100 mg, Tk. 28.00/Tab., 25 mg, Tk. 8.00/Tab.
Sitap (ACI), Tab., 50 mg, Tk. 15.05/Tab., 100 mg, Tk. 28.08/Tab.
Sitavia (Sharif), Tab., , Tk. 15.00/Tab.
Sitazid (Eskayef), Tab, 100mg, Tk. 25.00/Tab., 50mg, Tk. 13.00/Tab.,
Sliptin (Drug Intl), Tab., 100mg, Tk. 28.10/Tab., 25mg, Tk. 8.05/Tab., 50mg, Tk. 15.05/Tab.
Sucosit (Globe), Tab., 100 mg, Tk. 28.00/Tab., 50 mg, Tk. 16.00/Tab.

Vidagliptin

Aptin (ACI), Tab., 50 mg, TK. 20.00/Tab.
Dialiptin (Drug Intl), Tab., 50 mg, Tk. 15.05/Tab.
Galvus [®] (Novartis), Tab., 50 mg, Tk. 31.50/Tab.
Gluvan (Aristo), Tab., 50 mg, Tk. 20.00/Tab.
Gluvil (Alco), Tab., 50 mg, Tk. 20.00/Tab.
Redia (Healthcare), Tab., 50 mg, Tk. 20.00/Tab.
SB-Vilda (Sunman-Bardem), Tab., 50 mg, Tk. 15.00/Tab.
Sucovil (Globe), Tab., 50 mg, Tk. 20.00/Tab.
Vida (Pacific), Tab., 50 mg, Tk. 20.00/Tab.
Vigatin (Eskayef), Tab, 50 mg, Tk. 20.00/Tab.,
Viglita (Square), Tab., 50 mg, Tk. 16.00/Tab.,
Vildagil (Sharif), Tab., 50 mg, Tk. 18.04/Tab.

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Vildapin (*Acme*), Tab. , 50 mg, Tk. 15.04/Tab.
Vildus (*Opsonin*), Tab. , 50 mg, Tk.
 20.00/Tab.
Viptin (*General*), Tab. , 50 mg, Tk. 20.06/Tab.

Vildagliptin + Metformin HCl

Aptin (*ACI*), Tab., 50mg + 850mg, TK.
 23/Tab. ; 50mg +500mg, TK. 22/Tab.
Dialiptin M (*Drug Intl*), Tab. , 50mg+500mg,
 Tk. 16.05/Tab.; 50mg+850mg, Tk. 17.05/Tab.
Galvus Met[®] (*Novartis*), Tab. , 50 mg+ 500
 mg, Tk. 31.50/Tab.; 50 mg+ 850 mg, Tk.
 31.50/Tab.
Gluvan (*Aristo*), Tab., 50 mg + 500mg , Tk.
 21.00/Tab.; 50 mg + 850mg , Tk. 22.00/Tab.
Redia (*Healthcare*), Tab., 50 mg + 500mg,
 Tk. 22.00/Tab.; 50mg + 850mg , Tk.
 24.00/Tab.
SB-MetVilda, (*Sunman-Bardem*), Tab. , 50 mg
 + 500 mg , Tk. 17.00/Tab. ; 50 mg 850 mg, Tk.
 17.00/Tab.
Sucovil (*Globe*), Tab. , 50 mg + 500 mg, Tk.
 15.75/Tab.; 50 mg + 850 mg, Tk. 23.00/Tab.
Vidaplus (*Pacific*), Tab. , 50 mg+ 850 mg ,
 Tk. 24.00/Tab. ; 50 mg+ 500 , Tk. 22.00/Tab.
Vigamet (*Eskayef*), Tab. 50mg + 500mg, Tk.
 20.00/Tab.; 50mg + 850mg, Tk. 22.00/Tab.;
Vildagil M (*Sharif*), Tab. , 50+500mg, Tk.
 20.07/Tab. ; 50+ 850mg , Tk. 22.07/Tab.
Vildamet (*Opsonin*), Tab. , 50 mg + 500 mg,
 Tk. 22.06/Tab. ; 50 mg+ 850 mg , Tk.
 23.00/Tab.
Vildapin plus (*Acme*), Tab. , 50mg + 850 mg,
 Tk. 20.00/Tab. ; 50mg + 500 mg , Tk.
 16.00/Tab.
Viglimet (*Square*), Tab., 50 mg + 850 mg, Tk.
 23.00/Tab.; 50 mg + 500 mg, Tk. 22/Tab.
Viptin Plus (*General*), Tab. , 50mg +
 850mg, Tk. 22.07/Tab.; 50mg + 500mg, Tk.
 21.07/Tab.
 Sitagliptin + Metformin
Glipita M (*Beximco*), Tab., 50mg + 1gm, Tk.
 16.00/Tab.; 50mg +500mg, Tk. 14.00/Tab.
Incrit (*Sanofi*), Tab. , 50mg +500mg, Tk.
 20.06/Tab.; 50mg+1gm, Tk. 22.07/Tab.
Janmet (*Acme*), Tab. , 50 mg + 500 mg, Tk.
 16.04/Tab. ; 50 mg + 1gm, Tk. 18.04/Tab.
Rediglip M (*Radiant*), Tab. , 50mg + 500mg,
 Tk. 20.00/Tab.
SB-Metsita (*Sunman-Bardem*), Tab. , 50 mg +
 1 gm, Tk. 22.00/Tab. ; 50 mg + 500mg, Tk.
 20.00/Tab.
SGN (*Pacific*), Tab. , 50 mg+ 500 , Tk.
 16.00/Tab.
Siglimet (*Square*), XRTab. , 50 mg + 1gm ,
 Tk. 16.00/Tab. ;ER 50 mg + 1gm , Tk.
 18.00/Tab. ; 50 mg + 500 mg , Tk. 14.00/Tab.
 ; XR100 mg + 1gm , Tk. 30.00/Tab.
Sitagil (*Incepta*), Tab. , 50 mg + 1gm, Tk.
 35.00/Tab. ; 50 mg + 500 gm, Tk. 18.00/Tab.
Sitamet (*Renata*), Tab. , 50mg+50mg, Tk.
 20.00/Tab.

Sitavia (*Sharif*), Tab. , 50+ 100 mg, Tk.
 18.00/Tab. ; 50+ 500 mg, Tk. 16.00/Tab.
Sitomet (*ACI*), Tab., 50 mg + 1 gm, Tk.
 18.05/Tab. ; 50 mg + 500mg, Tk. 16.05/Tab.
Sliptin (*Drug Intl*), Tab. , 500mg, Tk.
 16.05/Tab.; 500mg, Tk. 16.05/Tab.;
 50mg+1gm, Tk.18.10/Tab.;50mg+500mg, Tk.
 16.05/Tab.;

5.2.2.6 GLIFLOZIN

Gliflozin drugs are a class of medications that inhibit reabsorption of glucose in the kidney and therefore lower blood sugar. They act by inhibiting sodium-glucose transport protein 2 (SGLT2), and are therefore also called SGLT2 inhibitors. Gliflozins are used in the treatment of type II diabetes mellitus (T2DM). Apart from glycemic control, gliflozins have been shown to provide significant cardiovascular benefit in T2DM patients. The gliflozins are used to treat type 2 diabetes mellitus but are most often used as second- or third-line agents instead of first-line because there are other drugs on the market that have much longer safety record and are less expensive than gliflozins. Gliflozins may be a good option for patients who are failing with metformin monotherapy, especially if weight is part of the underlying treatment. They are often used in combination therapy, for example the dual therapy metformin plus gliflozin and the triple therapy metformin, sulphonylurea and gliflozin.

DAPAGLIFLOZIN

Indications: Type 2 diabetes as monotherapy (if metformin not tolerated), or in combination with insulin or other antidiabetic drugs (if existing treatment fails to achieve adequate glycaemic control);

Cautions: Kidney disease/failure (dialysis), bladder cancer, dehydration, low blood pressure, heart failure, yeast infections in the vagina or penis electrolyte disturbances; cardiovascular disease or elderly (risk of hypotension);

Contraindications: ketoacidosis,

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hepatic impairment, renal impairment, pregnancy

Side-effects: Hypoglycaemia (in combination with insulin or sulphonylurea), constipation, dyslipidaemia, back pain, genital infection, urinary-tract infection, dysuria, polyuria, thirst, sweating;

Dose: ADULT over 18 years, 10mg once daily; ELDERLY over 75 years, initiation not recommended

Proprietary Preparations

Dapaglip (*Incepta*), Tab., 5 mg, Tk. 16.00/Tab.

Glycema (*ACI*), Tab., 5 mg, Tk. 16.00/Tab.; 10 mg, Tk. 30.00/Tab.

Note: Dose of concomitant insulin or drugs that stimulate insulin secretion may need to be reduced

EMPAGLIFLOZIN

Indications : Type 2 diabetes mellitus as an adjunct to diet and exercise

Cautions: Assessment of renal function is recommended prior to initiation of Empagliflozin and periodically thereafter. Empagliflozin should not be initiated in patients with an eGFR less than 45 mL/min/1.73m². No dose adjustment is needed in patients with an eGFR greater than or equal to 45 mL/min/1.73m²

Contra-indications: Empagliflozin is contraindicated in patients with history of serious hypersensitivity reaction to Empagliflozin or any of its ingredients, severe renal impairment, renal disease, dialysis, breast feeding, pregnancy
Interactions: Diuretics; Insulin or Insulin Secretagogues: Co-administration of Empagliflozin with insulin or insulin secretagogues increases the risk for hypoglycemia

Side effects Urinary tract infections and female genital mycotic infections. Others common side effects include dehydration, hypotension, weakness, dizziness and increased thirstiness

Dose: The recommended dose of Empagliflozin is 10 mg once daily, taken in the morning, with or without food.

Proprietary Preparations:

Empa (*NIPRO JMI*) Tab. 10 mg; Tk.

25.00/Tab.; 25mg, Tk. 40.00/Tab.

Empazin (*Delta*), Tab. 10mg, Tk. 15/Tab.; 25 mg,

Jardian (*Beximco*), Tab. 10 mg Tk. 25/Tab.; 25mg, Tk. 40/Tab.

Jardiance⁽¹⁾ (*Boehringer*) Tab. 10 mg Tk. 25/Tab.; 25mg, Tk. 40/Tab.

5.2.2.7 ALPHA GLUCOSIDASE INHIBITOR

Alpha-glucosidase inhibitors are oral anti-diabetic drugs used for diabetes mellitus type 2 that work by preventing the digestion of carbohydrates (such as starch and table sugar). Carbohydrates are normally converted into simple sugars (monosaccharides) by alpha-glucosidase enzymes present on cells lining the intestine, enabling monosaccharides to be absorbed through the intestine. Hence, alpha-glucosidase inhibitors reduce the impact of dietary carbohydrates on blood sugar.

Dose: Since alpha-glucosidase inhibitors are competitive inhibitors of digestive enzymes, they must be taken at the start of main meals to have maximal effect. Their effects on blood sugar levels following meals will depend on the amount of complex carbohydrates in the meal.

Side effects and precautions: Since alpha-glucosidase inhibitors prevent the degradation of complex carbohydrates into glucose, the carbohydrates will remain in the intestine. In the colon, bacteria will digest the complex carbohydrates, thereby causing gastrointestinal side effects such as flatulence and diarrhea. Since these effects are dose-related, it is generally advised to start with a low dose and gradually increase the dose to the desired amount.

ACARBOSE

Indications: Diabetes mellitus inadequately controlled by diet with or without other antidiabetic agent

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Cautions: Monitor liver function

Contraindications and Side-effects: Pregnancy and breast-feeding, inflammatory bowel disease (ulcerative colitis, Crohn's disease), hepatic impairment, severe renal impairment

Interactions: See Appendix-2

Dose: Initially 50 mg daily, increased up to 100 mg three times daily slowly; single dose taken with breakfast, higher doses divided; maximum 600 mg daily. CHILD under 12 years not recommended

Proprietary Preparations

Carbos (*Ibn Sina*), Tab. 50mg.Tk 8/Tab

Gluco (*Acme*), Tab. 100 mg, Tk. 20.07/Tab.; 50 mg, Tk. 11.04/Tab.

Sugatrol (*Pacific*), Tab. 100 mg, Tk. 25.00/Tab.; 50 mg, Tk. 15.00/Tab.

MIGLITOL

Indications: Type 2 diabetes alone or in combination with a sulfonylurea such as glyburide

Side Effects: Diarrhoea, bloating, soft stools, stomach pain

Cautions: Pregnancy breast-feeding, if the patient has stomach or bowel problems, liver disease, or kidney disease

Interactions: See Appendix -2

Dose: 25 mg three times daily and then increase after four to eight weeks to 50-100mg three times daily

Proprietary Preparations

Diaset (*ACI*), Tab 25mg, Tk. 10.07/Tab; 50 mg, 15.11/Tab.

5.2.2.3 OTHER ANTIDIABETIC AGENTS

LIRAGLUTIDE

Indications: Indicated for the treatment of adults with insufficiently controlled type 2 diabetes mellitus as an adjunct to diet and exercise as monotherapy, in addition to other medicinal products for the treatment of diabetes.

Side-effects: Nausea Diarrhoea,
Nasopharyngitis, Bronchitis,

Hypoglycaemia, Anorexia, Appetite decreased, Headache Dizziness, Vomiting, Dyspepsia, Abdominal pain upper, Constipation, Gastritis, Flatulence, Abdominal distension, Gastro esophageal reflux disease, Abdominal discomfort, Toothache

Cautions: Liraglutide should not be used in patients with type 1 diabetes mellitus or for the treatment of diabetic ketoacidosis. Liraglutide is not a substitute for insulin

Interactions: See Appendix -2

Dose: To improve gastro-intestinal tolerability, the starting dose is 0.6 mg liraglutide daily. After at least one week, the dose should be increased to 1.2 mg. Some patients are expected to benefit from an increase in dose from 1.2 mg to 1.8 mg and based on clinical response, after at least one week, the dose can be increased to 1.8 mg to further improve glycaemic control. Daily doses higher than 1.8 mg are not recommended

Proprietary Preparations

Victoza (*Novo Nordisk*), Inj., 6 mg/ml, Tk. 6500.00/Pen.

5.2.4 DIABETIC EMERGENCY

5.2.4.1 DIABETIC KETOACIDOSIS (DKA)

5.2.4.2 HYPOGLYCAEMIA

5.2.4.1 DIABETIC KETOACIDOSIS (DKA)

Diabetic Ketoacidosis (DKA) is a medical emergency in diabetics often found in Typ1 DM and also in stressful situation in other types of diabetes. It results from lack of insulin leading to hyperglycaemia and ketoacidosis. Its causes are: omission or reduction of insulin dose; undiagnosed diabetes; and intercurrent illness, especially acute infection.

Soluble insulin given intravenously, is used in the management of DKA. If infusion pump is available, infuse at a rate of 3-6 units per hour. Alternately, give intramuscularly 10-20 units, followed by hourly 5-10 units. Hourly fall of blood sugar should be in the range of 3-6 mmol/L. Usual subcutaneous regime

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of insulin may be started when blood glucose falls below 15 mmol/L.

Intravenous replacement of fluid and electrolytes is an essential part of the management of ketoacidosis. **Normal Saline** is infused initially at 1 litre per hour, and then the rate is calculated against clinical status. If blood level of K^+ is < 3 mmol/L, infuse at a rate of 39 mmol/hr; if blood level is 3-4 mmol/L, infuse at a rate of 26 mmol/hr; if blood level is 5-6 mmol/L, infuse at a rate of 13 mmol/hr; and if blood level is more than 6 mmol/L, stop infusion. **Sodium bicarbonate** infusion is only used in cases of extreme acidosis and shock. In patients with severe acidosis (bicarbonate less than 15 mmol/L), infuse 500 ml of 1.4% Sodium bicarbonate and consider extra potassium supplement. Glucose solution (5%) is infused if the blood glucose level falls below 10 mmol/L but insulin infusion must continue.

5.2.4.2 HYPOGLYCAEMIA

The most frequent complication of insulin therapy and of high doses of sulphonylureas is hypoglycemia and it occurs when blood sugar becomes very low (less than 50 mg/litre). Patients need to be educated about its warning symptoms and treatment. Warning signs include hunger pain, sweating, tremor, light headedness and dizziness. Later on patients develop behavioral and sensorial changes with subsequent coma and even convulsions if uncorrected. Unfortunately some patients especially those with neuropathy or on beta blocker therapy do not experience the early warning signs. Common causes of hypoglycaemia in a diabetic are: unusual excessive exercise; delay or omission of a snack or meal; administration of too much of insulin (especially in intramuscularly); excess intake of sulphonylurea; over indulgence in alcohol; and severe impairment of renal function. Mild and to moderate hypoglycaemia may be treated by the

patient himself/herself or by a family member with sugar or a glass of soft drinks or fruit juice or biscuit, chocolate or honey. If the symptoms reappear within half an hour, repeat the treatment or let the patient take the next meal. In severe hypoglycaemia with unconsciousness (stupor, coma or seizures), **intravenous dextrose** (25%) should be given by infusion through a large-gauge needle. If recovery does not occur, search for additional causes. Frequent blood glucose monitoring will help to prevent severe hypoglycaemia.

Glucagon may be given (1 mg intramuscularly or intravenously) as an alternative to parenteral glucose. It increases plasma glucose concentration by mobilizing glycogen stored in the liver. If there is no response within 10 minutes, intravenous glucose must be given. In nocturnal hypoglycaemia, reduce the dose of insulin or change the timing of evening insulin dose with dinner time. These adjustments are made in conjunction with blood glucose monitoring.

GLUCAGON

Indications: Hypoglycemia

Cautions: Insulinoma, starvation and adrenal insufficiency; ineffective in chronic hypoglycemia

Contra-indications:

Phaeochromocytoma

Side-effects: Nausea, vomiting, diarrhoea; rarely hypersensitivity

Dose: By intramuscularly, intravenously or subcutaneously, for adult and child over 25 kg, 1 mg (1 unit); child under 25 kg, 0.5 unit.

Generic Preparation

Injection: powder for reconstitution, glucagon as hydrochloride with lactose, 1 mg (=1 unit)/vial; 1mg/ml/vial.

5.2.5 DRUGS USED IN DIABETIC NEUROPATHY

In case of painful diabetic neuropathy, optimal control is essential. Patients should be treated with insulin and relief

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can be probably accelerated by continuous insulin infusion. **Aspirin** and **paracetamol** (non-opioids analgesics) are indicated for pain. (**Tricyclic antidepressants** like **Amitriptyline**, **Imipramine**, **Nortriptyline**) are also recommended for the relief of pain. **Duloxetine** is effective for the treatment of

painful diabetic neuropathy. If treatment with amitriptyline or duloxetine is inadequate, treatment with **Pregabalin** should be tried. **Gabapentin** and **Carbamazepine** are sometimes used for the treatment of neuropathic pain (see section 7.6)

In autonomic neuropathy diabetic, diarrhoea can be controlled by 2 or 3 doses of **Tetracycline** 250 mg. Antiemetics may control vomiting in gastroparesis. In neuropathic postural hypotension an increased salt intake and the use of the mineralocorticoid **Fludrocortisone** 100 to 400 microgram daily help by increasing plasma volume but edema is a common side-effect. Gustatory sweating can be managed by antimuscarinics e.g. **Propantheline bromide** (see section 2.3.2).

DULOXETINE

Indications: Major depressive disorder, generalized anxiety disorder, osteoarthritis, painful peripheral neuropathy, particularly diabetic neuropathy, to control the symptoms of fibromyalgia.

Cautions: Increase the risk of suicide in persons younger than 25.

Contraindications: children and adolescents and in the 18–24 age group.

Side-effects: nausea, somnolence, insomnia, dizziness

Dose: diabetic neuropathy, ADULT over 18 years, 60mg once daily; max. 120mg daily in divided doses

Proprietary Preparations

Deloxi (*Eskayef*), Cap., 20 mg, Tk.

7.00/Cap.; 30 mg, Tk. 18.00/Cap.

Diliner (*Square*), DR Cap., 60 mg, Tk. 16.11/Cap.

Dulox (*Acme*), Tab., 30 mg, Tk. 10.07/Tab.; 20mg, Tk. 7.04/Tab.

Duloxen (*Incepta*), Tab., 20 mg, Tk.

7.00/Tab.; 30 mg, Tk.10.00/Tab.

Duzela (*Sun*), Cap., 20 mg, Tk. 7.05/Cap.

Loxetine (*ACI*), Tab., 20mg, Tk. 7.00/Tab.;

30mg, Tk. 10.00/Tab.

Stresin (*Unimed*), Cap., 20 mg, Tk. 8.00/Cap.

Xinolax (*Opsonin*), Cap., 60 mg, Tk.

16.05/Cap.; 30 mg, Tk. 10.00/Cap.

5.3 ADRENOCORTICAL STEROIDS

5.3.1 Replacement therapy

5.3.2 Glucocorticoid therapy

5.3.1 REPLACEMENT THERAPY

The adrenal cortex secretes hydrocortisone (cortisol) which is predominantly a glucocorticoid with weak mineralocorticoid activity. It also secretes aldosterone, a potent mineralocorticoid hormone. Physiological replacement in deficiency state is best achieved by a combination of **Hydrocortisone** and the mineralocorticoid **Fludrocortisone**; hydrocortisone alone usually does not provide sufficient mineralocorticoid activity for complete replacement. In Addison's disease or following bilateral adrenalectomy, hydrocortisone 20–30 mg daily by mouth is usually required. This is given in 2 divided doses, 2/3rd in the morning and rest in the evening; mimicking the normal diurnal rhythm of cortisol secretion. The optimal daily dose is determined on the basis of clinical response. Glucocorticoid therapy is supplemented by fludrocortisone 50–300 micrograms daily. In acute adrenocortical insufficiency, hydrocortisone is given intravenously, (preferably as sodium succinate) in doses of 100 mg every 6-8 hourly in sodium chloride (0.9%) intravenous infusion. Glucocorticoids should be given in hypopituitarism as in adrenocortical insufficiency, but since the production of aldosterone is also regulated by the renin-angiotensin system, a mineralocorticoid is not usually required. Additional replacement therapy with thyroxine and sex hormones should be given as indicated by the hormone deficiency.

Corticosteroid cover for adrenalectomy, for hypophysectomy or for operations on patients on long term treatment with steroids is determined from the

knowledge that normally a person in major stress will not secrete more than 300 mg of cortisol in 24 hours; once the stress is over, return to maintenance dose (approximately 20 mg per 24 hours) gradually. For example: an operation under steroid coverage can be done by one injection of 100 mg hydrocortisone given intramuscularly or intravenously as a premedication, and then repeated 8 hourly. In absence of complications, the dose can be halved every 24 hours until a maintenance dose of 20–30 mg per day is reached on the 5th day after the operation.

5.3.2 GLUCOCORTICOID THERAPY

(See also section 4.2)

Used on a short-term basis, hydrocortisone is given by intravenous route during emergency management of some conditions. The relatively moderate anti-inflammatory potency of hydrocortisone also makes it a first choice topical corticosteroid for the management of inflammatory skin conditions; cortisone is not active topically. **Prednisolone** has predominantly glucocorticoid activity and is most commonly used by mouth for long-term disease suppression. **Prednisone** has similar level of glucocorticoid activity but is only active after conversion in the liver to prednisolone; it is not recommended. **Betamethasone** and **Dexamethasone** have very high glucocorticoid activity in conjunction with insignificant mineralocorticoid activity. This makes them particularly suitable for high dose therapy such as in cerebral edema. They have long duration of action; so they are suitable for conditions which require suppression of ACTH secretion (e.g. congenital adrenal hyperplasia). Some esters of betamethasone and of **Beclomethasone** have a marked topical effect (e.g. on the skin or the lungs) than when given orally. Such topical effect without much systemic activity is useful for skin applications and asthma inhalations. **Deflazacort** is a newly introduced corticosteroid with high

glucocorticoid activity; it is derived from prednisolone.

Side-effects: include diabetes mellitus, osteoporosis, muscle wasting, peptic ulcer, mental disturbances like euphoria, paranoid state or depression. In children, there may be growth suppression. During pregnancy high dose can affect foetal adrenal development. High doses may cause exogenous Cushing's syndrome and suppression of pituitary-adrenal axis leading to secondary adrenal insufficiency and atrophy. This atrophy may persist for years, requiring steroid coverage during any illness or surgical emergency.

Indications: In acute hypersensitive reactions like angioedema of upper respiratory tract or anaphylactic shock, corticosteroids are indicated as adjunct to emergency treatment with adrenaline. In such case hydrocortisone by intravenous injection in a dose of 100 to 300 mg may be required. Corticosteroids are used by inhalation in the management of asthma but systemic therapy in association with bronchodilators are required for the management of severe acute asthma. Corticosteroids are also useful in conditions such as rheumatic fever, chronic active hepatitis and sarcoidosis; they may also lead to remissions of acquired haemolytic anemia, and some cases of nephrotic syndrome and thrombocytopenic purpura. Corticosteroids can improve the prognosis of serious conditions such as systemic lupus erythematosus (SLE). The suppressive action of corticosteroid on cortisol secretion is least when it is given in the morning; therefore whenever possible single morning dose of steroid is preferred. For special safety precautions during pregnancy and breast-feeding, see Appendix-5 & 6.

BECLOMETHASONE DIPROPIONATE

Indications: Chronic bronchial asthma not controlled by short-acting β_2 agonists (See also section 4.2)

Cautions: See section 4.2

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Side effects: See also section 4.2. It can cause candidiasis which can be prevented by using spacer. It also responds to antifungal lozenges after inhalation of a dose. There may not be any need to discontinue the therapy

Dose & Preparations: See section 4.2

BETAMETHASONE ^[ED]

Indications: Suppression of inflammatory and allergic disorders, congenital adrenal hyperplasia, cerebral edema; see notes above and ENT (sec.11.), eye (sec 10), and skin (sec. 12)

Cautions; Contraindications; Side-effects: See notes above

Interactions: See Appendix-2

Dose: By mouth, usual range 0.5-5 mg/day.; by intramuscular injection or slow intravenous injection or infusion, 4–8 mg, repeat up to 4 times in 24 hours; for CHILD: by slow intravenous injection, up to 1 year 1 mg, 1–5 years 2 mg, 6–12 years 4 mg

Proprietary Preparations

Bet-A (Acme), Tab., 0.50 mg, Tk. 0.72/Tab
Betnelan (GSK), Tab., 0.5 mg, Tk. 0.63/Tab.

DEFLAZACORT

Indications: Suppression of inflammatory and allergic disorders

Cautions: History of adrenal suppression, infections (ex-chickenpox, shingles, measles) children, elderly, tuberculosis, recent heart attack,

Contra-indications: Renal impairment, pregnancy and breast feeding, active thyroid, osteoporosis, diabetes mellitus

Side-effects: Impaired glucose tolerance, weight gain, abdominal bloating, nausea, muscle weakness, change in pigmentation, increased hair growth, mood changes

Dose: ADULT: Initially up to 120 mg/day maintenance: 3-18 mg/day. CHILD: oral: 0.25-1.5 mg/kg/day given on alternate days. Suspension: 5 ml-60ml per day.

Proprietary Preparations

Cortiflo (Beximco), Tab., 6mg, Tk. 10/Tab.
Cortimax (Acme), Tab., 24 mg, Tk. 30.00/Tab.; 6.00 mg, Tk. 8.00/Tab.
Deflacort (Square), Suspn., 6 mg/5 ml, Tk. 200.00/60ml, Tab., 24 mg, Tk. 30.00/Tab.; 6 mg, Tk. 8.03/Tab
Deflazit (Incepta), Tab., 24 mg, Tk. 30.00/Tab.; 6 mg, Tk. 8.00/Tab.
Defzort (ACI), Tab., 24mg, Tk. 30.00/Tab.; 6mg, Tk. 8.00/Tab.
Flacort (Aristo), Tab., 6mg, Tk. 8.00/Tab.
Nuvicort (Nuvista), Tab., 6 mg, Tk. 8.00/Tab.
Xalcort (Beacon), Tab., 24mg, Tk. 30.00/Tab.; 6mg, Tk. 8.02/Tab.; Suspn., 6mg/5mg, Tk. 200.00/60 ml

DEXAMETHASONE ^[ED]

Indications: Suppression of inflammatory and allergic disorders; shock; diagnosis of Cushing's syndrome; congenital adrenal hyperplasia; cerebral edema; rheumatic disorders

Cautions; Contraindications; Side-effects: See notes above and under prednisolone;

Interactions: see Appendix-2

Dose: By mouth, usual range 0.5-10 mg/day; by intramuscular injection or slow intravenous injection or infusion (as with dexamethasone phosphate), initially 0.5–20 mg; for CHILD: 200–500 micrograms/kg daily. For cerebral edema (as dexamethasone phosphate), by intravenous injection, 10 mg initially, then 4 mg intramuscularly once every 6 hours as required for 2–10 days

Proprietary Preparations

Amason (Ambee), Tab., 0.5mg, Tk 1/Tab.
D-Cort (Globe), Tab., 0.50 mg, Tk. 0.75/Tab.; Inj., 5 mg /ml, Tk. 15.00/Amp.
Decafos (Techno), Tab., 0.5 mg, Tk. 0.38/Tab.; Inj, 5 mg/ml, Tk. 17.00/Amp.
Decason (Opsonin), Inj., 5 mg/ ml, Tk. 16.66/Amp.; Tab., 0.5 mg, Tk. 0.75/Tab.
Dexa (Renata), Tab., 0.5 mg, Tk. 0.75/Tab.; Inj, 5 mg/ml, Tk. 25.00/Amp.
Dexagen (General), Inj, 5 mg/ ml, Tk. 22.00/Amp.; Tab., 0.5 mg, Tk. 1.00/Tab.
Dexam (Medimet), Inj., 0.05mg/Amp., Tk. 15.00/Amp.; Tab., 0.05mg, Tk. 1.00/Tab.
Dexamet (Rephco), Inj, 5 mg/ ml, Tk. 16.00/Amp.; Tab., 0.5 mg, Tk. 0.70/Tab.
Dexamethasone (Albion), Tab., 0.5 mg, Tk. 1.00/Tab.

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Dexamethasone(APC), Tab., 0.5 mg, Tk. 0.42/Tab.
Dexamin (Jayson), Inj, 5 mg/ ml, Tk. 18.00/Amp. Tab. , 0.5 mg, Tk. 0.55/Tab.
Dexan (Chemist), Tab., 0.5 mg, Tk. 0.42/Tab.; Inj., 5 mg, Tk. 15.00/ ml Amp.
Dexon (Ibn Sina), Inj, 5 mg/ ml, Tk. 16/Amp.
Dexonex (Square), Inj, 5 mg / 5 ml, Tk. 20.00/Amp. ;Tab. , 0.5 mg, Tk. 0.89/Tab.
Dextason (Ziska), Inj., 5mg/1ml, Tk. 12.00/1mlAmp.; Tab., 0.5mg, Tk. 0.60/Tab.
Dextor (Eskayef), Tab, 0.5 mg, Tk. 1.00/Tab.
G-Dexamethasone (Gonoshasthaya), Inj, 4mg/ ml, Tk. 10.00/Amp
Gludex (Kemiko), Inj, 5 mg/ml , Tk. 22.00/Amp. ;Tab. , 0.5 mg, Tk. 1.00/Tab.
Odeson (Beximco), Inj, 4 mg/ ml, Tk. 15/Amp.
Sonexa (Aristo), Inj, 5 mg/ ml, Tk. 15/Amp.
Stedex (Navana), Inj, 5 mg/ ml, Tk. 22/Amp
Steron (Acme), Inj, 5 mg/ ml , Tk. 22.00/Amp. ;Tab. 0.5mg, Tk. 0.9/Tab.

HYDROCORTISONE [ED]

Indications: Adrenocortical insufficiency; shock; hypersensitivity reactions (such as anaphylactic shock, angioedema), inflammatory bowel disease, rheumatic disease, eye disease, skin disease (see sections 10 & 11)

Cautions; Contraindications & Side-effects: See notes above and under Prednisolone

Interactions: See Appendix-2

Dose: By mouth, replacement therapy, 20-30 mg/day in divided doses. For CHILD: 10-30 mg/day. By Intramuscular injection or slow intravenous injection or infusion, 100–500 mg, 3–4 times in 24 hours or as required; in CHILD: by slow intravenous injection up to 1 year 25 mg, 1-5 years 50 mg, 6–12 years 100 mg

Proprietary Preparations

Anacort (Techno), Inj.,100 mg/vial,Tk. 60/Vial
Cortef (Aristo), Inj., 100 mg/vial, Tk. 50/Vial
Cortinex (Ziska), Inj., 100 mg/Vial, Tk. 50/Vial
Cotson (Opsonin),Inj.,100 mg/vial, Tk. 37.74/Vial
Glucort (Globe), Inj., 100 mg/Vial, Tk. 50/Vial
Hison (ACI), Inj., 100 mg/vial, Tk. 50.19/Vial
Hycort (Chemist), Inj., 100 mg/Vial, Tk. 50/Vial
Intasone (Incepta), Inj.,100 mg/vial, Tk. 50/Vial

METHYLPREDNISOLONE

Indications: Suppression of inflammatory and allergic disorders; cerebral

edema; rheumatic disorders (see sec. 9.1.2.1), skin diseases (see section 12)

Cautions; Contraindications & Side-effects: See notes above and; rapid intravenous administration of large dose has been associated with cardiovascular collapse

Interactions: See Appendix-2

Dose: By mouth, usual range 2-40 mg/day, for chemotherapy emesis. By intramuscular injection or slow intravenous injection or infusion (as dexamethasone phosphate), initially 10-100 mg; graft rejection up to 1 g/day by infusion for up to 3 days

Proprietary Preparations

Depodrol (Opsonin), Tab.,16 mg , Tk. 20.00/Tab.; 2 mg , Tk. 3.00/Tab.; 4 mg , Tk. 5.00/Tab.; 8 mg , Tk. 10.00/Tab.
Depomed (Drug Intl), Tab., 4mg, Tk. 6.00/Tab. ;
Medrol [®] (Pfizer), Tab.,4mg, Tk. 7.52/Tab.; 16mg, Tk. 23.45/Tab
Mepcort (Globe), Tab., 8mg, Tk. 10.03/Tab.; 16mg, Tk. 20.06/Tab.; 4mg, Tk. 5.01/Tab.; 2mg, Tk. 3.01/Tab.
Methipred (General), Tab. , 8mg, Tk. 10.03/Tab.; 16mg, Tk. 20.06/Tab.; 4mg, Tk. 5.01/Tab.; 2mg, Tk. 3.01/Tab.
Methsolon (Incepta), Tab. , 4 mg, Tk. 5.00/Tab. ; 16 mg, Tk. 20.00/Tab.
Predixa (UniMed), Tab ,16mg, Tk. 24.00/Tab.; 4mg, Tk. 6.00/Tab.; 8mg, Tk. 12.00/Tab.
Solupred (Ziska), Tab., 4 mg, Tk. 5.00/Tab.; 8 mg, Tk. 3.00/Tab.; 16 mg, Tk. 15.00/Tab.; 2 mg, Tk. 3.00/Tab.

Methylprednisolone Acetate

Depo Medrol [®] (Pfizer) Inj., 40mg/ml, Tk. 111.36/Vial.; 80mg/2ml, Tk. 143.00/Vial.
Depodrol (Opsonin), Inj., 40 mg/vial, Tk. 48.87/Vial
Depomed (Drug Intl), Inj., 40mg/ml, Tk. 75.25/Vial.; 80mg/2ml, Tk. 100.30/Vial.
Depo-pred (Ziska), Inj., 40mg/ml, Tk. 75.00/ml Vial
Medrol (Techno), Inj., 40 mg/vial, Tk. 65.00/Vial ; 80 mg/vial, Tk. 90.00/Vial
Mepcort (Globe), Inj., 1 gm, Tk. 1000.00/Vial; 500 mg, Tk. 600.00/Vial
Uni-medrol (Chemist), Inj., 40mg/1ml, Tk. 65.00/1 ml Vial; 80mg/2ml, Tk. 90.00/2 ml Vial

Methylprednisolone (as Sodium Succinate)

Depomed (Drug Intl), Inj. 500mg/Vial, Tk. 600.00/Vial

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Mepcort (*Globe*), Inj. , 500 mg/Vial, Tk. 600.00/Vial
Methsolon, (*Incepta*), Inj. , 1gm/Vial, Tk. 1000.00/Vial ; 500 mg/Vial, Tk. 600.00/Vial
Methyl Prednisolon sodium succinate⁽ⁿ⁾ (*Rotex*), Inj., 500mg/15ml vial Tk.679.65/vial
Pro-Medrol (*Techno*), Inj., 1 gm/Vial, Tk. 1,200.00/Vial; 500 mg/Vial, Tk. 800.00/Vial
Solu Medrol⁽ⁿ⁾ (*Pfizer*) Inj., 1 gm/Vial, Tk. 1,975.65/Vial; 500mg/Vial, Tk. 1,580.,24/Vial
Solupred (*Ziska*), Inj., 125 mg/Vial, Tk. 200.00/Vial; 1g/Vial, Tk. 1000.00/Vial; 500mg/Vial, Tk. 600.00/Vial

PREDNISOLONE ^[ED]

Indications: Suppression of inflammatory and allergic disorders, inflammatory bowel disease, asthma, immunosuppression, rheumatic disease (sec 9.1.2.1); see notes above and also sub-sections on ear (sec.11.1), eye (sec 10), nose (sec11.2) and skin (sec 11.2)

Cautions: Adrenal suppression, infection, children and adolescents (growth retardation); elderly frequent monitoring required in those with history of tuberculosis, hypertension, recent myocardial infarction, congestive heart failure, liver failure, renal impairment, diabetes mellitus, osteoporosis, glaucoma, severe affective disorders, epilepsy, peptic ulceration, hypopituitarism, history of steroid myopathy; pregnancy and breastfeeding.

Adrenal suppression: Prolonged therapy with prednisolone may cause adrenal atrophy which may persist for years after withdrawal of the drug. Too rapid reduction of dose after prolonged course (more than 7 days) can lead to adrenal crisis (shock). So withdrawal should be gradual-over weeks or even months, depending on dose and duration of therapy. Withdrawal may also be associated with fever, myalgia, arthralgia, rhinitis, conjunctivitis, painful itchy skin nodules and loss of weight. Any significant intercurrent illness, traumas, or surgical procedures requires a temporary increase in dosage, or if already stopped, a temporary re-introduction of corticosteroids. Patients on steroid therapy should carry a treatment card giving clear instructions

on precautions to be taken to minimize risk and provide details of drug, dose and duration of treatment. Anaesthetists must know whether a patient is taking or has been taking corticosteroids to avoid precipitous fall of blood pressure during anaesthesia or in the immediate post-operative period

Infections: Susceptibility and severity of infections may be increased and clinical presentation may be atypical. Serious infections e.g. septicaemia and tuberculosis may reach an advanced stage before being recognized. Symptoms of amoebiasis, strongyloidiasis, measles and chickenpox may exacerbate if corticosteroids are being taken by the patients simultaneously

Contra-indications: Systemic infection (until specific treatment is given); avoid live virus vaccines in those receiving immunosuppressive doses

Side-effects: Use of lowest effective dose can minimize side-effects. Gastrointestinal effects include dyspepsia, peptic ulceration (with perforation), abdominal distension, acute pancreatitis, oesophagial ulceration and candidiasis. Musculoskeletal effects include proximal myopathy, osteoporosis, vertebral and long bone fractures, avascular osteonecrosis, tendon rupture. Endocrine effects include adrenal suppression, menstrual irregularities and amenorrhoea. Cushing's syndrome (with high dose), hirsutism, weight gain, negative nitrogen and calcium balance, increased appetite. Neuropsychiatric effects include euphoria, dependence, depression, insomnia, increased intracranial pressure with papilledema in children, psychosis and aggravation of schizophrenia, suicidal tendencies, aggravation of epilepsy. Ophthalmic effects include glaucoma, papilledema, posterior sub-capsular cataract, corneal or scleral thinning and exacerbation of viral or fungal eye disease. Other side-effects include impaired healing, skin atrophy, bruise, striae, telangiectasia, acne, myocardial rupture following recent myocardial infarction, fluid and electrolyte imbalance, leukocytosis,

hypersensitivity reactions (including anaphylaxis), thromboembolism, nausea, hiccup and malaise

Interactions: See Appendix-2 (corticosteroids)

Dose: By mouth, up to 10-20 mg/day (severe disease, up to 60 mg/day), preferably taken in the morning after breakfast; can often be reduced within few days but may need to be continued for several weeks or months. For maintenance, usual range 2.5–15 mg/day, but higher dose may be needed; Cushingoid side-effects are likely with dose above 7.5 mg/day

by intramuscular injection, prednisolone acetate, 25–100 mg once or twice weekly

Proprietary Preparations

Adam (Nuvista), Tab., 20 mg, Tk. 6.28/Tab., 5 mg, Tk. 1.73/Tab.

Altason (Albion), Tab., 10 mg, Tk. 2.07/Tab.; Tab., 20 mg, Tk. 3.73/Tab.; Tab., 5 mg, Tk. 1.14/Tab.

Bexipred (Beximco), Tab., 10mg, Tk. 3.23/Tab., 20mg, Tk. 6.28/Tab., 5mg, Tk. 3.23/Tab.

Cortan (Incepta), Tab., 2.5 mg, Tk. 0.80/Tab., 20 mg, Tk. 6.27/Tab., 5 mg, Tk. 1.72/Tab., 10 mg, Tk. 3.23/Tab.

Cortisol (Aristo), Tab., 5 mg, Tk. 1.70/Tab.; 20 mg, Tk. 6.25/Tab.; 10 mg, Tk. 3.20/Tab.; Syrup 5 mg/5 ml, 5 mg/5 ml, Tk. 65.00/50 ml

Deltapred (Ziska), Tab., 10mg, Tk. 2/Tab.; 20mg, Tk. 3.70/Tab.; 5mg, Tk. 1.10/Tab.

Deltasone (Renata), Tab., 2.5 mg, Tk. 0.33/Tab., 20 mg, Tk. 6.26/Tab., 5 mg, Tk. 1.72/Tab., 10 mg, Tk. 3.23/Tab.

G-Prednisolone (Gonoshasthaya), Tab., 5 mg, Tk. 1.14/Tab.

Inflagic (Square), Tab., 5 mg, Tk. 1.15/Tab.; Tab., 20 mg, Tk. 6.27/Cap.

P-cort (Globe), Tab., 5 mg, Tk. 1.70/Tab., Syrup, 5 mg/5 ml, Tk. 60.00/50 ml

Pedipred (Ziska), Syrup, 5mg/5ml, Tk. 95/100ml; Tk. 60/50ml

Precodil (Opsonin), Tab., 10 mg, Tk. 2.43/Tab. 20 mg, Tk. 4.71/Tab.; 5 mg, Tk. 0.86/Tab.

Pred (Eskayef), Tab, 5 mg, Tk. 1.14/Tab.; 20 mg, Tk. 3.70/Tab.; 10 mg, Tk. 2.00/Tab.

Prednelan (GSK), Tab., 20 mg, Tk. 281.97/Tab.; Tab., 5 mg, Tk. 1.50/Tab.

Prednisolone (Ambee), Tab., 5 mg, Tk. 1.2/Tab. Syrup 5 mg/5 ml, Tk. 60.00/50 ml; Tk. 95.00/100ml

TRIAMCINOLONE

Indications: Suppression of inflammatory and allergic disorders; rheumatic disorders (section 9.1.2.1), mouth and skin diseases (sections 11.2.1 & 12.3)

Cautions; Contraindications & Side-effects: See notes above and under Prednisolone; triamcinolone in high dosage has a greater tendency to cause proximal myopathy and should be avoided in chronic therapy

Interactions: See Appendix-2.

Dose: By mouth, usual range 2-24 mg/day; by deep intramuscular injection, 40 mg of acetate for depot effect, repeated at intervals according to patient's response; maximum single dose 100 mg

Proprietary Preparations

Alfacort (Ziska), Inj., 40 mg/ml, Tk. 60/Vial

Cenolon (Incepta), Inj., 40 mg/vial, Tk. 75/Vial

Cynocort (Techno), Inj., 40 mg/vial, Tk. 60/Vial

Trecilon (Rephco), Inj., 40 mg/vial, Tk. 65/Vial

Triacin (Kemiko), Inj., 40 mg/vial, Tk. 60/Vial

Trialon (Drug Int.), Inj., 40 mg/vial, Tk. 75/Vial;

Triamon (Globe), Inj., 40 mg/ml, Tk. 70/1ml amp

Trimcort (Chemist), Inj., 40 mg/ml Tk. 60/1 ml Vial;

5.4 SEX HORMONES

5.4.1 FEMALE SEX HORMONES AND ANTAGONISTS

5.4.1.1 OESTROGENS AND HRT

5.4.1.2 PROGESTERONE

5.4.2 ANTI-OESTROGENS

5.4.3 MALE SEX HORMONES AND ANTAGONIST

5.5.4 ANABOLIC STEROIDS

5.4.1 FEMALE SEX HORMONES AND ANTAGONISTS

5.4.1.1 OESTROGENS AND HORMONE REPLACEMENT THERAPY (HRT)

Oestrogens are necessary for puberty development in female; they also stimulate myometrial hypertrophy with endometrial hyperplasia. **Natural oestrogens** (oestradiol, oestrone and oestriol) have more appropriate profile in terms of oestrogenic activity than

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synthetic oestrogens (ethinyloestradiol, mestranol, stilboesterol) for hormone replacement therapy (HRT). The activity of **Conjugated oestrogens** resemble that of natural oestrogens.

Oestrogen therapy is given cyclically or continuously for a number of gynaecological conditions. During long term treatment a progestogen should be added to prevent cystic hyperplasia of endometrium and possible transformation to cancer. Oestrogens are no longer used to suppress lactation because of their association with thromboembolism.

Hormone Replacement Therapy (HRT)

Hormone replacement therapy is indicated for menopausal women to relieve the inconveniences due to vaginal atrophy or vasomotor instability. Oestrogens relieve vasomotor symptoms, prevent bone loss, promote new bone formation, restore normal urogenital and skin epithelium, reduce incidence of stroke and myocardial infarction. Only small dose oestrogens are used for HRT, either alone or in combination with progestogens. A woman with uterus requires oestrogen with cyclical progestogen for the last 10-14 days of the cycle or administration of a preparation which combines both oestrogenic and progestogenic activity. Oestrogen therapy alone is suitable for long-term continuous therapy in a woman without a uterus. Cyclical HRT (where a progestogen is taken for 10-14 days of each cycle) usually results in a regular withdrawal bleeding towards the end of the progestogen. The aim of continuous combined HRT (where a combination of oestrogen and progestogen is taken continuously) is to avoid withdrawal bleeding but irregular bleeding may occur during early treatment stages; if it continues, endometrial abnormality needs to be excluded and cyclical HRT considered.

With HRT, there is an increased risk of endometrial cancer, which can be reduced by combining progestogens along with oestrogens. After prolonged use for some years, there may be an increased risk of breast cancer. Recent

studies indicate an increased risk of deep vein thrombosis and of pulmonary embolism in women taking HRT. Being beneficial for most menopausal women, HRT may be prescribed if not specifically contraindicated. HRT should be undertaken only under specialist supervision.

Side-effects of HRT include nausea, vomiting, breast enlargement and tenderness, premenstrual-like syndrome, fluid retention, change in liver function, cholestatic jaundice, rashes and chloasma, depression, migraine or migraine like headache. Transdermal delivery system may cause contact sensation (possible severe hypersensitivity reaction on continued exposure).

Contraindication of HRT: Oestrogen dependent neoplasm (oestrogen receptor positive); active thromboembolism; liver diseases, Dubin-Jansons and Rotor syndrome; undiagnosed abnormal genital bleeding.

Choice of Preparation: Many proprietary single or combination preparations for HRT are available in the international market but only a few of them are available in Bangladesh now. Some of the preparations available in Bangladesh are listed below. For doses and instructions "see manufacturers' literature and inserts."

Proprietary Preparations

Prempak-C[®] (Ayrest), Tab. conjugated oestrogen 625 microgram and norgestrel 150 microgram. Tk. 12.33/Tab

Pausogest[®] (Richter), Tab. estradio 2mg and Norethisteron 1mg Tk. 25.22/Tab.

Estrimox[®] (Richter), Tab. estradiol 2mg Tk. 417.23/28's Tab

Conjugated oestragens only

Estracon (Renata), Tab., 0.625mg, Tk. 20/Tab.

Premicon (Techno), Tab., 0.625mg, Tk. 15/Tab

Premarin[®] (Ayrest), Tab. 0.625mg, Tk. 29.85/Tab

ETHINYLOESTRADIOL

(Other name: Ethinylestradiol)

Indications: Used as hormone replacement in menopause in a dose of

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10-20 micrograms daily. This has now been largely replaced by more suitable forms of oestrogen. It is also used in breast cancer

Cautions; Contra-indications; Side-effects: Cardiovascular disease and hepatic impairment

Interactions: see appendix-2

Dose: see indications above

Generic Preparation

Tablets, 10 micrograms; 50 micrograms

OESTRIOL

Oestriol is a naturally occurring oestrogen with actions similar to other oestrogenic hormones.

Indications: Treatment of and prophylaxis of menopausal disorders. It has also been given in combination with other natural oestrogens in HRT (see notes above)

Cautions, Contraindications: pregnancy, thrombosis, oestrogen dependent tumours, undiagnosed vaginal bleeding

Interactions: see Appendix-2

Side-effects: pain in breast, spotting or excessive cervical exudation (reduce dose), nausea

Doses: for short-term treatment orally 500 micrograms to 3 mg daily as single dose for one month and then reduced to 500 micrograms to 1 mg daily; usual doses range from 250 micrograms to 2 mg daily

Proprietary Preparations

Defogen (*Incepta*), Tab., 1 mg, Tk. 8.00/Tab.

Femastin (*Square*), Tab., 1 mg, Tk. 8.00/Tab.

Ovestin (*Nuvista*), Tab. 1mg Tk. 9.90/Tab.;

Ovestin[®](*Organon*) Cream 1 mg/g; Tk. 240.05/15g

TIBOLONE

Tibolone (a synthetic steroid structurally related to norethinodrel) combines oestrogenic and progestogenic activity with weak androgenic activity.

Indications: Treatment of vasomotor symptoms in oestrogen deficiency menopausal women (including women being treated with gonadotrophin

releasing hormone analogues), osteoporosis pro-phylaxis and HRT. Tibolone is now popular for HRT because no withdrawal bleeding occurs if it is started after one year of spontaneous menopause

Cautions: Renal insufficiency, epilepsy, migraine, diabetes, hypercholesterolemia, abnormal liver function tests, thrombophlebitis, thromboembolism, pregnancy, breast-feeding, uninvestigated vaginal bleeding
Contraindications: Hormone dependent neoplasm; active thromboembolism; liver diseases, undiagnosed abnormal genital bleeding

Interactions: See Appendix-2

Side-effects: Weight change, ankle edema, seborrhoeic dermatitis, vaginal bleeding, gastrointestinal disturbance, headache, increased facial hairs, migraine, visual disturbance, liver function test abnormality; rash and pruritus has also been reported

Dose : 2.5 mg daily continuous

Proprietary Preparations

Menorest (*Renata*), Tab., 2.5 mg, Tk. 20.07/Tab.

Renorma (*Square*), Tab., 2.5 mg, Tk. 20.07/Tab.

Tibo(*Popular*), Tab., 2.5 mg, Tk. 20.08/Tab.

Tibon (*Techno*), Tab., 2.5 mg, Tk. 15.00/Tab.

Tibonor (*Eskayef*), Tab., 2.5 mg, Tk. 20.00/Tab.

Tivion (*ACI*), Tab., 2.5 mg, Tk. 20.00/Tab.

Ubilon (*Incepta*), Tab., 2.5 mg, Tk. 20.00/Tab.

Liviol[®](*Organon*) Tab., 2.5 mg, Tk. 2,200.00/Tab.

5.4.1.2 PROGESTOGENS

There are two main groups of progestogen-progesterone and its analogues (dydrogesterone, hydroxyprogesterone, medroxyprogesterone); and testosterone analogues (norethisterone and norgestrel). The newer progestogens (desogestrel, norgestimate, and gestodene) are derivative of norgestrel; levonorgestrel is the active isomer of norgestrel and has twice its potency. Progesterone and its analogues are less androgenic than the testosterone derivatives; neither

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progesterone nor dydrogesterone causes virilisation. Other synthetic derivatives are variably metabolised into testosterone and oestrogen; thus side-effects vary with preparations and the dose. Some progestogens such as norethisterone are used in endometriosis.

Oral progestogens are used widely for menorrhagia but they are relatively ineffective compared to other agents. Oral progestogens are also used for severe dysmenorrhea, but in young women where contraceptive is also necessary, best choice is combined oral contraceptives. Progestogens are used for alleviation of premenstrual symptoms, but no convincing physiological basis for treatment has been shown. Progestogens have been used in habitual abortion but there is no evidence of benefit; if they are used for this purpose they should be of true progesterone derivatives (e.g. hydroxyprogesterone hexanoate) to avoid possible masculinisation of female fetus. In post-menopausal women receiving long-term oestrogen therapy for hormone replacement, a progestogen needs to be added to prevent cystic hyperplasia of the endometrium and possible transformation to cancer. **Desogestrel, Ethynodiol, Gestodene, Levonorgestrel, Norethisterone and Norgestimate** are used in combined oral contraceptives and in progestogen only contraceptives (see section 6.3.2.1). Progestogens have no role in neoplastic disease.

DYDROGESTERONE

Indications: See under dose and notes above

Cautions; Contra-indications & Side-effects: See under Medroxyprogesterone Acetate and notes above; break-through bleeding may occur

Dose: Endometriosis, 10 mg 2-3 times daily from 5th to 25th day of cycle or continuously; dysfunctional uterine bleeding, 10 mg twice daily (together with an oestrogen) for 5-7 days to arrest bleeding, and 10 mg (together with an

oestrogen) from 11th to 25th day of cycle to prevent bleeding; dysmenorrhoea (see notes above), 10 mg twice daily from 5th to 25th day of cycle; amenorrhoea, 10 mg twice daily from 12th to 25th day of cycle with oestrogen therapy from 1st to 25th day of cycle; premenstrual syndrome (see notes above), 10 mg twice daily from 12th to 26th day of cycle increased if necessary; hormone replacement therapy, with continuous oestrogen therapy (see section 7.5.1.1), 10 mg daily on days 15-28 of each 28-day oestrogen HRT cycle, increased to 10 mg twice daily if withdrawal bleeding is early or endometrial biopsy shows inadequate gestational response; habitual abortion (see notes above), 10mg twice daily from 16th to 25th day of cycle until conception, then continuously until 20th weeks of gestation and gradually reduced

Proprietary Preparation

Duphaston[®] (Abbott), Tab. 10 mg.
Tk.29.81/Tab

HYDROXYPROGESTERONE HEXANOATE

Indications: Habitual abortion & see note above.

Cautions: Pregnancy, diabetes.

Contraindications & Side-effects: See under Medroxyprogesterone and notes above.

Dose: By slow intramuscular injection, 250-500 mg weekly during first half of pregnancy.

Proprietary Preparation

HPC (Popular), Inj., 250 mg/vial, Tk. 350/Vial

LYNOESTRENOL

(Lynestrenol)

Indications: Uses similar to those described for other progestogens. It has been used as an adjunct to oestrogen therapy in menopausal disorders. It is also used as the progestogenic component of some combined oral

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contraceptives or as a progestogen only contraceptive.

Cautions; Contraindications &

Side-effects: As with other progestogens.

Proprietary Preparation

Lynotril (ACI), Tab., 5mg, Tk. 12.00/Tab.

Orgatril (Nuvista), Tab. 5mg, Tk. 11.55/Tab.

MEDROXYPROGESTERONE ACETATE

Indications: See under dose, contraception (see section 6.3.2.1), malignant disease (see section 14.3.2).

Cautions: Diabetes, hypertension, cardiac or renal disease

Interactions: See Appendix -2.

Contraindications: Pregnancy, undiagnosed vaginal bleeding, active liver disease, breast or genital tract carcinoma

Side-effects: Gastrointestinal upset, change in libido, breast discomfort, premenstrual symptoms, irregular menstrual cycles, depression, insomnia, alopecia, hirsutism, anaphylactoid-like reactions, rarely jaundice

Dose: By mouth, 2.5–10 mg daily for 5–10 days beginning on 16th to 21st day of cycles, repeated for 2 cycles in dysfunctional uterine bleeding and 3 cycles in secondary amenorrhoea; mild to moderate endometriosis, 10 mg 3 times daily for 90 consecutive days beginning on 1st day of cycle. By deep intramuscular injection (see section 6.3.2.2)

Proprietary Preparations

See section 6.3.2.1

NORETHISTERONE

Indications: See under dose, HRT (section 5.4.1.1); contraception (section 6.3.2.1)

Cautions; & Side-effects: see under medroxyprogesterone acetate,

Contraindications: pregnancy, epilepsy and migraine

Dose: Endometriosis, 10 mg daily for 4–6 months or longer, starting on day 5 of cycle (increase the dose to 20–25 mg daily if spotting occurs, reduce once bleeding stops); menorrhagia, 5 mg 3 times daily for 10 days to arrest bleeding, and to prevent bleeding 5 mg twice daily from 19th to 26th day of cycle; dysmenorrhoea, 5 mg 3 times daily from day 5 to 24 for 3–4 cycles; premenstrual syndrome, 5 mg 2 to 3 times daily from day 19 to 26 for several cycles; postponement of menstruation, 5 mg 3 times daily starting 3 days before anticipated onset (menstruation occurs 2–3 days after stopping); progestonic supplement to oestrogen in HRT (see section 5.4.1.1)

Proprietary Preparations

Ethinor (Eskayel), Tab, 5 mg, Tk. 5.00/Tab.

Menogia (ACI), Tab., 5 mg, Tk. 5.00/Tab.

Menoral (Square), Tab., 5 mg, Tk. 5.50/Tab.

Norestin (Beximco), Tab., 5 mg, Tk. 6.84/Tab.

Normens (Renata), Tab., 5 mg, Tk. 5.50/Tab.

Noteron (Incepta), Tab., 5 mg, Tk. 5.50/Tab.

Remens (Popular), Tab., 5 mg, Tk. 5.01/Tab.

PROGESTERONE

Indications: See under dose and notes above

Contraindications: See notes above; missed or incomplete abortion

Side-effects: See notes above; injection site reaction; pain; diarrhoea and flatulence can occur with rectal administration

Dose: Menopausal symptoms, insert 1 applicator of 4% gel on alternate days for the last 12 days of oestrogen therapy in each cycle

Infertility due to inadequate luteal phase, insert 1 applicator of 8% gel daily starting either after documented ovulation or on day 18–21 of cycle. In vitro fertilization, daily application of 8% gel, continued for 30 days after laboratory evidence of pregnancy.

Proprietary Preparations

Crinone[®] (Merck), Gel, 8%, Tk. 339.00/1.45 gm

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Microgest (*Renata*), Cap., 100 mg, Tk. 15/Cap.
200 mg, Tk. 30/Cap.

5.4.2. ANTI-OESTROGENS

The anti-oestrogens **Clomiphene** and **Tamoxifen** are used in treatment of infertility due to ovulatory dysfunctions (as in polycystic ovarian syndrome). They induce gonadotropin release by occupying oestrogen receptors in the hypothalamus, thereby interfering with feedback mechanism; chorionic gonadotropin is sometimes used as adjunct. Patient should be warned that there is risk of multiple pregnancy.

CLOMIPHENE CITRATE

(Clomifene Citrate)

Indications: An ovulatory infertility, see notes above; Men: when a low sperm count is caused by low testosterone levels

Cautions: Polycystic ovary, ovarian hyper stimulation syndrome, uterine fibroids, ectopic pregnancy, multiple pregnancy, visual impairment.

Contraindications: Hepatic disease, ovarian cysts, hormone dependent tumours, undiagnosed abnormal uterine bleeding, pregnancy.

Interactions: See Appendix-2.

Side-effects: Visual disturbance, hot flushes, ovarian hyperstimulation, abdominal discomfort, nausea, vomiting, depression, insomnia, breast tenderness, headache, intermenstrual spotting, menorrhagia, endometriosis, convulsions, weight gain, rashes, dizziness, hair loss

Dose: An ovulatory infertility; 50 mg daily for 5 days, starting within about 5 days of menstruation (preferably on 2nd day) or at any time (normally preceded by a progestogen-induced withdrawal bleeding) if no menses; second course of 100 mg daily for 5 days may be given if there is no ovulation; 3 courses should constitute adequate trial; long term cyclical therapy not recommended

Proprietary Preparations

Clomifen (*Novo Health*), Tab., 50 mg, Tk. 10.00/Tab.

Comipen (*Pacific*), Tab., 50 mg, Tk. 3.76/Tab.

Fermid (*G.A.co*), Tab., 50 mg, Tk. 10/Tab

Fertil (*Beximco*), Tab., 50 mg, Tk. 10/Tab.

Ovuclon (*Incepta*), Tab., 100 mg, Tk. 18.00/Tab.; Tab., 50 mg, Tk. 10/Tab.

Ovulet (*Renata*), Tab., 100 mg, Tk. 18.06/Tab.; Tab., 50 mg, Tk. 10.04/Tab.

Reomen (*Eskayef*), Tab., 50mg, Tk. 10/Tab.

5.4.3 MALE SEX HORMONES AND ANTAGONISTS

Masculinisation is caused by androgens; they may be used as replacement therapy in adult with androgen deficiency due to pituitary or testicular disease or for castration. In normal males they inhibit gonadotropin secretion and thereby suppress spermatogenesis. Androgens also have anabolic action which led to the development of anabolic steroids (see section 5.4.4).

Treatment of impotence and impaired spermatogenesis by androgens is useless if there is associated hypogonadism. Androgen treatment in hypopituitarism can lead to normal sexual development and potency but not to fertility. When fertility is desired, gonadotropins or pulsatile gonadotropin releasing hormones therapy will stimulate spermatogenesis as well as androgen production. Induction of puberty in boys with delayed puberty by use of androgens or **Chorionic gonadotropin** should be used with caution, and only under expert supervision.

Intramuscular depot preparations of **Testosterone esters** are preferred for replacement therapy. Testosterone enanthate or propionate or a mixture of them has long duration of action. Menopausal women are also sometimes given implant of testosterone (in a dose 50-100 mg every 4-8 months) as an adjunct to hormone replacement therapy.

TESTOSTERONE AND ESTERS

Indications: Testosterone replacement therapy in male hypogonadal disorders; osteoporosis due to androgen deficiency

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Cautions: Cardiac, renal or hepatic impairment; elderly, ischaemic heart disease, hypertension, epilepsy, migraine, skeletal metastasis (risk of hypercalcaemia), pre-pubertal boys (see notes above)

Contraindications: Breast cancer in men, prostate cancer, hypercalcaemia, pregnancy, breast-feeding; nephrosis

Interactions: See Appendix-2

Side-effects: Prostate abnormalities, prostate cancer, headache, depression, gastro-intestinal bleeding, nausea, cholestatic jaundice, change in libido, anxiety, generalized paraesthesia, electrolyte imbalance including sodium retention with edema and hypercalcemia; increase bone growth, androgenic effects such as hirsutism, male pattern baldness, seborrhoea, acne, excessive frequency and duration of penile erections, precocious sexual development and premature closure of epiphysis in prepubertal males, virilism in women, and suppression of spermatogenesis in men

Dose : See under preparations

Proprietary Preparations

Andriol ^(®) (*Organon*), Cap. Testosterone undecionate 40 mg, Tk. 22.44/Tab

Androcap (*Renata*), Cap. Testosterone undecionate 40 mg, Tk. 20.00/Cap

Dose: initially 120-160 mg daily for 2-3 weeks, maintenance 40-120 mg daily.

Testosterone Propionate 30mg, Testosterone phenylpropionate 60mg, Testosterone isocaproate 60mg, Testosterone decanoate 100 mg/ml

Testanon (*Nuvista*), Inj. Tk. 161.70/1ml amp

Sustogen (*Techno*), Inj., Tk. 129.00/ml Amp.

Testoren (*ACI*), Inj., Tk. 174.00/Amp

Dose: For androgen deficiency, deep intramuscular injection 1 ml usually every 3 weeks .

ANTI-ANDROGENS

Cyproterone acetate is an antiandrogen used in the treatment of severe hypersexuality and sexual deviation in the male. It inhibits spermatogenesis and produces reversible infertility but it is not used as male contraceptive; abnormal

sperm forms are produced. Fully informed consent and an initial sperm count and morphology are recommended before anti-androgen therapy. Hepatic tumors have been reported in animals. Therefore, careful consideration should be given to the risk/benefit ratio before treatment. Cyproterone acetate is also used as an adjunct in prostatic cancer and in the treatment of acne and hirsutism in women.

Finasteride is a specific inhibitor of the enzyme 5-alpha-reductase which metabolises testosterone into the more potent androgen, dihydrotestosterone. This inhibition of testosterone metabolism reduces the prostate size with the improvement of the urinary flow rate and relieves obstructive symptoms. It is alternative to alpha-blockers particularly in men with a significantly enlarged prostate. A low strength of finasteride is used for treating male pattern baldness in men.

CYPROTERONE ACETATE

Indications: For the treatment of severe hypersexuality or sexual deviation in male; also used as an adjunct in prostate cancer and hirsutism in women (along with oestrogen)

Cautions: Blood counts initially and throughout treatment; monitor hepatic function regularly. A semen analysis and fully informed consent from the patient is recommended

Contraindications: Prostate cancer, hepatic disease, diabetes with vasculopathy; sickle cell anemia, malignant or wasting disease, severe depression, history of thromboembolic disorders; before 18 years of age (may arrest bone maturation and testicular development).

Interactions: See Appendix-2

Side-effects: Fatigue, lassitude, breathlessness, weight changes, reduce sebum production, change in hair pattern, gynaecomastia (rarely galactorrhoea), osteoporosis, inhibition

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of spermatogenesis; hepatotoxicity (in high dose)

Dose: Male hypersexuality, 50 mg twice daily after food

Proprietary Preparations

Giane (*Renata*), Tab Cyproterone acetate 2mg + ethinylestradiol 35 microgram, Tk. 9.50

FINASTERIDE

Indications: Benign prostatic hyperplasia, male pattern baldness in men

Cautions: Obstructive uropathy, prostate cancer (may decrease markers such as prostate specific antigen); use of condoms recommended if sexual partner is pregnant or is likely to become pregnant since finasteride is excreted in semen. It is not recommended in women of child bearing age

Side-effects: Impotence, decreased libido, ejaculation disorders, testicular pain, breast tenderness and enlargement, hypersensitivity reactions such as pruritus, rashes, lip and face swelling

Dose: 5mg daily, treatment to be reviewed after 6 months; sometimes it may require several months to get benefit

Proprietary Preparations

Pronor (*Square*), Tab., 5mg, Tk. 10.07/Tab.

Prosfen (*Beximco*), Tab., 5mg, Tk. 10.04/Tab.

Recur (*Beximco*), Tab., 1mg, Tk. 4.02/Tab.

5.4.4 ANABOLIC STEROIDS

Anabolic steroids have some androgenic activity but they cause less virilisation than androgens in women. They have protein-building property. Their use as body builders or tonics is unjustified; they are some times abused by some athletes. Anabolic steroids are used in the treatment of some aplastic anemia, and to reduce itching of chronic biliary obstruction.

NANDROLONE

Indications: Osteoporosis in post menopausal women, aplastic anemia

Cautions: Cardiac and renal impairment, hepatic impairment, hypertension, diabetes, epilepsy, migraine, monitor skeletal maturation in young patients, skeletal metastasis (risk of hypercalcemia)

Side-effects: Acne, sodium retention with edema, virilisation, amenorrhoea, inhibition of spermatogenesis, premature epiphyseal closure, abnormal liver function tests

Dose: For osteoporosis, 50 mg deep intramuscular every 3 weeks; for palliative treatment in selected case of mammary carcinoma in women, 50mg by deep intramuscular injection weekly

Proprietary Preparation

Decabolon (*Techno*), Inj., 50mg/ml, Tk.

112/Amp.; 25 mg/ml, Tk. 40/Amp.

Deca-Durabolin (*Nuvista*) Inj., 50mg/ml, Tk.

217.80/Amp

Durabolin (*Nuvista*), Inj. 25 mg/ml Tk.

86.90/Amp

Hybolin (*Chemist*), Inj., Inj. 25 mg/ml Tk.

42.00/1 ml Amp.

Hydeca (*Chemist*), Inj., 50 mg/ml, Tk.

125.00/Amp.

Nandron (*Renata*), Inj., 50mg/ml, Tk.

195.00/Amp.; 25mg/ml, Tk. 75.00/Amp

5.5 HYPOTHALAMIC AND PITUITARY HORMONES

5.5.1 HYPOTHALAMIC HORMONES

5.5.2 ANTERIOR PITUITARY HORMONES

5.5.3 POSTERIOR PITUITARY HORMONES

5.5.1 HYPOTHALAMIC HORMONES

Gonadorelin if injected intravenously in normal subjects leads to a rapid rise in both Follicular Stimulating Hormone (FSH) and Leutinizing Hormone (LH). It can distinguish between hypothalamic and pituitary lesions. Gonadorelin is also used in treatment of infertility. Gonadorelin analogues are used in treatment of endometriosis and infertility and in breast and prostate cancer.

Protirelin if injected intravenously in normal subjects leads to a rapid rise in TSH; it fails to show such a response even in subclinical hyperthyroidism. So it is used in confirming difficult cases of

hyperthyroidism. **Sermorelin**, an analogue of growth hormone releasing hormone is used in a diagnostic test for growth hormone secretion.

Somatostatin is a polypeptide obtained from the hypothalamus or by synthesis. Somatostatin is usually given as the acetate in the treatment of gastrointestinal haemorrhage.

SOMATOSTATIN

Indications: Upper gastrointestinal haemorrhage including variceal haemorrhage, insulin resistance, and the management of hormone-secreting tumours

Cautions: Concomitant parenteral nutrition has been suggested because of the inhibitory effects of somatostatin on intestinal absorption; blood sugar should be monitored since somatostatin may interfere with carbohydrate metabolism

Side-effects: Abdominal discomfort, flushing, nausea, and bradycardia have been associated with too rapid administration

Dose: Somatostatin is usually given as the acetate. 3.5 microgram/kg body-weight per hour has been given by intravenous infusion

Proprietary Preparations

Stilamin[®] (Serono) Inj., 3 mg, Tk. 5085/Vial

5.5.2 ANTERIOR PITUITARY HORMONES

5.5.2.1 GROWTH HORMONES

5.5.2.2 GONADOTROPINS

5.5.2.3 CORTICOTROPINS

5.5.2.1 GROWTH HORMONES

Growth hormone is required in the treatment of growth hormone deficiency. Only the growth hormone of human type is effective. Human growth hormone (HGH) has been replaced by human sequence type **somatropin**, produced by using recombinant DNA technology.

SOMATROPIN

(Synthetic Human Growth Hormone)

Indications: See under dose

Cautions: Diabetes mellitus, papill edema, relative deficiency of other pituitary hormones, history of malignant disease, slipped epiphysis of the hip, history of intracranial hypertension; avoid in pregnancy

Contra-indications: Evidence of tumour activity (start after completion of tumour treatment); renal transplantation; for growth promotion in children with closed epiphysis

Side-effects: Headache, visual disturbance (due to benign intracranial pressure fundoscopy); arthralgia, myalgia, peripheral edema due to fluid retention; antibody formation, transient reaction at injection site; leukaemia in children with growth hormone deficiency has also been reported

Dose: By subcutaneous injection, weekly dosage tailored for individual and given in 3, 6 or 7 divided doses (rotate injection sites); alternatively by intramuscular injection, weekly dosage given in 3 divided dose; in gonadal dysgenesis (Turner syndrome), 0.6–1.0 unit/kg weekly in divided doses subcutaneously; in children with growth hormone deficiency, 14–20 units/square meter body surface weekly in divided doses given subcutaneously or intramuscularly; in chronic renal failure in children, 30 units/square meter body surface weekly in divided doses given subcutaneously or intramuscularly; in adult with growth hormone deficiency, 0.125 to 0.25 units/kg weekly divided in daily doses subcutaneously or intramuscularly

Proprietary Preparation

Norditropin Simplex[®] (Novo Nordisk), Inj. (Pre filled pen) 5mg/1.5ml.Tk.10901.22/pen.
Omnitrope[®] (Sandoz), Inj., 3.3 mg/ml, Tk. 9,000.00/1 ml Cartridge

5.5.2.2 GONADOTROPINS

FSH and LH together (as in **human menopausal gonadotropin**) or FSH alone (as in **urofollitropin** or **follitropin**), are used in the treatment of

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infertility due to nonovulation or superovulation in assisted reproductive techniques (such as in vitro fertilization). **Gonadotrophins** are also used in treatment of oligospermia associated with hypopituitarism. **Chorionic gonadotropin** is also used in delayed puberty in male to stimulate endogenous testosterone production but has little advantage over testosterone.

HUMAN MENOPAUSAL GONADOTROPINS

Purified extract of human postmenopausal urine containing FSH and LH; the relative *in vivo* activity is designated as a ratio; 1:1 ratio is known as menotropin.

Indications: See notes above

Cautions: Ovarian cysts, adrenal or thyroid disorders, hyperprolactinemia or pituitary tumour

Side-effects: Ovarian hyperstimulation, multiple pregnancy; local reactions

Dose: By deep intramuscular injection according to patient's response

Proprietary Preparations

Menogon[®] (Ferring) Inj. 75 IU; Tk. 4967.90/amp;

Pergonal[®] (Serono) Inj. 75 IU; Tk. 721.65/amp; 150IU Tk.1298.51/amp

UROFOLLITROPIN

(Other name: Urofollitropin)

Extract of the urine of post menopausal women containing follicle-stimulating hormone

Indications: See notes above

Cautions & Side-effects: See under human menopausal gonadotropins

Dose: By subcutaneous or intramuscular injection according to patient's response

Proprietary Preparation

FSH50 (Popular), Inj., 50IU/vial, Tk.1375.00/vial

FOLLITROPIN ALFA and BETA

(Recombinant human follicular stimulating hormone)

Indications: See notes above

Cautions; Side-effects: See under human menopausal gonadotropins

Dose: By subcutaneous injection according to patient's response

Proprietary Preparations

Gonal F[®] (Serono), Inj. (P.Fsyringe). 75IU., Tk.1889.13/syringe

Puregon[®] (Organon), Inj. 50 IU, Tk.2,600.00/amp 100 IU; Tk. 5,100.00/amp.

Follitropin alfa150IU+ Lutropin75IU

Pergoveris[®] (Serono), Inj. Tk.4783.57/vial

CHORIONIC GONADOTROPHIN

(Human Chorionic Gonadotropin; HCG)

A preparation of a glycoprotein fraction secreted by the placenta and obtained from the urine of pregnant women, having the action of pituitary luteinising hormone

Indications: see notes above

Cautions: see notes above; cardiac and renal impairment, asthma, epilepsy, migraine

Side-effects: edema, headache, tiredness, mood changes, gynaecomastia, local reactions; sexual precocity with high doses; ovarian hyperstimulation syndrome has been reported

Dose: by subcutaneous or intramuscularly injection according to patient's response

Proprietary Preparations

Choragon[®] (Ferring) Inj. 5000IU,

Tk.1382.54/Vial

HCG (Popular), Inj., 5000IU, Tk.1300/Vial

Ovidril[®] (Serono), Inj, 250 mcg, Tk. 2383/Vial

Pregnyl[®] (Organon), Inj.5000IU.Tk.2350/Vial

5.5.2.3 CORTICOTROPINS

Tetracosactrin an analogue of corticotropins (ACTH) is used to test adrenocortical function. Failure of the plasma cortisol to rise after intramuscular administration indicates adrenal insufficiency. Corticotrophins were formerly used as alternatives to corticosteroids in conditions such as Crohn's disease or rheumatoid arthritis.

5.5.3 POSTERIOR PITUITARY HORMONES AND ANTAGONISTS

Vasopressin (Antidiuretic hormones, ADH) is used in treatment of cranial diabetes insipidus, as is its analogue **desmopressin**. The synthetic form of vasopressin is known as **Argipressin**. Dosage is tailored according to response; slight diuresis is maintained to avoid water intoxication. Diabetes insipidus after trauma or pituitary surgery may be transient; so a short period of treatment may be enough. **Desmopressin** has a longer duration of action than vasopressin; unlike vasopressin it has no vasoconstricting effect. It is given by mouth or intranasally for maintenance therapy, and by injection in the postoperative period or in unconscious patients. **Desmopressin** is also used in differential diagnosis of diabetes insipidus. Following a dose of 2 micrograms intramuscularly or 20 micrograms intranasally, restoration of urine concentration capacity after a water deprivation confirms a diagnosis of cranial diabetes insipidus; a failure to produce such a response indicates nephrogenic diabetes insipidus. In nephrogenic and partial cranial (pituitary) diabetes insipidus, benefit may be gained from the paradoxical antidiuretic effect of thiazide (e.g. **chlorthalidone** 100 mg twice daily, reduced to 50 mg daily for maintenance). **Chlorpropamide** is also used in partial cranial diabetes insipidus; it acts by increasing renal tubular sensitivity to vasopressin (e.g. **chlorpropamide** 250 mg once daily for adult; 125–200 mg once daily in children); care must be taken so that hypoglycemia does not occur. **Carbamazepine** is also used with limited success (dose: 200 mg daily); its mode of action is similar to that of chlorpropamide. **Desmopressin** is also used to boost factor VIII concentration in mild to moderate haemophilia and for the control of nocturnal enuresis. Vasopressin infusion is used to control

variceal bleeding in portal hypertension. **Terlipressin** has effects milder than vasopressin and is used to control bleeding from oesophageal varices. **Oxytocin**, another posterior pituitary hormone is used in obstetrics (see section 6.1.1).

DESMOPRESSIN

Indication: See notes above

Side effects, caution & contra-indication: consult product literature

Dose: See notes above and consult physician

Proprietary Preparations

Minirin Melt[®] (Ferring), Sublingual tab. 120 microgram, Tk. 85.15/Tab., 60microgram, Tk. 50.67/Tab.

ANTIDIURETIC HORMONE ANTAGONISTS

Demeclocycline may be used in the treatment of hyponatraemia resulting from inappropriate secretion of antidiuretic hormones. It is thought to act by directly blocking the renal tubular effect of anti-diuretic hormones. Initial dose: 0.9–1.2 g daily in divided dose; maintenance with 600–900 mg daily.

5.6 DRUGS AFFECTING BONE METABOLISM

5.6.1 BISPHOSPHONATES

5.6.2 CALCITONIN

Osteoporosis is a quantitative reduction of bone with increased fragility. This is common sequelae of aging process and is more marked in postmenopausal woman. Risk factors for osteoporosis include corticosteroid therapy, lack of physical activity, low body weight, smoking, alcoholism, and calcium and vitamin D deficiency. Other causes include hyperthyroidism, hyperparathyroidism, hypogonadism and Cushing's disease. Early treatment of osteoporosis is useful to prevent its complications. For any established complication (e.g.

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development of a low trauma fracture), therapy is strongly indicated. The therapeutic options for treatment and prophylaxis are the same:

Post-menopausal osteoporosis. Bisphosphonates (alendronic acid and risedronate, section 5.6.1) are effective for preventing postmenopausal Osteoporosis, if phosphonates are unsuitable Calcitriol (section 16.2.3.4) or strontium ranelate may be considered. Hormone replacement therapy (HRT section 5.4.1.1) is an option where other therapies are contraindicated, cannot be tolerated, or if there is a lack of response. Calcitonin is no longer recommended for the treatment of postmenopausal osteoporosis as the benefits are outweighed by the risk of malignancy associated with long-term use. Parathyroid hormone, and teriparatide have been introduced for the treatment of postmenopausal osteoporosis.

Corticosteroid induced osteoporosis. The dose of corticosteroid should be as low as possible and the course as short as possible to reduce the chance of osteoporosis. With a dose of prednisolone 7.5mg/day or more for 3 months or longer, the patient should be assessed for osteoporosis. During corticosteroid therapy, age of 65 years and above constitute a high-risk group. During prolonged therapy the maximum bone loss occurs during the first 6-12 months.

Note: Those who are at risk of osteoporosis should maintain an adequate intake of calcium and vitamin D and any deficiency should be corrected by increasing dietary intake or taking supplements.

5.6.1 BISPHOSPHONATES

The bisphosphonates (**Alendronic acid, Disodium etidronate, Disodium pamidronate, Ibandronic acid, Sodium clodronate**) become absorbed on to bone crystals (hydroxyapatite) conferring resistance to hydrolysis and prolonging of half-life in the skeleton. Also when the

complex is phagocytosed by an osteoclast that cell is inhibited and can not reabsorb more bone.

Bisphosphonates are used in the treatment of Paget's disease, osteoporosis in postmenopausal women and hypercalcaemia due to cancer. They may be given orally or intravenously. Bioavailability of oral bisphosphonates is very poor and constitutes only 10 percent and the rest is eliminated unchanged by the kidney. Fall in serum calcium begins in 1-2 days, reaches a nadir in 5-6 days and lasts for 20-30 days.

ALENDRONIC ACID

Indications: Treatment of osteoporosis in postmenopausal women

Side-effects: Pyrexia, diarrhoea, oesophageal reactions, abdominal pain and distension, headache, nausea, vomiting, increase of bone pain. Long term use of high dose may cause fracture of bone and esophageal irritation

Cautions: Gastritis, dysphagia, vitamin D deficiency, renal impairment

Contraindications: Strictures of oesophagus, achalasia, hypocalcaemia and breast-feeding

Interactions: See Appendix-2

Dose: Treatment of post-menopausal osteoporosis 10 mg daily or 70mg once weekly at least 30 minutes before breakfast

COUNSELLING: Swallow the tablet whole with a full glass of water on an empty stomach at least 30 minutes before breakfast; stand or sit upright for at least 30 minutes and do not lie down until after eating breakfast. Do not take the tablets at bedtime or before rising

Proprietary Preparations

Ostel (Square), Tab., 70 mg, Tk. 25.10/Tab.; 10 mg, Tk. 5.01/Tab.

Alendon (Beximco) Tab., 70 mg, Tk. 25.10/Tab.; 10 mg, Tk. 5.01/Tab.

Ostomax (Easkayef) Tab., 70 mg, Tk. 25.10/Tab.; 10 mg, Tk. 5.01/Tab.

Alendronic acid + Colecalciferol

5. ENDOCRINE SYSTEM

Bonemass D (*Incepta*), Tab., 70 mg + 2800 IU
Tk. 30.00/Tab
Ostel-D 70/2800 (*Square*), Tab., 70 mg + 2800
IU, Tk. 30.11/Tab.; Tab., 10 mg + 400 IU, Tk.
6.02/Tab
Alen-D (*ACI*), Tab., 70mg+2800IU, Tk.
25.17Tab.

IBANDRONIC ACID

Indications: Hypercalcaemia induced by metastatic bone diseases

Cautions: Hepatic impairment; monitor renal function and serum calcium, phosphate and magnesium; cardiac disease (avoid volume overload); *not recommended for use in children*

Contraindications: Moderate to severe renal impairment, pregnancy, breast-feeding

Side-effects: Hypocalcaemia, hypophosphatemia, flu-like symptoms including fever, chills, muscle and bone pain reported; rarely hypersensitivity reactions; bronchospasm and angioedema reported

Dose: *by mouth*, 150mg once a month in empty stomach at least 30 minutes before breakfast (Counselling as for Alendronic Acid)

By intravenous infusion, according to serum calcium concentration, 2-4 mg in single infusion; CHILD not recommended

Proprietary Preparations

Boncare (*Orion*), Tab., 150 mg, Tk. 1203.61/Tab.
Bondrova (*Healthcare*), Inj., 3mg/3ml, Tk. 4500.00/Inj.; Tab., 150mg, Tk. 1960.00/Tab.
Bondronat ^(®) (*Roche*), Inj., 6 mg/6 ml, Tk. 22211.00/6 ml Vial
Bone (*Incepta*), Tab., 150mg, Tk. 510.00/Tab.
Bonfix (*Opsonin*), Tab., 150 mg, Tk. 500.00/Tab.
Bonmax (*Globe*), Tab, 150 mg, Tk. 510.00/Tab.
Bonova (*Radiant*), Tab., 150 mg, Tk. 2,500.00/Tab.
Ibandron (*Aristo*), Tab., 150mg, Tk. 1,200.00/Tab.
Idrofos (*Sun Pharma*), Tab., 150 mg, Tk. 1500.00/Tab.
Ivana (*Renata*), Tab., 150mg, Tk. 995.00/Tab.
Maxbon (*Square*), Tab., 150 mg, Tk. 510.00/Tab.

Osnil (*Acme*), Tab., 150 mg, Tk. 500.00/Tab.

Calcium Orotate 400 mg and Ibandronic Acid 150 mg (KIT)

Calorate (*Beximco*), Kit Tab., Tk. 990/Kit

Maxbon (*Square*), Kit, Tab., Tk. 990/Kit

O-Cal Kit (*Acme*), Kit, Tab., Tk. 990/Kit

Orocal (*Ziska*), Kit, Tab., Tk. 400/Kit

RISEDRONATE SODIUM

Indications: *See under dose*

Cautions: Oesophageal abnormalities and other factors which delay transit or emptying (e.g. stricture or achalasia-see under side-effects); renal impairment (manufacturer advises avoid if creatinine clearance is less than 30mL/minute); correct hypocalcaemia before starting, correct other disturbances of bone and mineral metabolism (e.g. vitamin-D deficiency) at onset of treatment

Interactions: *See Appendix- 2*

Contraindications: hypocalcaemia (see Cautions above), pregnancy and breast-feeding

Side-effects: Gastro-intestinal effects (including dyspepsia, nausea, diarrhoea, constipation, oesophageal stricture, and duodenitis); dizziness, headache; influenza-like symptoms, musculoskeletal pain, rarely glossitis, edema, weight loss, apnoea, bronchitis, sinusitis, rash, nocturia, amblyopia, corneal lesion, dry eye, tinnitus, iritis

Dose: Paget's disease of bone, 30mg daily for 2 months; may be repeated if necessary after at least 2 months treatment of postmenopausal osteoporosis to reduce risk of vertebral or hip fractures, 5 mg daily or 35 mg once weekly

prevention of osteoporosis (including corticosteroid induced osteoporosis) in postmenopausal women, 5mg daily
COUNSELLING. swallow tablets whole with full glass of water; on rising, in empty stomach at least 30 minutes before first food or drink of the day or, if taking at any other time of the day, avoid food and drink for at least 2 hours before or after risedronate (particularly avoid calcium-containing products e.g. milk, also avoid iron and mineral supplements

5. ENDOCRINE SYSTEM

and antacids); stand or sit upright for at least 30 minutes; do not take tablets at bedtime or before rising

Proprietary Preparations

Risedon (*Square*), Tab., 35 mg + 500 mg, Tk. 7.88/Tab.

Risedon (*Square*), Tab., 150 mg, Tk. 120.37/Tab.

Risedronate Sodium + Calcium

Risonet (*Opsonin*), Tab., 150 mg, Tk. 120.00/Tab., 35 mg, Tk. 50.00/Tab.

Salost (*UniMed*), Tab., 150mg, Tk. 200.00/Tab., 5mg, Tk. 8.00/Tab., 35mg, Tk. 50.00/Tab.

Sedron (*General*), Tab., 5mg, Tk. 8.05/Tab., 35mg, Tk. 35.25/Tab.

ZOLEDRONIC ACID

Indications: See under dose

Cautions: Monitor serum electrolytes, calcium, phosphate and magnesium, assess renal function before each dose, renal impairment severe hepatic impairment; cardiac disease (avoid fluid overload)

Interactions: See Appendix-2

Contra-indications: Pregnancy, breast-feeding

Side-effects: Hypophosphataemia, anemia, influenza like symptoms including bone pain, fever and rigors gastro-intestinal effects including nausea, vomiting, and anorexia, headache, conjunctivitis renal impairment (rarely acute renal failure); rarely diarrhoea, constipation, taste disturbance, dry mouth, stomatitis, chest pain, dyspnoea, cough, dizziness, paraesthesia, tremor, anxiety, sleep disturbance, blurred vision, weight gain, pruritus, rash, sweating, haematuria, proteinuria, hypersensitivity reactions (including angioedema) peripheral edema, thrombocytopenia, leucopenia, hypomagnesaemia, also injection site reactions; very rarely bradycardia, confusion, hyperkalaemia, hypokalaemia, hypernatraemia, pancytopenia

Dose: For post-menopausal osteoporosis and osteoporosis in men by intravenous infusion, 5mg as a single

dose over at least 15 minutes, once a year

reduction of bone damage in advanced malignancies involving bone (with calcium and vitamin D supplement), by intravenous infusion, 4 mg every 3-4 weeks

Hypercalcaemia of malignancy, by intravenous infusion 4mg as a single dose.

Proprietary Preparation

Aclasta[®] (*Novartis*), Inj., (IV Infusion), 0.05%, Tk. 32500.00/Vial

Bonizol (*Square*), Inj., (IV Infusion), 0.05%, Tk. 6000/Vial

Drometa (*Incepta*), 4mg/5ml, Tk. 5000.00/Vial

Xoleron (*Beacon*), Inj., 4 mg/5 ml, Tk. 5,000.00/Vial

Zoclast (*Healthcare*), Inj 4mg/5ml, Tk. 6499.99/Vial

Zoledron (*Opsonin*), Inj., (IV Infusion), 0.05%, Tk. 5950.00/100 ml

Zolenic (*Incepta*), Inj., (IV Infusion), 0.05%, Tk. 5947.00/Vial

Zoltero (*Beximco*), Inj., (IV Infusion), 0.05%, Tk. 7000.00/100ml

Zometa (*Novartis*), Infusion 4 mg/5ml, 30000.00/Vial

5.6.2 CALCITONIN

Calcitonin is a peptide hormone produced by the C-cell of thyroid. It acts on bone to inhibit osteoclasts to reduce the rate of bone turnover, and on kidney to reduce the reabsorption of calcium and phosphate. It is used to lower the plasma calcium concentration in some patients with hypercalcaemia, especially associated with malignant disease. Effect on serum calcium is observed within 4-6 hours and last for 6-10 hours only. Prolonged use of porcine calcitonin can lead to production of neutralizing antibodies. **Salcatonin**, the partially synthesized calcitonin derived from salmon is less immunogenic and is more suitable for long-term therapy.

Indications: Paget's disease; hypercalcaemia; see notes above and also under dose.

5. ENDOCRINE SYSTEM

Cautions: history of allergy, heart failure, breast feeding, pregnancy

Side-effects: Inflammatory reactions at injection site, gastrointestinal upset, allergic reactions, flushing, tingling sensation in hands

Dose: in Paget's disease of bone, *by subcutaneous or intramuscular injection*, dose range 50 units 3 times weekly to 100 units daily, in single or divided doses
In hypercalcaemia, *by subcutaneous or intramuscular injection*, initially 4 units/kg daily adjusted according to clinical and biochemical response

Proprietary Preparations

Miacalcic[®] (Novartis), Injection, 100 IU/ml, Tk. 591.00/Vial

Miacalcic[®] (Delpharm), Nasal Spray, 200 IU/ml, Tk. 2958.00/ml

Chapter 6

OBSTETRICS, GYNAECOLOGY AND GENITO-URINARY TRACT DISORDERS

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For hormone therapy of gynaecological disorders see *section 5.4.1* (female sex hormones), *section 5.5.1 & 5.4.2.3* (hypothalamic, anterior pituitary hormones and antioestrogens) and *section 14.3.4.2* (gonadorelin analogues).

6.1 DRUGS USED IN OBSTETRICS

- 6.1.1 OXYTOCICS AND PROSTAGLANDINS
 - 6.1.2 DUCTUS ARTERIOSUS
 - 6.1.3 MISOPROSTAL
 - 6.1.4 MIFEPRISTONE
 - 6.1.5 MYOMETRIAL RELAXANT
-

6.1.1 OXYTOCICS AND PROSTAGLANDINS

Oxytocics and prostaglandins are known to increase myometrial activity and can be used to stimulate (induce or augment) labour, to minimize blood loss from placental site and to induce abortion. They include oxytocin, ergometrine and the prostaglandins. All induce uterine contraction with varying degrees of pain

6. OBSTETRICS, GYNAECOLOGY AND URINARY-TRACT DISORDERS

according to the strength of contractions induced.

INDUCTION OR AUGMENTATION OF LABOUR: Oxytocin is administered by slow intravenous infusion preferably using infusion pump to induce or augment labour, usually in conjunction with amniotomy. Uterine activity must be monitored carefully and hyperstimulation avoided. Large doses of oxytocin may result in excessive fluid retention due to its vasopressin like action, though it may not occur with presently available synthetic products (e.g. Syntocinon).

Prevention and Treatment of PPH (Postpartum Hemorrhage): Bleeding due to incomplete abortion can be controlled with **Ergometrine** and **Oxytocin**. Usually given intramuscularly (or intravenously), the dose is adjusted according to the patient's condition and blood loss. This is used prior to surgical evacuation of uterus, particularly when surgery is delayed or after evacuation. Ergometrine acts better in first trimester, but later oxytocin and ergometrine combined are more effective than either drug alone.

For active management of third stage of labour inj. oxytocin 10 units is given by intramuscular injection immediately after delivery of baby. & after excluding the presence of additional babies. In case of home delivery where oxytocin is not available tab. Misoprostol 3 tab 600 microgram taken orally can be a good alternative.

In high risk cases where there is increase risk of PPH, intravenous infusion of oxytocin 10-20 unit in 500 ml of normal saline can be given after delivery as a measure of prevention and/or treatment of postpartum hemorrhage, particularly when the uterus is atonic. Excessive bleeding also has to be controlled with inj. Ergometrine and tab. prostaglandin.

ERGOMETRINE MALEATE^[ED]

Indications: PPH, heavy bleeding in incomplete abortion.

Cautions: Cardiac disease; hypertension; hepatic and renal

impairment; multiple pregnancy (it can be given after the delivery of last baby)

Contraindications: Induction of labour, first and second stages of labour, vascular disease, severe cardiac disease, impaired pulmonary function, severe hepatic and renal impairment, sepsis, severe hypertension, eclampsia.

Interactions: See Appendix-2

Side effects: Nausea, vomiting, headache, dizziness, tinnitus, abdominal pain, palpitation, dyspepsia, bradycardia, transient hypertension, vasoconstriction, stroke, myocardial infarction and pulmonary edema also reported.

Dose: 0.25- 0.50 mg I/M or I/V initial dose and continuing according to clinical need. 1 unit = 2 microgram.

Proprietary Preparations

G-Ergometrine(*Gonoshasthaya*), Inj. 0.2mg/ml, Tk. 3.90/Amp.; Tab. 125 microgram, Tk. 0.55/Tab.

Urgotin(*Chemist*), Inj. 0.2mg/ml, Tk. 30.00/ Amp.

Metherspan(*Opsonin*), Tab. , 125 mcg , Tk. 0.55/Tab. ;Inj.,200 mcg/Amp, Tk. 3.01/Amp

CARBETOCIN

Indications: Prevention of uterine atony after caesarean section

Cautions: Hyponatraemia; cardiovascular disease (avoid if severe); migraine; asthma

Contraindications: Pre-eclampsia and eclampsia; epilepsy, hepatic and renal impairment

Side-effects: nausea, vomiting, abdominal pain, metallic taste; flushing, hypotension, chest pain; dyspnoea; headache, tremor, dizziness; anaemia; back pain; pruritus.

Dose: By slow intravenous injection over 1 minute, a single dose of 100micrograms, as soon as possible after delivery, preferably before removal of placenta

Proprietary Preparations

Arbecin(*Renata*), Inj., 100microgram/ml, Tk. 150.00/vial

Carbate(*Incepta*), Inj., 100microgram/ml, Tk. 150.00/vial

Duratocin(*Beacon*), Inj., 100microgram/ml, Tk. 150.45/vial

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OXYTOCIN^[ED]

Indications: Induction of labor for medical reasons or stimulation of labor in hypotonic uterine inertia by intravenous infusion until labor pattern established similar to normal. (see under dose and notes above)

Cautions: Particular caution needed when given for induction or enhancement of labour in presence of borderline cephalopelvic disproportion; mild to moderate pregnancy induced hypertension or cardiac disease; history of lower uterine segment Caesarean section (see also under Contraindications); if foetal death in utero or meconium stained amniotic fluid, avoid tumultuous labour (may cause amniotic fluid embolism); avoid large infusion volumes and restrict fluid intake by mouth (to prevent water intoxication and hyponatremia); caudal block anaesthesia (may enhance hypertensive effects of sympathomimetic vasopressors);

Contraindications : Hypertonic uterine contraction, mechanical obstruction to delivery, fetal distress; any condition where spontaneous labour or vaginal delivery is inadvisable (e.g. significant cephalopelvic disproportion, malpresentation, placenta Previa, vasa Previa, placental abruption, cord presentation or prolapse, predisposition to uterine rupture as in multiple pregnancy, polyhydramnios, grand multiparity and presence of uterine scar from major surgery including Caesarean section); avoid prolonged administration in oxytocin-resistant uterine inertia, severe pre-eclampsia or severe cardiovascular disease.

Interactions : See Appendix-2

Side-effects: Uterine spasm (may occur even at low doses), uterine hyperstimulation (usually with excessive doses may cause fetal distress, asphyxia and death, or may lead to hypertonicity, tetanic contractions, soft tissue damage or uterine rupture); water intoxication and hyponatremia associated with high doses with large infusion volumes of electrolyte-free fluid

(see also under Dose below); also nausea, vomiting, arrhythmias, rashes and anaphylactic reactions (with dyspnoea, hypertension or shock) reported; placental abruption and amniotic fluid embolism also reported on overdose

Dose : Induction of labour for medical reasons or stimulation of labor in hypotonic uterine inertia by intravenous infusion 0.001-0.004 units/minute until labour pattern established similar to normal (usually less than 0.01 units/minute for pregnancy at term); maximum recommended rate 0.02 unit/minute (use solution containing 10 units/500 ml if higher rate required); (may be repeated the following day starting again at 0.001-0.004 units/minute)

IMPORTANT: Careful monitoring of fetal heart rate and uterine contraction by trained personnel essential to allow dose titration according to response (never give direct intravenous injection); discontinue immediately in uterine hyperactivity or fetal distress. In Caesarean section: *by slow intravenous injection* immediately after delivery, 5-10 units. Prevention of postpartum haemorrhage after delivery of placenta: *by slow intravenous injection* 5-10 units (if infusion used for induction or enhancement of labour, increase rate during third stage and for next few hours). May be given in a dose of 5-10 units by intramuscular injection instead of oxytocin with ergometrine (see notes above). Treatment of postpartum hemorrhage: by slow intravenous injection 5-10 units followed in severe cases by intravenous infusion of 5-20 units in 500 ml of non hydrating diluent (e.g. glucose 5% solution) at a rate sufficient to control uterine atony. Avoid rapid intravenous injection (may cause short-lasting drop in blood pressure); prolonged administration, see warning below. Incomplete, inevitable or missed abortion: by slow intravenous injection 5 units, followed if necessary by intravenous infusion of 0.02-0.04 units/minute or faster

WARNING. Prolonged intravenous administration at high dose with large

6. OBSTETRICS, GYNAECOLOGY AND URINARY-TRACT DISORDERS

volume of fluid (as possible in inevitable or missed abortion or postpartum haemorrhage) may cause water intoxication with hyponatraemia. To avoid: use electrolyte containing diluent (i.e not glucose), increase oxytocin concentration to reduce fluid, restrict fluid intake by mouth; monitor fluid and electrolytes.

Proprietary Preparations

Inducin(Incepta), Inj., 5 IU/ml, Tk. 25.00/ Amp

Linda-SDS(Nuvista), Inj., 10 IU/ml, Tk.

25.29/Amp

Ocin(Opsonin), Inj., 5 IU/ml, Tk. 15/Amp

Oxyton(Renata), Inj., 5 IU/ml, Tk. 10.00/ Amp

Pitocin(Chemist), Inj., 10 IU/ml, Tk. 15/Amp.; 5 IU, Tk. 8.35/Amp.

Syntocin(Techno), Inj., 5IU/ml, Tk. 7.50/ Amp

6.1.2 DUCTUS ARTERIOSUS

Alprostadil (Prostaglandin E₁) is used to maintain patency of the ductus arteriosus in neonates with congenital heart defects, prior to corrective surgery in centres where intensive care is immediately available. Prostaglandin E₁ maintains the patency of the ductus arteriosus; **Indomethacin** is believed to close it by inhibiting prostaglandin synthesis.

6.1.3 MISOPROSTOL

Indications: Termination of pregnancy following mifepristone.

Cautions: Cerebrovascular disease, cardiovascular disease, Inflammatory bowel disease.

Contraindications: Pregnant women, history of allergy to prostaglandins.

Side effects: Diarrhea, abdominal pain, abnormal vaginal bleeding, dizziness, dyspepsia, flatulence, Intermenstrual bleeding, menorrhagia, nausea, postmenopausal bleeding rashes, vomiting.

Dose: It is given by mouth for the termination of pregnancy up to 49 days. In adult 400 micrograms for 1 dose, dose to be given 24-48 hours after mifepristone.

Termination of pregnancy following mifepristone (gestation 50 to 13 days)

initially by vagina, or by buccal administration or by sublingual administration.

Adult: 800 micrograms for 1 dose, dose to be given 24-48 hours after mifepristone, if abortion has not occurred 4 hours after first misoprostol dose a further dose may be given, (by mouth or by vagina) 400 micrograms for 1 dose.

Termination of pregnancy following mifepristone (gestation of 9 to 13 weeks) initially by vagina

Adult: 800 micrograms for 1 dose, dose to be given 36-48 hours after mifepristone, following by (by vagina or by mouth) 400 micrograms every 3 hours if required for a maximum of 4 doses, if abortion has not occurred 3 hours after the last dose of misoprostol, a further dose of mifepristone may be given, and misoprostol may be recommended 12 hours later.

Proprietary Preparations

Cytomis(Incepta), Tab., 200 mcg, Tk.

15.00/Tab.

G-Misoprostol (Gono), Tab. 200mcg Tk

30.00/Tab

Indula(Renata), Tab., 200 mcg, Tk.

15.00/Tab.

Isovent(Square), Tab., 200 mcg, Tk.

15.10/Tab., 600 mcg, Tk.40.13/Tab.

Misoclear(Acme), Tab., 200 mcg, Tk.

15.04/Tab.

Misopa(Beximco), Tab., 200mcg, Tk.

15.00/Tab.

Misopil(General), Tab., 200mcg, Tk.

15.00/Tab.

Misoprostol(Amico), Tab., 200mcg, Tk.

15.00/Tab.

Misotab(Euro), Tab., 200mcg, Tk. 15/Tab.

Misotec(Sharif), Tab., 200 mcg, Tk.

15.04/Tab.

Misotol(Ziska), Tab., 200 mcg, Tk. 15.00/Tab.

6.1.4 MIFEPRISTONE

Indications: Medical termination of intrauterine pregnancies of up to 49 days gestation. It is used in combination with **Gemeprost** for termination of pregnancies between 13 and 24 weeks gestation; can also be used in smaller doses as an emergency contraceptive; used in combination with misoprostol for the termination of

6. OBSTETRICS, GYNAECOLOGY AND URINARY-TRACT DISORDERS

intrauterine pregnancy through day 49 of the pregnancy

Contraindications: Presence of an intrauterine device, ectopic pregnancy, adrenal failure, hemorrhagic disorders and anticoagulant or long-term corticosteroid therapy

Side effects: Vaginal bleeding, cramping, nausea, vomiting, diarrhea, dizziness, back pain, and tiredness.

Dose: It is given by mouth for the termination of pregnancy up to 63 days duration. Single dose of 600 mg of mifepristone followed by gemeprost 1 mg vaginally or misoprostol 400 micrograms by mouth 36-48 hours later if the abortion has not been completed. Lower doses of mifepristone and other prostaglandins have also been used for medical termination of pregnancy.

Note. Treatment with mifepristone and misoprostol requires three separate office visits.

Day 1: Three 200 mg tablets (600 mg) of mifepristone are taken as a single dose.

Day 3: 400 microgram of misoprostol is given orally unless abortion has been confirmed.

Day 14: No medication administered. Patient returns for a post-treatment examination to confirm that a complete termination of pregnancy has occurred.

Proprietary Preparations

Mifetab(Euro), Tab., 200 mg, Tk. 240.00/Tab.

Mifeston(Incepta), Tab., 200 mg, Tk. 175.00/Tab.

MIF(Renata), Tab., 200 mg, Tk. 175.00/Tab.

Mprix(Sharif), Tab., 200 mg, Tk. 240.72/Tab.

Misoprostol 0.20mg/1Tab and Mifepristone 200mg 4Tablet

Abkit(Renata), Tab., Tk. 300.00/Kit

Abo kit(Globe), Tab., Tk. 280.00/Kit

Cytomis(Incepta), Tab., Tk. 300.00/Kit

Kit-63(General), Tab., Tk. 300.00/Kit

Mariprist(Acme), Tab., Tk. 300.00/Kit

MM Kit(Ziska), Tk. 280.00/Kit

MTP Kit(Sharif), Tk. 300.00/Kit

Terminex(Square), Tab., Tk. 300.00/Kit

6.1.5 MYOMETRIAL RELAXANTS

NIFEDIPINE^[ED]

Indication: Premature labour.

Caution: Should not be given combined with magnesium sulphate or beta 2 agonists.

Dose: It is given in the dose of 20mg stat followed by 10 -20 mg after 30 min & then 10-20 mg every 6-8 hourly for 48 hours until the dose of inj.

Dexamethasone for lung maturity has been completed.

Note: Pretreatment with fluids before infusion reduce hypotension and uteroplacental perfusion.

Proprietary Preparations

(See section 3.3.2)

RITODRINE HYDROCHLORIDE

Indication :Uncomplicated premature labour(See notes above)

Cautions: Cardiac disease hypertension, hyperthyroidism, special risk with potassium depleting diuretics, diabetes mellitus (closely monitor blood glucose during intravenous treatment); mild to moderate preeclampsia monitor blood pressure and pulse rate (see section-16).over hydration.

Closely monitor state of hydration (discontinue immediately and institute diuretic therapy if pulmonary oedema occurs);

Contraindications: Cardiac disease, eclampsia, severe preeclampsia, intrauterine infection, intra uterine fetal death, antipartum hemorrhage (requires immediate delivery) placenta praevia (requires immediate delivery), cord compression; first or second trimesters.

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, flushing, sweating, tremor, hypokalaemia, tachycardia, palpitations and hypertension (left lateral position throughout infusion to minimize risk); increased tendency to uterine bleeding (see cautions), pulmonary oedema(see below and under cautions); chest pain or tightness (with or without ECG changes) and arrhythmias; salivary gland

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enlargement; on prolonged administration (several weeks) leucopenia and agranulocytosis reported; liver function abnormalities (including increased transaminase level and hepatitis) reported.

Dose: Used (by mouth or by injection) as a myometrial relaxant. Usual dose 10 mg three times daily.

Proprietary Preparation

Ritopar(ACI), Tab. 10 mg, Tk. 8.00/Tab.; Inj. 50 mg/5 ml, Tk. 70.00/Vial

SALBUTAMOL^[ED]

Indications: Uncomplicated premature labour(see notes above); asthma (see section 4.1.1)

Cautions; Contraindications; Side-effects: See under *Ritodrine Hydrochloride*

Dose: By intravenous infusion, 10 micrograms/minute gradually increased to max. of 45 micrograms/minute until con-traction have ceased, then gradually reduced; or by intravenous or intramuscular injection, 100-250 micrograms repeated according to response; then by mouth (but see notes above), 4 mg every 6-8 hours.

Proprietary Preparation

See section 4.1.1

6.2 TREATMENT OF VAGINAL AND VULVAL CONDITIONS

6.2.1 PREPARATION FOR VAGINAL ATROPHY.

6.2.2 ANTI-INFECTIVE DRUGS FOR COMMON VAGINAL CONDITIONS

Symptoms are preliminarily referred to the vulva, but infections almost invariably involve the vagina which should also be treated. Applications to the vulva alone are likely to give only symptomatic relief without cure. Aqueous medicated douches may disturb normal vaginal acidity and bacterial flora. Topical anaesthetic agents give only symptomatic relief and may cause sensitivity

reactions. They are indicated only in cases of pruritus where specific local causes have been excluded. Systemic drugs are required in the treatment of infections such as gonorrhea and syphilis

6.2.1 PREPARATION FOR VAGINAL ATROPHY

Application of an oestrogen containing cream may be used on a short-term basis to improve the quality of the vaginal epithelium in menopausal atrophic vaginitis. It is important to bear in mind that topical oestrogen should be used in the minimum effective amount to minimize absorption of the oestrogen; if they are used on a long-term basis, some require oral progestogen for 10-14 days of each month to combat endometrial hyperplasia (for details see under preparations below). **Topical oestrogen** are also used prior to vaginal surgery in postmenopausal women, e.g. in prolapse when there is epithelial atrophy.

TOPICAL OESTROGENS

Indications: Menopausal atrophic vaginitis; **Topical oestrogen** are also used prior to vaginal surgery, in prolapse when there is epithelial atrophy.

Cautions; Contraindications; Side-effects: See *Oestrogen for HRT* (section 5.4.1.1); contraindicated in pregnancy and lactation. Examine patients periodically to assess the need for further treatment.

Proprietary Preparations

Ovestin⁽⁰⁾(Organon), Intravaginal cream, oestriol 0.1%; 1 applicator-dose to be inserted daily for 2-3 weeks, before retiring at night, then reduce to twice a week dose (discontinue every 2-3 months for 2 weeks to assess the need of further treatment; vaginal surgery, 1 applicator dose daily for 2 weeks before surgery resuming 2 weeks after surgery; 1 application (with calibrated applicator filled up to ring mark) contains 0.5 mg ovestin cream which corresponds to 0.5 mg oestriol. Tk. 1114.00/15g tube

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Premarin[®](Pfizer), Vaginal cream, conjugated oestrogens (equine) 0.625 mg in 1 g non-liquidifying cream; insert 1-2 daily, starting on day 5 of cycle for 3 weeks followed by one week interval; if therapy is long term in women with intact uterus, oral progesterone needs to be given for 10-14 days at end of each cycle. Tk. 801.03/14 gmTube

6.2.2 ANTI-INFECTIVE DRUGS FOR COMMON VAGINAL CONDITIONS

Effective specific treatments are available for common vaginal infections.

FUNGAL INFECTIONS

(See section 1.2&12.2)

Candidal vulvitis can be treated locally with cream but is almost invariably associated with vaginal infection which should also be treated. Vaginal candidiasis is treated primarily with antifungal pessaries or cream inserted high into the vagina (including during menstrual). Imidazole drugs (**Clotrimazole**, **Econazole**, **Fenticonazole**, **Isoconazole** and **Miconazole**, **Ticonazole**) are effective in short course of 3 to 14 days according to the preparation used; single dose preparations offer an advantage when compliance is a problem. Vaginal applications may be supplemented with antifungal cream for vulvitis and to treat other superficial sites of infection. **Nystatin** is a well established treatment (but stains clothings yellow). One or two pessaries are inserted for 14 to 28 nights; they may be supplemented with cream for vulvitis and to treat other superficial sites to infection. Oral treatment with **Fluconazole** or **Itraconazole** (see section 12.2.2) is also effective; oral **Ketoconazole** (see section 12.2.2) has been associated with fatal hepatotoxicity.

Recurrence is common if the full course of treatment is not completed and particularly if there are predisposing factors such as antibiotic therapy, oral contraceptive use, pregnancy or diabetes mellitus. Possible reservoirs of infection may also lead to recontamination and should be treated. These include other skin sites such as

digits, nail beds and umbilicus as well as the gastrointestinal tract and the bladder. The partner may also be the source of reinfection and should be treated with cream at the same time.

CLOTRIMAZOLE

Indications: See notes above

Dose: See notes above.

Pessary (with applicator), Clotrimazole 500 mg; 1 tablet is to be inserted at night as a single dose.

Note: Treatment should be timed to avoid menstrual period. Effect on latex condoms and diaphragms is not yet known

Proprietary Preparations

Afun VT (Square), Vaginal Tab., 200 mg, Tk.

20.6/Tab.; 500 mg, Tk. 60.18/Tab.

Clotrim (Acme), Vaginal Tab., 200.00 mg, Tk.

20.13/Tab.; Vaginal Supp., 200 mg, Tk.

20.13/supp.;

Clozovt (Chemist), Vaginal Tab., 200 mg, Tk. 60/Tab.

Dermasim VT (ACI), Vaginal Tab., 500 mg, Tk.

60.41/Tab., 200mg, Tk. 20.14/Tab.

Neosten (Beximco), Vaginal Tab., 200mg, Tk. 20.00/Tab.

ECONAZOLE

Indications: Same as that of clotrimazole.

Dose: Insert one tablet high in vagina for 3 consecutive nights regardless of any intervening menses.

Note: Econazole vaginal preparations are known to damage latex condoms and diaphragms.

Proprietary Preparations

Econate VT (Incepta), Vaginal Tab., 150 mg, Tk. 23.33/Tab.

Ecoren VT (ACI), Vaginal Tab., 150 mg, Tk.

24.16/Tab.

Ecozol-VT (Opsonin), Vaginal Tab. 150mg Tk. 23.49/Tab.

NYSTATIN^[ED]

Indications: Vulvitis, perineal pruritus, dyspareunia and dysuria due to fungal infection.

Side-effects: Local irritation and burning sensation; stains clothing yellow.

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Proprietary Preparation

Nystat VT(Acme), Vaginal tablet 5 Lac IU., insert 1-2 tablets daily and continue for 2 weeks; may be continued during menstruation. Tk. 1.95/Tab.

FENTICONAZOLE

Indications: Vulvovaginal candidiasis.

Cautions: Pregnancy, lactation

Contraindications: known hypersensitivity to imidazole derivatives

Side-effects: Transient burning, sensitization

Dose: One applicator full (about 5 g) is administered into the vagina by a re-usable applicator (morning and evening for three days).

Proprietary Preparations

Fentizol(Square), Vaginal Tab., 600 mg, Tk. 120.00/Tab.

FentigalVT(Sharif), Vaginal Tab, 600 mg, Tk. 120.00/Tab

TIOCONAZOLE

Indications: Vaginal yeast infections; reduces vaginal burning, itching.

Side-effects: Same as that of Nystatin.

Proprietary Preparation

Tycon(Acme), Vaginal Supp., 300 mg Tk. 60.40/Supp

OTHER INFECTIONS

Vaginal preparations intended to restore normal acidity may prevent recurrence of vaginal infections and permit the re-establishment of the normal vaginal flora. Trichomonal infections commonly involve the lower urinary tract as well as the genital system and need systemic treatment with **Metronidazole** or **Tinidazole**. Bacterial infections are particularly common in association with gynaecological operations and trauma. **Metronidazole** is effective against certain Gram-negative organisms, especially *Bacteroides* may be used prophylactically in gynaecological surgery (for systemic preparations of **Metronidazole**, (see section 1.1.9). In

case of trichomonal infection, the male partner should be treated concurrently with metronidazole 200 mg orally twice daily for 10 days.

Topical vaginal products containing **Povidone iodine** may be used to treat vaginitis due to candidal, trichomonal, non-specific or mixed infections; they are also used for the pre-operative preparation of the vagina. **Clindamycin** cream and **Metronidazole** gel are also indicated for bacterial vaginosis. Antibacterial and antifungal combination products are also available for mixed infections.

The antiviral drugs **Aciclovir**, **Famciclovir** and **Valaciclovir** may be used in the treatment of genital infection due to herpes simplex virus, the HSV type 2 being a major cause of genital ulceration. They have a beneficial effect on virus shedding and healing generally giving relief from pain and other symptoms. For antiviral drugs, see section 1.4 for systemic preparations and section 12.2.3 for topical preparations.

Note: Avoid in impaired renal function.

PREPARATIONS FOR OTHER VAGINAL INFECTIONS

Proprietary Preparations

Clindax(Opsonin), Vaginal cream, Clindamycin 2%, Tk. 70.26/20 gm

Flamyd(Incepta), Vaginal Gel, 750mg/100gm, Tk. 50.00/30gm

Povisep(Jayson), Gel, Povidone iodine 10%, Tk. 80/30 gm

Neomycin sulphate 35,000 IU polymyxin B sulphate 35,000 IU, nystatin 1,00,000 IU and metronidazole 200 mg

Gynastin(Acme), Vaginal Supp., Tk. 24.08/Supp

Gyned(Pacific), Vaginal Supp., Tk. 35.00/Supp

Gynepro(Square), Vaginal Supp., Tk. 24.08/Supp

Gynoheal (Globe) Vaginal Supp., Tk. 25.10/Supp

Gynomix(Drug Intl), Vaginal Supp., Tk. 25.10/Supp

Gynoril(Opsonin), Vaginal Supp., Tk. 24.16/Supp

Gynoxin(Aristo), Vaginal Supp., Tk. 24.00/Supp

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Vcap(Renata), Vaginal Supp., Tk. 25.00/Supp

6.3 CONTRACEPTIVES

- 6.3.1 COMBINED ORAL CONTRACEPTIVES
- 6.3.2 PROGESTERONE ONLY CONTRACEPTIVES
- 6.3.2.1 ORAL PROGESTERONE ONLY CONTRACEPTIVES
- 6.3.2.2 PARENTERAL PROGESTERONE ONLY CONTRACEPTIVES
- 6.3.2.3 INTRAUTERINE PROGESTERONE ONLY CONTRACEPTIVES
- 6.3.3 SPERMICIDAL CONTRACEPTIVES
- 6.3.4 CONTRACEPTIVE DEVICES
- 6.3.5 EMERGENCY CONTRACEPTIVES

6.3.1 COMBINED ORAL CONTRACEPTIVES

Their advantages include: Reliability; reduction of dysmenorrhoea; less premenstrual tension; significant protection against endometrial and ovarian cancer; and protection against pelvic inflammatory disease.

Low dose preparations (containing ethinyloestradiol 20 micrograms) are particularly appropriate for obese or older women provided a combined oral contraceptive is otherwise suitable. It is recommended that the combined oral contraceptive is not continued beyond 50 years of age since there are more suitable alternatives. Switching from low dose to high dose pill or from high dose to low dose pill does not cause any major problem. They are particularly appropriate for obese or older women. The latest 4th generation OCP contains ethinyloestradiol 0.030 mg. and 4th generation progesterone Drospirenone 3 mg.

Standard dose preparations (containing ethinyloestradiol 30 or 35 micrograms) are appropriate for standard use in the case of those also containing levonorgestrel or norethisterone (but in

the case of those also containing desogestrel or gestodene, see *advice below*).

High dose preparations (containing either ethinyloestradiol 50 micrograms or mestranol 50 micrograms) provide greater contraceptive security but with an increase in the possibility of side-effects. These are used mainly in circumstances of reduced bioavailability (e.g. during long term use of enzyme inducing antiepileptics, see *under Interactions below*).

The progestogens desogestrel, gestodene and norgestimate in combination with ethinyloestradiol have been reported to have less adverse effects on lipids than ethynodiol, levonorgestrel and norethisterone in combination with ethinyloestradiol. Desogestrel and gestodene may be given to women who experience side-effects (such as acne, headache, depression, weight gain, breast symptoms and breakthrough bleeding) with other progestogens. However, women should be advised that desogestrel and gestodene have also been associated with an increased risk of venous thromboembolism (see *below*).

It is, therefore, advised that combined oral contraceptives containing gestodene or desogestrel should not be used by women with risk factors for venous thromboembolism including obesity (body mass index greater than 30 kg/m²), varicose veins or a previous history of thrombosis from any cause. Combined oral contraceptives containing desogestrel or gestodene should only be used by women who are intolerant of other combined oral contraceptives and are prepared to accept an increased risk of thromboembolism. Any personal history of venous or arterial thrombosis is a contraindication to any combined oral contraceptive.

MISSED PILL: The following advice is now recommended by family planning directorate: 'If you forget one pill, take it as soon as you remember and the next one at normal time, so that 2 pills are to be taken on that particular day. If you forget two pills, take 2 pills as soon as

6. OBSTETRICS, GYNAECOLOGY AND URINARY-TRACT DISORDERS

you remember, take another 2 pills on the next day. Take one pill daily and use condom, till you finish rest of the pills. When the pills are finished and menstruation starts, start a new packet. If you forget three pills, pills will no more work; stop pills and use condom. Probably menstruation will start; start the next packet at the first day of menses.

DIARRHOEA AND VOMITING: Vomiting and severe diarrhoea can interfere with absorption and limit the effectiveness. Additional precautions (use condom) should therefore be used during and for 7 days after recovery. If vomiting and diarrhoea occurs during the last 7 tablets, the next pill-free interval should be omitted; in the case of Every Day (ED) pills, the inactive ones should be omitted.

Some broad-spectrum antibiotics (e.g. ampicillin) may reduce the efficacy of combined oral contraceptives by impairing the bacterial flora responsible for recycling of ethinyloestradiol from the large bowel. Additional contraceptive precautions should be taken whilst taking a short course of a broad-spectrum antibiotic and for 7 days after stopping. If these 7 days run beyond the end of a packet the next packet should be started immediately without a break (in the case of ED pills, the inactive ones should be omitted). If the course exceeds 2 weeks, the bacterial flora develops antibiotic resistance and additional precautions become unnecessary.

Interactions: See also Appendix-2

SURGERY: Oestrogen containing oral contraceptives should be discontinued (and adequate alternative contraceptive arrangements made) 4 weeks before major elective surgery (requiring at least one week of bed rest) and all surgery to the legs. They should normally be recommended at the first menses occurring at least 2 weeks after full mobilization. A depot injection of a progestogen only contraceptive may be given, if required, until the oestrogen containing contraceptive can be reinstated. When discontinuation of an oestrogen containing contraceptive is not possible (e.g. after trauma or if by

oversight), and a patient admitted for an elective procedure is still on an oestrogen containing oral contraceptive, some consideration should be given to subcutaneous heparin prophylaxis against thromboembolism. These recommendation do not apply to minor surgery with short duration of anaesthesia, e.g. laparoscopic sterilization or tooth extraction or to women taking oestrogen free hormonal contraceptives (whether by mouth or by injection).

Combined oral contraceptives should be stopped if any of the following occur:

- Sudden severe chest pain (whether or not radiating to the left arm);
- Sudden breathlessness (or cough with blood stained sputum);
- Severe stomach pain;
- Hepatitis, jaundice, generalized itching, liver enlargement;
- Severe depression;
- Blood pressure above systolic 160 mmHg and diastolic 95 mm Hg;
- Detection of a risk factor-see Cautions and Contraindications under Combined Oral Contraceptives.

COMBINED ORAL CONTRACEPTIVES(COC) [ED]

(See section 5.4.2.2, Progesterone)

Indications: Contraception; menstrual symptoms.

Contraindications : Pregnancy; severe or multiple risk factors for arterial disease (see above); risk factors for venous thromboembolism (see above); valvular heart disease associated with pulmonary hypertension or risk of mural thrombi, ischaemic heart disease; transient cerebral ischaemic attacks without headaches; migraine; liver diseases including disorders of hepatic excretion (e.g. Dubin-Johnson or Rotor syndromes), infective hepatitis (until liver function returns to normal); systemic lupus erythematosus; porphyria (section 9.8.2); liver adenoma, gallstones; after evacuation of hydatidiform mole (until return to normal of urine and plasma

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gonadotrophin concentration); history of haemolyticuraemic syndrome or history of pruritus or cholestatic jaundice during pregnancy, pemphigoidgestationis, chorea or deterioration of otosclerosis, breast or gastrointestinal tract carcinoma; undiagnosed vaginal bleeding; breast feeding (until weaning or for 6 months after birth)

Interactions: See above and also Appendix-2 (contraceptives, oral)

Cautions: Risk factors for venous thromboembolism, arterial disease and migraine, see below and also notes above; hyperprolactinaemia (seek specialist advice); severe depression, sicklecell disease, inflammatory bowel disease including Crohn's disease.

RISK FACTORS FOR VENOUS THROMBOEMBOLISM: Use with caution if any of following factors present: Family history of venous thromboembolism in first degree relative aged under 45 years (avoid if prothrombotic coagulation abnormality e.g. factor V Leiden or antiphospholipid antibodies (including lupus anticoagulant); obesity (avoid if body mass index exceeds 39 kg/m²; Long-term immobilization e.g. in a wheelchair (avoid if confined to bed or leg in plaster cast); varicose veins, avoid during sclerosing treatment or where definite history of thrombosis exists.

RISK FACTORS FOR ARTERIAL DISEASE: Use with caution if any one of following factors present but avoid if two or more factors present; family history of arterial disease in first degree relative aged under 45 years (avoid if atherogenic lipid profile); diabetes mellitus (avoid if diabetes complication present); hypertension (avoid if blood pressure is above systolic 160 mmHg and diastolic 95 mm/Hg); smoking (avoid if smoking 40 or more cigarettes daily); age over 35 years (avoid if over 50 years); obesity (avoid if body mass index exceeds 39 kg/m²); migraine, subject should report any increase in headache frequency or onset of focal symptoms (discontinue immediately and refer urgently to neurology expert if focal neurological symptoms not typical of

aura persist for more than 1 hour, see also notes above)

Side effects: Nausea, vomiting, headache, breast tenderness, changes in body weight, fluid retention, thrombosis (more common when factor V present or in blood groups A, B and AB) (see notes above); changes in libido, depression, chorea, skin reactions, chloasma, hypertension, contact lenses may irritate impairment of liver function, hepatic tumours, reduced menstrual loss, spotting in early cycles absence of withdrawal bleeding rarely photosensitivity.

BREAST CANCER: There is a small increase in the risk of having breast cancer diagnosed in women taking the combined oral contraceptive pills; this relative risk may wholly or partly be due to earlier diagnosis. In users of combined oral contraceptive pills, the cancers are more likely to be localized to the breast. The most important risk factors appears to be the age at which the contraceptive is stopped rather than the duration of use; the risk disappears gradually during the 10 years after stopping and there is no excess risk by 10 years. A small increase in the risk of breast cancer should be weighed against the benefits and evidence of the protective effect against cancers of the ovary and endometrium.

Dose: By mouth every day combined (mono-phasic) preparations (28-tablets packet; each tablet should be taken at approximately same time each day; if delayed by longer than 12 hours contraceptive protection may be lost. Always start with the first tablet, follow the arrow/finger and swallow from the first tablet 21 tablets in 21 days. After finishing the white tablets similarly take one brown tablet a day for the next 7 days. Irrespective of starting of menstrual bleeding, after finishing the 7 brown tablets, start taking the first white tablet from a new packet

Pills should be swallowed with water, take tablet same time each day. Best time is after meal at night or at bed time. If for any reason husband is out of home for few days pills have to be

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continued. After starting taking pills some clients may experience minor side effects (e.g. nausea, spotting) but nothing to be worried. It corrects itself after 3-4 months of continuing taking pills. If these are matter of concern/anxiety client should contact family planning clinics. Pills should be kept in dry place and out reach of the children. During each follow up visit clients should bring the rest of the pills. During taking any other health related services a client should always mention that she is taking oral contraceptive pills. 21-day combined (monophasic) preparations (21 tablets packet); 1 tablet daily for 21 days; subsequent course repeated after a 7-day interval (during which withdrawal bleeding occurs). First course usually started on 1st day of cycle; if starting on 4th day of cycle or later, additional precautions (barrier methods) necessary during first 7 days.

Biphasic and triphasic preparations: As instructed under individual preparations.

CHANGING FROM PROGESTOGEN-ONLY TABLET: Start on first day of menstruation, or any day if amenorrhoea is present and pregnancy has been excluded.

SECONDARY AMENORRHOEA (exclude pregnancy): Start any day, additional precautions (barrier methods) necessary during first 7 days.

AFTER CHILDBIRTH (not breast-feeding): Start 3 weeks of postpartum (increased risk of thrombosis if started earlier); later than 3 weeks of postpartum additional precautions (barrier methods) are necessary for first 7 days. Not recommended if woman is breast-feeding (oral progestogen only contraceptive is to be given).

AFTER ABORTION OR MISCARRIAGE OR MENSTRUAL REGULATION (MR): Start on the same day.

COUNSELING: Clients must be counseled before giving oral contraceptive pills (OCP). The subject of discussion should include all other available methods of contraception, previous experience, superstitions and actual information's on OCP. If the

clients decides on using oral contraceptive pills, give proper information on how OCP acts; advantage and disadvantage; probable side effects (nausea vomiting; headache; inter-menstrual bleeding). If a woman is nervous she may stop taking pills management. Inform on common side effects, how to take pills and what to do for missing pill; danger signs and for follow up visits. Resupply should be ensured before the pervious supply is finished. In follow-up visits clients should be asked about proper use of OCP, problems encountered in taking the pills, detection of side effects, and treatment. Encourage using of condom in case of missing pill and stoppage of use of OCP due to side effect.

Note: Under the national family planning program, the Govt. is supplying in the brand name of **Shukhi** the standard preparation of oral contraceptive.

Shukhi White tablets levonorgestrel 150 micrograms, ethinylestradiol 30 microgram; brown tablets, ferrous fumarate 75 mg; Govt. supply. **Dose:** 1 white tablet (active) daily from 1st day of menstruation for 21 days followed by 7 brown (inactive) tablets; withdrawal bleeding usually occurs during taking of the brown tablets; brown tablets to be continued during bleeding; the 1st white tablet from the next packet should be started from the next day after finishing the brown tablets irrespective of occurrence of withdrawal bleeding.

Proprietary Preparations

Levonorgestrel 0.15mg + Ethinylestradiol 0.03mg

Levopil (Popular), Tab. Tk. 1.36/Tab.

Lyta 28 Pill (Incepta), Tab. Tk. 0.84/Tab.

Mini 28 (ACI), Tab. Tk. 1.00/Tab.

Nordette® (Pfizer) Tab. Tk.

Ovorest (Renata) Tab. Tk. 1.00/Tab.

Dose: as Shukhi above

Ethinylestradiol 0.03mg + Norgestrel 0.30mg

Conrena-R (Renata) Tk. 1.20/Tab

Norpil (Popular), Tab. Tk. 1.368/Tab.

Desogestrel 0.15mg + Ethinylestradiol 0.03mg

Ceptiva (ACI), Tab., Tk. 5.00/Tab.

Desolon (Renata), Tab., Tk. 5.00/Tab.

Marvelon (Nuvista), Tab. Tk. 5.00/Tab

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Noret(Popular), Tab. Tk. 1.36/Tab

Dose: 1 tab daily from 1st day of menstruation for 21 days followed by 7 days tab-free interval (during which withdrawal bleeding occurs).

Desogestrel 0.15mg + Ethinylestradiol 0.02mg
Microlon(Nuvista)Tab.Tk.4.30

Gestodene 0.30mg & Ethinylestradiol 0.075mg
Gestop(Incepta), Tab., Tk. 3.56/Tab

Other Proprietary Preparations **High Dose Pills**

Lynestrenol 2.5 mg with Ethinylestradiol 50 micrograms

Lynes(Nuvista), Tab; Tk. 5.91/Tab.

Regumen(Reneta) Tab; Tk. 4.77/Tab.

Dose: 1 tab daily from 1st day of menstruation for 22 days followed by 6 tab-free days (during which withdrawal bleeding occurs).

OvostatGold(Nuvista), Tab.Ethinylestradiol 0.0375mg +Lynestrenol 0.75mg.Tk. 3.19/Tab

Drospirenone 3mg + Ethinylestradiol 0.03mg

Novelon(Renata), Tab. Tk. 19.00/Tab.

Rosen(Incepta), Tab., Tk. 14.25/Tab.

6.3.2 PROGESTOGEN-ONLY CONTRACEPTIVES

6.3.2.1 ORAL PROGESTOGEN-ONLY CONTRACEPTIVES

6.3.2.2 PARENTERAL PROGESTOGEN-ONLY CONTRACEPTIVES

6.3.2.1 ORAL PROGESTOGEN ONLY CONTRACEPTIVES

Oral progestogen,are the only preparations offer a suitable alternative when oestrogens are contraindicated (including patients with venous thrombosis or a past history or predisposition to venous thrombosis), but have a higher failure rate than combined preparations. These are suitable for older women, for heavy smokers and for those with hypertension, valvular heart disease, diabetes mellitus and migraine. Menstrual irregularities (oligomenorrhoea, menorrhagia) are more common but tend to resolve on long-term treatment. Effectiveness of oral progestogen-only preparations is not affected by broad spectrum antibiotics

but is reduced by enzyme inducing drugs (see Appendix-2). All progestogen only contraceptives (including those given by injection) are suitable for use as an alternative to combined oral contraceptives before major elective surgery.

STARTING ROUTINE: 1 tablet daily on a continuous basis, starting on 1st day of cycle and taken at the same time each day (if delayed by longer than 3 hours contraceptives protection may be lost). Additional contraceptive precautions are not necessary when initiating treatment. Changing from a combined oral contraceptive: start on the day following completion of the combined oral contraceptive course without a break (or in the case of ED tablets omitting the inactive ones). After childbirth: start any time after 3 weeks postpartum (increased risk of breakthrough bleeding if started earlier); lactation is not affected.

ADVICE ON MISSED PILL: If a pill is forgotten, take it as soon you remember and carry on with the next pill at the right time. If the pill was more than three hours overdue you are not protected. Continue normal pill taking but you must also use another method, such as the condom, for the next 7 days.

ORAL PROGESTOGEN-ONLY CONTRACEPTIVES

(Progestogen-only pill, 'POP')

Indications: Contraception; for use in Emergency Contraception, see section 6.3.5

Cautions: Heart disease, sex-steroid dependent cancer, past ectopic pregnancy, malabsorption syndromes, functional ovarian cysts, active liver disease, recurrent cholestatic jaundice, history of jaundice in pregnancy, uncontrolled diabetes mellitus. Advised caution in patients with history of thromboembolism, hypertension, diabetes and migraine

Contraindications: Pregnancy, undiagnosed vaginal bleeding; severe arterial disease; live adenoma, porphyria; after

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evacuation of hydatid form mole (until return to normal urine and plasma gonadotrophin values), lump in breast or breast cancer.

Interactions: See Appendix-2

Side-effects: Menstrual irregularities; nausea, vomiting, headache, dizziness, breast discomfort, depression, skin disorders, disturbance of appetite, weight changes, changes in libido. Vomiting and severe diarrhoea can interfere with absorption and limit effectiveness; additional precautions should be used during and for 7 days after recovery.

Proprietary Preparations

Desogestrel

Bredicon(Renata), Tab., 75 microgram, Tk. 2.15/Tab

Pop-D(Incepta), Tab., 75 microgram, Tk. 2.15/Tab.

Levonoregestrel

Emcon 1(Renata), Tab., 1.5mg, Tk. 70/Tab.

Emcon(Renata), Tab., 75 mcg, Tk. 65/Tab.

E-plan(ACI), Tab., 75mcg., Tk. 22.50/Tab. ;

E-PlanMax(ACI), 1.5mg, Tk. 70/Tab.

I-PilMax(Popular), Tab., 1.50mg, Tk. 70/Tab.

I-Pil(Popular), Tab., 75mcg, Tk. 22.50/Tab.

Norpill(Square), Tab., 75 mcg, Tk. 22.57/Tab.

Norpill1(Square), Tab., 1.5 mg, Tk. 70/Tab.

Setfree(Nuvista), Tab., 1.5 mg, Tk. 65/Tab

Medroxyprogesterone

Medogen(Incepta), Tab., 10 mg, Tk.

10.00/Tab.; 5 mg, Tk. 5.38/Tab.

Medora(Nuvista), Tab., 5 mg, Tk. 4.78/Tab.; 10 mg, Tk. 8.89/Tab.

Medrina(Beacon), Tab., 5mg, Tk. 4.70/Tab.

Medrogest(Renata), Tab., 5 mg, Tk.

5.38/Tab.; 10 mg, Tk. 10.00/Tab.

Medroxy(Popular), Tab., 10mg, Tk.

10.07/Tab. ;

Movera(ACI), Tab., 10mg, Tk. 0.03/Tab. ;

5mg, Tk. 5.40/Tab.

Perlutex^(L)(Leo)Tab 5 mg, Tk. 8.53/Tab

Provenor(Eskayef), Tab., 10mg, Tk.

10.00/Tab.; 5 mg, Tk. 5.00/Tab.;

6.3.2.2 PARENTERAL PROGESTOGEN-ONLY CONTRACEPTIVES

Delayed return of fertility and irregular cycles may occur after discontinuation of treatment but there is no evidence of permanent infertility. Heavy bleeding has been reported in patients given

Medroxyprogesterone acetate in the immediate puerperium (the first dose is best delayed until 5 to 6 weeks postpartum). If the woman is breast-feeding, the first injection may be given within 5 days postpartum (she should be warned that the risk of heavy or prolonged bleeding may be increased). Reduction in bone mineral density has also been reported.

Norethisterone enanthate is a long-acting progestogen given as an oily injection, which provides contraception for 8 weeks to provide short-term interim contraception e.g. before vasectomy becomes effective.

The cautions and contra-indications of the oral progestogen only contraceptives apply except that since the injection also inhibits ovulation, it protects against ectopic pregnancy and functional ovarian cysts. Clients who have PID or are high risk for PID and cannot take IUD are suitable candidates for receiving parenteral progestogen only contraceptives; these can also be used for endometriosis (monthly injections).

Levonorgestrel-releasing implant system is also available. Its efficacy is comparable to that of injected **Medroxyprogesterone acetate** but lasts for 5 years. The cautions and contra-indications are again as for oral preparations, but irregular and prolonged bleeding and amenorrhoea are common; unlike the injectable preparations the method is almost immediately reversible on removal of the implants. The risk of ectopic pregnancy is believed to be reduced overall but the proportion of ectopic to intrauterine pregnancies is increased among the very few pregnancies that do occur; since functional ovarian cysts may also be more common they need to be distinguished from ectopic pregnancy. Health personnel administering (or removing) the system should be fully trained in the technique and should provide full counseling backed by the manufacturer's approved leaflet.

PARENTERAL PROGESTOGEN-ONLY CONTRACEPTIVES**MEDROXYPROGESTERONE ACETATE**

Indications: Contraception for women who have at least one living child; endometriosis; *see also notes above and under preparations.*

Cautions; Contraindications; Side-effects: *See notes above and under preparations.*

Interactions: Effectiveness is not affected by broad-spectrum antibiotics but may be reduced by enzyme inducing drugs; the interval between injections of medroxyprogesterone acetate should be reduced from 12 weeks to 10 weeks; *see Appendix-2 (progestogens)*

Dose: *By deep intramuscular injection*, 150 mg within first 5 days of cycle or within first 5 days after parturition (delay until 6 weeks after parturition if breast-feeding); for long-term contraception, repeated every 12 weeks (if interval greater than 12 weeks and 5 days, exclude pregnancy before next injection and advise patient to use additional contraceptive measures (e.g. barrier) for 14 days after the injection). It should be started immediately after abortion or MR. To be started immediately after stopping other contraceptive methods. During Ramadan, Muslim ladies will not take injection during daytime, so the injection can be given 14 days earlier/later or at night. During rainy season or flood doses of injections can be given 14 days earlier/later.

Note: Injection (aqueous suspension), medroxyprogesterone acetate 150mg/ml available free of charge under the national family planning program.

Proprietary Preparations

Depoprovera[®](Pharmasia) Inj., 150 mg/ml, Tk. 279.05/Vial.

Medogen(Incepta), Inj., 150 mg/ml, Tk. 38.00/Vial.

Medroxy(Popular), Inj., 150 mg/ml, Tk. 38.00/Vial

Provera(Techno), Inj., 150 mg/ml, Tk. 43.40/Vial

6.3.2.3 INTRAUTERINE PROGESTOGEN-ONLY CONTRACEPTIVE

Levonorgestrel is released directly in to the uterine cavity from an intrauterine system. Effects are therefore mainly local and hormonal including prevention of proliferation of the endometrium, thickening of cervical mucus, and suppression of ovulation in some women (in some cycles): the physical presence of the system in the uterus may also make a minor contribution to the overall contraceptive effect. Return of fertility after removal is rapid and appears to be complete. Advantages over copper intra-uterine devices are that there may be an improvement in any dysmenorrhoea and a reduction in blood loss; there is also evidence that the frequency of pelvic inflammatory disease may be reduced (particularly in the youngest age groups who are most at risk).

Cautions and contraindications are as for standard intra-uterine devices (section 6.3.4) but the risk of ectopic pregnancy is considerably reduced and pre-existing heavy menses and anaemia may be alleviated. Moreover, since the progestogen is released close to the site of the main contraceptive action (on cervical mucus and endometrium) progestogenic side-effects and interactions are less likely to be a problem in particular, enzyme inducing drugs are unlikely to have much influence on the contraceptive effect. Initially changes in the pattern and duration of menstrual bleeding (spotting or prolonged bleeding) are common and full counseling should be undertaken before insertion. Improvement usually occurs a few months after insertion and bleeding may often become scanty or absent; this may therefore be a method of choice for women who have excessively heavy menses. Functional ovarian cysts (usually asymptomatic) may occur and usually

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resolve spontaneously (ultrasound monitoring recommended).

Indication: Contraception

Cautions; Contra-indications; Side-effects: See notes above; avoid in severe liver impairment. Insert into uterine cavity within 7 days of onset of menstruation (any time if replacement) or immediately after first-trimester termination by curettage; post-partum insertions should be delayed until 6 weeks after delivery; effective for 5 years
Interactions: See notes above and Appendix-2

and the woman wishes to continue to full-term, the device should be removed in the first trimester if possible.

INTRA-UTERINE CONTRACEPTIVE DEVICES (IUDs)

Indications: Contraception; secondary amenorrhoea due to Asherman's syndrome; see notes above

Cautions: Anaemia, heavy menses, endometriosis, severe primary dysmenorrhea, history of pelvic inflammatory disease, history of ectopic pregnancy or tubal surgery, diabetes, fertility problems, nullparity and young age, severely scarred uterus (including after endometrial resection) or severe cervical stenosis, valvular heart disease (antibiotic cover needed), avoid if prosthetic valve or past attack of infective endocarditis; HIV infection or immunosuppressive therapy (avoid if immunosuppression); joint and other prostheses; epilepsy; increased risk of expulsion if inserted before uterine involution; anti coagulant therapy (avoid if possible); remove if pregnancy occurs (if pregnancy occurs, increased likelihood that it may be ectopic). Gynecology examination advised before insertion, 6 weeks after (or sooner if there is a problem), then after 6 months and then yearly.

Contraindications : Pregnancy, severe anemia, recent sexually transmitted infection (if not fully investigated and treated), unexplained uterine/vaginal bleeding, distorted or small uterine cavity, genital malignancy, trophoblastic disease, pelvic inflammatory disease, chronic cervicitis, erosion, polyp; history of vaginal discharge and ectopic pregnancy; established or marked immunosuppression; copper devices: copper allergy, Wilson's disease, medical diathermy

Side effects: Uterine or cervical perforation, displacement, pelvic infection may be exacerbated, heavy menses, dysmenorrhea, allergy on insertion: some pain (helped by giving Bupropion 30 minutes before insertion);

6.3.3 SPERMICIDAL CONTRACEPTIVES

Spermicidal contraceptives based on nonoxinol (**Delfen, double Check, Duragel**, etc.) are useful additional safeguards but do not give adequate protection if used alone; they are suitable for use with barrier methods. However, no such drug preparation is registered in Bangladesh.

6.3.4 CONTRACEPTIVE DEVICES

INTRA-UTERINE DEVICES

The intra-uterine device (IUD) is suitable for older parous women but should be a last-resort contraceptive for young nulliparous women because of the increased risk of pelvic inflammatory disease and infertility. In recent times, smaller devices have been introduced to minimise side-effects; these consist of a plastic carrier wound with copper wire or fitted with copper bands; some also have a central core of silver to prevent fragmentation of the copper. Family planning services now recommend that the replacement time for these devices should be 5 years. IUDs are also useful for emergency contraception (see section 6.3.5).

An intra-uterine device should not be removed in midcycle unless an additional contraceptive was used for the previous 7 days. If removal is essential (e.g. to treat severe pelvic infection), post-coital contraception should be considered. If an intrauterine device fails

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and bleeding; occasionally epileptic seizure, vasovagal attack.

COUNSELING: Inform the patient about all available contraceptive methods in a friendly environment. IUD is a suitable method of contraceptive for couple with one or more children and who want contraceptive measures for longer time. If a client chooses IUD as her contraceptive method she should be informed on what can happen during and after its insertion; she should be also informed about the side-effects, and that though there are some side-effects, the method suits most women who fulfill selection criteria. Use a checklist during counseling and take feedback. Provide a card to the client with her name, date of insertion, date of removal and date of follow up. Clients should be shown how to feel the thread and asked to feel it. She should also be informed about danger signs and return of fertility after removal of IUD

CuT 380. Intrauterine device, copper wire surface area 320 mm² wound on vertical stem of T-shaped plastic carrier (impregnated with radio opaque substance), plastic thread attached to base of vertical stem and copper collar surface 30 mm² on distal portions of each arm; replacement time 5 years. It is available free of charge in family planning clinics (*Green Umbrella*) under the national family planning program.

CuT 200B, Intrauterine device, copper wire surface area 200 mm² wound on vertical stem of T-shaped plastic carrier (impregnated with radio opaque substance), plastic thread attached to base of vertical stem; replacement time 3 years. Available free of charge in family planning clinics (*Green Umbrella*) under the national family planning program.

BARRIER METHODS

CONDOMS^[ED]

A condom is a sheath or covering made to fit over a man's erect penis usually made of thin latex rubber. Condoms help prevent both pregnancy and sexually

transmitted diseases (STDs), ensures male participation in contraception, are safe, easily available and inexpensive and almost devoid of any side-effect. Additional advantages include prevention of premature ejaculation and over-coming of dryness during intercourse; prevention of STDs and Reproductive Tract Infections (RTIs). It also prevents anti sperm antibody formation.

Contraindication: Practically nil; only medical contraindication is allergy to latex which is very rare (recommend non-latex condom in that case)

INSTRUCTIONS FOR USE: Put the condom on the erect penis before penis touches the vagina. Hold the pack at its edge and open by tearing from a ribbed edge. Hold the condom so that the rolled rim is facing up, away from the penis. Pull the foreskin back if the penis is uncircumcised. Place the condom on the tip of the penis and unroll it all the way to the base of the penis. The condom should unroll easily; if it does not, it is probably placed backwards; turn it over and try again. If using the condom to avoid passing an STD, throw away the condom that was on backwards and start over with a new one.

Any lubricant used should be water based. Water can also be used. Good lubricants include spermicides, glycerine and other specially made products. They help keep condoms from tearing during intercourse. Natural vaginal secretions also act as a lubricant. Do not use lubricants made with oil because most oils damage condoms. Never use cooking oil, baby oil, coconut oil, hair oil, mineral oil, petroleum jelly, vaseline, skin lotions, suntan lotions, cold cream, butter, cocoa butter or margarine.

After ejaculation, hold the rim of the condom to the base of the penis so that it does not slip off. It is advisable that the penis be withdrawn out of the vagina before completely losing its erection. Take off the condom without spilling semen on the vaginal opening. Throw the condom into a pit latrine, bury it, burn it or dispose of it in some other way; do not leave it where children can find it and

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play with it. Do not use a condom more than once. If a condom breaks while it is being used: immediately insert a spermicide into the vagina, if a spermicide is available. Washing both penis and vagina with soap and water may reduce the risk of STDs and pregnancy to some extent. Some client may want to use emergency oral contraception to prevent pregnancy (see below).

Various brands of condoms are available in the market. *Raja*, *Panther* and *Sensation* are some of the popular brands which are available both in family planning clinics and also in most pharmacies.

Proprietary Preparation

Pengun[®](Unidus), Tk.3.03

6.3.5 EMERGENCY CONTRACEPTIVES

Emergency contraception refers to contraceptive methods that can be used by women in the first few days following unprotected intercourse to prevent an unwanted pregnancy. The hormonal (Yuzpe) method is suitable for emergency use (2% failure) but it is less effective than insertion of an intra-uterine device (1% failure). Emergency contraception is indicated to prevent pregnancy within 3 days (72 hours) of unprotected sexual intercourse or a contraceptive accident or misuse (e.g. condom rupture, slippage, or misuse; failed coitus interruptus; IUD expulsion; in cases of sexual assault, etc.). Emergency contraception is not suitable as a regular method of contraception.

HORMONAL METHOD.

Hormonal emergency contraceptives include Levonorgestrel and Ulipristal; either drug should be taken as soon as possible after unprotected intercourse to increase efficacy.

Levonorgestrel is effective if taken within 72 hours (3 days) of unprotected intercourse and may also be used between 72 and 96 hours after unprotected intercourse, but efficacy decreases with time. **Ulipristal**, a progesterone receptor modulator, is

effective if taken within 120 hours (5 days) of unprotected intercourse.

Levonorgestrel is less effective than insertion of an intra-uterine device (see below). Ulipristal is as effective as levonorgestrel, but its efficacy compared to an intrauterine device is not yet known.

If vomiting occurs within 2 hours of taking levonorgestrel or within 3 hours of taking ulipristal, a replacement dose should be given.

Side-effects of hormonal methods include nausea, vomiting, headache, dizziness, breast discomfort and menstrual irregularities.

IUD METHOD. Insertion of an IUD is more effective emergency contraceptive method than the hormonal method. Copper based IUDs may be appropriate for some women who meet the strict screening requirements for IUD use and who wish to retain the IUD for long-term contraception. Inserted within five days (120 hours) of unprotected intercourse, IUDs provide a highly effective method of emergency contraception.

ULIPRISTAL ACETATE

(See section 6.3.5)

Indications: Emergency contraception; uterine fibroids

Proprietary Preparations

Ulipristal Acetate

5x(Renata), Tab., 30mg, Tk. 200/Tab.

Fibropress(Beximco), Tab., 5mg, Tk. 55/Tab.

Peuli(Ziska), Tab., 30 mg, Tk.195/Tab.

Preroid(Renata), Tab., 5mg, Tk. 40/Tab.

Tulip(Square), Tab., 30 mg, Tk. 280/Tab.

Ulicon(Eskayef), Tab., 30mg, Tk. 195/Tab.

Uliroid(Ziska), Tab., 5 mg, Tk. 40/Tab.

Utal(Square), Tab., 5 mg, Tk. 54.50/Tab.

6.4 DRUGS FOR GENITO-URINARY DISORDERS

6.4.1 DRUGS FOR URINARY RETENTION

6.4.2 DRUGS FOR URINARY INCONTINENCE AND NOCTURNAL ENURESIS

6.4.3 DRUGS USED IN UROLOGICAL PAIN

6.4.4 DRUG FOR ERECTILE DYSFUNCTION

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6.4.5 ALKALINISATION AND ACIDIFICATION OF URINE

For individual drugs used in the treatment of urinary tract infection, see section 1.1

6.4.1 DRUGS FOR URINARY RETENTION

Acute retention is painful and is treated by catheterisation. Chronic retention is painless and often long standing; catheterisation is not needed unless there is deterioration of renal function. After the cause has initially been established and treated, drugs may be required to increase detrusor muscle tone. Benign prostatic hyperplasia is treated either surgically or medically with alpha-blockers (see below) or with the anti-androgen **Finasteride** (section 12.8.2).

ALPHA-BLOCKERS

(See also section 3.2.3)

The selective alpha-blockers **Alfuzosin**, **Doxazosin**, **Indoramin**, **Prazosin**, **Tamsulosin** and **Terazosin** relax smooth muscle in benign prostatic hyperplasia producing an increase in urinary flow rate and an improvement in obstructive symptoms. Side-effects of selective alpha blockers include sedation, dizziness and hypotension (notably postural hypotension particularly after the first dose); other side-effects associated with this group of drugs include drowsiness, weakness and lack of energy, depression, headache, dry mouth, nausea, urinary frequency and incontinence, tachycardia and palpitations. They should be avoided in patients with a history of orthostatic hypotension and micturition syncope; special care (and reduced dosage) is needed when initiating them in the elderly and in renal and possibly hepatic impairment. Since selective alpha-blockers are also anti-hypertensive, patients receiving antihypertensive treatment require reduced dosage and

specialist supervision (as do those with cardiac disorders). Selective alpha-blockers may cause drowsiness and so affect ability to drive or operate machinery. For interactions, see *Appendix-2 (alpha-blockers)*.

Note: FIRST DOSE EFFECT: First dose may cause collapse due to hypotensive effect (therefore should be taken on retiring to bed). Patient should be warned to lie down if symptoms such as dizziness, fatigue or sweating develop and to remain lying down until they pass off completely

ALFUZOSIN

Indications, Cautions, Contra-indications & Side-effects: See notes above;

Dose: Benign prostatic hyperplasia 10 mg once daily. Acute urinary retention associated with benign prostatic hyperplasia in men over 65 years, 10 mg once daily for 2–3 days during catheterisation and for one day after removal; max. 4 days

Proprietary Preparations

Alfasin (Incepta) Tab, 10 mg, Tk. 10/Tab.
Alfumax (UniMed), Tab, 10 mg, Tk. 10/Tab.
Uriten (Square), Tab., 10 mg, Tk. 10.07/Tab.
Zatral (Eskayef), Tab., 10 mg, Tk. 10.00/Tab.

PRAZOSIN HYDROCHLORIDE

Indications: Benign prostatic hyperplasia; see notes above; hypertension; also see section 3.2.3

Cautions, Contraindications & Side-effects: See notes above and also section 3.2.3

Dose : Initially 500 micrograms twice daily for 3–7 days, subsequently adjusted according to response; usual maintenance (and maximum) 2 mg twice daily. ELDERLY: initiate with lowest possible dose.

Proprietary Preparations

Alphapress (Renata), Tab, 1mg, Tk. 4.00/Tab., 2mg, Tk. 6.00/Tab.
Prazolok (Square), Tab., 1mg, Tk. 4.00/Tab.; 2 mg, Tk. 6.00/Tab.

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Prazopress(UniMed), 2mg, Tk. 6.00/Tab.;
1mg, Tk. 4.00/Tab. XRTab , 2.5mg, Tk.
10.00/Tab.; 5mg, Tk. 15.00/Tab.,

TAMSULOSIN HYDROCHLORIDE

Indications: See notes above

Cautions, Contraindications & Side-effects: See notes above; avoid in severe liver impairment

Dose: 400 micrograms daily after breakfast

Proprietary Preparations

Eziflo(Biopharma), Cap., 400 microgram Tk. 10.00/Cap.
Flonor(Novo), Cap., 400 microgram , Tk. 10.00/Cap.
Maxrin(Square), Cap., 400 microgram, Tk. 10.07/Cap.
Prostam(Drug Intl), Cap., 400 microgram , Tk. 10.05/Cap.
Prostanil(Aristo), MR.Cap., 400 microgram, Tk. 10.00/Cap.
Protinavit(Incepta), Cap., 400 microgram Tk. 9.00/Cap
Sasolin(ACI), Cap., 400 microgram , Tk. 10.07/Cap.
Tamfast(Radiant), Cap., 400 microgram, Tk. 10.03/Cap.
Tamisol(Healthcare), MR.Cap., 400 microgram, Tk. 10.00/Cap.
Tamlosin(Orion), Tab., 400 microgram, Tk. 10.07/Tab.
Tamosin(Supreme), Cap, 400 microgram, Tk. 10.00/Cap.
Tamsule(Sharif),XR Cap., 400 mcg, Tk. 10.03/Cap.
Tamurin(Globe), Cap., 400 microgram, Tk. 10.00/Tab.
Urinom(Opsonin),MR.Cap., 400 microgram, Tk. 10.00/Cap., Tab., Tk. 10.04/Tab.
Urocap(IbnSina), Cap., 400 microgram, Tk. 10.00/Cap.
Uroflo(Beximco), Cap., 400 microgram, Tk. 10.00/Cap.
Urolosin(General), Tab., 400 microgram , Tk. 10.07/Tab.
Uromax(UniMed), Cap, 400 microgram, Tk. 10.00/Cap.
Uropass(Acme), Cap., 400 microgram, Tk. 10.07/Cap.
Urosin(Eskayef), Cap, 400 microgram, Tk. 10.00/Cap.,
Urotam(Navana), Cap.400 microgram, Tk. 10.00/Cap.

Tamsulosin HCl 400 microgram +
Dutasteride 500 microgram,

Combomax(Drug Intl),Cap., Tk. 15.05/Cap.

Eziflo(Biopharma), Cap.,Tk. 20.00/Cap.
Maxrin(Square), Cap.,Tk. 20.00/Cap.
Prostacin-D(Incepta), Cap. , Tk. 20.00/Cap.
TamsinD(Delta), Cap., Tk. 20.00/Cap.
Urocap-D(IbnSina), Cap. Tk. 600.00/Cap.
UrolosinD(General), Cap. ,Tk. 20.00/Cap.
Uromax-D(UniMed), Tab ,Tk. 20.00/Tab.
Uropass(Acme), Cap.,Tk. 20.00/Cap.

TERAZOSIN

Indications; Cautions, Contraindications & Side-effects: :See notes above and also section 3.2.3

Dose: Initially 1 mg at bedtime; dose may be doubled at weekly intervals according to response to maximum 10 mg once daily; usual maintenance 5-10 mg daily

FIRST DOSE EFFECT: First dose may cause collapse due to hypotensive effect (therefore should be taken on retiring to bed). Patient should be warned to lie down if symptoms such as dizziness, fatigue or sweating develop and to remain lying down until they pass off completely

Proprietary Preparation

Terazon(Incepta), Tab. 2 mg, Tk. 5.00/Tab.;
5mg, Tk. 8.00/Tab.

PARASYMPATHOMIMETICS

Parasympathomimetics produce the effect of parasympathetic nerve stimulation: they possess the muscarinic rather than the nicotinic effect of acetylcholine and improve voiding efficiency by increasing detrusor muscle contraction. In the absence of obstruction to bladder outlet they have a limited role in relieving urinary retention. Generalised parasympathomimetic side effects such as sweating, bradycardia and intestinal colic may occur, particularly in the elderly. Use of parasympathomimetics is now limited because they do not give clinical benefit to patients as might be expected. Their use has largely been replaced by intermittent catheterisation, especially in cases of areflexia. **Carbachol** and **Bethanechol** are choline esters that have been used in postoperative urinary retention. Bethanechol has a more selective action on the bladder than

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carbachol but the use of both has now been superseded by catheterisation.

Distigmine inhibits the breakdown of acetylcholine. It may help patients with an upper motor neuron neurogenic bladder. No drug preparation containing carbachol, bethanechol or distigmine is presently registered in Bangladesh.

6.4.2 DRUGS FOR URINARY INCONTINENCE AND NOCTURNAL ENURESIS

URINARY INCONTINENCE: Antimuscarinic drugs such as **Oxybutynin** and **Flavoxate** are used to treat urinary frequency; they increase bladder capacity by diminishing unstable detrusor contractions. The dosage needs to be carefully assessed, particularly in the elderly. **Flavoxate** has less marked side effects but is also less effective. **Tolterodine** and **Propiverine** are also antimuscarinic drugs used for urinary frequency, urgency and incontinence.

Propantheline was formerly widely used in urinary incontinence but had a low response rate with a high incidence of side-effects; it is now primarily indicated in adult enuresis. The **Tricyclic antidepressants** (see section 7.3) such as **Imipramine**, **Amitriptyline**, and **Nortriptyline** (see section 7.3) are sometimes effective in the management of unstable bladder because of their antimuscarinic properties.

NOCTURNAL ENURESIS: Nocturnal enuresis is a normal occurrence in young children but persists in about 5% by 10 years of age. In the absence of urinary-tract infection simple measures such as bladder training or the use of an alarm system may be successful. Drug therapy not usually appropriate for children under 7 years of age and should be reserved for cases when alternative measures have failed, and preferably on a short term basis to cover period away from home. The possible side effects of the drugs should be borne in mind when they are prescribed. **Desmopressin** (see section 5.3.3), an analogue of vasopressin, is used or nocturnal

enuresis; particular care is needed to avoid fluid overload and treatment should not be continued for longer than 3 months without stopping for a week for full reassessment. Tricyclic antidepressants (see section 7.3) such as amitriptyline, imipramine, and less often nortriptyline, are also used but behavior disturbances may occur and relapse is common after withdrawal. Treatment should not normally exceed 3 months unless a full physical examination (including ECG) is given and the child is fully reassessed; toxicity following over dosage with tricyclics is of particular concern.

Darifenacin, **Fesoterodine**, **Propiverine**, **Solifenacin**, and **Trospium** are newer anti-muscarinic drugs indicated for urinary frequency, urgency, and incontinence.

Mirabegron, a selective beta₃ agonist, is used for the treatment of urinary frequency, urgency, and urge incontinence associated with overactive bladder

DARIFENACIN

Indications, Cautions, Contra-indications & Side-effect: See notes above

Proprietary Preparations

Darilax (Incepta), ER Tab., 15 mg, Tk.

40/Tab.; ER Tab., 7.5 mg, Tk. 22/Tab.

Darifen (Acme), Tab., 7.50 mg, Tk. 22.07/Tab.

FLAVOXATE HYDROCHLORIDE

Indications: Urinary frequency and incontinence, dysuria, urgency, bladder spasm due to catheterization.

Cautions, Contraindications: See under oxybutynin hydrochloride (antimuscarinic effect considerably less marked)

Side-effects: antimuscarinic side-effects; see also notes above.

Dose: 200 mg 3 times daily; for CHILD under 12 years, not recommended.

Proprietary Preparations

Avox (Opsonin) Tab., 100 mg, Tk. 10.07/Tab.;

200 mg, Tk. 18.13/Tab.

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Flavox(Somatec), Tab, 100 mg, Tk. 10.00/Tab.; 200 mg, Tk. 18.00/Tab.
Urilax(Incepta), Tab., 100 mg, Tk. 10.00/Tab.

MIRABEGRON

Indications: See notes above

Cautions: History of QT-interval prolongation; concomitant use with drugs that prolong the QT interval

Contraindications: severe hypertension, Hepatic impairment Breast-feeding

Side-effects: Tachycardia, urinary-tract infection; less commonly dyspepsia, gastritis, palpitation, atrial fibrillation, hypertension, vulvovaginal infection and pruritus, joint swelling, rash, pruritus

Dose: ADULT over 18 years, 50mg once daily

Proprietary Preparations

Iragon(Drug Intl), Tab., 25mg, Tk. 30.00/Tab.

Mirabeg(General), Tab., 25mg, Tk. 30/Tab.; 50mg, Tk., 55.00/Tab.

Miragon(ACI), Tab., 25mg, Tk. 30.00/Tab.

Utromeg(UniMed), Tab., 50mg, Tk. 55/Tab.; 25mg, Tk. 30.00/Tab.

OXYBUTYNIN HYDROCHLORIDE

Indications: Urinary frequency, urgency and incontinence; neurogenic bladder instability and nocturnal enuresis

Cautions: Frail elderly; hepatic and renal impairment; hyperthyroidism; cardiac disease where increase in heart rate undesirable; prostatic hypertrophy; hiatus hernia with reflex oesophagitis; pregnancy, breast feeding; porphyria

Contraindications: Intestinal obstruction or atony; severe ulcerative colitis or toxic megacolon; significant bladder outflow obstruction; glaucoma; myasthenia gravis

Side-effects: Dry mouth, constipation, blurred vision, nausea, abdominal discomfort, facial flushing (more marked in children), difficulty in micturition (less commonly urinary retention), also headache, dizziness, drowsiness, dry skin, rashes, angioedema, photosensitivity, diarrhoea, arrhythmia, restlessness, disorientation, hallucination (children higher risk of excitatory effects); convulsions

Dose: 5 mg 2-3 times daily increased if necessary to max. 500 mg 4 times daily. ELDERLY, 2.5-3 mg twice daily initially, increased to 5 mg twice daily according to response and tolerance. CHILD, over 5 years, neurogenic bladder instability, 2.5-3 mg twice daily increased to 5 mg 3 times daily, max. 5 mg 3 times daily; nocturnal enuresis (preferably over 7 years), 2.5-3 mg twice daily increased to 5 mg 2-3 times daily (last dose before bedtime)

Proprietary Preparation

Uricon(Beximco), Tab. 5mg, Tk.6/Tab.

PROPANTHELINE BROMIDE

Indications: Adult enuresis, see notes above; see also section 2.2.

Cautions; **Contraindications:** See under oxybutynin hydrochloride.

Side-effects: Antimuscarinic side-effects; see also notes above

Dose: 15-30 mg 2-3 times daily one hour before meals

Proprietary Preparation

See section 2.2

SOLIFENACIN SUCCINATE

Indications: Urinary frequency, urgency and urgeincontinence

Cautions: See notes above; neurogenic bladder disorder

Contraindications: See notes above; hepatic impairment; renal impairment; pregnancy;

Side-effects: See notes above; also chest pain, peripheral oedema; sinusitis, bronchitis; paraesthesia

Proprietary Preparations

Solicare(Acme), Tab., 10 mg, Tk. 30.00/Tab.; 5 mg, Tk. 15.00/Tab.

Solider(Square), Tab., 10 mg, Tk. 30/Tab.; 5 mg, Tk. 15.00/Tab.

Solifen(Aristo), Tab., 5 mg, Tk. 20.00/Tab.

Utrobin(UniMed), Tab, 10 mg, Tk. 30/Tab.; 5 mg, Tk. 15.00/Tab.

TOLTERODINE TARTRATE

Indications: Urinary frequency, urgency and incontinence.

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Cautions: Significant bladder outflow obstruction; gastro-intestinal obstruction; hiatus hernia; neuropathy; liver impairment; renal impairment.

Contraindications: Urinary retention, uncontrolled angle-closure glaucoma; myasthenia gravis; severe ulcerative colitis or toxic megacolon,

Side-effects: Dry mouth, dyspepsia, constipation, abdominal pain, flatulence, vomiting, headache; paraesthesia; less commonly blurred vision, chest pain; rarely urinary retention, confusion.

Dose: 2 mg twice daily; reduce to 1 mg twice daily if necessary to minimise side-effects; review after 6 months

Not recommended for CHILDREN

Proprietary Preparations

DetrusinLA(UniMed), Tab., 2 mg, Tk. 3.50/Tab., 1 mg, Tk. 2.66/Tab; ERCap., 4 mg, Tk. 15.00/Cap., ER2 mg, Tk. 8.00/Cap. .

Tolorin(General), Tab., 2 mg, Tk. 3.02/Tab.

Tolter(Renata), Tab., 2 mg, Tk. 3.00/Tab., 1mg, Tk. 2.00/Tab.

Toltrex(Incepta), Tab., 2 mg, Tk. 3.00/Tab.

Ucol(Square), Tab., 2 mg, Tk. 3.01/Tab.

Uritol(Eskayef), Tab., 1 mg, Tk. 2.00/Tab., 2mg, Tk. 3.00/Tab.

6.4.3 DRUGS USED IN UROLOGICAL PAIN

The acute pain of ureteric colic may be relieved with **Pethidine**(see section 7.5.1). **Diclofenac** by injection or as suppositories (see section 9.1.1) is also effective and compares favorably with pethidine; other non-steroidal antiinflammatory drugs are occasionally given by injection. **Lignocaine gel** is a useful topical application in urethral pain or to relieve the discomfort of catheterization (see section 8.2).

6.4.4 DRUG FOR ERECTILE DYSFUNCTION

Erectile disorders are treated with drugs given by mouth which increase the blood flow to the penis. Drugs should be used with caution if the penis is deformed.

DAPOXETINE

Indications: Premature ejaculation

Cautions: Bleeding disorders; concomitant use of drugs that increase risk of bleeding; epilepsy (avoid if uncontrolled, discontinue if convulsions develop); susceptibility to angle-closure glaucoma;

Contraindications: Significant cardiac disease; history of syncope; history of mania, bipolar disorder, or severe depression; discontinue if psychiatric disorder develops, hepatic and severe renal impairment

Side-effects: Nausea, vomiting, diarrhoea, constipation, abdominal pain, abdominal distension, dyspepsia, dry mouth, flushing, sweating, hypertension, malaise, irritability, dizziness, headache, anxiety, agitation, abnormal dreams, sleep disturbances, drowsiness, tremor, paraesthesia, impaired attention,

Dose: ADULT 18–64 years, initially 30mg approx. 1–3 hours before sexual activity, subsequent doses adjusted according to response to max. 60mg as a single dose; max. 1 dose in 24 hours; review treatment after 4 weeks (or 6 doses) and at least every 6 months

Proprietary Preparations

Daporex(Euro), Tab., 30mg, Tk. 30.00/Tab.; 60mg, Tk. 50.00/Tab.

Dapotin(Beacon), Tab., 30mg, Tk. 30.09/Tab.

Dapoxen(Opsonin), Tab., 30 mg, Tk.

30.00/Tab.; 60 mg, Tk. 50.00/Tab.

Daxetin(ACI), Tab., 30mg, Tk. 30.00/Tab.,

60mg, Tk. 50.00/Tab.

Dejac(Globe), Tab., 30 mg, Tk. 30.00/Tab.

Dulong(Radiant), Tab., 30mg, Tk. 30.00/Tab.

Dumax(Eskayef), Tab., 30mg, Tk. 30.00/Tab.;

60mg, Tk. 50.00/Tab.

Impreja(UniMed), Tab., 30mg, Tk. 30.00/Tab.

Maturex(Incepta), Tab., 60mg, Tk. 50.00/Tab.;

30 mg, Tk. 30.00/Tab.

Prolong(Ziska), Tab, 30 mg, Tk. 30.00/Tab.;

60 mg, Tk. 50.00/Tab.

Susten(Square), Tab., 30 mg, Tk. 30.00/Tab.;

60 mg, Tk. 50.00/Tab.

X ride(Somatec), Tab., 30mg, Tk. 30.00/Tab.;

60mg, Tk. 50.00/Tab.

6. OBSTETRICS, GYNAECOLOGY AND URINARY-TRACT DISORDERS

SILDENAFIL

Indications: Erectile dysfunction, pulmonary arterial hypertension and for the prevention and treatment of high-altitude pulmonary edema.

Cautions: Angina, heart failure, hypotension, dehydration, priapism. It is taken not more than once per day between 30 minutes and 4 hours prior to sexual intercourse.

Contraindications: Taking organic nitrates and nitrates, men having cardiovascular risk factors, hepatic impairment, impairment in renal function, recent stroke or heart attack.

Side-effects: Headache, flushing, dyspepsia, nasal congestion and impaired vision.

Note: Rare but serious adverse effects found through postmarketing surveillance include priapism, severe hypotension, myocardial infarction (heart attack), ventricular arrhythmias, stroke, increased intraocular pressure, and sudden hearing loss.

Dose: ADULT over 18 years initially 50mg approx. 1 hour before sexual activity, subsequent doses adjusted according to response to 25–100mg as a single dose as needed; max. 1 dose in 24 hours (max. single dose 100 mg)

Proprietary Preparations

Acme(Acme), Tab., 25 mg, Tk. 20.07/Tab., 50 mg, Tk. 30.10/Tab., 100 mg, Tk. 50.14/Tab.
Activa(Pacific), Tab., 50 mg, Tk. 25.00/Tab., 100 mg, Tk. 40.00/Tab.
Adegra(ACI), Tab., 25mg, Tk. 20.06/Tab., 100mg, Tk. 50.15/Tab., 50mg, Tk. 30.09/Tab.
Aggra(Eskayef), Tab, 100 mg, Tk. 50.00/Tab., 50 mg, Tk. 30.00/Tab.
Edegra(Sun), Tab. 100 mg, Tk. 50.00/Tab.; 50 mg, Tk. 30.00/Tab.
Enegra(Beximco), Tab., 100mg, Tk. 50.00/Tab., 50mg, Tk. 30.00/Tab.,
Enigma(Healthcare), Tab., 50mg, Tk. 33.00/Tab.
Enjofil(Navana), Tab., 100 mg, Tk. 50.00/Tab.; 25 mg, Tk. 15.00/Tab.
Erecta(Renata), Tab., 25 mg, Tk. 30.00/Tab., 50 mg, Tk. 50.00/Tab.
Fulfeel(Orion), Tab., 50 mg, Tk. 30.09/Tab.

Immense(Biopharma), Tab., 50mg, Tk. 25.00/Tab.
KX(Kemiko), Tab., 100 mg, Tk. 50.14/Tab., 50 mg, Tk. 30.09/Tab.
Peak(General), Tab., 100mg, Tk. 50.15/Tab., 50mg, Tk. 20.00/Tab.
Silagra(Incepta), Tab., 100 mg, Tk. 50.000/Tab., 50 mg, Tk. 30.00/Tab.
Silfil(Organic), Tab., 50 mg, Tk. 250.75/Tab., 100 mg, Tk. 50.50/Tab.
Sohagra(Popular), Tab., 25 mg, Tk. 20.06/Tab., 50 mg, Tk. 30.00/Tab.
Trigger(Globe), Tab., 50 mg, Tk. 30.00/Tab.
Veagra(Astra Bio), Tab., 100 mg, Tk. 50.00/Tab., 25 mg, Tk. 20.00/Tab., 50 mg, Tk. 30.00/Tab.,
Viamax(UniMed), Tab., 50mg, Tk. 30.00/Tab., 100mg, Tk. 50.00/Tab., 25mg, Tk. 20.00/Tab.
Viax(Opsonin), Tab., 50 mg, Tk. 30.00/Tab., 100 mg, Tk. 50.00/Tab.
Vigorex(Square), Tab., 100 mg, Tk. 50.15/Tab., 25 mg, Tk. 20.06/Tab., 50 mg, Tk. 30.10/Tab.
Visagra(Sharif), Tab. 50 mg, Tk. 30.10/Tab.
X-cite(Alco), Tab., 50 mg, Tk. 30.09/Tab., 100 mg, Tk. 50.15/Tab.

TADALAFIL

Indications: Erectile dysfunction, pulmonary hypertension, benign prostatic hyperplasia with erectile dysfunction.

Caution and Contraindications: Same as that of sildenafil

Side-effects: Headache, stomach discomfort or pain, indigestion, burping, acid reflux, back pain, muscle aches, flushing, and stuffy or runny nose.

Dose: For BPH, or BPH and erectile dysfunction is 5 mg daily taken about the same time each day. Tadalafil may be taken with or without food since food does not affect its absorption from the intestine.

Proprietary Preparations

Adafil(Beximco), Tab., 10mg, Tk. 35.00/Tab.; 20mg, Tk. 60.00/Tab.
Ciaton(ACI), Tab., 10mg, Tk. 35.11/Tab.; 20mg, Tk. 60.18/Tab.; 5mg, Tk. 18.05/Tab.
Edysta(UniMed), Tab., 2.5mg, Tk. 10.00/Tab.; 20mg, Tk. 60.00/Tab.; 5mg, Tk. 18.00/Tab.; 10mg, Tk. 35.00/Tab.
Intimate(Square), Tab., 10 mg, Tk. 35.11/Tab.; 20 mg, Tk. 60.18/Tab.; 5 mg, Tk. 18.05/Tab.

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KTX (*Kemiko*), Tab., 10 mg, Tk. 35.11/Tab.; 20 mg, Tk. 60.00/Tab.
Megafil (*Acme*), Tab., 10 mg, Tk. 35.11/Tab., 20 mg, Tk. 60.18/Tab.
Nirvana (*Healthcare*), Tab., 10mg, Tk. 38.00/Tab., 20mg, Tk. 60.00/Tab., 5mg, Tk. 24.00/Tab.
Penfil (*Biopharma*), Tab., 10mg, Tk. 30.00/Tab.; 20mg, Tk. 55.00/Tab.
Prolonga (*Pacific*), Tab., 10 mg, Tk. 25.00/Tab., 20 mg, Tk. 40.00/Tab.
Refeel (*Orion*), Tab., 10 mg, Tk. 30.09/Tab., 20 mg, Tk. 50.15/Tab.
Tada (*Eskayef*), Tab, 10mg, Tk. 35.00/Tab., 20mg, Tk. 60.00/Tab., 5mg, Tk. 18.00/Tab.,
Tadalafil (*Astra Bio*), Tab., 10 mg, Tk. 35.00/Tab., 5 mg, Tk. 18.00/Tab., 20 mg, Tk. 60.00/Tab.
Tadalafil (*Incepta*), Tab., 10 mg, Tk. 35.00/Tab.
Tafil (*Sharif*), Tab., 10 mg, Tk. 35.11/Tab.
Tealis (*Opsonin*), Tab., 10 mg, Tk. 35.00/Tab., 5 mg, Tk. 18.00/Tab.
Tiagra (*Ziska*), Tab., 5 mg, Tk. 18.00/Tab., 10 mg, Tk. 30.00/Tab.
TopUp (*Euro*), Tab., 10 mg, Tk. 35.00/Tab., 20 mg, Tk. 50.00/Tab.
Viev (*Alco*), Tab., 10 mg, Tk. 35.11/Tab., 20 mg, Tk. 60.18/Tab.

VARDENAFIL

Indications: Erectile dysfunction

Cautions: Elderly; bleeding disorders or active peptic ulceration; susceptibility to prolongation of QT interval (including concomitant use of drugs which prolong QT interval)

Interactions: See Appendix 2

Contraindications: Hereditary degenerative retinal disorders Hepatic impairment

Side-effects: Same as that of sildenafil also less commonly drowsiness, dyspnoea, increased lacrimation, photosensitivity; rarely anxiety, transient amnesia, hypertonia, and raised intra-ocular pressure

Dose: ADULT over 18 years, initially 10mg (patients on alpha-blocker therapy 5mg) approx. 25–60 minutes before sexual activity, subsequent doses adjusted according to response up to max. 20mg as a single dose; max. 1 dose in 24 hours

Proprietary Preparations

Valenty (*Eskayef*), Tab., 10mg, Tk. 35.00/Tab.; 20mg, Tk. 60.00/Tab.
Vardena (*Globe*), Tab., 10 mg, Tk. 32.00/Tab.; 20 mg, Tk. 58.00/Tab.

6.4.5 ALKALINISATION AND ACIDIFICATION OF URINE

Alkalinisation of urine may be undertaken with **Potassium citrate**.

The alkalinising action may relieve the discomfort of cystitis caused by lower urinary tract infections. Sodium bicarbonate and sodium citrate are also used as urinary alkalinising agents for relief of discomfort in mild urinary tract infections.

Acidification of urine has been undertaken with **Ascorbic acid** but it is not always reliable. Large doses may cause gastrointestinal disturbances including diarrhoea. Special pH-modifying solutions are necessary for the maintenance of indwelling urinary catheters.

Urological surgery

Endoscopic surgery within the urinary tract requires an isotonic irrigant since there is a high risk of fluid absorption; if this occurs in excess, hypervolaemia, haemolysis, and renal failure may result.

Glycine Irrigation Solution (1.5%) is the irrigant of choice for transurethral resection of the prostate gland and bladder tumours. **Sterile sodium chloride solution 0.9%** (physiological saline) is used for percutaneous renal surgery.

ASCORBIC ACID^[ED]

Indications: Acidification of urine but see notes above; prevention and treatment of scurvy (see section 16.2.4.3)

Dose: By mouth 4 g daily in divided doses.

Proprietary Preparation

See section 16.2.3.3

GLYCINE

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Indications: Bladder irrigation during urological surgery; *see notes above*

Cautions; Side-effects: *See notes above*

Generic Preparations

Irrigation Solution 1.5%

Glycine(Opso Saline), Tk. 60.15/1000 ml

Irigate(Acme)TK. 80.24

Irigon(Beximco), Tk. 70.80/1000 ml

Sterisol(Popular), Tk.165.00/2000 ml

POTASSIUM CITRATE

Indications: Relief of discomfort in mild urinary tract infections; alkalinisation of urine; stone prophylaxis.

Cautions: Renal impairment, cardiac disease; elderly;

Interactions: *see Appendix-2 (Potassium salts)*

Side-effects: Hyperkalaemia on prolonged high dosage, mild diuresis.

Potassium Citrate Mixture BP: Oral solution, potassium citrate 30%, citric acid monohydrate 5% in a suitable vehicle with a lemon flavour. Preparations should be freshly prepared; contains about 28 mmol k⁺/10 ml

Dose: 10 ml (well diluted with water) 3 times daily

Proprietary Preparation

Urokit(Easkayef), Tab., 1080mg, Tk. 10/Tab.

Urilit(Opsonin), Tab. 1080mg, Tk. 10.03/Tab.

Urokit(Easkayef), Tab, 1080mg Tk. 10/Tab.,

Potassium Citrate 30gm + Citric

Acid 5gm/100ml

Alkamax(Drug Intl), Oral Solutn, , Tk.

200.00/200ml

Citra-K(UniMed), Oral Solution, Tk.

200.00/200ml

Potacit(Healthcare), Oral Solutn, Tk.

200.00/200ml

Urikal(Incepta), Oral Solutn, Tk.

120.00/100ml; Tk. 200.00/200ml

Uriset(Square), Oral Solutn, Tk.

200.00/200ml

Urokit(Easkayef), Oral Solutn, , Tk.

200.00/200ml

SODIUM BICARBONATE

Indications: Relief of discomfort in mild urinary tract infections; alkalinisation of urine.

Cautions; Side effects: Caution in elderly; *see also section 1.1.2*

Dose: 3 gm in water every 2 hours until urinary pH exceeds 7; for maintenance of alkaline urine 5-10 gm daily.

Proprietary Preparations

Sodium Bi Carbonate(Opso

Saline), Inj., (IV Infusion) 7.5%, 75mg/ml, Tk.

5.29/25 ml

Sodinate(Opsonin), Tab. , 600 mg, Tk.

6.02/Tab.

Sodicarb(Popular), Tab. , 600mg, Tk.

6.02/Tab.

6.5 HORMONE THERAPY OF GYNAECOLOGICAL DISORDERS

6.5.1 BROMOCRIPTINE

6.5.2 DANAZOL

6.5.3 CETRORELIX

6.5.4 TRIPTORELIN

6.5.5 CABERGOLINE

6.5.1 BROMOCRIPTINE

Bromocriptine is a stimulant of dopamine receptors in the brain. It also inhibits release of prolactin by the pituitary. It is used in the treatment of galactorrhoea and cyclic benign breast disease, and for treatment of prolactinomas (when it reduces both serum prolactin and tumour size). Bromocriptine also inhibits the release of growth hormone and is sometimes used in treatment of acromegaly. Other dopamine-receptor stimulants are **Cabergoline** and **Quinagolide**. **Bromocriptine** and other dopaminereceptorstimulants are *not recommended for routine suppression of lactation* or for the relief of postpartum pain and engorgement of the breasts, which can be adequately treated with simple analgesics and breast support.

BROMOCRIPTINE MESYLATE

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Indication: Prevention and suppression of lactation (see notes above), hypogonadism, galactorrhoea, infertility, cyclical benign breast disease, acromegaly, prolactinoma; see also under Dose. Use in children under 15, not recommended

Cautions: Pituitary enlargement, particularly during pregnancy; peptic ulcer in acromegalic patients; oral contraceptives may increase prolactin concentrations; caution in patients with serious mental or psychotic disorders or with cardio-vascular disease or Raynaud's syndrome (monitor for retroperitoneal fibrosis); hepatic and renal impairment; porphyria; hypotensive reactions (may be disturbing in some patients during the first few days of treatment); caution with antihypertensive therapy and avoid other ergot alkaloids. *Should be dispensed under prescription only*

Contraindications: Hypersensitivity to bromocriptine or other ergot alkaloids; toxemia of pregnancy and hypertension in post-partum women or in puerperium; advise women not to breast-feed if lactation prevention fails. Should not be used in postpartum or in puerperium in women with high blood pressure, coronary artery disease or with symptoms (or history) of serious mental disorder. Discontinue immediately if hypertension, unremitting headache or signs of CNS toxicity develop

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, indigestion, constipation, headache, fatigue, dizziness, insomnia, nasal congestion, postural hypotension, vasospasm of fingers and toes particularly in patients with Raynaud's syndrome. With high doses, confusions, psychomotor excitation, hallucination, dyskinesia, dry mouth, leg cramps, pleural effusions, retroperitoneal fibrosis (needs monitoring)

Dose: Prevention/suppression of lactation 2.5 mg on first day (prevention) or daily for 2–3 days (suppression); then 2.5 mg twice daily for 14 days. Hypogonadism/galactorrhoea, infertility, initially 1.25 mg at bed time increased

gradually; usual dose 7.5 mg daily in divided doses; increased if necessary to a maximum of 30 mg daily; usual dose in infertility without hyperprolactinemia, 2.5 mg twice daily. Cyclical benign breast disease and cyclical menstrual disorders with pain, 1.25 mg at bed time, increased gradually; usual dose 2.5 mg twice daily. Acromegaly, initially 1.25 mg at bedtime, increased gradually to 5 mg every 6 hours. Prolactinoma, initially 1.25 mg at bedtime, increased gradually to 5 mg every 6 hours

Proprietary Preparations

Bromodel(Opsonin), Tab., 2.5mg, Tk.12/Tab.

Bromolac(Square), Tab., 2.5mg, Tk.

12.03/Tab.

Bromotone(Nuvista), Tab., 2.5mg, Tk.

11.03/Tab.

Criptine(Renata), Tab., 2.5mg, Tk.12/Tab.

6.5.2 DANAZOL

Danazol is a 19 Nortestosterone derivative. It inhibits pituitary gonadotropins; it has androgenic, antioestrogenic and antiprogesterogenic properties. It is used in the treatment of endometriosis and also in mammary dysplasia and gynaecomastia where other measures have proved unsatisfactory; it has been used in menorrhagia and other menstrual disorders but in view of its side-effects, treatment with other drugs may be preferable. It may be effective in the long-term in management of hereditary angioedema. Another less common drug Gestrinone, has general action similar to those of danazol and has also been used in the treatment of endometriosis.

Indications: See notes above and under dose

Cautions: Cardiac, renal and hepatic impairment (avoid if severe); elderly; polycythaemia, epilepsy, diabetes mellitus, hypertension, migraine, lipoprotein disorders, history of thrombosis; withdraw if signs virilisation appear; non-hormonal contraception should be used.

Contraindications: Pregnancy (ensure that patient with amenorrhoea are not pregnant); breast-feeding; severe renal,

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cardiac and hepatic impairment; thromboembolic disease; undiagnosed vaginal bleeding; androgen dependent tumours; porphyria.

Interactions: See Appendix-2

Side-effects: Nausea, headache, dizziness, rashes, backache, nervousness, weight gain; menstrual disturbances, flashing, reduction in breast size; skeletal muscle spasm, hair loss; androgenic effects like- acne, oily skin, oedema, hirsutism, voice changes and clitoral hypertrophy; insulin resistance; leucopenia, thrombocytopenia; benign intracranial hypertension and visual disturbance reported

Dose: Usual range 200-800 mg daily in up to 4 divided dose; all dose should start during menstruation, preferably on first day of cycle. Endometriosis: initially 400 mg daily up to 4 divided doses, adjust according to response, usually for 6 months. Menorrhagia: 200 mg daily, usually for 3 months. Severe cyclical mastalgia: 200-300 mg daily, usually for 3-6 months. Benign breast cysts: 300 mg daily, usually for 3-6 months. Gynaecomastia: 400 mg daily in divided doses for 6 months (adolescents 200 mg daily, increased to 400 mg daily if response after 2 months). Pre-operative thinning of endometrium: 400-800 mg daily for 3-6 weeks.

Proprietary Preparations

Danzol(Renata), Cap., 100 mg, Tk. 20/Cap.; 200 mg, Tk. 38.00/Cap.

Danamet(Eskayef), Cap, 100mg , Tk. 20.00/Cap.; 200mg, Tk. 38.00/Cap.

Danazol(IbnSina), Cap. , 100mg, Tk. 20.00/Cap.; 200mg, Tk. 38.00/Cap.;

Lozana(Incepta), Cap. 200 mg, Tk. 38.00/Cap.; 100 mg, Tk. 20.00/Cap.

6.5.3 CETRORELIX

Indications: Combination with gonadotropins used in the treatment of female infertility (under fertility specialist supervision)

Contraindications: Pregnancy, breast-feeding, moderate renal impairment, moderate hepatic impairment.

Side effects: nausea, headache, injection site reaction, rarely hypersensitivity reactions

Dose: 0.25 mg/ml (250 microgram) by subcutaneous injection into the lower abdominal wall to be administered daily in the morning on day 5 or 6 of ovarian stimulation with gonadotropins continue throughout the administration of gonadotropins

Proprietary Preparation

Cetrotide[®] (Serono), Inj. 0.25mg, Tk.3,592.90/Vial

6.5.4 TRIPTORELIN

Indications: Endometriosis; precocious puberty; reduction in size of uterine fibroids; male hypersexuality with severe sexual deviation; advanced prostate cancer

Cautions: Non-hormonal, barrier methods of contraception should be used during entire treatment period,; also use with caution in patients with metabolic bone disease

Contraindications: Gonadorelin analogues are contra-indicated for use longer than 6 months in the treatment of endometriosis (do not repeat) and when there is unexplained vaginal bleeding; pregnancy, breast feeding

Side-effects: gastro-intestinal disturbances; in precocious puberty, withdrawal bleeding in females may occur in the first month of treatment and also see consult product literature.

Dose: Consult physician and consult product literature

Proprietary Preparation

Decapepty[®] (Ferring), Inj., 95.6 mcg/ml, Tk.683/amp.; 3.75mg/ml, Tk.7,968.31

6.5.5 CABERGOLINE

Indications: Treat hyperprolactinemia (high levels of prolactin, a natural substance that helps breast-feeding women produce milk but can cause symptoms such as infertility, sexual problems, and bone loss in women who

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are not breast-feeding or men). Cabergoline is in a class of medications called dopamine receptor agonists. It works by decreasing the amount of prolactin in the body.

Cautions: Should be used with caution in patients with a history of peptic ulcer, particularly in acromegalic patients. Treatment should be withdrawn if gastrointestinal bleeding occurs. In hyperprolactinaemic patients, monthly pregnancy tests during the amenorrhoeic period; advise nonhormonal contraception if pregnancy not desired.

Contra-indications: History of puerperal psychosis; history of pulmonary, pericardial, or retroperitoneal fibrotic disorders (see Fibrotic Reactions in notes above); cardiac valvulopathy. Hepatic impairment reduce dose in severe hepatic impairment. Pregnancy exclude pregnancy before starting and discontinue 1 month before intended conception (ovulatory cycles persist for 6 months)—discontinue if pregnancy occurs during treatment (specialist advice needed). Breast-feeding suppresses lactation; avoid breastfeeding if lactation prevention fails.

Side-effects: Cardiac valvulopathy, dyspepsia, gastritis, epigastric and abdominal pain, angina, syncope, depression, confusion, hallucinations, breast pain; rarely vomiting, palpitation, epistaxis, digital vasospasm, hot flushes, transient hemianopia, muscle weakness; also reported erythromelalgia.

Dose: Consult *Physician or product literature*.

Proprietary Preparation

Argolin(Opsonin), Tab., 500mcg, Tk.80/Tab.

Cabergol(Popular) Tab., 500mcg, Tk.80/Tab.

Cabolac(Incepta), Tab., 500mcg, Tk.80/Tab.

Cabolin(Renata), Tab., 500mcg, Tk.80/Tab.

Chapter 7

CENTRAL NERVOUS SYSTEM

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7.1 HYPNOTICS & ANXIOLYTICS

Hypnotics are used to treat insomnia and as anxiolytics are used to treat anxiety. Drugs that relieve anxiety generally cause a degree of sedation and drowsiness. Hypnotics and anxiolytics should be reserved for short-time use because these drugs can cause dependence and tolerance.

CHILD: The prescribing of hypnotics to children are not rational except for night terror and sleep-walking.

ELDERLY: It is advisable to avoid hypnotics for the elderly who are prone to develop confusion and at risk of becoming ataxic.

BENZODIAZEPINES

Benzodiazepines have anxiolytic, sedative, hypnotic, anticonvulsant skeletal muscle relaxant action.

Benzodiazepines are indicated in the management of anxiety disorders or for the short time relief of the symptoms of anxiety and the short-term relief of some sleep disorders. They are also used to treat acute symptom of alcohol withdrawal.

Lorazepam, Temazepam and **Oxazepam** are preferred in patients with hepatic impairment but they carry a greater risk of withdrawal symptoms. Sleep disturbance is very common in depressive illness. In such cases an antidepressant such as Amitriptyline (See section 7.3) is the drug of choice instead of benzodiazepines.

Anxiolytic treatment with benzodiazepines should be with the minimum possible dose and for the shortest possible time. **Diazepam, Alprazolam, Bromazepam, Chlordiazepoxide, Chlorazepate, Clobazam, Oxazepam, Lorazepam, Temazepam** are indicated for the short-term relief of anxiety. In children, anxiolytic treatment should be

7. CENTRAL NERVOUS SYSTEM

used only to relieve acute anxiety caused by fear.

Contraindications: known hypersensitivity to benzodiazepines and acute narrow angle Glaucoma are usually considered as absolute Contraindications. Persons predisposed to substance abuse or alcoholism should be given benzodiazepines with Cautions because these may cause physical and psychological dependence and also interact additively with other sedative or hypnotic drugs. Pregnant women should be prescribed benzodiazepines with Cautions as there are increasing numbers of reports of congenital malformations.

Interactions :Clinically the most important Interactions of benzodiazepines are their additive effects when combined with other sedative or hypnotic drugs including alcohol (Ethanol), Phenothiazines, narcotics, barbiturates, MAOIs, tricyclic anti-depressants (See also Appendix-2). Benzodiazepines being central nervous system depressants have the common effects of sedation, fatigue, drowsiness, ataxia and confusion, progressing to coma which may occur at high doses.

ALPRAZOLAM^[CD]

Indications: Short term use in anxiety, agoraphobia with frequent panic attack, panic disorder, depressive syndrome where anxieties are the predominant cause, generalized anxiety disorder, situational anxiety

Cautions: Driving and operating machinery. Children: Dependence; 10 times more potent than diazepam

Contraindications: Pregnancy and lactation

Interactions: See Appendix-2

Side-effects: Drowsiness, light headedness, dry mouth, nausea, vomiting, allergy, rebound anxiety

Dose: 2 to 6mg daily. For anxiety, 0.25-0.5 mg three times daily

Panic disorder with agoraphobia needs higher doses such as 0.5 mg 3 times daily. Dose depend upon the individual and severity of condition

Proprietary Preparations

Actrim(Globe), Tab. 500 microgram, Tk. 1.75/Tab.
Alpam(Asiatic), Tab. 250 microgram, Tk.1.00; 500 microgram, Tk. 2.00/Tab.
Alprax(Opsonin), Tab., 250 microgram, Tk. 1.00/Tab.; 500 microgram, Tk. 2.01/Tab.; 1 mg, Tk. 4.02/Tab.; 2 mg, Tk. 8.03/Tab.
Alprazol(Albion), Tab. 250 microgram, Tk.1.00/Tab.; 500 microgram, Tk.2.00/Tab.
Alzolam(Sun), Tab. 250 microgram, Tk.1.12/Tab.; 500 microgram, Tk.2.03/Tab.; SR Tab. 1 mg, Tk.4.00/Tab.
Nixalo(Square), Tab. 500 microgram, Tk.2.00/Tab.
Serelam(General), Tab. 250 microgram, Tk.1.00/Tab.; 500 microgram Tk. 2.01/Tab.
Xanax(Navana), Tab., 250 microgram, Tk. 1.00/Tab.; 500 microgram, Tk. 2.51/Tab.
Xiotic(Globe), Tab., 500 microgram, Tk. 2.00/Tab.
Xolam(Aristo), Tab., 500 microgram, Tk. 2.00/Tab.; 1 mg, Tk. 4.00/Tab.
Zolax(Beximco), Tab., 250 microgram, Tk. 1.00/Tab.; 500 microgram, Tk. 2.00/Tab.
Zolium(Incepta), Tab., 250 microgram Tk. 1.50/Tab.; 500 microgram, Tk. 3.00/Tab.

BROMAZEPAM^[CD]

Indications: Anxiety, agitation, insomnia, muscle spasms and alcohol withdrawal syndrome

Interactions: See Appendix-2

Side-effects: dependence, sedation, mental confusion

Dose: ADULT: 3-18 mg daily in divided doses

CHILD: Not recommended

Proprietary Preparations

Ancotil(Rangs), Tab., 3 mg, Tk. 4.00/Tab.
Anxio(UniMed), Tab. 3 mg, Tk. 4.50/Tab.
Anxionil(NIPRO JMI), Tab., 3mg, Tk. 5.02/Tab.
Anxirel(Novo), Tab., 3 mg, Tk. 4.00/Tab.
Anxopam(Popular), Tab. 3 mg, Tk. 4.00/Tab.
Benzopam(Benham), Tab., 3 mg, Tk. 5/Tab.
Bomaz(Sharif), Tab., 3 mg, Tk. 4.01/Tab.
Bopam(Opsonin), Tab., 3 mg, Tk. 4.54/Tab.
Brolon(Albion), Tab. 3 mg, Tk. 3.00/Tab.
Bromazep(Orion), Tab, 3 mg, Tk. 4.01/Tab.
Broze(Biopharma), Tab., 3 mg, Tk. 5.00/Tab.
Brozep(Alco), Tab., 3 mg, Tk. 5.00/Tab.
Carbocal-D(Globe), Tab. 3 mg, Tk. 4.50/Tab.
Kpam(Kemiko), Tab., 3 mg, Tk. 4.01/Tab.
Laxonil(Rephco), Tab. 3 mg, Tk. 3.00/Tab.
Laxyl(Square), Tab., 3 mg, Tk. 5.02/Tab.

Lexnil(*Asiatic*), Tab., 3 mg, Tk. 4.00/Tab.
Lexopil(*Healthcare*), Tab. 3 mg, Tk. 6.00/Tab.
Lexotanil(*Radiant*), Tab. 3 mg, Tk. 8.00/ Tab.
Nightus(*Beximco*), Tab., 3 mg, Tk. 3.00/Tab.
Norry (*Renata*), Tab., 3 mg, Tk. 5.00/Tab.
Notens(*Aristo*), Tab. 3 mg, Tk. 5.00/Tab.
Relaxium(*Amico*), Tab. 3 mg, Tk. 4.00/Tab.
Restol(*Eskayef*), Tab, 3 mg, Tk. 5.00/Tab.
Siesta(*Incepta*), Tab. 3 mg, Tk. 4.00/Tab.
Tenapam(*General*), Tab.,3 mg, Tk. 5.01/Tab.
Tenil(*Acme*), Tab. , 3 mg, Tk. 5.01/Tab.
Tensfree(*Globe*), Tab., 3 mg, Tk. 4.50/Tab.
Tynaxie(*Navana*), Tab., 3 mg, Tk. 5.02/Tab.
Xionil(*Novartis*), Tab. 3 mg, Tk. 5.00/Tab.
Xiopam(*Euro*), Tab., 3 mg, Tk. 5.00/Tab.
Zepam(*ACI*), Tab., 3 mg, Tk. 5.02/Tab.
Zerotens(*Popular*), Tab., 3 mg, Tk. 4.00/Tab.

CLOBAZAM

Indications: Generalized anxiety disorder, stress, agitation, aggression, psych-osomatic disorders, sleeps disturbances associated with anxieties, an adjunctive therapy in epilepsy

Cautions&Contraindications: See under diazepam

Interactions: See also Appendix-2

It potentiates the effects of alcohol and of drugs that depress the Central Nervous System such as analgesics, hypnotics, neuroleptics. Respiratory depression occur if used in combination treatment with Clozapine.

Side-effects: Ataxia, drowsiness (especially in the elderly), disorientation, dizziness and occasionally confusion. It can develop dependence on higher doses used for long duration. Muscle weakness, and sedation may also occur.

Dose: Anxiety: 20-30mg daily in divided dose or as a single dose at bed time, increased in severe anxiety (indoor hospital patient) to a maximum of 60mg daily in divided dose; ELDERLY and/or Debilitated: 10-20 mg daily. Epilepsy, 20-30mg daily; maximum 60mg daily; CHILD: over 3 years, not more than half the adult dose

Proprietary Preparations

Alsium(*Albion*), Tab., 10 mg, Tk. 1.00/Tab.
Calm(*Biopharma*), Tab., 10 mg, Tk. 2.76/Tab.
Clob(*Opsonin*), Tab., 10 mg, Tk. 3.51/Tab.
Clobam(*Square*), Tab., 10 mg, Tk. 4.02/Tab.
Clobid(*Medimet*), Tab., 10mg, Tk.3.00/Tab.
Cosium(*Acme*), Tab., 10mg., Tk. 3.52/Tab.

Frisium(*Sanofi*), Tab., 10mg, Tk. 5.02/Tab.
Keolax(*Beximco*), Tab., 10 mg, Tk. 2.77/Tab.
Nebium(*Globe*), Tab., 10 mg, Tk. 2.55/Tab.
Prozium(*Astra*), Tab., 10 mg, Tk. 2.55/Tab.
Sedazam(*ACI*), Tab., 10mg , Tk. 2.82/Tab.
Suzium(*Supreme*), Tab., 10mg, Tk.2.55/Tab.
Tensnil(*Alco*), Tab., 10 mg, Tk. 4.01/Tab.
Tranquil(*Ibn Sina*), Tab., 10 mg, Tk. 4.00/Tab.
Venium(*Hudson*), Tab., 10mg, Tk.2.70/Tab.

CHLORDIAZEPOXIDE

Indications: Short term anxiety, as an adjunct in alcohol withdrawal.

Cautions, Contraindications & Side-effects: See under diazepam

Dose: 10 mg three times to 60-100 mg in divided doses.

Proprietary Preparations

Amitriptyline 12.5mg + Chlordiazepoxide 5mg
Limbix(*Acme*), Tab., 7.00/Tab.
Reelife(*Eskayef*), Tab., Tk. 7.00/Tab.

DIAZEPAM^[ED] [CD]

Indications: Insomnia, generalized anxiety disorder, phobic disorder, panic disorder, status epilepticus, catatonia, muscle spasm, alcohol withdrawal syndrome

Cautions: Pregnancy, lactating mother, respiratory diseases, muscle weakness (special care in myasthenia gravis), history of alcohol or drug abuse and elderly

Contraindications: Hypersensitivity, drug dependence

Interactions: See Appendix-2

Side-effects: Dependence, sedation, confusion, headache, decrease of libido

Dose: 15 - 60 mg/day Reduce dose in the elderly.

Proprietary Preparations

Azepam(*Acme*), Tab., 5 mg, Tk. 0.69/Tab.
Diazem(*Albion*), Tab., 5 mg, Tk. 0.69/Tab.
Diazemet(*Medimet*), Tab., 5 mg, Tk. 0.69/Tab.
Diazepam(*Popular*), Tab., 5 mg, Tk. 0.68/Tab.
D-Pam(*General*), Tab., 5 mg, Tk. 0.68/Tab.
Easium(*Opsonin*), Suppository, 10 mg , Tk. 3.01/Supp.; Inj., 10 mg/2 ml, Tk. 3.71/Amp.; Tab., 5 mg , Tk. 0.69/Tab.
Evalin(*Aristo*), Tab., 5mg, Tk. 0.68/Tab
G-diazepam(*Gonoshasthaya*), Inj. 10 mg/2 ml, Tk. 3.70 /Inj.; Tab., 5 mg, Tk. 0.50 /Tab.
Relaxen(*Sonear*), Tab., 5 mg, Tk. 0.68/Tab.
Seda(*Supreme*), Tab., 5 mg, Tk. 0.68/Tab.

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Sedapan(Amico), Tab., 5mg , Tk. 0.69/Tab.
Sedil(Square), Inj., 10 mg/2 ml, Tk.
 3.05/Amp.; Tab., 5 mg, Tk. 0.69/Tab.
Seduxen(Ambee), Inj., 10 mg/2ml, Tk.3.6/2ml
 Amp; Tab., 5 mg, Tk. 0.23/Tab

MIDAZOLAM

Indications: Status epilepticus; febrile convulsions
Contraindications: See section 8.1.2 use with caution in Renal and hepatic impairment, Pregnancy
Side-effects: See section 8.1.2 also depression of consciousness
Dose : By buccal administration, ADULT over 18 years, 10mg repeated once after 10 minutes if necessary; CHILD up to 3 months , 300micrograms/kg (max. 2.5mg), 3 months–1 year 2.5mg, 1–5 years 5mg, 5–10 years 7.5mg, 10–18 years 10mg; these doses may be repeated once after 10 minutes if necessary

Proprietary Preparations

Anquil (General), Tab., 7.5 mg, Tk. 8.05/Tab.; 15 mg, Tk. 15.11/Tab.; Inj, 15mg/3 ml , Tk. 75.22/3 ml amp
Benquil, (Biopharma), Tab., 15mg , Tk. 8.00/Tab.
Dormax (Aristo), Inj, 15mg/3 ml , Tk. 75.00/3 ml amp.; Tab., 7.5mg , Tk. 8.00/Tab.
Dormicum (Radiant), Tab. , 7.5mg, Tk. 19.56/Tab.
Dormilat (ACI), Tab., 15mg, Tk. 15.05/Tab. ; 7.5mg, Tk. 8.02/Tab. ; Inj, 1mg/ ml , Tk. 55.17/3 ml amp.; 15mg/3 ml , Tk. 75.23/3ml
Dormitol(Square), Inj, 15mg/3 ml , Tk. 120.37/3ml amp.; Tab. , 7.5 mg, Tk. 10.03/Tab.
Hypnocum (Healthcare), Tab., 7.5mg, Tk. 10.00/Tab.
Hypnofast (Incepta), Inj, 1mg/ ml , Tk. 50.00/3 ml amp.; 15mg/3 ml , Tk. 90.00/3 ml amp.; Tab., 7.5 mg, Tk. 8.00/Tab.;
Midaben (Amico), Tab., 7.5mg , TK. 8.00/Tab.
Midolam (Opsonin), Inj, 1mg/ ml , Tk. 50.19/5mg amp.; 15mg/3 ml , Tk. 75.28/3ml amp, Tab. , 15 mg , Tk. 15.06/Tab. ; 7.5 mg , Tk. 8.03/Tab. ;
Midzo (Renata), Inj, 15mg/3 ml , Tk. 75.00/3 ml amp.; Tab., 7.5 mg, Tk. 8.00/Tab.
Milam (Eskayef), Inj, 15mg/3 ml , Tk. 120.00/3 ml amp, Tab, 7.5mg, Tk. 10.00/Tab.; 15mg , Tk. 20.00/Tab.; 7.5 mg, Tk. 10.00/Tab.
Mizolam (Acme), Tab. , 7.50 mg, Tk. 8.07/Tab.
Sedoz (Asiatic), Tab., 7.50mg , Tk. 9.50/Tab.

FLURAZEPAM^[CD]

Indications: Mainly used as hypnotic in Insomnia and generalized anxiety disorders
Cautions: Pregnancy and Lactating mother; see under *Diazepam*
Contraindications: Respiratory depression, drug dependence
Interactions: See Appendix-2
Side-effects: Dependence, sedation, confusion, headache
Dose: 15–30 mg/day; ELDERLY 15 mg/day

Proprietary Preparations

Aluctin(Ambee), Cap., 30 mg, Tk. 6.00/Cap.
Flurazepam(Albion), Cap., 15 mg, Tk. 3.51/Cap.; 30 mg, Tk. 6.00/Cap.
Slipam(General), Cap., 15 mg, Tk. 4.51/Cap.; 30 mg, Tk. 8.03/Cap.

HYDROXYZINE (H1 antagonist)

Indications: Genaralized anxiety disorder, urticaria, atopic dermatitis
Cautions, Side-effects: See section: 4.8.1
Dose: 10-25mg at bed time

Proprietary Preparations

See section: 4.8.1

LORAZEPAM^[CD]

Indications: Anxiety(Short term), insomnia, as an anticonvulsant in the management of Status Epilepticus. It is also used for its sedative and amnesic properties in premedication; also in antiemetic regimens for the control of nausea and vomiting associated with cancer chemotherapy.
Cautions, Contraindications&Side-effects: See under *Diazepam*
Interactions: See Appendix-2
Dose: Anxiety disorders: By mouth, 1-4 mg divided dose; in insomnia associated with anxiety, a single dose of 1-2 mg at bedtime. In the management of Status Epilepticus, 4 mg may be given as a single intravascular injection
 CHILD: Not recommended

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Proprietary Preparations

Lorapam(Popular), Inj., 4 mg/ml, Tk. 75.28/Amp

Lorazem(Albion), Tab., 1 mg Tk. 2/Tab.

Lozicum(Incepta), Tab., 1 mg, Tk. 2/Tab.

Trapex(Sun), Tab., 1 mg, Tk. 2/Tab.

MELATONIN(Hormone produces by pineal gland)

Indications: Insomnia (short term use), Jetlag, Attention deficit disorder in children

Cautions: Depression, diabetes, hypertension, pregnancy

Dose: Tab. 3mg, use one before bed time

Proprietary Preparation

Filfresh(Square), Tab., 3 mg, Tk. 3.01/Tab.

NITRAZEPAM^[CD]

Indications: Insomnia, myoclonic seizure

Cautions: Respiratory diseases, muscle weakness, pregnancy and lactating mother (see also *Diazepam* above)

Contraindications: Respiratory depression, drug dependence, sleep apnoea.

Interactions: See Appendix-2

Side-effects: Dependence, sedation, confusion, headache, light headedness

Dose: 5–10 mg/day at bed time

Proprietary Preparations

Epam(Opsonin), Tab., 5 mg, Tk. 0.75/Tab.

Nectum(Albion), Tab., 5 mg, Tk. 0.69/Tab.

Noctin(Ambee), Tab. 5 mg, Tk. 0.69/Tab

SUVOREXANT

Indications: For the treatment of insomnia, characterized by difficulties with sleep onset and/or sleep maintenance.

Cautions: Daytime somnolence: Risk of impaired alertness and motor coordination, including impaired driving; risk increases with dose;

Side-effects: Sleepiness during the day, not thinking clearly, acting strangely, confused, or upset sleep-walking

Dose: 10 mg, no more than once per night taken before 30 minutes of going to bed

Proprietary Preparations

Somarant(Incepta), Tab., 10 mg, Tk. 35.00/Tab.

Suvotol(Square), Tab., 10 mg, Tk. 35.00/Tab.

TEMAZEPAM^[CD]

Indications: Short term insomnia for peri-operative use; see also section 7.1

Cautions: See under *Nitrazepam* & notes above

Contra-indications: See under *Nitrazepam* & notes above

Interactions: See Appendix-2

Side-effects: See under *Nitrazepam*.

Dose: ADULT 10–20 mg at bedtime, exceptional circumstances 30–40 mg; ELDERLY and/or Debilitated: 10mg at bedtime, exceptional circumstances 20 mg; CHILD: Not recommended

Proprietary Preparations

Temazin(Globe), Tab., 10 mg

Temazepam(Renata), Tab., 10 mg

OXAZEPAM

Indications: For short term anxiety, insomnia associated with anxiety, irritation in elderly.

Side-effects: Drowsiness, withdrawal effect

Dose: 10–15mg 3 times a day

Proprietary Preparation

Anoxa(Square), Tab., 10 mg, Tk. 3.52/Tab.

OTHER HYPNOTICS/ANXIOLYTICS

Zopiclone, Zolpidem and Zaleplon are non benzodiazepine hypnotics; “Z-drugs” but they act at the benzodiazepine receptors and rapidly initiate sleep, without reduction of total REM sleep. Zopiclone and Zolpidem have short elimination half-life, with no significant accumulation of drug substance on repeated doses. Course of treatment with these drugs should be not be

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recommended for more than 4 weeks of duration.

Beta-blockers (beta-adrenoceptor blocking agents) such as **Propranolol** and **Oxprenolol** (See section 3.1) do not affect psychological symptoms (such as anxiety, tension, fear, etc.), but they reduce autonomic symptoms such as palpitation and tremor. Beta-blockers are used mainly to reduce psycho-somatic symptoms (e.g. tremor, palpitations, sweating etc.) which in turn may prevent the onset of worries, anxieties and fear.

Antihistamines with sedative action, such as **Diphenhydramine** and **Promethazine hydrochloride** (for details see section 4.7.1) are sometimes used for inducing sleep, particularly for wakeful children but the random use of these drugs in children is not clinically justified. In recent times, **Buspirone** which acts specifically on the 5HT (5-Hydroxytryptamine) receptors has been used as an anxiolytic; it does not have any appreciable sedative action.

Barbiturates are now practically obsolete as sedative and anxiolytic agents, though some intermediate-acting barbiturates (e.g. amobarbitone, butobarbitone, secobarbital, etc.) are still occasionally prescribed in the treatment of severe intractable insomnia. Barbiturates should be avoided in the elderly.

Chloralhydrate and **Paraldehyde** are no longer recommended as sedatives. **Meprobamate** is less effective than benzodiazepines, more hazardous in over-dosage, and more likely to induce dependence; it is not recommended for use.

BUSPIRONE HYDROCHLORIDE (Acts on 5HT_{1A})

Indications: In short term anxiety low dependence & abuse potential

Cautions: History of hepatic or renal impairment; does not alleviate benzodiazepine withdrawal

Contraindications: Epilepsy; severe hepatic or renal impairment; children, pregnancy and lactating women

Interactions: See Appendix-2

Side-effects: Nausea, dizziness, headache, nervousness, rarely tachycardia, palpitation and chest pain

Dose: By mouth, initially 5 mg 2-3 times daily, increased as necessary every 2-3 days; usual range 15-30 mg in divided doses; maximum upto 45mg daily.
CHILD: Not recommended

Proprietary Preparation

Busper (Kumudine), Tab., 5mg, Tk. 4.00/Tab, Tab. 10mg, Tk. 7.00/Tab

ESZOPICLONE

Indications, Cautions, Contra-indications & Side-effects: See under Zopiclone

Dose: Initial dose: 1 mg orally immediately before bedtime

Proprietary Preparations

Sleepon (Silva), Tab., 1mg, Tk. 2.01/Tab.; 2mg, Tk. 3.01/Tab.

Sleepwell (Popular), Tab., 1 mg, Tk. 2.01/Tab.; 2 mg, Tk. 3.01/Tab.

Sono (Acme), Tab., 2 mg, Tk. 3.01/Tab.; 1 mg, Tk. 2.01/Tab.

Zopilone (Incepta), Tab., 2mg, Tk. 3.00/Tab.

PROPRANOLOL^[ED]

Indications: Treatment of somatic manifestations of generalized anxiety disorder, anticipatory and situational anxiety, and treatment of drug induced tremor, anaesthesia, migraine, alcohol withdrawal syndrome

Side-effects & Contra-indications: See section 3.1

Interactions: See Appendix-2

Dose: 20–240 mg/day

Proprietary Preparation

See section 3.1

ZALEPLON

Indications: Short term treatment of insomnia

Contra-indications: Sleep apnoea syndrome; myasthenia gravis; not to be used individually to treat psychosis and in lactating mothers

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Cautions: Respiratory insufficiency, hepatic impairment (Appendix-3), history of drug or alcohol abuse, avoid prolonged use and abrupt withdrawal thereafter, pregnancy (Appendix-5),

Interactions: See Appendix-2

Sideeffects: Headache, asthenia, drowsiness, dependence, dizziness, amnesia, paradoxical effects

Dose: 10mg at bedtime or after going to bed if difficulty in falling asleep; CHILD: Under 18 years not recommended.

Proprietary Preparations

Eplon(Beximco), Cap. 10mg Tk. 10/Cap;

Somna(Square), Cap. 10mg, Tk. 7/Cap.;

ZOLPIDEM TARTRATE

Indications: Insomnia (short-term use—up to 4 weeks)

Cautions: Respiratory depression, muscle weakness and myasthenia gravis, history of drug or alcohol abuse; elderly; avoid prolonged use (and abrupt withdrawal thereafter); Driving Drowsiness may persist the next day and affect performance of skilled tasks; effects of alcohol enhanced

Contraindications: Obstructive sleep apnoea, acute or severe respiratory depression, marked neuromuscular respiratory weakness including unstable myasthenia gravis, psychotic illness, hepatic impairment; renal impairment, pregnancy and breast-feeding

Interactions: See Appendix-2 (anxiolytics and hypnotics)

Side-effects: Diarrhoea, nausea, vomiting, dizziness, headache, drowsiness, hallucination, agitation, asthenia, amnesia; dependence, memory disturbances, nightmares, depression, confusion, perceptual disturbances or diplopia, tremor, ataxia, falls, skin reactions, changes in libido; paradoxical effects, muscular weakness, and sleep-walking also reported

Dose: ADULT: Over 18 years: 10mg at bedtime; ELDERLY or Debilitated: 5mg

Proprietary Preparations

Nitrest(Sun), Tab., 10 mg, Tk. 3.16/Tab.

Zolexin(Opsonin), Tab., 10 mg, Tk. 3.71/Tab.

ZOPICLONE

Indications: Short-term treatment of insomnia, including difficulties in falling asleep, and early awakening, transient insomnia, insomnia secondary to psychiatric illness and insomnia due to severe distress

Cautions: Dose should be half in liver diseases

Contraindications: Children, pregnancy and lactating mother

Interactions: See Appendix-2

Side-effects: Bitter taste following ingestion, behavioral disturbances including confusion, depressed mood, irritability and amnesia have been reported. With accidental overdoses, drowsiness, lethargy and ataxia have been reported without any other serious effects

Dose: By mouth, 7.5 mg Zopiclone just before going to sleep up to four weeks. In severe or persistent insomnia up to 15 mg may be needed. In elderly, start with a lower dose of 3.75 mg; subsequently the dose may be increased if the condition improves clinically

Proprietary Preparation

Imovane(Sanofi), Tab., 7.5mg, Tk. 10.03/Tab.

Hypnoclone(ACI) Tab., 7.5mg, Tk. 4.03/Tab

Zopi(Astra), 7.5 mg, Tk. 4.03/Tab.

7.2 DRUGS USED IN PSYCHOSIS AND RELATED DISORDERS

Behavioral and cognitive effects of psychotropic drugs have contributed much to a better understanding of the relationship between brain functions, psychiatric illnesses and their therapy. These drugs are useful for psychotic symptoms such as paranoia, delusion, hallucination, disordered thinking, and also in Schizophrenia. They are known as psychotropic or anti-psychotic drugs, and also called as 'Neuroleptics'. Modern psychotropic drugs have profoundly changed the treatment of psychiatric disorders.

Regardless of which antipsychotic drug is chosen for the treatment of a

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psychotic patient, it is important to be fully familiar with the pharmacology of the drug including its therapeutic and Side-effects profile. Proper dosage of any of the therapeutic agents is a critical issue for its safe and effective application.

Antipsychotic drugs are thought to act by interfering with dopaminergic transmission or by blocking dopamine receptors in the brain. They may also affect cholinergic, alpha-adrenergic, histaminergic and serotonergic receptors in the brain. Differential effect of the various antipsychotic drugs on the storage, release, destruction and uptake or reuptake of either serotonin or norepinephrine may account for their differential efficacy in various psychotic or behavior disordered patients.

Many of the antipsychotic drugs are PHENOTHIAZINE derivatives which may be classified into three groups:

Group 1: **Chlorpromazine** belongs to this group which is characterized by strong sedative effects and moderate antimuscarinic and extrapyramidal Side-effects.

Group 2: **Thioridazine** belongs to this group which is generally characterized by moderate sedative effects, marked antimuscarinic effects but fewer extrapyramidal Side-effects than groups 1 and 3.

Group 3: **Fluphenazine, Prochlorperazine, and Trifluoperazine** belong to this group which is generally characterized by fewer sedative effects, fewer antimuscarinic effects, but more pronounced extrapyramidal Side-effects than groups 1 and 2.

Psychotropic drugs of other chemical types tend to resemble the phenothiazines of Group 3. They include:

BUTYROPHENONES (e.g. Haloperidol, Droperidol);

THIOXANTHINES (e.g. Flupenthixol, Zuclopenthixol);

SUBSTITUTED BENZAMIDES (e.g. Sulpiride; Remazopride);

DIBENZODIAZEPINES (e.g. Clozapine).

Phenothiazines and related thioxanthines and also butyrophenones block many types of neurotransmitter

receptors including mainly the dopaminergic D₂-receptors. Newer compounds like Sulpiride and Remazopride block D₄-receptors in addition to blocking the D₂-receptors.

Other atypical antipsychotics include **Aripiprazole, Olanzapine and Risperidone**. Risperidone which is indicated for psychosis in which both positive and negative symptoms are present, and Olanzapine which is effective in maintaining clinical improvement in patients who have responded to initial treatment.

Lithium salts are a class by itself, and are used in the prophylaxis and treatment of mania, in the prophylaxis of manic depressive disorder and in the prophylaxis of recurrent unipolar depression. The decision to use lithium salts needs careful and special considerations of specialists. Lithium is unsuitable for children.

WITHDRAWAL: Withdrawal of antipsychotic drugs after long-term therapy should always be gradual and closely monitored to avoid the risk of acute withdrawal syndromes or rapid relapse.

ARIPIRAZOLE

Indications: Schizophrenia, bipolar mania and mixed manic/depressive episodes and as adjunctive therapy for major depressive disorder

Cautions: History of seizures, neuroleptic malignant syndrome, dementia, history of diabetes mellitus & hypertension

Interactions: See Appendix-2

Side effects: Constipation, dizziness, drowsiness, headache, nausea, pain, restlessness, stomach upset

Dose: Schizophrenia, by mouth, ADULT over 18 years: 10 - 15mg once daily, usual maintenance 15mg once daily; maximum 30mg once daily

Proprietary Preparations

Aripin (Opsonin), Tab., 15 mg, Tk. 7.03/Tab.; 10 mg, Tk. 5.02/Tab.

Aipra (Incepta), Tab., 10 mg, Tk. 5.00/Tab. 15 mg, Tk. 7.00/Tab.

Ariprazole (General), Tab., 10mg, Tk. 5.04/Tab.; 5 mg, Tk. 3.52/Tab.

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Ariprex(Square), Solutn., 5 mg/5 ml, Tk. 75.00/50ml; Tab., 10 mg, Tk. 5.00/Tab.; 15 mg, Tk. 7.00/Tab.; 2 mg, Tk. 2.00/Tab.
Sizopra(Acme), Tab., 10.00 mg, Tk. 5.03/Tab.; 15.00 mg, Tk. 7.04/Tab.

CHLORPROMAZINE HCl ^[ED]

(See also Section 7.8)

Indications: Schizophrenia, delusional disorder, mania, and aggressive behavior; other psychosis; emesis

Cautions: Pregnancy, lactation, cardiovascular and cerebrovascular disease, respiratory disease, seizure

Contra-indications: Coma due to CNS depression, Parkinsonism, glaucoma, hepatic disease, jaundice, bone marrow depression, blood dyscrasias

Interactions: See Appendix-2

Side-effects: Anorexia nervosa, sedation, postural hypotension, extrapyramidal symptoms (EPS), dry mouth, tachycardia, galactorrhoea, impaired ejaculation, amenorrhoea, constipation, weight gain, jaundice, agranulocytosis

Dose: 300–1500 mg per day.

Proprietary Preparation

See section 7.8

CLOZAPINE

Indications: Only for the treatment of Schizophrenia in patients unresponsive to, or intolerant of, conventional antipsychotic drugs

Cautions: Should not drive or operate any machinery

Contra-indications: Bone marrow depression, drug induced agranulocytosis; patients receiving carbamazepine, CNS depressants; renal or hepatic impairment; epilepsy; pregnancy and breastfeeding

Interactions: See Appendix-2

Side-effects: Sedation, drowsiness, hypersalivation, postural hypotension, hyperthermia, constipation, weight gain, agranulocytosis, seizures with high doses

Dose: Initially, 12.5 mg once on the first day followed by 25 mg on the second day, subsequently daily dose may be increased gradually, if well tolerated, by

25 mg up to 300 mg daily in divided doses.

Proprietary Preparations

Clozapin(Albion), Tab., 100 mg, Tk. 9.00/Tab.; 25 mg, Tk. 2.55/Tab.

Sensipin(Beximco), Tab., 25 mg, Tk. 3.84/Tab.

Sizopin(Sun), Tab., 100mg, Tk. 9.55/Tab.; 25mg, Tk. 2.55/Tab.

Zapenia(Incepta), Tab., 100 mg, Tk. 9.00/Tab.; 25 mg, Tk. 2.50/Tab.

FLUPENTHIXOL

(Flupentixol)

Indications: Schizophrenia, other psychoses, particularly with apathy and withdrawal but not in mania or hyperactivity; Depression (see section 7.3)

Contra-indications: Parkinsonism, liver disease, blood dyscrasia, neuroleptic malignant syndrome, Tardive dyskinesia

Interactions: See Appendix-2

Side-effects: Asthenia, sedation, hypotension, extrapyramidal symptoms (EPS), amenorrhoea, galactorrhoea, loss of libido, weight gain

Dose: Orally for psychosis, initially 0.5-3 mg twice daily adjusted according to response

ELDERLY (or debilitated), quarter to half of the adult dose

CHILD: Not recommended. *Intramuscularly*, see next entry for the depot injection of flupentixol decanoate

Proprietary Preparations

Funam(Amico), Tab., 0.5 mg, Tk. 3.00/Tab.

Sentix(Eskayef), Tab, 1 mg, Tk. 5.00/Tab.; 0.5 mg, Tk. 3.50/Tab.

Fluxanol[®](Lundbeck), Tab, 1mg, Tk. 16.79/Tab.

Flupentixol 500 microgram+ Melitracen 10 mg

Adelax(ACI), Tab., Tk. 5.02/Tab.

Amilax(Amico), Tab., Tk. 2.00 / Tab.

Anfree(Aristo), Tab., Tk. 5.00/Tab.

Agentz(Healthcare), Tab., Tk. 5.00/Tab.

Antison(Asiatic), Tab., Tk. 4.50/Tab.

Anzet(Popular), Tab., Tk. 4.00/Tab.

Banxyt(Bristol), Tab., Tk. 3.50/Tab.

Benzit(Biopharma), Tab., Tk. 5.00/Tab.

Danxit(Astra Bio), Tab., Tk. 5.00/Tab.

Deleta(General), Tab., Tk. 5.01/Tab.

Dexit(UniMed), Tab., Tk. 5.00/Tab.

Diconten(Drug Intl), Tab., Tk. 4.05/Tab.

Dormir(Somatec), Tab., Tk. 4.00/Tab.

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Femanol(kemiko), Tab., Tk. 4.01/Tab.
Femixit(Monico), Tab., Tk. 3.50/Tab.
Flumetra(Virgo), Tab., Tk. 4.00/Tab.
Fluxit(Opsonin), Tab., Tk. 5.02/Tab.
Folison(Jayson), Tab. Tk. 0.34/Tab.
Frenxit(Beximco), Tab., Tk. 5.00/Tab.
Henxit(Hudson), Tab., Tk. 4.00/Tab.
Leanxit(Acme), Tab., Tk. 5.01/Tab.
Melanxit(Organic), Tab., Tk. 4.02/Tab.
Melipen(Supreme), Tab., Tk. 3.50/Tab.
Melixol(Square), Tab., Tk. 5.02/Tab.
Meltix(Navana), Tab., Tk. 5.00/Tab.
Melixit(Ziska), Tab., Tk. 3.50/Tab.
Neoxit(Novo), Tab., Tk. 4.00/Tab.
Penticin(Euro), Tab., Tk. 5.00/Tab.
Radex(Globe), Tab., Tk. 5.00/Tab.
Remood(Ibn Sina), Tab., Tk. 5.00/Tab.
Renxit(Renata), Tab., Tk. 5.00/Tab.
Sensit(Eskayef), Tab., Tk. 5.00/Tab.
Tenaxit(Incepta), Tab., Tk. 5.00/Tab.
Thenxet(Pacific), Tab., Tk. 5.00/Tab.
Thixtra(NIPRO JMI), Tab., Tk. 5.02/Tab.
Tixocin(Sharif), Tab., Tk. 5.00/Tab.
Tixol(Alco), Tab., Tk. 4.01/Tab.
U4(Orion), Tab., Tk. 5.01/Tab.
Xolitra(Beacon), Tab., Tk. 5.02/Tab.
Zenxit(Zenith), Tab., Tk. 3.25/Tab.

FLUPENTHIXOL DECANOATE

Indications: Schizophrenia and other psychoses with depressive symptoms but not mania or any psychomotor hyperactivity

Cautions, Contraindications, Side-effects, and Interactions: See under *Flupenthixol*

Interactions: See *Appendix-2*

Dose: By deep intra-muscular injection into the gluteal muscle, initial test dose 20 mg, then after at least 7 days, 20-40 mg repeated at intervals of 2 to 4 weeks, adjusted according to response, max. 400 mg weekly; usual maintenance dose 50-100 mg every 4 weeks

ELDERLY: Initially quarter to half the adult dose;

CHILD: Not recommended

Proprietary Preparation

Fluanxol[®](Lundback), Inj. 20 mg/ml, Tk.349.15./amp, 40 mg/2 ml; Tk.511.08/amp;

FLUPHENAZINE DECANOATE^[ED]

Indications: Maintenance therapy of schizophrenia and other psychoses

Side-effects, Contraindications and Interactions: See *Appendix-2*

Dose: By deep intramuscular injection into the gluteal muscle, test dose of 2.5 mg (6.25 mg in the elderly), then after 5-7 days 12.5–100 mg repeated at intervals of 2-5 weeks, adjusted according to response. **CHILD:**Not recommended

Proprietary Preparations

Fenazine(Incepta), Inj., 25 mg/ml, Tk.

75.00/Amp.

Fluphenazine[®](Rotex),Inj., 25mg/ml, Tk.

90.35/Amp.

HALOPERIDOL^[ED]

Indications: Schizophrenia, Mania, other psychosis, Tourette's syndrome, autism, Huntington's Chorea, Sydenham's Chorea, Delirium

Cautions: Pregnancy, lactation, coadministration with lithium may cause neurotoxicity

Contra-indications: Parkinsonism, liver disease, depressive illness

Interactions:See *Appendix-2*

Side-effects: Sedation, hypotension, EPS, amenorrhoea, loss of libido, constipation, retention of urine

Dose:Orally 5–100 mg/day, adjusted according to response; **ELDERLY:** initially half of adult dose. **CHILD:** initially 25-50 micrograms/kg daily; adolescents up to 30 mg daily

By intramuscular injection 2–10 mg, subsequent dose given every 6–8 hours according to response, to a maximum of 60mg daily; **CHILD:**Not recommended

Depot Injection (as Haloperidol Decanoate) by deep intramuscular injection into the gluteal muscle initially 50 mg every 4 weeks, if necessary increasing gradually up to 200 mg every 4 weeks

Proprietary Preparations

G-haloperidol(Gonoshashaya), Tab., 5mg, Tk.0.49/Tab.

Halop(Opsonin), Tab., 5 mg, Tk. 1.00/Tab.

Haloperidol(Albion), Tab., 5 mg, Tk.1.00/Tab.

Halolid(Incepta), Inj., 5mg/ml, Tk. 10.80/1 ml Amp; Tab., 5 mg, Tk.1.00/Tab.

Peridol(Square), Tab.,5 mg, Tk. 1.01/Tab.

Perigen(General), Inj., 5mg/ml, Tk. 12.03/1ml Amp; Tab., 5mg, Tk. 1.00/Tab.

Perol(Ambee), Tab., 5 mg, Tk. 0.51/ Tab.; Inj., 5 mg/5 ml, Tk. 10.04/1 ml Amp

LITHIUM CARBONATE^[ED]

Indications: Treatment and prophylaxis of mania, bipolar mood disorder and recurrent depression; impulsive aggressive or self-mutilating behavior; *see also notes above*

Cautions: Fever, sweating, driving, alcohol. *To be used only under the supervision of a specialist*

Contra-indications: Cardiac, renal, thyroid or neurological dysfunction, blood dyscrasia, pregnancy and lactation

Interactions: *See Appendix-2*

Side-

effects: Hypersalivation, anxiety, drowsiness, malaise, polyuria, polydipsia, delirium, hypothyroidism, nausea, vomiting, diarrhoea, and renal failure

Dose: 800–2000 mg/day. ELDERLY: 400 mg to 1000 mg. CHILD: Not recommended.

Proprietary Preparations

Litiam(ACI), ER Tab., 400 mg, Tk. 5.02/Tab.

Lithin(Incepta), SR Tab., 400 mg, Tk. 5/Tab.

Lithosun(Sun), SR Tab., 400 mg, Tk. 5.05/Tab.

Lithium(Albion), SR Tab., 400 mg, Tk. 5.05/Tab.

OLANZAPINE(Atypical antipsychotic drug.

Effective against both positive and negative symptoms)

Indications: Schizophrenia, treatment of moderate to severe episodes of mania, drug induced psychosis in Parkinson's Disease.

Cautions: Pregnancy, prostatic hypertrophy, paralytic ileus, hepatic or renal impairment, diabetes mellitus (risk of exacerbation or ketoacidosis), low leucocyte or neutrophil count, bone marrow depression, hypereosinophilic disorders, myeloproliferative disease, Parkinson's disease

Contra-indications: Angle closure glaucoma and breast-feeding

Interactions: *See Appendix-2*

Side-effects: Mild, transient antimuscarinic effects; drowsiness, speech difficu-

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lty, exacerbation of Parkinson's disease, akathisia, asthenia, increased appetite, raised triglyceride concentration, oedema, hyperprolactinaemia (but clinical manifestations are rare), occasionally blood dyscrasias, rarely bradycardia, rash, photosensitivity, diabetes mellitus, priapism, hepatitis, pancreatitis

Dose: Schizophrenia, combination therapy for mania, ADULT: Over 18 years, 10 mg daily adjusted to usual range of 5-20 mg daily; doses greater than 10 mg daily only after reassessment

Monotherapy for mania, ADULT over 18 years, 15 mg daily adjusted to usual range of 5-20 mg daily; doses greater than 15 mg only after reassessment

Note. When one or more factors (e.g. female gender, elderly, non-smoker) are present that might result in slower metabolism consider initial lower dose then increase it gradually

Proprietary Preparations

Deprex(Square), Tab., 10 mg, Tk. 4.51/Tab.; 5 mg, Tk. 2.50/Tab.

Lopez(General), Tab., 10 mg, Tk. 4.53/Tab.; 5 mg, Tk. 2.52/Tab.

Lopez(General), Tab., 10 mg, Tk. 4.52/Tab.; 5 mg, Tk. 2.51/Tab.

Olanap(Incepta), Tab., 10 mg, Tk. 4.5.00/Tab.; 5 mg, Tk. 2.50/Tab.

Olanor(Beacon), Tab., 5 mg, Tk. 2.50/Tab.; 10 mg, Tk. 4.50/Tab.

Olanza(Albion), Tab., 10 mg, Tk. 4.52/Tab.

Oleanz(Sun), Tab., 10 mg, Tk. 4.55/Tab.; 5 mg, Tk. 2.55/Tab.

Pericam(Beximco), Tab., 10 mg, Tk.

2.51/Tab.; 5 mg, Tk. 1.50/Tab.

Xytrex(ACI), Tab., 10 mg, Tk. 4.53/Tab.; 5 mg, Tk. 2.52/Tab.

PROCHLORPERAZINE

(*See section 7.5*)

Indications: Schizophrenia, emesis (*see also section 7.5.4.1*)

Contra-indications: Parkinsonism, liver disease

Interactions: *See Appendix-2*

Side-effects: Sedation, EPS

Dose: *Orally*, short-term management of psychomotor agitation, 100–200 mg 4 times daily; CHILD: Not recommended. As antiemetic: 5-15 mg daily

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By intramuscular injection, for short-term adjunctive management of psychomotor agitation, 50 mg (25 mg in elderly), repeated if necessary. CHILD: Not recommended

Proprietary Preparations

Almetil(Albion), Tab., 5 mg, Tk. 0.30/Tab.
Ametil(Aristo), Tab., 5mg, Tk. 0.30/Tab.
Avotil(Rephco), Tab., 5 mg, Tk. 0.30/Tab.
Emitab(Sonear), Tab., 5 mg, Tk. 0.46/Tab.
Promtil(Square), Tab., 5 mg, Tk. 0.45/Tab.
Stemetil(Sanofi), Tab., 5mg, Tk. 0.46/Tab.
Vergon(Oponin), Inj., 12.5 mg/ml, Tk. 5.01/Amp; Tab, 5 mg, Tk. 0.46/Tab.

PALIPERIDONE (Atypical antipsychotic drug)

Indications: Used to treat schizophrenia and schizoaffective disorder.

Cautions: Patients with diabetes mellitus should be monitored regularly for worsening of glucose control. Should not be used in Patients in severely psychotic state, known cardiovascular disease hypotension, seizures, renal impairment

Contra-indications: Known hypersensitivity to paliperidone, risperidone.

Side-effects: Allergic reaction; Adults with schizophrenia: extrapyramidal symptoms, tachycardia, and akathisia. ; Adolescents with schizophrenia: somnolence, akathisia, tremor, dystonia, cogwheel rigidity, anxiety, weight increased, and tachycardia.

Dosage: 150 mg on treatment day 1 and 100 mg one week later (day 8), both administered in the deltoid muscle in order to attain therapeutic concentrations rapidly. Consult product literature

Note: used for the short-term treatment of schizoaffective disorder in adults and for the treatment of schizophrenia in adults and in adolescents (12-17 years of age).

Proprietary Preparations

Invega[®](Janssen) Inj. 75mg, Tk. 9093.18 / P.F Syringe; 100mg Tk. 9093.18 / P.F Syringe; 150mg Tk. 9093.18/P.F Syringe;
Palimax(ACI) Tab., 1.5mg, Tk. 4.00/Tab.; 3mg, Tk. 7.00/Tab.; 6mg, Tk. 10.00/Tab.

QUETIAPINE (Atypical antipsychotic drug)

Indications: Acute manic depression in Bipolar disorder as monotherapy or adjunct to Lithium & Valproic acid, Schizophrenia, Major depressive disorder, Alzheimer's disease, psychosis

Cautions: Behavioral disorders in elderly patients with dementia, less than 18 years old.

Contra-indications: Hypersensitivity to quetiapine

Interactions: See Appendix-2

Side effects: Dry mouth, dizziness, headache, somnolence, constipation, asthenia, tremor, peripheral oedema, Stevens-Johnson syndrome

Dose: ADULT: 50 mg daily for bipolar disorder; 25 mg orally once a day for Schizophrenia

Proprietary Preparations

Qmax(ACI), Tab., 25mg, Tk. 3.01/Tab., 100mg, Tk. 10.03/Tab.
Qpine(Sanofi), Tab., 100mg, Tk. 10.07/Tab., 200mg, Tk. 18.05/Tab., 25mg, Tk. 3.02/Tab.
Qpine(Sanofi), Tab., 100 mg, Tk. 10.04/Tab.; 200 mg, Tk. 18.00/Tab.; 25 mg, Tk. 3.01/Tab.
Quetinil(Albion), Tab., 100 mg, Tk. 10.50/Tab.
Quiet(Incepta), Tab., 100 mg, Tk. 10/Tab., 25mg, Tk. 3.00/Tab., 200 mg, Tk. 8.00/Tab.
Qutap(Healthcare), Tab., 100mg, Tk. 10/Tab., 25mg, Tk. 3.00/Tab.
Qutipin(Sun), Tab., 100mg, Tk. 10.05/Tab.; 25mg, Tk. 3.00/Tab.
Seropin(Eskayef), Tab., 25mg, Tk. 3/Tab., 100mg, Tk. 10.00/Tab.,
Seroquet(UniMed), Tab., 100mg, Tk. 10/Tab., 25mg, Tk. 3.00/Tab.
Tiapine(General), Tab., 50mg, Tk. 7.00/Tab., 200mg, Tk. 20.00/Tab., 25mg, Tk. 3.01/Tab., 100mg, Tk. 10.07/Tab.

RISPERIDONE

Indications: Acute and chronic psychoses, especially for psychoses in which both positive and negative symptoms are present

Cautions: Parkinson's disease; pregnancy; hepatic or renal impairment

Contra-indications: Breast-feeding

Interactions: See Appendix-2

Side-effects: Insomnia, agitation, anxiety, headache, drowsiness, impaired concentration, fatigue, blurred vision,

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constipation, nausea and vomiting, dyspepsia, abdominal pain, hyperprolactinaemia (with galactorrhoea, menstrual disturbances, amenorrhoea, gynaecomastia), sexual dysfunction, priapism, urinary incontinence, tachycardia, hypertension, rash, rhinitis, cerebrovascular accidents, neutropenia and thrombocytopenia

Dose: 2 mg in 1-2 divided doses on first day, then 4 mg in 1-2 divided doses on second day (slower titration appropriate in some patients); usual dose range 4-6 mg daily; doses above 10 mg daily only if benefit considered to outweigh risk (max. 16 mg daily). ELDERLY (or in hepatic or renal impairment), initially 500 micro-grams twice daily to 1-2 mg twice daily. CHILD: Under 15 years not recommended

Proprietary Preparations

Frenia(Incepta), Tab., 1 mg, Tk.2.00/Tab.; 2mg, Tk. 3.00/Tab.; 4 mg, Tk.5.50/Tab.
Resco(Drug Intl), Tab., 1mg, Tk. 1.55/Tab., 2mg, Tk. 2.05/Tab.
Residon(Healthcare), Tab., 1mg, Tk. 3.00/Tab., 2mg, Tk.5.00/Tab., 4mg, Tk. 9.00/Tab.
Riscord(General), Tab., 1mg, Tk. 2.50/Tab., 2mg, Tk. 5.00/Tab., 4mg, Tk. 8.00/Tab.
Risdon(UniMed), Tab., 1mg, Tk. 3.00/Tab., 2mg, Tk. 5.00/Tab., 4mg, Tk. 9.00/Tab.
Rislock(Albion), Tab., 1 mg, Tk.1.50/Tab.; 2 mg, Tk.3.00/Tab.; 4 mg, Tk.9.00/Tab.
Risomax(ACI), Tab., 1mg, Tk. 3.00/Tab., 2mg, Tk. 5.00/Tab., 4mg, Tk. 9.00/Tab.
Rispa(Orion), Tab., 1 mg, Tk. 3.01/Tab., 2 mg, Tk. 5.01/Tab.
Risperdalconsta[®](Cilag), Inj., 25mg/vial, Tk. 9413.42/vial; 37.50mg /vial, Tk. 12521.23/vial; 50mg /vial, Tk.18826.82/vial
Risperdex(Opsonin), Tab., 1 mg, Tk. 1.51/Tab., 2 mg, Tk. 2.01/Tab.
Risperdex(Opsonin), Tab., 1 mg, Tk.1.14/Tab.; 2 mg, Tk.1.51/Tab.
Rispolux(Novartis), Tab., 1 mg, Tk.3.20/Tab.; 2 mg, Tk.6/Tab.; 4 mg, Tk. 9.20/Tab.
Sizodon(Sun), Tab., 1 mg, Tk.3.00/Tab.; 2 mg, Tk.6.00/Tab.; 4 mg, Tk.9.00/Tab.
Sperdal(Sanofi), Tab., 2mg, Tk. 5.02/Tab., 1mg, Tk. 3.01/Tab., 4mg, Tk. 8.02/Tab., Syrup, 1mg/ml, Tk. 15.00/Bottle;

SULPIRIDE

Indications: Schizophrenia

Cautions: Pregnancy and lactation

Contra-indications: Parkinsonism, depression, blood dyscrasia, liver disease, tardive dyskinesia, neuroleptic malignant syndrome, pheochromocytoma

Interactions: See Appendix-2

Side-effects: Sedation, hypotension, EPS, galactorrhoea, amenorrhoea

Dose: 200 - 400 mg twice daily

ELDERLY: Low initial dose to be increased gradually according to response. CHILD: Under 14 years not recommended

Generic Preparation

Tablet, 200mg

TRIFLUPERAZINE

Indications: Schizophrenia and other psychoses; short-term management of severe anxiety

Contra-indications: Parkinsonism, blood dyscrasia, liver disease

Interactions: See Appendix-2

Side-effects: Sedation, hypotension, extrapyramidal symptoms, dry mouth, constipation, tachycardia, galactorrhoea, amenorrhoea, impaired ejaculation, cardiac arrhythmia

Dose: Schizophrenia and Psychoses: initially 5 mg twice daily (half in the elderly), increased by 5 mg after one week, then at intervals of 3 days, according to response, maximum 60mg daily.

Short-term adjunctive for management of severe anxiety, 2-4 mg daily in divided doses

Proprietary Preparations

Flurazine(Incepta), Tab., 1 mg, Tk. 1.50/Tab.; 5 mg, Tk. 2.50/Tab.
Sizonil(Healthcare), Tab., 1mg, Tk. 2.00/Tab.; 5mg, Tk. 3.50/Tab.
Stela(Delta), Tab., 1 mg, Tk.1.50/Tab.; 5 mg, Tk. 2.50/Tab.
Telazine(Eskayef), Tab., 5mg, Tk. 3.00/Tab.; 1mg, Tk. 2.00/Tab.

Trifluoperazine HCl+ Isopropamide iodide

Telabid(Eskayef), Tab., 1 mg+5 mg, Tk. 2.00/Tab.; 2 mg + 5 mg, Tk. 3.00/Tab.

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ZUCLOPENTHIXOL DECANOATE

Indications: Psychoses, especially schizophrenia with agitation and aggression
Contraindications, Side-effects & Cautions: As for chlorpromazine HCl

Interactions: See Appendix-2

Dose: By deep intramuscular injection into the upper outer buttock or lateral thigh, test dose 100 mg, followed after at least 7 days by 200–500mg or more, repeated intervals of 1–4 weeks, adjusted according to response; max. 600 mg weekly; ELDERLY quarter to half of usual starting dose;

Note: CHILD: Not recommended.

Proprietary Preparations

Clopixol Depot[®] (Lundbeck), Inj. 200mg/1ml. Tk.511.08/vial

Clopixol Acuphase[®] (Lundbeck), Inj. 50mg/2ml. Tk.736.82/vial; 50mg/ml; Tk.552.61/vial

ZUCLOPENTHIXOL HYDROCHLORIDE

Indications, Side-effects & Contraindications: As under Chlorpromazine hydrochloride.

Interactions: See Appendix-2.

Dose: Orally, initially 20-30 mg daily in divided doses, increasing to a max. of 150 mg daily if necessary; usual maintenance dose 20-50 mg daily. ELDERLY or Debilitated: initially quarter to half of the adult dose.

CHILD: Not recommended.

Proprietary Preparation

Copixol[®] (Lundbeck), Tab. 10mg., Tk.8.05/Tab (Depot Injection: see under Zuclopenthixol Decanoate below).

7.3 ANTIDEPRESSANT DRUGS

The major drugs that are used to treat Depressive illness, Neuropathic pain, Migraine Prophylaxis. Depending on molecular target, antidepressants are sub-grouped as follows:

A. Selective serotonin (5-HT) re-uptake inhibitors or (SSRI): **Citalopram, Fluoxetine, Sertraline**

B. Serotonin Noradrenaline re-uptake inhibitors (SNRIs),

-SNRIs: **Duloxetine, Venlafaxine,**

-Tricyclic Antidepressants: **Amitriptyline, Nortriptyline, Imipramine, Clomipramine**

C. Serotonin receptor modulator: **Trazodone, Nefazodone**

D. Monoamine-oxidase inhibitors or MAOIs (e.g. **Phenelzine, and Selegiline**)

E. Others: **Bupropion, Mirtazapine, Amoxapine, Meprobamate**

Cautions: Hyponatraemia has been associated with all types of antidepressants (especially in the elderly and possibly due to inappropriate secretion of antidiuretic hormone), and should be considered in all patients who develop drowsiness, confusion or convulsions while taking an antidepressant drug.

SELECTIVE SEROTONIN (5-HT) REUPTAKE INHIBITORS

Selective serotonin (5-HT) re-uptake inhibitors (SSRIs) such as **Citalopram, Fluoxetine** (see sec 7.9) **Paroxetine** and **Sertraline** are effective as antidepressants. SSRIs are less sedative and have fewer antimuscarinic and cardiotoxic side effects than tricyclic antidepressants.

Cautions: Should be avoided in patients with epilepsy (prolonged seizures reported with Fluoxetine). SSRIs should not be used if the patient enters a manic phase. These drugs may also interfere with performance of skilled tasks (e.g. driving).

Interactions: Citalopram, Fluoxetine, Sertraline should not be started until 2 weeks after stopping an MAOI. Conversely, an MAOI should not be started until at least a week after these drugs have been stopped.

CITALOPRAM

Indications: Depressive illness, panic disorder

Cautions: Epilepsy (bleeding disorders (especially gastro-intestinal bleeding),

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hepatic and renal impairment, pregnancy and breast-feeding; *see also notes above*

Contra-indications: Should not be used if the patient enters a manic phase

Interactions: *See notes above; see also appendix-2*

Side-effects: Palpitations, tachycardia, postural hypotension, coughing, yawning, confusion, impaired concentration, amnesia, migraine, paraesthesia, taste disturbance, increased salivation, rhinitis, tinnitus, and micturition disorders have been reported

Dose: Depressive illness, 20 mg daily as a single dose in the morning or evening, increased if necessary up to 60 mg daily; ELDERLY, maximum 40 mg daily; CHILD, Not recommended

Panic disorder, initially 10 mg daily increased to 20 mg after a week, usual dose 20-30 mg daily; CHILD, not recommended

Proprietary Preparations

Arpolax(*Incepta*), Tab. 20 mg, Tk. 8.00/Tab.
Citapram(*General*), Tab. 10 mg, Tk. 5.04/Tab.; Tab. 20 mg, Tk. 8.05/Tab.

ESCITALOPRAM

Indications: Depressive illness, panic disorder, social anxiety disorder

Cautions: Epilepsy, history of mania, cardiac disease, diabetes mellitus, angle closure glaucoma, hepatic impairment, renal impairment, breast feeding, abrupt withdrawal should be avoided

Contraindications: Should not be used if the patient enters a manic phase. Adolescent & Child under 18 yrs not recommended

Interactions : *See Appendix-2*

Side-effects: Nausea, vomiting, dyspnoea, abdominal pain, diarrhoea, constipation, anorexia with weight loss and hypersensitivity reactions possibly associated with vasculitis, risk of Suicidal thinking and behavior

Dose : Depressive illness, 10mg once daily, increased if necessary to max 20mg daily; elderly initially half the adult dose, lower maintenance dose may be sufficient; panic disorder, initially 5mg

daily increase to 10mg daily after 7 days, maximum 20mg daily

Proprietary Preparations

Acipam(*Ibn Sina*), Tab., 10mg, Tk. 10.00/Tab.; 5mg, Tk. 5.00/Tab.
Andepam(*Radiant*), Tab., 10mg, Tk. 12.00/Tab.; 5mg, Tk. 7.00/Tab.
Citalam(*ACI*), Tab., 10mg, Tk. 12.00/Tab.; 5mg, Tk. 7.00/Tab.
Citalex(*Opsonin*), Tab., 10 mg, Tk. 8.03/Tab.; 5 mg, Tk. 5.50/Tab.
Citalon(*Popular*), Tab., 10mg, Tk. 10.00/Tab.; 5mg, Tk. 6.00/Tab.
Elodep(*Acme*), Tab., 10 mg, Tk. 10.03/Tab.; 5 mg, Tk. 5.52/Tab.
Epram(*Albion*), Tab., 10 mg, Tk. 10.00/Tab.; 5 mg, Tk. 5.52/Tab.
Esipram(*Incepta*), Tab., 10 mg, Tk. 10.00/Tab.; 5 mg, Tk. 5.50/Tab.
Esita(*Healthcare*), Tab., 5 mg, Tk. 7.00/Tab.; 10 mg, Tk. 12.00/Tab.
Expres(*Sanofi*), Tab., 10mg, Tk. 12.00/Tab.; 5mg, Tk. 7.00/Tab.
Losita(*Eskayef*), Tab, 10mg, Tk. 10.00/Tab.; 5 mg, Tk. 6.00/Tab.
Meliva(*Jayson*), Tab., 10mg, Tk. 8.06/Tab.
Nexcital(*UniMed*), Tab, 10mg, Tk. 10.00/Tab.; 5mg, Tk. 5.50/Tab.
Nexito(*Sun*), Tab., 10 mg, Tk.10/Tab.; 5mg, Tk. 5.50/Tab.
Oxapro(*Square*), Tab., 10 mg, Tk. 10.03/Tab.; 5 mg, Tk. 5.54/Tab.
S-citapram(*General*), Tab, 10mg, Tk. 10.07/Tab.; 5mg, Tk. 7.03/Tab.
Seropam(*Beximco*), Tab., 10 mg, Tk. 8/Tab.; 5 mg, Tk. 5.50/Tab.
Talopram(*Navana*), Tab., 10 mg, Tk. 9.00/Tab.; 5 mg, Tk. 5.30/Tab.

FLUOXETINE

Indications: *See under dose*

Cautions: Epilepsy (avoid if poorly controlled, discontinue if convulsions develop), concurrent electroconvulsive therapy, history of mania, cardiac disease, diabetes mellitus, angle-closure glaucoma, concomitant use of drugs that increase risk of bleeding, history of bleeding disorders (especially gastrointestinal bleeding), hepatic and renal impairment, pregnancy and breast-feeding

Contra-indications: Should not be used if the patient enters a manic phase.

Interactions: *See notes above*

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Side-effects: Possible changes in blood sugar, fever, neuroleptic malignant syndrome-like event; also reported (no causal relationship established), abnormal bleeding, aplastic anaemia, haemolytic anaemia, cerebrovascular accident, ecchymoses, eosinophilic pneumonia, gastrointestinal haemorrhage, pancreatitis, pancytopenia, thrombocytopenia, thrombocytopenic purpura, vaginal bleeding on withdrawal, risk of Suicidal thinking and behavior, hair loss have been also reported. Hypersensitivity including angioedema and other allergic reactions have also been reported

Dose: Depressive illness, 20 mg daily, CHILD: Not recommended. Bulimia nervosa, 60 mg daily; CHILD not recommended

Obsessive-compulsive disorder, initially 20 mg daily; may be increased if no response after several weeks; maximum 60 mg daily; CHILD not recommended.

Premenstrual dysphoric disorder, 20 mg daily for 6 months, then reassess for benefit before continuing.

LONG DURATION OF ACTION. Long half-life of Fluoxetine should be considered when adjusting dosage (or in overdosage)

Proprietary Preparations

Fluoxetine(Albion), Cap., 20 mg, Tk. 2.58/Cap.

Modipran(Beximco), Cap., 20 mg, Tk. 2.89/Cap.

Nodep(General), Cap., 20 mg, Tk. 2.81/Cap.

Nodepress(Kemiko), Cap., 20 mg, Tk. 2.60/Cap.

Oxetin(Decent), Cap., 20mg, Tk. 2.88/Cap.

Prodep(Sun), Cap., 20 mg, Tk. 3.01/Cap.

Prolert(Square), Cap., 20 mg, Tk. 3.01/Cap.; Syrup, 20 mg/5 ml, Tk. 60/50ml

FLUVOXAMINE

Indications: Depressive illness, Compulsive disorder, tension headache.

Cautions: History of mania, seizure, diabetes, glaucoma, breast feeding, pregnancy, hepatic impairment, skilled performance (driving)

Contra-indications: See notes above

Side-effects: nausea, diarrhea, gas, loss of appetite; increased sweating, palpitation, tachycardia, malaise

Dose: 50mg increase to 300mg in steps.

Proprietary Preparation

Relafin(General), Tab., 50mg, Tk. 15.11/Tab.

MILNACIPRAN

Indications: Depression, fibromyalgia

Cautions: Delirium, psychosis

Contra-indications: Known hypersensitivity, patients under 15 years of age, advanced renal disease, BPH, hypertension and heart disease, open angle glaucoma, pregnancy

Interactions: See Appendix-2

Side-effects: Nausea, headache, constipation, dizziness, insomnia, hot flush, hyperhidrosis, palpitations, dry mouth and hypertension

Dose: ADULT: Initial dose on day 1: 12.5 mg once daily

Days 2 and 3: 12.5 mg twice daily

Days 4 through 7: 25 mg twice daily

After day 7: 50 mg twice daily

Proprietary Preparations

Milran(Beacon), Tab., 12.50 mg, Tk. 6.02/Tab.; 50 mg, Tk. 15.05/Tab.

Neocipran(Ibn Sina), Tab., 50 mg, Tk. 15.50/Tab.

PAROXETINE

Indications: Depression, obsessive-compulsive disorder, post-traumatic stress disorder and premenstrual dysphoric disorder

Contra-indications: Pregnancy and patients under 18 years of age.

Side-effects: Belching, decreased appetite, decreased sexual ability, heartburn, tenderness around the eyes and cheekbones, unusual drowsiness, risk of Suicidal thinking and behavior

Dose: Initial dose: 20 mg orally once a day with or without food, usually in the morning. Maintenance dose: 20 to 50 mg orally once a day with or without food, usually in the morning.

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Proprietary Preparations

Oxat(Square), Tab., 20 mg, Tk. 12.03/Tab.
Panirid(Incepta), Tab., 10 mg, Tk. 9.50/Tab.
Parotin(ACI), Tab., 10 mg, Tk. 6.04/Tab.,
 20mg, Tk. 10.07/Tab.
Paroxet(Jayson), Tab., 20mg, Tk.9.06/Tab.

SERTRALINE

Indications: Depressive illnesses; see also under dose

Cautions: Epilepsy concurrent electroconvulsive therapy, history of mania, cardiac disease, diabetes mellitus, angle-closure glaucoma, concomitant use of drugs that increase risk of bleeding, history of gastro intestinal bleeding; hepatic and renal impairment, pregnancy and breast-feeding; may impair performance of skilled tasks (e.g. driving), risk of suicidal thinking and behavior

Interactions: See notes above

Side-effects: Tachycardia, confusion, amnesia, aggressive behaviour, psychosis, pancreatitis, hepatitis, jaundice, liver failure, menstrual irregularities, paraesthesia; thrombocytopenia

Contra-indications: Should not be used if patient enters a manic phase

Dose: Depressive illness, initially 50 mg daily, increased if necessary by increments of 50 mg over several weeks to maximum 200 mg daily; usual maintenance dose 50 mg daily; CHILD: Not recommended

Obsessive-Compulsive Disorder: for ADULT and ADOLESCENT over 13 years, initially 50 mg daily, increased if necessary in steps of 50 mg over several weeks; usual dose range 50-200 mg daily; CHILD 6-12 years initially 25 mg daily, increased to 50 mg daily after 1 week, further increased if necessary in steps of 50 mg at intervals of at least 1 week (max. 200 mg daily); CHILD under 6 years not recommended

Post-traumatic stress disorder, initially 25 mg daily, increased after 1 week to 50 mg daily; if response is partial and if drug is tolerated, dose is increased in steps of 50 mg over several weeks to max. 200 mg daily

Proprietary Preparations

Andep(Healthcare), Tab., 100 mg, Tk. 10.00/Tab., 25 mg, Tk. 5.00/Tab., 50mg Tab., Tk. 5.50/Tab.
Atralin(Beximco), Tab. 50 mg, Tk. 5.00/Tab.
Chear(ACI), Tab., 100 mg, Tk. 10.07/Tab., 25 mg, Tk. 3.02/Tab., 50 mg, Tk. 6.04/Tab.
Mudiral(Opsonin), Tab., 50 mg, Tk. 6.02/Tab., 25 mg, Tk. 3.01/Tab.
Repose(Incepta), Tab., 100 mg, Tk. 9.50/Tab., 50 mg, Tk. 6.00/Tab., 25 mg, Tk. 3.00/Tab.
Sartra(Pacific), Tab., 50 mg, Tk. 4.51/Tab.
Selotin(White Horse), Tab., 50 mg, Tk. 5.00/Tab.
Serlin(Ibn Sina), Tab., 25 mg, Tk. 3.00/Tab.; Tab., 50 mg, Tk. 6.00/Tab.
Serolux(Novartis), Tab., 100 mg, Tk. 11.10/Tab.; 25 mg, Tk. 4.00/Tab.; Tab., 50 mg, Tk. 7.00/Tab.
Sertal(Drug Intl), Tab., 100 mg, Tk. 8.05/Tab., 25 mg, Tk. 3.05/Tab., 50mg, Tk.6.04/Tab.
Sertalin(Popular), Tab., 50 mg, Tk. 6.02/Tab.
Sertlin(Albion), Tab. 50 mg, Tk. 6.00/Tab.
Setra(General), Tab., 100 mg, Tk. 10.07/Tab.
Zosert(Sun), Tab., 100 mg, Tk.10/Tab., 25mg, Tk. 3.00/Tab.; 50 mg, Tk. 6.00/Tab.

TRIMIPRAMINE

Indications: Depressive illness with sedative effect

Dose: Initially 50-75mg at bed time to 150-300mg. Elderly: 10-25mg three times daily

Proprietary Preparation

Surmontil (Sanofi), Tab. 25 mg

TRAZODONE

Indications: Depression when sedation is required

Cautions: Epilepsy history of psychosis, cardiac disease, history of bipolar disease, cardiovascular disease, angle-closure glaucoma, urinary retention hepatic and renal impairment, pregnancy and breast-feeding

Contra-indications: Age less than 18 years, may provoke suicide thinking, Serotonin syndrome

Side-

effects: Nausea, somnolence, constipation, myalgia

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Dose: Age over 18year 50mg daily increase at 3-40 interval to maximum 400mg daily

Generic Preparation
Tablet, 50mg

SEROTONIN NORADRENALINE RE- UPTAKE INHIBITORS (SNRIS,)

AMITRIPTYLINE HCl^[ED]

Indications: Depressive illness, mixed anxiety with depression, nocturnal enuresis in children

Cautions: Cardiac disease, pregnancy, history of mania

Contra-indications: Recent myocardial infarction, arrhythmia, liver disease, manic phases, renal failure, enlarged prostate, co-administration with MAO inhibitors

Interactions: See Appendix-2

Side-effects: Dry mouth, sedation, blurred vision, increased intraocular pressure, constipation, nausea, difficulty in micturition, cardiovascular side effects, ECG changes, arrhythmia, postural hypotension, tachycardia, syncope particularly with high dose, hypersensitivity reactions, hypomania or mania, confusion (particularly in elderly), disturbances in sexual function

Dose: By mouth initially 75 mg daily in divided dose or as a single dose at bed time (in ELDERLY 30-50 mg daily). Increased gradually as necessary to maximum 150mg
CHILD: Nocturnal enuresis 7-10 years: 10-20 mg at night; 11-16 years: 25-50mg at night.

Proprietary Preparations

Amitin (Opsonin), Tab., 10 mg, Tk. 0.85/Tab.;

25 mg, Tk. 1.75/Tab.

Amit (General), Tab., 10mg, Tk. 0.85/Tab.;

25mg, Tk. 1.76/Tab.

Reptylin (Albion), Tab., 10 mg, Tk. 0.55/Tab.;

25 mg, Tk. 1.00/Tab.

Tryptin (Square), Tab., 10 mg, Tk.

0.85/Tab.; 25 mg, Tk. 1.76/Tab.

CLOMIPRAMINE

Indications: Depressive illness, obsessional state, catalepsy

Cautions: Purpura, thrombocytopenia),, asthma, chronic bronchitis angle-closure glaucoma type), arrhythmias, coronary artery disease, recent heart attack,

Interactions: MAO inhibitors anticholinergics drug "blood thinners" such as warfarin/heparin, anti-platelet drug including aspirin or NSAIDs such as ibuprofen

Side-effects: Abdominal pain, hypotension, muscle weakness

Dose: Age over 18 over-10mg, increase to 30-150mg in divided doses

Proprietary Preparations

Anafranil (Novartis) Tab., 25 mg, Tk. 5.01/Tab
Tk. 9.25/Tab

Timex (Orion), Tab., 25 mg, Tk. 5.01/Tab.

DOXEPIN

(See also section 12.5)

Indications: Depressive illness, when sedation is required, Pruritus

Side-effects: Abdominal pain, stomatitis, flushing, edema

Dose: Age over 12 year : 75mg daily in divided dose, or at single dose at bed time.

Proprietary Preparations

Somopin (Incepta), Tab., 3 mg, Tk.

6.00/Tab.; 6 mg, Tk. 10.00/Tab.

Slipaid (Beacon), Tab., 3 mg, Tk. 6.00/Tab.;

6mg, Tk. 10.00/Tab.

DULOXETINE

Indications: Depressive illness

Cautions, Side-effects, contra-indication: See section 5.2.4

Dose: ADULT >18 year 30-60mg as a single dose.

Proprietary Preparations

Deloxi (Eskayef), Cap., 20 mg, Tk. 7/Cap.;

30mg, Tk. 18.00/Cap.

Diliner (Square), DR Cap., 60mg,

Tk. 16.11/Cap.

Dulox(Acme), Tab., 30 mg, Tk. 10.07/Tab.; 20mg, Tk. 7.04/Tab.
Duloxen(Incepta), Tab., 20 mg, Tk. 7/Tab.; 30 mg, Tk. 10.00/Tab.
Loxetine(ACI), Tab., 20mg, Tk. 7.00/Tab.; 30mg, Tk. 10.00/Tab.
Stresin(UniMed), Cap., 20mg, Tk. 8.00/Cap.; 30mg, Tk. 12.00/Cap.
Xinolax(Opsonin), Cap., 60 mg, Tk. 16.05/Cap.; 30 mg, Tk. 10.00/Cap.

IMIPRAMINE HYDROCHLORIDE

Indications: Depressive disorder, panic disorder, phobic disorder, enuresis, attention deficit disorder, narcolepsy, chronic pain

Cautions: Pregnancy, administration along with MAO inhibitors

Contra-indications: Myocardial infarction, glaucoma, enlarged prostate, liver disease

Side-effects: Sedation, dry mouth, tachycardia, constipation, decreased libido

Interactions: See Appendix-2

Dose: 75-300mg/day

CHILD: Not recommended for use for depression; for nocturnal enuresis, 7-11 years 25-50 mg, over 11 years 50-75mg

Proprietary Preparations

Depram(Square), Tab., 25 mg, Tk. 4.02/Tab.

Pinor(Aristo), Tab., 25 mg, Tk. 4.00/Tab.

Pramin(Incepta), Tab., 25 mg, Tk. 2.00/Tab.

Tofranil(Novartis), Tab., 25 mg, Tk. 5.50/Tab.

MAPROTILINE HYDROCHLORIDE

It is a selective noradrenergic (NA) uptake inhibitor, also having moderate antihistaminic properties but has less anticholinergic effects than imipramine.

Indications: Depressive disorders where sedation is required, depression of late onset, neurotic or reactive depression; depressive mood disorders characterized by anxiety, dysphoria, irritability, apathetic condition, bipolar depressive disorder

Contra-indications: Hypersensitivity to the drug itself, epilepsy or lowered convulsive threshold; recent myocardial infarction, cardiac conduction defects e.g., bundle branch block, glaucoma,

prostate hypertrophy, pregnancy, lactation, liver disease

Interactions: MAOIs, anti-hypertensives, sympathomimetics, anticholinergic agents, anticonvulsants, alcohol, anticoagulants, antidiabetics, epilepsy; also see Appendix-2

Side-effects: Sedation, postural hypotension, inhibition of ejaculation, reflex tachycardia, nasal congestion, weight gain, drowsiness, constipation, dry mouth, fine tremor, akathisia, headache, lowering of seizure threshold, less anticholinergic effects, disturbances of cardiac conduction occasionally

Dose: Initially 25 mg once daily, then increasing gradually according to therapeutic response up to 75-150 mg daily. In elderly reduce to 75 mg daily depending on the patient's response. More than 200 mg has been associated with a higher incidence of seizures than with the usual dosage of tricyclic treatment

Overdosage: Severe anticholinergic and cardiotoxic effects such as ataxia, restlessness, drowsiness, convulsions, arrhythmia, convulsions, hypotension, respiratory depression, muscle twitching, stupor, coma. There is no specific antidote. Recommended to transfer patient to the hospital for intensive care

Proprietary Preparations

Ludiomil(Novartis), Tab. 25mg, Tk. 6.50/Tab

NORTRIPTYLINE

Indications: Depressive disorders; nocturnal enuresis in children, neuropathic pain

Cautions: History of convulsion

Contra-indications: Myocardial infarction, enlarged prostate, pregnancy, liver disease, glaucoma, simultaneous administration with MAO inhibitor

Interactions: See Appendix-2

Side-effects: Sedation, dry mouth, tachycardia, constipation, tremor, confusion

Dose: Depression, initial low dose increased as necessary to 75-100 mg daily in divided doses or as a single

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dose; ELDERLY, 30-50 mg daily in divided doses

Compound Preparation: Fluphenazine HCl 0.5 mg + Nortriptyline 10 mg (per tablet) 2-3 time daily for 3 months.

For nocturnal enuresis, CHILD 7 years, 10 mg, 8-11 years 10-20 mg, over 11 years 25-35 mg at night; maximum period of treatment 3 months; CHILD: Not recommended for depression in children.

Proprietary Preparations

Nortin(Navana), Cap., 10 mg, Tk. 1.00/Cap.; 25 mg, Tk. 1.50/Cap.

Compound preparations (Fluphenazine hydrochloride 0.5 mg with nortriptyline hydrochloride 10 mg):

Amival-F(Amico), Tab., Tk. 2.01/Tab.

Anflu(Alco), Tab. Tk. 0.75/Tab.

Apresin(Beximco), Tab., Tk. 1.05/Tab.

Ateval(Ziska), Tab., Tk. 1.00/Tab.

Euphor(Biopharma), Tab., Tk. 0.80/Tab.

Flutrip(General), Tab., Tk. 0.71/Tab.

Fresh(Nipa), Tab., Tk. 0.80/Tab.

Moodon(Ibn Sina), Tab., Tk. 1.00/Tab.

Norflu(Acme), Tab. Tk. 1.06/Tab.

Norzin(Aristo), Tab., Tk. 1.05/Tab.

Pernival(Opsonin), Tab., Tk. 0.75/Tab.

Sanit(Square), Tab. Tk. 0.80/Tab.

OTHER ANTIDEPRESSANT DRUGS

AGLOMELATINE(melatonin receptor agonist)

Indications: Major depression

Cautions: Bipolar disorder, mania or hypomania; concomitant use of drugs associated with hepatic injury; excessive alcohol consumption; obesity; diabetes;

Contra-indications: dementia; Hepatic and Renal impairment, pregnancy, breast-feeding

Side-effects: Nausea, vomiting, diarrhoea, constipation, abdominal pain, increased serum transaminases headache, dizziness, drowsiness, agitation, sleep disturbances, fatigue, anxiety, back pain; sweating; less commonly paraesthesia, blurred vision, and eczema

Dose: ADULT over 18 years, 25mg at bedtime, increased if necessary after 2 weeks to 50mg at bedtime

Proprietary Preparations

Agotin(Beacon), Tab., 25mg, Tk. 50.15/Tab.

MIRTAZAPINE(Increase central serotonergic, noradrenergic transmission)

Indications: Depressive illness (produce sedation)

Cautions: Epilepsy, hepatic and renal impairment, hypotension, history of urinary retention and bipolar depression, avoid abrupt withdrawal; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Increased appetite and weight gain, sedation; abnormal dreams, tremor, myoclonus, paraesthesia, arthralgia, myalgia, reversible agranulocytosis

Dose: Initially 15 mg daily at bed time increased according to response up to 45 mg daily as a single dose at bedtime or in 2 divided doses; CHILD: Not recommended

Proprietary Preparations

Mirapin(Beacon), Tab., 15mg, Tk. 9.03/Tab.

Mirez(Healthcare), Tab., 7.5mg, Tk. 6.50/Tab.;

15mg, Tk. 8.00/Tab.; 30mg, Tk. 15.00/Tab.

Mirtaz(Sun), Tab., 15 mg, Tk. 8.05/Tab.; 30 mg, Tk. 15.00/Tab.

Mirzalux(Novartis), Tab., 15 mg, Tk.

10.00/Tab.; 30 mg, Tk. 18.00/Tab.

Mitaprex(Incepta), Tab., 30 mg,

Tk. 15.00/Tab.; 15 mg, Tk. 8.00/Tab.; 7.5 mg,

Tk. 6.00/Tab.

Mitrazin(General), Tab., 15mg, Tk. 8.05/Tab.;

30mg., Tk. 15.04/Tab.; 7.5mg, Tk. 6.50/Tab.

Rapine(ACI), Tab., 15mg, Tk. 8.00/Tab.;

30mg, Tk. 15.00/Tab.; 7.5mg, Tk. 6.00/Tab.

Resant(Drug Intl), Tab., 15mg, Tk. 6.00/Tab.

Trazapin(Albion), Tab., 15 mg, Tk. 8.00/Tab.

VENLAFAXINE

Indications: Depressive illness, generalised anxiety disorder

Cautions: History of myocardial infarction or unstable heart disease, epilepsy, mania, hepatic or renal impairment; glaucoma; avoid abrupt withdrawal; driving; diabetes; epilepsy; glaucoma; bleeding disorder

Skin Reaction: Advise patients to contact doctor if rash, urticaria or related allergic reaction develops.

7. CENTRAL NERVOUS SYSTEM

Contra-indications: Severe hepatic or renal impairment; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: nausea, constipation, dry mouth, headache, insomnia, drowsiness, dizziness, asthenia, nervousness, sweating, sexual dysfunction; hypertension, palpitations, dyspnoea, chills, tinnitus, tremor, hypertonia, psychiatric disturbances, increased urinary frequency, arthralgia, myalgia, visual disturbances, ecchymoses, photosensitivity, hyponatraemia; neuroleptic malignant syndrome, Stevens-Johnson syndrome.

Dose: Depression, initially 75 mg daily in 2 divided doses, increased if necessary after several weeks to 150 mg daily in 2 divided doses

Severely depressed or hospitalized patients, initially 150 mg daily in 2 divided doses, increased if necessary in steps of up to 75 mg every 2-3 days to max. 375 mg daily, then gradually reduced; ADOLESCENT and CHILD under 18 years not recommended

Proprietary Preparations

Veniz XR(Sun), XR Cap., 75 mg, Tk.10/Cap.

Venlax(General), Tab., 37.5mg, Tk.5.54/Tab; 75 mg, Tk.10.07/Tab.

DES-VENLAFOXINE

(Active metabolite of venlafexine)

Indications: Major depressive illness.

Cautions, Side-effects: See under Venlafaxin

Contra-indications: Hypersensitivity

Dose: Tab 25, 50, 100mg

Proprietary Preparations

Hapytab(Eskayef), ER Tab, 50 mg, Tk. 10.00/Tab.

Nevola(Ziska), ER Tab., 100 mg, Tk. 15.00/100mg.; 50 mg, Tk. 9.00/50mg

7.4 DRUGS USED IN SUBSTANCE DEPENDENCE (See Appendix-1e)

Alcohol dependence: Benzodiazepines are drugs of choice for alcohol withdrawal symptoms; diazepam 20mg 6 hourly over a period of 5-7 days may be

given. Disulfiram can be given as an adjunct to other treatments. High-dose of vitamin B₁ (Thiamine) should be given during withdrawal syndrome. Multivitamins may be given *intravenously* 8 hourly for 2 days followed by *intramuscular* injection for the following 7 days.

Opioid dependence: Methadone, an opioid agonist can prevent the onset of withdrawal syndrome due to opioids. It should only be prescribed for those who are physically dependent on opioids;

Buprenorphine can also be given. Before starting buprenorphine, the action of opioids is to be blocked; it may be given to former addicts to prevent relapse of withdrawal syndrome.

Nicotine replacement therapy and Bupropion are effective aids

Cigarette smoking cessation: Nicotine replacement therapy and Bupropion are effective aiding to smoking cessation for those smoking more than 10 cigarettes a day. Bupropion has been used as an antidepressant but its mode of action in smoking cessation is not clear and may involve an effect on noradrenaline and dopamine neurotransmission. Nicotine replacement therapy is regarded as the pharmacological treatment of choice in the management of smoking cessation.

BUPRENORPHINE

Indications: See notes above

Cautions, Contra-indications & Side-effects: See notes above and also under Bupropion

Dosage: Oral ADULT Sublingual

Moderate to severe pain: 200-400 mcg 6-8 hourly.

Proprietary Preparation

Acron (ACI), Tab., 200mcg, TK. 10.07/Tab.

Note: Consult product literature and physician

BUPROPION (Block reuptake of dopamine noradrenaline serotonin; Also block nicotine receptor)

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Indications: Adjunct to smoking cessation in combination with motivational support

Cautions: Elderly, hepatic impairment, measure blood pressure before and during treatment

Contraindications: History of seizures, of eating disorders and of bipolar disorder; pregnancy and breast feeding

Interactions: See Appendix-2

Side-effects: Insomnia, tremor, dizziness, depression, hallucinations, memory impairment, paraesthesia, in coordination, Stevens Johnson Syndrome

Dose: Initially 1-2 weeks before target stop date, initially 150 mg daily for 6 days then 150 mg twice daily (maximum single dose 150 mg, maximum daily dose 300mg; minimum 8 hours between doses).

Proprietary Preparations

Depnox SR (Jayson), SR Tab. 150 mg, Tk.10.06/Tab.

Zybex (Beximco) SR Tab. 150 mg, Tk.10.00/Tab.

7.5 ANALGESICS

- 7.5.1 OPIOIDS
- 7.5.2 NON-OPIOIDS
- 7.5.2.1 PARACETAMOL
- 7.5.2.2 ASPIRIN (ACETYLSALICYLIC ACID)
- 7.5.2.3 OTHER NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS)
- 7.5.3 DRUGS USED IN NEURALGIC/NEUROPATHIC PAIN
- 7.5.4 DRUGS USED IN MIGRAINE
- 7.5.4.1 ACUTE MIGRAINE ATTACK
- 7.5.4.2 PROPHYLAXIS OF MIGRAINE

7.5.1 OPIOIDS

(See also section 8.1.4.1)

Morphine is the most valuable narcotic analgesic for severe pain, although it frequently causes nausea and vomiting. It is the standard against which other opioid analgesics are compared, and is mostly used in the treatment of severe pain in the terminal conditions. **Pethidine** is probably the most

frequently used narcotic analgesic. It produces prompt but short-lasting analgesia; it is less constipating, less nauseating and causes less respiratory depression than morphine, but even in high doses is a less potent analgesic. It is mostly used during labour and in postoperative painful conditions.

Codeine is effective for the relief of mild to moderate pain but is used mainly for its cough suppressant property (see section 4.6.1).

Tramadol is a relatively newer opioid derivative, which has fewer of the typical Side-effects than other opioids (notable, less respiratory depression, constipation and addiction).

MORPHINE SULPHATE^[ED] [CD]

Indications: Postoperative painful condition; pain in labour, myocardial infarction, acute pulmonary oedema, and other acute pain of visceral origin resistant to non-narcotic analgesics; chronic pain in terminal illness

Cautions: Hypotension, hypothyroidism, asthma and decreased respiratory reserve, prostatic hypertrophy, pregnancy and breast-feeding; hepatic and renal impairment; elderly, epilepsy

Contra-indications: Acute respiratory depression, acute abdomen, raised intracranial pressure or head injury, pheochromocytoma

Interactions: See Appendix-2

Side-effects: Nausea and vomiting, constipation, drowsiness, respiratory depression, hypotension, dry mouth, sweating, headache, facial flushing, vertigo, bradycardia, tachycardia, palpitation, postural hypotension, hypothermia, hallucination, dysphoria, mood changes, miosis, ureteric or biliary spasm; severe dependence and tolerance

Dose: Acute pain, by *subcutaneous or intravenous injection*, 10 mg every 2-4 hours according to the need. Myocardial infarction and pulmonary oedema, by *slow intravenous injection* (2 mg/minute) 10 mg followed by a further 5-10 mg if necessary

Proprietary Preparations

G-morphine(*Gonoshasthaya*), Tab., 15 mg, Tk. 14.00 /Tab.; Inj., 15 mg/ml, Tk. 40.00/1ml Amp.

Morphine(*Renata*), Inj., 15 mg/ml, Tk. 22.31/Amp

Morphinex(*Popular*), Inj., 15 mg/ml, Tk. 20.31/amp

MSL Oral(*UniMed*), Oral Solution, 5mg/5ml, Tk. 80.00/100ml; Tab., 15 mg, Tk. 14.00/Tab.;

OXYMORPHONE

Indications: For the relief of moderate to severe pain and also as a preoperative medication to alleviate apprehension, maintain anaesthesia and as an obstetric analgesic. It can be used for the alleviation of pain in patients with dyspnoea associated with acute left ventricular failure and pulmonary oedema

Cautions: Reduce the dose gradually; sudden withdrawal may cause withdrawal reactions

Contra-indications: *Similar to other opioids*

Side effects: Similar to other opioids with constipation, nausea, vomiting, dizziness, dry mouth and drowsiness. Over dosage is characterized by respiratory depression, extreme somnolence progressing to stupor or coma, skeletal muscle flaccidity, cold and clammy skin

Dose:**Acute Pain**

- Immediate-release tablets indicated for acute moderate-to-severe pain where opioid use is appropriate.
- Opioid-naïve patients (immediate-release): 10-20mg PO q4-hr PRN initially, then titrated as warranted (may start with 5-mg increments)
- Conversion from IV oxymorphone to PO: The absolute bioavailability of PO is ~100% therefore conversion from 1mg IV q4-6hr in equipotent to 10mg PO q4-hr.
- Elderly patients or those with renal or hepatic impairment : 5 mg PO q4-6hr initially.

Chronic Severe Pain:

Extended-release is indicated for the management of pain severe enough to

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require daily, around-the-clock, long-term opioid treatment and for which alternative treatment options are inadequate.

Opioid-naïve patients (extended-release); 5mg PO q12hr initially, then titrated in increments of 5-10mg q12hr every 3-7 days to level that provides adequate analgesia and minimizes side effects.

Conversion from IV oxymorphone to extended-release PO: The absolute oral bioavailability of Opana ER is ~100%, therefore conversion from 1mg IV q 6hr (4mg/day) is equipotent to 20mg PO q12hr (40mg/daly)

Proprietary Preparation

O-morphon(*Ziska*), Inj., 1mg/ml, Tk. 50.00/1ml Amp.; Tab., 10mg, Tk. 20.00/Tab.

PETHIDINE HYDROCHLORIDE [ED][CD]

Indications: Moderate to severe pain, labour pain, peri-operative pain

Cautions, Contraindications & Side-

effects: *See under Morphine*; avoid in severe renal impairment; convulsions may occur with over dosage

Interactions: *See Appendix-2*

Dose: 50-150 mg every 4 hours according to requirement

Proprietary Preparations

G-Pethidine(*Gonoshasthaya*), Inj., 100mg/2ml, Tk. 34.50/Amp.

Pehin(*Popular*), Inj., 100 mg/2 ml, Tk. 19.95/Amps

Pethidine(*Renata*), Inj., 100 mg/2 mL, Tk. 19.88/2 ml Amp; 50 mg/ml, Tk. 6.79/Amp.

TAPENTADOL

Indications: Pain due to injury or following surgery, peripheral neuropathy in diabetic patients

Cautions: Operating heavy machinery and any vehicle

Contraindications: Severe bronchial asthma, hypercapnia, and patients who have or are suspected to have paralytic ileus

Side-effects: Dizziness, constipation, sedation, dependence

Dose: Acute Moderate-to-Severe Pain.

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Immediate-release tablet or oral solution; 50-100mg PO q4-6hr PRN; not to exceed 700mg on day 1 and 600mg/day thereafter

Chronic (extended-release tablet)

→ 50-250mg PO q1 12hr PRN; not to exceed 500mg/day

→ Opioid-naïve patients; 50mg PO q1 2hr; titrated to optimal dosage as needed; not to exceed 500mg/day

Chronic Severe Pain

Indicated for the management of pain severe enough to require daily, around-the-clock, long-term opioid treatment and for which alternative treatment options are inadequate 50-250mg PO q1 2hr PRN; not exceed 500mg/day

Opioid-naïve patients; 50mg PO q1 2hr; titrated to optimal dosage as needed; not to exceed 500mg/day

Proprietary Preparations

Centradol(Incepta), Tab, 50 mg, Tk. 12.00/Tab., 75 mg, Tk. 17.00/Tab.

Cynta(Healthcare), Tab., 100mg, Tk. 25.00/Tab., 50mg, Tk. 14.00/Tab., 75mg, Tk. 20.00/Tab.

Lopenta(ACI), Tab., 75mg, Tk. 20.00/Tab., 50mg, Tk. 14.00/Tab.

Pentadol(Square), Tab., 100 mg, Tk. 25.08/Tab., 75 mg, Tk. 20.06/Tab., 50 mg, Tk. 14.05/Tab.

Tapendol(Opsonin), Tab., 50 mg, Tk. 12.00/Tab., 75 mg, Tk. 17.00/Tab., 50mg, Tk. 12.00/Tab.

Tapenta(Eskayef), Tab., 100mg, Tk. 20.00/Tab., 50mg, Tk. 12.00/Tab., 75mg, Tk. 17.00/Tab.

Tapexia(Globe), Tab., 50 mg, Tk. 12.00/Tab., 75 mg, Tk. 17.00/Tab.

TRAMADOL HYDROCHLORIDE

Indications: Moderate to severe pain

Cautions: See under morphine;

Contra-indications: History of epilepsy; pregnancy and lactation

Interactions: See Appendix-2

Side effects: Paraesthesia, hypotension, anaphylaxis, hallucinations and confusion

Dose: By mouth, 50-100 mg every 4 hours; total of more than 400 mg daily by mouth is not usually required. CHILD: Not recommended

By intramuscular or intravenous injection, 50-100 mg every 4-6 hours. CHILD not recommended

Postoperative pain 100 mg initially then 50 mg every 15-20 minutes, maximum 250 mg in the first hour including initial dose; then 50-100 mg every 4-6 hours to a max. 600 mg daily. CHILD: Not recommended

Proprietary Preparations

Anadol(Square), Inj., 100 mg/2 ml, Tk. 20.14/2 ml Amp; Suppo. 100 mg, Tk. 15.10/Supp; Cap., 50 mg, Tk. 8.07/Cap., 100 mg, Tk. 12.09/Cap.

Dolonil(Acme), Inj., 100mg/2ml, Tk. 20.13/2ml Amp; Cap. 50 mg, Tk. 7.55/Cap., Tab., 100.00 mg, Tk. 25.08/Tab.

Dolorex(Biopharma), ER Cap., 100mg, Tk. 20.08/Cap.

Kadol(Kemiko), Cap., 50 mg, Tk. 8.00/Cap.

Kingdol(Drug Intl), Cap., 50mg, Tk. 7.00/Cap.

Lucidol(Beximco), Supp., 100mg, Tk. 15.00/Supp; Cap., 50mg, Tk. 7.50/Cap., Inj., 50mg/ml, Tk. 20.00/2 ml Amp

Murtrum(Monico), Inj., 50 mg/ml, Tk. 20.00/2 ml Amp

Opalgic(Euro), Cap., 50mg, Tk. 8.00/Cap.

Pendol(Alco), Cap., 50 mg, Tk. 6.02/cap.

Reladol(Globe), Inj., 100 mg/2 ml, Tk. 20.00/2 ml Amp

Syndol(Healthcare), Inj., 100mg/2ml, Tk. 25.00/2 ml Amp; Cap., 50mg, Tk. 8.50/Cap.

Tendia(ACI), Cap., 50mg, Tk. 7.55/Cap., 100mg, Tk. 14.09/Cap., Inj., 100mg/2ml, Tk. 20.13/2 ml Amp

Trado(Pacific), Cap., 50 mg, Tk. 8.00/Cap., Inj., 100 mg/2 ml, Tk. 25.00/2 ml Amp

Tramadol(Amico), Cap., 50mg, Tk. 6.00/Cap

Tramanil(Ziska), Inj., 100 mg/2 ml, Tk. 20.00/2 ml Amp

Tramapan(Popular), Inj., 100 mg/2 ml, Tk. 20.08/2 ml Amp

Tramavir(Virgo), Tab., 100 mg, Tk. 13.00/Tab., Cap. 50 mg, Tk. 8.50/Cap.

Tranal(Opsonin), Cap., 50 mg, Tk. 7.53/Cap., Inj., 100 mg/2ml, Tk. 20.08/2 ml Amp., Supp., Tk. 15.06/Supp.

Trumen(General), Cap., 50mg, Tk. 6.00/Cap., Inj., 100mg, Tk. 22.07/2ml Amp

Utramal(UniMed), Tab., 100mg, Tk. 20.00/Tab., 50mg, Tk. 10.00/Tab., Cap., 50mg, Tk. 8.50/Cap., Supp., 100mg, Tk. 25.00/Supp; Inj., 100mg, Tk. 25.00/2 ml Amp

Winpain(Incepta), Cap., 50 mg, Tk. 8.50/Cap.

Xtrapel(Beacon), Cap., 100mg, Tk. 12.08/Cap., 50mg, Tk. 8.05/Cap., Inj., 100mg/2ml, Tk. 20.13/2 ml Amp

Zydol(Novo Health), Cap. , 100 mg, Tk. 12.00/Cap., 50 mg, Tk. 7.50/Cap., Inj. 100 mg/2 ml, Tk. 18.00/2 ml amp

7.5.2 NON-OPIOID ANALGESICS

Paracetamol and **Aspirin** and other non-steroidal anti-inflammatory drugs or NSAIDs (see sec. 9.1.1) are useful for relief of pain of musculo-skeletal origin. Narcotic analgesics are particularly required for moderate to severe pain of visceral origin especially where non-narcotic analgesics fail to provide adequate relief.

7.5.2.1 PARACETAMOL^[ED]

Indications: Mild to moderate pain e.g. muscle pain, tension headache, neckache, lumbago; pyrexia

Cautions&Contra-indications: Hepatic and renal impairment

Interactions: See Appendix-2

Side-effects: Blood disorders, mild gastrointestinal upset; liver damage following overdose and misuse; less frequently renal damage may also occur. OVERDOSAGE with paracetamol is particularly dangerous as it may cause hepatic damage (see Appendix-7 for treatment of overdose and poisoning)

Dose: By mouth, 0.5-1 g every 6 hours to a max. dose of 4 g daily; CHILD under 3 months 10 mg/kg (5mg/kg if jaundiced); 3 months to 1 year 60-120 mg, 1 to 5 years 120-250 mg, 6 to 12 years 250-500 mg, Dose may be repeated 4 to 6 hourly

By rectum as suppositories, ADULT and CHILD over 12 years 0.5 to 1 g up to 4 times daily; CHILD 1 to 5 years 125 to 250 mg, 6 years to 12 years 250-500 mg up to 4 times daily.

Proprietary Preparations

Ace(Square), Paed. drops, 80 mg/ml, Tk. 20.7/30ml, Supp, 500 mg, Tk. 8.06/Supp, 250 mg, Tk. 5.03/Supp, Syrup, 120 mg/5 ml, Tk. 20.7/60ml, , Tk. 31.88/100ml, Susp., 120 mg/5 ml, Tk. 20.7/60ml, Tab. , 500 mg, Tk. 0.80/Tab., 125 mg, Tk. 4.03/Supp., Tab., 665 mg, Tk. 1.51/Tab.

Acep(Zenith), Paed. drop, 80 mg/ ml, Tk. 10.91/15 ml, , Susp., 120 mg/ 5 ml, Tk. 16.11/60ml, Tab., 500 mg, Tk. 0.80/Tab. **Aceta**(Biopharma), Susp., 120 mg/5 ml, Tk. 20.63/60ml, Tab., 500.00mg, Tk. 0.80/Tab., TabXR., 665.00mg, Tk. 1.50/Tab., Paed. drops, 80 mg/ml, Tk. 12.30/15ml **Actol**(Somatec), Susp., 120 mg/5 ml, Tk. 20.69/60ml **Asmol**(Sharif), Susp., 120 mg/5 ml, Tk. 20.64/60ml, Tab, 500 mg, Tk. 0.800/Tab. **Atopen**(Kemiko), Tab., 500 mg, Tk. 0.80/Tab. **ATP**(General), Syrup, 120mg/5ml, Tk. 20.63/60ml, Tab, 500mg, Tk. 0.80/Tab., Susp., 120 mg/5 ml, Tk. 20.63/60ml **Benalgin**(Benham), Susp., 120 mg/5 ml, Tk. 21.69/60ml; Tab., 665 mg, Tk. 1.50/Tab. **Cetal**(Supreme), Tab., 500 mg, Tk. 0.80/Tab., Susp., 120 mg/5 ml, Tk. 20.63/60ml **Cetam**(Pacific), Tab., 500 mg, Tk. 0.60/Tab., 500 mg, Tk. 0.60/Tab., 500 mg, Tk. 0.60/Tab., Susp., 120 mg/5 ml, Tk. 20.00/60ml **D-Cetamol**(Decent), Susp., 120 mg/5 ml, Tk. 16.00/60ml, Tab., 500mg, Tk. 0.80/Tab. **Fap**(Beacon), Tab., 500mg, Tk. 0.80/Tab. **Fast**(Acme), Supp., 125.00 mg., Tk. 4.03/Supp, 250.00 mg., Tk. 5.03/Supp, 500.00 mg, Tk. 8.07/Supp. **Fea**(Navana), Susp., 120 mg/5 ml, Tk. 20.06/60ml; Tab., 500 mg, Tk. 0.80/Tab. **Fea-XR**(Navana), Tab., 665 mg, Tk. 1.51/Tab. **Fevac**(Orion), Susp., 120 mg/5 ml, Tk. 20.06/60ml **G-paracetamol**(Gonoshasthaya), Susp., 120 mg/5 ml Tk. 16.00 /60ml; Syrup, 120mg/5 ml, Tk. 15.00/50ml; Tab., 500 mg, Tk. 0.60/Tab. **Hepa**(Hudson), Susp., 120 mg/5 ml, Tk. 20.00/60ml; Tab., 500 mg, Tk. 0.80/Tab. **Longpara**(Ibn Sina), XR Tab., 665 mg, Tk. 1.51/Tab. **M-Pol**(Modern), Susp., 120 mg / 5 ml., Tk. 20.00/60ml, Tab. , 500 mg, Tk. 0.80/Tab. **Nap**(Beximco), Supp, 125mg, Tk. 4.00/Supp **Napa**(Beximco), Susp., 120mg/5ml, Tk. 20.69/60ml, Syrup, 120mg/5ml, Tk. 20.70/60ml, XR Tab., 665mg, Tk. 1.51/Tab., 500mg, Tk. 0.80/Tab., Infusion, 1 gm/100 ml, Tk. 150/100 ml, Paed. drops, 80mg/ml, Tk. 14.82/15ml, Supp, 250mg, Tk. 5.00/Supp, 500mg, Tk. 8.00/Supp, 60mg, Tk. 3.50/Supp, **Pamix**(Ziska), Susp., 120mg/5ml, Tk. 20.70/5ml, Tab, 500 mg, Tk. 0.80/Tab. **Panol**(Virgo), Susp., 120 mg/5 ml, Tk. 20.00/60ml, 120 mg/5 ml, Tk. 30.00/100ml, Tab, 500 mg, Tk. 0.65/Tab. **Para**(Amico), Paed. drops, 80 mg/ml, TK. 12.00/15ml, Susp., 120mg/5ml, TK. 20.00/60ml, Tab., 500mg, TK. 0.80/Tab. **Paracetamol**(Ziska), Tab. , 500 mg, Tk. 0.57/Tab.

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Paraciv (*Beacon*), IV Infusion, 1 gm/100ml, Tk. 120.36/100 ml
Paradil (*Biogen*), Syrup, 120mg/5ml, Tk. 20.00/60 ml
Parafen (*Ziska*), Susp., 120 mg/5 ml, Tk. 16.28/60ml
Paragesic (*SMC Enterprise*), Tab., 500 mg, Tk. 0.80/Tab.
Parapyrol (*GSK*), Tab., 500 mg, Tk. 0.72/Tab
Pol (*Globe*), Susp., 120 mg/5 ml, Tk. 20.56/Vial, Tab, 500 mg, Tk. 0.80/Tab.
Pyrac (*Medimet*), Susp., 120 mg/5 ml, Tk. 20.00/60ml; Syrup, 120 mg/5 ml, Tk. 18.25/50ml; Tab., 500 mg, Tk. 0.80/Tab.
Pyralgin (*Renata*), Susp., 120 mg/5 ml, Tk. 20.64/60ml, Tab, 500mg, Tk. 0.80/Tab.
Reliv (*Astra Bio*), Susp., 120 mg/5 ml, Tk. 20.63/5ml, Tab., 500 mg, Tk. 0.80/Tab.
Renova (*Opsonin*), Inj., (IV Infusion), 1 gm/100 ml, Tk. 120.00/100 ml, Supp, 250 mg, Tk. 5.02/Supp, 500 mg, Tk. 8.03/Supp; 125 mg, Tk. 4.02/ Supp, 60 mg, Tk. 3.51/Supp, Susp., 120mg/5 ml, Tk. 20.70/60 ml, Tk. 24.53/100 ml, 120mg/5 ml, Tk. 31.60/100 ml, Paed. drops, 100 mg /1.25 ml, Tk. 12.35/1.25ml; 120mg/5 ml, Tk. 20.64/ 60 ml; Tab., 500 mg, Tk. 0.80/Tab., 665 mg, Tk. 1.50/Tab.
Reset (*Incepta*), Inj., (IV Infusion), 0.5 gm/50 ml, Tk. 120.00/50 ml; Paed. drops, 80 mg/ml, Tk. 12.30/15 ml; Susp., 120 mg/5 ml, Tk. 20.64/60ml; Tab., 500 mg, Tk. 0.80/Tab., 665 mg, Tk. 1.50/Tab.
Sinapol (*Ibn Sina*), Susp., 120 mg/5 ml, Tk. 20.00/60ml; Tab., 500 mg, Tk. 0.80/Tab.
Tamen (*Eskayef*), Susp., 120 mg/5 ml, Tk. 20.68/60ml; 120 mg/5 ml, Tk. 20.68/60ml; Syrup, 120 mg/5 ml, Tk. 24.53/100ml; Tab, 665mg, Tk. 1.50/Tab., 500mg, Tk. 0.80/Tab., 500mg, Tk. 0.80/Tab., Inj., (IV Infusion), 1 gm/100 ml, Tk. 120.00/100 ml; Paed. Drops, 80 mg/ml, Tk. 14.77/15ml;
Tamino (*NIPRO JMI*), Susp., 120 mg/5 ml, Tk. 20.69/60ml; Tab., 500 mg, Tk. 0.80/Tab.; Tab., 665 mg, Tk. 1.50/Tab.
Temol (*Team*), Susp., 120mg/5ml, Tk. 20.70/60ml; Tab., 500mg, Tk. 0.80/Tab.
Tempil (*Alco*), Tab., 500 mg, Tk. 0.80/Tab., 500 mg, Tk. 0.80/Tab.
Tempol (*Asiatic*), Paed. Drops, 80 mg/ml, Tk. 12.31/15ml; 80 mg/ml, Tk. 15.73/30ml; Susp., 120 mg/5 ml, Tk. 16.34/60ml;
Timidal (*G.A.Co*), Susp., 120 mg/5ml, Tk. 20.06/60 ml; Tab., 500 mg, Tk. 0.80/Tab.
Xcel (*ACI*), Tab., 665mg, Tk. 1.28/Tab., Paed. drops, 80mg/ml, Tk. 20.70/30ml; Supp. 125mg, Tk. 4.00/Suspp; 250mg, Tk. 5.00/Suspp; 500mg, Tk. 8.00/ Supp; Susp., 120mg /5ml, Tk. 20.70/60ml; Syrup, 120mg/5ml, Tk. 30.00/60ml;
Xpa (*Aristo*), XR Tab., 665mg, Tk. 1.50/Tab., 500mg, Tk. 0.80/Tab, Paed. drops, 80mg/ml,

Tk. 14.80/15ml; Supp., 250mg, Tk. 6.00/Supp; 125mg, Tk. 5.00/Supp; 500mg, Tk. 9.00/Supp; Susp., 120 mg/5 ml, Tk. 20.60/60ml; , Tk. 30.00/100ml;
Zerin (*Jayson*), Ped. drops, 80mg/ml, Tk. 12.34/15ml; Susp., 120 mg/5 ml, Tk. 20.06/60ml; Tab., 500mg, Tk. 0.80/Tab.

Paracetamol 500 mg + Caffeine 65 mg
Ace (*Square*), Tab., Tk. 2.51/Tab.,
Acep (*Zenith*), Tab., Tk. 1.51/Tab.
Aceta (*Biopharma*), Tab, Tk. 2.50/Tab.
Asmol (*Sharif*), Tab., Tk. 1.51/Tab.
Atopen (*Kemiko*), Tab., Tk. 2.51/Tab.
Benalgin (*Benham*), Tab., Tk. 2.50/Tab.
Cafedon (*Healthcare*), Tab., Tk. 2.50/Tab.
Cafenol (*General*), Tab., Tk. 1.92/Tab.
Cafeta (*Nipa*), Tab., Tk. 2.50/Tab.
Caffo (*Somatec*), Tab., Tk. 1.90/Tab.
Caf-N (*Globex*), Tab., Tk. 1.00/Tab.
Caftyl (*One Pharma*), Tab., Tk. 1.91/Tab.
Capdol (*Novo Health*), Tab., Tk. 1.90/Tab.
Cetal (*Supreme*), Tab., Tk. 1.90/Tab.
Cetam (*Pacific*), Tab., Tk. 2.50/Tab.
DC-Plus (*Decent*), Tab., Tk. 2.00/Tab.
Duet (*Silva*), Tab., Tk. 2.25/Tab.
Enyl (*Euro*), Tab., Tk. 2.00/Tab.
Fap (*Beacon*), Tab., Tk. 1.92/Tab.
Fast (*Acme*), Tab., Tk. 1.91/Tab.
Fea Plus (*Navana*), Tab., Tk. 2.51/Tab.
Gesic (*Popular*), Tab., Tk. 1.51/Tab.
Hedex (*Orion*), Tab., Tk. 2.50/Tab.
Hepa (*Hudson*), Tab., Tk. 2.00/Tab.
K-Pol (*Modern*), Tab., Tk. 1.90/Tab.
Napa (*Beximco*), Tab., Tk. 2.50/Tab.
Neopara (*Bristol*), Tab., Tk. 1.50/Tab.
P+C (*Alco*), Tab., Tk. 1.91/Tab.
Pac (*Ibn Sina*), Tab., Tk. 2.50/Tab.
Pamix (*Ziska*), Tab., Tk. 2.50/Tab.
Panadol (*GSK*), Tab., Tk. 2.50/Tab
Panol (*Virgo*), Tab., Tk. 1.90/Tab.
Para-C (*Amico*), Tab., Tk. 1.90/Tab.
Paragesic (*SMC*), Tab., Tk. 2.50/Tab.
Pol (*Globe*), Tab., Tk. 2.00/Tab.
Pyra (*Renata*), Tab, Tk. 2.00/Tab.
Reliv (*Astra Bio*), Tab., Tk. 1.90/Tab.
Renova (*Opsonin*), Tab., Tk. 2.51/Tab.
Reset (*Incepta*), Tab., Tk. 2.50/Tab.
Tamen (*Eskayef*), Tab., Tk. 1.90/Tab.,
Tamino (*NIPRO JMI*), Tab., Tk. 1.51/Tab.
Temfin (*Organic*), Tab, Tk. 1.80/Tab.
Temol (*Team*), Tab., Tk. 2.40/Tab.
Tempol (*Asiatic*), Tab., Tk. 1.90/Tab.
Temrif (*Monico*), Tab., Tk. 1.50/Tab.
Timidal (*G.A.Co*), Tab., Tk. 2.01/Tab.
Xcel (*ACI*), Tab., Tk. 2.35/Tab.
Xpa-C (*Aristo*), Tab., Tk. 2.50/Tab.
Zerin-XP (*Jayson*), Tab., Tk. 1.9/Tab.

Paracetamol 325 mg + Tramadol 37.50 mg
Aceta (*Biopharma*), Tab., Tk. 8.00/Tab.
Acetram (*Square*), Tab., Tk. 8.03/Tab.

Atopen(Kemiko), Tab., Tk. 8.02/Tab.
Fapdol(Beacon), Tab., Tk. 8.00/Tab.
Fastdol(Acme), Tab., Tk. 8.03/Tab.
Fevedol(Drug Intl), Tab., Tk. 5.00/Tab.
Napadol(Beximco), Tab., Tk. 8.00/Tab.,
Paratadol(Euro), Tab., Tk. 8.00/Tab.
P-Dol(Popular), Tab., Tk. 5.00/Tab.
Resadol(Incepta), Tab., Tk. 8.03/Tab.
Syndol(Healthcare), Tab., Tk. 8.00/Tab.
Tamenol(Eskayef), Tab, Tk. 8.00/Tab.
Tempol-D(Asiatic), Tab., Tk. 8.00/Tab.
Tramatol(Somatec), Tab, Tk. 8.00/Tab.
Tramp(General), Tab., Tk. 6.02/Tab.
Utracet(UniMed), Tab, Tk. 8.00/Tab.
Xcel (ACI), Tab., Tk. 8.02/Tab.

7.5.2.2 ASPIRIN (ACETYSALICYLIC ACID)^[ED]

Because of its potent anti-inflammatory effect, it may also be used in many inflammatory diseases e.g. rheumatic fever, Aspirin causes significant gastric irritation. Its use (in low dose) is now more and more restricted to its antiplatelet action (see section 3.9). Dispersible aspirin tablets are adequate for most purposes as they act rapidly and are less irritant for the stomach.

Indications: Mild to moderate pain, pyrexia, inflammatory condition; used as an antiplatelet drug

Cautions: Asthma, peptic ulcer, gastric hyperacidity, renal and hepatic impairment, allergic conditions and pregnancy

Contra-indications: Children under 12 years and breast-feeding mothers are not to be given aspirin because it may cause Reye's syndrome; active peptic ulcer, haemophilia, known hypersensitivity to NSAIDs

Interactions: See Appendix-2

Side-effects: Gastric irritation, nausea, vomiting, heartburn, epigastric burning, gastro-intestinal bleeding, bronchospasm and precipitation of bronchial asthma, hypersensitivity

Dose: As analgesic antipyretic anti-inflammatory 300-900 mg every 4-6 hours when necessary; maximum 4 g daily; CHILD: Not recommended
 For antiplatelet activity, 75-300mg daily.
 Also see section. 3.9

Proprietary Preparations

Aciprin CV(ACI), Tab. 75mg, Tk.0.39/Tab.

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Asorin(Kemiko), Tab. 75 mg, Tk.0.50/Tab.
Aspirin(Albion), Tab. 300 mg, Tk.1.07/Tab.; 75 mg, Tk.0.50/Tab.
Caid(Jayson), Tab. 75 mg, Tk.0.50/Tab.
Carva(Square), Tab. 75 mg, Tk.0.57/Tab.
Disprin(Reckitt), Tab., 100 mg, Tk. 0.80/Tab.; 300 mg, Tk. 1.60/Tab.
Ecosprin (Acme), Tab. 150 mg, Tk.0.8/Tab.; 300 mg, Tk. 1.72/Tab.; 75 mg, Tk.0.58/Tab.
Encoprin(Medimet), Tab., 75mg, Tk.0.50/Tab
Erasprin(UniMed), Tab. 75 mg, Tk.0.57/Tab.
G-aspirin(Gonoshasthaya), Tab., 100 mg, Tk. 0.60 /Tab.; 300 mg, Tk. 0.30/Tab.
Mysprin(Pacific), Tab., 75 mg, Tk. 0.58/Tab.
Solrin(Opsonin), Tab., 75 mg, Tk. 0.63/Tab.

7.5.2.3 OTHER NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS) (See also section 9.1.1)

7.5.3 DRUGS USED IN NEURALGIC/ NEUROPATHIC PAIN

Neuralgic pain responds poorly to conventional non-opioid or opioid analgesics. They can sometimes be distressing and difficult to control with drugs and may require special measures like transcutaneous electrical nerve stimulation (TENS), nerve blocks or surgery. The neuralgic/neuropathic pain includes trigeminal neuralgia, brachial neuralgia (and other radicular pain), post-herpetic neuralgia, diabetic amyotrophy, atypical facial pain, pains from entrapment neuropathies, thalamic pain and phantom limb syndrome.

Carbamazepine is a frequently used drug for neurogenic pain. It is particularly effective in the treatment of trigeminal neuralgia, thalamic pain and sometimes in radicular pains. It is always started with a low dose and gradually increased to the required dose to prevent initial gastrointestinal and CNS Side-effects. Patients should be counselled about the possible hypersensitivity reaction that may occur usually within 7 days and may be fatal (causing Stevens Johnson syndrome) if not stopped immediately.

Amitriptyline is also a frequently used drug in this category. It has less short and long term Side-effects than carbamazepine but sometimes requires very high dose to be effective. It can

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sometimes be distressingly sedating and is particularly effective in post-herpetic neuralgia and often prescribed in other neurogenic pains along with carbamazepine.

Phenytoin, gabapentin and sodium valproate may also be used either alone or in combination with amitriptylin or carbamazepine.

AMITRIPTYLINE^[ED]

(See section 7.3 on Anti-depressant drug)

Dose: By mouth, initially 10-25 mg daily as a single dose in the evening; increased gradually as necessary to maximum 100mg/day in divided doses

Proprietary Preparations

See section 7.3

CARBAMAZEPINE^[ED]

(See section 7.6.1 on anti-epileptic drugs).

Proprietary Preparation

See section 7.6.1

7.5.4 DRUGS USED IN MIGRAINE

7.5.4.1 ACUTE MIGRAINE ATTACK

7.5.4.2 PROPHYLAXIS OF MIGRAINE

7.5.4.1 ACUTE MIGRAINE ATTACK

Treatment of acute attack of Migraine is symptomatic mostly with **analgesics** and **antiemetics**, and should be initiated as soon as the headache phase starts. Patients should also be instructed to rest in a dark and quiet room during this phase. Rarely in refractory cases, specific treatment such as the use of **Ergotamine** may be required.

Most Migraine headaches respond to simple analgesics such as paracetamol or aspirin (see section 7.5.2.1) but occasionally more potent NSAIDs e.g. Naproxen (see section 9.1.1) and Tolfenamic acid may be needed.

At the beginning of the headache phase of a migraine attack, the most frequently

used anti-emetic is **Prochlorperazine** though **Metoclopramide** is equally effective and has the added advantage of promoting gastric emptying and normal peristalsis which may be impaired in this condition. These may be used either by mouth or by intramuscular injection. **Domperidone** is a suitable alternative.

DOMPERIDONE

See also section 2.2

METOCLOPRAMIDE HCl^[ED]

See section 2.2

PROCHLORPERAZINE

(See also section 7.2)

Indications: Severe nausea, vomiting, vertigo irrespective of the aetiology; acute migraine attack

Cautions and Contra-indications: See under Chlorpromazine Hydrochloride in section 7.2

Interactions: See Appendix-2

Side-effects: See under Chlorpromazine Hydrochloride (see section 7.2); extrapyramidal symptoms may occur, particularly in children, elderly and debilitated

Dose: By mouth, 5-10 mg 1-3 times/day according to the requirement and response. CHILD: Not recommended. By deep intramuscular injection, 12.5 mg followed if necessary after 6 hours by oral dose, as above. CHILD: Not recommended

Proprietary Preparations

See Section 7.2.

TOLFENAMIC ACID

Indications : Acute attack of migraine

Cautions: History of asthma, bleeding disorders, peptic ulcer, hypertension

Contra-indications: Hepatic or renal impairment, elderly, pregnancy and breastfeeding

Side-effects: Dysuria in males, diarrhea, nausea, redness of the skin, headache, tremor, fatigue.

Dose: 200 mg when 1st symptoms appear, may be repeated once after 1-2 hour

Proprietary Preparations

Anilic(Drug Intl), Tab., 200 mg, Tk.8.00/Tab.
Arain(Opsonin), Tab., 200 mg, Tk.10.00/Tab.
Lograin(IbnSina), Tab., 200mg, Tk.10.00/Tab.
Migratol(Beacon), Tab., 200 mg, Tk.8.05/Tab.
Migrex(Incepta), Tab., 200mg, Tk.10.00/Tab.
Namitol(ACI), Tab., 200 mg, Tk.10.00/Tab.
Tolfi(Benham), Tab., 200 mg, Tk. 9.50/Tab.
Tolmic(Beximco), Tab., 200 mg, Tk.8.03/Tab.
Tufnil(Eskayef), Tab, 200 mg, Tk. 10.00/Tab.

5HT₁AGONIST

A 5HT₁ agonist may be used and is of value in the treatment of acute migraine attack and is preferred if the treatment is not responding to simple analgesic or NSAIDs. The 5HT₁ agonist (triptans) act on the 5HT₁ (serotonin) IB/ID receptors and they are therefore sometimes referred to as 5HT₁ receptor agonist.

The 5HT agonist available for treating migraine are **Almotriptan, Frovatriptan, Naratriptan, Rizatriptan, Sumatriptan, and Zolmitriptan**

Cautions: 5HT₁ agonist should be used with Cautions in conditions which predispose to coronary artery disease; hepatic impairment; pregnancy; and breast feeding. 5HT₁ agonist are recommended as monotherapy and should not be taken concurrently with other therapies for acute migraine. If intense chest and throat pain and tightness occur, treatment should be discontinued as it may be due to coronary vasoconstriction.

Contraindications: 5HT₁ agonists should not be used prophylactically and should not be administered to patients with basilar or hemiplegic migraine. They are contraindicated in uncontrolled or severe hypertension, ischemic heart disease, a history of myocardial infarction, coronary vasospasm (Prinzmetal angina), peripheral vascular disease.

Drowsiness may occur following treatment with 5HT₁ agonist so it may affect performance of skilled tasks e.g driving, operating machine etc.

7. CENTRAL NERVOUS SYSTEM

Side-effects: Most common side effects are dizziness, flushing, weakness, drowsiness, fatigue. Nausea and vomiting may occur. Pain and tingling sensation, heat, heaviness of any part of the body are also reported.

ALMOTRIPTAN

Indications: Acute Migraine

Contraindications: History of cardiovascular accident, TIA, Peripheral vascular disease, hepatic and renal insufficiency

Dose: At onset 12.5mg, 2hour after another 12.5mg. Maximum 25mg in 24 hours.

Proprietary Preparation

Almitan(Opsonin), Tab., 6.25 mg , Tk. 25.08/Tab.

Altrip(Nipro JMI) Tab., 6.25 mg , Tk. 25.08/Tab.

RIZATRIPTAN

Indications: Treatment of the headache phase of acute migraine attacks

Cautions: See notes above and under sumpatriptan

Contraindications: See notes above and under Sumpatriptan

Interactions: See Appendix-2

Side effects: See notes above and under sumpatriptan

Dose: By mouth Initially 10mg dose may be repeated after not less than 2 hours if migraine recurs; (patient not responding should not take second dose for same attack) max. 20mg in 24 hours

Proprietary Preparations

Rizamig(Healthcare), Tab., 5 mg, Tk. 35.50/Tab.

Rizat(Acme), Tab., 5 mg, Tk. 30.20/Tab.

SUMATRIPTAN

Indications: Treatment of acute

migraine attacks, cluster headache

Cautions: See notes above; renal impairment and hepatic impairment, history of epilepsy

7. CENTRAL NERVOUS SYSTEM

Contra-indications: See notes above; ischaemic heart attack, moderate and severe hypertension

Interactions: See Appendix-2

Side-effects: See notes above. drowsiness, transient increase in blood pressure, hypotension, bradycardia or tachycardia, visual disturbance, ischaemic colitis, Raynaud's syndrome altered liver function; seizures are reported; erythema at injection site

Dose: Initially 50mg (some patients may require 100mg) as soon as possible at onset (patient not responding should not take second dose for same attack); dose may be repeated after not less than 2 hours if migraine recurs; maximum 300mg in 24 hours CHILD and ADOLESCENT under 18 years: Not recommended.

Proprietary Preparation

Nomigran (Ambee), Tab., 100 mg, Tk. 90.35/Tab; 50 mg, Tk. 45.17/Tab

ZOLMITRIPTAN

Indications: Treatment of acute migraine attacks

Cautions: See notes above and under sumatriptan; should not be taken within 12 hours of any other 5HT₁ agonist

Contraindications: See notes above and under Sumpatriptan; Wolf-Parkinson-White syndrome or arrhythmias associated with accessory cardiac conduction pathways; previous cerebrovascular accident or transient ischaemic attack

Interactions: See Appendix-2

Side-effects: See notes above and under Sumpatriptan;

Dose: By mouth Initially 2.5 mg as soon as possible after onset; dose may be repeated after not less than 2 hours if migraine persists or recurs; (increase to 5mg for subsequent attacks in patients not achieving satisfactory relief with 2.5mg dose); maximum 10mg in 24 hours

CHILD: Not recommended

Proprietary Preparations

Miotrol (Drug Int), Tab., 2.5 mg, Tk. 15.05/Tab.

Nomi (Square), Tab., 2.5 mg, Tk. 25.17/Tab.

Zomitan (Incepta), Tab., 2.5 mg, Tk. 25/Tab.

7.5.4.2 PROPHYLAXIS OF MIGRAINE

Preventive treatment is not necessary for many migraine patients. Those who require it should be carefully chosen. An elaborate search to find out relevant common migraine precipitants e.g. excess physical or mental stress, sleep or food deprivation, certain food or drink that precipitate an attack etc. and the patient is asked to avoid these as far as possible. If the attacks are still too frequent or severe or prolonged enough to impair one's lifestyle, it is generally advisable to start a prophylactic drug. The commonly used drugs are **Sodium Valproate**, **Propranolol** and **Amitriptyline**. Other possible useful drugs are **Pizotifen**, some beta-blockers e.g. **(Metoprolol, Nadolol, Timolol)**, **Tricyclic antidepressants (Nortriptyline, Imipramine)** and calcium channel blockers (e.g. **Verapamil**).

Sodium valproate (see section 7.6.1) may be effective in a dose of 300-600 mg/day in 2 divided doses. It can be a very effective migraine prophylactic drug but has been associated with severe hepatic and pancreatic toxicity, although such effects are rare. It should not be prescribed in young females of childbearing age (many migraine patients are) because of its potential teratotoxicity. However, it is still possibly the best prophylactic drug for migraine in adult males.

Propranolol is the most commonly used beta-blocker for migraine and can be quite effective when given in a dose of 80-160 mg/day in 2-3 divided doses. The value of beta-blockers is limited by their Contraindications (see section 3.1).

Amitriptyline (see section 7.3) may be useful even when there is no evidence of depression. It is started with a dose of 10 mg at night, increasing to a maintenance dose of 50-75 mg at night.

Pizotifen is an antihistamine and serotonin antagonist. It is indicated in prophylactic treatment of migraine

probably after sodium valproate, propranolol and amitriptyline have failed though it is said to be very much effective in children. Occasionally its use is limited by its Side-effects of excess drowsiness and weight gain.

PIZOTIFEN

Indications: Prevention of vascular headache including migraine with or without aura and cluster headache

Cautions: Urinary retention; closed angle glaucoma, renal impairment; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Drowsiness, increased appetite and weight gain; nausea, dizziness; hyperactivity in children

Dose: 1.5 mg at night or 0.5 mg 3 times daily, adjusted according to response within the usual range 0.5-3 mg daily; maximum single dose 3 mg, maximum daily dose 4.5 mg; CHILD up to 1.5 mg daily in divided doses; maximum single dose at night 1 mg

Proprietary Preparations

Antigrain(Ibn Sina), Tab., 0.5mg, Tk. 3.25/Tab.

D-Fen(Drug Intl), Tab., 0.5mg, Tk. 3.05/Tab., 1.5mg, Tk. 5.05/Tab.

Migranil(Square), Tab., 0.5 mg, Tk. 3.01/Tab., 1.5 mg, Tk. 7.04/Tab.

Pifen(Opsonin), Tab., 0.5 mg, Tk. 3.01/Tab., 1.5 mg, Tk. 7.03/Tab.

Pigrain(Supreme), Tab., 1.5mg, Tk. 7.00/Tab., 0.5mg, Tk. 3.00/Tab.

Pizo-A(Acme), Tab., 0.5mg, Tk. 3.01/Tab., 1.5 mg, Tk. 7.04/Tab.

Pizofen(Navana), Tab., 0.5 mg, Tk. 3.01/Tab.

Pizofen TS(Navana), Tab., 1.5 mg, Tk. 7.02/Tab.

Pizotin(Nipa), Tab., 1.5 mg, Tk. 7.00/Tab., 0.5 mg, Tk. 3.00/Tab.

Zeromig(Eskayef), Tab, 0.5mg, Tk. 3.00/Tab., 1.5mg, Tk. 7.00/Tab.

Zofen(Aristo), Tab., 1.5mg, Tk. 7.20/Tab., 0.5mg, Tk. 3.00/Tab.

7.6 ANTI-EPILEPTIC DRUGS

7.6.1 CONTROL OF EPILEPSY

7.6.2 STATUS EPILEPTICUS

7.6.1 CONTROL OF EPILEPSY

7. CENTRAL NERVOUS SYSTEM

Once the diagnosis of epilepsy is made, it is crucial to decide the correct choice of anticonvulsant.

IDIOPATHIC GENERALISED EPILEPSY: The drugs of choice for all types of IGEs are **Sodium Valproate**, **Phenobarbitone**, **Phenytoin** and **Lamotrigine**.

ABSENCE EPILEPSY (Petit Mal): **Ethosuximide** and **Sodium Valproate** are the drugs of choice, and both are about equally effective.

MYOCLONIC EPILEPSY: **Clonazepam** is considered second best choice after **sodium valproate**.

LOCALISATION RELATED EPILEPSY: **Carbamazepine**, **Sodium Valproate**, **Phenobarbitone**, **Phenytoin** and **Lamotrigine** are the drugs of choice for secondary (partial) epilepsy. Second line drugs include **Clonazepam** and **Clobazam**. **Gabapentine**, **Vigabatrin** and **Topiramate** are used as adjunct therapy where control is difficult to obtain.

Levetiracetam is also used in partial seizures, or as an adjunctive therapy for partial, myoclonic and tonic clonic seizures.

Fosphenytoin is a pro drug. It can be administered through IM/IV

CARBAMAZEPINE^[E]

Indications: Partial and secondary generalized seizure, alcohol withdrawal seizure, prophylaxis of manic depressive illness, trigeminal neuralgia, other forms of neuralgic pains

Cautions: Pregnancy; hepatic or renal impairment; cardiac disease; skin reactions to other drugs; breast-feeding; avoid sudden withdrawal

Contra-indications: Hypersensitivity, history of bone marrow depression, AV conduction abnormalities

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, headache, drowsiness, diplopia, ataxia, dizziness, blurred vision, dry mouth, Stevens-Johnson-Syndrome, leucopenia and other blood disorders.

7. CENTRAL NERVOUS SYSTEM

Other Side-effects include cholestatic jaundice, hepatitis and acute renal failure.

Dose: Epilepsy in ELDERLY, initially 100-200 mg 2 times daily, increased slowly to usual dose of 0.8-1.2 g daily in divided doses, in some cases, 1.6-2 g daily may be needed. CHILD up to 1 year of age 100-200 mg daily in divided doses; 1-5 years, 200-400 mg; 5-10 years, 400-600 mg; 10-15 years, 0.6-1 g Prophylaxis of Manic Depressive Illness (bipolar disorder) unresponsive to lithium therapy, initially 400 mg daily in divided doses increased until symptoms controlled; usual range 400-600 mg daily maximum 1.6 g daily

Proprietary Preparations

Anleptic(*Square*), Tab., 200 mg, Tk. 6.02/Tab.; Susp., 100 mg/5 ml, Tk. 300.9/100ml
Carbazine(*Eskayef*), Tab, 200 mg, Tk. 4.00/Tab.; CR Tab, 200 mg, Tk. 4.50/Tab.
Carmapine(*Incepta*), Susp., 100mg/5 ml, Tk. 250.00/100ml.; Tab., 200 mg, Tk. 4.00/Tab.; CR Tab., 200 mg, Tk.5.00/Tab.
Cazep(*Opsonin*), Tab., 200 mg, Tk. 4.02/Tab.
Cepilep(*ACI*), Tab., 200mg, Tk. 4.03/Tab.
Epilep(*Beximco*), CRTab., 200mg, Tk. 4.52/Tab.; Tab. 200mg, Tk. 3.51/Tab.
Tegretol(*Novartis*), Syrup, 100 mg/5 ml, Tk. 379.00/100ml.; Tab., 200 mg, Tk. 9.03/Tab.; CR Tab. 200 mg, Tk. 9.53/Tab.

CLONAZEPAM

Indications: Most clinical forms of epilepsy in infants and children, specially partial seizures and absence seizures as an adjunctive therapy; panic and phobic disorders; anticipatory anxiety associated with alprazolam treatment; myoclonus; status epilepticus (see section 7.6.2)

Contraindications: Respiratory depression; acute pulmonary insufficiency; alcohol intoxication

Cautions: Respiratory, renal and hepatic diseases; those receiving barbiturates; elderly, pregnancy and breast-feeding (mothers undergoing treatment should not breast feed); has been associated with the emergence of depression; avoid sudden withdrawal

Interactions: See Appendix-2

Side-effects: Drowsiness, ataxia is dose related which usually subsides within 3 to 4 days; paradoxical behavioural changes like hyperactivity, irritability and aggressiveness

Dose: Initially 1 mg (half in elderly) at night for 4 nights, increased over 2-4 weeks to a maintenance dose of 4-8 mg daily in divided doses; doses must be individually adjusted according to clinical response. CHILD, up to 1 year 250 micrograms increased as above to 0.5-1 mg, 1-5 years 250 micrograms increased up to 1-3 mg, 5-12 years 500 micrograms increased up to 3-6 mg
OVERDOSE: Specific benzodiazepine antagonist Flumazenil may be used in severe cases. Supervision of other vital function with supportive measure is necessary

Proprietary Preparations

Arotril(*Aristo*), Tab., 1 mg, Tk. 8.00/Tab.; 0.5mg, Tk. 6.00/Tab.; 2mg, Tk. 10.00/Tab.
Cloma(*Biopharma*), Tab., 0.500mg, Tk. 4.00/Tab.; 2.00mg, Tk. 6.00/Tab.
Clon(*Globe*), Tab., 0.5 mg, Tk. 4.50/Tab.; 2 mg, Tk. 7.00/Tab.
Clonaben(*Benham*), Tab., 0.5 mg, Tk. 5.00/Tab.; 2 mg, Tk. 7.00/Tab.
Clonapin(*Popular*), Tab., 0.500mg, Tk. 3.00/Tab.; 1.00mg, Tk. 8.00/Tab.
Clonatrill(*Healthcare*), Tab., 0.5mg, Tk. 6.00/Tab.; 1mg, Tk. 8.00/Tab.; 2mg, Tk. 10.00/Tab.
Clonazepam(*Amico*), Tab., 0.5mg, Tk. 3.00/Tab.; 2mg, Tk. 5.00/Tab.
Clonium(*ACI*), Tab., 0.5mg, Tk. 6.00/Tab.; 1mg, Tk. 8.00/Tab.; 2mg, Tk. 10.00/Tab.; Paed. drops, 2.5mg/ml, Tk. 130.88/10ml
Clopam(*Sharif*), Tab., 0.5 mg, Tk. 3.01/Tab.; 2 mg, Tk. 5.01/Tab.
Cloron(*Eskayef*), Paed. drops, 2.5 mg/ml, Tk. 80.00/10ml.; Tab. 0.5mg, Tk. 6.00/Tab.; 1mg, Tk. 8.00/Tab.; 2mg, Tk. 10.00/Tab.
Conpan(*Navana*), Tab., 0.5 mg, Tk. 5.80/Tab.; 2mg, Tk. 9.00/Tab.
Denixil(*Renata*), Tab., 0.5mg, Tk. 6.00/Tab.
Disopan(*Incepta*), Tab., 0.5 mg, Tk. 6.00/Tab.; 1 mg, Tk. 8.00/Tab.; 2 mg, Tk. 10.00/Tab. Inj., 1mg/ml, Tk. 150/Amp
Epiclone(*General*), Tab., 0.5mg, Tk. 6.00/Tab.; 1mg, Tk. 8.00/Tab.; 2mg, Tk. 10.00/Tab.
Epitra(*Square*), Tab., 0.5 mg, Tk. 6.00/Tab.; 1 mg, Tk. 8.00/Tab.; 2 mg, Tk. 10.00/Tab.
Epizam(*Alco*), Tab., Tk. 4.00/Tab.; Tk. 6.00/Tab.
Esypan(*Silva*), Tab., 0.5 mg, Tk. 2.01/Tab.; 2 mg, Tk. 4.02/Tab.

7. CENTRAL NERVOUS SYSTEM

Leptic(Acme), Tab, 0.50 mg., Tk. 5.50/Tab.; 1.00 mg., Tk. 8.00/Tab.; 2.00 mg., Tk. 8.50/Tab.

Myotril(Ibn Sina), Tab., 0.5mg, Tk. 5.00/Tab.

Pandura(NIPRO JMI), Tab., 2mg, Tk.

10.00/Tab.; 0.50mg, Tk. 6.00/Tab.; 1mg, Tk. 8.00/Tab.

Pase(Opsonin), Tab., 1 mg , Tk. 6.00/Tab.; 2 mg , Tk. 7.00/Tab.; 500 mcg , Tk. 5.00/Tab.; Paed. drops, 2.5mg/ml, Tk. 80.30/10 ml.;

Rivo(Orion), Tab. , 0.5 mg, Tk. 4.00/Tab.; 2 mg, Tk. 6.00/Tab.

Rivotril(Radiant), Tab., 0.5mg, Tk. 8.00/Tab.; 2mg , Tk. 13.00/Tab.

Sypam(Asiatic), Tab., 0.5mg , Tk. 6.00/Tab.; 2.00mg , Tk. 10.00/Tab.

Xetрил(Beximco), Tab., 0.5mg, Tk. 6.00/Tab.; 2mg, Tk. 8.00/Tab.

Xioclon(Somatec), Tab., 0.5 mg, Tk. 5.00/Tab.; 1 mg, Tk. 6.00/Tab.; 2 mg, Tk. 7.00/Tab.

ESLICARBAZEPINE(Cerbamazepine related drug)

Indications: Used as add-on therapy in partial or generalized seizure

Dose: ADULT;400 mg once daily which should be increased to 800 mg once daily after one or two weeks. Based on individual response the dose may be increased to 1200 mg once daily

Proprietary Preparation

Eslicar(Square), Tab. , 400 mg, Tk. 35.11/Tab.

ETHOSUXIMIDE

Indications: Drugs of choice in absence seizure

Cautions: Hepatic & renal impairment

Side-effects: GI disturbances, dizziness, hypersensitivity

Dose: 3-6 years : 250mg>6yr : 500mg

Proprietary Preparations

Serontin(ACI), Syrup, 5mg/100ml, Tk.130.39/70ml

GABAPENTIN

Indications: Adjunctive treatment of partial seizures with or without secondary generalization not satisfactorily controlled with other antiepileptics, neuropathic pain

Cautions: Avoid sudden withdrawal (taper off over at least 1 week); history of psychotic illness, elderly (may need to reduce dose), renal impairment, diabetes mellitus, false positive readings with some urinary protein tests, pregnancy

Interactions: See Appendix-2

Side-effects: Drowsiness, dizziness, ataxia, fatigue, tremor, diplopia, amnesia, asthenia, paraesthesia, arthralgia, purpura, leucopenia rhinitis, urinary incontinence,

Dose: Epilepsy, 300mg on day 1, then 300mg twice daily on day 2, then 300mg 3 times daily (approx. every 8 hours) on day 3, then increased according to response in steps of 300mg daily (in 3 divided doses) to maximum 2.4g daily, usual range 0.9-1.2 g daily; CHILD: 6-12 years (under specialist guidance) 10mg/kg on day 1, then 20mg/kg on day 2, then 25-35mg/kg daily (in divided doses approx. every 8 hours) maintenance 900 mg daily (body-weight 26-36Kg) or 1.2g daily (body-weight 37-50 kg)

For neuropathic pain, 300 mg on day 1, 300mg twice daily on day 2, 300mg 3 times daily on day 3, then increased according to response in steps of 300mg daily (in 3 divided doses) to maximum 1.8g daily.

Proprietary Preparations

Gaba(Renata), Tab., 300 mg, Tk. 16.07/Tab.; 300 mg, Tk. 30.11/Tab.

Gabamax(Beacon), Tab., 300 mg, Tk. 16.11/Tab.

Gabapen(Incepta), Tab., 300 mg, Tk. 16.00/Tab.; 300 mg, Tk. 6.00/Tab.

Gabastar(Square), Tab., 300 mg, Tk. 6.04/Tab.; 300 mg, Tk. 16.11/Tab.

Gabatin(UniMed), Tab, 300 mg, Tk. 15.00/Tab.

Gabon(Acme), Tab., 300 mg, Tk. 16.04/Tab.

Gpentin(Opsonin), Tab., 300 mg, Tk. 16.06/Tab.

Nepsy(Eskayef), Tab, 300 mg, Tk. 16.00/Tab.

Neuropen(Drug Intl), Tab., 300 mg, Tk. 16.05/Tab.

LAMOTRIGINE

Indications: Monotherapy and adjunctive treatment of partial seizures and primary and secondary generalized

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tonic-clonic seizures; Lennox-Gestaut Syndrome associated seizures

Cautions: Closely monitor hepatic, renal and clotting parameters and consider withdrawal if rash, fever, influenza-like symptoms, drowsiness, or worsening of seizure control develops; avoid abrupt withdrawal; elderly, pregnancy and breast-feeding

Contraindications: Hepatic impairment

Interactions: See Appendix-2

Side-effects: Skin rashes, influenzalike symptoms, drowsiness lymphadenopathy, leucopenia and thrombocytopenia, angioedema, photosensitivity, blurred vision, ataxia, aggression, tremor, confusion;

Dose: Monotherapy, initially 25 mg daily for 14 days, increased to 50 mg daily for further 14 days, then increased by maximum of 50-100 mg every 7-14 days; usual maintenance with 100-200 mg daily in 2-3 divided doses (up to maximum 500 mg daily)

Adjunctive therapy with Valproate: Initially 25 mg every other day for 14 days then 25 mg daily for further 14 days, thereafter increased by maximum of 25-50 mg every 7-14 days; usual maintenance with 100-200 mg daily in 1-2 divided doses

Adjunctive therapy without Valproate: Initially 50 mg daily for 14 days then 50 mg twice daily for further 14 days, thereafter increased by maximum of 100 mg every 7-14 days; usual maintenance with 200-400 mg daily in 2 divided doses (up to 700 mg daily may be required)

CHILD under 12 years: Monotherapy not recommended; adjunct therapy with Valproate: initially 150 micrograms/kg daily for 14 days then 300 microgram/kg daily for further 14 days, thereafter increased by 300 microgram/kg every 7-14 days; usual maintenance with 1-5 mg/kg daily in 1-2 divided doses. CHILD under 12 years, adjunct therapy without Valproate, initially 600 microgram/kg daily in 2 divided doses for 14 days then 1.2 mg/kg daily in 2 divided doses for further 14 days, thereafter increased by maximum of 1.2 mg/kg every 7-14 days; usual maintenance with 5-15 mg/kg daily in 2 divided doses

Proprietary Preparations

Lamictal (Square), Tab., 50 mg, Tk. 20.00/Tab.

Lamitrin (ACI), Tab., 25mg, Tk. 10.07/Tab. ; 50mg, Tk. 18.05/Tab.

Lamogin (Incepta), Tab., 25 mg, Tk. 10.00/Tab.; 50 mg, Tk. 18.00/Tab.

Lameptil (Novartis) Tab., 25mg, Tk. 12.00, Tab. , 50 mg, Tk. 20.00/Tab.

LEVETIRACETAM

(Piracetam analog)

Indications: Partial seizures, or as adjunctive therapy for partial, myoclonic and tonic clonic seizures.

Cautions: Should not be discontinued suddenly because of the risk of increased seizure activity, patients who are started on therapy should be closely observed for clinical worsening, suicidal thoughts, or unusual changes

Interactions: See Appendix-2

Side-effects: Headache, sleepiness, dizziness, and difficulty walking or moving, ataxia.

Dose: Monotherapy of focal seizures, by mouth or by intravenous infusion, ADULT and CHILD over 16 years: initially 250 mg once daily

Adjunctive therapy of focal seizures, by mouth, ADULT and CHILD over 12 years, body-weight over 50 kg, initially 250 mg twice daily, increase to maximum 1000 mg daily.

CHILD over 6 months, body-weight under 50 kg, initially 10 mg/kg once daily, increased by max. 10 mg/kg twice daily every 2 weeks

Proprietary Preparations

Citazar (ACI), Tab., 250mg, Tk. 15.11/Tab. ; 500mg, Tk. 25.17/Tab.

Eletam (UniMed), Tab., 250mg, Tk. 16.00/Tab.; 500mg, Tk. 30.00/Tab.; Susp., 100mg/5ml, Tk. 400.00/100ml

Erata (Novartis), Tab., 250 mg , Tk. 16.25/Tab.; Tab., 500 mg , Tk. 30.50/Tab.

Iracet (Square), Susp., 100mg/ml, Tk. 200.61/50ml.; Tab. , 250 mg, Tk. 16.00/Tab. ; 500 mg, Tk. 30.00/Tab.; Inj., 500 mg/5 ml, Tk. 40.13/5ml Amp

Leveron (Sanofi), Tab., 250mg, Tk. 16.05/Tab.; 500mg, Tk. 30.09/Tab.; Susp., 100mg/ml, Tk. 400.00/100ml.

Neurocet(Incepta), Tab., 250 mg, Tk. 15.00/Tab.; 500 mg, Tk. 25.00/Tab.

OXCARBAMAZEPINE

Indications: In partial generalized epilepsy

Contra-indications: Hypersensitivity reaction

Side-effects: Dizziness, somnolence
Dose: 600-2400mg/ day in two divided doses

Preparations: Oxetol (Sun), tab 150/300mg

Proprietary Preparations

Leptal(Healthcare), Tab., 300 mg , Tk. 18.00/Tab., 600 mg , Tk. 30.00/Tab.

Trileptal(Novartis), Tab. , 300 mg, Tk. 20.06/Tab., Susp., 60 mg/ml, Tk. 1072.00/100 ml., Tab. , 600 mg, Tk. 35.11/Tab.

PHENYTOIN^[ED]

Indications: All forms of epilepsy except absence seizures; trigeminal neuralgia as an alternative to carbamazepine

Cautions: Hepatic impairment, pregnancy, breast-feeding; avoid sudden withdrawal

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, mental confusion, tremor, insomnia, peripheral neuropathy, ataxia, slurred speech, nystagmus, gingival hypertrophy, coarse facies, acne and hirsutism, lupus erythematosus, hypocalcaemia, Stevens-Johnson syndrome; haematological effects including megaloblastic anaemia, leucopenia, thrombocytopenia, agranulocytosis, and aplastic anaemia;

Dose: By mouth, initially 100 mg/day, increased gradually as necessary; usual dose 200-500 mg daily. CHILD initially 5 mg/kg daily in 2 divided doses, usual dose range 4-8 mg/kg daily (max. 300 mg). by intravenous injection-see section 7.6.2 on status epilepticus.

Proprietary Preparations

D-Toin(Drug Intl), Tab., 100mg, Tk. 3.00/Tab.

Sizatoin(Incepta), Tab., 100mg, Tk. 4.00/Tab.

Xentoin(Beacon), Tab., 100mg, Tk. 4.01/Tab.

7. CENTRAL NERVOUS SYSTEM

FOSPHENYTOIN

When only parenteral administration is possible, fosphenytoin (section 4.8.2), a pro-drug of phenytoin, may be convenient to give. Unlike phenytoin (which should only be given intravenously), fosphenytoin may also be given by intramuscular injection.

Proprietary Preparations

Fosfen(Popular), Inj., 150mg/2ml, Tk. 70.26/Amp

PREGABALIN

Indications: As an adjunct treatment in partial & generalized tonic clonic seizures, neuropathic pain associated with diabetic peripheral neuropathy and in combination with other drugs to treat partial onset seizures in adults.

Cautions: Neuropathic painrenal impairment, pregnancy, breast-feeding; avoid sudden withdrawal

Side-effects: Somnolence, ataxia, dry mouth, constipation, vomiting, flatulence, oedema, dizziness, drowsiness, confusion, malaise, appetite changes, insomnia, sexual dysfunction, blurred vision,

Dose: Neuropathic pain, ADULT over 18 years, initially 150 mg daily in 2-3 divided doses, ADULT over 18 years, initially 25mg twice daily; consult product literature

Proprietary Preparations

Asibalin(Asiatic), Cap., 50mg , Tk. 12.00/Cap., 75mg , Tk. 16.00/cap.

Gaba(Renata), Cap., 25 mg, Tk. 8.00/Cap., 50 mg, Tk. 12.00/Cap.; 75 mg, Tk. 16.07/Cap.

Gabamet(Somatec), Cap., 75 mg, Tk. 16.00/Cap., 50 mg, Tk. 12.00/Cap., 25 mg, Tk. 8.00/Cap.

Gabarol(ACI), Cap., 150mg, Tk. 34.00/ Cap., 25mg, Tk. 8.02/Cap., 75mg, Tk. 16.11/ Cap., 100mg, Tk. 22.15/ Cap., 50mg, Tk. 12.04/Cap.

Lirica(Biopharma), Cap., 25mg, Tk. 7.00/Cap., 50mg, Tk. 13.00/Cap., 75mg, Tk. 16.00/Cap.

Lyric(Healthcare), Cap. , 150mg ,Tk. 30.00/Cap., 25mg, Tk. 160.00/Cap., 75mg , Tk. 540.00/Cap., 50mg , Tk. 420.00/Ca.

7. CENTRAL NERVOUS SYSTEM

Lyrinex(NIPRO JMI), Cap., 50 mg, Tk. 12.00/Cap.; 75 mg, Tk. 16.00/Cap.
Myrica(UniMed), Cap., 50mg, Tk. 28.00/Cap., 100mg, Tk. 20.00/Cap., 75mg, Tk. 16.00/Cap.
Nepco(Pacific), Cap. , 150 mg, Tk. 35.00/Cap. , 100 mg, Tk. 22.00/cap. , 25 mg, Tk. 10.00/Cap., 50 mg, Tk. 14.00/Cap., 75 mg, Tk. 19.00/Cap.
Nervalin(Beximco), Cap., 25mg, Tk. 8.00/cap., 50mg, Tk. 11.00/Cap., 75mg, Tk. 16.00/Cap., 150.00 mg, Tk. 30.10/Cap.
Neugalin(Acme), Cap. , 25.00 mg, Tk. 8.00/Cap., 50 mg, Tk. 11.03/Cap., 75 mg, Tk. 16.04/Cap.
Neurega(Ibn Sina), Cap. , 25mg, Tk. 8.00/Cap., 50mg, Tk. 13.00/Cap., 75mg, Tk. 340.00/Cap., 100mg, Tk. 2.64/Cap.
Neurica(Globe), Cap., 75 mg, Tk. 16.00/Cap., 50 mg, Tk. 12.00/Cap
Neurolin(Square), Cap. , 25 mg, Tk.8.03/Cap., 50 mg, Tk.12.03/Cap., 75 mg, Tk.16.05/Cap.
Neurovan(Aristo), Cap. , 50mg , Tk. 12.00/Cap., 75mg , Tk. 16.00/Cap., 25mg , Tk. 8.00/Cap.
Pegalin(Popular), Cap. , 100mg, Tk. 22.08/Cap., 25mg, Tk. 8.00/Cap., 75 mg, Tk. 16.06/Cap., 50mg , Tk. 12.00/Cap., 150mg, Tk. 30.11/Cap.
Pegamax(Astra Bio), Cap. , 50 mg, Tk. 11.00/Cap., 75 mg, Tk. 16.00/Cap.
PG(Eskayef), Cap. , 150mg , Tk. 30.00/Cap., 25mg , Tk. 8.00/Cap., 75mg, Tk. 16.00/Cap., 25mg , Tk. 8.00/Cap., 50 mg, Tk. 11.00/Cap.,
Prebalin(General), Cap. , 25mg, Tk. 8.00/Cap., 50mg, Tk. 12.04/Cap., 150mg, Tk. 30.20/Cap., 75mg, Tk. 16.11/Cap.
Pregaba(Opsonin), Cap. , 150 mg , Tk. 30.20/Cap., 25 mg , Tk. 8.03/Cap., 50 mg , Tk. 12.09/Cap., 75 mg , Tk. 16.06/Cap.
Pregaben(Incepta), Cap. , 150 mg, Tk. 30.00/Cap., 75 mg, Tk. 16.00/Cap., 25 mg, Tk. 8.00/Cap., 50 mg, Tk. 12.00/Cap.
Pregalex(Sharif), Cap. , 50 mg, Tk. 11.03/Cap., 75 mg, Tk. 16.04/Cap., 150 mg, Tk. 30.10/Cap.
Pregan(Navana), Cap., 50 mg, Tk. 11.03/Cap.; 75 mg, Tk. 16.05/Cap.
Prelica(Radiant), Cap. , 50mg , Tk. 14.54/Cap., 75mg , Tk. 19.06/Cap., 150mg , Tk. 35.11/Cap., 25mg , Tk. 10.03/Cap.
Prelin(Drug Intl), Cap., 25mg, Tk. 8.05/Cap., 50mg, Tk. 11.05/Cap., 150mg, Tk. 30.10/Cap., 75mg, Tk. 16.05/Cap.
Pretor(Sanofi), Cap. , 50mg, Tk. 12.04/Cap., 75mg, Tk. 16.05/Cap.
Priga(Monico), Cap., 75mg, Tk. 16.00/Cap.
Regab(Beacon), Cap., 25mg , Tk. 8.02/Cap., 50mg , Tk. 12.04/Cap., 75mg , Tk. 16.05/Cap.
Vaxar(Nuvista), Cap., 50 mg, Tk. 12.00/Cap., 25 mg, Tk. 8.00/Cap., 75 mg, Tk. 16.00/Cap.,

Xil(Orion), Cap., 75 mg, Tk. 16.05/Cap., 50 mg, Tk. 12.04/Cap.

SODIUM VALPORATE^[ED]/ VALPROIC ACID

Indications: All forms of epilepsy, also bipolar disorder and migraine prophylaxis

Cautions: Monitor liver functions before and 6 months after initiation of therapy (especially in children under 3 years of age where there has been reports of fatal hepatic failure); undue potential for bleeding; renal impairment; breast feeding; SLE; avoid sudden withdrawal

Contraindications: Active liver disease, family history of severe hepatic dysfunction, pregnancy and child bearing women

Interactions: Inhibit metabolism of other antiepileptic drugs, *See Appendix-2*

Side-effects: Gastric irritation, ataxia and tremor, weight gain; transient hair loss, oedema, leucopenia, pancytopenia, amenorrhoea, gynaecomastia, toxic epidermal necrolysis, hearing loss, vasculitis, Stevens-Johnson syndrome, Idiosyncratic thrombocytopenia, hepatotoxicity

Dose: Initially 400 mg daily in 2 divided doses, preferably after food, increased by 200 mg at 3 day intervals to a max. of 2g daily in divided doses; usual maintenance dose 800-1600 mg daily. CHILD up to 20 kg, initially 10 mg/kg daily in divided doses, may be increase to 20 mg/kg (further increase requires regular plasma concentration monitoring); over 20 kg, initially 400 mg daily in 2 divided doses, increase until control (usually in range of 20-30 mg/kg/day); max. 35 mg/kg/day

Proprietary Preparations

Encorate(Sun), ECTab., 200mg Tk. 3.00/Tab.
Epilim(Sanofi), Syrup, 40mg/ml, Tk. 80.54/100ml., Tab., 200 mg, Tk. 5.02/Tab., 300 mg, Tk. 8.02/Tab.
Epival(Albion), Tab. , 200 mg, Tk. 3.00/Tab.
Nalipsy(Drug Intl), Tab., 200mg, Tk. 3.00/Tab.
Proval(General), Tab. , 200mg, Tk. 2.52/Tab., Syrup, 200 mg/5 ml, Tk. 75.51/100ml;

Sodival(ACI), Tab., 200mg , Tk. 2.52/Tab., 300 mg, Tk. 6.02/Tab Syrup, 200 mg/5 ml, Tk. 80.24/100ml;
Valex(Incepta), Tab. 200 mg , Tk. 3.00/Tab., Syrup, 200 mg/5 ml, Tk. 80.00/100ml;
Valoate(Square), CR Tab. , 500 mg, Tk. 12.03/Tab., 200 mg, Tk. 5.02/Tab., , CR.300 mg, Tk. 8.03/Tab. Syrup, 200 mg/5 ml, Tk. 100.3/100ml

Sodium Valporate and valporic acid

ConvulesCR(Opsonin), Tab. , 200 mg, Tk. 4.02/Tab., CR Tab., 300 mg, Tk. 10.07/Tab., 300 mg, Tk. 6.04/Tab., Syrup 200 mg/5 ml, Tk. 75.28/ 100 ml

Encorate chrono(Sun), Tab. , 200 mg, Tk. 4.50/Tab.; 300 mg, Tk. 7.00/Tab.; 500 mg, Tk. 11.00/Tab.

Epilim(Sanofi), Tab., 200 mg, Tk. 5.02/Tab., 300 mg, Tk. 8.02/Tab. , 500 mg, Tk. 12.04/Tab.

Epival Chrono(Albion), CR Tab. , 200 mg, Tk. 4.50/Tab. ; Tab. , 300 mg, Tk. 7.00/Tab. ;Tab. , 500 mg, Tk. 11.00/Tab.

ProvalCR(General), CRTab. 300 mg, Tk. 8.00/Tab., 500 mg, Tk. 12.00/Tab., 200 mg, Tk. 5.00/Tab.,

SodivalCR(ACI), CR Tab., 200 mg, Tk.

4.01/Tab., 300 mg, Tk. 10.03/Tab.,

ValexCR(Incepta), CR Tab. , 500 mg, Tk. 11.00/Tab., CR 300 mg, Tk. 7.00/Tab., 200 mg , Tk. 4.50/Tab., Syrup, 200 mg/5 ml, Tk. 80.00/100ml;

TOPIRAMATE

Indications: Adjunctive therapy for partial seizures (LRE); seizures associated with Lennox-Gastaut syndrome; idiopathic GTCS; absence seizure, migraine headache, infantile spasm

Cautions: Avoid abrupt withdrawal; ensure adequate hydration; pregnancy; hepatic or renal impairment

Contraindications: Breast-feeding

Interactions: See Appendix-2

Side-effects: Myopia glaucoma, nausea, anorexia, abdominal pain, weight loss; confusion, impaired speech, depression, ataxia, paraesthesia, fatigue, asthenia, visual disturbances leucopenia

Dose: Initially 25 mg daily for 1 week then increased in steps of 25-50 mg daily at intervals of 1-2 weeks in 2 divided doses; max. 800mg daily. CHILD 2-16 years, initially 25 mg at night for one week then increased in steps of 1-3 mg/kg daily according to response at

7. CENTRAL NERVOUS SYSTEM

intervals of 1-2 weeks and taken in 2 divided doses; recommended dose range 5-9 mg/kg daily in 2 divided doses

Proprietary Preparations

Etopira(UniMed), Tab., 25 mg, Tk. 5.00/Tab.; 50 mg, Tk.10.00/Tab.

Piramed(Square), Tab., 200 mg, Tk. 15.05/Tab.; 25 mg, Tk. 3.01/Tab.

Topirva(Incepta), Tab., 25 mg, Tk.

3.00/Tab.; 50 mg, Tk. 5.00/Tab.

Topmate(Renata), Tab., 25 mg, Tk.

4.00/Tab.; 50 mg, Tk. 6.00/Tab.

7.6.2 STATUS EPILEPTICUS

DIAZEPAM^[ED] [CD]

(See also section 7.1)

Indications: Status epilepticus; convulsions due to poisoning; for other Indicationsee section 7.1

Cautions: Intravenous diazepam is potentially hazardous, calling for close and constant observation and best carried out with ICU facilities in a hospitalsee section 7.2

Contraindications: See section 7.1 on psychiatric drugs.

Side-effects: Hypotension and apnoea; See also section 7.2

Interactions : See Appendix-2

Dose: By intravenous injection, 10-20 mg at a rate of 0.5 ml (2.5 mg) per 30 seconds, repeated if necessary after 30-60 minutes; may be followed by intravenous infusion to max. 3 mg/kg over 24 hours; CHILD 200-300 micrograms/kg or 1 mg per year of age

Proprietary Preparations

See section 7.1

PHENOBARBITONE/

PHENOBARBITONE SODIUM^[ED][CD]

Indications: All forms of epilepsy except absence seizures; status epilepticus; febrile convulsion

Cautions: Pregnancy and lactation

Contra-indications: Drug dependence, liver disease, renal disease

Interactions: See Appendix-2

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Side-effects: Nausea, vomiting, hyperactivity, cognition impairments, folate deficiency, decreased libido, dependence

Dose: By mouth, 30-180 mg at night. CHILD, 5-8 mg/kg daily

By intramuscular injection, 200 mg, repeated after 6 hours if necessary. CHILD 15/kg as a single dose

By intravenous injection in status epilepticus, (dilute injection 1 in 10 with water for injection), 10 mg/kg at a rate of not more than 100 mg/minute; max. 1 gram

Proprietary Preparations

Barbipan(Albion), Elixir, 20mg/5ml Tk. 56.00/100 ml; Tab., 15 mg, Tk. 0.57/Tab.; 30 mg, Tk. 0.78/Tab.; 60 mg, Tk. 1.14/Tab.

Barbit(Incepta), Elixir, 20 mg/5 ml, Tk. 29.06/50ml; Tk. 57.00/100ml; Tab., 60mg, Tk. 1.14/Tab., Tab. 30 mg, Tk. 0.78/Tab., Inj., 200 mg/ml, Tk. 16.00/Amp

Berdinal(G.A.Co), Tab., 30 mg, Tk. 0.78/Tab.

Emer(Opsonin), Elixir, 20 mg/5 ml, Tk. 57.32/100 ml; Tab. 30 mg, Tk. 0.78/Tab., 60 mg, Tk. 1.14/Tab., Inj., 200 mg/ml, Tk. 16.05/Amp

Epinal(Square), Elixir, 20 mg/5 ml, Tk. 56.37/100ml; Tab. 30 mg, Tk. 0.78/Tab.

G-phenobarbitone(Gonoshasthaya), Inj., 200 mg/ml, Tk. 15.00 /Amp.; Tab., 30 mg, Tk. 0.75/Tab.

Pheno(Delta), Tab., 30 mg, Tk.

0.78/Tab.; Tab., 60 mg, Tk. 1.14/Tab.

Phenoba(Biopharma), Tab., 30mg, Tk.

0.78/Tab., Tab., 60mg, Tk. 1.14/Tab.

Phenoson(Jayson), Tab., 30 mg, Tk.

0.78/Tab.

7.7 DRUGS USED IN PARKINSONISM

7.7.1 DOPAMINERGIC DRUGS

7.7.2 ANTIMUSCARINIC DRUGS

7.7.3 DRUGS USED IN ESSENTIAL TREMOR, CHOREA, TICS AND RELATED DISORDERS

7.7.1 DOPAMINERGIC DRUGS

Levodopa used along with a dopa-decarboxylase inhibitor is the treatment of choice for patients disabled by idiopathic Parkinson's disease. It is in combination with **dopa-decarboxylase inhibitor** useful in the elderly or frail patients with other significant disease and in those with more severe

symptoms. It is effective and well tolerate in the majority of patients.

Its use is often limited by its Side-effects; when used with levodopa, abnormal involuntary movements and confusional states are common.

Amantadine has modest antiparkinsonian effects. It improves mild brady-kinetic disabilities as well as tremor and rigidity. Unfortunately only a small proportion of patients derive much benefit from this drug and tolerance to it occurs. However it has the advantage of being relatively free from untoward Side-effects.

Pramipexole is a dopamine agonist of the non-ergoline class indicated for treating Parkinson's disease and restless legs syndrome

AMANTADINE HYDROCHLORIDE

(Releases dopamine, weak anti parkinsonism agent, shortacting)

(See also section 1.3.3)

Indications: Parkinson's disease
Antiviral. For other indications, see also section 1.3.3

Cautions: Seizure, heart failure, hepatic or renal impairment, congestive heart disease, confusions or hallucinatory states, elderly; avoid abrupt withdrawal

Contra-indications: Epilepsy, history of gastric ulceration, severe renal impairment; pregnancy, breast-feeding

Interactions: See Appendix-2

Side-effects: Excitement, hallucination, dermatological reaction. Anorexia, nausea, nervousness, inability to concentrate, insomnia, dizziness, convulsions, blurred vision, gastrointestinal disturbances, peripheral oedema.

Dose: 100 mg daily increased after one week to 100 mg twice daily, usually in conjunction with other treatment; some patients may require higher doses, max. 400 mg daily

Proprietary Preparation

Amantril(ACI), Cap., 100mg, Tk. 10.00/Cap.

Alttrip(NIPRO JMI), Tab., 6.25 mg, Tk. 35.08/Tab.

BROMOCRIPTINE(Dopamine Receptor Agonist)

Indications: Parkinsonism, endocrine disorders (see section 6.5.1)

Cautions: **Contra-indications&Side-effects:** See section 6.5.1

Interactions: See Appendix-2

Dose: First week 1-1.25 mg at night, second week 2-2.5 mg at night, third week 2.5 mg 3 times daily then increasing by 2.5 mg every 3-14 days according to response to a usual range of 10-40 mg daily; taken with food

Proprietary Preparations

Bromodel(Opsonin), Tab., 2.5 mg, Tk.12/Tab.

Bromolac(Square), Tab., 2.5 mg, Tk.12.03/Tab.

Bromotone(Nuvista), Tab., 2.5 mg, Tk. 11.03/Tab.

Criptine(Renata), Tab., 2.5 mg, Tk. 12/Tab.

**CO-CARELDOPA
CARBIDOPA-LEVODOPA**

This is a combination of levodopa and carbidopa at a proportion of 10:1.

Indications: Parkinson's disease

Cautions: Pulmonary disease, peptic ulcer, cardiovascular disease, osteomalacia, diabetes mellitus, openangle glaucoma, skin melanoma, psychiatric illness; avoid abrupt withdrawal; pregnancy and breast-feeding

Contra-indications: Closed-angle glaucoma

Interactions: See Appendix-2

Side-effects: GI-effect: nausea, vomiting CVS effect: postural hypotension arrhythmia, CNS effect: Anxiety, delusion

Motor Function: dyskinesias, choreoatetosis anorexia insomnia, agitation; abnormal involuntary movements and psychiatric symptoms, drowsiness, peripheral neuropathy, taste disturbance, pruritus,

Dose: Expressed as levodopa, initially 100mg (with carbidopa 25 mg) 3 times daily, increased by 50-100mg (with carbidopa 12.5 or 25 mg) daily or on alternatedays according to response, up to 800 mg (with carbidopa 200 mg) daily in divided doses

7. CENTRAL NERVOUS SYSTEM

Note: Carbidopa 70-100 mg daily is necessary to achieve full inhibition of dopa-decarboxylase

Proprietary Preparations

Aldopa (Albion), Tab., 25 mg + 250 mg, Tk. 6.00/Tab.

Cinemat(ACI), Tab., 50 mg + 200mg, Tk. 12.50/Tab.; 25mg + 100 mg, Tk. 10.00/Tab.

Co-dopa(UniMed), Tab, 10mg + 100mg, Tk. 7.00/Tab.; 25mg+ 250mg, Tk. 10.00/Tab.; 50mg+200mg, Tk. 20.00/Tab.

D-dopa(Drug Intl), Tab., 10 mg + 100 mg, Tk. 5.05/Tab.; 25 mg + 250 mg, Tk. 6.05/Tab.

Levopa(Acme), Tab., 10 mg + 100 mg, Tk. 4.01/Tab.; 25 mg + 250 mg, Tk. 7.52/Tab.

Perkidopa(Square), Tab., 10 mg + 100 mg, Tk. 7.00/Tab.; 25 mg + 250 mg, Tk. 10.00/Tab.

Syndopa (Sun), CR Tab., 25 mg + 100 mg, Tk. 10.00/Tab.; Tab., 10 mg + 100 mg, Tk. 7.00/Tab. CR Tab., 50 mg + 200 mg, Tk. 12.50/Tab.

Levodopa+Carbidopa+Entacapone

Stalevo[®](Novartis), Tab., 75 mg + 18.75 mg + 200 mg, Tk.85.00/Tab

125 mg + 31.25 mg + 200 mg Tk.85.00/Tab

200 mg+ 50 mg + 200 mg Tk.,85.00/Tab

Tridopa(ACI), Tab., 50mg+12.5mg+200mg Tk. 15.00/Tab.; 200mg+50mg+200mg, Tk.

40.00/Tab.; 150mg+37.5mg+200mg, Tk.

30.00/Tab.; 100mg+25mg+200mg, Tk.

25.00/Tab.

ENTACAPONE

Indications: Adjunct to levodopa in Parkinson's disease patients who have 'end-of-dose' motor fluctuations

Cautions: Concurrent levodopa dose may need to be reduced by about 10-30%

Contra-Indications: Pregnancy and breast-feeding; hepatic impairment; pheochromocytoma; concomitant use of non-selective MAO-A or MAO-B inhibitors; history of neuroleptic malignant syndrome or non-traumatic rhabdomyolysis

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, abdominal pain, constipation, diarrhea, urine may be coloured reddish-brown, dry mouth, dyskinesias; dizziness; rarely elevated liver enzymes; anaemia reported

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Dose: 200 mg with each dose of levodopa with dopa-decarboxylase inhibitor; max. 2 g daily

Proprietary Preparation

Comtan[®](Orion), Tab. 200 mg, Tk. 92.00/Tab

Comtan[®](Novartis), Tab. , 200 mg, Tk. 92.00/Tab.

PRAMIPEXOLE(Dopamine receptor agonist as a monotherapy or with Levodopa)

Indications:Parkinson's disease and restless legs syndrome

Contra-indications: Renal impairment, hypotension

Interactions: See Appendix-2

Side effects:Nausea, vomiting, sedation, somnolence, weight loss, insomnia, hallucinations, unusual tiredness

Dose: Initial dose: 0.125 mg orally three times a day with or without food at weekly interval increased to 0.5 to 1.5 mg three times daily

Note: used as monotherapy or with levodopa.

Proprietary Preparations

Parixol(ACI), Tab. 88 microgram, Tk. 2.01/Tab, 180 microgram, Tk. 6.02/Tab

ROPINIROLE (Dopamine receptor agonist)

Indications:Parkinson's disease, extrapyramidal symptoms.

Contraindications: known hypersensitivity to ropinirole

Interactions: See Appendix-2

Side effects: Nausea, dizziness, hallucinations, orthostatic hypotension, and sudden sleep attacks during the daytime.

Dose:ADULT: 0.25 mg orally three times daily for Parkinson's Diseases may be increased by 0.75 mg at weekly interval

Proprietary Preparations.

Perkirol(Square), Tab., 2 mg, Tk. 6.04/Tab. , 0.25 mg, Tk. 2.01/Tab.

Repitol(Beximco), Tab. , 0.25 mg , Tk. 2.00/Tab.; 2 mg, Tk. 10.00/Tab.

Ropinol(Incepta), Tab., 0.25 mg, Tk. 2.00/Tab., 1 mg, Tk. 4.00/Tab., 2 mg Tk. 6.00/Tab

SELEGILINE

HYDROCHLORIDE(Selective irreversible inhibitor of MAO-B, enhance & prolong action of levodopa, slow disease progression)

Indications: Parkinson's disease

Cautions: Gastric and duodenal ulcer, uncontrolled hypertension, arrhythmias, angina, psychosis, pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Constipation, diarrhoea, nausea and vomiting, dry mouth, sore throat, confusion, psychosis, vertigo, insomnia, back pain, difficulty in micturition

Dose: 10 mg in the morning or 5 mg at breakfast and midday

Proprietary Preparations

Jumex[®](Chinoin), Tab 5mg, Tk. 14.5/Tab.

7.7.2 ANTIMUSCARINIC DRUGS

(See also section 8.1.3 & 2.2)

PROCYCLIDINE HYDROCHLORIDE

Indications: Parkinsonism, drug-induced extrapyramidal symptoms (EPS)

Cautions: cardiovascular diseases, hepatic or renal impairment, elderly; avoid sudden withdrawal; liable to abuse
Contraindications: Narrow angle glaucoma, enlarged prostate, and myasthenia gravis

Interactions: See Appendix-2

Side-effects: Dry mouth, constipation, blurring of vision, urinary retention, postural hypotension, tachycardia

Dose: By mouth, 2.5 mg 3 times daily, gradually increase if necessary; usual max. 30 mg daily. ELDERLY, preferably reduced doses

By intramuscular injection in acute dystonia, 5-10 mg repeated if necessary after 20-30 minutes; max. 20 mg daily. ELDERLY, reduce dose

Proprietary Preparations

Kemadrin(GSK), Tab., 5 mg, Tk. 1.87/Tab

Cyclid(Incepta), Inj., 10 mg/ 2 ml, Tk. 30.00/ 2 ml Amp; Tab., 5 mg, Tk. 1.00/Tab.

Perkinil(Square), Inj., 10 mg/2 ml, Tk. 35.00/2 ml Amp., Tab, 5mg, Tk. 1.00/Tab.

Extranil(General), Inj., 10mg/2ml, Tk. 30.10/2ml Amp; Tab., 5mg, Tk. 0.76/Tab.
Procilin(Supreme), Tab., 5mg, Tk. 0.50/Tab.
Kdrin(Opsonin), Inj., 10 mg/2 ml, Tk. 30.11/2ml Amp; Tab, 5 mg , Tk. 1.00/Tab.

TRIHXYPHENIDYL

Indications: Parkinson disease and other Parkinson-like disorders when used in combination with other drugs; Parkinson-like side effects of certain drugs

Cautions: May be abused due to a short acting mood-elevating and euphoriant effect; obstructive diseases of the urogenital tract, known history of seizures

Contraindications: Hypersensitivity, narrow angle glaucoma, ileus, under 18 years of age

Interactions: See Appendix-2

Side effects: Drowsiness, vertigo, headache, and dizziness are frequent, delirium and confusion.

Dose: ADULT: 4 to 10 mg orally daily

Proprietary Preparations

Delpark(Healthcare), Tab., 5mg,

Tk. 12.00/Tab., 2mg, Tk. 5.50/Tab.

Hexinor(Beacon), Syrup, 2mg/5ml, Tk.

100.00/Bottle; Tab., 2mg, Tk. 5.02/Tab., 5mg, Tk. 10.03/Tab.

Parkifen(UniMed), Tab., 2mg, Tk. 5.00/Tab., 5mg, Tk. 12.00/Tab.

Tricalm(ACI), Tab., 2mg, Tk. 5.00/Tab., 5mg, Tk. 10.00/Tab.

Trihexy(Incepta), Tab., 2mg, Tk. 5/Tab., 5 mg, Tk. 10.00/Tab

7.7.3 DRUGS USED IN ESSENTIAL TREMOR CHOREA, TICS AND RELATED DISORDERS

Haloperidol, Clonidine, Sulpiride, Chlorpromazine, Propranolol and **Piracetam** are used in this type of disorders. Haloperidol (see section 7.2) may relieve motor tics and some choreas. Propranolol or some other beta-adrenoceptor blocking agent (see section 3.1) is indicated for treating essential tremors associated with anxiety or thyrotoxicosis in a doses of 40mg 2-3 times daily

7. CENTRAL NERVOUS SYSTEM

Piracetam is used as an adjunctive treatment for myoclonus of cortical origin.

PIRACETAM

Indications: Adjunctive treatment of cortical myoclonus

Cautions: Avoid abrupt withdrawal; elderly; renal impairment (avoid if severe)

Contraindications: Hepatic and renal impairment; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Diarrhoea, weight gain; somnolence, insomnia, nervousness, depression; hyperkinesia; rash

Dose: Initially 7.2 g daily in 2-3 divided doses, increased according to response by 4.8 g daily every 3-4 days to max. 20g daily. CHILD under 16 years not recommended

Proprietary Preparations

D-Pira(Drug Intl), Tab., 800mg, Tk. 6.00/Tab.

Juvain(Opsonin), Syrup, 500 mg /5 ml, Tk.

150.57/100 ml; Tab, 800 mg , Tk. 6.02/Tab.

Memopil(ACI), Syrup, 500mg/5ml, Tk.

151.02/100ml; Tab., 800mg, Tk. 6.04/Tab.,

1200mg, Tk. 9.06/Tab., Inj., 200 mg/ml, Tk.

75.51/15ml vial;

Neuratam(Ibn Sina), Syrup, 500mg/5ml, Tk.

150.00/100ml; Tab., 800mg, Tk. 300.00/Tab.

Neurolep(Square), Tab. , 800 mg, Tk.

6.04/Tab., syrup, 500 mg/5 ml, Tk.

151.02/100ml

Piramax(Aristo), Tab. , 800mg , Tk. 6.00/Tab.

Piratam(General), Syrup, 10gm/100ml, Tk.

100.00/100ml; Tab., 800mg, Tk. 4.00/Tab.

7.8 DRUGS USED IN NAUSEA, VOMITING AND VERTIGO

BETAHISTINE

Indications: For treatment of Ménière's syndrome, symptoms of which may include vertigo, tinnitus, hearing loss and nausea.

Cautions: History of peptic ulcer, bronchial asthma

Contraindications: Pheochromocytoma

Side-effects: GI disturbances, rash, pruritis

7. CENTRAL NERVOUS SYSTEM

Dose: 8-16mg three times daily.

Preparations: Tab. 8,16mg

Proprietary Preparations

Menaril(Incepta), Tab., 8 mg, Tk. 2.00/Tab.; 16 mg, Tk. 4.00/Tab.

Merison(Square), Tab., 6 mg, Tk. 2.01/Tab. **Tiniril**(Opsonin), Tab., 16 mg, Tk. 5.00/Tab.; 8 mg, Tk. 2.01/Tab.

Vectra(Healthcare), Tab., 16 mg, Tk.

250.00/Tab.; 8 mg, Tk. 150.00/Tab.

Veserc(UniMed), Tab., 16 mg, Tk. 5.00/Tab.; 8 mg, Tk. 3.00/Tab.

CHLORPROMAZINE^[ED]

(See also section 7.2)

Indications: Nausea and vomiting of terminal illness where other drugs have failed or are not available; other Indications, see section 7.2

Cautions; Contraindications; Side-effects: See section 7.2

Interactions: See Appendix-2

Dose: By mouth, 10-25 mg every 4-6 hours. CHILD 500 µg/kg every 4-6 hours (1-5 years max. 40 mg daily, 6-12 years max. 75 mg daily)

By deep intramuscular injection initially 25 mg then 25-50 mg every 3-4 hours until vomiting stops. CHILD 500 microgram/kg every 6-8 hours (1-5 years maximum 40 mg daily, 6-12 years maximum 75 mg daily)

Proprietary Preparations

Gevril(Albion), Syrup, 0.5 gm/100 ml, Tk. 15.00/100 ml

Largactil(Sanofi), Inj., 25 mg/ml, Tk. 4.12/Amp.; Tab., 50 mg, Tk. 0.60/Tab.; 25 mg, Tk. 0.41/Tab.; Tab., 100 mg, Tk. 1.01/Tab.

Opsonil(Opsonin), Tab., 100 mg, Tk. 1.01/Tab.; 50 mg, Tk. 0.60/Tab.; Inj., 50 mg/2 ml, Tk. 4.02/2ml amp.

CINNARIZINE

Indications: Vestibular disorders, such as Meinner's disease, vestibular neuritis, paroxysmal positional vertigo, motion sickness; vascular disease

Cautions and Contraindications: Prostatic hypertrophy, urinary retention, glaucoma, hepatic disease, epilepsy; porphyria, severe heart failure

Interactions: See Appendix-2

Side-effects: Drowsiness, dry mouth, blurred vision, allergic skin reactions, fatigue; rarely extrapyramidal symptoms in elderly on prolonged therapy

Dose: 15-30 mg 3 times daily. CHILD 5-12 years, half adult dose

Proprietary Preparations

Cinaron(Square), 15 mg, Tk. 1.00/Tab.

Cinaryl(Opsonin), Tab., 15 mg, Tk. 0.75/Tab.

Cinarzin(Ibn Sina), Tab., 15 mg, Tk. 1/Tab.

Cinazin(Acme), Tab., 15 mg, Tk. 0.70/Tab.

Cinnarizine(Albion), Tab., 15 mg, Tk. 1/Tab.

Cinrim(Supreme), Tab., 15 mg, Tk. 1/Tab.

Inarzin(Beximco), Tab., 15 mg, Tk. 0.90/Tab.

Suzaron(Rephco), Tab., 15 mg, Tk. 1/Tab.

Zincin(Aristo), Tab., 15 mg, Tk. 1.00/Tab.

Cinnarizine 20mg+Dimenhydrinate 40mg is used in the treatment of vertigo.

Proprietary Preparations

Artigo(ACI), Tab., Tk. 2.01/Tab.

Cinaron(Square), Tab., Tk. 2.00/Tab.

Cinaryl(Opsonin), Tab., Tk. 2.00/Tab.

Cinarzin Plus(Ibn Sina), Tab., Tk. 2.00/Tab.

Cinazin(Acme), Tab., Tk. 1.51/Tab.

Revert(Incepta), Tab, Tk. 2.00/Tab.

DOMPERIDONE

(See notes above and also section 2.2)

Indications: See section 2.2

Cautions: age over 60 years – risk of ventricular arrhythmia/also see section: 2.2

Contra-indications: Cardiac conduction defect (prolong QT)

Side-effects: See section 2.2

Interactions: See Appendix-2

Dose: By mouth, acute nausea and vomiting, 10-20 mg every 4-8 hours, max. period of treatment 12 weeks

CHILD: Nausea and vomiting following cytotoxic therapy or radiotherapy only, 200-400 micrograms/kg every 4-8 hours.

By rectum as suppositories, nausea and vomiting, 30-60 mg every 4-8 hours.

CHILD following cytotoxic therapy or radiotherapy, over 2 years bodyweight 10-15 kg max. 15 mg twice daily, body weight 15-25 kg max. 30 mg twice daily, body weight 25-45 kg max 30 mg 3-4 times daily; suppositories may be cut up for children.

7. CENTRAL NERVOUS SYSTEM

Note: Does not cause CNS effect, e.g. sedation, dystonia can be used with anti parkinson drug.

Proprietary Preparations
See section 2.2

APREPITANT (Neurokinin 1-receptor antagonist)

(See section 2.1.2)

Indications: as adjunct to setrons/ dexamethasone in chemotherapy

Side-effects: Hiccough, dyspepsia, GI disturbance, dizziness, confusion

Dose: ADULT: 125mg before chemotherapy. **Fos aprepitant:** IV infusion 150mg 30 minutes before chemo therapy

Proprietary Preparations

Emestop (Incepta), Cap., 40 mg, Tk. 50.00/Cap.; 125 mg, Tk. 150.00/Cap.
Emend (Opsonin), Cap., 40 mg, Tk. 45.13/Cap.

CYCLIZINE

Indications: Nausea, vomiting, motion disturbance, sickness

Side-effects: Hypertension, paresthesia

Dose: 50mg three times daily

Generic Preparations
Tab., 50mg

DROPERIDOL

Indications: Post-operative nausea, vomiting

Cautions: Coronary artery disease, asthma, bronchitis

Contra-indications: QT prolongation, hepatic-renal impairment

Dose: IV. infusion at 0.625-1.25mg 30min before surgery

Generic Preparations
Inj., IV infusion

GRANISETRON

Indications: In management of nausea, vomiting in patient requiring cytotoxic drug & operation; also see under: dose

Cautions: Pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Constipations, headache, rash; transient increases in liver enzymes; hypersensitivity reactions reported.

Dose: Nausea and vomiting induced by cytotoxic chemotherapy or radiotherapy, by mouth 1-2 mg within 1 hour before start of treatment, then 2 mg daily in 1-2 divided doses during treatment; when intravenous infusion also used, max. combined total 9 mg in 24 hours; CHILD 20 micrograms/kg (maximum 1 mg) within 1 hour before start of treatment, then 20 micrograms/kg (max. 1 mg) twice daily for up to 5 days during treatment

By intravenous injection (diluted in 15 ml sodium chloride 0.9% and given over not less than 30 seconds) or by intravenous infusion (over 5 minutes), prevention, 3 mg before start of cytotoxic therapy (up to 2 additional 3 mg doses may be given within 24 hours); treatment, as for prevention (the two additional doses must not be given less than 10 minutes apart); max. 9 mg in 24 hours; CHILD, *by intravenous infusion*, (over 5 minutes), prevention, 40 micrograms/kg (max. 3 mg) before start of cytotoxic therapy; treatment as for prevention-one additional dose of 40 micrograms/kg (max. 3mg) may be given within 24 hours (not less than 10 minutes after initial dose)

Postoperative nausea and vomiting, by intravenous injection (diluted to 5ml and given over 30 seconds), prevention, 1 mg before induction of anaesthesia; treatment, 1 mg, given as for prevention; max. 2 mg in one day; CHILD not recommended.

Proprietary Preparation

Naurif (Square), Inj., 1 mg/ml, Tk. 48.19/1 ml Inj. Tab., 1 mg, Tk. 28.10/Tab.

MECLIZINE HYDROCHLORIDE

Indications: Nausea, vomiting, motion sickness, vertigo

7. CENTRAL NERVOUS SYSTEM

Cautions: Patients with asthma, bronchitis, emphysema, enlarged prostate, glaucoma or urinary tract blockage should take Meclizine (like other antiemetics) with Cautions; driving and effects of alcohol enhanced.

Contraindications: Hypersensitive to Meclizine

Interactions: See Appendix-2

Side-effects: Drowsiness, dry mouth, and blurred vision

Dose: Nausea and vomiting: 25-100 mg daily (single dose) or directed by physician; Motion sickness: 25-50 mg 1 hour before travel. The dose may be repeated every 24 hours as needed, Vertigo: 25-100 mg daily, in divided doses

Proprietary Preparations

Acliz(Aristo), Tab., 50 mg, Tk. 2.50/Tab.
Anosea(Ibn Sina), Tab., 50 mg, Tk. 2.60/Tab.
Avert(Biopharma), Tab., 50 mg, Tk. 2.51/Tab.
Emenil(Incepta), Tab., 50 mg, Tk. 2.50/Tab.
Emezin(Eskayef), Tab., 50 mg, Tk. 2.50/Tab.
Melizin(Pacific), Tab., 50 mg, Tk. 1.88/Tab.
Nomosis(Drug Int), Tab., 50 mg, Tk. 2.50/Tab.
Vomec(Beximco), Tab., 50 mg, Tk. 2.50/Tab.

Meclizine HCl 25mg + Pyridoxine HCl 50mg

Acliz Plus(Aristo), Tk. 3.00/Tab.
Ancliz(Monico), Tab., Tk. 3.00/Tab.
Anoseaplus(Ibn Sina), Tab., Tk. 150.00/Tab.
Anvert(Orion), Tab., Tk. 3.01/Tab.
Asivert(Asiatic), Tab., Tk. 3.00/Tab.
Avert plus(Biopharma), Tab, Tk. 3.00/Tab.
Avonex(Novo Health), Tk. 2.5./Tab.
Devomit(Silva), Tab., Tk. 3.25/Tab.
Emego plus(Opsonin), Tab., Tk. 3.00/Tab.
Emenil plus(Incepta), Tab., Tk. 3.00/Tab.
Emezinplus(Eskayef), Tab, Tk. 3.00/Tab.
Meclixin(General), Tab, Tk. 2.00/Tab.
Melizin plus(Pacific), Tab., 50 mg, Tk. 3.00/Tab.
Nomesis(Healthcare), Tab. Tk. 3.50/Tab.
NVP(Acme), Tab. Tk. 3.01/Tab.
Pyrimac(ACI), Tab., Tk. 2.50/Tab.
S-Vom(Sharif), Tab. Tk. 3.01/Tab.
Vertina plus(Square), Tab. Tk. 3.01/Tab.
V-Nil(Alco), Tab. Tk. 3.01/Tab.
Xmec(Beacon), Tab., Tk. 3.02/Tab.

HYOSCINE HYDROMIDE (SCOPLOMINE HYDROBROMIDE)

Indications: Motion sickness, hypersecretion state, premedication to control salivary, respiratory secretion.

Dose: Motion sickness: Over age of 10yr, 150-300mg 30minute before; hypersecretion: 300mg upto three times daily; adhesive patch 1mg/72 hours.

Preparations: 300mg upto three times daily .adhesive patch 1mg/72hr

Proprietary Preparations

Asipan(Asiatic), Tab., 20mg, Tk. 3.00/Tab.
Buscon(Ibn Sina), Tab., 10 mg, Tk. 689.00/Tab.; Inj., 20mg/ml, Tk. 29.50/1 ml Amp
Butapan(Sanofi), Tab., 10mg, Tk. 6.90/Tab.; 20mg, Tk. 13.64/Tab.
Colik(ACI), Tab., 10mg, Tk. 6.90/Tab.; 20mg, Tk. 6.72/Tab., Inj., 20 mg/ml, Tk. 29.90/ml Amp,
Eziride(Opsonin), chewable Tab., 150 microgram, Tk. 5.00/Tab.
Hybucin(Supreme), Tab., 10 mg, Tk. 3.40/Tab.
Hybut(Amico), Tab., 10mg, Tk. 3.43/Tab.
Hysomide(Opsonin), Inj., 20 mg/ml, Tk. 29.90/ ml Amp; Tab., 10 mg, Tk. 6.90/Tab.; 20 mg , Tk. 13.64/Tab.
Spanil(Beximco), Tab., 10mg, Tk. 6.90/Tab.
Spasmozen(Zenith), Tab., 10 mg , Tk. 3.44/Tab.
Typan(Astra Bio), Tab., 10 mg, Tk. 3.43/Tab.

NABILONE (A synthetic Cannabinoid).

Indications: Use in unresponsive to conventional antiemetics associated with cytotoxic chemotherapy.

Cautions: Hypertension, psychiatric disorder

Side-effects: Drowsiness, vertigo, euphoria, ataxia.

Dose: 1 mg or 2 mg twice a day. The lower starting dose may be used and increased later if necessary. It should be given 1 to 3 hours before chemotherapy, and a dose given the night before may be useful.

Generic Preparation

Capsule, 1mg, 2mg

METOCLOPRAMIDE HCl^[ED]

(See also section 2.2)

Indications: Post operative nausea vomiting, chemotherapy induced nausea and vomiting; acute migraine attack

7. CENTRAL NERVOUS SYSTEM

Cautions: Hepatic and renal impairment; elderly, young adults, and children; may mask underlying disorders such as cerebral irritation; avoid for 3-4 days following gastro-intestinal surgery, may cause acute hypertensive response in phaeochromocytoma; pregnancy, breast-feeding and Parkinsonism

Interactions: See Appendix-2

Side-effects: Acute dystonic reaction, oculogyric crisis, conduction defect, extrapyramidal effects, hyperprolactinaemia, occasionally tardive dyskinesia on prolonged administration; drowsiness, restlessness, diarrhoea, depression, neuroleptic malignant syndrome, cardiac conduction abnormalities reported following intravenous administration

Dose: By mouth 10 mg 3 times daily. CHILD up to 1 year, 1 mg twice daily; 1-3 years 2 mg 2-3 times daily, 5-9 years 2.5 mg 3 times daily, 9-14 years 5 mg 3 times daily

Proprietary Preparations

See also section 2.2

ONDANSETRON

Indications: See under dose

Cautions: acute intestinal obstruction, QT prolongation, pregnancy and breast-feeding; moderate or severe hepatic impairment

Interactions: See Appendix-2

Side-effects: Constipation, headache, sensation of warmth or flushing, hiccups; occasional alterations in liver enzymes; occasional transient visual disturbances and dizziness following intravenous administration; involuntary movements, chest pain, arrhythmias, hypotension and bradycardia

Dose: Moderately emetogenic chemotherapy or radiotherapy, by mouth, 8 mg 1-2 hours before treatment or by rectum, 16 mg 1-2 hours before treatment or by intramuscular injection or slow intravenous injection, 8 mg immediately before treatment then by mouth, 8 mg every 12 hours for up to 5 days or by rectum, 16 mg daily for up to 5 days

Severely emetogenic chemotherapy, by intramuscular injection or slow intravenous injection, 8 mg immediately before treatment, where necessary followed by 8 mg at intervals of 2-4 hours for 2 further doses (or followed by 1 mg/hour by continuous intravenous infusion for up to 24 hours) then by mouth, 8 mg every 12 hours for up to 5 days or by rectum, 16 mg daily for up to 5 days alternatively, by intravenous infusion over at least 15 minutes, 32 mg immediately before treatment or by rectum, 16 mg 1-2 hours before treatment then by mouth, 8 mg every 12 hours for up to 5 days or by rectum, 16 mg daily for up to 5 days

Note. Efficacy may be enhanced by addition of a single dose of dexamethasone sodium phosphate 20 mg by intravenous injection.

CHILD: By slow intravenous injection or by intravenous infusion over 15 minutes, 5 mg/ml immediately before chemotherapy then, 4 mg by mouth every 12 hours for up to 5 days

Prevention of postoperative nausea and vomiting, by mouth, 16 mg 1 hour before anaesthesia or 8 mg at intervals of 8 hours for 2 further doses.

Alternatively, by intramuscular or slow intravenous injection, 4 mg at induction of anaesthesia;

CHILD over 2 years, by slow intravenous injection, 100 microgram/kg (max. 4 mg) before, during, or after induction of anaesthesia.

Treatment of postoperative nausea and vomiting, by intramuscular or slow intravenous injection, 4 mg; **CHILD** over 2 years, by slow intravenous injection, 100 micrograms/kg (max. 4 mg)

Proprietary Preparations

Anset (Opsonin), Supp. 16 mg, Tk. 11.28/Supp.; Tab., 4 mg, Tk. 3.40/Tab.; Tab., 8 mg, Tk. 7.55/Tab. Inj., 2 mg/ml, Tk. 22.56/Amp.

Avona (Popular), Syrup, 4 mg/5 ml, Tk. 35.00/50 ml.; Cap., 8 mg, Tk. 10.00/Cap., 4 mg, Tk. 4.00/Cap.; Inj., 8 mg/4 ml, Tk. 30.00/Amp.

Emeren (Renata), Tab., 4 mg, Tk. 6.00/Tab.; 8 mg, Tk. 10.00/Tab.; Inj., 8 mg/4 ml, Tk. 30.00/Amp.

Emistat (Healthcare), Inj., 8 mg/4 ml, Tk. 30.00/Amp.; Tab., 4 mg, Tk. 6.00/Tab.; 4 mg/5

7. CENTRAL NERVOUS SYSTEM

ml, Tk. 45.00/50 ml ; Tab., 8 mg, Tk. 10.00/Tab.
Emiston(*Ibn Sina*), Inj., 8 mg/4 ml, Tk. 25.00/Amp.; Syrup, 4 mg/5 ml,
Leofran(*Leon*), Inj. 4 mg/2 ml, Tk. 25.00/Amp.
 ;Tab. , 8 mg, Tk. 10.00/Tab. ; oral Solution, 4 mg/5 ml, Tk. 45.00/50 ml
Nauset(*Navana*), Inj. 8 mg/4 ml, Tk. 30.10/Inj.; Syrup, 4 mg/ 5 ml, Tk. 45.13/50ml; Tab., 8 mg, Tk. 10.03/Tab.
Ofran(*Square*), Inj., 8 mg/4 ml, Tk. 30.00/Amp. ;Syrup, 4 mg/5 ml, Tk. 40.00/50 ml ;Supp, 16 mg, Tk. 20.00/Supp.; Tab. , 8 mg, Tk. 10.04/Tab.
Onaseron(*Incepta*), Inj., , Tk. 25.00/Amp;ODT , 4 mg, Tk. 5.00/Tab. ;8 mg, Tk. 10.00/Tab. ; Syrup., 4 mg/5 ml, Tk. 40.00/50 ml
Onasia(*Orion*), Inj, 2 mg/ ml, Tk. 25.00/Amp.; Syrup., 4 mg/5 ml, Tk. 45.00/50 ml ;Tab. , 8 mg, Tk. 5.00/Tab.
Oncodex (*Jayson*), Inj. 8mg/4mL, Tk. 25.17/Inj.; Tab., 4mg, Tk. 4.54/Tab.; 8mg, Tk. 8.06/Tab. .
Oncodex(*Jayson*), Tab. , 4 mg, Tk. 4.52/Tab.; Tab. , 8 mg, Tk. 8.03/Tab.; Inj., 8 mg/4 ml, Tk. 25.10/Amp.
Ondamax(*Somatec*), Tab. , 4 mg, Tk. 5.00/Tab.; Tab. , 8 mg, Tk. 10.00/Tab.; Syrup., 4 mg/5 ml, Tk. 40.00/50 ml
Ondantor(*Novartis*), Tab. , 8 mg, Tk. 12.00/Tab.
Ondaron(*General*), Inj., 8 mg/4 ml, Tk. 30.00/Amp.
Ondason(*Drug Int.*), Syrup, 4 mg/ 5 ml, Tk. 40.00/50 ml; Inj., 2 mg/ml, Tk. 30.00/Amp. ;Tab. , 8 mg, Tk. 10.00/Tab.
Onsat(*Beximco*), Inj., 8 mg/4 ml, Tk. 25.00/Amp.; oral Soluble Film, 4 mg , Tk. 12.00/Pcs.;oral Soluble Film, 8 mg, Tk. 18.00/Pcs ;Tab. , 8 mg, Tk. 10.00/Tab.
Osetron(*ACI*), Inj., 2 mg/ ml , Tk. 25.09/Amp.; Syrup,4 mg/5 ml, Tk. 30.11/50 ml ;Tab. , 8 mg , Tk. 10.04/Tab.
Periset(*Acme*), Inj., 8 mg/4 ml, Tk. 30.00/Amp.Syrup, 4 mg/5 ml, Tk. 40.00/50 ml;Tab., 8 mg , Tk. 10.00/Tab.
Seton(*Delta*), Tab. , 8 mg, Tk. 8.00/Tab. Syrup, 4 mg/5 ml, Tk. 33.83/50 ml Tk.35.00/50 ml ;Tab. , 8 mg, Tk. 10.00/Tab.
Vomiset(*RAK*), Tab., 8 mg, Tk. 10.0/Tab.;Syrup,4 mg/5 ml, Tk. 30.0/50 ml
Zofer MD(*Sun*), Tab. ,4 mg, Tk. 5.50/Tab.
Zofra(*Eskayef*), Syrup, 4 mg/5 ml, Tk. 40.00/50 ml ;Inj.,Tk. 30.00/Amp. ODT, 4 mg, Tk. 5.00/Tab.; ODT , 8 mg, Tk. 10.00/Tab.

PALONOSETRON

Indications:In prevention of nausea and vomiting caused by cancer chemotherapy.

Cautions:Pregnancy,breast feeding,driving, QT prologation
Side-effects:Constipation, headache,,swelling, tiredness,severeallergic reactions,unusual muscle movement
Dose:oral: 0.5 mg orally administered approximately1hour
 Parenteral: 0.25 mg IV as a single dose 30 minutes before the start of chemotherapy.

Proprietary Preparations

Palnox(*Drug Intl*), Inj., 250 mcg/5 ml, Tk. 100.30/5 ml Amp, Tab., 0.5mg, Tk. 10.00/Tab.
Paloron(*Ziska*), Inj. , 75 mcg/1.5 ml, Tk. 75.00/1.5 ml amp, 250 mcg/5 ml, Tk. 100.00/5 ml Amp, Tab, 0.50 mg, Tk. 20.00/Tab.
Paloset(*Square*),Inj., 75 mcg/1.5 ml, Tk. 75.22/1.5 ml Amp, 250 mcg/5 ml, Tk. 100.30/5 ml Amp, Tab, 0.5 mg, Tk. 20.00/Tab.
Palosis(*Eskayef*), Cap, 0.5mg , Tk. 20.00/Cap., 0.5mg , Tk. 20.00/Cap., Tab, 0.5mg, Tk. 20.00/Tab., 0.5mg , Tk. 20.00/Tab.
Palostar(*Orion*), Inj, 75 mcg/1.5 ml, Tk. 75.00/1.5 ml Amp, 75 mcg/1.5 ml, Tk. 75.00/1.5 ml Amp, 250 mcg/5 ml, Tk. 100.00/5 ml Amp, Tab, 0.5 mg, Tk. 20.00/Tab., 0.5mg, Tk. 200.00/Tab.
Paloxi(*Beacon*), Cap., 0.5mg , Tk. 22.00/Cap., Inj., 75 mcg/1.5 ml, Tk. 75.23/1.5 ml Amp, 250 mcg/5 ml, Tk. 100.30/5 ml Amp, Tab, 0.50mg, Tk. 20.06/Tab.
Paloxiron(*Incepta*), Inj., 250 mcg/5 ml, Tk. 100.00/5 ml Amp, 75 mcg/1.5 ml ,Tk. 75.00/1.5 ml Amp, Tab, 0.5 mg, Tk. 20.00/Tab.
Palzen(*Healthcare*), Inj, 75 mcg/1.5 ml, Tk. 90.00/1.5 ml Amp, 250 mcg/5 ml, Tk. 125.00/5 ml Amp., Tab., 0.5mg , Tk. 25.00/Tab.
Panoset(*Opsonin*), Inj., 250 mcg/5 ml, Tk. 100.00/5ml Amp, 75 mcg/1.5 ml, Tk. 75.00/1.5ml Amp, Tab, 500 mcg , Tk. 20.00/Tab.
Patron(*Acme*),Inj., 75 mcg/1.5 ml, Tk. 75.00/1.5 ml Amp, 250 mcg/5 ml, Tk. 100.00/5 ml Amp, Tab., 0.5 mg, Tk. 20.00/Tab.

PROCHLORPERAZINE

(See also section 7.2)

Indications:Severe nausea and vomiting; for other Indications, see section 7.2

Cautions, Contra-indications & Side-effects:See section 7.2 on psychiatric drugs

Interactions: See Appendix-2

Dose: 2-4 mg daily in divided doses; max. 6 mg daily. CHILD 3-5 years up to 1 mg daily, 6-12 years up to 4 mg daily

Proprietary Preparations
See section 7.2

PROMETHAZINE HCl^[ED]

Indications: Nausea, vomiting, vertigo, labyrinthine disorders, motion sickness; For other Indications: see section 4.9.1
Cautions, Contra-indications & Side-effects: See section 4.9.1

Interactions: See Appendix-2

Dose : 20-25 mg twice daily; CHILD under 2 years not recommended, 2-5 years 5 mg twice daily, 5-10 years 10 mg twice daily

Proprietary Preparations
See section 12.5

PROMETHAZINE THEOCLATE

Indications: Nausea, vomiting vertigo, labyrinthine disorders, motion sickness (action longer than of promethazine hydrochloride)

Cautions; Contra-indications&Side-effects: See section 4.9.1 under promethazine hydrochloride.

Interactions: See Appendix-2

Dose: 25-75 mg, max. 100 mg daily; CHILD 5-10 years, half adult dose. Prevention of Motion Sickness: 25 mg at bedtime on night before traveling. CHILD 5-10 years, half adult dose For vomiting in pregnancy, 25 mg increased if necessary to a max. of 100 mg daily

Proprietary Preparations
Avomine(Sanofi), Tab., 25mg, Tk. 0.57/Tab.
Promet(opsonin), Tab., 25 mg, Tk. 0.44/Tab.

TRIFLUOPERAZINE

(See also section 7.2)

Indications: Severe nausea and vomiting; for other Indications, see section 7.2

Cautions; Contraindications; Side-effects: See section 7.2; extrapyramidal

7. CENTRAL NERVOUS SYSTEM

symptoms (EPS) may occur particularly in children and elderly

Interactions: See Appendix-2

Dose: 2-4 mg daily in divided doses or as a single dose. CHILD, 3-5 years up to 1 mg daily; 6-12 years, up to 4 mg daily

Proprietary Preparations

Sizonil(Healthcare), Tab., 1mg, Tk. 2/Tab.; 5mg, Tk. 3.5.00/Tab.

Telazine(Eskayef), Tab., 5mg, Tk. 3/Tab.; 1 mg, Tk. 2.00/Tab.

7.9 DRUGS USED IN THE TREATMENT OF OBESITY

Obesity is a most common nutritional disorder in affluent societies. Obesity may be defined as a condition in which there is excessive amount of body fat. This condition is most prevalent in middle age, but can occur at any earlier stage of life. The use of **Steroids**, **Oral Contraceptives**, **Phenothiazines** and **Insulin** is commonly followed by weight gain due to stimulation of appetite. Whatever the ultimate cause of obesity, weight reduction can be achieved only by restricting diets and increasing physical activities. Although there is no substitute for dietary regimen, a limited use as an adjunct in carefully selected patients may be useful in refractory obesity.

The most useful group of drugs at present to support a weight reducing regime acting as appetite suppressants are **Phentarsine** and centrally acting **Fluoxetine**. Anti-obesity drugs acting on the gastro-intestinal tract are **Methylcellulose** and **Orlistat** (a pancreatic lipase inhibitor which reduces the absorption of fat).

FLUOXETINE

Indications: See notes above

Interactions: See Appendix-2

Side-effects: Drowsiness

Dose: Bulimia Nervosa, 60 mg daily, CHILD: Not recommended

Proprietary Preparations

Fluoxetine(Albion), Cap., 20mg, Tk. 2.58/Cap.

Modipran(Beximco)Cap., 20mg, Tk. 2.89/Cap.

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Nodep(General), Cap., 20mg, Tk. 2.81/Cap.
Nodepress(Kemiko), Cap., 20 mg, Tk. 2.60/Cap.
Oxetin(Decent), Cap., 20mg, Tk. 2.88/Cap.
Prodep(Sun), Cap., 20 mg, Tk. 3.00/Cap.
Prolert(Square), Cap., 20 mg, Tk. 3.01/Cap.; Oral Solution, 20 mg/5 ml, Tk. 60/50ml

METHYLCELLULOSE

Indications: Adjunct in obesity, ulcerative colitis, constipation
Contraindications: Colonectomy
Interactions: See Appendix-.2
Side-effects: Skin rash, itching
Dose: As an adjunct in obesity, 800-1200 mg to be taken with at least 300 ml warm liquid half an hour before each meal or when hungry.
Constipation, 800-1600 mg to be taken in divided doses with at least 300 ml of water or liquid

Generic Preparation

Tab. Methyl Cellulose 400mg+Micro Crystalline 220mg

ORLISTAT

Indications: See notes above
Cautions: Diabetes mellitus; may impair absorption of fat-soluble vitamins
Contra-indications: Chronic malabsorption syndrome; cholestasis, pregnancy and breast-feeding.
Interactions: See Appendix-2
Side-effects: Liquid oily stool, flatulence, increased defecation and fecal incontinence
Dose: 120mg with each main meal, up to max. 360mg daily. CHILD not recommended.

Proprietary Preparations

Adiponil(Incepta), Cap., 120 mg, Tk. 40/Cap.
Dietil(Eskayef), Cap., 120 mg, Tk. 40.00/Cap.
Olistat(Square), Cap., 120 mg, Tk. 60.18/Cap., 60 mg, Tk. 30.00/Cap.
Orlifit(Opsonin), Cap., 120 mg, Tk. 50.00/Cap.
Ornicol(ACI), Cap, 120 mg, Tk. 55.00/Cap.
Slimfast(Healthcare), Cap., 120 mg, Tk. 60.00/Cap.
Slimi(UniMed), Cap., 60 mg, Tk. 30.00/Cap.

Xenobese(Radiant), Cap., 120 mg, Tk. 60.18/Cap.

7.10 DRUGS USED FOR DEMENTIA

Dementia is defined as a clinical syndrome characterized by a loss of previously acquired intellectual function in the absence of impairment consciousness. The commonest causes are Alzheimer's disease and Cerebrovascular disease. Dementia is predominantly associated with the elderly.

Drugs should be avoided in demented patients unless there are specific Indications.

Cautions: dementia patients are highly sensitive to sedative drugs. If medication is needed to treat episodes of confusion or excitement, **Thioridazine** 25 mg 8 hourly can be given (see section 7.2).

Among psychiatric patients, the most significant disorder is the amnesic syndrome caused by thiamine deficiency. In such cases, immediate treatment with **Thiamine** 50 mg intravenously daily should be given to minimize the damage (see section 16.2.3.2).

Anticholinesterase inhibitors sometimes improve cognitive functions. **Donepezil**, **Galantamine** and **Rivastigmine**, both reversible acetylcholinesterase inhibitors have recently been introduced to treat dementia in Alzheimer's disease.

Citicoline is an intermediate in the generation of phosphatidylcholine from choline; it is used for Alzheimer's disease and other types of dementia

ALMITRIN BISMESYLATE WITH RAUBASINE

Indications: Cerebral insufficiency characterized by (disorders of memory, concentration, etc). Auditory, vestibular and visual disorders of ischemic etiology.

Contra-indications: In combination with MAOIS

Cautions: Pregnancy; avoid concomitant use of other drug containing Almitrin

Side-effects: Sleep disturbances, palpitations, anxiety, dizziness.

7. CENTRAL NERVOUS SYSTEM

Proprietary Preparations

Almitrine Bismesylate 30 mg with Raubasine 10 mg
Albasine(Drug Intl), Tab., Tk. 12.05/Tab.
Aruxil(Opsonin), Tab., Tk. 10.00/Tab.
Duxil(ACI), Tab., Tk. 10.05/Tab.
Truxil(Square), Tab., Tk.10.03/Tab.

CITICOLINE(Intermediate compound required for biosynthesis of membrane phospholipid)

Indications: Alzheimer's disease head trauma, stroke, age-related memory loss, attention deficit hyperactive disorder

Side-effects :Insomnia, headache, diarrhea, nausea, blurred vision, chest pains

Dose: ELDERLY:1000-2000 mg per day for dementia

Proprietary Preparation

Cikolin(Drug Intl), Inj., 500mg/4ml, Tk. 140.00/Vial.; Tab., 500mg, Tk. 50.00/Tab.
Citicol(Beximco), Tab., 500mg, Tk. 50.00/Tab.; Inj., 500mg/4ml, Tk. 140/Vial
Cogniz(UniMed), Tab., 500mg, Tk. 50/Tab.

DONEPEZIL HYDROCHLORIDE

Indications: Alzheimer's disease

Cautions: Sick sinus syndrome or other supraventricular conduction abnormalities; patients at risk of developing peptic ulcers; asthma, obstructive airway disease

Contra-indications: Pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, diarrhea, fatigue, insomnia, muscle cramps, less frequently headache, dizziness, syncope, bradycardia, rarely sinoatrial block, AV block, and convulsions;

Dose: 5 mg once daily at bedtime, increase if necessary after one month to 10 mg daily; max. 10 mg daily

Proprietary Preparations

Ameloss (Incepta), Tab., 5 mg, Tk. 10/Tab.
Dimenta(Healthcare), Tab., 5 mg, Tk.10/Tab.
Elzer (Square), Tab., 5 mg, Tk. 10.07/Tab.

GALANTAMINE

Indications:Vascular dementia and Alzheimer's disease

Cautions:Parkinson's disease, severe asthma,

Contra-indications:Renal and hepatic impairment, pregnancy

Sideeffects:Nausea, anorexia,dizziness,headache, tremor,fatigue, irritation andinsomnia

Proprietary Preparation

Antial(ACI), Tab., 8mg, Tk. 20.14/Tab.; 4mg, Tk. 12.09/Tab.

RIVASTIGMINE

Indications: Alzheimer's disease

Cautions: Renal impairment, mild to moderate hepatic impairment (see Appendix-3); Sick Sinus Syndrome, conduction abnormalities; gastric or duodenal ulcers (and those at risk of developing ulcers); history of asthma or chronic obstructive pulmonary disease; pregnancy (Appendix-5); monitor body-weight

Contra-indications: breast-feeding

Interactions: See Appendix-2

Side-effects: Asthenia, anorexia, weight loss, dizziness, nausea, vomiting, drowsiness, abdominal pain, agitation and confusion, depression, diarrhoea, dyspepsia, headache, insomnia, sweating, malaise, tremor rarely angina pectoris, gastrointestinal hemorrhage, syncope; potential for causing bladder outflow obstruction; convulsions

Note:Gastro-intestinal Side-effects may occur more commonly in women

Dose: Initially 1.5 mg twice daily, increased in steps of 1.5 mg twice daily at intervals of at least 2 weeks according to response and tolerance; usual range 3-6 mg twice daily; maximum 6 mg twice daily

Proprietary Preparations

Demelon(UniMed), Cap., 3 mg, Tk. 20.00/Cap.; 1.5 mg, Tk. 20.00/Cap.
Exelon(Novartis), Cap., 3 mg, Tk. 145.00/Cap.; 6 mg , Tk. 145.00/Cap.; 1.5 mg, Tk. 145.00/Cap.; 4.5 mg, Tk. 145.00/Cap.,

7. CENTRAL NERVOUS SYSTEM

Transdermal Patch, 9.5 mg, Tk. 224.00/Vial.,
13 mg, Tk. 223.27/Vial., 4.6 mg, Tk. 224.00/

Exelon Patch 10⁰⁰(LTS Lohmann),
Transdermal Patch, 9.5 mg/24h, Tk.
224.00/Patch

Exelon Patch 5⁰⁰(LTS Lohmann),
Transdermal Patch, 4.6 mg/24h, Tk.
224.00/Patch

Rivacap(Ibn Sina), Cap., 1.5 mg, Tk.
10.00/Cap.

Rivamer(Sun), Cap. , 1.5 mg, Tk.
20.00/Cap.;4.5 mg, Tk. 40.00/Cap.

Rivascol(Albion), Cap. 1.5 mg, Tk. 14.10/Cap.

Chapter 8

ANAESTHESIA

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8.1 GENERAL ANAESTHESIA

Only experienced and authorized personnel (anaesthetists) should administer several drugs with different action to produce a state of surgical anaesthesia with minimal risk of toxic effect.

An intravenous anaesthetic is usually used for induction, followed by maintenance with inhalation anaesthetic, often supplemented by other drugs administered intravenously. Specific drugs are often used to produce and maintenance of muscle relaxation when positive pressure ventilation is employed.

8.1.1 INTRAVENOUS ANAESTHETICS

BARBITURATES

ETOMIDATE

Indications: Induction of anaesthesia in patients with an unstable cardiovascular system and is safe to use in patients with porphyria.

Cautions: It is best avoided in patients with epilepsy or a history of adrenocortical insufficiency

Dose: Induction 0.2-0.3 mg/kg by intravenous infusion

Proprietary Preparation

Etomid (Popular), Inj. (IV Infusion), 2mg /ml, Tk. 150.57/Amp

KETAMINE^[ED]

Indications: Induction and maintenance of anaesthesia. It is used mainly for pediatric patients when repeated doses are required.

Cautions: Patients with a history of cerebrovascular accidents, myocardial ischemia, hypertension and raised intracranial pressure

Contraindications : Airway obstruction, thyrotoxicosis, cerebral trauma, intracranial mass or haemorrhage, penetrating eye injuries, increased intraocular pressure and psychiatric disorders

Interactions: See Appendix-2

Side-effects: Emergence of delirium, nightmares, hypertension, tachycardia, increased salivation, increased ICP, nausea and vomiting are common after its sole use.

Dose: By intramuscular injection, 10 mg/kg usually produce 15-30 minutes of surgical anaesthesia; diagnostic maneuvers and procedures not involving intense pain, initially 4 mg/kg by intravenous injection over at least 60 seconds, 2 mg/kg usually produces 5-10 minutes of surgical anaesthesia

By intravenous infusion, for longer procedures, induction, bolus dose of 0.5-2mg/kg; maintenance dose of 10-45 micrograms/kg/min, rate adjusted according to response.

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Proprietary Preparations

G-Ketamine (*Gonoshasthaya*), Inj., 50 mg/ml,
KAIN (*Renata*), Inj. 50 mg/ml, Tk. 110.00/10
ml vial.

Ketalar (*Popular*), Inj., 50 mg/ml, Tk. 115.43/10
ml vial

Ketaride (*Incepta*), Inj, 50 mg/ml, Tk.
115.00/10 ml vial

Pentyl(ACI), Inj., 50 mg/ml, Tk. 115.78/10ml
vial

PROPOFOL

Indications: Induction of anaesthesia, total intravenous anaesthesia, sedation during surgery, diagnostic procedures and in intensive care.

Cautions: Care must be taken in patients with cardiac diseases or who are hypovolaemic (bradycardia is common). Strict aseptic technique must be taken during use to avoid bacterial contamination.

Contraindications: History of propofol allergy, airway obstruction, sedation of children and ECT.

Side effects: Profound hypotension and respiratory depression apnoea more common and of longer duration than Thiopentone, hypersensitivity reactions; pain on injection.

Dose: Induction of anaesthesia, *by intravenous injection* or *by intravenous infusion* 1.5-2.5mg/kg (less in the ELDERLY) at a rate of 20–40 mg every 10 seconds. CHILD over 3 years 2.5 mg/kg adjusted as necessary

Maintenance of anaesthesia, *by intravenous infusion*, 4-12 mg/kg/hour or *by intermittent injection* (25-50 mg repeated according to response); CHILD over 3 years 9-15 mg/kg/hour

Sedation during intensive care (with assisted ventilation), *by intravenous infusion*, 0.3-4 mg/kg/hour for up to 3 days; CHILD is not recommended

Sedation for surgical and diagnostic procedures, initially *by intravenous injection* 0.5-1.0mg/kg over 1-5 minutes; maintenance, *by intravenous infusion* 1.5-4.5 mg/kg/hour, those over 55 years may require lower dose; CHILD is not recommended

Note. Propofol 2% should not be given

by bolus intravenous injection.

Proprietary Preparations

Propofol ^(f) (*Fresenius*) Inj. (IV Infusion) 1%,
Tk.270/10ml Tk. 351.06/20 ml; Tk.779.00/50ml

Pofol (*Popular*), Inj., (IV Infusion), 1%, Tk.
200.75/20 ml

Propofol lipuro ^(f) (*B.Braun*) Inj., (IV Infusion),
1%, Tk. 585.25/50 ml; Tk.278.69/20ml

Propofol (*Techno*) Inj. (IV Infusion) 1%, Tk.
195.00/20 ml

Ufol (*Incepta*), , Inj. (IV Infusion) 1%, Tk.
300.00/20 ml

THIOPENTONE SODIUM ^[ED]

(Thiopental sodium)

Thiopentone sodium is a widely used, rapid onset, ultra-short acting barbiturates, rapidly reaches the brain and causes unconsciousness within 30-40 seconds.

Indications: Induction of general anaesthesia and in the treatment of status epilepticus.

Cautions: Its potency makes it a highly dangerous drug in inexperienced hands. It is very easy to give an over dose to sick and elderly alone. It should never be given patients in the sitting position. Should never be given rapidly to any but fit and robust. Apparatus capable of ventilating should always be readily available. Unsuitable for use in out patients

Contraindications: Airway obstruction, hypersensitivity to barbiturate, severe shock, uncompensated heart disease, status asthmaticus.

Interactions: See Appendix-2

Side-effects: Apnoea, hypotension.

Dose: *By intravenous injection* as a 2.5% solution; the dose required to produce anesthesia varies, and the response to each patient must be assessed carefully. In adults, initially 3-5 mg/kg (reduced in elderly or debilitated) over 15–20 seconds (longer in elderly or debilitated), followed by further quantity (50–100 mg) as supplementary dose to be given if necessary according to response after 30–60 seconds; CHILD induction 2-4 mg/kg.

Proprietary Preparations

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Genisia (Square), Inj., 500 mg/Vial, Tk. 69.59/Vial

G-Thiopental (Gonoshasthaya), Inj., 1 gm/Vial, Tk. 100.00/Vial; 500 mg/Vial, Tk. 64.69/Vial

Thiaton (Techno), Inj., 1 gm/Vial, Tk. 100.00/Vial; 500 mg/Vial, Tk. 60.00/Vial

Thiopon (ACI), Inj., 1 gm/Vial, Tk. 100.68/Vial; Inj., 500 mg/Vial, Tk. 70.05/Vial

TPS (Popular), Inj., 1gm/Vial, Tk. 90.00/Vial 500 mg/Vial, Tk. 100.68/Vial

8.1.2 INHALATIONAL ANAESTHETICS

HALOTHANE^[ED]

Halothane is a potent volatile liquid anaesthetic commonly used in clinical practice.

Indication: For induction and maintenance of anaesthesia.

Cautions: Patients with intracranial mass lesion, should be used with great caution

Contraindications: A history of unexplained jaundice or pyrexia in a patient following exposure to halothane is absolute contraindication for its future use in that patient; repeated use of halothane within a period of at least 3 months; severe arrhythmia;

Side-effects: Respiratory and myocardial depression, hypotension, arrhythmias; post operative shivering.

Dose: Using a specifically calibrated vaporizer for induction concentration increased gradually up to 2–4 % in oxygen or nitrous oxide-oxygen; CHILD 1.5–2%. Maintenance 0.5–2 % using by MAC.

Proprietary Preparation

Halosin (ACI), Inhalation anesthetic , Tk. 187.00gm/100ml, Tk. 1890.45/250ml , Tk. 1504.00/200ml

ISOFLOURANE

Indication: Same as that of halothane.

Cautions: Heart rate may rise particularly in younger patients. Systemic arterial pressure may fall, owing to a decrease in systemic vascular resistance and with less decrease in cardiac output than occurs with halothane. Respiration is depressed.

Contraindication: Hepatic impairment.

Interaction: See Appendix-2

Side-effects: Profound respiratory depression in high dose.

Dose: Using a specifically calibrated vaporizer, induction, increased gradually from 0.5% to 3%, in oxygen or nitrous oxide-oxygen *Maintenance*, 1.1 to 1.5% in nitrous(MAC) oxide-oxygen; an additional 0.5-1% may be required when given with oxygen alone; caesarean section, 0.5-0.75% in nitrous oxide-oxygen

Proprietary Preparation

Forane⁽ⁱ⁾ (Abbott) Inhalation anesthetic Tk. 3666.00/100ml

Flurane(Techno), Inhalation anesthetic Tk. 3,009.00/100ml

NITROUS OXIDE^[ED]

Indications: Used for maintenance of anesthesia and for augmentation analgesia in case of changing painful dressing.

Cautions: The most obvious problem with nitrous oxide administration is hypoxia. So oxygen concentration of at least 30 % should be given.

Side-effects: Diffusion hypoxia, middle ear and obstructed intestine, vitamin B₁₂ deficiency and depression of bone marrow.

Dose: It is commonly used in a concentration of 50 to 70% in oxygen as part of a balanced anaesthetic technique. For analgesia, a mixture with 50% oxygen.

Proprietary Preparation

Nitrous oxide(Linda), Inhalation gas, nitrous oxide 98%, Tk. 2875/3.60 kiloliter

Entonox (Linda) ,Inhalation gas, nitrous oxide 50% + oxygen 50%, Tk. 1300/kilo liter

Medical compressed gas(Linda), 20.4-21.4%+Nitrogen, Tk. 342.24/6.2 cubic meter

SEVOFLURANE

Indications: Induction and maintenance of anaesthesia. It is particularly useful in children. Single breath induction.

Caution: Renal impairment.

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Contraindications & Side effects: Same as other volatile anaesthetics.

Dose: It has a MAC value of 1.71-2.05. 2-3% for induction, being higher in children and reduced in the presence of nitrous oxide

Proprietary Preparation

Sevorane[®] (Abbott) Inhalation anesthetic
Tk.15500.00/250 ml

Sevoran(Techno) Inhalation anesthetic
Tk.10500.00/250 ml

8.1.3 ANTIMUSCARINIC AND ANXIOLYTIC DRUGS FOR PERI OPERATIVE USE

ANTIMUSCARINIC DRUGS

ATROPINE SULPHATE [ED]

Indications: For drying of secretions and reversal of excessive bradycardia; with neostigmine to antagonize its muscarinic action, acute arrhythmias after myocardial infarction and during cardiopulmonary resuscitation.

Cautions: Marked tachycardia in thyrotoxicosis, hyperpyrexial patients, in glaucoma children, in the elderly, reflux oesophagitis, diarrhoea, acute myocardial infarction, hypertension, pregnancy and breast-feeding.

Contraindications: In angle-closure glaucoma, myasthenia gravis, paralytic ileus, pyloric stenosis and prostatic enlargement.

Side-effects: Constipation, initial bradycardia, reduced bronchial secretions, urinary urgency and retention, dilatation of the pupils with loss of accommodation, photophobia, dry mouth, flushing and dryness of the skin.

Dose: Premedication, by *intravenous injection*, 300-600 micrograms immediately before induction of anaesthesia, and in incremental doses of 100micrograms for the treatment of bradycardia.

By *intramuscular injection*, 300-600 micrograms 30-60 minutes before anaesthesia induction; CHILD 20 micrograms/kg.

for control of muscarinic side-effects of neostigmine in reversal of competitive

neuromuscular block, by *intravenous injection*, 0.6-1.2 mg usually used in a ratio of 2.5 mg neostigmine to 1mg.

Proprietary Preparations

See section 2.2

GLYCOPYRRONIUM BROMIDE

Indications: To reduce salivary, tracheobronchial, and pharyngeal secretions and for decreasing the acid secretion. It is also used in conjunction with neostigmine to prevent the muscarinic effect of neostigmine.

Cautions: thyrotoxicosis, arrhythmia, hypertension, congestive heart failure pregnancy

Contraindications: Pregnancy, breast-feeding, enlarged prostate, glaucoma

Side-effects: Fever, dry mouth, difficulty in urinating, blurred vision.

Dose: Premedication, by *intramuscular or intravenous injection*, 200-400 micrograms or 4-5 micrograms/kg (max. 400 micrograms); CHILD 1 month-12 years, 4-8 micrograms/kg (max. 200 micrograms) Intra-operative bradycardia, by *intravenous injection*, 200-400 micrograms or 4-5 micrograms/kg (max. 400 micrograms), repeated if necessary; CHILD 1month-18 years, 4-8 micrograms/kg (max. 200 micrograms), repeated if necessary.

Control of muscarinic side-effects of neostigmine in reversal of non-depolarising neuromuscular block, by *intravenous injection*, 200 micrograms per 1mg of neostigmine, or 10-15 micrograms/kg; CHILD 1month-12 years, 10 micrograms/kg (max. 500 micrograms)

Proprietary Preparation

Seebri Breezhaler[®] (Novartis) Inhalation Powder Hard Cap., 50 mcg, Tk. 99.50/Cap

Supotaria (Incepta), Cap. , 50 mcg, Tk. 20.00/Cap.; Inj., 200 mcg/ml, Tk. 90.00/Amp

HYOSCINE HYDROBROMIDE

(Scopolamine Hydrobromide)

Indications: Used as a sedative, amnesic and anti-sialogogue in

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premedication, antiemetic and in the treatment of motion sickness

Caution: As atropine sulphate.

Side effects: Excitement, ataxia, hallucinations, behavioral abnormalities, and drowsiness.

Dose: Premedication, *by subcutaneous or intramuscular injection*, 200–600 micrograms 30–60 minutes before induction of anaesthesia (often given with papaveretum)

Proprietary Preparations

Buscon (*Ibn Sina*), Inj., 20 mg/ml, Tk. 29.50/Amp.

Colik (*ACI*), Inj., 20 mg/ml, Tk. 29.90/amp

G-Hyoscine (*Gonoshasthaya*), Inj., 20 mg/ml, Tk. 7.75/Amp.

Hysomide (*Opsonin*), Inj., 20 mg/ml, Tk. 29.90/Amp.

Spasmoson (*Jayson*), Inj., 20 mg/ml, Tk. 15.00/Amp.

Papaveretum and Hyoscine

Inj. Papaveretum 15.4 mg + hyoscine hydrobromide 400 micrograms/ml, 1 ml amp.

ANXIOLYTICS

(See also section 7.1 & 7.2)

Benzodiazepines (e.g. **Diazepam**, **Lorazepam** and **Midazolam**) are widely used.

BENZODIAZEPINES

DIAZEPAM^[ED] [CD]

(See also section 7.1)

Indications: For premedication including anxiolysis, sedation and amnesia and regarded as a drug of first choice in the treatment and prevention of all kinds of convulsive condition.

Cautions: Marked respiratory depression; hepatic and renal impairment particularly the elderly. Diazepam injection cannot be diluted and it precipitates when mixed with most other agents.

Interactions: See Appendix-2

Side-effects: Pain, thrombophlebitis, tenderness have occurred following injection of diazepam.

Dose: *By mouth*, 5 mg on night before

minor or dental surgery then 5 mg 2 hours before procedure.

By intravenous injection, into a large vein 10–20 mg over 2–4 minutes as sedative cover for minor surgery or invasive medical procedure; premedication 100–200 micrograms/kg.

Proprietary Preparations

See section 7.1

MIDAZOLAM

Indications: Premedication before general anaesthesia, induction of anaesthesia, to provide sedative care for minor surgical or investigative procedures; patients in intensive care

Cautions and Side effects: same as for diazepam

Interactions: See Appendix-2

Dose: Premedication, *by intramuscular injection*, 70–100 micrograms/kg 30–60 minutes before surgery; usual dose 5 mg (ELDERLY 2.5 mg)

Induction of anaesthesia, *by slow intravenous injection*, 200 micrograms/kg (ELDERLY 100–200 microgram/kg; CHILD over 7 years 100 microgram/kg) Sedation of patients receiving intensive care, *by intravenous infusion*, initially 30–100 micrograms/kg given over 5 minutes, then 30–150 micrograms/kg per hour; reduce dose or omit initial dose in hypovolaemia, vasoconstriction or hypothermia.

Sedation for dental, minor surgical and other procedures, *by intravenous injection*, 2 mg initially (half in elderly) over 30 seconds followed after 2 minutes by increments of 0.5–1 mg if sedation not adequate; usual total dose 2.5 to 7.5 mg (~70 micrograms/kg), elderly 1–2 mg.

Proprietary Preparations

Dormilat (*ACI*), Inj, 1mg/ ml, Tk. 55.17/ amp.; 15mg/3ml, Tk. 75.23/3ml amp

Hypnofast (*Incepta*), Inj, 1mg/ ml, Tk. 50/ amp.; 15mg/3 ml, Tk. 90.00/3ml amp.

Dormitol (*Square*), Inj, 15mg/3 ml, Tk. 120.37/3ml amp.;

Midzo (*Renata*), Inj, 15mg/3 ml, Tk. 75/3ml amp,

Dormax (*Aristo*), Inj, 15mg/3 ml, Tk. 75/3ml amp.

8. ANAESTHESIA

Milam (*Eskayef*), Inj, 15mg/3 ml , Tk. 120/3 ml amp,;
Anquil (*General*), Inj, 15mg/3 ml, Tk. 75.22/3ml
Midolam (*Opsonin*), Inj, 15mg/3 ml , Tk. 50.19/5mg amp.; 1mg/ ml , Tk. 75.28/amp.; , ;

Opifen (*Incepta*), Inj., 100 mcg/2 ml, Tk. 40.00/Amp
Fentanyl(*Renata*), Inj, 100 mcg/2 ml, Tk. 40.15/2 ml amp

8.1.4 ANALGESICS FOR PERI OPERATIVE USE

8.1.4.1 OPIOIDS 8.1.4.2 NON-OPIOIDS

8.1.4.1 OPIOIDS

(See also section 7.5.1)

FENTANYL^[CD]

Indications: For analgesia during operation; for epidural anesthesia as adjuvant.

Cautions: Analgesic doses of fentanyl will always cause respiratory depression, truncal rigidity and facilities for its treatment must be immediately available.

Side-effects: Abdominal pain, asthenia, anorexia, anxiety, diarrhoea, dyspepsia, dyspnoea, gastro esophageal reflux disease, hypertension, myoclonus, paraesthesia, pharyngitis, rhinitis, stomatitis and vasodilatation.

Contraindications: Hypersensitive to fentanyl citrate or other opioid medicines.

Dose: By intravenous injection, with spontaneous respiration, 50-200 micrograms, and then 50 micrograms as required. For CHILD, 3-5 microgram/kg, and then 1 microgram/kg as required. With assisted ventilation, 0.3–3.5 mg, then 100-200 micrograms as required. CHILD 15 micrograms/kg, then 1–3 micrograms/kg as required.

Proprietary Preparations

Durogesic[®] (*Janseen*,), Transdermal Patch, 25micrograms, /h, (Fentanyl 4.2mg/unit dose) Tk. 650.03/patch.; 50 micrograms/h, (Fentanyl 8.4mg/unit dose); Tk. 1293.21/Patch

Fentanyl[®], (*Rotex*) , Inj., 0.1mg/2ml , Tk. 36.76/2mlAmp

Fentanyl HEXAL MAT[®] (*Hexel*) , Transdermal patch (matrix), 25 mcg/h, Tk. 370.00/Patch

Fentyl (*Popular*), Inj., 100 mcg/2 ml, Tk. 40.15/Amp.

MORPHINE SULPHATE^[ED] [CD]

(See section 7.5.1)

Indications: Moderate to severe acute pain, chronic pain often in terminal illness, relief of anxiety in serious and frightening condition, relief of dyspnoea in acute left ventricular failure, cardiac ischaemia, premedication before operation.

Cautions: Depressant action in all level. Concern about overdose and monitoring.

Contraindications: Adrenocortical insufficiency, severe liver diseases, hypothyroidism, diverticulitis, and other spastic condition of the colon, biliary colic, patients treated with MAOIs, elderly patients, during labour, confusion and vomiting.

Side-effects: Overdoses causes respiratory failure, cardiovascular collapse and coma.

Dose: Usual adult dose for pain oral, sublingual, or buccal: 5 to 30 mg every 3 to 4 hours as needed Extended-release capsules: 100 mg and 200 mg for use only in opioid tolerant patients: To be taken orally 1 to 2 times daily swallowed whole or opened and sprinkled on a small amount of applesauce immediately prior to ingestion. Maximum dose: 1600 mg orally daily

IM or subcutaneous: 2.5 to 20 mg every 3 to 4 hours as needed.

IV: 4 to 15 mg every 3 to 4 hours as needed. Give very slowly over 4 to 5 minutes. Starting doses up to 15 mg every 4 hours have been used. Chest pain: 2 to 4 mg repeat as necessary.

Continuous IV: 0.8 to 10 mg/hour. Maintenance dose: 0.8 to 80 mg/hour. Rates up to 440 mg/hour have been used.

IV patient controlled analgesia or subcutaneous patient controlled analgesia: 1 to 2 mg injected 30 minutes after a standard IV dose of 5 to 20 mg. The lockout period is 6 to 15 minutes.

8. ANAESTHESIA

The 4 hour limit is 30 mg.
Continuous subcutaneous: 1 mg/hour after a standard dose of 5 to 20 mg.

Epidural: 5 mg one time. May give 1 to 2 mg more after one hour to a maximum of 10 mg. *Intrathecal*: 0.2 to 1 mg one time
Intrathecal Continuous: 0.2 mg/24 hours. May be increased up to 20 mg/24 hours.
Rectal: 10 to 30 mg every 4 hours as needed.

Usual pediatric dose for pain:

Less than or equal to 4 weeks:
Use preservative-free formulation:
Initial: 0.05 mg/kg/IM, IV, or subcutaneously every 4 to 8 hours titrating carefully to effect. Maximum dose: 0.1 mg/kg/dose.
Continuous Infusion: 0.01 mg/kg/hour continuous IV infusion. Do not exceed infusion rates of 0.015 to 0.02 mg/kg/hour.

Greater than or equal to 1 month but less than 12 years:
Oral: 0.2 to 0.5 mg/kg / dose every 4 to 6 hours (tablets/solution) or 0.3 to 0.6 mg/kg/dose every 12 hours (extended release)

IM, subcutaneous, IV: 0.05 to 0.2 mg/kg/dose (up to 15 mg) every 4 hours as needed.

IV/subcutaneous Continuous: 0.025 to 0.206 mg/kg/hour (sickle cell or cancer pain) or 0.01 to 0.04 mg/kg/hour (postop pain)

Epidural: (use preservative-free formulation): 0.025 mg/kg/dose every 6 to 8 hours (postop pain). Maximum per 24 hours: 5 mg.

Greater than or equal to 12 years:
Premedication for anesthesia IV: 3 to 4 mg once, may repeat in 5 minutes if necessary. *Oral*: 0.2 to 0.5 mg/kg/dose every 4 to 6 hours (tablets/solution) or 0.3 to 0.6 mg/kg/dose every 12 hours (extended release). *IM, subcutaneous, IV*: 0.05 to 0.2 mg/kg/dose (up to 15 mg) every 4 hours as needed.
IV/subcutaneous Continuous: 0.025 to 0.206 mg/kg/hour (sickle cell or cancer pain) or 0.01 to 0.04 mg/kg/hour (postop pain). *Epidural* (use preservative-free formulation): 0.025 mg/kg/dose every 6 to 8 hours (pastor pain). Maximum per 24 hours: 5mg. *IV patient controlled analgesia*: 0.015 mg/kg/dose (postop

pain); lockout period of 10 minutes; 4 hour limit of 0.25 mg/kg.

Dose adjustments: Titrate doses slowly upward, taking into consideration the dosages received for breakthrough pain, to meet the specific needs of a patient.

Factors such as age, disease state, concomitant drug therapy, and tolerance to narcotics can have variable but important effects on dose and response. Women have been reported to require more morphine than men to achieve a similar degree of analgesia.

If a patient is not able to take oral morphine, divide the oral dose by half and give subcutaneously. If the IV route is preferred, the oral dose may be divided by 3.

The potency ration of oral to rectal morphine is 1:1.

Proprietary Preparations

See also section 7.5.1

NALBUPHINE (Opioid analgesic drug and opioid receptor antagonist)

Indications: Used for premedication, anaesthesia and treatment of pain.

Side- effects : Vomiting is thought to be less than with morphine, although maximal attainable analgesia is also less, psychomimetic effects.

Dose: 0.1–0.3 mg/kg IV/IM/SC. Up to 1.0 mg/kg IV has been used during anaesthesia.

Proprietary Preparations

Nabulex (General), Inj., 20 mg/2 ml, Tk. 100.30/2ml Amp

Nalbutin (ACI), Inj., 20 mg/2 ml, Tk. 100.30/2ml Amp, 10 mg/1 ml, Tk. 60.18/1 ml Amp

Nalphin (Acme), Inj., 10 mg/1 ml, Tk. 60.40/1 ml Amp.; 20 mg/2 ml, Tk. 100.30/2 ml Amp

Radirif (Square), Inj., 20 mg/2 ml, Tk. 100.68/2ml Amp

Nalbun (Incepta), Inj., 20 mg/2 ml, Tk. 100.00/2 ml Amp.; 10 mg/1 ml, Tk. 60.00/1 ml Amp.;

Raltrox (Opsonin), Inj., 10 mg/1 ml, Tk. 60.23/1 ml Amp.; 20 mg/2 ml, Tk. 100.68/2ml Amp

PETHIDINE HYDROCHLORIDE^{[ED] [CD]}

(See section . 7.5.1)

8. ANAESTHESIA

Indications: Same as that of Morphine; also for labor analgesia.

Contraindication: Same as that of Morphine.

Side-effects: May cause convulsions, especially in children.

Dose: May be given by mouth, IM, IV.

For analgesia: Oral/IM- 50-100mg every 3-4h as necessary. For premedication: IM 50-100mg ig given before operation.

As balanced anaesthesia; 10-15 mg IV, Supplementary necessary every 20-30 min.

In tachypnoea IV upto 25mg.

For obstetric use: 100-150 mg IM when labour pain become regular then repeated every 2-3 h as required.

For epidural anaesthesia as adjuvant; 2-200 microgram/kg body weight.

Proprietary Preparation

See also section 7.5.1

TRAMADOL

Indications: Moderate to severe pain with CKD, CLD.

Contraindications: Severe asthma, intestinal obstruction, patients taking narcotic medicines or sedatives.

Side-effects: Headache, dizziness, drowsiness, constipation, diarrhoea, nausea, vomiting, stomach pain; feeling nervous or anxious; itching, sweating, flushing, seizure, shallow breathing

Dose: Usual ADULT dose for pain: For acute pain 3mg/kg IV, increment of 50-100mg, until adequate relief is obtained, upto 400mg per day. For mild to moderate severe chronic pain not requiring rapid onset of analgesic effect: Initial dose: 25 mg every morning Titration: Increase in 25 mg increments as separate doses every 3 days to reach 100 mg per day taken as 25 mg 4 times per day. Then the total daily dose may be increased by 50 mg as tolerated every 3 days to reach 200 mg per day taken as 50 mg 4 times per day. Maintenance: After titration, tramadol 50 mg to 100 mg can be administered as

needed for pain relief every 4 to 6 hours not to exceed 400 mg per day.

Tramadol Extended-Release (ER)

16 years and older: Initial: 100 mg once daily. Titrate by 100 mg increments every 2 to 3 days if needed for pain control Maximum: 300 mg/day

Proprietary Preparations

See section 7.5.1

8.1.4.2 NON-OPIOIDS

(See also section 7.5.2&9.1.1)

DICLOFENAC

(See section 9.1.1)

Indications: Moderate pain of musculoskeletal origin including tendinitis and bursitis conditions, rheumatoid and osteoarthritis.

Side-effects: Gastro-intestinal effects; long-term diclofenac treatment can raise plasma aminotransferase levels, allergic reactions, fluid retention.

Cautions: PUD, bleeding disorder, renal disorder.

Dose: 100-200 mg 2 to 4 times daily. Depending on the diclofenac formulation used and the condition being treated.

Proprietary Preparations

See section 9.1.1

IBUPROFEN^{ED}

(See section 9.1.1)

Indications: Dysmenorrhea, osteoarthritis, rheumatoid arthritis and juvenile idiopathic arthritis and fever.

Contraindication and side-effects: Similar to other NSAIDs.

Dose: 10 mg/kg can be administered by mouth every 6–8 hours. Individuals should not use ibuprofen for more than 10 days for the treatment of pain or more than 3 days for the treatment of a fever unless directed by a physician. Ibuprofen should be taken with meals to prevent stomach upset. Children 6 months to 12 years of age usually are given 5-10 mg/kg of ibuprofen every 6-8 hours for the treatment of fever and pain. The maximum dose is 40 mg/kg daily.

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Proprietary Preparations

See section 9.1.1

KETOROLAC

(See also section 9.1.1)

Indications: Moderately severe pain, usually after surgery.

Caution: It should be taken at around the same times every day.

Contraindication: CHILD under two years.

Side-effects: Somnolence, dyspepsia, pruritus, oedema, increased blood urea nitrogen, drowsiness, hypertension, blurred vision, bronchospasm, cholestatic jaundice, depression, insomnia, laryngeal/lingual edema.

Dose: ADULT- Moderately Severe Acute Pain.

Short-term (≤ 5 days) management of moderately severe acute pain that requires analgesia at opioid level; not indicated for minor or chronic painful conditions.

IV: 30 mg as single dose or 30 mg q6hr; not to exceed 120 mg/day.

IM: 60 mg as single dose or 30 mg q6hr; not to exceed 120 mg/day.

PO: 20 mg once after IV or IM therapy, then 10 mg q4-6hr; not to exceed 40 mg/day.

Dosing Considerations:

Always begin with parenteral therapy; oral administration indicated only as continuation of IV/IM dosing, if necessary. Duration of therapy should not exceed 5 days.

Doses beyond maximum or labeled doses will not provide better efficacy but will increase risk of serious adverse events.

Decrease daily dose in patients >65 years, <50 kg, or with moderately elevated serum creatinine.

Following intravenous therapy, the recommended dose is one or two tablets initially followed by 1 tablet every 4-6 hours.

PAEDIARTIC

Moderately Severe Acute Pain
2-16 years

Single dose: 0.5 mg/kg IV/IM once; not to exceed 15 mg

Multiple doses: 0.5 mg/kg IV/IM q6hr; not to exceed 5 days

GERIATRIC

Moderately Severe Acute Pain

Short-term (≤ 5 days) management of moderately severe acute pain that requires analgesia at opioid level; not indicated for minor or chronic painful conditions

IV: 15 mg as single dose or 15 mg q6hr; not to exceed 60 mg/day

IM: 30 mg as single dose or 15 mg q6hr; not to exceed 60 mg/day

PO: 10 mg once after IV or IM therapy, then 10 mg q4-6hr; not to exceed 40 mg/day.

Proprietary Preparations

See section 9.1.1.

PARACETAMOL^[ED]

(See section 7.5.2.)

Indications: Mild, moderate, acute pain.

Side-effects: nausea, vomiting, anorexia and abdominal pain. Dose dependent hepatic necrosis.

Dose: 10–15 mg/kg every 4–6 hours administered by mouth or rectally is a safe and effective method for controlling postoperative pain.

IV :30-40mg/kg

Proprietary Preparations

See section 7.5.2.

8.1.5 MUSCLE RELAXANTS

Muscle relaxants used in anesthesia are also known as **neuromuscular blocking drug**. By specific blockades of the neuromuscular junction they enable adequate relaxation of the muscle of the abdomen and diaphragm. They also relax the vocal cord and allow the passage of tracheal tube.

NON-DEPOLARISING MUSCLE RELAXANTS

Non-depolarizing muscle relaxants (also

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known as competitive muscle relaxants) compete with acetylcholine for receptor sites at the neuromuscular junction and their action may be reversed with anticholinesterases (e.g. Neostigmine, see section 8.1.6). Non-depolarising muscle relaxants may be divided into the aminosteroid group, which includes **Pancuronium**, **Pipecuronium**, **rocuronium** and **Vecuronium**, and the benzylisoquinolinium group, which includes **Atracurium**, **Cisatracurium** and **Gallamine**.

Non-depolarising muscle relaxants have a slower onset of action than **Suxamethonium**. These drugs can also be classified by their duration of action as short acting (10-20 minutes), intermediate-acting (40-60 minutes) and long-acting (60-120 minutes), although duration of action is dose-dependent. Drugs with a shorter or intermediate duration of action, such as **Atracurium** and **Vecuronium**, are more widely employed than those with a longer duration of action such as **Pancuronium** or **Pipecuronium**.

Non-depolarizing muscle relaxants have no sedative or analgesic effects and are not considered to be a triggering factor for malignant hyperthermia.

Cautions: Allergic cross-reactivity between neuromuscular blocking agents has been reported; caution is advised in cases of hypersensitivity to these drugs. Their activity is prolonged in patients with myasthenia gravis and in hypothermia where lower doses are required. Resistance may develop in patients with burns who may require increased doses.

Side-effects: Benzyl isoquinolinium non-depolarizing muscle relaxants (except cisatracurium) are associated with histamine release, which can cause skin flushing, hypotension, tachycardia, bronchospasm and rarely, anaphylactoid reactions.

Interactions: Intensification or prolongation of action of inhalational or intravenous anaesthesia; reduction of action of corticosteroids.

ATRACURIUM BESYLATE

Indications: Used in surgery of moderate duration in the presence of renal or hepatic impairment.

Cautions and Side-effects: See notes above.

Dose: By intravenous injection, ADULT and CHILD over 1 month initially 0.3-0.6 mg/kg, then 0.1-0.2 mg/kg as required. By intravenous infusion, 5-10 micrograms/kg/ minute (300-600 micrograms/kg/hour).

Proprietary Preparations

Relaxon (Techno), Inj., 25 mg/2.5 ml, Tk.80.00/2.5 ml

Tracrium [®] (GSK.), Inj., 25 mg/2.5 ml, Tk.645.49/2.5 ml

CISATRACURIUM

Indications: Same as that of Atracurium

Cautions and Side-effects: See notes above.

Dose: By intravenous injection, intubation, 150 micrograms/kg; maintenance, 30micrograms/kg approx. every 20 minutes.

CHILD over 2 years, initially, 100 micrograms/kg; maintenance, 20 micrograms/kg approx. every 9 minutes

By intravenous infusion, ADULT and CHILD over 2 years, initially, 3 micrograms/kg/minute, then 1-2 mg/kg/minute; dose reduced by up to 40% if used with inhalation anaesthetist
CHILD under 2 years not recommended.

Generic Preparation

Inj. 2 mg/ml 2.5 ml amp; 5 mg/ml 30 ml vial.

PANCURONIUM BROMIDE

Indications: Neuromuscular relaxation of fairly long duration (60-90min)and emergency cases

Cautions: Hepatic and renal impairment and myasthenia gravis

Side-effects: See notes above

Dose: By intravenous injection, initially for intubation, 50-100 micrograms/kg then 10-20 micrograms/kg as required. CHILD initially 60-100 micrograms/kg, then 10-20 micrograms/kg; NEONATE

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30-40 micrograms/kg initially then 10-20 micrograms/kg
Intensive care, *By intravenous injection*
60 micrograms/kg every 60-90 minutes.

Proprietary Preparations

Panalon (Techno) Inj., 2mg/ml Tk. 275/Amp
Pancuronium^(®) (Rotex), Inj., 2mg/ml Tk.
650/Amp

PIPECURONIUM BROMIDE

Indications: Operation requiring for long time muscle relaxation

Cautions: Neuromuscular disorders, obese patients, hepatic or renal impairment

Contraindications: Myasthenia gravis and pregnancy; *see also notes above*

Side-effects: *See notes above*

Dose: 100microgram/kg to allow intubation.

Proprietary Preparations

Arduan^(®) (Richter), Inj. 4 mg/2 ml
Tk.1072.52/Amp
Pycuron(Techno) Inj. 4 mg/2 ml
Tk.475.00/Amp

ROCURONIUM BROMIDE

Indications, Cautions and Side-effects: *Similar to vecuronium.*

Dose: *By intravenous injection*, intubation, 600 micrograms/kg; maintenance, 150micrograms/kg.

By intravenous infusion, 300-600 micrograms/kg/hour (after initial intravenous injection of 600 micrograms/kg).
CHILD similar to adults; NEONATE not recommended.

Proprietary Preparations

Esmeron^(®) (Organon), Inj. 10mg/ml 5ml vial
Tk. 4400.00/Vial.
Rocuron IV (Incepta), Inj. 1 gm/100 ml,
Tk.300.00/Vial

VECURONIUM BROMIDE^[ED]

Indications: Any operation requiring muscle relaxation of any duration.

Cautions: same as for other competitive muscle relaxants; to be monitored continuously

Side effects: *See notes above.*

Dose: Because of its lack of cardiovascular side effects, vecuronium can be given in larger doses which shorten the time to onset and extend the duration of action. *By intravenous injection*, intubation, 80-100 micrograms/kg; maintenance 20-30 micrograms/kg according to response; NEONATE and INFANT up to 4 months, initially 10-20 micrograms/kg then incremental doses to achieve response; CHILD over 5 months, as ADULT dose (up to 1 year onset more rapid and high intubation dose may not be required)
By intravenous infusion, 0.8-1.4 micrograms/kg/minute (after initial intravenous injection of 40-100 micrograms/kg).

Proprietary Preparations

Nor Q (Incepta), Inj., 10 mg/Vial, Tk. 185.00/Vial
Vencur(Popular), Tab., 10 mg/Vial, Tk. 200.00/Vial
Vencuron (Techno), Inj., 10 mg/Vial, Tk. 185.00/Vial; 4 mg/ml, Tk. 80.00/Vial
Survec (Healthcare), Inj., 10mg/ml , Tk. 350.00/vial.
Vecuron (ACI), Inj., 4mg/ml, Tk. 82.56/vial

DEPOLARISING MUSCLE RELAXANTS

SUXAMETHONIUM CHLORIDE^[ED]

Indications: Endoscopies, manipulations and electroconvulsive therapy and as an aid to tracheal intubation (profound skeletal muscle relaxation is required for short periods)

Cautions: Patients with cardiac, respiratory or neuromuscular disease; raised intraocular pressure and hyperkalaemia.

Contraindications: Severe liver diseases, burned patients, degenerating muscle mass, paraplegia of recent onset and major limb trauma, family history of malignant hyperthermia, known low plasma cholinesterase activity and penetrating eye injury.

Side effects: Postoperative muscle pain, myoglobinaemia, tachycardia, arrhythmia, bronchospasm, prolonged respiratory depression, hyperkalaemia,

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hyperthermia, see also notes above.

Dose: By intravenous injection, ADULT 1 mg/kg (range 0.3-1.5 mg/kg); usual range 20-100 mg; max. 500 mg/hour; CHILD 1-12 years, 1-2 mg/kg; INFANT under 1 year, 2 mg/kg By intravenous infusion of a solution containing 1-2 mg/ml (0.1-0.2%), 2-5 mg/minute; max. 500 mg/hour.

By intramuscular injection, CHILD up to 4 mg/kg; max. 150 mg; INFANT up to 4-5 mg/kg

Proprietary Preparations

G-Suxamethonium (*Gonoshasthaya*), Inj.,

100mg/2ml, Tk. 7.50/ Amp

Neosuxa (*Popular*), Inj., 100 mg/2 ml, Tk.

8.43/ Amp

Rapilax (*ACI*), Inj., 100 mg/2 ml, Tk.

17.25/Amp

Suxalax (*Square*), Inj. 100 mg/2 ml, Tk.

17.00/ Amp.

Suxonium (*Techno*), Inj., 100mg/2ml, Tk.8.40/ Amp

8.1.6 ANTICHOLINESTERASES USED IN ANAESTHESIA

(See also section 9.2.1)

NEOSTIGMINE METHYLSULPHATE^[ED]

Indications: To antagonize the effects of competitive neuromuscular blocking drugs and in the treatment of atony of the intestinal tract, atony of the bladder, myasthenia gravis, glaucoma and sinus tachycardia.

Cautions: Atropine should always be given with particular care in the presence of asthma and heart disease, must not be used in an attempt to reverse the action of Suxamethonium.

Side effects: Overdose of Neostigmine may cause sudden death due to cardiac arrest; restlessness, weakness, muscular twitching, dysarthria, pin-point pupils, nystagmus, sweating, salivation, nausea and vomiting, hypotension. Respiration is embarrassed by bronchospasm and excessive secretions and death due to respiratory paralysis and pulmonary edema may follow.

Dose: Reversal of non-depolarising neuromuscular blockade, by intravenous injection over 1 min, 50-70 micrograms/kg (max. 5 mg) after or with

atropine sulphate 0.6-1.2mg.

Proprietary Preparations

G-Neostigmine (*Gonoshasthaya*), Inj., 0.5mg/ml, Tk. 6.00/Amp.

Neos-R (*Renata*), Inj., 0.5 mg/ml, Tk.

8.00/Amp, Tk. 35.00/Amp

Neostig (*Popular*), Inj., 0.5 mg/ml,,

Tk.6.07/Amp

Prostigmin (*Novo Health*), Inj., 0.5 mg/ml,

Tk.6.00/Amp

Stigmin (*Techno*), Inj., 0.5 mg/ml,

Tk.6.00/Amp.

Stignal (*ACI*), Inj., 0.5 mg/ml,, Tk. 6.07/Amp

Versia (*Square*), Inj. 0.5 mg/ml, Tk. 7.04/Amp

8.1.7 ANTAGONISTS FOR RESPIRATORY DEPRESSION

Respiratory depression is a major concern with opioid analgesics. It may be reversed by **Naloxone** (analgesia may also be reversed). Alternatively, the respiratory stimulant **Doxapram** may be used which does not reverse the analgesic effect of the opioids.

NALOXONE HYDROCHLORIDE^[ED]

Indication: Reversal of opioid-induced respiratory depression.

Cautions: Cardiovascular disease physical dependence on opioids, repeated dose or infusion may be necessary to reverse effect of opioids with longer duration of action.

Side effects: Nausea, vomiting, tachycardia and fibrillation.

Dose: By intravenous injection, 100-200 micrograms (1.5-3 micrograms/kg); if response is inadequate, increments of 100 micrograms every 2 minutes; further doses by intramuscular injection after 1-2 hours if required.

Proprietary Preparation

Naloxone Hydrochloride ^(b) (*Mayne Pharma*),

Inj. 400 microgm/ml; Tk. 141.87/Vial

8.1.8 DRUGS FOR MALIGNANT HYPERTHERMIA

FLUMAZENIL

Flumazenil is a benzodiazepine antagonist. Flumazenil has a shorter

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half-life than that of diazepam and midazolam; therefore, it may have to be administered repeatedly.

Dose: The drug is given initially in a bolus of 0.2 mg intravenously and then in 0.1 mg increments until the desired end-point is reached. A total dose of 0.5 mg is usually sufficient. By continuous intravenous rates up to 1mg/h may be necessary to maintain a patient in a 'safe' condition.

Proprietary Preparation

Anexate[®] (Cenexi), Inj., 0.5 mg/5 ml, Tk. 2,548.92/5 ml Vial

8.2 LOCAL ANAESTHESIA

The great advantage of **Bupivacaine** over other local anaesthetics is its longest duration of action of the existing drugs. It has a slower onset of action. The degree of motor block increases .

BENZOCAINE

Indications: For the temporary relief of pain due to minor injury or irritation of the mouth and gums like Toothache, Sore gums, Canker sores, Braces, Minor dental procedures, Dentures

Dose: Apply to the affected area up to 4 times daily or as directed by a doctor/dentist.

Proprietary Preparations

Orogel (Square), Dental Gel, 20%, Tk.50.15/5gm

Oratics (Acme), oralGel, 20%, Tk.40.12/5gm

Benzocaine 14%+Butamben 2%+Tetracaine 2%.

Instasia (Ziska), Gel Tk. 350.00/30gm

LIGNOCAINE HYDROCHLORIDE^[ED]

(Lidocaine Hydrochloride)

Indications: To produce local anesthesia by infiltration, nerve, spinal, epidural and caudal block and topical application; for the control of the myocardial irritability and ventricular arrhythmias, particularly in the treatment following myocardial infarction.

Cautions: Wound; atopic dermatitis;

avoid use near eyes or middle ear; in anemia, or congenital or acquired methaemoglobinemia; epilepsy, hepatic or respiratory impairment, impaired cardiac conduction, bradycardia; porphyria; reduce dose in elderly or debilitated; patient resuscitative equipment should be available.

Contraindications: Hypovolemia and complete heart block.

Side effects: Numbness, pallor, tinnitus, excitement, restlessness, confusion, convulsions, respiratory depression, ventricular fibrillation, bradycardia and hypotension; hypersensitivity reported.

Dose: Epinephrine, unless otherwise contra-indicated, is normally used with lidocaine to delay absorption and prolong the action. *Infiltration anaesthesia*- a 0.5 per cent solution is commonly employed. According to patient's weight and nature of procedure max. 200 mg without or 500 mg with adrenaline. *Nerve block* -A 1 per cent solution is used with epinephrine, up to 10 ml for single nerves and 15-30 ml for brachial plexus block. *Epidural and caudal block*-A solution of 2 per cent lidocaine with 1:200 000 epinephrine is normally used. Spinal block-5 per cent hyperbaric solutions. (Not used at present). *Intravenous local anaesthesia* - 25-40 ml of 0.5 per cent lidocaine is used for the arm.

Surface anaesthesia, 2-4%.

May be in various forms, (a) *Cream* containing lignocaine 2.5 % with prilocaine 2.5 % ; (b) *Antiseptic gel* containing anhydrous lignocaine hydrochloride 2 % with chlorhexidine gluconate 0.25 % in a sterile lubricant basis; (c) *Anhydrous gel* containing anhydrous lignocaine hydrochloride 2% in a sterile lubricant water-miscible basis; (d) *Topical preparation* containing anhydrous lignocaine hydrochloride 40 mg/ml; (e) *Ointment*, containing lignocaine 5% in a water-miscible base (may include propylene glycol).

Proprietary Preparations

G-Lignocaine (Gonoshasthaya), Inj. 2%,

Jasocaine (Jayson), Inj. 1%, Inj 2%

Jasocaine (Jayson), Gel 2%

Leecain (Gaco), Gel 2 %,

8. ANAESTHESIA

Lido (*Square*), Spray Tk. 300.00/30ml
Lidocaine (*Aristo*), Inj, 1%, Tk. 3.06/3.5ml Amp, Tk. 2.95/2ml Amp.
Locaine (*Aristo*), Inj., 2%, Tk. 28.74/50ml
Xylogel (*UniMed*), Gel 2%, Tk. 100.00/30gm
Xylone (*ACI*), Inj., 2%, Tk. 3.57/2ml, 4% Tk. 3.75/2ml
Xyloken (*Opsonin*), Spray, 10gm/100 ml, Tk. 100.30/10ml Tk. 450.00/50ml
Z-lidocaine (*Ziska*), Gel, Tk. 90.00/30gm; Inj, 2%, Tk. 28.65/Amp
Lidocaine 2.5% + Prilocaine 2.5%
Topican (*Popular*), Cream, Tk. 130.49/5gm
Skisia (*Healthcare*), Cream, Tk. 135.00/5 gm
Xylone (*ACI*), Cream, Tk.130.39/5gm

Adrenaline+Lidocaine

Indications: Local Anesthetic

Note: Adrenaline must be in low concentration when administration with local anesthetic the total dose of adrenaline should not exceed 500 microgram

G-Lidocaine with Adrenaline (20 mcg+20 mg)/ml Inj.; Tk. 50.0/50 ml vial

Jasocaine-A (*Jayson*), 5 mcg+10 mg/ml Tk. 65.00/50ml vial, (5 mcg+20 mg)/ml Tk. 40.12/50 ml vial

EMLA (eutectic mixture of local anaesthetics)

Indications: Analgesia for venepuncture, venous and arterial cannulation, lumbar puncture, epidural injection, superficial skin surgery and relief of tourniquet pain during IVRA.

Side-effects: May produce blanching of the skin; increases in methaemoglobin have been reported several hours after application.

How to use: Providing analgesia of the skin 60–90 min after topical application and covering with an occlusive dressing. It may continue to be released from skin depots even after removal of surface cream. It is particularly useful in children.

Proprietary Preparations

Lidocaine 2.5% + Prilocaine 2.5%

Topican (*Popular*), Cream, Tk. 130.49/5gm

Skisia (*Healthcare*), Cream, Tk. 135.00/5 gm

Xylone Plus (*ACI*), Cream, Tk. 130.39/5gm

Emprila (*UniMed*), Cream, Tk. 100.00/5 gm

LIGNOCAINE INJECTION FOR DENTAL USE^[ED]

Note: A large variety of lignocaine

injection, plain or with adrenaline or nor-adrenaline, is available in the form of dental cartridges.

BUPIVACAINE HYDROCHLORIDE^[ED]

Indications: Particularly suitable for continuous epidural analgesia in labour and for single-dose epidural injections for surgery.

Cautions: Avoid accidental intravascular injection; because of its relatively greater toxicity on the heart and more resistant to treatment; precaution about over dose and hepatic impairment must be taken.

Contraindication: Intravenous regional anaesthesia.

Interactions: See Appendix-2

Side effects: See under *Lignocaine Hydrochloride*.

Dose: Adjusted according to patient's weight and nature of procedure. Maximum safe dose for bupivacaine is 0.5 mg/kg given at one time or in any 4-hour period.

Local infiltration-0.25% solution is commonly employed.

Peripheral nerve block- 0.5% solution is commonly employed.

Epidural block: 0.25–0.5% (max. 30 ml)

Spinal anaesthesia, 0.5 % anhydrous bupivacaine in 8 % dextrose solution, sterile injection, 2–4 ml

Note. 0.75% is contraindicated for epidural use in obstetrics.

Proprietary Preparations

Bupi (*Popular*), Inj., 5%, Tk. 60.23/30 ml

Nerkein (*Beximco*), Inj., 5%, Tk. 60.00/30 ml

Ultracaine (*Jayson*), Inj, 5%, Tk. 60.23/30 ml

Nerkein (*Beximco*), Inj., Tk. 59.99/30 ml

Pivacain (*ACI*), Inj., 0.25%, Tk. 45.31/20ml ; 0.5%, Tk. 60.41/30ml

Bupivacaine 0.5% + Dextrose 8%.

Anespine (*Square*), Inj., Tk. 30.20/14 ml Amp

Bupi Heavy (*Popular*), Inj., Tk. 30.11/20 ml; Tk. 60.23/30 ml

G-Bupivacaine Heavy (*Gonoshasthaya*) Inj., Tk. 28/4 ml

Pivacain (*ACI*), Inj., Tk. 30.20/4ml Amp

Sivacaine (*Renata*), Inj. Tk. 30.11/4 ml Amp

Spino (*Incepta*), Inj., Tk. 30.00/4 ml Amp

Ultracaine Heavy (*Jayson*), Inj., Tk. 30.11/4 ml Amp.

Vaspine (*Healthcare*), Inj. Tk. 32.00/4 ml Amp

Chapter 9

MUSCULOSKELETAL AND JOINT DISEASES

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9.1 DRUGS USED IN RHEUMATIC DISORDERS AND GOUT

- 9.1.1 NON-STEROIDAL ANTI-INFLAMMATORY DRUGS
- 9.1.2 CORTICOSTEROIDS
 - 9.1.2.1 Systemic Corticosteroids
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- 9.1.3 DISEASE-MODIFYING ANTIRHEUMATIC DRUGS
- 9.1.4 DRUGS FOR TREATMENT OF GOUT

9.1 DRUGS USED IN RHEUMATIC DISORDERS AND GOUT

9.1.1 NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs)

In single doses NSAIDs have analgesic activity comparable to that of paracetamol (see section on paracetamol), but paracetamol is preferred, particularly in the elderly. In regular full dosage NSAIDs have both lasting analgesic and anti-inflammatory effects, which make them particularly useful for the treatment of continuous or regular pain associated with inflammation. Therefore, NSAIDs are more appropriate than paracetamol in inflammatory arthritis (e.g. rheumatoid arthritis, juvenile chronic arthritis, ankylosing spondylitis) and in advanced osteoarthritis (osteoarthritis). They are also of

benefit in the less well defined conditions of back pain and soft-tissue disorders.

Cautions and Contra-indications: NSAIDs should be used with caution in the elderly in coagulative defects, and during pregnancy and breast feeding..

In patients with renal, hepatic or cardiac impairment caution is required since the use of NSAIDs may result in deterioration of renal function.

NSAIDs should also be used with caution in Crohn's disease or ulcerative colitis, as these conditions may be exacerbated.

They should be used with cautions in patients with a past history of cardiac failure or hypertension NSAIDs are contraindicated in patients with active hepatic ulcerations. They should be avoided in patients with previous gastrointestinal bleeding or ulcerations and should be withdrawn if gastrointestinal lesions develop. They are also contraindicated when there is a previous history of hypersensitivity to any NSAIDs.

In severe heart failure, all NSAIDs are contra-indicated. Diclofenac celecoxib, etoricoxib are contra-indicated in cerebrovascular disease, peripheral arterial disease, ischaemic heart disease and mild to severe heart failure.

Interactions: See Appendix-2.

Side-effects: Gastro-intestinal discomforts, diarrhoea, and occasionally bleeding and ulceration occur. The susceptibility to develop these side

9. MUSCULOSKELETAL AND JOINT DISEASES

effects while using a specific NSAID varies from patient to patient. Concomitant use of ranitidine or any other H₂ blockers is strongly recommended. Other side-effects include hypersensitivity reactions (particularly rashes, bronchospasm and angioedema), headache, dizziness, vertigo, tinnitus, photosensitivity and haematuria. Fluid retention may occur. Renal failure can be provoked, by NSAIDs. Hepatic damage, alveolitis, pancreatitis, Steven-Johnson syndrome and toxic epidermal necrosis are other rare side-effects. Aseptic meningitis has been reported; patients with connecting tissue disorders (eg. SLE) may be especially susceptible.

ACECLOFENAC

Indications: Pain and inflammation in osteoarthritis, rheumatoid arthritis and ankylosing spondylitis

Cautions: Avoid in porphyria; see notes above

Interactions: See Appendix-2

Side-effects: **Contra-indications:** See notes above

Dose: 100 mg twice daily (reduce to 100 mg daily in hepatic impairment). Child not recommended

Proprietary Preparations

AC PR(Pacific), Tab. 100 mg, Tk. 4.00/Tab.

Aceclofen(Astra Bio), Tab. 100 mg, Tk. 4.00/Tab.

Acocol(Ziska), Tab. 100 mg, Tk. 4.00/Tab.

Acefenac(General), Tab. 100mg, Tk. 4.01/Tab.

ACF(Decent), Tab., 100mg, Tk. 4.00/Tab.

Aclo(Alco), Tab. 100 mg, Tk. 4.00/Tab.

ACN(Modern), Tab. 100 mg, Tk. 4.00/Tab.

Alona(Kemiko), Tab. 100 mg, Tk. 4.01/Tab.

Apitac(Acme), Tab. 100.00 mg, Tk. 4.01/Tab.

Aros(Globe), Tab. 100 mg, Tk. 4.00/Tab.

Avenac(Radiant), Tab. 100mg, Tk. 5.02/Tab.

Ceclofen(Renata), Tab. 100 mg, Tk. 4.00/Tab.

Celofen(ACI), Tab. 100mg, Tk. 4.01/Tab.

Clofenta(Amico), Tab., 100mg, Tk. 3.00/Tab.

Ena(Asiatic), Tab. 100mg, Tk.3.00/Tab.

Fenacin(Nipa), Tab.,100 mg, Tk. 4.00/Tab.

Fixonac(Euro), Tab. 100mg, Tk. 4.00/Tab.

Flexi(Square), Tab., 200 mg, Tk.7.02/Tab.; 100 mg, Tk. 4.02/Tab.

Flexidol(SMC Enterprise), Tab. 100 mg, Tk. 3.00/Tab.

Freemax(Nuvista), Tab. 100 mg, Tk. 4.96.00/Tab.

Intas(Virgo), Tab. 100 mg, Tk. 350.00/Tab.

Lofens(Zenith), Tab. 100 mg, Tk. 1.51/Tab.

Mervan(Aristo), Tab. 200mg , Tk. 7.00/Tab.; 100mg, Tk. 4.00/Tab.

Movex(Opsonin), Tab. 200 mg , Tk. 7.00/Tab. ,Tab. 100 mg, Tk. 4.00/Tab.

Noak(Orion), Tab. , 100mg, Tk. 4.01/Tab.

Nofenac(Drug Intl), Tab. 100mg, Tk. 4.05/Tab.

Nostrin(Monico), Tab. 100mg, Tk. 3.00/Tab.

Orcenac(Organic), Tab. 100 mg, Tk. 4.02/Tab.

Orifen(Silva), Tab. 100mg, Tk. 2.51/Tab.

Ostoflex(Somatec), Tab. 100 mg, Tk. 4.00/Tab.

Paino(Eskayef), Tab. 100mg, Tk. 4.00/Tab.

Ponos(One Pharma), Tab. 100 mg, Tk. 3.99/Tab.

Preservin(Ibn Sina), Tab., 100 mg, Tk. 5.00/Tab.

Qrip(Sanofi), Tab. 100mg, Tk. 4.01/Tab.

Reservix(Incepta), Tab. 100 mg, Tk. 4.00/Tab.; 200 mg, Tk. 7.00/Tab.

Servex(Novo Healthcare), Tab. 100 mg, Tk. 4.00/Tab.

Tek(Team), Tab., 100 mg, Tk. 3.50/Tab.

Ternilla(Healthcare), Tab., 100mg, Tk. 5.00/Tab.

Tuffox(Eskayef), Tab., 100mg , Tk. 3.0114/Tab.

Xpain(G.A.Co), Tab. 100 mg, Tk. 3.01/Tab.

Xyfen(Supreme), Tab. 100mg, Tk., 3.00/Tab.

Zolfin(Beximco), Tab. 100mg, Tk. 4.00/Tab.

Zolonac(Sharif), Tab. 100 mg, Tk. 4.01/Tab.

ACEMETACIN

Indications: Pain and inflammation in rheumatic disease and other musculo-skeletal disorders, postoperative analgesia

Cautions: See under indometacin and notes above; driving and performance of skilled activities may be affected due to dizziness

Contraindications: See notes above

Dose: 60mg twice daily

Proprietary Preparation

Tendonil(Orion), Cap., 60 mg, Tk. 8/Cap.

CELECOXIB

Indications: Rheumatoid arthritis, advanced osteoarthritis, chronic musculoskeletal pain, post surgical and dental pain; adenomatous poliposis coli

9. MUSCULOSKELETAL AND JOINT DISEASES

Cautions: Hypertension, liver failure, renal failure; see *notes above*

Contra-indications: known hypersensitivity to this drug and sulfonamides; aspirin induced asthma, see *notes above*

Interactions: See *Appendix-2*

Side-effects: See *notes above*; headache insomnia, abnormal liver function tests

Dose: Rheumatoid arthritis, 100-200 mg twice a day; osteoarthritis, 100 mg twice a day; not recommended below 18 years as there is no clinical data available for this age group

Proprietary Preparations

Celenta(Incepta), Cap., 100 mg, Tk. 4.50/Cap.
Celoxib(Ziska), Cap., 100 mg, Tk. 6.75/Cap.
Cox B(Beximco), Cap., 100mg, Tk. 4.50/Cap.; Cap., 200mg, Tk. 8.00/Tab.

DEXIBRUPOFEN

Indications: Mild to moderate pain and inflammation associated with osteoarthritis and other musculoskeletal disorders; dysmenorrhoea and dental pain

Caution, Contraindications and Side-effects: See *notes above*

Dose: 600-900 mg daily in 3 divided doses; (max. 1.2g daily; max. single dose 400 mg)

Proprietary Preparations

Anaflam(Asiatic), Tab., 200mg, Tk. 3.00/Tab.; 300mg, Tk. 4.00/Tab.; 400mg, Tk. 5.00/Tab.;
Artoflex(Opsonin), Tab., 300 mg, Tk. 4.02/Tab.
Dexpro(Orion), Tab., 300 mg, Tk. 4.03/Tab.; 400 mg, Tk. 5.03/Tab.
Flamex(ACI) Tab., 200 mg, Tk. 0.88/Tab.; Tab., 400 mg, Tk. 1.43/Tab., Cap., 300mg, Tk. 4.01/cap.;
Inflam(Sanofi), Tab., 200mg, Tk. 3.02/Tab.; 300mg, Tk. 4.03/Tab.; 400mg, Tk. 5.04/Tab.
Purifen(Incepta), Susp., 100 mg/5 ml, Tk. 60.00/100ml; Tab., 300 mg, Tk. 3.00/Tab.; 400 mg, Tk. 5.00/Tab.
Serifen(Silva), Tab., 300mg, Tk. 4.02/Tab.; 400mg, Tk. 5.02/Tab.
Xflam(Square), Tab., 400 mg, Tk. 5.03/Tab.

DEXKETOPROFEN

Indications: Short term treatment of mild to moderate pain and inflammation including dysmenorrhoea

Caution, Contra-indications and Side-effects: See *notes above*

Dose: 12.5 mg every 4-6 hours or 25 mg every 8 hours; max. 75 mg daily; ELDERLY initially max. 50 mg daily; CHILD not recommended

Proprietary Preparations

Actidex(Incepta), Tab., 25 mg, Tk. 4.00/Tab.
Keto(Acme), Tab., 25 mg, Tk. 4.03/Tab.
Ketron D(ACI), Tab., 25 mg, Tk. 4.03/Tab.
Kynol D(Eskayef), Tab., 25 mg, Tk. 4.00/Tab.

DICLOFENAC POTASSIUM

Indications: Pain and inflammation in rheumatic disease and other musculoskeletal disorders; acute gout; post-operative pain; migraine

Caution, Contraindications and Side-effects: See *notes above*

Dose: Rheumatic disease, musculoskeletal disorders, acute gout, postoperative pain, 75-150 mg in 2-3 divided doses; CHILD over 14 years, 75-100 mg in 2-3 divided doses
Migraine, 50 mg at onset, repeated after 2 hours if necessary, then after 4-6 hours; max. 200 mg daily; CHILD not recommended

Proprietary Preparations

A-Fenac K(Acme), Tab., 50mg., Tk. 3.01/Tab.
Anuva(Novartis), Tab., 50 mg, Tk. 8.02/Tab.
Intafenac-K(Incepta), Tab., 50 mg, Tk. 3.00/Tab.
Kalinac(Square), Tab., 50 mg, Tk. 4.03/Tab
Nopain Drug Intl, Tab., 25mg, Tk. 2.05/Tab.; 50mg, Tk. 4.05/Tab

DICLOFENAC SODIUM

(See also 8.1.4.2)

Indications: Acute post-traumatic musculoskeletal pain, rheumatoid arthritis (including JCA), advanced osteoarthritis, acute gout, dysmenorrhoea, and post-operative pain

Cautions, Contra-indications and Side-effects Suppositories may cause rectal irritation; see *notes above*

Interactions: See *Appendix-2*

9. MUSCULOSKELETAL AND JOINT DISEASES

Dose: By mouth, 75-150 mg in 2 to 3 divided doses, preferably after meals. Dispersible preparations may be taken dissolved in water for rapid control of pain (for short period only). Slow release (SR) preparations, 100 mg once daily after meals (for management of chronic painful or inflammatory conditions)

By rectum in suppositories, 50 mg once to thrice a daily

By injections, 75 mg once or twice daily by IM injections into gluteal muscles for not more than 3 days. IV injections can be administered (in hospital settings, for post operative pain relief), 75 mg dissolved in 100 ml **Normal Saline** by slow infusion over 60 minutes, repeated in 4 to 6 hours if necessary

Maximum total daily dose by any or a combination of routes is 150 mg

CHILD 1-12 years, for JCA, can be given by mouth or by rectum 1-3 mg/kg daily in divided doses (as 25 mg tablets or 12.5 mg suppositories)

Proprietary Preparations

A-Fenac(Acme), Tab., 50.00 mg., Tk. 0.84/Tab.; 100 mg., Tk. 3.01/Tab.; 25 mg., Tk. 0.55/Tab.; Gel, 1%, Tk. 13.09/10gm; Inj., 75 mg./3 ml., Tk. 14.10/Amp.; Supp, 12.50 mg., Tk. 8.07/Supp, 50.00 mg., Tk. 14.10/Supp
Alterin(Euro), Tab., 50 mg, Tk. 1/Tab.; 100 mg, Tk.3.00/Tab.

Anodyne(Ibn Sina), Tab, 50 mg, Tk. 1.00/Tab.; Cap., 100 mg, Tk. 4.00/Cap.; Gel, 1%, Tk. 13.00/10gm.; Inj., 73mg/3ml , Tk. 12.00/Amp.

Apain(Kemiko), Cap., 100 mg, Tk. 3.01/Cap.
Apnac(Supreme), Tab. , 100mg, Tk. 3.00/Tab.; 50 mg, Tk. 0.85/Tab.

Clofenac(Square), Cap., 100 mg, Tk. 4.02/Cap.; Gel, 1%, Tk. 40.27/20gm.; Tab, 100 mg, Tk. 4.02/Tab., 50 mg, Tk. 1.51/Tab.; 46.50 mg,(dispersible) Tk. 4.02/Tab.; Gel, 1%Tk. 12.99/10gm.; Supp, 100 mg, Tk. 20.06/Supp.; 12.5 mg, Tk. 9.06/Supp. ; 50 mg, Tk. 15.10/supp, 25 mg, Tk. 12.09/Supp.;

DCF(Decent), Tab., 50mg, Tk. 0.60/Tab.
Diclofen(Opsonin), Inj., 75 mg /3 ml, Tk. 15.10/3ml.; Supp, 100 mg, Tk. 20.00/Supp.; 12.5 mg , Tk. 9.06/ Suppp.; 25 mg, Tk. 12.09/ Suppp.; 50 mg , Tk. 15.05/ Supp.; Gel, 1%, Tk. 12.95/1gm.; Tab, 100 mg, Tk. 3.01/Tab., 25 mg , Tk. 0.52/Tab., 50 mg, Tk 0.88/Tab.

Diclonac(Ziska), Cap. , 100 mg, Tk. 80.00/Cap.; Tab. , 50 mg , Tk. 83.00/Tab.; Inj., 75 mg/3 ml, Tk. 85.00/Amp.

Diclonil(Zenith), Tab., 50 mg, Tk. 0.80/Tab.; Cap, 100 mg , Tk. 3.01/Cap.

Diclovir(Virgo), TR Cap. , 100 mg , Tk. 150.00/Cap.

Dilock(Bristol), Cap., 100mg , Tk. 2.00/Cap.; Tab. , 100mg, Tk. 3.00/Tab.

Erdon(Aristo), Gel, 1%, Tk. 12.90/10g, Tk. 100.00/50g.; Supp., 50mg , Tk. 15.00/

Supp.;Cap., 300mg , Tk. 3.00/Cap.

Genac(Globe), Inj., 75 mg /3 ml, Tk. 14.00/Amp. ; Tab., 50 mg, Tk. 1.20/Tab.

Intafenac(Incepta), Tab, 50 mg, Tk. 0.75/Tab.

Locopain(Asiatic), TR Cap., 100mg , Tk. 3.00/Cap. ; Tab., 50 mg, Tk. 0.40/Tab.

Mobife(ACI), Supp, 12.50mg, Tk. 9.00/Supp 25mg, Tk. 12.00/Supp ,50mg Tk.12.00/supp; Tab.,50mg,Tk.0.88/Tab.,Cap100mg,Tk.3.02/C ap.,75mg,Tk.3.02/capSR100mg.,Tk.2.50/Cap.; Gel, 1%, Tk. 12.90/10g,

Moov(Astra Bio), Gel, 1%Tk. 13.00/10gm , Tk. 60.00/25gm; Cap , 100 mg, Tk. 2.50/Cap.

Movonac(Sharif), Cap. , 100 mg, Tk. 3.01/Cap.; Tab., 50 mg, Tk. 0.81/Tab.

Neofenac(Modern), Cap. , 100 mg., Tk. 3.00/Cap.

Novarin(Amico), Gel, 1%, Tk. 12.90/10gm.; Cap., 100mg , Tk. 2.50/Cap.

Orfenac(Orion), Cap. , 100 mg, Tk. 3.01/Cap. ; Tab. , 50 mg, Tk. 0.80/Tab.

Orgafen(Organic), Cap. , 100 mg, Tk. 3.01/Cap.

Panfre(Pacific), Cap. , 100 mg, Tk. 3.00/Cap. ; Gel, 1%, Tk. 15.00/10gm.; Inj., 75 mg/3 ml, Tk. 15.00/Vial; Gel, 1%, Tk. 40.15/20gm

Proflam(Novo Health),Cap., 100 mg, Tk. 3.00/Cap.; Tab. ,50 mg, Tk. 0.50/Tab.

Refain(Monico), Cap., 100mg, Tk. 3.00/Cap.;Inj., 75mg/3ml, Tk. 9.50/Amp.

Reutren(G.A.Co), Tab., 100 mg, Tk. 3.01/Tab.

Sifen(Silva), TR Cap., 100mg, Tk. 2.51/Cap.

Tenac(Team), Cap., 100 mg, Tk. 3.00/Cap.

Tolfenac-SR(Globex), Cap., 50 mg, Tk. 1.00/Tab.

Ultrafen(Beximco), Supp., 12.5mg, Tk. 9.00/Supp., 50mg,

Tk. 15.00/Supp.; Tab., 25mg, Tk. 0.54/Tab.; 50mg, Tk. 0.83/Tab.; 100mg, Tk. 3.00/Tab.;

Voligel(Beximco), Gel, 1%, Tk. 97.00/50 gm

Volinac(Square), Gel, 1%, Tk. 100/50gm

Volmax(Eskayef), Cap, 100mg, Tk. 3.00/Cap.;

Voltafen(Sharif), Gel, 1%, Tk. 97.29/50g ,TK.55.17/25g

Volitalin(Novartis), Inj., 75 mg/ 3ml, Tk.

135.00/Amp.; Supp, 100 mg, Tk. 65.00/Supp.; 12.5 mg, Tk. 31.00/Supp.; 25 mg, Tk .

35.00/Suspp.; 50 mg, Tk. 58.50/ Suspp.; Tab. , 25 mg, Tk. 4.01/Tab.; SR Tab. 50 mg , Tk.

8.50/Tab.; 100 mg, Tk. 18.00/Tab.; SR Tab. 75 mg, Tk. 11.03/Tab.

VolitalinD(Novartis)Dispersible Tab. 50mg , Tk.,8.02/Tab

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Voltalin Forte(Novartis), Tab., 50 mg, Tk. 8.50/Tab.

Diclofena 75 mg + Lidocaine 20 mg/2ml
A-Fenac Plus(Acme), Inj., Tk. 14.10/Amp
Apain Plus(Kemiko), Inj, Tk. 15.05/Amp
Arthrofen Plus(Healthcare), Inj., Tk. 23.00/Amp
Clofenac Plus(Square), Inj., Tk. 15.10/Amp
Diclofen Plus(Opsonin), Inj., Tk. 15.10/Amp
Diclonac(Ziska), Inj., Tk. 95.00/Amp
Erdon Plus(Aristo), Inj., Tk. 14.00/Amp
Genac Plus(Globe), Inj., Tk. 15.00/Amp
Intafenac Plus(Incepta), Inj., Tk. 9.50/Amp
Mobifen Plus(ACI), Inj., Tk. 9.57/Amp
Orfenac Plus(Orion), Inj, Tk. 9.06/Amp
Panlid(Pacific), Inj., Tk. 15.00/Amp
Profenac L(Popular), Inj, Tk. 9.54/Amp
Ronac Plus(General), Inj., Tk. 15.04/Amp
Ultrafen L(Beximco), Tk. 15.00/Amp

ETODOLAC

Indications: Pain and inflammation in rheumatoid arthritis and osteoarthritis

Cautions: Avoid in severe renal impairment, *see notes above*

Contraindication: *See notes above*

Side-effects: Pyrexia, tremor, palpitation, dyspnoea, confusion, fatigue, paraesthesia, dysuria and pruritus; *see notes above*;

Dose: ADULT over 18 years, 300-600 mg daily in 1-2 divided doses

Proprietary Preparations

Edolac(Opsonin), Tab., 600 mg, Tk. 18.07/Tab.; Cap, 300 mg, Tk. 8.03/Cap.
Edopain(Incepta), Cap., 300 mg, Tk. 8.00/Cap.; Tab., 600 mg, Tk. 18/Tab.
Etogesic(Acme), Tab., 600 mg, Tk. 15.04/Tab.
Panodin(Square), Tab., 600 mg, Tk. 15.10/Tab.

ETORICOXIB

Indications: Pain and inflammation in osteoarthritis, rheumatoid arthritis and acute gout

Cautions: Monitor blood pressure, breast-feeding, *see notes above*

Contraindications: uncontrolled hypertension, inflammatory bowel diseases, *see notes above*

Interactions: *See Appendix-2*

Side-effects: Dry mouth, taste disturbance, mouth ulcers, flatulence, constipation, chest pain, paraesthesia, myalgia, *see notes above*

Dose: Osteoarthritis, ADULT and ADOLESCENT over 16 years, 60mg once daily. Rheumatoid arthritis, ADULT and ADOLESCENT over 16 years, 90mg once daily. Acute gout, ADULT and ADOLESCENT over 16 years, 120mg once daily

Proprietary Preparations

Algirex(Ibn Sina), Tab., 120mg, Tk. 14.25/Tab.; 60mg, Tk. 7.00/Tab.; 90mg Tk. 8.00/Tab.
Artorix(Asiatic), Tab., 120mg, Tk. 14.00/Tab.; 60mg, Tk. 7.00/Tab.; 90mg, Tk. 12.00/Tab.
Cox-E(Popular), Tab., 120mg, Tk. 14.00/Tab.; 60mg, Tk. 7.00/Tab.; 90mg, Tk. 12.00/Tab.
Coxet(Pacific), Tab., 120 mg, Tk. 14.00/Tab.; 90 mg, Tk. 12.00/Tab.
Coxfree(Kemiko), Tab., 120 mg, Tk. 14.04/Tab.; 60 mg, Tk. 7.02/Tab.; 90 mg, Tk. 12.03/Tab.
Coxia(ACI), Tab., 120mg, Tk. 14.09/Tab.; 60mg, Tk. 7.05/Tab.; 90mg, Tk. 12.09/Tab.
Coxitor(Beacon), Tab., 60mg, Tk. 7.05/Tab.; 90mg, Tk. 12.08/Tab.
Coxpain(Novo), Tab., 120 mg, Tk. 14.00/Tab.; 60 mg, Tk. 7.00/Tab.; 90 mg, Tk. 12.00/Tab.
Coxsafe(Sharif), Tab., 120 mg, Tk. 14.00/Tab.; 60 mg, Tk. 7.00/Tab.; 90 mg, Tk. 12.00/Tab.
Ecox(Alco), Tab., 120 mg, Tk. 14.04/Tab.
Eroflam(Orion), Tab., 60mg, Tk. 7.02/Tab.; 90mg, Tk. 12.04/Tab.
Etocox(General), Tab., 120mg, Tk. 14.09/Tab.; 60mg, Tk. 7.05/Tab.; 90mg, Tk. 12.09/Tab.
Etoricoxib(Bristol), Tab., 60mg, Tk. 6.00/Tab.; 90mg, Tk. 11.00/Tab.; 120mg, Tk. 12.00/Tab.
Etoriflex(Somatec), Tab., 60 mg, Tk. 7.00/Tab.; 90 mg, Tk. 12.00/Tab.
Etorix(Eskayef), Tab., 120mg, Tk. 14.00/Tab.; 60mg, Tk. 7/Tab.; 90mg, Tk. 12.00/Tab.;
Etosis(Organic), Tab., 120 mg, Tk. 14.05/Tab.; 90 mg, Tk. 12.03/Tab.
Etovan(Aristo), Tab., 90mg, Tk. 12.00/Tab.; 120mg, Tk. 14.00/Tab.; 60mg, Tk. 7.00/Tab.
Etosib(Globe), Tab., 60 mg, Tk. 7.00/Tab.; 90 mg, Tk. 12.00/Tab.
Oricox(Incepta), Tab., 120 mg, Tk. 14.00/Tab.; 60 mg, Tk. 7.00/Tab.; 90 mg, Tk. 12.00/Tab.
Recox(Renata), Tab., 120 mg, Tk. 14.00/Tab.; 60 mg, Tk. 7.00/Tab.;

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Ribox(Beximco), Tab., 120mg, Tk. 14.00/Tab.; 60mg, Tk. 7.00/Tab.; 90mg, Tk. 12.00/Tab.
Rito(Opsonin), Tab., 120 mg, Tk. 14.05/Tab.; 60 mg, Tk. 7.03/Tab.; 90 mg, Tk. 12.05/Tab.
Setorib(Acme), Tab., 120 mg, Tk. 14.10/Tab.; 60 mg, Tk. 7.04/Tab.; 90 mg, Tk. 12.09/Tab.
Temcox(Team), Tab., 120 mg, Tk. 13.00/Tab.; Tab., 60 mg, Tk. 6.50/Tab.; 90 mg, Tk. 11.50/Tab.
Torbi(Euro), Tab., 120mg, Tk. 14.00/Tab.; 90mg, Tk. 12.00/Tab.
Torimon(Nuvista), Tab., 120 mg, Tk. 14.04/Tab.; 90 mg, Tk. 12.02/Tab.
Tory(Square), Tab., 120 mg, Tk. 14.1/Tab.; 60 mg, Tk. 7.04/Tab.; 90 mg, Tk. 12.09/Tab.

FLURBIPROFEN

Indications: Mild to moderate pain and inflammation in rheumatic disease and musculoskeletal disorders; dysmenorrhoea; migraine; sore throat; post-operative analgesia

Caution, Contraindications and Side-effects: Stomatitis; less commonly fatigue, paraesthesia, confusion and hallucination, *see notes above*

Dose: ADULT and CHILD over 12 years, 150-200 mg in 2-4 divided doses, max. 300 mg daily

Proprietary Preparation

Urbifen(General), Tab., 50mg, Tk. 3.50/Tab

IBUPROFEN^[ED]

Indication: Pain and inflammation in rheumatic diseases including juvenile chronic arthritis (JCA) and other musculoskeletal disorders; mild to moderate pain including dysmenorrhoea; fever and pain in children

Interactions: *See Appendix-2 (NSAIDs)*

Cautions; Contraindications; Side effects: *See notes above*

Dose: 1.2 to 1.6 g daily in 3-4 divided doses preferably after food; maximum dose permitted is 2.4 g daily; maintenance dose of 0.6-1.2 g daily may be adequate. CHILD 20 mg/kg daily in divided doses; maximal dose allowed is 40 mg/kg; not recommended for children under 7 kg

Proprietary Preparations

Advel(Opsonin), Susp., 100 mg /5 ml, Tk. 33.71/ 100 ml.; Tab., 200 mg, Tk. 0.88/Tab.; 400 mg, Tk. 1.43/Tab.
Anaflam(Asiatic), Tab., 400mg, Tk. 1.43/Tab.
Bufen SR(Drug Intl), SR Cap., 300mg, Tk. 4.10/Cap.
Flamex(ACI), Tab., 400mg, Tk. 1.43/Tab.; 200mg, Tk. 0.88/Tab.; Susp., 100 mg/5 ml., Tk. 33.81/100ml.; Cap., 300mg, Tk. 4.01/Cap.
Iben(Zenith), Tab., 400 mg, Tk. 1.30/Tab.
Ibuprofen(Amico), Tab., 400mg, Tk. 1.43/Tab.
Inflam-D(Sanofi), Tab., 200mg, Tk. 0.88/Tab.; 400mg, Tk. 1.43/Tab.; Susp., 100 mg/5 ml., Tk. 33.80/susp.
Neurofen(Globe), Tab., 400 mg, Tk. 1.42/Tab.
Reumafen(Beximco), Susp., 100 mg/5 ml., Tk. 33.82/100ml.; Tab., 400mg, Tk. 1.43/Tab.
Siflam(Silva), Tab., 400mg, Tk. 1.20/Tab.
Trufen(Modern), Tab., 400 mg, Tk. 1.43/Tab.
Tyflam(Astra Bio), Tab., 400 mg, Tk. 1.43/Tab.
Uniflam(Bristol), Tab., 400mg, Tk. 1.00/Tab.

INDOMETACIN

Indications: Pain and moderate to severe inflammation in rheumatic diseases and other musculoskeletal disorders; acute gout, acute frozen shoulder, acute de Quervain's disease of the wrist; dysmenorrhoea; closure of ductus arteriosus

Cautions & Contraindications: Epilepsy, Parkinsonism, Psychiatric disturbances; dizziness may affect skilled task (e.g. driving); during prolonged therapy ophthalmic and blood examinations are particularly advisable; avoid rectal administration in proctitis and haemorrhoids, *see notes above*

Interactions: *See Appendix-2*

Side-effects: Frequently gastrointestinal disturbances including diarrhoea, headache, dizziness and light headedness; gastrointestinal ulceration and bleeding; rarely, drowsiness, confusion, insomnia, convulsions, psychiatric disturbance, blood disorders (particularly thrombocytopenia); suppositories may cause rectal irritation and occasional bleeding, *see notes above*

Dose: *By mouth*, rheumatic disease, 50-200 mg daily in divided doses, with food;

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CHILD not recommended. Acute gout, 150-200 mg daily in divided doses. Dysmenorrhoea, up to 75 mg daily
By rectum, in suppositories, 100 mg once or twice daily - not more than 3 days; total daily dose (suppositories alone or combined oral and suppository) max. 200 mg; CHILD not recommended

Proprietary Preparations

Imet(Pacific), Cap., 75 mg, Tk. 4.00/Cap.; 25 mg, Tk. 1.00/Cap.
Indo-A(Acme), Cap., 25 mg, Tk. 1.00/Cap.; 25mg, Tk. 0.60/Cap.; 75 mg, Tk. 4.00/Cap.; Supp, 100mg., Tk. 7.04/supp.;
Indomet(Opsonin), Cap., 75 mg, Tk. 4.02/Cap.; 25 mg, Tk. 1.00/Cap.; Supp, 100 mg, Tk. 7.06/Supp
Indomethacin, (Bristol), Cap., 25mg, Tk. 50.00/Cap.
Insaid(ACI), Cap., 25mg, Tk. 1/Cap.
Reumacap(Aristo), Cap., 25mg, TK. 1.00/Cap.; 75mg, Tk.4.00/Cap.
Supp, 100mg, Tk. 9.00/Supp
Servimeta(Novartis), Cap.,25 mg, Tk. 1.80/Cap.

KETOPROFEN

Indications: Pain and mild inflammation in rheumatic diseases and other musculoskeletal disorders; after orthopaedic surgery; acute gout; dysmenorrhoea

Cautions; Contraindications; Side-effects: Pain may occur at injection site (with occasional tissue damage); suppositories may cause rectal irritation; see notes above

Interactions: See Appendix-2

Dose: *By mouth*, in rheumatic disease, 100-200 mg in 2 divided doses with food; in pain and dysmenorrhoea 50 mg up to 3 times a day; CHILD not recommended
By rectum (in suppositories), rheumatic disease, 100 mg at bedtime; combined oral and rectal treatment, maximum total daily dose 200 mg; CHILD not recommended

By deep intramuscular injection into the gluteal muscle, 50-100 mg every 6 hours (maximum 200 mg in 24 hours) for up to 3 days; CHILD not recommended

Proprietary Preparations

Festam(Pacific), Gel, 2.5%, Tk. 120.00/30g; Tk. 200.00/50gm
Keptrofen(Astra Bio), Tab., 50 mg, Tk. 5.00/Tab.
Keto-A(Acme), Supp., 100.00 mg., Tk. 12.09/Supp.; Tab., 100.00 mg., Tk. 5.53/Tab.; 50.00 mg., Tk. 3.52/Tab.; Inj., 100 mg/2 ml, Tk. 19.64/Amp; 10gm/100ml, Tk. 109.41/10ml, Tk. 281.06/30ml;
Ketofast(Novo Healthcare), Gel, 2.5%, Tk. 53.00/20gm
Ketron(ACI), SR,Cap., 100mg, Tk. 7.05/Cap.; SR 200mg, Tk. 10.07/Cap.; Tab., 50mg, Tk. 3.52/Tab.
Kontrol(Silva), Tab., 100mg, Tk. 6.02/Tab.
Kop(Square), Cap., 100 mg, Tk. 11.03/Cap.; 200 mg, Tk. 20.06/Cap.; Inj., 100 mg/2 ml, Tk. 35.11/2ml
Kynol(Eskayef),TRCap, 100mg, Tk. 7.00/Cap.; TR200mg, Tk. 10.00/Cap.
Orket(Orion), Inj, 100 mg/2ml, Tk. 15.10/Amp.
Profenid(Sanofi), Gel, 2.5%, Tk. 120.36/2.5gm Inj., 50mg/ml, Tk. 50.15/Amp.; CRCap., 100mg, Tk. 11.03/Cap.; 200mg, Tk. 20.06/Cap.
Profinied(Sanofi), ER Tab., 50 mg, Tk. 6.02/Tab. 100mg, Tk. 9.03/Tab
Keto-SR(Hudson), Cap. 100 mg, Tk. 7.00/Cap
Wakoflex(Incepta), Tab. 100 mg, Tk. 6.00/Tab.; 50 mg, Tk. 3.50/Tab.; Inj. 100 mg/2ml, Tk. 20.00/Amp.

KETOROLAC

(See also 8.1.4.2)

Indications: Short term management of moderate to severe acute postoperative pain

Cautions: Reduce dose in elderly and in those weighing less than 50 kg; reduce dose and monitor in mild renal impairment; hepatic failure, cardiac impairment, cardiac decompensation, hypertension; peptic ulcer

Contraindications: History of hypersensitivity to aspirin, angioedema, asthma, complete or partial syndrome of nasal polyp; haemorrhagic diathesis, confirmed or suspected cerebro-vascular bleeding, moderate to severe renal impairment; pregnancy and breast-feeding

Interactions: See Appendix-2

Side-effects: Allergic reactions (including anaphylaxis), fluid retention, abdominal discomfort, dyspepsia, peptic ulceration, gastrointestinal bleeding, pancreatitis; mental and sensory

9. MUSCULOSKELETAL AND JOINT DISEASES

changes, psychotic reactions, convulsions; palpitation, hypertension, bradycardia; purpura, thrombocytopenia, prolonged bleeding time; dyspnoea, pulmonary oedema; postoperative wound haemorrhage, haematoma, epistaxis; pain at injection site

Dose: *By mouth*, 10 mg every 4-6 hours (ELDERLY every 6-8 hours), max. dose 40 mg daily; max. duration of treatment 7 days

By intramuscular or intravenous injections over not less than 16 seconds, initially 30 mg, then 10-30 mg every 4-6 hours when required (every 2 hours in initial postoperative period. Max. dose 90 mg daily (ELDERLY and patients weighing less than 50 kg, max. 60 mg daily); max. duration of treatment 2 days; CHILD under 16 years, not recommended

Proprietary Preparations

Actifast(SMC Enterprise), Tab., 10mg, Tk. 10.00/Tab.

Acupain(Beacon), Tab., 10mg, Tk.

10.06/Tab.; Inj., 30mg/ml, Tk. 55.20/Amp

Analac(Ziska), Inj., 60 mg/2 ml, Tk.

95.00/Amp.; 30 mg/ml, Tk. 275.00/Amp.; Tab., 10 mg, Tk. 200.00/Tab.

Doltro(UniMed), Tab., 10mg, Tk. 100.00/Tab.

Emodol(JaysonTab.), 10 mg, Tk.

10.15/Tab.; Inj., 30 mg/ml, Tk. 50.19/amp.

Etolac(Ibn Sina), Inj., 60 mg/2 ml, Tk.

100/Amp; **30mg/ml, Tk. 60/Amp,**

Kelorac(One Pharma), Inj, 30 mg/ml, Tk.

55.00/Amp.; Tab., 10 mg, Tk. 10.00/Tab.

Kepros(Monico), Inj., 60mg/2 ml, Tk.

95.00/Amp, 30mg/ml, Tk. 55.00/Amp.; Tab., 10mg, Tk. 10.00/Tab.;

Kerolac(G.A.co), Tab., 10 mg, Tk. 10.03/Tab.

Ketofast(Veritas), Inj., 60 mg/2 ml, Tk.

55.00/amp.; Tab., 10 mg, Tk. 12.00/Tab.

Ketoflex(Somatec), Tab., 10 mg, Tk.

10.03/Tab.

Ketogate (Pharmacil), Inj, 30 mg/ml, Tk. 75.23/Amp

Ketolab(Labaid), Tab., 10 mg, Tk. 12/Tab.

Ketonaaf(Naafco), Tab., 10 mg, Tk.

10.00/Tab.

Ketonic(Eskayef), Tab., 10 mg, Tk. 10/Tab.;

Inj., 30 mg/ml, Tk. 55.00/amp.; 60 mg/2 ml, Tk. 95.00/amp.

Ketoprix(Sharif), Inj., 30 mg/ml, Tk.

55.17/Amp.; 60mg/2 ml, Tk. 95.29/Amp.; Tab., 10 mg, Tk. 10.03/Tab.

Ketorin(Orion), Inj., 30 mg/ml, Tk.

55.16/Amp.; Tab., 10 mg, Tk. 20.14/Tab.

Ketoroz(Astra Bio), Inj., 30 mg/ml, Tk.

55.00/Amp.; Tab., 10 mg, Tk. 10.00/Tab.

Ketoshot(Nuvista), Tab., 10 mg, Tk.

10.00/Tab.

Ketovir(Virgo), Tab., 10 mg, Tk. 10.00/Tab.

Ketromin(Pacific), Inj., 30mg/ml, Tk.

60.00/Amp.; 60mg/2ml, Tk. 95.00/Amp.; Tab., 10 mg, Tk. 10.00/Tab.

Kilpan(Decent), Tab., 10mg, Tk. 10.00/Tab.

Lactro(Zenith), Tab., 10 mg, Tk. 10.00/Tab.

Minolac(ACI), Inj., 10 mg/ml, Tk. 33.10/Amp.;

30 mg/ml, Tk. 55.38/Amp.; 60 mg/2 ml, Tk.

95.65/Amp.; Tab., 10mg, Tk. 10.07/Tab.;

Ofpain(Kemiko), Tab., 10 mg, Tk. 10.03/Tab.

Inj., 30 mg/ml, Tk. 55.00/Amp.; 60 mg/ml,

Tk. 95.29/Amp

Oradol(Aristo), Inj, 30 mg/ml, Tk. 95.00/Amp.;

30mg/ml, Tk. 55.00/Amp.; Tab., 10mg, Tk.

10.00/Tab.

Ostelac(Supreme), Tab., 10mg, Tk.

10.00/Tab.

Pair(Drug Intl), Tab., 10mg, Tk. 10.05/Tab.;

Inj., 30mg/ml, Tk. 55.20/Amp

Repopain(Organic), Inj., 30 mg/ml, Tk.

55.00/Amp.; Tab., 10 mg, Tk. 10.03/Tab.

Roket(Globe), Inj., 60 mg/2 ml, Tk.

95.00/Amp.; 30 mg/ml, Tk. 55.00/Amp.; Tab.

, 10 mg, Tk. 10.00/Tab.;

Rolac(Renata), Inj., 30 mg/ml, Tk.

50.00/Amp.; 60 mg/2ml, Tk. 95.00/Amp.;

10 mg/ml, Tk. 32.13/Amp.; Tab., 10mg, Tk.

10.04/Tab.

Rotek(Novo Health), Tab., 10 mg, Tk.

10.00/Tab.

Sanoket(Sanofi), Inj., 30mg/ml, Tk.

55.38/Amp.; Tab., 10mg, Tk. 10.03/Tab.;

60mg/2ml, Tk. 95.29/Amp

Surgidol(Globex), Tab., 10 mg, Tk. 10.00/Tab.

Surpim(Asiatic), Tab., 10mg, Tk. 10.00/Tab.;

Inj., 30mg/ml, Tk. 54.00/Amp

Temoket(Team), Tab., 10 mg, Tk. 9.50/Tab.

Todol(Opsonin), Inj., 30 mg/ml, Tk.

56.37/Amp.; 60 mg/2ml, Tk. 95.65/Amp.;

Tab., 10 mg, Tk. 10.04/Tab.

Tolec(Alco), Inj., 60 mg/2 ml, Tk. 95.00/Amp.;

30 mg/ml, Tk. 55.18/Amp.; Tab., 10 mg, Tk.

10.03/Tab.

Toradol(Radiant), Tab., 10mg, Tk.

30.09/Tab.; Inj, 30mg/ml, Tk. 130.39/Amp

Toramax(Popular), Tab., 10.00mg, Tk.

10.04/Tab.; Inj., 30mg/ml, Tk. 110.00/Amp.;

60 mg/2 ml, Tk. 190.00/Amp

Torax(Square), Inj., 30 mg/ml, Tk.

55.37/Amp.; 60 mg/2 ml, Tk. 95.65/Amp.;

Tab., 10 mg, Tk. 10.07/Tab.

Toroaid(General), Inj., 30 mg/ml, Tk.

55.17/Amp.; 60 mg/2 ml, Tk. 95.29/Amp,

10mg, Tk. 10.03/Tab.

Torolac(Silva), Tab., 10 mg, Tk. 10.00/Tab.

Troy(Amico), Tab., 10mg, Tk. 10.00/Tab.

Winop(Acme), Inj., 60mg/2 ml, Tk.

95.65/Amp.; 10mg/ml, Tk. 30.20/Amp.;

9. MUSCULOSKELETAL AND JOINT DISEASES

30mg/ml, Tk. 55.37/Amp.; Tab., 10.00 mg, Tk. 10.07/Tab.
Xidolac(Beximco), Tab., 10mg(Dispersible Tab), Tk. 12.00/Tab.; 10mg, Tk. 10.00/Tab.; Inj., 30mg/ml, Tk. 55.00/Amp.;
Zeropain(Healthcare), Inj., 30mg/ml, Tk. 60.00/Amp.; 60mg/2ml, Tk. 100.00/Amp.; Tab., 10mg, Tk. 360.00/Tab.;

MEFENAMIC ACID

Indications: Mild to moderate pain in rheumatoid arthritis (including JCA), osteoarthritis, and related conditions; dysmenorrhoea and menorrhagia

Cautions; Contraindications: Contra-indicated in inflammatory bowel disease; porphyria; blood tests required during long term treatment, *see notes above*

Interactions: *See Appendix-2*

Side-effects: Drowsiness, diarrhoea; thrombocytopenia; haemolytic anaemia and aplastic anaemia have been reported; convulsion may occur with overdose, *see notes above*

Dose: ADULT over 18 years, 500 mg 3 times daily preferably after food; CHILD 12-18 years, acute pain including dysmenorrhoea, menorrhagia, 500 mg 3 times daily

Proprietary Preparations

Amifen (Opsonin), Susp., 50mg/5ml, Tk. 28.11/60 ml; Tab., 500 mg, Tk. 5.02/Tab.

Dysmen (Renata), Tab., 250 mg, Tk. 2.80/Tab.; 500 mg, Tk. 5.00/Tab.

Fenamic (Beximco), Susp., 50mg/5ml, Tk. 15.00/60ml

Fenaton (Drug Intl), Tab., 500mg, Tk. 5.55/Tab.

Flamic (Globe), Susp., 50 mg /5 ml, Tk. 40.00/60ml; Tab., 250 mg, Tk. 3.00/Tab.; 500 mg, Tk. 5.00/Tab.

HPR (Pacific), Susp., 50mg/5ml, Tk. 45.00/60ml; Tab., 250 mg, Tk. 3.00/Tab.; 500 mg Tk. 5.00/Tab.

MELOXICAM

Indications: Pain and inflammation in rheumatic diseases, ankylosing spondylitis, acute exacerbations of osteoarthritis (short term management)

Cautions; Contra-indications & Side-effects: Avoid rectal administration in patients with haemorrhoids; *see also notes above*

Interactions: *See Appendix-2*

Dose: *By mouth*, osteoarthritis, 7.5 mg once daily with food, increased to 15 mg once daily if necessary. Rheumatoid arthritis and ankylosing spondylitis, 15 mg once daily with food (7.5 mg in elderly)

By rectum, in suppository, rheumatoid arthritis, 15 mg once daily (7.5 mg in elderly); ankylosing spondylitis, 15 mg once daily

Child under 15 years not recommended

Proprietary Preparation

Melcam(Square), Tab., 15 mg, Tk. 4.03/Tab.

NAPROXEN

Indications: Pain and inflammation in rheumatic disease (including JCA), advanced osteoarthritis and other musculoskeletal disorders; dysmenorrhoea, acute gout

Interactions: *See Appendix-2*

Cautions; Contra-indications and Side-effects: *See notes above*

Dose: *By mouth*, 0.5-1 g daily in 2 divided doses; CHILD over 5 years, for JCA, 10 mg/kg daily in 2 divided doses. Acute musculoskeletal disorders and dysmenorrhoea, 500 mg initially, then 250 mg every 6-8 hours as required; max. dose after first day 1.25 g daily; CHILD under 16 years not recommended. Acute gout, 750 mg initially, then 250 mg every 8 hours until attack has passed

Proprietary Preparations

Anaflex(ACI), CR.Tab., 500mg, Tk. 14.09/Tab.; Gel, 10%, Tk. 116.35/30gm, 62.42/15gm; Tab., 250mg, Tk. 5.04/Tab.

;SR Tab., 500mg, Tk. 9.06/Tab.

Arnex(Silva), Tab., 500mg, Tk. 6.02/Tab.

Diproxen(Drug Intl), Tab., 250mg, Tk. 4.30/Tab.; Tab., 500mg, Tk. 7.05/Tab.; 500mg, Tk. 10.05/Tab.; Gel, 10%, Tk. 60.20/15 gm

Dolwin(SMC Enterprise), Tab., 500 mg, Tk. 7.00/Tab.

Eprox(Euro), Tab., 500mg, Tk. 8.00/Tab.

Fritt(Sormatec), Tab., 500 mg, Tk. 7.03/Tab.; 250 mg, Tk. 4.01/Tab.

Gloxe(Globe), Tab., 250 mg, Tk. 4.00/Tab.; 500 mg, Tk. 7.00/Tab.

H-Nap(Hudson), Tab., 500 mg, Tk.8.00/Tab.

Naid(Pacific), Tab., 500 mg, Tk. 7.52/Tab.; 250 mg, Tk. 4.00/Tab.

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Napix(Modern), Tab. , 500 mg., Tk. 7.00/Tab.
Napren(Alco), Tab. , 500 mg, Tk. 9.03/Tab. ; 250 mg, Tk. 5.02/Tab.
Napro (Aristo), Tab., 250mg, Tk. 4.20/Tab. ; 500mg , Tk. 7.00/Tab.
Napro A(Acme), Tab., 250.00 mg., Tk. 4.03/Tab. ; 500 mg., Tk. 7.04/Tab.;
Naproid(GA.Co), Tab., 250 mg, Tk. 4/Tab.; 500 mg, Tk. 7.02/Tab.
Naprosyn(Jayson), Tab., 250 mg, Tk. 4/Tab.
Naprosyn(Radiant), Suspn, 125mg/5ml, Tk. 120.36/50ml.; Tab., 250mg , Tk. 8.02/Tab.; 500mg, Tk. 15.05/Tab.
Naprox(Eskayef), Gel, 10%, Tk. 70.00/15gm.; Tab, 250mg, Tk. 5.00/Tab.; 500mg, Tk. 9.00/Tab. ;
Naproxen(Albion), Tab. , 250 mg, Tk. 4.00/Tab.; 500 mg, Tk. 6.89/Tab.
Naproxen(Amico), Tab., 500mg , Tk. 7.00/Tab.; 500 mg, Tk. 10.00/Tab.;
Naproxen(Organic), Tab. , 500 mg, Tk. 7.00/Tab.
Naproxin (Ambee), Tab., 500 mg, Tk. 6.92/Tab
Naprozen(Zenith), Tab., 250 mg , Tk. 5.00/Tab.
Napryn(Healthcare), Gel, 10% , Tk. 70.00/15 gm.; Suspn, 125mg/5mg, Tk. 90.00/50ml.; Tab., 250mg , Tk. 7.00/Tab.; 500mg, Tk. 11.00/Tab.
Napsod(UniMed), Tab ,250mg , Tk. 5.00/Tab.; 500mg, Tk. 9.00/Tab.
Naspro(Popular), Tab. , 250mg, Tk. 5.02/Tab.; 500mg, Tk. 9.03/Tab.
Naxin(Opsonin), SR Tab. , 500 mg , Tk.14.05/Tab. ; 500 mg , Tk. 9.03/Tab. ; 250 mg, Tk. 5.02/Tab.
Nipoxen(Nipro JMI), Tab. , 250 mg, Tk. 5/Tab.; SR Tab. , 500 mg, Tk. 14/Tab.
Nuprafen(Beximco), Tab., 250mg, Tk. 4.20/Tab.; 500mg, Tk. 7.85/Tab.
Nupralgin(Ibn Sina), Tab. , 500mg, Tk. 9.00/Tab.; 250mg, Tk. 5.00/Tab.
NX-1(One Pharma), Tab., 500 mg, Tk. 9.00/Tab.
Pairox(Asiatic), Suspn, 125 mg/5 ml, Tk. 30.00/50ml.; Tab., 250mg, Tk. 5.00/Tab.; 500mg , Tk. 8.00/Tab.; 500mg, Tk. 7.00/Tab.
Releve(General), Tab. , 500mg, Tk. 9.03/Tab.
Servinaprox(Novartis), Tab. , 250 mg, Tk. 7.00/Tab.; 500 mg, Tk. 12.00/Tab.
Sonap(Square), Supp, 500 mg, Tk. 12.09/Supp.; Tab. , 250 mg, Tk. 4.03/Tab. ; 500 mg, Tk. 7.04/Tab.
 Suspn, 125mg/5ml, Tk. 35.00/50 ml
Suxen(Supreme), Gel 10%, Tk. 60.00/15gm;
Ticoflex(Incepta), Gel, 10%, Tk. 60.00/15gm.; Suspn , 125mg/5mg, Tk. 35.00/50ml.; 250 mg, Tk. 4.00/Tab. ; 500 mg, Tk. 7.00/Tab.
Tofa(Kemiko), Tab., 250 mg, Tk. 4.01/Tab. ; 500 mg, Tk. 8.02/Tab.

Venoxen(Orion), Tab. , 500mg, Tk. 9.03/Tab.
Vinap(Virgo), Tab. , 500 mg, Tk. 7.00/Tab.
Xenap(Astra Bio), Tab. , 500 mg,
Xenapro(Renata), Tab. , 250mg , Tk. 5.00/Tab.; 500mg, Tk. 8.03/Tab.
Xpro(Apex), Tab., 500 mg, Tk. 7.00/Tab.
Zenosyn(Sharif), Tab., 500 mg, Tk. 7.02/Tab.

Esomeprazole + Naproxen

AnaflexMax(ACI), DR Tab., 375mg + 20mg, TK. 8.02/Tab.; 500mg + 20mg, TK. 10.03/Tab.
DemovoTM(Delta), Tab. , 20 mg + 375 mg, Tk. 8.00/Tab. ; 20 mg + 500 mg, Tk. 10.00/Tab.
Dinovo TM(Beximco), Tab., 375mg + 20mg, Tk. 8.00/Tab.; 500mg + 20mg, Tk. 10.00/Tab.
Emaprox(Globe), Tab. , 375 mg + 20 mg, Tk. 3.00/Tab.; 500 mg+20 mg, Tk. 10.00/Tab.
Esona(Navana), Tab., 20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Eso-plus(Asiatic), Tab., 500mg + 20mg , Tk. 10.00/Tab.; 375mg + 20mg , Tk. 8.00/Tab.
Esoxen(Organic), Tab, 375mg + 20 mg, Tk. 8.03/Tab.; 500 mg + 20 mg, Tk. 10.03/Tab.
Inflect(Kemiko), Tab., 375 mg +20 mg, Tk. 8.02/Tab.; 500 mg +20 mg, Tk. 10.03/Tab.
Locin(Globe), Tab., 20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Nameso(Opsonin), Tab, 375mg + 20mg, Tk. 8.00/Tab.; 500mg + 20mg, Tk. 10.00/Tab.
Napexa(UniMed), Tab , 375mg + 20mg, Tk. 12.00/Tab.; 500mg + 20mg, Tk. 16.00/Tab.
Napren ES(Alco), Tab. , 20 mg + 375 mg, Tk. 8.00/Tab. ; 20 mg + 500 mg, Tk. 10.00/Tab.
Napreso(Euro), Tab., 500mg+20mg, Tk. 10.00/Tab.
Napro-A Plus(Acme), Tab. , 375.00 mg. +20 mg, Tk. 8.03/Tab.; 500.00 mg. + 20 mg, Tk. 10.03/Tab.
Naproflex(Somatec), Tab. , 20 mg + 375 mg, Tk. 8.00/Tab. ; Tab. , 20 mg + 500 mg, Tk. 10.00/Tab.
Naproflex(Somatec), Tab., 375 mg + 20 mg, Tk. 8.00/Tab.; 375 mg + 20 mg, Tk. 10.00/Tab.
Naprosyn Plus(Radiant), Tab., 375mg/20mg, Tk. 16.05/Tab.; 500mg + 20mg, Tk. 20.06/Tab.
Naprotec(Sharif), Tab. , 375mg + 20 mg, Tk. 8.03/Tab.; 500mg + 20 mg, Tk. 10.30/Tab.
Naprox Plus(Eskayef), Tab, 500mg + 20mg, Tk. 10.00/Tab.; 375mg + 20 mg, Tk. 8.00/Tab.;
Naproxen Plus(Albion), Tab. , 20 mg + 500 mg, Tk. 6.89/Tab.
Naproxen(Zenith), Tab, 375mg + 20 mg , Tk. 8.00/Tab.; 500 mg + 20 mg , Tk. 10.00/Tab.;
Naproxzia(Amico), Tab., 500mg + 20mg , TK. 10.00/Tab.
Naprozol(General), Tab, 500mg + 20mg, Tk. 10.03/Tab.; 375mg + 20mg, Tk. 8.03/Tab.
Napsec(Drug Intl), Tab., 375+20mg, Tk. 8.05/Tab.; 500mg+20mg, Tk. 10.05/Tab.

9. MUSCULOSKELETAL AND JOINT DISEASES

Napxon(Ziska), Tab. , 375 mg + 20 mg, Tk. 256.00/Tab.; 500 mg + 20 mg, Tk. 320.00/Tab.
Nasopain(Julpher), Tab., 20 mg + 375 mg, Tk. 10.0/Tab.; 20 mg + 500 mg, Tk. 12.0/Tab.
Neso(Aristo), Tab., 375mg + 20mg , Tk. 8.00/Tab.; 500mg + 20mg , Tk. 10.00/Tab.
Nesotem(Team), Tab., 500 mg + 20 mg, Tk. 9.50/Tab.; 375 mg + 20 mg, Tk. 7.50/Tab.
Novoxen(Orion), Tab. , 375 mg + 20 mg, Tk. 8.02/Tab.; 500 mg +20 mg, Tk. 15.03/Tab.
Nupralgin Plus(Ibn Sina), Tab. , 20 mg + 500 mg, Tk. 10.00/Tab. ; 20 mg + 375 mg, Tk. 8.00/Tab.
Nupralgin(Ibn Sina), Tab. , 500mg + 20 mg, Tk. 300.00/Tab.; 375mg + 20 mg, Tk. 80.00/Tab.
Progesic(Incepta), Tab. , 375 mg + 20 mg, Tk. 8.00/Tab.; 500mg+ 20mg, Tk. 10.00/Tab.
Progut-N(Popular), Tab. , 20 mg + 375 mg, Tk. 8.00/Tab.; 20 mg + 500 mg, Tk. 10.00/Tab.
Solivo(Healthcare), Tab., 375mg + 20mg, Tk. 390.00/Tab.; 500mg + 20mg, Tk. 450.00/Tab.
Xenap(Astra Bio), Tab. , 20 mg + 500 mg., 375mg + 20mg, Tk. 8.02/Tab.
Xenole(Square), Tab. , 375 mg + 20 mg, Tk. 8.03/Tab.; 500 mg + 20

OXAPROZIN

Indications: Treat [arthritis](#). It reduces pain, swelling, and stiffness of the joints.
Cautions; Contraindications&side effects: See *notes above*
Dose: ADULT Two 600 mg tablets taken once per day.

Proprietary Preparations

Dayprox(Eskayef), Tab., 600 mg , Tk. 7.00/Tab.
Demarin(ACI), Tab., 600 mg, Tk. 7.05/Tab.

PIROXICAM

Indications: Pain and inflammation of rheumatic diseases (including JCA) and other musculoskeletal disorders; acute gout
Cautions & Contraindications: See *notes above*
Interactions: See *Appendix-2*
Side-effects: Pain may occur at injection site (occasional tissue damage), see *notes above*
Dose: By mouth, rheumatic disease, initially 20 mg daily, maintenance 10-30 mg daily in single dose. CHILD over 6 years, JCA, less than 15 kg, 5 mg daily;

16-25 mg or divided per kg, 10 mg; 26-45 kg, 15 mg; over 45 kg, 20 mg. Acute musculoskeletal disorders, 40 mg daily in single or twice daily doses for 2 days, then 20 mg daily for 7-14 days; CHILD not recommended. Acute gout, 40 mg initially, then 40 mg daily in single or divided doses for 4-6 days; CHILD not recommended

By deep intramuscular injection into gluteal muscle, for initial treatment of acute conditions, as dose by mouth (on short-term basis); CHILD not recommended

Proprietary Preparations

Flexicam(Renata) Cap.,10mg, Tk.1.67/Cap.
 Inj.40mg/2ml, Tk.14.67/amp.
Rheudene(Gaco), Cap 10mg,Tk.1.75/Cap.Inj. 40mg/2ml,Tk.14.67/amp.

SULINDAC

Indications: Pain and inflammation in rheumatic disease and other musculoskeletal disorders; acute gout
Cautions; Contraindications: See *notes above*; history of renal stones; ensure adequate hydration
Side-effects: Fever, jaundice, cholestasis, hepatitis; urine discoloration
Dose: 200 mg twice daily (may be reduced according to response); max. 400 mg daily; limit treatment to 7-10 days; CHILD not recommended

Proprietary preparations

Clinorel(Opsonin), Tab. , 100 mg , Tk. 5.00/Tab.; 200mg , Tk. 9.54/Tab.
Lindac(Popular), Tab. , 200mg, Tk. 9.54/Tab.; 100mg, Tk. 5.02/Tab.
Sudac(Drug Intl), Tab., 200mg, Tk. 9.00/Tab.; 100mg, Tk. 5.00/Tab.
Sulidac(Eskayef), Tab, 200mg, Tk. 9.50/Tab.; 100mg, Tk. 5.00/Tab.

TENOXICAM

Indications: Pain and inflammation in rheumatic diseases and other musculoskeletal disorders
Cautions; Contraindications & Side-effects: See *notes above*
Interactions: See *Appendix-2*

9. MUSCULOSKELETAL AND JOINT DISEASES

Dose: By mouth, rheumatic disease, 20 mg daily; CHILD not recommended. Acute musculoskeletal disorders, 20 mg daily for 7 days; max. 14 days; CHILD not recommended

By intramuscular or intravenous injection, for initial treatment for 1-2 days, as dose by mouth; CHILD not recommended

Proprietary Preparation

Enocam(Acme), Tab. , 20mg, Tk. 8.03/Tab.

Inoten(Opsonin), Tab. , 20mg, Tk. 8.03/Tab.

Mobicam(Beximco), Tab., 20mg, Tk. 8.00/Tab.

Oxicam(ACI), Tab., 20mg, Tk. 8.05/Tab., 20mg, Tk. 8.00/Tab.

Tenoflex(Beacon), Tab. , 20mg, Tk. 8.05/Tab.

Tenopain(Incepta), Tab. , 20mg, Tk. 8.00/Tab.

Tenorix(Orion), Tab. , 20mg, Tk. 8.06/Tab.

Tenoxim(Eskayef), Tab, 20mg, Tk. 8.00/Tab., 20mg, Tk. 8.00/Tab.

Tilkotil(Radiant), Tab. , 20mg, Tk. 17.06/Tab.

Xicotil(Aristo), Tab. , 20mg, Tk. 8.00/Tab.

Xten(Square), Tab. , 20mg, Tk. 8.03/Tab.

TOLMETIN

Indications: Pain and inflammation in rheumatic diseases (including JCA) and other musculoskeletal disorders

Cautions; Contraindications & Side-effects: See notes above

Interactions: See Appendix-2

Dose: 0.6-1.8 g daily in 2-4 divided doses; max. 30 mg/kg daily up to 1.8 g; CHILD, JCA, 20-25 mg/kg daily in 3-4 divided doses; max. 30 mg/kg up to 1.8 g.

Generic Preparation

Capsule, 200mg, 400mg

9.1.2 CORTICOSTEROIDS

9.1.2.1 SYSTEMIC CORTICOSTEROIDS

9.1.2.2 LOCAL CORTICOSTEROIDS

9.1.2.1 SYSTEMIC CORTICOSTEROIDS

(See also section 5.3.2)

The use of corticosteroids in rheumatic disease should be restricted to short term management of an acute

exacerbation (to tide over the crisis) and for long term management when other drugs fail. In severe life threatening conditions a high initial dose of systemic steroid is given to induce remission. Thereafter the dose is gradually tapered to the lowest possible maintenance dose, or withdrawn altogether, if possible. Pulse dose of corticosteroids (for example- methylprednisolone sodium succinate, up to 1 g intravenously on consecutive three days) is in current use to suppress highly inflammatory disease while longer term and slower acting medication is being commenced. Prolonged use of corticosteroids can induce osteoporosis, therefore prophylaxis should be considered in this situation.

Prednisolone is the standard oral steroid preparation for use in rheumatic disease. It permits finer dosage adjustment and therefore is advantageous over the more potent steroids. To manage severe inflammatory conditions in rheumatoid arthritis a high initial dose of prednisolone, e.g. 80 mg daily in divided doses, should be administered and this should be rapidly tapered to total withdrawal or a minimum maintenance dose. To minimize side-effects the maintenance dose of prednisolone should be kept as low as possible, e.g. 5 mg daily or on alternate days.

Recent evidence has suggested that prednisolone 7.5 mg daily may substantially reduce the rate of joint destruction in moderate to severe rheumatoid arthritis of less than 2 years duration. Care should be taken not to increase the equivalent of prednisolone 7.5 mg daily. Current evidence supports maintenance of this anti-erosive dose for 2-4 years only to avoid possible long-term adverse effects. After that, treatment should be tapered off.

Polymyalgia rheumatica should always be treated with corticosteroids. The initial dose of prednisolone in polymyalgia rheumatica is 10 to 15 mg daily. Treatment should be continued until remission of disease activity. Thereafter the dose should be gradually reduced to

9. MUSCULOSKELETAL AND JOINT DISEASES

a maintenance dose of about 7.5 mg and this may be continued up to 3 to 6 years. Relapse is common if therapy is stopped within 3 years.

Giant cell (temporal) arteritis, polyarteritis nodosa and polymyositis should be treated with an initial dose of 40-60 mg prednisolone daily and reduced to a maintenance dose of 7.5 to 10 mg daily after remission.

Ankylosing spondylitis should not be treated with long-term corticosteroids. Pulse doses may rarely be required to control active disease that does not respond to conventional treatment.

Dexamethasone and **Betamethasone** may be used alternatively for systemic oral therapy. They have very high glucocorticoid activity in conjunction with insignificant mineralocorticoid activity, and are long acting drugs- suitable for prolonged therapy.

BETAMETHASONE^[ED]

(See section 5.3.2)

Indications: Cerebral oedema, suppression of inflammatory and allergic disorders, rheumatic disease; diagnosis of Cushing's disease, congenital adrenal hyperplasia

Cautions; Contraindications; Side-effects: See notes above under Prednisolone

Dose: 0.5-5 mg daily by mouth

Proprietary Preparations

See section 5.3.2

DEFLAZACORT

Indications: See section 5.3.2; under deflazacort

Cautions; Contraindications; Side-effects and dose: See section 5.3.2; under deflazacort

Proprietary Preparations

See section 5.3.2

DEXAMETHASONE^[ED]

(See section 5.3.2)

Indications: Shock, cerebral oedema, suppression of inflammatory and allergic disorders, rheumatic diseases; diagnosis of Cushing's disease, congenital adrenal hyperplasia

Cautions; Contraindications; Side-effects: See notes above under Prednisolone; perineal irritation may follow intravenous administration of phosphate ester

Dose: By mouth, 0.5-10 mg daily, precautions same as for Prednisolone By intramuscular or slow intravenous injection (as dexamethasone phosphate), initially 0.5-20 mg; CHILD 200-500 microgram/kg daily

Proprietary Preparations

See section 5.3.2

METHYLPREDNISOLONE

Indications: Suppression of inflammatory and allergic disorders; rheumatic disorders also see notes above

Cautions; Contra-indications & Side-effects: See section 5.3.2

Interactions: See Appendix-2

Dose: By intravenous injection, methylpredni-solone sodium succinate, slow intravenous injection or infusion, up to 1 gm for not more than three days

By intramuscular injection, methylprednisolone acetate, 25-100 mg repeated after 2-3 weeks

Proprietary Preparations

See section 5.3.2

PREDNISOLONE^[ED]

(See section 5.3.2)

Indications: Rheumatic diseases, not controlled by NSAIDs; suppression of inflammatory and allergic disorders; inflammatory bowel disorders; immunosuppression

Cautions: Adrenal suppression, infection, growth retardation in children and adolescents, peptic ulceration, diabetes mellitus, pregnancy and breast feeding; special precautions needs to be observed in elderly (side effects more

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serious), in those with history of tuberculosis (reactivation of tuberculosis is possible), in osteoporosis (postmenopausal women at special risk). Monitoring is required in hypertension, congestive heart failure, recent myocardial infarction, liver failure, renal impairment and glaucoma

Contra-indications: Systemic infection (unless specific antimicrobial therapy given); avoid live virus vaccine (serum antibody response diminished)

Side-effects: Musculoskeletal effects include proximal myopathy, osteoporosis, vertebral and long bone fractures, avascular necrosis, tendon rupture; for other side-effects see under *endocrine section*

Dose: By mouth, initially 15-30 mg daily in divided doses (up to 80 mg daily in severe cases), should be taken after meals and preferably covered by an H₂ blocker drug (e.g. ranitidine). The dose should be tapered rapidly to a maintenance as low as possible (e.g. 5 mg daily). See notes above

Proprietary Preparations
See section 5.3.2

9.1.2.2 LOCAL CORTICOSTEROIDS

Local corticosteroid injections have an important role in managing inflamed joints and tendon sheaths. In selected cases, these long acting local steroid preparations are injected intra-articularly or into the sinuial sheaths. In rheumatoid arthritis, they are given by intra-articular injections to relieve pain, increase mobility, and reduce deformity in one or a few joints. In smaller amounts corticosteroids may also be injected directly into soft tissues for relief of inflammation in conditions such as tennis elbow or golfer's elbow or compressive neuropathies. In tendinitis, injections should be made into the tendon sheath and not directly into the tendon, otherwise rupture of tendon may happen due to the absence of a true tendon sheath and a high risk of rupture, the Achilles tendon should not be injected. Full aseptic preparations are essential. Corticosteroid injections are contra-

indicated in infected areas. Occasionally an acute inflammatory reaction develops after an intra-articular or soft-tissue injection of a corticosteroid. This is possibly a reaction to the microcrystalline suspension of the corticosteroid used. However, one must be cautious that sepsis has not been introduced into the injection site. Intra-articular corticosteroid injections can cause flushing and may affect the hyaline articular cartilage. Charcot-like arthropathies have also been reported (particularly following repeated intra-articular injections). Intra-articular injection of corticosteroids to one single joint should not exceed 4 times in one year.

Methylprednisolone, Dexamethasone Sodium phosphate, and Triamcinolone acetonide are useful local corticosteroid preparations.

LOCAL CORTICOSTEROID INJECTIONS

(See section 5.3.2)

Betamethasone, Dexamethasone, Hydrocortisone acetate, Methylprednisolone acetate, Prednisolone acetate, Triamcinolone acetonide

Indications: Local inflammation of joints due to rheumatoid arthritis or advanced osteoarthritis; stenosing tenovaginitis (e.g. de Quervain's disease of the wrist); overuse injury (e.g. tennis elbow); compressive neuropathies (e.g. carpal tunnel syndrome).

Cautions; Contraindications & Side-effects: See notes above

Dose: See under preparations (section 5.3.2)

Proprietary Preparations
See section 5.3.2

9.1.3 DISEASE-MODIFYING ANTI-RHEUMATIC DRUGS (DMARD)

These are drugs, which have the capacity to modify the clinical and pathological course of rheumatoid arthritis and a few related disorders.

9. MUSCULOSKELETAL AND JOINT DISEASES

Prolonged administration is required and the effects are slow to appear. These drugs require 4 to 6 months of treatment for a full response. If one of these drugs does not lead to objective benefit within 6 months, it should be discontinued and another may be tried.

DMARDs may improve symptoms and signs of inflammatory joint disease and also extra-articular manifestations such as vasculitis. They reduce the erythrocyte sedimentation rate, and sometimes the titre of rheumatoid factor. These drugs are indicated in rheumatoid arthritis when NSAIDs alone fail to provide adequate control. Some rheumatologists would administer these drugs early in case of clinically severe rheumatoid arthritis. As all these drugs have potentially serious side-effects they should be administered with caution, preferably by specialists only. Frequent monitoring of patients is required.

CHOICE: When choosing among the DMARDs, hydroxychloro-quine or sulfasalazine can be the first choice as they have the minimum adverse reactions among the group.

Chloroquine and hydroxychloroquine have a very acceptable toxicity profile. Retinopathy is rare if the dose recommended below is not exceeded. It is particularly effective in the early treatment of mild to moderate and/or seronegative rheumatoid arthritis. However, this drug should not be used in psoriatic arthritis.

Sulphasalazine shares many attributes with chloroquine. It has an acceptable toxicity profile and is recommended for early mild rheumatoid arthritis. Side effects include rash, gastro-intestinal intolerance and, especially in patients with rheumatoid arthritis, occasional leucopenia, neutropenia, and thrombocytopenia. These haematological changes occur usually during the first 6 months of treatment. Close monitoring of blood counts is indicated during the first 2 months and 6 weekly thereafter. Liver function tests should also be done at 6 weekly intervals.

Methotrexate is an immunosuppressant drug used by rheumatologists widely to

control severe rheumatoid arthritis nowadays. Long-term clinical studies have clearly demonstrated the efficacy and safety of this drug. The use of folic acid reduces the incidence of common side effects, especially gastrointestinal toxicity, without decreasing the effectiveness of methotrexate. Regular blood counts and liver function tests should be done during the therapy (at 4-6 weekly intervals), but liver biopsy is not required unless a persistent abnormality of liver function is demonstrated.

Leflunomide is useful in moderate to severe rheumatoid arthritis. It is an immunosuppressant drug and requires frequent monitoring of haematological, renal and hepatic functions. Pregnancy must be excluded before initiating treatment, and effective contraception is essential during treatment and at least for 2 years after treatment in women and at least for 3 months after treatment in men.

ADALIMUMAB

Indication: Rheumatoid Arthritis, Juvenile Idiopathic Arthritis, Psoriatic Arthritis, Ankylosing Spondylitis, Crohn's Disease, Ulcerative Colitis (UC): *see under dose*

Cautions and Contraindications : Serious infections; monitored infection before, during, and after treatment, discontinue if new serious infection develops; hepatitis B virus—monitor for active infection; heart failure, malignancy; monitor for nonmelanoma, Skin cancer before and during treatment, avoid in pregnancy and breast feeding.

Interactions: Avoid live vaccines. Concomitant other biologic DMARDs (eg, abatacept or anakinra) or other TNF blockers; not recommended. Immunosuppressants increase risk of infection. Concomitant CYP450 substrates with narrow therapeutic index (eg, warfarin, cyclosporine, theophylline); monitor and adjust dose of these drugs.

Side-effects: Pyrexia, erythema and/or itching, hemorrhage, pain or swelling at injection site, headache, nausea, rash,

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abdominal pain; Lupus-like syndrome
The most common adverse reactions leading to discontinuation of Adalimumab in rheumatoid arthritis were clinical flare reaction, rash and pneumonia. Interstitial lung disease
Dose: ADULT over 18 years, 40mg on alternate weeks; if necessary increased to 40mg weekly in patients receiving adalimumab alone; review treatment if no response within 12 weeks
Psoriatic arthritis, ankylosing spondylitis, severe axial spondyloarthritis, ADULT over 18 years, 40mg on alternate weeks; discontinue treatment if no response
Within 12 weeks
Polyarticular juvenile idiopathic arthritis, CHILD 2–18 years, consult product literature

Proprietary Preparation
Advixa(Incepta), Inj. Tk. 15000.00/Vial

AZATHIOPRINE

Indications: See notes above; transplantation rejection
Cautions; Contra-indications; Side-effects: See in section on cytotoxic drugs
Dose: By mouth, initially 3 mg/kg daily, reduced according to response; maintenance dose 1-3 mg/kg daily; withdraw treatment if no improvement is apparent in 3 months

Proprietary Preparations
See section 14.2.1

CHLOROQUINE^[ED]

Indications: Active rheumatoid arthritis, juvenile chronic arthritis; systemic and discoid lupus erythematosus; malaria(see also section 1.4.1)
Cautions, Contra-indications and Side effects: See also section 1.4.1
Dose: Chloroquine base 150 mg daily; maximum 2.5 mg/kg daily; CHILD, up to 3 mg/kg daily; see recommendations above
Proprietary Preparations
See section 1.3

CYCLOSPORINE

(See section 14.2.1)

Indications: Severe active rheumatoid arthritis when conventional therapy inappropriate or ineffective; graft-versus-host disease; atopic dermatitis and psoriasis
Cautions; Contra-indications & Side-effects: See in section on cytotoxic drugs (section 14.1.2.) Additional cautions in rheumatoid arthritis
Contra-indication: In abnormal renal function, hypertension not under control, infections not under control, and malignancy. Serum creatinine needs to be measured initially before treatment, and monitored every 2 weeks for the first 3 months, and thereafter every 4 weeks
Dose: ADULT over 18 years by mouth, administered in accordance with expert advice, 2.5 mg/kg daily in 2 divided doses initially, then increased if necessary after 6 weeks to max. 4 mg/kg daily; treatment should be discontinued if the response is insufficient in 3 months; dose should be adjusted according to the response and should be reviewed in 6 months and treatment should be continued only if benefits are clearly outweigh risks. CHILD and under 18 years, not recommended

Proprietary Preparations
see section 14.2.2

HYDROXYCHLOROQUINE

Indications: Active rheumatoid arthritis (including juvenile chronic arthritis), systemic and discoid lupus erythematosus
Cautions; Side-effects: See notes above
Dose: Initially 400 mg daily in divided doses; maintenance dose 200-400 mg daily; maximum dose 6.5 mg/kg, but not exceeding 400 mg daily. CHILD, up to 6.5 mg/kg daily

Proprietary Preparations
Reconil(Incepta), Tab. 200mg, Tk.12.00/Tab.
Roquin(Zenith), Tab., 200 mg, Tk. 12.00/Tab.

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Reconil(*Incepta*), Tab., 200 mg, Tk. 12.00/Tab.

LEFLUNOMIDE

Indications: Moderate to severe active rheumatoid arthritis

Cautions: Renal impairment; impaired bone marrow function including anaemia, leucopenia or thrombocytopenia; recent treatment with other hepatotoxic or myelotoxic DMARD (avoid concomitant use); history of tuberculosis; exclude pregnancy before treatment. Monitor full blood count before treatment and every 2 weeks for 6 months then every 8 weeks. Monitor liver function. Monitor blood pressure

Contraindications: Severe immunodeficiency; severe infections; hepatic impairment; severe hypoproteinemia; pregnancy

Side-effects: Diarrhoea, nausea, vomiting, anorexia, oral mucosal disorders, abdominal pain, weight loss; increased blood pressure; headache, dizziness, paraesthesia, asthenia; dry skin, rash, pruritus, eczema, alopecia; tenosynovitis; leucopenia, thrombocytopenia, anaemia; hepatic dysfunction; severe infection, anaphylaxis

Dose: Initially 100 mg for 3 days, then maintenance, 10-20 mg daily; CHILD under 18 years safety and efficacy not established

Proprietary Preparations

Motoral(*ACI*), Tab., 20 mg, Tk. 5.04/Tab.; 100 mg, Tk. 20.13/Tab.

Nodia(*Incepta*), Tab., 10 mg, Tk. 3.00/Tab

INFLIXIMAB

Indications: For the treatment of Crohn's disease, ulcerative colitis, psoriasis, psoriatic arthritis, ankylosing spondylitis, and rheumatoid arthritis.

Cautions, Contraindications & Side effect: See sec14.1 and same as that of Adalimumab

Dose: Consult Physician and product literature

Proprietary Preparation

Remicade[®](*Cilag*)Inj., (IV Infusion) 100mg/vial, Tk.32,5,54?vial

METHOTREXATE^[ED]

Indications: Severe active rheumatoid arthritis; malignant disease

Cautions; Contraindications & Side-effects: See notes above and also the section on antineoplastic drugs (section 14.1.3). Pulmonary toxicity may be a special problem in rheumatoid arthritis. Patients on methotrexate are advised to contact doctor immediately if he or she develops dyspnoea or cough

Dose: By mouth, 7.5 mg once weekly (in a single dose, or divided doses of 2.5 mg at intervals of 12 hours – to be adjusted according to response). Total maximum dose is 20 mg weekly

Proprietary Preparations

See section 14.1.3

SULFASALAZINE

Indications: Active rheumatoid arthritis; also ulcerative colitis; see notes above also section 2.5

Cautions; Contra-indications & Side-effects: See notes above. Patients receiving sulphasalazine should be advised to report any unexplained bleeding, bruising, purpura, sore throat, fever or malaise that occurs during treatment

Dose: Administered on expert advice, as enteric-coated tablets, initially 500 mg daily, increased by 500 mg daily at intervals of 1 week to a maximum of 2 – 3 g daily in divided doses

Proprietary Preparations

Reumazin(*Aristo*), Tab., 500 mg, Tk. 5.20/Tab.

Sulfazin(*Popular*), Tab., 500 mg, Tk. 5.22/Tab.

Sulfacol(*Drug Int.*), Tab., 500 mg, Tk. 5.00/Tab.

Salazine(*Opsonin*), Supp., 500 mg, Tk. 7.52/Supp.; Tab., 500 mg, Tk. 3.92/Tab.

Zulfidin(*UniMed*), Tab, 500 mg, Tk. 7.00/Tab.

TOCILIZUMAB

Indication: To treat moderate to severe rheumatoid arthritis in adults. It is

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sometimes given together with other arthritis medicines. Actemra is used to treat systemic juvenile idiopathic arthritis (in children who are at least 2 years old).

Cautions, Contraindications & Side effect: See sec14.1 and same as that of Adalimumab

Dose: Consult Physician and product literature

Proprietary Preparation

Actemra (Roche), Inj. (IV infusion) Tk. 80mg/4ml, Tk. 12797.21, Tk. 200mg/10ml, Tk. 29,756.00/vial.

TOFACITINIB

Indications: To treat adults with moderate to severe rheumatoid arthritis as an alteration to methotrexate, particularly when there is inadequate response to or intolerance of methotrexate. It may also be useful in treating psoriatic arthritis and ankylosing spondylitis.

Cautions and Side-effects: Gastrointestinal perforation, headache, diarrhea and nasopharyngitis, Immunosuppression leading to infection (including tuberculosis) and development of lymphoma and other malignancies.

Contraindication: Tuberculosis and any other active infection.

Dose: Orally-5mg, twice daily, sustained releases preparation; 11mg daily.

Proprietary Preparations

Jaktor (Beacon), Tab., 5mg, Tk. 48/Tab.

Tocit (Drug Intl), Tab., 5mg, Tk. 35/Tab.

Tofacent (Incepta), Tab., Tk. 48/Tab.

Tofanib (Globe), Tab., 5 mg, Tk. 48.00/Tab.; 11 mg, Tk. 80.00/Tab.

Tofatin (Ziska), XRTab., 11 mg, Tk. 80.00/Tab.; 5 mg, Tk. 45.00/Tab

9.1.4 DRUGS FOR TREATMENT OF GOUT

Rheumatic diseases are characterized by osteoarticular or muscle pain. Late sequel of rheumatic diseases are gradually increasing deformities and loss of function of limbs. Analgesics and anti-inflammatory drugs are therefore needed

for the initial management of these diseases. Paracetamol is often adequate to control mild to moderate pain. For severe pain and when there is significant inflammation a non-steroidal anti-inflammatory drug (NSAID) is indicated. Steroids are needed for severe inflammatory pain. To control the disease process disease modifying anti-rheumatic drugs (DMARDs) are used. Colchicine is used for acute attack of gout while allopurinol of uric acid and febuxostat are used for interval treatment of gout.

Drugs used for treatment of acute attack of gout are different from those used in long term control (interval treatment) of the disease. The latter should not be initiated during an acute attack, because this may exacerbate and prolong the acute manifestations of the disease.

ACUTE ATTACKS: High doses of NSAIDs with strong anti-inflammatory effects are used to control an acute attack of gout. Indomethacin 150-200 mg in divided doses (orally or in suppositories) is a good choice. Diclofenac, naproxen or piroxicam are alternatives. Aspirin is not indicated in acute gout. Colchicine is probably as effective as NSAIDs. It may develop toxicity at higher doses, but is advantageous for heart failure patients, as it does not induce fluid retention. Also, it does not have drug interactions with anticoagulants. See NSAIDs. Colchicine is useful in controlling pain and inflammation in acute gout.

COLCHICINE

Indications: Acute gout; short term prophylaxis during initial therapy with allopurinol or uricosuric drugs

Cautions: See notes above; gastrointestinal disease; cardiac disease; renal impairment; elderly

Contraindications: Blood disorders

Side-effects: Nausea, vomiting, abdominal pain, profuse diarrhoea, gastrointestinal bleeding, rash, hepatic and renal damage

Dose: Acute gout- 0.5/0.6 mg 2-4 times daily until symptoms are relieved, max. 6

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mg per course; course not be repeated in 3 days

Prevention of gout attack- during initial treatment with allopurinol or uricosuric drugs, 0.5 mg twice daily

Proprietary Preparations

Colimax(Square), Tab., 6 mcg, Tk. 5.02/Tab.

Coluric(UniMed), Tab., 6 mcg, Tk. 7.50/Tab.

Kolchin(Incepta), Tab., 6 mcg, Tk.

5.00/Tab.; 5 mcg, Tk. 4.00/Tab.

INTERVAL TREATMENT: Reducing uric acid formation from purines with xanthine-oxydase inhibitor allopurinol and febuxostat can do long term control (interval treatment) of gout. Alternatively, uric acid excretion can be increased by using uricosuric a drug such as sulfinpyrazone. Treatment with these drugs should not be initiated during an acute attack. Even in quiescent stage, initiation of interval treatment may precipitate an acute attack of gout. Therefore, when starting the interval treatment, a potent NSAID or colchicine should be administered side by side, and should be continued for about one month after the hyperuricaemia has been corrected. If an acute attack develops during interval treatment, the treatment should be continued while the acute attack should be treated on its own merit.

Allopurinol is widely used as it is well tolerated. It is not indicated for asymptomatic hyperuricaemia. This drug has a long half-life, so it may be given as once daily dose. If the dose exceeds 300 mg, it should be given in divided doses.

Febuxostat is an alternative of allopurinol and is indicated for chronic hyperuricaemia where urate deposition has already occurred. According to NICE guidance, febuxostat is recommended as an option for management of chronic hyperuricaemia in gout only for patients who are intolerant to allopurinol or for whom allopurinol is contra-indicated.

Sulfinpyrazone can be used instead of allopurinol, or in combination with it in cases that are resistant to treatment.

ALLOPURINOL^[ED]

Indications: Prophylaxis of gout: prophylaxis for uric acid and calcium oxalate renal stones

Cautions: Administer prophylactic NSAID (not aspirin or salicylates) or colchicine on initiation of treatment (see *notes above*); ensure adequate fluid intake (2 litres/day); hepatic and renal impairment. In neoplastic conditions treatment with allopurinol should be started before cytotoxic drugs are given

Contra-indications: Not a treatment of acute gout; see *notes above*

Side-effects: Rashes (if severe-withdraw therapy, if mild - suspend therapy for a time, then reintroduce cautiously but discontinue immediately if rashes recur); fever, lymphadenopathy, arthralgia, eosinophilia; malaise, headache, vertigo, drowsiness; taste disturbance, hypertension, alopecia, hepatotoxicity, peripheral neuropathy

Dose: Initially 100 mg daily as a single dose after food, gradually increase at weekly interval according to plasma concentration of uric acid to about 300mg; usual maintenance dose is 200-600 mg daily, divided into doses not more than 300 mg. CHILD (in neoplastic conditions, enzyme disorders) 10-20 mg/kg daily

Proprietary Preparations

Alurol(Incepta), Tab., 100 mg, Tk. 4.00/Tab.

Duric(Opsonin), Tab., 100 mg, Tk. 4.02/Tab.

Esloric(Square), Tab., 100 mg, Tk. 4.03/Tab.; 300 mg, Tk. 8.06/Tab.

Purinol(Drug Intl), Tab., 100mg, Tk.

4.05/Tab.; Tab., 300mg, Tk. 8.05/Tab.

Ucorex(Healthcare), Tab., 100mg, Tk. 4.05/Tab.

FEBUXOSTAT

Indications: Chronic hyperuricaemia in gout

Cautions: Administer prophylactic NSAID (not aspirin or salicylates) or colchicine on initiation of treatment at least for 6 months after starting treatment with febuxostat (see *notes above*); monitor liver function before and periodically during treatment; thyroid disorders; ischaemic heart disease;

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congestive cardiac failure; transplant recipients

Contraindications: Do not start treatment during an acute attack of gout

Side-effects: Gastro-intestinal disturbances, oedema, rash, headache; abnormal liver function tests, hyperlipidaemia, cholelithiasis, ECG abnormalities; taste and smell disturbances, flushing, hypertension, chest pain, palpitation, dyspnoea, cough, bronchitis, dizziness, drowsiness, insomnia, paraesthesia, hyposthaesia; anorexia and weight changes, diabetes mellitus, increased thyroid stimulating hormone, decreased libido, erectile dysfunction; increased urinary frequency, haematuria, proteinuria, nephrolithiasis, renal failure; arthralgia, myalgia, muscle weakness, muscle spasm, arthritis, bursitis, dermatitis; rarely- severe hypersensitivity reactions including Stevens-Johnson syndrome and acute anaphylaxis

Dose: ADULT over 18 years, 80 mg once daily, if after 4 weeks serum uric acid remains above 6 mg/dl, increase dose to 120 mg once daily

Proprietary Preparations

Barif(Square), Tab., 40 mg, Tk. 12.03/Tab.; 80 mg, Tk. 22.06/Tab.

Eburic(Beximco), Tab., 40mg, Tk. 12.00/Tab.

Feburen(Renata), Tab., 80 mg, Tk. 22.00/Tab.; 40 mg, Tk. 12.00/Tab.

Febus(ACI), Tab., 40mg, Tk. 12.04/Tab.; 80mg, Tk. 22.07/Tab.

Febustat(Incepta), Tab., 40 mg, Tk. 12.00/Tab.; 80 mg, Tk. 22.00/Tab.

Febux(Monico), Tab., 40mg, Tk. 12.00/Tab.; 40mg, Tk. 12.00/Tab.

Febuxostat(Popular), Tab., 40mg, **Feluric**(Healthcare), Tab., 40mg, Tk. 12.00/Tab.; 80mg, Tk. 22.00/Tab.

Fostat(Orion), Tab., 40 mg, Tk. 10.03/Tab.

Goustat(Acme), Tab., 40.00 mg, Tk. 12.03/Tab.

Goutil(Eskayef), Tab., 40mg, Tk. 12.00/Tab.; 80mg, Tk. 22.00/Tab

Urostat(General), Tab., 40 mg, Tk. 12.04/Tab.; 80mg, Tk. 22.07/Tab.

Xanuric(UniMed), Tab., 120mg, Tk. 34/Tab.; 40mg, Tk. 12/Tab.; 80mg, Tk. 22/Tab.

SULFINPYRAZONE

Indications: Gout prophylaxis, hyperuricaemia

Cautions: Ensure adequate fluid intake (about 2-3 litres daily), render urine alkaline if uric acid overload is high; peptic ulceration; cardiac disease (may cause salt and water retention); regular blood count advisable

Contra-indications: history of blood disorder, nephrolithiasis, acute attack of gout

Side-effects: Gastro-intestinal disturbances, allergic skin reactions, water and salt retention; rarely blood disorders, acute renal failure, hepatitis

Dose: Initially 100-200 mg daily with food (or milk), increasing over 2-3 weeks to 600 mg daily, continue until serum uric acid level returns to normal limits, then reduce to maintenance dose

Generic Preparation

Pyrazone(Incepta), Tab. 200mg, Tk. 40.00/Tab

9.2 DRUGS USED IN NEUROMUSCULAR DISORDERS

9.2.1 DRUGS WHICH ENHANCE NEUROMUSCULAR TRANSMISSION

9.2.2 MUSCLE RELAXANTS

9.2.1 DRUGS WHICH ENHANCE NEUROMUSCULAR TRANSMISSION

Anticholinesterases are used as first line treatment in myasthenia gravis. Corticosteroids are only given concomitantly if anticholinesterase treatment is failing.

Anticholinesterase drugs enhance neuromuscular transmission in voluntary and involuntary muscles in myasthenia gravis. They prolong the action of acetylcholine by inhibiting the enzyme acetylcholinesterase.

Muscarinic side-effects of anticholinesterases include increased sweating, salivary, and gastric secretion; increased gastrointestinal and uterine motility; bradycardia. Excessive dosage of these drugs may impair neuromuscular transmission and precipitate a 'cholinergic crisis' by causing a depolarising block.

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NEOSTIGMINE^[ED]

Indications: Myasthenia gravis; reversal of muscle relaxation action (for nondepolarizing skeletal muscle relaxants) in general anaesthesia (see also section 8.1.6)

Cautions: Asthma (extreme caution), bradycardia, recent myocardial infection, epilepsy, hypotension, Parkinsonism, vagotonia, peptic ulceration, renal impairment, pregnancy and breast-feeding. Atropine or other antidote to muscarinic effects may be necessary (particularly when neostigmine is given by injection), but it should not be given routinely as it may mask the signs of overdose

Contraindications: intestinal or urinary obstruction

Interactions: See Appendix- 2

Side-effects: Nausea, vomiting, increased salivation, diarrhoea, and abdominal cramps. Signs of overdose are increased gastrointestinal defect, bronchial secretion, and sweating; involuntary defaecation and micturition; miosis, nystagmus, bradycardia, hypotension; agitation, excessive dreaming, fasciculation and ultimately paralysis

Dose: By mouth, neostigmine bromide 15-30 mg at suitable intervals throughout the day, total daily dose 75-300 mg (see notes above), NEONATE 1-5 mg every 4 hours, half an hour before feed; CHILD up to 6 years 7.5 mg initially, 6-12 years initially 15 mg, usual total dose 15-90 mg daily

By subcutaneous or intramuscular injection, neostigmine methylsulphate 1-2.5 mg at suitable intervals throughout day, usual total daily dose 5-20 mg; NEONATE 50-250 micrograms every 4 hours half an hour before feeds; CHILD 200-500 micrograms as required

Proprietary Preparations

See section 8.1.5

PYRIDOSTIGMINE

Indication: Myasthenia gravis

Cautions: See under Neostigmine

Contra-indications: See under Neostigmine

Side-effects: See under Neostigmine

Dose: By mouth, 30-120 mg at suitable intervals throughout the day.

Proprietary Preparations

Dostimid(UniMed), Tab., 60 mg, Tk. 22.00/Tab.

Pyrostig(Popular), Tab., 60 mg, Tk. 25.09/Tab

9.2.2. MUSCLE RELAXANTS FOR RELIEF OF CHRONIC MUSCLE SPASM OR SPASTICITY

SKELETAL MUSCLE RELAXANTS

These drugs are useful for relief of acute or chronic skeletal muscle spasm. Diazepam and baclofen act principally on the central nervous system while dantrolene acts on a peripheral site of action. **Tolperisone, Eperisone, Tizanidine and Clobenzaprine** are centrally acting skeletal muscle relaxants. The underlying cause of spasticity should be treated concomitantly and any aggravating factor removed.

BACLOFEN

Indications: To treat muscle spasms caused by certain conditions (such as multiple sclerosis, spinal cord injury/disease). It works by helping to relax the muscles.

Cautions: Psychiatric and nervous system disorder; Parkinson's, elderly; respiratory impairment; epilepsy, peptic ulcer (avoid oral route in active peptic ulceration); diabetes; hypertonic bladder sphincter; avoid abrupt withdrawal, hyperactive state, may exacerbate spasticity, and precipitate autonomic dysfunction including hyperthermia, psychiatric reactions and convulsions, drowsiness may affect performance of skilled tasks (e.g. driving)

Contra-indications: For intrathecal treatment local or systemic infection

Side-effects: Dry mouth, respiratory depression, light-headedness, fatigue, confusional state, dizziness, headache, insomnia, depression, euphoric mood, myalgia, muscular weakness, ataxia,

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tremor, nystagmus, hallucination, nightmare, cardiac output decreased gastrointestinal disorder, retching, vomiting, constipation, diarrhoea

Dose: By mouth, ADULT over 18 years, initially 5mg 3 times daily, gradually increased; usual maintenance dose up to 60mg daily in divided doses (max. 100 mg daily);

CHILD under 18 years, initially 300 micrograms/kg daily in 4 divided doses, increased gradually at weekly intervals until satisfactory response; usual maintenance dose 0.75–2 mg/kg daily in divided doses;

CHILD up to 8 years, max. total daily dose 40 mg/day;

CHILD 8–18 years, max. total daily dose 60 mg/day

Proprietary Preparations

Bacifen(Biopharma), Tab., 10mg, Tk. 8/Tab.

Backtone(Pharmacil), Tab., 10mg, Tk. 10.03/Tab.

Bacium(Virgo), Tab., 10 mg, Tk. 8/Tab.

Baclodol(Astra Bio), Tab., 10 mg, Tk. 8/Tab.

Baclof(Pacific), Tab., 10 mg, Tk. 9.50/Tab.

Bacloflex(Somatec), Tab., 10 mg, Tk. 8/Tab.

Baclon(Orion), Tab., 10 mg, Tk. 8.06/Tab.; 5 mg, Tk. 4.54/Tab.

Bacmax(Drug Intl), Tab., 5mg, Tk. 4.05/Tab.; 10mg, Tk. 8.05/Tab.;

Bacofen(Ibn Sina), Tab., 5 mg, Tk. 5.50/Tab.; 10 mg, Tk. 8.00/Tab.

Beclovan(Aristo), Tab., 10mg, Tk. 8.00/Tab.; 5mg, Tk. 5.50/Tab.

Beklo(Opsonin), Syrup., 5 mg /5 ml, Tk. 100.00/100 ml.; Tab. 10 mg, Tk. 8.06/Tab.;

25 mg, Tk. 20.08/Tab.; 5 mg, Tk. 4.54/Tab.

Easybak(Euro), Tab., 10mg, Tk. 8.00/Tab.

Fenobac(Eskayef), Syrup., 5 mg /5 ml, Tk. 100.00/100ml.; Tab. 10mg, Tk. 8.00/Tab.;

Flexibac(Beacon), Tab., 25mg, Tk. 20.06/Tab.; 5mg, Tk. 5.50/Tab.

Flexifen(Incepta), Tab., 10 mg, Tk. 8.00/Tab.; 25 mg, Tk. 16.00/Tab.; 5 mg, Tk. 4.50/Tab.

Flexilax(Square), Tab., 10 mg, Tk. 9.00/Tab.;

5 mg, Tk. 5.50/Tab.

Liorel(ACI), Tab., 10mg, Tk. 8.05/Tab.; 5mg, Tk. 4.53/Tab.

Liorel[®](Novartis), Tab., 10 mg, Tk. 12.96/Tab.; 25 mg, Tk. 22.46/Tab.

Lospan(Beximco), Tab., 10mg, Tk. 8.00/Tab.

Maxolax(Renata), Tab., 5 mg, Tk. 5.00/Tab.;

10 mg, Tk. 8.00/Tab.

Muslofen(Organic), Tab., 10 mg, Tk. 8/Tab.

Mylofen(Popular), Tab., 10mg, Tk. 8.00/Tab.;

Myorel(Healthcare), Tab., 25mg, Tk. 20/Tab.; 5mg, Tk. 5.00/Tab.; 10mg, Tk. 8.00/Tab.

Rembac(Monico), Tab., 10mg, Tk. 8.00/Tab.

Restobac(General), Tab., 10mg, Tk. 8.05/Tab.

Skelofen(Acme), Tab., 10 mg, Tk. 8.03/Tab.; 5 mg, Tk. 4.51/Tab.

Spaflex(Nuvista), Tab., 10 mg, Tk. 8/Tab.; 5 mg, Tk. 4.50/Tab.

Spakem(UniMed), Tab., 10mg, Tk. 8.00/Tab.; 5mg, Tk. 4.50/Tab.;

Spinafen(Globe), Tab., 10 mg, Tk. 8.00/Tab.; 10 mg, Tk. 8.03/Tab.

CYCLOBENZAPRINE

Indications: It is used as an adjunct in the symptomatic treatment of painful muscle spasm associated with musculoskeletal conditions in non-ambulatory patients

Cautions: It may cause drowsiness; patients affected should not drive or operate machine

Contraindications: Recent myocardial infarction, enlarged prostate, glaucoma, liver disease

Interactions: See Appendix-2

Side-effects: Sedation, dry mouth, postural hypotension, confusion

Dose: 10-20mg three times daily given by mouth (max. daily dose 60mg.) **Note:** Treatment more than 3 weeks is not recommended

Proprietary Preparations

Flexor(Incepta), Tab., 5 mg, Tk. 2.00/Tab.; 10 mg, Tk. 3.00/Tab.

DANTROLENE SODIUM

Indications: To treat muscle tightness and cramping (spasms) caused by certain nerve disorders such as spinal cord injury, stroke, cerebral palsy, and multiple sclerosis. It works by relaxing the muscle. It helps

Reduce muscle pain and stiffness,

Cautions: Potentially life-threatening hepatotoxicity reported, usually if doses greater, test liver function before and at intervals during therapy—discontinue if abnormal liver function tests or symptoms of liver disorder. drowsiness may affect performance of skilled tasks (e.g. driving)

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Contraindications: Acute muscle spasm; avoid when spasticity is useful, for example, locomotion, hepatic impairment; injection may be used in an emergency for malignant hyperthermia; Pregnancy

Dose: Initially 25mg daily, may be increased at weekly intervals to max. 100 mg 4 times daily; usual dose 75mg 3 times daily; **CHILD:** Consult product literature

Proprietary Preparations

Danlene(Incepta), Cap., 25 mg, Tk. 10.00/Cap.

Relaxo(Ziska), Cap., 25 mg, Tk. 10.00/Cap.; 50 mg, Tk. 15.00/Cap.

Trolen(Drug Intl), Cap., 25mg, Tk. 10.00/Cap.

DIAZEPAM^{[ED][CD]}

(See also section 7.1, 7.2 & 7.6.2)

Indications: Muscle spasm of varied aetiology, including tetanus; other indications

Cautions, Contraindications and Side-effects: Sedation and occasional hypotonia

Interactions: See Appendix-2

Dose: By mouth, 5-15 mg in single or twice daily doses initially, increased to 60 mg daily in divided doses if necessary. Cerebral spasticity, in selected cases, 2-40 mg daily in divided doses

By intramuscular or intravenous injection (into a large vein at a rate not more than 5 mg/minute), in acute muscle spasm, 10 mg repeated if necessary after 4 hours, Tetanus, ADULT and CHILD, by intra-venous injection, 100-300 microgram/kg repeated every 1-4 hours

Proprietary Preparations

See section 7.1

EPERISONE

Indications: Spasticity and rigidity of skeletal muscles due to lesions of the pyramidal tract, multiple sclerosis, encephalomyelitis; cerebral palsy; muscle spasm due to back or neck pain

Cautions and Side-effects: Muscular weakness

Dose: 50-150 mg 3 times daily

Proprietary Preparations

Myonil(Square), Tab., 50 mg, Tk. 3.01/Tab.

Epriel(Orion), Tab., 50 mg, Tk. 3.01/Tab.

TIZANIDINE

Indications: Painful muscle spasm associated with functional disorders of the spine and spasticity due to multiple sclerosis, spinal cord injury, cerebrovascular accident

Cautions: Impaired renal and liver function; in pregnancy and breast-feeding. Monitor liver functions monthly for 4 months and then in those who develop unexplained nausea, anorexia or fatigue

Contraindications: Known hypersensitivity to tizanidine, severe hepatic impairment

Interactions: See Appendix-2

Side-effects: Fatigue, dizziness, dry mouth, gastrointestinal disturbances slight decrease in blood pressure; also reported; insomnia, transient increase in serum transaminases, bradycardia

Dose: In painful muscle spasm, 2 mg 3 times daily; spasticity due to neuromuscular disorders, 6 mg/day in 3 divided doses, then increase stepwise 12 to max. 36 mg daily CHILD not recommended

Proprietary Preparations

Relentus(Beximco), Tab., 2 mg, Tk. 5.00/Tab.

Sirdalud(Novartis), Tab., 2 mg, Tk. 10/Tab.

Tizadin(ACI), Tab., 2 mg, Tk. 5.04/Tab.

Tizalud(Opsonin), Tab., 2 mg, Tk. 5.02/Tab.

TOLPERISONE

Indications: Spasticity and rigidity of skeletal muscles due to lesions of the pyramidal tract, multiple sclerosis, encephalomyelitis; cerebral palsy; muscle spasm due to back or neck pain

Cautions and Side-effects: Muscular weakness, somnolence (rarely in children)

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Dose: Oral, 150-450 mg 3 times daily.
CHILD 3 months to 6 years, 5-10 mg/kg daily in divided doses, 6-12 years, 1-2 mg/kg daily in divided doses
Injections, for ADULTS, 100-200 mg slowly intravenously or intramuscularly

Proprietary Preparations

A-Calm(Acme), Tab., 50 mg, Tk. 6.00/Tab.
Musclex(Aristo), Tab., 50 mg, Tk. 5.00/Tab.
Myolax(Incepta), Tab., 50 mg, Tk. 12.00/Tab.; 100 mg, Tk. 7.00/Tab.
Myoson(Ibn Sina), Tab., 100 mg, Tk. 8.00/Tab.; 50 mg, Tk. 4.00/Tab.
Myoxan(Globe), Tab., 50 mg, Tk. 4.00/Tab.
Myoxant(UniMed), Tab., 50 mg, Tk. 5.00/Tab.
Mydoclam[®](Richter)Tab., 50 mg, Tk. 9.08/Tab.
Rison(Kemiko), Tab., 50 mg, Tk. 4.01/Tab.
Tolcalm(General), Tab., 50 mg, Tk. 4.01/Tab.
Tolmus(Beximco), Tab., 50 mg, Tk. 3.00/Tab.
Tolpa(Biopharma), Tab., 50 mg, Tk. 4.00/Tab.
Tolson(Opsonin), Tab., 100 mg, Tk. 8.00/Tab.; 50 mg, Tk. 5.00/Tab.
Toperin(Eskayef), Tab, 50 mg, Tk. 3.00/Tab.

Tolperisone Hydrochloride 2.5mg & Lidocaine Hydrochloride 100mg
Myolax Plus(Incepta), Inj., Tk. 34.00/Inj.

9.3 SUPPLEMENTARY DRUGS USED IN JOINT DISEASES

Different biologic agents and nutrition supplements have been used to treat degenerative or inflammatory joint diseases. Glucosamine hydrochloride is approved in Bangladesh for therapeutic use in osteoarthritis for its chondro-protective properties. The mechanism of action is not understood and there is limited evidence to show it is effective. Combination product of glucosamine sulphate and chondroitin sulphate, is also useful in chronic management of degenerative arthritis as they provide a synergistic chondro-protective effect. Combination of glucosamine sulphate and diacerein with similar synergistic chondro-protective effects with added benefit of analgesic effects has been licensed. Diacerein works by inhibiting interleukin-1 beta.

GLUCOSAMINE

Indications: Mild to moderate osteoarthritis of knee and hip

Cautions: Diabetic patients are advised to monitor blood glucose level. Pregnancy and lactation (enough studies have not been carried out)

Contra-indications: known hypersensitivity to glucosamine sulphate

Side-effects: Gastro-intestinal upsets (uncommon)

Dose: By mouth, 1.5g daily in single or divided doses

Proprietary Preparations

Glustin(General), Tab., 500 mg, Tk. 3.51/Tab.
Glupain(ACI), Tab., 500 mg, Tk. 3.02/Tab.
Joinix(Incepta), Tab., 500 mg, Tk. 3.00/Tab.

GLUCOSAMINE + CHONDROITIN

Indication: Mild to moderate osteoarthritis of knee, hip, spine and other locations

Caution: See notes above

Contraindications: known hypersensitivity to glucosamine sulphate or chondroitin sulphate

Side-effects: Gastro-intestinal upset

Dose: By mouth, glucosamine sulphate 750-1500mg + Chondroitin sulphate 600-1200mg daily in divided doses with meals

Proprietary preparations

Glucosamine 250mg + Chondroitin 200mg.
Arth A(Acme), Tab., Tk. 8.07/Tab.
Arthrosin(UniMed), Tab., Tk. 8.00/Tab.
Articulax(Ibn Sina), Tab., Tk. 8.25/Tab.
Bencart(Benham), Tab., Tk. 8.00/Tab.
Bonflex(Eskayef), Tab., Tk. 8.00/Tab.
Carticare(Radiant), Tab., Tk. 19.06/Tab.
Carticel Plus(Opsonin), Tab., Tk. 8.00/Tab.
Cartifit(Globe), Tab., Tk. 8.00/Tab.
Cartigen(Somatec), Tab., Tk. 8.03/Tab.
Cartilage Plus(Renata), Tab., Tk. 8.03/Tab.
Cartilex(ACI), Tab., Tk. 8.05/Tab.
Contilex(Square), Tab., Tk. 8.50/Tab.
Glucium(Biopharma), Tab., Tk. 8.00/Tab.
Glucotin-plus(Drug Intl), Tk. 8.05/Tab.
Glustin(General), Tab., 250 Tk. 8.05/Tab.;
Joinix Plus(Incepta), Tab., Tk. 13.33/Tab.
Jointin(Globex), Tab., Tk. 8.00/Tab.
Rejoin(Aristo), Tab., Tk. 8.00/Tab.
Synflex(Healthcare), Tab., Tk. 8.50/Tab.

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GLUCOSAMINE + DIACEREIN

Indications: Osteo-arthritis of knee, hip and other joints

Cautions: Liver disease

Contra-indications: Hypersensitivity to glucosamine or diacerein

Side-effects: Gastro-enteritis (diarrhoea), yellow or pink discolouration of urine

Dose: ADULT, orally start with (Glucosamine 750 mg +Diacerein 50 mg) daily for first 2 weeks, then increase to Glucosamine 1500 mg + Diacerein 100 mg daily; continue up to 3 years

Proprietary Preparations

Diacerein 50mg +Glucosamine 750 mg

Arth-A(Acme), Tab., Tk. 12.03/Tab.

Bontiv(Healthcare), TabTk. 12.00/Tab.

Cartibon(Popular), Tab., Tk. 12.00/Tab.

Carticare(Radiant), Tab., Tk. 20.00/Tab.

Cartilex(ACI), Tab., Tk. 12.00/Tab.

Cosarin(Opsonin), Tab.,Tk. 12.03/Tab.

Diacer(Beacon), Tab., Tk. 12.00/Tab.

Glucerin(Astra Bio), Tab., Tk. 12/Tab.

Glucium(Biopharma), Tab.,Tk. 12/Tab.

Glucotin(Drug Intl), Tab., Tk. 12/Tab.

Glustin(General), Tab., Tk. 12.04/Tab.

Joinix(Incepta), Tab., Tk. 12.00/Tab.

Jointec(Beximco), Tab.,Tk. 12.00/Tab.

Osticare(Eskayef), Tab, Tk. 12/Tab.;

Ostorin(Ibn Sina), Tab., Tk. 12/Tab.

Rejoin(Aristo), Tab., Tk. 12/Tab.

Tilex Max(Square), Tab., Tk. 12/Tab.

SODIUM HYALURONATE

Indications: To treat knee pain caused by osteoarthritis. It is usually given when other arthritis medications have not been effective.

Cautions: Allergic to avian proteins, feathers, and egg products. Strict aseptic administration technique must be

followed. Remove joint effusion, if present, before injecting Sodium Hyaluronate. Do not use the same syringe for removing joint effusion and for injecting Sodium Hyaluronate. It is recommended that the patient avoid any strenuous activities or prolonged (i.e., more than 1 hour) weight-bearing activities such as jogging or tennis within 48 hours following the intra-articular injection..

Contraindications : Hypersensitivity to hyaluronan preparations, knee joint infections, infections or skin disease in the area of the injection sit.

Side-effects: Headache,itching of the skin large, nonelevated blue or purplish patches in the skin, loss of appetite, nausea and/or vomiting stomach pain swelling of the knee. Most side effects are related to local reactions such as injection site pain, pain, swelling, effusion, or redness of the joint.

Dose: By intra-articular injection. A treatment cycle consists of five injections given at weekly intervals. Some patients may experience benefit with three injections given at weekly intervals. consult product literatur.

Proprietary Preparation

Hyalgun(Healthcare), Inj., 20mg/2ml , Tk. 1980.00/2 ml vial

Hyronate(Incepta), Inj., 20mg/2ml , Tk. 1500.00/2 ml vial

9.4 DRUGS USED IN OSTEOPOROSIS

See section 5.6

Chapter 10

EYE

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10.1 ADMINISTRATION OF DRUGS TO THE EYE AND CONTROL OF MICROBIAL CONTAMINATION

Prerequisites of successful therapy in ophthalmology:

1. **Correct application:** Good technique usually requires active participation by the patient. The instruction and initial supervision by ophthalmologist or qualified assistant is needed.
2. **Proper frequency:** the medications should be given at correct times, which might vary from once in a day to every 1-15 minutes.
3. **Sufficient quantity:** One drop is all that is needed though typically less than 5% of the dose given in an eye drop is absorbed intraocularly.
4. **Compliance:** The practical realization of the prescribed medication depends on the reliability of the patient.
5. **Systemic effects from topical application :** Undesirable effects may well arise from absorption of

drugs into the general circulation via conjunctival vessels or from the nasal mucosa after the excess of the preparation has drained down through the tear ducts; nasal drainage of drugs is much more often associated with eye drops than with eye ointments. For example, a beta blocker administered as eye drops may induce bronchospasm or bradycardia in susceptible individuals. Although the extent of systemic absorption following ocular administration is highly variable.

6. **Miscellaneous :** Other factors that should be kept in mind : Eye drops must be kept sterile (container tip should not touch the eye), proper storage (protection from high temperature, humidity and light) must be ensured, attention to shaking suspensions and expiration date must be noticed.

ROUTES OF ADMINISTRATION

LOCAL

- a) **Topical :** This route should always be considered before resorting to

the systemic route. Frequent application is almost equivalent to subconjunctival injections.

- i) **Eye Drops:** Method of instillation: Eye drops are generally instilled into the pocket formed by gently pulling down the lower eyelid; one drop is all that is needed.

- When administered in the form of eye drops, drugs penetrate the globe, probably through the cornea.
- Runoff can be reduced and contact time prolonged, if it is instilled into the lower fornix after gently pulling the lower lid away from the globe.
- Undesirable systemic side effect (by beta blocker) can be reduced by keeping both eyes closed for 1-3 minutes after instillation of a drop and also by pressing on the area of the lacrimal sac for a few minutes.
- When two different preparations in the form of eye drops are required at the same time in a day, for example **Pilocarpine** and **Timolol** in glaucoma, dilution and overflow may occur when one immediately follows the other. **The patient should therefore leave an interval of at least 5 minutes.**
- Generally it is inadvisable for patients to continue to wear contact lenses, particularly hydrophilic (soft) contact lenses when receiving eye drops.

- ii) **Ointments** An eye ointment is generally applied by squeezing a small amount (about 1 cm) of ointment into the pocket formed by gently pulling down the lower eyelid; the ointment melts rapidly and blinking helps to spread it. Ointments with Vaseline base are not suitable for daytime use as it blurs vision that with Vaseline base is less problematic than with paraffin base.

b) **Anterior peri-ocular injections**

i) **Subconjunctival injections**

- In this route the drug diffuses through the cornea and sclera to the anterior and posterior chambers and vitreous in higher concentration.
- Because the dose-volume is limited (**usually not more than 1 ml**), this route is suitable only for drugs, which are readily soluble.
- Useful for non-compliant patients needing high concentration of antibiotic or steroids. Also used for giving mydriatics.
- Injection is painful and if not carefully given conjunctiva tends to become scarred.
- When given at the end of surgery care should be taken to avoid retrograde leak into the eye.

ii) **Sub-Tenon Injections**

- More effective than sub-conjunctival injection.
- Technically difficult, chances of perforation more if adequate care is not taken.
- Less retrograde needle tract reflux than sub-conjunctival injection.

c) **Posterior Peri-ocular (Peribulbar or Retrobulbar) Injection:**

- Technically difficult and more risk of perforation than the previous ones.
- Usually used to give depot steroid (to have prolonged effect achievable in vitreous, choroids, optic nerve with risk of elevation of high intraocular pressure in steroid responder) and to give block before different ocular operations.

d) **Intracameral Injection**

Usually given to constrict the pupil near the end of cataract surgery.

e) **Intravitreal Injection**

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- Mainly indicated for endophthalmitis
 - Must be given by an expert inside the operation theatre (OT).
 - Exact calculation of the dose and the amount to be injected must be strictly calculated.
 - Updated knowledge of the retinal toxicity of the drugs should be kept in mind.
- f) Ocusert: These are suitable plastic devices that gradually release a specified amount of drug over a period. It is not available in our country.

SYSTEMIC DRUGS

Infections of the eye not controllable by local medications need systemic drugs. Infections involving deep structures that can not be reached by local applications, and those that pose a danger of systemic spread, require therapy via bloodstream e.g. dacryocystitis, orbital cellulitis and metastatic endophthalmitis. Gonococcal infections always should be treated systemically to forestall generalized spread. The same applies to *Pseudomonas*, *Haemophilus* and *Chlamydia* infections in children.

Use of steroids in the systemic route is indicated particularly in cases where ocular disease is a part of general systemic condition or where the eye is the target of a systemic response, e.g. in orbital pseudotumor, Graves' orbitopathy, giant cell arteritis, rejection of grafted tissue and in certain type of posterior panuveitis such as Harada's disease, sympathetic ophthalmia, Behcet's disease and sarcoidosis. For rapid control of intraocular pressure (IOP) in glaucoma, systemic route is a must.

Most of the needed cytotoxic drugs in neoplastic disorders of the eye are given by systemic routes.

Systemic form can be given by oral or intravenous routes

MICROBIAL INFECTION

Steps needed to control microbial contamination:

- Strict sterility of the preparations for the eye should be ensured. Care should be taken to avoid contamination of the contents of the eye drops during use.
- Eye drops in multiple-application containers for **domiciliary** use should not be used for more than 4 weeks after first opening.
- Rules for use of eye drops in hospitals - Eye drops for uses in hospital wards are normally discarded one week after first opening. Separate containers should be provided for each patient. Containers used before an operation should be discarded at the time of the operation and fresh containers to be supplied. A fresh supply should also be provided upon discharge from hospital.
- Eye drops used in out-patient departments should be discarded at the end of each day. In clinics for eye diseases (e.g., cornea clinic) and in accident and emergency departments, where the dangers of infection are high, single-application packs should be used: if a multiple-application pack is used, it should be discarded after single use.
- Diagnostic dyes (e.g. fluorescent) should be used only from single application packs or from strips as chances of fungal contamination is very high in our country.
- In eye surgery it is wise to use single-application containers. Preparations used during intra-ocular procedures and others that may penetrate into the anterior chamber must be isotonic and without preservatives and buffered if necessary to a neutral pH. Large volume intravenous preparations are not suitable for this purpose.

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For all surgical procedures, a previously unopened container is used for each patient.

10.2 ANTI-INFECTIVE EYE PREPARATIONS

Treatment by topical applications is sufficient for most acute superficial eye infections. Blepharitis and conjunctivitis are often caused by *staphylococci*; *keratitis* and endophthalmitis or other eye infections may be bacterial, viral, fungal even protozoal (e.g. acanthamebia, crab lice etc).

BACTERIAL BLEPHARITIS is treated by application of antibacterial eye ointment to the lid margins and to the conjunctival sac to prevent spread of infection there. Systemic treatment may occasionally be needed. It is usually given after culture of organisms from lid margin and determining their antibiotic sensitivity. Antibiotic such as tetracycline given for 3 months or longer may be appropriate. But above all maintenance of lid hygiene is the most important step to improve the condition.

Acute infective conjunctivitis is treated with antibacterial eye drops and ointment. Initial treatment should not be started with a sophisticated, newly discovered broad-spectrum anti-infectives, which should be kept reserved for unresponsive resistant cases. A poor response might indicate viral or allergic conjunctivitis. Gonococcal conjunctivitis is treated with systemic and topical antibiotics.

Corneal ulcer and keratitis require specialist treatment in specialized clinics where facilities of taking swabs and scrapping for gram staining, Potassium Hydroxide preparations and culture is available. All the facilities are needed for prompt, precise and accurate diagnosis of the cause of the disorder. Prompt accurate diagnosis and management save million eyes from blindness. Treatment options include specific, broad spectrum or fortified topical antibiotics, subconjunc-

tival or systemic administration of antibiotics.

Endophthalmitis is a medical emergency, which also calls for specialist management and often requires parenteral, subconjunctival or intravitreal administration of antibiotics.

ANTIBACTERIAL AGENTS

Bacterial infections are generally treated topically with eye drops and eye ointments. Systemic administration is sometimes appropriate in blepharitis. Other than topical, a variety of routes (intra-cameral, intravitreal and systemic) may be used in intra-ocular infection.

USE IN MIXTURE WITH CORTICOSTEROIDS. Many antibiotic preparations also incorporate a corticosteroid. For symptomatic relief and when accurate diagnosis can not be made such mixtures should not be used. In particular they should not be prescribed for undiagnosed 'red eye', which is sometimes caused by the herpes simplex virus and may be difficult to diagnose. These preparations can be used postoperatively after intraocular surgery.

ADMINISTRATION

Eye drops: Instillation varies according to the severity of infection. It varies from every minute to 2- 3 times a day. Some preparation needs very infrequent instillation to exert antibacterial effect in the maintenance therapy e.g. twice daily with lomefloxacin and fusidic acid.

Eye ointment: Apply either at night (if eye drops used during the daytime) or 3-4 times daily (if eye ointment used alone).

10.2.1 ANTIMICROBIALS (see section 1.1)

AZITHROMYCIN DIHYDRATE

Indications: Trachomatous conjunctivitis caused by *Chlamydia*

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trachomatis and purulent bacterial conjunctivitis.

Side-

effects: Ocular discomfort (including pruritus, burning), blurred vision; less commonly eyelid eczema, eyelid erythema, eyelid oedema, conjunctival hyperaemia, keratitis

Dose: Apply twice daily for 3 days; review if no improvement after 3 days

Proprietary Preparations

Azithromycin 1%

AZ (*Aristo*), Eye drops, Tk. 120.00/2.5ml,;
Azicin (*Opsonin*), Eye drops, Tk. 120/2.5 ml
Azin, (*Acme*), Eye drops, Tk. 110.41/2.5ml
Odazyth (*ACI*), Eye drops, Tk. 110.41/2.5 ml
Romycin (*Ibn Sina*), Eye drops, Tk. 115.00/2.5ml
Zibac (*Popular*), Eye drops, Tk. 110.41/2.5ml
Zimax (*Square*), Eye drops, Tk. 110.34/5ml
Zita (*Kemiko*), Eye drops, Tk. 120.35/2.5 ml

CHLORAMPHENICOL ^[ED]

Indications: Superficial ocular infections as it has the broadest spectrum and lowest propensity for generating resistance in organisms (see also section 1.1.12)

Cautions: Blood dyscrasia secondary to bone marrow hypoplasia can occur

Side-effects: Hypersensitivity, transient stinging, bitter taste in mouth

Dose: 4-5 times daily. In severe infection 2/4 hourly can be given.

Note: Should not be used in patient with severe blood dyscrasia, family history of bone marrow depression, new born. Not recommended for prolonged use.

Proprietary Preparations

Aristophen (*Aristo*), Eye drops, 0.50%, Tk. 34.40/10ml
Chlorovis (*Biopharma*), Eye drops, 0.50%, Tk. 34.40/10ml
Chlorphen (*Nipa*), Eye drops, 0.50%, Tk. 30.00/10ml, Eye Oint., 1%, Tk. 8.50/3gm
Cloram (*Ibn Sina*), Eye drops, 0.50%, Tk. 34.39/10ml, Eye Oint., 1%, Tk. 13.00/5gm
Conicol (*Opsonin*), Eye / Ear drops, 0.50%, Tk. 34.40/10 ml
Eyephen (*Healthcare*), Eye drops, 0.50%, Tk. 34.00/10 ml

Glophen (*Globe*), Eye drops, 0.50%, Tk. 34.00/10ml

Icol (*ACI*), Eye/ Ear drops, 0.50%, Tk. 34.5/10ml
I-guard (*Incepta*), Eye/ Ear drops, 0.50%, Tk. 34.40/10ml

Nidependiol (*Pacific*), Eye drops, 0.50%, Tk. 34.00/10ml
Ocucolor (*General*), Eye Oint., 1%, Tk. 8.52/3gm, Tk. 12.54/5gm, Eye drops, 0.50%, Tk. 34.37/10ml

Ocutrex (*Beximco*), Eye drops, 0.50%, Tk. 34.50/10ml
Opsomycetin (*Opsonin*), Eye drops, 0.50%, Tk. 44.71/60 ml

Optabac (*Popular*), Eye drops, 0.50%, Tk. 34.37/10ml,;

Ophthacol (*Drug Intl*), Eye / Ear Drops, 0.50%, Tk. 30.10/10ml

Optichlor (*Jayson*), Eye drops, Tk. 20.23/10 ml; Oint., 1%, Tk. 12.04/5 gm

Opticol (*Asiatic*), Eye Oint., 1%, Tk. 8.34/3gm Eye drops, 0.50%, Tk. 34.39/10ml

Ramphen (*Kemiko*), Eye drops, 0.50%, Tk. 35.00/10ml

SQ-Mycetin (*Square*), Eye/ Ear drops, 0.50%, Tk. 34.5/10ml

Dexamethasone 0.1% + Chloramphenicol 0.5%

A-PhenicolD (*Acme*), Eye drops, Tk. 70.21/5ml

CloramD (*Ibn Sina*), Eye drops, Tk. 70.00/5ml

Chlormet (*Beximco*), Eye drops, Tk. 70.00/5ml

Chlorodex (*Nipa*), Eye drops, Tk. 70.00/5ml

Decalor (*Jayson*), Eye drops, Tk. 50.33/5 ml

Decason (*Opsonin*), Eye drops, Tk. 70/5ml

Denicol (*ACI*), Eye drops, Tk. 70.00/5ml

Dexaguard (*Incepta*), Eye drops, Tk. 70.00/5ml

Dextor C (*Eskayef*), Eye drops, Tk. 70.00/5ml

Dexacol (*Opso Saline*), Eye drops, Tk. 70.00/5ml

DexagenC (*General*), Eye drops, Tk. 70.21/5ml

Dexonex (*Square*), Eye drops, 0.5%+0.1%, Tk. 70.21/5ml

Dexchlor (*G.A. Co*), Eye drops, Tk. 70.22/5ml

Eyephen (*Healthcare*), Eye drops, Tk. 70/5 ml

Glophen (*Globe*), Eye drops, Tk. 70.00/5 ml

Nidependiol-D (*Pacific*), Eye drops, Tk. 70/5ml

Opticol-D (*Asiatic*), Eye drops, Tk. 70.00/5ml

Orbidex C (*Popular*), Eye drops, Tk. 70.00/5ml

Sonexa-C (*Aristo*), Eye drops, Tk. 70.00/5ml

Stenicol (*Drug Intl*), Eye drops, , Tk. 60.20/5ml

Ramdex (*Kemiko*), Eye drops, Tk. 70.21/5ml

AMINOGLYCOSIDES

(See also section 1.1.4)

These antibiotics may cause irreversible, partial or total deafness when given systemically or when applied topically to open wounds or damaged skin. This effect is dose related and is enhanced by renal or hepatic impairment. Although this effect has not been reported following topical ocular use,

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the possibility should be considered when high dose topical treatment is given to small children or infants. These group of drugs are nephrotoxic and ototoxic.

GENTAMICIN^[ED]

Indications: Effective against many gram negative organisms (Specially *Pseudomonas aeruginosa*) and *Staphylococci* (see also section 1.1.3). Topical preparation can be strengthened to 2% to have effective concentration in anterior chamber.

Cautions : Patient with renal toxicity. It should not be introduced intraocularly as it can cause corneal endothelial damage if injected in anterior chamber and retinal infarction if injected intravitreally. Prolonged use may develop resistance and chances of superinfection. It may retard corneal wound healing

Dose : See section 10.2

Proprietary Preparations

Gentamicin 0.3%.

Asigen(Asiatic), Eye/Ear drops, Tk. 3210ml

Genacyn(Square), Eye/Ear drops, Tk.

32.12/10ml; Oint., Tk. 12.09/10gm

Gentacin(Acme), Eye Oint., Tk. 9.78/3.5gm

Gisin(Nipa), Eye/Ear drops, Tk. 30.36/10ml

Gentin(Opso Saline), Eye Oint. Tk. 6.79/3

gm; Eye drops, Tk. 23.59/10 ml

G-Gentamicin(Gonoshasthaya), Eye/Ear

drops, Tk. 25.00/10 ml

Igen(ACI), Eye drops, 32.12/10ml

NEOMYCIN

Powerful bactericidal antibiotic. It is added to many antimicrobials and steroid preparations

Indications : Acanthamoeba keratitis

Side-effects : It has the propensity to induce allergy.

Dose : See section 10.2

Proprietary Preparations

Neomycin Sulphate 500 IU + Bacitracin Zinc 1 Lac IU/gm.

Polymix(Opso Saline), Eye Oint., . Tk.

26.41/3 gm

Polytracin (Ibn Sina), Eye Oint, Tk.

65.00/5gm

Dexamethasone + Neomycin Sulphate + Polymixin B Sulphate

Indications: Inflammatory ocular
conditions: Management of corticosteroid-responsive inflammatory ocular conditions where bacterial infection or a risk of bacterial infection exists.

Proprietary Preparations

Polydex-N(Aristo), Eye Oint., Tk. 50.00/3gm,;

Eye drops, Tk. 90.00/5ml

Prednesolone acetate+Neomycin sulfate+Polymixin B sulfate

Indications : To treat bacterial infections of the eyes.

Proprietary Preparations

Polyforte(Aristo), Eye drops, Tk.150.00/5 ml

PoyPred⁽ⁱ⁾(Allergen), Eye drops,

Tk.188.42/5ml

Poly(Eskayef), Eye drops, Tk. 223.75/5ml

TOBRAMYCIN

Same spectrum as that of gentamicin but the effect on *pseudomonas* is even better.

Proprietary Preparations

Tobramycin 0.3%

Cinarex(Beximco), Eye drops, Tk.

100.00/5ml

Gentob(General), Eye drops, Tk. 100.00/5ml;

Eye Oint., Tk. 80.00/3gm

Intobac(Incepta), Eye drops, 0Tk. 90.00/5ml;

Ocutob(Globe), Eye drops, Tk. 85.00/5 ml

T-Mycin(Aristo), Eye drops, Tk. 100.00/5ml; Eye

Oint., Tk. 80.00/3g

Tobi(Asiatic), Eye drops, Tk. 80.00/5ml

Tobirax(G.A.Co), Eye drops, Tk. 90.27/5 ml; Eye

oint., Tk. 60.00/3.5 gm

Tobrabac(Popular), Eye drops, Tk. 85.32/5ml;

Onit., Tk. 60.00/3 gm

Tobram(Pacific), Eye drops, Tk. 100.00/5ml

Tobramin(Nipa), Eye drops, Tk. 90.00/5ml

Tobrel(Healthcare), Eye drop, Tk. 100.00/5 ml

Tomin(Kemiko), Eye drops, Tk. 100.00/5ml

Tomycin(Ibn Sina), Eye drops, Tk. 90.00/5ml;

Oint., Tk. 55.00/3gm

Torcin(Opsonin), Eye drops, Tk. 90.00/5ml

Xitob(Biopharma), Eye drops, Tk. 90.00/5ml

Tobramycin 0.3% + Dexamethasone 0.1%.

Indications : This medication treats or prevents only bacterial eye infections

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Proprietary Preparations

Cinarex D(Beximco), Eye drops, Tk. 150.00/5ml
Dexagen(General), Eye drops, Tk. 150.45/5ml; Oint., Tk. 90.28/3gm
Dextor(Eskayef), Eye drops, Tk. 150.00/5 ml
Dextrobac(Incepta), Eye drops, Tk. 150.00/5ml
Eytex(Nipa), Eye drops, Tk. 150.00/5ml; Oint., Tk. 90.00/3gm
Infladex(Biopharma), Eye drops Tk. 150.00/5ml
Orbidex(Popular), Eye drops, Tk. 150.00/5ml; Oint., Tk. 90.00/3 gm
Steron-T(Acme), Eye drops, , Tk. 130.39/5ml
Texa(Drug Intl), Eye drops, Tk. 125.40/5ml
T-Mycin Plus(Aristo), Eye Oint., Tk. 115.00/3.5g; drops Tk. 150.00/5ml
Tobicort(Asiatic), Eye drops, Tk. 150.00/5ml; Oint., Tk. 90.00/3.5gm
Tobidex(G.A.Co), Eye Oint., Tk. 90.27/3.5 gm; drops, Tk. 145.00/5 ml
Tomin(Kemiko), Eye drops, Tk. 150.00/5ml
Tomycin D(lbn Sina), Eye drops, Tk. 150.00/5ml; Oint., Tk. 90.00/3.5gm

FLUOROQUINOLONES

(See also section 1.1.7)

Broad-spectrum bactericidal antibiotic effective against *Staphylococci*, *Pseudomonas*, *Brucella*, *Haemophilus*, *Morexella*, *N. gonorrhoea*, *Klebsiella*, but less effective against *Streptococci* and *Pneumococci*.

They produce effective and long lasting concentration in tears.

BESIFLOXACIN

Indications: Conjunctivitis caused by susceptible strains of CDC coryneform group G, *Corynebacterium pseudodiphtheriticum*, *C. striatum*, *Haemophilus influenzae*, *Moraxella lacunata*, *Staphylococcus aureus*, *S. epidermidis*, *S. hominis*, *S. lugdunensis*, *Streptococcus mitis* group, *S. oralis*, *S. pneumoniae*, or *S. salivarius*.

Side-effects: Redness, blurred vision, pain, irritation, pruritus and headache

Dose: One drop in the affected eye(s) 3 times a day, four to twelve hours apart for 7 days.

Proprietary Preparations

Besifloxacin 0.6%

Besibac(Popular), Eye drops, Tk. 350.00/5 ml
Besiven(Incepta), Eye drops, Tk. 350.00/5ml
Besiflox(Aristo), Eye drops, Tk. 350.00/5ml
Besigen(General), Eye drops, Tk. 351.06/5ml
Florobex(lbn Sina), Eye drops., Tk. 350.00/5ml
Floxiquin(Asiatic), Eye drops., Tk. 350.00/5ml

CIPROFLOXACIN^[ED]

Indications: Corneal ulcer, used for any eye infection pre and post-operative prophylaxis in intraocular surgery. It is especially useful to combat methicillin resistant *Staphylo-cocci*, *Pseudomonas*, and *Gonococci*

Cautions : CHILD under 1 year of age

Side-effects : Local burning sensation, discomfort, foreign body sensation, conjunctival hyperemia white crystalline precipitate

Dose : See section 10.2.

Intensive application (especially in the first 2 days) is required throughout the day and night. Dose frequency depends on severity of the infection.

Proprietary Preparations

Ciprofloxacin 0.3%

Aprocin(Aristo), Eye/Ear drops, Tk. 50.00/10ml; Oint., Tk. 35.00/3gm;,
Bactin(lbn Sina), Eye drops, Tk. 50/10ml, Tk. 35.14/5ml, Tk. 90.00/10ml;,
Cip(Asiatic), Eye Oint., Tk. 32.00/3gm; Eye/Ear drops, Tk. 45.00/10ml
Civox(Popular), Eye drops, Tk. 35.13/Vial
Floxacin(Navana), Eye drops, Tk. 50/10 ml
Lox Eye(Apex), Eye drops, Tk. 35.00/5 ml; Ear drops Tk. 50/10 ml
Rocipro(Healthcare), Eye drops, Tk. 75/5 ml
Beuflox(Incepta), Eye/Ear drops , 0Tk. 40.00/5ml
Ciflocin(Astra Bio), Eye drops, Tk. 40.00/5ml
Cipcin(Biopharma), Eye drops , Tk. 40.00/5ml
Ciprin(Nipa), Eye drops, Tk. 50.00/10ml; Tk. 40.00/5ml; Oint. Tk. 35.00/3gm;,
Neofloxin(Beximco), Eye drops, Tk. 40.00/5ml
G-Cipro(Gonoshasthaya), Eye drops, Tk. 15.00/10 ml
Ciproxy(Opso Saline), Eye /Ear drops, Tk. 38.00/10 ml
Ciprox(Opsonin), Eye/Ear drops, Tk. 40.15/1ml
Ciprocin(Square), Eye/Ear drops, Tk. 40.27/5ml
Procin(Kemiko), Eye drops, Tk. 50.14/10ml
Ciprozid(Drug Intl), Eye/Ear drops, Tk. 40.15/10ml
Cero(G.A.Co), Eye drops, Tk. 50.15/10 ml, Tk. 40.12/5 ml; Oint., Tk. 35.00/5 gm,
CiproA(Acme), Eye drops, Tk. 40.12/5ml;,
Floxabid(ACI), Eye drops, Tk. 40.12/5ml
Spectra(Jayson), Eye/Ear drops, Tk. 40.12/5 ml

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Ciprofloxacin 0.3% + Dexamethasone 0.1%

Opdex(Nipa), Eye drops,Tk. 75.00/5 ml
Procin-D(Kemiko), Eye/Ear drops,Tk. 75.22/5 ml
Aprodex(Aristo), Eye/Ear drops, Tk. 75.00/5ml
BactinD(Ibn Sina), Eye/Ear drops, Tk. 75.28/5ml
BeufloxD(Incepta), Eye/Ear drops , Tk. 75.00/5ml
Cerodex(G.A.Co), Eye/Ear drops, Tk.75.23/5ml
Cipcin-DX(Biopharma), Eye drops , Tk. 75.00/5ml
Cip-D(Asiatic), Eye/Ear drops, Tk. 75.00/5ml;
CiproD(Acme), Eye Drops, Tk. 75.22/5ml
Ciprozid-DX(Drug Intl), Eye/Ear drops, Tk. 75.25/5ml
Civodex(Popular), Eye/Ear drops, Tk. 75.28/5ml
Dexaflox(General), Eye/Ear drops, Tk. 75.22/5ml
Dexilo(Pacific), Eye/Ear drops, Tk. 75.00/5ml
Neofloxin D(Beximco), Eye/Ear drops, Tk. 75.00/5 ml
Opdex(Nipa), Eye/Ear drops,Tk. 75.00/5ml
Procin(Kemiko), Eye/Ear drops, Tk. 75.22/5ml
Rocipro(Healthcare), Eye/Ear drops, Tk. 75.00/5 ml

GATIFLOXACIN

Indications:Bacterial infections (e.g. Bacterial conjunctivitis, Blepharitis and Blepharo-conjunctivitis) caused by susceptible strains of the following organisms: Aerobic Gram-Positive Bacteria, *Corynebacterium propinquum*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus pneumonia*, Aerobic Gram-Negative Bacteria Haemophilus influenza.

Cautions: Pregnancy & Breast-feeding.

Side-effects: Bad taste in the mouth,blurred vision, eye discharge, headache, irritation, pain, dryness, or redness of the eyes, itchy eyes, tearing and watery eyes.

Dose: Days 1 and 2; 1 drop into the affected eye(s) every 2 hours while awake, up to 8 times daily. Days 3 to7 days; 1 drop up to 4 times daily while awake.

Proprietary Preparations

Floxigat(Asiatic), Eye drops0.3% Tk. 60.00/5ml
Gatibac(Popular), Eye drops, 0.3%Tk. 100/5 ml
Gatiflox(Incepta), Eye drops, 0.3%Tk. 100/5ml
Gatiflox ES(Incepta), Eye drops, 0.5%, Tk.125.00/5ml
Gatigen(General), Eye drops, 0.3% Tk. 100.30/5ml
Gatsina(Ibn Sina), Eye drops, 0.3%Tk. 100.00/5ml
Tag(Aristo), Eye drops, 0.3%Tk. 100.00/5ml
T-Get(Opsonin), Eye drops,0.3%Tk. 100/5 ml
Zymar(Eskayef), Eye drops,0.3%Tk. 247.72/5ml,
Zymarin(Eskayef),Eye drops,0.5%Tk. 125.00/5ml
Xegal(Beximco), Eye drops, 0.3%Tk. 90/5ml

Gatifloxacin , 0.3% + Loteprednol

Etabonate0.5%.

Gatinol(Acme), Eye drops.,Tk. 250.00/5ml
Lotenol(Popular), Eye drops, Tk. 250.00/5ml
Lotepro(Incepta), Eye drops, Tk. 250.00/5ml

Gatifloxacin0.3% +Dexamethasone0.1%.

DexagenG(General), Eye drops, Tk. 120.37/5ml
Gatison(Aristo), Eye drops, Tk. 120.00/5ml
Dexon(Ibn Sina), Eye drops, Tk. 120.00/5ml
OrbidexG(Popular), Eye drops, Tk. 120.00/5ml

LEVOFLOXACIN

Indications: Postoperative ocular infection and bacterial conjunctivitis; endophthalmitis

Contraindication: Hypersensitivity to levofloxacin

Side-effects:Transient decreased vision, fever, foreign body sensation, headache, ocular pain, discomfort, photophobia

Dose: Day 1&2: 1-2 drops in the affected eye(s) every 2 hours while awake up to 8 times /day
 Day 3 to 7:1-2 drops in the affected eye(s) every 2 hours while awake up to 4 times per day

Proprietary Preparations

Asilee(Asiatic), Eye drops, 1.5%, Tk.130/5ml,
Evo(Beximco), Eye drops, 0.5%, Tk.90/5ml, 1.5%, Tk. 130.00/5ml
Genolev(General), Eye drops, 0.5%, Tk. 90.28/5ml.; 1.5%, Tk. 130.39/5ml.,
Leo(Acme), Eye drops, 0.5%, Tk. 80.55/5ml
Lequin(Apex), Eye drops, 0.5% Tk. 80/5 ml

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Levomax(Eskayef) Eye drops, 0.5%, Tk.90/5ml
Levoquin(Navana), Eye drops, 0.5%, Tk.90/5 ml
Levolo(Pacific), Eye drops, 0.5% , Tk. 90/5ml
Lin(Kemiko), Eye drops, 0.5%, Tk. 90.00/5ml
Locin(Globe), Eye drops, 0.5%, Tk. 90/5 ml
Lovicin(Nipa), Eye drops, 0.5%, Tk. 90/5ml,;
Leflox(ACI), Eye drops, 0.5%, Tk. 87.00/5ml, 1.5%, Tk. 128.00/5ml
Lifcin(Biopharma), Eye drops, 1.5%, Tk. 130.00/5ml,;
Levoflox(Drug Intl), Eye drops, 0.5%, Tk. 80.25/5ml
Livacin(GA.Co), Eye drops, 0.5%, Tk.90.27/5ml
Levobac(Popular), Eye drops, 0.5%, Tk. 90.00/5ml,; 1.5%, Tk. 130.00/5ml
Levox(Opsonin), Eye Drops, 0.5%, Tk. 90.00/5ml,; 1.5%, Tk. 130.00/5ml,;
Levosina(Ibn Sina), Eye drops, 0.5% , Tk. 90.00/5ml,; 1.5%, Tk. 130.00/5ml,;
Levoxin(Incepta), Eye drops, 0.5%, Tk.130.00/5ml,; 1.5% , Tk. 90.00/5ml
Ovel(Aristo), Eye drops, 1.5%, Tk. 130.00/5ml,; 0.5%, Tk. 90.00/5ml
Resquin(Healthcare) Eye drops, 0.5%, Tk. 90/5ml
Revacin(Reman) Eye drops, 0.5%, Tk.150/5 ml; Eye ; 1.5%, Tk. 150.00/5 ml

LOMEFLOXACIN

Indications: Same as that of Ciprofloxacin. Bactericidal cone in AC reached by topical application. Incidence of resistance is less frequent than ciprofloxacin. It can be given in children under 14 years of age
Side-effect: Photosensitivity
Dose : One drop twice daily
Proprietary Preparations
Lomefloxacin 0.3%.
Lomebac(Popular), Eye drops, Tk. 70.00/5ml
Lomeflox(Aristo), Eye drops, Tk. 70.00/5ml,
Lomegen(General), Eye drops, Tk. 70.21/5ml
Lomequin(Incepta), Eye drops, Tk. 70.00/5ml
Lomexa(Opsonin), Eye drops, Tk. 70.00/ 5ml
Lumex(G.A.Co), Eye drops, Tk. 65.00/5 ml
Lyflox(Ibn Sina), Eye drops, Tk. 70.00/5ml
Meflocin(Asiatic), Eye drops, Tk. 70.00/5ml
Mexlo(Square), Eye drops, Tk. 70.21/5ml
Namicin(Nipa), Eye drops, Tk. 70.00/5ml
Ocuflox(Biopharma), Eye drops , 0.3%, Tk. 70.00/5ml
Omefflox(ACI), Eye drops, Tk. 68.00/5ml
Opthaflox(Drug Intl), Eye drops, Tk. 60.20/5ml
Optiflox(Jayson), Eye drops, Tk. 50.20/5 ml

Optilom(Healthcare), Eye Drop, Tk. 80/5 ml
Optilom(Healthcare), Eye drops Tk.80/5 ml
Safquin(Apex), Eye drops, Tk.60/5 ml

MOXIFLOXACIN

Indications: Same as that of Ciprofloxacin with less chances of resistance.;less effective in *Pseudomonas* than Ciprofloxacin
Cautions: Not recommended for neonates
Side-effects: Taste disturbances, ocular discomfort (including pain, irritation and dryness), hyperaemia;
Dose: Varies according to the dose of infection. ADULT and CHILD over 1 month, apply 3-8 times daily (continue treatment for 2–3 days after infection improves; review if no improvement within 5 days)

Proprietary Preparations

Moxifloxacin 0.05%.
Cinagen(Navana), Eye drops, Tk.160/5 ml
Eyemox(Acme), Eye drops., Tk. 100.68/5ml
Floromox(Ibn Sina), Eye drops., Tk. 100.00/5ml,;
Floxalone(Drug Intl), Eye drops, Tk. 80.25/5ml,;
Floximox(Asiatic), Eye drops, Tk. 100.00/5ml;
Glomox(Globe), Eye drops, Tk 100.00/5 ml
Iventi(Square), Eye drops, Tk. 100.68/5ml,;
Kilgen(G.A.Co), Eye drops, Tk. 100.30/5 ml
Maxiflox(ACI), Eye drops, Tk. 100.68/5ml ,;
MFC(Nipa), Eye drops, Tk. 100.00/5ml
Moxibac(Popular) Eye drops Tk. 100.38/5ml,
Moxif(Biopharma), Eye drops, Tk. 100.00/5ml
Moxigen(General), Eye drops, Tk. 140.00/5ml
Moxigram(Apex), Eye drops, Tk.100/5 ml;
Moxikem(Kemiko), Eye drops, Tk. 100.30/5ml
Moxilocin(Opsonin), Eye drops, Tk.100.38/5ml
Moxivin(Healthcare), Eye drops, Tk. 100/5ml
Moxilocin(Pacific), Eye drops, Tk. 100.00/5ml
Moxquin(Incepta), Eye drops Tk. Tk. 160.00/5ml
Odyacin(Beximco), Eye drops, Tk. 140.00/5ml
Optimox(Aristo), Eye drops, Tk. 150.00/5ml, Tk. 130.00/5ml,;
Visomox(Eskayef), Eye drops, 0.5%, Tk. 140.00/5ml,;

Moxifloxacin with xanthin gum

Moxquin XG(Incepta) Eye drops,Tk.150/5ml
Moxigen(General), Eye drops, 0.50%, Tk. 150.00/5ml
Mfc XG(Nipa), Eye drops, , Tk. 145.00/5ml
Moxibac XG(Popular),Eye drops Tk. 150.00/5ml

Dexamethasone Phosphate 0.1% + Moxifloxacin Hydrochloride 0.5%.
Dexamox(Aristo), Eye drops, Tk. 200.00/5ml
Moxidex(Popular), Eye drops,Tk. 200.00/5 ml
VisomoxD(Eskayef), Eye drops, Tk. 200.00/5ml,;

OFLOXACIN

Indications:Same as that of *Ciprofloxacin*

Cautions: Corneal ulcer or epithelial defect (risk of corneal perforation); Pregnancy and breast-feeding.

Side-effects:Ocular discomfort and irritation; also reported facial oedema, keratitis, visual disturbances, photophobia, increased lacrimation, ocular oedema, dry eyes, ocular hyperaemia

Dose:See section 10.2.

Proprietary Preparations

Ofloxacin 0.3%.
Obactin(Ibn Sina), Eye drops,Tk. 85.00/5 ml
Vista(Aristo), Eye/ Ear drops, Tk. 85.00/5 ml

SULPHACETAMIDE

Bacteriostatic; action on Gram-positive, Gram-negative organisms and Chlamydiae .

Indications : Trachoma and inclusion conjunctivitis

Side-effects: Irritation, burning, conjunctival hyperemia, and allergic reactions

Dose :See notes above.

Proprietary Preparations

Optacid(Reman), Eye drops, 20% Tk. 45.00/10ml
Icid(Nipa) Eye drops, 20% Tk. 27.00/10ml
Optimide(Jayson) Eye drop, 20% Tk. 22.40/10ml

PEPTIDE ANTIBIOTICS

They are usually used in combination (except vancomycin).

FUSIDIC ACID

Indications: Broad spectrum antibiotic; effective mainly against Gram-positive organisms especially *Staphylococci*.

Caution: High rate of development of resistance

Dose: Twice daily application is sufficient for acute conjunctivitis

Proprietary Preparations

Fucithalmic[®](Leo), Eye drop 1%, Tk. 249.78/5g
Fusithal(Aristo), Eye drops, 1%, Tk. 250/5gm

POLYMYXIN B

Bactericidal; effective particularly against gram negative organisms including *Pseudomonas* (*proteus* is resistant). It can not penetrate into the eye.

Dose :See in section 10.2

Proprietary Preparations:

See under Neomycin

VANCOMYCIN

(See section 1.1.12)

Indications: Active against many Gram-positive organisms including *Streptococci*, *Staphylococci*, *Corynebacterium*, *Clostridium*; (Gram-negative bacteria, *Mycobacteria* and fungi are resistant)

Dose: For intravitreal injection 1mg in 0.1 ml. Intravitreal injection to be given only by experts in the OT for endophthalmitis

Generic Preparation

Intravitreal injection 1mg/0.1ml

TETRACYCLINES

(See also section 1.1.6)

Bacteriostatic; effective against wide spectrum of Gram-positive and Gram-negative organisms, *Chlamydia*, *Borrelia*. Many strains like *Proteus*, *Pseudomonas*, *Staphylococci* develop resistance. They are readily penetrate corneal epithelium

TETRACYCLINES^[ED]

Indications : Chlamydial infections (trachoma and inclusion conjunctivitis)

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Contraindications : Pregnancy and lactation

Side-effects: More chance of super infection

Dose : See section 10.2

Proprietary Preparations

Tetracycline hydrochloride 1%

A-Tetra(Acme), Eye Oint., Tk.11.55/5gm;
Tk.8.50/3.5gm

G-Tetracycline(Gonosasthaya), Eye/Ear Oint. Tk. 8.00/5 gm

CEPHALOSPORINE

(See also section 1.1.2)

CEFUROXIME

It can be administered by intracameral injection for the prophylaxis of Endophthalmitis following cataract surgery.

Indication: Prophylaxis of end ophthalmitis after cataract surgery

Cautions: Severe risk of infection, complicated cataracts or combined operations with cataract surgery, severe thyroid disease, reduced corneal endothelial cells (less than 2000)

Dose: By intracameral injection, ADULT over 18 years, 1mg into the anterior chamber of the eye at the end of cataract surgery

Generic Preparation

intracameral injection 1.0 mg/0.1 ml

ANTIBIOTIC STEROID COMBINATIONS

Following combination products are used in different infective conditions.

Chloramphenicol+Dexamethsone

Ciprofloxacin+ Dexamethsone

Gatifloxacin+ Dexamethsone

Proprietary Preparations

See under Chloramphenicol

Ciprofloxacin/Gatifloxacin

10.2.2 ANTIFUNGALS

(See also section 1.2)

Fungal infection of the eye is one of the important considerations for tropical, hot & humid countries. Fungi can infect any part of the eye or its adnexia. There

are two important causes of fungal infection; one is trauma; trauma may be accidental- particularly involving plants and vegetable matter, surgical trauma and **Immunosuppression** due to prolong use of antibiotics, topical or systemic steroid preparations.

Superficial mycoses appear on the lids, lid margins, conjunctiva. Keratomycosis (affection of the cornea) usually follows trauma. One should suspect its presence in all cases of agricultural trauma. Filamentous fungi are mostly found after trauma in our country. Mycotic endophthalmitis may occur after perforating injury or intraocular surgery.

Mycotic infection should be confirmed by simple microscopic examination of the infected materials (KOH preparations and Gram staining).

POLYENE ANTIBIOTICS

AMPHOTERICIN B

(See also section 1.2.1)

Most effective broad spectrum antibiotic for systemic fungal infection.

Indications: keratomycosis, metastatic and endogenous endophthalmitis. Effective against yeast and filamentous fungi (see also section 1.2.1).

It has numerous side-effects after IV use.

Use in ophthalmology is limited to intravitreal injections to be given by experts for fungal endophthalmitis.

Can be used topically after preparing in conc. of 0.1% to 1% but the preparation is very much irritant for routine use.

Generic Preparations

intravitreal injections :Not available

NATAMYCIN

Can be used topically only; wide spectrum like amphotericin B.

Indications: Effective against filamentous fungi and *Candida albicans*. It may be supplemented by ketoconazole

Side-effects: It only penetrates superficially into the cornea so it can not be used for deep fungal infections.

As debridement of corneal epithelium aids its penetration, it is an important tool for successful treatment.

Dose : See section 10.2

Proprietary Preparations

Natamycin 5%

Natagen(General), Eye drops, Tk. 100.30/5ml

Natapro(Popular), Eye drops, Tk. 100.00/5ml

Natoph(Ibn Sina), Eye drops, Tk. 100.00/5ml

Nicin(Nipa), Eye drops, Tk. 100.00/5ml

N-Mycin(Aristo), Eye drops, Tk. 100.00/5ml

Ocunat(Asiatic), Eye drops, Tk. 100.00/5ml

AZOLE DERIVATIVES

IMIDAZOLE

The drug is less toxic than polyenes.

Indication: acanthaemeba infection; because of its action on sterol synthesis, this drug should not be used concurrently with polyenes; (see also section 12.2.2)

CLOTRIMAZOLE^[ED]

(See also section 12.2.2)

Indications : Wide spectrum against *Aspergillus* and *Candida*; less effective against *Fusarium*. Used topically and systemically against *Acanthaemeba* also.

Proprietary Preparations

Clotrimazole 1%

Aristen(Aristo), Eye Oint., Tk. 80.00/3g/4 gm

Clarizol(Incepta), Eye/Ear drops, Tk 80/10 ml

Fungizol(Reman), Eye Oint Tk.55.5/4gm Eye/Ear drop, Tk.80/10ml.

Fungin(Ibn Sina), Eye drops, 1%, Tk. 80.00/10ml

KETOCONAZOLE

Candidal infection; well absorbed after oral administration; relatively non-toxic.

Indications: *Candida albicans* infections

Cautions: if therapy is to be continued for more than 2 weeks; then s-GPT, s-GOT enzymes to be monitored.

Side-effects: Pruritus, nausea, vomiting, diarrhoea, hepatotoxicity.

Dose: 200-800 mg daily with meal. Treatment must be maintained over weeks to months.

Proprietary Preparation

See Section 1.2.1 under Ketoconazole

TRIAZOLES

FLUCONAZOLE^[ED]

Indications : Effective against *Candida* and *Cryptococcus* infections.

Absorption on oral administration is excellent.

Dose: 1-2 drops to be instilled into the affected eye 5 times daily.

Proprietary Preparations

Fluconazol 0.3%

Naz(Reman), Eye drops, Tk. 100.5/5 ml

Nispor(Incepta), Eye drops, Tk. 80/5 ml

(See also section 1.2.1 under Fluconazole)

VORICONAZOLE

(See also section 1.2.1)

Indications : Effective against invasive aspergillosis, candidiasis and serious fungal infections caused by *Scedosporium sp.* or *Fusarium sp.* or invasive fluconazole resistant *Candida sp.*

Side-effects: Visual disturbances (change in vision), fever, rash, nausea, vomiting, diarrhea, headache, swelling of the extremities, stomach pains

Dose: 1%, eye drops are well tolerated and penetrate into aqueous humor when administered at hourly or 6-hourly intervals

Generic Preparation

1%, Eye drops not available

10.2.3 ANTIVIRALS

(See also section 1.4)

The common viral agents are adenovirus, herpes simplex and zoster virus which commonly infect lid, periorbital skin, conjunctiva, cornea, retina. Antiviral agents should not be used for undiagnosed red eye with corneal affection as these agents themselves might cause different complications. Antiviral topical drugs are most effective against

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herpes simplex. In herpes zoster infection systemic antiviral drugs are the drugs of choice.

ACICLOVIR^[ED]

Acts specifically on virus infected cells; relatively non-toxic. It can penetrate corneal epithelium and stroma

Indications : Stromal herpetic keratitis and disciform keratitis

Side-effects : Superficial punctate keratitis, transient stinging.

Dose : Ointment 5 time a day for herpes simplex

Proprietary Preparation

Aciclovir 3%

Acerux(Opsonin), Eye Oint., Tk. 45.17/3gm;

Acyvir(Aristo), Eye Oint., Tk. 125.00/5gm,

Clovir(Ibn Sina), Eye Oint., Tk. 100.00/5gm

Cuvir(General), Eye Oint., Tk. 125.00/5gm

Optivir(Biopharma), Eye Oint., Tk.

100.00/5gm

Sevirax(G.A.Co), Eye oint., Tk. 70.21/5 gm

Virine(Nipa), Eye Oint., Tk.100.00/5gm;

Cyclovex(Opso Saline), Eye Oint.,Tk.

33.96/3gm

GANCICLOVIR

Indications:Local treatment of herpes simplex infections

Side-effects: Burning sensation, tingling, superficial punctate keratitis

Dose: Apply 5 times daily until healing complete, then apply 3 times daily for a further 7 days

Proprietary Preparations

Ganciclovir 0.15%

Genclovir(General), Eye Gel, Tk.

200.61/5gm

Herpigel(Popular), Eye Gel,Tk. 200.00/5 gm

Xoviral(Aristo), Eye Gel, Tk. 200.00/5gm

Zirgan(Ibn Sina), Eye Gel, Tk. 200.00/5gm

IDOXURIDINE (IDU)

Indications : Herpes simplex keratitis (see also section 1.4.1)

Side-effects : Corneal punctate erosions, follicular conjunctivitis, scarring of conjunctiva, delayed wound healing, superficial pannus, lacrimal obstruction, punctal occlusion, contact dermatitis

Dose : One drop hourly

Proprietary Preparation

Herplex(Opso Saline), Eye drops, 1 mg/ml, Tk. 45.29/10 ml

TRIFLURIDINE

Indications : For the treatment of primary keratoconjunctivitis and recurrent epithelial keratitis due to herpes simplex virus, type 1 and 2.

Side-effects: Mild, transient burning or stinging sensation upon instillation. Other side effects are superficial punctate keratopathy, epithelial keratopathy, hypersensitivity reaction, stromal edema, irritation, keratitis sicca, hyperemia and increased intraocular pressure.

Dose: 1 drop every 2 hrs while awake; maximum 9 drops/day until the corneal ulcer has completely re-epithelialized

Proprietary Preparation

Fludin(Aristo), Eye drops, 1%,Tk. 950/5 ml

10.3 CORTICOSTEROIDS, OTHER ANTI-INFLAMMATORY PREPARATIONS. AND ANTIHISTAMINES

CORTICOSTEROIDS

(See also section 5.3)

Corticosteroids can be administered topically to reduce ocular inflammation. These drugs, when administered topically, by subconjunctival injection, and systemically have an important place in treating uveitis and scleritis; they are also used to reduce post-operative inflammation following eye operations.

Topical corticosteroids should be used under expert supervision; they should not be prescribed for undiagnosed 'red eye'. The greatest danger in their use is that, by interfering with local defense mechanisms, they may either worsen the existing eye infection (particularly due to virus e.g. herpes simplex keratitis or fungus) or aggravate the condition which may lead to loss of vision or even loss of the eye.

Due to the use of eye drop formulations, a 'steroid glaucoma' may be produced in people susceptible to

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steroid. Other side effects include cataract, thinning of the cornea and sclera (with perforation); delayed hypersensitivity reactions. In the children Cushing's syndrome can occur from systemic absorption due to prolong use.

Systemic corticosteroids may be useful for various ocular conditions. The risk of producing glaucoma is not great, but 'steroid cataract can develop if more than 15mg of prednisolone is given daily for several years. The longer the duration, the greater is the risk. Other risks of systemic steroid administration should also be kept in mind.

One of the great concerns for the use of topical steroid in our country is that there is the increasing tendency for the use of corticosteroids for chronic allergic conjunctivitis. As patients get benefit from it, they medicate themselves for prolong period without having the knowledge of the complications.

Sub conjunctival injection is short lasting than subtenon injection, which is technically difficult. Sometimes crystalline suspensions are given in the periorbital route which stays longer (4-8 week or longer) and high conc. can be achieved within the vitreous cavity, choroids and optic nerve. Only experts should consider Intravitreal route.

COMPARISON OF DIFFERENT TOPICAL STEROID PREPARATIONS

Prednisolone acetate exhibits the greatest anti-inflammatory activity on the anterior segment of the eye including concentration in the aqueous.

Dexamethasone has a longer half-life in ocular tissue than other necessitating less frequent application. The drug can reach deep ocular tissue.

Fluoromethalone has lower incidence of steroid induced glaucoma.

Fluoromethalone alcohol is less effective than prednisolone acetate. But fluoromethalone acetate is nearly as effective as prednisolone acetate.

Loteprednol also has lower propensity to increase intra ocular pressure.

BETAMETHASONE^[ED]

Indications: Treatment for local inflammation

Cautions: See notes above

Dose: Single drop every 1-2 hours until inflammation is controlled; then the frequency is to be reduced; in case of eye ointment 2-4 times daily or at night when used with eye drops

Proprietary Preparations

B-Cort(Globe), Eye drops, 0.1%, Tk. 30/5 ml

Betricin(Nipa), Eye/Ear drops, 0.1%, Tk. 29.33/5ml

Eyebet(Incepta), Eye/Ear/Nasal drops, 0.1%, Tk. 30.00/5ml

Betamethasone sodium phosphate 0.1% + Neomycin sulfate 0.5%

Indications: Local treatment of eye infection and bacterial infection

Dose: ADULT: Apply up to 6 times daily

Aristobet-N(Aristo), Eye, /Ear /Nasal drops, Tk. 35.00/5ml,

Betacine-N(Ibn Sina), Eye/Ear/ Nasal drops,, Tk. 35.00/5ml

BN Eye(Asiatic), Eye, Ear & Nasal Drops, Tk. 32.00/5ml

Methasol(G.A.Co), Eye, /Ear /Nasal drops, Tk. 35.11/5 ml; Eye Oint., Tk. 14.00/5 gm

Optison-N(Opso Saline), Eye/Ear Nasal/drops, Tk. 22.86/5 ml; Oint., Tk. 7.92/3 gm

DEXAMETHASONE^[ED]

Indications: Short term treatment for local inflammation, Allergic condition if other antiallergic are not working, Uveitis

Cautions: See notes above.

Dose: Apply eye drops every 6 hours daily; in severe conditions every 30 minutes until inflammation is controlled; then the frequency is to be reduced

Proprietary Preparations

Dexamethasone 0.1%(Eye drop), 0.05%(Eye ointment)

Acicot(ACI), Eye drops, TK. 65.00/ 5ml

Celudex(Drug Intl), Eye /Ear drops, Tk. 60.20/5ml

D-Cort(Globe), Eye drops, Tk. 70.00/5 ml,

Dexagen(General), Eye drops, Tk. 70.21/5ml, Oint., Tk. 80.00/5ml

Dexacort(Opso Saline), Eye/Ear drops, Tk. 70.00/5 ml

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Dexasia(*Asiatic*), Eye Oint., Tk. 35.00/3gm
Dexon(*Ibn Sina*), Eye drops, Tk. 70.00/5ml; Oint. Tk. 60.00/3gm
Dexonex(*Square*), Eye/Ear drops, , Tk. 70.21/5ml;
DM-Sone(*Pacific*), Eye drops, Tk. 70/5ml
D-ONE(*Nipa*), Eye/Ear drops, Tk. 70/5ml
Gludex(*Kemiko*), Eye drops, Tk. 70.21/5ml;
Infladex(*Biopharma*), Eye drops, Tk. 70/5ml
Inflavis(*Beximco*), Eye drops, Tk. 70/5ml
Metadaxan(*Incepta*), Eye/Ear drops Tk. 70.00/5ml
Ocudex(*Asiatic*), Eye drops, Tk. 70.00/5ml
Orbidex(*Popular*), Eye drops, Tk. 70.00/5ml, Onit. Tk. 60.00/
Sonexa(*Aristo*), Eye drops, Tk. 70.00/5ml; Eye Oint. Tk. 80.00/3gm
Steron(*Acme*), Eye drops, Tk. 70.21/5ml,

FLUROMETHALONE

Indications: Treatment for local inflammation

Cautions: See notes above

Dose: Apply eye drops every 1-2 hours until inflammation is controlled; then the frequency is to be reduced

Proprietary Preparations

Fluorometholone 0.1%
NGS(*Opso Saline*), Eye drops, Tk. 67.67/5 ml
Flurom(*Apex*), Eye drops, Tk. 80/5 ml
Otholon(*Navana*), Eye drops, Tk. 90/5 ml
Afm(*Aristo*), Eye drops, Tk. 100.00/5ml
Eylon(*Ibn Sina*), Eye drops, Tk. 100.00/5ml
F-Lon(*Drug Intl*), Eye drops, Tk. 80.00/5ml
Flucort(*G.A.Co*), Eye drops, Tk. 95.00/5 ml
Fluflam(*Eskayef*), Eye drops, Tk. 100.00/5ml
Flumeth(*Nipa*), Eye drops, Tk. 100.00/5ml
Flurate(*Pacific*), Eye drops, Tk. 100.00/5ml
Flurolon(*General*), Eye drops, Tk. 100.30/5ml
Fluromet(*Popular*), Eye drops, Tk. 100.00/5ml;
Flurone(*Biopharma*), Eye drops, Tk. 100.00/5ml
Flurosia(*Asiatic*), Eye drops, Tk. 100.00/5ml
Metalone(*Incepta*), Eye drops, Tk. 100.00/5ml;
Metholone(*Kemiko*), Eye drops, Tk. 90.27/5ml
Rubalon(*Beximco*), Eye drops, Tk. 100.00/5ml
Fluorometholone 0.1%+ Gentamicin 0.3%
Indications: Inflammation associated with infections in the anterior segment of the eye due to bacteria susceptible to Gentamicin it is also indicated in postoperative infection

Inflagen(*Asiatic*), Eye drops., Tk. 130.00/5ml

AFM-Plus(*Aristo*), Eye Oint., Tk. 130.00/3g; Eye drops, Tk. 110.00/5ml
Fluorometholone + Tetrahydrozoline
AFM-T(*Aristo*), Eye drops, 0.1%+ 0.025%, Tk. 100/5 ml
Metalone Plus(*Incepta*), Eye drops, 0.1%+ 0.025%, Tk. 110/5 ml
Eylon(*Ibn Sina*), Eye drops, 0.1%+ 0.025%, Tk. 100/5 ml
Refemoline(*Reman*), Eye drops, Tk. 100/5ml

LOTEPREDNOL ETABONATE

Indications: Treatment of post-operative inflammation following ocular surgery

Cautions: See notes above

Side-effects: Blurred Vision, fluid Accumulation In Lining Of Eye With Swelling, problems With Eyesight, red Eye

Dose: Apply 4 times daily starting 24 hours after surgery; max. duration of treatment 14 days

Proprietary Preparations

Loteprednol Etabonate 0.5%
Lacrison(*Beximco*), Eye drops, Tk. 175.00/5ml
Loteflam(*General*), Eye drops, Tk. 175.53/5ml; Eye Gel, Tk. 150.00/3gm
Lotenate(*Pacific*), Eye drops, Tk. 175.00/5ml
Lotenol(*Popular*), Eye drops, Tk. 175.00/5 ml
Lotepred(*Aristo*), Eye drops, Tk. 175.00/5ml; Eye Gel, Tk. 200.00/5g
Lotepro(*Incepta*), Eye drops, Tk. 175.00/5ml
Lotrel(*Eskayef*), Eye Gel, Tk. 200.00/5gm; Eye drops, Tk. 175.00/5ml
LPD(*Nipa*), Eye drops, Tk. 175.00/5ml
Olopred(*Asiatic*), Eye drops, Tk. 175.00/5ml

Loteprednol Etabonate 0.5% + Tobramycin 0.3%

Loteba(*Navana*), Eye drops, Tk. 200/5 ml
Lacrison(*Beximco*), Eye drops, Tk. 200.00/5ml
Loteflam T(*General*), Eye drops, Tk. 200.61/5ml
Lotemycin(*Acme*), Eye drops, Tk. 200.00/5ml
LotenoIT(*Popular*), Eye drops, Tk. 200.75/5 ml
Lotepro Plus (*Incepta*), Eye drops, Tk. 200.00/5ml
Olopred Plus(*Asiatic*), Eye drops., Tk. 200.00/5ml

PREDNISOLONE^[ED]

Indications: Local inflammation

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Cautions: See notes above

Dose: Apply eye drops every 1-2 hours until inflammation is controlled; then the frequency is to be reduced

Proprietary Preparations

Prednesolone acetate 1%

Prednol(Reman), Eye drop, Tk. 100/5ml

Bexpred(Beximco), Eye drops, Tk. 100.00/5ml;

Biocort(Biopharma), Eye drops, Tk. 100.00/5ml

Cortan(Incepta), Eye drops, Tk. 100.00/5ml;.

Cortisol(Aristo), Eye drops, Tk. 100.00/5ml;.

Isolon(Ibn Sina), Eye drops, Tk. 100.00/5ml

Pednisol(Drug Intl), Eye drops, Tk. 90.30/5ml;

Predflam(General), Eye drops, Tk. 100.30/5ml

Prednicort(Asiatic), Eye drops, Tk. 100/5ml

DIFLUPREDNATE

Indications: Treatment for the local inflammation, postoperative ocular inflammation, uveitis.

Cautiona: Glaucoma, any type of ocular infection (including herpes)

Side effects: Blurred vision; change in colour vision, eye discomfort, pain, redness, photophobia, blepharitis, punctate keratitis, increased intra ocular pressure.

Dose: 4 times/day for two weeks followed by tapering as clinically indicated.

pregnancy Warning: animal studies have shown this drug to be embryotoxic and teratogenic. There is no adequate and well controlled studies in pregnant woman.

Proprietary Preparations

Difluprednate 0.05%.

Diflupred(General), Eye drops, Tk. 180.00/5ml

Dipred(Popular), Eye drops, Tk. 180.00/5 ml

Neopred(Aristo), Eye drops, Tk. 180.00/5ml

Predasin(Asiatic), Eye drops, Tk. 180.00/5ml

NON STEROIDAL ANTI INFLAMMATORY DRUGS (NSAIDs)

(See also section 9.1.2).

NSAIDs that reduce inflammation following ophthalmic surgery include Flurbiprofen, Diclofenac and Ketorolac.

Flurbiprofen and Diclofenac may also be used to induce mydriasis and reduce surgical miosis. NSAIDs act through inhibition of prostaglandin E₂ synthesis. Unlike topical steroids, they do not cause increased risk of infection. But all cause burning sensation after instillation

Indications:

- Preoperatively for maintaining blood aqueous barrier and for inhibition of intraoperative miosis during cataract surgery (**Flurbiprofen and Diclofenac**).
- Pre and post operatively to control inflammation and for analgesia (**Diclofenac**).
- To control inflammation in episcleritis, scleritis, chemical injury.
- Allergic conjunctivitis (**ketorolac 0.5%** is more useful than others)

BROMOFENAC

Indication: Treatment of postoperative inflammation and reduction of ocular pain in patients who have undergone ocular surgery (cataract extraction, IOL implantation etc).

Dose: Applied to the affected eye(s) two times daily beginning 24 hours after ocular surgery and continuing through the first 2 weeks of the postoperative period.

Side-effects: Abnormal sensation in eye, conjunctival hyperemia, eye irritation (including burning/stinging), eye pain, eye pruritus, eye redness, headache and iritis

Proprietary Preparations

Acunac(General), Eye drops, 0.09% Tk. 100.30/5ml

BFC(Nipa), Eye drops, 0.09% , Tk. 100/5ml

Bfenac(Popular), Eye drops, 0.09%, Tk. 100.00/5 ml

Bromnac(Opsonin), Eye drops, 0.09%, Tk. 100.38/ 5 ml

Bromofen(Ibn Sina), Eye drops, 0.09%, Tk. 100.00/5ml

BSH(Opso Saline), Eye drops, 0.09%

Tk. 75.19/5ml

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Catalan(Healthcare), Eye drop, 0.09% , Tk. 110.00/5 ml
Eyefen(Acme), Eye drops, 0.09% , Tk. 100.30/5ml
Ocubrom(Square), Eye drops, 0.09%, Tk.100.68/5ml.; 0.07%, Tk. 90/5ml
Ocubronac(Asiatic), Eye drops, 0.09%, Tk. 100.00/5ml
Optifen(Globe), Eye drops, 0.09%, 100.00/5ml
Refenac(Reman), Eye drop 0.09% Tk.100/5ml
Relye(Biopharma), Eye drops, 0.09% , Tk. 100.00/5ml
Romfen(Eskayef), Eye drops, 0.09%, Tk. 90.00/5ml
Rotarac(ACI), Eye drops, 0.09% Tk. 90.00/5ml; 0.07% Tk.90.00/5ml
Rotarac(ACI), Eye drops, Tk. 95.36/5 ml Tk. 110.00/5ml
Xibrofen(Incepta), Eye drops , 0.09% Tk. 100.00/5ml
Xibrofen(Incepta), Eye drops, Tk. 100/5 ml
Xirom(Aristo), Eye drops, 0.09% Tk. 100.00/5ml

DICLOFENAC SODIUM

Preoperative: Up to 1 drop 5 times over the 3 hours preceding surgery
Postoperative: 1 drop 3 times immediately after surgery, thereafter 1 drop 3-5 times daily
Other indications: 1 drop 4-5 times daily

Proprietary Preparations

Diclofenac sodium 0.1%,

Anfenac(Nipa), Eye drops, Tk. 80.00/5ml
Anodyne(Ibn Sina), Eye drops, Tk. 80.00/5ml
Diclofen(Opso Saline), Eye drop, Tk.60.15/5ml
Diclon(Reman), Eye/Ear drop Tk.78.50/5ml
Dinac(Navana), Eye drops, Tk. 80/5 ml
Erdon(Aristo), Eye drops, Tk. 80.00/5ml
Intafenac(Incepta), Eye drops Tk. 80.00/5ml.;
Mobife(ACI), Eye drops, Tk. 75.41/5ml .;
Nopain(Drug Intl), Eye drops, Tk. 75.25/5ml
Profenac(Popular), Eye drops, Tk. 75.28/5ml

FLURBIPROFEN SODIUM

Prevention of miosis: 1 drop half hourly beginning 2 hour before surgery
Postoperative inflammation: 1 drop 4 times daily for 2-3 weeks
Prevention of cystoid macular oedema: 1 drop 4 times daily for 3-6 months

Proprietary Preparation

Ocufen[®](Allergen), Eye drop. 0.03%, Tk.164.54/5ml

KETOROLAC TROMETHAMINE

Dose: 1 drop 3 times daily

Proprietary Preparations

Ketorolac Tromethamin 0.5%,

Emodol(Jayson), Eye drops, Tk. 70/5 ml
Etolac(Ibn Sina), Eye Drops, Tk. 85.00/5ml
Etorac(Incepta), Eye drops, Tk. 80/5 ml;
Ketromin(Pacific), Eye drops, Tk. 80.00/5ml
Lopadol(Popular), Eye drops, Tk. 80.30/5ml
Ofpain(Kemiko), Eye drops, Tk. 80.00/5ml
Ofpain(Kemiko), Eye drops, Tk. 80/5 ml;
Oradol(Aristo), Eye drops, , Tk. 80.00/5ml.;
Pair(Drug Intl), Eye drops Tk. 70.25/5ml
Regular(Reman), Eye drop Tk.80.30/5ml
Surpim(Asiatic), Eye drops, Tk. 80.00/5ml,
Todol(Opsonin), Eye drops, Tk. 80.30/0.
Toroaid(General), Eye drops, Tk.80.24/5ml.;
Winop(Acme) Eye drops, Tk. 80.24/5ml
Xidolac(Beximco), Eye drops, Tk. 80/5 ml.

NEPAFENAC

Indication: Post-operative ocular pain and inflammation including cataract surgery

Inhibition of surgery induced miosis and Prevention of post-operative cystoid macular edema (CME)

Dose: For post-operative pain & inflammation: 1 drop 3 times daily 1 day prior to cataract surgery and continued on the day of surgery and through the first 2 weeks of the post-operative period.

For surgery induced miosis: 1 drop 3 times daily 1 day before surgery & on the day of surgery.

For prevention of post-operative CME: 1 drop 3 times daily 1 day before surgery and continued on the day of surgery and through the first 6 weeks of the post-operative period.

Side effects: are foreign body sensation, lid margin crusting, ocular discomfort, ocular hyperemia etc.

Proprietary Preparations

Nepag(General), Eye drops, 0.1%, Tk. 150.00/5ml.; 0.3%, Tk. 225.00/5ml
Nevan(Aristo), Eye drops, 0.1%, Tk. 150.00/5ml.; 0.3%, Tk. 225.00/5ml

Ocunep(*Asiatic*), Eye drops, 0.1%, Tk. 150.00/5ml
Opanac(*Beximco*), Eye drops, 0.1%, Tk. 150.00/3ml.; 0.1%, Tk. 150.00/5ml
Optafenac(*Popular*), Eye drops, 0.1%, Tk. 150.00/5 ml.; 0.3%, Tk. 225.00/5 ml

ANTI HISTAMINES

See also section 4.8.1 & 11.2.1

Topical Antihistamines (e.g. Pheniramine Maleate, Pyrrolaminemaleate, antazoline) usually combined with a vasoconstrictor (e.g. Naphazoline, Phenylephrine). Ketorolac (NSAID), Ketotifen, Bepotastine Besilate is also used to treat allergic conjunctivitis. They decrease itching and normalize vascular permeability in allergic conjunctivitis.

These drugs are very useful for the urban people of our country where incidence of allergy is more. Prolong use has little side effect as compared to steroids. These drugs give temporary relief.

Cautions: Hypertension, cardiac arrhythmia.

Dose: 1 drop 5 times daily.

ALCAFTADINE

Indications: For symptoms & signs of allergic conditions of the anterior segment of the eye.

Side-effects: Mild irritation, burning & redness

Dose: 0.25%; one drop once daily

Proprietary Preparations

Alcaftadine 0.25%.

Acicraft(*ACI*), Eye drops, Tk. 400/5ml
Alcadin(*Popular*), Eye drops, Tk. 400/5 ml
Alcaft(*Healthcare*), Eye drop, Tk. 450/5 ml
Alcafta(*Incepta*), Eye drops, Tk. 400/5 ml
Caftadin(*Aristo*), Eye drops, Tk. 400/5 ml
Genacraft(*General*), Eye drops, Tk. 400/5 ml

ANTAZOLINE SULFATE

Indications: Allergic conjunctivitis

Cautions: Hypertension, hyperthyroidism, diabetes mellitus, angle-closure glaucoma; phaeochromocytoma, cardio-vascular disease, urinary retention

Side-effects: Transient stinging; also reported blurred vision, mydriasis, eye irritation

Dose: ADULT and CHILD over 12 years apply 2–3 times daily (max. 7 days)

Antazoline 0.05%+Tetrazoline 0.04%

Proprietary Preparations

Zocare(*Healthcare*), Eye drops, Tk. 115/5 ml

NAPHAZOLINE HYDROCHLORIDE

Indications, caution, side-effect & Dose: same as that of Antazoline sulfate

Naphazoline hydrochloride 0.025% with pheniramine maleate 0.3%.

Napcon(*ACI*), Eye drops, Tk. 70.00/10ml

Nafamin(*Acme*), Eye drops, Tk. 125.00/15ml

Naphazoline Nitrate 0.005% & Zinc Sulphate 0.02%.

Naphalon(*Reman*), Eye drop, Tk. 80.30/5ml

Nazin(*Aristo*), Eye drops, Tk. 80.00/10ml

Oculogen(*General*), Eye drops, Tk. 80.24/10ml

BEPOTASTINE BESILATE

Indications: Itching associated with signs and symptoms of allergic conjunctivitis.

Dose: Apply one drop into the affected eye(s) twice a day.

Proprietary Preparations

Bepotastine Besilate 1.5%

Bepogen(*General*), Eye drops, Tk. 300.90/5ml

Bepotas(*Aristo*), Eye Drops Tk. 300/5ml

Betasil(*Ibn Sina*), Eye drops, Tk. 300/5ml

Betastin(*Incepta*), Eye drops, Tk. 300/5ml

Eyetin(*Acme*), Eye drops, Tk. 300/5ml

I-Bestin(*Asiatic*), Eye drops, Tk. 300/5ml

Ocustin(*Popular*), Eye drops, Tk. 300/5 ml

Reprove(*Healthcare*), Eye drops, Tk. 320/5 ml

EMEDASTINE

Indications: Seasonal allergic conjunctivitis

Side-effect: Transient burning or stinging; blurred vision; local oedema; keratitis; irritation; dry eye; infiltrates (discontinue); and staining; photophobia;

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headache and rhinitis occasionally reported

Dose: ADULT and CHILD over 3 years apply twice daily.

Proprietary Preparation

Emadin^(Alcon), Eye drops 0.05%, Tk. 327.02/5ml

EPINASTINE HYDROCHLORIDE

Indications: Seasonal allergic conjunctivitis

Side-effects: Burning; less commonly taste disturbance, headache, conjunctival hyperaemia, dry eye, eye pruritus, visual disturbance, increased lacrimation, eye pain, nasal irritation, rhinitis

Dose: ADULT and CHILD over 12 years, apply twice daily; max. duration of treatment 8 weeks

Proprietary Preparations

Epinastine hydrochloride 0.05%

Relestat^(Allergan) Eye drops, Tk. 296.73/5ml

Alpatin(Beximco), Eye drops, Tk. 150.00/5ml

Epinastr(Aristo), Eye drops, Tk. 150.00/5ml

KETOTIFEN FUMERATE

Indications: Seasonal allergic conjunctivitis

Side-effects: Transient burning or stinging, punctate, corneal epithelial erosion; less commonly dry eye, subconjunctival hemorrhage, photophobia, headache, drowsiness, skin reaction, and dry mouth also reported.

Dose: ADULT and CHILD over 3 years, apply twice daily

Proprietary Preparations

Ketotifen 0.025%

Alarid(Square), Eye drops Tk. 100.3/5 ml,;

Aljen(Apex), Eye drops, Tk. 95/5 ml

Fenat(Drug Intl), Eye drops, Tk. 95.30/5 ml

Ketof(Ibn Sina), Eye drops, Tk. 100.00/5 ml,;

Ketolac(Nipa), Eye drops, Tk. 80.00/5ml

Ketomar(Incepta), Eye drops Tk. 100/5 ml,;

Kofen(Opsonin), Eye drops, Tk. 100/5 ml,;

Masfen(Opso Saline) Eye drops, Tk. 75.19/5ml

Ocutif(Asiatic), Eye drops Tk. 95/5ml

Ocutifen(General), Eye drops Tk. 95.29/5 ml

Proasma(ACI), Eye drops, Tk. 100/5 ml,;

Stafen(Aristo), Eye drops, Tk. 100/5ml

Tofen(Beximco), Eye drops, Tk. 100/5 ml,;

Zadit(Popular), Eye drops, Tk. 95.36/5ml,;

MAST CELL STABILIZERS

(See also section 4.4.1 & 11.2.1)

SODIUM CROMOGLYCATE

It is a useful drug without major side effects. Majority of patients in our country suffer from allergy; it is strongly recommended for continued use if it is indicated for allergy.

Usually it has preventive role. Its effect builds up gradually and it needs uninterrupted application for more than one week.

When allergic reactions are higher, then short-term supplementation of steroid is needed.

Indication: Allergic conjunctivitis

Dose: 1 drop 4 times a day

Proprietary Preparations

Aristocrom(Aristo), Eye/Nasal drops, 2%, Tk. 65.00/5ml

Cromolin(Ibn Sina), Eye drops, 4%, Tk. 80.00/10ml

Icrom(ACI), Eye drops, 2%, Tk. 65.45/10ml

Itchin(G.A. Co), Eye/Nasal drops, 2%, Tk. 65.00/10 ml; DS4%, Tk. 75.23/10 ml

Mastguard(Incepta), Eye/Nasal drops, 2%, Tk. 100.00/10ml

Nasochrom(Drug Intl), Eye/Nasal drops, 2%, Tk. 60.20/10ml

Socolate(Pacific), Eye/Nasal drops, 2%, Tk. 65.00/10ml

Sodicrom(Popular), Eye drops, DS 4%, Tk. 75.28/5 ml; 2%, Tk. 60.23/10ml

LODOXAMIDE

It is about 2500 times more potent than **cromoglycate** to inhibit mediator release from mast cell

Indication: Allergic conjunctivitis

Dose: 1 drop 4 times a day. It needs to be used without interruption

Proprietary Preparation

Alomide^(Alcon), Eye drop. 0.1% Tk. 312.61/5ml

OLOPATADINE

Inhibits the release of inflammatory mediators like histamine, tryptase,

PGD₂ from human conjunctival mast cells thus prevents changes in vascular permeability.

Indication: Seasonal allergic conjunctivitis

Side-effects: Transient burning and stinging; distinctive taste

Dose : ADULT and CHILD over 3 years, apply twice daily; max. duration of treatment 4 months

Proprietary Preparations

Alacot(Square), Eye drops, 0.1%, Tk. 110.34/5ml; 0.2%, Tk. 150.45/5ml
Aladay(Eskayef), Eye drops, 0.1%, Tk. 110.00/5ml; 0.2%, Tk. 160.00/5ml
Alercon(Acme), Eye drops, 0.2%, Tk. 150.44/5ml; 0.1%, Tk. 100.30/5ml
Allet(Healthcare), Eye drops, 0.2%, Tk. 180.00/5 ml; 0.1%, Tk. 110.00/5 ml
Conrif(Globe), Eye drops, 0.1%, 100.00/5ml
Contova(ACI), Eye drops, 0.1%, Tk. 107.00/5ml ; 0.2% Tk. 150.00/5ml
Lopadine(Incepta), Eye drops, 0.1%, Tk. 110.00/5ml; 0.2%, Tk. 150.00/5ml; 0.2%, Tk. 200.00/5ml;
Olacing(Pacific), Eye drops, 0.2%, Tk. 150.00/5ml
Olarif(Biopharma), Eye drops, 0.1%, Tk. 110.00/5ml; Eye drops, 0.2%, Tk. 150.00/5ml
Ologen(General), Eye drops, 0.2%, Tk. 175.00/5ml; 0.1%, Tk. 100.30/5ml; Tk. 225.00/5ml
OLON-DS(Kemiko), Eye drops, 0.2%, Tk. 150.00/5ml
Olopan(Beximco), Eye drops, 0.1%, Tk. 110.00/5ml, 0.2%, Tk. 160.00/5ml
Olopta(G.A.Co), Eye drops, 0.1%, Tk. 100.30/5 ml; 0.2%, Tk. 150.00/5 ml
Olpadin(Aristo), Eye drops, 0.2%, Tk. 175.00/5ml; 0.1%, Tk. 110.00/5ml
Opatin(Opsonin), Eye drops, 0.2%, Tk. 150.57/1ml; 0.1%, Tk. 110.00/1ml
OPD(Nipa), Eye drops, 0.1%, Tk. 110.00/5ml; 0.2%, Tk. 150.00/5ml
Optadin(Asiatic), Eye drops, 0.1%, Tk. 100.00/5ml; 0.2%, Tk. 150.00/5ml
Patadin(Popular), Eye drops, 0.2%, Tk. 150.57/5ml; DS 0.1%, Tk. 150.57/5ml
Patalon(Ibn Sina), Eye drops, 0.2%, Tk. 150.00/5ml, 0.1%, Tk. 110.00/5ml

10.4 MYDRIATICS, CYCLOPLEGICS AND TREATMENT OF GLAUCOMA

10.4.1 & 2 MYDRIATICS AND CYCLOPLEGICS

Anticholinergic agents (**Atropine**, **Homatropine**, **Tropicamide** etc.) have both cycloplegic and mydriatic activity in variable degree. **Atropine** is the strongest agent whose action lasts for prolonged period. Anticholinergic agents are usually used for refraction, pupillary dilatation and relief of inflammation. **1% Atropine** (in ointment form) is sometimes preferred for children under 5 years of age for refractive purposes.

Direct acting adrenergic agent, phenylephrine usually in a 2.5% concentration, is one of the most commonly used mydriatic for diagnostic purposes. It should be cautiously used in patients with ischaemic heart disease. **Phenylephrine** does not cause cycloplegia

Tropicamide or **Phenylephrine** is sufficient for examination of the fundus. Sometimes for maximal dilatation combination of **Tropicamide** and **Phenylephrine** or **Tropicamide** and **Cyclopentolate** is used. For refraction in a CHILD, **1% Cyclopentolate** is indicated and used commonly due to its short duration of action

Indications: For relief of inflammation and to have profound cycloplegia, **atropine** is the drug of choice

Cautions: The use of these drugs should have restricted use. Patients should be well informed not to use it in the normal eyes. Darkly pigmented iris is more resistant to pupillary dilatation.

Side-effects: A few patients, usually middle-aged or elderly hypermetropic individuals, may develop an attack of acute angle closure glaucoma following mydriasis; this constitutes a severe and sight-threatening emergency.

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Tablet 10.4.1 A : List of drugs comparing different effects is given in the table

Drug	Mydriasis Maximal effect (min)	Mydriasis Full recovery (days)	Cycloplegia Maximal effect (hr.)	Cycloplegia Full recovery (days)
Atropine 1%	40	10+	6	14
Hyoscine (0.25% & 0.5%)	30	7	1	7
Homatropine (1% -5%)	60	3	1	3
Cyclopentolate (0.5%- 2%)	60	1	1	1
Tropicamide (0.5% & 1%)	40	0.25	0.5	0.25
Phenylephrine 2.5% & 10%	20	0.25	Nil	---

Cautions: There are risk of systemic side effects with atropine eye drops in infants under 3 months of age (ointment is used in these case)

Side-effects: Transient stinging, raised intraocular pressure, hyperaemia, oedema, conjunctivitis, contact dermatitis

ATROPINE SULPHATE^[ED]

Proprietary Preparations

Atropine sulfate 1%

Atrogen(General), Eye drops, Tk. 70.21/10ml.; Tk. 50.14/5ml.; Tk. 70.00/3gm,
Atropine-OSL(Opso Saline), Eye drops, Tk. 25.95/5 ml; Oint, Tk. 14.05/3 gm
G-Atropine(Gonoshasthaya), Eye drops., Tk. 27.25/10 ml
Mydri-Atropin(Reman), Eye drops. Tk. 40/10ml; 30/5ml; Oint. Tk. 25/4gm

CYCLOPENTOLATE

Proprietary Preparation

Mydrate(Beximco), Eye drops, 1%, Tk. 120/5ml

HOMATROPINE HYDROBROMIDE

Proprietary Preparations

Homatropine hydrobromide 2%
Homatropine(Reman), Eye drop Tk. 56.55/10ml
Hemomin(Nipa), Eye Drops, 2%, Tk. 56.55/10ml
Matropin(Aristo), Eye drops, 2%, Tk. 56.70/10ml

TROPICAMIDE

Proprietary Preparations

Camide(Ibn Sina), Eye Drops, 0.5%, Tk. 60.22/5 ml; 1%, Tk. 80.31/5 ml
Dilate(Incepta), Eye drops, 1%, Tk. 76.00/5ml
Tropicam(Aristo), Eye drops, 0.5%, Tk. 60.00/5ml; 1%, Tk. 85.00/5ml
Tropicamide OSL(Opso Saline), Eye drops, 1%, Tk. 64.15/5 ml; 0.5%, Tk. 45.11/5 ml

Tropicamin(Nipa), Eye drops, 1%, Tk. 85.00/5ml; 0.5%, Tk. 60.00/5ml
Tropidil(Popular), Eye drops, 1%, Tk. 85.32/5ml
Tropigen(General), Eye drops, 1%, Tk. 85.26/5ml
Trusil(G.A.Co), Eye drops, 0.5%, Tk. 55.80/5 ml; 1%, Tk. 85.00/5ml

Tropicamide 0.8% + Phenylephrine 5%
Dilate plus(Incepta), Eye drops, Tk. 80.00/5 ml
Trophen(Aristo), Eye drops, Tk. 90.00/5ml
TropidilPlus(Popular), Eye drops, Tk. 80.30/5 ml
Tropigen Plus(General), Eye drops, Tk. 80.24/5ml
Trusil(G.A.Co), Eye drops, , Tk. 85.00/5 ml
Vasotrop(Asiatic), Eye drops, Tk. 90.00/5ml

10.4.3 DRUGS FOR GLAUCOMA

The complex primary pathologic mechanism in glaucoma consists of an incompatibility between intraocular pressure (IOP) and pressure tolerance of the tissues of the optic nerve head resulting in damage to the optic nerve fiber. IOP at which this incompatibility does occur varies from elevated IOP to an IOP totally within the normal range (**IOP not necessarily high always**). Thus the target IOP at which damage to optic nerve does not occur also varies from just within the normal range to well below the normal range. Approximately two thirds of all glaucoma are primary. Among the primary open angle glaucoma is more

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prevalent in our country, which needs routine screening for its diagnosis.

Treatment is aimed at reducing IOP to a target pressure safe and compatible with the normal functioning of the optic nerve.

Control of primary open angle glaucoma can be achieved and maintained in many cases by drugs only. But if it does not halt the progress of the disease or if there is non-compliance to drugs or if patient is not able to bear the cost of treatment, surgery is the treatment of choice.

Medical control of IOP can be achieved by using eye drops containing **miotics, beta blockers, sympathomimetic amines and prostaglandin analogues** or by systemic or topical therapy with carbonic anhydrase inhibitors (CAI).

At first the disease is to be treated with a topical beta-blockers and other drugs are to be added as necessary to control IOP.

For cases of acute primary angle closure glaucoma, **surgery is the only immediate and effective treatment** after medical control of IOP (mainly by **miotics, anhydrase inhibitors and even mannitol infusion**).

Among the secondary causes-steroid induced glaucoma, lens induced glaucoma, glaucoma secondary to uveitis and trauma are the main varieties. They should be treated according to the causes.

In emergency or before surgery, **Mannitol** should be given by slow IV infusion until the intraocular pressure has been satisfactorily reduced.

Acetazolamide by IV injection may also be used for the emergency management of raised intraocular pressure.

If supplementary topical treatment is required after iridectomy or a drainage operation in either variety of glaucoma, a **Beta-blocker** is preferred to **Pilocarpine**. This is because the risk that posterior synechiae will be formed as a result of the miotic effect of **Pilocarpine** especially in angle closure glaucoma. It is then also advantageous

to utilize the mydriatic side effect of adrenaline.

MIOTICS

It includes the cholinergic agonists **Pilocarpine** and **Carbachol**, and the anticholinesterases. They cause constriction of the ciliary muscle, which helps to open the drainage channels in the trabecular meshwork between the iridocorneal junction and the canal of Schlemm. Small pupil is an undesirable side effect of the drug.

Among the miotics used for control of ocular pressure, only pilocarpine drop in different concentration (1%, 2%, 4%) is use, stronger concentration (>3%) contraindicated in closure glaucoma.

Cautions: darkly pigmented iris of our population may require higher concentration of the **miotics** or more frequent administration. When frequent administration is needed; care should be taken to avoid overdose. Retinal detachment has occurred in susceptible individuals and those with **retinal disease** (especially with **long acting miotics**); therefore fundus examination is to be advised before starting treatment with a miotic. They should be used with caution in ischaemic heart disease, hypertension, bronchial asthma, peptic ulceration, urinary tract obstruction and Parkinson's diseases.

Contraindications: They are contraindicated in conditions where pupillary constriction is undesirable such as acute iritis, anterior uveitis and some form of secondary glaucoma. They should be avoided in acute inflammatory disease of the anterior segment.

Side-effects: Ciliary spasm leads to headache and browache which may be more severe in the initial 2-4 weeks of treatment (particularly in patient under 40 years of age). Ocular side effects include blurred vision

PILOCARPINE^[ED]

Indications: Cataract surgery, penetrating keratoplasty, iridectomy and

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other anterior segment surgery requiring rapid and complete miosis

Cautions: Before finishing the surgery the injections should be removed by aspiration otherwise chances of postoperative aseptic inflammation is more.

Contraindications: See notes above

Dose: Apply eye drops every 5 minute to 4 times daily

Proprietary Preparations

Pilocarpine(Opso Saline), Eye drops, 2%, Tk. 55.85/10ml

Pilodrop(Reman), Eye drops, 1%.Tk. 74.20/10ml;2% Tk.200/10ml;4%, Tk.212/10ml;

Asipine(Asiatic), Eye drops, 2%, Tk. 80.00/10ml

Optacarpine(Popular), Eye drops, 2% , Tk. 200.00/10 ml

Piloma(Opsonin), Eye drops, 2%, Tk. 200.00/10ml

BETA BLOCKERS

(See also section 3.1)

These blocking agents reduce IOP by decreasing the production of aqueous humour and produce minimal local adverse effects. They are used as eye drops which includes non-selective beta blockers (e.g. **Timolol**, **Carteolol**, **Levobunolol**) and cardioselective beta blockers (e.g. **Betaxolol**) preparations.

They are used in all types of glaucoma, irrespective of the state of the angle.

Beta blockers combined with **Pilocarpine** has a good additive effect. In absence of systemic contraindications, they are the first choice of drugs for primary open angle glaucoma.

Cautions: Drainage via the lacrimal duct and absorption from the nasal mucosa into the systemic circulation can produce significantly high blood levels that can lead to systematic side effects (to minimize it patient is to be advised to close the eyes and apply digital pressure over the lacrimal puncta for a few minute after instillation). Cardioselective agents e.g. **Betaxolol**, may therefore be preferable to non-selective agents (**Carteolol**, **Levobunolol**, **Timolol**) in the elderly;

caution is to be taken in patients with heart disease or bronchial asthma,

Systemic side effects: Bronchospasm, bradycardia (always feel the pulse of the patient before prescribing a beta-blocker), hypotension, delayed recovery from hypoglycemia in insulin-dependent diabetes mellitus, fatigue, headache, nausea, impotence, decreased libido.

BETAXOLOL

Indications : See notes above

Contraindications : See notes above

Side effects :See notes above

Dose : Apply eye drops twice daily

Proprietary Preparation

Betaxolol 0.5%.

Optibet(Jayson), Eye Drops, Tk.150.56/5ml

Glucovis(Beximco), Eye drops, 2.5mg/ml, Tk. 200.00/5ml

Optaloc(Popular), Eye drops, 0.5%, Tk. 200.75/5ml

LEVOBUNOLOL HYDROCHLORIDE

Indications : See notes above

Contraindications : See notes above

Side effects :See notes above

Dose : Apply eye drops 2 times daily

Proprietary Preparation

Betagan[®] (Allergan), Eye drop 0.5% Tk.193.56/5ml

TIMOLOL MALEATE

Indications : See notes above

Contraindications : See notes above

Side effects :See notes above

Dose : One drop twice daily

Proprietary Preparations

Timolol(as maleate) 0.5%.

Aristomol(Aristo), Eye drops, Tk. 70.00/5ml

Asinol(Asiatic), Eye drops, Tk. 67.00/5ml

Gemolol(General), Eye dropsTk. 70.21/5ml

Glumol(Globe), Eye drops, Tk. 70.00/5ml

Intramol(Beximco), Eye drop, Tk. 70/5ml

Lotensin(ACI), Eye drops, Tk. 67.45/5ml

Ocupres(Popular), Eye drops, Tk. 70.26/5ml

Ticoma(Opsonin), Eye drops, Tk. 70.26/5 ml

Timocare(Healthcare), Eye drops, Tk. 80/5ml

Timodrop(Reman), Eye drops,Tk. 50/5ml;

Timolat(Ibn Sina), Eye drops, Tk.75/5ml

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Timolol - OSL(Opso Saline), Eye drops, Tk. 52.63/5 ml
Timopress(Incepta), Eye drops, Tk. 70/5ml

SYMPATHOMIMETICS

These drugs are alpha and beta adrenergic agonists.

Sympathomimetics increase aqueous outflow through their alpha agonistic action and decrease aqueous inflow through their beta agonist activity. Additive effect is poor with **Timolol**, good with miotics (in which case miotic should be instilled first). Sympathomimetics are the first choice of drugs in the treatment Primary Open Angle Glaucoma (POAG) in patients who have systemic contraindications to **Beta blocker**. They are useful in most secondary glaucoma, but should not be used in closed angle glaucoma (as it has mydriatic effect).

Adrenaline does not have any effect on ciliary body and is often most effective when used in conjunction with miotics.

Side-effects: Severe smarting and redness of the eye

Cautions: It should be used with caution in patients with hypertension and heart diseases

ALPHA₂ AGONISTS

(See also section 3.2.6)

Alpha₂ agonists are used in the treatment of glaucoma include **Apraclonidine** and **Brimonidine**. They reduce the production of aqueous and increase uveoscleral outflow. In contrast to beta-blockers they have minimal effects on cardiovascular parameters and do not affect pulmonary function. **Brimonidine** is considered to be more selective than **Apraclonidine** for alpha₂ –receptors and as a result produces its ocular hypotensive effect without causing the mydriasis or conjunctival blanching seen with apraclonidine.

BRIMONIDINE TARTARATE

Indications: Open-angle glaucoma or ocular hypertension.

Cautions: Severe cardiovascular disease, depression, cerebral or

coronary insufficiency, pregnancy, breast feeding & renal impairment

Contraindications: Neonate or CHILD under 2 years, See notes above

Side effects: Eye discomfort, itching, redness, blurred vision, dizziness, dry mouth, drowsiness, or tiredness

Dose: One drop 3 times a day, see notes above

Proprietary Preparations:

Brimonidine Tartrate 0.2%

Alphaten(Aristo), Eye drops, Tk. 80/5ml

Bricoma(Opsonin), Eye drops, Tk. 60.38/5ml

Brimo(Popular), Eye oint, Tk. 80.30/5ml

Brimodin(Incepta), Eye drops, Tk. 80/5ml

Locular(Square), Eye drops, Tk. 80.30/5ml

Timolol 0.5% +Brimonidine Tartrate 0.2%

Bimole (*Ibn Sina*), Eye drops, Tk.

110.00/5ml

Binzotim(Eskayef), Eye drops, Tk.

550.00/5ml

Brimodin Plus(Incepta), Eye drops,

Tk.110.00/5ml

Brimopres(Popular), Eye drops, Tk.

110.42/5ml

Combat(General), Eye drops, Tk.120.00/5ml

Combigan[®](Allergan), Eye Drops, , Tk.1

741.57/5ml

Combipres(Aristo), Eye drops,

Tk.120.00/5ml

Locoma (ACI), Eye drops, Tk. 120.00/5ml

Locular Plus(Square), Eye drops,

Tk.110.34/5ml

Ticoma B(Opsonin), Eye drops, Tk.

83.02/5ml

Wigan(Healthcare), Eye drop, Tk. 120.00/

CARBONIC ANHYDRASE INHIBITORS

See also section 3.5.5

These enzyme inhibitors decrease intraocular pressure by suppressing the production of aqueous humour.

ACETAZOLAMIDE^[ED]

Indications: Reduction of intraocular pressure in open angle glaucoma, secondary glaucoma and perioperatively in angle-closure glaucoma

Cautions: Not generally recommended for continuous use but if it is to be given plasma electrolytes and blood count

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should be monitored; pulmonary obstruction

Contraindications: Hypokalaemia, hyponatraemia, hyperchloraemic acidosis; severe hepatic impairment; renal impairment; **Sulphonamide** hypersensitivity.

Side-effects: Nausea, vomiting, diarrhoea, taste disturbances, loss of appetite, flushing, headache, dizziness, fatigue, irritability, depression, thirst, polyuria, reduced libido, tingling of fingers, hand and feet, Steven-Johnson syndrome, blood dyscrasia, weak diuresis

Long-term use may lead to electrolyte disturbances, metabolic acidosis

Dose: For acute control of IOP 250-1000mg IV in divided dose; or 5mg/kg body weight; action onset of action is within 2 minutes and reaches to maximum 10-15 minute; Orally, 1g daily divided into 2-4 doses

Proprietary Preparation

Acemox(Acme), Tab., 250 mg, Tk. 2/Tab.

BRINZOLAMIDE

Indication: For short term management of glaucoma

Caution: Check cardiovascular status

Dose: Apply twice daily increased to max. 3 times daily if necessary

Proprietary Preparations

Brinzolamide 1%

Azopres(Ibn Sina), Eye drops, Tk.500/5 ml

Benozole(Popular), Eye drops, Tk. 500/5 ml

Brinzopt(Aristo), Eye drops, Tk. 500/5 ml

Genazopt(General), Eye drops, Tk.500/5 ml

Xolamid(Opsonin), Eye drops, Tk. 375.94/5ml

Zolamid(Incepta), Eye drops, Tk. 500/5ml

Brinzolamide 1% + Brimonidine 0.2%.

Indication, Caution & Dose: Same as that of Brinzolamide

Genazopt Plus(General), Eye Drops, Tk. 550.00/5 ml

Benozol BR (Popular), Eye drops, Tk. 550/5ml

Brindin(Acme) Eye drops, Tk. 550.00/5 ml

Zoladin (Aristo), Eye drops, Tk. 550.00/5 ml

Zolamid Plus(Incepta), Eye drops, Tk.550/5ml

DORZOLAMIDE

Indications: To treat high pressure inside the eye due to glaucoma (open angle-type) or other eye diseases (e.g., ocular hypertension).

Side-effects: Temporary blurred vision, burning/stinging/itching/redness of the eye, watery eyes, dry eyes, sensitivity of eyes to light, bitter taste, or headache may occur. If any of these effects persist or

Dose: One drop in the affected eye(s) three times a day

Dorzolamide 2% + Timolol 0.5%

Proprietary Preparations

Azopt(Ibn Sina), Eye drops, Tk. 550.00/5ml

Cozopt(Aristo), Eye drops, Tk. 550.00/5ml

Orozo(Opso saline), Eye drops, Tk. 550.00/5ml

HYPEROSMOTIC AGENTS

These agents (e.g. Glycerol, isosorbide and mannitol) are used as dehydrating agent or to promote polyuria.

MANNITOL

(See section 3.5.4)

PROSTAGLANDIN ANALOGUES

Latanoprost and **Travoprost** most recently introduced drugs, which increase uveoscleral outflow.

BIMATOPROST

Indications : Control the of glaucoma,

Cautions: Lashes may grow long that they become ingrown and scratch the cornea

Contraindication: Should not be used if the patient is allergic to any ingredient in bimatoprost drops

Side-effects: Blurred vision, eyelid redness, eye discomfort, burning sensation, thickening of the eyelashes.

Dose: Apply once daily, preferably in the evening; CHILD under 18 years, not recommended

Proprietary Preparation

Bimatoprost 0.03%.

Bimast(Incepta), Eye drops, Tk. 500.00/3ml

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Bimaprost(Popular), Eye drops, Tk. 500/3ml
Lumigan^(Allegan), Eye drops,
Tk.1354.45/3ml

Bimatoprost0.03% + Timolol 0.5%
Bimator(Square), Eye dropsTk. 500/3ml

LATANOPROST

Indications: Patients with open-angle glaucoma or ocular hypertension

Cautions: Intraocular inflammation, aphakia, patients with risk factors for macular edema, glaucoma, contact lens wearers, pregnancy and lactation

Contraindications: Hypersensitivity to latanoprost, benzalkonium chloride, or any component of the formulation

Side-effects: Blurred vision, burning and stinging, conjunctival hyperemia, foreign body sensation, itching, increased pigmentation of the iris, punctate epithelial keratopathy, bacterial keratitis

Dose: One drop in the affected eye(s) once daily in the evening.

Note: *Safety and efficacy have not been determined for use in patients with angle-closure glaucoma*

Proprietary Preparations

Lumigin^(Allegan), Eye drops, 0.03%, Tk.1140.60/3 ml

Repaprost(Reman), Eye drops 0.05%, Tk.496.87/2.5 ml

Xalaprost(Beximco), Eye drops, 0.03%, Tk.460.00/2.5 ml

Xalatan^(Pfizer) Eye drops 0.05%, Tk.703.75/2.5 ml

Timolol 0.5% + Latanoprost 0.005%
Lotensin plus (ACI), Eye drops, Tk. 402.72/5ml

Xalacom^(Pfizer) Eye Drops, Tk. 781.94/2.5 ml

Xalanol(Beximco), Eye Drops, Tk.495/2.5ml

TRAVOPROST

Indication: For controlling the progression of glaucoma

Cautions: Allergic to any ingredient in travoprost drops, iritis, uveitis, narrow-angle and neovascular glaucoma

Side-effects: Blurred vision, eyelid redness, darken eyelashes, eye

discomfort, temporary burning sensation during use, thickening of the eyelashes, restricting urine flow

Dose: Same as that of latanoprost

Proprietary Preparations

Travoprost 0.004%

Avatan(Aristo), Eye drops, Tk. 470.00/5ml

Avost(Ibn Sina), Eye drops, Tk. 470.00/3ml

Avro(Drug Intl), Eye drops, Tk. 451.40/3ml

Travagen(General), Eye drops, Tk. 470.00/3ml

Travast(Incepta), Eye drops, Tk. 470.00/3ml

Travolar(Square), Eye drops, Tk. 470.00/3ml

Travoprost 0.004% + Timolol 0.5%

Avatan-T(Aristo), Eye drops, Tk. 500/3 ml

Avost plus(Ibn Sina), Eye drops, Tk. 500/3ml

Travast Plus(Incepta), Eye drops, Tk.500/3ml

Travofix Plus (opso saline), Eye drops, Tk.500/3 ml

TAFLUPROST

Indications: Control the progression of the open angle glaucoma or ocular hypertension.

Caution: Allergic to any ingredient in tafluprost drug.

Side-effects: Blurred vision, burning, dry or itching of eyes, redness, pain, swelling of the eye or eyelid, increased growth of the eye lashes, headache.

Dose: One drop in the affected eye once daily in the evening.

Warnings: In pregnancy should be used only if the benefit outweighs the risk to the fetus. Animal studies revealed reproductive toxicity. But there is no adequate studies in pregnant woman

Proprietary Preparations:

Taflan(Aristo), Eye drops, 1.5 mg/100 ml, Tk. 600.00/3ml

10.5 LOCAL ANAESTHETICS

Topical: Anaesthesia of the conjunctiva and cornea can be obtained very readily by the use of drops.

The most commonly used are short acting preparations such as **Lignocaine**, **Oxybuprocaine**, **Proparacaine** and **Proxymetacain**.

10. EYE

These act within a few seconds and wear off within half an hour. They are adequate for such procedures as sub tarsal or corneal foreign body removal, and application tonometry, lacrimal manipulation and irrigation.

Oxybuprocaine or a combined preparation of **lignocaine** and **fluorescein** is used for tonometry. Among other things **Proparacaine** is preferred to be used as excellent topical local anaesthetic for those ocular surgery which can be done under topical anaesthesia like cataract surgery.

Amethocaine produces a more powerful and prolonged anesthesia and is suitable for use before minor surgical procedures, such as the removal of

Tablet 10.5 A : Comparison of Lignocaine & Bupivacaine regarding the concentration, onset and duration of action

Drug	Concentration/ Maximum dose	Onset of action	Duration of action
Lignocaine	1%-2% / 500mg	4-6 min	40-60min 120min (with adrenaline)
Bupivacaine	0.25%-0.75%	5-11min	480-720min (with adrenaline)

Side-effects: are usually the result of excessively high blood concentration due to inadvertent intravascular injection, excessive dosage, rapid absorption or occasionally due to hypersensitivity, idiosyncrasy or diminished tolerance

CNS reactions include nervousness, dizziness, blurred vision and tremors, followed by drowsiness, convulsions, unconsciousness and possibly respiratory arrest.

Cardiovascular reactions are hypotension, myocardial depression, bradycardia and possibly cardiac arrest.

BUPIVACAINE INJECTION^[ED]

Proprietary Preparation
(See section 8.2)

OXYBUPROCAINE HCl

Proprietary Preparations

corneal sutures. It has a temporary disruptive effect on the corneal epithelium.

Proxymetacaine causes less initial stinging and is useful for children.

Regional anesthetics: **Lignocaine**, with or without adrenaline, is injected into the eyelids for minor surgery, while retrobulbar or peribulbar injections are used for surgery of the globe itself. The speed of onset and duration of action is increased by the addition of vasoconstrictor adrenaline and absorption into circulation from the site of injection is reduced. **Bupivacaine** has prolonged effect than lignocaine. So both is mixed before use if time of surgery is expected to be prolonged.

Buprocaine(General), Eye drops, 0.4%, Tk. 100.30/10 ml

Oxycaine(Reman) Eye drops, 0.4%, Tk. 50.43/10ml

Novocaine(Opso Saline), Eye drops, 0.4%, Tk. 31.7/10ml

PROPARACAINE

Indication: See notes above.

Side effects: See notes above.

Proprietary Preparations

P-caine (Popular), Eye drop. 0.5%, Tk.150/10ml; Tk.125/5ml

Procain(Aristo), Eye drops, 0.5%, Tk. 150/10ml

Note. local anaesthetic should never be used for the management of ocular symptoms.

ROLE OF INJECTION OF HYALURONIDASE

10. EYE

Hyaluronidase is a spreading factor. It spreads the anaesthetic agent rapidly around the infiltrated area.

It is mixed with lignocaine. 1 vial containing 1500 IU added to a 30ml vial of lignocaine for local anaesthesia.

Proprietary Preparations

Hyanid(Techno), Inj. 150IU/vial, Tk. 30.09/vial

10.6 MISCELLANEOUS OPHTHALMIC PREPARATIONS

10.6.1 TEAR DEFICIENCY, OCULAR
LUBRICANTS AND
ASTRINGENTS

10.6.2 DIAGNOSTIC AND
PERIOPERATIVE
PREPARATIONS

10.6.1 TEAR DEFICIENCY, OCULAR LUBRICANTS AND ASTRINGENTS

Dry eye refers to a deficiency in either the aqueous or mucin components of the precorneal tear film. The most commonly encountered aqueous-deficient dry eye is keratoconjunctivitis sicca, while mucin-deficient dry eyes may be seen in cases of hypovitaminosis A, Stevens-Johnson syndrome, ocular pemphigoid, extensive trachoma and chemical burn. Some predisposing conditions should be kept in mind like- elderly age, postmenopausal women, patients with drugs like **anticholinergics, antimuscarinics, psychotropics, oral contraceptives** etc, people in dry dusty environment, computer workers etc.

Chronic soreness of the eyes associated with reduced or abnormal tear secretion (e.g. in Sjogren's syndrome) often responds to tear replacement therapy. The severity of the condition and patient preference will often guide the choice of preparation.

Ocular lubricants are designed to correct deficiencies that may arise in the watery component, the mucus layer or the lipid layer of the tear film. Often more than one component is affected

and it is a matter of trial to find which product suits the patient best.

Groups	Constituents
Cellulose derivatives	Hypromellose 0.5%
Polyvinyl alcohol	Polyvinyl alcohol 1.4%
Mucomimetics	Hypromellose 0.3% + Dextran 70

Hypromellose eye drops are the most commonly used tear substitutes and are of benefit when the watery component is deficient. It may need to be instilled frequently (e.g. hourly) for adequate relief. Ocular surface mucin is often abnormal in tear deficiency and the combination of hypromellose with a mucolytic such as **Acetylcysteine** can be helpful.

Agents such as **Polyvinyl alcohol, Polyacrylic acid, povidone** and **dextran** help the aqueous layer spread over the hydrophobic corneal and conjunctival epithelium when the mucus layer is deficient and tear film distribution is patchy. **Polyvinyl alcohol** increases the persistence of the tear film and is useful when the ocular surface mucin is reduced. **Sodium chloride** eye drops (**0.9%**) may be used to irrigate the eye in lid disease that may be preventing secretion of the lipid layer by the meibomian glands. It can be used as 'comfort drops' by contact lens wearers, and to facilitate lens removal.

Eye ointments containing **Paraffin** may be used to lubricate the eye surface, especially in cases of recurrent corneal epithelial erosion. They may cause temporary visual disturbance and are best suited for application before sleep. Ointments should not be used during contact lens wear.

Zinc sulphate is a traditional astringent that is now little used. As it causes intense burning on application many prefer to restrict its use only for angular conjunctivitis.

CARBOXYMETHYL CELLULOSE SODIUM

Proprietary Preparations

Carboxymethyl cellulose sodium 1%

Aquafresh(Popular), Eye drops, Tk. 250/10ml**Carmelus**(Pacific), Eye drops Tk. 275.00/10ml**Drylief**(Aristo), Eye drops, Tk. 275.00/5ml**Lubgel**(Square), Eye drops, Tk. 275.00/10ml**Refresh I**(Asiatic), Eye drops, Tk. 250/10ml,**Sinafresh**(Ibn Sina), Eye drops, Tk. 250/10ml**Tearfresh**(General), Eye drops, Tk. 275/10ml, Tk. 375.00/15ml**Tearon**(Beximco), Eye drops, Tk. 275/10ml**TR Care**(Healthcare), Eye drops, Tk. 250/10 ml**Lubrimax**(ACI), Eye drops, Tk. 275.00/10ml**Carboxymethylcellulose Sodium 0.5%+ Glycerin 0.9%****Neotear**(Aristo), Eye drops, Tk. 190/10 ml**Eyedew**(Acme), Eye drops, Tk. 190/10ml**Neotear**(Aristo), Eye drops, Tk. 190/10ml**Carmelus**(Pacific), Eye drops, Tk. 190/10ml**G-fresh**(Ibn Sina), Eye drops, Tk. 190/10ml**Carboxymethylcellulose Sodium 0.25% + Hypromellose 0.3%****Aqua**(Opso Saline), Eye drops, Tk. 142.86/10ml**Lubric Extra**(Incepta), Eye drops, Tk. 210/10ml**Isotear**(Popular), Eye drops, Tk. 200/10 ml**Ocufresh**(square), Eye drops, Tk. 250/10 ml

CYCLOSPORINE

Indication: To increase tear production in patients whose tear production is presumed to be suppressed due to ocular inflammation associated with dry eye syndrome

Side-effects: Ocular burning, conjunctival hyperemia, discharge, epiphora, eye pain, foreign body sensation,

Dose: 0.05% twice a day

Proprietary Preparations**Cyporin**(Aristo), Eye drops, 0.05%, Tk. 210/5ml**Cyclorin**(Ibn Sina), Eye drops, 0.05%, Tk. 210/5 ml**Sporium** (Incepta), Eye drops, 0.05% , Tk. 210/5ml,;

HYDROXYPROPYL METHYL CELLULOSE

Proprietary Preparations**Lubric**(Incepta), Eye drops, 2%, Tk. 120/3ml**Ocugel**(Aristo), Eye drops, 2%, Tk. 120/3ml**Optagel**(Popular), Eye/Ear drops, 2%, Tk. 120.45/3 ml

HYPERTONIC SODIUM

5% NaCl ophthalmic preparation for decreasing corneal(epithelial) odema
1 drop 4-6 times a day

Proprietary Preparations**I-Sol**(Opso Saline), Eye drops, 5%, Tk. 70/10ml**NCL**(Aristo), Eye drops, 0.9%, Tk. 70/5 ml**Norsol**(Opso Saline), Eye drops, 0.9%, Tk. 25/25 ml**N-Sol**(Popular), Eye drops, 0.9%, Tk. 20/5 ml**Hypersol**(Beximco) Eye drops, 5% Tk. 70/10ml**Cordema**(Globe), Eye drops, 5% Tk. 70/10 ml

HYPROMELLOSE

Proprietary Preparations**Atier ED** (ACI), Eye drops, 0.30%, Tk. 70.00/10ml**Genagel**(General), Eye Gel, 0.30%, Tk. 250.00/10ml**Hypso**(Nipa), Eye drops, 0.50%, Tk. 80.00/5ml**Hypomer**(Aristo), Eye Gel, 0.30%, Tk. 250.00/10g**Hypersol**(Beximco), Eye drops, 0.30%, Tk. 70.00/10ml**Lubric**(Incepta), Eye drops, 2%, Tk. 140.00/10ml**Ocutear**(Asiatic), Eye drops, 0.30%, Tk. 65.00/10ml**Tearin**(Biopharma), Eye drops, 0.50%, Tk. 80/10ml**Tear**(GA. Co), Eye drops, 0.30%, Tk. 90.27/10ml**Viscogel**(General), Eye drops, 2%, Tk. 120.00/3ml**Dextran 70 1% + Hypromellose 0.3%.****Lubtear**(Square), Eye drops, Tk. 90.27/10ml**Lubric D**(Incepta), Eye drops, Tk. 90.00/10ml**Lacrima**(Opsonin), Eye drops, Tk. 70.00/10ml**Glamor**(Ibn Sina), Eye drops, Tk. 90.00/10ml**Syntar**(Drug Intl), Eye drops, Tk. 90.30/10ml**Hypromellose 0.360%, Polyethylene****Glycol 0.20%, +Glycerin 1%**

10. EYE

Co-fresh (*Ibn Sina*), Eye drops, Tk. 250.00/10ml
Glypeg (*Acme*), Eye drops, Tk. 250.00/10ml
Oculax (*ACI*), Eye drops, Tk. 250.00/10ml
Visitear (*Incepta*), Eye drops, Tk. 310.00/10ml
Visin (*Popular*), Eye drops, Tk. 250.00/10 ml

SODIUM HYALURONATE

Proprietary Preparations

Hyloron (*Aristo*), Eye drops, 0.2%, Tk. 270.00/10 ml; 0.1%, Tk. 220.00/10 ml
Optagel (*Popular*), Eye drop, 0.2%, Tk. 120.45/3ml vial
Hyronate (*Incepta*), Eye drop, 0.1%, Tk. 220.00/10 ml vial; 0.2%, Tk. 270.00/10 ml

PARAFFIN

White Soft Paraffin 57.30gm + Liquid Paraffin 42.50gm + Wool Alcohol 0.20gm/100gm

Proprietary Preparations

Parafresh (*Ibn Sina*), Eye Oint., Tk. 250/5gm
Night Fresh (*General*) Eye Oint., Tk. 250/5gm

POLYVINYL ALCOHOL

Proprietary Preparation

Liquifilm Tear[®] (*Allergen*), Eye drops, 1.4%, Tk. 173.46/15 ml

POLYETHYLENE GLYCOL 0.4% + PROPYLENE GLYCOL 0.3%,

Proprietary Preparations

Polygel (*Ibn Sina*), Eye drops, Tk. 150/10 ml
Polysol (*Apex*), Eye drops, Tk. 150/10 ml
Autotear (*Popular*), Eye drops, Tk. 150.57/10ml
Filtear (*Incepta*), Eye drops, Tk. 210.00/10ml
Freshtear (*Eskayef*), Eye drops, Tk. 200.00/10ml
Glytear (*General*), Eye drops, Tk. 200.00/10ml
I-Fort (*Biopharma*), Eye drops, Tk. 150.00/10ml
Oclube (*ACI*), Eye drops, Tk. 150.00/10ml
Oculant (*Square*), Eye drops, Tk. 150.45/10ml
Opcol (*Acme*), Eye drops, Tk. 150.44/10ml
Polypro (*Pacific*), Eye drops, Tk. 150.00/10ml
Polygel (*Ibn Sina*) Eye drops, Tk. 150.00/10ml
Syskem (*Kemiko*), Eye drops, Tk. 150.45/10ml
Systear (*Aristo*), Eye drops, Tk. 200.00/10ml
Tearon (*Beximco*), Eye drops, Tk. 175.00/10ml

POVIDONE IODINE

Proprietary Preparations

Povidone 5%,

Aquatear (*Biopharma*), Eye drops, Tk. 90.00/10ml
Artear (*Popular*), Eye drops, Tk. 90.00/5ml
Bludrop (*Healthcare*), Eye drops, Tk. 100.00/10 ml
Eyetear (*Drug Intl*), Eye drops, Tk. 80.00/10ml
Optear (*Ibn Sina*), Eye drops, Tk. 90.00/10ml
Povilect (*Kemiko*), Eye drops, Tk. 90.00/10ml
Povin (*Opsonin*), Eye drops, Tk. 100.00/5ml; Tk. 90.00/10ml
Protear (*Aristo*), Eye drops, Tk. 90.00/5ml
Rovidone (*ACI*), Eye drops, 5%, Tk. 90/10ml
Solotear (*Asiatic*), Eye drops, Tk. 90.00/10ml
Tearex (*Beximco*), Eye drops, Tk. 90.00/10ml
Teargen (*General*), Eye drops, Tk. 90.28/10ml

10.6.2 DIAGNOSTIC AND PERIOPERATIVE PREPARATIONS

DIAGNOSTIC

Stains are used in diagnostic procedures and for locating damaged areas of the cornea and conjunctiva due to diseases or injury. Fluorescein and rose bengal are water-soluble dyes that are taken up by hydrophilic or water-containing substances such as the tear film, damaged epithelial cells (healthy epithelial cells being hydrophobic) and corneal stroma. Both can be viewed directly, and the appropriate interpretation can be made of takeup of the yellow or red dye. Corneal abrasions, ulcers (particularly the branching dendritic ulcer of herpes simplex), and keratoconjunctivitis can be diagnosed with ease.

Fluorescein applied primarily as a 2% alkaline solution, and with impregnated paper strips, is used to examine the integrity of the conjunctival and corneal epithelia. Defects in the corneal epithelium will appear bright green in ordinary light & bright yellow when a cobalt blue filter is used in the light path. Similar lesion in conjunctiva appears bright orange-yellow in ordinary illumination.

Fluorescein is also used for checking fitness of rigid contact lens, though it cannot be used for soft lenses, which absorbs the dye.

In addition **Fluorescein** is used for performing applanation tonometry and

one test of lacrimal apparatus patency (Jones test).

Rose Bengal is much more efficient for the diagnosis of conjunctival epithelial damage but it stings excessively unless a local anaesthetic is instilled beforehand. Devitalized cells stain bright red, while normal cells shows no change.

As chances of growth of fungus inside the container of the dye is higher, it is unwise to use it for prolong period. It is best to use the dye impregnated paper strips.

Trypan Blue 0.06% is a selective tissue staining agent (dye) which stains anterior lens capsule of the human crystalline lens. The dye does not penetrate the capsule, permitting visualization of the anterior capsule in contrast to the non-stained lens cortex and inner lens material.

FLUORESCEIN SODIUM^[ED]

Proprietary Preparation

Fluorocin(Reman), Eye drop 2%, Tk.34/4ml

TRYPAN BLUE

Proprietary Preparation

Visi Blue (Incepta), 0.06%, Tk. 120.01/vial

OCULAR PERIOPERATIVE DRUGS

These are discussed in the heading of injections that are used intracamerally (inside the eye), irrigating solutions that is used both externally and intracamerally.

INTRACAMERAL INJECTIONS

It must be preservative free. The only established indication for this route is the administration of antibiotics in the treatment of endophthalmitis, only minute amounts of antibiotic are tolerated within the eye. Through this route xylocaine and miotics may be used.

Miotics

Acetylcholine chloride 1%

Pilocarpine nitrate 0.5% (see also sec 10.4.3)

Mydriatic

Adrenaline injection (1 in 1000) is diluted with 500ml BSS/ Ringer solution to make and maintain the pupil dilated during surgery. It is contraindicated in ischaemic heart disease.

Irrigating Solutions

Balanced salt solution (BSS): Most friendly irrigating solution for intracameral manoeuvre causing no untoward effect on corneal endothelium.

COMPOSITION: sodium chloride 0.64%, sodium acetate 0.39%, sodium citrate 0.17%, calcium chloride 0.048%, magnesium chloride 0.03%, potassium chloride 0.075%.

BSS plus solution has 3 additional constituents for corneal endothelium (sodium bicarbonate, dextrose, oxidized glutathione)

Ringer's solution though not comparable to BSS solution (composition in 1000ml: NaCl-8.6g, KCl-0.3g, and CaCl₂-0.33g) it can be used when BSS solution is not found and is not affordable by the patient.

Presentation: 15ml, 250ml, 500ml

Proprietary Preparations

Balanced salt solution :

Navsol(Beximco) , Tk. 250/500ml

Opso-Rinse(Opso Saline), Tk.35.13/100ml

VISCOELASTIC SUBSTANCES

Hydroxypropylmethylcellulose

(HPMC): Most widely used in our country as it cheap and plenty available.

It has good coating ability but less retentive capacity. It can be autoclaved.

Sodium hyaluronate 1%(Healon) (10mg/ml): It has very good retentive capability but meticulous removal before finishing surgery is strongly indicated otherwise chances of increased IOP is more. It is very costly which makes its use limited.

Proprietary Preparations

Hyalgun(Healthcare), Inj., (P.F syringe) 20

mg/2 ml, Tk. 1,980.00/ Syringe

Hyronate(Incepta), Inj., (P.F syringe) 20mg/2 ml, Tk.1,500.00/Syringe

OTHER PERIOPERATIVE PREPARATIONS

Apraclonidine 1% for prevention or control of postoperative of IOP.

10. EYE

NSAIDs: Used for maintenance of the mydriasis during surgery and for control of postoperative inflammation as stated in section 10.3

10.6.3 ANTIOXIDANT VITAMIN AND ANTI CATARACT PREPARATIONS

Indications: is indicated for age-related eye diseases. This is an antioxidant supplement formulated to provide nutritional support for the eye

Dose: One capsule, one or two times daily or as directed by the physician

Proprietary Preparations

Vitamin C 60mg, vitamin E 30mg, lutein 6mg, copper 2mg and zinc 15mg/capsule
Azocol(Incepta), Cap., Tk. 10.00/Cap
Eye-q(Nipa), Cap., Tk. 10.00/Cap.
Eyevi(Square), Cap., Tk. 10.00/Cap.
Optavit(Popular), Cap., Tk. 10.00/Cap
I-Gold(Aristopharma), Cap.Tk. 10.00/Cap.
Tioxil(ACI), Cap.Tk. 10.00/Cap

10.7 CONTACT LENSES

Contact lenses are increasingly gaining popularity in our country.

Indications: COSMETIC: Most people specially the young females use it for cosmetic reasons. They prefer it to the spectacles.

MEDICAL: There are also its therapeutic uses

Types in use:

1. Rigid (hard or gas permeable)
2. Soft (hydrogel) lens the most popular type.

Though rapidly gaining popularity its use might decline in the long run for the vision threatening complications resulting from:

1. Improper cleaning and disinfection of the contact lens
2. Improper use of contact lens like using for prolonged period of the day than prescribed, using while sleeping etc. The advent of Lasik Surgery for the correction of refractive errors will also result in the decline of the popularity of contact lens.

Complications include ulcerative keratitis (specially acanthamoeba keratitis resulting from ineffective lens cleaning and disinfection), conjunctival

problems (purulent or papillary conjunctivitis).

Note. It is the duty of the ophthalmologists (as there is great paucity of optometrist in Bangladesh) to make the user well aware of the complications and to instruct them to visit them for checking whether they are cleaning and disinfecting regularly.

Prescribing eye medications for contact lens users:

Some drugs and preservatives in eye preparations accumulate in the soft lens and may induce toxic reactions. Contact lens users are instructed to remove soft lens before instillation and advised not to wear them during the period of treatment. Ointments can not be used in conjunction of contact lens wear.

Adverse effects of some systemic drugs on contact lens:

1. Oral contraceptives (with high oestrogen content)
2. Those reduce blink rate: anxiolytics, hypnotics, antihistamines, muscle relaxants.
3. Those reduce tear production: antihistamines, antimuscarinics, phenothiazines, some beta-blockers, diuretics, and tricyclic antidepressants.
4. Those increase lacrimation: ephedrine, hydralazine
5. Others: aspirin (absorbed by contact lens leading to irritation), rifampicine and sulphasalazines (may discolor the lens).

Adenosine 0.2% + Cytochrome C 0.05% + Sodium Succinate 0.6% + Nicotinamide 1.0%

Indications: is used for the treatment of lens opacification.

Proprietary Preparations

Catnil(Acme), Eye drops, Tk. 125.37/5ml
Catrix(Incepta), Eye drops, Tk. 125.00/5ml
Cytonic(ACI), Eye drops, Tk. 120.36/5ml
Phacovit(Aristo), Eye drops, Tk. 125.00/5ml
Ractovit(Ibn Sina), Eye drops, Tk. 125.00/5ml
Vitafol(Popular), Eye drops, Tk. 125.00/5ml
Vitalens(General), Eye drops, Tk. 120.37/5ml

Chapter 11

EAR, NOSE AND THROAT

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11:1 EAR, NOSE AND THROAT

Otitis externa is the inflammation of ear canal. Furuncle is a localized otitis externa, which is a staphylococcal infection of the hair follicle. Patient usually presents with severe pain and tenderness in the ear. Treatment consists of systemic antibiotics, analgesics and local heat.

Diffuse otitis externa is commonly seen in hot and humid climate. It is characterized by burning sensation in the ear followed by pain which is aggravated by movements of jaw. Ear starts oozing thin serous discharge which later becomes thick and purulent. Common organisms responsible for otitis externa are *Staph. Aureus*, *Pseud. pyocyaneus*, *B. proteus* and *Esch. Coli*. But more often the infection is mixed. Aural toileting is the most important treatment. After thorough toileting a gauze wick soaked in antibiotic-steroid preparation is inserted in the ear canal and patient is advised to keep it moist by instilling the same drops twice or thrice daily then it can be substituted by ear drops. Broad-spectrum systemic antibiotics are used when there is cellulitis and acute lymphadenitis. Analgesics are used for relief of pain.

Otomycosis is a fungal infection of the ear canal caused by *Aspergillus niger*, or *Candida albicans*. It is seen in hot and humid climate of tropical and subtropical countries. The cardinal features of otomycosis include intense itching, pain, watery discharge with a musty odour, and ear blockage. **Nystatin** is effective against *Candida*. Other broad spectrum antifungals include **Clotrimazole** and **Betadine**. **2 salicylic acid** in alcohol is keratolytic. Antifungal treatment should be continued for a week even after apparent cure to avoid recurrence. Ear must be kept dry.

Otitis externa haemorrhagic is a viral infection characterized by formation of haemorrhagic blebs on the tympanic membrane and deep meatus causing severe pain in the ear and blood stained discharge when the blebs rupture. Treatment is directed to relief of pain with analgesics and antibiotics for infection. Another viral infection, **Herpeszoster oticus** is characterized by formation of vesicles on the tympanic membrane, meatal skin, concha and post-auricular groove. Treatment consists of intravenous **Acyclovir** as soon as possible.

Eczematous otitis externa is the result of hypersensitivity to infective organisms or

11. EAR, NOSE AND THROAT

topical ear drops such as **Chloromycetin** or **Neomycin**. Intense irritation, vesicle formation, oozing and crusting in the canal characterize it. Treatment is withdrawal of topical antibiotic causing sensitivity and application of steroid cream.

Seborrhoeic otitis externa is associated with seborrhoeic dermatitis of the scalp. Itching is the main complaint. Greasy yellow scales are seen in the external canal. Treatment consists of Aural toileting, application of cream containing salicylic acid and sulphur; and attention is to be given to the scalp.

Neurodermatitis is caused by compulsive scratching due to psychological factors. Main complaint is intense itching and may follow infection of raw area left by scratching. Antibiotics can be given. Ear pack and bandage to the ear are helpful to prevent compulsive scratching. Malignant or necrotising otitis externa is an inflammatory condition caused by *Pseudomonas* infection usually in the elderly, diabetics or in those on immunosuppressive drugs. Early manifestations are excruciating pain and appearance of granulations in the meatus. Treatment consists of high doses of intravenous antibiotics such as **Tobramycin**, **Ticarcillin** or third generation cephalosporins such as **Moxalactum**. Antibiotics are given for 6-8 weeks or longer. Diabetes should be controlled.

11.1.1 DRUGS USED IN OTITIS EXTERNA

CORTICOSTEROID PREPARATIONS

BETAMETHASONE SODIUM PHOSPHATE^[ED]

(see section 5.3)

Indications : Eczematous otitis externa.

Cautions : Prolonged use must be avoided

Contraindications : Should not be used in untreated infection

Side-effects : Local sensitivity reactions

Preparations : Drops for ear/eye/nose

Applications : Apply 2-3 drops every 8 hourly

Proprietary Preparations

Eyebet (*Incepta*), Eye/Ear/Nose drops, 0.1 %, Tk. 30/5 ml

Methasol (*Gaco*), Eye/Ear/Nose drops, 0.1 %, Tk. 31.80/5 ml

Betamethasone Sodium Phosphate with Neomycin Sulphate

Indications: Otitis externa and other infective and inflammatory ear conditions.

Contraindications: Perforated ear drum,

Application: apply 2 to 3 drops every 8 hourly

Betamethasone Sodium Phosphate 0.1% + Neomycin Sulphate 0.5%

Proprietary Preparations

Aristobet-N (*Aristo*), Eye/Ear/Nasal drops, Tk. 35.00/5 ml., oint Tk. 14.30/3gm

Betacin-N (*Ibn Sina*), Eye/ Ear /Nasal drops, Tk. 35.00/15 gm

Betason-N (*Reman*), Eye/Ear/Nasal drops Tk. Tk 32.44/5ml

Betricin-N (*Nipa*) ,Eye/ Ear /Nasal drops Tk. 35.00/5ml

Bn (*Asiatic*), Eye/Ear/Nasal drops, Tk. 32/5ml

Methasol-N (*Gaco*), Eye/ Ear /Nasal drops Tk. 35.00/5ml

Optison-N (*Opso Saline*), Eye/Ear/Nasal drops, Tk. 22.86/5 ml

DEXAMETHASONE^[ED]

(See also section 5.3)

Indications : Eczematous otitis externa

Cautions : Prolonged use must be avoided

Contraindications : Should not be used in untreated infection

Side-effects : Local sensitivity reactions may occur

Preparations : Ear drop / ointment

Application : Apply 3-4 times daily

Proprietary Preparations

Dexamethasone 0.1%

Acicot (*ACI*), Eye/Ear drops, Tk. 60/5 ml

Celudex (*Drug Int.*), Eye/Ear drops, . 60.20/5ml

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Dexacort (*Opso Saline*), Eye/Ear drops, Tk. 70.00/5 ml
Dexadron (*Reman*), Eye/Ear drops, Tk. 60.23/4ml
D-ONE (*Nipa*), Eye/Ear drops, Tk. 70.00/5ml
Dexonex (*Square*), Eye/Ear drops, Tk. 70.21/5ml
Gludex (*Kemiko*), Eye/Ear drops, Tk. 70.21/5ml
Orbidex (*Popular*), Eye/Ear drops, Tk. 70.5ml
Metadaxan (*Incepta*), Eye/Ear drops, Tk. 70.00/5ml

HYDROCORTISONE^[ED]

(See also Section 5.3)

Indications : Eczematous otitis externa

Cautions : Prolonged use must be avoided

Contraindications : untreated infection

Side-effects : Local sensitivity reactions

Preparations : Ear drops

Application : Apply 2-4 drops into the ear 3-4 times daily

Proprietary Preparations

Hydrocortisone 1% + Neomycine Sulphate+ 0.5% + Polymyxine B Sulphate 10,000 units;

NPH (*Reman*), Eye/ Ear drops, Tk 60.23/ 5ml
Otosporin (*GSK*), Eye/ Ear drops, Tk. 60.17/5ml
Polymix-H (*Opso Saline*), Eye/ Ear drops, Tk. 40/5 ml
Renamycin (*Renata*) Eye/ Ear oint, Tk. 17.49/5ml

Hydrocortisone 1%+ Gentamicin 0.3%.
Gentabac HC (*Popular*), Eye/Ear drops, Tk. 51.04/5 ml
Gisin-H (*Nipa*), Eye/Ear drops, Tk. Tk. 50.00/5ml
Recin HC (*Reman*), Eye/Ear drops, Tk. 50/10 ml
Gento-Hc (*G.A.Co*), Eye/Ear drops, Tk. 60.18/10 ml,;

TRIAMCINOLONE ACETONIDE

(See notes above and section 11.2)

ANTIMICROBIAL PREPARATIONS

CHLORAMPHENICOL^[ED]

(See also section 1.1. 12)

Indications : Bacterial otitis externa

Cautions : Avoid prolonged use

Side-effects : High incidence of sensitivity reactions

Preparations : Ear drops containing

Chloramphenicol 5%

Administration : Apply 2-3 drops into the ear 2-3 times daily

Proprietary Preparations

Conicol (*Opsonin*), Eye / Ear drops, 0.50%, Tk. 34.40/ 10 ml

I-guard (*Incepta*), Eye/Ear drops , 0.50%, Tk. 34.40/10ml

Icol (*ACI*), Eye / Ear Drops, 0.50%, Tk. 34.5/10ml

SQ-Mycetin (*Square*), Eye/Ear drops, 0.50%, Tk. 34.5/10ml

Supraphen (*G.A.Co*), Eye/Ear drops, 0.50%, Tk. 25.57/10 ml 0.50%, Tk. 16.10/10 ml

Ophthacol (*Drug Intl*), Eye / Ear drops, 0.50%, Tk. 30.10/10ml

Ramphen (*Kemiko*), Eye/Ear drops, 0.5%, Tk. 34.27/10 ml

Chloramphenicol 5%+ Lignocaine 1%

Chlorphen (*Nipa*), Ear drops, Tk. 20.23/10ml

Otophenicol (*Reman*), Ear drops, Tk. 25.00/10ml

Supraphen plus (*Gaco*), Ear drops, Tk. 20.00/10ml

CIPROFLOXACIN^[ED]

(See also section 1.1.5)

Indications: Otitis externa, acute otitis media, chronic suppurative otitis media, and prophylaxis during otic surgeries such as mastoid surgery.

Contraindications: Known hypersensitivity to ciprofloxacin.

Cautions: Prolonged use may result in overgrowth of non-susceptible organisms including fungi. The drug should be discontinued if the sign of hypersensitivity reaction.

Side-effects: See section 1.1.5

Application: Initially apply 2 to 3 drops every 06 hours; reducing the frequency of instillation gradually as infection is controlled.

Proprietary Preparations

Ciflox (*Reman*), Eye/Ear Drops 0.3%, Tk. 35.00/5 gm

Cip (*Asiatic*), Eye / Ear drops, 0.3%, Tk. 45.00 40.15/5 ml

Ciproxy (*Opso Saline*), Eye / Ear drops, 0.3%, Tk. 26.41/10 ml;

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Neofloxin (*Beximco*), Eye/Ear drops, 0.3%, Tk. 40.00/5ml,; /5 ml
Procin (*Kemiko*), Eye / Ear drops 0.3%, Tk. Tk. 50.14/10ml
Spectra (*Jayson*), Eye / Ear drops, 0.2%Tk. 40.00/5 ml
Beuflox (*Incepta*), Eye/Ear drops , 0.3%, Tk. 40.00/5ml,;
Ciprocin (*Square*), Eye/Ear drops, 0.3%, Tk. 40.27/5ml,;
Ciprox (*Opsonin*), Eye/Ear drops, 0.3%, Tk. 40.15/1ml,;
Ciprozid (*Drug Intl*), Eye/Ear drops, 0.3%, Tk. 40.15/10ml,;
Cip(*Asiatic*), Eye/Ear drops, 0.3%, Tk.45.00/10ml

Ciprofloxacin 0.3% +Dexamethasone 0.1%,
Aprodex (*Aristo*), Eye/Ear drops Tk. 75.00/5ml
Beuflox D (*Incepta*), Eye/Ear drops, Tk. 75.00/5ml
Cerodex (*G.A.Co*), Eye/Ear drops, 75.23/5 ml
Cip-D (*Asiatic*), Eye/Ear drops Tk. 75.00/5ml;
Ciprozid-DX (*Drug Intl*), Eye/Ear drops, Tk. 75.25/5ml
Civodex (*Popular*), Eye/Ear drops, Tk.75.28/5ml
Dexaflox (*General*), Eye/Ear drops, Tk. 75.22/5ml
Dexcilo (*Pacific*), Eye/Ear drops, Tk.75.00/5ml
Neofloxin D (*Beximco*), Eye /Ear drops, Tk. 75.00/5 ml
Opdex Nipa), Eye drops, Tk. 75.00/5ml
Procin D (*Kemiko*), Eye drops, Tk.75.22/5ml

Ciprofloxacin HCl 0.3%+ Hydrocortisone
Acetate 1%,
Bactin HC (*Ibn Sina*) Otic Susp. Tk. 90.00/10ml
Ciprocort (*Drug Intl*), Otic Susp. Tk. 90.30/10ml Tk.

CLOTRIMAZOLE^[ED]

(See also section 12.2.2)

Indications : Fungal infection in External Auditory Canal
Side-effects : occasional local irritation.
Preparations: Clotrimazole 1% in polyethylene glycol
Applications : Apply 2-3 times daily continuing for at least 14 days after disappearance of infections

Proprietary Preparations
 (See section 10.2.2)

CLIOQUINOLAND FLUMETASONE PIVALATE

Indications: This combination is indicated for the treatment of external ear inflammation and infections (otitis externa) and fungal infections of the outer ear (Otomycosis).

Side-effects : Burning sensation, itching, skin rashes may occur at the site of application.

Contraindications: Punctured eardrum, pre-existing tuberculosis of the skin, fungal or viral infections of the skin, hypersensitivity, do not use the ear drop in children under 2 years of age.

Applications : Apply 2 to 3 drops twice daily for the prescribed period of time (usually not longer than 10 days).

Proprietary Preparations

Clioquinol 1%+ Flumetasone Pivalate 0.02%
Clomet (*Incepta*), Ear Drops, Tk. 100.00/5ml
Flumetanol (*Aristo*), Ear Drops, Tk. 100.00/5ml

GENTAMICIN^[ED]

(See also section 1.1.3)

Indications : Bacterial otitis externa

Cautions : Avoid prolonged use

Side-effects : Local sensitivity; ototoxicity

Preparation : Ear drop

Application : Apply 2-4 drops 3-4 times daily

Proprietary Preparations

Gento (*Gaco*), Eye/Ear drops, 0.3%, Tk. 31.49/10 ml
Recin(*Reman*), Eye/Ear drops, 0.3%, Tk. 35/10ml
G-Gentamicin (*Gonoshasthaya*), Eye/Ear drops, 0.30% , Tk. 25.00/10 ml
Genacyn (*Square*), Eye/Ear drops, 0.30%, Tk. 32.02/10 ml
Asigen (*Asiatic*), Eye/Ear drops, 0.30%, Tk. 32.00/10ml
Genacyn (*Square*), Eye/Ear drops, 0.30%, Tk. 32.12/10ml,;
Gentabac (*Popular*), Ear drops, 0.30%, Tk. 32.03/10ml
Gisin (*Nipa*), Eye/Ear drops, 0.30%, Tk. 30.36/10ml

Gentamicin Sulphate 0.3%+ +Hydrocortisone Acetate1%.
Gento-HC (G.A.Co), Otic Susp., Tk. 60.18/10 ml;
Gentabac (Popular), Ear drops, Tk. 51.04/5 ml
Gisin -H (Nipa), Ear/Ear drops. Tk. 50.00/5ml

LOMEFLOXACIN

(See also section 1.1.5)

Indications: Otitis externa, acute otitis media, chronic suppurative otitis media, and prophylaxis during otic surgeries such as mastoid surgery.

Contraindications: Known hypersensitivity to Lomefloxacin

Side-effects: Photosensitivity

Application: Initially apply 2 to 3 drops every 06 hours; reducing the frequency of instillation gradually as infection is controlled.

Proprietary Preparations

Lomecin (Reman) Ear/Eye drop, 0.3%, Tk 60.00/5 ml

Lumex (Gaco) Ear/Eye drop, 0.3%, Tk 60/5 ml

OFLOXACIN

(See also section 1.1.5)

Indications: It is indicated for the treatment of external ear infections (otitis externa) and certain middle ear infections (otitis media)

Contraindications: Known hypersensitivity to ofloxacin or any other component of this preparation,

Side-effects: mild irritation or mild discomfort in the ear may occur. Symptoms of an allergic reaction include rash, itching, swelling or trouble breathing

Caution: Prolonged use of ear drops may result in overgrowth of non-susceptible organisms and secondary infection respectively.

Proprietary Preparations

Obactin (Ibn Sina), Eye/Ear drops, 0.3%, Tk. 85.00/5 ml

Vista (Aristo), Eye / Eardrops, 0.3%, Tk. 85/5ml

11.1.2 DRUGS USED IN OTITIS MEDIA

Otitis media is an inflammation of middle ear cleft. It is more common in infants and children especially of lower socio-economic group. Infection enters via eustachian tube. Most common organisms are *Strept. pneumoniae*, *H. influenzae*, *Strept. pyogens*, *Staph. aureus* and *Esch. coli*. Otitis media with effusion is a condition characterized by accumulation of non-purulent effusion in the middle ear. The effusion is thick and viscid but some times it may be thin and serous. The fluid is nearly always sterile. It is commonly seen in school going children. Antibacterial therapy is indicated in all cases of acute and chronic suppurative otitis media. The drugs which are effective in acute otitis media are **Penicillin**, **Amoxicillin**, **Cefaclor**, **Cotrimoxazole**, **Erythromycin**, **Cefuroxime Axetil** or **Cefixime**. Antibacterial therapy must be continued for minimum 10 days till tympanic membrane regains its normal appearance and hearing returns to normal. Nasal decongestant e.g. **Ephedrine**, **Oxymetazoline**, **Xylometazoline** should be used to relieve eustachian tube oedema and promote ventilation of middle ear. Analgesics and antipyretics such as **Paracetamol** or **Aspirin** help to relieve pain and temperature. If there is discharge in the ear, it is dry-mopped with sterile cotton buds and a wick moistened with antibiotic may be inserted. Dry local heat may help to relieve pain. Treatment of otitis media with effusion can be given by topical decongestant in the form of nasal drops, sprays or systemic decongestants. Antimicrobial prophylaxis can be given for those having recurrent otitis media associated with upper respiratory tract infection. In such cases, low dose long term antibiotic or sulphonamide can be instituted.

Chronic suppurative otitis media (CSOM) is a long standing infection of a part or whole of the middle ear cleft.

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Incidence of CSOM is higher in developing countries because of poor socio-economic condition, poor nutrition and lack of health education. It is the single most important cause of hearing impairment in rural population. CSOM show multiple organisms like *Ps. aeruginosa*, *B. proteus*, *E. coli*, *Staph. aureus* and some anaerobes include *Bacteroids*, *B. fragilis* and *Streptococci*. It is characterized by ear discharge, which is offensive or non offensive, mucoid, mucopurulent, purulent or blood stained and persistent or intermittent according to the type of safe or unsafe variety of CSOM. Aural toileting can be done by dry mopping with absorbent cotton buds, suction clearance under microscope. Antibiotic ear drops containing **Neomycin**, **Polymixin**, **Chloramphenicol** or **Gentamicin** are used. They are combined with steroids which have local anti-inflammatory effect (see also section 11.1.1). To use ear drops, patients to be lied down with the diseased ear up, antibiotic drops are instilled and then intermittent pressure to be applied on the tragus for antibiotic solution to reach the middle ear. This should be done 3-4 times a day. The patient should be instructed to avoid water entry into the ear during bathing, swimming and hair washing. Many attacks are viral in origin and need only simple analgesic such as **paracetamol** (See also section 7.5.2.1) for relief of pain. Severe bacterial infection should be treated with systemic antibiotics (See also section 1.1). Surgical treatment is the only option for unsafe variety of CSOM.

11.1.3 REMOVAL OF WAX

Treatment of wax consists of its removal by syringing or instrumental manipulation. Hard impacted wax may sometimes require prior softening with wax solvents. Syringing should be avoided in patients with a history of recurrent otitis externa, a perforated ear drum, or previous ear surgery. Wax may be removed by syringing with normal

saline at body temperature. Suction clearance under microscope is a better option. Some times, the wax is too hard and impacted to be removed by syringing or instrumentations. It should be softened by drops of **5% Sodium bicarbonate in equal parts of glycerine and water** instilled two or three times a day for several days. **Hydrogen peroxide, liquid paraffin or olive oil** may also achieve the same result. Commercial preparations containing ceruminolytic agents like para dichlorobenzine 2% can also be used and syringing can be tried again.

11.1.4 DRUG USED IN MEINERE'S DISEASE

BETAHISTINE

Indications: It is commonly prescribed to patients with balance disorders or to alleviate vertigo symptoms associated with Meniere's disease.

Side effects: Headache, insomnia, nausea

Contraindications: For people with pheochromocytoma, bronchial asthma and peptic ulcer

Doses : ADULTS : 1 to 2 tablets three times per day after meals.

Proprietary Preparations

Menaril (Incepta), Tab. , 8 mg, Tk. 2.00/Tab.; 16 mg, Tk. 4.00/Tab.

Merison (Square), Tab. , 6 mg, Tk. 2.01/Tab.

Tiniril (Opsonin), Tab. , 16 mg , Tk. 5.00/Tab. ; 8 mg , Tk. 2.01/Tab.

Vectra (Healthcare), Tab., 16 mg , Tk. 250.00/Tab.; 8 mg , Tk. 150.00/Tab.

Veserc (UniMed), Tab , 16 mg, Tk. 5.00/Tab.; 8 mg, Tk. 3.00/Tab.

11.2 DRUGS ACTING ON THE NOSE

11.2.1 DRUGS USED IN NASAL ALLERGY

It is an IgE-mediated immunologic response to nasal mucosa to air borne allergens and is characterized by watery nasal discharge, sneezing, nasal

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obstruction and itching in the nose. Allergens e.g. house mite, pillow or mattress with plastic sheet, particular foods to which the patient is found allergic, should be avoided. Drugs used in nasal allergy are antihistamines, they control rhinorrhoea, sneezing and pruritus. Dose and type of antihistamines have to be individualized. If one is not effective, another may be tried from a different class. Sympathomimetic drugs such as **Phenylephrine**, **Oxymetazoline** and **Xylometazoline** are often used to relieve nasal obstruction. Oral corticosteroids are very effective in controlling the symptoms of allergic rhinitis. Topical steroids such as **Beclomethasone Dipropionate**, **Budesonide** and **Flunisolide Acetate**, **Fluticasone**, **Mometasone**, **Dexamethasone** **Isonicotine** used as aerosols are very effective in controlling the symptoms. **Sodium cromoglycate** stabilises the mast cells. It is used as 2% solution for nasal drops or spray or as an aerosol powder. In addition to these following Anti histamine preparations are used in nasal allergy:

Chlorpheniramine, **Diphenhydramine**, **Hydroxyzine**, **Pheniramin**, **Promethazine**, **Triprolidine**, **Pseudoephedrine HCl**, **Desloratadine**, **Fexofenadine**, **Levocetirizine**, **Loratadine**, **Acrivastine** and **Cetirizina**
(See section 4.8.1)

ANTIHISTAMINES USED FOR NASAL ALLERGY

(See section 4.8.1)

CORTICOSTEROID PREPARATIONS USED FOR NASAL ALLERGY

(See also section 4.2)

BECLOMETHASONE DIPROPIONATE

Indications : Prophylaxis and treatment of allergic and vasomotor rhinitis

Cautions : Should be avoided in untreated nasal infection and after nasal surgery till complete healing. It should

also be avoided in pulmonary tuberculosis

Side-effects : Dryness, irritation of nose and throat and epistaxis, raised intra-ocular pressure. Smell and taste disturbances may occur

Dose : 50-100 micrograms (1-2 sprays) into each nostril twice daily in ADULT and CHILD over 6 years

Proprietary Preparations

Beclomet (*Acme*), Nasal Spray, 100 mcg/Actuation, Tk. 120.37/200spray

Beconase (*G.S.K.*), Nasal Spray, 50 mcg/Spray, Tk. Tk. 236.25/100 ml Spray

Becospray (*Square*), Nasal Spray, 50 mcg / spray, Tk. 130/200 Spray

Decomit (*Beximco*), Nasal Spray, 50 mcg/Spray, Tk. 146.00/200 Spray

BUDESONIDE

Indications : Prophylaxis and treatment of allergic and vasomotor rhinitis; nasal polyps

Cautions : See under *Beclomethasone Dipropionate*

Side-effects: See under

Beclomethasone Dipropionate

Dose: ADUL and CHILD over 12 years 200 micrograms (2 spray) into each nostril daily in the morning or 100 microgram (1 spray) into each nostril twice daily.

Proprietary Preparations

Budicort (*Incepta*), Nasal Spray, 100mcg/Spray, Tk. 250.00/120 Spary

Budenide (*ACI*), Nasal Spray, 100mcg/Spray, Tk. 250.75/120 Spary

Pulmicort (*Opsonin*), Nasal Spray, 100mcg/Spray, Tk. 250.00/120 Spary

Rhinocort (*Drug Intl*), Nasal Spray, 100mcg/Spray, Tk. 250.00/120 Spary

CICLESONIDE

Indications: For the treatment of the symptoms of seasonal allergic rhinitis in patients aged 6 years and older and perennial allergic rhinitis in patients aged 12 years and older.

Side-effects & Contraindications : see section 4.2under *Ciclesonide*

Dose: spray (50 micrograms/spray) in each nostril once a day. The maximum

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total daily dosage should not exceed 2 sprays in each nostril

Proprietary Preparations

Cicloson, (*Incepta*), Nasal Spray, 500 microgram/ml, Tk. 350.00/120 dose
Ciclex Nasal, (*Opsonin*), Nasal Spray, 500 microgram/ml, Tk. 250.75/120 dose

FLUTICASONE PROPIONATE

Indications : Prophylaxis and treatment of allergic rhinitis

Cautions : See under *Beclomethasone Dipropionate*

Side-effects : See under *Beclomethasone Dipropionate*

Dose: ADULT and CHILD over 12 years, 100 micrograms in to each nostril once daily, increased to twice daily if required; maximum total 400 microgram daily. CHILD up to 4-11 years, 50 microgram into each nostril once daily, increased to twice daily if required; maximum total 200 microgram daily

Proprietary Preparations

Flixonase (*GSK*), Aqueous (Intra-Nasal) Spray, 50 microgram/ Spray, Tk. 293.48/120 Spray
Flonaspray (*Square*), Nasal Spray, 50 microgram/spray, Tk. 251.5/120 Spray
Fluticon (*Acme*), Nasal Spray, 50 microgram/ Spray Tk. 250.76/120ml;
Fluvent (*ACI*), Nasal Spray, 50microgram/spray, Tk. 250.75/120 Spray
Lutisone (*Incepta*), Nasal Spray, 50 microgram/Spray, Tk. 250.00/120 Spray
Perinase (*Beximco*), Nasal Spray, 50microgram, Tk. 250.00/120 Spray

Fluticasone furoate

Avamys[®] (*GSK*), Aqueous (Intra-Nasal) Spray, 27.5 mcg/Spray, Tk. 386.00/120 spray
Avaspray (*Square*), Nasal Spray, 27.5 mcg/spray, Tk. 275/120 spray
Flutica, (*Aristo*), Nasal Spray, 27.50mcg, Tk. 250.00/120 spray
Neotison (*Incepta*), Nasal Spray, 27.5 mcg/spray, Tk. 250.00/120 spray

Azelastine Hydrochloride
137microgram+ Fluticasone
Propionate50microgram

Indication: For the relief of symptoms of seasonal allergic rhinitis in patients 6 years of age and older.

Doses & Administration:

The recommended dose is one spray each nostril twice daily.

Proprietary Preparations

Flonasin (*Square*), Nasal Spray, Tk. 320/120 Spray
Zeltas Nasal (*Opsonin*), Nasal Spray, Tk. 320/120 Spray

MOMETASONE FUROATE

Indications : Prophylaxis and treatment of allergic rhinitis

Cautions : See under *Beclomethasone*

Side-effects : See under *Beclomethasone*

Dose : ADULT and CHILD over 12 years 100 micrograms in to each nostril once daily, increased to twice daily if required; maximum total 200 microgram daily. When control achieved reduce to 50 micrograms. CHILD upto 6-11 years, 50 microgram in to each nostril once daily.

Proprietary Preparations

Meloderm (*ACI*), Nasal Spray, 50 mcg/spray, Tk. 250.75/100Spray
Metaspray (*Square*), Nasal Spray, 50 mcg/spray, Tk. 251.5/120Spray
Momeson (*Incepta*), Nasal Spray, 50 mcg/spray, Tk. 250.00/120 spray
M-Son (*Drug Intl*), Nasal Spray, 50mcg/Spray, Tk. 250.00/120spray
Nasomet (*Beximco*), Nasal Spray, 50mcg/spray, Tk. 250.00/spray
Nasonex (*Opsonin*), Nasal Spray, 50 mcg/Actuation, Tk. 250.00/120spray

TRIAMCINOLONE ACETONIDE

Indications: Prophylaxis and treatment of allergic rhinitis

Cautions: See notes above

Side-effects: See notes above

Dose: For ADULT apply 110 micrograms (2 spray) in to each nostril once daily; CHILD upto 6-12 years half of the adult dose.

Proprietary Preparations

Cenolon (*Incepta*), Nasal Spray, 550 mcg/ml, Tk. 200.00/120 Spray
Cortefin (*ACI*), Nasal Spray, 55 mcg/ml, Tk. 200.60/120 spray
T-cort (*Opsonin*), Nasal Spray, 550 mcg/ml, Tk. 200.00/120 spray
Trispray (*Square*), Nasal Spray, 550 mcg/ml, Tk. 201120 metered dose

MAST CELL STABILIZERS FOR NASAL ALLERGY

OLOPATADINE

Indications: Seasonal allergic rhinitis
Side-effects: Epistaxis, nasal ulceration, and nasal septal perforation
Dose : ADULT: two sprays per nostril twice daily. CHILD over 6 years of age one spray per nostril twice daily.

Proprietary Preparations

Alercon (*Acme*), Nasal Spray, 0.6%, Tk. 400.00/120 doses;
Lopadine (*Incepta*), Nasal Spray, 0.6%, Tk. 400.00/120 doses
Olopan (*Beximco*), Nasal Spray, 0.6%, Tk. 400.00/120 doses.

SODIUM CROMOGLYATE

Indications: Prophylaxis for allergic rhinitis
Side-effects: Local irritation
Dose : 4% aqueous nasal spray ADULT and CHILD, apply 1 puff into each nostril 2-4 times daily

Proprietary Preparations

G-Cromo (*Gonoshasthaya*), Eye /Nasal drops, 2%, Tk. 50.00/10 ml
Nacromin (*Square*), Nasal drops, 2%, Tk. 66.45/15 ml
Opsocrom (*Opso Saline*), Eye / Nasal drops, 2%, Tk. 48.87/10 ml
Aristocrom (*Aristo*), Eye/Nasal drops 2%, Tk. 65.00/5ml
Itchin (*G.A.Co*), Eye/Nasal drops, 2%, Tk. 65.00/10 ml; 4%, Tk. 75.23/10 ml
Mastguard (*Incepta*), Eye/Nasal drops, 2%, Tk. 100.00/10ml
Nasochrom (*Drug Intl*), Eye/Nasal drops 2%, Tk. 60.20/10ml
Socolate (*Pacific*), Eye/Nasal drops 2%, Tk. 65.00/10ml

11.2.2 TOPICAL NASAL DECONGESTANTS

Atmospheric temperature and humidity may cause nasal congestion because nasal mucosa is sensitive to it. The nasal sinuses produce huge amount of mucus in a day and most of it passes into the stomach through the nasopharynx. **0.9% Sodium chloride solution** given as nasal drops may relieve nasal congestion by liquefying mucus secretions. Decongestant nasal drops contain sympathomimetic drugs relieve symptoms of nasal congestion associated with vasomotor rhinitis and common cold. Use of these drugs must be for short term, usually not longer than 7 days. These drugs exert their effect by vasoconstriction of the mucosal blood vessels, which in turn reduces oedema of the nasal mucosa. These drugs are of limited value because they can give rise to rebound congestion on withdrawal, which is due to a secondary vasodilatation with a subsequent temporary increase in nasal congestion. This in turn makes habits for further use of the decongestant and that leads to a vicious cycle of events. **An ephedrine nasal drop**, the sympathomimetic preparation can be used as nasal decongestant. It can give relief of nasal congestion for several hours. **Oxymetazoline** and **Xylometazoline** are more potent sympathomimetic nasal decongestant but are more likely to cause a rebound effect. All of these preparations should not be used concomitantly with mono amino-oxidase inhibitor because it may cause hypertensive crisis. **Ipratropium bromide** responds well to the treatment of non-allergic watery rhinorrhoea. Inhalation of warm moist air, compounds containing volatile substances such as **menthol** and **eucalyptus** are also useful.

EPHEDRINE HYDROCHLORIDE

Indications : Nasal congestion

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Caution : Excessive or prolonged use must be avoided. It should not be used for infants under 3 months. If irritation occurs it may cause narrowing of nasal passage

Side-effects: Local irritation, tolerance may develop after excessive use; Rebound congestion is another important side-effect

Administration: Instill 4-5 drops in to each nostril up to 3-4 times daily

Proprietary Preparation

Remadrin (Reman), Nasal drops, 0.5%, Tk. 45.52/10ml

IPRATROPIUM BROMIDE

Indications : Rhinorrhoea associated with allergic and non allergic rhinitis

Cautions : Glaucoma, prostatic hypertrophy, pregnancy

Contraindication: Avoid spraying near eyes

Side-effects: Nasal dryness and epistaxis

Administration : Apply 2 puffs into each nostril 2-3 times daily, CHILD under 12 years not recommended

Proprietary Preparation

Rinase (ACI), Nasal Spray, 20mcg/spray, Tk. 150.45/120 Spray;

Rynaspray(Square) Nasal Spray, 20mcg/spray, Tk. 149.21/120 Spray;

OXYMETAZOLINE HYDROCHLORIDE

Indications: Nasal congestion

Cautions: See under *ephedrine hydrochloride*

Side-effects: See under *ephedrine hydrochloride*

Administration: See under *xylometazoline hydrochloride*

Proprietary Preparations

Afrin (Aristo), Nasal drops, 0.05%, Tk. 45.00/10ml, 0.025%, Tk. 40.00/10ml

Azolin (Acme), Nasal drops 0.025%, Tk. 40.12/10ml, 0.05%, Tk. 45.13/10ml

Confree (Asiatic), Nasal drops, 0.025%, Tk. 40.00/10ml; 0.05%, Tk. 45.00/10ml

G-con(Kemiko), Nasal drops, 0.025%, Tk. 40.12/10ml, 0.05%, Tk. 45.14/10ml

Nasalox (General), Nasal drops 0.05%, Tk. 45.13/10ml

Natazol (Ibn Sina), Nasal drops, 0.05%, Tk. 45.00/10ml; 0.025%, Tk. 40.00/10ml

Nazolin (Beximco), Nasal drops, 0.025%, Tk. 130.00/10 ml

Oxydex (Opsonin), Nasal drops, 0.025%, Tk. 40.00/10 ml; 0.05%, Tk. 45.00/10 ml;

0.05%, Nasal spray. Tk. 80.00/200 MD

Rynex (Incepta), Nasal drops, 0.025%, Tk. 40.00/10ml; 0.025%, Tk. 45.00/10ml; 0.05%,

Nasal spray. Tk. 80.00/200 MD

Xylocon (Square), Nasal drops, 0.03%, Tk. 40.13/10ml; 0.05%, Tk. 45.13/10ml

XYLOMETAZOLINE HYDROCHLORIDE

Indications: Nasal congestion.

Cautions: See under *ephedrine hydrochloride*

Contraindication: CHILD under 3 months

Side-effects: See under *ephedrine hydrochloride*

Administration: ADULT: Instill 4-5 drops of 0.1% in to each nostril 2-3 times daily when required. Maximum duration 7 days

CHILD: Over 3 months instill 2-3 drops of 0.05% in to each nostril 2-3 times daily when required. Maximum duration 7 days.

Proprietary Preparations

Antazol (Square), Nasal drops,, 0.05%, Tk. 11.04/15ml; 0.10%, Tk. 11.55/15ml

Novin (G.A.Co), Nasal drops, 0.05%, Tk. 6.91/10 ml; 0.1%, Tk. 7.53/10 ml

G-Xylometazoline (Gonosshasthaya), Nasal drops, 0.1%, Tk. 11.25/15 ml

11.51/15 ml

Xylomet (Opsonin), Nasal drops,, 0.1%, Tk. 11.96/10 ml

Xylovin (Opso Saline), Nasal drops, 0.1%, Tk. 5.47/10 ml; 0.05%, Tk. 5.47/10 ml

Sodium Cromoglycate 2.6mg + Xylometazoline HCl 0.0325mg/spray

Antazol plus (Square), Nasal Spray, Tk. 110.5/120 Spray

XylometPlus (Opsonin), Nasal Spray, Tk. 110.00/120 Spray

11.2.3 NASAL PREPARATIONS FOR THE INFECTION AND EPISTAXIS

Infection of the nasal skin (**cellulitis**) is usually invaded by *Streptococci* or *Staphylococci* leads to a red, swollen and tender nose. Infection can be treated with antibiotics, hot compression and analgesics. An acute infection of the hair follicle by the *Staphylococcus aureus* is called furuncle or boil. The lesion is small but extremely painful and tender. The furuncle may rupture spontaneously in the nasal vestibule. Treatment consists of warm compression, an analgesic to relieve pain, and topical and systemic antibiotics directed against *staphylococcus*.

Vestibulitis is diffuse dermatitis of nasal vestibule. Causative organism is *Staph. aureus*. Treatment consists of cleaning the nasal vestibule of all crusts and scales with cotton applicator soaked in **Hydrogen peroxide** and application of antibiotic steroid ointment. Treatment should always be continued for a few more days even after the apparent cure, as the condition is likely to relapse.

Septal abscess mostly results from secondary infection of septal haematoma. Systemic antibiotic should be started and continued at least for 10 days.

Acute rhinitis can be viral, bacterial or irritant type. Viral rhinitis is known as common cold (coryza). The infection is usually acquired through air borne droplets. Several viruses such as adenovirus, rhinovirus, coxsackie virus are responsible. There is burning sensation at the back of the nose soon followed by nasal stuffiness, rhinorrhoea and sneezing. Patient feels chilly and there is low-grade fever. Initially nasal discharge is watery and profuse but may become mucopurulent due to secondary bacterial invasion. Secondary invaders include *Strep. haemolyticus*, *Pneumococcus*, *Staphylococcus*, *H. influenzae*, *Kleb. pneumoniae* and *M. catarrhalis*. Treatment consists of bed

rest, which is essential to cut down the course of illness. Plenty of fluids are encouraged. Symptoms can be easily controlled with antihistamines and nasal decongestants. Analgesics are useful to relieve headache, fever and myalgia. Antibiotics are only required when secondary infection supervenes.

Bacterial rhinitis may be primary which is seen in children and is usually the result of infection with *Pneumococcus*, *Streptococcus* or *Staphylococcus*. A grayish white tenacious membrane may form in the nose. Secondary bacterial rhinitis is the result of bacterial infection supervening acute viral rhinitis.

Irritant rhinitis is the form of acute rhinitis, caused by exposure to dust, smoke or irritating gases such as ammonia, formalin, acid fumes etc. Treatment includes particular attention to sinuses, tonsils, adenoids, allergy, and smoky or dusty surroundings. Nasal irrigation with alkaline solution help to keep the nose free from viscid secretions and also remove superficial infection. Nasal decongestants help to relieve nasal obstruction and improve sinus ventilation. Antibiotics help to clear nasal infection and concomitant sinusitis.

Nasal polyps are non-neoplastic masses of oedematous nasal or sinus mucosa. Nasal stuffiness leading to total nasal obstruction, partial or total loss of smell, headache due to associated sinusitis, sneezing and watery nasal discharge due to associated allergy, Polyp protruding from the nostril may be the presenting symptom. Conservative treatment may include antihistamines and control of allergy. A short course of steroid nasal drop or spray is often helpful to produce significant shrinkage in the early stages of polyp. The reduction of the oedema can be maintained by the continuing treatment with the same spray. If the condition does not respond to medical therapy, endoscopic clearance of the polyp should be carried out immediately.

Acute inflammation of the sinus mucosa is called acute sinusitis. Most common cause of acute sinusitis is viral rhinitis

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followed by bacterial invasion. Sinus mucosa is the continuation of nasal mucosa and infections from nose can travel directly. Infected water can enter the sinuses through their ostia during swimming and diving. Trauma may permit direct infection of sinus mucosa. Infection from the molar or premolar teeth or their extraction may be followed by acute sinusitis. Sinusitis is common in cold and wet climate. Atmospheric pollution, smoke, dust and overcrowding also predispose to sinus infection. The bacteria most frequently responsible for acute suppurative sinusitis are *Strep. pneumoniae*, *H. Influenzae*, *Moxacella catarrhalis*, *Strep. pyogenes*, *Staph. aureus* and *Kleb. pneumoniae*. Anaerobic organisms and mixed infections are seen in sinusitis of dental origin. Constitutional symptoms and signs consist of fever, headache, pain, tenderness, redness and oedema of chick and nasal discharge. Conservative treatment includes antimicrobial drugs such as **Ampicillin**, **Amoxycillin**, **Erythromycin**, **Doxycycline** or **Cotrimoxazole**, **Sparfloxacin** etc. Nasal decongestant drops such as **1% Ephedrine** or **0.1% Xylo-** or **Oxymetazoline** are used as nasal drops or sprays. Steam inhalation with steam alone or medicated with **Menthol** or **Tincture benzoin** provides symptomatic relief and encourages sinus drainage. **Paracetamol** can be given for the relief of pain and headache. Local heat to the affected sinus is often soothing and helps in the resolution of inflammation. Most cases of acute maxillary sinusitis respond to medical treatment. Surgical treatment is done only when medical treatment fails.

Bleeding from inside the nose is called epistaxis. It is fairly common and is seen in all age groups and often presents as an emergency. It is the sign and not a disease so attempt should be made to find out any local or constitutional cause. Causes are trauma, infections, foreign bodies, neoplasm of nose, atmospheric changes such as high altitude, hypertension, arteriosclerosis, mitral

stenosis, aplastic anemia, leukemia, purpura, hemophilia, scurvy, vitamin K deficiency etc. Most of the times, bleeding occurs from the Little's area and can be easily controlled by pinching the nose with thumb and index finger for about 10 minutes. This compresses the vessels of the Little's area. If the bleeding is profuse or site of bleeding is difficult to localize then packing should be done. For this, use ribbon gauze soaked with liquid paraffin. One or both cavities may need to be packed. Pack can be removed after 24 hours if bleeding has stopped. Some times it has to be kept for 2-3 days. Systemic antibiotics should be given to prevent sinus infection (see section 1.1).

Bismuth idoform paraffin paste (BIPP) pack is used for packing cavities after surgery and epistaxis as mild disinfectant and astringent.

AMOXYCILLIN

(See section 1.1.1.3)

AMPICILLIN

(See section 1.1.1.3)

PHENOXYMETHYL PENICILLIN

(See section 1.1.1.2)

PREPARATIONS FOR NON-INFECTED INFLAMMATORY NASAL CONDITIONS

BETAMETHASONE SODIUM PHOSPHATE

Indications : Non-infected inflammatory conditions of the nose

Cautions : Should be avoided in the presence of untreated nasal infection and also after nasal surgery. Should also be avoided in pulmonary tuberculosis

Side-effects : Dryness and irritation of the nose

Preparation : Drops (for nose, eye, ear)
Betamethasone sodium phosphate 1%

Application : 2-3 drops into each nostril
2-3 times daily

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Proprietary Preparations

(See section 11.1.1)

PREPARATION FOR NASAL INFECTION & EPISTAXIS

BETAMETHASONE SODIUM PHOSPHATE & NEOMYCIN SULPHATE

Indications: Nasal infection and epistaxis

Application: Apply 2-3 drops in to nostril 2-3 times daily

Proprietary Preparations

See section 11.1.1

11.3 DRUGS ACTING ON THE OROPHARYNX

11.3.1 DRUGS FOR ORAL ULCERATION AND INFLAMMATION

The causes of ulcers of the oral cavity are trauma, (physical, chemical or thermal). Infection, (viral, bacterial, fungal), immune disorders, (aphthous ulcer), neoplasm, skin disorders, blood disorders, nutritional deficiencies, gastrointestinal diseases and drug therapy. First of all diagnosis must be made because majority of these conditions require specific treatment along with the local treatment. Mouth ulcer for more than 3 weeks duration need urgent diagnosis and treatment to exclude carcinoma. Aim of local treatment is to give protection to the ulcerated area, relieving pain and reducing inflammation. A saline or compound **Thymol glycerin** mouthwash may relieve pain. Antiseptic mouthwashes such as **Chlorhexidine** or **Povidone iodine** mouth wash is beneficial for healing of recurrent aphthous ulcer. Topical **Corticosteroid** therapy may be useful for some form of oral ulceration. It is most effective in the treatment of aphthous ulcer, thrush or other types of candidiasis. **Amelexanox**

paste is also used in the treatment of aphthous ulcer.

Systemic **Corticosteroid** must be reserved for severe conditions such as pemphigus vulgaris. To relieve pain **lidocaine (lignocaine) 5% ointment or lozenges** are applied to the ulcer, but care must be taken not to use this before meals as this might lead to choking. **Carbenoxolone** gel or mouthwash may be of some value. **Carmellose gelatin** paste may relieve some discomfort arising from ulceration by protecting the ulcer site. For mild oral and perioral lesion **salicylates** may be used.

Benzydamine mouth wash or spray may be useful in palliating the discomfort associated with a variety of ulcerative condition. It has also been found to be effective in reducing the discomfort of post irradiation mucositis.

11.3.2 OROPHARYNGEAL ANTI INFECTION DRUGS

Viral infection is most common. These are herpes simplex. Herpangina is a coxsackie viral infection mostly affecting children. They usually persist for about a week. Herpetic gingival stomatitis is also known as orolabial herpes, is caused by herpes simplex virus. It may be primary and secondary. Primary infection affects children and secondary or recurrent herpes mainly affects adults. Most commonly it involves the vermilion border of the lip which is known as herpes labialis. Treatment is mostly symptomatic. **Acyclovir**, 200 mg, five times a day for 5 days helps to cut down the course of recurrent herpes labialis. Acute ulcerative gingivitis is also called Vincent's infection caused by *Borrelia vincenti*. Treatment is systemic antibiotics (**Penicillin** see section 1.1.1 or **Erythromycin** see section 1.1.4 and **Metronidazole** (see section 1.1.8). Frequent mouth washes (with sodium **Bicarbonate** solution) and attention are to be given to dental hygiene. Moniliasis (*Candidiasis*) is caused by *C. albicans*, and occur in the form of thrush

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and chronic hypertrophic candidiasis. The condition is seen in infants and children. Adults are also affected when they are suffering from malignancy and diabetes or taking broad-spectrum antibiotics, cytotoxic drugs, steroid or radiation. Thrush can be treated by topical application of **Nystatin** or **Clotrimazole**. Hypertrophic form usually requires excision surgery. Acute pharyngitis is also very common. Streptococcal pharyngitis is treated with **Penicillin**.

Diphtheria is to be treated with diphtheria antitoxin and **Penicillin** or **Erythromycin**.

Gonococcal pharyngitis responds to conventional doses of **Penicillin** or **Tetracycline**.

Fungal pharyngitis of the oropharynx can occur as an extension of oral thrush; **Nystatin** is the drug of choice.

Aphthous ulcer is an autoimmune process that may be caused by nutritional deficiency (**Vitamin B₁₂**, **Folic acid** and **Iron**), viral infection, hormonal changes or stress. Treatment consists of topical application of **Steroids** and cauterization with 10% **Silver nitrate**. In severe cases 250 mg of **Tetracycline** dissolved in 50 ml of water is given as mouth rinse and then to be swallowed, four times a day. Local pain can be relieved with **lignocaine** viscous.

Oral mucosal lesions (erythema multiforme) consist of vesicles or bullae which may involve lips, buccal mucosa and tongue. The disease is self-limiting and management is mainly supportive. Steroid preparations are used to treat the severe cases.

Proprietary Preparations

Erythromycin (See Section 1.1.5)

Nystatin (See Section 1.2.1)

Penicillin (See Section 1.1.1)

Tetracycline (See Section 1.1.6)

ACYCLOVIR^[ED]

(See section 1.4.)

Indications: Herpes simplex and varicella-zoster

Cautions: Renal impairment, pregnancy, breast-feeding; adequate hydration must be maintained with infusion

Side-effects: Rashes, gastrointestinal disturbances, increased bilirubin and liver enzymes, increases blood urea and creatinine

Dose: Tab. 200 mg 5 times daily for 5 days. Child under 2 years, half of adult dose. For streptococcal infections, required systemic penicillin

Proprietary Preparations

(See Section 1.4.)

PENICILLIN

(See section 1.4.)

Indications: Acute ulcerative gingivitis (Vincent's infection) responds to systemic metronidazole (see section 1.1.8)

DRUGS USED IN OROPHARYNGEAL ULCERS

(See also Dental Practitioner's Formulary)

FOR APHTHOUS ULCER

AMLEXANOX

Indications: Aphthous ulcers in people with normal immune systems.

Proprietary Preparations

Amlexanox 5%.

Apsol(Square), Oral Paste, Tk. 75.50/5gm

Amlex (ACI), Oral Paste, TK. 75.23/5gm

Sorex (Eskayef), Oral Paste, Tk. 75.00/5gm

(See also Dental Practitioner's Formulary)

FOR FUNGAL INFECTION

Amphotericin (see section 1.2), **Nystatin** (see section 1.2.2&1.2.3)

MICONAZOLE GEL^[ED]

See section 12.2.2

Indications: Oropharyngeal candidiasis.

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Dose: 5-10 ml after food 4 times a day. Retain near oral lesions before swallowing. Continue treatment until 48 hours until lesions have healed.

Proprietary Preparations

Miconazole oral gel 2%

A-Migel(Acme), Oral Gel, Tk. 52.16/15gm

Candoral (Beximco), Oral Gel, Tk.52.00/15gm

Dakrin (General), Oral Gel, 2%, Tk. 60.18/15gm

Fungidal (Square), Buccal Tab. , 10 mg, Tk. 5.03/Tab. ;

Gelora (Square), Oral Gel, Tk. 60.18/15gm

Mic (Globe), Cream, Tk. 35.00/10 gm

Micoral (ACI), Oral gel, Tk. 100.30/30gm ,Tk. 60.18/15gm

Mycon (Aristo), Oral Gel ,Tk. 60.00/15gm

Mycosina (Ibn Sina), Oral Gel, Tk. 60.00/15gm

Oragel (UniMed), Oral gel, Tk. 50.00/15gm

Ormico (Pacific), Oral GelTk. 60.00/15gm

Orocare (Novo Healthcare), Oral Gel, Tk. 50.00/15gm

Oroconazol (Incepta), Oral Gel, Tk.

50.00/15gm

Orogurd (Eskayef), Oral Gel, Tk. 60.00/15gm

11.3.3 MOUTHWASH AND GARGLES

Mouthwash freshens the mouth and it has got a mechanical cleansing action. **Sodium chloride** and **Thymol Glycerins** are also very useful mouthwash. **Hydrogen peroxide** is an oxidizing agent and is very much useful in the treatment of acute ulcerative gingivitis (Vincent's infection). Since the organisms involved in these cases are anaerobes, mouthwashes containing **Hydrogen peroxide** are useful. It produces a mechanical cleansing action due to frothing when it comes in contact with oral debris. A **Chlorhexidine** mouthwash may be used for oral infection or when tooth brushing is not possible. **Chlorhexidine** has a specific effect for inhibition of the formation of plaques on teeth. For mucosal infection povidone iodine mouthwash may be used. As significant amount of iodine may absorb so it should not be used for not more than 14 days. Thymol mouthwash to be used as mouth wash.

CHLORHEXIDINE GLUCONATE^[ED]

Indications: Oral hygiene and plaque inhibition

Caution: If desquamation occurs then it must be discontinued

Side-effects: Mucosal irritation. Reversible brown staining of teeth and parotid gland swelling may occur

Dose: Rinse mouth with 10 ml, for about 1 minute twice daily.

Preparations: Chlorhexidine gluconate 0.2% mouth wash

Proprietary Preparations

Chlorhexidine gluconate 0.2%

ORAL-C(Unimed), Mouthwash, Tk. 75/125 ml

Fresh Breath (Greenland), Mouth wash, Tk. 40.00/100ml

Oralon (ACI), Mouth Wash, Tk. 60.00/100ml

POVIDONE IODINE^[ED]

Indication : Oral hygiene

Cautions : Pregnancy and breast-feeding

Contraindications : Patients with thyroid disorders or those receiving lithium therapy

Side-effects: Idiosyncratic mucosal irritation and hypersensitivity reactions. It may interfere with thyroid function tests and with tests for occult blood

Proprietary Preparations

Povidone Iodine 1%

Arocin (Aristo), Gargle & Mouthwash , Tk. 35.00/100 ml; Tk. 35.00/100ml;

Betadine (Mundipharma), Gargle & Mouthwash, Tk. 60.00/50 ml; Tk. 95/100 ml

Cleanser(General), Gargle & Mouthwash, Tk. 25/100 ml

Povisep (Jayson), Gargle & Mouthwash, Tk. 35/100 ml

Povin (Opsonin), Gargle & Mouthwash, Tk. 18.86/100 ml 25.09/ 100 ml;

Viodin (Square), Gargle & Mouthwash, Tk. Tk. 35.11/100ml;

Cleanser (General) Gargle & Mouthwash, 1%, Tk. 25.07/100ml

Piodin(Pharmasia) Gargle & Mouthwash, Tk. 25/100 ml

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MENTHOL, THYMOL , EUCALYPTOL, METHYL SALICYLATE

Indications : Antiseptic mouth wash

Menthol 0.042 gm + Thymol 0.064 gm + Eucalyptol 0.092gm + Methyl Salicylate 0.060gm/100ml.

Proprietary Preparations

Alconil Mouthwash (*Ziska*), Mouthwash, Tk. 85.00/120ml; , Tk. 150.00/250ml

Listcare Gold (*General*), Mouth Wash Tk. 145.00/250 ml; Tk. Tk. 80.00/120ml; Tk. 30.00/75ml

Listcare r zero (*General*), Mouth Wash Tk. 145.0 Tk. 30.00/75ml 0/250ml; Tk. 80.00/120 ml

Listoral Cool Mint (*ACI*), Mouth Wash, Tk. 75.51/120 ml; Tk. 140. 95/250 ml

Listoral Original (*ACI*), Mouth Wash, Tk. 75.51/120 ml; Tk. 140.95/250 ml

Orostar Cool Mint (*Square*), Mouth wash, Tk. Tk. 75.51/120ml ml; Tk. 140.95/250ml ml

Orostar Original (*Square*), Mouth wash, Tk. 80.24/120ml; Tk. 150.45/250ml ml

Orostar plus (*Square*), Mouth wash, Tk. 85.26/120ml; Tk. 150.45/250 ml

Oralis(*Opsonin*) Mouth wash, Tk. 75.22/120ml; Tk. 140.42/250 ml

Oroclean Coolmint(*Incepta*) Mouth wash, Tk. 75.00/120ml; Tk. 140.00/250 ml

Oroclean Original (*Incepta*) Mouth wash, Tk. 75.00/120ml; Tk. 140.00/250ml

Thymol 0.063gm + Eucalyptol 0.091gm + Menthol 0.042gm /100ml

Lister Zero (*General*), Mouthwash, Tk.145.00/250ml, Tk.30.00/75ml

Lister Total Care Anticavity Mouthwash

(*General*), Mouthwash30.00/75ml

Sodium Fluoride0.02%.

Listacare (*General*), Mouthwash, Tk. 80.00/120ml; Tk. 145.00/250ml; Tk. 30.00/75ml

Fluorodent(*Nipro Jmi*) ,Mouthwash, Tk. 80.00/120ml;

Oralis Cavicare(*Opsonin*) Mouth wash, Tk. 80.24/120ml; Tk. 145.43/250 ml

BENZOCAINE

Indications : Used to reduce pain caused by teething, cold sores, canker sores, and toothaches.

Proprietary Preparations

Oroge (*Square*), Oral Gel, 20%, Tk.50.15/5gm

Oratics (*Acme*), Oral Gel, 20%, Tk.40.12/5gm

SODIUM FLUORIDE0.02%,

Proprietary Preparation

Listacare Whiting Plus(*General*), Mouthwash,

0.02%, Tk. 80.00/120ml; Tk. 145.00/250ml;

Tk. 30.00/75ml

Chapter 12

SKIN

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12.1 MANAGEMENT OF SKIN CONDITIONS

General guidelines for topical therapy: Whilst systemic administration of drugs is often necessary in dermatology, many common skin diseases can be effectively managed using the wide range of topically applied physical or pharmacological modalities that are available. Topical treatment offers the potential to achieve high concentrations of a drug in the skin with minimal exposure of other organs.

This can greatly increase efficacy and also safety relative to systemic administration. When side effects do occur, they are most likely to take the form of localized reactions. Some factors that affect penetration of topical agents include: concentration of medication, thickness and integrity of the stratum corneum, frequency of application, occlusiveness of the vehicle, and compliance.

Vehicle: Topical medication must be applied to the skin in a suitable vehicle. This term encompasses all the constituents of the formulation apart from the active pharmaceutical agent. Various

vehicles deliver topical therapy, most frequently in the form of creams and ointments, solutions, lotions, emollients, gels, powders, soaps and paints. The choice of vehicle may be as important as the active drug. Either the vehicle or its active ingredient(s) may cause local toxicity.

Ointments: Ointments are greasy semisolid preparations, which are normally anhydrous and insoluble in water. They are petrolatum-based vehicles, capable of providing occlusion, hydration, and lubrication. Some ointments contain emulsifying agents such as polyhydric alcohols (macrogols, polyethylene glycol), or cetostearyl alcohol (e.g. emulsifying ointment). The latter have the advantage of being less greasy, with good solvent properties, and are easily washed off.

Ointments require fewer preservatives than other vehicles since they contain no water and do not sustain growth of microorganisms. Ointments are particularly suitable for chronic dry lesions. They often have mild anti-inflammatory effect.

Creams: Creams are emulsions of oil and water and are generally well

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absorbed into the skin. They may contain an antimicrobial preservative unless the active ingredient has sufficient intrinsic bactericidal and fungicidal activity. They are emollient, lubricant and mildly occlusive (but less so than ointments). Generally creams are cosmetically more acceptable than ointments because they are usually greasy and easier to apply.

Solutions: A solution involves the dissolution of two or more substances into homogenous clarity. The liquid vehicle may be aqueous, hydroalcoholic, or nonaqueous (alcohol, oils, or propylene glycol). Collodions are liquid preparations consisting of cellulose nitrate in organic solvent. They evaporate rapidly to leave a flexible film which can hold medicaments in contact with the skin. They are most frequently used to apply salicylic and lactic acids to warts. They may also be used as protectives to seal minor cuts and abrasions. They are easy to apply and water repellent, but inflammable.

Lotions: Lotions are liquid formulations which are usually simple suspensions or solutions of medication in water, alcohol or other liquids. The applied lotion leaves the skin feeling cooler via evaporation of the aqueous component. Lotions are easier to apply and allow for uniform coating of the affected area, and are often the favorite preparation in treating children. Lotions are more drying than ointments, and preparations with alcohol tend to sting eczematized or abraded skin. Lotions are suitable for application to large surface areas due to their ability to spread easily. Aqueous suspensions of powders which require shaking prior to each application are known as shake lotions. Examples include calamine lotion, steroid lotions, and emollients containing urea or lactic acid.

Emollients: Soothe, smooth and hydrate the skin and they are indicated for all dry or scaling disorders. Their

actions are short lasting and they should be applied frequently even after improvement. They are useful in dry and eczematous conditions, and to a lesser extent in psoriasis. It should be applied in the direction of hair growth. Preparations containing an antibacterial ingredient should be avoided unless infection is present.

Gels: Gel consists of active ingredients in suitable hydrophilic or hydrophobic bases. Gels are popular because of their clarity and ease of both application and removal. They are suitable for facial or hairy areas because after application little residue is left behind. Nevertheless, they lack any protective or emollient properties. If they contain high concentrations of alcohol or propylene glycol, they tend to be drying or cause stinging. Gels require preservatives. They generally have a high water content.

Powders: Powders absorb moisture and decrease friction. Because they adhere poorly to the skin, their use is mainly limited to cosmetic and hygienic purposes. Generally, powders are used in the intertriginous areas and on the feet. Adverse effects of powders include caking (especially if used on weeping skin), crusting, irritation, and granuloma formation. They are occasionally used to deliver drugs such as antifungal agents applied to the feet.

Paints: Paints are liquid preparations, either aqueous, hydroalcoholic or alcoholic (tinctures), which are usually applied with a brush to the skin or mucous membranes and then evaporate.

12.2 ANTI-INFECTIVE SKIN PREPARATIONS

General considerations: Both topical and systemic antibiotics are commonly used in dermatological conditions according to requirements. Systemic antibiotics are commonly prescribed for

deeper bacterial infections.

12.2.1 TOPICAL ANTIBIOTICS

Topical antibiotics play an important role in the management of many common dermatologic conditions.

AZELAIC ACID

Indications; Side-effects;
Cautions, Contraindications; Dose: See Section 12.7.
Proprietary Preparation
 See Section 12.7.

CLINDAMYCIN

Indications; Side-effects;
Contraindications; Dose: See Section 12.7.

Proprietary Preparation
 See Section 12.7.

ERYTHROMYCIN

Indications; Side-effects;
Cautions, Contraindications; Dose: See section 12.7.

Proprietary Preparation
 See Section 12.7.

FUSIDIC ACID

(See section 1.1.12)

Indications: Staphylococcal skin infections, erythrasma, pitted keratolysis.

Cautions: Pregnancy & lactation; avoid contact with eye as it causes irritation of conjunctiva

Side-effects: Rash, irritation, hypersensitivity reaction, pruritus, urticaria, burning sensation in skin, contact dermatitis, dry skin

Dose: ADULT & CHILD: apply 2% cream/ointment 3-4 times daily until improvement occurs

Proprietary Preparations

Fusidic Acid / Sodium Fusidate

Facid(Eskayef), Cream, 2%, Tk. 90.00/15gm

Fusidate(Aristo), Oint., 2%, Tk.85.00/20gm;

Fusidic acid 2%+Betamethasone valerate 0.1%:

Facid(Eskayef), Cream, Tk. 160/10 gm

Fusigal(Sharif), Cream, Tk. 160/15 gm

Xzema(Orion), Cream, Tk.201.35/10gm

Fusidic Acid 2%+Hydrocortisone Acetate1%

Fusidate-H(Aristo), Cream, Tk.125/10gm

Fortison(Incepta), Cream, Tk.125/10gm

Fusitrim(Asiatic), Cream, Tk. 125/10gm

Fusibac-H(Drug Int.), Cream, Tk.125.40/10gm

Fusicort(Opsonin), Cream, Tk.125.47/10 gm

Facid HC(Eskayef), Cream, Tk.125/10gm

Fucort(Novo), Cream, Tk.125/10gm

Fusitop(Square), Cream, Tk. 125/10gm

Dose: Apply 3 times daily to uncovered lesions for up to 2 weeks. Apply less frequently to covered lesions.

GENTAMICIN^[ED]

(See also section 1.1.4)

Indications: Bacterial infections

Side-effects: Contact dermatitis, cross-reactivity with other aminoglycosides

Contra-indications: known hypersensitivity to gentamicin

Dose: Apply 3-4 times a day for 7-10 days.

Proprietary Preparations

Genacyn(Square), Oint., 0.10%, Tk. 12.09/10gm

Gentin(Opsonin), Cream, 0.3%, Tk.12.54/10 gm

Monamycin(Amico), Cream, 0.3%, Tk 12.00/10gm; Tk. 18.45/15gm

Gentamicin 0.3%+ Hydrocortisone Acetate1%

Gento HC(G.A.Co), Cream, Tk. 60.18/10g

Dose: Apply 2-3 times daily.

METRONIDAZOLE^[ED]

(See also section 1.3.2)

Indications: Acne rosacea, vaginal infections

Cautions: Pregnancy, breastfeeding, avoid unnecessary prolonged exposure to sunlight

Contra-indications: known hypersensitivity to metronidazole

Side-effects: Skin redness, dryness, burning, irritation, or stinging

Dose: For vaginal infections: twice daily for 5 consecutive days

12. SKIN

For acne: Wash the affected skin area with mild soap about 15-20 minutes before applying the medication. Apply a thin layer of gel and rub it gently into the affected area

Proprietary Preparation

Flamyd(*Incepta*), Gel, 0.75%, Tk.50/30 gm

MUPIROCIN

Indications: Bacterial skin infections, particularly impetigo, folliculitis, impetiginized eczema, burns, lacerations, and leg ulcer; and to eliminate nasal staphylococcal carriage, even MRSA

Cautions: Moderate to severe renal impairment, avoid contact with eyes, pregnancy, lactation, child < 3 months

Side-effects: Pain, burning, and itching, an uncommon cause of postoperative ACD following dermatologic surgery.

Dose: Apply 2-3 daily times for a maximum of 10 days

Proprietary Preparations

Mupirocin 2%

Bactrocin(*Supreme*), Oint., Tk.140.42/10gm

Bactoderm(*UniMed*), Oint., Tk. 140.00/10g

Bactroban(*GSK*), Oint, Tk. 146.74/10gm

Dermupin(*Acme*), Oint., Tk. 140.42/10gm

Dermoban(*Opsonin*), Oint.,Tk. 130.49/10gm

Mupi(*Alco*), Oint., Tk. 140.42/10gm;

Tk.80.24/5gm

Muron(*Drug Intl*), Oint.,Tk. 130.45/10 gm

Muroderm(*General*), Oint., Tk. 140.96/10gm

Mupiron(*Eskayef*), Oint., Tk.220/20gm;

140.00/10gm;

Mupiderm(*Healthcare*), Oint., Tk. 140/10 gm

Muderm(*Globe*), Oint., Tk. 140/10 gm

Systope(*ACI*), Oint., Tk. 140.42/10gm

Sinaban(*Ibn Sina*), Oint., Tk. 140.00/10gm

Trego(*Incepta*), Oint., Tk.140/10gm

Tigocin(*Pacific*), Oint., Tk.140/10gm

NEOMYCIN

(See also section 1.1.4)

Indications: Effective against several gram-negative and several gram positive bacteria. It is useful for treating minor wounds and cutaneous infections. It is used in combination with bacitracin to achieve optimal staphylococcal and streptococcal coverage

Cautions: Ototoxicity may occur if large areas may be treated, renal impairment, pregnancy, children

Contraindications:Known hypersensitivity, perforated eardrums

Side-effects:Allergic contact dermatitis, cross-sensitization with other aminoglycosides, local irritation and itching

Proprietary Preparations

Neomycin 3.5 mg + bacitracin400 IU + **polymyxin** 5000 IU/gm

Neocin Plus(*Opsonin*), Oint, Tk. 30.20/10gm

Poyban(*Popular*) Oint, Tk. 30.11/10 gm

Neogen plus(*General*) Oint, Tk. 30.20/10 gm

Nebaskin Plus(*Pacific*) Tk. 30.00/10 gm

Nuba Plus(*Biopharma*) Tk.30.11/10 gm

Nebanol Plus(*Square*) Tk.30.20 /10 gm

Dose: apply 3-4 times daily for 7-10 days.

Bacitracin Zinc250 IU + **Neomycin Sulphate**5 mg/gm(**Powder**)

B-mycin(*G.A.Co*), Powder, Tk. 10.03/5 gm

Neocitrin(*ACI*), Powder, Tk. 10.37/5gm

Nebanol(*Square*), Powder, Tk. 20.13/10gm

Nenol(*Alco*), Powder, Tk. 15.55/5gm

Neocitrin(*ACI*), Powder,

Tk.10.37/5gm, Tk.20.14/10gm

Neotracin(*Acme*), Powder, Tk. 10.18/5gm, Tk.

20.13/10gm

Tybac(*Somatec*), Powder, Tk. 15.43/5 gm

Dose: Apply 3-4 times daily for 7-10 days.

Bacitracin Zinc 500 IU + **Neomycin Sulphate** 5mg/gm(**ointment**)

B-mycin(*GA Co.*), Oint., Tk. 17.36/10 gm

Monabacin(*Amico*), Oint., Tk. 18.50/10gm

Nebanol(*Square*), Oint, Tk. 44.2/20gm

Nebazin(*Incepta*), Oint., Tk. 43.9.00/20gm

Neo-B(*Drug Intl*), Oint., Tk. 32.60/15 gm

Neobacin(*Kemiko*), Oint.,Tk. 44.03/20gm

Neomycin Sulphate3.5 mg + **Polymyxin B** sulphate10000IU + **Pramoxine Hydrochloride**10gm/gm

Nuprin(*Alco*), Cream, Tk. 75.23/10gm Tk.

140.42/30gm ,Tk. 40.12/5gm

Nepranol(*Square*) cream, Tk. 75.50/10gm

NITROFURAZONE

Indications: Prevention or treatment of surface bacterial infections of wounds, burns, and cutaneous ulcers, before skin grafting

Contraindications: Hypersensitivity, cross-sensitivity with other nitrofurans derivatives

12. SKIN

Side-effects: Sensitization, generalized allergic skin reactions

Dose: 0.2% ointment/cream: Apply 2 times daily for 7 days

Proprietary Preparation

Furasep(Beximco), Cream, 0.2%, Tk.17/20g

POLYMYXIN B

Indications: Bacterial skin infections, especially gram negative infections. Usually used in combination with other topical antibiotic agents to broaden their coverage

Cautions: Treatment of large areas may cause ototoxicity particularly in children, in elderly and in renal impairment

Side-effects: Skin rash, urticaria, eosinophilia, fever, nephrotoxicity

Dose: In combination with bacitracin or as triple antibiotic ointment with bacitracin and neomycin: apply 1-3 times a day

Proprietary Preparations

see under neomycin

One g ointment contain Oxytetracycline HCl 30mg and Polymixin 10,000 IU

Renamycin(Renata), Oint. Tk.44/3.5g; Tk.12.62/5g

Tetraderm(Rephco), Oint.Tk. 12.43/5g

RETAPAMULIN

Indications: Impetigo due to *S. aureus* or *S. pyogenes* in adults and children 9 months of age or older

Cautions: Pregnancy & lactation

Side-effects: Pruritus, paresthesia, irritation, pain at the site of application, allergic contact dermatitis

Dose: Apply twice daily for 5 days

Proprietary Preparation

Pamulin(Navana), Oint., 1%, Tk. 200/10gm

Retabac(Square), Oint., 1%, Tk. 200/10gm

Retapex(Incepta), Oint., 1%, Tk.

200/10gm, Tk. 300/15gm

SILVER SULFADIAZINE^[ED]

Indications: Treatment & prophylaxis of infection in burn wounds, infection in leg

ulcers, pressure sores, infection in skin graft donor sites and extensive abrasions

Cautions: Hepatic and renal impairment, pregnancy, breast-feeding, neonates

Contraindications: Pregnancy and breast-feeding, sensitivity to sulfonamides and should not be recommended in neonates

Side-effects: Allergic reactions, burning sensation, itching, rashes, leucopenia, may develop if drug is used for prolonged period. Hemolysis in glucose-6-phosphate dehydrogenase (G6PD) deficiency patients, methemoglobinemia

Dose: Apply once or twice daily

Proprietary Preparations

Silver Sulfadiazine1%

Burna(Square), Cream, Tk. 40.13/25gm

Burnless(Sharif), Cream, Tk. 225.68/250g; Tk. 35.11/25g

Burnrid(Globe), Cream, Tk. 40.00/25 gm

Burnsil(Beximco), Cream., Tk.45.00/25gm

Dazine(Alco), Cream, Tk. 50.15/25gm

Eburn(Pacific), Cream, Tk. 50.00/25gm

Neozine(Opsonin), Cream, Tk. 225.85/250

gm., Tk. 30.11/25 gm, Tk. 399.00/500 gm, Tk. 260.78/250gm

Sibalyn(ACI), Cream, Tk. 40.12/25gm

Silvadazin(Aristo), Cream, Tk. 60.00/25g, Tk. 225.00/ 250g & Tk. 425.00/500g

Silvec(Drug Intl), Cream, Tk. 50.00/25 gm

Silverax(Healthcare), Cream, Tk.57.00/25 gm

Silverzine(G.A.co), Cream, Tk. 40.12/25

gm Tk. 202.90/250 gm Tk. 401.20/500 gm

Silzin(Kemiko), Cream, Tk. 50.00/25gm

12.2.2 ANTIFUNGALS

(See also section 1.2)

Compound topical preparations: Combination of an imidazole and a weak corticosteroid may be of value in the treatment of eczematous intertrigo and a severely inflamed patch of ringworm. The combination of nystatin and a weak corticosteroid may be of use in the treatment of intertrigo associated with candida. Combination agents have a higher rate of treatment failure and disease relapse.

Choices of anti-fungal formulation

:Lotions or sprays are suitable for application to large and hairy areas.

12. SKIN

Ointments are generally used on dry areas. Creams are suitable for moist areas.

BENZOIC ACID + SALICYLIC ACID (WHITFIELD'S OINTMENT)^[ED]

It is a combination of 6% benzoic acid which has fungistatic action and 3% salicylic acid which has keratolytic action.

Indications: Superficial fungal infections, pityriasis versicolor

Cautions: Avoid contact with eyes

Contra-indications: Known hypersensitivity to any component of Whitfield's ointment

Interactions: See Appendix-2

Side-effects : Mild inflammatory lesions.

Dose: Apply twice daily to the affected area for at least 4 weeks

Proprietary Preparations

Ointments containing Benzoic acid 6% and Salicylic acid 3% :

Albi-Whitfield(Albion), Oint., Tk.9/20gm

Bensal(G.A.Co), Oint., Tk. 5.56/10 gm; Tk. 25.00/25 gm

BS(Acme), Oint. Tk. 665.00/Kg

G-Benzosal(Gonoshasthaya), Oint., Tk.12.50/25 gm

Saliben(Amico), Oint.Tk. 667/1kg;Tk. 25.00/20gm

Whitefield(Asiatic), Oint. Tk. 13/30gm

BUTENAFINE

Indications: Dermatophytoses, pityriasis versicolor

Cautions: Lactation, avoid contact with mouth, eyes, and other mucous membranes, child less than 12 years of age

Contraindications: Pregnancy, known hypersensitivity to butenafine

Side-effects: Burning, stinging, contact dermatitis, erythema, irritation, itching

Dose: Cream: For tinea pedis: once daily for 4 weeks, or twice daily for 1 week
For tinea elsewhere: once daily for 2 weeks

For pityriasis versicolor: once daily for 2 weeks

Proprietary Preparations

Butefin (Square), Cream, 1%, Tk.40.13/10gm

Fintop(Drug Intl), Cream, 1%, Tk. 40.15/10 gm

Tenafin(Beximco), Cream, 1%, Tk.50/15gm

CICLOPIROX OLAMINE

Indications: Tinea pedis, Tinea cruris, Tinea corporis due to Trichophyton rubrum, Trichophyton mentagrophytes, Epidermophyton floccosum and Microsporum canis, Candidiasis (moniliasis) due to Candida albicans, Tinea (pityriasis) versicolor due to Malassezia furfur

Side-effects: Mild burning, stinging, itching, swelling, or other signs of skin irritation, Redness of skin

Proprietary Preparations

Candirox(Incepta), Cream, 10 mg/gm Tk.

110.00/10 gm

Clopirox(Square), Cream, 10 mg/gm Tk.

80.24/10gm

CLOTRIMAZOLE^[ED]

Indications: Dermatophytes, pityriasis versicolor, cutaneous and vaginal candidiasis

Cautions: Pregnancy & lactation, hepatic and renal impairment, avoid use around the eyes

Contra-indications: known hypersensitivity to clotrimazole

Side-effects: Erythema, burning, irritation, stinging, contact dermatitis, peeling, blistering edema, pruritus, and urticaria at the site of application

Dose: Apply twice daily for 2-4 weeks.

Intravaginal clotrimazole tablets:

(See section 6.2.2)

Proprietary Preparations

Clotrimazole 1%

Afun(Square), Cream, Tk.35.11/10gm Tab.,

Cantina(Kemiko), Cream, Tk. 35.11/10gm

Clodal(Globe), Oint., Tk. 25.00/10gm

Cloderm(General), Cream, Tk. 35.20/10gm

Closten(Alco), Cream, Tk. 25.08/10gm

Clotrim(Acme), Cream, Tk. 30.10/10gm, Tk. 18.37/5gm

Clotrimazole(Amico), Cream, Tk.35.00/10gm, Tk. 60.00/20gm

Clotzol(Sharif), Cream, Tk. 29.08/10g

Clozox(UniMed), Cream, Tk. 25.00/10gm

Dermasim(ACI), Cream, Tk. 35.21/10gm,; Tk. 40.12/15gm,; Tk. 68.20/20ml
Fungin(Ibn Sina), Cream, Tk. 35.00/10gm
Kanis(G.A.Co), Cream, Tk. 30.09/10 gm
Lotrimin(Novo Health), Solu., Tk.25.00/10mg
Neosten(Beximco), Cream, Tk. 45.00/20gm
Tinatrim(GSK), Cream, Tk. 35.20/10gm
Tinazol(Popular), Cream, Tk. 25.09/10gm
Triderm(Healthcare), Cream, Tk. 35/10 gm, Tk. 45.00/20 mg
Trimazole(Opsonin), Cream, Tk. 25.09/10gm; Solution, Tk. 68.00/5ml

ECONAZOLE

Indications: Dermatophytoses, pityriasis versicolor, mucocutaneous candidiasis

Cautions: avoid use around the eyes

Contraindications: known hypersensitivity to econazole, porphyria, pregnancy

Side-effects: Erythema, burning, stinging, contact dermatitis, and pruritus.

Dose: 1% cream: 1-2 times daily for 2-4 weeks

Vaginal candidiasis: See section 6.2.2

Proprietary Preparations

Econazole 1%

Conacream(Supreme), Cream, Tk. 28.00/10gm
Ecoderm(Rephco), Cream, Tk. 28/10gm
Ecolet(Amulet), Cream, Tk. 32/10 gm
Econal(Kemiko), Cream, Tk. 32.10/10gm
Econate(Incepta), Cream, Tk. 32.00/10 gm
Econate-G(Incep), Cream, Tk. 70.00/30gm
Ecoren(ACI), Cream, Tk. 30.20/10gm
Ecozol(Opsonin), Cream, Tk. 70.48/30 gm, Tk. 12/10gm
Pevaryl(Sanofi) Cream, Tk. 32.59/10 gm
Spectazole(Healthcare), Cream, Tk. 35/10gm

ECONAZOLE WITH TRIAMCINOLONE ACETONIDE

Steroid-responsive inflammatory dermatoses with econazole-sensitive mycotic and/or bacterial superinfections

Dose: Apply 1-2 times daily for 2 weeks

Proprietary Preparations

Econazole 1% + Triamcinolone Acetonide 0.1%
Aristocort Plus(Aristo), Cream, Tk. 20/5g, Tk. 40.00/10g
Avison(Orion), Cream, Tk. 40.00/10gm
Dicot(Drug Int), Cream, Tk. 40.15/10 gm
Ecocort(Globe), Cream, Tk. 40.00/10 gm
Ecolon(Supreme), Cream, Tk. 40.00/10gm

Econate Plus(Incepta), Cream, Tk. 40/10gm
Ecoren-T(ACI), Cream, Tk. 41.27/10gm
Ecostat(Sharif), Cream, Tk. 34.10/10g
Ecotrim(Beximco), Cream, Tk. 34.50/10gm
Ecozol Plus(Opsonin), Cream, Tk. 34.13/10 gm
Elocon(Amico), Cream, Tk. 40.00/10gm
Enazol(Biopharma), Cream, Tk. 40.00/10gm,;
Etriam(Eskayef), Cream, Tk. 40.00/10gm
Exinil(Acme), Cream, Tk. 40.00/10gm
Fungicort(Ibn Sina), Cream, Tk. 40.00/10gm
Pevisia(Asiatic), Cream, Tk. 40.00/10gm
Pevisone(Sanofi), Cream, Tk. 55.00/10 gm,; Tk. 75.51/10 gm
Pevitin(Square), Cream, Tk. 45.00/10gm
Spectazole(Healthcare), Cream, Tk. 40/10gm

FENTICONAZOLE

Indications: Vulvovaginal candidiasis.

Cautions: Pregnancy, lactation

Contra-indications: Known hypersensitivity to imidazole derivatives

Side-effects: Transient burning, sensitization

Dose: One applicator full (about 5 g) is administered into the vagina by a reusable applicator (morning and evening for three days).

Proprietary Preparations

Fentizol(Square), Vaginal Tab., 600 mg, Tk. 120.00/Tab.
Fentigal(Sharif), Cream, 2%, Tk. 195.59/30g; Vaginal Tab., 600 mg, Tk. 120.00/Tab.

FLUCONAZOLE^[ED]

(See section 1.2.1)

Indications: Candidiasis, dermatophytosis (tinea), onychomycosis, pityriasis versicolor, cryptococcal meningitis, sporotrichosis

Cautions, Side-effects & Dose: See section 1.2.1 under Fluconazole

Interactions: See Appendix -2

Proprietary Preparations

Anfasil(Silva), Cap., 50mg, Tk. 7.03/Cap.; Tab., 150mg, Tk. 20.08/Tab.
Canazole(ACI), Suspn, 50mg/5ml, Tk. 78.53/35ml; Tab., 150mg, Tk. 22.15/Tab.; 50mg, Tk. 8.05/Tab.; 200mg, Tk. 25.08/Tab.
Candid(Amico), Cap., 150mg, Tk. 22/Cap.; 50mg, Tk. 8.00/Cap.; Tab., 150mg, Tk. 22.00/Tab.
Candidal(Radiant), Cap., 50mg, Tk.; 8.02/Cap.; 150mg, Tk. 22.57/Cap.

12. SKIN

Candinil(*Healthcare*), Cap., 150mg, Tk. 264.00/Cap.; 200mg, Tk. 300.00/Cap.; 50mg, Tk. 240.00/Cap.; Susp., 50mg/5ml, Tk. 78.00/35 ml.

Conaz(*Orion*), Cap., 150 mg, Tk. 22.14/Cap.; 50 mg, Tk. 8.06/Cap.

Derma(*Alco*), Cap., 150 mg, Tk. 20.06/Cap.; 50 mg, Tk. 8.02/Cap.

Dermicon(*Asiatic*), Cap., 150mg, Tk. 22.00/Cap.; 50mg, Tk. 8.00/Cap.

Diflu(*Aristo*), Cap., 200mg, Tk. 5.00/Cap.; 150mg, Tk. 22.00/Cap.; 50mg, Tk. 8.00/Cap.; Susp., 50mg/5ml, Tk. 78.00/35ml

Flucoder(*Eskayef*), Cap, 50 mg, Tk. 8.10/Cap., 150mg, Tk. 22.00/Cap., 200mg, Tk. 25.00/Cap.; Susp., 50mg/5ml, Tk. 78.00/35ml

Flucon(*Opsonin*), Cap., 150 mg, Tk. 22.08/Cap.; 200 mg, Tk. 25.00/Cap.; 50 mg, Tk. 8.06/Cap.; Susp., 50 mg /5 ml, Tk. 78.52/35ml.

Fluconaa(*Naafco*), Cap. 50 mg, Tk. 7.50/Cap.

Fluconal(*Acme*), Susp., 50mg/5ml., Tk. 78.53/35ml.; Tab., 150 mg, Tk. 22.15/Tab.; 50 mg, Tk. 8.07/Tab.

Fluconazole(*Biogen*), Cap., 50mg, Tk. 7.00/Cap.; 150mg, Tk. 22.00/Cap.; 50mg, Tk. 24.00/Cap.

Flucostan(*Ziska*), Cap., 50 mg, Tk. 10.00/Cap.

Fluda(*Novo Health*), Cap., 150 mg, Tk. 22.00/Cap.; 50 mg, Tk. 8.00/Cap.

Flufun(*Astra Bio*), Cap., 150 mg, Tk. 22.00/Cap.; 50 mg, Tk. 8.00/Cap.

Flugal(*Square*), Cap., 150 mg, Tk. 22.14/Cap.; 200 mg, Tk. 25.17/Cap.; 50 mg, Tk. 8.07/Cap.; Susp., 50 mg/5 ml, Tk. 78.53/35ml.

Flukzol(*Sharif*), Cap., 50 mg, Tk. 8.03/Cap.

Fluma(*Modern*), Cap., 150 mg., Tk. 20.00/Cap.; 50 mg., Tk. 8.00/Cap.

Flumyc(*Euro*), Cap., 150mg, Tk. 22.00/Cap.; 50mg, Tk. 8.00/Cap.

Flunac(*Drug Intl*), Cap., 50mg, Tk. 8.05/Cap.; 150mg, Tk. 20.10/Cap.; Susp., 50mg/5ml, Tk. 70.25/35ml

Flunol(*Somatec*), Susp., 50 mg/5 ml, Tk. 78.30/35ml, Cap., 150 mg, Tk. 22.00/Cap.; 50 mg, Tk. 8.00/Cap.

Flunova(*Nipa*), Cap., 150 mg, Tk. 22.00/Cap.; 50 mg, Tk. 8.00/Cap.

Flutinex(*Organic*), Cap., 150 mg, Tk. 22.06/Cap.; 50 mg, Tk. 8.03/Cap.; Susp., 50 mg / 5 ml, Tk. 78.24/35ml

Fluvin-OD(*GSK*), Tab., 150 mg, Tk. 21.75/Tab., 50 mg, Tk. 8.06/Tab

Fluzo(*Pacific*), Tab., 150 mg, Tk. 22.00/Tab.; 50 mg, Tk. 8.00/Tab.

Fluzole(*Globe*), Tab., 150 mg, Tk. 22.00/Tab.; 50 mg, Tk. 8.00/Tab.

Fungata(*Biopharma*), Cap., 150mg, Tk. 22.08/Cap., 50mg, Tk. 8.03/Cap.; Susp., 50mg/5ml Tk. 78.29/35ml

Funzole(*Monico*), Cap., 150mg, Tk. 22.00/Cap.; 50mg, Tk. 8.00/Cap.; Susp., 50mg/5ml, Tk. 78.00/35ml

F-Zol(*Popular*), Cap., 150mg, Tk. 22.08/Cap.; 50mg, Tk. 8.03/Cap.; 200mg, Tk. 25.00/Cap.; IV Infusion, 200mg/100ml, Tk. 200.00/100 ml.; Susp., 50mg/5ml, Tk. 78.29/35ml

Galfin(*General*), Cap, 150mg, Tk. 22.15/Cap.; 50mg, Tk. 8.05/Cap.

Iluca(*Ibn Sina*), Cap., 150 mg, Tk. 23.00/Cap.; 50 mg, Tk. 9.00/Cap.

Innocan(*Pharmacil*), Cap., 150mg, Tk. 22.00/cap.; 50mg, Tk. 9.00/Cap.

Lucan(*Renata*), Cap., 150 mg, Tk. 25.00/Cap.; 50 mg, Tk. 22.08/Cap.; 50mg, Tk. 8.03/Cap.; Susp., 50mg/5ml, Tk. 78.30/35ml

Mycoder(*UniMed*), Tab., 150mg, Tk. 20.00/Tab.; 50mg, Tk. 7.00/Tab.

Nispore(*Incepta*), Cap., 150 mg, Tk. 22.00/Cap.; 200 mg, Tk. 25.00/Cap.; 50 mg, Tk. 8.00/Cap.; Susp., 50mg/5ml, Tk. 78.00/35ml

Olif(*Kemiko*), Cap., 150 mg, Tk. 22.06/Cap.; 50 mg, Tk. 8.02/Cap.

Omastin(*Beximco*), Cap., 150mg, Tk. 22.00/Cap.; 200mg, Tk. 25.00/Cap.; 50mg, Tk. 8.00/Cap.; IV Infusion, 200mg/100ml, Tk. 200.00/100 ml.; Susp., 50mg/5ml, Tk. 78.00/35ml

Onicon(*Zenith*), Susp., 50 mg/5 ml, Tk. 65.24/35ml.; Tab., 50 mg, Tk. 6.00/Tab.

Orcon(*Team*), Cap., 50 mg, Tk. 7.50/Cap.

Pileus(*One Pharma*), Cap., 150 mg, Tk. 22.00/Cap.; 50 mg, Tk. 7.99/Cap.

Segal(*Supreme*), Cap, 150mg, Tk. 22.00/Cap., 50mg, Tk. 8.00/cap.; Susp., 50mg/5ml, Tk. 78.00/35ml

Xeroder(*Beacon*), Cap., 150mg, Tk. 22.15/Cap., 50mg, Tk. 8.05/Cap.; IV Infusion, 200mg/100ml, Tk. 200.60/100ml

GRISEOFULVIN^[ED]

(See section 1.2.2)

Indications: Superficial fungal infections, especially tinea capitis. Griseofulvin is not used as a first-line therapy for fungal infections other than tinea capitis.

Cautions, Contra-indications & Side-effects: See section 1.2.2

Interactions: See Appendix- 2

Dose: ADULT: 10 mg/kg/day, CHILD: 5–10 mg/kg/day, for tinea corporis: 2-4 weeks, for onychomycosis: over 1 year

Proprietary Preparations

Grisovin FP(GSK), Tab. , 500 mg, Tk. 5.88/Tab
Fulcinex(ACI), Suspn., 2.5gm/100ml, Tk. 23.49/60mlTab., 500mg, Tk. 5.60/Tab.
Grisozen(Zenith), Tab., 500 mg,Tk.6.68/Tab.
G-G VIN(Gonoshasthaya), Tab., 500 mg, Tk. 4.00/Tab.

ITRACONAZOLE

(see section 1.2.1)

Indications: Onychomycosis, systemic mycoses such as blastomycosis, histoplasmosis, and aspergillosis, candidiasis, dermatophytoses (tinea)

Cautions Contraindications& Side-effects: See section 1.2.1

Interactions: See Appendix-2.

Dose: See section 1.2.1

Proprietary Preparations

See section 1.2.1

KETOCONAZOLE

(see section1.2.1)

Indications: Deep fungal infections ,dermatophyte infections not responding to topical therapy (tinea pedis, tinea cruris, and tinea corporis), candidiasis, seborrhoeic dermatitis,and extensive pityriasis versicolor

Cautions, Contraindications, Side effects : See section1.2.1 underKetoconazole

Dose: Ketoconazole 2% cream: Apply 1-2 times daily

Proprietary Preparations

Ketocon(Opsonin), Tab. , Tk. 8.06/Tab. ; Shampoo, Tk. 176.19/60 ml
Ketofun(Amico), Tab., TK. 8.30/Tab.
Nizoder(UniMed), Cream, Tk. 50.00/15gm,; Shampoo, Tk. 230.00/100ml

MICONAZOLE^[ED]

Indications:Dermatophytoses, pityriasis versicolor, mucocutaneous candidiasis

Side-effects: Irritation, burning, maceration, allergic contact dermatitis

Dose: Apply 1-2 times daily for 2-4 weeks

Proprietary Preparations

Miconazole Cream 2%.
Fungidal(Square),Cream, Tk. 35.24/10gm
Mic(Globe), Cream, Tk. 35.00/10 gm
Micoderm(Drug Intl), Cream, Tk. 40.00/10gm,;
Miconex(ACI), Cream, Tk. 39.00/10gm
Skimico(Pacific), Cream, Tk. 35.00/10gm
Topicazole(Incepta), Cream, Tk. 35.00/10gm
Unigal(Opsonin), Cream, Tk. 35.27/10 gm,Tk. 60.18/ 15 gm
G-Miconazole(Gonoshasthaya), Cream, Tk. 18.25/5 gm; Tk. 34.50/10 gm

Miconazole with hydrocortisone

steroid-responsive inflammatory dermatoses

Dose:apply 2 times daily for 2-4 weeks.

Proprietary Preparations

Miconazole 2%+ Hydrocortisone1%
Gemison(General), Cream, Tk. 40.27/10gm
Unigal(Opsonin), Cream, Tk. 40.15/10mg
Mic HC(Globe), Cream, , Tk. 40.00/10gm
FungidalHC(Square), CreamTk. 40.27/10gm
Micosone(ACI), Cream, Tk. 40.27/10gm,; Oint., Tk. 40.27/10gm
Micozole(G.A.co), Cream, Tk. 40.12/10 gm
Topicazole(Incepta), Cream, Tk. 40.00/10gm
Miki(Orion), Cream, Tk. 40.27/10gm
Miconil(Nipa), Cream, Tk. 40.00/10gm
MHC(Sharif), Cream, Tk. 40.12/10g

MICONAZOLE GEL^[ED]

Indications: Oropharyngeal candidiasis.

Dose: 5-10 ml after food 4 times a day. Retain near oral lesions before swallowing. Continue treatment until 48 hours until lesions have healed

Proprietary Preparations

Miconazole Oral Gel 2%
A-Migel(Acme), Oral Gel, Tk. 52.16/15gm
Candoral(Beximco), Oral Gel, Tk.52.00/15gm
Dakrin(General), Oral Gel, Tk.60.18/15gm
Fungidal(Square), Buccal Tab.,10 mg, Tk. 5.03/Tab. ; Cream, Tk. 35.24/10gm
Gelora(Square), Oral Gel, Tk. 60.18/15gm
Orogurd(Eskayef),Oral Gel, Tk. 60.00/15gm;
Orocare(Novo).Oral Gel, Tk. 50.00/15gm
Micoderm(Drug Intl),Oral Gel, Tk.50.20/15gm
Micoral(ACI), Oral gel., Tk. 100.30/30gm.,Tk. 60.18/15gm
Mycon(Aristo), Oral Gel , Tk. 60.00/15gm
Mycosina(Ibn Sina), Oral Gel,Tk. 60.00/15gm
Oragel(UniMed), Oral gel, Tk. 50.00/15gm
Ormico(Pacific), Oral Gel, Tk. 60.00/15gm
Oroconazol(Incepta), Oral Gel, Tk. 50.00/15gm

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NYSTATIN^[ED]

(See also section 1.2.3&6.2.2)

Indications: Cutaneous and mucocutaneous candidiasis

Cautions: Pregnancy, lactation

Side-effects: burning, pruritus, rash, eczema, rarely pain on application

Dose: Oral candidiasis (thrush): apply four to five times daily for 2 weeks
Powder, cream, ointment, or gel:
For cutaneous candidiasis: apply 2-4 times daily for 2 weeks

Proprietary Preparations

Candex(Square), Susp., 1 Lac Unit/ml, Tk. 46.84/30ml

Fefun(Amico), Susp., 1 Lac IU/ ml, Tk. 22.00/12ml

Fungistin(Beximco), Susp., 1 Lac IU/ ml, Tk. 22.81/12ml

Mycocin(Ibn Sina), Susp., 1 Lac IU/ ml, Tk. 22.50/12ml, Tab., 5 Lac Unit Tk. 5.75

Naf(Opsonin), Susp., 1.25 Lac IU /1.25 ml, Tk. 20.47/1.25ml

Nyscan(ACI), Susp. 1 Lac IU/ ml, Tk. 20.44/12ml

Nyst(Somatec), Susp., 1 Lac IU/ ml., Tk. 22.65/12ml

Nystat(Acme), Susp., 1 Lac IU/ ml., Tk. 22.79/12ml, Tab., 5 Lac IU Tk. 6.27

Ornys(Kemiko), Susp., 1 Lac IU/ ml., Tk. 20.46/12ml

Zenistin(Zenith), Susp., 1 Lac IU/ ml, Tk. 20.00/12ml

OXICONAZOLE

Indications: Dermatophytoses, pityriasis versicolor

Cautions: Pregnancy and breast feeding

Contra-indications: known hypersensitivity to oxiconazole

Side-effects: Pruritus, burning, irritation, erythema, maceration, and fissuring

Dose: 1% cream: Apply once daily for 2-4 weeks

Proprietary Preparation

Oxifun(Square), Cream, 1%, Tk. 50.35/10gm, Lotion, 1%, Tk. 135/30ml

TERBINAFINE

(See section 1.2.1)

Indications: Onychomycosis tinea capitis in children older than 4 years of age, selected cases of tinea corporis, tinea pedis, or tinea cruris that are widespread, severe, or resistant to topical treatment and pityriasis versicolor
Cautions, Contra-indications & Side-effects: See section 1.2.1

Interactions: See Appendix-2.

diarrhea, stomach upset, loss of taste, toxic epidermal necrolysis and erythema multiforme.

Dose: Oral; See section 1.2.1

Topical preparatio; For tinea pedis (interdigital): twice daily for 1 week

For tinea pedis (plantar): twice daily for 2 weeks

For tinea elsewhere: once or twice daily for at least 1 week, up to 4 weeks

For pityriasis versicolor: once or twice daily for 2 weeks

For systemic use: See section 1.2.2

Proprietary Preparations

Terbinafine 1%

Bacron(Biopharma), Oint., Tk. 140.00/10gm

Derbicil(Incepta), Cream, Tk. 50.00/5gm

Derfin(Alco), Cream, Tk. 30.09/10gm

Finater(Popular), Cream, Tk. 50.19/

Infud(General), Cream, Tk. 50.34/5gm

Mycofin(Eskayef), Cream, Tk. 50.00/5gm

Mycofree(Drug Intl), Cream, Tk. 80.00/20 gm

Skinabin(ACI), Cream, Tk. 50.34/15gm ;

Terbex(Beximco), Cream, Tk. 35.00/5gm

Terbifin(Aristo), Cream, Tk. 52.00/5g;

Termider(Biopharma), Cream, Tk. 50.19/10gm

Xfin(Square), Cream, Tk. 50.34/5gm

(See section 1.2.2 for systemic preparation)

TIOCONAZOLE

Indications: Fungal nail infection, dermatophytoses, tinea versicolor

Cautions: Avoid contact with eyes and mucous membrane.

Contraindications: Pregnancy, known hypersensitivity to tioconazole

Interactions: See Appendix-2.

Side-effects: Occasional local irritation, local edema, dry skin, nail discoloration; periungual inflammation; rash; exfoliation.

Dose: Apply to nails and surrounding

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skin twice daily. Pityriasis versicolor: up to 7 days. Tinea pedis: up to 6 weeks. Dermatophytoses in other sites, candidiasis, erythrasma: 2-4 weeks. Onychomycosis: 6-12 months.

Proprietary Preparations

Ticonazole 1%

Conasyl(Renata), Cream, Tk. 63.00/10 gm
Suconal(Supreme), Cream, Tk. 47.54/10 gm
Tiozol(Incepta), Oint., Tk. 70.00/10 gm
Tycon(Acme), Cream, Tk. 47.86/10 gm;.

TOLNAFTATE

Indications: Dermatophytosis and pityriasis versicolor.

Contraindications: known sensitivity to tolnaftate.

Side-effects: Itching, burning, rarely contact dermatitis.

Dose: Apply twice daily for 2-4 weeks.

Proprietary Preparations

Tinaderm[®](Schering), Solun 1%, Tk. 158.81/bot

12.2.3 ANTIVIRALS

(See section 1.4.1)

A major antiviral drug, acyclovir is frequently used to treat cutaneous herpes simplex, herpes zoster and chicken pox. Intralesional injection of interferon alfa-2b is administered for chondylomata acuminata. Improvement of psoriasis in AIDS patients with oral zidovudine has been reported.

ACYCLOVIR^[ED]

(See section 1.4.1.1)

Indications: Herpes simplex, herpes zoster, recurrent erythema multiforme

Caution: avoid contact with eyes and mucus membranes

Contraindications: Renal impairment, pregnancy and breast-feeding

Side-effects: Transient stinging or burning, occasionally erythema or drying of the skin

Oral or intravenous acyclovir: nausea, vomiting, diarrhea, headache, reversible renal impairment due to a

crystalline nephropathy

Dose: Oral: See section

1.4.1.1. Topical: Apply to lesions every 4 hours for 5-10 days; should be started at first sign of attack.

Proprietary Preparations:

ACYCLOVIR 5%

Acerux(Opsonin), Cream, Tk. 40.15/50mg;

Clover(Ibn Sina), Tk. 40.00/5gm;

Novirax(Drug Intl), Cream, 10gm, Tk. 40.15/5gm

Suclovir(Supreme), Cream, Tk. 45.00/5gm

Virux(Square) Tk. 70/10gm; Tk. 40.27/6gm

Simplovir(Incepta), Cream, Tk. 40.00/5 gm

Acyclovir BP 5% & Hydrocortisone 1%

NoviraxHC(Drug Intl), Cream, 10gm, Tk.

70.00/10gm

ViruxHC(Square), Cream, 50 mg/gm, Tk.

70/10gm;

(For oral and injectable preparation See section 1.4.1.1)

DOCOSANOL

Indications: Cold sores/fever blisters (herpes labialis)

Cautions: Do not use in or near the eyes; avoid applying directly inside the mouth

Contra-indications: Known hypersensitivity to docosanol

Side-effects: Headache, skin irritation, burning, dryness, itching, allergic reactions

Dose: Apply 5 times a day at the first sign of recurrence of herpes simplex labialis for 5-7 days.

Proprietary Preparation

Lafrost(Incepta), Cream 10%, Tk. 50.00/5g

VALACICLOVIR

Indications: Herpes simplex, herpes zoster

Cautions, Contraindications, Side-

effects & Dose: See section 1.4.1

Dose: See section 1.4.1.1

Proprietary Preparation

See section 1.4.1.1

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12.2.4 ANTIPARASITICS

BENZYL BENZOATE^[ED]

Indication: Scabies.

Cautions: Avoid contact with eyes and mucous membrane. It should not be used on broken or secondary infected skin. Breast-feeding must be stopped till the product has been washed off. Drying effect in elderly.

Contraindications: Broken or irritated skin, neonates, pregnancy

Side-effects: Skin eruption, burning sensation, especially on genitalia and excoriation.

Dose: Apply 3 times at 12 hourly intervals over the whole body below the neck. Wash off 12 hours after the last application.

Proprietary Preparations

Benzyl Benzoate 25%

Ascab (Hudson), Emulsion, Tk. 12.13/60ml; Tk. 18.00/100ml

Ascabiol (Sanofi), Emulsion, Tk. 32.16//100ml

Benosol (Amico), Emulsion, Tk. 35.25/100ml

Benzolet (General) Lotion, 35.26/100ml, Tk. 125.00 /450ml

Benzyl (Acme), Lotion, Tk. 126.50/450 ml

G-B. Benzoate (Gonoshasthaya), Lotion, Tk. 25.00/100 ml

Scabex (Supreme), Emulsion, Tk. 32/100 ml

Scabisol (Jayson), Emulsion, Tk. 35.11/100 ml

CROTAMITON

Indication: Scabies.

Cautions: Should not be applied in the eyes or mouth ; acutely inflamed skin or raw or weeping surfaces and pregnancy.

Contraindications: known hypersensitivity to crotamiton, acute exudative dermatitis.

Side-effects: Pruritus, contact dermatitis, rash, irritation, warm sensation.

Dose: ADULT: Apply 10% cream/lotion to the whole body from below the chin first after bathing and drying. A second application is done after 24 hours. May need to be used once daily for 5 days for it to be effective.

Pruritic skin disorders:

ADULT: Apply 10% cream/lotion 2-3 times on skin.

CHILD < 3 years: Apply 10% cream/lotion onto the skin once daily for 3 days.

Proprietary Preparations

Crodex (GACO), Cream, 10%, Tk. 60.18/20 gm

Cronix (UniMed), Lotion, 10%, Tk. 80.00/60ml

IVERMECTIN

(See section 1.5.1.6)

Indications: Scabies, Filariasis caused by *Wuchereria bancrofti* (lymphatic filariasis), pediculosis (head lice), onchocerciasis, strongyloidosis and trichuriasis.

Cautions: Bronchial asthma

Contraindications: Bronchial asthma, known hypersensitivity to ivermectin, pregnancy

Side-effects: Nausea, vomiting or decreased appetite, diarrhoea or constipation, muscle or joint pain, swelling of the lymph nodes, fever, tiredness, dizziness, tremor, itching, eyelid swelling or eye redness.

Dose: For scabies, strongyloidosis & head lice : 200 microgram/kg single dose, repeat after 7-14 days if necessary.

Ivermectin should be administered as a single dose with a full glass (240 ml) of water on an empty stomach (1 hour before breakfast).

Proprietary Preparations

Alice Lotion (Square), Lotion, 0.5%, Tk. 130.00/60gm

(See also section 1.5.1.6 for oral preparation)

MONOSULFIRAM

Indications: Scabies.

Cautions : Avoid alcohol before and 48 hours after application.

Side-effects: Dizziness, headache, fatigue and erythematous rash

Dose: Monosulfiram is first diluted with 2-3 parts of water, and the solution is

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applied all over the body (except face and scalp) after a bath, and it should be rubbed in well once a day on two or three consecutive days.

Proprietary Preparation

Tetrasol(ACI), Solution, 25%, Tk. 68.20/30ml ml

PERMETHRIN^{ED}

Indication: Scabies and head lice, pediculosis pubis Scabies with intractable pruritus.

Cautions: Avoid contact with eyes; it should not be used on broken or secondary infected skin, pregnancy or lactation, history of asthma,

Side-effects: Burning, stinging, pruritus, erythema, tingling, rarely rashes and oedema

Dose: Scabies:

Apply over all skin surfaces from neck to toe (excluding head), and wash off after 8-12 hrs.

Adults and children > 12 years: a full 30 gm tube.

Children aged 6-12 years: up to 1/2 of a 30 gm tube

Children aged 1-5 years: up to 1/4 of a 30 gm tube

Children aged 2 months to 1 year: up to 1/8 of a 30 gm tube

Repeat after 7 days if necessary.

Head lice: Apply 30-60 ml of 1% lotion (cream rinse) to wash and towel-dried hair and allow to remain for 10 minutes. Rinse with water. Treatment may be repeated after 7-10 days if lice or nits are detected at hair-scalp junction.

Pediculosis pubis: Adult: apply sufficient amount of 1% lotion (cream rinse) or 5% cream to thoroughly saturate the pubic area. Allow to remain for 10 minute and then rinse with water.

Proprietary Preparations

Permethrin 5%

Arotrix(Aristo), Cream, Tk. 28.00/15gm; Tk. 50.00/30g

Delice(Amico), Cream, Tk. 40.00/30gm, Tk. 25.00/15gm

Deorix(Popular), Cream, Tk. 40.15/30 gm

Dermanix(Novo Health), Cream, Tk. 50.00/30gm

Elimate(Incepta), Cream, Tk. 40.00/30gm

Licerin(Drug Intl), Cream, Tk. 40.15/30 gm; Tk. 25.10/15 gm

Lorix(Opsonin), Cream, Tk. 55.37/30gm, Tk. 20.00/15gm

Mecabis(Asiatic), Cream, Tk.

40.00/30gm, Cream, Tk. 25.00/15gm

Neeper(Kemiko), Cream, Tk. 28.08/15gm; Tk. 40.12/30gm

Noscab(Beximco), Cream, Tk. 35.00/25gm

Perls(Globe), Cream, Tk. 40.00/30 gm

Perma(Alco), Cream, Tk. 35.11/30gm, Tk. 24.07/15gm

Permet(Gaco), Cream, Tk. 25.08/15 gm

Permin(Acme), Cream, Tk. 40.27/30gm, Tk. 25.17/15gm

Permisol(ACI), Cream, Tk. 45.14/30gm, Tk. 30.09/15gm

Perosa(Eskayef), Cream, Tk. 50.00/30gm

Scabex(Square), Cream, Tk. 50.15/30gm, Tk. 30.11/15gm

Scabfre(Pacific), Cream, Tk. 50.00/30gm

Scaper(Biopharma), Cream, Tk.

29.00/15gm, Tk. 50.00/30gm

Scarin(Ibn Sina), Cream, Tk. 45.00/30gm, Tk. 30.00/15gm

Skilin(General), Cream, Tk. 30.00/15gm, Tk. 55.00/30gm

Unix(Unimed), Cream, Tk. 40.00/30gm

Permethrin 5% & Crotamiton 10%

Elimate Plus(Incepta), Lotion, Tk. 100.00/60ml

Lorix Plus(Opsonin), Lotion, Tk. 60.38/60 ml

Permisol(ACI), Lotion, 5% +10 ml, Tk. 100.00/60ml

Unix-C(Unimed), Lotion, Tk. 100/60 ml

PRECIPITATED SULFUR

Indication: Scabies, particularly in pregnancy

Cautions: Avoid contact with the eyes.

Side-effects: Noxious odor and mild skin irritation.

Dose: Apply for 24 hours, then wash off, and repeat daily for 5 days

Proprietary Preparations

Coal Tar Solution 12%+ Salicylic Acid 2% +

Precipitated Sulphur 4%

Soritar(Unimed), Scalp Oint. Tk. 200/30 gm

12.3 TOPICAL CORTICOSTEROIDS

CORTICOSTEROID (TOPICAL)

Indications : Dermatitis and papulosquamous diseases: atopic

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dermatitis, diaper dermatitis, dyshidrotic eczema, erythroderma, lichen planus, lichen simplex chronicus, nummular dermatitis, pityriasis rosea, psoriasis (intertriginous), psoriasis (plaque or palmoplantar), seborrheic dermatitis

Bullous diseases:

Bullous pemphigoid, cicatricial pemphigoid, epidermolysis bullosa acquisita, pemphigus foliaceus

Connective tissue diseases: dermatomyositis, lupus erythematosus

Other dermatologic uses: behçet's disease, pyoderma gangrenosum, alopecia areata, acne keloidalis nuchae, cutaneous T cell lymphoma (patch-stage), granuloma annulare, lichen planopilaris, lichen sclerosis et atrophicus, morphea, pruritus (perianal, vulvar, scrotal), sarcoidosis, vitiligo

Cautions: if secondary infection occurs during treatment, appropriate systemic or local antimicrobials should be added.

Interactions: See Appendix-2.

Systemic Side-effects: Suppression of hypothalamic-pituitary-adrenal axis, iatrogenic Cushing's syndrome, growth retardation in infants and children

Local side-effects: Epidermal atrophy, steroid-induced acne, prominent vasculature, striae, purpura, allergic or irritant contact dermatitis, tachyphylaxis, glaucoma/cataracts, facial hypertrichosis, folliculitis, miliaria, genital ulceration, exacerbation or increased susceptibility to bacterial, fungal, and viral infections, reactivation of Kaposi's sarcoma, perioral dermatitis, rosacea, delayed wound healing, skin atrophy especially on thin skin areas such as the face or skin flexures. Absorption through the skin can cause pituitary adrenal axis suppression and Cushing's syndrome.

Contraindications: Infants under 1 year of age, known hypersensitivity to the topical corticosteroid, bacterial, mycobacterial, fungal, viral infection, infestation, ulceration

Dose: apply 1-2 times daily.

BETAMETHASONE DIPROPIONATE^[ED]

Indications: Atopic eczema, nummular

eczema, contact dermatitis, neurodermatitis, anogenital and senile pruritus, lichen planus and psoriasis

Cautions: Should not be used in or near the eyes: see notes above

Contraindications: Disorders of calcium metabolism, children below 18 years of age, erythrodermic, exfoliative and pustular psoriasis, severe renal insufficiency, severe hepatic disorders, and it is not to be used in ophthalmic conditions; see notes above

Interactions: See Appendix-2.

Side-effects: See notes above

Dose: Apply a thin film once or twice daily to cover completely the affected area

Proprietary Preparations

Betamethasone (as dipropionate) 0.1% + Clotrimazole 1%

Betavate CL (Drug Intl), Oint. Tk. 29.10/10gm

Bet-CL (Acme), Cream, Tk. 29.20/10gm; Oint., Tk. 29.08/10gm

Betnovate CL (GSK), Oint, Tk. 29.39/10gm

Betson (Opsonin), Cream, Tk. 25.09/ 10 gm; Oint., Tk. 29.31/ 10 gm

Derson (Kemiko), Oint., Tk. 29.08/10gm

Oni (Square), Cream, Tk. 35.11/10gm

Topibet (Eskayef), Cream, Tk. 30.00/10gm

Dose: Apply twice daily, tinea cruris/corporis: for 2 weeks, tinea pedis: for 4 weeks

Betamethason Dipropionate 9.75mg +

Clotrimazole 150mg + Gentamicin 15mg

Bet-CG (Acme), Cream, Tk. 75.00/15gm

Aristoderm (Aristo), Cream, Tk. 75/15gm.

BETAMETHASONE VALERATE^[ED]

Indications: See notes above

Cautions, Contraindications, Side-effects: See notes above

Dose: Apply 2-3 times daily till remissions occur

Proprietary Preparations

Betamethasone (as Valerate)

Bet-A (Acme), Oint., 0.05%, Tk. 35.00/15 gm; Cream, 0.1%, Tk. 33.00/15 gm

Betaderm (Incepta), Oint., 0.05%, Tk. 35.00/15 gm

Betaval (Healthcare), Cream, 0.1%, Tk.

33.00/15 gm; Oint., 0.1%, Tk. 35.00/15 gm

Betnelan (GSK.), Cream, 0.1%, Tk. 39.36/20

gm; Oint., 0.1%, Tk. 42.23/20 gm

Betson (Opsonin), Cream, 0.05%, Tk.

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33.56/15 gm; Oint., 0.05%, Tk 35.14/15 gm
Diprobet(Square), Cream, 0.05%,
 Tk.33.56/15gm; Oint.,0.05%,Tk. 35.14/15gm
Mexiderm(Biopharma), Cream, 0.05%,
 Tk.25.09/15gm; Oint.,0.05%,Tk.30.11/15 gm
Sinacort(Ibn Sina), Cream & Oint., 0.1%, Tk.
 20.00/10 gm

Betamethasone (as valerate)0.1% + Neomycin
 sulphate 0.5% :

Albevat-N(Albion), Oint., Tk. 18.47/5 gm
Aristobet-N(Aristo), Oint., Tk. 14.30/3 gm;
Betaderm N(Incepta), Oint., Tk. 22/15 gm
Betameson-N(Square), Cream, Tk.22.08/5gm
Betamycin(Supreme), Oint., Tk.15.30/5 gm
Betaval N(Healthcare), Oint., Tk.18.54/15gm;
 Cream, Tk. 18.51/5 gm
Betavate-N(Drug Intl), Cream, Tk. 21.55/10gm
Betnovate-N(GSK), Cream, Tk. 16.29/5 gm;
 Oint., Tk. 16.31/5 gm
Betson-N(Opsonin), Cream, Tk.18.51/5 gm
Mexiderm-N(Biopharma), Cream, Tk. 15.06/5
 gm; OintTk.16.06/5 gm
Neobet(Acme), Cream, Tk. 22.08/10 gm;
 Oint., Tk. 22.63/5 gm
Neocort(Ibn Sina), Oint., Tk. 18.53/15 gm
Relitch(Drug Intl), Oint., Tk. 30.00/15 gm

Betamethasone valerate 0.05% + Lidocaine
 Hydrochloride 2.5% + Phenylephrine
 Hydrochloride 0.1% rectal ointment

Relief of symptoms of itching, irritation,
 discomfort or pain for local non-infective anal
 or perianal conditions associated with external
 haemorrhoids

Proprietary Preparations

See section 2.7.2

CLOBETASONE BUTYRATE

Indications, Cautions, Side-effects:
 See notes above.

Dose: Apply to the affected area up to 4
 times daily until improvement occurs,
 when the frequency of application may
 be reduced

Proprietary Preparations

Eumovate(GSK), Cream, 0.05%, Tk.
 41.48/10gm; Skin Oint, 0.05%, Tk. 41.50/10gm
Ezex(Square), Cream, 0.05%, Tk.
 75.51/25gm; Oint., 0.05%, Tk. 75.51/25gm
Miclo(General), Cream, 0.05%, Tk.
 40.27/10gm,; Oint., 0.05%, Tk. 40.27/10gm

CLOBETASOL PROPIONATE

Indications : Severe resistant

inflammatory skin disorder (recalcitrant
 psoriasis)

Cautions: See notes above

Contraindications: See notes above

Side-effects: See notes above

Dose: Apply sparingly to the affected
 area once or twice daily until
 improvement occurs. As with other
 highly active topical steroid
 preparations, therapy should be
 discontinued when control is achieved.
 If a longer course is necessary, it is
 recommended that treatment should not
 be continued for more than four weeks
 without the patient's condition being
 observed.

Clobetasol propionate scalp solution:

Apply required quantity of spray of
 clobetasol scalp solution once or twice
 daily to the affected areas of the scalp
 and gently rub in. The total dose applied
 should not exceed 50 ml weekly. If
 necessary, the solution may be
 massaged into the scalp using the tips of
 the fingers. Therapy should be
 discontinued if no response is noted
 after one week or as soon as the
 lesion heals. It is advisable to use
 clobetasol propionate scalp solution for
 brief periods only.

Proprietary Preparations

Aclobet(Acme), Cream, 0.05%, Tk. 45.13/10
 gm; Oint.,0.05%, Tk. 50.14/10gm
Clobederm(Drug Intl), Cream, 0.05%, Tk.
 50.20/10gm,; Oint., 0.05%, Tk. 50.00/10gm
Clonate(Kemiko), Oint., 0.05%, Tk.
 50.14/10gm,; Cream, 0.05%, Tk.58.17/10gm
Clobesol(Aristo), Cream, 0.05% , Tk. Tk.
 58.00/10 gm; Oint., 0.05%, 68.00/10 gm
Clovate(ACI), Oint., 0.05%, Tk. 68.20/10 gm
Comol(Sanofi), Oint., 0.05%, Tk.68.20/10 gm
Darmacort(Ibn Sina), Cream, 0.05%, Tk.
 50.00/10gm,; Oint., 0.05%, Tk. 52.00/10gm
Dermasol(Square), Cream, 0.05%, Tk.
 70.48/20gm,; Oint., 0.05%, Tk. 75.5/20gm
Dermex(Opsonin), Cream, 0.05%, Tk.
 43.97/10 gm,; Oint., 0.05%, Tk. 48.88/10 gm
Dermovate(GSK), Cream, 0.05%, Tk.
 59.06/10gm, Oint., 0.05%, Tk. 69.13/10gm
Dersole(Sharif), Cream, 0.05%, Tk.
 45.13/10g, Oint., 0.05%, Tk. 50.14/10gm
Eclo(General), Cream, 0.05%, Tk.
 58.00/10gm,; Oint., 0.05%, Tk. 68.00/10gm
Exovate(Beximco), Cream., 0.05%, Tk.
 45.00/10gm,; Oint., 0.05%, Tk. 50.00/10gm
Nyclobate(Incepta), Cream, 0.05%, Tk.
 45.00/10gm, Tk. 70.00/20gm; Oint., 0.05%, Tk.

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50.00/10gm, Tk. 75.00/20gm
Protasol(Asiatic), Cream, 0.05%, Tk. 45.00/10gm; Oint., 0.05%, Tk. 50.00/10gm
Skinovate(Gaco), Cream, 0.05%, Tk. 35.11/10 gm
Synovate(Popular), Cream, 0.05%, Tk. 85.32/25mg,Tk. 50.19/10mg; Oint., 0.05%, Tk. 85.32/25 gm
Temovate(Healthcare), Cream, 0.05%, Tk. 58.00/10gm; Oint., 0.05%, Tk. 68.00/10 gm
Topiclo(Eskayef), Cream., 0.05%, Tk. 45.00/10gm,; Oint., 0.05%, Tk. 50.00/10gm
Xderm(Biopharma), Oint., 0.05%, Tk. 50.19/10gm; Cream, 0.05%, Tk. 45.17/10gm
Xenocort(Orion), Cream, 0.05%, Tk. 40.27/10gm; Oint., 0.05%, Tk. 50.35/10gm
Xenovate(UniMed), Cream, 0.05%, Tk. 58.00/10gm; Oint., 0.05%,Tk. 68.00/10g, Tk. 150.00/30g

Clobetasol propionate scalp solution 0.05%
Clovate(ACI), Scalp Solu., 0.05%, Tk. 206.00/30 ml Solu. 0.05%, Tk. 200.60/30ml
DermasolS(Square), Scalp Solu, 50 mg/100 ml, Tk. 200.61/25ml ml
Dermovate(GSK), Scalp Lotion,0.05%,Tk. 250.00/30ml
Nyclobate(Incepta), Scalp Application, 50 mg/100 ml, Tk. 200.00/30 ml; Shampoo, 50 mg/100ml, Tk.350.00/60 ml

Clobetasol propionate0.05% +Salicylic acid ointment3% /cream
Topiclo S(Eskayef), Oint, 0.05% + 3%, Tk. 70.00/10 gm
Clobesol(Aristo), Oint., Tk. 70.00/10gm
Closalic(Ziska), Oint., Tk. 70.00/10gm
Topiclo(Eskayef), Oint., Tk. 120.00/20gm,Tk. 70.00/10gm
Topiclo(Eskayef), Oint., Tk. 120.00/20gm, Tk. 70.00/10gm,
Xenosol(UniMed), Oint., Tk.150.00/30g

Clobetasol Propionate 0.5mg + Neomycin Sulphate 5mg + Nystatin 1lac unit/gm
AclobetN(Acme), Oint.,Tk. 65.45/15gm,; Cream, Tk. 60.18/15gm
ClonateNN(Kemiko), Cream, Tk. 75.22/15gm
ClovateN(ACI), Cream, Tk. 65.20/10g ,; Oint., Tk. 70.21/15gm
Comol-NN(Sanofi), Oint., Tk. 65/15 gm; Cream, Tk. 65/10 gm
DermasolN(Square), Cream, , Tk. 70.21/15gm,; Oint., Tk. 75.22/15gm
DermexN(Opsonin), Cream, Tk. 55.21/10gm
ExovateN(Beximco), Cream.,Tk. 90.00/25gm
NyclobateNN(Incepta), Cream, Tk. 60/10gm; Tk. 80.00/20gm
TopicloNN(Eskayef), Oint., Tk. 65.00/15gm,Tk. 65.00/15gm
Vesol N(Novo Health), Cream, Tk. 60/10gm
Xenoderm(UniMed), Oint., Tk. 150.00/30g,;

Cream Tk. 150.00/30g

DESONIDE

Indications: Mild to moderate atopic dermatitis in patients 3 months of age and older

Cautions:Use only externally and avoid contact with the eyes. It should not be used on the underarm or groin areas of pediatric patients.

Contraindications: Pregnancy, lactation, known hypersensitivity

Side-effects: See notes above

Dose:Gel should be applied as a thin layer to the affected areas two times daily and rubbed in gently.

Proprietary preparation

Desotop(ACI)Gel, 0.5%,Tk.50.19/15gm

DIFLORASONE DIACETATE

Indications, Cautions,

Contraindications, Side-effects: See notes above

Dose: Apply to the affected areas as a thin film from 1-2 times daily depending on the severity of the condition

Proprietary Preparations

Eczena(Square), Cream, 0.05%, Tk.70.48/10gm;Oint., 0.05%, Tk. 70.48/10 gm

FLUCINOLONE ACETONIDE

Indications: Inflammatory skin disorders such as eczema, psoriasis; also see notes above

Cautions: Children, elderly, hepatic failure, prolonged use on the face, avoid contact with eyes

Interactions: See notes above

Contra-indication: See notes above

Side-effects:See notes above

Dose:Apply 2 times a day

Proprietary Preparations

Skinalar(ACI), Oint., 0.03%, Tk. Tk. 38.12/5gmgm ;Cream, 0.03%, Tk. 38.12/5gm gm
Dermidex(Amico), Cream, 0.03%, 25mg/100gm, TK. 30.00/5gm

Flucinolone+Neomycin

Skinalar-N(ACI), Cream, 0.025%+0.5%, Tk. 40.12/5 gm; Oint., 0.025%+0.5%, Tk. 40.12/5gm
Flucinolone Acetonide 0.01% + Hydroquinone 4% + Tretinoin 0.05%
Amela (Ibn Sina), Cream, Tk. 200.00/30gm

FLUTICASONE PROPIONATE

Indications: Inflammatory skin disorder such as eczema and dermatitis; see notes above

Cautions, Contraindications, Side-effects, Dose: See notes above

Proprietary Preparations

Cutisone(General), Oint., 0.05%, Tk. 50.34/10gm, Cream, 0.05%, Tk. 96.65/10gm
Cutivate(GSK), Cream, 0.05%, Tk. 115.78/10gm,; 0.005%, Tk. 80.04/10gm
Fluticare(Ibn Sina), Cream, 0.05%, Tk. 96.00/10g; 0.01%, Tk. 50.00/10gm
Flutiderm(Drug Intl), Oint., 0.005%, Tk. 90.30/10gm
Fluvate(Opsonin), Oint., 0.005%, Tk. 50.19/10gm
Lutisone(Incepta) Oint., 0.05%, Tk. 50.00/10gm
Ticas(Square), Cream, 0.05%, Tk. 90.61/10gm
Ticason(Asiatic), Cream, 0.05%, Tk. 90.00/10gm; 0.005%, Tk. 40.00/10gm

HALCINONIDE

Indications: Short-term treatment for severeresistant inflammatory skin disorder such as recalcitrant psoriasis(See also notes above)

Cautions, Contraindications, Side-effects: See notes above

Dose: Apply to the affected areas 2-3 times daily

CHILD: Apply minimal amount necessary for effective therapy

Proprietary Preparations

Cinon(Ambee), Cream, 0.1 %, Tk.16/5 gm
Dermalog(Jayson), Cream, 0.1 %, Tk. 30.34/10gm,
Zemalog (Gaco), Cream, 0.1%, Tk. 18/5 gm

HALOBETASOL PROPIONATE

Indications, Cautions, Contraindications, Side-effects: See notes above

Dose: Apply 1-2 times daily for 2 weeks

Proprietary Preparations

Halobetasol Propionate 0.05%
Halobet(Square), Cream, Tk. 90.27/10gm,; Oint., Tk. 90.27/10gm
Halocort(ACI), Cream, Tk. 135.41/15gm ,Tk. 90.27/10gm; Tk. 135.41/15gm, Tk. 90.27/10gm
Ulticort(Incepta), Cream, Tk.120.00/15gm

HALOMETASONE

Indications: See notes above

Cautions: Continuous therapy should not exceed 2 to 3 weeks

Contraindications : Viral infection of the skin, syphilitic skin affections, tuberculosis of the skin, acne vulgaris, known hypersensitivity to halomethasone

Side-effects: Burning sensation, itching and signs of inflammation at the site of application

Dose: Apply twice daily

Proprietary Preparations

Sicorten(Novartis), Cream 0.05%; Oint. 0.05%; Tk. 77/5gm
Sicorten Plus(Novartis), Cream. Halometasone + Triclosan 0.1%. Tk. 83/5gm
Halometasone + Triclosan 0.1%:
 Steroid-responsive inflammatory dermatoses.

HYDROCORTISONE^[ED]

Indications: Corticosteroid-responsive dermatoses

Proprietary Preparations

Hydrocortisone 1%
Cortider(Eskayef), Cream, Tk. 35.00/10 gm
Cortimet(Medimet), Cream, 1gm, Tk.28/10gm
Genacort(General), Oint., Tk. 15.06/5 gm
Hydrocort(Alco), Cream, Tk. 28.00/10 gm
Intasone(Incepta), Cream, Tk. 30.00/10 gm
Topicort(Square), Cream, Tk. 40.00/10 gm
Zocort(ACI), Cream, Tk. 38.14/15 gm

Hydrocortisone 1% + Miconazole 2%:

Topical treatment of inflamted dermatoses, where inflammation coexists.

Fungidal(Square), Cream, Tk. 40.27/10gm
Gemison(General), Cream, Tk. 40.27/10gm
MHC(Sharif), Cream, Tk. 40.12/10g
Mic HC(Globe), Cream, Tk. 40.00/10gm
Miconil(Nipa), Cream, Tk. 40.00/10gm
Micosone(ACI), Cream, Tk. 40.27/10gm,; Oint., Tk. 40.27/10gm
Micozole(G.A.co), Cream, Tk. 40.12/10 gm

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Miki(Orion), Cream, Tk. 40.27/10gm
Topicalazole(Incepta), Cream, Tk. 40.00/10gm
Unigal(Opsonin), Cream, Tk. 40.15/10gm

Hydrocortisone 1% + Pramoxine 2.5% cream: Inflammatory and pruritic manifestations of corticosteroid-responsive dermatoses, minor skin irritations, anal itching or hemorrhoids, insect bites etc

CLOTRIMAZOLE+HYDROCORTISONE

(see also under clotrimazole in section 12.2.2.)

Indications, Cautions; Contra-indications & Side effects: See notes above.

Dose: Apply 2-3 times daily on affected and surrounding areas, for dermatophytoses: 3-4 weeks, candidiasis: 1-2 weeks

Proprietary Preparations

Clotrimazole 1% + Hydrocortisone 1%
Clotison(Biopharma), Cream, Tk. 30.11/10gm
Neosten HC(Beximco), Cream, Tk. 35/10 gm; Tk. 55.00/20 gm
HTrimazole(Opsonin), Cream, Tk. 35.63/10gm
Clori HC(Amulet), Cream, Tk. 35.00/10 gm

MOMETASONE FUROATE

Indications: Severe inflammatory skin disorders such as eczemas unresponsive to less potent corticosteroid; psoriasis

Cautions, Contra-indications & Side-effects: See notes above

Dose: 1% cream/ointment: apply thinly once daily (to scalp in case of lotion). Do not use for more than 3 weeks in children

Proprietary Preparations

Mometasone Furoate 0.1%
Momtec(Sanofi), Cream, Tk. 100/5 gm; Tk. 180/10 gm
Elocan(General), Oint., Tk. 100.38/5 gm
Momeson(Incepta), Cream, Tk. 100.00/5gm.;
Mometa(Popular), Cream, Tk. 180.68/10gm, Tk. 100.38/5gm
Momtas(Globe), Cream, Tk. 180.00/10 gm
Soneta(Aristo), Cream, Tk. 100.00/5g, Tk. 500.00/30g.; Oint., Tk. 100.00/5g, Tk. 550/50g

TRIAMCINOLONE ACETONIDE

Indications: Short-term treatment only for severe resistant inflammatory skin disorder such as recalcitrant psoriasis; also see notes above

Oral paste: Mouth ulceration

Dose: Apply onto lesion without rubbing until a thin film appears, apply 2-3 times a day preferably after meals

Proprietary Preparations

Triamcinolone Acetonide 0.1%
Aristocort(Aristo), Oint., Tk. 25.00/10g; Tk. 25.00/10g
Cortefin(ACI), Oint., Tk. 25.08/10gm; Cream, Tk. 25.17/10gm;
Skinaderm(Kemiko), Oint., Tk. 20.06/10gm
Stelone(General), Oint., Tk. 25.16/10gm
Trialon(Drug Intl), Cream, Tk. 25.00/10 gm; Oral Paste, Tk. 100.30/10 gm;

NYSTATIN+NEOMYCIN+GRAMICIDIN +TRIAMCINOLONE ACETONIDE:

Atopic eczema, contact eczema, follicular eczema, infantile eczema, anogenital pruritis (anal and vulval pruritis), nummular eczema, post-traumatic infective eczema, seborrhoeic or flexural eczema, neurodermatitis, psoriasis.

Dose: Apply 2-3 times daily for 2-4 weeks.

Proprietary Preparations:

Nystatin 10,000 units, Neomycin Sulphate 2.5mg, Gramicidin 0.25mg, Triamcinolone Acetonide 1mg/g
Tetracomb(Pharmasia), Cream, Tk. 22.00/5 gm; Tk. 35.00/10 gm; Oint., Tk. 22.00/5 gm; Tk. 35.00/10 gm

Triamcinolone acetonide intralesional

injection: Alopecia areata, discoid lupus erythematosus, keloids, localized hypertrophic, infiltrated, inflammatory lesions of granuloma annulare, lichen planus, lichen simplex chronicus (neurodermatitis), and psoriatic plaques; necrobiosis lipoidica diabetorum.

Cautions, Contraindications, Side-effects: See notes above.

Proprietary Preparations

(See section 5.3.2)

Cinchocaine Hydrochloride + Esculin + Hydrocortisone + Neomycin Sulphate

Internal and external haemorrhoids, anal fissure, anal pruritus, perianal eczema, preoperative and postoperative treatment of haemorrhoidectomy, postpartum haemorrhoidal conditions, and as prophylaxis in between haemorrhoidal attacks.

Proprietary Preparations:

(See section 2.7.2)

Dose: Apply 2 times daily in the painful pruritic area and after each stool.

12.4 SYSTEMIC CORTICOSTEROIDS

(see section 5.3.2)

BETAMETHASONE^[ED]

Indications, Cautions, Contraindications & Side-effects: See section 5.3.2

Proprietary Preparations:

See also section 5.3.2

DEFLAZACORT

Indications, Cautions, Contraindications & Side-effects: See section 5.3.2

Proprietary preparations

see section 5.3.2

DEXAMETHASONE^[ED]

Indications, Cautions, Contraindications, Side-effects: See section 5.3.2

Proprietary preparations

See also section 5.3.2

HYDROCORTISONE^[ED]

Indications, Cautions, Contraindications, Side-effects: See section 5.3.2

Proprietary preparations

see section 5.3.2

METHYLPREDNISOLONE^[ED]

Indications, Cautions, Contraindications, Side-effects: See section 5.3.2

Proprietary preparations

See section 5.3.2

PREDNISOLONE^[ED]

Indications, Cautions, Contraindications, Side-effects: See section 5.3.2

Proprietary preparations

See section 5.3.2

TRIAMCINOLONE

Indications, Cautions, Contraindications, Side-effects: See section 5.3.2

Proprietary preparations

See section 5.3.2

12.5 ANTIHISTAMINES, ANTIPRURITICS AND TOPICAL LOCAL ANAESTHETICS

(See also sec. 4.8.1)

H₁ antihistamines are first-line therapy for chronic idiopathic and physical urticarias. They may be useful in treating other conditions with histamine-driven pruritus. Limited evidence supports the use of antihistamines in the treatment of atopic dermatitis. Certain special patient populations, including children, the elderly, and patients with renal or hepatic impairment, may require dosage adjustments when using H₁ antihistamines. H₂ antihistamines may be a useful adjunct to H₁ antihistamine therapy in refractory cases of chronic idiopathic urticaria/angioedema and pruritus.

First generation (sedating) antihistamines consist of **Hydroxyzine**,

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Pheniramine, Chlorpheniramine, Diphenhydramine, Promethazine, mebhydrolin and mepyramine. Second generation (less-sedative) are **Fexofenadine, Cetirizine, Levocetirizine, Loratadine, Desloratadine, Ebastine, Mizolastine, and Rupatadine**
Indications: Acute urticaria, chronic idiopathic urticaria, physical urticarias and dermatographism, atopic dermatitis systemic mastocytosis, pruritus associated with other conditions

Cautions: patients taking benzodiazepines, other non psychiatric agents, older ages

Contraindications: known hypersensitivity to antihistamines

Interactions: See Appendix-2

Side-effects: First generation antihistamines: significant sedation. Second generation: somnolence and cognitive impairment; hyperexcitability, dry mouth, constipation, dysuria, erectile dysfunction, tachycardia, blurred vision

CETIRIZINE

Indications, Cautions,

Contraindications, Side-effects: See notes above

Dose: ADULT: 10 mg once daily or 5 mg twice daily

Syrup: CHILD 12 years and above: 10 ml (2 teaspoonful) daily

CHILD 6 - 11 years: 5 ml (1 teaspoonful) daily

CHILD 6 months - 5 years: 2.5 ml (1/2 teaspoonful) daily

Proprietary Preparations

Acitrin(ACI), Tab., 10 mg, Tk. 3.00/Tab;

Paed. drops, 2.5 mg/ml, Tk. 25.00/15 ml;

Syrup, 5 mg/5 ml, Tk. 30.00/60 ml

Alatin(Concord), Tab., 10 mg, Tk. 2.00/Tab.

Alatrol, (Square),

Paed. drop, 125mg/1.25ml, Tk. 25.00/15

ml; Syrup, 5 mg/5 ml, Tk. 25.00/15 ml; Tab., 10

mg, Tk. 3.00/Tab.

Allernil(Kemiko), Syrup, 5 mg/5 ml, Tk.

25.00/60 ml; Tab., 10 mg, Tk. 2.50/Tab.

Antrin(Central), Tab., 10 mg, Tk. 2.50/Tab.

Arcet(JMI), Syrup, 5 mg/5 ml, Tk.

25.00/60ml; Tab., 10 mg, Tk. 2.00/Tab.

Asitrol(Asiatic), Syrup, 5 mg/5 ml, Tk.

16.00/60 ml Tab., 10 mg, Tk. 2.00/Tab.

Atrizin(Beximco.), Paed. drop, 2.5 mg/ml, Tk.

25.00/15 ml; Syrup, 5 mg/5 ml, Tk. 30.00/60 ml; Tab., 10 mg, Tk. 3.00/Tab.

Beticin(Bios Pharma), Tab., 10 mg, Tk.

2.25/Tab.; Tab., 10 mg, Tk. 2.25/Tab.

Celozin(Leon), Tab., 10 mg, Tk. 2.50/Tab.

Cetirizine(Albion), Syrup, 5 mg/5 ml, Tk.

16.00/60 ml; Tab., 10 mg, Tk. 2.50/Tab.

Cetirizine(APC), Syrup, 5 mg/5 ml, Tk.

16.00/60 ml; Tab., 10 mg, Tk. 2.50/Tab.

Cetizin(Acme), Tab., 10 mg, Tk. 3.00/Tab.

Cetriben(Benham), Tab., 10 mg, Tk. 2.50/Tab.

Cetri-Mak(Maks), Tab., 10 mg, Tk. 2.50/Tab.

Cetirin(Drug), Tab., 10 mg, Tk. 3.00/Tab.

Cetritz(Astra), Tab., 10 mg, Tk. 2.50 /Tab

Cetrol(Doctor TIMS), Tab., 10 mg, Tk.

3.00/Tab.

Citin(Opsonin), Syrup, 5 mg/5 ml, Tk.

18.80/60 ml; Tab., 10 mg, Tk. 1.89/Tab.

CTZ(Delta), Tab., 10 mg, Tk. 1.00/Tab.

CZ(Organic), Tab., 10 mg, Tk. 2.50/Tab.

Dyno(Rephco), Tab., 10 mg, Tk. 2.00/Tab.

Dyzin(Amico), Syrup, 5 mg/5 ml, Tk. 16.00/60

ml; Tab., 10 mg, Tk. 2.50/Tab.

G-Cetirizine(Gonoshasthaya), Tab., 10 mg,

Tk. 2.00/Tab.

Noler, (Alco), Syrup, 5 mg/5 ml, Tk. 16.00/60

ml; Tab., 10 mg, Tk. 2.50/Tab.

Nosemin(Ibn Sina), Syrup, 5 mg/5 ml, Tk.

20.00/60 ml; Tab., 10 mg, Tk. 3.00/Tab.

Ontin(Eskayef), Syrup, 5 mg/5 ml, Tk.

20.00/60 ml; Tab., 10 mg, Tk. 2.50/Tab.

Procet(Somatec), Syrup, 5 mg/5 ml, Tk.

20.00/60 ml; Tab., 10 mg, Tk. 2.50/Tab.

Rhinil(Aristo), Syrup, 5mg/5ml, Tk. 20.00/60ml

; Tab., 10 mg, Tk. 2.50/Tab.

Rinzin(Globex), Tab., 10 mg, Tk. 3.00/Tab.

Riz(Orion Pharma), Syrup, 5 mg/5 ml, Tk.

20.00/60 ml; Tab., 10 mg, Tk. 3.00/Tab.

Sarcet(White Horse), Tab., 10 mg, Tk.

2.50/Tab.

Setir(Amulet), Tab., 10 mg, Tk. 2.00/Tab.

Sistin(Supreme), Syrup, 5 mg/5 ml, Tk.

16.00/60 ml; Tab., 10 mg, Tk. 2.50/Tab.

Trizin(Navana), Syrup, 5 mg/5 ml, Tk.

16.00/60 ml; Tab., 10 mg, Tk. 1.00/Tab.

CHLORPHENIRAMINE^[ED]

Indications, Cautions,

Contraindications, Side-effects: See

notes above and see section 4.8.1.

Dose: ADULT: 4 mg every 4-6 hourly

Maximum 24 mg daily

Proprietary Preparations

Antista(Square), Syrup, 2 mg/5 ml, Tk.

21.78/100 ml

Biocin(Biopharma), Syrup, 2 mg/5 ml, Tk.

21.78/100 ml; Tab., 4 mg, Tk. 0.20/Tab.

Centagan(Central), Syrup, 2 mg/5 ml, Tk.

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9.50/60 ml ;Tk. 12.00/100 ml
Chlorpheniramine(Popular), Tab., 4 mg, Tk. 0.20/Tab.
Clomin(Alco), Syrup, 2 mg/5 ml, Tk. 13.00/100 ml
Cloramin(Orion), Syrup, 2 mg/5 ml, Tk. 21.78/100 ml
Cytacin(Albion), Tab. , 4 mg, Tk. 0.20/Tab.
G-Antihistamine(Gonoshasthaya), Tab., 4mg, Tk. 0.20 /Tab ;Syrup, 2 mg/5 ml, Tk. 17.00/100 ml; Tk. 11.70/60 ml
Hisnul(Somatec), Syrup, 2 mg/5 ml, Tk. 21.78/100 ml
Histacin(Jayson), Inj. 10 mg/ml, Tk. 3.34/Amp.;Syrup, 2 mg/5 ml, Tk. 14.90/60 ml;Tk. 21.78/100 ml; Tab., 4 mg,Tk. 0.29/Tab.
Histaco(Supreme), Syrup, 2 mg/5 ml, Tk. 11.70/60 ml; Tab. , 4 mg, Tk. 0.20/Tab.;Tab. , 4 mg,Tk. 0.20/Tab.
Histal(Opsonin), Syrup, 2 mg/5 ml, Tk. 10.34/60 ml
Histalex(Acme), Syrup, 2 mg/5 ml, Tk. 21.78/100 ml;Tab., 4 mg, Tk. 0.3/Tab.
Histam(Maks), Syrup, 2 mg/5 ml, Tk. 11.70/60 ml ;Tk. 21.75/100 ml
Hitagen(General), Syrup, 2 mg/5 ml, Tk. 14.03/100 ml;Tk. 8.03/60 ml;Tab., 4 mg, Tk. 0.20/Tab.
Penamin(APC), Tab., 4 mg, Tk. 0.20/Tab. ; Syrup, 2 mg/5 ml, Tk. 11.70/60 ml
Pheramin , (Amico) , Tab. , 4 mg, Tk. 0.20/Tab.
Piriton(GSK), Syrup, 2 mg/5 ml, Tk. 19.13/100 ml ;Tab. 4 mg,Tk.0.18/Tab.
Safamin(Benham), Syrup, 2 mg/5 ml, Tk. 21.00/100 ml
Sinamin(Ibn Sina), Syrup, 2 mg/5 ml, Tk. 21.78/100 ml ;Tab., 4 mg, Tk. 0.20/Tab.

DESLORATADINE

Indications, Cautions, Contraindications, Side-effects:See notes above and section 4.8.1
Dose:ADULT and CHILD over 12 years: Tablet:One tablet (5 m g) once daily.
CHILD 2-5 years:Syrup: 2.5ml (1/2teaspoonful) daily

Proprietary Preparations

Alertadin(Beacon), Tab. , 5 mg, Tk. 2.50/Tab.; Tab. , 5 mg, Tk. 2.50/Tab.
Aslor(Drug int.), Tab. , 5 mg, Tk. 2.50/Tab.
Benlor (Benham), Tab. , 5 mg, Tk. 3.00/Tab.
Clarex(Asiatic), Tab. , 5 mg, Tk. 2.50/Tab.
Deen(Kemiko), Tab. , 5 mg, Tk. 2.50/Tab.
Delosia(Pharmasia), Syrup, 2.5 mg/5 ml, Tk. 28.00/60 ml ;Tab. , 5 mg, Tk. 2.50/Tab.
Delot(Apex), Syrup, 2.5 mg/5 ml, Tk. 25.00/60 ml; Tab. , 5 mg, Tk. 2.00/Tab.

Delotad(Organic), Tab. , 5 mg, Tk. 2.50/Tab.
Derat(Pacific), Tab., 5 mg, Tk. 1.88/Tab.
Des(Opsonin), Syrup, 2.5 mg/5 ml, Tk. 18.86/60 ml;Tab., 5 mg, Tk. 1.89/Tab.
Desatrol(Navana), Syrup, 2.5 mg/5 ml, Tk. 25.08/60ml; Tab.,5 mg, Tk. 2.51/Tab.
Desgud(Leon), Tab., 5 mg, Tk. 3.00/Tab.
Deslor(Orion), Syrup, 2.5 mg/5 ml, Tk. 30.00/60 ml ;Tab., 5 mg, Tk. 3.50/Tab.;
Deslor Kidz (Orion). Paed.drops, 50mg/100ml, Tk. 25.00/15 ml
Desloratadine(Albion), Tab., 5 mg, Tk. 2.50/Tab.
Deslorin(ACI), Syrup, 2.5 mg/5 ml , Tk. 25.09/60 m;Tab., 5mg, Tk. 2.50/Tab.
Desodin(Eskayef), Tab, 5 mg, Tk. 3.00/Tab.
Desolet(Amulet), Tab., 5 mg, Tk. 2.50/Tab.
Desta(White Horse), Tab , 5 mg, Tk. 2.50/Tab.
Destin(Unimed), Syrup, Tk. 25.00/60 ml; Tab., 5 mg, Tk. 2.50/Tab.
Lara(Hudson), Tab.,5 mg, Tk. 2.50/Tab.
Momento(Beximco.), Syrup, 2.5 mg/5 ml, Tk. 25.00/60 ml ;Tab. , 5 mg, Tk. 2.50/Tab.
Neocilor(Incepta), Syrup, 2.5 mg/5 ml, Tk. 25.00/50 ml; Tab. , 5 mg, Tk. 2.50/Tab.
Neolor(Supreme), Tab., 5 mg, Tk. 2.50/Tab.
Orinex(Acme), Tab., 5 mg, Tk. 2.51/Tab.
Relergy(General), Tab., 5 mg, Tk. 2.51/Tab.
Sarinex(Delta), Tab., 5 mg, Tk. 2.50/Tab.
Sedno(Square), Syrup, 2.5 mg/5 ml, Tk. 25.10/60 ml; Tab., 5 mg, Tk. 2.51/Tab.

DIMETHOTHIAZINE MESYLATE

Indications: See notes above
Cautions: ELDERLY (above 65 years), hepatic and renal impairment. Also see notes above
Contraindications, Side-effects:See notes above
Dose:ADULT: 20 mg 3 times a day up to 120 mg daily in 3 divided doses

Generic Preparation

Tablet, 20 mg

DIPHENHYDRAMINE

Indications, Cautions, Contraindications, Side-effects: See notes above and see section 4.8.1
Dose: Allergic conditions are controlled with 25 to 50 mg (12.5 to 25 ml of syrup) 3 to 4 times a day.
CHILD 6 to 12 years of age: 10 mg (5 ml of syrup) 3 to 4 times a day.
CHILD 1 to 6 years of age: 5 mg (2.5 ml of syrup) 3 to 4 times a day.

12. SKIN

The maximum daily dose should not exceed 300 mg in adults and children

Proprietary Preparations

Adryl(*Square*), Syrup, 10 mg/5 ml, Tk. 40.00/100 ml
Cufnot(*Maks*), Syrup, 10 mg/5 ml, Tk. 22.00/100 ml
Diphenhydramine(*Albion*), Syrup, 10 mg/5 ml, Tk. 15.00/100ml
Dorenta(*Eskayef*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml ;Tab, 50 mg , Tk. 2.50/Tab.
Dytan(*Supreme*), Syrup, 10mg/5ml, Tk. 30.00/100ml
Pedeamin(*Beximco*), Syrup, 10 mg/5 ml, Tk. 38.00/100 ml
Pedilar(*Popular*), Syrup, 10 mg/5 ml, Tk. 45.17/100ml
Pediphen(*Somatec*), Syrup, 10 mg/5 ml, Tk. 38.00/100 ml
Phenadryl(*Acme*), Syrup, 10 mg/5 ml, Tk. 38.00/100 ml
Rymin(*Opsonin*), Syrup, 10 mg/5 ml, Tk. 24.06/100 ml

EBASTINE

Indications: Allergic rhinitis and chronic idiopathic urticaria

Cautions: Should be exercised in patients with history of liver and kidney impairment, QT interval prolongation, during pregnancy and breastfeeding

Side-effects : Headache, dry mouth, drowsiness, inflammation of pharynx/nose/sinus, abdominal pain, indigestion, weakness, nosebleed, nausea and sleeplessness

Dose: 10 and 20 mg once-daily

Proprietary Preparations

Ebanex(*Opsonin*), Tab., 10mg, Tk. 4.51/Tab.; Syrup, 5 mg/5 ml, Tk. 60.15/50 ml
Ebaril(*Incepta*), Syrup, 5 mg/5 ml, Tk. 60.00/30 ml ;Tab., 10 mg, Tk. 6.00/Tab.
Ebatin(*Popular*), Syrup, 5 mg/5 ml, Tk. 60.00/30ml; Tk.80.00/50ml;Tab., 10mg, Tk. 6.02/Tab.
Ebatrol(*Delta*), Tab.,10 mg, Tk. 5.00/Tab.
Siba(*Eskayef*), Syrup, 5 mg/5 ml, Tk. 60.00/30 ml ;Tab, 10 mg, Tk. 6.00/Tab.
Tebast(*Square*), Syrup, 5 mg/5 ml, Tk. 80.00/50 ml ;Tab. 10 mg, Tk. 6.00/Tab.

FEXOFENADINE

Indications, Cautions, Contraindications, Side-effects: See

notes above and see section 4.8.1

Dose:Oral: 120 mg once daily in adults, 30 mg twice daily in children 6 – 11 years

Proprietary Preparations

Alafree(*Apex*), Tab., 180 mg, Tk. 8.00/Tab.; 120 mg, Tk. 6.50/Tab.
Alagra(*Alco*), Tab., 120 mg, Tk. 6.00/Tab.; Susp., 30 mg/5 ml, Tk. 48.00/50 ml ;Tab., 180 mg, Tk. 8.50/Tab. ; 30 mg, Tk.3.00/Tab.; 60 mg, Tk. 3.50/Tab.
Alanil(*Acme*), Susp., 30 mg/5 ml, Tk.48.00/50 ml ;Tab., 120 mg, Tk. 6.50/Tab.;180 mg, Tk. 8.00/Tab.
Alerfast(*Biopharma*),Tab.,120 mg, Tk.6/Tab.
Axodin(*Beximco*), Susp., 30 mg/5 ml, Tk. 55.00/50 ml ; Tab., 120 mg, Tk. 7.00/Tab. ; 180 mg, Tk. 9.00/Tab. ;60 mg, Tk. 5.00/Tab.
Axofen(*Aristo*), Susp., 30 mg/5 ml, Tk. 48.00/50 ml; Tab., 180 mg, Tk. 9.00/Tab.; 120 mg, Tk. 7.00/Tab.
Dinafex(*Eskayef*), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ;Tab., 60 mg, Tk. 3.50/Tab.; 180 mg, Tk. 8.00/Tab. ;120 mg, Tk. 6.50/Tab.
Fenadin(*Renata*), Susp., 30 mg/5 ml, Tk. 48.19/50 ml; Tab., 120 mg, Tk. 7.02/Tab.; 180 mg, Tk. 9.03/Tab. ;30 mg, Tk. 2.51/Tab.; 60mg, Tk. 3.50/Tab.
Fenargic(*Rangs*), Tab., 120mg, Tk. 7/Tab.
Fenaxo(*Kemiko*), Tab., 120 mg, Tk. 7/Tab.; 180 mg, Tk. 9.00/Tab.;60 mg, Tk. 5/Tab.
Fenofex(*Incepta*), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ; Tab., 120 mg, Tk. 7.00/Tab.; 180 mg, Tk. 9.00/Tab.; 60 mg, Tk. 3.50/Tab.
Fexo(*Square*), Susp., 30 mg/5 ml, Tk. 48.19/50 ml;Tab., 60 mg, Tk. 3.51/Tab.; 180 mg, Tk. 8.04/Tab.; 120 mg, Tk. 6.53/Tab.
Fexocon(*Concord*), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ; Tab., 120 mg , Tk. 6.50/Tab. ; 180 mg, Tk. 8.00/Tab.
Fexodin(*Pacific*), Susp., 30 mg/5 ml, Tk. 45.26/50 ml ;Tab., 120mg, Tk. 5.26/Tab.
Fexofast(*Drug Int.*), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ; Tab., 120 mg, Tk. 7.00/Tab.; 180 mg, Tk. 9.00/Tab.
Fexofen(*Somatec*), Susp., 30 mg/5 ml, Tk. 48.18/50 ml;Tab., 60 mg, Tk. 6.02/Tab.;120 mg, Tk. 7.03/Tab.
Fexofenadine(*Albion*), Tab., 180 mg, Tk. 9.00/Tab.; 120 mg, Tk.7.00/Tab.
Fexomin(*Ibn Sina*), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ; Tab., 120 mg, Tk. 7.00/Tab.; 60mg, Tk. 5.00/Tab.
Fexon(*Astra*), Tab., 120 mg, Tk. 6.50/Tab.; Tab., 180 mg, Tk. 8.00/Tab.
Fexona(*Globe*), Suspn. 30 mg/ 5 ml, Tk. 48.00/50 ml; Tab. 120 mg, Tk. 6.50/Tab.; 180 mg, Tk. 8.00/Tab.; 60 mg, Tk. 3.50/Tab.
Fexotab(*Veritas*), Tab., 120 mg, Tk. 7.00/Tab.; 180 mg, Tk. 9.00/Tab.

Fexten(NIPRO JMI), Tab., 120mg, Tk. 6.05/Tab.; 60mg, Tk. 5.00/Tab.; Susp., 30mg/5ml, Tk. 48.14/100ml
Fixal(Opsonin), Susp., 30 mg/5 ml, Tk. 36.23/50 ml;Tab., 120 mg, Tk. 5.29/Tab.; 180mg, Tk. 6.79/Tab.;30 mg, Tk. 2.64/Tab.; 60mg, Tk. 3.77/Tab.
Fixen(Sharif), Tab., 120 mg, Tk. 7.00/Tab.
Flufex(Doctor TMS), Tab., 120 mg,Tk. 7/Tab.
Furia(Organic), Susp.,30 mg/5 ml, Tk.48.00/50ml; Tab., 120 mg, Tk. 7.00/Tab.; 180 mg, Tk. 9.00/Tab.; 60 mg, Tk. 3.50/Tab.
Nosedex(Orion), Susp., 30 mg/5 ml, Tk. 40.15/40 ml ;Tab., 120 mg , Tk. 6.53/Tab.
Odafen(Navana), Tab., 120 mg, Tk. 6.50/Tab.; 180 mg, Tk. 8.50/Tab.; Susp., 30 mg/5 ml, Tk. 48.15/50ml
Ritch(ACI), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ;Tab., 60 mg , Tk. 5.02/Tab.; 180 mg , Tk. 9.03/Tab. ; 120 mg, Tk. 7.03/Tab.
Telfast(Sanofi), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ;Tab., 180 mg, Tk. 10.00/Tab. ; 120 mg, Tk. 8.00/Tab.
Telfex(Pharmasia), Susp., 30 mg/5 ml, Tk. 48.00/50 ml ;Tab., 120 mg, Tk. 6.50/Tab.
Vifas(Healthcare), Tab., 180 mg, Tk. 10.00/Tab.; 60 mg, Tk. 5.00/Tab.; 120 mg, Tk. 8.00/Tab.
X-din(Benham), Tab., 120 mg, Tk. 7.00/Tab.; 180 mg, Tk. 9.00/Tab.
Xofena(Asiatic), Tab., 120 mg, Tk. 7.00/Tab.; 180 mg, Tk. 9.00/Tab.

HYDROXYZINE

Indications, Cautions, Contraindications, Side-effects: See notes above and see section 4.8.1
Dose:ADULT: 25mg at night, increased if required up to 25mg 3-4 times daily
CHILD 6 - 12 years: Initially 15–25 mg (1½ teaspoonfuls - 2½ teaspoonfuls) at night, increased if necessary to 50–100 mg daily in 3–4 divided doses
CHILD 6 months - 6 years: Initially 5–15 mg (½ teaspoonfuls - 1½ teaspoonfuls) at night,increased if necessary to 50 mg daily in 3–4 divided doses

Proprietary Preparations

Artica(ACI), Tab., 25 mg, Tk. 2.00/Tab.; 10mg, Tk. 1.25/Tab.; Syrup, 10 mg/5 ml, Tk. 40.15/100 ml
Xyiril(Opsonin), Tab., 10 mg, Tk.0.77/Tab.;25 mg, Tk. 1.32/Tab.;Syrup, 10 mg/5 ml, Tk. 26.41/100 ml

LEVOCETIRIZINE

Indications, Cautions, Contraindications, Side-effects:See notes above and see section 4.8.1
Dose:Oral:ADULT: 5 mg once daily in the evening. Maximum dose 5 mg daily
CHILD: 6-11 years: 2.5 mg once daily maximum dose 2.5 mg daily

Proprietary Preparations

Acitrin-L(ACI), Oral solution, 2.5 mg/5 ml, TK. 55.00/60ml ; Tab., 5mg, TK. 3.01/Tab.
Alcet(Healthcare), Tab., 5mg, Tk. 450.00/Tab.; Syrup, 2.5mg/5ml, Tk. 50/60 ml
Clarigen(Drug Intl), Tab., 5mg, Tk. 2.05/Tab.
Curin(Beximco), Tab., 5mg, Tk. 3.50/Tab.
Lecet(Pacific), Tab. , 5mg, Tk. 3.00/Tab. ; 5mg , Tk. 2.00/Tab.
Lerex(Asiatic), Tab., 5 mg, Tk. 2.00/Tab.
Levocet(Alco), Tab. , 5 mg, Tk. 2.01/Tab.
Levorex(Popular), Tab. , 5mg, Tk. 2.01/Tab.
Levotiz(Euro), Tab., 5mg, Tk. 2.5/Tab.
Lozin(Kemiko), Tab., 5 mg, Tk. 3.01/Tab.
LVC(Organic), Tab. , 5 mg, Tk. 3.01/Tab.
Polan(Globe), Tab. , 5 mg, Tk. 3.00/Tab.
Purotrol(Square), Syrup, 2.5 mg / 5 ml, Tk. 35.14/50 ml ;Tab., 5 mg, Tk. 3.51/Tab.
Rinotin(Biopharma), Tab., 5 mg,Tk. 2.01/Tab.
Seasonix(Incepta), Syrup 2.5 mg/5 ml, Tk. 40.00/60 ml ;Tab., 5 mg, Tk. 3.50/Tab.
Sinacet(Ibn Sina), Syrup, 2.5 mg/5 ml, Tk. 50.00/60 ml ;Tab., 5 mg, Tk. 4/Tab.
Verizin(Sharif), Tab. , 5 mg, Tk.2.00/Tab.
Verizin(Sharif), Tab., 5mg, Tk. 2.00/Tab.
Vocet(Apex), Tab. , 5 mg, Tk. 2.00/Tab.

LORATADINE

Indications, Cautions, Contraindications, Side-effects:See notes above and see section 4.8.1
Dose:ADULT: 10 mg once daily
CHILD: 2-5 years: 5 mg once daily

Proprietary Preparations

Alaron(ACI), Susp., 5 mg/5 ml, Tk. 30.11/60ml; Tab. , 10 mg, Tk. 3.01/Tab.
Aleze(Unimed), Tab. , 10 mg, Tk. 2.50/Tab.;Susp., 5 mg/5 ml , Tk. 26.00/60 ml
Eladin(Jayson), Susp., 5 mg/5 ml , Tk. 26.40/60 ml ;Tab. 10 mg, Tk. 3.05/Tab.
Encilor(Incepta), Tab. , 10 mg, Tk. 3/Tab. Tab., 10 mg, Tk. 4.00/Tab.
Itchlor(Nipro JMI), Susp., 5 mg/5 ml , Tk. 30.12/60 ml ; Tab. , 10 mg, Tk. 3.03/Tab.
Kevil(Kemiko), Susp., 5 mg/5 ml , Tk. 30.00/60 ml ;Tab. 10 mg, Tk. 3.00/Tab.
Lodin, (Amico), Tab. , 10 mg, Tk. 3.00/Tab.

12. SKIN

Lora(Opsonin), Tab., 10 mg, Tk.
1.89/Tab.; Susp., 5 mg/5 ml, Tk. 22.64/60 ml
Loradin(Aristo), Tab., 10 mg, Tk. 3/Tab.
Lorat(Drug Int.), Tab., 10 mg, Tk. 3/Tab.
Loratadine (Albion), Susp., 5 mg/5 ml, Tk.
30.00/60 ml; Tab., 10 mg, Tk. 3.00/Tab.
Loratin(Techno), Tab., 10 mg, Tk. 3/Tab.
Loratin(Square), Susp., 5 mg/5 ml, Tk.
30.11/60 ml; Tab., 10 mg, Tk. 3.01/Tab.
Loratin Fast(Square), ODT Tab., 10 mg,
Tk. 3.01/Tab.
Lorfast(Biopharma), Tab., 10 mg, Tk.
3.01/Tab.; Susp., 5 mg/5 ml, Tk. 26.10/60 ml
Lorin(General), Susp., 5 mg/5 ml, Tk.
30.11/60 ml; Tab., 10 mg, Tk. 3.01/Tab.
Oradin(Eskayef), Susp., 5 mg/5 ml, Tk.
30.00/60 ml; Tab., 10 mg, Tk. 4.00/Tab.
Orin(Acme), Tab., 10 mg, Tk. 3.00/Tab.;
Susp., 5 mg/5 ml, Tk. 40.00/100 ml; Tk.
26.1/60 ml
Pretin(Beximco), Tab., 10 mg, Tk. 3.00/Tab.
Silora(Ibn Sina), Tab., 10 mg, Tk. 2.50/Tab.

MEBHYDROLIN

Indications, Cautions,
Contraindications, Side-effects: See
notes above and section 4.8.1
Dose: ADULT and CHILD over 10 years:
2-6 tablets daily
Syrup: CHILD 2-6 years: 5 ml (1
teaspoon full) once daily or 2.5 ml (half
teaspoon full) twice daily
CHILD 6 months to less than two years:
2.5 ml (half teaspoon full) once daily

Proprietary Preparations

Aexidal(Albion), Tab., 50 mg, Tk. 1.50/Tab.
Bexidal(Beximco), Tab., 50 mg, Tk. 3/Tab.
Dayhista(Medimet), Tab., 50 mg, Tk. 2/Tab.
Mebastin(Incepta), Tab., 50 mg, Tk. 2/Tab.
Mebidal(Eskayef), Tab., 50 mg, Tk. 3/Tab.
Mebolin(Acme), Tab., 50 mg, Tk. 2.01/Tab.
Medrolin(Opsonin), Tab., 50 mg, Tk. 1.51/Tab.

MEPYRAMINE (PYRILAMINE)

Indications, Cautions,
Contraindications, Side-effects: see
notes above
Dose: Apply to affected area 2 to 3 times
daily for up to 3 days

Proprietary Preparation

Anthisan(Aventis), Cream 2% Tk. 34.90/15g

MIZOLASTINE

Indications: See *notes above*

Cautions: CHILD under 12 years,
pregnancy, lactation, see *notes above*

Contraindications, Side-effects: See
notes above

Dose: ADULT and CHILD above 12
years: 10 mg once daily

Proprietary Preparations

Mastel(ACI), Tab., 10 mg, Tk. 6.52/Tab.

Rhinor(Opsonin), MR Tab., 10 mg, Tk.
5.02/Tab.

PHENIRAMINE

Indications, Cautions,

Contraindications, Side-effects: See
notes above and section 4.8.1

Dose: Syrup: ADULT: 2 teaspoonful (10
ml) 3-4 times daily

CHILD up to 1 year: ½ teaspoonful (2.5
ml) twice daily

CHILD (1-5 years): ½ - 1 teaspoonful
(2.5-5 ml) thrice daily

CHILD > 5 years: 1-2 teaspoonful (5-10
ml) 3-4 times daily

Oral: ADULTS: 1-2 times daily, up to 45
mg 3 times a day; Maximum dose
3mg/kg/day.

Proprietary Preparations

Aerovil(Beximco), Syrup, 15 mg/5 ml, Tk.
20.07/100 ml

Alervil(Incepta), Syrup, 15 mg/5 ml, Tk.
20.00/100ml; 15 mg/5 ml, Tk. 25.00/75ml

Amarin(Opsonin), Syrup, 15 mg/5 ml, Tk.
20.00/100 ml; Tab., 22.7 mg, Tk. 0.47/Tab.,
Inj., 45.5mg/2ml, Tk. 7.48/2ml Amp

Avil(Sanofi), Inj., 45.5mg/2ml, Tk. 7.55/2 ml
Amp; Syrup, 15 mg/5 ml, Tk. 25.08/75 ml;
Tab., 75mg, Tk. 2.02/Tab., Tab., 22.7mg, Tk.
1.51/Tab.

Fenimex(Asiatic), Inj., 45.50mg /2ml, Tk.
7.50/2 ml Amp

Pevil(ACI), Tab., 22.7mg, Tk. 0.46/Tab.

PROMETHAZINE^[ED]

Indications, Cautions,

Contraindications, Side-effects: See
notes above and section 4.8.1

Dose: ADULT: 25-50 mg daily IM or slow
IV. Maximum 100 mg daily

CHILD 2-5 years: 5-15 mg daily in 1-2

divided doses
CHILD 5-10 years: 10-25 mg daily in 1-2 divided doses

Proprietary Preparations

Allphen(Medimet), Syrup, 5mg/5 ml, Tk. 24.00/100ml; Tk. 12.00/50ml
Avomine(Sanofi), Tab., 25mg, Tk. 0.57/Tab.
Histavil(Pacifc), Elixir, 5 mg/5 ml, Tk. 10.00/60ml
Otosil(Opsonin), Syrup, 5 mg/5 ml, Tk. 14.73/60 ml; 5 mg/5 ml, Tk. 24.55/100 ml; Tab., 10 mg, Tk. 0.31/Tab., 25 mg, Tk. 0.44/Tab.
Phenerex(Jayson), Inj., 25 mg/1mL, Tk. 33.80/1ml Amp.; 50 mg/2mL, Tk. 41.80/2 ml Amp.; Syrup, 5mg/5mL, Tk. 24.03/100ml
Phenergan(Sanofi), Elixir, 5 mg/5 ml, Tk. 28.05/Vial., Tab, 10mg, Tk. 0.68/Tab.
Promalex(Modern), Syrup, 5 mg/5 ml, Tk. 18.70/60ml; 5 mg/5 ml, Tk. 23.95/100ml
Promergan(G.A.Co), Syrup, 5 mg/5 ml, Tk. 12.04/60 ml
Promezin(Beximco), Syrup, 5 mg/5 ml, Tk. 15.50/100 ml
Prozen(Zenith), Tab., 25 mg, Tk. 0.42/Tab.

RUPATADINE

Indications: Allergic rhinitis and chronic urticaria in adults and children over 12 years

Side-effects: Somnolence, headaches and fatigue

Dose: ADULT and CHILD above 12 years: 10 mg once daily

Proprietary Preparations

Alarup(Popular), Tab., 10mg, Tk. 10.00/Tab.
Dipa(Drug Intl), Tab., 10mg, Tk. 8.03/Tab.
Duvent(Beximco), Oral Solution, 1 mg/ml, Tk. 60.00/60 ml; Tab., 10mg, Tk. 10.00/Tab.
Largix(ACI), Oral Solution, 1 mg/ml, Tk. 75.00/60ml; Tab., 10mg, Tk. 10.00/Tab.
Minista(Radiant), Tab., 10mg, Tk. 12.04/Tab.
Nerupa(Team), Tab., 10 mg, Tk. 9.50/Tab.
Paftrol(Navana), Tab., 10 mg, Tk. 10.03/Tab.; Oral Solution, 5mg/5 ml, Tk. 60.00/50ml
Rosela(Healthcare), Tab., 10mg, Tk. 12/Tab.
Rubest(Benham), Tab., 10 mg, Tk. 10/Tab.
Rufast(Opsonin), Tab., 10 mg, Tk. 10/Tab.
Rufecta(Biopharma), Tab., 10mg, Tk. 10/Tab.
Rupa(Aristo), Tab., 10mg, Tk. 10.00/Tab., Oral Solution, 1 mg/ml, Tk. 75.00/60ml,
Rupaday(Eskayef), Oral Solution, 1 mg/ml, Tk. 74.99/60 ml; 1 mg/ml, Tk. 74.99/60 ml; Tab, 10mg, Tk. 10.00/Tab.,
Rupadin(Beacon), Tab., 10mg, Tk. 10.03/Tab., Oral Solution, 1 mg/ml, Tk. 75.00/60 ml

Rupafen(Somatec), Tab. 10 mg, Tk. 10/Tab.
Rupaler(Alco), Tab., 10 mg, Tk. 10.00/Tab.
Rupamin(Ibn Sina), Tab., 10mg, Tk. 10/Tab.
Rupanex(Sharif), Tab., 10 mg, Tk. 10.03/Tab.
Rupastin(Acme), Tab., 10 mg, Tk. 10.03/Tab.
Rupatan(Novo), Tab., 10 mg, Tk. 10.00/Tab.
Rupatid(NIPRO JMI), Tab., 10 mg, Tk. 10.03/Tab.
Rupatrol(Square), Tab, 10 mg, Tk. 10.03/Tab.
Rupenta(Orion), Tab., 10 mg, Tk. 10/Tab.
Rupex(Incepta), Oral Solution, 1 mg/ml, Tk. 75.00/60ml; Tab., 10 mg, Tk. 10.00/Tab.
Rupin(Ziska), Oral Solution, 1 mg/ml, Tk. 60.00/60 ml; Tab., 10 mg, Tk. 10/Tab.
Rupoma(General), Oral Solution, 1 mg/ml, Tk. 60.00/60 ml; Tab, 10mg, Tk. 10.00/Tab.
Rutipa(Euro), Tab., 10mg, Tk. 10.00/Tab.

ANTIPRURITICS AND TOPICAL LOCAL ANAESTHETICS

Pruritus may be caused by systemic disease such as drug hypersensitivity, obstructive jaundice, endocrine disease, malignant disease as well as by skin diseases e.g psoriasis, eczema, urticaria and scabies. An emollient may be of value where the pruritus is associated with dry skin.

CALAMINE

Indications : Topical soothing relief of itching, pain, and discomfort due to minor skin irritations, such as those caused by eczemas, prickly heat (miliaria), sunburn, napkin rash, cosmetic rashes, pruritis of dry skin including as well as symptomatic relief of itchiness in Chickenpox viral infection

Cautions: Avoid contact with the eyes and other mucous membranes such as mouth, nose and genital region. Do not apply to abraded, blistered, inflamed, raw or oozing areas of the skin. Do not use on open wounds or burns

Contraindications: known hypersensitivity to calamine

Dose: apply sparingly to the affected parts and surrounding skin areas 2-3 times daily

Proprietary Preparations

Calamilon(United Chem), Lotion, Tk. 20/100ml

12. SKIN

Calamine 15 gm + Zinc Oxide 5 gm/100 ml
Calamine(Amico), Lotion, 0.15g/ml, Tk. 38.00/100ml
Calzirin(Opsonin) Lotion, Tk. 23.06/100ml

CAPSAICIN

Indications: postherpetic neuralgia, diabetic neuropathy, reflex sympathetic dystrophy, Raynaud phenomenon, nostalgia paresthetica, arthralgias, plantar warts, diabetic neuralgia, and hemodialysis-related pruritus

Cautions: Pregnancy

Contra-indications: Broken skin, known hypersensitivity

Side-effects: Burning sensation, pruritus, erythema, coughing, and sneezing, superficial erosions

Dose: Apply 3-5 times daily for a maximum of 4-6 weeks

Proprietary Preparation

Ostocin(General), Cream, Tk. 50.34/20gm

Topicacin(Incepta), Cream, Tk. 50.00/20gm

CROTAMITON

(see section 12.2.4)

DOXEPIN

Indications: Short-term (up to 8 days) management of moderate pruritus in adult patients with atopic dermatitis or lichen simplex chronicus

Cautions: Children and elderly

Contra-indications: known hypersensitivity to doxepin

Side-effects: Local burning, stinging, irritation, tingling, sedation, allergic contact dermatitis

Dose: ADULT and CHILD over 12 years: apply thinly 3–4 times daily; usually a maximum of 3 g per application; total maximum dose is 12 g daily; coverage should be less than 10% of body surface area.

Proprietary Preparations

Adnor(Apex), Cap., 75 mg, Tk. 5.00/Cap.

Doxiderm(Incepta), Cream, 5% Tk. 120.00/30 gm; Tab., 3 mg, Tk. 6.00/Tab.; 6mg, Tk. 10.00/Tab.

Slipaid(Beacon), Tab., 3 mg, Tk. 6.00/Tab.;

6mg, Tk. 10.00/Tab.

DIPHENHYDRAMINE

Indications: Temporarily relief of pain and itching associated with insect bites, minor burns, sunburn, minor skin irritations, minor cuts, scrapes, rashes due to poison ivy, poison oak, and poison sumac.

Indications, Cautions, Contra-indications and Side-effects: See section 4.8.1

Dose: ADULT & CHILD above 2 years: apply to the affected area 3 to 4 times daily

Proprietary Preparations

Adryl(Square), Syrup, 10 mg/5ml, Tk. 40.13/100ml

Didryl(G.A.Co), Syrup, 10 mg/5ml, Tk. 45.31/100 ml

Difin(Nipa), Syrup, 10 mg/5ml, Tk. 40.00/100ml

Diphenhydramine(Albion), Syrup, 10 mg/5ml, Tk. 15.00/100ml

Dorenta(Eskayef), Tab., 50 mg, Tk. 2.50/Tab.; Syrup, 10 mg/5ml, Tk. 40.00/100ml; 10 mg/5ml, Tk. 40.00/100ml

Dytan(Supreme), Syrup, 10 mg/5ml, Tk. 20.00/100ml

Pedeamin(Beximco), Syrup, 10 mg/5ml, Tk. 45.00/100ml; 10 mg/5ml, Tk. 38.00/100ml

Pedilar(Popular), Syrup, 10 mg/5 ml, Tk. 45.17/100ml

Pediphen(Somatec), Syrup, 10 mg/5 ml, Tk. 38.00/100 ml

Phenadryl(Acme), Syrup, 10 mg/5ml, Tk. 38.11/100ml

Rymin(Opsonin), Syrup, 10 mg/5ml, Tk. 45.00/100 ml

Diphenhydramine Hydrochloride + Zinc Acetate

Bendil(Alco), Cream, 20 mg + 1 mg/gm, Tk. 55.17/30gm; 20 mg + 1 mg/gm, Tk. 22.00/5gm; Tk. 35.11/10gm

Togent(Square), Cream, 20 mg + 1 mg/gm, Tk. 35.24/10gm

Topical Local Anaesthetics

Indications: Topical anaesthesia of the skin prior to minor superficial cosmetic procedures, postherpetic neuralgia, pruritus

Cautions: Local anesthetic ointments

are absorbed through the rectal mucosa, therefore its excessive application should be avoided. These preparations should not be used for more than 3 days. Not suitable for young children

Contra-indications: Hypersensitivity to lidocaine or preservatives, pregnancy, significant hepatic or renal impairment, myasthenia gravis, hyperthyroidism

Side-effects: Erythema, edema, abnormal sensation, allergic reaction

Dose: Up to 2 g for a minimum of 1 hour, maximum of 5 hours

Proprietary Preparation

Jasocaine(Jayson) Gel lidocaine, 2% Tk. 80.00/30g

12.6 PREPARATIONS FOR ECZEMA AND PSORIASIS

Pimecrolimus by topical application is used in mild to moderate atopic eczema. For short term use to treat sign and symptoms and for intermittent use to prevent flares. **Tacrolimus** is used in moderate to severe atopic eczema. Both drugs whose long term safety and place in therapy is still being evaluated and they should not usually be considered first line treatments unless there is a specific reason avoid or reduce the use of topical corticosteroids.

General Principle of Topical Corticosteroid therapy in Psoriasis:

Topical corticosteroids are most useful for localized psoriasis or psoriasis of the scalp. Localized plaque psoriasis generally requires a high-potency or superpotent topical corticosteroids twice daily, followed by a maintenance regimen, to obtain and preserve remission. Regardless of the choice of topical corticosteroid, psoriasis usually recurs after discontinuation of corticosteroid treatment.

(see under section 12.3)

ANTHRALIN (DITHRANOL)

Indications: Chronic plaque psoriasis, alopecia areata

Cautions: Should not be used on the face or on acute eruptions or excessively

inflamed areas. Care should be taken to avoid contact with normal tissue and the eyes

Contraindications: Pregnancy

Interactions: See Appendix-2

Side-effects: Irritant contact dermatitis and staining of clothing, skin, hair, and nails

Dose: The most common approach is to start with a lower concentration of anthralin, such as 0.1% or 0.25%. The anthralin is left on the treatment area for 10–20 minutes daily. The contact time is increased weekly until the total contact time prior to washing is 1 hour

Proprietary Preparations

Dithranol 0.1%+Boric 2%+Salicylic Acid 1%

Gacozema(G.A co), Oint. Tk. 28.00/6 gm

Ring Fight(Millat), Oint Tk, 10.00/12 gm

AZATHIOPRINE

(see also section 14.2.1)

Indications: Organ transplantation, severe rheumatoid arthritis, immunobullous dermatoses, SLE, DLE, psoriasis

Caution: Renal impairment

Contra-indications: Pregnancy, known hypersensitivity to azathioprine, active clinically significant infections. Allopurinol use: the dose of azathioprine should be reduced significantly

Interactions: See Appendix-2

Side-effects: Bone marrow suppression, neutropenia, rarely agranulocytosis and pancytopenia; human papilloma virus, herpes simplex, scabies
Transaminase elevation, hepatotoxicity
Teratogenicity

Dose: 1–2 mg per kg body weight per day, often concurrent with high-dose prednisone.

Proprietary Preparations

See section 14.2.2

CALCIPOTRIOL

(Vitamin D₃ analogue)

Indications: Mild to moderate plaque psoriasis affecting up to 40% of skin area

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Cautions: More than 100 mg should not be applied to the body considering the risk of hyperpigmentation, should not be used on the face, in children under 6 years of age

Contra-indications: Known hypersensitivity to calcipotriol, patients with known disorders of calcium metabolism.

Interactions: See Appendix-2

Side-effects: Pruritis, skin irritation (especially if accidentally transferred to face), burning and stinging sensation, dry skin, erythema, rash, hypercalcemia

Dose: ADULT: Apply to the affected area once to twice daily. Application of the cream can be reduced to once daily when appropriate. Maximum weekly dose should not exceed 100 g.

CHILD over 12 years: apply to the affected area twice daily. Maximum weekly dose should not exceed 75 g.

CHILD aged 6 to 12 years: apply to the affected area twice daily. Maximum weekly dose should not exceed 50 g.

Proprietary Preparations

Dovonex(Drug Intl), Oint., 0.005%, Tk. 200.00/10gm

Dyvon(Square), Cream, 0.05 %, Tk. 351.06/20gm

Planex(Incepta), Oint, 0.005% Tk.200.00/10g

Calcipotriol 0.005 %, + Betamethasone Dipropionate 0.05%

Apply once daily to the affected areas. Treatment on the body may be continued for up to 8 weeks. Treatment on the scalp may be continued for up to 4 weeks. The maximum daily dose is 15 g per day, or 100 g per week, in total of all products containing calcipotriol.

Proprietary Preparation

Dyvon Plus(Square), Oint. Tk. 381.14/20gm;

Planex Plus(Incepta), Oint., Tk. 380.00/20gm

COAL TAR

Indications: Chronic psoriasis, either alone or in combination with exposure to ultraviolet light, atopic dermatitis, seborrheic dermatitis

Cautions: Coal tar preparations should not be applied to the inflamed, broken or

infected skin

Contra-indications: known hypersensitivity to tar preparations, pregnancy

Interactions : See Appendix-2

Side-effects: Staining of clothing, tar folliculitis, acneiform eruptions, irritant dermatitis, burning, and stinging, allergic contact dermatitis, atrophy, telangiectases, pigmentation, exfoliative dermatitis, and keratoacanthomas.

Dose:Goeckerman technique: A 2–5% tar preparation is applied to the skin, and a tar bath is taken at least once a day
Ingram technique: a daily coal tar bath in a solution such as 120 mL liquor carbonis detergens to 80 L of warm water. This is followed by daily exposure to UV light for increasing periods.

Proprietary Preparation

Soritar(Unimed), Cream, 10%, Tk.300/50 gm

CYCLOSPORINE

(See also section 14.2.2)

Indications: Treatment resistant psoriasis, disabling psoriasis;lichen planus, severe atopic dermatitis

Cautions Monitored regularly serum creatinine, blood pressure, oedema, hypertension, and immuno-suppression

Contraindications: Impaired Renal function, uncontrolled hypertension, hypersensitivity to cyclosporine, pregnancy and lactation

Interactions: See Appendix-2

Side-effects: Nausea, vomiting, abdominal discomfort, diarrhea; nephrotoxicity; Hypertension; tremor, headache, paresthesia, hyperesthesia, hyper-trichosis, gingival hyperplasia, myalgia, lethargy, arthralgia, hyperkalemia, hyper-uricemia hypomagnesemia, hyper-lipidemia

Dose: 2.5 to 5 mg/kg/day

Proprietary Preparations

see section 14.2.2

METHOTREXATE^[ED]

(See also section 14.1.3)

Indications: Extensive, severe plaque psoriasis not responsive to conventional

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therapy erythrodermic psoriasis, psoriatic arthritis not responsive to conventional therapy, lack of response to phototherapy cutaneous lupus erythematosus, immunobullous dermatoses see also section 9.1.3 and 14.1.3

Cautions: Renal impairment; diabetes mellitus

Contra-indications: Pregnancy, lactation, hepatic impairment

Side-effects: Nausea, vomiting, megaloblastic anemia, neutropenia, thrombocytopenia, bone marrow suppression, stomatitis, acute pneumonitis, reactivation of TB, teratogenicity

Dose: Baseline laboratory investigations before starting methotrexate include a complete blood cell count (CBC); platelet count; liver function testing; serologic assessment for hepatitis A, B, and C antibodies, renal function assessment; pregnancy and HIV screening (where indicated), chest X-ray

Initiation of methotrexate therapy typically involves use of a single 5- to 10-mg test dose. If the test dose is tolerated and laboratory studies are satisfactory, weekly therapy may commence using a typical starting dose of 7.5–10 mg/week, depending on the severity of disease, overall health, and ideal body weight of the patient. The dose may be increased by 2.5–5.0 mg every 4–8 weeks until adequate control is achieved or toxicity ensues. When improvement has stabilized, the dose may be tapered in 2.5-mg decrements to a point at which disease activity increases slightly

Proprietary Preparations

see section 14.1.3

METHOXSALEN

Indications: Idiopathic vitiligo, severe, disabling, psoriasis not adequately responsive to conventional topical therapy; selected cases of atopic eczema and polymorphic light eruptions

Cautions: Diseases associated with light sensitivity such as porphyria, liver diseases

Contraindications: Aphakia, melanoma

or a history of melanoma, and invasive squamous cell carcinoma, children

Side-effects: Nausea, mental effects including insomnia, nervousness, and depression Other effects include oedema, dizziness, headache, vesiculation, bulla formation, onycholysis, acneiform eruption, and severe skin pain

Dose: It is given both by mouth and applied topically. To repigment, vitiliginous areas, methoxalen is given in a dose of up to 600 microgram per kg body-weight by mouth 2 to 4 hours before measured periods of exposure to UVA twice a week, at least 48 hours apart. To be applied topically to repigment small, well-defined vitiliginous lesions, preparations containing up to 1% have been used but dilution to 0.1 or 0.01% may be necessary to avoid adverse cutaneous effects. The surrounding skin should be protected by an opaque sunscreen.

For the treatment of psoriasis a similar schedule is used to that outlined above for vitiligo. A dose of up to about 600 microgram per kg by mouth 2 hours before UVA is usually given twice a week. It may also be used topically with UVA exposure for the treatment of psoriasis.

Proprietary Preparations

Meladinine[®](CLS Pharma), Tab. 10mg Tk.14.14/Tab. Paint 1% Tk. 599.58/24ml

Oxsoralen[®](ICN), Cap., 0.367g, Tk.25.67/Cap. Lotion, 1% + 1.19%, Tk.909.35/bottle

Vitilen Lotion(Ziska) Lotion 1% Tk. . 398.00/30ml

PIMECROLIMUS

Indications: Atopic dermatitis in patients over 2 years of age

Cautions: UV light exposure, erythroderma, immunosuppression

Contraindications: known hypersensitivity to pimecrolimus.

Interactions : See Appendix-2

Side-effects: Burning sensation, pruritus, skin infection, folliculitis, herpes simplex, molluscum contagiosum;

Dose: Apply a thin layer of cream only to

12. SKIN

the affected skin areas twice daily,

Proprietary Preparation

Elidel[®] (Novartis), Cream, 10 mg/gm, Tk. 1406.7/15 gm

TACROLIMUS

Indications: Moderate to severe atopic dermatitis

Cautions: UV light exposure

Contra-indications: Pregnancy and breast feeding, known sensitivity to tacrolimus

Interactions : See Appendix-2

Side-effects: Burning, pruritus, allergic reactions, anaphylactoid reaction, angioedema, anorexia.

Dose: Apply a thin layer of ointment to the affected skin twice daily. Stop using when signs and symptoms of atopic dermatitis resolve.

Proprietary Preparations

Tacrolimus 0.03%

Remus(Square), Oint., 0.03%, Tk. 80.55/m; 0.10%, Tk. 200.61/5gm

Tacrol(Acme), Oint., 0.03%, Tk. 80.55/5gm; 0.10%, Tk. 200.61/5gm; 0.03%, Tk. 151.02/10gm

Tacrolim(Incepta), Oint., 0.03%, Tk. 80.00/5gm; 0.01%, Tk. 200.00/5gm

Vitilimus(UniMed), Oint., 0.10%, Tk. 1000.00/30g; 0.03%, Tk. 450.00/30g

SYSTEMIC RETINOIDS

Retinoids are synthetic derivatives of vitamin A. These include: acitretin, isotretin, etretinate, tazarotene, adapalene, bexarotene etc

Indications: Psoriasis (severe plaque-type, generalized or localized pustular psoriasis), combination therapy in psoriasis with UVB or PUVA, or with cyclosporine or with biologic therapies, Disorders of keratinization e.g., Darier's disease, pityriasis rubra pilaris, ichthyosis spectrum, keratodermas

Cautions: Care should be taken to avoid contact with eyes, mucus membranes and open sores

Contra-indications: Pregnancy or woman who is likely to become pregnant, nursing mothers, leukopenia,

hypothyroidism, hyperlipidaemia, hepatic or renal dysfunction

Side-effects: Hair loss, dry skin and lips, hypertriglyceridemia, burning, stinging,

Interactions: See Appendix-2

ACITRETIN

Indications: See notes above

Side-effects: See notes above

Contraindications: See notes above

Dose: Initiate at 25–50 mg daily and escalate and titrate to response.

Proprietary Preparations

Soricap(UniMed), Cap., 10mg, Tk. 40.00/Cap.; 25mg, Tk. 75.00/Cap.

Soritec(ACI), Cap., 10mg, Tk. 45.14/Cap.; Cap., 25mg, Tk. 85.26/Cap.

SYSTEMIC ISOTRETINOIN

Indications: See section 12.7 **Cautions, Contraindications & Side-effects:** See notes above

Dose: See section 12.7

Proprietary Preparations

See section 12.7

12.7 ACNE AND ROSACEA

TOPICAL RETINOIDS

Indications: Acne, photoaged skin, and melasma, tazarotene in psoriasis involving less 20% of body surface area, bexarotene in cutaneous T-cell lymphoma

Cautions: Pregnancy, who are planning on becoming pregnant should not use retinoid

Contra-indications: Known hypersensitivity to topical retinoids

Side-effects: Erythema, peeling, dryness, tightness, and burning sensation

Interactions: See Appendix-2

Note: It should not be applied near the eyes, the mouth, paranasal creases of the nose, and mucous membranes

ADAPALENE

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Indications: Mild to moderate acne
Cautions, Contra-indications & Side-effects: See notes above
Dose: Applied to the affected areas of skin, once daily at night-time

Proprietary Preparations

Aclene(Drug Intl), Cream, 0.1%, Tk. 60.20/10gm
Adgar(ACI), Gel, 0.30%, Tk. 80.24/10 gm; 0.1%, Tk. 60.18/10 gm
Apalene(Incepta), Cream, Tk. 60.00/10 gm
Adapel(Healthcare), Tk. 60.00/10 gm
Fona(Square), Gel, Tk. 160.48/10 gm; Cream, 0.10%, Tk. 60.4/10 gm; 0.30%, Tk. 80.55/10 gm
Pimplex(Biopharma), Cream, 0.1%, Tk. 60.00/10 gm

Adapalene 0.1%+ Benzoyl Peroxide 2.5%
Acleneplus(Drug Intl), Gel, 0.1%, Tk. 150.00/10gm
Acnegel(Acme), Gel, Tk. 160.48/10 gm
Adaben Duo(Incepta), Gel, Tk. 200.00/20gm
Fona Plus(Square), Gel, Tk. 160.48/10gm
Freshlook Gel(Ziska), Gel, Tk. 160/10g
Nomark(Opsonin), Gel, Tk. 160.00/10 gm

AZELAIC ACID

Indications: Mild-to-moderate inflammatory acne vulgaris, post-inflammatory hyperpigmentation
Cautions: Pregnancy, breast feeding;
Contra-indications: Known hypersensitivity to azelaic acid
Side effects: Pruritus, burning, stinging, erythema, dryness, rash, peeling, irritation, dermatitis, and contact dermatitis
Dose: Apply a thin film gently but thoroughly into the affected areas twice daily, in the morning and evening for 4 weeks

Proprietary Preparations

Azelec(Acme), Cream, 20%, Tk. 75.51/10gm
 Tk. 40.27/5gm

BENZOYL PEROXIDE

Indications: Mild to moderate acne vulgaris, more effective on non-inflamed lesions
Cautions: Open sores or broken skin

Contraindications: Known hypersensitivity to benzoyl peroxide or any components of the preparation
Interactions: See Appendix-2
Side-effects: Irritant contact dermatitis
Dose: Apply once daily to affected areas of face after washing. Treatment is usually started with 2.5% or 5.0% preparations. The frequency of application is then gradually increased as the initial irritant reaction subsides

Proprietary Preparations

Benzac(Drug Intl), Cream, 4%, Tk. 150.45/15 gm
Brevoxyl(GSK), Cream, 4%, Tk. 332.41/40 gm
Caress(Renata), Cream, 2.5%, Tk. 45/15 gm
Oxigel(UniMed), Cream, 5%, Tk. 200/20 gm ; 5%, Tk. 400.00/50 gm; 2.5%, Tk. 150/20 gm
Clindamycin 1% + Benzoyl peroxide 5%:
Duac(Stiefel), Gel, Tk. 697.85/25gm
Benoxiclin(UniMed), Gel, Tk. 350.00/20gm
Clindax(Opsonin), Cream, Tk. 150.00/1gm
Duac(GSK), Gel, Tk. 750.00/30gm

CLINDAMYCIN (Topical)

(See also section 1.1.12)

Indications: Acne vulgaris characterized by inflammatory lesions such as papules and pustules, erythrasma, rosacea, periorificial dermatitis, folliculitis
Cautions: Do not apply to from eyes, nose, mouth and other mucous membranes
Contra-indications: Known hypersensitivity to clindamycin
Interactions: See Appendix-2.
Side-effects: Erythema, desquamation, burning sensation, eye irritation, tenderness, dryness, contact dermatitis

Dose: Apply a thin film to the affected areas twice daily, in the morning and in the evening for 6 weeks

Proprietary Preparations

Clindamycin Cream 2% , Lotion 1%
Clocin(Healthcare), Cream, Tk. 73.00/20 mg
Clindax(Opsonin), Lotion Tk. 125.85/25ml, Cream, , Tk. 70.26/ 20 gm
Dacilin(ACI), Lotion, Tk. 125.38/25ml ml
Clinex(Aristo), Lotion, Tk. 125/25 ml
Lindamax(Eskayef), Lotion, Tk. 125.00/25ml ml
Clindacin(Incepta), Lotion, Tk., 125.00/25ml ml

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Cream, Tk. 70.00/20gm

Clindamycin 1.2% + Tretinoin 0.025%.
Cinamycin Plus(Ibn Sina), Gel, Tk. 150/15gm
Clinacyn T(Beximco), Gel, Tk. 150/15gm
Clindacin Plus(Incepta), Gel, Tk. 150/15gm
Clindax Plus(Opsonin), Cream, Tk. 120.45/ 10
Clinex Plus(Aristo), Gel, Tk. 150.00/15 gm
Clinface(Square), Gel, Tk. 151.02/15 gm
Dalacin Plus(Drug int.), Gel, Tk. 150.45/15
Lindamax Plus(Eskayef), Gel, Tk. 120/15gm

ERYTHROMYCIN (Topical)

Indications: Mild to moderate acne vulgaris, bacterial skin infections susceptible to erythromycin

Contra-indications: Known

hypersensitivity to erythromycin

Interactions: See Appendix-2

Side-effects: Erythema, desquamation, burning sensation, eye irritation, tenderness, dryness, oily skin

Dose: Apply to the affected areas twice daily in the morning and evening. Before applying thoroughly wash with warm water and soap, rinse and pat dry all areas to be treated

Proprietary Preparations

A-Mycin(Aristo), Lotion, 3%, Tk. Tk. 120.00/25ml; ml

Eromycin(Square), Lotion, 3%, Lotion, 3%, Tk. 120.37/25ml

Macrocin T(Sanofi), Solu., 20 mg/ml, Tk. 200.61/100 ml

ISOTRETINOIN (Topical)

Indications; Cautions, Side- effects and Dose: See under Tretinoin.

Proprietary Preparations

Isotretinoin 0.05%

Aknill(Incepta), Gel, Tk. 130.00/10gm

Isotrex[®](Stiefel), Gel, Tk. 265.13/10gm

Retigel(Unimed), Gel, Tk. 200/20gm

ISOTRETINOIN (Systemic)

Indications: Acne: nodulocystic acne, recalcitrant acne, especially if there is any scarring tendency

Cautions, Contraindications, Side-effects: See section 12.6 under systemic retinoids

Dose: 0.3 to 0.5 mg/kg/day initially, then 0.5 to 1.0 mg/kg/day, for at least 4-6 months. A lag period of 1-3 months may occur before the onset of the therapeutic effect. A flare-up of disease during the first few weeks of treatment and the evolution of acne cysts into lesions resembling pyogenic granuloma may be observed

Proprietary Preparations

Isotretinoin[®](Pharmathen), Cap., 10 mg, Tk. 21.66/Cap.; 20 mg, Tk. 34.95/Cap.

Reticap(UniMed), Cap., 10mg, Tk. 40.00/Cap. ; 20mg, Tk. 75.00/Cap.

Roaccutane[®](R.P. Scherer), Cap., 10 mg, Tk. 96.54/Cap.; 20 mg, Tk. 101.45/Cap.

TAZAROTENE

Indications: Stable plaque psoriasis mild to moderate acne

Cautions, Contra-indications & Side-effects: See notes above.

Dose: For psoriasis: Apply once a day, in the evening, for at least 8-12 weeks.

For acne: apply a thin film gel 0.1% in the evening once a day for 6-8 weeks.

Proprietary Preparations

Tazarotena 0.10%

Soritene(Beximco), Cream, Tk. 151/25 gm

Tazoskin(Incepta), Cream, Tk. 140/20 gm

TRETINOIN (ALL-TRANS RETINOIC ACID)

Indications: Acne vulgaris in which comedones, papules and pustules predominate, hyperpigmentation, roughness and fine wrinkling of photodamaged skin due to chronic sun exposure

Cautions, Contra-indications, Side-effects: See notes above

Dose: Once daily, before retiring, to the skin where lesions appear, using enough to cover the entire affected area lightly. The therapeutic effects will not usually be observed until after 6-8 weeks of treatment

Proprietary Preparations

Cosmotrin(Beximco), Cream, 0.025%, Tk. 45.00/10 gm

Nilac(Square), Gel, 0.03%, Tk. 45.16/10 gm

Retin-A(Sanofi), Cream, 0.5%, Tk. 65/15 gm;
Tk.100/30g;Tk. 26.40/5 gm
Trena(ACI), Gel, 0.03%, Tk. 45.31/10 gm
Tretinoin(Albion), Cream, 0.025%, Tk. 45/10 gm

ORAL ANTIBIOTICS FOR ACNE

Tetracycline: See section 1.1.6. Initially 250–500 mg 1–4 times a day, with gradual reduction of the dose, depending on clinical response

Doxycycline: See section 1.1.6. 50–100 mg once or twice a day, depending on the disease severity.

Minocycline: See section 1.1.6. 50–100 mg once or twice a day, depending on the severity of disease.

Erythromycin: See section 1.1.5 initial dose is 250–500 mg 2–4 times a day, reduced gradually after control is achieved.

Clindamycin: See section 1.1.5 the initial dose is 150 mg three times a day, reduced gradually as control is achieved.

HORMONAL TREATMENT FOR ACNE

CO-CYPRINDIOL (a mixture of cyproterone acetate with ethinyl estradiol)

Co-cyprindiol Some women with moderately severe hirsutism acne vulgaris in women, unresponsive to systemic antibiotics

Cautions: Pregnancy, predisposition to thrombosis and as for combined oral contraceptives; see also section 6.3

Contraindications, Side-effects: See under combined oral contraceptives. See section 6.3

Dose: 1 tablet daily for 21 days starting on day 1 of menstrual cycle and repeated after a 7 day interval, usually for several months; withdraw when acne or hirsutism remits.

Proprietary preparation

Giane (Renata), Tab. cyproterone acetate 2mg, ethinylestradiol 35 microgram, Tab. 9.50/Tab

12.8 MISCELLANEOUS SKIN PREPARATIONS

ALUMINIUM CHLORIDE HEXAHYDRATE

Indications: Palmoplantar hyperhidrosis

Cautions: For external use only. Do not apply to broken, irritated or recently shaved skin. Avoid contact with eyes, mouth, nose and lips. Avoid direct contact with clothing and polished metal or jewellery surfaces

Contraindications: known hypersensitivity to aluminium chloride hexahydrate

Side-effects: Skin irritation: burning, stinging, redness, swelling, tingling or itching of treated skin areas

Dose: Apply at night after drying the affected areas carefully. Wash off in the morning. Do not re-apply the product during the day. Initially the product may be applied every night until sweating stops during the day. The frequency of application may be reduced to twice a week or less, if excess sweating is stopped during the day.

Generic Preparation
solution 20%

FINASTERIDE

(See section 5.4.3)

Indications: Male pattern hair loss (androgenetic alopecia) in men only.

Cautions: Hepatic impairment

Contra-indications: Known hypersensitivity to finasteride, women and paediatric patients

Interactions: See Appendix-2

Side-effects: Decreased libido, erectile dysfunction, ejaculation disorder and decreased volume of ejaculate

Dose: 1 mg once daily. In general, daily use for three months or more is necessary before benefit is observed. Continued use is recommended to sustain benefit. Withdrawal of treatment leads to reversal of effect within 12 months

Proprietary Preparations:
See section 5.4.3

12. SKIN

L-LYSINE

Indications: Treatment and prevention of infection in cuts, wounds abrasion, surgical incisions and burns. For the treatment of decubitus or stasis ulcers, advance chronic wounds, infected traumatic lesions etc

Contraindications: Known hypersensitivity to L-lysine

Side-effects: Slight itching sensation

Dose: Apply as often as required, preferably at an interval of 24, 48, 72 hrs. The affected areas should be cleaned with normal saline and/or surgically if necessary till the wound bed looks red/few bleeding points appear in the cleaned wound bed. Then gel should be applied liberally. The areas may be covered with a moist dressing and/or a bandage

Proprietary Preparations

Colagel(*Incepta*), Gel 15%, Tk. 80/25g

Limogel(*Beximco*), Oint., 15%, Tk. 80/25gm

MINOXIDIL

Indications: Androgenetic alopecia in men and women aged between 18 and 65.

Cautions: Before using Minoxidil, the user should determine that the scalp is normal and healthy. Patients with known cardiovascular disease or cardiac arrhythmia should contact a physician before using Minoxidil. Minoxidil contains alcohol, which will cause burning and irritation of the eye. In the event of accidental contact with sensitive surfaces (eye, abraded skin and mucous membranes) the area should be bathed with large amount of cool tap water

Contraindications: Known hypersensitivity to minoxidil, pregnancy.

Side-effects: Hypertrichosis (unwanted non-scalp hair including facial hair growth in women), local erythema, itching, dry skin/scalp flaking, and exacerbation of hair loss have been reported commonly

Dose: Hair and scalp should be thoroughly dry prior to topical application

of Minoxidil. A dose of 1 ml Minoxidil cutaneous solution should be applied to the total affected areas of the scalp twice daily. The total dosage should not exceed 2 ml. If fingertips are used to facilitate drug application, hands should be washed afterwards. It should be used twice daily for four months or more before evidence of hair growth can be expected

Proprietary Preparations

Regain(*Renata*), Solun., 2%, Tk. 500/60ml,; 5%, Tk. 600/60ml

Splendora(*Square*), Solun., 5%, Tk. 601.81/60ml

Trugain(*Ziska*), Solun., 2%, Tk. 348.00/60ml,; 5%, Tk. 398.00/60ml

Xenogrow(*Incepta*), Solun., 5%, Tk. 600/60 ml,; 2%, Tk. 500/60 ml

PARAFFIN

Light Liquid Paraffin + White Soft Paraffin

Indications: Prevention & treatment of itchy, irritating dry skin conditions, eczema & psoriasis

Cautions: Not to be used in eye

Contraindications: Known

hypersensitivity to paraffin

Dose: Apply to the affected area and rub in well. It is especially effective after washing body areas because the sebum content of the stratum corneum may be depleted after washing resulting in excessive moisture loss

Proprietary Preparations

Emolent(*Square*), Cream, Tk. 160.00/25gm

PODOPHYLLOTOXIN

Indications: Anogenital warts

Contra-indications: Pregnancy, known hypersensitivity to podophyllotoxin

Side-effects: Erythema, erosions, and tenderness

Dose: Apply with a protective inert ointment to surrounding skin and wash off 4–6 hours after application. Treatment is generally at weekly intervals

Proprietary Preparation

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Wartix(Incepta), Cream 0.15%

PRIMROSE OIL

Indications: Atopic dermatitis, premenstrual syndrome symptoms (PMS), cyclical mastalgia

Contraindications: known hypersensitivity to primrose oil

Side-effects: Diarrhoea, abdominal pain

Dose: One or two capsules two to three times daily

Proprietary Preparation

Eprim (Square), Cap. Tk. 5.00/Cap

SALICYLIC ACID^[ED]

Indications: Chronic atopic dermatitis, lichen simplex, psoriasis, seborrhoeic dermatitis, ichthiosis, warts, corns and calluses

Salicylic acid + Urea ointment:

Debridement and promotion of normal healing of hyperkeratotic surface lesions, particularly where healing is retarded by local infection, necrotic tissue, fibrinous or purulent debris or eschar. Urea is useful for the treatment of hyperkeratotic conditions such as dry, rough skin, dermatitis, psoriasis, xerosis, ichthyosis, eczema, keratosis pilaris, keratosis palmaris, keratoderma, corns and calluses

Cautions: Surrounding skin to be protected; avoid broken skin; not suitable for application to face, anogenital region or large areas. Avoid contact with eyes, do not inhale vapors

Contraindications: Diabetes, poor peripheral blood circulation, irritated skin or any area that is infected or reddened, known hypersensitivity

Side-effects: Skin irritation, prolonged use may cause salicylism

Dose: For viral warts and calluses:

Wash the affected area, the wart/callus may be soaked in water for 5 minutes. Dry thoroughly and apply one drop at a time with applicator to sufficiently cover each wart/callus, then let dry again. Self-adhesive cover-up discs may be used to

conceal warts. Repeat procedure once or twice daily as needed (until wart/callus is removed) for up to 12 weeks

Proprietary Preparations

Salicylic acid

Acnecare(General), Gel, 0.5%, Tk. 100.30/10 gm

Kerasol(Incepta), Cream, 12%, Tk. 110.00/30gm., 6%, Tk. 65.00/30 gm

Salidex(Eskayef), Cream, 6%, Tk. 42.00/15 gm

Salicid(Square), Cream, 12%, Tk. 100/30gm

Salicylic Acid 16.7% + Lactic Acid 16.7%,

Salitic (Ziska), Solun, Tk. 250.00/

UREA

Indications: Ichthyosis and dry skin conditions, eczemas, psoriasis

Cautions: Not to be used in eyes

Contraindications: Known hypersensitivity to urea

Side-effects: Burning and irritation, if applied to inflamed, broken or exudative skin eruptions, local irritation and oedema

Dose: Wash affected areas well, rinse off all traces of soap, dry, and apply sparingly twice daily

Proprietary Preparations

Urea 10%

Aqua Care(Drug Int.) Cream, Tk. 32.02/30 gm

Equa(Square), Cream, Tk. 32.02/15 gm

Eukrim(Beximco), Cream, Tk. 30.00/15 gm

Eudrate(Incepta), Cream, Tk. 30.00/15 gm

Eucera(Unimed), Cream, Tk. 75.00/30 gm

12.8.1 DISINFECTANTS AND CLEANSERS

ALCOHOL (70%)

Indication: Skin preparation before injection

Cautions: Flammable, patients suffering from severe burns. Avoid broken skin

Contraindications: broken skin

CHLORHEXIDINE GLUCONATE^[ED]

Indications : For the disinfection of clean and intact skin. For pre-operative

12. SKIN

surgical hand disinfection, hand disinfection on the ward prior to aseptic procedures or after handling contaminated materials. For disinfection of the patients' skin prior to surgery or other invasive procedures.

Cautions: External use only.

Dose:ADULT:preoperative surgical hand disinfection: Dispense 5 ml of solution and spread thoroughly over both hands and forearms, rubbing vigorously. When dry apply a further 5 ml and repeat the procedure. Antiseptic hand disinfection on the ward: Dispense 3 ml of solution and spread thoroughly over the hands and wrists rubbing vigorously until dry. Disinfection of patients skin:prior to surgery apply the solution to a sterile swab and rub vigorously over the operation site for a minimum of 2 minutes. Chlorhexidine Gluconate is also used for preparation of the skin prior to invasive procedures such as venepuncture.

Proprietary Preparations

Germiso (Square), Hand Rub, 0.5% , Tk. 130.39/200ml; 0.5% , Tk. 40.00/50ml

Handirub (Eskayef), Solu, , Tk. 100.00/200ml; Tk. 40.00/50ml;

Handiwash(General), Solu, 0.5%, Tk. 130.39/200 ml;Tk. 40.00/50 ml; ml Tk. 130.00/250ml;

Handscrub (Greenland), Solun., 20%, Tk. 250.00/250ml

Hexicor (ACI), Solun., 4%, Tk. 45.14/25ml

Hexicord (ACI), Solun., 4% Tk. 30.09/10ml; Tk. 275.83/250ml; Tk. 65.2/50ml

Hexiscrub(ACI), Skin Cleanser, 4%, Tk. 250.00/250 ml Tk. 300.00/250ml

Hexitane (ACI), Cream, 1%, Tk. 90.00/60ml

Kevirub (Opsonin), Solun., Tk. 105.72/250 ml; Tk. 31.12/50 ml

Pedicord (Greenland), SolutnTk. 30.00/10ml

Safetisol (Silva), Solun., , 0.5%, Tk. 105.40/300ml

Sanityza (Incepta), Solu., 0.5%, Tk. 130.00/250ml; Tk. 40.00/50ml

Chlorhexidine Gluconate,

Handirub(Eskayef), Hand Rub ,Tk. 40.00/50 ml; Tk. 100.00/200 ml

Handisol (Greenland), Solu, Tk. 70.00/100ml; Tk. 130.00/250ml; Tk. 40.00/50ml

Xisol(Aristo), Hand Rub Solution, Tk.30/50ml; Tk. 105.00/250 ml

Hexisol(ACI), Hand Rub,(with dispenser) Tk. 140.00/250 ml; 0.50%, Tk. 130.00/250

ml;0.50%, Tk. 40.00/50 ml;Tk. 30/10ml, Tk. 215.65/500ml, 196.33/500ml, Tk.

130.39/250ml;

CHLOROXYLENOL

Indications:For application to the skin for use in cuts, bites, stings, abrasions, and for use as an antiseptic hand cream.

Contraindications: Allergic skin reactions, dermatitis, eczema or other skin complaints.

Proprietary Preparations

Dettol(Reckitt), Liquid 4.80%, Tk.40.00/100ml; 2.4% Tk.33.00/50ml, Tk.208.00/75ml

CETRIMIDE

Usually used in combination with other antiseptics such as chlorhexidine

Indications: Skin disinfection.

Cautions: Avoid contact with eyes, avoid use in body cavities.

Side-effects: Skin irritation.

Proprietary Preparations

Cetrimide + Chlorhexidine Gluconate

Decon (Greenland), Solu, Tk. 200.00/1000ml; Tk. 30.00/112ml; Tk. 690.00/5000ml; Tk. 110.00/500ml; Tk. 22.00/56ml

G-Antiseptic(Gonoshasthaya), Solun., Tk.20.00/100 ml

Kevilon(Opsonin), Cream, Tk. 18.80/30 gm

Savlon (ACI), Solun, Tk.1745.23/5L Tk. 185.00/100l; Tk. 712.14/5Litre; Tk. 125.38/500ml; Tk. 44.00/112ml; Tk. 32.00/56ml; Tk. 220.66/1Litre ; Cream, Tk. 100.00/60gm; Tk. 34.10/60gm,Tk.50.00/100gm,Tk. 12.09/15gm ; Tk. 25.08/30gm

Welon (Eskayef), Solun, Tk. 145.00/1Litre; , Tk. 85.00/500ml

GENTIAN VIOLET^[ED]

Indications: Fungal skin infections, e.g., oral candidiasis (oral thrush), vulvovaginal candidiasis (vaginal thrush), superficial bacterial skin infections such as infected eczema, boils, and chronic (long-standing) leg ulcers

Cautions: Avoid contact with eyes, avoid use in body cavities.

Side-effects: Irritation of mucous membranes if used at high concentrations, staining of clothes

Proprietary Preparation

Viola(Hudson), Solun., 2%, Tk.12.00/60ml.
Tk.22.00/100ml

HYDROGEN PEROXIDE

Indications: Skin disinfection, particulate cleansing and deodorizing wounds and ulcers

Cautions: Large or deep wounds, avoid normal skin

Contra-indications: Deep wounds

Proprietary Preparation

Caress(Renata), Cream, Tk.43.50/15gm

POVIDONE-IODINE^[ED]

Indications: Solution: pre-operative and post-operative skin disinfection of surgical sites, as an antiseptic of hydrotherapy equipments, for the treatment of acne vulgaris of the face and neck and pyogenic skin conditions, bacterial and myotic skin infections.

Ointment: treatment and prevention of infections in cuts and abrasions, minor surgical procedures, and other topical lesion, as an adjunct to systemic therapy, in the treatment of primary or secondary topical infections, decubitus or stasis ulcer, pyoderms and infected traumatic lesions.

Gargle and Mouth-Wash: for infected inflammatory conditions of the mouth and pharynx caused by bacterial infections and in dental surgery

Cautions: Application of povidone iodine to large wound or severe burns may produce systemic adverse effects such as metabolic acidosis, hypernatraemia, pregnancy, breast-feeding and renal impairment

Contraindications: Avoid regular use in patient with thyroid disorders or those receiving lithium therapy and who shows hypersensitivity to iodine

Side-effects: Idiosyncratic mucosal irritation and hypersensitivity reactions rarely, may interfere with thyroid-function tests

Dose: Solution: Apply the full strength as often as required as a paint or wet soak. For minor wounds and infection apply

directly to the affected area. The site may be covered with gauze or adhesive bandage

ointment: apply ointment directly to the affected area after being cleaned and dried. May be covered with a dressing or bandage

Proprietary Preparations

Apodin (Globe), Oint., 5%, Tk. 15.00/10 gm ;
Solu., 10%, Tk.600.00/1L; 10%, Tk. 80.00/100ml

Arocin (Aristo), Solu., 1g/100ml, Tk. 35.00/100ml; Oint., 5%, Tk. 22.00/10g; Tk. 40.00/25g; 10%, Tk. 100.00/100ml, Tk. 500.00/1 Litre;

Betadine (Mundipharma), Oint., 5%, Tk. 75.00/15 gm; Tk. 196.00/125 gm; Surgical Scrub, 7.5%, Tk. 100.00/50 ml; Tk.165.00/100 ml; Tk. 650.00/500 ml

Cleanser (General), Solu., 10%, Tk. 85.00/100ml; Tk. 625.00/1000ml;

Povical (Drug Intl), Oint.5%Tk. 40.00/25 gm

Poviclean (Greenland), Solun., 10%, Tk. 100.00/100ml; Tk. 600.00/1000ml

Povid (Acme), Solu, 10%, Tk. 176.66/500ml; Tk. 341.28/1000ml; Tk. 36.27/100ml

Povidex (Healthcare), Oint., 5%, Tk. 55.00/100 gm; Cream, 6%, Tk. 50.00/10 gm

Povidine (Alco), Oint., 5%, Tk. 34.10/15gm

Povidon (Eskayef), Solun., 10%, Tk. 55.00/30ml; 100.00/100ml; Tk. 700.00/1 Lit. ;

Oint., 5%, Tk. 40.00/20gm

Povidone (Amico), Cream, 6%, Tk. 300.00/125gm; Tk. 40.00/10gm; Tk. 65.00/20gm; Tk. 80.00/25gm; 22.00/5gm

Solu., 10%, Tk. 3500.00/5Litre; , Tk. 55.00/30ml; Tk. 700.00/1 Lit. ; Tk. 90.00/100ml;

Povidon-I (Ziska), Solu, 10%, Tk. 100.00/100 ml

Povin (Opsonin), Solun., 5%, Tk. 25.09/ 100 ml; Oint., 5%, Tk. 15.10/1gm; Solu.,10%, Tk. 700.00/5ml

Povisep (Jayson), Surgical Scrub, 7.5%, Tk. 5,000.00/5 Liter; Solun, 10%, Tk. 100.00/100 ml ; Tk. 700.00/1 Litre; Tk. 3250.00/5 Liter; Tk. 55.00/30 ml; 5%, Tk. 25.00/20 ml; Tk. 80.00/100 ml; Powder , 5%, Tk. 30.00/10 gm

Provia (Asiatic), Solun., 10%, Tk. 30.00/100ml

Provia (Asiatic), Solun.,10%, Tk. 30/100 ml ,Solun., 10%, Tk. 110.00/50 ml; Tk. 190/100 ml; Tk. 550/500 ml; Tk. 1000/1 Litre ;5%, Tk. 100/50 ml; Tk. 150/100 ml; Tk. 450/500ml; Tk. 800.00/1 Litre

Topidin (Pacific), Oint., 5%, Tk. 35.00/25gm

Viodin (Square), Oint., 5%, Tk. 50/25gm; Solu., 10%, Tk. 25.08/15ml; Tk. 100.3/100ml; Tk. 702.11/1L

Viodin (Square), Solu.,10%, Tk. 60/100 ml; Tk.

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15.00/15 ml; Tk. 341.28/1 Litre ;Oint., 5%Tk.
40/20 gm

ZINC OXIDE

Indications: To treat or prevent skin irritations (e.g., burns, bed sore, cuts, poison ivy, diaper rash). Protects chafed skin due to diaper rash and helps seal out wetness

Cautions: For external use only. Avoid contact with the eyes

Contraindications: Known hypersensitivity to any component of the preparation

Side-effects: Usually well-tolerated. Extremely low frequency of hypersensitivity reaction

Dose: Apply thin layer topically every 8 hourly. Change wet and soiled diapers, promptly cleanse the diaper area, allow to dry and apply ointment liberally as often as necessary, with each diaper change, especially at bedtime or any time when exposure to wet diapers may be prolonged

Proprietary preparations

Zinc Oxide 40%

De-rash(Square), Oint., Tk. 50.20/25 gm

Happynap (Drug Int.), Oint., Tk. 90.00/50 gm

Napguard(Incepta), Oint., Tk. 50.00/25 gm

Q-Rash(Beximco), Oint., Tk. 50.00/25 gm

Rashguard(Popular), Oint., Tk. 40.15/20 gm

Softi(Eskayef), Oint., Tk. 90.00/50 gm

12.8.2 SUNSCREENS, CAMOUFLAGERS, SHAMPOOS AND OTHER SCALP PREPARATIONS

SUNSCREENS

Indications: Photodermatoses including those caused by radiotherapy, photosensitisation, solar urticaria, acute solar dermatitis, drug-induced photosensitivity, acute lupus erythematosus, cutaneous albinism, vitiligo, polymorphic light eruption

Cautions: Application to broken skin should be avoided. Contact with the eyes and other mucous membranes should be avoided.

Contraindications: known hypersen-

sitivity to any of the sunscreen components, children under the age of 6 months

Dose: Sunscreen should be applied 15–30 minutes before sun exposure to allow sufficient time for the protection to develop, and reapplied every 2 hours. Sunscreen should be reapplied after prolonged swimming or vigorous activity leading to sweating. If swimming or perspiring heavily, a water-resistant or waterproof product should be used.

Proprietary Preparations

Padimate O 8% + Avobenzone 2% +

Oxybenzone 3% + Titanium dioxide 2%

SolaScren(Incepta) lotion SPF 28, Tk. 400.00/60ml

AZELAIC ACID

See section 12.7.

HYDROQUINONE

Indications: Melasma, freckles, senile lentigines and other unwanted areas of melanin hyperpigmentation

Fluocinolone acetonide 0.1 mg +

Hydroquinone 40 mg + Tretinoin 0.5 mg

Cream: Moderate to severe melasma of the face, in the presence of measures for sun avoidance, including the use of sunscreen

Cautions: Where there is itching or vesicle formation or excessive inflammatory response, further treatment is not advised. If no bleaching or lightening effect is noted after 2 months of treatment, the medication should be discontinued. Contact with the eyes and lips should be avoided. Hydroquinone should not be applied to cut or abraded skin

Contraindications: known hypersensitivity to hydroquinone

Side-effects: Irritant dermatitis, contact dermatitis, postinflammatory pigmentation, and cutaneous ochronosis.

Dose: hydroquinone should be applied to the affected area and rubbed in well

twice daily. Most discolorations begin to lighten after 4 weeks of treatment but it may take longer

Hydroquinone 4%, + Octyldimethyl P-aminobenzoate 8% + Dioxybenzone 3%, + Oxybenzone: 2%

Apply once or twice daily, preferably at night

Proprietary Preparations

Hydrosy(*Supreme*) Cream; Tk. 80/10gm

Spotclen Plus(*Incepta*), Cream; Tk. 80/10g

Fluocinolone acetonide 0.1 mg +

Hydroquinone 40 mg + Tretinoin 0.5 mg cream:

Apply once daily at night. It should be applied at least 30 minutes before bedtime. A thin film of the cream should be applied to the hyperpigmented areas of melasma including about ½ inch of normal appearing skin surrounding each lesion. Cream is for short-term (up to 8 weeks) treatment of moderate to severe melasma of the face. It is not for long-term (more than 8 weeks) or maintenance (continuous) treatment of melasma

Proprietary Preparations

Melatrín(*Ziska*), Cream, Fluocinolone

Acetonide 0.01%, Hydroquinone 4%, Tretinoin 0.05% Tk. 200.00/30g

Nospot(*Eskayef*), Cream, Fluocinolone

Acetonide 0.01%, Hydroquinone 4%, Tretinoin 0.05% Tk. 200.00/30 gm

Spotclen(*Incepta*), Cream; Hydroquinone 4% Tk. 50/10g

Trimela(*Incepta*), Cream, Fluocinolone

Acetonide 0.01%, Hydroquinone 4%, Tretinoin 0.05% Tk. 200.00/30 gm

CAMOUFLAGERS

Disfigurement of the skin can be very distressing to patients and have a very marked psychological effects. These preparations can be very effective in concealing scars and birthmarks. The patches in vitiligo are very disfiguring and thus dermablend cover cream, dermacolour camouflage cream and kermomask masking powder are of great cosmetic value.

SHAMPOOS AND SOME OTHER SCALP PREPARATIONS

Dandruff is a mild form of seborrhoeic dermatitis. This can be treated with frequent use of a mild detergent shampoo, generally once or twice weekly.

Shampoos containing antimicrobial agents such as pyrithion zinc and selenium sulphide have beneficial effects. Ketoconazole shampoo is most effective. Corticosteroid gels and lotions can also be used. Shampoos containing coal tar and salicylic acid are useful. Infants may be treated with olive oil or arachis oil (groundnut oil, peanut oil). Applications must be followed by shampooing, keratolytic agents e.g. lactic acid, glycolic acid and salicylic acid are employed to treat multiple hyperkeratotic and scaling cutaneous eruptions. Lactic acid and salicylic acid are applied topically for the treatment of hyperkeratotic skin disorders. Glycolic acid is used for the treatment of xerosis, ichthyosis and photo-aging

Ketoconazole 2% shampoo:

Apply daily for 5 consecutive days. As prophylaxis, apply at least 2-3 times a week, then monthly (see section 1.2.1 under Ketoconazole)

Proprietary Preparations

Ketoconazole 2% shampoo

Dancel(*Incepta*), Shampoo, Tk. 230/100ml

Ketocon(*Opsonin*), Shampoo, Tk. 176.19/60ml

Ketozol(*Aristo*), Shampoo, Tk. 175/60ml

Nizoder(*UniMed*), Shampoo, Tk. 230/100ml

Betamethasone(as dipropionate) 0.05% + Salicylic Acid 2%

Betamesal(*Incepta*), Scalp Lotion, Tk. 150.00/30ml

Betamesal(*Incepta*), Scalp Lotion, Tk. 150.00/30 ml

Diprosal(*Arist*), Lotion, Tk. 150.00/30ml

Ecsota(*ACI*), Scalp Lotion, Tk. 150.00/30ml

Prosalic(*Square*), Lotion, Tk. 150.45/25ml

Salison(*Globe*), Oint., Tk. 70.00/10 gm

Dose: Apply twice daily

12. SKIN

CLOBETASOL PROPIONATE SHAMPOO

Indications: Moderate to severe forms of scalp psoriasis in subjects 18 years of age and older

Cautions: Treatment should be limited to 4 consecutive weeks because of the potential for the drug to suppress the hypothalamic-pituitary-adrenal axis. The total dosage should not exceed 50 g per week; breast feeding

Contraindications: Pregnancy, children younger than 18 years of age

Side-effects: Burning/stinging, pruritus, edema, folliculitis, acne, dry skin, irritant dermatitis, alopecia, urticaria, skin atrophy, Systemic absorption can cause reversible HPA axis suppression

Dose: Apply into the dry (not wet) scalp once a day in a thin film to the affected areas only, and leave in place for 15 minutes before lathering and rinsing

Proprietary Preparations

Dermasol(*Square*), Scalp Solution, 0.05%, Tk. 200.61/25ml

Dermovate(*GSK*), Scalp Lotion, 0.05%, Tk. 250.00/30ml

Nyclobate(*Incepta*), Scalp Application, 0.5%, Tk. 200/30ml; Shampoo, 0.5%, Tk. 350/60ml

Chapter 13

IMMUNOLOGICAL PRODUCTS AND VACCINES

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13. IMMUNOLOGICAL PRODUCTS AND VACCINES

Vaccination' and 'immunization' are the two terms that are now-a-days being used almost synonymously. But vaccination denotes only the administration of a vaccine, whereas, immunization means the result of vaccination which resulted in providing immunity which is mostly used to indicate active but may also related to passive treatment modules.

13.1 IMMUNITY, IMMUNIZATION SCHEDULE AND STORAGE

13.1.1 ACTIVE AND PASSIVE IMMUNITY

ACTIVE IMMUNITY

Vaccines may consist of:

- i) a live attenuated form of a virus (e.g. measles vaccine) or bacteria (e.g. BCG vaccine);
- ii) Inactivated preparations of the virus (e.g. influenza vaccine) or bacteria (e.g. Pertussis, VI Typhoid vaccine) or
- iii) extracts of or detoxified exotoxins produced by a micro-organism (e.g. tetanus vaccine, diphtheria vaccine).

Side-effects: some vaccines e.g. poliomyelitis produce very few reactions like VAPP or VDPV, while others e.g. measles may produce very mild form of

disease. Some vaccines may produce discomfort at the site of injection and mild fever and malaise. Vaccines that have been incorporated into national immunization systems have been well studied and are relatively safe. Although uncommon there can serious untoward reactions related or unrelated to the vaccine and these should always be reported to the proper health authority. Anaphylactic reactions are very rare but can be fatal. For full details of side-effects, the product literature should always be consulted.

Caution: Most of the vaccines are safe to receive. However, vaccination may be postponed if the individual is suffering from an acute illness. It is not necessary to postpone immunisation inpatients with minor illnesses without fever or systemic upset. If alcohol or disinfectant is used for cleansing the skin it should be allowed to evaporate before vaccination to prevent possible inactivation of live vaccines.

When 2 or more vaccines are required, they should be given simultaneously at different sites, preferably in a different limb; if more than one injection is to be given in the same limb, they should be administered at least 2.5 cm apart (also see under BCG Vaccines). When 2 live vaccines cannot be given at the same time, they should be separated by an interval of at least 4 weeks.

If Post-immunisation pyrexia develops after childhood immunisation, and the infant seems distressed, a dose of

13. IMMUNOLOGICAL PRODUCTS AND VACCINES

paracetamol (infant aged 2–3 months, the dose of paracetamol is 60 mg) can be given and, if necessary, a second dose can be given 4–6 hours later. Ibuprofen (50 mg for 2–3 months aged infants or as per physician's advice) can be used if paracetamol is not suitable, but if a second dose of ibuprofen is required, it is given 6 hours after the first dose. The parent should be warned to seek medical advice if the pyrexia persists.

Predisposition to neurological problems

In children who have had a seizure associated with fever without neurological deterioration, immunisation is **recommended**; advice on the management of fever (see above) should be given before immunisation. When a child has had a convulsion not associated with fever, and the neurological condition is not deteriorating, immunisation is **recommended**. Children with stable neurological disorders (e.g. spina bifida, congenital brain abnormality, and perinatal hypoxic-ischaemic encephalopathy) should be immunised according to the recommended schedule. When there is a still evolving neurological problem, including poorly controlled epilepsy, immunization should be deferred and the child referred to a specialist. Immunisation is recommended if a cause for the neurological disorder is identified. If a cause is not identified, immunisation should be deferred until the condition is stable.

See also *Cautions under individual vaccines*

For individuals with bleeding disorders, see under administration of vaccines, below.

Contra-indications: Most vaccines have some basic contraindications to their use, and the product literature should always be consulted. In general, vaccination should be postponed if the subject is suffering from an acute illness or if there is a known case of immunodeficiency. Minor infections without fever or systemic upset are not

contraindications. A definite severe reaction to a preceding dose is a contraindication to further doses.

Some viral vaccines contain small quantities of antibiotics such as neomycin or polymyxin (or both); such vaccines may need to be withheld from individuals who are *extremely sensitive to these antibiotics*. *Hypersensitivity to egg* contra-indicates influenza vaccine (residual egg protein present) and, if evidence of previous anaphylactic reactions, also contraindicates immunization with yellow fever vaccine.

Live vaccines should not be routinely administered to *pregnant women* because of possible harm to the fetus but where there is a significant risk of exposure (e.g. to poliomyelitis or yellow fever), the need for vaccination outweighs any possible risk to the fetus. Vaccination is usually not given in the first trimester of pregnancy. In case of Rubella vaccines, it is recommended not to conceive within one month of vaccination.

Live vaccines should not be given to individuals *with impaired immune responses* whether caused by disease (e.g., HIV) or as a result of radiotherapy or other immunosuppressive drugs or immunodeficiency due to genetic anomalies. These should not be given to those suffering from *malignant conditions* such as leukaemia and tumors of the reticuloendothelial system. The intramuscular route should not be used in patients with bleeding disorders such as haemophilia or thrombocytopenia.

VACCINES and HIV INFECTION. HIV-positive subjects with or without symptoms can receive the following live vaccines:

Measles, BCG, MMR (but not while severely immunosuppressed), Rubella; And the following inactivated vaccines: DPT, Hib, Hepatitis A, Hepatitis B, Inactivated Polio, Meningococcal, Rabies, Tetanus & Typhoid.

HIV positive subjects **should not** be immunized with live vaccines such as BCG and yellow fever vaccines. HIV infected individuals, including children,

13. IMMUNOLOGICAL PRODUCTS AND VACCINES

who are receiving anti-retroviral therapy (ART), are clinically well and immunologically stable should be vaccinated. Neonates born to women of unknown HIV status should be vaccinated.

Note: Live vaccines should be postponed until at least 3 months after stopping corticosteroids and 6 months after stopping chemotherapy.

False contra-indications: It is important to remember that immunization should not be postponed due to conditions wrongly considered to be contraindications for immunization. It is particularly important to immunize children suffering from malnutrition. Low grade fever, mild respiratory infections and other minor illness should not be considered as contraindication. Diarrhoea **should not be considered a contraindication to oral poliomyelitis vaccine (OPV)**. Table below shows the conditions which are NOT contraindications to immunization.

Table 13. A: Conditions which are NOT contraindications to immunization

*Minor illness such as upper respiratory infections or diarrhoea with fever < 38.5°C
*Allergy, asthma, or other atopic manifestations, hay fever or "snuffles"
*Pre-maturity, small-for-date infants
*Malnutrition
*Child being breast-fed
*Family history of convulsions
*Treatment with antibiotics, low-dose corticosteroids or locally acting (e.g. topical or inhaled) steroids
*Dermatoses, eczema or localized skin infection
*Chronic diseases of the heart, lung, kidney and liver
*Stable neurological conditions, such as cerebral palsy, spinabifida and Down's syndrome
*History of jaundice after birth

PASSIVE IMMUNITY

Immunity with immediate protection against certain infective organisms can be obtained by injecting preparations made from the plasma of immune individuals with adequate levels of antibody to the disease for which protection is sought. (See under *immunoglobulins*, section 13.3). Passive immunity lasts only for a few weeks. Where necessary, passive immunization can be repeated. Antibodies of human origin are usually termed **immunoglobulins**. The term antiserum is applied to material prepared in animals. Because of serum sickness and other allergic-type reactions that may follow injections of antisera, this therapy has been replaced wherever possible by the use of immunoglobulins. Reactions are theoretically possible after injection of human immunoglobulins but reports of such reactions are very rare.

13.1.2. STORAGE AND USE

Care must be taken to store all vaccines and other immunological products under the conditions recommended in the product literature, otherwise the preparation may become denatured and totally ineffective. **Refrigerated storage** is usually necessary; many vaccines need to be stored at 2-8°C and are not allowed to freeze. Vaccines should be protected from light. Opened multi-dose vials that have not been fully used should be disposed of within six hours or at the end of the session whichever come first if no preservative is present. When vaccines containing a preservative WHO multi dose vial policy will be used.

Particular attention must be paid to the instructions on the use of diluents and ampoules of vaccine should always be adequately shaken before use to ensure uniformity of the material to be injected.

Administration of Vaccines: Vaccines containing aluminum adjuvants (DPT, DT, Hepatitis B vaccine) should be injected intramuscularly. The preferred

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site for intramuscular injection in infants and young children is the anterolateral aspect of the upper thigh since it provides the largest muscular mass. In older children the deltoid has achieved sufficient size to offer a convenient site for intramuscular injection. Similarly in adult women, the deltoid is recommended for routine intramuscular administration of TT. Passive immunity is also obtained through fetal transfer of antibodies from vaccinated mothers (e.g with TT vaccine or other vaccines) or via breast milk to infants.

Note: The buttock should not be used routinely as an immunization site for infants, children, or adults because of the risk of injury to the sciatic nerve. Since the depth of gluteal fat in adult women is usually more than 3.5 cm, which is typically the length of the injecting needle, injecting vaccines into the buttock may result in poor absorption of the vaccine from fatty tissues.

If alcohol or other disinfecting agent is used to wipe the injection site, it must be **allowed to evaporate**, otherwise inactivation of a live vaccine may occur.

13.1.3 EPI & IMMUNIZATION SCHEDULE

(For immunization schedule see also Appendix-8a, 8b & 8c)

EPI IN BANGLADESH

In Bangladesh EPI was formally launched on 7th April 1979 and the targeted diseases were Tuberculosis, Diphtheria, Whooping cough, Tetanus, Poliomyelitis and Measles. The country adopted the goal of 'Universal Child Immunization' (UCI) in 1985

Table 13B: Bangladesh EPI Immunization Schedule for children.

AGE	Vaccine
Birth	BCG and OPV*
6 weeks	Hib penta, PCV, ID IPV and OPV
10 weeks	Hib penta, PCV and OPV

14 weeks	Hib penta, PCV, OPV and ID IPV
9 months	MR
15 months to 18 months	MR

From early 2014, Bangladesh has conducted vaccination of children 9 month to below 15 years aged target population for MR vaccination.

*WHO recommends that a child be given OPV dose soon after birth

Table 13C: TT immunization schedule for child bearing age women

Dose	When to give	Duration of protection
TT-1	15 years completed	None
TT-2	At least 4 weeks After TT-1	3 years
TT-3	At least 6 months after TT-2	5 years
TT-4	At least 1 year after TT-3	10 years
TT-5	At least 1 year after TT-4	Up to reproductive period

Note. Minimum time interval between doses must be maintained but no maximum limit is to be considered.

Booster doses of EPI in Bangladesh:

In Bangladesh, the EPI has not yet addressed the issue of booster doses of EPI vaccines. The first priority is to ensure that infants are completely immunized against target diseases at the youngest age possible. Global immunization policy suggests that where resources are limited, booster doses should not be considered until coverage levels for fully immunized infants are above 80%.

Bangladesh introduced HepB vaccine in the year 2003 in a phase wise manner. During 1st phase seven districts and one City Corporation, during 2nd phase 25 districts and 5City Corporation and during last phase national wide replication by including 32 districts. Now this vaccine is a component of Hib

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penta vaccine (DPT, HepB and Hib) become part of national EPI vaccination program. All cost of the vaccine was covered by Gavi during phasing but now Bangladesh uses this vaccine for maintaining co financing policy developed by Gavi where modest amount payment to UNICEF for Hib penta vaccine since 2009.

13.2 VACCINES AND ANTISERA

BCG (Bacillus Calmette-Guerin) VACCINE^[ED]

BCG vaccine is a dried vaccine prepared from a live attenuated strain known as the Bacillus Calmette-Guerin strain, which is derived from *Mycobacterium bovis*. It contains an amount of viable bacteria such that inoculation, in the recommended dose, of tuberculin negative persons results in an acceptable tuberculin conversion rate

Indication: Prevention or primary TB infection, especially with severe manifestation (miliary TB and TB meningitis)

Special Caution: Children born to HIV seropositive mother

Contraindications: Congenital or acquired immunosuppression affecting cellular immunity. BCG is also contraindicated in subjects with generalized septic skin conditions (in the case of eczema, a vaccination site free from lesions should be chosen)

Side-effects: Adenitis, lymph node suppuration

Dose: ADULT and CHILD ≥ 1 year, 0.1ml; < 1 year 0.05 ml

Route of Administration: by intradermal injection.

Proprietary Preparation

BCG vaccine is available in EPI only
BCG Medac[®](Medac), Inj., Tk.8620.80

DIPHTHERIA VACCINES^[ED]

Protection against diphtheria is essentially due to antitoxin, the production of which is stimulated by

vaccines prepared from the toxin of *Corynebacterium diphtheriae*. These are more effective and cause fewer reactions if adsorbed onto a mineral carrier. Adsorbed diphtheria vaccines are recommended for the routine immunization of babies and are usually given in the form of a *triple vaccine*, **Adsorbed Diphtheria, Tetanus, and Pertussis vaccine**. Recently, another *tetavalent vaccine* **Adsorbed Diphtheria, Tetanus pertussis and Hepatitis B** has been made available.

a) Diphtheria vaccines with pertussis and tetanus (triple vaccine) :

ADSORBED DIPHTHERIA, PERTUSSIS AND TETANUS VACCINE (DPT VACCINE) OR DIPHTHERIA-PERTUSSIS-TETANUS COMBINED VACCINE^[ED]

Indications: Protection against Diphtheria, Pertussis and Tetanus

Contraindications: personal history of epilepsy

Side-effects: Transient rise in temperature, restlessness, irritability, crying or loss of appetite may sometimes occur a few hours after vaccination. These usually do not call for treatment. Rarely anaphylaxis may occur. Convulsion, infantile spasms and encephalopathy have been reported as rare complication, which are actually due to the pertussis component

Dose: Primary immunization of children, 0.5 ml by intramuscular injection at 6 weeks followed by second dose after 4 weeks and third dose after another 4 weeks (see Appendix-8a)

Proprietary Preparations

DPT Vaccine is available from EPI centers only. From 2009 this vaccine is in combination with **Hepatitis B** and **Hib** as **Hib penta** form and using 3 doses in Bangladesh for infant age 6 weeks, 10 weeks and 14 weeks.

b) Diphtheria vaccines with pertussis, tetanus and Hepatitis B:

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DPT VACCINE WITH HEPATITIS B

Prepared from diphtheria and tetanus toxoids, inactivated pertussis bacteria and purified HBsAg. The vaccine is presented as a liquid suspension.

Indications: Protection against Diphtheria, Pertusis, Tetanus and Hepatitis B of infants from 6 weeks onwards

Contra-indications: as with DPT triple vaccines. It should not be administered intradermally which may result in reduced immune response

Side-effects: as with DPT triple vaccines

Dose: primary immunization of children, 0.5 ml by intramuscular injection at 6 weeks followed by second dose after 4 weeks and third dose after another 4 weeks.

Route of Administration: By *Intramuscular injection* at upper outer quadrant of thigh

Proprietary Preparation

Not available in the market.

DPT VACCINE WITH HEPATITIS B AND HAEMOPHILUS INFLUENZA TYPE B

Prepared from diphtheria and tetanus toxoids, Bordetella pertussis inactivated cellular suspension, hepatitis B surface antigen (HBsAg), and Haemophilus influenza type b conjugated oligosaccharide. The vaccine is presented as a liquid suspension.

Indications: Protection against Diphtheria, Pertusis, Tetanus, Hepatitis B and invasive illness caused by H. influenza type b. of infants from 6 weeks onwards

Contraindications: Should not be administered to children with known hypersensitivity to any vaccine component or to children having shown signs of hypersensitivity after previous administration of diphtheria, tetanus, pertussis, hepatitis B, or Hib vaccines.

Children who have experienced an encephalopathy of unknown aetiology after a previous vaccination with vaccine containing pertussis should not be vaccinated. In these circumstances, the vaccination course should be continued with diphtheria, tetanus, hepatitis B, and Hib vaccines. As with other vaccines, vaccination should be postponed in children suffering from acute febrile illness.

Side-effects: Diarrhoea, vomiting, fever, injection site reactions (erythema, induration, pain), feeding disorders, sleepiness, irritability and rash.

Dose: Primary immunization of children, 0.5 ml by intramuscular injection at 6 weeks followed by second dose after 4 weeks and third dose after another 4 weeks. Reinforcing vaccination of toddlers (13–24 months after birth): one booster dose of 0.5 ml.

Route of Administration: By *Intramuscular injection* at upper outer quadrant of thigh or alternatively in the deltoid region in children 13–24 months after birth.

Generic Preparation

Intra-muscular injection, 0.5ml/vial.

HAEMOPHILUS INFLUENZA TYPE B POLYSACCHARIDE, CONJUGATE TO TETANUS PROTEIN

Produced from vaccine of purified polyribosyl ribitol phosphate capsular polysaccharide (PRP) of Hib, covalently bound to tetanus toxoid.

Contra-indications: known hypersensitivity to any component of the vaccine, or having shown signs of hypersensitivity after a previous dose of this vaccine or any injection containing Haemophilus Influenza type B.

Indication: Active immunisation against Haemophilus influenza type b infection in children aged from 2 months to 5 years.

Dose: One dose each at 2, 4, and 6 months of age. The first dose may be given as early as 6 weeks of age. One booster dose given at 15through 18 months of age.

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Proprietary Preparation

ActHIB[®] (Sanofi Pasteur): 0.5ml solutions for intramuscular injection.

This standalone Hib vaccine (ActHIB) is not marketed anymore. But this HIB antigen is available in combination with other antigens like diphtheria, tetanus, acellular pertussis, inactivated polio and hepatitis b in HEXAXIM.

DPT VACCINE WITH HAEMOPHILUS INFLUENZA TYPE B

Prepared from Diphtheria and tetanus toxoids, inactivated whole cell Bordetella pertussis and Haemophilus influenza type b polysaccharide conjugated with tetanus protein. The vaccine is presented as a liquid suspension.

Indications: Protection against Diphtheria, Pertussis, Tetanus and invasive illness caused by H. influenzae type b. of infants from 6 weeks onwards. Booster dose is given 1 year after the 3rd injection of the primary vaccination.

Contraindications: Neurological disease, strong reaction occurring within 48 hours following a previous vaccination: fever $\geq 40^{\circ}\text{C}$, persistent crying syndrome, febrile or non-febrile convulsion, hypotonus – hypo reactivity syndrome, hypersensitivity appearing after a previous vaccination against diphtheria, tetanus and pertussis and known allergy to any of the ingredients of the vaccine.

Side-effects: same as above.

Dose: Primary immunization of children, 0.5 ml by intramuscular injection at 6 weeks followed by second dose after 4 weeks and third dose after another 4 weeks. Reinforcing vaccination of toddlers (13–24 months after birth): one booster dose of 0.5 mL.

Route of Administration: Antero-lateral region of the thigh (middle third) by intramuscular or subcutaneous route.

Proprietary Preparation

TETRAAct-HIB[®] (Sanofi Pasteur): Suspension for injection intramuscular or subcutaneous route.

TETRAAct-HIB has been discontinued in Bangladesh. With the introduction of hexavalent vaccine (HEXAXIM) all these antigens of above four diseases are found along with antigens of polio and hepatitis b.

DIPHTHERIA VACCINE WITH TETANUS

ADSORBED DIPHTHERIA AND TETANUS VACCINE (DT VACCINE)

Prepared from diphtheria formal toxoid and tetanus formal toxoid adsorbed on a mineral carrier.

Contraindications: Should not be administered intradermally

Side-effects: See general discussion

Dose: Primary immunization of children omitting pertussis component, 0.5 ml by intramuscular injection at 2 months, followed by second dose after 4 weeks and third dose after another 4 weeks. Reinforcement at school entry, 0.5 ml

TYPHOID VACCINE

Typhoid fever is a very common disease in our country that affects adults and children alike. Due to poor nutritional status, and lowered body immunity, majority of our children are especially prone to suffer from the complications of typhoid fever (e.g., gastro-intestinal haemorrhage, intestinal perforation, bronchitis, septicaemia, cholecystitis, orchitis, meningitis etc.) resulting in an overall child morbidity and mortality rates. So use of typhoid vaccine may be encouraged in our country.

POLYSACCHARIDE TYPHOID VACCINE

This new type of vaccine contains the fraction of capsular polysaccharide of Vi antigen of *Salmonella typhi*. It is given by intramuscular or deep subcutaneous

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injection; further doses are needed every 2 to 3 years.

Indications: Active immunisation against typhoid fever for adults and children older than two years of age.

Contraindication: Intravascular administration may cause anaphylactic reaction, Known allergy to any ingredients of the vaccine

Special Caution: has not been evaluated in children under 2 years of age. Postpone vaccination in subjects suffering from acute febrile illness.

Dosage and administration: A single dose of 0.5 ml containing 25 µg of the *Vi polysaccharide* of *Salmonella typhi*s recommended for both children and adults. Subjects who remain at risk of typhoid fever should be revaccinated using a single dose of vaccine every 2 to 3 years.

Consult product literature

This vaccine is not incorporated in EPI program.

Side-effects: See notes above

Storage: store between 2 to 8 °C (in a refrigerator). Do not freeze

Proprietary Preparations

Typhim VI[®](Sanofi), Inj., (P.F

Syringe) Tk. 707.4/syringe

Vaxphoid(Incepta); Inj. Tk 300.00/vial

HAEMOPHILUS INFLUENZAE TYPE B VACCINE

Indications: prevention of infants from 2 months of age against invasive infections caused by *H. influenzae* type b (meningitis, septicaemia, cellulitis etc.). It does not provide protection against infections due to other types of *H. influenzae* nor against meningitis caused by other microorganisms.

Contra-indications: known allergy to one of the ingredients of the vaccine, particularly tetanus protein or allergy appearing after a previous injection of conjugate *H. influenzae* type b vaccine.

Dose :

- Infants between 2-6 months:

3 injections at 1-2 months apart followed by a booster 12 months after 3rd dose.

- If not vaccinated before 6 months:
 - a) 6-12 months: 2 injections 1-2 months apart followed by a booster 12 months after last injection.
 - b) 1- 5 years: Only one single injection.

Now this vaccine is a component of Hib penta vaccine become part of national EPI vaccination program.

Consult product literature

Route of administration: intramuscular

Proprietary Preparations

Combined Vaccine

Diphtheria, Tetanus, Pertussis (Acellular, Component), Poliomyelitis (Inactivated) and Haemophilus Type b Conjugate Vaccine, hepatitis B

Indication: This vaccine is indicated in the joint prevention of invasive infections caused by *Haemophilus influenzae* type b (meningitis, septicaemia, cellulitis, arthritis, epiglottitis, etc), diphtheria, tetanus, pertussis and poliomyelitis.

Contraindication: Hypersensitivity to any of the active substances of the vaccine; febrile or acute disease; evolving encephalopathy.

Dose: 3 doses of vaccine are given in 1- or 2-month interval from 2 months of age by IM route followed by a booster injection during the 2nd year of life.

Proprietary Preparations

Diphtheria, Tetanus, Pertussis (Acellular, Component), Poliomyelitis (Inactivated) Haemophilus Influenzae Type b Conjugate and Hepatitis B

HEXAXIM[®](Sanofi Pasteur) Inj.

(P.F.syringe) 0.5ml Tk 3510/syringe

Infanrix - Hexa[®] (Glaxo) Inj. (P.F syringe)

0.5ml Tk 3300.00/syringe

INACTIVATED INFLUENZAE VACCINE

The influenza vaccination is an annual vaccination using a vaccine specific for a given year to protect against the highly variable influenza virus. Each seasonal influenza vaccine contains antigens

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representing three (trivalent vaccine) or four (quadrivalent vaccine) influenza virus strains: one influenza type A subtype H1N1 virus strain, one influenza type A subtype H3N2 virus strain, and either one or two influenza type B virus strains. Influenza vaccines may be administered as an injection, also known as a flu shot, or as a nasal spray.

Indications: Prophylaxis of influenza, especially in those who run an increased risk of associated complications. It is indicated in adults and children from 6 months of age.

Dose:

Trivalent Influenza Vaccine

Adults: 0.5 ml trivalent influenza vaccine. Pediatric population: Children from 36 months onwards: 0.5 ml trivalent influenza vaccine. Children from 6 months to 35 months: Dosages of 0.25 ml trivalent influenza vaccine.

Quadrivalent Influenza Vaccine

Adults: 0.5 ml quadrivalent influenza vaccine. Pediatric population: Children from 6 months onwards: 0.5 ml quadrivalent influenza vaccine.

Contra-indications: Hypersensitivity to the active substances, to any of the excipients, to egg, to chicken protein, formaldehyde, gentamicin sulphate or sodium deoxycholate.

Side effects: The most common local adverse reactions and general adverse events were pain and redness at the injection site, muscle aches, fatigue, and headache.

Proprietary Preparations

Influvax(Incepta) Inj., 0.5ml/vial Tk. 700.00/vial

Vaxigrip Enfant[®](Sanofi Pasteur) Inj.,

(P.Fsyringe) Tk593.41/syringe

Vaxigrip[®](Sanofi Pasteur), Inj. P.Fsyringe) Tk. 750/ syringe.

Vaxigriptetra[®](Sanofi Pasteur) QuadriValent Influenza Vaccine (Split-virion, inactivated), 0.5 ml PFS Tk1125/ syringe.

MENINGOCOCCAL VACCINE

Meningococcal Meningitis and septicaemia are caused by various serogroups of *Neisseria meningitidis*. Endemic disease occurs worldwide and is mostly caused by meningococci of serogroups A, B, or

C, although group Y is gaining importance. In recent years, also group W135 meningococci have caused an outbreak in the "African meningitis belt" as well as in Saudi Arabia. Current internationally marketed meningococcal vaccines are either bivalent (groups A and C) or tetravalent (groups A, C, Y and W135). The vaccines are purified, heat-stable, lyophilized capsular polysaccharides from meningococci of the respective serogroups. These vaccines are very safe, and significant systemic reactions have been extremely rare.

Travellers to areas affected by meningococcal outbreaks are advised to be vaccinated. For **pilgrims to the Hajj and Ramadan Omrah, Saudi Arabia requires visitors obtain a tetravalent vaccine (A, C, Y and W135)** at least ten days prior to their arrival in the country.

MENINGOCOCCAL A, C, W, Y VACCINE

Indications: indicated for the active immunisation of children from 2 years of age, adolescents and adults against meningococcal disease caused by meningococci of serogroups A, C, W-135 and Y. The vaccine is particularly recommended for subjects at risk, for example those living in or visiting areas where the disease is epidemic or highly endemic. It is also recommended for subjects living in closed communities and close contacts of patients with disease caused by *meningococci* of serogroups A, C, W-135 and Y.

Caution: Seroconversion rate of Children below 2 years is lower for the serogroup C and to a lesser extent for A, W₁₃₅ and Y. However, seroconversion for the serogroup A is acceptable in children from age 6months onward.

Side-effects: Erythema, slight induration and tenderness hyperthermia and mild erythema at the site of injection.

This vaccine is not incorporated in EPI program as yet.

Proprietary Preparation

Ingovax(Incept)Inj.0.5ml, Tk.600/vial, Tk. 1000.00/Vial

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ADULT and CHILD over 1 year 0.5mL as a single dose; CHILD 3 months–1 year 2 doses of 0.5mL separated by an interval of 1 month
Meningococcal A, C, Y and W 135 conjugate vaccine

Menactra[®] (Sanofi), 0.5 ml, /dose Tk. 3803.94/vial

HUMAN PAPILLOMAVIRUS VACCINES

Human papillomavirus vaccine is used in females for the prevention of cervical cancer and other pre-cancerous lesions caused by human papillomavirus. This vaccine is available as a bivalent vaccine or quadrivalent. Quadrivalent is licensed for use in females for the prevention of cervical cancer, genital warts and pre-cancerous lesions caused by human papillomavirus types 6, 11, 16, and 18. Bivalent vaccine is licensed for use in females for the prevention of cervical cancer and other pre-cancerous lesions caused by human papillomavirus types 16 and 18.

The vaccines may also provide limited protection against disease caused by other types of human papillomavirus. The two vaccines are not interchangeable and one vaccine product should be used for an entire course.

Human papillomavirus vaccine will be most effective if given before sexual activity starts. Consult product literature.

HUMAN PAPILLOMAVIRUS VACCINES

Indications: See notes above

Cautions: See section 13.1.1

Contraindications: See section 13.1.1

Side-effects: See section 13.1.1

Dose: under the preparation

Proprietary Preparations

Gardasil[®] (MSD), suspension of virus-like particles of human papillomavirus type 6 (40 micrograms/mL), type 11 (80 micrograms/mL), type 16 (80 micrograms/mL), type 18 (40 micrograms/mL). 0.5ml vial, Tk. 4254.15/vial

Dose: prevention of premalignant genital lesions, cervical cancer and genital warts, by intramuscular injection

preferably into deltoid region or higher anterolateral thigh, ADULT and CHILD over 9 years, 3 doses of 0.5 mL, the second 2 months and the third 6 months after the first dose

Cervarix[®] (GSK), suspension of virus-like particles of human papillomavirus type 16 (40 micrograms/mL), type 18 (40 micrograms/mL) Prefilled syringe 0.5ml Tk. 2100/ 0.5ml

Dose: prevention of premalignant genital lesions and cervical cancer, by intramuscular injection into deltoid region, for females aged 9 dose of vaccine is recommended at 0, 6 months schedule. For women aged 15 years above, 3 dose of vaccine is recommended at 0, 1, & 6 months schedule.

POLIOMYELITIS VACCINES^[E]

There are 2 types of vaccines against poliomyelitis : poliomyelitis vaccine, live (oral) (Sabin) and poliomyelitis vaccine, inactivated (injectable) (Salk).

Oral poliomyelitis vaccine (OPV) is composed of the three types of attenuated strains of poliovirus types 1, 2, and 3. Because of its low cost, ease of administration, superiority in conferring intestinal immunity, and the potential to infect household contacts secondarily, it is used in the EPI, as the vaccine of choice for eradication of poliomyelitis.

Dose: 2-3 drops (as guided by the manufacturer) from a multi-dose container constitute a single dose. Usually 3 such doses are given at intervals of 4 weeks on 3 occasions at the same time as routine immunization against diphtheria, tetanus and pertussis. **Note:** EPI is now follow multi dose vial policy for IPV vial and the vaccine can be used up to 28 days after opening the vial following certain conditions. The IPV vaccine is supported by Gavi and exempted from Gavi co financing policy due to global unique need of polio eradication...

Contra-indications: See general discussion. The efficacy of the vaccine

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may be impaired if given in subjects having diarrhoea or vomiting.

Side-effects: vaccine related paralysis might occur on very rare occasions.

Proprietary Preparations

Oral polio vaccine is available from EPI centers only. The SEAR countries including Bangladesh certified as polio free from March 2014, as per WHO recommendation to eradicating polio from the world all OPV using countries like Bangladesh need to incorporate at least one dose of IPV in routine EPI during DPT3 contact. Bangladesh decided to incorporate one dose of IPV with OPV3/Hibpenta3 dose from the month of October 2014. From March 2015 Bangladesh introduced IPV with Hib penta 3rd dose. But due to the global shortage of IPV vaccine as per SAGE recommendation from November 2017 the country using intradermal IPV at 6th week and 14 week. The IPV vaccine cost is covered by Gavi due to global unique need to eradicate polio by 2021.

MEASLES VACCINE^[ED]

MEASLES VACCINE, LIVE

Measles Vaccine, Live is a preparation containing a suitable modified strain of live measles virus grown in cultures of chick embryo cells or in other suitable approved cell cultures. It is prepared immediately before use by reconstitution from the dried vaccine with the liquid stated on the label to give a suspension. The vaccine does not contain any added antimicrobial preservative.

Dose: Two doses of 0.5 ml reconstituted vaccine is administered subcutaneously (SC) at the anterolateral part of mid-thigh at the age of 9 months and 15 months.

Note: Administration of measles vaccine (measles containing vaccine) to children may be associated with a mild measles-like syndrome with a measles-like rash and pyrexia about a week after injection. Much less commonly, convulsions and, very rarely, encephalitis have been reported. Convulsions in infants are

much less frequently associated with measles vaccines than with other conditions leading to febrile episodes.

Contraindications: See *general discussion*

Proprietary Preparations

Measles containing vaccine measles and rubella (MR) available in EPI centers only.

Rubavax(Incept) Inj., 0.5ml/vial
Tk.400/vial

MEASLES, MUMPS AND RUBELLA (MMR) VACCINE

A combined measles/mumps/rubella (MMR) vaccine aims to eliminate rubella (and congenital rubella syndrome), measles, and mumps. Ideally, every child should receive two doses of MMR vaccine by entry to primary school.

Infants between 9 and 12 months of age: The first dose of MMR vaccine may be given to infants from 9 months of age. Individuals 12 months of age or older: The dose is 0.5 ml. A second dose should be given according to official recommendation.

Contraindications: See *general discussion*; hypersensitivity to neomycin or to any other component and egg, children who have received another live vaccine by injection within 3 weeks, if given to women, pregnancy should be avoided for 3 months after vaccination

Side-effects: malaise, fever or rash may occur following the first dose of MMR vaccine, most commonly about a week after immunization and lasting about 2-3 days. Paracetamol can be given to reduce the fever followed if necessary by a second dose 4-6 hours later. After a second dose of MMR vaccine, adverse reactions are considerably less common than after the first dose.

Post-vaccination meningoencephalitis was reported (rarely and with complete recovery) following immunization with MMR vaccine containing Urabe mumps vaccine. This strain has been discontinued in most developed countries including UK. No cases have

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been confirmed in association with the Jeryl Lynn mumps vaccine.

Dose: 0.5 ml by deep subcutaneous or intramuscular injection (consult manufacturer's literature)

Proprietary Preparations

Priorix⁽¹⁾ (GSK), Inj., Tk. 600.00/0.5ml vial
Trimovax⁽¹⁾ (Sanofi Pasteur), Inj. This vaccine is currently not available.

TETANUS VACCINE (TETANUS TOXOID)^[ED]

Tetanus toxoid (TT) is prepared from tetanus toxin produced by the growth of *Clostridium tetani*. The toxin is converted to tetanus toxoid by treatment with formaldehyde solution and adsorbed on to aluminium salts to increase its antigenicity.

Note: An advantage of the adsorbed preparation is that antitoxins (immunoglobulins) do not neutralize them. So they can be given concurrently unlike the plain tetanustoxoid (where a 6 weeks wait is necessary to allow the antitoxin levels to fall). TT is stable and can withstand exposure to room temperature for months and to 37°C for a few weeks without significant loss of potency. But usually it is preserved at a temperature between 2° and 8°C. In that condition the expiration date is not later than 2 years after date of issue from manufacturer's cold storage. TT is a highly effective vaccine and induces the formation of specific antitoxins, which neutralize the toxin. Antitoxin, which passes to the foetus across the placenta following active immunization of the mother, prevents neonatal tetanus. In EPI TT is used to prevent neonatal tetanus by immunizing women.

Dose: When most women of child-bearing age have not previously immunized with TT in their infancy or adolescent or when there is little or no documentation of past immunization, implementation of a TT five dose schedule for women of childbearing age is of the utmost importance (Appendix-8b).

This TT immunization schedule should include a first dose given at the first contact, a second dose at least 4 weeks after the first dose, and a third dose given 6-12 months after the second dose (or next pregnancy). Protective antibody levels are attained in 80-90% of women after the second dose and in 95-98% of women after the 3rd dose. This basic course will provide protection for at least 5 years. Fourth and fifth dose of TT given later will prolong the duration of immunity for 10 and 20 years (or life long) respectively. Since women who received only three doses of DPT in infancy may not respond well to one booster dose of TT, it is prudent to give them two doses of TT (during pregnancy) with an interval of 1 month, and complete the full immunization with one dose of TT one year later (or in a subsequent pregnancy).

In Bangladesh from 1993 for child bearing age women (15 to 49 years) TT-five doses schedule recommended which are as follows: The TT1 is at 15 years, TT2 four weeks after TT1, TT3 six months after TT2, TT4 one year after TT3 and TT5 one year after TT4. If an infant received three doses of Hib penta in that case when she reaches 15 years of age will receive only three doses of TT instead of five doses if there is valid document for vaccination. Here at 15 years she will receive TT3, after one year TT4 and TT5 one year after TT5.

Contra-indications: See general discussion and individuals who had developed transient thrombocytopenia or neurological complications previously after administering any dose of tetanus toxoid

Side-effects: local reactions such as tenderness, erythema, induration oedema and nodule at the injection site. Headache, circulatory reactions, sweating, chills, fever, dyspnoea, muscle and joint complaints. GI discomfort, exanthema, blood disorders

Interactions: immunosuppressive therapy, see also Appendix-2

Proprietary Preparations

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T. VaccinumTetani[®](Biomed), Inj., Tk.64.73/0.5ml amp
TT Vax (Popular), Inj.TK.80.00/0.5ml Vial
Vaxitet(Incepta),Inj.,Tk.60/0.5ml amp;(1's) Tk. 80/0.5mlAmp(10's)

HEPATITIS B VACCINE^[ED]

Hepatitis B vaccine contains inactivated hepatitis B virus surface antigen (HbsAg) adsorbed on Aluminium hydroxide adjuvant. It is made biosynthetically using recombinant DNA technology. The vaccine is safe and immunogenic even when administered at birth (Maternal anti-HBsAg antibody does not interfere with the response to the vaccine), and highly efficacious. Over 90% of susceptible children develop a protective antibody response (over 10 IU/ml) following three doses of vaccine. Infants of HBsAg-positive carrier mothers respond less well to the vaccine since it is delivered after infection has occurred. A combined DTP and Hepatitis B vaccine is also available for infants.

Immunization schedule

Primary immunization : A series of three intramuscular injections is required to achieve optimal protection.

Two primary immunization schedules can be recommended :

- A rapid schedule, with immunization at 0, 1 and 2 months, will confer protection more quickly and is expected to provide better patient compliance.
- Schedules which have more time between second and third doses, such as immunization at 0, 1 and 6 months, may take longer to confer protection, but will produce higher anti-HBs antibody titres.

The birth dose should be followed by 2 or 3 additional doses to complete the primary series. A birth dose of hepatitis B vaccine can be given to low birth weight (<2000g) and premature infants. For these infants, the birth dose should not count as part of the primary 3 dose series; the 3 doses of the standard primary series

should be given according to the national vaccination schedule.

The rapid schedule is more appropriate for Bangladesh.

Special Dosage Recommendations:

Dosage recommendation for neonates born of mothers who are HBV carriers:

The 0, 1, and 2 months immunization schedule is recommended, and should start at birth. Concomitant administration of HBIG is not necessary, but when HBIG is given simultaneously with Hepatitis B vaccine, a separate injection site must be chosen.

The vaccine should be injected intramuscularly in the deltoid region in adults, anterolateral thigh is the preferred site in infants and children. It should not be injected into the buttock(vaccine efficacy reduced); subcutaneous route used for patients with haemophilia.

Contra-indications : The Hepatitis B Vaccine should not be administered to subjects with known hypersensitivity to any component of the vaccine, or to subjects having shown signs of hypersensitivity after previous administration.

Special warnings and cautions for use:

Because of the long incubation period of Hepatitis B it is possible for unrecognized infections to be present at the time of immunization. The vaccine may not prevent Hepatitis B infection in such cases.

Dose: 3 doses of 1 ml (20 mcg) by intramuscular injection for adults and children over 15 years. 0.5 ml (10 mcg) for children under 15 years.

Now this vaccine is a component of Hib penta vaccine become part of national EPI vaccination program.

Proprietary Preparations

Engerix –B (GSK); prefilled syringe 1 ml TK 6.08/ syringe.

Hepa-B(Incepta),Inj.. 0.5 ml dose/vialTk.400.00/0.5ml vial;1mldose/vial Tk.500.00 /1mlvial.

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Hepavax(Popular)Inj., Tk.400.00/0.5ml
vial;vial.Tk500.00/1mlvial

With DPT and influenza vaccine
Easyfive(Popular) Inj.,Tk.1000/0.5mlvial

Avaxim80[®](Sanofi),Inj.,(P.Fsyringe)
Tk.1110/0.5ml Syringe

Preva(Incepta)Inj.,0.5mlvialTk.
600.00/0.5ml;1ml/via;Tk. 1000/1ml

HEPATITIS A VACCINE

Indication: This is effective for prevention of HAV in adults and children. In view of the endemicity and an increasing risk of morbidity and mortality, the use of the vaccine may be of significant value in our community. Immunisation against HAV is especially recommended for:

- Occupationally exposed persons (especially fecal materials) such as healthcare professionals, laboratory personnel, laundry & cleaning staff in hospitals & staff at day-care centers.
- Travellers/armed forces/aid workers
- Food-handlers.
- Injectable drug users/haemophiliacs as well as subjects with chronic liver conditions due to Hepatitis B, D,C or E viruses or alcohol.

Dosage and administration: The vaccine is available in 1ml dose for adults and 0.5 ml dose for children.

Child dose is 0.5 ml at a given date followed by a booster dose 6-12 months later by *intramuscular administration* into the anterolateral part of thigh in young children and deltoid region in older children. **Adult dose** is 1 ml at a given date followed by a booster dose 6-12 months later administered by *intramuscular injection* into the deltoid region.

Consult product literature

This vaccine is not incorporated in EPI program.

Contraindications:See *general contraindications*

Side-effects: usually mild including transient soreness, erythema and induration at the injection site.

Proprietary Preparations

Avaxim160[®](Sanofi),Inj.(P.F
syringe)Tk.1524.00/0.5ml syringe

PNEUMOCOCCAL VACCINES

Pneumococcal vaccines protect against infection with *Streptococcus pneumoniae* (pneumococcus).

Pneumococcal vaccination is recommended for individuals at increased risk of pneumococcal infection as follows:

age over 65 years; asplenia or splenic dysfunction asthma treated with continuous or frequent use of a systemic corticosteroid; chronic heart , renal diseaseand liver disease; diabetes mellitus requiring insulin or oral hypoglycemic drugs; HIV infection, prolonged systemic corticosteroid treatment for over 1 month at dose equivalents of prednisolone. ADULT and CHILD over 20 kg, 20mg or more daily; child under 20 kg,1 mg/kg or more daily); presence of cochlear implant; conditions where leakage of cerebrospinal fluidmay occur; CHILD under 5 years with a history of invasive pneumococcal disease; at risk of occupational exposure to metal fume (e.g.welders).

Where possible, the vaccine should be given at least 2weeks before splenectomy, cochlear implant surgery, chemotherapy, or radiotherapy; patients should begiven advice about increased risk of pneumococcal infection. If it is not practical to vaccinate at least 2weeks before splenectomy, chemotherapy, or radiotherapy,the vaccine should be given at least 2 weeks afterthe splenectomy or, where possible, at least 3 months after completion of chemotherapy or radiotherapy. Prophylactic antibacterial therapy against pneumococcal infection should not be stopped after immunization

PNEUMOCOCCAL VACCINE

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Indications: Immunisation against pneumococcal infection and see also notes above

Cautions: See also section 13.1 and note above

Contraindications: See section 13.1

Pregnancy, Breast-feeding and children under 6 weeks old.

Side-effects: See section 13.1

Revaccination: In individuals with higher concentrations of antibodies to pneumococcal polysaccharides, revaccination with the 23-valent pneumococcal polysaccharide vaccine more commonly produces adverse reactions. Revaccination is therefore not recommended, except every 5 years in individuals in whom the antibody concentration is likely to decline rapidly (e.g. asplenia, splenic dysfunction and nephrotic syndrome). If there is doubt, the need for revaccination should be discussed with a haematologist, immunologist, or microbiologist. For 13 valent pneumococcal conjugate vaccine, severe allergic reaction (e.g., anaphylaxis) to any component of 13 valent pneumococcal conjugate vaccine or any diphtheria toxoid-containing vaccine.

Dose: See under preparations

Proprietary Preparations

Pneumococcal polysaccharide vaccine

Pneumo 23[®] (Sanofi Pasteur), Inj. (0.5ml Prefilled Syringe)

Dose should be given by intramuscular or subcutaneous route. This vaccine is indicated for adult and child over 2 years of age. Pneumo 23 is currently not available in the market.

Pneumococcal polysaccharide conjugate vaccine (adsorbed)

Synflorix[®] (GSK), Inj. (P.F syringe) Tk.1936.49/0.5ml Syringe;

Dose: by intramuscular injection, CHILD 6 weeks–5 years, consult product literature

Note. Deltoid muscle is preferred site of injection in young children; anterolateral thigh is preferred site in infants

Pneumococcal 13valent Conjugate Vaccine

Prevnar 13[®] (Pfizer.), Inj. 0.5ml (Prefilled syringes) Tk.5,308.50/syringe

Dose: by intramuscular injection. To be administered as a four-dose series at 2, 4, 6, and 12-15 months of age. For adults of 18 years of age and older, Prevnar 12 is given as a single dose.

Pneumococcal polyvalent Vaccine

Pneumovax

23[®] (MSD), Inj., 25 microgram/dose, Tk.1768.93/vial

RABIES VACCINE^[ED]

One of the most important elements in the effective control of human rabies is the use of efficacious vaccines. Vaccines produced in neural tissues have been in existence for over 100 years. However, it is the availability and use of cell culture and purified embryonated egg rabies vaccines that have dramatically decreased the number of human deaths throughout the world, most notably in countries where canine rabies is endemic.

Side-effects: mild, local in less than 5% of the patients. Headache; lethargy, mild allergic skin reactions and slight elevation in temperature may be seen in some sensitive patients.

Cautions: immunosuppressive therapy and excessive alcohol should be avoided during immunization.

Presentation: presented as 1 dose vial This vaccine is not incorporated in EPI program.

Proprietary Preparations

Rabipur[®] (Chiron), Inj. 2.5l.U.; Tk.850.00/vial

Rabix-VC[®] (Incepta), Inj. Tk.500.00/vial

Rabivax[®] (Popular) Inj. 2.5l.U/0.5ml

Tk.500.00/vial

Verorab[®] (Sanofi Pasteur), Inj. 0.5ml.Tk.

850/0.5ml syringe

VARICELLA VACCINE

Varicella (Chicken Pox) vaccine is a lyophilised preparation of the live-attenuated OKA strain of varicella-zoster virus.

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Indication: Effective for prevention of chicken pox in healthy infants (from the age of 9 months onwards), children, adolescents and adults.

Dosage and administration: 0.5 ml of the reconstituted vaccine contains one immunising dose. CHILD dose from the age of 9 months up to 12 years of age, 1 single dose. ADULT dose from 13 years of age and up, 2 doses with an interval of 6-8 weeks; The vaccine should be given *by subcutaneous injection*. The upper arm (deltoid region) is the preferred site of injection.

Contra-indication: Pregnancy (avoid pregnancy for 3 months after vaccination) and during breast feeding. This vaccine is not incorporated in EPI program.

Proprietary Preparations

Varilrix (GSK), Inj. 0.5 ml, TK. 2350/ Vial

ROTAVIRUS VACCINE

Rotavirus vaccine is a live, oral vaccine that protects young children against gastro-enteritis caused by rotavirus infection.

The recommended schedule consists of 2 doses, the first at 2 months of age, and the second at 3 months of age. The first dose of rotavirus vaccine must be given between 6–15 weeks of age and the second dose should be given after an interval of at least 4 weeks; the vaccine should not be started in children 15 weeks of age or older.

Indications: Protection against gastro-enteritis caused by rotavirus.

Cautions: Vaccination should be postponed in subjects suffering from diarrhea or vomiting; immunosuppressed close contacts.

Contraindications: See section (13.1.1);also predisposition to, or history of, intussusception

Side-effects: See section (13.1.1)

Dose: By mouth, CHILD over 6 weeks, 2 doses of 1.5 ml, separated by an interval of at least 4 weeks; first dose must be given between 6–15 weeks of age; course should be completed before 24

weeks of age (preferably before 16 weeks)

Proprietary Preparations

Rotarix(GSK); Oral applicator, Tk.1473.95/Oral applicator.

Rotateq[®](MSD), Oral susp, Tk.1490.35/Tube

YELLOW FEVER VACCINE

Live yellow fever vaccine is indicated for those travelling to, passing through or living in an endemic area and for laboratory staff who handle the virus or who handle clinical material from suspected cases. The immunity which probably lasts for life is officially accepted for 10 years starting from 10 days after primary immunization and for a further 10 years immediately after revaccination.

Pregnancy: Live yellow fever vaccine should not be given during pregnancy because there is a theoretical risk of fetal infection. If exposure cannot be avoided during pregnancy, then the vaccine should be given if the risk from disease in the mother outweighs the risk to the fetus from vaccination

Breast-feeding: Should not be given to nursing mothers,seek specialist advice if exposure to virus cannot be avoided.

YELLOW FEVER VACCINE, LIVE

Indications: Immunization against yellow fever

Contra-indications: See section (13.1.1)also children under 6 months; history of thymus dysfunction.

Pregnancy : See notes above.

Breast-feeding: See notes above.

Side-effects: See section (13.1.1);also associated viscerotropic disease and neurotropic disease

Dose: ADULT and CHILD over 9 months,0.5ml (see also notes above) Consult product literature.

Route of administration:Subcutaneous

Proprietary Preparations

Stamari[®](Sanofi Pasteur)j.0.5ml reconstituted vaccine. Tk 2250/ P.Fsyringe

JAPANESE ENCEPHALITIS VACCINE

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Japanese encephalitis (JE) is a serious viral infection and is one of the main causes of childhood encephalitis in south eastern and southern Asia. It is caused by Japanese encephalitis virus (JEV) and is transmitted mainly by the mosquito *Culex tritaeniorhynchus*. Whilst the majority of infections are mild and remain undetected, between 30,000 – 50,000 cases of encephalitis are estimated to occur each year resulting in at least 10,000 – 15,000 deaths, these figures likely to be underestimates. Half of survivors develop serious neurological sequelae and disability is common in the remainder.

Indication: JE vaccine is indicated for prophylaxis of Japanese encephalitis caused by the Japanese encephalitis virus, in subjects from 12 months of age and over.

Administration: it is administered via the subcutaneous route.

Dose:

Primary vaccination: Subjects 12 months of age and over: a 0.5 mL single injection.

Booster: Paediatric population: A booster dose should be given after primary vaccination in order to confer long term protection. The booster dose should be given preferably 12 months after primary vaccination and can be given up to 24 months after primary vaccination. Adult population: There is no need for a booster dose up to 5 years after the administration of a single dose of JE vaccine.

Contra-indication: JE vaccine should not be administered to anyone with a history of severe allergic reaction to any component of the vaccine. Vaccination must be postponed in case of febrile or acute disease. Congenital or acquired immune deficiency impairing cellular immunity, including immunosuppressive therapies. JE vaccine must not be administered to persons with symptomatic HIV infection or with asymptomatic HIV infection when accompanied by evidence of impaired immune function.

Pregnancy and lactation: As with all live attenuated vaccines, pregnancy constitutes a contra-indication. JE vaccination is contraindicated in breastfeeding women.

Proprietary Preparations

Imojev[®] (Sanofi Pasteur). 0.5ml reconstituted vaccine. Tk 2040.28 P.F/syringe

ANTITOXINS OR ANTISERA

Antitoxins or antisera are prepared in animals such as horses. Originally these were used for passive immunization. Administration of antiserum frequently gives rise to serum sickness and anaphylactic shock. These are gradually being replaced by human immunoglobulin preparations that are much safer.

TETANUS ANTITOXIN (ATS)

Tetanus Antitoxin is prepared from serum of horses that have been immunized against the toxins of the tetanus bacilli. It is used to confer passive immunity against tetanus.

Presentation: Solution of enzyme refined globulin is available in ampoules of 1,500 IU and 10,000 IU

Uses: immediate protection is its advantage and short-lived immunity is its disadvantage. They are used for emergency prophylaxis and treatment of tetanus.

Doses and administration: For prophylaxis : 1,500 IU intramuscularly (or subcutaneously) as soon as possible after injury; routine use of tetanus antitoxin after an injury has been discarded because of the very short-lived immunity it offers and the possible anaphylaxis reactions following its administration. For treatment previously a large dose 1,00,000 IU intravenously at the start and a repetition of the same dose in one or two days and is followed by a further 15,000 IU weekly (until symptoms abate) was used. But now a small dose of only 3,000 IU is given intravenously for

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patients of all ages soon after diagnosis without any repetition

Side-effects: Frequent hypersensitivity reactions

Cautions: Patients should be asked about previous history of serum reaction, history of asthma, urticaria, allergy or eczema. An intradermal test dose of 0.1 ml of a 1 in 10 dilution may be given to elicit sensitivity. Preparation is to be kept ready to face the reaction after injection. These are Adrenaline, antihistamine and hydrocortisone injection ampoules, disposable syringe and airway tube etc

Proprietary Preparation

Vaxitet-IG(*Incepta*), Inj.TK408.00/Vial

13.3 IMMUNOGLOBULINS

Human immunoglobulins have replaced immunoglobulins of animal origin (antisera) which were frequently associated with hypersensitivity. Injection of immunoglobulins produces immediate protection lasting for several weeks. Human immunoglobulins are of two types: Normal Human Immunoglobulin (NHlg) and Specific Immunoglobulin.

NORMAL HUMAN IMMUNOGLOBULIN^[ED] (GAMMA GLOBULIN)

Normal Human Immunoglobulin is prepared from a pool of at least 1000 donations of human plasma. It contains antibody to measles, mumps, varicella, hepatitis A and other viruses that are currently prevalent in the general population. It is used to prevent measles in highly susceptible individuals and to provide temporary protection (up to 12 weeks) against hepatitis A infection for travellers to endemic areas and to control institutional and household outbreaks of hepatitis A infection.

Live vaccines should not normally be given for 12 weeks after an injection of NHlg and if a live vaccine has already been given NHlg injection should be deferred for 2 weeks.

Proprietary Preparations

Human gama globulin⁽ⁱ⁾ (*Chiron*), Inj.16%.

Tk.133.82/2ml amp

Octagam⁽ⁱ⁾(*Octapharma*), Inj. 2.5gm/50ml.

Tk.6157.88/50ml

Pentaglobin⁽ⁱ⁾(*Biotest*) Inj. 50mg/ml,10ml vial;

Tk.4478.28/vial

Humaglobin⁽ⁱ⁾(*Bioplazma*),Inj.100ml

Tk.31386.48/vial

Rhophlac⁽ⁱ⁾(*Lilly*) Inj.(prefilled

pen)Tk.3050.00/2 ml pen

Normoglobulin(*Incepta*) Inj.,10ml Tk.

2800.00/vial.

DISEASESPECIFIC IMMUNOGLOBULINS

Specific human immunoglobulins or hyper immune immunoglobulins are prepared from the plasma of selected donors who have recently recovered from an infection or who have been immunized against a specific infection. That is why they have high levels of the specific antibody required, e.g,Hepatitis-B Immunoglobulin (HBlg), Rabies Immunoglobulin (RIg) (*See under Rabies vaccine*), Tetanus Immunoglo-bulin (TIg).

TETANUS IMMUNOGLOBULIN (TIG)^[ED]

Presentation: Purified immunoglobulin obtained from the sera of healthy human donors known to have high levels of tetanus antitoxin following active immunization with tetanus vaccine. Each vial contains 250 IU of tetanus antitoxin in 1.0 ml solution.

Uses: For passive immunization against tetanus, in conjunction with adsorbed tetanus vaccine as soon as practicable after a tetanus susceptible person has sustained wound. Also for the treatment of tetanus

Doses and administration:

a) Prevention of tetanus following injury

ADULTS: TIG should be administered by IM injection usually in a dose of 250 IU. Persons not immunized or inadequately immunized with tetanus vaccine are susceptible to tetanus and all wounds are prone to tetanus infection. In cases of doubt a person should be regarded as

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inadequately immunized. Administration of immunoglobulin does not obviate the need for debridement of and wound cleansing, nor does it contraindicate the use of antibiotics. The prophylactic immunization schedule against tetanus should be carried out as soon as possible after a person has sustained a Wound. Passive immunization with immunoglobulin should be accompanied by simultaneous active immunization with adsorbed tetanus toxoid. If more than 24 hours have elapsed since the wound was sustained or if there is a risk of heavy contamination with *Clostridium tetani* 2 ml (500 IU) should be given irrespective of immunization history. Tlg and adsorbed tetanus toxoid should be administered with separate syringes and into separate sites. Tetanus toxoid in single solution is unsuitable for administration concurrently with Tlg. A single dose of Tlg usually provides a protective level of tetanus antitoxin over 0.01 IU per ml serum, for a period of 4 weeks. Long-term immunity against tetanus is conferred by giving further doses.

CHILDREN: As for adults

b) Treatment of tetanus :

ADULTS: 30-300 IU /Kg given IM

CHILDREN: As for adults

Contra-indications: TIG should not be given intravenously. The administration of immunoglobulin may be contra-indicated by a history of anaphylaxis resulting from administration of a previous dose of human gamma globulin.

Cautions: TIG should not be given concurrently with tetanus toxoid in single solution. Although anaphylaxis is rare, facilities for its management should always be available during vaccination.

Side-effects: Local reaction, consisting of a small area of inflammation and tenderness, may occur after administration of the immunoglobulin, but this rarely constitutes more than temporary inconvenience. Constitutional upsets, and particularly anaphylactic reactions are uncommon. Patients with antibody deficiency syndromes may be liable to have local reactions after

administration of the immunoglobulin.
USE IN PREGNANCY AND LACTATION : Accurate information is not available on the safety of TIG in pregnancy and lactation

Proprietary Preparations

Protet(Incepta) Inj. 250IU/ml; Tk. 975.00/vial.
Tetuman Berna^(f)(Swiss Serum). Inj. 250IU/ml; Tk.541.73/vial

RABIES IMMUNOGLOBULIN (RIG)^[ED]

Indications: Rabies Immunoglobulin provides passive immunization against rabies for prevention of rabies in patients after contact with a rabid animal or an animal presumed to be rabid. Anti rabies serum itself does not constitute an anti rabies treatment and should always be used in conjunction with rabies vaccine.

Dosage and administration: The recommended dose for both ADULTS and CHILD is 40 IU/kg of body weight. If anatomically feasible, as much as possible of the dose should be infiltrated around and into the wound(s). The remainder should be administered intramuscularly (into the gluteal region) in a single injection.

However, for children, particularly in the case of multiple wounds, it has been proposed to dilute the dose 2-3 times in a 0.9% sodium chloride solution to obtain a sufficient quantity of equine rabies immunoglobulin to infiltrate the wound(s) correctly.

Contra-indications: Known history of allergic symptoms to horse proteins. Nevertheless, the lethal risk associated with rabies overcomes any potential contraindication.

Drug interactions: For treatment associating rabies immunoglobulin and rabies vaccine, the rabies vaccine should be injected in a contra lateral anatomic site (i.e., on opposite side) using a different syringe. As a general rule, corticosteroids, liable to attenuate the immune response, should be avoided.

Pregnancy and Lactation: The safety of rabies immunoglobulin when used during pregnancy has not been

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established in clinical trials in human beings. Considering the lethal risk associated with rabies, pregnancy may not be a contraindication to the administration of rabies immunoglobulin subsequent to exposure.

Side-effects: Immediate or delayed hypersensitive type reactions may be developed on administration of rabies immunoglobulin. The observed immediate reactions are hypotension, dyspnoea, and urticaria. Delayed reactions consist of inflammatory reaction, fever, pruritis, rash or urticaria, adenopathy and arthralgia.

Proprietary preparation:

Rabix-IG(Incepta), 1000 IU/5ml, Tk 1000/Vial

13.4 INTERNATIONAL TRAVEL

A vaccination plan should be established, taking into account the traveler's destination, overall state of health and current immune status, the duration and type of travel.

Smallpox: No country any longer requires a certificate of vaccination against smallpox.

Cholera: Cholera Vaccine is no longer recommended for international travel due to low risk of cholera in travelers and the limited benefit of available vaccines. In rare circumstances when an unofficial demand may be anticipated, confirmation of non-requirement of cholera vaccine may be given on official notepaper signed and stamped by the medical practitioner.

Oral cholera vaccine (see p. 816) should be considered for backpackers and those travelling to situations where the risk is greatest (e.g. refugee camps). Regardless of vaccination, travellers to areas where cholera is endemic should take special care with food hygiene (see below)

No particular immunization is required for travelers to the United States, Europe, Australia, or New Zealand although all travelers should have immunity to tetanus and poliomyelitis and childhood immunization should be

up to date. In Non-European areas surrounding the Mediterranean, in Africa, the Middle East, Asia and South America, certain special precautions are required (see also Appendix-8C)

Food hygiene In areas where sanitation is poor, good food hygiene is important to help prevent hepatitis A, typhoid, cholera, and other diarrhoeal diseases (including travellers' diarrhoea). Food should be freshly prepared and hot, and uncooked vegetables (including green salads) should be avoided; only fruits which can be peeled should be eaten. Only suitable bottled water, or tap water that has been boiled or treated with sterilising tablets, should be used for drinking.

Yellow fever immunization is recommended for travel to the endemic zones of Africa and South America. Many countries require an International Certificate of Vaccination from individuals arriving from, or who have been travelling through, endemic areas; other countries require a certificate from all entering travellers (consult the Department of Health handbook, Health Information for Overseas Travel, www.dh.gov.uk).

VACCINE AGAINST CHOLERA AND ETEC-DIARRHOEA

Preparation: The vaccine is composed of *Vibrio cholerae* O1 Inaba and Ogawa, classic and El Tor strains (heat/formalin inactivated), cholera toxin B subunit, sodium dihydrogen phosphate, disodium hydrogen phosphate, sodium chloride, sterile water.

Indication: Protection against cholera and ETEC-diarrhoea. The vaccine is recommended for adults and children from 2 years of age visiting the disease prone areas.

Contraindication: Children under 2 years old; Known allergy allergic to any ingredient of the vaccine or to formaldehyde; acute stomach disorder or infection with fever

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Side-effect: Gastrointestinal symptoms including stomach pain, diarrhoea, nausea and vomiting.

Dose and administration: For cholera: Basic immunisation comprises 2 doses of vaccine for adults and children over the age of 6. Children from 2 to 6 years of age should receive 3 doses. Doses are to be administered with an interval of 1-6 weeks. For ETEC: adults and children comprises 2 doses of vaccine with an interval of 1-6 weeks between doses.

Proprietary preparation:

Dukoral[®] (SBL Vaccine AB): Oral suspension 3 ml (vaccine) and Sodium hydrogen carbonate effervescent granules 5.6g (buffer). Tk 1500/dose.

Poliomyelitis: On 5 May 2014, the Director-General of WHO declared the international spread of wild polio virus a Public Health Emergency of International Concern. The declaration followed

advice given by an Emergency Committee under the International Health Regulations (IHR) that was convened to assess whether the international spread of polio in 2014. As per declaration by DG WHO the temporary recommendation for the States infected with WPV1, cVDPV1 or cVDPV3, with potential risk of international spread (WPV1; States infected with cVDPV2s, with potential risk of international spread; and States no longer infected by WPV1 or cVDPV, but which remain vulnerable to re-infection by WPV or cVDPV. *To ensure all residents and long-term visitors (i.e. within four weeks), who have not received a dose of OPV or IPV in the previous four weeks to 12 months, receive a dose of oral polio vaccine at least by the time of departure as this will still provide benefit, particularly for frequent travelers.*

Chapter 14

DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

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14.1 CYTOTOXIC DRUGS

- 14.1.1 ALKYLATING DRUGS
 - 14.1.2 CYTOTOXIC ANTIBIOTICS
 - 14.1.3 ANTIMETABOLITES
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-

Along with its anti-cancer activity cytotoxic drugs have also the potential for damage to normal tissue. Intermittent combination chemotherapy principle has been established to give cancer chemotherapy. Several drugs were combined together, chosen on the basis of different mechanisms of actions and non-overlapping toxicities. In an increasing number of cases chemotherapy may be combined with radiotherapy or surgery or both as either neoadjuvant (Pre-surgery chemotherapy for early and locally advanced cancer)

treatment or as adjuvant (Chemotherapy following local treatment for early cancer) treatment.

Drug combination may have the advantage in certain tumors of enhanced response and reduced development of drug resistance and increased survival. However, for some tumors, single-agent chemotherapy remains the treatment of choice. Cytotoxic drugs may be given with a curative intent or to palliate the symptoms or it may aim to prolong the survival.

SIDE EFFECTS OF CYTOTOXIC DRUGS

A number of cytotoxic drugs will cause severe local tissue necrosis if leakage into the extravascular compartment occurs. In addition, if there is rapid cell destruction with extensive purine catabolism, urates may precipitate in the renal tubules and they cause kidney

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

damage. All cytotoxic drugs produce severe nausea and vomiting. Some compounds have particular toxic effects which are specific for them.

Note: Cytotoxic drugs should be administered under the supervision of a physician with sufficient experience in cancer chemotherapy at medical institutions in which appropriate medical treatment can be made in case of emergency.

Nausea and vomiting: Severe vomiting can be produced by the platinum-based drugs such as dacarbazine, high doses of cyclophosphamide, cisplatin and taxane. Moderately emetogenics are doxorubicin, intermediate and low dose of cyclophosphamide, mitoxantrone and high dose of methotrexate (0.1 – 1.2 g/m²). The less severe or mild emesis is found with fluorouracil, etoposide, methotrexate (less than 100 mg/m²), the Vince alkaloids and abdominal radiotherapies.

To prevent emesis a specific (5HT₃) serotonin antagonist, **Granisetron** is used. The 5HT₃ antagonists are highly effective in controlling The addition of **Lorazepam** to antiemetic therapy is sometimes helpful to prevent anticipatory symptoms.

Hyperuricemia: which can result in uric acid crystals form in the urinary tract with associated renal dysfunction is a major complication of treatment for non-Hodgkin's lymphoma, leukaemia and myelo-proliferative diseases. Patients should be adequately hydrated. Increased urinary volume decreases the concentration of urate in urine and thus minimizes the problem. Alkalinisation of urine should be initiated to maintain urine pH at least 7. Other than this, Allopurinol should be started 24 hours before treating such tumors, and should be continued for 7-10 days; the dose of Mercaptopurine or Azathioprine should be reduced if Allopurinol needs to be given concomitantly.

Bone Marrow Suppression: is caused by all the cytotoxic drugs except **vincristine** and **bleomycin**. It commonly occurs 7-10 days after administration, but also delayed in certain drugs, such as carmustine, **Lomustine**, and **Melphalan**. To overcome these problem peripheral blood counts must be checked before each treatment, and

doses should be reduced or therapy delayed if bone marrow has not recovered. Bone marrow toxicity with decreased leucocyte production and thus decreased resistance to infection, impaired wound healing, depression of growth in children, sterility, teratogenicity, loss of hair, and damage to the gastrointestinal epithelium.

Fever in a neutropenic patient should receive parental broad-spectrum antibiotics. Appropriate culture and sensitivity tests should be done as soon as possible.

Colony-stimulating factors, G-CSF is sometimes successful in selected patients depending on the duration and severity of the neutropenia.

Alopecia: many but not all the cytotoxic drugs are capable of causing hair loss. Hair always regrows on completion of chemotherapy.

Pregnancy: most cytotoxic drugs are teratogenic and should not be administered during pregnancy, especially during first trimester.

Breast-feeding: most cytotoxic drugs are avoided during breast feeding. Consult product literature

Cardio-toxicity: this is a rare side effect of chemotherapy, usually associated with doxorubicin. It is dose-related and can largely be prevented by keeping the total dose within the safe range.

Neuro-toxicity: this occurs predominantly with the plant alkaloids and platinum analogues. It is dose-related and chemotherapy usually stopped before the development of the significant polyneuropathy. This is only partially reversible.

Sterility: some anticancer drugs, especially alkylating agents, may cause sterility. This can be irreversible. In male storage of sperm is the only important consideration when chemotherapy is given with curative intentions.

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

Interactions: See Appendix-2

Drugs to prevent cytotoxic-induced side-effects

Methotrexate-induced mucosities and myelosuppression

Folinic acid (calcium folinate) is used to counteract the folate-antagonist action of methotrexate. When folinic acid and fluorouracil are used together in metastatic colorectal cancer the response-rate improves compared to that with fluorouracil alone (see also section 15.1.2.1).

Levofolinic acid: The calcium salt of levofolinic acid is the single isomer of folinic acid. It is used as folinic acid. The dose of levofolinic acid is half of folinic acid.

CALCIUM FOLINATE

(Calcium leucovorin)

Indications: Methotrexate induced mucositis and myelosuppression

Cautions: Avoid simultaneous administration of methotrexate, not indicated for pernicious anemia or other megaloblastic anemia due to vitamin B12 deficiency; pregnancy and breastfeeding

Interactions: Antiepileptic; plasma concentration of phenobarbital, phenytoin and primidone possibly reduced (see also Appendix-2)

Contraindication: Intrathecal injection.

Side-effects: Rarely pyrexia after parental use

Dose: As an antidote to Methotrexate (usually started 24 hours after the beginning of methotrexate infusion), usually up to 120 mg in divided doses over 12-24 hours by intramuscular or intravenous injection or intravenous infusion, followed by 12-15 mg intramuscularly or 15 mg by mouth every 6 hours for the next 48–72 hours.

Suspected methotrexate overdose, immediate administration of Folinic acid at a rate not exceeding 160 mg/minute in

a dose equal to (or higher than) the dose of methotrexate

Proprietary Preparations

Biofo (Incepta), Tab. 25 mg, Tk. 25.00/Tab.; 5 mg, Tk. 9.00/Tab.

Folinex (Beacon), Inj. , 10mg /ml, Tk. 500.00/50 ml

Calcium Folate PhaRe[®] (Haupt) Inj., 10mg /ml, Tk. Tk.4239.61/50mlvial, Tk.2119.80/20ml vial

Folcasin[®] (Actavis) Inj. , 10mg /ml, Tk. 477/100 ml vial

CALCIUM LEVOFOLINATE

(Calcium levoleucovorine)

Indications: Same as that of calcium folinate

Cautions: Same as that of calcium folinate

Side-effects: Same as calcium folinate

Dose: As an antidote to methotrexate (usually started 24 hours after the beginning of methotrexate injection), usually 7.5 mg, by intramuscular injection or by intravenous injection or by intravenous infusion every 6 hours for 10 doses

Suspected methotrexate overdose, immediate administration of levofolinic acid at a rate not exceeding 160 mg/minute in a dose which is at least 50% of the dose of methotrexate

Proprietary Preparation

Leucovorine[®] (Mayne), Inj. 50mg/ml

Tk.377.09/vial, Tk.15mg/2ml, Tk.228.78/vial

PLATINUM-INDUCED NEUTROPENIC INFECTION AND NEPHROTOXICITY

Granulocyte colony-stimulating factor and granulocyte macrophage-colony stimulating factor are used for the reduction of risk of infection associated with neutropenia.

Recombinant human granulocyte-colony stimulating factor (rhG-CSF) stimulates the production of neutrophils and may reduce the duration of chemotherapy-induced neutropenia and thereby reduce the incidence of associated sepsis; there is yet no evidence that it improves overall survival. Filgrastim

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(unglycosylated rhG-CSF) and lenograstim (glycosylated rhG-CSF) have similar effects; both have been used in a variety of clinical settings but they do not have any clear-cut routine indications. Prolonged use may be associated with increased risk of malignancy.

Molgramostim (Recombinant human granulocyte macrophage colony stimulating factor) stimulates the production of all granulocytes and monocytes. It has more side-effects than granulocytes colony stimulating factor and is ineffective in congenital neutropenia.

Interactions: See Appendix-2

FILGRASTIM

(Recombinant human granulocyte colony stimulating factor, G-CSF) (see also section 15.1.4)

Indications: Incidence of febrile neutropenia in cytotoxic chemotherapy for malignancy (except chronic myeloid leukemia and myelodysplastic syndromes); reduction in duration of neutropenia (and associated sequel) in myeloablative therapy followed by bone marrow transplantation; mobilization of peripheral blood progenitor cells for harvesting and subsequent autologous infusion; severe congenital neutropenia, cyclic neutropenia, or idiopathic neutropenia and history of severe or recurrent infections (distinguish carefully from other haematological disorders, consult product literature); persistent neutropenia in advanced HIV infection

Cautions: Reduced myeloid precursors; monitor leucocyte count (discontinue treatment if leucocytosis, consult product literature); monitor platelet count and haemoglobin; regular morphological and cytogenetic bone marrow examinations recommended in severe congenital neutropenia (possible risk of myelodysplastic syndromes or leukaemia); monitor the spleen size, osteoporotic bone disease (monitor bone density if given for more than 6 months); does not prevent other toxic effects of high dose chemotherapy; pregnancy, breastfeeding

Interactions: Possible exacerbation of neutropenia with fluorouracil

Note: use not recommended in the period from 24 hours before to 24 hours after chemotherapy - for further details consult product literature.

Contraindications: Severe congenital neutropenia with abnormal cytogenetics

Side-effects: Musculoskeletal pain, transient hypotension, disturbances in liver enzymes and serum uric acid; thrombocytopenia; urinary abnormalities including dysuria; allergic reactions (more common after intravenous infusion), proteinuria, haematuria, and transient decrease in blood glucose reported; cutaneous vasculitis also reported, also splenic enlargement, hepatomegaly, headache, diarrhoea, anaemia, epistaxis, alopecia, osteoporosis and rash, reactions at injection site; rarely reported, exacerbation of rheumatoid arthritis, adult respiratory distress syndrome

Dose: Cytotoxic-induced neutropenia, preferably by *subcutaneous injection* or by *intravenous infusion* (over 30 minutes), ADULT and CHILD, 50,00,000 units/kg daily started not less than 24 hours after cytotoxic chemotherapy, continued until neutrophil count in normal range, usually for up to 14 days (up to 38 days in acute myeloid leukaemia)

Proprietary Preparations

See section 15.1.4 under *filgrastim*

LENOGRASTIM

(Recombinant human granulocyte-colony stimulating factor, rhG-CSF)

Indications: For reduction in the duration of neutropenia and associated complications following bone marrow transplantation for nonmyeloid malignancy or following treatment with cytotoxic chemotherapy associated with the significant incidence of febrile neutropenia; mobilization of peripheral blood progenitor cells for harvesting and subsequent infusion

Cautions: See under *filgrastim*; premalignant myeloid conditions

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Dose: Cytotoxic induced neutropenia, by subcutaneous injection, ADULT 19.2 million units/sq.m. daily started the day after completion of chemotherapy, continued until neutrophil count is stable in the acceptable range (max. 28 days)

Proprietary Preparation

See section 15.1.4 under Lenograstim

Amifostine is used recently for the reduction of risk of infection related to neutropenia in patients undergoing treatment with cisplatin and cyclophosphamide and for the reduction of nephrotoxicity due to cisplatin. It is also used recently to protect against xerostomia during radiotherapy for head and neck cancer.

UROTHELIAL TOXICITY

Hemorrhagic cystitis is a common manifestation of urothelial toxicity which occurs with the **Oxazaphosphorines**, **Cyclophosphamide** and **Ifosfamide**; it is caused by the metabolite acrolein. **Mesna** reacts specifically with this metabolite in the urinary tract, preventing toxicity. **Mesna** is used routinely (preferably by mouth) in patients receiving ifosfamide, cyclophosphamide by intravenous route at a high dose (more than 2 g) or in those who experienced urothelial toxicity when given cyclophosphamide previously.

MESNA

Indications: See notes above.

Contraindications: Hypersensitivity to thiol-containing compounds

Side-effects: Nausea, vomiting, colic, diarrhoea, fatigue, headache, limb and joint pains, depression, irritability, rash, hypotension and tachycardia

Dose: Calculated according to **oxazaphosphorine** (cyclophosphamide or ifosfamide) treatment. When given by mouth, dose is given 2 hours before oxazaphosphorine treatment and repeated 2 and 6 hours after treatment; when given by intravenous injection, the

dose is given with oxazaphosphorine treatment and repeated 4 and 8 hours after treatment

Proprietary Preparations

Ifomes (*Beacon*), Inj., 400 mg/Vial, Tk. 190.00/Vial

Mesna (*Techno*), Inj., 400 mg/Vial, Tk. 240.00/Vial

Uromitexan ⁽¹⁾ (*Baxter*), Inj., 400 mg/4 ml, Tk. 4474.50/4 ml Vial

14.1.1 ALKYLATING DRUGS

BUSULFAN

(Busulphan)

Indication: Chronic myeloid leukemia.

Caution: See section 14.1; acute porphyria, pregnancy, breast feeding, hepatic impairment, monitor cardiac and liver function

Side-effects: See section 14.1; thrombocytopenia, hyperpigmentation of skin

Dose: ADULT: induction of remission, 60 micrograms/kg to max 4 mg/m² daily until the leucocyte count is 50% of the original level; maintenance, 0.5-2 mg/m² daily. CHILD: not recommended

Generic Preparation

Tablet. 2 mg.

CHLORAMBUCIL ^[ED]

Indications: Chronic lymphocytic leukemia, low-grade non-Hodgkin's lymphoma; ovarian carcinoma

Caution: See section 14.1 and avoid in porphyria

Side-effects: See section 14.1

Dose: Used alone, usually 100-200 micrograms/kg daily for 4-8 weeks

Note: Chlorambucil is administered either as a single agent or combination with prednisone.

Proprietary Preparation

Leukeran ⁽¹⁾ (*GSK*), Tab. 2 mg

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CYCLOPHOSPHAMIDE ^[ED]

Indications: Breast, lung, ovary, testis and bladder carcinomas. Bone and soft tissue sarcomas, Hodgkin's and Non-Hodgkin's lymphomas. acute and chronic lymphocytic leukemias, neuroblastoma and Wilm's tumor of childhood, multiple myeloma.

Cautions: Hepatic and renal impairment risk of cardiotoxicity; diabetes mellitus; avoid in acute porphyria

Interactions: Anticoagulants, pentostatin (avoid concomitant use), muscle relaxants (enhance the effect of suxamethonium) (See also Appendix-2)

Side-effects: See section 14.1

Dose: High dose therapy: 20-40mg/kg as a single I.V. dose given at 10-20 days intervals. Medium dose therapy: 10-15 mg/kg as a single I.V. dose weekly. Low dose therapy: 2-6 mg/kg as a single I.V. dose or in divided oral dose for 7 days & maintenance 100-200 mg daily. CHILD not recommended

Proprietary Preparations

Cyclomide (Techno), Inj, 1 gm/ Vial, Tk.1,200.00/Vial

Cyclotox (Beacon), Inj., 1 gm/ Vial, Tk.650/Vial; Inj., 200mg/ Vial, Tk.180.00/Vial

Cyphos (Drug Intl), Inj., 200mg/ vial, Tk. 150.00/vial

Endoxan[®] (Baxter), Inj., 200mg./vial Tk. 3114.2/Vial; 500mg/vial, Tk. 20.52/Vial; 1gm, Tk. 1374.56/Vial; Tab., 50mg, Tk. 1718/Tab.

G-Cyclophosphamide (Gonoshasthaya), Tab., 50 mg, Tk. 6/Tab.

Neoclomide (Healthcare), Inj., 200mg/vial, Tk.; 197.00/vial, 500mg/vial, Tk. 464.00/vial.; Tab., 50mg, Tk. 31.00/Tab.

IFOSFAMIDE

Indications: Tumors of testis, pancreas, ear; nose & throat, ovary, bone, breast, lungs, GI Tract, kidneys; lymphomas and soft tissue sarcomas

Cautions: See section 14.1; reduce the dose in hepatic and renal impairment, acute porphyria

Interactions: See Appendix-2

Side-effects: See the side-effects of cytotoxic drugs

Dose: 8-10 g/m² IV fractionated equally to single daily dose for 5 consecutive days or a 24 hours infusion of 5-6 g/m²; use in combination with **Mesna** (60% of total dose of Ifosfamide)

Proprietary Preparations

Holoxan[®] (Baxter), Inj., Tk. 3049.8/1 gm Vial; Tk. 4810.58/2 gm Vial

Ifamide (Techno), Inj., Tk. 2,400.00/1gmVial, Tk. 4,500.00/2gmVial

Xifos (Beacon), Inj., Tk. 1800.00/1gmVial, Tk. 3200.00/2gmVial

LOMUSTINE

Indications: Primary and metastatic brain tumor, and advanced Hodgkin's disease

Cautions: See section 14.1

Side-effects: See section 14.1, nausea and vomiting are common, permanent bone marrow damage may occur with prolonged use

Dose: used alone, 120-130 mg/m² PO once every 6-8 weeks

Proprietary Preparation

G-Lomustin (Gonoshasthaya), Tab. 10mg, Tk.60/Tab.

TEMOZOLOMIDE

Indications: Newly diagnosed glioblastoma multiforme in adults (in combination with radiotherapy) and subsequently as monotherapy, Second-line treatment of malignant glioma in adults.

Cautions: Pneumocystis jiroveci pneumonia; consult product literature for monitoring and prophylaxis requirements

Interactions: See Appendix-2

Side-effects: See section 14.1 and notes above; oral mucositis, thromboembolism, tumor lysis syndrome.

Dose: Consult product literature

Proprietary Preparation

Temonix (Beacon), Cap., 100mg, Tk. 600.00/Cap.; 250mg, Tk. 1300.00/Cap.

Zolomide (Techno), Cap., 100mg, Tk. 650.00/Cap., 250mg, Tk. 1500.00/Cap

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14.1.2 CYTOTOXIC ANTIBIOTICS

BLEOMYCIN ^[ED]

Indications: Squamous cell carcinoma, lymphomas, germ cell tumors of testis and ovary and certain solid tumors

Cautions: See section 14.1; renal impairment; irritant to tissue

Side-effects: See section 14.1; Pulmonary-fibrosis, Pigmentation, hyper pyrexia

Dose: Over 80 years, 15 mg/week, total 100mg; 70-79 years, 30 mg/week, total 150-200 mg; 60-69 years, 30-60 mg/week, total 200-300 mg; under 60 years, 30-60 mg/week, total 500 mg; all are given I.V. or in infusion

Proprietary Preparation

Bleocin [®](Nippon), Inj. 15000unit/vial Tk. 2063.99/vial

DACTINOMYCIN

(Actinomycin D)

Indications: Gestational trophoblastic neoplasms, Wilm's tumor, rhabdomyosarcoma and Ewing's sarcoma of childhood

Cautions: See section 14.1; caution in handling- irritant to tissue

Side-effects: See section 14.1

Dose: CHILD: 0.40-0.45 mg/m² (up to maximum of 0.5 mg) IV daily for 5 days every 3-5 weeks.

ADULT: 0.40-0.45 mg/m² IV on days. 1-5 every 2-3 weeks. 0.5 mg IV daily for 5 days every 3-5 weeks.

Generic Preparation

Injection. 100 microgram/vial.

DAUNORUBICIN HYDROCHLORIDE

Indications: Acute leukemia.

Cautions: Hepatic and renal impairment; caution in handling-irritant to tissue (see section 14.1)

Side-effects: See section 14.1 and similar to those of Doxorubicine

Dose: 30 to 45 mg/m² IV for 3 days; using extravasation precautions; to be injected into a recently established

patent IV site through sidearm of a running IV over 2 to 5 minutes; courses may be repeated after 3 to 6 weeks.

Proprietary Preparation

Rubicin (Beacon), Inj., 20mg/vial, Tk. 600/Vial

DOXORUBICIN HCL ^[ED]

Indications: Lymphoma, leukemia, breast cancer, ovarian cancer, sarcomas and varieties of solid tumors

Cautions: Hepatic and renal impairment caution in handling - irritant to tissue (See section 14.1)

Interactions: See Appendix-2.

Side-effects: See section 14.1; extravasation at the infusion site can cause local necrosis, cumulative dose related cardiac damage, leading to arrhythmias and heart failure

Dose: 60-75 mg/m² I.V. every 3 weeks. 30 mg/m² I.V. one days 1 and 8 every 4 weeks (in combination). 15-20 mg/m² instilled into bladder weekly for 4 weeks

Proprietary Preparations

Sindroxocin [®](Actavis), Inj., 50mg/vial, Tk. 1765.91/vial; Inj., 10 mg/Vial, Tk.908.75/vial

Adribin (Healthcare), Inj. , 10mg/5ml, Tk. 350.00/vial; 50mg/25ml Inj., Tk. 1100.00/vial

Dobixin(Drug Intl), Inj. , 10mg/5 ml, Tk. 275.00/vial; 50mg/25 ml, Tk. 900.00/vial

Doxorubicin HEXAL [®](Hexel), Inj., 10 mg/5

ml, Tk. 307.00/5 ml Vial; 100 mg/50 ml, Tk. 1,725.00/50 ml Vial; 200 mg/100 ml, Tk. 3,080.00/100 ml Vial; 50 mg/25 ml, Tk. 1,096.00/25 ml Vial

Doxorub (Techno), Inj., 10 mg/Vial, Tk. 406.00/10 ml vial ; 50 mg/Vial, Tk. 1,590.00/50

ml vial

Xorubion (Beacon), Inj., 10 mg/Vial, Tk. 300.00/10 mlvial; 50 mg/Vial, Tk. 1,000.00/50

ml Vial

EPIRUBICIN HYDROCHLORIDE

Indications: Breast cancer

Cautions: Hepatic impairment; caution in handling - irritant to tissue (see section 14.1)

Side-effects: See section 14.1; cardiotoxicity

Dose: 70 to 90 mg/m² as a bolus injection repeated every 3 to 4 weeks; bolus injection over 2 to 5 minutes or as

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a continuous infusion through a central venous catheter

Proprietary Preparations

Erubin (*Beacon*), Inj., 10mg/5ml, Tk. 915/5 ml vial; 50 mg/25 ml, Tk. 3,700/25ml vial
Episindan^(Sindan), Inj. 2 mg/ml, Tk. 3,866.00/25ml vial; Tk.971.00/5ml vial
Pharmorubicin^(Pharmacia), Inj. 50 mg/Vial, Tk. 3118,91/Vial
Epirubicin Pha Res^(Thymoorgan) Inj., 10 mg/ 5 ml vial, Tk. 1420.40/5 ml vial; 50 mg/25 ml, Tk. 4545.29/25ml

MITOMYCIN

Indications: Upper gastrointestinal and breast cancer

Cautions: Hepatic impairment; caution in handling - irritant to tissue; (see section 14.1)

Side-effects: See section 14.1; delayed bone marrow toxicity, lung fibrosis and renal damage.

Dose: 20 mg/m² I.V. on day every 4-6 weeks. 2 mg/m² I.V. on days 1-5 and 8-12 every 4-6 weeks. 30-40 mg instilled into bladder weekly for 4-8 weeks then monthly for 6 months

Proprietary Preparations

Mitomycin-C Kyowa^(Kyowa) Inj. 10mg/vial, Tk.729.20/vial, Inj. 2mg/2ml, Tk.193.28/vial

14.1.3 ANTIMETABOLITES

CAPECITABINE

Indications: Colorectal cancer, breast cancer and other gastrointestinal tract malignancy.

Side-effects: See section 14.1, hand-foot syndrome.

Interactions: See Appendix-2.

Dose: 2500 mg/m² per day in 2 to 3 divided doses for 2 weeks followed by 1 week rest, to be taken with food

Proprietary Preparation

Cabita (*Drug Intl*), Tab.500mg, Tk.100/Tab.
Tysinior (*Genvio*), Tab. 500 mg, Tk.120/Tab.; 150 mg, Tk.60/Tab.
Xelobine (*Healthcare*), Tab., 500mg, Tk.150/Tab
Xeloda^(Roche), Tab., 500 mg, Tk. 317.50/Tab.

Xitabin (*Beacon*), Tab., 500mg, Tk.125/Tab.

CYTARABINE

Indications: Acute myeloid leukemia and, chronic myelogenous leukemia and non-Hodgkin's lymphoma

Cautions: See section 14.1; hepatic impairment

Side-effects: See section 14.1; bone marrow toxicity, gastrointestinal disturbance, intra-hepatic cholestasis and central nervous system toxicity

Dose: 100-200 mg/m²/day continuous IV infusion for 5-10 consecutive days – Induction or 100 mg/m² IV or SC twice a week for 5 days every 28 days.

MAINTENANCE DOSE:

- 40-50 mg/m² intrathecally every 4 days per week.
- 1,000 mg to 3,000mg/m² IV over 1 hour every 12 hours for up to 12 doses.

Proprietary Preparations

Cytabin (*Beacon*), Inj. , 100mg/5ml, Tk. 180.00/Vial.; Inj., 500mg/5ml, Tk. 900.00/Vial.; 1gm/10ml, Tk. 1550.00/Vial.
Cytarabine^(Choongwa) Inj. 100mg/5ml

FLUDARABINE PHOSPHATE

Indications: B-cell chronic lymphocytic leukemia, low-grade Non-Hodgkin's lymphoma, acute myeloid leukaemia-Refractory and relapsing case.

Cautions: vaccination-during and after treatment with fludarabine phosphate, vaccination with live vaccines should be avoided; renal impairment.

Contraindication: Hypersensitivity to the active substance or to any of the excipients; renal impairment with creatinine clearance < 30 ml/ min; Hemolytic anemia; Pregnancy; Lactation; below 18 years of age

Side-effects: Myelosuppression, opportunistic Infections, cough, fever, fatigue, weakness, nausea, vomiting, diarrhea, hematological disorders

Dose: 25 mg/m² body surface area given daily for 5 consecutive days every 28 days by the Intravenous route for up to 6 cycles.

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Proprietary Preparation

Fludara[®] (Genzyme), Inj., 50mg/2ml, Tk. 7422/Vial

FLUOROURACIL ^[ED]

Indications: Breast and gastrointestinal cancer, palliation of inoperable malignant neoplasm colonic cancer

Cautions See section 14.1

Contraindications: In handling-irritant to tissues

Interactions: Antibacterials such as metronidazole inhibit the metabolism (increase toxicity), filgrastim possibly exacerbates neutropenia
Ulcer healing drugs such as cimetidine inhibit metabolism (increase plasma concentration)

Side-effects: Same as the side-effects of cytotoxic drugs; bone marrow suppression, gastrointestinal ulceration, bleeding, severe diarrhoea, leucopenia, thrombocytopenia, stomatitis

Dose: Systemic - 500 mg/m² IV on days 1-5 every 4 weeks. 450-600 mg/m² IV weekly. 200-400 mg/m² IV daily as a continuous IV infusion. 1000 mg/m² IV daily for 4 days as a continuous IV infusion every 3-4 weeks

Intra-cavitary- 500-1000 mg for pericardial effusion. 2000-3000 for pleural or peritoneal effusion

Intra-arterial - 800-1200 mg/m² as a continuous infusion on days 1-4 followed by 600 mg/m² as a continuous infusion on days 5-21

Proprietary Preparation

Drucil (Healthcare), Inj., 250mg/5ml, Tk. 100.00/vial.; 500mg/10ml, Tk. 150.00/vial

Fluracil (Drug Intl), Inj., 500/10 ml, Tk. 100.00/vial

Fluroxan (Beacon), Inj., 250mg /5 ml, Tk. 60.00/vial.; 500mg/10 ml, Tk. 100.00/vial

5-Fu PhaRes[®] (Haurt) Inj., 50mg/ml, Tk. 457.15/10mlVial

GEMCITABINE

Indications: Advanced pancreatic cancer; metastatic breast cancer

Cautions: See section 14.1;

Side-effects: See section 14.1; renal and hepatic impairment, myelotoxicity,

pulmonary oedema, alopecia, hypotension.

Dose: IV 1 g/m² over a period of 30 minutes once weekly for 7 weeks followed by 1-week rest. Subsequent courses of treatment are administered at the dose of 1 g/m² per week for 3 weeks followed by 1-week rest

Proprietary Preparations

Cytogem, (Drug Intl), Inj. (IV Infusion),, 1gm/Vial, Tk. 4500.00/Vial

Gemcitabin Aqvida[®] (Actavis) Inj.(I.V Infusion), 1gm/vial, Tk.7029.50/Vial; 200mg/vial, Tk.2196.72/vial

Gemcitabin HEXAL[®] (Ebewe) Inj., (IV Infusion), 40mg/ml, 975.00/5mlvial, Tk. 3,937/25ml

Gemcitabin medac[®] (Medac) Inj., (IV Infusion), 200mg/vial, Tk.2,482.81/Vial; 100mg/vial, Tk.12,411.03/vial

Gemcitabin PhaRes[®] (Thymoorgn) Inj., (IV Infusion), 200mg/vial, Tk.2,450/Vial; 1gm/vial, Tk.7080/vial

Gemcitin (Techno), Inj., (IV Infusion), 200mg/vial,Tk.7287.50/25ml,1,987.50/5mlvial

Gemoxen (Beacon), Inj. (IV Infusion), , 200mg/vial, Tk. 1400.00/5mlVial.; 1gm/vial, Tk. 5000.00/25mlVial

Gemzar[®] (Lilly)Inj., (IV Infusion), 200mg/vial, Tk.2,478.34/Vial; 1g/vial, Tk.8671.92/vial

Gitrafin[®] (Actavis) Inj., (IV Infusion), 200mg/vial, Tk.1848.08/Vial; 1gm/vial Tk.5850.50/vial

MERCAPTOPURINE

Indications: Acute lymphatic leukemia and acute non-lymphocytic leukemia. May be useful treatments for chronic myeloid leukemia (CML), non-Hodgkin's lymphoma, polycythemia vera, inflammatory bowel disease and psoriatic arthritis

Cautions: Same as the side-effects of cytotoxic drugs reduce the dose in mild and moderate renal impairment; max. 2.5 mg in 24 hours and avoid in severe impairment

Interactions: See Appendix-2.

Side-effects: Same as the side-effects of cytotoxic drugs

Dose: Oral dose is 70 to 100 mg/m²/day (by mouth 2.5 mg/kg daily); 75% of the standard dose to be reduced if allopurinol is co-administered. A common IV dose is 500-1000 mg/m²/day

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for 2-3 days. Dose adjustment of 6-MP administered by IV is not necessary with concomitant administration of allopurinol

Proprietary Preparations

Leukin (Beacon) Tab. 50 mg.Tk. 20/Tab.

Puri Nethol ^(b) (GSK), Tab. 50 mg, Tk.40.76/Tab

METHOTREXATE ^[ED]

Indications: Choriocarcinoma, hydatidiform mole, all acute lymphocytic leukemia, prophylaxis and treatment of meningeal lymphocytic leukemia, breast cancer, epidermal tumors of the head and neck, lung cancer, non-Hodgkin's lymphoma, T-Cell lymphoma, psoriasis and rheumatoid arthritis . Methotrexate may be a useful treatment for multiple myeloma, rhabdomyosarcoma and cancer of the bladder, brain, cervix, esophagus, kidney, ovary, prostate, stomach and testis

Cautions: See section 14.1 ; hepatic and renal impairment

Interactions: Analgesics such as aspirin reduce the excretion, avoid concomitant use of azapropazone, diclofenac, ibuprofen, indomethacin, ketoprofen, meloxicam, naproxen and phenylbutazone and probably other NSAIDs increase the risk of toxicity (see also Appendix-2 and notes below).

Antibacterials such as co-trimoxazole and trimethoprim increase the antifolate effect of methotrexate, penicillin and sulphonamides decrease the excretion of methotrexate and increase the risk of toxicity.

Antiepileptics such as phenytoin increase the antifolate effect and thus increase the toxicity.

Antimalarial such as pyrimethamine increase the antifolate effect.

Ciclosporin increases the toxicity.

Corticosteroids increase the risk of hematological toxicity.

Uricosuric-probenecid reduces the excretion of methotrexate and increases the risk of toxicity

Side-effects: Same as the side-effects of cytotoxic; myelosuppression

Dose: Oral doses up to 40mg/m² are well absorbed. Parenteral doses vary from 20-40 mg/m² every 1 to 2 weeks to 200 to 500 mg/m² every 2 to 4 weeks

As an adjuvant treatment for osteosarcoma, doses of 12,000 to 15,000 mg/m² have been given with leucovorin rescue the usual adult intrathecal dose is 10 to 15 mg in 7 to 15 ml of preservative-free saline. Doses greater than 80 mg/week should be accompanied by leucovorin rescue

Proprietary Preparations

G-Methotrexate (Gonoshasthaya), Tab., 2.5mg, Tk. 4.00/Tab.

Meth (Drug Intl), Tab., 10mg, Tk. 12.00/Tab. ; 2.5mg, Tk. 4.00/Tab.

Methotrax (Delta), Tab., 10 mg, Tk. 15/Tab.; Tab. , 2.5 mg, Tk. 5.00/Tab.

Methox (Popular), Tab. 2.5, Tk. 5.52/Tab.; 10 mg, Tk. 15.06/Tab.

Metorax (Renata), Tab.,10mg, Tk. 15.00/Tab. Tab., 2.5 mg, Tk. 5.50/Tab.

Mtrex(Techno), Inj., 50 mg, Tk 110/Amp.

Trexonate (Beacon), Tab. , 10 mg, Tk. 15/Tab.; Tab., 2.5 mg, Tk. 5/Tab.; Inj., 50 mg, Tk.130/Amp.

RALTITREXED

Indications: Advanced colorectal cancer

Caution: Hepatic and renal impairment

Contra-indication: Pregnancy and breastfeeding

Side-effect: See section 14.1; myelosuppression and gastrointestinal disturbance

Interaction: See Appendix-2

Dose: consult with an oncologist

Generic Preparation

Injection 2mg/vial

14.1.4 VINCA ALKALOIDS AND ETOPOSIDE

ETOPOSIDE

Indications: Particularly useful in lung cancer, testicular and ovarian cancer, gestational choriocarcinoma, Hodgkin's and non Hodgkin's lymphomas, acute myelogenous leukemia, acute myelomonocytic leukemia, Kaposi's

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

sarcoma, neuroblastoma, Ewing's sarcoma, Wilm's tumor and rhabdomyosarcoma, cancer of breast, bladder and prostate.

Cautions: See section 14.1

Contraindications: Severe hepatic impairment

Side-effects: See section 14.1: myelosuppression, alopecia, peripheral neuropathy; it is also irritant to tissue, nausea and vomiting

Dose: 120-240 mg/m²/day for 3 to 5 days; given orally

Proprietary Preparations

Eposid (Techno), Inj., 100 mg/vial, Tk. 530/Vial
Eposin[®](Pharmachemie), Inj., 100mg/vial, Tk. 584.07/Vial

Toposar (Drug Intl), Inj., 100mg/5 ml, Tk. 350.00/5ml vial

Topoxin (Beacon), Inj., 100mg/5 ml, Tk. 400.00/5ml Vial

VINBLASTINE SULPHATE ^[ED]

Indications: Advanced Hodgkin's lymphomas and also to treat the carcinomas of bladder, breast, Kaposi's sarcoma and certain other malignant conditions, mycosis fungoides

Cautions: Hepatic impairment. Caution in handling; (see under section 14.1)

Contraindications: Intrathecal injection

Side-effects: See under section 14.1; irritant to tissue, leucopenia

Dose: 6 to 10mg/m² every 2 to 4 weeks in combination with other drugs

Proprietary Preparation

Velvin (Beacon), Inj. 10mg/vial, Tk. 850.00/vial

VINCISTINE SULPHATE ^[ED]

Indications: Vincristine is an essential part of combination chemotherapy regimens for ALL and play an important role in the treatment of both Hodgkin's and non Hodgkin's lymphomas and certain other tumors.

Cautions: Same as the side-effects of cytotoxic drugs; hepatic impairment. Caution in handling

Contraindications: Intrathecal injection

Side-effects: Same as the side-effects of cytotoxic drugs; irritant to tissue, paresthesia, motor weakness.

Interactions: See Appendix-2

Dose: commonly used doses range from 0.5 to 1.4 mg/m² every 1 to 4 weeks. Continuous infusion regimens of 0.5 mg to 0.5 mg/m²/day for 4 days have been used

Proprietary Preparations

Criston (Beacon), Inj., 1 mg/Vial, Tk. 350.00/Vial; 2 mg/Vial, Tk. 580.00/Vial

Vincrist (Techno), Inj., 1 mg/Vial, Tk. 460.00/Vial

Vincristine[®](Pharmachemie) 1 mg/Vial, Tk.

371.95/Vial; 2 mg/Vial, Tk. 526.92/Vial

Vinstin (Drug Intl), Inj., 2mg/vial, Tk.

400.00/Vial

VINORELBINE

Indications: Used for different malignant conditions (Acute leukemias, lymphomas and breast and lung cancer)

Cautions and Side-effects: See section 14.1

Interactions: See Appendix-2.

Dose: Consult with oncologist

Proprietary Preparations

Vinorelbin Sandoz[®] (Ebewe), Inj (I.V Infusion) 10 mg/ ml, Tk. 1247.00/Vial; 4,370.00/5 ml, Vial

Vinorelbin Actavis[®] (Actavis), Inj(I.V Infusion), 10 mg/ ml, Tk. 10246.93/5mlVial;

14.1.5 OTHER ANTINEOPLASTIC DRUGS

Crisantaspase is the enzyme asparaginase produced by *Erwinia chrysanthemi*. It is given IM or S/C exclusively in Acute Lymphoblastic Leukaemia. Side-effects include nausea and vomiting and can cause anaphylactic reactions, CNS depression, and liver damage.

ALTRETAMINE

Indications: Advanced ovarian cancer where other regimen have failed

Cautions: Hepatic and renal impairment; to be careful in handling; regular neurological examinations is recommended. (See section 14.1)

Side-effects: See section 14.1 and notes above; peripheral and central

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

neurotoxicity, rash, renal and hepatic toxicity

Dose: 260 mg/m²/day in 4 divided dose (after meals and at bedtime) for 14 days to 21 days of a 28 day cycle; given for up to 12 cycle.

Generic Preparation
Capsule 100mg

BORTEZOMIB

Indication: Relapsed multiple myeloma and mantle cell lymphoma

Cautions: Pregnancy, liver disease, kidney disease

Contraindication: Pregnancy

Side-effects: Peripheral neuropathy, myelosuppression, neutropenia, thrombocytopenia, asthenia

Dose: 1.3 mg/m² (with or without dexamethasone) administered by intravenous bolus on days 1,4,8 and 11 of a 21-day cycle for a maximum of eight cycles in heavily pretreated patients with relapsed/refractory multiple myeloma.

Proprietary Preparations

Bortez (Beacon), Inj., 1mg/vial Tk. 7500.00/Vial

Velcade ^(l) (Janseen)Inj.,1mg/vial Tk. 14204.90/vial.

DACARBAZINE AND TEMOZOLOMIDE

DACARBAZINE

Indication: Metastatic malignant melanoma, soft tissue sarcoma, Hodgkin's disease

Caution: Hepatic and renal impairment, pregnancy, breastfeeding

Side-effects: Same as the side-effects of cytotoxic drugs myelosuppression, severe nausea and vomiting; rarely liver necrosis due to hepatic vein thrombosis; irritant to skin and tissues

Dose: It is given IV in doses of 150-250 mg/m²/day for 5 days, to be repeated at intervals of 4 weeks, or 250 mg/m² body surface daily for 5 days, to be repeated at intervals of 3 weeks.

Proprietary Preparations

Decarbazine ^(l) (Mayane), Inj. 200 mg/20 ml. Tk.1126.96/20ml vial

Decarbazine Medac ^(l) (Medac), Inj., 200mg/20ml vial,Tk.7962.35/vial

Temozolomide is structurally related to dacarbazine and is licensed for the second line treatment of malignant glioma. It is an oral preparation.

Proprietary Preparations

Temonix(Becon),Cap.,100mg.TK.600/Cap.; 250mg.Tk.1300/cap

DASATINIB

Indication: Chronic phase chronic myeloid leukaemia, acute lymphoblastic leukemia

Caution: Same as the side-effects of cytotoxic drugs; Hepatitis B infection. Risk of cardiac dysfunction, susceptibility to QT interval prolongation, pulmonary arterial hypertension

Side-effects: Same as the side-effects of cytotoxic drugs; amnesia, asthma, cholecystitis, cholestasis. drowsiness, erythema nodosum, gynaecomastia, hepatitis, hypersensitivity reactions, hypocalcemia, hypotension, irregular menstruation, nail disorders, oesophagitis, pancreatitis, photosensitivity, pigmentation, proteinuria, rhabdomyolysis, seizures, syncope, thrombophlebitis, transient ischaemic, hepatic failure, hepatitis Breactivation, hyperuricemia, interstitial lung disease, nausea, , thromboembolism, thrombosis, tumor lysis syndrome

Dose: It is given orally 100 mg once daily, then increased if necessary up to 140 mg once daily in case of Chronic phase chronic myeloid leukemia; whereas orally 140 mg once daily, then increased if necessary up to 180 mg once daily for Acute lymphoblastic leukemia

Proprietary Preparations

Dasanix (Beacon), Tab. 100 mg. Tk.400/ Tab.. 20 mg. Tk.80/ Tab.

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ERLOTINIB

Indications: metastatic or locally advanced non-small cell lung cancer, advanced unresectable metastatic prostate cancer

Cautions: See section 14.1; hepatic impairment; renal impairment; pregnancy & breastfeeding

Side-effects: Same as the side-effects of cytotoxic drugs

Dose: Non-small cell lung cancer, 150 mg once daily. Pancreatic cancer, 100 mg once daily in combination with gemcitabine

Note: Erlotinib monotherapy is not recommended for maintenance treatment in people with locally advanced or metastatic non-small-cell lung cancer who have stable disease after platinum-based first-line chemotherapy.

Proprietary Preparations

Erlotinib (*Incepta*), Tab., 100 mg, Tk. 550.00/Tab.; 150 mg, Tk. 700.00/Tab.
Erlotinib (*Beacon*), Tab., 100 mg, Tk. 550.00/Tab.; 150 mg, Tk. 700.00/Tab.
Erlotinib (*Renata*), Tab., 100 mg, Tk. 600.00/Tab.; 150 mg, Tk. 750.00/Tab.
Erlotinib (*Healthcare*), Tab., 100 mg, Tk. 750.00/Tab.; 150 mg, Tk. 1000.00/Tab.
Tarceva[®] (*Roche*), Tab., 150 mg, Tk. 3987.95/Tab.; 100 mg, Tk. 3606.00/Tab.
Terceonib (*Techno*), Cap., 150 mg, Tk. 750.00/Cap.; 100 mg, Tk. 650.00/Cap.

OSIMERTINIB

Indications: locally advanced or metastatic epidermal growth factor receptor T790M mutation-positive non-small-cell lung cancer

Cautions: Elderly; history of interstitial lung disease; radiation pneumonitis requiring steroid treatment, risk factors for QTc interval prolongation; pregnancy & breastfeeding.

Side-effects: Diarrhoea; dry skin disorders; interstitial lung disease; nail disorders, pruritus, rash; stomatitis; QTc interval prolongation.

Dose: 80 mg once daily orally for dose adjustment due to side-effects-consult product literature

Proprietary Preparations

Tagris 80 (*Beacon*), Tab. 80 mg, Tk.80/ Tab.
Osicent 80 (*Incepta*), Tab. 80 mg, Tk.500/ Tab.

IBRUTINIB

Indications: Treatment of relapsed or refractory mantle cell lymphoma; chronic lymphocytic leukemia and Waldenström's macroglobulinemia

Cautions: Family history of congenital short QT syndrome, increased lymphocytes increased risk of leukostasis, consider withholding treatment temporarily and monitor closely, patients at risk from further shortening of QTc interval, personal history of congenital short QT syndrome, risk of hemorrhagic events—withhold ibrutinib treatment for at least 3 to 7 days before and after surgery depending on risk of bleeding; hepatic and renal impairment, pregnancy & breastfeeding.

Side-effects: Arthralgia, atrial fibrillation, blurred vision, bruising, constipation, dehydration, diarrhea, dizziness, dry mouth, epistaxis, haemorrhage, headache, musculoskeletal pain, peripheral oedema, petechiae, pyrexia, rash, respiratory tract infection, sepsis, sinusitis, skin infection, subdural haematoma, urinary tract infection, Leukostasis, oral mucositis, thromboembolism, tumour lysis syndrome

Dose: For treatment of relapsed or refractory mantle cell lymphoma; 560 mg once daily orally and for treatment of chronic lymphocytic leukemia and Waldenström's macroglobulinemia, orally 420 mg once daily

Proprietary Preparations

Ibrutinib (*Beacon*), Cap., 140 mg, Tk. 600.00/Cap.
Ibrutinib 140 (*Incepta*), Cap., 140 mg Tk. 500.00/Cap.
Ibrutinib (*Julphar*), Cap., 140 mg.

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EVEROLIMUS

Indications: Advanced renal cell carcinoma, prevention of organ rejection after renal and kidney transplant, breast cancer in post-menopausal women with advanced hormone-receptor positive

Cautions: Hepatic impairment, renal impairment, pregnancy, breastfeeding.

Side-effects: change in ability to taste food, dry mouth, weakness, difficulty falling asleep, nose bleed, muscle cramps

Dose: Renal cell carcinoma, neuroendocrine tumors of pancreatic origin, hormone-receptor-positive breast cancer. ADULT over 18 years, 10mg once daily; *consult product literature*

Proprietary Preparations

Afinitor[®] (Novartis), Tab., 5 mg, Tk. 5813.00/Tab.; 10 mg, Tk. 8943.00/Tab.; **Certican**[®] (Novartis), Tab., 0.25 mg, Tk. 125.00/Tab.; 0.50 mg, Tk. 250.00/Tab.; 0.5mgTK.375/Tab **Xevriol** (Beacon), Tab. , 5mg , Tk. 1500.00/Tab.

GEFITINIB

Indication: Non-small cell lung cancer

Cautions: Breastfeeding, interstitial lung disease, hepatotoxicity and liver impairment

Contraindication: Pregnancy and breastfeeding (must be discontinued while receiving Gefitinib therapy)

Side-effects: Anorexia mild or moderate, conjunctivitis, blepharitis, and dry eye, corneal erosion, Keratitis (0.12%), hemorrhage, diarrhea, vomiting, hepatobiliary disorders, skin reactions, nail disorder, cutaneous vasculitis, proteinuria, cystitis

Dose: 250mg tablet once a day

Proprietary Preparation

Gefinix (Beacon), Tab. 250 mg, Tk.250/Tab. **Geficent** (Incepta), Tab. , 250 mg, Tk. 120.00/Tab.

HYDROXYCARBAMIDE/HYDROXYU REA

HYDROXY CARBAMIDE

Indication: Chronic myeloid leukemia.

Cautions and Side-effect : *See section 14.1;* bone marrow depression

Contraindications: Pregnancy & breastfeeding

Dose: *Consult with oncologist*

Proprietary Preparations:

Hydrea[®](Squibb), Cap.500mg, Tk.19.83/Cap **Hydronix**(Beacon),Cap. 500mg, Tk.15.00/Cap **Mylostaf** (Drug Int) Cap. 500mg, Tk.15.00/Cap

IMATINIB

Indication: Chronic myeloid leukemia

Cautions: Cardiac disease; risk factors for heart failure; history of renal failure; monitor for fluid retention; monitor liver function; monitor growth in children

Side-effects: *See section 14.1;* oedema, muscle pain, headache, nausea, vomiting diarrhoea

Dose: 400 mg/day till the disease persists (Literature advised for at least one year)

Proprietary Preparations

Glivec[®] (Novartis), Cap. 100 mg, Tk. 1666.00/Cap. **Enliven** (Orion), Cap. 100 mg, Tk. 125.85/Cap. **Imanix** (Beacon), Tab., 100mg , Tk. 100.00/Tab. ; 400mg , Tk. 300.00/Tab. **Tyrosin** (Renata), Tab., 400MG, Tk. 300.00/Tab. **Tyrosin** (Healthcare), Tab., 400mg , Tk. 350.00/Tab.; 100mg , Tk. 100.00/Tab.

LAPATINIB

Indications: Metastatic breast cancer and other solid tumors. It is used in combination therapy for HER2-positive breast cancer

Cautions: Hepatotoxicity, pregnancy category D, renal impairment

Contraindication: *Same as that of cautions*

Side-effects: Fast or pounding heartbeats, extreme dizziness or tired feeling, feeling like you might pass out,

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severe diarrhea, dry cough, feeling short of breath, white patches or sores inside the mouth or on lips, nose bleeding (see section 14.1)

Dose: 1,250 mg given orally once daily on Days 1-21 continuously in combination with capecitabine 2,000 mg/m² /day (administered orally in 2 doses approximately 12 hours apart) on Days 1-14 in a repeating 21-day cycle

Proprietary Preparation

Lapacent (Incepta), Tab., 250 mg, Tk. 300.00/Tab.

Tykerb⁽¹⁾ (Novartis), Tab., 250 mg, Tk. 356.49/Tab.

Tykerb⁽¹⁾ (GSK), Tab., 250 mg Tk.356.59/Tab

NILOTINIB

Indications: Chronic myeloid leukemia where Philadelphia chromosome is positive

Cautions: Prolongs the QT interval; concomitant use of drugs that prolong QT interval; hypokalemia, hypomagnesemia, or long QT syndrome

Side-effects: Headache with chest pain and severe dizziness, fainting, fast or pounding heartbeats, fever, chills, body aches, flu symptoms, sores in mouth and throat, blood in urine or stools; severe pain in upper stomach spreading to back; Q-Tinterval prolongation; hypertension, edema

Dose: Consult product literature

Proprietary Preparation

Tasigna⁽¹⁾ (Novartis), Cap. 200 mg, Tk.3040/Cap.

PAZOPANIB

Indications: Renal cell carcinoma and soft tissue sarcoma

Cautions: Hypertension, including hypertensive crisis, thrombotic microangiopathy; thrombocytopenic purpura, hemolytic uremic syndrome; decreased LVEF and congestive heart failure

Contraindications: Same as that of cautions, not recommended in patients with severe hepatic impairment

Side-effects: Changes in hair colour, hypertension which usually occurs during the first few weeks of treatment, appetite loss, hyperglycemia, hypocalcemia, hypomagnesemia, hypophosphatemia, increased AST, ALT and protein in the urine, edema, rash, fatigue, and myelosuppression

Interactions: See Appendix -2

Dose: 800 mg orally once daily without food (at least 1 hour before or 2 hours after a meal). Baseline moderate hepatic impairment – 200 mg orally once daily

Proprietary Preparation

Votrient⁽¹⁾ (GSK) Tab., 800 mg Tk.625.69/Tab

PERTUZUMAB

Indications: It is indicated for the treatment of HER2-positive metastatic or locally recurrent unresectable breast cancer in combination with trastuzumab and docetaxel, in patients who have not received previous anti-HER2 therapy or chemotherapy. Pertuzumab is given by intravenous infusion; resuscitation facilities should be available and treatment should be initiated by a specialist

Cautions: See section 14.1; a history of congestive heart failure, impaired left ventricular function uncontrolled hypertension, recent myocardial infarction, serious cardiac arrhythmia, prior anthracycline exposure, or radiotherapy to the chest area assess for signs and symptoms of congestive heart failure (including left ventricular ejection fraction) before and during treatment—consult product literature, and withhold treatment if necessary

Contraindication: Pregnancy, breast feeding, hepatic and renal impairment

Side-effects: See section 14.1; also (when used in combination with trastuzumab and docetaxel) decreased appetite, diarrhoea, constipation, dyspepsia, left ventricular dysfunction, oedema, dyspnoea, cough, pleural effusion, nasopharyngitis, insomnia,

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peripheral neuropathy, headache, dizziness, taste disturbance, pain, malaise, pyrexia, chills, upper respiratory-tract infection, paronychia, neutropenia (including febrile neutropenia), leucopenia, anaemia, myalgia, arthralgia, increased lacrimation, rash, nail disorder, pruritus, dry skin; infusion-related reactions including severe hypersensitivity reactions; less commonly interstitial lung disease

Dose: Consult physician and product literature

Proprietary Preparations

Perjeta⁽¹⁾ (Roch) Inj., (IV Infusion), 420mg/14ml vial, Tk. 211695/vial

Pertuza (Incepta), Inj., (IV Infusion), 420 mg/14 ml, Tk. 70000.00/14 ml Vial

RUXOLITINIB

Indications: For the treatment of disease-related splenomegaly or symptoms in adult patients with primary myelofibrosis (also known as chronic idiopathic myelofibrosis), post polycythaemia vera myelofibrosis or post essential thrombocythaemia myelofibrosis.

Cautions, Contraindications & Side effects: See section 14.1 and consult product literature

Dose: Consult physician and product literature

Proprietary Preparation

Jakvi⁽¹⁾ (Novertis), Tab. 5mg Tk. 3891.67/Tab.

SORAFENIB

Indications: Advanced renal cell carcinoma, hepatocellular carcinoma, thyroid cancer

Caution: Major surgical procedures, cardiac ischemia, susceptibility to QT-interval prolongation, hepatic impairment, pregnancy and breast-feeding

Side-effects: Decreased blood flow to the heart and heart attack, bleeding problems, high blood pressure, hand-foot skin reaction, Interstitial lung

disease reversible thyroid dysfunction and Stevens-Johnson syndrome

Dose: ADULT over 18 years, 400 mg twice daily.

Proprietary Preparation

Sofenib (Renata), Tab., 200 mg, Tk. 300.00/Tab.

Sonib (Drug Intl), Tab., 200 mg, Tk. 250.00/Tab.

Soracent (Incepta), Tab., 200 mg, Tk. 275.00/Tab.

Soranix (Beacon), Tab., 200 mg, Tk. 275.00/Tab.

SUNITINIB

Indications: Advanced kidney cancer. It is also used in gastrointestinal stromal tumor, after failure of imatinib, and for the treatment of unresectable or metastatic pancreatic neuroendocrine tumour

Cautions: Increased risk of bleeding; monitor for thyroid dysfunction; congestive heart failure, high blood pressure, QT-interval prolongation; consider dental check-up before initiating treatment, pregnancy and breastfeeding

Side-effects: Fatigue, hand-foot skin reaction, hypertension, paraesthesia, hypothyroidism, arthralgia, increased lacrimation, epistaxis

Dose: 50 mg once daily for gastrointestinal stromal tumor and advanced renal cell carcinoma

Proprietary Preparation

Sunitix (Beacon), Cap. 50mg, Tk. 1800/Cap.

TEMOZOLOMIDE

Indication: Malignant glioma

Cautions: Same as the side-effects of cytotoxic drugs; hepatic and renal impairment; caution in handling

Contraindication: CHILD under 3 years not recommended

Side-effects: See notes above

Dose: Consult product literature

Proprietary Preparations:

Temonix (Beacon), Cap., 100 mg, Tk. 600.00/Cap.; 250 mg, Tk. 1,300.00/Cap.

Zolomide (Techno), Cap., 100 mg, Tk. 650.00/Cap.; 250 mg, Tk. 1,500.00/Cap

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PLATINUM COMPOUNDS

The platinum compounds are complexes of platinum with ligands which can be displaced by nucleophilic (electron rich) atoms to form strong bonds with covalent characteristics. Thus, like the alkylating agents, the platinum agents form strong chemical bonds with thiol sulfurs and amino nitrogens in proteins and nucleic acids.

Cisplatin requires a "Day-care setting" and is given intravenously. It is of value in patients with metastatic germ cell tumors (Teratoma, seminoma). It can also be used in bladder, lung, upper GIT and ovarian cancer though for ovarian cancer **carboplatin** is more preferable. **Cisplatin** requires intensive intravenous hydration and treatment may be complicated by severe nausea and vomiting. This is generally toxic giving rise to nephrotoxicity, ototoxicity, peripheral neuropathy.

Carboplatin has activity equivalent to that of cisplatin but used especially in ovarian cancer and lung cancer (Particularly small cell type). It is administered intravenously on an out patient basis and it is better tolerable than **cisplatin**. The dose of carboplatin is determined according to the renal function rather than the body surface area. Though the myelosuppression is more severe than cisplatin but the nephrotoxicity or ototoxicity with carboplatin is less severe.

Oxaliplatin is administered intravenously for the treatment of metastatic colorectal cancer in combination with fluorouracil and folinic acid. Along with sensory peripheral neuropathy which is dose limiting other side effects eg. GIT disturbance, ototoxicity, myelosuppression are also common. Manufacturers advise for close monitoring of the renal functions.

CARBOPLATIN

Indications: Ovarian cancer and lung cancer (particularly small cell type)

Cautions: See section 14.1; renal impairment

Interactions: Antibacterials such as aminoglycosides, vancomycin and capreomycin increase the risk of nephrotoxicity and possibly ototoxicity; diuretics increase the risk of nephrotoxicity and ototoxicity.

Side-effects: See section 14.1; myelosuppression

Doses: Common IV dose is 360 to 400 mg/m² every 4 weeks. Doses of 400 to 550 mg/m² have been given. Carboplatin can also be administered in higher doses (e.g. 1500 mg/m²) in combination with other antineoplastic drugs

Proprietary Preparations

Carboplat (Beacon), Inj., (I.V infusion)

10mg/ml, Tk. 1,400.00/15ml Vial ; Tk.

3,800.00/45 ml Vial

Carbotin (Techno), Inj. (I.V infusion) 10mg/ml,

Tk. 4,637.50/45ml; Tk. 1,550.00/15ml Vial

Carboplatin HEXAL[®] (Hexel), Inj. (I.V

infusion) 10mg/ml ,Tk. 1,166.00/15 ml Vial;

Tk. 3,069.00/45 ml Vial; Tk. 423.00/5 ml Vial

Carboplatin sindan[®] (Sindan) Inj. (I.V

infusion) 10mg/ml, Tk. 4146.14/45ml vial; Tk.

5156.47/60ml vial

Carboplatin Phares[®] (Thymoogan) Inj. (I.V

infusion) 10mg/ml, Tk. 4700/45ml vial;

ITk. 2400/15ml Vial

Carboplat (Beacon), Inj., 150mg/15ml, Tk.

1400.00/vial.; 450mg/45 ml , Tk. 3800.00/vial

Carplatin (Drug Intl), Inj., 150mg/15ml, Tk.

1400.00/vial.; 450mg/45 ml, Tk. 3700.00/vial

Cytocarb (Healthcare), Inj., 150mg/15ml, Tk.

1600.00/vial.; 450mg/45ml, Tk. 4400.00/vial

CISPLATIN^[ED]

Indications: Teratoma, seminoma (metastatic germ cell tumors) and also bladder, lung, upper GIT cancer

Cautions: See section 14.1 ; renal impairment; to be monitored renal function and haemoglobin parameter

Interactions: Antibacterials such as aminoglycosides, vancomycin and capreomycin increase the risk of nephrotoxicity and possibly ototoxicity; diuretics increase the risk of nephrotoxicity and ototoxicity

Side-effects: See section 14.1 severe nausea and vomiting, nephrotoxicity, ototoxicity, peripheral neuropathy.

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

Dose: Doses may vary from 20 to 40 mg/m²/day for 3 to 5 days every 3 to 4 weeks or from 20-120 mg/m² given as a single dose every 3-4 weeks intra peritoneal dose of 100 to 270 mg/m² have been given in combination with IV sodium thiosulfate

Proprietary Preparations

Cesalin (Techno), Inj. (I.V infusion) , Tk. 225.00/10mgVial;Tk. 1,060.00/50mgVial
Cisplat (Healthcare), Inj. (I.V infusion) , 1mg/ml, Tk. 300.00/10mlVial, Tk. 957.08/50mlVial
Cisplatin ^(P) (Pfizer), Inj. (I.V infusion) 1mg/ml Tk. 1124/50 ml Vial, Tk. 502/10 ml Vial, Tk.3836/45mlvial
Cisplatin HEXAL PI ^(H) (Hexel), Inj. (I.V infusion) 1mg/ml Tk. 313.00/20 ml; Tk. 987/100 ml
Cisplatin Pha Res ^(T) (Thymoogran), Inj. (I.V infusion), 1mg/ml Tk.1330/100ml Vial;
Neoplat (Drug Intl), Inj. (I.V infusion) , 1mg/ml, Tk. 250.00/Vial, Tk. 800.00/50 ml Vial
Platinex (Beacon), Inj. (I.V infusion) 1mg/ ml , Tk. 250.00/10mlVial, Tk. 815.00/50ml Vial
Sinplatin ^(S) (Sindan), Inj. (I.V infusion), 1mg/ml, Tk.1548/50mlVial
Sinplatin ^(A) (Actavis), Inj. (I.V infusion) 1mg/ml, Tk.1114.47/50mlVial; Tk.370.00/10ml vial

OXALIPLATIN

Indications: Metastatic colorectal cancer in combination with FU and folinic acid

Cautions: Renal impairment

Contra-indications: Peripheral neuropathy and functional impairment

Side-effects: See section 14.1 and notes above

Dose: Consult with oncologist

Proprietary Preparations

Eloxatin ^(A) (Aventis), Inj. 50 mg/Vial, Tk. 6230.74/Vial
Oxaliplat (Healthcare), Inj. , 100 mg/Vial, Tk. 5498.84/Vial; 50 mg/Vial, Tk. 2998.84/Vial
Oxaliplatin Aqua Vida ^(A) (Aquvida) , Inj., 100 mg/20mlvial,Tk.6249.77/vial.,50mf/10ml.Tk.3693.05/vial
Oxaliplatin medac ^(M) (Medac) , Inj., 100 mg/vial, Tk. 5387.32/vial
Oxalotin (Techno), Inj., 100 mg/vial, Tk. 7,900.00/vial ;50 mg/vial,Tk. 5,962.50/vial
Oxiplat (Drug Intl), Inj. 100 mg/Vial, Tk. 5000.00/Vial; 50 mg/Vial, Tk. 2500.00/Vial

Sindaoxplatin ^(S) (Sindan), Inj., 50 mg/Vial, Tk. 4377.00/vial

Xaloplat (Beacon), Inj., 100 mg/vial, Tk. 5,500.00/vial; 50 mg/vial, Tk. 3,000.00/vial

PROCARBAZINE ^(ED)

Indications: Is mainly used in the treatment of Hodgkin's disease, with other combination eg. MOPP (Mustine, Oncovin, Procarbazine and Prednisolone)

Cautions: See section 14.1 and notes above; renal impairment; reduce the dose in moderate impairment

Interactions: Alcohol ingestion may cause a disulfiram-like reaction; it can cause hypertension, because it is a weak MAOI. See also Appendix-2

Side effects: See section 14.1; nausea, hypertension, tachycardia, diplopia, photophobia, myelosuppression and skin rash above

Dose: Initially 50 mg daily, increased by 50 mg daily to 250-300 mg daily, in divided doses; maintenance (on remission) 50-150 mg daily to a cumulative total of at least 6g

Generic Preparation

Capsule 50 mg.

TAXANES

CABAZITAXEL

Indications: In combination with prednisone, for the treatment of patients with hormone-refractory metastatic prostate cancer (mHRPC) previously treated with a docetaxel-containing treatment regimen

Cautions: Severe hypersensitivity can occur and may include generalized rash/erythema, hypotension and bronchospasm. Discontinue cabazitaxel immediately if severe reactions occur and administer appropriate therapy

Contraindications: In patients with neutrophil counts of $\leq 1,500$ cells/mm³; a history of severe hypersensitivity reactions to cabazitaxel or to other drugs formulated with polysorbate 80

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

Side-effects: The most common (10%) grade 1–4 adverse reactions were anemia, leukopenia, neutropenia, thrombocytopenia, diarrhea, fatigue, nausea, vomiting, constipation, asthenia, abdominal pain, hematuria, back pain, anorexia, peripheral neuropathy, pyrexia, dyspnea, dysgeusia, dyspepsia, cough, arthralgia, and alopecia. The most common (5%) grade 3–4 adverse reactions in patients who received cabazitaxel were neutropenia, leukopenia, anemia, febrile neutropenia, diarrhea, fatigue, and asthenia

Dose 25 mg/m² as a 1-hour IV every 3 weeks, in combination with oral prednisone 10 mg administered daily

Proprietary Preparation

Jevtana[®] (Sanofi), Inj., 60 mg/1.5 ml, Tk. 142687/Vial

DOCETAXEL

Indications: Advanced or metastatic breast cancer, non-small cell lung cancer, gastric cancer, head and neck cancer, ovarian cancer;

Cautions: Monitor liver function - dose reduced according to liver enzymes; avoid in severe hepatic impairment

Contraindications: Patients with serious bone marrow depression, complication of infection, suspected of infection

Interactions: Erythromycin, ketoconazole, Cyclosporin may cause possible interactions; see also Appendix-2

Side-effects: Neutropenia, nausea and vomiting are common, but brief. Fluid retention severe hypersensitivity reactions with flushing, hypotension with or without dyspnoea.

Dose: ADULT dose is 60-100 mg/m² (body surface area), IV drip infused over 1 hour once a day at intervals of 3-4 weeks

Proprietary Preparations

Docetaxel Aqvida[®] (oncotec) Inj., (IV infusion) 20 mg/ml, Tk. 3,593.58/Vial; Tk. 10780.73/4mlVial

Docetaxel Pha Res[®] (Thymoorgan) Inj., (IV infusion) 20 mg/ml, Tk. 3,900/Vial; 11,730.00/4ml, Vial

Docetex (Techno), Inj., (IV infusion) 20 mg/0.5 ml, Tk. 5,000.00/Vial; 80 mg/2 ml, Tk. 18,000.00/Vial

Docexan (Beacon), Inj., (IV infusion) 20 mg/0.5 ml, Tk. 3,200.00/Vial; 80 mg/2 ml, Tk. 11,000.00/Vial

Taxotere[®] (Sanofi), Inj., (IV infusion) 20 mg/ml, Tk. 27724.13/4mlVial

PACLITAXEL

Indications: Primary ovarian cancer (advanced or residual disease following laparotomy) in combination with cisplatin; metastatic ovarian cancer where standard platinum-containing therapy has failed; advanced or metastatic breast cancer (in combination with trastuzumab) when an anthracycline not appropriate; metastatic breast carcinoma where standard anthracycline-containing therapy has failed or is inappropriate; non small cell lung cancer (in combination with cisplatin) when surgery or radiation therapy not appropriate

Cautions, Contraindications and Side-effects: See section 14.1; bradycardia or asymptomatic hypotension, myelosuppression, peripheral neuropathy and cardiac conduction defects with arrhythmias (which are nearly asymptomatic). It also causes alopecia, muscle pain, nausea and vomiting from mild to moderate.

Interactions: See Appendix-2

Dose: Consult with oncologist

Proprietary Preparations

Paclitaxel Actavis[®] (Actavis), Inj (I.V Infusion), 6mg/ ml, Tk. 5081.88/16.7 ml Vial; Tk.13855.01/43.33ml vial

(Nano particle Albumin bound)

Nab Xelpac (Beacon), Inj. (I.V Infusion), 6mg/ml, Tk. 25000.00/16.7mlVial

Ontaxel (Drug Intl), Inj., (I.V Infusion), 6mg/ml, Tk. 2500.00/16.7mlVial, Tk. 7500.00/50mlVial

Paclitaxel Aqvida[®] (oncotec) Inj (I.V Infusion), 6mg/ ml, Tk. 4599.78/16.7mlVial; Tk. 2012.40/5mlVial

Paclitaxel medac[®] (Medac) Inj (I.V Infusion),

6mg/ ml, Tk/13,552.94/50ml; , Tk.

6,707.25/16.7ml Vial; Tk.2,647.69/5 ml Vial

Paclitaxel Pha Res[®] (Haupt), Inj (I.V

Infusion), 6mg/ ml, Tk. 4522.25/16.7 ml Vial;

Tk. 1,978.48/5 ml Vial

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Paclitaxel Sandoz^(®) (Ebewe), Inj.(I.V Infusion), 6mg/ ml , Tk. 2,826.00/16.7 ml, Vial; Tk. 1,205.00/5mlVial
Paclitex (Techno), Inj.(I.V Infusion), 6 mg/ml, Tk. 2,650.00/5mlVial ; Tk. 11,500.00/50mlVial
Paxel (Healthcare), Inj. (I.V Infusion), 6mg/ ml 3 Tk. 12000.00/50mlVial ; 30mg/5ml, Tk. 2320.20/5mlVial, Tk. 6148.50/16.7mlVial
Xelpac (Beacon), Inj. (I.V Infusion), 6mg/ ml, , Tk. 4500.00/16.7mlVial, Tk. 9900.00/50mlVial,; Tk. 1700.00/5mlVial

TOPOISOMERASE I INHIBITORS

IRINOTECAN HYDROCHLORIDE

Indications: Carcinoma of the colon or rectum in combination with fluorouracil
Cautions: See section 14.1; raised serum bilirubin concentration. Avoid in severe hepatic impairment
Contraindications: Chronic IBS, bowel obstruction, plasma bilirubin concentration more than 1.5 times the upper limit of reference range; avoid conception for at least 3 months after cessation of treatment
Side-effects: Same as the side-effects of cytotoxic drugs; acute cholinergic syndrome and delayed diarrhoea
Dose: 350 mg/m² administered as an IV infusion over a 30 to 90 minute period every three weeks as single agent in 5FU refractory cases, and 180 mg/m² in combination with 5FU and Folinic acid as first-line therapy

Proprietary Preparations

Campto^(®) (Pfizer), Inj.(I.Vinfusion), 20 mg/ ml, Tk. 11,957.63/5 ml Vial; Tk. 4985.59/2ml Vial. Tk.10943.97/5mlVial
Irinotecan medac^(®) (Medac), Inj.(I.Vinfusion), 20 mg/ ml, Tk. 9,101.42/5mlVial ; Tk. 4,137.01/2mlVial
Irinotecan PhaRes^(®) (Thymoorgan), Inj.(I.Vinfusion), 20 mg/ ml, Tk. 4946.21/5mlVial
Irinotecan Sandoz^(®) (Ebewe), Inj.(I.V infusion), 20mg/ ml, Tk. 1,398.00/2 mlVial ; Tk. 2,800.00/5 ml Vial
Irinotecan^(®) (Sindan), Inj.(I.Vinfusion), 20 mg/ ml, Tk. 6928.70/5mlVial
Irinotesin^(®) (Actavis), Inj.(I.V infusion), 20mg/ml, Tk.6326.38/5ml vial; Tk.2588.06/2ml vial
Irinox (Beacon), Inj.,(I.V infusion), 20mg/ml,, Tk. 4000.00/5ml vial , Tk. 2000.00/2mlvial

TOPOTECAN

Indications Metastatic, ovarian cancer when first line or subsequent therapy has failed
Cautions: Renal impairment, pregnancy and breastfeeding
Contraindications: Hepatic impairment, pregnancy and breastfeeding
Side-effects: See sec section14.1; gastrointestinal effects, asthenia, alopecia and anorexia.
Dose:1.5 mg/m²/day for 5 days as single agent

Proprietary Preparations

Topotecan PhaRes^(®) (Thymoorgan),Inj.,(IV infusion) 1mg/ml, Tk.9500/4ml vial

TRABECTEDIN

Indications: Treatment of advanced soft tissue sarcoma ifosfamide has failed or is contra-indicated and in combination with pegylated liposomal doxorubicin for the treatment of relapsed platinum-sensitive ovarian cancer.
Cautions: See section 14.1.; renal impairment, p and breastfeeding.
Contr-indications: See section 14.1.; hepatic impairment, pregnancy and
Side-effects: See sec section14.1; gastrointestinal effects, pyrexia; hypokalaemia, dehydration, increased blood creatine kinase; myalgia, arthralgia, back pain
Dose: Consult Product literature

Proprietary Preparation

Yonediles(I) (Baxter) Inj. (IV Infusion) 1 mg/vial Tk. 129200.63/Vial

TRASTUZUMAB

Indications: As a single agent is indicated for the treatment of metastatic breast cancer in HER2 over expressions
Cautions: History of hypertension, pregnancy
Contraindications: Severe dyspnoea and breastfeeding
Side-effects: Chills, fever, anaphylaxis, urticaria, angioedema, gastrointestinal

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symptoms, asthenia, arthralgia, hypotension

Dose: 4 mg/kg IV as a loading dose over 90 min followed by 2 mg/kg over 30 min weekly

Proprietary Preparations

Herceptin[®] (Roch) Inj., (IV Infusion) 440 mg/Vial, Tk. 1,023,77.68/Vial

Trastunix (Beacon), Inj. (IV Infusion), 440mg/Vial Tk. 80,000.00/Vial

Zumab (Techno), Inj.,(IV Infusion) 440 mg/Vial, Tk. 1,26,000.00/Vial

Proprietary Preparations

Avastin[®] (Roche), Inj.,(IV Infusion) 100 mg/4 ml, Tk. 38652.50/4ml, Vial; 400mg/16ml. Tk.98,899.00/vial

Bevacimab (Healthcare), Inj., (IV Infusion), 100mg/4ml, Tk. 25000.00/vial.,400mg/16ml, Tk. 80000.00/vial.

Bevastim (Beacon), Inj.,(IV Infusion) 100mg/4ml, Tk. 20000.00/vial., 400mg/16ml, Tk. 75000.00/vial.

Bevixa (Incepta), Inj., (IV Infusion), 400mg/16ml, Tk. 75,000.00/vial,100mg/4ml , Tk. 20,000.00/vial

TRETINOIN

Indication: Acute promyelocytic Leukaemia.

Caution: Monitor Retinoic Acid Syndrome

Contraindications: Pregnancy & nursing mother as it is highly teratogenic

Side-effects: RAS, acute respiratory distress, edema, hepatic or renal failure

Interactions: See Appendix-2

Dose: ADULT and 45 mg/m² daily in two divided doses. Duration of treatment is 90 days

Proprietary Preparation

Vesanoid[®] (catalent), Cap. 10 mg, Tk. 232.00/Cap.

BEVACIZUMB

Indications: used in combination with I.V 5FU based chemotherapy, first-line treatment of patient with metastatic carcinoma of colon and rectum

Contraindications: Should not be indicated for at least 28 days following major surgery; the incision should be fully healed prior to initiation of the chemotherapy

Side effects: Serious and in some case fatal hemorrhage has occurred with non-small cell lung cancer treated with chemotherapy; gastrointestinal perforation and impaired wound healing; hypertensive crisis, nephrotic syndrome, congestive heart failure

Dose: 5mg/kg given once every 14 days as an IV infusion until disease progression is detected

14.2. DRUGS AFFECTING THE IMMUNE RESPONSE

14.2.1 ANTIPROLIFERATIVE IMMUNOSUPPRESSANTS

14.2.2 CORTICOSTEROIDS AND OTHER IMMUNOSUPPRESSANTS

14.2.3 RITUXIMAB

14.2.4 INTERFERONS

14.2.5 ALDESLEUKIN

14.2.6 BCG IMMUNOTHERAPEUTICS

IMMUNOSUPPRESSANT THERAPY

Immunosuppressants are used to suppress rejection of transplanted organs and tissues (kidney, bone marrow etc.); to suppress graft-versus-host disease in bone marrow transplants; to treat a variety of chronic inflammatory and auto-immune diseases which includes ITP, some forms of Haemolytic Anaemia, GN, Myasthenia Gravis, SLE, Rheumatoid Arthritis, etc.

PREGNANCY: Transplant patients maintained with azathioprine should not discontinue it on becoming pregnant; because there is no evidence of azathioprine's teratogenicity. There is less experience of ciclosporin in pregnancy but it does not appear to be any more harmful than azathioprine. Tacrolimus and mycophenolate mofetil are contraindicated in pregnancy by the manufacturers themselves.

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

14.2.1 ANTIPROLIFERATIVE IMMUNOSUPPRESSANTS

AZATHIOPRINE

Indications: Transplant recipient and autoimmune diseases

Cautions: Monitor blood count weekly for 4 weeks; thereafter reduce the frequency of monitoring to at least every three months; the doses to be reduced in hepatic and renal impairment; elderly patients and pregnancies

Interactions: See Appendix-2.

Contraindication: Hypersensitivity to azathioprine or mercaptopurine

Side-effects: Hypersensitivity reactions, dose-related bone marrow suppression, nausea hair loss and increased susceptibility to infections and colitis in patients also receiving corticosteroids

Dose: By mouth, by intravenous injection over at least 1 minute (followed by 50 ml sodium chloride intravenous infusion) or by intravenous infusion; Autoimmune conditions: 1-3 mg/kg daily, adjusted according to response; Suppression of transplant rejection, initially up to 5 mg/kg then 1-4 mg/kg daily according to response

Proprietary Preparations

G-Azathiopine (Gonosshasthaya), Tab., 50 mg, Tk. 8.00/Tab.

Imuran[®] (GSK), Tab., 50 mg, Tk. 1,244.64/Tab.

MYCOPHENOLATE MOFETIL

Indications: Prophylaxis of acute renal, cardiac or hepatic transplant rejection

Cautions: Blood count every week for 4 weeks then twice a month for 2 months then every month in the first year elderly patients, risk of hemorrhage, ulceration and perforation; delayed graft function; susceptibility to skin cancer

Interactions: Anion exchange resin colestyramine reduces absorption; antacids reduce absorption of the drug

Contraindications: Breastfeeding, pregnancy (exclude before starting and avoid for 6 weeks after discontinuation)

Side-effects: Gastrointestinal discomfort, hypertension, edema, dyspnoea, cough, rhinitis, dizziness, insomnia, headache, tremor, infection, leucopenia, anemia, thrombocytopenia, leukocytosis, polycythemia, electrolytes disturbances, hyperglycemia, renal damage, haematuria, acne, lymphoproliferative disease

Dose: Renal transplantation: by mouth, 1 g twice daily starting within 72 hours of transplantation or by intravenous infusion, 1 g twice daily within 24 hours of transplantation for up to maximum 14 days

Cardiac transplantation: by mouth 1.5 g twice daily within 5 days of transplantation.

Note: Patients should be warned to report immediately any signs or symptoms of bone marrow suppression e.g. infection, inexplicable bruising or bleeding

Proprietary Preparations

Cellcept[®] (Roche), Tab., 500 mg, Tk. 98.07/Tab.

Mycophenolat-Mofetil sandoz[®] (Sandoz), Tab., 500 mg, Tk. 67.46/Tab.

Mycotil (Techno), Tab., 500 mg, Tk. 55.00/Tab.

Myfortic[®] (Novartis), Tab., 180 mg, Tk. 79.00/Tab.; 360 mg, Tk. 157.00/Tab.

Phenocept (Renata), Tab., 500 mg, Tk. 65.00/Tab.

14.2.2 CORTICOSTEROIDS AND OTHER IMMUNOSUPPRESSANTS

Corticosteroids have great clinical value in the treatment of acute lymphoblastic leukemia, malignant lymphomas etc. It is also active in endocrine cancers. Glucocorticosteroids also serve a function in the treatment of several frequently occurring side effects of malignancies as well as general palliative therapy. The corticosteroids are also powerful immunosuppressants, that are used to prevent organ transplant rejection, and in high dose to treat rejection episodes. Corticosteroids may cause osteoporosis, iatrogenic Cushing's syndrome, suppress response to

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

infection and allow diseases such as septicemia or tuberculosis to reach an advanced stage before being recognized (see also section 5.3; 9.1.2; 10.3&12.3)

Basiliximab and **Daclizumab** are given with ciclosporin and corticosteroid immunosuppressant regimens; their use should be confined to specialist centers.

BASILIXIMAB

Indications: Prophylaxis of acute rejection in allergic renal transplantation.

Cautions: breastfeeding and pregnancy (contraception during treatment and up to 16 weeks after last dose)

Contraindications: Known hypersensitivity to Basiliximab or any other component of the formulation

Side-effects: Severe hypersensitivity reactions and cytokine release syndrome have been reported. see section 14.1

Dose: By intravenous injection or by intravenous infusion, 20mg within 2 hours before transplant surgery and 20mg 4 days after surgery; withhold second dose if severe hypersensitivity or graft loss occurs; CHILD and ADOLESCENT 1–17 years, body-weight under 35 kg, 10mg within 2 hours before transplant surgery and 10mg 4 days after surgery; body-weight over 35 kg, adult dose

Proprietary Preparation

Simulect[®] (Novartis), Inj., (I.V infusion) 20 mg/vial, Tk.102884.00/Vial

CYCLOSPORIN

Indications: As the notes above and under atopic dermatitis, psoriasis and rheumatoid arthritis

Cautions: Monitoring of kidney function is very important. Dose-dependent increase in serum creatinine and urea during first few weeks may necessitate dose reduction in transplant patients or discontinuation in non-transplant patients; liver functions to be monitored based on serum bilirubin and liver enzymes; monitor blood pressure; discontinue if hypertension develops. Monitor serum potassium especially in marked renal impairment; pregnancy

and breastfeeding. One has to keep in mind about Nephrotic syndrome, atopic dermatitis, psoriasis and rheumatoid arthritis.

Note: contains polyethoxylated castor oil which has been associated with anaphylaxis- observe for at least 30 minutes after starting infusion and at frequent intervals thereafter

Contraindications: Uncontrolled hypertension or infections

Interactions: See Appendix-2

Side-effects: Commonly dose-dependent increase in serum creatinine and urea during first few weeks and less commonly renal structural changes on long-term administration; oedema, pancreatitis, neuropathy, confusion, paresthesia, convulsions, amenorrhea; muscle weakness, cramps, myopathy, gynaecomastia; thrombocytopenia, haemolytic-uraemic syndrome; hypertrichosis, tremor, hypertension (specially in heart transplant patients) hepatic dysfunction, fatigue, gingival hypertrophy, gastrointestinal disturbances, and burning sensation in hands and feet, hyperkalaemia, hyperuricaemia, hypomagnesaemia

Dose: Organ transplantation, used alone, 10-15 mg/kg by mouth before 4-12 transplantation followed by 10-15 mg/kg daily for 1-2 weeks postoperatively then reduced to 2-6 mg/kg daily for maintenance (dose should be adjusted by monitoring blood concentrations and renal function); dose to be lower if given concomitantly with another immunosuppressant; if necessary one third oral dose can be given by intravenous infusion over 2-6 hours

Bone marrow transplantation, prevention and treatment of graft-versus-host disease, 3-5 mg/kg daily by intravenous infusion over 2-6 hours from day before transplantation to 2 weeks postoperatively (12.5-15 mg/kg daily by mouth) then 12.5 mg/kg daily by mouth for 3-6 months then tailed off (may take up to a year after transplantation) Nephrotic syndrome, by mouth, 5 mg/kg daily in 2 divided doses; CHILD 6 mg/kg daily in 2 divided doses according to

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

proteinuria and serum creatinine measurements; discontinue after 3 months if no improvement in glomerulonephritis or glomerulosclerosis (after 6 months in membranous glomerulonephritis)

Proprietary Preparations

Imural (Techno), Cap., 100 mg, Tk. 60.00/Cap.
Sandimmun Neoral[®] (R.P. Scherer) Cap., 25 mg, Tk. 59.00/Cap.; 50 mg, Tk. 117.00/Cap.; 100 mg, Tk. 234.00/Cap.
Sporium (Incepta), Solu, 10 gm/100 ml, Tk. 2,385/10 gm

TACROLIMUS

Indications: Used to prevent body from rejecting a heart, liver, or kidney transplant. It may be used along with other medicines and see also notes above

Cautions: See section 14.1 and; Monitor blood pressure, ECG, fasting blood-glucose concentration **Interactions:** See Appendix-2

Contraindications: Pregnancy breastfeeding; hypersensitivity to macrolides; avoid concurrent administration with Ciclosporin

Side-effects: See section 14.1 and Neurotoxicity and nephrotoxicity. cardiomyopathy, disturbances of glucose metabolism

Dose: consult product literature

Proprietary Preparation

Tacrolimus Sandoz[®] (Sandoz), Cap., 1 mg, Tk. 42.82/Cap.; 5 mg, Tk. 174.80/Cap. 0.5mg, Tk.24.82/Cap

14.2.3 RITUXIMAB

RITUXIMAB

Indications: Chemotherapy-resistant advanced follicular lymphoma.

Cautions: For full details consult product literature; pregnancy, angina, arrhythmia and heart failure.

Contra-indications: Pregnancy and breastfeeding

Side-effects: Rash, pruritus, fever and chills, nausea and vomiting,

angioedema, bronchospasm and dyspnoea; See also section 14.1

Dose: 375 mg/m² administered for once weekly for 4 weeks (at day 01, day 08, day 15, and day 22). In diffuse NHL it should be administer along CHOP at day 1 of each chemotherapy.

Proprietary Preparations

Mabthera[®] (Roche), Inj.(IV infusion) 500 mg/50 ml, Tk.63,521,79/Vial; 100mg/10 ml,Tk. 12,661.55/Vial

Relyto (Incepta), Inj.(IV infusion) 100 mg/10 ml, Tk. 13,000.00/10 ml; 500 mg/50 ml vial, Tk. 60,000.00/50 ml

Rituxim (Beacon), Inj.(IV infusion) 100mg/10 ml, Tk. 11000.00/10 ml; 500mg/50 ml , TK. 55,000/vial

14.2.4 INTERFERONS

The **interferons** are a family of proteins that are produced by cells in response to viral infections or stimulation with double-stranded RNA, antigens or mitogens. They may be produced through recombinant DNA technology. The interferons can interfere with a subsequent viral challenge, and they have many immunomodulating and antiproliferative effects.

INTERFERON ALFA

Indications: AIDS-related Kaposi's sarcoma, hairy cell leukemia, follicular lymphoma, chronic myelogenous leukemia, lymph or liver metastasis of carcinoid tumor, chronic hepatitis B, chronic hepatitis C, adjunct to surgery in malignant melanoma and maintenance of remission in multiple myeloma; see also the notes above

Cautions: Consult product literature

Interactions: See also Appendix-2.

Contraindications: Consult product literature.

Side-effects: Nausea, influenza-like symptoms, lethargy, myalgia, hypotension arrhythmia, Severe bronchospasm, nephrotoxicity and hepatotoxicity have been reported.

Dose: For chronic hepatitis B: Interferon alfa-2a is given in a dose of 2.5 to 5

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million units/m² body surface 3 times a week by SC injection for 4 to 6 months; For chronic hepatitis C: Interferon alfa-2a is given in a dose of 3 to 6 million units/m² body surface 3 times a week for 4 to 6 months followed by 3 million units 3 times a week for an additional 6 months

Proprietary Preparation

Roferon-A[®] (Roche), Inj., 3 MIU, Tk. 2,391.53/0.5ml prefilled syringe; 4.5 MIU, Tk. 3,531.70/0.5ml prefilled syringe
Interon (Beacon), Inj., 4.5MIU, Tk. 1200.00/.0.5ml prefilled syringe

PEG INTERFERON ALFA

Indications: Combine with ribavirin for chronic hepatitis C; as monotherapy if ribavirin not tolerated or contra-indicated
Interactions: See Appendix-2

Side-effects: Same as that of interferon alfa
Dose: Consult with oncologist

Proprietary Preparations

Optipleg-A (Incepta), Inj., (P.F Syringe), 180 mg/0.5ml Syringe , Tk. 9,800.00/ Syringe;135 mg/0.5ml Syringe , Tk. 8,800.00/ Syringe
Peg Intron[®] (Schering), inj., 80 mcg/vial, Tk. 12698.94/0.5 ml Vial
Pegasys[®] (Roche), Inj. 180 mcg/ml, Tk. 25,051.25/Vial; 135 mcg/ml, Tk. . 22,576.23/Vial
Pegferon (Healthcare), Inj180mcg/0.5ml Syringe Tk. 15000.00/ Syringe
Pegin (Beacon), Inj., (P.F Syringe), 135 mg/ 0.5ml Syringe , Tk. 8,800.00/P Syringe ;180 mg/ 0.5ml Syringe , Tk. 9,800.00/ Syringe

14.2.5 ALDESLEUKIN

Aldesleukin is a preparation of recombinant interleukin-2 has had some action on metastatic renal cell carcinoma unresponsive to other therapy at the expense of profound toxic effects due to vascular leakage causing pulmonary oedema and hypotension. Bone marrow, hepatic, renal, thyroid and CNS toxicity are also severe.

14.2.6 BCG IMMUNOTHERAPEUTICS

Indications: For the treatment of superficial transient cell carcinoma of the urinary bladder; for intravesical use in the treatment and prophylaxis of primary or recurrent carcinoma *in situ* of the urinary bladder

Cautions: Pregnancy, lactation, pneumonitis, hepatitis, and other organ dysfunction outside of gastrointestinal tract with granulomatous inflammation on biopsy, respiratory distress

Contraindications: Receiving immunosuppressive therapy (with drugs or radiation) or with compromised immune systems because of the danger of a systemic BCG reaction, pyrexia of unknown origin, urinary tract infection caused by bacteria

Interactions: Drug combination containing bone marrow depressants and or immunosuppressants and or radiation may impair the response of the drug

Side-effects: Most common local reactions are transient dysuria and urinary frequency, transient fever, skin rash, arthralgia, or migratory arthritis, systemic BCG reactions

Dose: Induction treatment comprises 6 weekly intravesical treatment with BCG Immunotherapeutic, each treatment dose comprises 3 vials of the BCG Immunotherapeutic. After a 6 weeks pause, another dose of 3 vials of the BCG Immunotherapeutic should be given intravesically once weekly for 1-3 weeks. 3 weekly doses should definitely be given to patients who still have evidence of bladder cancer.

14.3. SEX HORMONES AND HORMONE ANTAGONISTS IN MALIGNANT DISEASES.

- 14.3.1 ESTROGENS
- 14.3.2 PROGESTOGENS
- 14.3.3 ANDROGENS
- 14.3.4 HORMONE ANTAGONISTS

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

Tumors derived from hormone-sensitive tissues may be hormone-dependent. Their growth can be inhibited by hormones, with opposing actions, by hormone antagonists or by agents that inhibit the synthesis of relevant hormones. Hormones and hormone analogues have inhibitory actions on particular tissue and can play an important role in the treatment of breast, prostate, and endometrial cancer. The objective of the hormone therapy is to provide excellent relief of symptoms for a period of years. Response to the treatment and toxicity to be carefully monitored and treatment to be changed if progression occurs or side-effects exceed benefit.

14.3.1 ESTROGENS

Diethylstilbestrol (Stilbestrol), a synthetic non-steroidal estrogen has been used in the palliation of prostate and breast cancer. Dose-related side-effects include nausea, fluid retention and arterial and venous thrombosis. Impotence and gynecomastia occur in men and withdrawal bleeding may occur in women. Hypercalcemia and bone pain may also occur in breast cancer. Stilbestrol should be used with caution in cardiovascular disease, hepatic and renal impairment; it is contraindicated in pregnancy.

FOSFESTROL TETRA SODIUM

Indication: Prostate cancer
Caution: Cardiovascular disease, hepatic and renal impairment
Side-effects: Nausea and vomiting, after intravenous injection peritoneal irritation and pain on bony metastasis
Dose: By slow intravenous injection, 0.6-1.2 g daily for at least 5 days; maintenance, initially up to 240 mg 3 times daily for 7 days then reducing over 14 days to 120-360 mg daily in divided doses

Proprietary Preparation

Honvan [®] (Astamedica) Tab. 50mg, Tk.20.82/Tab.Inj. 60 mg/ml.

14.3.2 PROGESTOGENS

MEDROXYPROGESTERONE ACETATE

Indications: Second or third line therapy in breast cancer

Cautions: Diabetes, hypertension, cardiac or renal disease

Contraindications: Pregnancy, undiagnosed vaginal bleeding, hepatic impairment or active liver disease, severe arterial disease, breast and genital tract cancer

Side-effects: Acne, urticaria, fluid retention, weight changes, gastrointestinal disturbances, changes in libido, breast discomfort, premenstrual symptoms, irregular menstrual cycles; also depressions, insomnia, somnolence, alopecia, hirsutism, anaphylactoid reactions

Dose: By mouth, endometrial, prostate and renal cancer, 100-500 mg daily; breast cancer, various doses in the range 0.4-1.5 g daily

By deep intramuscular injection into gluteal muscle, various doses in range 1 g daily down to 250 g weekly

Proprietary Preparations

See section: 5.4.2.2

NORETHISTERONE

Indication: Breast cancer

Cautions: See under medroxyprogesterone acetate

Contra-indications: See under medroxyprogesterone acetate

Side-effects: See under medroxyprogesterone acetate; more virilizing and greater incidence of liver disturbances and jaundice; exacerbation of epilepsy and migraine

Dose: Breast cancer, 40 mg daily, increased to 60 mg daily if required

Proprietary Preparations

See section: 5.4.2.2

MEGESTROL

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

Indication: Breast cancer

Cautions: See under *medroxyprogesterone acetate*; susceptibility to thromboembolism

Contraindications: See under *medroxyprogesterone acetate*

Side-effects: See under *medroxyprogesterone acetate*; vomiting, weight gain, fever, gas, decreased sexual ability/desire, weight gain, changes in appetite.

Dose: Breast cancer, orally 160 mg once daily.

Proprietary Preparations

Apegestrol (*Techno*), Tab. 160 mg, Tk. 70.00/Tab

Apetiz (*Aristo*), Tab., 160 mg, Tk. 90.00/Tab.

Meexia compress ⁽ⁱ⁾ (*Doppel*) Tab. 160 mg, Tk. 88.00/Tab

Megestol (*Ziska*), Tab., 160 mg, Tk. 60/Tab

Mezest (*Beacon*), Tab. 160 mg, Tk. 90.00/Tab., Tab. 40 mg, Tk. 35.00/Tab

14.3.3 ANDROGENS

Testosterone esters are occasionally still used as second or third line therapy for metastatic breast cancer.

14.3.4 HORMONE ANTAGONISTS

14.3.4.1 BREAST CANCER

14.3.4.2 PROSTATE CANCER AND GONADORELIN ANALOGUE

14.3.4.1 BREAST CANCER

The management of patients with breast cancer involves surgery, radiotherapy, drug therapy, or a combination of these. All women with invasive breast cancer should be considered for the adjuvant therapy, which is determined by assessment of risk of recurrence, estrogen receptor status of primary tumor and menopausal status.

Tamoxifen is an estrogen antagonist with actions similar to clomiphene. It is given in the adjuvant endocrine therapy of early breast cancer and is also given for the palliative treatment of advanced disease. Tamoxifen is generally well tolerated and the most frequent adverse

effects are hot flushes, nausea and vomiting. Other adverse effects include edema, vaginal bleeding, pruritus, increased tendency to thromboembolism. Treatment with tamoxifen delays the growth of metastases and increases survival; if tolerated it should be continued for at least 5 years.

Toremifene, is an antiestrogen which has properties similar to tamoxifen is used for hormone-dependent metastatic breast cancer in post-menopausal patients. It is given by mouth, 60 mg daily.

Aminoglutethimide act predominantly by blocking the conversion of androgen to estrogens in the peripheral tissues. Aminoglutethimide is used as second-line treatment for prostate cancer. Toxicity may include drowsiness, drug fever, and morbilliform eruption; these side-effects are generally reversible. It causes induction of hepatic enzymes and may require modification of doses of other drugs.

Anastrozole and **Letrozole** are inhibitors of aromatase system used in the treatment of breast cancer. Recently introduced **Formestane** and **Exemestane**, steroidal aromatase inhibitors are used to treat advanced postmenopausal breast cancer. They are more tolerated than aminoglutethimide and corticosteroid replacement therapy.

Trilostane is also used for postmenopausal breast cancer. It is well tolerated. Diarrhea and abdominal discomfort are their main side effects. It may cause adrenal hypofunction and need corticosteroid replacement therapy.

Goserelin, a good gonadorelin analogue is also indicated for advanced breast cancer in post-menopausal women.

ANASTROZOLE

Indications: Early breast cancer in postmenopausal women as adjuvant treatment (treatment following surgery with or without radiation), first-line treatment for hormone receptor-positive or hormone receptor unknown, locally

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

advanced or metastatic breast cancer in postmenopausal women.

Cautions: Renal and hepatic impairment

Contraindications: Pregnancy and breastfeeding, not for premenopausal women

Side-effects: Arthralgia, arthritis, bone fractures, bone pain, rash (including Stevens-Johnson syndrome)

Dose: 1 mg tablet taken once a day and consult product literature

Proprietary Preparations

Anastrol (*Beacon*), Tab., 1mg, Tk. 50.00/Tab.

Aromatin (*Aristo*), Tab., 1mg, Tk. 50.00/Tab.

EXEMESTANE

Indication: To treat breast cancer in postmenopausal women. It is often given to women whose cancer has progressed even after taking tamoxifen therapy for 2 to 3 year, *See notes above*

Cautions: Renal and hepatic impairment

Interactions: *see Appendix-2*

Contraindications: Pregnancy and breastfeeding

Side-effects: *See notes above*

Dose: 25 mg daily

Proprietary Preparation

Exemestane^(Doppel) Tab. 25mg. Tk. 176/Tab

LETROZOLE

Indications: Advanced breast cancer in post-menopausal women in whom anti-estrogen therapy has failed

Caution: severe renal impairment

Contraindications: Severe hepatic impairment, pre-menopausal women

Side-effects: Hot flushes, gastrointestinal disturbances, chest pain, cough, dizziness, fatigue, headache, infection, musculoskeletal pain, peripheral edema, rash, pruritus

Dose: 2.5 mg daily until tumor progression is evident

Proprietary Preparations

Endofree (*Incepta*), Tab., 2.5 mg, Tk. 40/Tab.

Femara^(Novartis) Tab. 2.5 mg, Tk. 375/Tab.

Femzole (*Beximco*), Tab. 2.5 mg, Tk. 40.00/Tab.

Intez (*Genvio*), Tab., 2.5 mg, Tk. 40.00/Tab.

Lenor (*Eskayef*), Tab. 2.5 mg, Tk. 40.00/Tab.

Lerozol (*Square*), Tab., 2.5 mg, Tk. 40.27/Tab.

Letrogen (*Ibn Sina*), Tab., 2.5 mg, Tk. 40/Tab.

Letrol (*Renata*), Tab., 2.5 mg, Tk. 40.15/Tab.

Lexel (*Beacon*), Tab. 2.5 mg, Tk. 40.00/Tab.

Loreta (*Popular*), Tab., 2.5 mg, Tk. 40.00/Tab.

Ovazol (*ACI*), Tab., 2.5 mg, Tk. 40.00/Tab.

TAMOXIFEN^[ED]

Indications: *See notes above*

Caution: Increased risk of thromboembolic events when used with cytotoxics, cystic ovarian swelling, premenopausal women, hypercalcemia in bony metastasis

Contraindications: Pregnancy and breastfeeding

Interactions: *See Appendix-2*

Side-effects: Hot flushes, vaginal bleeding or suppression of menstruation in some premenopausal women, vaginal discharges, pruritus vulvae, gastrointestinal disturbances, headache, alopecia, rashes, uterine fibroids; visual disturbances, leucopenia, sometimes anemia and thrombocytopenia

Dose: Breast cancer, 20 mg daily for at least 5 years

Anovulatory fertility, 20 mg on day 2, 3, 4 and 5 of cycles; if necessary the daily dose may be increased to 40 mg then 80 mg for subsequent courses; if cycles irregular, start initial course on any day, with subsequent course starting 45 days later or on day 2 of cycle if menstruation occurs

Proprietary Preparations

G-Tamoxifen (*Gonoshasthaya*), Tab., 10 mg, Tk. 6.00/Tab.; 20 mg, Tk. 10.00/Tab.

Tamolex (*Beacon*), Tab., 10 mg, Tk. 8.00/Tab.; 20 mg, Tk. 16.00/Tab.

Tamona (*Beximco*), Tab., 10 mg, Tk. 10.07/Tab.; 20 mg, Tk. 16.07/Tab.

Tamoxen (*General*), Tab., 10 mg, Tk. 10.04/Tab.; 20 mg, Tk. 16.06/Tab.

14.3.4.2 PROSTATE CANCER AND GONADORELIN ANALOGUES

Hormonal treatment in metastatic cancer of the prostate is aimed to deplete

14. DRUGS USED IN MALIGNANT DISEASES AND FOR IMMUNOSUPPRESSION

androgen. Analogues of gonadotropin-releasing hormones, such as **Buserlin**, **Goserelin**, **Leuprorelin** or **Triptorelin** can under certain circumstances be made use of advanced prostate cancer and in some cases of advanced breast cancer in pre-menopausal women.

The standard treatment is bilateral sub-capsular orchidectomy, which commonly results in response lasting 12-18 months. Alternatively, a gonadorelin analogue may be given.

Gonadorelin analogues are expensive and require parenteral administration. Initially these analogues stimulate then depress luteinising hormone released by pituitary. During the first 2 weeks of treatment there is surge of testosterone secretion associated with progression with prostate cancer. In susceptible patients this tumor progression may cause spinal cord compression, ureteric obstruction or increased bone pain. When such problems are anticipated, orchiectomy or concomitant use of an anti-androgen such as cyproterone acetate or flutamide are suggested; anti-androgen treatment to be started 3 days before the gonadorelin analogues and to be continued for 3 weeks.

Cautions: Men at risk of tumor flare should be monitored closely during the metabolic bone disease in women; the injection site should be rotated.

Side-effects: hot flushes, sweating, sexual dysfunction, vaginal dryness or bleeding, and gynecomastia or changes in breast size. Sign and symptoms of prostate and breast cancer may worsen initially. Other side-effects include hypersensitivity reactions injection site reactions, headache, visual disturbances, dizziness, arthralgia, gastrointestinal disturbances, weight changes, sleep disorders.

ANTI-ANDROGENS: **Cyproterone acetate**, **Flutamide**, and **Bicalutamide** are anti-androgens which can be used to cover the tumor flare which may occur after commencing gonadorelin analogue administration. **Cyproterone acetate** and **Flutamide** are also used alone in patients with metastatic prostate cancer refractory to gonadorelin analogue

therapy. **Bicalutamide** is used alone in patients with locally advanced, metastatic prostate cancer.

ABIRATERONE ACETATE

Indications: It is used in combination with prednisone for the treatment of patients with metastatic castration-resistant prostate cancer (mCRPC) who have received prior chemotherapy containing docetaxel

Cautions: Cardiovascular disease; control hypertension and correct hypokalemia before treatment. Monitor blood pressure, serum potassium and symptoms of fluid hepatic impairment retention at least monthly; diabetes; hepatic impairment; renal impairment

Interaction: See appendix-2

Side-effects: see notes above

Dose: 1 g once daily

Note: Consult product literature for dose of concurrent prednisone or prednisolone

Proprietary Preparations

Zytix (Beacon), Tab., 250mg, Tk.700/Tab.

Zytiga[®] (Patheon), Tab., 250mg, Tk.1665.82/Tab

BICALUTAMIDE

Indications: See notes above

Cautions&side-effect: See notes above

Dose: Consult with Oncologist

Proprietary Preparations

Bical (Beacon), Tab., 50 mg, Tk. 80.00/Tab.

Bicalon (Drug Intl), Tab., 50 mg, Tk. 30.00/Tab

DEGARELIX

Degarelix is a gonadotrophin-releasing hormone antagonist

Indications: Used to treat advanced hormone-dependent prostate cancer.

Cautions: Susceptibility to QT-interval prolongation (avoid concomitant use of drugs that prolong QT interval); monitor bone density; diabetes

Contraindication: Hepatic and Renal impairment

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Side-effects: Nausea; dizziness, headache, drowsiness, insomnia, asthenia; influenza-like symptoms; hot flushes, sweating (including night sweats), weight gain; injection-site reactions; sexual dysfunction, anaemia, musculoskeletal pain, tinnitus, urticaria, alopecia, and rash

Dose: By *subcutaneous injection* into the abdominal region, ADULT over 18 years, initially 240mg (administered as 2 injections of 120m

Proprietary Preparation

Firmagon 80[®] (*Feering*), Inj., 80mg/syringe
Tk.18344/00; 120mg/syringe,
Tk.21775/syringe

LEUPRORELIN

Indication: Advanced prostate cancer; also see *notes above*

Cautions & side-effect: See *notes above*

Interactions: See *appendix-2*

Side-effects: See *notes above*

Dose: Consult with oncologist

Proprietary Preparation

Lucrin Depot 3.75mg PDS[®] (*Abbvie*) Inj.
(P.F.Syringe),
11.25/syringe, Tk.37512./Syringe

FLUTAMIDE

Indication: Advanced prostate cancer

Cautions: Cardiac disease, hepatic impairment, abdominal pain, unexplained influenza-like syndromes

Interactions: See *appendix-2*

Side-effects: See *notes above*

Dose: 250 mg 3 times daily

Proprietary Preparation

Proscan (*Renata*), Tab., 250 mg, Tk. 12/Tab.

14.3.4.3 SOMATOSTATIN ANALOGUES

Octreotide and **Lanreotide**, the recently introduced analogues of somatostatin, hypothalamic release inhibiting hormone. They are indicated for the relief of symptoms carcinoid tumors and acromegaly.

OCTREOTIDE

Proprietary Preparation

Sandostatin[®] (*Novertis*), Inj. 0.05 mg/ml, Tk. 1400.00/20mg

Chapter 15

ANEMIAS AND OTHER BLOOD DISORDERS

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15.1 IRON DEFICIENCY ANEMIA

15.1.1	ORAL IRON
15.1.2	PARENTERAL IRON

Iron deficiency is the most common nutritional disorder in Bangladesh. Two main reasons are low dietary intake, and low biological availability of dietary iron. These are often accentuated by the prevalence of intestinal worms, especially hookworm. The most vulnerable groups are pregnant and lactating women, young children, and adolescent girls.

The widespread prevalence of iron deficiency anemia makes it almost mandatory to provide iron prophylaxis for pregnant and lactating women. In fact, iron requirements of pregnant women cannot be met through dietary intake. It may also be worthwhile to provide iron prophylaxis for adolescent girls to prepare them to meet the iron demand of future pregnancies.

Treatment of choice for iron deficiency is oral preparation. In severe cases of iron deficiency anemia or in those cases that are inaccessible or non-compliance parenteral preparation of iron can be given through intramuscular route or IV

preparations in a single dose repletion. In addition to administration of iron, it is important to increase the dietary intake of haem sources of iron (iron from animal foods) which are better absorbed than non haem sources (iron from vegetable sources). Increased consumption of iron rich animal food would also assist absorption of dietary iron.

Prophylactic treatment is justifiable in pregnancy only for women who have additional risk factors for iron deficiency e.g. poor diet, menorrhagia, after subtotal or total gastrectomy, and in the management of low birth weight infants such as premature babies, twins and in infants delivered by caesarian section.

15.1.1 ORAL IRON

Ferric salts are much less well absorbed than ferrous salts. Choice of preparation is usually decided by incidence of side effects and cost. Haemoglobin regeneration rate is little affected by the type of salts used provided sufficient iron is given and in most patients the time factor is not critical.

For iron deficiency the oral dose of

15. ANEMIAS AND OTHER BLOOD DISORDERS

elemental iron should be 100mg to 200mg daily. Usually it is given as dried Ferrous sulfate 200mg then 3 times daily (200mg dried Ferrous Sulfate = 65mg elemental iron). A dose of 200mg of ferrous sulfate once or twice daily is used in prophylaxis and for mild iron deficiency anemia. If side effects develop, dose is reduced or alternate iron salt may be used. Side effect of ferrous sulfate is not greater than with another iron salt when compared on the basis of equivalent amount of elemental iron.

Table: Iron content of different iron salts:

Iron salt	Amount (mg)	Content of Ferrous Iron (mg)
Ferrous fumarate	200mg	65mg
Ferrous gluconate	300mg	35mg.
Ferrous succinate	100mg	35mg
Ferrous sulfate	300mg	60mg
Ferrous sulfate, dried	200mg	65mg

Therapeutic Response

The haemoglobin concentration should rise by about 100mg to 200 mg per 100ml over 3 to 4 weeks (or 1-2 g per liter). Treatment will be continued after the haemoglobin concentration has risen to normal for a further 3 months in order to maintain the iron stores.

MODIFIED RELEASE CAPSULE AND TABLETS

These preparations are likely to carry the iron in the first part of the duodenum into an area of the gut where conditions of iron absorption are poor. So, small amount of iron is available in these circumstances and the incidence of side effects is also low.

FERROUS FUMARATE^[ED]

Indications: Iron-deficiency anemia (prophylaxis and treatment)
Cautions: History of peptic ulcer

Interactions: See Appendix. 2

Side-effects: Large doses may produce gastrointestinal irritation, vomiting, diarrhoea; continued administration may result in constipation

Dose: ADULT Therapeutic-Ferrous iron, 120-180mg in single or divided doses; Prophylaxis-60 mg iron daily
 CHILD: Therapeutic- upto 1 year 36 mg; 1-5yrs, 72 mg; 6-12yrs, 120 mg iron daily in divided doses.
 Indications of (iron preparations with) folic acid-see under folic acid under vitamins

Proprietary preparations

Irofol(General), Suspn., 100mg/5ml, Tk. 32.18/200ml

Ferrous Fumarate + Folic Acid

Aristofol (Beximco), Tab., Tk. 0.47/Tab.
Feroplus TR (Pacific), Cap., Tk. 2.37/Cap.
Irofol(General), Cap Tk.0.53/Cap
Irolic(Ziska), Tab. , Tk. 3.20/Tab.
Sinaferon(Ibn Sina), Cap , Tk. 0.19/Tab.
Suprafol(Supreme), Cap, Tk. 2.30/Cap.
Zenifol Plus(Zenith), Tab. , Tk. 0.39/Tab.

FERROUS GLUCONATE^[ED]

Indication: Iron deficiency anemia

Cautions, Interactions, Side-effects: See under Ferrous Sulfate

Dose: Two tablets (300mg Ferrous Gluconate tab. = 35mg iron) daily before food for prophylactic purpose.
 4-6 tablets daily in divided doses before food in adults for therapeutic purpose.
 CHILD : 6-12 years, 1-3 tablets daily for prophylactic & therapeutic purpose

Proprietary preparation

Feridex(ACI), Syrup 300mg/5ml
 Tk.32.22/200ml

FERROUS SULPHATE^[ED]

Indications: Iron deficiency anemia

Cautions: Pregnancy, history of peptic ulcer

Interactions: See Appendix- 2

Side-effects: Nausea, vomiting, abdominal discomfort or pain, diarrhoea and constipation

Dose: 100 to 200mg elemental iron/day

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in kg/day as a liquid preparation in infants and children
DURATION OF THERAPY: To restore normal level 4 - 5 weeks is required
 For replenishment of iron stores further 3-6 months therapy with smaller doses is required.

Proprietary preparations

Aristoferon (*Beximco*), Syrup, 200 mg/5 ml, Tk. Tk. 40.25/200ml
Bioron (*Biopharma*), Syrup, 200 mg/5 ml, Tk.26.10/200 ml
Dicalat (*Albion*), Syrup, 200 mg/5 ml, Tk.24.50/200 ml; Tk. 15.00/100 ml
Feosphate (*Asiatic*), Syrup, 200mg/5ml, Tk. 26.75/200ml
Feroplus(*Pacific*), Syrup, 200 mg/5 ml, Tk. Tk. 26.00/200ml
Ferreton-S(*Supreme*), Syrup, 200 mg/5 ml, Tk. 26.00/200 ml
Ferroglobin(*Acme*), Syrup, 200 mg/5 ml, Tk. Tk. 26.00/200ml
G-Iron(*Gonoshasthaya*), Syrup, 200 mg/5 ml, Tk. 25.10/200 ml
Hemobin(*Zenith*), Syrup, 200mg/5ml, Tk. 13.90/100ml; , Tk. 24.00/200ml
Ironic(*Bios Pharma*), Syrup, 200 mg/5 ml, Tk. 25.00/200 ml
Makferon(*Maks*), Syrup, 200 mg/5 ml, Tk.25.00/200 ml
Sinaferon(*Ibn Sina*), Syrup, 200mg/5ml , Tk. 40.00/200ml

IRON(III) HYDROXIDE POLYMALTOSE COMPLEX

Indications: Iron deficiency anemia (prophylaxis and treatment)

Contraindications: Haemochromatosis, thalassemia or haemosiderosis; hypersensitivity to iron

Side-effects: Nausea, vomiting, abdominal discomfort or pain, diarrhoea and constipation

Dose: ADULT 10ml daily.

CHILD: 6-12 years 10ml daily; 2-6years 5ml daily.Premature infants and infants 1.1mg elemental iron/kg body weight

Proprietary preparations

Iron Hydroxide Polymaltose

Compiron(*Incepta*), Paed.Drops, Tk. 50.00/30ml; Syrup, Tk. 50.00/100ml; Tk. 90.00/200ml

Hemofix(*Beximco*), Tab., Tk. 4.00/Tab.

Ipec(*Aristo*),Syrup.,Tk 40.00/100 ml

Iromia(*Opsonin*), syrup, Tk. 37.59/200 ml

Pem DS(*Astra Bio*), Syrup, Tk. 30.00/5ml

Polimine(*Asiatic*), Syrup, Tk. 20.00/50ml

Polyron(*ACI*), Syrup, Tk. 40.12/100ml;

Iron Polymaltose Complex

Folic Acid, Thiamine Hydrochloride, Riboflavin,

Pyridoxine Hydrochloride, Nicotinamide, Zinc

Sulphate Monohydrat

Alneed Gold(*Incepta*), Cap. , Tk. 6.00/Cap..

Asivit ZI(*Asiatic*), Syrup, Tk. 50.00/100ml; Tk. 90.00/200ml

Bicozin-I(*Square*), Syrup, Tk. 50.35/100ml

Biovit Plus(*Biopharma*), Syrup, Tk. 50.19/100ml

Biozinc-I(*Ibn Sina*), Syrup, Tk. 50.19/100 ml

Fecon(*Alco*), Cap. , Tk. 3.01/Cap

Feona Z(*Delta*), Cap. , Tk. 3.50/Cap.

Feviz Plus(*Popular*), Cap.,Tk. 6.02/Cap.

Feziplex(*Acme*), Syrup, Tk. 50.20/100 ml

Folvit(*Eskayef*), Cap, Tk. 3.00/Cap

Folvit CI(*Eskayef*), Cap, Tk. 3.25/Cap.

Heptamin(*Orion*), Cap. , Tk. 3.01/Cap.

Irobest(*Nipro JMI*), Tab. , Tk. 3.00/Tab.

Irotrex Plus(*Amico*), Syrup, Tk. 50.00/100

Itop-BZ(*Pharmasia*), Syrup, Tk. 50.19/100 ml

Livita(*ACI*), Syrup, Tk. 50.34/100ml

Orofer(*UniMed*), Tab , Tk. 3.50/Tab., Syrup ,

Tk. 50.00/100ml

Reoplex Plus(*Rephco*), Syrup, Tk. 30/50 ml;

Tk. 50/100 ml; Tk. 85/200 ml;Tk.180/450 ml

Tk. 90.34/200 ml

Xvit(*Beacon*), Cap. , Tk. 3.50/Cap

Zepiron(*Ibn Sina*), Cap. , Tk. 5.00/Cap.

Ziliron-B(*Square*), Cap. Tk. 4.52/Cap.

COMBINATION PREPARATION SPECIALLY DESIGNED FOR PREGNANCY & LACTATION

Indications: For the treatment and prophylaxis of iron, folic acid and zinc deficiency especially during pregnancy and lactation.

Cautions: Failure to respond to treatment may indicate other causes of anemia and should be further investigated. Iron and zinc chelates with tetracycline and absorption of all three agents may be impaired. The absorption of zinc may be reduced in the presence of iron. Absorption of iron may be impaired by penicillamine and by antacids. Separating administration of each product by several hours, interval can reduce such potential interactions. In patients with renal failure, a risk of zinc accumulation could exist.

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Contraindications: Patients hypersensitive to the product or those with iron overload

Side-effects: Dark stools are usual during iron therapy, and nausea and other symptoms of gastrointestinal irritation, such as anorexia, vomiting, discomfort, constipation, and diarrhea is sometimes encountered. Zinc may also produce gastrointestinal upset. These sustained or timed-release capsules are designed to reduce the possibility of gastrointestinal irritation. There have been rare reports of allergic reactions

Dose: 1 capsule a day, in more severe cases, 2 capsule a day

Proprietary preparations

Carbonyl Iron, Folic Acid & Zinc
Concivit Z (Nipro JMI) Cap. Tk. 2.84/Cap
Enazif (Virgo), Cap., Tk. 4.00/Cap
Preneed CI (Incepta), Cap., Tk. 4.00/Cap.
Zeefol (Eskayef), Cap, Tk. 3.00/Cap., Tk. 4.00/Cap.,
Zifocap (Nuvista), Cap., Tk. 5.38/Cap.
Iron+ Zinc+ Folic Acid+Vitamin-B Complex+Vitamin-C
Carbomet (Somatec), Cap., Tk. 3.01/Cap.
EPL (Globe), Cap., Tk. 3.50/Cap.
Famina (Silva), Cap., Tk. 3.51/Cap.
FeconBC (Alco), Cap., Tk. 2.94/Cap.
Feocron Plus (Novo Health), Cap., Tk. 3.50/Cap.,
Fer-V (Organic), Cap., Tk. 3.51/Cap.
Folvit (Eskayef), Cap., Tk. 3.25/Cap.
Ipec Super (Aristo), Cap. Tk. 6.00/Cap.
Maxiron (Apex), Cap., Tk. 3.50/Cap.
Xinoplex (Silva), Syrup, Tk. 90.33/200ml ; Tk. 50.19/100ml
Zilvit (Eskayef), Cap, Tk. 3.50/Cap., Tk. 3.50/Cap.

IRON AND FOLIC ACID^[ED]

Feofol (Eskayef), Cap, Tk. 2.50/Cap.
Feofol TR (Eskayef), Cap, Tk. 2.41/Cap.
Fer (Organic), Cap., Tk. 2.51/Cap.
Fero TR (Amico), Cap., 2.37/Cap.
Prenat Plus (Healthcare), Cap., Tk. 4.00/Cap.
Zepiron Plus (Ibn Sina), Cap. Tk. 5.00/Cap
Ziliron B (Square), Cap., Tk. 4.54/Cap.

These preparations are used for the prevention of iron and folic acid deficiencies in pregnancy.

COMPOUND PREPARATION

Ferrous Sulphate 150 mg + Folic Acid 500 microgram

Defaz (Acme), Cap. Tk. 3.01/Cap., Tab.
Fecon-Z (Alco), Cap., Tk. 2.94/Cap.
Feofol TR (Eskayef), Cap, Tk. 2.41/Cap.
Feraz (Amico), Cap., Tk. 2.50/Cap.
FeridexTR (ACI), Cap., Tk. 2.35/Cap.
Fero (Amico), Tab., Tk. 0.37/Tab.
Fero Plus (Amico), Tab., Tk. 0.38/Tab.
Fero TR (Amico), Cap., Tk. 2.37/Cap.
Ferospan (Drug Intl), TR Cap. 2.41/Cap
Folin SR (Somatec), Cap., Tk. 2.38/Cap.
HefolinSR (Beximco), Cap., Tk. 2.40/Cap
Hemofol- TR (Benham), Cap., Tk. 2.36/Tab.
Ifol Plus (Albion), Cap., Tk. 2.40/Cap

Ferrous sulphate+ Folic Acid + Zinc

Animet (Asiatic), Cap., Tk. 3.00/Cap.
Apefol-TR (APC), Cap., Tk. 2.90/Cap.
Biofez (Jayson), Cap., Tk. 3.01/Cap
Defaz (Acme), Cap., Tk. 3.01/Cap.,
Fecel (Asiatic), Cap., Tk. 3.00/Cap.
Fecel TR (Asiatic), Cap., Tk. 3.00/Cap.
Ferix (Renata), Cap., Tk. 4.00/Cap.
Ferocit Z (Acme), Cap., Tk. 2.94/Cap
Ferofol-Z (Central), Cap., Tk. 2.90/Cap.
Feroplus Z (Pacific), SR Cap., Tk. 2.90/Cap.
Feropreg (Amico), Cap., Tk. 3.00/Cap.
Ferrolin TR (Orion), Cap., Tk. 2.92/cap..
Fer-Z (Organic), Cap., Tk. 3.01/Cap.
Fezin (Rephco), CR Cap., Tk. 3.00/Cap.
Folized (General), Cap., Tk. 3.11/Cap.
Glory (Orion), Cap., Tk. 3.01/Cap.
Hemo Plus (Zenith), cap., Tk. 3.00/cap.
Hemo Z (Astra), Cap., Tk. 2.90/Cap.
Hemofix (Beximco), Tab., Tk. 4.00/Tab.
Hemofix FZ (Beximco.), Tab., Tk. 5.00/Tab.
Ifozin-SR (Ibn Sina), Cap., Tk. 3.05/Cap.
Ipec-Plus (Aristo), Tab., Tk. 3.50/Tab.
Itop-Z (Pharmasia), Cap., Tk. 3.02/Cap.; Tk. 3.51/Cap.
Prenat (Healthcare), Cap., Tk. 4.00/Cap.
Prenat CI (Healthcare), Cap., Tk. 4.00/Cap.
Suprafol TR (Supreme), Cap., Tk. 2.30/Cap.
Suprafol ZTR (Supreme), Cap, Tk. 2.70/Cap.
ZeefolCI (Eskayef), Cap, Tk. 3.00/Cap.
Zepiron (Ibn Sina), Tab. Tk. 3.50/Tab.
Zif (Square), Cap., Tk. 3.01/Cap.
Zif-CI (Square), TR Cap., Tk. 3.01/Cap.
Ziliron (Square), Tab. Tk. 3.01/Tab.
Fecon (Alco), Cap., Tk. 2.41/Cap.

15.1.2 PARENTERAL IRON

When oral iron therapy fails due to lack of patient co-operation or there is severe gastrointestinal side effects or continuing

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severe blood loss or mal absorption iron is administered parenterally. **Iron sorbitol citrate:** (only by Intramuscular route) is a colloidal solution of a complex of Iron, sorbitol and citric acid, stabilized with dextran and sorbitol contain 5% (50mg/ml.) Of iron. **Iron sucrose** (iron hydroxide sucrose complex): a complex ferric hydroxide with sucrose containing 2% (20mg/ml) of iron given in severe iron deficiency anemia.

PARENTERAL IRON PREPARATIONS

Iron can be administered parenterally as Iron dextran, Iron sucrose, Ferric carboxymaltose,

Indications: Intolerance to oral iron, gastrointestinal disease e.g. ulcerative colitis or Crohn's disease, peptic ulceration

Impaired iron absorption: gastrectomy, gastroenterostomy, sprue and coeliac disease

When rapid replenishment of iron stores is required (severe iron deficiency anemia in late pregnancy)

Chronic blood disease e.g. persistent menorrhagia and repeated epistaxis of hereditary haemorrhagic telangiectasia.

Side-effects: Flushing, nausea, urticaria shivering, general aches and pains, dyspnoea and syncope

Delayed reactions: Arthralgia, fever, lymphadenopathy, exacerbation of rheumatoid arthritis

Contraindications: Patients with history of asthma, cardiac abnormalities e.g. angina, arrhythmia, acute renal failure, severe liver disease

IRON DEXTRAN

Iron dextran is a colloid of ferric dihydroxide with dextran.

From all parenteral preparations the iron complex is taken up by macrophages of the reticuloendothelial system, from where iron is released to circulating transferrin which then takes it to the marrow.

Indications, Contraindications and Side-effects: See notes above

IM Injection: given into the upper outer quadrant of the buttock alternating the sides on successive injection; Administered daily to weekly until the total amount required is given. Each dose should not exceed 2ml;

The skin is moved aside at the site of injection and kept taut to prevent leakage back of the dark staining fluid

I.V. Injection

Undiluted method

The total iron dextran dose is given as a single bolus in a series of injection in a manner similar to I/M administration

Total dose infusion method

The dose is diluted in a liter of isotonic saline or dextrose. The maximum concentration of iron used should not exceed 2.5g (50ml iron dextran/100ml diluent)

The infusion is initially run slowly e.g. at the rate of 15drops/min. If there is no reaction, then the dose can be increased to 45 to 60 drops/min, until the infusion is completed.

Side-effects: Anaphylactic reactions; Delayed reactions: pyrexia, arthralgia, myalgia, regional lymphadenopathy, exacerbation of joint pain in rheumatoid arthritis

Generic preparation

Cosmofer[®] (Pharmacosmo) Inj., 100mg/2ml Amp

FERRIC CARBOXYMALTOSE

A ferric carboxymaltose complex containing 5% (50mg/mL) of iron

Indications, Contraindications and Side-effects: See notes above

Dose: By slow intravenous injection or by intravenous infusion, ADULT and CHILD over 14 years, calculated according to body-weight and iron deficit, consult product literature

Proprietary preparations

Ferinject[®] (Vifor) Inj., iron (as ferric carboxymaltose) 50mg/ml. Tk. 996.74/2ml Vial Tk. 3,114.80/10ml vial

Fematos (General), Inj., 100mg/2 ml, Tk. 400.00/2ml.; 500mg/10 ml, Tk. 700.00/10ml

Ferisen (Healthcare), Inj, 100mg/2ml, Tk. 410.00/2ml ; 500mg/10ml, Tk. 710.00/10 ml

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Maltofer(Incepta), Inj. , 500mg/10ml, Tk. 700.00/10ml.; 100mg/2ml, Tk. 400.00/2ml; 1gm/20 ml, Tk. 1300.00/20ml

IRON SUCROSE

A complex of ferric iron and isomaltosides containing 10% (100 mg/ml) of iron

Indications: Iron deficiency anaemia, see notes above

Dose: By deep intramuscular injection into the gluteal muscle or by slow intravenous injection or by intravenous infusion, calculated according to body-weight and iron deficit, consult product literature. CHILD under 14 years, not recommended

Proprietary preparations

Anofer(Monico), Inj, 20 mg/ml., Tk. 300.00/5mlAmp

Defiron, (Square), Inj, 20 mg/ml, Tk. 350.00/5mlAmp

Fofofer(Eskayef), Inj, 20 mg/ml, Tk. 600.00/10ml Amp; Tk. 350.00/5 ml vial

Ferimax(Incepta), Inj, 20 mg/ml, Tk.300.00/5ml; Tk. 600.00/10 ml Amp.;

Feristar(Renata), Inj, 20 mg/ml, Tk.325.00/5 ml

Feroven(Orion), Inj, 20 mg/ml, Tk. 327.26/5 mlAmp

Hemofer(Popular), Inj, 20 mg/ml, Tk.325.00/5ml

Inofar(Aristo), Inj, 20 mg/ml ml, Tk.300/5 ml vial

Irosuc(ACI), Inj, 100 mg/5 ml, Tk. 350/5ml vial

Kidifer(General), Inj, 20 mg/ml Tk. 327.26/5mL

Maxifer(Globe), Inj, 20mg/ml, Tk. 300/5ml vial

Sucraven(Ibn Sina), Inj, 20 mg/ml, Tk. 350.00/5ml vial

Unifer(Ziska), Inj, 100 mg/5 ml, Tk.326/5 ml vial

Veniron (Beximco), Inj., 20mg/ml, Tk. 300/5 ml

Xenofer (Beacon), Inj, 20 mg/ml Tk. 350.00/5 ml

Xoferon(Novo Health), Inj, 100 mg/5 ml, Tk. 325.00/5 ml vial

15.1.3. DRUGS USED IN MEGALOBLASTIC ANEMIA

The cause of most Megaloblastic anemia is either lack of B₁₂ or folic acid. Before starting treatment it is essential to

establish the cause of megaloblastosis as administration of folic acid may precipitate the onset of subacute combined degeneration of spinal cord. In cases of undiagnosed megaloblastic anemia, it will be better to start combined therapy with both B₁₂ and folic acid.

Vitamin B₁₂ should be given as a prophylaxis after these operations to prevent B₁₂ deficiency. Dietary deficiency of vitamin B₁₂ is very uncommon with persons consuming a mixed diet. It may, however, occur in persons consuming completely vegetarian diet.

Apart from dietary intake, all other causes of B₁₂ deficiency are attributable to malabsorption. There is little place of oral administration of Vitamin B₁₂ in the treatment. Vitamin B₁₂ should be administered by injection.

For prophylaxis in haemolytic states or in renal dialysis, it will be sufficient to give 5mg daily or even weekly depending on the diet and the state of haemolysis. For prophylaxis during pregnancy, the dose of folic acid should be 200-500 microgram daily.

To prevent recurrence of neural tube defect in a child with spina bifida or if there is a history of neural tube defect in a previous child, women who wish to become pregnant or who are at risk of becoming pregnant should be advised to take folic acid supplements at a dose of 5mg daily. Supplementation should be continued up to 12 weeks pregnancy. Women receiving antiepileptics therapy need individual counseling before starting folic acid therapy.

Different Vitamin B₁₂ preparations (see section 16.2.3.2)

CYANOCOBALAMIN

(See section 16.2.3)

Indications: B₁₂ responsive megaloblastic anemia and pernicious anemia, prophylaxis in total gastrectomy or total ileal resection, malabsorption syndrome, coeliac disease and tropical sprue

Contraindications: Leber's disease, tobacco amblyopia

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Dose: ADULT 250-1000 microgram IM on alternate days for 1-2 weeks or for 10 days, then 250microgram weekly until blood picture is normal. For maintenance, 1000 microgram every month.

CHILD: Initially as for adult; subsequent doses according to hematological response.

Proprietary preparations

Cynomim(Jayson), Inj., 250 microgram/ml, Tk. 3.51/1 ml amp.; 1 mg/ml, Tk. 3.03/1ml amp; Tk. 32.00/10 ml amp

G-Vitamin(Gonoshasthaya), Inj., 1 mg/ml, Tk.4.00/1 ml amp

FOLIC ACID^[ED]

Hemolytic anemia may be complicated by folate deficiency. Drugs that inhibit dihydrofolate reductase such as methotrexate, trimethoprim or that interfere with the absorption and storage of folate in tissues such as certain Anticonvulsants, oral contraceptives are capable of lowering the concentration of folate in plasma and at times may cause a megaloblastic anemia.

Indications: Folate deficient megaloblastic anemia. Standard treatment to bring about a hematological remission and replenish body stores; prophylaxis in chronic haemolytic states or in renal dialysis

Interactions: See Appendix -2

Side-effects: Oral folic acid is usually is not toxic even with the doses as high as 15 mg/day. Nausea, anorexia, abdominal distension and flatulence may develop

Cautions : Should never be given alone in pernicious anemia and other vitamin B₁₂ deficiency states; because it may precipitate sub-acute combined degeneration of the spinal cord

Contraindications: Pernicious anemia and other vitamin B₁₂ deficiency states

Dose: Initially 5mg daily for 4 months. Maintenance dose, 5mg every 1-7 days depending on underlying disease. Child upto 1 year, 500 microgram/kg daily over 1year as ADULT dose.

ADULT Initially 5 mg daily for 4 months

or until a hematological response has been obtained maintenance 5mg every 1-7 days.

Prophylaxis in chronic haemolytic states or in renal dialysis, 5mg daily or even weekly depending on the diet and the rate of haemolysis.

For prophylaxis in pregnancy 200-500 microgram daily.

CHILD: initially daily for 2 days, upto 1 year 500microgram /kg body wt., 1-5 years 5 mg, 6-12 years, 10mg; maintenance half the initial dose

Proprietary preparations

Folac(Ambee) , Tab., 5 mg, Tk.0.24/Tab

Folicasia(Pharmasia), Tab., 5 mg, Tk.0.27/Tab.

Folic-Son(Bristol), Tab. , 5mg , Tk. 0.27/Tab.

Folate(Ad-din), Tab., 5mg, Tk. 0.30/Tab.

Folus(Monico), Tab., 5mg, Tk. 0.30/Tab.

Folison(Jayson), Tab., 5 mg, Tk. 0.34/Tab.

Folic(Amico), Tab., 5mg , TK. 0.35/Tab.

Terovit(G.A.Co), Tab., 5 mg, Tk. 0.31/Tab

FOLINIC ACID

It is a synthetic tetrahydrofolic acid.

Indication: The principal use of folinic acid is to circumvent the action of inhibitors of dihydrofolate reductase, such as methotrexate.

Cautions: Never be used for the treatment of pernicious anemia or other megaloblastic anemias secondary to a deficiency of vitamin B₁₂. It is not indicated in folic acid deficiency

Contraindications: Pernicious anemia or other megaloblastic anemia secondary to a deficiency of vitamin B₁₂

Side-effects:it's use can result in an apparent response of the hematopoietic system, but neurological damage may occur or progress if already present

Proprietary preparations

(see section 14.1.1)

15.1.4 DRUGS USED IN HYPOPLASTIC, HAEMOLYTIC AND RENAL ANEMIAS

Pyridoxine, antilymphocyteimmuno-globulin and various corticosteroids are used in hypolastic and hemolytic anemia.

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Antilymphocyte globulin given by intravenous infusion produces a response in 50% of acquired cases. Higher response rates have been reported when ciclosporin is given as well. Pyridoxine is indicated in both idiopathic, acquired and hereditary sideroblastic anemias. Corticosteroids indicated in the management of a wide variety of haematological disorders. They include conditions with an immune basis such as autoimmune haemolytic anemia, immune thrombocytopenias, neutropenias and major transfusion reactions.

ERYTHROPOIETINS

EPOETIN BETA AND ALFA

Indications: Anemia associated with erythropoietin deficiency in chronic renal failure, to increase the yield of autologous blood in normal individuals and to shorten the period of anemia in patients receiving platinum-containing chemotherapy

Cautions: Patient with depression or psychiatric disorder, epilepsy, severe renal or hepatic impairment, cardiac disorder, myelosuppression, poorly controlled thyroid dysfunction. Monitor closely blood pressure, haemoglobin and electrolytes. Interrupt treatment if blood pressure uncontrolled. Sudden stabbing migraine like pain is warning of hypertensive crisis. Exclude other causes of anemia e.g. folic acid or vitamin B₁₂ deficiency. Monitor platelet count for 1st 8 weeks, convulsions, malignant disease, liver failure, pregnancy and breast-feeding

Contra-indication: Uncontrolled hypertension

Interactions: See Appendix -2

Side-effects: Hypertensive crisis, generalized tonic clonic seizures, dose dependent increase in platelet count, convulsions, skin reactions, anaphylaxis.

Dose: See under preparations

Note: Although Epoetin alfa and beta are clinically indistinguishable the prescriber must specify which is required

EPOETIN ALFA

Proprietary preparations

Epoetin(Incepta), Inj., (P.F Syringe), 2000 IU/0.2 ml, Tk. 1025.00/ Syringe; 3000 IU/0.3 ml, Tk. 1480.00/ Syringe; 4000 IU/0.4 ml, Tk. 1935.00/ Syringe; 5000 IU/0.5 ml, Tk. 2160.00/ Syringe

Eporen(Square), Inj., (P.F Syringe), 2000IU/0.2 ml, Tk. 1103.31/ Syringe; 3000IU/0.3 ml, Tk. 1454.37/ Syringe; 5000IU/0.5 ml, Tk. 2106.32/ Syringe

Eposis(Beacon), Inj Inj., (P.F Syringe), ., 10000IU/ml, Tk. 4000.00/ syringe.; 2000IU/0.50ml, Tk. 1028.08/syringe.; 3000IU/0.75ml, Tk. 1484.45/syringe.; 4000IU/0.40ml, Tk. 1935.80/syringe; 5000IU/0.5ml, Tk. 2166.5/syringe.

Eporex(Cilag) Inj., (P.F Syringe), 2000 IU/0.5 ml, Tk. 1619.33/ Syringe; 3000 IU/0.3 ml, Tk. 1,647.74/ Syringe; 4000 IU/0.4 ml, Tk. 2982.98/ Syringe; 10000IU/ml, Tk. 5250.60/ Syringe;

Intier(Healthcare), Inj., (P.F Syringe), 1,000 IU/0.5ml, Tk. 681.99/syringe.; 10,000 IU/1ml, Tk. 5001.72/syringe.; 2,000 IU/0.5ml, Tk. 1136.75/syringe.

Nipotin(Aristo), Inj., (P.F Syringe) 5000IU/0.5ml, Tk. 2150.00/ syringe.; 10000IU/ml, Tk. 4200.00/ syringe.; 2000IU/0.2ml, Tk. 1100.00/ syringe 3000IU/0.3ml, Tk. 1400.00/ syringe 4000IU/0.4ml, Tk. 1900.00/ syringe)

Recogen(ACI), Inj., 10000IU/1ml, Tk. 3900.00/ syringe.; 2000IU/0.5ml, Tk. 1000.00/ syringe.; 3000IU/0.75ml, Tk. 1300.00/ syringe.; 5000IU /0.5ml, Tk. 2000.00./ syringe

Dose: Anemia in adults receiving cancer chemotherapy, by subcutaneous injection (max. 1 ml per injection site), initially 150 units/kg 3 times weekly, increased if appropriate rise in haemoglobin (or reticulocyte count) not achieved after 4 weeks to 300 units/kg 3 times weekly; discontinue if inadequate response after 4 weeks at higher dosel reduce dose by 25-50% if haemoglobin rise exceeds 2g/100ml per month; suspend if haemoglobin exceeds 14g/100ml until it falls below 12g/100ml; and reinstate with dose at 25% below previous dose; continue epoetin for 1 month after end of chemotherapy (consult also product literature).

Note: subcutaneous injection contra-indicated in patients with chronic renal failure.

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EPOETIN BETA

Proprietary preparations

Recormon[®](Roche), Inj., 2000 IU, Tk. 1,335.36/Syringe; 5000 IU, Tk. 3,249.02/Inj. Syringe; 10000 IU, Tk. 6,654.55/Syringe

Dose: *Subcutaneous injection*, Initially 60 units/kg weekly in 1-7 divided doses for 4 weeks. Adjust according to response at interval of 1-2 weeks maximum 720 units/kg weekly. IV injection over 2 minutes, initially 40 units/kg 3 times weekly for 4 weeks. Increased according to response to 80 units/kg 4 times weekly max. 720 units/kg weekly (consult also product literature)

METHOXY POLYETHYLENE GLYCOLEPOETIN BETA

Indications: Treatment of symptomatic anaemia associated with chronic renal failure (CRF) in adults and paediatric patients (both dialysis and non-dialysis).

Proprietary preparations

Mircera[®](Roche), Inj., 75 microgram/0.3 ml, Tk. 10,601.76/Syringe; 0.100mg/0.3 ml, Tk. 14,153.14/syringe. 14153.14/syringe; 50 microgram/0.3 ml, Tk. 7081.00/ Syringe

Dose : *Consult with Physician and product literature*

DARBEPOETIN ALFA

Indications: Treatment of symptomatic anaemia associated with chronic renal failure (CRF) in adults and paediatric patients (both dialysis and non-dialysis) and symptomatic anaemia in adult cancer patients with non-myeloid malignancies receiving chemotherapy.

Proprietary preparations

Darbetin (Healthcare), Inj. , 100mcg/0.5ml , Tk. 9090.28/Vial; 25mcg/0.42ml , Tk. 2840.71/Vial; 40mcg/0.4ml , Tk. 4545.15/Vial; 60mcg/0.3ml , Tk. 5505.31/Vial

Dose : *Consult with Physician and product literature*

15.1.5 DRUGS USED IN NEUTROPENIA

Recombinant human granulocyte colony stimulation factor (rG-CSF) stimulates the production of neutrophils. It may reduce the duration of chemotherapy induced neutropenia and can reduce the incidence of associated sepsis.

Pregnancy There have been reports of toxicity in animal studies and manufacturers advise not to use granulocyte-colony stimulating factors during pregnancy unless the potential benefit outweighs the risk.

Breast-feeding There is no evidence for the use of granulocyte-colony stimulating factors during breast feeding and manufacturers advise avoiding their use.

Interactions: *See Appendix-2*

FILGRASTIM

Indications : Neutropenic fever, neutropenia in cytotoxic chemotherapy for malignancy, in myeloablative therapy followed by bone-marrow transplantation, idiopathic neutropenia and history of severe or recurrent infections; persistent neutropenia in advanced HIV infection (see also section 14.1)

Cautions: Treatment should be discontinued if leucocytosis occur; monitoring of platelet count and haemoglobin and cytogenic bone marrow examinations recommended in severe congenital neutropenia; monitoring of spleen size, bone density is a must if given the drug for more than 6 months. Caution must be taken in case of pregnancy and breast-feeding

Contra-indication: Severe congenital neutropenia

Interactions: *See appendix -2*

Side-effects: Musculoskeletal pain, disturbances in liver enzymes and serum uric acid, thrombocytopenia, dysuria, allergic reactions, haematuria, hepatomegaly, epistaxis, alopecia, osteoporosis

Dose: Cytotoxic induced neutropenia, drug is to be administered by subcutaneous injection or intravenous infusion (over 30 minutes), ADULT and

15. ANEMIAS AND OTHER BLOOD DISORDERS

CHILD, 500,000 units/kg daily started not less than 24 hours after cytotoxic chemotherapy, continued until neutrophil count in normal range, usually for up to 14 days and up to 38 days in acute myeloid leukemia.

Proprietary preparations

Filastin(Incepta), Inj.,(P.F syringe) 300 microgram/0.5 ml, Tk. 2,890.00/Syringe
Filgrast(Beacon), Inj., (P.F syringe) 300 microgram/0.5 ml, Tk. 2500.00/Syringe
Grastim(Square), Inj.,(P.F syringe) 300 microgram/0.5 ml, Tk. 3961.87/0.5 /Syringe
Neupogen^(R)(Roche), Inj., 30 MIU, Tk. 8,000.00/Vial
Zarzio^(R)(Sandoz), Inj., 30 MIU/0.5 ml, Tk. 21,000.00/0.5 ml Prefilled Syringe
Filgen(Aristo), Inj.,(P.F syringe) 30MU/0.5ml , Tk. 3500.00/0.5 ml Syringe
Neufil(Healthcare), Inj.,(P.F syringe) 120mcg/0.2ml, Tk. 1450.00/0.2 Syringe;30MU/0.5ml , Tk. 3919.99/ Syringe
Ropenia(ACI), Inj.,(P.F syringe) 30MU/0.5ml, Tk. 3200.00/0.5 ml Pre-filled Syringe

LENOGRASTIM

(Recombinant human granulocyte-colony stimulating factor, rhG-CSF)

Indications: For reduction in the duration of neutropenia and associated complications following bone marrow transplantation for nonmyeloid malignancy or following treatment with cytotoxic chemotherapy associated with the significant incidence of febrile neutropenia; mobilization of peripheral blood progenitor cells for harvesting and subsequent infusion

Cautions: See under *filgrastim*; premalignant myeloid conditions

Dose: Cytotoxic induced neutropenia, by *subcutaneous injection*, ADULT 19.2 million units/sq.m. daily started the day after completion of chemotherapy, continued until neutrophil count is stable in the acceptable range (max. 28 days)

Proprietary Preparation

Granocyte^(R) (Sanofi Winthrop), Inj. 34 MIU/vial, Tk. 5961.54/Vial

PEGFILGRASTIM

(Pegylated recombinant methionyl human

granulocyte-colony stimulating factor)

Indications: Same as that of *lenograstin*

Cautions and side-effects: See notes above and under *filgrastim*; also acute leukaemia and myelosuppressive chemotherapy;

Dose: By *subcutaneous injection*, ADULT over 18 years, 6mg(0.6 mL) for each chemotherapy cycle, starting 24hours after chemotherapy

Proprietary Preparation

Pegfilastin(Incepta), Inj.,(P.F syringe) 6mg/0.60ml, Tk. 15000.00/syringe
Pegfilgrast(Beacon), Inj.,(P.F syringe) 6mg/0.60ml, Tk. 15000.00/Vial
Pegneufil(Healthcare), Inj.,(P.F syringe) 6mg/0.60ml, Tk. 20300.00/syringe
Neulasti (I)
(Roch),Inj.,(P.F syringe),6mg/0.6ml,Tk.50800/syringe

15.1.6 DRUGS USED IN AUTOIMMUNE THROMBOCYTOPENIC PURPURA (ITP)

First line treatment of ITP is corticosteroids. Other therapy that has been tried in refractory cases. These drugs include **Azathioprine**(see section 14.2.2)

Cyclophosphamide(see section 14.1.1)

Vincristine(see section 14.1.4),

Ciclosporin(see section 14.2.1),

Danazol (see section 6.5.2)

Intravenous immunoglobulins (see section 13.3) have also been used in refractory cases or where a temporary rapid rises in platelets is needed. For patients with chronic severe thrombocytopenia refractory to other therapy, tranaxaemic acid (see section 3.11) may be given to reduce the severity of haemorrhage.

15.1.7 THALASSAEMIA

Thalassaemia is an inherited impairment of hemoglobin production, in which there is partial or complete failure to synthesize a specific type of globin chain. Failure to synthesize beta chains is the most common type (beta-thalassaemia). The anemia is crippling and the probability of survival for more

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than a few years without transfusion is low.

Table: Treatment of beta – thalassaemia major (see below in the table)

Problem	Management
Erythropoietic failure	Allogenic bone marrow transplantation from HLA compatible sibling Hypertransfusion to maintain Hb>100g/lit
Iron overload	Iron therapy forbidden; desferrioxamine therapy
Splenomegaly causing mechanical problems, excessive transfusion required	Splenectomy

Beta-thalassaemia minor is diagnosed by haemoglobin electrophoresis. This type of thalassaemia often does not need treatment.

DESFERRIOXAMINE

Indications: Acute iron poisoning, iron overload with repeated blood transfusion e. g. thalassemia, aplastic anemia.

Side-effects: Gastrointestinal disturbances, arrhythmia, hypotension, anaphylaxis, dizziness, convulsion, skin reaction and pain on IM injection

Caution: Impaired renal and hepatic function; eye and ear examinations required before treatment and annually during treatment, pregnancy, breast feeding

Dose: Subcutaneous infusions of Desferrioxamine in a dose of 20-40 mg/kg over 12 hours are given on 5-7 nights each week; it may also be given through the infusion line at the time of blood transfusion upto 2g per unit of blood

Proprietary preparation

Desferal[®](Novartis), Inj. 500 mg, Tk. 258.11/Vial

DEFERASIROX

Indications, Side effects, Caution:

Same as that of Desferrioxamine

Dose: Consult product literature

Proprietary preparations

Asunra[®](Novartis), Dispersible Tab. 100 mg, Tk. 50.00/Tab.; Tk. 187.00/Tab.

Ferasirrox(uniMed)Tab.250mgTk 85.00/Tab

Feripon(Drug Intl), Tab., 500mg, Tk. 18.10/Tab.

15.2 BLOOD AND BLOOD COMPONENTS

- 15.2.1 WHOLE BLOOD
- 15.2.2 CONCENTRATE RED CELL (PACKED CELL)
- 15.2.3 WASHED RBC_s
- 15.2.4 FRESH PLASMA OR FRESH FROZEN PLASMA (FFP)
- 15.2.5 PLATELET RICH PLASMA OR PLATELET CONCENTRATES
- 15.2.6 CRYOPRECIPITATES
- 15.2.7 DRUG USED IN PLATELET DISORDER

Blood and blood components are considered drugs because of their use in treating diseases. The transfusion of blood cells is also transplantation in that the cells must survive and function after transfusion in order to have therapeutic effects. The modern transfusion service suggests very little use of whole blood for adult practice.

DECISION MAKING AND PRECAUTIONS REGARDING TRANSFUSION

Blood transfusion is necessary in medical, surgical and obstetrical practice to save life.

A clinician drawing blood for cross matching has to identify the patient at the bed side; label the sample and has to write down the request form after identifying the patient; The clinician must be ensured that the information

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requested by the transfusion laboratory is to be given on both the sample and request form. The person administering blood should identify the patient at the bedside; must be ensured that the patient identification and the identification of the unit match; to be checked that the ABO and Rh D groups of the patient and units are identical; must inspect the units for evidence of damage; to be ensured that the checking procedures are validated by another member of the nursing or medical staff; to be completed the necessary documentation, indicating the detailed identification of the units transfused.

FOLLOW-UP DURING AND AFTER TRANSFUSION

The blood pack from collection prior to transfusion cold chain should be strictly maintained. Before transfusion cold refrigerated blood should be left for half an hour to return to room temperature.

During transfusion, physician should be keen enough to find out signs and symptoms of immediate haemolytic transfusion reaction (IHTR) by observing fever, chills, facial flushing, pain at transfusion site, chest pain, back or flank pain, hypotension, abdominal pain, nausea, dyspnoea, vomiting, urticaria, haemoglobinaemia and haemoglobinuria. During follow-up for delayed hemolytic transfusion reaction (DHTR) the physician has to monitor the patient constantly and to observe whether the patient has developed fever, anemia, mild jaundice, haemoglobinemia, haemoglobinuria, shock and renal failure.

Complications and side-effects of transfusion

The decision to transfuse must be based on weighing the therapeutic benefits against potential risks to the recipient. Transfusion always carries increased risk of transmission of diseases transmitted by blood e.g. malaria, syphilis, HBV, HCV and HIV. All communicable diseases are not possible to be screened out e.g. kalaazar, filariasis, toxoplasmosis, brucellosis, trypanosomiasis and certain viral infection-Epstein Bar Virus

(EBV), Cytomegalovirus (CMV) and HTLV. There is also limitation of test procedure, kits or reagents to detect diseases do not have less sensitivity and specificity.

Following transfusion of blood or its components there is a chance of immediate and delayed adverse effects, which may be immune or non-immune type. There are also adverse effects due to cold blood component transfusion e.g. hypothermia, painful venous spasm, cardiac arrhythmia, reduction in oxygen carrying capacity and aggravation of citrate toxicity. Metabolic effects of transfusion are citrate toxicity, potassium toxicity, acid load and iron overload. Some of the immediate and delayed effects are listed below.

Immediate immune effects: IHTR, FNHTR, allergic reaction, anaphylaxis;

Immediate non-immune effects: bacterial contamination; circulatory overload; physical RBC damage; depletion and dilution of coagulation factors & platelet; air embolism and phlebitis;

Delayed immune effects: DHTR, alloimmunization; post transfusional purpura (PTP); GVH disease; delayed non-immune effect; iron overload

15.2.1 WHOLE BLOOD

Fresh whole blood contains all constituents of blood- RBC, Plasma, WBC, and Platelets and clotting factors but refrigeration causes depletion of WBC, platelet and clotting factor.

Indications: in massive acute hemorrhage where all components are required in large amounts; multiple injuries; road traffic accidents; severe gastrointestinal bleeding e.g. rupture esophageal varices, haematemesis and melena; obstetrical causes e.g. rupture uterus, rupture ectopic pregnancy, post partum hemorrhage

Cautions: Avoid cold blood, micro aggregate or prolonged transfusion

Side-effects: volume overload, acid overload, potassium toxicity, citrate toxicity, (see also complications of transfusion)

Note. exchange transfusion should be

15. ANEMIAS AND OTHER BLOOD DISORDERS

given in hemolytic disease in neonates (HDN); per operative blood loss

Contraindications: Severe chronic anemia; anemia associated with risk of circulatory overload like chronic renal failure, heart failure, pregnancy at term
APPROXIMATE VOLUME: 500 ml per unit

STORAGE TEMPERATURE: 2° to 6°C
SHELF LIFE: 14 days in ACD, 21 days in CPD, 35 days in CPDA₁

DOSAGE EFFECT: 1 unit whole blood raises the hemoglobin 10 g/L approximately.

15.2.2 CONCENTRATE RED BLOOD CELLS (RCC) OR PACKED CELL

Packed cells are prepared by removing approximately 80 percent of the plasma from a unit of whole blood. Regulations require that the final haematocrit of an RCC unit not exceed 80%. Significant reduction in the levels of acid, citrate, and potassium in units prepared just before transfusion. This reduces the risk of acid level, citrate toxicity and potassium load in patients with cardiac, renal, or liver diseases.

Indications: RCC is indicated for increasing the RBC mass in patients who require increased oxygen carrying capacity and correction of anemia in patients with increased risks of volume overload like in pregnancy, heart failure (CCF), renal failure, elderly patient and thalassaemia.

APPROXIMATE VOLUME: 250-300 ml per unit

STORAGE TEMPERATURE: 2 to 6°C
SHELF LIFE: 14 days in ACD, 21 days in CPD, 35 days in CPDA₁

DOSAGE EFFECT: One unit raises the haemoglobin 10 g/L approximately.

Side-effects: See notes above.

Cautions: Potassium toxicity (see notes above)

15.2.3 WASHED RBCs

The washing process removes about 90 percent of contaminating leukocytes due

to febrile reactions and most of the allergic reactions. Preparation contains 60-80% RBCs and 20-40% saline.

Indications: Prevention of febrile non-haemolytic transfusion reaction (FNHTR) caused by antibodies to leucocytes and HLA antigens in sensitized patients receiving multiple transfusions; prevention of sensitization of potential recipients of tissue transplantation who require blood transfusion; patient with IgA deficiency and anti-IgA antibodies.

APPROXIMATE VOLUME: 250-300 ml per unit

STORAGE TEMPERATURE: 2 to 6°C

SHELF LIFE: 24 hours

DOSAGE EFFECT: one unit raises the hemoglobin 10 g/L approximately.

Cautions: See notes above

Side-effects: Bacterial contamination and hyperkalaemia; see also *complication of transfusion*

15.2.4 FRESH PLASMA OR FRESH FROZEN PLASMA (FFP) ^[ED]

Prepared from the supernatant of one unit of whole blood by the process of centrifugation and fractionation. The plasma is then frozen within 6 hours of collection for FFP. The product is free from RBC and contains therapeutic levels of all the plasma clotting factors, including factors V and VIII, but no platelets. Transfusion is ABO and Rh group specific.

Indications: Non specific hematological replacement after massive transfusion in Disseminated Intravascular Coagulation (DIC); after cardiopulmonary bypass; liver diseases; rapid anticoagulant reversal; to prevent or arrest bleeding; hemophilia; as volume expander in nephrotic syndrome and burns; acute liver disease

APPROXIMATE VOLUME: 150-250 ml per unit

STORAGE TEMPERATURE: below -20° to -30°C

Shelf life: one year when stored below -30°C, but when kept at -20°C its shelf-life is shorter than one year.

Dosage effect: increase factor levels 20–

15. ANEMIAS AND OTHER BLOOD DISORDERS

30% per dose of 10-15ml/kg of body weight

Cautions: FFP should be thawed at 37°C water bath with a stirrer, with frequent agitation by hand. It should never be thawed under hot water tap. Administer within half an hour after thawing as the activity of coagulation factors V and VIII is rapidly lost on standing. FFP is given intravenously through transfusion set, at a flow rate not greater than 10-ml/min. Special care to be taken in patients with history of bronchial asthma or previous severe reaction to plasma

Side-effects: Urticaria and anaphylactoid reactions, circulatory overload, non-haemolytic febrile transfusion reaction, alloimmunisation to plasma protein, reactions produce by vasoactive substances and transmission of diseases

15.2.5 PLATELETS CONCENTRATES

Platelet concentrates can be prepared manually or by using a blood cell processor; they can be obtained from a single donor or pooled from several donors. Manually prepared concentrates are available as single platelet concentrates harvested from one unit of blood or as pooled platelet concentrates harvested from four to six units of blood. Transfusion is ABO and Rh compatible. Concentrates contain platelets, plasma with negligible amount of RBC and WBC.

Indications: Correction of thrombocytopenia due to decreased function, production or consumption of platelet; as in aplastic anemia; acute leukemia following chemotherapy or irradiation in malignancy; cardiopulmonary bypass; massive transfusion; exchange transfusion; neonatal thrombocytopenia; DIC; ITP; dengue haemorrhagic fever (DHF)

APPROXIMATE VOLUME: 50-70 ml per unit of whole blood

STORAGE TEMPERATURE: 20° to 24°C

DOSAGE EFFECT: increase count 5,000 –10,000 per unit

Cautions: Require optimum temperature and constant agitation; transfusion must

be within 6 hours

Side-effects: Alloimmunisation to platelet antigens and platelet refractoriness, febrile reactions, allergic reactions, granulocytopenia; see also complications of transfusion

15.2.6 CRYOPRECIPITATE (ANTI HEMOPHILIC FACTOR)

Cryoprecipitate is the cold-precipitated concentration of factor VIII, the antihaemophilic factor. It is prepared from FFP thawed slowly at 4°C. The product contains most of the factor VIII and part of the fibrinogen from the original plasma. Significant factors of cryoprecipitate are factor XIII and Von Willebrand factor. Transfusion is ABO compatible. A unit of cryoprecipitate contains on average 80 IU of factor VIII.

Indications: treatment of moderate to severe factor VIII deficiency (haemophilia A); afibrinogenemia; Von Willebrand disease; disfibrinogenemia; intractable bleeding in uraemia; factor XIII deficiency

APPROXIMATE VOLUME: 10-25 ml per unit of whole blood

STORAGE AND SHELF LIFE: stable for one year when kept at a temperature below -30°C

DOSAGE EFFECT: The dose of factor VIII for treatment of haemophilia A and IV Willebrand's disease is calculated using formula: $D = BW \times I/2$; (D is the dose in IU, BW body weight in kg, and I the desired increment in i.u./dl).

Cautions: Administer as soon as possible and not later than one hour after thawing.

Side-effects: urticaria and anaphylactoid reactions; bleeding tendency due to very high fibrinogen concentration achieved after infusion of a large number of cryoprecipitate units, reactions produced by vasoactive substances, transmission of diseases

Proprietary preparations

Alphanate[®](Grifols) Inj., 250IU Tk.9970.00/vial

Haemoclin[®](Biotest-pharma), Inj. 10% 250 IU, Tk.5196.79/vial

15. ANEMIAS AND OTHER BLOOD DISORDERS

15.2.7 DRUGS USED IN PLATELET DISORDERS

ELTROMBOPAG

Eltrombopag is a thrombopoietin receptor agonists

Indications: For the treatment of thrombocytopenia in adult and pediatric patients 1 year and older with chronic immune (idiopathic) thrombocytopenia (ITP) who have had an insufficient response to corticosteroids, immunoglobulins, or splenectomy., thrombocytopenia in patients with chronic hepatitis C to allow the initiation and maintenance of interferon-based therapy. □ patients with severe aplastic anemia who have had an insufficient response to immunosuppressive therapy, used only in patients with ITP whose degree of thrombocytopenia and clinical condition increase the risk for bleeding

Contraindication: Should be used only in patients with chronic hepatitis C whose degree of thrombocytopenia prevents the initiation of interferon based therapy or limits the ability to maintain interferon-based therapy. Safety

and efficacy have not been established in combination with direct acting antiviral agents used without interferon for treatment of chronic hepatitis C infection.

Cautions: Hepatotoxicity: Monitor liver function before and during therapy. Thrombotic/Thromboembolic Complications: Portal vein thrombosis has been reported in patients with chronic liver disease receiving. Monitor platelet counts regularly.

Side-effects: Nausea, diarrhea, upper respiratory tract infection, vomiting, increased ALT, myalgia, and urinary tract infection. , upper respiratory tract infection, and nasopharyngitis. anemia, pyrexia, fatigue, headache, nausea, diarrhea, decreased appetite, influenza-like illness, asthenia, insomnia, cough, pruritus, chills, myalgia, alopecia, and peripheral edema.

Dose: Consult product literature

Proprietary preparations

Eltrom 25(Julpher) Tab. , 25 mg, Tk. 600.00/Tab.

ETP(Beacon), Tab. , 25 mg , Tk. 511.33/Tab.; 50 mg , Tk. 909.02/Tab.

Revoidae⁽¹⁾(Novartis), Tab. , 25 mg, Tk. 916.00/Tab.

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NUTRITION

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16. NUTRITION

16.1 ELECTROLYTES AND INTRAVENOUS NUTRITION

Electrolytes and IV solutions are given to meet normal fluid and electrolyte requirements or to replenish substantial deficits or continuing losses, when the patient is nauseated or vomiting and is unable to take adequate amounts by mouth.

In an individual patient the nature and severity of the electrolyte imbalance must be assessed from the history and clinical and biochemical examination.

Sodium, potassium, chloride, magnesium, phosphate and water depletion can occur singly and in combination with or without disturbances of acid base balance.

16.1.1 ELECTROLYTES

Normal Saline: Sodium chloride (0.9%) in isotonic solution provides the most important extracellular ions in near physiological concentration and is indicated in sodium depletion, which may arise from such conditions as gastroenteritis, diabetic ketoacidosis, ileus and ascites. In a severe deficit of from 4 to 8 litres, 2 to 3 litres of isotonic sodium chloride may be given over 2-3 hours; thereafter infusion can usually be given at a slower rate.

Compound sodium lactate:

(*Hartmann's Solution*) can be used instead of isotonic sodium chloride solution during surgery or in the initial management of the injured or wounded patients.

ORAL REHYDRATION SALTS (ORS) [ED]

Indications: Fluid and electrolyte loss in diarrhea.

Dose: According to fluid loss, usually 200–400mL solution after every loose motion; INFANT 1–1½ times usual feed

volume; CHILD 200ml after every loose motion

Proprietary Preparations

See section 2.4

NORMAL SALINE [ED] (Sodium chloride 0.9%)

Indication : Electrolyte imbalance

Cautions: Restrict intake in impaired renal function of large doses may give rise to sodium accumulation and oedema

Dose: See notes above. Usual strength of Sodium chloride is 0.9%; this strength being available in normal saline for injection

IV infusion of 0.9% sodium chloride as isotonic solution

Proprietary Preparations

Isoline IV (General), Inj. (IV Infusion), 0.9%, Tk. 74.22/100 ml

Normal Saline (Opso Saline), Inj. (IV Infusion), 0.9%, Tk. 87.14/1000ml; Tk. 67.64/500 ml

Normalin IV (Popular), Inj. (IV Infusion), 0.9%, Tk. 47.14/100 ml, Tk. 56.17/250 ml, Tk. 67.64/500 ml, Tk. 87.39/1000ml, Tk. 117.29/2000ml

Normasol (Libra), IV Infusion, 0.90%, Tk. 117.29/2000ml; Tk. 47.88/100ml; Tk. 53.63/250ml; Tk. 67.85/500ml; Tk. 87.30/1000ml

Salinor (ACI), Inj. (IV Infusion), 0.9%, Tk. 50.14/100 ml

Saloride (Beximco), Inj. (IV Infusion), 0.9%, Tk. 67.80/500 ml; Tk. 53.60/250 ml; Tk. 87.39/1000 ml; Tk. 48.06/100 ml

Salpac (Orion), Inj. (IV Infusion), 0.9%, Tk. 47.87/100 ml; Tk. 67.44/500ml; Tk. 87.39/1000 ml

Solo (Square), IV Infusion, 0.90%, Tk. 40.25/50ml; Tk. 48.06/100ml; Tk. 67.85/500ml; Tk. 87.39/1000ml;

Xenosol (Beacon), Inj. (IV Infusion), 0.90%, Tk. 108.32/500 ml; Tk. 85.26/250 ml; Tk. 74.22/100 ml

ORAL BICARBONATE

Sodium bicarbonate is given by mouth for chronic acidotic states such as uraemic acidosis or renal tubular acidosis. The dose for correction of metabolic acidosis is not predictable and the response must be assessed; sodium

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bicarbonate 4.8 g daily (57 mmol each of Na^+ and HCO_3^-) or more may be required. For severe metabolic acidosis, sodium bicarbonate can be given intravenously

Proprietary Preparations

Sodinate (*Opsonin*), Tab., 600mg, Tk.6.02/Tab
Sodicarb(*Popular*), Tab., 600 mg, Tk. 6.02/Tab
Compound Sodium Lactate Infusion
 (Hartmann's Solution for injection)
 Intravenous infusion contains sodium chloride 0.6%, sodium lactate 0.32%, potassium chloride 0.04%, and calcium chloride 0.027%.

Proprietary Preparations

Electrosal (*Popular*), Inj., (IV Infusion), Tk. 71.30/500ml, Tk. 92.00/1000ml
Glucohart (*Popular*), Inj., (IV Infusion), Tk. 62.97/500ml, Tk. 81.28/1000ml
Hartman (*Orion*), Inj., (IV Infusion), Tk. 71.09/500 ml; Infusion, Tk. 92.00/1000 ml
Hartmann's (*Popular*), Inj., (IV Infusion), Tk.92.00/1000ml,
Hartsol (*Libra*), Inj., (IV Infusion) Tk. 71.30/500ml; Tk. 91.99/1000ml
Lactoride (*Beximco*), Inj., (IV Infusion), Tk. 92.00/1000ml;Tk. 71.30/500ml
Lactoring (*Square*), Inj., (IV Infusion), Tk. 71.3/500ml;Tk. 91.99/1000ml
Ringer's Solution For Injection:
 Intravenous infusion contain: Calcium Chloride (dihydrate) 322microgram, Potassium Chloride 300microgram. Calcium chloridiae 8.6mg/ml. providing the following ions (in mmol/litre), Ca^{2+} 2.2, K^+ 4, Na^+ 147, Cl^- 156

Proprietary Preparations

Ringer's Solution (*Opsosaline*), IV Infusion Tk. 45.17/500ml

INTRAVENOUS POTASSIUM

IV infusion of potassium chloride + sodium chloride and potassium chloride + glucose are used to correct severe hypokalaemia and depletion and when sufficient potassium cannot be taken by mouth. Potassium chloride containing ampoules of 1.5 g (20 mmol K^+ in 10 ml), may be added to 500 ml of sodium chloride or glucose IV infusion and given slowly over 2-3 hours with specialist advice and ECG monitoring in difficult cases. Repeated measurements of plasma potassium are necessary to

determine whether further infusions are required and to avoid the development of hyperkalaemia; especially liable to occur in renal impairment.

POTASSIUM CHLORIDE ^[ED]

Indications: Electrolyte imbalance and also for oral potassium supplements

Cautions: For IV infusion the concentration of solution should not usually exceed 3.2 g.

Side-effects: Rapid infusion is toxic to heart

Dose: By slow IV infusion, depending on the deficit or the daily maintenance requirements

Proprietary Preparations

KT (*Jayson*), Inj., 150 mg/ml, Tk. 15.00/Vial;
KCL (*Opsonin*), Inj., 150 mg/ml, Tk10.03/ Vial

POTASSIUM CHLORIDE AND GLUCOSE IV INFUSION

Usual strength for IV infusion, potassium chloride 0.3% with 5% of anhydrous glucose.

POTASSIUM CHLORIDE AND SODIUM CHLORIDE IV INFUSION

Usual strength for IV infusion, potassium chloride 0.3% (3 g/litre) and sodium chloride 0.9% (9 g/litre).

POTASSIUM CHLORIDE, SODIUM CHLORIDE AND DEXTROSE IV INFUSION

Usual strength for IV infusion: Sodium chloride 0.18% with 4% anhydrous glucose (dextrose monohydrate) and required amount of potassium chloride to provide 10-40 mmol of potassium ion/litre.

16.1.2 INTRAVENOUS NUTRITION

When the patient can not take food through the alimentary tract, nutrients are to be given through IV infusion. It may be in addition to oral or tube

16. NUTRITION

feeding-which is known as supplemental parenteral nutrient, or IV nutrient may be the sole source of nutrition-total parenteral nutrition (T.P.N)

Indication for IV nutrition:
Undernourished patients for surgery; chemotherapy, or radiation therapy; severe or prolonged disorder of gastrointestinal tract; trauma or burns; prolonged coma or refused to eat; and some patients with hepatic or renal failure.

Total parenteral nutrition (T.P.N):

Solution is infused through a central venous catheter inserted under full surgical procedures.T.P.N requires the use of solution containing amino acid, glucose, fat, electrolyte, trace elements, and vitamins .

Partial Parenteral nutrition (P.P.N):

Is given as infusion through a peripheral vein. It is used as supplementary nutrition for periods of up to a month; to correct serious deficits appropriate biochemical test are to be carried out before starting the infusion. Nutrition and electrolyte status is to be monitored throughout treatment.

AMINO ACID

Ideally all essential amino acid should be included with a wide variety of non-essential ones to provide sufficient nitrogen together with electrolytes. Available solution vary in their composition of amino acids; they often contain energy source(usually glucose) and electrolytes.

Amino acid +Glucose +Electrolyte

Aminosin plus (*Ibn Sina*), Inj. (IV infusion), Tk. 400/500 ml

Amisol Gold (*Popular*), Inj. (IV infusion), Tk. 260.98/250ml, Tk. 401.51/500ml

Clinosol Gold (*Opsonin*), Inj. (IV infusion), Tk. 402.72/500 ml

Nutrimin D (*Beximco*), Inj. (IV infusion), Tk. 410/500 ml

Proliv-Plus (*Orion*), Inj. (IV infusion), Tk. 402.72/500 ml

Protinx (*Easkayef*) Inj. (IV infusion) Tk.750/500ml

Repotyn Max (*ACI*) Inj. (IV infusion) Tk. 401.20/500ml

Amino Acid with D-Sorbitol & Electrolytes

Powersol (*General*), Inj. (IV infusion), Tk. 351.06/500 ml

Protinex (*Easkayef*), Inj.(IV infusion),Tk. 350/500 ml

Repotyn (*ACI*), Inj. (IV infusion), Tk. 352.38/500ml

Xemocid (*Beacon*), Inj. (IV infusion), Tk. 501.50/500ml;

Human milk based Amino Acid

Protinex (*Easkayef*) Inj. (IV infusion) Tk.280/500ml

Amino acid

Amilac (*Biopharma*), Inj.(IV infusion), Tk. 350.00/500ml

Aminomax (*Globe*), Inj. (IV infusion), Tk. 400.00/500ml;

Aminoplex (*Acme*), Inj. (IV infusion), Tk. 402.72/500ml

Aminosin (*Ibn Sina*), Inj. (IV infusion), Tk. 350/500 ml

Aminosol (*Opso Saline*), Inj.(IV infusion), Tk. 264.15/500 ml

Amisol (*Popular*), Inj.(IV infusion), Tk. 200.75/250ml, Tk. 351.32/500ml

Clinosol (*Opsonin*), Inj.(IV infusion), Tk. 352.38/500 ml

Esamin (*Monico*), Inj.(IV infusion), Tk. . 350.00/500ml

Nurisol (*Novo Health*) Inj.(IV infusion), Tk. . 351.00/500ml

Nutrilve (*Healthcare*), Inj. (IV infusion), Tk. 350/500 ml

Nutrimin (*Beximco*), Inj. (IV infusion), Tk. 410.00/500ml

Powersol (*General*), Inj. (IV infusion), Tk. 351.06/500ml

Proliv (*Orion*), Inj. (IV infusion), Tk.130.49/100 ml

Prosol (*Incepta*),Inj.,(IV Infusion), Tk. 350/500 ml

Protemin (*Easkayef*), Inj.(IV infusion), Tk. 351.32/500 ml

Repotyn (*ACI*),Inj.(IV infusion),Tk. 351.32/500 ml

Vigosol (*Square*), Inj.(IV infusion),Tk. 352/500ml

16.1.3 GLUCOSE (DEXTROSE MONOHYDRATE) SOLUTION

Dextrose solutions (5 are mainly used to replace water deficits and should be given alone when there is no significant loss of electrolytes. Average water requirements in a healthy adult are 1.5 to 2.5 liters daily and this is needed to balance unavoidable losses of water

through the skin and lungs and to provide sufficient for urinary excretion. Excessive loss of water without loss of electrolytes is uncommon, occurring in fever, hyperthyroidism and in uncommon water-losing renal states such as diabetes insipidus or hypercalcaemia. Glucose solutions are also given in regimens with calcium, bicarbonate and insulin for the emergency management of hyperkalaemia. They are also given, after correction of hyperglycemia, during treatment of diabetic ketoacidosis, when they must be accompanied by continuing insulin infusion.

GLUCOSE (DEXTROSE MONOHYDRATE) ^[ED]

Indications: Fluid replacement, provision of energy

Side-effects: Venous irritation and thrombophlebitis

Dose: Dose of water replacement described above. Energy source, 1-3 liters daily of 20-50% solution

Proprietary Preparations

Dexaqua (*Beximco*), Inj. (IV Infusion) DS 10%, 78.20/500ml ml; Tk. 105.80/1000ml; ml; 5%, Tk. 71.30/500ml ml; Tk. 92.99/1000ml; ml

Dextropac (*Orion*), Inj. (IV Infusion), 25%, Tk. 73.22/250 ml; Tk. 48.14/100 ml, 10%, Tk. 78.20/500 ml; Tk. 105.80/1000 ml; 5%, Tk. 71.30/500 ml

Dextrose (*Opso Saline*), Inj., (IV Infusion,) 10%, Tk. 105.48/1000 ml; Tk. 77.96/500 ml; 25%, Tk. 21.7/100 ml; Tk. 45.29/250 ml; Tk. 6.89/25 ml; 5%, Tk. 100.89/1000 ml; Tk. 71.08/500 ml

Glucolin (*Popular I*), Inj (IV Infusion,) DS 10%, Tk. 78.20/500ml ml; Tk. 105.80/1000 ml, 5%, Tk. 71.30/500 ml, Tk. 92.00/1000 ml

Infudex (*Square*), Inj., (IV Infusion), 10%, Tk. 105.8/1000ml; Tk. 78.2/500ml; ;5%, Tk. 92/1000ml; Tk. 71.3/500ml

Infusol (*Beacon*), Inj., (IV Infusion), 10%, Tk. 125.38/500ml

Libott (*Libra*), Inj., (IV Infusion), 10%, 500ml, Tk. 78.20/500ml; ml; Tk. 105.80/1000ml ml; 25%, Tk. 73.22/250ml; 48.14/100ml 5%, 91.99/1000ml; ml Tk. 71.3/500ml

Nutridex (*Beximco*), Inj., (IV Infusion,) 25%, Tk. 37.55/100 ml; Tk. 61.08/250 ml;

Sodium chloride and glucose solutions are indicated when there is combined water and sodium depletion. A 1 :1 mixture of isotonic sodium chloride and 5% glucose allows some of the water (free of sodium) to enter body cells which suffer most from dehydration while the sodium salt with a volume of water determined by the normal plasma sodium ions remains extracellular. Combined sodium, potassium, chloride and water depletion may occur in severe diarrhoea or persistent vomiting. In that case replacement is carried out with sodium chloride intravenous infusion 0.9% and glucose intravenous infusion 5% with potassium as appropriate.

IV infusion of sodium and glucose: normal strength sodium chloride 0.18% and 4% of anhydrous glucose.

Proprietary Preparations

Dextrose Anhydrous + Sodium Chloride

ADS (Libra), Inj., (IV Infusion), 10% + 0.225%, Tk. 106.95/1000ml; Tk. 80.50/500ml

APN (*Opso Saline*), Inj., (IV Infusion),, 100 mg

+ 2.25 mg/ml, Tk. 64.90/1000 ml

Baby Saline (*Libra*), Inj., (IV Infusion), 5% + 0.225 % ml, , Tk. 55.20/100 ml, 10 gm + 225

mg/100 ml Tk. 72.24/500 ml

Baby Sol (*Opso Saline*), Inj., (IV Infusion), 5%

+ 0.225%, Tk. 72.23/500ml

Baby Sol Junior (*Opso Saline*), Inj., (IV

Infusion), 5% + 0.45% Tk. 73.38/500 ml

Babysol (*Opso Saline*) Inj., (IV Infusion), 50

mg + 2.25 mg/ml, Tk. 72.23/500 ml

Babysol Junior (*Opso Saline*), Inj (IV

Infusion), 50mg+4.5mg/ml, Tk. 73.38/500 ml

Dexoride (*Beximco*), Inj., (IV Infusion), 5% +

0.9%, Tk. 101.00/1000 ml; Tk. 75.90/500 ml

Dextrosal (*Orion*), Inj., (IV Infusion), 5% +

0.9%, Tk. 75.89/500 ml; Tk. 101.19/1000 ml

Dextrosal-Baby (*Orion*), Inj., (IV Infusion),,

5% + 0.225%, Tk. 72.24/500 ml

Dextrose Monohydrate + Sodium Chloride

Dextrose+sodium chloride (*Opso Saline*),

Inj., (IV Infusion), 50 mg + 9 mg/ml, Tk.

75.66/500 ml;

Dextros-ISO (*Orion*), Inj., (IV Infusion), 4.3%

+ 0.18%, Tk. 71.30/500 ml; Tk. 94.08/1000 ml

Dextros-Mini (*Orion*), Inj., (IV Infusion), 5% +

0.45%, Tk. 73.60/500 ml

Electrodex-10 (*Orion*), Inj., (IV Infusion), 10%

+ 0.225%, Tk. 66.07/500 ml; Tk. 87.52/1000

ml bag solution

Glucosal (*Popular*), Inj., (IV Infusion), 0.9gm +

5gm/100ml, Tk. 75.89/500 ml, Tk. 101.19/1000ml

16.1.4 DEXTROSE (GLUCOSE) SALINE

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Glucosol M (Popular), Inj., (IV Infusion), 0.18gm + 4.3gm/100ml, Tk. 71.09/500 ml, Tk. 94.08/1000 ml
Infusol Plus (Beacon), Inj., (IV Infusion), 5gm + 900 mg/100 ml, Tk. 115.35/500 ml
Isodex (Square), Inj., (IV Infusion), 5 gm + 180 mg/100 ml Tk. 91.34/1000ml
Isoride (Beximco), Inj., (IV Infusion), 4.3% + 0.18 %, Tk. 91.30/1000 ml; Tk. 71.09/500 ml
Libott-M (Libra), Inj., (IV Infusion), 10% + 0.18 %, Tk. 71.30/500 ml; Tk. 94.09/1000 ml
Libott-S (Libra), Inj., (IV Infusion), 5% + 0.9% Tk. 76.22/500 ml; Tk.101.20/1000 ml
Libott-S Jr (Libra), Inj., (IV Infusion), 5% g+ 0.45%, Tk. 73.60/500 ml
Neosol (Beximco), Inj (IV Infusion), 5% + 0.225%, Tk. 55.20/250 ml
Neosol DS (Beximco), Inj (IV Infusion), 5% + 0.45%, Tk. 55.20/250 ml; Tk. 73.60/500 ml
Pedisol (Popular), Inj (IV Infusion), 0.225gm + 0.50gm / 100ml, Tk. 80.50/500 ml, Tk. 64.69/100 ml
Pedisol DS (Popular), Inj., (IV Infusion), 0.225gm + 10gm / 100ml, Tk. 80.50/100 ml
Solodex (Square), Inj., (IV Infusion), 0.9% + 5%, Tk. 101.20/1000ml, Tk. 75.89/500ml
SolodexBabyIV (Square), Inj., (IV Infusion) 0.225%+ 5%, Tk. 72.45/500ml;
SolodexJR (Square), Inj., (IV Infusion), 0.45% + 5%, Tk. 73.6/500ml;

INFUSION FLUIDS FOR PARENTERAL FEEDING

Purified soybean oil(Fat emulsion)
Fatisol (Popular), IV Inj., 10.00gm/100ml, Tk. 380.00/100ml, Tk. 580.00/250ml, Tk. 910.00/500ml
Intralipid ⁽ⁱ⁾ (Fresenius) IV Inj. 10% Tk 1200/500ml bottle
Glucose Solution 19% 526ml + amino acid solution 300ml+ fat emulsion (intralipid 20%) 200ml
Kabiven ⁽ⁱ⁾ (Fresenius) IV infusion (three chamber in one) Tk. 2,780/Bag, (885ml+ a 300ml+ 255ml) Tk. 2,650.00/

16.1.5 PLASMA AND PLASMA SUBSTITUTES

Albumin solutions are used for the treatment of severe hypoproteinaemia, particularly when associated with a low plasma volume. Concentrated albumin solutions may also be used to obtain a diuresis in hypoalbuminaemic patients. The use of albumin solutions in acute

plasma or blood loss may be wasteful; plasma substitutes are more appropriate.

HUMAN ALBUMIN SOLUTION

Indications: Albumin solutions are used for the treatment of severe hypoproteinaemia, particularly when associated with a low plasma volume. A solution of protein derived from human plasma, serum or normal placenta; at least 95% of the protein is albumin. The solution may be isotonic; concentration varies from 4-5% to 15-25%

Cautions: Cardiac or circulatory disease (to avoid rapid rise in blood pressure and cardiac failure administer slowly and monitor cardiovascular and respiratory function)

Contra-indications: Cardiac failure; severe anaemia

Side-effects: Allergic reactions with nausea, vomiting, increased salivation, fever, tachycardia, hypotension and chills reported

Proprietary Preparations

Albumin Human ⁽ⁱ⁾ (Octapharma), IV Infusion 20% Bottles 50ml, 100ml; Tk.3806.34/100ml; Tk.1903.17/50ml
Albutein ⁽ⁱ⁾ (Therapeutic Corp). IV Infusion 5%.Tk.3144.37/250ml; 25%, Tk.2676.83/50ml; Tk.5281.80/100ml 20%.Tk 2052/50ml; 4046.61/100ml
Albutein ⁽ⁱ⁾ (Grifol) IV Infusion 5%.Tk.3144.37/250ml; 25%, Tk.4,796.14/50ml; Tk.9628.00/100ml 20%.Tk 2052/50ml; 7694.00/100ml
Biotest Human Albumin ⁽ⁱ⁾ (Biotest.), IV Infusion 20%; Tk.2802/50ml.
Human Albumin ⁽ⁱ⁾ (Bioplazma) IV Infusion 20%; Tk.5863.34/100ml; Tk.2968.56/50ml vial
Human Albumin Baxter ⁽ⁱ⁾ (Baxter) IV Infusion 20%; Tk.4211.56/50ml; Tk.7195.23/ 100ml

PLASMA ISOTONIC SOLUTIONS

Indications: Acute or sub-acute loss of plasma volume in case of burns, pancreatitis, trauma and complications of surgery and plasma exchange
Usual concentration is Human Albumin Solution 4.5%

HUMAN PLASMA CONCENTRATED SOLUTIONS (20-25%)

Indications: Severe hypoalbuminaemia associated with low plasma volume and generalised oedema where salt and water restriction with plasma volume expansion are required; adjunct in the treatment of hyperbilirubinaemia by exchange transfusion in the newborn

PLASMA SUBSTITUTES

Plasma substitutes should be used to maintain plasma volume in conditions like burns or peritonitis where there is loss of plasma protein, water and electrolytes over periods of several days or weeks. In these conditions, plasma or plasma protein fractions containing large amounts of albumin should be given.

Dextran, Gelatin and Hetastarch, pentastarch (etherified starches) are the plasma substitutes generally used which are metabolised slowly.

Dextran 70 by IV infusion is used predominantly for volume expansion. Dextran 40 IV infusion is used in an attempt to improve peripheral blood flow in ischaemic disease of the limbs.

DEXTRAN 40

Indications: Peripheral local slowing of the blood flow; prophylaxis of post-surgical thromboembolic disease

Cautions: Plasma substitutes should be used with caution in patients with cardiac disease or renal impairment. Monitoring urine output is necessary during treatment. Care should be taken to avoid haematocrit concentration from falling below 25-30% and the patient should be monitored for hypersensitivity reactions

Side-effects: Hypersensitivity reactions may occur including, rarely, severe anaphylactoid reactions

Dose: By IV infusion, initially 500-1000 ml; further doses are given according to the patient's condition

Generic Preparations

IV Infusion 10% Saline in Dextrose 5%
10% Solution Normal Saline

DEXTRAN 70 [ED]

Indications: For short-term blood volume expansion

Cautions: See notes for Dextran 40

Side-effects: See notes for Dextran 40

Dose: By intravenous infusion, after moderate to severe haemorrhage or in the shock phase of burn injury (initial 48 hours), 500-1000 ml rapidly initially followed by 500 ml if necessary

Generic Preparation

Dextran-70 6% in Normal Saline (IV Infusion)
500 ml bag.

GELATIN

Indication: Low blood volume

Cautions: Used with caution in patients with cardiac disease or renal impairment

Side-effects: Hypersensitivity reactions may occur, transient increase in bleeding time may occur

Dose: By IV infusion, initially 500-1000 ml of a 3.5-4% solution

Generic Preparation

IV Infusion 3.5-4% Modified Gelatin Solution

HETASTARCH, HEXASTARCH AND PENTASTARCH (ETHERIFIED STARCH)

Indications: They are used at the outset to expand and maintain blood volume in shock arising from conditions such as burns or septicaemia

Cautions: Should not be used to maintain plasma volume in conditions such as burns or peritonitis where there is loss of plasma protein, water and electrolytes over periods of several days or weeks. In these situations, plasma or plasma protein functions containing large amounts of albumin should be given

Side-effects: hypersensitivity reactions, severe anaphylactoid reactions

Proprietary Preparations

Haes Steril⁽¹⁾ (Fresenius), IV Infusion, 6%Tk.
607.77/500ml

Plasmex (Beacon), IV Infusion, ,6% Tk.
650/500ml

Voluven⁽¹⁾ (Fresenius), IV Infusion, ,6% Tk.
631/500ml

16. NUTRITION

16.2. ORAL NUTRITION

16.2.1 FOODS FOR SPECIAL DIET

Malnutrition is one of the most important health problems of Bangladesh population. Apart from the highly prevalent nutritional diseases, particularly affecting mothers and children, malnutrition is the underlying cause of many associated diseases from which millions suffer almost every day. The most prevalent nutritional diseases or states are protein energy malnutrition, nutritional anaemias (particularly iron deficiency), riboflavine deficiency and vitamin C deficiency. The most important cause of this malnutrition is poor dietary intake and intake of unbalanced diet. Therefore, any formulation of prescription of medicinal remedies must be combined or even preceded by advice on dietary improvement to balance the diet of the consumer.

There are preparations that have been modified to eliminate a particular constituent from food or are nutrient mixtures formulated as substitutes for the food, for patients, who either cannot tolerate or cannot metabolize certain common constituents of food.

PHENYLKETONURIA

Phenylketonuria which results from the inability to metabolize phenylalanine, is required to restrict its dietary intake to a small amount sufficient for tissue building and repair. Aspartamine contributes to phenylalanine intake and should be avoided.

COELIAC DISEASE

Coeliac disease, which results from an intolerance of gluten, is managed by completely eliminating gluten from the diet.

Recipes for Treatment of Severe PEM: WHO has suggested the following three recipes :

(1) Starter Recipes (a) :

Dried skimmed milk (g)	25
Sugar (g)	100
Vegetable oil (g)	30
Electrolyte mineral solution (ml)	20
Water to make	1000 ml
Contains 75 Kcal and 0.9 g protein per	100 ml

(2) Catch Up (b) :	
Dried skimmed milk (g)	80
Sugar (g)	50
Vegetable oil (ml)	60
Electrolyte mineral solution (ml)	20
Water to make	1000 ml
Provides 100 Kcal and 2.9 protein per	100 ml

(3) Catch Up (c) :	
Dried skimmed milk (g)	90
Sugar (g)	65
Vegetable oil	85
Electrolyte mineral solution (ml)	27
Water to make	1000 ml
Provides 135 kcal and 3.3 g protein per	100 ml

(a) Comparable starter formulas can be made from 35 g whole dried milk, 100 g sugar, 20 g oil, 20 ml of electrolyte/mineral solution and water up to 1000 ml.

(b) Comparable catch up formulas can be made from 110 g of dried whole milk, 50g sugar, 30 g oil, 20ml of electrolyte/mineral solution and water to 1000ml.

OR

880 ml of fresh cows milk, 75 g sugar, 20 ml oil and 20 ml electrolyte mineral solution and water up to 1000ml.

(c) For use in special circumstances in case of low weight gain or possible inadequate feeding

RECIPE FOR ELECTROLYTE/ MINERAL SOLUTION :

Potassium Chloride	224 g	24 mmol
Tripotassium Citrate	81	2 mmol
Magnesium Chloride	76	3 mmol
Zinc Acetate	8.2	300 µmol
Copper sulphate	1.4	45 µmol
Water make up to		2500 ml

16.2.2 MINERALS

IRON

Oral iron

Iron salts should be given by mouth unless there are good reasons for using another route. Ferrous salts show only marginal differences between one another in efficiency of absorption of iron. Haemoglobin regeneration rate is little affected by the type of salt used provided sufficient iron is given, and in most patients the speed of response is not critical. Choice of preparation is thus usually decided by the incidence of side-effects and cost. The oral dose of elemental iron for iron-deficiency anaemia should be 100 to 200mg daily. It is customary to give this as dried ferrous sulfate, 200 mg (: 65mg elemental iron) three times daily; for prophylaxis of iron-deficiency anaemia, a dose of ferrous sulfate 200 mg once or twice daily may be effective. For treatment of iron-deficiency anaemia in children and for prophylaxis of iron-deficiency anaemia in babies of low birth weight, see BNF for Children.

Therapeutic response The haemoglobin concentration should rise by about 100–200 mg/100mL (1–2 g/litre) per day or 2 g/100mL (20 g/litre) over 3–4 weeks. When the haemoglobin is in the reference range, treatment should be continued for a further 3 months to replenish the iron stores. Epithelial tissue changes such as atrophic glossitis and koilonychia are usually improved, but the response is often slow.

Side-effects: Gastro-intestinal irritation can occur with iron salts. Nausea and epigastric pain are dose related, but the relationship between dose and altered bowel habit (constipation or diarrhoea) is less clear. Oral iron, particularly modified-release preparations, can exacerbate diarrhoea in patients with inflammatory bowel disease; care is also needed in patients with intestinal strictures and diverticular disease.

Iron preparations taken orally can be constipating, particularly in older patients and occasionally lead to faecal impaction. If side-effects occur, the dose may be reduced; alternatively, another iron salt may be used, but an improvement in tolerance may simply be a result of a lower content of elemental

iron. The incidence of side-effects due to ferrous sulfate is no greater than with other iron salts when compared on the basis of equivalent amounts of elemental iron.

Iron preparations are a common cause of accidental overdose in children. For the treatment of iron overdose,

Parenteral iron

Iron can be administered parenterally as iron dextran, iron sucrose, ferric carboxymaltose, iron isomaltoside 1000, or ferumoxytol. Parenteral iron is generally reserved for use when oral therapy is unsuccessful because the patient cannot tolerate oral iron, or does not take it reliably, or if there is continuing blood loss, or in malabsorption. Parenteral iron may also have a role in the management of chemotherapy-induced anaemia, when given with erythropoietins, in specific patient groups.

(See also section 15.1.1)

16.2.2.1 CALCIUM & CALCIUM SUPPLEMENTS

- 16.2.2.2 HYPERCALCAEMIA
- 16.2.2.3 MAGNESIUM
- 16.2.2.4 PHOSPHATE SUPPLEMENTS AND PHOSPHATE BINDING AGENTS
- 16.2.2.5 FLOURIDE (See Dental Practitioner's formulary)
- 16.2.2.6 IODINE
- 16.2.2.7 ZINC

Dietary intake of calcium is generally yet deficiency signs are not very overt. Dietary requirement varies with age and physiological status is relatively greater in childhood and pregnancy and lactation due to increased demand and in old age due to impaired absorption. In osteoporosis, a calcium intake double the recommended amount reduces the bone loss.

CALCIUM SALTS

Indications : Deficient dietary intake as in childhood, rickets, pregnancy and

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lactation, in old age due to impaired absorption, osteomalacia, osteoporosis, hypocalcaemic tetany, neonatal tetany, systolic cardiac arrest

Contra-indications: Conditions associated with hypercalcaemia and hypercalcuria

Cautions: Renal impairment, sarcoidosis. Concurrent administration with thiazide diuretics may increase the risk of hypercalcaemia

Side-effects: Mild gastrointestinal disturbances, bradycardia, arrhythmia and irritation after injection

Dose: By mouth up to 29 ml calcium daily in divided doses as calcium gluconate, lactate or pentothenate. By very slow injection IV of calcium gluconate 1-2 g (2.25-4.5 mmol of Ca⁺⁺); CHILD half the adult dose by slow IV route

CALCIUM CARBONATE

Proprietary Preparations

A-Cal (Acme), Tab., 250 mg, Tk. 1.00/Tab.; Tab., 500 mg, Tk. 3.51/Tab.
Acical (ACI), Tab., 500 mg, Tk. 4.01/Tab.; 250 mg, Tk. 3.01/Tab.
Ambeecal (Ambee), Tab., 500 mg, Tk. 2.01/Tab.
Aristocal (Beximco), Tab., 500mg, Tk. 4.00/Tab.
Bonec (Orion), Tab., 500 mg, Tk. 3.51/Tab.
Boni (Delta), Tab., 500 mg, Tk. 3.00/Tab.
Bpcal (Bristol), Tab., 500mg, Tk. 2.00/Tab.
Cal (Pacific), Tab., 250 mg, Tk. 3.00/Tab.; 500 mg, Tk. 5.00/Tab.;
Calbo (Square), Tab., 500 mg, Tk. 5.00/Tab.; 250 mg, Tk. 3.01/Tab.
Calbon (Aristo), Tab., 500mg, Tk. 5.00/Tab.
Calcarb (Alco), Tab., 500 mg, Tk. 4.00/Tab.
Calcibo (Astra Bio), Tab., 500 mg, Tk. 3.00/Tab.
Calcibost (Sharif), Tab., 500 mg, Tk. 3.01/Tab.
Calcicar (Incepta), Tab., 500 mg, Tk. 2.50/Tab.
Calcid (Opsonin), Tab., 400 mg, Tk. 2.01/Tab.
Calcifil (G.A.Co), Tab., 500 mg, Tk. 3.27/Tab.
Calcin (Renata), Tab., 500 mg, Tk. 5.00/Tab.
Calciton (Chemist), Tab. 500 mg, Tk. 2/Tab.
Calcium (Albion), Tab., 250 mg, Tk. 2/Tab.; 500 mg, Tk. 2.00/Tab.
Calcizen DS (Zenith), Tab., 500 mg, Tk. 2.01/Tab.
Caldical (Ziska), Tab., 500 mg, Tk. 2.50/Tab.

Caldil (Drug Intl), Tab., 500mg, Tk. 4.00/Tab.
Calfor (Asiatic), Tab. 500 mg, Tk. 2.50/Tab.
Calmet (Somatec), Tab. 500 mg, Tk. 3.00/Tab.
Calmi (Alco), Tab., 500 mg, Tk. 4.01/Tab.
Calos (Modern), Tab., 500 mg, Tk. 4.00/Tab.
Calsil (Silva), Tab., 500mg, Tk. 4.00/Tab.
Calsto (Monico), Tab., 500mg, Tk. 2.00/Tab.
Caltonic (Globex), Tab. 500 mg, Tk. 4.00/Tab.
Carben (Benham), Tab. 500 mg, Tk. 3.50/Tab.
Carbocal (Globe), Tab., 500 mg, Tk. 2.20/Tab.
Casalt (Kemiko), Tab., 500 mg, Tk. 4.01/Tab.
Cenet (Central), Tab. 500 mg, Tk. 1.60/Tab.
Costin (General), Tab., 500mg, Tk. 4.00/Tab.
Eurocal (Euro), Tab., 500 mg, Tk. 4.5/Tab.
Forbon (SMC Enterprise), Tab., 500 mg, Tk. 3.00/Tab.
Gravite (Bios), Tab., 500 mg, Tk. 2.40/Tab.
Ipical (Ibn Sina), Tab., 500 mg, Tk. 3.50/Tab.
Ipical (Ibn Sina), Tab., 500 mg, Tk. 3.50/Tab.
Jasocal (Jayson), Tab., 250 mg, Tk. 1.50/Tab., 500mg, Tk. 2.01/Tab.
Kidcal (Acme), Chewable Tab., 250 mg, Tk. 1.51/Tab.
Maxical (Orion), Tab., 500 mg, Tk. 3.52/Tab.
Med-Cal (Medimet), Tab., 500 mg, Tk. 2.00/Tab.
Miracal (Navana), Tab., 500 mg, Tk. 4.00/Tab.; Tab., 250 mg, Tk. 2.00/Tab.
Monocal (Concord), Tab., 500 mg, Tk. 4.00/Tab.
Mycal (Organic), Tab., 500 mg, Tk. 3.01/Tab.
Myocal (Nipa), Tab., 500 mg, Tk. 3.00/Tab.
Naafcal (Naafco), Tab., 500 mg, Tk. 4.00/Tab.
Neocal (White Horse), Tab., 500 mg, Tk. 2.50/Tab.
Oracal (Amico), Tab., 500mg, Tk. 2.00/Tab.
Orthocal (Biopharma), Tab. 500 mg, Tk. 4.00/Tab.
Orthocal (Biopharma), Tab., 500mg, Tk. 4.00/Tab.
Oscal (UniMed), Tab. 500 mg, Tk. 3.50/Tab.
Ostacid (Rangs), Tab., 500 mg, Tk. 3.50/Tab.
Ostimet (Virgo), Tab., 500 mg, Tk. 3.00/Tab.
Ostocal (Eskayef), Tab. 500 mg, Tk. 4.00/Tab.
Ostocal (Eskayef), Tab. 250 mg, Tk. 2.00/Tab.; 500 mg, Tk. 3.00/Tab.
Ostogen (Opsonin), Tab., 250 mg, Tk. 2.01/Tab., 500 mg, Tk. 3.26/Tab.
Protebon (Beacon), Tab. 500 mg, Tk. 2.01/Tab.
Rejuven (Novo Health), Tab., 250 mg, Tk. 1.50/Tab.; 500 mg, Tk. 3.00/Tab.
Rocal (Healthcare), Tab., 500mg, Tk. 2.00/Tab.
Sandocal (Novartis), Tab., 500 mg, Tk. 5/Tab.
Sucal (Supreme), Tab. 500 mg, Tk. 3.25/Tab.
Sycal (MST), Tab., 500 mg, Tk. 2.50/Tab.
Tumy (Eskayef), Tab. 250 mg, Tk. 1.50/Tab.

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Xcid (*Square*), chewable Tab. 1000 mg , Tk. 2.01/Tab.
Xtracal (*Pharmasia*), Tab., 500 mg, Tk. 4/Tab.

CALCIUM GLUCONATE^[ED]

Proprietary Preparations

Calcium ambee (*Ambee*), Inj. 500mg/5 ml, Tk. 6.22/5 ml Amp.
Calcium-Jayson (*Jayson*), Inj., 10%, Tk. 9.74/10 ml Amp.; Tk. 9.15/5 ml Amp.
G-Calcium Gluconate (*Gonoshasthaya*), Inj., 10%, Tk. 9.16/5 ml Amp.

CALCIUM LACTATE

Proprietary Preparations

Calcitate (*G.A.Co*), Tab., 300 mg, Tk. 0.71/Tab.
Calcitate (*Ambee*), Tab. 300 mg, Tk. 0.29/Tab.
Calson (*Hudson*), Tab. 300 mg, Tk. 0.29/Tab.
Calcizen (*Zenith*), Tab., 300 mg, Tk. 0.30/Tab.
Lactocal (*Acme*) Tab., 300 mg, Tk. 0.30/Tab.
Calac (*Opsonin*), Tab., 300 mg, Tk. 0.31/Tab.
G-CALCIUM LACTATE (*Gonoshasthaya*), Tab., 300 mg, Tk. 0.40/Tab..

CALCIUM OROTATE

Proprietary Preparations

Calborate (*Square*) Tab., 400 mg, Tk. 8.03/Tab., 740mg, Tk. 12.03/Tab.
Calcin (*Renata*), Tab., 400 mg, Tk. 8.00/Tab., 740mg, Tk. 12.00/Tab.
Caldil (*Drug Intl*), Tab., 400mg, Tk. 8.05/Tab.
Calofast (*Eskayef*), Tab., 400mg , Tk. 8.00/Tab.; 400mg , Tk. 8.00/Tab.
Calorate (*Beximco*), Tab., 740mg, Tk. 10.00/Tab, 400mg, Tk. 8.00/Tab.
Cden (*Sanofi*), Tab., 740mg, Tk. 12.00/Tab.
Effical (*Globe*), Tab., 400 mg, Tk. 8.00/Tab.
Intracal (*Incepta*), Tab., 400 mg, Tk. 8.00/Tab.; 740 mg, Tk. 10.00/Tab.
O-Cal (*Acme*), Tab., 740 mg , Tk. 10.00/Tab.
Orcical (*Ibn Sina*), Tab., 400mg, Tk. 8.00/Tab.; 740mg, Tk. 10.00/Tab.
Ortical (*Opsonin*), Tab., 400 mg, Tk. 6.02/Tab.
Protebon (*Beacon*), Tab., 400mg , Tk. 8.02/Tab.
Rotacal (*ACI*), Tab., 400mg, Tk. 8.00/Tab.; 740mg, Tk. 12.00/Tab. ;

CALCIUM PENTOTHENATE

Proprietary Preparations

Calci (*Opsonin*), Inj. 100mg, Tk. 3.52/amp

Calcinate (*G.Aco*), Inj. 100mg, Tk. 3.50/amp
Pantoson (*Jayson*), Inj. 100mg, Tk. 3.85/amp

CALCIUM AND VITAMIN C

Indications: Increased demand for calcium and vitamin C e.g pregnancy, lactation, period of rapid growth, old age, infectious disease, convalescence; treatment for calcium and vitamin C deficiency; adjuvant in colds and influenza

Contra-indications: Hypersensitivity to drug, hypercalciuria, severe renal failure

Cautions: Impaired renal function; reduce dosage or discontinue therapy if necessary

Side-effects: Mild gastrointestinal disturbance

Dose: ADULT 1 tablet daily; CHILD; half tablet daily

Proprietary Preparations

Acical-C (*ACI*), Tab. Tk. 11.03/Tab.
C-4 (*Alco*), Tab., Tk. 8.02/Tab.
C4(Alco) Tab., Tk. 8.00/Tab
CaC-1000 (*Novartis*), Effervescent Tab., Tk. 15.00/Tab.
Calbo-C (*Square*), Tab., Tk. 7.88/Tab.
Cavic C (*Incepta*), Effervescent Tab., Tk. 10.00/Tab.
CavicPlus (*Incepta*), Effervescent Tab., Tk. 10.00/Tab.
Ostocal (*Easkayef*) Tab., Tk. 8.00/Tab.
Ostogen C (*Opsonin*) Tab., Tk. 8.06/Tab.
Ostogen C Plus (*Opsonin*) Tab., Tk. 7.064/Tab
Ultracal-C (*Popular*), Tab., Tk. 10.54/Tab.

CALCIUM WITH VITAMIN D₃

Indications: Calcium is necessary for many normal functions of body, especially bone formation and maintenance. Vitamin D is important for the absorption of calcium from the stomach and for the functioning of calcium in the body. Calcium and vitamin D combination is used to prevent or to treat a calcium deficiency.

Proprietary Preparations

A-Cal D (*Acme*), Tab., 500 mg + 200 IU, Tk. 6.50/Tab. 500 mg+400IU, Tk. 7.50/Tab
Acical-D (*ACI*), Tab. 500 mg + 200 IU, Tk. 7.00/Tab.

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- Adcal D** (*Amulet*), Tab. , 500 mg + 200 IU, Tk. 4.00/Tab.
- Ambeecal-D** (*Ambee*), 500 mg + 200 IU, Tk. 3.31/Tab
- Apocal D** (*Apex*), Tab. , 500 mg + 200 IU, Tk. 4.00/Tab.
- Aristocal D** (*Beximcoi*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab.
- Beucal D** (*Julpher*), Tab., 500 mg + 200 IU, Tk. 5.00/Tab.
- Boni D** (*Delta*), Tab. , 500 mg + 200 IU, Tk. 4.00/Tab.
- BPcal** (*Bristol*), Tab. 500mg + 200 IU, Tk. 3.30/Tab.;600 mg + 400 IU, Tk. 3.30/Tab.
- Cadmin** (*General*), Tab. , 500 mg + 200 IU, Tk. 3.32/Tab.,
- Cadolín** (*Jayson*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab
- Cal D** (*Pacific*), Tab., 500 mg + 200 IU , Tk. 7.00/Tab.
- Calbo D** (*Square*), Tab. , 500 mg + 200 IU, Tk. 7.00/Tab.
- Calbo D vita** (*Square*), EffervescentTab., 600 mg + 400 IU, Tk. 15.05/Tab
- Calbon-D** (*Aristo*), Tab. , 500 mg + 200 IU, Tk. 7.00/Tab.
- Calcibo-D** (*Astra*), Tablet, 500 mg + 200 IU, Tk. 4.00/Tab. .,
- Calcibost-D** (*Sharif*), Tab. , 500 mg + 200 IU, Tk. 4.01/Tab.,
- Calci-D** (*Rephco*), Tab. , 500 mg + 200 IU, Tk. 2.00/Tab.
- Calci-D plus** (*Rephco*), Tab. , 500 mg + 400 IU, Tk. 4.30/Tab.
- Calcifil** (*G.A.Co*), Tab.,500 mg + 200 IU, Tk. 4.02/Tab.;
- Calcin-D** (*Renata*), Tab. , 500 mg + 200 IU, Tk. 7.00/Tab.,
- Caldical-D** (*Ziska*), Tab., 500 mg + 200 IU, Tk.4.00/Tab.
- Caldil Plus** (*Drug Int.*), Tab. , 500 mg + 200 IU, Tk. 6.00/Tab.
- Caldivit** (*G.S.K*), Tab. , 500 mg + 200 IU, Tk. 3.52/Tab.
- Caldolin** (*Chemist*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab
- Calfor D** (*Asiatic*), Tab. , 500 mg + 200 IU, Tk. 6.00/Tab.
- Calget (*Getwell*), Tab.500mg + 200 IU, Tk. 7.00/Tab.
- Calmet D** (*Somatec*), 500 mg + 200 IU, Tk.
- Calmi-D**(*Alco*), Tab. , 500 mg + 200 IU, Tk. 5.02/Tab.
- Calsil** (*Silva*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab.
- Calsto** (*Monico*), Tab., 500mg + 200IU, Tk. 5.00/Tab.
- Caltonic-D** (*Globex*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab.
- Calvimax** (*Incepta*), Tab., 500 mg + 200 IU, Tk. 5.00/Tab.
- Carben -D** (*Benham*), Tab. , 500 mg + 200 IU, Tk. 4.00/Tab.
- Carbocal** (*Globe*), Tab. , 500 mg + 200 IU, Tk. 7.00/Tab.
- Carbocal-D** (*Globe*), Tab., 500 mg + 200 IU, Tk. 5.00/Tab.
- Casalt-D** (*Kemiko*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab.
- Corabon** (*Nuvista*), Tab. , 500 mg + 200 I.U., Tk. 10.03/Tab.
- Coralcal-D**, (*Radiant*), Tab., 500mg + 200IU, Tk. 11.00/Tab.; DX 600mg + 400IU, Tk. 15.05/Tab.
- DOS** (*Central*), Tab. , 500 mg + 200 IU, Tk. 4.00/Tab.
- Eurocal** (*Euro*), Tab., 500mg + 200IU, Tk. 6.5/Tab.
- FizyCal** (*Incepta*), Effervescent Tab. 600 mg + 400 IU., Tk. 15.00/Tab
- Ipical-D** (*Ibn Sina*), Tab., 600mg+400 IU, Tk. 8.00/Tab. ; 500mg + 200 IU, Tk. 5.00/Tab
- Labcal D** (*Labaid*), Tab. , 500 mg + 200 IU, Tk. 7.00/Tab.
- Maxical** (*Orion*), Tab. 500mg + 200 IU., Tk. 8.85/Tab.
- Miracal-D** (*Navana*), Tab., 500 mg + 200 IU, Tk. 5.00/Tab.
- Monocal D** (*Concord*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab.
- Mycal** (*Organic*), Tab., 500mg + 200 IU, Tk. 6.00/Tab. ; 600 mg + 400 IU, Tk. 6.00/Tab.
- Myocal-d (*Nipa*), Tab. , 500 mg + 200 IU, Tk. 7.00/Tab.
- Naafcal-D**(*Naafco*), Tab. , 600 mg + 400 IU, Tk. 8.00/Tab.; 500 mg + 200 IU, Tk. 7.00/Tab.
- Novacal-D** (*Leon*), Tab. , 500 mg + 200 IU, Tk. 4.00/Tab.
- Nutribon** (*Veritas*), Tab., 500 mg + 200 IU, Tk. 6.00/Tab.
- Oceancal** (*General*), Tab. , 600mg + 400IU, Tk. 15.00/Tab.
- Onecal**(*One Pharma*), Tab., 500 mg + 200 IU , Tk. 4.99/Tab.
- Oracal-D** (*Amico*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab.
- Orthocal-D**, (*Biopharma*), Tab., 500mg + 200IU, Tk. 6.00/Tab.;
- Oscal** (*UniMed*), Tab. ;500 mg + 400 IU, Tk. 5.00/Tab. 600 mg + 400 IU, Tk.6.00/Tab
- Ostacid-D** (*Rangs*), Tab., 500 mg + 200 IU, Tk. 4.00/Tab.
- Ostimet** (*Virgo*), Tab. , 500 mg + 200 IU, Tk. 5.00/Tab.
- Ostium-D** (*APC*), Tab., 500 mg + 200 IU, Tk. 3.50/Tab.
- Ostocal D** (*Eskayef*), Tab, 500 mg + 200 IU, Tk. 7.00/Ta
- Ostogen D** (*Opsonin*), Tab., 600 mg + 400 IU, Tk. 6.00/Tab. ; 500 mg + 200 IU, Tk. 5.02/Tab.
- Protebon D** (*Beacon*), Tab., 500 mg + 200 IU, Tk. 7.00/Tab.

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Rejuven (Novo Health), Tab., 500 mg + 200 IU, Tk. 4.00/Tab.

Rocal- D Vita (Healthcare), Tab., 600 mg + 400 IU, Tk. 15.00/Tab.

Rocal-D (Healthcare), Tab., 500 mg + 200 IU, Tk. 8.00/Tab.

Sandocal D (Novartis), Tab., 500 mg + 200 IU, Tk. 7.00/Tab.

Starcal D (Nipro JMI), Tab., 500 mg + 200 IU, Tk. 6.00/Tab.; 500 mg + 400 IU, Tk. 8.00/Tab.

Sucal-D (Supreme), 500mg+200IU, Tk. 4.00/Tab.

Sycal-D (MST), Tab., 500 mg + 200 IU, Tk. 4.00/Tab.

Temcal (Team), Tab., 500 mg + 200 IU, Tk. 6.50/Tab.;

Ultracal-D (Popular), Tab., 500 mg + 200 IU, Tk. 5.00/Tab.

Xtracal-D (Pharmasia), Tab., 500 mg + 200 IU, Tk. 4.00/Tab.

Calcium (Coral Source) + Vitamin D3

CalcoralD(Popular), Tab., 500 mg + 200 IU, Tk. 10.00/Tab.; DX600mg + 400IU, Tk. 15.00/Tab.

Cora(ACI), Tab., 500mg +200IU, Tk.10.00/Tab.; 600mg+ 400IU, Tk. 15.00/Tab.

Coral (Ibn Sina), Tab., 500mg+ 200IU, Tk. 8.00/Tab.; 600mg+ 400IU, Tk. 10.00/Tab

Coralex(Acme),Tab., 500 mg + 200 IU 10.00/Tab

Fossical (Aristo), Tab., 500mg +200IU, Tk. 10.00/Tab.; DX 600mg + 400IU , Tk. 15.00/Tab.

Marincal(Incepta), Tab., 500mg +200IU, Tk. 10.00/Tab.

Oceancal- D (General), Tab., 500mg + 200IU, Tk. 10.00/Tab.; DX 600mg + 400IU, Tk. 15.00/Tab.

Okical (UniMed) 500mg+ 200IU, Tk. 10.00/Tab.; 600mg+ 400IU, Tk. 15.00/Tab

Ostocal GX (Eskayef), EffervescentTab, 600 mg + 400 IU, Tk. 15.00/Tab.

Reef (Healthcare), Tab., 600 mg + 400 IU, Tk. 50.00/Tab.; 500 mg + 200 IU, Tk. 24.00/Tab.

SB-Cora (Sunman-Bardem), Tab., 500mg +200IU, Tk. 10.00/Tab.

Seacal(Drug Intl), Tab., 500mg + 200IU, Tk. 10.00/Tab

Calcium+vitaminC+vitaminD

Calbo fort (Square) Effervescent Tab., Tk. 8.06/Tab.

Cavic-C Plus (Incepta), Tab.,Tk. 8.00/Tab.

Ostovit (Eskayef), Effervescent Tab., Tk. 8.00/Tab.

CALCIUM + MINERALS

Indications: Prevention and treatment of osteoporosis; nutritional supplement;

pregnancy and lactation; deficiency state of calcium and vitamin D

Contra-indications, Side-effect, Cautions: See under calcium and vitamin-C

Dose: 2 tablets per day, preferably 1 tablet in the morning and 1 tablets in the evening

Proprietary Preparations

Acical-M (ACI), Tab., Tk. 5.04/Tab.

Apocal DM (Apex), Tab., Tk. 4.00/Tab.

Aristocal M (Beximco), Tab., 500 mg, Tk. 5.5/Tab.;

Boni M (Delta), Tab., Tk. 4.00/Tab. .

Bontoni (Globex), Tab., Tk. 5.00/Tab.

Cadmin Plus (General), Tab., Tk. 4.04/Tab.

Cal D Plus (Pacific), Tab., Tk. 8.00/Tab.

Calbon M (Aristo), Tab., Tk. 5.00/Tab.; Tk. 5.00/Tab.

Calbon Plus (Aristo), Tab., Tk. 5.50/Tab.

Calboplex (Square), Tab., Tk. 5.02/Tab.

Calcin-M (Renata), Tab., Tk. 5.50/Tab.

Calcium Forte (Albion), Tab., 500 mg + 200 IU, Tk.3.30/Tab

Calcium Forte Plus (Albion), Tab., Tk. 3.50/Tab.

Calcium- M (APC), Tab., Tk. 4.00/Tab.

Calcium-C Forte (Albion), Tab., Tk. 8.00/Tab.

Calcium-fort Plus (Albion), Effervescent Tab., Tk.7.86/Tab

Calmi-M (Alco), Tab., Tk. 5.50/Tab.

Calsil M (Silva), Tab., Tk. 5.50/Tab.

Calvimax Plus (Incepta), Tab., Tk. 5.00/Tab.

Ipical-M (Ibn Sina), Tab., Tk. 6.00/Tab.

Miracal-M (Navana), Tab., Tk. 5.36/Tab.

Oracal-M (Amico), Tab., Tk. 4.00/Tab.

Oscal-M (Unimed), Tab., Tk. 5.00/Tab.

Ostocal-M (Easkayef) Tab., Tk. 5.00/Tab.

Protebon M (Beacon), Tab., Tk. 5.03/Tab.

Rocal-M (Healthcare), Tab., Tk. 9.00/Tab.

Xtracal-M (Pharmasia), Tab., Tk. 3.52/Tab.

16.2.2.2 HYPERCALCAEMIA

Treatment of acute severe hypercalcaemia is needed when calcium level is 3.0 mmol/l loop diuretics can be given which enhances calcium reabsorption, bisphosphonates or plicamycin can be given in acute cases. Because of its toxicity plicamycin is not the drug of choice for the treatment of hypercalcaemia. (See also Section 5.6)

16.2.2.3 MAGNESIUM

Indications: To prevent convulsion in patients with pre-eclampsia, eclampsia, tetanus and acute uremia

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Contra-indications: Heart block or myocardial damage

Interactions: See Appendix-2

Side-effects: Excessive administration of magnesium results in hypermagnesaemia manifested by nausea, vomiting, flushing of the skin, thirst, hypotension, drowsiness, confusion, loss of tendon reflexes, respiratory depression, cardiac arrest

Dose: Seizure prophylaxis in pre-eclampsia and eclampsia: a loading dose of 4 g or 16 mmol (100 ml) over up to 20 minutes followed by a maintenance dose of 2 g or 8 mmol (50 ml) per hour. Recurrence of seizure may require and additional I.V. bolus of 2-4 g or 8-16 mmol (50-100 ml). For seizure prophylaxis, treatment should continue during labour and for at least 24 hours after delivery

Proprietary Preparations

G-Mag Sulph (*Gonoshasthaya*), Inj. 4% Tk.3.00/5ml,

Magsum (*Renata*) Inj. 2.5g/5ml, Tk.18.06

Nlepsin (*Beximco*), I.V. Infusion, Mag.sulph 4%+NaCl 0.45%+Dextrose 5%, Tk.70.8/100ml

16.2.2.4 PHOSPHATE SUPPLEMENTS AND PHOSPHATE BINDING AGENTS

Indications: Patients who have been suffering from hypophosphataemic Vitamin D resistant rickets. Phosphate infusion is occasionally needed in the debilitated patients taking IV nutrition deficient in potassium phosphate supplements and in severe diabetic ketoacidosis.

Side-effects: Diarrhoea is the common problem during the treatment with potassium phosphate supplements and the dose should be reduced at that time.

Cautions: essential to monitor closely plasma concentration of phosphate and other electrolytes

Phosphate binding agents: Aluminum containing and calcium containing antacids are used as phosphate binding agents in the management of

hyperphosphataemia complicating renal failure

16.2.2.5 FLOURIDE

(See *Dental Practitioner's Formulary*)

16.2.2.6 IODINE

Indications: Endemic Goiter due to iodine deficiency is widespread in Bangladesh. The commonly affected groups are adolescent girls, school age children, and pregnant and lactating mothers.

Dose: The recommended adult intake is about 150 microgram.

Cautions: An intake over 2000 IU is considered excessive and may cause toxicity in individual cases. Excessive consumption may cause iodine-induced hyperthyroidism.

PROPHYLAXIS

Iodination of salt: To provide 150 µg/day which requires iodination of salt with potassium iodate at the rate of 15 parts per million. To provide for storage and cooking losses, Bangladesh program for control of goiter put iodine at 15 parts per million.

Proprietary Preparation

I-Cap (*Drug Intl*), Cap. 200mg

16.2.2.7 ZINC

Indications: Subclinical zinc deficiency to prevent growth retardation in children

Dose: Whole grain cereals are good sources of zinc but most of the zinc are present in bran and germ and lost during milling. Legumes are also good sources. Requirement is about 15 microgram.

ZINC SALTS ^[ED]

Indications: See notes above

Side effect: abdominal pain, dyspepsia

Proprietary Preparations

Baby Zinc (*Acme*), Tab., 20 mg, Tk. 1.76/Tab.

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Bimuty (*Pacific*), Tab., 20 mg, Tk. 1.50/Tab.; DS Syrup, 10 mg/5 ml, Tk. 29.80/100ml
Biozinc (*Ibn Sina*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml
B-Zn (*Benham*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml
C-Zinc (*Central*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Dispazinc (*ACI*), Tab., 20 mg, Tk. 2.01/Tab.
Dz-20 (*Julpher*), Syrup, 20 mg/5 ml, Tk. 50.00/100 ml
Ezy Xinc (*Eskayef*), Tab., 20 mg Tk. 1.75/Tab.
G-Zinc (*Gonoshasthaya*), Syrup, 10 mg/5 ml, Tk. 24.00/100 ml; Tab., 20 mg, Tk. 1.00/Tab.
Kidizinc (*Virgo*), Syrup, 20 mg/5 ml, Tk. 35.00/100ml
Kidzin (*Sharif*), Syrup, 10 mg/5 ml, Tk. 35.11/100 ml
Leozinc (*Leon*), Syrup, 10 mg/5 ml, Tk. 32.00/100 ml
Mazic (*Renata*), Tab., 20 mg, Tk. 1.50/Tab.; DS Syrup, 20 mg/5 ml, Tk. 55.00/100 ml; 4 mg/5 ml, Tk. 38.00/100 ml; 10 mg/5 ml, Tk. 35.00/100 ml
Naafzinc (*Naafco*), Syrup, 20 mg / 5 ml, Tk. 45.00/100ml; Tab., 20 mg, Tk. 1.75/Tab.
Nid (*Opsonin*), Tab., 20 mg, Tk. 1.14/Tab.; Syrup 10 mg/5 ml, Tk. 26.32/100 ml
Nipozin (*Nipro JMI*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml
Novo Zinc (*Novo Health*), Tab., 20 mg, Tk. 2.00/Tab.
Oralzin (*Aristo*), Syrup, 10 mg/5 ml, Tk. 28.00/50ml, Tk., 30.00/100 ml
Orazinc (*Navana*), Tab., 20 mg, Tk. 1.51/Tab.; Syrup, 10 mg/5 ml, Tk. 20.08/50 ml; Tk. 30.11/100 ml
Orgazinc (*Organic*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml
Pedi-Z (*Supreme*), Syrup, 10 mg/5 ml, Tk. 30.00/100ml
Pem (*Astra Bio*), Syrup, 10 mg/5 ml, Tk. 30.00/5ml
Pep (*Orion*), Syrup, 4mg/5 ml, Tk. 33.00/100 ml, 10 mg/5 ml, Tk. 38.00/100 ml; Tk. 60.18/200 ml; 20 mg/5 ml, Tk. 57.00/100 ml; Tab., 20 mg, Tk. 2.75/Tab.
Peptin Ds (*Nipa*), Syrup 10 mg/5 ml Tk. 35.00/100ml
SMC Zinc (*SMC Enterprise*), Tab., Tab. 20mg, Tk. 1.75/Tab
Soluzinc (*Popular*), Tab., 10 mg/5 ml, Tk. 30.11/100 ml
Temzinc (*Team*), Syrup, 10mg/5ml, Tk. 33.00/100ml
Tiny-Z (*Pharmasia*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Xinc (*Eskayef*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml; 55.00/200ml; 50.00/150ml Tab, 20 mg, Tk. 2.75/Tab.

Zeal (*Jayson*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Zedex (*Beximco*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Zemin (*Euro*), Syrup, 20 mg/5 ml Tk. 55.00/100ml
Zep (*Alco*), Syrup, 10 mg/5 ml, Tk. 35.11/100 ml
Zep Junior (*Alco*), Syrup, 10 mg/5 ml, Tk. 27.47/100 ml
Zesup (*Square*), Syrup, 10 mg/5 ml, Tk. 35.11/100 ml; Syrup, 20 mg/5 ml, Tk. 50.20/100 ml
Zico (*General*), Syrup, 10 mg/5 ml, Tk. 32.00/100ml
Zido (*Novo Health*), Syrup, 20 mg/5 ml, Tk. 35.00/100ml
Ziflu (*Incepta*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Zikid (*Globe*), Syrup, 10 mg/5 ml, 35.00/100ml
Zinc (*Asiatic*), Syrup, 10 mg/5 ml, Tk. 28.00/100 ml, 20 mg/5 ml Tk. 30.00/100ml;
Zinc (*Alco*), Tab. 20mg, Tk. 1.75/Tab.
Zinc (*Square*), Tab., 20 mg, Tk. 2.01/Tab.
Zinc Sulphate (*Albion*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Zinc Sulphate (*APC*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Zincare (*Jayson*), Tab., 20 mg, Tk. 2.00/Tab.
Zinc-DT (*Alco*), Tab., 20 mg, Tk. 1.75/Tab.
Zincol (*Somatec*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Zincoral (*Ziska*), Syrup, 10 mg/5 ml, Tk. 30.00/100ml
Zinga (*Biopharma*), Tab., 20mg Tk. 2.01/Tab.; Syrup, 10 mg/5 ml, Tk. 35.00/100 ml
Zinofa (*Modern*), Syrup, 10 mg/5 ml, Tk. 30.00/100ml
Zipol (*Apex*), Syrup, 20 mg/5 ml, Tk. 45.00/100 ml, Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
Ziqui (*Monico*), Syrup, Syrup, 10 mg/5 ml, Tk. 35.00/100ml
Zis Acme, Syrup, 10 mg/5 ml, Tk. 38.00/100 ml
Zismo (*Kemiko*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml
Ziton (*Drug Intl*), Syrup 10 mg/5 ml, Tk. 30.10/100ml
Zixol (*UniMed*), Syrup, 10mg/ 5ml, Tk. 30.00/100ml
Zn (*Amico*), Syrup, 10 mg/5 ml, Tk. 35.00/100 ml; Syrup, 20 mg/5 ml, Tk. 50.00/100 ml, Tab., 20mg, Tk. 2.00/Tab.
Znkid (*Delta*), Syrup, 10 mg/5 ml, Tk. 30.00/100 ml
ZS (*Decent*), Syrup, 20mg/5ml, Tk. 30.00/100ml
Z-sil (*Silva*), Syrup, 10 mg/5 ml, Tk. 25.09/100ml
ZT (*Beacon*), Tab., 20 mg, Tk. 1.51/Tab.

16.2.3 VITAMIN PREPARATIONS

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- 16.2.3.1 VITAMIN A
- 16.2.3.2 VITAMIN B COMPLEX
- 16.2.3.3 VITAMIN C
- 16.2.3.4 VITAMINS D
- 16.2.3.5 VITAMIN E
- 16.2.3.6 VITAMIN K
- 16.2.3.7 MULTIVIT AND MINERAL PREPARATIONS
- 16.2.3.8 ANTIOXIDANT VITAMIN PREPARATION.

16.2.3 VITAMIN PREPARATIONS

Vitamin A deficiency is widespread particularly among the pre school children and pregnant and lactating mothers.

For prophylaxis it is advised to give 200,000 I.U. of vitamin A every 6 months to all children 1-6 months that are at risk and to all infants 6-11 months, 100,000 particularly along with the vaccination of measles and polio. For lactating mothers, 200,000 I.U. orally at delivery or during the first 8 weeks postpartum if breast-feeding to raise the level of vitamin A in the breast milk to protect the breast-fed infants; or first 6 weeks if not breast-feeding to protect the mother.

Because of the epidemiological evidence of involvement of vitamin A and carotene in the prevention of cancer vitamin A has been incorporated in special anti-oxidant preparations, which are widely used in Bangladesh. The available evidences are still controversial and inconclusive and may not justify the cost in its use. Bangladeshi physicians should carefully scrutinize these evidences before suggesting them for use. Consumption of high doses of vitamin A during pregnancy has been reported to cause birth defects. Supplements of vitamin A should not be taken without the advice of a doctor.

Toxicity from consumption of pre-formed vitamin A (not carotinoids) can occur with chronic consumption of doses of 10 times higher than the recommended dietary allowances. Dose dependent toxicity include headache, vomiting, diplopia, dryness of the mucus

membrane, desquamation, bone and joint pain, liver damage and coma.

16.2.3.1 VITAMIN A

Indications: Vitamin A deficiency states, such as night blindness, impaired dark adaptation, follicular hyperkeratosis of the skin, Bitot's spot and keratomalacia in the eye

Cautions: Hypervitaminosis A can occur in infants and children given massive doses for long periods and early pregnancy

Side-effects: overdose can cause rough skin, dry hair, enlarged liver, raised ESR, raised serum calcium and serum alkaline phosphatase concentrations

Dose: For treatment of xerophthalmia, CHILD under 1 year, immediately 100,000 IU; next day 100,000 IU; 2-4 weeks later 100,000 IU

For CHILD over 1 year, 200,000 IU immediately; next day 200,000 IU; 2-4 weeks later 200,000 IU.

In severely protein energy malnutrition : Monthly until PEM resolves under 1 year, 100,000 IU; and 200,000 IU when the child is over a year

Proprietary Preparations

A-Forte (Globe), Cap. 50,000 IU; Tk.1.90/cap;

A-Vit (Globe), Cap 1,00,000 IU, Tk. 2.83/Cap, 2,00,000, IU Tk./Cap Tk.4.04/Cap

Ovit-A (Opsonin) Cap 50,00 IU, Tk. 1.93/Cap, 2,00,000, IU Tk./Cap Tk.6.33/Cap

Ratinol Forte (Drug Intl), Cap. 50,000 IU; Tk.1.93/Cap

RE-gel(Renata) Cap.50,000IU;

Tk.1.90/Cap,1,00,000Tk.3.00/cap,2,00,000Tk. 4.00/Cap

Vis (Pacific), Cap. 50000 IU, Tk. 1.90/Cap.

16.2.3.2 VITAMIN B COMPLEX

Deficiency of certain vitamin of B-group is very common in Bangladesh. There is widespread prevalence of clinical signs of riboflavin deficiency. Sub-clinical deficiency of other B-group vitamin remain unquantified but likely to be very common. Folic acid deficiency is very common amongst pregnant women. Vitamin B₁ deficiency may not be common due consumption of parboiled

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rice. Pyridoxine deficiency is rare but may occur during isoniazide therapy and is characterised by peripheral neuritis.

THIAMINE B₁ [ED]

THIAMINE HYDROCHLORIDE

Indications: Beriberi, diabetic neuropathy, polyneuritis after infectious diseases, mental disorders associated with alcoholism, Wernickes' syndrome, and anorexia nervosa

Dose: ADULT : daily requirements 3-6 mg; neuritis 25-100 mg by IM injection daily followed by 10-15 mg orally daily for a few months. In acute deficiency, 100-200 mg daily by IM or IV daily followed by 100-200 mg orally. Neuralgia 50-150 mg by injection every alternate days. Anorexia same as Neuritis
CHILD : 5-20 mg orally and parenterally

Proprietary Preparations

A-B1 (*Acme*), Tab., 100 mg, Tk. 0.74/Tab.
Beovit (*Square*), Tab. 100 mg, Tk. 0.86/Tab.
Berin (*GSK*), Tab. 10 mg, Tk. 2.66/Tab.
B-One (*Alco*), Tab., 10 mg, Tk. 0.74/Tab.
G-Vitamin B1 (*Gonoshasthaya*), Tab., 10 mg, Tk. 0.63/Tab.
Thianomin (*Rephco*), Inj., 25 mg/ml, Tk. 2.60/1ml Amp.
Thiason (*Jayson*), Inj., 100 mg/ml, Tk. 3.55/1ml Amp. Tk. 16.24/10 ml Amp.
Thiosina (*Ibn Sina*), Tab., 10 mg, Tk. 0.84/Tab.
Thiosina (*Ibn Sina*), Tab., 100 mg
Tivit (*ACI*), Tab., 100 mg, Tk. 0.74/Tab.
Tone (*Orion*), Tab., 10 mg, Tk. 0.73/Tab.
Vita-1 (*Pacific*), Tab., 100 mg, Tk. 0.73/Tab.
Vitaone (*Zenith*), Tab., 100 mg, Tk. 0.73/Tab.

RIBOFLAVINE B₂ [ED]

Indications: Angular stomatitis, cheilosis, glossitis, seborrhoeic dermatitis, photophobia, anaemia and neuropathy

Dose: ADULT and CHILD 5-10 mg daily

Proprietary Preparations

Riboflavin (*Amico*), Tab., 5 mg, Tk. 0.13/Tab.
Riboflavin (*Amico*), Tab., 5 mg, Tk. 0.13/Tab.
G-Vitamin B2 (*Gonoshasthaya*), Tab, 5 mg, Tk. 0.18/Tab.
Ribozen (*Zenith*), Tab. 5 mg, Tk. 0.23/Tab.

Ribomin (*Ad-din*), Tab. 5 mg, Tk. 0.23/Tab.
Ribosina (*Ibn Sina*), Tab., 5 mg, Tk. 0.30/Tab.
Rivin (*Supreme*), 5 mg, Tk. 0.30/Tab.
Riboson (*Jayson*), Tab., 5 mg, Tk. 0.30/Tab.

NICOTINIC ACID (B₃)

Indications: Prevention and treatment of pellagra, as vasodilator in peripheral vascular disease, Vincent's infection, hypercholesterolaemia and hypertriglyceridaemia

Contra-indications: Pregnancy, breast-feeding

Side-effects: Flushing, dizziness, palpitations, pruritus, nausea, vomiting, rarely impaired liver function and rashes.

Cautions: Diabetes mellitus, gout, liver disease and peptic ulcer

Dose: 100-200 mg daily

Proprietary Preparation

Nicoson (*Jayson*), Tab., 500mg; 50mg
Niconic (*Pacific*), Tab., 50 mg, Tk. 2.00/Tab.

PYRIDOXINE (B₆) [ED]

Indications: Peripheral neuritis, isoniazid induced peripheral neuritis, premenstrual syndrome, pregnancy, radiation sickness, idiopathic sideroblastic anaemia, B₆-deficiency anaemia, other deficiency states and convulsions in children

Contra-indication: In patients receiving levodopa

Cautions: Drug interaction with levodopa but does not occur if dopa decarboxylase inhibitor is also given

Dose: ADULTS and deficiency states, 20-25 mg up to three times daily. Isoniazid neuropathy, prophylaxis 10 mg daily

Idiopathic sideroblastic anaemia, 100-400 mg in divided doses

Premenstrual syndrome, 50-100 mg daily

CHILD: Convulsion 20-100 mg daily.

Proprietary Preparations

Pyrol (*Jayson*), Tab., 25 mg, Tk. 0.50/Tab.
G-Vitamin B6 (*Gonoshasthaya*), Tab., 25 mg, Tk. 0.25/Tab.
Sixvit (*Beacon*), Tab., 20mg, Tk. 1.30/Tab.

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CYNOCOBALAMIN B₁₂

(See section 15.1.2)

Indications: Pernicious anaemia and other B₁₂ responsive macrolytic anaemias; prophylaxis in total gastrectomy or total ileal resection, malabsorption syndrome, coeliac disease, tropical sprue etc

Contra-indications: Leber's disease, tobacco amblyopia (use hydroxocobalamin)

Dose: ADULT: 250-1000 microgram IM on alternate days for 1-2 weeks (or for 10 times) then 250 microgram weekly until blood count is normal. Maintenance, 1000 microgram every monthly
CHILD: initially as for adult, subsequent dosage according to haematological response (*for detail see manufacturers' literature*)

Proprietary Preparation

(See section 15.1.2)

MECOBALAMIN

Indications: Diabetic and alcoholic neuropathy; drug induced neuropathy; lumbago; intercostals neuralgia and other neuropathies). Megaloblastic anemia due to vitamin due B₁₂ deficiency (injection only)

Cautions: The methylcobal Tablet should not be used for months. Methylcobal injection should be discontinued if symptoms of hypersensitivity, such as eruption occur; infrequently pain and induration at the site of injection.

Dose: By mouth 500 microgram three times daily. The dose should be justed according to the age of patient and the severity of symptoms

Injection 500 microgram administered intramuscularly or intravenously three times a week in *peripheral neuropathies*.

In *megaloblastic anemia* the usual adult dose is 500 microgram administered intramuscularly or intravenously three times a week. After about 2months of administration, dose should be changed

to 500 microgram every one to three months as maintenance therapy

Proprietary Preparations

Colamin (Rangs), Tab., 0.5mg, Tk. 4.00/Tab.

Maclon (White Horse), Tab., 0.5 mg, Tk. 4.00/Tab.

Mb (Acme), Tab., 500 microgram, Tk.

4.01/Tab.; Inj., 500 microgram / ml, Tk.

30.11/Amp

Mecobal (General), Tab., 500 microgram,

Tk. 4.02/Tab.; Inj., 500 microgram / ml, Tk.

30.00/Amp.

Mecol (Aristo), Tab., 0.5mg, Tk. 4.00/Tab.

Mecolagin (Incepta), Tab., 500 microgram,

Tk. 4.00/Tab.; Inj., 500 microgram / ml, Tk.

30.00/Amp.

Mecolin (Drug Int), Tab., 500 microgram, Tk.

4.00/Tab.

Mecopen (Eskayef), Tab., 500 microgram,

Tk. 4.00/Tab.

Methicol (Square), Tab., 500 microgram, Tk.

4.01/Tab.; Inj., 500 microgram / ml, Tk.

30.11/Amp.

Nervex (Orion), Tab., 500 microgram, Tk.

4.02/Tab.

Nerviton (Opsonin), Tab., 500 microgram, Tk.

3.02/Tab.; Inj., 500 microgram / ml, Tk.

22.64/Amp.

Neural (Healthcare), Tab., 0.5 mg, Tk.

4.25/Tab.

Pedial (Globe), Tab., 0.5 mg, Tk. 4.00/Tab

Phyton (ACI), Inj., 5mg/ml, Tk. 30.11/Amp. ;

Tab., 0.5mg, Tk. 4.02/Tab.

Remylin (Ibn Sina), Tab., 500 microgram, Tk.

4.50/Tab.

VITAMIN B-COMPLEX PREPARATIONS

Indications: B-complex deficiency states during pregnancy, lactation, prolonged antibiotic therapy, convalescence

Dose: prophylactic 1-2 cap. daily Other preparations - see under individual drugs

VITAMIN B-COMPLEX [ED]

Proprietary Preparations

Nicotinamide 20mg + Pyridoxine Hydrochloride 2mg + Riboflavin 2mg + Vitamin B₁ 5mg

Adcovit (Team), Syrup., Tk. 62.19/200ml

Aduvit (Pacific), Cap., Tk. 0.52/Cap.,

Syrup, Tk. 35.00/100ml; Tk. 60.00/200ml

Aristoplex (Beximco), Syrup, Tk.

35.64/100ml; Tk. 42.90/200ml

Aristovit (Beximco), Tab., Tk. 0.62/Tab.

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Aritone (*Incepta*), Syrup, Tk. 55.00/100ml; Tk. 95.00/200ml
Asivit (*Asiatic*), Tab., Tk. 0.52/Tab.
B-50 Forte (*Square*), Inj., Tk. 10.03/Inj.; Cap. Tk. 1.25/Cap., Syrup, Tk. 62.19/200ml
Beconex (*Renata*), Syrup, Tk. 35.00/100ml; Tk. 62.00/200ml
Benvit -B (*Benham*), Tab. Tk. 0.51/Tab.
Big B (*Amico*), Tab. Tk. 4.00/Tab.
Biovit (*Biopharma*), Syrup, Tk. 35.00/100ml; Tk. 62.00/200ml
Combivit (*Orion*), Inj., Tk. 10.03/Inj.
Complavit (*G.S.K.*), Syrup, Tk. 18.40/100 ml
Flavit (*Amico*), Syrup, Tk. 20.65/100ml; Tk. 38.00/200ml; TK. 19.80/syrup
Genaplex (*General*), Syrup, Tk. 20.75/100 ml; Tk. 37.75/200 ml;
G-Vitamin B Complex (*Gonoshasthaya*) Tab. Tk. 0.45/Tab; Syrup, Tk.18.00/100 ml; Tk.36.00/200 ml ,Inj., Tk. 10.00/2 ml
Hiposul (*G.A.Co*), Inj., Tk. 10.03/2ml Amp; Syrup, Tk. 38.3/200 ml; Tab., Tk. 0.43/Tab.
Kidizinc (*Virgo*), Syrup, Tk. 50.00/100ml
Kvit-B (*Kemiko*), Inj., Tk. 10.03/2ml Amp.; .
Miovit (*Somatec*), Tab., Tk. 4.01/Tab.
Nerbo (*Sharif*), Tab., Tk. 4.00/Tab
Nervin (*Jayson*), Inj., Tk. 10.00/2 ml Amp.
Neucos-B (*Radiant*), Tab., Tk. 11.00/Tab.
Neurobest (*Renata*), Inj., Tk. 30.00/Amp.; Tab. Tk. 5.00/Tab.
Neuvital (*UniMed*), Tab., Tk. 5.00/Tab.
Nipaplex (*Nipa*), Syrup, Tk. 62.00/200ml
Nutrivit-B(ACI) Tk. 62.19/200ml Tk. 35.65/100ml
Nutrovita (*Asiatic*), Syrup, Tk. 20.91/100ml; Tk. 38.17/200ml; Cap., Tk.. 0.58/Cap.
Opsovit (*Opsonin*), Tab., Tk. 0.62/Tab.;Syrup, Tk. 25.59/100 ml; Tk. 42.77/200 ml;
Orgabion(*Organic*), Tab., Tk. 7.00/Tab.
Orioplex (*Orion*), Syrup, Tk. 35.65/100ml; Tk. 62.19/200ml; Tab., Tk. 0.51/Tab
Polyvit-B (*Albion*), Cap., Tk. 0.57/Cap.; Syrup, Tk. 20.00/100 ml; Tk. 38.60/200ml
Renovit (*Healthcare*), Inj., Tk.140/3 ml Amp., Tab., Tk. 8.00/Tab.
Sinafort B (*Ibn Sina*), Syrup, Tk. 55.00/200ml; Tab.,Tk. 27.90/Tab.
Solvit (*Eskayef*), Tab, Tk. 0.62/Tab.,
Solvitone (*Eskayef*), Syrup, Tk. 35.54/100ml; Tk. 35.54/100ml; Tk. 62.00/200ml;
Supra (*Drug Intl*), Syrup, Tk. 50.2/100ml Tab.Tk. 0.62/Tab.
Univit Plus (*Aristo*), Tab., Tk. 1.50/Tab
Vitagrow (*Incepta*), Syrup, Tk.80.00/100 ml
Vitamin B-Complex (*Popular*), Tab., Tk. 0.44/Tab.
VitasilB (*Silva*), Syrup, Tk. 20.06/100ml; Tk. 38.14/200ml; Tab., Tk. 0.44/Tab.
V-Plex (*Acme*), Syrup Tk. 35.54/100ml; Tk.62.00/200 ml Tab., Tk. 0.44/Tab; Cap., Tk. 0.56/Cap.

Ziskavit (*Ziska*), Cap., Tk. 137.00/Cap., Tab., Tk. 55.00/Tab.
Zismo B(*Kemiko*), syrup, Tk. 85.26/200ml; Tk.50.14/100ml

Cyanocobalamin200 mcg + Pyridoxine Hydrochloride200 mg + Vitamin B₁100 mg(Tab)

Cyanocobalamin 1 mg + Pyridoxine Hydrochloride100 mg + Vitamin B₁100 100 mg/3 ml(Inj)

Asibion (*Asiatic*), Tab., Tk. 7.00/Tab.
B126(*Popular*), Tab., , Tk. 5.00/Tab
Berin plus(*GSK*), Tab., , Tk. 4.45/Tab.,
Getbion (*Getwell*), Tab., Tk. 8.00/Tab.
Kvit (*Kemiko*), Inj., Tk. 25.07/3 ml Amp.; Tab., Tk. 6.00/Tab.,
Miovit (*Somatec*), Tab., Tk. 7.00/Tab.
Myelin (*Opsonin*), Inj.,Tk. 25.09/3ml Amp; Tab., Tk. 5.02/Tab.
Neobion (*Aristo*), Inj., Tk. 26.00/3 ml Amp; Tab., Tk. 8.00/Tab.
Nerbo (*Sharif*), Tab., Tk. 7.00/Tab.
Nerviplex (*Jayson*), Inj., Tk. 25.10/3 ml Amp.; Tab., Tk. 4.01/Tab.
Neubin (*Ziska*), Tab., Tk. 240.00/Tab., Inj., Tk. 250.00/Amp
Neucos-B (*Radiant*), Tab., Tk. 11.03/Tab
Neuralgin (*Ibn Sina*), Tab., Tk. 5.00/Tab., Inj., Tk. 26.00/3 ml Amp
Neurep (*Biopharma*), Tab., Tk. 7.00/Tab.
NeurexB (*Silva*), Tab., Tk. 5.00/Tab.
Neuroaid (*Novo Health*), Tab, Tk. 5.00/Tab.
Neuro-B (*Square*), Inj., Tk. 25.10/Amp.; Tab. Tk. 5.00/Tab
Neurobest (*Renata*), Inj. Tk. 30.00/3 ml Amp.; Tab., Tk. 8.00/Tab
Neurocare (*Beximco*), Tab., Tk. 8.00/Tab.
Neurotonic (*Globex*), Tab., Tk. 5.00/Tab.
Neuvital (*UniMed*), Tab., Tk. 5.00/Tab
Nevrona (*One Pharma*), Tab., Tk. 4.99/Tab.
Nugesic (*Orion*), Inj, Tk. 25.00/Amp.; Tab. Tk. 8.00/Tab.
Nuropa (*Nipa*), Tab. Tk. 7.00/Tab.
Orgabion, (*Organic*), Tab., Tk. 4.10/Tab.
Pacibion (*Pacific*), Tab., Tk. 7.00/Tab
Povital (*ACI*), Inj., Tk. 25.17/3ml Amp; Tab, Tk. 8.00/Tab.
Rejubion (*Beacon*), Inj., Tk. 25.17/3ml Amp.; Tab, Tk. 8.00/Tab.
Renep (*Alco*), Tab., Tk. 5.02/Tab.
Solbion (*Eskayef*), Tab., Tk. 8.00/Tab., Inj, Tk. 25.00/3 ml Amp.;
Supra B (*Drug Intl*), Tab., Tk. 8.00/Tab.
TPC (*Acme*), Inj. Tk. 25.17/3 ml Amp.; Tab., Tk. 7.00/Tab.
Tri-B (*White Horse*), Tab., Tk. 7.00/Tab
Tribion (*Globe*), Tab., Tk. 7.00/Tab., Inj., Tk. 25.00/3 ml Amp
Univit Plus (*Aristo*), Tab., Tk. 2.00/Tab.
Virobion (*Virgo*), Tab., , Tk. 5.00/Tab.

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Vitabion (*Incepta*), Tab., Tk. 0.16/Tab., Inj., Tk. 25.00/3 ml Amp.

Vitalex (*Supreme*), Syrup, Tk. 20.75/100ml, Tk. 38.00/200ml; Cap, Tk. 0.56/Cap.

V-nerve (*Monico*), Inj., Tk. 25.00/3 ml Amp
Cyanocobalamin 2 mg + Folic Acid 2.5 mg + Pyridoxine Hydrochloride 25 mg

PFC (*Aristo*), Tab., Tk. 6.00/Tab.

Vita (*Novo Health*), Tab., Tk. 3.00/Tab.

Vgard (*Opsonin*), Tab., Tk. 4.03/Tab.

Vicard (*Popular*), Tab., Tk. 6.00/Tab.

Vit B Complex + Zinc+Iron

Alneed Gold (*Incepta*), Cap., Tk. 6.00/Cap.

Beconex zi (*Renata*), Syrup, Tk. 30.00/50ml; Tk. 50.00/100ml

Bicozin I (*Square*), Syrup, Tk. 90.61/200ml;

Biozinc-I (*Ibn Sina*), Syrup, Tk. 45.17/100ml

Bizi (*Globe*), Syrup, Tk. 50.00/100ml

B-Plus (*Somatec*), Syrup, Tk. 62.18/200ml

Livita (*ACI*) Tk. 50.34/100ml

Vitaflower-Z (*Organic*), Syrup, Tk.

50.15/100ml

Vitazin I (*Aristo*), Syrup, Tk. 30.00/50ml; Tk.

45.00/100ml; Tk. 90.00/200ml

Vitonic (*Beximco*), Syrup, Tk. 50.00/100ml;

Tk. 80.00/200ml

Feviz (*Popular*), Syrup, Tk. 50.19/100 ml,

Vit B Complex + Zinc

Bicozin (*Square*), Syrup, Tk. 95/200ml; Tk. 55/100ml;

Buzz (*Nipa*), Syrup, Tk. 50.00/100ml; Tk.

85.00/200ml., Tab. Tk. 2.00/Tab.

Hizin (*Monico*), Syrup, Tk. 45.00/100ml

OzinkB (*One Pharma*), Syrup, Tk.

44.99/100ml

Temzic Plus (*Team*), Syrup, Tk. 83.00/200ml

UnivetPlus (*Aristo*), Tab., 2.00

VitalexZ (*Supreme*), Syrup, Tk. 85.00/200ml;

Tab. 3.00/Tab

Xinc B (*Eskayef*), Syrup, Tk. 95.00/200ml;

Tab., Tk. 3.00/Tab., Tk. 55.00/100ml;

Xinoplex (*Silva*), Syrup, Tk. 45.16/100ml

Zicovit-B (*Globex*), Syrup, 45.00/100ml

Zivit (*Alco*), Syrup, Tk. 100.30/200ml; Tk.

60.18/100ml; Tk. 100.30/200ml; Syrup, Tk.

60.18/100ml

Zn-B (*Amico*), Syrup, Tk. 50.00/100ml

16.2.3.3 VITAMIN C

Vitamin C therapy is essential in scurvy. Prescribers sometimes prescribe Vitamin C in colds and in injuries for rapid wound healing; but the available incidences are not conclusive and may not rationalize its use.

ASCORBIC ACID^[ED]

Indications: Prevention and treatment of scurvy

Dose: Prophylactic, 25-75 mg daily; therapeutic, not less than 250 mg daily in divided doses

Proprietary Preparations

Ascobex (*Beximco*), Tab., 250 mg, Tk. 1.89/Tab.

Ascorbic (*Apex*), Tab., 250 mg, Tk. 1.30/Tab.

Ascoson (*Jayson*), Tab., 250 mg, Tk.

1.32/Tab.; Syrup, 100 mg/5 ml, Tk. 33.34/100

ml; Inj., 500 mg/5 ml, Tk. 5.99/Amp.

C-bon (*Ambee*), Tab., 250 mg, Tk. 1.3 / Tab

Cecon (*Acme*), Tab., 250 mg, Tk. 1.32/Tab.

Ceegram (*Incepta*), Tab., 1000 mg, Tk.

10.00/Tab.

Ceemet (*Medimet*), Tab., 250mg, Tk. 1.20/Tab.

Ceevit (*Square*), Tab., 250 mg, Tk. 1.90/Tab.;

Effervescent Tab., 1000 mg, Tk.

10.34/Tab. 500mg, Tk. 3.50

Cevalin (*Biopharma*), Tab., 250 mg, Tk.

1.31/Tab.

Cevion (*Healthcare*), Tab., 1000 mg, Tk.

8.10/Tab.

Chewce (*Navana*), Syrup, 100 mg/5 ml, Tk.

33.34/100 ml; Tab., 250 mg, Tk. 1.31/Tab.

Citamin (*Supreme*), Tab., 250 mg, Tk.

1.30/Tab

C-Lemon (*Zenith*), Tab., 250 mg, Tk. 1.14/Tab

C-On (*Rephco*), Tab., 250 mg, Tk. 0.70/Tab.;

Inj., 500 mg/5 ml, Tk. 4.75/Amp.; , Tk.

5.00/Sachet

G-Vitamin (*Gonoshasthaya*), Tab., 250 mg,

Tk. 1.30/Tab.

Hi-C (*Eskayef*), Syrup, 100 mg/5 ml, Tk.

33.32/100ml

Juci (*Eskayef*), 100 mg/5ml, Tk. 10.00/sachet;

Chewable Tab., 250 mg, Tk. 1.89/Tab., 500

mg, Tk. 3.57/Tab.

Kvit-C (*Kemiko*), Tab., 250 mg, Tk. 1.30/Tab.

Lemovit (*Ziska*), Inj., 500 mg/5 ml, Tk.

60.00/Amp; Tab., 250 mg, Tk. 1.31/Tab.

Lemovit-C (*Ziska*), Tab., 500mg, Tk.

1.31/Tab.

Livit-C (*Orion*), Syrup, 100 mg/5 ml, Tk.

33.34/100 ml

Nutrivit-C (*ACI*), Paed. drop, 100 mg/ml, Tk

30.20/15 ml; Tab., 250 mg, Tk. 1.90/Tab.;

Syrup, 100 mg/5 ml, Tk. 33.45/100 ml; Tab.,

1000 mg, Tk. 12.04/Tab.

Rapid C (*Popular*), Tab., 1000 mg, Tk.

10.07/Tab.; Syrup, 100 mg/5 ml, Tk.

33.45/100 ml

Suvic (*Amico*), Tab., 250 mg, Tk. 0.75/Tab.

Vasco (*Opsonin*), Syrup, 100 mg/5 ml, Tk.

33.35/ 100 ml

VC-250 (*Aristo*), Tab., 250 mg, Tk. 1.90/Tab.

Veesina, (*Ibn Sina*), Tab., 250 mg, Tk. 1.89/Tab.

Vita-C (*Central*), Tab., 250 mg, Tk. 1.30/Tab.

Vitamin-C (*Albion*), Syrup, 100 mg/5 ml, Tk. 33.22/100 ml; Tab., 125 mg, Tk. 0.89/Tab.; Tab., 1000 mg, Tk. 10.00/Tab.

Vasco (*Opsonin*), Tab., 250mg Tk. 1.90/Tab.

16.2.3.4 VITAMIN D

The term Vitamin D is used for a range of compounds, which possesses the property of curing and preventing rickets. They include ergocalciferol, Vitamin D₂ obtained by irradiating the plant sterol and Cholecalciferol (vitamin D₃) the major form in nature.

The exposure of skin in sunlight converts provitamin D (7-dehydrocholesterol) to previtamin D₃ in the skin.

Vitamin D is particularly toxic and is not excreted in urine and should be prescribed only when there is definite indication. The proprietary infant milk formulas should be carefully checked so that not more than 200 IU of Vitamin D is consumed by formula fed infants daily. Infants fed on breast milk should be exposed to sunlight regularly.

Toxic symptoms include anorexia, loss of weight, nausea, headache, depression and irritability.

VITAMIN-D PREPARATIONS

Ergocalciferol (Calciferol or Vitamin D₂).

Cholecalciferol (Vitamin D₃).

Alfacalceferol (1α-hydroxycholecalciferol).

Calcitriol (1, 25, dihydroxy cholecalciferol).

Dihydrotachysterol.

ERGOCALCIFEROL (D₂) / CHOLECALCIFEROL (D₃) [ED]

Indications: Rickets, osteomalacia, osteoporosis, abnormal calcium and phosphorus metabolism, intestinal malabsorption or liver diseases and renal osteodystrophy; hypocalcaemia of hypoparathyroidism; as adjunct to treatment of lupus vulgaris and tubercular adenopathies.

Contra-indications: Renal dysfunction; hypercalcaemia, metastatic calcification

Side-effects: Symptoms of overdose include anorexia, lassitude, nausea, vomiting, diarrhoea, weight loss, polyuria, sweating, headache, thirst, vertigo and raised concentrations of calcium and phosphate in plasma and urine

Dose: ADULT and CHILD: Simple Vitamin D deficiency, 400 IU (10microgram) daily; deficiency caused by intestinal malabsorption or chronic liver disease, upto 40,000 IU (1 mg) daily. Renal osteodystrophy, upto 200,000 IU (5 mg) daily. Rickets and osteomalacia 1000-5000 IU daily

Oily solution of cholecalciferol 200,000 IU/ml ampoule : injectable IM or drinkable.

In Rickets for prevention : 200,000 I.U. or 1 ampoule every 4 months, which may be, increased to 400,000 IU i.e. 2 ampoules. In pregnancy, 1 ampoule at 6 months. Prevention should be started early and continue to the 5th year of life.

In Rickets- Curative: 1 ampoule every 2 weeks for one month and then 1 ampoule every 4 months or 600,000 IU i.e. 3 ampoules renewed some months later, as per the severity of the case.

Hypocalcaemia caused by tetany : Same as for preventing Rickets.

Osteoporosis and Osteomalacia: 200,000 IU i.e. 1 ampoule every 15 days for 3 months.

Renal Osteodystrophy, 200,000 IU i.e. 1 ampoule or more daily or as advised by the physician.

Proprietary Preparations

Aristo D3 (*Aristo*), Inj., 2 Lac IU, Tk. 120.00/Amp

Calciferol (*Renata*), Inj., 2 Lac IU, Tk.120/Amp.

Colical (*Opsonin*), Inj., 2 Lac IU, Tk. 90.23/Amp.

D-Cap (*Drug Intl*), Soft Cap., 20000I.U, Tk. 20.00/Cap., 40000I.U, Tk. 35.00/Cap., 800I.U, Tk. 4.00/Cap.

Defrol (*Acme*), Syrup, 25 mcg/5ml, Tk. 75.00/100ml; Tab., 1000 IU, Tk. 2.00/Tab.

Deon-3 (*Rephco*), Inj., 2 Lac IU, Tk. 90/Amp.

D-Rise (*Beximco*), Cap., 40000IU, Tk. 35.00/Cap., 20000IU, Tk. 20.00/Cap., Tab., 2000IU, Tk. 2.50/Tab.,

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Kvit (Kemiko), 2 Lac IU, Tk. 90.27/Amp
K-Vit D (Kemiko), Inj., 2 Lac IU, Tk. 90/Amp.
MaxD (Ziska), Cap., 20000 IU, Tk. 320.00/Cap., Tab., 1000 IU, Tk. 100.00/Tab.
Osteo (Incepta), Inj., 2 Lac IU, Tk. 90.00/Amp.; Syrup, 25 mcg/5ml, Tk. 75.00/15ml; Tab., 1000 IU, Tk., 6.00/Tab.
VitaminD3B.O.N⁰ (Crinex) Inj., 2 Lac IU, Tk. 151.50.00/Amp

ALFACALCIDOL

(1 α -hydroxycholecalciferol)

Alfacalcidol or 1 α -hydroxycholecalciferol is the active form of vitamin-D₃, which is formed in the kidney tissues by hydroxylation of D₃.

Indications: Patients with severe renal impairment i.e. renal osteodystrophy, postmenopausal osteoporosis

Contra-indications; Side-effects & Cautions: See under ergocalciferol.

Dose: Renal osteodystrophy - ADULT, initially 0.25 microgram daily or on alternative days, increased if necessary in steps of 0.25 microgram at intervals of 2-4 weeks; usual dose 0.5–1 microgram daily; CHILD, not established
Established postmenopausal osteoporosis–0.25 microgram twice daily (monitor plasma calcium and creatinine level, if possible)

Proprietary Preparations

Bon One Tab. 0.5 microgram⁰ (Teijin), Tab., 0.5 microgram, Tk. 9.35/Tab.
One Alpha⁰ (Leo), Cap., 0.25microgram, Tk. 8.65/Tab.

CALCITRIOL

(1,25 - dihydroxycholecalciferol)

Indications: See under Alfacalcidol.

Cautions; Contra-indications & Side-effects: See under Ergocalciferol.

Dose: Hypocalcaemia in dialysis patients with chronic renal failure, by intravenous injection (or injection through catheter) after haemodialysis, initially 500 nanograms (approx. 10 nanograms/kg) 3 times a week, increased if necessary in steps of 250-500 nanograms at intervals of 2-4 weeks; usual dose 0.5-3 micrograms 3 times a week; CHILD not established

Dose : Renal osteodystrophy, ADULT, initially 250 nanograms daily or on alternate days, increased if necessary in steps of 250 nanograms at intervals of 2-4 weeks; usual dose 0.5-1 micrograms daily; CHILD not established.
Established postmenopausal osteoporosis, 250 nanograms twice daily (monitor plasma calcium and creatinine).

Proprietary Preparations

Calcitrol (Square), cap, 0.25 microgram, Tk. 10.03/Cap.
Caloren (ACI), Inj., 1 microgram/ml, Tk. 150.00/ Amp
Caltrol (Pacific), Cap., 0.25 microgram, Tk. 7.52/Cap.
Colitrol (Incepta), Cap., 0.25 microgram, Tk. 10.00/Cap.; Inj., 1 microgram/ml, Tk. 155.00/Amp.
Dicaltrol (Drug Intl), Cap., 0.25 microgram,, Tk. 10.05/Cap.
Encatrol (Globe), Cap., 0.25 microgram, Tk. 10.00/Cap.
Improcal (Opsonin), Cap., 0.25 microgram , Tk. 7.03/Cap.
Liquical, (Beacon), Cap., 0.25 microgram,, Tk. 10.06/Cap.
Lucent (Renata), Cap., 0.25 microgram,, Tk. 10.00/Cap.
Ostrial(Nipro JMI), cap, 0.25 microgram, Tk. 10.00/Cap.
Promocal (Navana), Inj., 1 microgram/ml, Tk. 155.00/Amp
Rocaltrol (Radiant), Cap., 0.25 microgram, Tk. 20.00/Cap.

Calcitriol + Calcium

Citritol (Opsonin), Tab., Tk. 6.00/Tab.

DicaltrolPlus (Drug Intl),Cap., Tk. 10.05/Cap.

16.2.3.5 VITAMIN E

The requirement of Vitamin E has not been definitely established in man. There is now substantial evidence that supplementation of Vitamin E reduces the incidence of coronary heart disease in doses of 200-400 mg. Deficiency of Vitamin E in Bangladesh has not been reported. Recently a possible public health requirement has been suggested as 40-60 mg daily; an increase of about 3-4 folds from the old recommended allowance.

ALPHA TOCOPHERYL ACETATE

Indications : Malabsorption syndrome, sprue, and neuromuscular abnormalities due to very low Vitamin E concentration as found in young children with congenital cholestasis. As an adjunct to specific hormone therapy in sterility, habitual or imminent abortion; intermittent claudication, premature infants

Dose : ADULT 3-15 mg daily, CHILD 1-10 mg/kg, 100-200 mg/daily

Proprietary Preparations

Alfa-E (*Aristo*), Tab., 200mg , Tk. 4.00/Tab.

Biovit E (*Biopharma*), Tab., 400mg , Tk. 5.00/Tab.

E-Cap (*Drug Intl*), Cap. , 200mg, Tk. 4.05/Cap., 400 mg, Tk. 6.05/Cap.

Ecovit (*Globe*), Cap., 200 mg, Tk. 4.00/Cap., 400 mg, Tk. 6.00/Cap.

E-fill (*General*), Cap. , 200mg, Tk. 4.04/Cap., 400mg , Tk. 6.04/Cap.

Efynal (*Healthcare*), Tab., 200mg , Tk. 6.50/Tab.

E-gel (*Renata*), Cap. , 200 mg, Tk. 4.01/Cap., 400 mg, Tk. 6.02/Cap.

E-Soft (*Pacific*), Cap. , 200 mg, Tk. 4.00/Cap., 400 mg, Tk. 6.00/Cap.

E-Tab (*Acme*), Tab. , 200 mg, Tk. 3.27/Tab.

Evit (*Square*), cap, 200 mg, Tk. 4.03/Cap., 400 mg, Tk. 6.04/Cap.

Formula E (*Beximco*), Tab., 200 mg, Tk. 3.82/Tab.

Inovit (*Incepta*), Cap. , 200mg, Tk. 4.00/Cap., 400 mg, Tk. 6.00/Cap.

Lifil (*Acme*), Cap. , 200 mg, Tk. 4.01/Cap., 400 m., Tk. 6.01/Cap.

Liqu-E (*Beacon*), Cap., 200mg , Tk. 4.02/Cap.

Nature (*UniMed*), Tab , 400 mg, Tk. 7.00/Tab., 200 mg, Tk. 5.00/Tab.

Nutrivit -C (*ACI*), Tab., 200mg, Tk. 3.82/Tab.

Ovit-E (*Opsonin*), Cap. , 200 mg , Tk. 4.00/Cap., 400 mg, Tk. 6.00/Cap.

Polyvit (*Albion*), Tab., 200 mg, Tk. 4.00/Tab.

Tocomin (*Amico*), Tab., 200 mg, Tk. 3.00/Tab.

Vanila (*Eskayef*), Tab., 200mg, Tk. 3.80/Tab.,

Vegecap-E (*Nipro JMI*), Cap., 200 mg, Tk. 5.00/Cap.; 400 mg, Tk. 7.00/

Vitamin E + Vitamin C

EC (*Orion*), Tab. , 200 mg + 250 mg, Tk. 6.02/Tab.

E-Cap Plus (*Drug Intl*), Cap. , 200mg+250mg, Tk. 4.05/Cap.

Egren (*Supreme*), Tab. , 200mg+250mg, Tk. 4.00/Tab.

Protecior (*Opsonin*), Tab. , 200 mg + 250 mg, Tk. 6.00/Tab.

16.2.3.6 VITAMIN K

Vitamin K is necessary for the production of blood clotting factors and proteins needed for the normal calcification of bones.

Because Vitamin K is fat soluble, patients with malabsorption, especially in biliary obstruction or hepatic disease may become deficient. For oral administration to prevent Vitamin K deficiency in malabsorption syndrome a water soluble preparation Menadiol sodium phosphate may be used in doses about 10 ml daily. Vitamin K is used for prophylaxis against haemorrhagic disease of the newborn.

Oral coumarin anticoagulants act by interfering with vitamin K metabolism in the hepatic cells and their effects can be antagonized by giving vitamin K.

Phytomenadione is natural vitamin K.

VITAMIN-K^[ED]

Indications: Hypoprothrombonaemia; prophylaxis and treatment of haemorrhagic diseases of the newborn.

Cautions: Anaphylactic reaction may occur with parenteral administration

Contra-indications: Synthetic analogues of vitamin K should be avoided in newborn because of the risk of kernicterus

Dose: ADULT, ORALLY 10-20 mg, max. 40 mg in 24 hours. CHILD & NEONATES, 1 mg, over 3 months, 5-10 mg

By injection, ADULT, 10-20 mg IM, or slow IV, max. 40 mg in 24 hours. CHILD & NEONATES 1 mg IM; over 3 months 5-10 mg IM

Proprietary Preparation

Konakion[®] (*Roche*), Inj. 2mg/0.2ml, Tk. 68.26/vial

Babykion (*Chemist*), Inj. 0.2 ml; Tk. 20/0.2 ml

Kayon (*Globe*), Cap., 1 mg, Tk. 15.00/Cap.

K MM (*Incepta*), Inj. , 2 mg/0.2 ml, Tk. 45.86/0.2 ml Amp; 10 mg/ml, Tk. 19.89/Amp

K-One (*Square*), Inj., 2 mg/0.2 ml, Tk. 19.94/0.2ml Amp

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16.2.3.7 MULTIVITAMIN AND MULTIVITAMIN WITH MINERAL PREPARATIONS

In view of the prevalence of multiple vitamin and mineral deficiencies together it is sometimes impossible to diagnose cases of specific deficiencies. It may be worthwhile to treat such cases with formulation containing multiple vitamins or with combined multivitamin and minerals. .

Indication: it is used as dietary supplement

MULTIVITAMINS

Indications: Multivitamin deficiencies in infants and children as in malabsorption syndrome and other gastrointestinal diseases; growth retardation and during antibiotic therapy

Dose: usual dosage, 10-15 drops once or twice daily

Proprietary Preparations

Babivit (Alco) Paed Drops Tk. 15.05/15
Biovit (Biopharma), Paed drops, Tk. 15.06/15 ml
Micovit (Amico), Paed drops, Tk. 15/15 ml
Multisina (Ibn Sina), Paed Drops, Tk. 20/15ml
Nutrivit-MV (ACI), Paed Drops, Tk.16.01/15 ml
Restovit M (Zenith) Paed drops, Tk. 15/15 ml
Tynisol (Beximco), Drops, Tk. 24/15 ml
Vita M (Opsonin), Paed drops, Tk. 16.54/15 ml
V-Plex (Acme), Paed Drops, Tk. 22/15 ml

MULTIVITAMIN + MULTIMINERALS

Proprietary Preparations

Activit Gold (Delta), Tab., Tk. 6.00/Tab.
Activit Silver (Delta), Tab., Tk. 6.00/Tab.
Apevit- M (APC), Tab., Tk. 1.00/Tab.
Aristocal M (Beximco), Tab., Tk. 5.50/Tab
Aristo Gold (Aristo), Tab., Tk. 7.00/Tab.
Aristo Kid (Aristo), Syrup, Tk. 86.00/100 ml; Tk. 152.00/200 ml
Aristo Kid (Aristo), Syrup, Tk. 86.00/50ml, Tk. 52.00/100ml, 200ml
Aristo Mom (Aristo), Tab., Tk. 3.00/Tab.
Aristogold (Aristo), Tab., Tk. 7.00/Tab.
Aristovit M (Beximco), Tab., Tk. 2.00/Tab.
Aristovit X (Beximco), Tab., Tk. 4.00/Tab.
Asitrum Gold (Asiatic), Tab., Tk. 6.00/Tab.
Asitrum Silver (Asiatic), Tab., Tk. 6.00/Tab.
Atoz Premium (Radiant), Tab., Tk. 12.00/Tab.
Atoz Senior (Radiant), Tab., Tk. 12.00/Tab.

Aztrum Gold (Apex), Tab., Tk. 6.00/Tab.
Benvit - M (Benham), Tab., Tk. 1.80/Tab.
Bextram (Beximco), Tab., Tk. 5.00/Tab
Bextram Gold (Beximco), Tab., Tk. 7.00/Tab.
Bextram KIDZ (Beximco), Syrup, Tk.80/100 ml
Bextram Silver (Beximco), Tab., Tk. 7.00/Tab.
Bextram Teen HM (Beximco), Tab., Tk. 6/Tab.
Bextram Teen HR (Beximco), Tab., Tk. 6/Tab.
Biovit Gold (Biopharma), Tab., Tk. 7/Tab.
Biovit Silver (Biopharma), Tab., Tk. 6.02/Tab.
Biovit-M (Biopharma), Tab., Tk. 1.80/Tab.
Central Gold (Central), Tab., Tk. 6.50/Tab.
Century Forte (UniMed), Tab., Tk. 6.00/Tab.
Century Select (UniMed), Tab., Tk. 6.00/Tab.
Cytaplex M (Central), Tab., Tk. 1.50/Tab.
Envit-M (Ibn Sina), Tab., Tk. 1.50/Tab.
Equate (Asiatic), Tab., Tk. 1.00/Tab.
Evagren (Incepta), Tab., Tk. 4.00/Tab
Filwel Gold (Square), Tab., Tk. 6.02/Tab.
Filwel Silver (Square), Tab., Tk. 6.02/Tab.
Flavit-M (Amico), Tab., Tk. 1.50/Tab.
Goldage (Orion), Tab., Tk. 6.02/Tab.
Goldpac (Pacific), Tab., Tk. 6.52/Tab.
Hygea Gold (Somatec), Tab., Tk. 6.02/Tab.
I Care (Pacific), Tab., Tk. 7.52/Tab.
Kidovit (Amico), Syrup, Tk. 65.00/100 ml
Kvit Gold (Kemiko), Tab., Tk. 6.00/Tab.
Kvit-M (Kemiko), Tab., Tk. 1.50/Tab.
Life Gold (Alco), Tab., Tk. 6.00/Tab.
Life Silver (Alco), Tab., Tk. 6.00/Tab.
Livwel (Square), Syrup, Tk. 160.60/200 ml; Tk. 90.34/100 ml
Multivit Plus (Square), Tab., Tk. 1.80/Tab.
Natal (Opsonin), Tab., Tk. 2.26/Tab.
Newage (Orion), Tab., Tk. 5.02/Tab.
Nipro Gold (Nipro JMI), Tab., Tk. 6.00/Tab.
Norad Plus (Pacific), Cap., Tk.3.76/Tab.
Nox (Alco), Tab., Tk. 2.53/Tab.
Nutrum 50+ (Acme), Tab., Tk. 6.02/Tab.
Nutrum Bone (Acme), Tab., Tk. 4.01/Tab.
Nutrum Gold (Acme), Tab., Tk. 6.02/Tab.
Nutrum Junior (Acme), Syrup, Tk. 85.32/100 ml
Nutrum Super (Acme), Tab., Tk. 4.01/Tab.
Opsovit Mm (Opsonin), Tab., Tk. 1.14/Tab.
Orioplex-M (Orion), Tab., Tk. 1.51/Tab.
Ostium-Gold (APC), Tab., Tk. 6.00/Tab.
Oxidex (Albion), Tab., Tk. 2.53/Tab.
Polyvit Plus A to Z Gold (Albion), Syrup, Tk. 85.00/100 ml ; Tab., Tk. 6.00/Tab.
Restovit M (Zenith), Tab., Tk. 1.43/Tab
Restovit M (Zenith), Tab., Tk. 1.43/Tab.
Revigor (ACI), Tab., Tk. 5.02/Tab.
Revital 30 (ACI), Tab., Tk. 6.02/Tab.
Revital32 (ACI), Tab., Tk. 6.02/Tab.
S-32 Gold (Sharif), Tab., Tk. 6.00/Tab.
Santox (Healthcare), Tab., Tk. 4.00/Tab.
Silvage (Orion), Tab., Tk. 6.02/Tab.
Sina Gold (Ibn Sina), Tab., Tk. 6.50/Tab.
Solvit-M (Eskayef), Tab., Tk. 1.80/Tab.
Supravit (Drug Intl), Soft Cap., Tk. 2.00/Cap.
Supravit-M (Drug Int.), Soft Cap., Tk. 3.50/Cap.

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Synergy (*Amico*), Tab., Tk. 4.00/Tab.
Vitace M (*Aristo*), Tab., Tk. 4.00/Tab.
Vitachild (*Popular*), Tab., Tk. 75.28/100 ml;
 Tk.140.53/200 ml
Vitaforce S (*Biopharma*), Tab., Tk. 4.02/Tab.
Vitagrow (*Incepta*), Syrup, Tk. 80/100 ml
Vitalgin (*Ibn Sina*), Syrup, Tk. 175/200ml;
 Tk.85/100 ml
Vitrum Gold (*Eskayef*), Tab, Tk. 6.00/Tab.
Vitrum Silver(*Eskayef*), Tab, Tk. 6.00/Tab.
VM Gold (*Organic*), Tab., Tk. 6.00/Tab.
V-Plex Plus (*Acme*), Tab., Tk. 0.44/Tab.
Zovia Teen B (*Opsonin*), Tab., Tk. 4.51/Tab.
Zovia Teen G (*Opsonin*), Tab., Tk. 4.51/Tab

MULTIVITAMIN WITH COD-LIVER OIL

A special preparation of multivitamin comprising vitamin A, D, B₂, B₆, C, E, nicotinamide and codliver oil.

Proprietary Preparations

Aquavit (*Somatec*), Syrup, Tk. 80.30/100 ml;
 Tk. 150.00/200 ml
Asitrum Cod (*Asiatic*), Syrup, Tk. 80/100 ml
CNV (*Delta*), Syrup, Tk. 80.00/100 ml
Cod Liver (*Drug Intl*), Cap. Tk. 2.05/Cap.
Cod Plus (*Apex*), Syrup, Tk. 80/100 ml;
 Tk.145/200 ml
Codcap (*Incepta*), Cap. , Tk. 2.00/Cap.
Codliv (*Pacific*), Cap. , Tk. 2.00/Cap.
Codlivit (*Silva*), Syrup, Tk. 80.30/100ml
Codomix (*Jayson*), Syrup, Tk. 80.00/100 ml
Codvit (*Opsonin*), Cap. , Tk. 2.00/Cap.
Codvita (*Amico*), Syrup, Tk. 80.00/100 ml
Dorakid (*Beacon*), Syrup, Tk. 100.00/Syrup
Filwel (*Square*), Syrup, Tk. 80.55/100ml
Filwel Kids (*Square*), Syrup, Tk.145.54/200
 ml ; Tk. 80.30/100 ml
Gold Kid (*Orion*), Syrup, Tk. 80.30/100 ml
Hepta seas (*ACI*), Syrup, Tk. 150.00/200ml; Tk.
 85.00/100ml
Junivit (*Ibn Sina*), Syrup, Tk. 90.00/100 ml
Kiddi (*Renata*), Syrup, Tk. 40.15/50 ml; Tk.
 140.53/200ml; Tk. 80.31/100 ml
Kidicare (*Virgo*), Syrup, Tk. 145.00/200ml; Tk.
 80.00/100ml
Kidivit (*Monico*), Syrup, Tk. 145.00/200ml; Tk.
 80.00/100ml
Kidsgro (*Biopharma*), Syrup, Tk. 80.00/100ml
Kvit seas (*Kemiko*), Syrup, Tk. 145.00/200 ml;
 Tk. 80.00/100 ml
Mixavit (*Eskayef*), Syrup, Tk. 80.00/100 ml
Multi Seas (*General*), Syrup, Tk. 80.30/100
 ml; Tk. 145.54/200 ml
Multicod (*Pacific*), Syrup, Tk. 75.19/100 ml
Multiseas (*General*), Cap. , Tk. 3.01/Cap.
Newseas (*Sharif*), Syrup, Tk. 80/100 ml

Nine Seas (*Aristo*), Syrup, Tk. 80/100 ml;
 Tk.150/200 ml
Pediavit (*UniMed*), Syrup, Tk. 80/100 ml
Polyvit Kids (*Albion*), Syrup, Tk. 80/100 ml
Revam (*Navana*), Syrup, Tk. 45.17/50 ml; Tk.
 80.30/100 ml
Seasvita (*Organic*), Syrup, Tk. 80/100 ml; Tk.
 145/200 ml
Simcod (*Pharmasia*), Syrup, Tk. 80/100 ml;
 Tk. 145/200 ml
Supracod (*Drug Intl*), Syrup, Tk.80.00/100 ml
Vitalex Cod (*Supreme*), Syrup, Tk.80/100 ml
Vitcod (*Alco*), Syrup, Tk. 75.00/100 ml; Tk.
 140.00/200 ml
Zovia Kids (*Opsonin*), Syrup, Tk. 60.38/100
 ml; Tk. 109.43/200

PRENATAL MULTIVITAMIN AND MULTIMINERAL

Indications: Improving the nutritional status of throughout the pregnancy and in postnatal period for both lactating and non-lactating mother; increase the nutritional status of women prior to conception

Side-effects: Allergic sensitization has been reported following oral administration of folic acid

Cautions: Folic acid in doses above 0.1mg daily may obscure pernicious anemia in that hematological remission can occur while neurological manifestation remain progressive. Accidental over dose of iron containing products is a leading cause of fatal poisoning in children under

Dose: one daily.

Proprietary Preparations

Biovit PN (*Biopharma*), Tab., Tk. 5.02/Tab
Nutrum PN (*Acme*), Tab. Tk.5/Tab
Nutrum PN (*Acme*), Tab., Tk. 5.01/Tab.
Placent-M (*Navana*), Tab., Tk. 1.51/Tab.
Precare (*Incepta*), Tab. Tk.5/Tab
Supravit-PN (*Drug Intl*), Soft Cap., Tk.5/Tcap
Supravit-PN (*Drug Intl*), Soft Cap., Tk. 5/Cap.

16.2.3.8 ANTIOXIDANT VITAMIN PREPARATIONS

β- CAROTENE + VITAMIN C + VITAMIN E:

Beta-carotene, vitamin C & vitamin E are antioxidant vitamins. It is found that their

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presence in foods help fight & protect the cell against harmful cell damage.

Indications: As antioxidant vitamins to combat degenerative process of ageing; prevent old age diseases, inflammatory rheumatic diseases, inflammatory rheumatic diseases, malignancy & pre-cancerous conditions, lung functional problems & immunological problems. Prophylactic use of vitamin E and vitamin C may prevent certain degenerative diseases

Contra-indications; Side-effects & Cautions: See under respective vitamins individually

Dose: 1 tablet or capsule daily, or as prescribed by the physician

Vitamin C+Vitamin E + Zinc + Copper Lutein.

Alvital (Silva), Tab. , Tk. 4.00/Tab.

Azecol (Incepta), Cap. , Tk. 10.00/Cap.,

Ecotin (Globe), Cap., Tk. 10.00/Cap

Eye-gel(Nipa), Cap. , Tk. 10.00/Cap.

Eyevi (Square), Cap. , Tk. 10.00/Cap.

I-Gold (Aristo), Cap., Tk. 10.00/Cap.

I-Vita (Opsonin), Cap. , Tk. 10.00/Cap.

Kvit I (Kemiko), Cap. , Tk. 10.03/Cap.

LutinPlus (General), Cap. , Tk. 10.03/Cap.

Nutrum Eye (Acme), Cap. , Tk. 8.03/Cap.

Ocuvit (Asiatic), Cap., Tk. 10.00/Cap.

Optagold (Ibn Sina), Cap. , Tk. 10.00/Cap.

Optavit (Popular), Cap. , Tk. 10.00/Cap.

Santox (Healthcare), Tab., Tk. 4.00/Tab.

Tanox

-Plus (Drug Intl), Tab.Tk. 4 /Tab

Tioxil (ACI), Cap., Tk. 10.00/Cap

Vivis (Beximco), Cap., Tk. 10.00/Cap

Beta-carotene 6 mg + Vitamin C 200 mg + VitaminE 50 mg.

Proprietary Preparations

Active Plus (White Horse), Tab.,Tk.2.50/Tab.

Antox (Acme), Tab., Tk. 2.54/Tab

Bec (Opsonin), Tab., Tk. 1.7/Tab.

Carocet (Beximco), Tab.Tk. 2.54 /Tab

Ceb (Rephco), Tab., Tk. 4.00/Tab.

Cebeta (Amulet), Tab., Tk. 2.53/Tab

Norad (Pacific), Tab., Tk. 3.01/Tab; Cap., Tk.3.01/Cap.

Oxet (Amico), Tab., Tk. 2.50/Tab.

Perex (Central),Tab., Tk. 2.50/Tab

Race (Ibn Sina), Tab., Tk. 2.50/Tab.

Rex (Square), Tab., Tk. 2.54/Tab.

Rexovit (Maks), Tab., Tk. 2.50/Tab

Tanox (Drug Intl), Tab.Tk.3.00 /Tab

Tasti (ACI), Tab., Tk. 2.50/Tab.

Vitace (Aristo), Tab., Tk. 3.00/Tab.

Vitaforce (Biopharma), Tab., Tk. 2.54/Tab

Chapter 17

CONTRAST MEDIA

17 **Contrast media** *p. 535*

17.1 **Drugs used in contrast media** *p. 540*

17 **CONTRAST MEDIA**

X-Ray image is produced by the differential attenuation of x-ray photons by tissues of different densities in the body; giving radiographic contrast in the image.

A number of organs and anatomic regions do not have sufficient inherent contrast for the plain radiography e.g. kidneys, gastrointestinal tract, gallbladder, brain etc. To visualize these organs in the body, it is necessary to introduce into the patients a contrast medium that is deposited in the organs and that absorbs X-ray either more or less than the surrounding tissue. Contrast media in common uses are: air, barium sulphate in the gastrointestinal tract and iodinated compound in the gallbladder, kidneys, vascular system, and brain.

IODINATED CONTRAST MEDIA ARE USED IN THE FOLLOWING RADIOLOGICAL PROCEDURES:

- Contrast enhancement in the CT scan of brain and in different parts of body.
- Cardio angiography.
- Cerebral aortography.
- Thoracic aortography.
- Abdominal aortography.
- Peripheral aortography.
- Phlebography.
- Urography.
- Myelography.
- Hysterosalpingography.
- Arthrography.
- Fistulography.
- Dacryocystography.
- Galactography.

- Sialography.

Non ionic, low-osmolar iodinated contrast media is preferable and suitable for all the above indications.

BIARIUM SULPHATE IS USED AS CONTRAST MEDIUM IN THE FOLLOWING EXAMINATIONS:

- Barium swallow-oesophagus
- Barium meal examination plain and double contrast
- Hypotonic duodenography
- Barium follow-through
- Small bowel enema or enteroclysis
- Barium enema examination

Barium sulfate of different suspension at different weight by volume strength is required for different examinations.

Biliary contrast is used for visualization of the gallbladder and common bile duct. For operative or post-operative choledochography and for visualization of the biliary tree and pancreatic duct in Percutaneous Transhepatic Cholangiography (P.T.C) and in Endoscopic Retrograde Cholecysto Pancreatography (E.R.C.P) the iodinated conventional water soluble contrast media is used.

Intravascular radiological contrast agent: Iodine (Atomic weight -53).

Iodine is the only element that has proved to be safe for an intravascular radiological contrast agent.

In the contrast media iodine molecule gives the radio-opacity, whereas the other elements in the media provide no radio-opacity but acts as a carrier of the iodine, increasing the solubility and reducing the toxicity of iodine molecule. To perform a 2 vessel or 3 vessel angiogram of brain or heart, 70-

17. CONTRAST MEDIA

80 gm of iodine is required, delivered into arterial tree for about one hour. Probably this is the largest quantity of any drug, used intravascularly in clinical practices.

Thus, highest quality of precaution and care is required for iodinated compounds, which is to be injected into the circulation.

All conventional ionic water soluble contrast media are hypertonic with high osmolalities of 1200 to 2000 mosmol/kg of water.

The very high osmolality is due to the non-radio opaque carrier ion i.e. cation (sodium or meglumine), which exert just as great as osmolar load, like that of iodinated anions. The cation serves no radiographic function, so a contrast medium with fewer cation or no cation would sound better.

Factors predisposing to adverse reactions:

1. Previous significant adverse reaction increases the risk of second serious reactions by 10 times.
2. History of allergy: cardiac disease, sickle cell anemia.
3. Pheochromocytoma.
4. Myelomatosis.
5. Diabetes mellitus.
6. Neonates, infants, and elderly patients.

Cautions:

- i. Most complications of contrast agents are unpredictable.
- ii. The smallest dose, the lowest concentration, and the smallest number of injection, which will give reliable and comprehensive diagnostic results, should be used.
- iii. A negative test dose or previous uneventful contrast examination do not ensure the safety of the present examination.

- iv. Radiologist or Radiographer should remain by the side of the patients for first 15 minutes following injections and an emergency trolley with all facilities should be immediately available.

Both conventional high osmolar ionic contrast and the newer more expensive low osmolar contrast media are very safe drugs, but like all other drugs care should be taken in high risk patients. Intravenous Urography (IVU) probably does not justify the use of the more expensive low osmolar contrast media except in special cases. The total dose of contrast medium in healthy persons should not exceed 75 gm of iodine at any one procedure or in a single day. High price of the low osmolar contrast is restricting their use, though they are safer and more comfortable.

ADVERSE REACTIONS:

This can be described as -

Unknown aetiology : Acute anaphylaxis - occurring in a previously sensitized individual within minutes of administering a contrast medium. Manifestations are - bronchospasm, glottic oedema, circulatory collapse, abdominal cramps. The patient may die unless immediate resuscitation is taken.

Anaphylactoid reactions: Similar but occurs in a non-sensitized individual.

Chemotoxic effects: Conventional high osmolar contrast media e.g. diatrizoate and iohalamate dissociate into ions. The anions are probably not a major cause of contrast medium reactions but the cations are clinically toxic. Sodium cations are more toxic than meglumine to brain (increased incidence of unconsciousness in patients with an altered blood-brain barrier) and myocardium (increased incidence of arrhythmias).

Hyperosmolar effects: Osmolality of contrast agents is 5-8 times higher than plasma (300 mosmol/kg of water) osmolality.

Haemodynamic and systemic effects: Injection of a conventional contrast

17. CONTRAST MEDIA

medium produces a significant, transient decrease in systemic arterial pressure, a decrease in peripheral vascular resistance, peripheral vasodilatation, tachycardia and an increase in pulmonary arterial pressure. This is accompanied by clinical perception of heat and with intra-arterial injections there is often pain. Low osmolar contrast media produce significantly less fluid shifts, change in measurable parameters, heat and pain.

Cardiac effects: There is a decrease in peak left ventricular systolic pressure, an increase in left ventricular end diastolic pressure, a biphasic decrease then increase in coronary blood flow, and bradycardia. Low osmolar contrast media have less effect on these parameters.

Red cell effects: Increasing concentrations of contrast media have an increasing sickling effect on red cells in sickle-cell anemia. Low osmolar contrast media have a lesser effect.

Vascular endothelial damage: Contrast medium induced thrombophlebitis is a particular complication of lower limb venography but its incidence is reduced fourfold when low-osmolar contrast media are used.

Central nervous system effects: Patients with cerebral tumours show an increased incidence of convulsions following enhancement for CT scans.

Pulmonary effects: Most patients suffer bronchospasm following administration of a contrast medium although this is not clinically apparent in the majority. It occurs more frequently in asthmatic and atopic individuals. The aetiology is uncertain but possible mechanisms include: direct histamine release from mast cells and platelets; cholinesterase inhibition; vagal overtone; complement activation; direct effect of contrast media on bronchi.

Renal effects: Impaired renal perfusion due to cardiotoxic effects; increased peripheral vasodilatation; renal vascular bed changes (increased blood flow

followed by a more prolonged decrease); increased rigidity of red blood cells; pre-dehydration; osmotic diuresis. Glomerular injury and tubular injury: Due to Impaired perfusion; hyperosmolar effects; chemotoxic effects.

Obstructive nephropathy: Cytoplasmic vacuolation in tubules. Precipitation of Tamm-Horsfall protein; precipitation of Bence Jones protein in multiple myeloma.

Gadolinium-based contrast medium can cause a condition known as nephrogenic systemic fibrosis (NSF) in patients with severely reduced kidney function. Severely reduced function is usually determined by a blood test called estimated glomerular filtration rate (eGFR). If patient's eGFR is 30 mL/min or below and kidney function is actively deteriorating then the patient may have a small increased risk of experiencing NSF with certain gadolinium contrast agents.

Iodine-containing contrast medium has the potential to cause a condition known as contrast-induced nephropathy. This condition can result in temporary and sometimes permanent reduction in kidney function to those with an already existing kidney problem.

Contrast media are regarded as generally very safe for patients who do not have severe kidney disease. If a patient has severe kidney disease, the radiologist in discussion with doctor might still decide that he/she should have contrast, because the benefit of the test or procedure outweighs the risk.

COMPLICATIONS:

MINOR REACTIONS: Flushing, nausea, arm pain, pruritus, vomiting, headache, mild urticaria. These are usually mild, of short duration, self limiting and require no treatment. Reassurance and restoration of patient's confidence is enough. Incidence of minor reaction is 5% to 30% only.

INTERMEDIATE REACTIONS: More serious degree of above symptoms, with

17. CONTRAST MEDIA

moderate degree of hypotension, bronchospasm. They respond to appropriate therapy-reassurance, chlorpheniramine for urticaria, 5 mg diazepam for anxiety, hydrocortisone 100 mg IV, salbutamol inhalation for bronchospasm. Incidence of moderate reaction is 0.5 to 2% but with non-ionic low osmolar contrast, it is still lesser.

SEVERE LIFE THREATENING REACTIONS: Severe manifestations of the above mentioned minor and moderate symptoms and in addition the following-convulsions, unconsciousness, laryngeal oedema, severe bronchospasm, cardiac arrhythmia, arrest, circulatory collapse.

MANAGEMENT OF COMPLICATIONS:

The airway to be secured. Oxygen, artificial respiration, cardiac massage, electrical DC defibrillators are to be administered as required. IV fluid infusion and drug therapy should be given.

IV furosemide for pulmonary oedema, IV diazepam for convulsions, adrenaline, hydrocortisone, aminophylline IV for anaphylactic symptoms can be used.

Vasopressors - Noradrenaline or dopamine infusion for hypotension.

Sodium-bi-carbonate for correction of acidosis.

Adrenaline 0.5 ml, 1/1000 solution by deep subcutaneous injection, repeated

at 20 min. interval provides the rapid and reliable relief for bronchospasm, angioneurotic oedema and other anaphylactoid symptoms.

Adrenaline - If given IV may precipitate ventricular fibrillation; but in very severe anaphylactoid reactions, even this route should be considered - 1:10,000 solution in 2 to 5 ml quantity IV very slowly preferably under ECG control.

Incidence of these life-threatening reactions is 0.1% in conventional contrast media and 0.02% in non-ionic contrast media.

Deaths: Above mentioned reactions may not respond to treatment and patient may die. Death may however be immediate also. Death rate is 1 in 40,000 in conventional ionic contrast reactions and 1 in 100,000 in low osmolar contrast media.

Indications for the use of low-osmolar contrast media:

Those at high risk from the hyperosmolar effects : Infants and small children, those with renal and/or cardiac failure; poorly hydrated patients, patients with diabetes, myelomatosis or sickle-cell anaemia, patients who have had a previous severe anaphylactoid or allergic reaction to a conventional contrast medium or those with strong allergic history.

Dose of non-ionic low osmolar contrast medium - Iopamidol in common radiological examination :

Indications	Route of administration	Iodine in mg/ml	Volume in ml
Myelography	Subarachnoid	200-300	5-15
Cerebral arteriography	Intra-arterial	300	Variable
Coronary arteriography	intracoronary	370	Variable
Thoracic and abdominal aortography	Intra-arterial	370	1.2 ml/kg
Peripheral arteriography	Intra-arterial	300-370	40-50
Selective abdominal arteriography	Intra-arterial	300-370	Variable
Venography	Intravenous	200-300	30-50
Urography	Intravenous –Adults	370	30-50
	Children < 8 kg	300	2-4 ml/kg
	Children > 8 kg	300	1.5-2 ml/kg
Arthrography	Intra-articular	300-370	Variable
CT scanning	Intravenous	300-370	0.5-2 ml/kg

BILIARY CONTRAST MEDIA

Like conventional urographic contrast media, biliary contrast media are also triiodobenzoic acid derivative. Iopanoic acid (Telepaque) was introduced in 1951.

Oral cholecystography: Now a days, this examination is not done as other modalities like ultrasonography & CT scan are preferred for biliary tree evaluation. Previously, it was routinely done to demonstrate suspected pathology in the gallbladder. The examination would not be successful, if serum bilirubin is greater than 34 micromol/litre.

Dose: Iopanoic acid (Telepaque) 500 mg, six tablets or sodium ipodate (Biloptin) 500 mg six capsules is the usual dose

Timing: Six tables are to be taken about 14 hours before the X-ray examination and no food or drink is to be allowed during this 14 hours. After the first film when gallbladder is opacified, a fatty meal is given and X-ray taken after 45 minutes to see its contraction.

Occasional adverse effects: Mild gastro intestinal disturbance in 50% cases. Skin reactions: urticaria, pruritus. Impairment of renal function may happen, if there is co-existent liver impairment, dehydration and repeat dose or double dose of contrast medium is used.

For doing choledochography - 25% hypaque or equivalent is used by diluting the contrast media.

Contrast media used in radiography of the Gastro intestinal tract :

Water soluble contrast media: gastrografen, gastroconray; Barium sulphate.

Indications of water soluble contrast media: Suspected perforation; meconium ileus. To distinguish bowel from other structures on a computerized tomography scan

Complications: Pulmonary oedema if aspirated; hypovolaemia due to hypertonicity of the contrast medium; allergic reactions due to absorbed contrast may occur.

BARIUM

Barium suspension is made up from pure barium sulphate. Barium carbonate is poisonous. The particles of barium must be small (0.1 to 3 micron) since this makes them more stable in suspension.

There are many varieties of barium suspension in use. In most situations the preparation may be diluted with water to give a lower density.

Examination of different parts of the gastrointestinal tract require barium preparations with different properties :

1. Barium swallow - require about 100 ml of barium of density 150% w/v.
2. Barium meal - require about 135 ml of barium of density 250% w/v.
A high density, low-viscosity barium is required for a double contrast barium meal to give a good thin coating that is still sufficiently dense to give satisfactory shadow.
3. Barium follow through require about 300 ml of barium of density 100% w/v.
4. Small bowel enema - require about 1000 ml. of diluted barium of density 100% w/v.

Barium enema - require about 500 ml of barium of density 125% w/v.

Complications :

Perforation : The escape of barium into the peritoneal cavity is extremely serious and will cause peritonitis. Mortality rate is about 50%. Of those who survive 30% will develop peritoneal adhesions and granulomata. So, water-soluble contrast media should be used in suspected perforation or in any investigation if there is any risk of perforation.

Aspiration : Barium if aspirated, is relatively harmless. Only

17. CONTRAST MEDIA

treatment required is physiotherapy.

Contrast agents used in CT scan :

Already mentioned Iodinated contrast media both ionic and low osmolar non-ionic are used according to the clinical situation. However non-ionic low osmolar Iodinated contrast media are safer and preferable. Different amount of iodinated contrast is used in different CT examinations. Non ionic low osmolar Iodinated contrast is preferred & can be safely used. Dose should not exceed 1 to 2 ml/kg body wt. of contrast having concentration of 300 to 370 mg iodine/ml.

Contrast agents used in Magnetic Resonance Imaging (MRI) :

The following agents can be used for enhancement MR scanning (a) Gadopentetic (b) Gadodiamide **loversal** is an Iodinated non-ionic monomeric contrast medium that is used by injection in angiography and urography.

Indications: Cranial and spinal Magnetic Resonance Imaging (MRI) in particular for the demonstration of tumors and for further differential diagnostic clarification in suspected meningioma, invasive tumors and metastases; for the demonstration of small and or isointense tumors; in suspected recurrence after surgery or radiotherapy; for the differentiated demonstration of rare neoplasms such as haemangioblastomas, ependymomas and small pituitary adenomas; for improved determination of the spread of tumors not of cerebral origin. Additionally in **spinal MR**: Differentiation of intra and extramedullary tumours : demonstration of solid tumor areas in known syrinx; determination of intramedullary tumor spread

Dose: patient is to fast of for two hours before the examination. In general the administration of 0.2 ml Magnevist/kg body weight is sufficient for good shadow and to answer the clinical question.

Side effects: nausea and vomiting and also allergy-type dermal and mucosal reactions were occasionally observed

after the administration of Magnevist. In very rare case anaphylactoid reactions, convulsions have been observed. Transient headache, vasodilatation, dizziness, chills and syncope have occasionally been reported.

Nephrogenic systemic fibrosis (NSF) is a relatively uncommon condition in which fibrous plaques develop in the dermis and, often, in deeper connective tissues. Reported cases have occurred almost exclusively in patients with severe renal disease, and almost all have been associated with prior use of gadolinium-containing MRI contrast agents. The disease is often disabling, no proven treatments exist, and it may contribute to patient demise

17.1 DRUGS USED IN CONTRAST MEDIA

BARIUM SULPHATE^[ED]

Proprietary Preparations

Visugut(Sonear), Powder, Tk. 102.51/150 gm
Viewgut(Popular), Powder, Tk. 200.75/150 gm

GADODIAMIDE

One ml contains Gadodiamide 287mg
(0.5mMol/ml)

Proprietary Preparations

Diascan(Techno), Inj., 28.7 gm/100 ml, Tk. ;
Tk. 590.00/10 ml;
Gadoscan(Popular), Inj., 28.7 gm/100 ml, Tk.
995.00/10 ml;
Omniscan^(b)(GE Healthcare), Inj., 28.7 gm/100
ml, Tk. 2225.29/10ml

GADOBUTROL

Gadavist Injection (Bayer)

The recommended dose of Gadavist for adult and pediatric patients (including term neonates) is 0.1 mL/kg body weight (0.1 mmol/kg)

Gadavist is indicated for use with magnetic resonance imaging (MRI) in adult and pediatric patients to detect and visualize areas with disrupted blood brain barrier and/or abnormal vascularity of the central nervous system also to assess the presence and extent of malignant breast disease and to evaluate known or suspected supra-aortic or renal artery disease.

17. CONTRAST MEDIA

Not Available

GADOXEDATE DOSODIUM

Eovist Injection (Bayer)

The recommended dose of EOVIST is 0.1 mL/kg body weight (0.025 mmol/kg body weight).

EOVIST is indicated for intravenous use in magnetic resonance imaging (MRI) of the liver to detect and characterize lesions in patients with known or suspected focal liver disease.

Not Available

IODIXANOL

One mL contains IODIXANOL 652 mg equivalent to 320 mg iodine/mL; trometamol 1.2 mg; sodium calcium edetate 0.1 mg; calcium chloride 0.04 mg; sodium chloride 1.11 mg; hydrochloric acid q.s.; water for injection q.s. to 1mL

Proprietary Preparation

Visipaque 320[®](GE Healthcare),
Inj., 320mg/ml Tk. 2874.26/50ml bottle

IOHEXOL

Each mL contains Iohexol 755 mg corresponding to 350 mg of iodine/mL; trometamol 1.2 mg; sodium calcium edetate 0.1 mg water for injection q.s. to 1mL.

Proprietary Preparations

Diapack(Techno), Inj., 300mg/ml, Tk. 300/10ml; Tk. 500/20ml; Tk. 650/30 ml; Tk. 850/50ml; Tk. 1,530/100ml; , Tk. 360/10ml; Tk. 600/20ml; Tk. 970/50ml; Tk. 1,880/100ml

Imiro(Popular), Inj., 350mg/ml, Tk.

1900.00/100ml, Tk. 1000.00/50ml

Omniclear(Incepta), Inj., 350mg/ml, Tk.

1000.00/50ml

Omnipaque[®](GE health care) Inj., 350 mg/ml,

Tk. 1043.81/50 ml, Tk. 2072.50/100ml

IOPAMIDOL

One 100mL bottle contains: active component Iopamidol 75.53 gm corresponding to 370mg of iodine/mL. inactive component trometamol 100 mg; calcium disodium edetate (dehydrate) 41 mg; hydrochloric acid q.s. to pH 6.9-7.1; water for injection q.s. to 100ml

Proprietary Preparations

Amidol(Incepta), Inj., 300 mg/ml, Tk.

1,203.00/50ml; 370 mg/ml, Tk. 1,318.00/50 ml;

Tk. 2,636.00/100 ml

Diapamiro(Techno), Inj., 300 mg/ml, Tk.

1,450.00/100 ml; Tk. 750.00/50 ml; 370 mg/ml,

Tk. 1,650.00/100 ml; Tk. 850.00/50 ml

Lopidam(Beximco), Inj., 370 mg/ml , Tk.

1,318.50/50 ml ;300 mg/ml, Tk. 2,636/100 ml

Lopamiro(Popular), Inj. 370mg/ml, Tk.

752.83/50ml, Tk. 1454.00/100ml; 75.52gm, Tk.

853.00/50ml, Tk. 1656.00/100ml

IOTHALAMIC ACID + MEGLUMINE

Generic Preparations

Inj. Iothalamic acid 45.6% + meglumine 8.4%;

Inj. Iothalamic acid 67.59% + meglumine

8.4%; Oral Sol 57.94%.

IOPANOIC ACID

Proprietary Preparation

Visugall(Sonear), Tab, 500 mg, Tk. 0.89/Tab.

APPENDIX-1

TREATMENT GUIDELINES

Treatment Guidelines followed in the National Disease Control Programmes of the Directorate General of Health Services, Government of the People's Republic of Bangladesh :

- Appendix-1a : Treatment Guidelines for Acute Watery Diarrhoea. *p.584*
 - Appendix-1b : Treatment Guidelines for Tuberculosis. *p. 589*
 - Appendix-1c : Treatment Guidelines for Leprosy. *p. 592*
 - Appendix-1d : Treatment Guidelines for Dengue Infection. *p. 594*
 - Appendix-1e : Treatment Guidelines for Acute Respiratory Tract Infection. *p. 598*
 - Appendix-1f : Treatment Guidelines for Drug Addicts. *p. 598*
 - Appendix-1g : Treatment Guidelines for Burn Injury. *p. 602*
 - Appendix-1h : Treatment Guidelines For Malaria *p. 606*
 - Appendix-1i : Treatment Guidelines for Kala-azar *p.607*
 - Appendix-1j : Treatment Guidelines for Chikungunya
-

[Appendix-1a](#) Treatment Guidelines for Acute Watery Diarrhoea

PLAN A: TREAT DIARRHEA AT HOME

Counsel the mother on the 4 Rules of Home treatment

1. Give extra fluid
2. Give zinc supplements (age 6 months up to 5 years)
3. Continue Feeding
4. When to return

1. GIVE EXTRA FLUID (as much as the child will take)

➤ **Tell the mother**

- Breastfeed frequently and for longer at each feed
- If the child is exclusively breastfed, give ORS or clean water in addition to breast milk
- If the child is not exclusively breastfed, give one or more of the following ORS: ORS solution, food-based fluid (such as rice water, chira apni, yogurt drink) or clean water

It is especially important to give ORS at home when:

- The child has been treated with Plan B or Plan C during the visit
- The child cannot return to a clinic if the diarrhea get worse

➤ **TEACH THE MOTHER HOW TO MIX AND GIVE ORS. GIVE THE MOTHER 2 PACKETS OF ORS TO USE AT HOME**

➤ **SHOW THE MOTHER HOW MUCH FLUID TO GIVE IN ADDITION TO THE USUAL FLUID INTAKE**

Up to 2 years	50 to 100ml after each loose stool
2 years or more	100 to 200ml after each loose stool

➤ **Tell the mother to**

- Give frequent small sips from a cup
- If the child vomits, wait 10 minutes. Then continue, but more slowly

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- Continue giving extra fluid until the diarrhea stops

2. GIVE ZINC

- For acute diarrhea, persisting diarrhea and dysentery, give Zinc supplements for 10 days

AGE	ZINC TABLET (20mg)
2 months up to 6 months (Persistent diarrhea)	½
6 months up to 5 years	1

TELL THE MOTHER HOW MUCH ZINC TO GIVE

SHOW THE MOTHER HOW TO GIVE ZINC SUPPLEMENTS

- Infants –dissolve tablet in a small amount of expressed breast milk or ORS

3. CONTINUE FEEDING

4. WHEN TO RETURN

PLAN B: TREAT SOME DEHYDRATION WITH NEW ORS

In clinic, recommended amount of ORS over 4-hour period

- **DETERMINE AMOUNT OF ORS TO GIVE DURING FIRST 4 HOURS**

AGE*	Up to 4 months	4 months up to	12 months up to	2 years up to
WEIGHT	<6kg	6-<10kg	10-<12 kg	12-<20kg
Amount of Fluid (ml) over 4 hours	200-450	450-800	800-960	960-1600

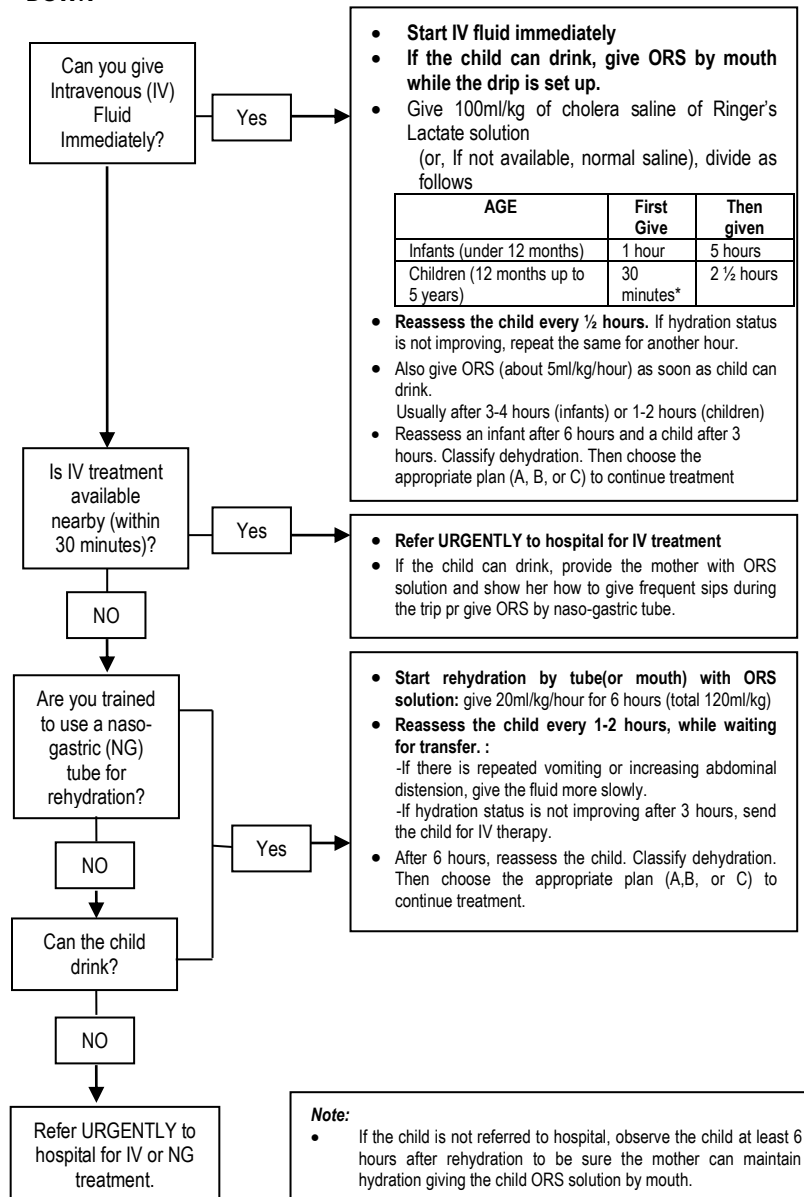
**Use the child's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in kg) times 75.*

- If the child wants more ORS than shown, give more
 - **SHOW THE MOTHER HOW TO GIVE ORS SOLUTION**
 - Give frequent small sips from a cup
 - If the child vomits, wait 10 minutes. Then continue, but more slowly
 - Continue breastfeeding whenever the child wants.
 - **AFTER 4 HOURS**
 - Release the child and classify the child for dehydration
 - Select the appropriate plan to continue the treatment
 - Begin feeding the child in clinic.
 - **IF THE MOTHER MUST LEAVE BEFORE COMPLETING TREATMENT:**
 - Show her how to prepare ORS solution at home.
 - Show her how much ORS to give to finish 4 hours treatment at home
 - Give her instruction how to prepare salt and sugar/gur solution at home (If ORS not available).
 - Explain the 4 Rules of Home Treatment:
1. GIVE EXTRA FLUID
 2. GIVE ZINC (age 6 months up to 5 years)
 3. CONTINUE FEEDING (exclusively breastfeeding if age less than 6 months)
 4. WHEN TO RETURN

APPENDIX 1 : TREATMENT GUIDELINES

Plan C: Treat Severe Dehydration Quickly

FOLLOW THE ARROWS, IF ANSWER IS “YES”, GO ACROSS, IF “NO” GO DOWN



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For dysentery: Give Ciprofloxacin for 3 days 15mg/kg/day-2 times a day for 3 days

Age or weight	Ciprofloxacin Give two times daily for 3 days
2 months up to 12 months (4 - <6kg)	1/4
4 months up to 3years (6 - <14kg)	1/2
3years up to 5years (14 - <20kg)	1

For CHOLERA: Give Tetracycline for 3 days

Age or weight	TETRACYCLIN Give 4 times daily for 3 days	ERYTHROMYCIN Give 4 times daily for 3 days
	CAPSULE 250mg	TABLET 250mg
2years up to 5years (10 - 19kg)	1	1

See also EPI Programme, DGHS, Ministry of Health & Family Welfare, Govt. of Bangladesh

APPENDIX 1 : TREATMENT GUIDELINES

Appendix-1b Treatment Guidelines for Tuberculosis

See also in section 1.1.9

Case Definition by previous treatment history

Case Classification	Definition
New	- A patient who has never received anti-TB drugs or - A patient who received anti-TB drugs for less than one month
Relapse	Relapse patients have previously been treated for TB, were declared cured or treatment completed at the end of their most recent course of treatment, and are now diagnosed with a recurrent episode of TB (either a true relapse or a new episode of TB cause by reinfection)
Treatment after failure	Treatment after failure patients are those who have previously been treated for TB and whose treatment failed at the end of their most recent course of treatment
Treatment after loss to follow up/default	Treatment after loss to follow up patients have previously been treated for TB and were declared to follow-up at the end of their most recent course of treatment. (These were previously known as treatment after default patients.)
Transfer in	A patient already registered for treatment in a DOTS centre and who is subsequently transferred to another register unit
Others(s)	Other previously treated patients are those who have previously been treated for TB but whose outcome after their most recent course of treatment is unknown or undocumented.

Standardized treatment regimen for each diagnostic category (Adults)

TB diagnostic Category	Types of Patient	Treatment regimen	
		Intensive Phase (Daily)	Continuation Phase (Daily)
Cat. I	New smear-positive bacteriologically positive PTB patient	2(HRZE) 2=First 2 months (HRZE)=4-FDC	4(HR) 4=Next 4months (HR)=2-FDC
	New smear-negative PTB patient		
	New extra pulmonary TB patient		
	New concomitant /associated HIV/AIDS		
Cat. II	Sputum smear-positive PTB with history of treatment of one month or more	2(HRZE)S/1(HRZE) 2=First 2 months, 1=Next 1 month (HRZE)=4-FDC S=Streptomycin	5(HRE) 5=Last 5 months (HRE)=3-FDC
	Relapse		
	Treatment failure after Cat. I treatment		
	After loss to follow up		
	Others		

APPENDIX 1 : TREATMENT GUIDELINES

Dosage of FDC Tablets

FDC Tablets are composed as follows:

4FDC: rifampicin 150mg + isoniazid 75mg + pyrazinamide 400mg + ethambutol 275mg
 2FDC: rifampicin 150mg + isoniazid 75mg
 3FDC: rifampicin 150mg + isoniazid 75mg + ethambutol 275mg

The Dosage of FDC Tablets for adults are as follows:

Category I

Pre-treatment Weight (Kg)	Intensive Phase	Continuation Phase
	Daily First 2 Months	Daily Next 4 Months
	Number of 4FDC tablets	Number of 2FDC tablets
30-37	2	2
38-54	3	3
55-70	4	4
>70	5	5

Category II

Pre-treatment Weight (Kg)	Intensive Phase		Continuation Phase
	Daily First 3 Months	Daily First 2 Months	Daily Next 5 Months
	Number of 4FDC tablets	Injection Streptomycin	Number of 3FDC tablets
30-37	2	500mg	2
38-54	3	750mg	3
55-70	4	1gm	4
>70	5	1gm	5

Definition of Drug Resistance:

There are four different categories of drug resistance, namely:

Mono-resistance: resistance to one anti TB drug

Poly-resistance: resistance to more than one anti TB drug; other than isoniazid and rifampicin

Multidrug-resistance (MDR): resistance to at least isoniazid and rifampicin; two most potent anti-TB agents

Extensive drug-resistance (XDR): MDR-TB, plus resistance to at least one of the fluoroquinolones, and at least one of three injectable second-line drugs (capreomycin, kanamycin and amikacin)

The standard MDR-TB regimen:

The recommended standard MDR-TB regimen is as follows:

8{km-Z-Lfx(Ofx)-Eto-CS}/12{Lfx(Ofx)-Eto-CS-Z}

APPENDIX 1 : TREATMENT GUIDELINES

Length of the treatment for the standard MDR-TB Regimen:

Date of first sustained conversion	Length of the injectable agents	Length of total treatment for the standard MDR-TB Regimen
Between month 0 and 4	8 months	20-22 months
Between months 5 and 8	Add 4 months from conversion date	Add 18 months from conversion date

* Date of first negative smear and culture by two consecutive months

Adult dosage for second line anti- tuberculosis drugs

Drug	<33kg (mg/kg/day)	33-50kg (mg/kg/day)	51-70kg (mg/kg/day)	>70kg(nax) (mg/kg/day)
Pyrazinamide(Z) (500mg)	30-40mg	1000-1750mg	1750- 2000mg	2000- 2500mg
Kanamycin (Km) (1gm Vial)	15-20mg	500-750mg	1000mg	1000mg
Levofloxacin (Lfx) (250mg, 500mg)	7.5mg-10mg	750mg	750mg	750-1000mg
Ethionamide (Eto) (250mg)	15-20mg	500mg	750mg	750-1000mg
Cycloserine (CS) (250mg)	15-20mg	500mg	750mg	750-1000mg

See also section 1.1.9 and for more details NATIONAL GUIDELINES AND OPERATIONAL MANUAL FOR TUBERCULOSIS CONTROL (fifth edition), Published by National Tuberculosis Control Programme, DGHS, Ministry of Health & Family welfare, Govt. of Bangladesh

Appendix-1c

Treatment Guidelines for Leprosy

Leprosy (Hansen's disease) is a chronic disease caused by *Mycobacterium leprae*; it affects peripheral nervous system, skin and some other tissues. It is transmitted from person to person when bacilli shed from the nose and skin lesions of infected patients, but most individuals are naturally immune. Clinical leprosy manifests as a result of deficient cell mediated immunity in susceptible individuals. In Bangladesh, approximately 3 per 10,000 people are affected, with highest prevalence in the northern districts of Nilphamari, Dinajpur, Thakurgaon and Lalmonirhat.

For the purpose of grouping patients for chemotherapy, leprosy may be classified as multibacillary or paucibacillary.

Multibacillary leprosy occurs when cellular immunity is largely deficient and includes the subgroups lepromatous (LL), borderline lepromatous (BL) and other types giving positive skin smear for acid-fast bacilli, generally the lepromin test is negative.

Paucibacillary leprosy, results when cellular immunity is only partially deficient and includes subgroups like borderline tuberculoid (TB), tuberculoid (TT) and indeterminate (I) when skin smear is negative, generally lepromin test is positive.

Reactive episodes may be seen in leprosy patients undergoing treatment - the lepra reactions. Most reactions belong to one of two main types. Type 1 lepra reactions are delayed hypersensitivity reactions (type IV hypersensitivity) and respond to analgesics and corticosteroids.

Type 2 lepra reactions (also known erythema nodosum leprosum, ENL) represent a humoral antibody reaction (type III hypersensitivity) to dead bacteria, usually occurring in lepromatous type and respond to increasing dose of clofazamine, corticosteroid and analgesics.

Multidrug treatment (MDT) for leprosy, as promoted by National TB and Leprosy Control Service of the Directorate General of Health Services, Government of the People's Republic of Bangladesh is shown in the *Table I* below.

Leprosy is a slowly progressive chronic infectious granulomatous disease caused by *Mycobacterium leprae* affecting mostly the skin and peripheral nerves resulting in anaesthetic hypopigmented patches in skin, and sometimes trophic changes producing deformities in certain other tissues notably oral/nasal mucosa, the eye, muscle and bone.

Leprosy can affect all ages and sexes. It is directly transmitted via droplets from nose and mouth, and by prolonged and/or close frequent contacts for many years. Rarely it may spread through fomites.

APPENDIX 1 : TREATMENT GUIDELINES

Table 1 : The following table is showing the classification of leprosy, age of patients, mode of administration and the doses of different drugs used in MDT

Monthly Supervised Dose					Self-Administered Dose	
MB Cases	Adults	Rifampin	Clofazimine	Dapsone	Clofazimine	Dapsone
	(15 yrs.+)	600mg	300mg	100mg	50mg daily	100mg daily
	Children (10-15 yrs)	450mg	150mg	50mg	50mg alternate days	50mg daily
	Children (6-9yrs)	300mg	100mg	25mg	50mg twice a week	25mg daily
PB Cases	Adults (15 yrs.+)	600mg	-	100mg	-	100mg daily
	Children (10-15 yrs)	450mg	-	50mg	-	50mg daily
	Children (6-9yrs)	300mg	-	25mg	-	25mg daily

For more details NATIONAL GUIDELINES AND TECHNICAL MANUAL FOR LEPROSY (4th edition), Published by National leprosy Control Programme, DGHS, Ministry of Health & Family Welfare, Govt. of Bangladesh

Appendix-1d Treatment Guidelines for Dengue Infections

Dengue is the most important emerging tropical viral disease of humans in the world today. Over the last 10-15 years, dengue fever (DF) and dengue haemorrhagic fever (DHF) has become a leading cause of hospitalization and death among children in South-East Asian region, following diarrhoeal diseases and acute respiratory infections.

Manifestation of Dengue Infection

Asymptomatic Dengue Fever : Undifferentiated fever.
Without haemorrhage.

Symptomatic Dengue fever : With usual haemorrhage.
Dengue haemorrhagic fever (DHF).
Dengue haemorrhagic shock (DHS).

Chart-1: Clinical manifestation & Management of DHS Grades I and II
(The Manifestations & Management of DF & DHF during the febrile phase are the same)

Phase	Manifestations	Management
Febrile Duration: 2-7 days	- Temp 39-40°C (102-104°F) - Headache - Retro-orbital pain - Muscle pain - Joint bone pain - Flushed face - Rush - Skin hemorrhage, bleeding from nose, gums - Positive tourniquet test - Liver often enlarged - Leucopenia - Platelet/Hct normal	- At home - Bed rest - Keep the body temp. below 30°C - Paracetamol - No aspirin/NSAIDs - Oral fluids (fresh fruit juices) electrolyte therapy(ORS) - Follow-up for any change of platelet/Hct
Afebrile (critical) Duration: 2-7 days after febrile stage	- Same as during febrile phase - Improvement can be achieved with fluid therapy - Platelet /Hct reduced - Appetite regained slowly	- Bed rest - Check platelets /Hct - Fluids & electrolyte therapy (oral & intravenous) - The fluids if given intravenously should be started 1.5ml/kg/hr(18drops/min) for 6 hours, then 3ml/kg/hrs(36 drops/min) for 6 hours, then 5ml/kg/hrs(60drop/min) for 6 hrs, then 7ml/kg/hrs(90drop/min) for

APPENDIX 1 : TREATMENT GUIDELINES

		6 hrs. (the increment of fluid is important if patient is not responding with starting low dose) After 24 hrs, the rate of IV fluid should be gradually reduced from 7 to 5, 5 to 3, 3 to 1.5 ml/kg/hr within next 24 hours.
Convalescence During 7-10 days after critical stages	- Further improvement in general condition & return of appetite - Bradycardia - Confluent petechial rash with white center/itching - weakness for 1or 2 weeks	- No special advise - No restriction - Normal diet

- Patients & household members should be informed by the doctor that severe abdomen pain, passing of black stool, bleeding from other sites, no urine output in last 6 hrs, sweating & cold skin are warning signs & if any of these signs is noticed the patients should be taken to hospital immediately. - Paracetamol should be administered not more than 4 times in a 24-hr period. Paracetamol (250mg):<1 year-1/4 tablet,1-4 years $\frac{1}{2}$ tablet,5yrs& above-one tablet. If syrup 50mg/kg/dose 18drops/min (1.5ml/kg/hr) can be given in children as 72 micro drops/min through microburret set. Rest will be accordingly [1drop=4 micro drops in microburret set]

APPENDIX 1 : TREATMENT GUIDELINES

Chart-1: DHS Grades III and IV

Phase	Manifestations	Management
Afebrile (critical) Duration 2-3 days after febrile phase	In addition to the manifestations of DGF Grade II: -Circulatory failure evident by rapid and weak pulse, narrowing the pulse pressure (<20) or hypotension with the presence of cold clammy skin -CTR more than 2 seconds. - Profound shock with unstable pulse and blood pressure	-Check Hct and total platelet count (TPL) -Initial IV therapy (0.9%NS) 10ml/kg/hr (125 drop/min) -Check vital signs , Hct, timed urine output - If improves, IV fluids should be reduced every hour from 10 (125 drop/min) To 7 (90 drop/min) and then from 7 to 5 (60 drop/min) and then 5 to 3 (36 drop/min) and lastly from 3 to 1.5ml/kg/hour(18 drop/min) that should be maintained up to 48 hours - If patient has already received 1 hour treatment of 10ml/kg/hour of IV fluids and vital signs are not stable check Hct again and If Hct is increasing changed IV fluid to colloidal solution preferably Dextran or Plasma at 10ml/kg/hour - If Hct is decreasing from initial value give fresh whole blood transfusion 10ml/kg/hour and continue fluid therapy at 10ml/kg/hour and reducing it stepwise to 1.5ml/kg/hour and maintain it up to 48 hours - Initiate IV therapy (5%DNS) 10ml/kg/hour (125drops/minutes) as a bolus 1 or 2 times - Oxygen therapy - If continued shock colloid fluids (Dextran/Plasma) at 10-20ml/kg/hour to instituted - Persisting shock with declining Hct fresh whole blood 10ml/kg as bolus - Vital signs monitoring half hourly - If severe bleeding fresh whole blood bolus 20ml/kg - If TPL <500-1000mm³ Platelet rich plasma transfusion - After blood transfusion continue fluid therapy at 10ml/kg/hour and step wise reduce it to 1.5ml/kg/hour to be maintained up to 24-48 hours

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Convalescence Duration: 2-3 days after recovery from critical stage	- 6-12 hours after critical/shock stage, some symptoms of respiratory distress (Pleural effusion, ascites) - 2-3 days after critical stage , strong pulse and normal blood pressure - Improved general condition with return of appetite - Good urine output - Stable Hct - TPL >50000 mm3 - Bradycardia/ arrhythmia - Eligible for discharge from hospital - Asthenia and depression continue for few weeks in adult.	- Rest for 1-2 days - Normal diet or no medication - Continued observation

See also for more details NATIONAL GUIDELINES AND FOR CLINICAL MANAGEMENT OF DENGUE SYNDROME (3rd edition; 2013), Published by Disease Control Division, DGHS, Ministry of Health & Family Welfare, Govt. of Bangladesh

APPENDIX 1 : TREATMENT GUIDELINES

Appendix-1e Treatment Guidelines for Acute Respiratory Tract Infections (ARI)

FOR PNEUMONIA, ACUTE EAR INFECTION, VERY SEVERE DISEASE OR SEVERE MALNUTRITION, IF INJECTABLE Drugs are not available

(Oral Amoxicillin can be given, in very severe disease; it is not possible to administer injectable Ampicillin, Gentamycin)

Age or weight	Amoxicillin Give two times daily for 5 days		COTRIMOXAZOLE (Trimethoprim + Sulphamethoxazole) Give two times daily for 5 days		
	Tablet 250mg	Syrup 125mg/5ml	Adult tablet 80mg Trimethoprim + 400mg Sulphamethoxazole	Pediatric tablet 20mg Trimethoprim + 100mg Sulphamethoxazole	Syrup 40mg Trimethoprim + 200mg Sulphamethoxazole/5ml
2months up to 12 months (4- <10kg)	3/4	7.5ml	1/2	2	5.0ml
12months up to 5years (10- <19kg)	1.5ml	15ml	1	3	7.5ml

See also EPI PROGRAMME, DGHS, Ministry of Health & Family Welfare, Govt. of Bangladesh

Appendix-1f Treatment Guidelines for Drug Addicts

Psychoactive Substance: A psychoactive substance is a substance that affects the body's central nervous system (CNS) and changes how people behave or perceive what is happening around them. Psychoactive substances include illicit/illegal drugs and some medications.

Psychoactive drugs are of the following types:

Stimulants	Opioids (Narcotics)	Depressants	Hallucinations	Others (Some drugs do not fit neatly into a category)
Cocaine	Heroin	Alcohol	LSD	Cannabinoids (marijuana, hashish)

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Amphetamine	Morphine	Barbiturates	Mescaline Peyote	Khat/Miraa
Methamphetamine	Opium	Benzodiazepines	Ecstasy	Dissociative anesthetics (phencyclidine [PCP], ketamine)
Nicotine, Caffeine	Demerol	Gamma-Hydroxybutyrate (GHB); Rohypnol	Mushrooms	Inhalants solvents, gases, nitrites

Nicotine, caffeine, and alcohol (in some countries), all of which are legal, are included in the chart of psychoactive substances. Just because a substance is legal does not mean it is safer than an illegal substance. The legality of a substance is generally more the result of traditions, culture, or political or religious factors than whether a substance is more or less harmful than another.

Substance Dependence: Also known as Drug Dependence. A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

- (1) tolerance,
- (2) Withdrawal,
- (3) the substance is often taken in larger amounts or over a longer period than was intended
- (4) there is a persistent desire or unsuccessful efforts to cut down or control substance use
- (5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects
- (6) important social, occupational, or recreational activities are given up or reduced because of substance use
- (7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption) (DSM-IV TR)

Addiction: Addiction is a chronic, relapsing brain disease that is characterized by compulsive substance seeking and use, despite harmful consequences.

Recovery: Recovery from alcohol and drug problems is a process of change through which an individual achieves abstinence and improved health, wellness, and quality of life. Recovery is defined as a process of continuous growth and improved functioning. It is not a goal that one achieves. It is instead a process of recovery management over a person's lifetime.

Relapse: A relapse is a complete return to using substances in the same way the person did before he or she quit.

Motivation

Treatment and recovery are ultimately about change. As we all know, change is not always easy for people. It is important to understand the concept of motivation because motivation for change is closely related to the level of probability that a

APPENDIX 1 : TREATMENT GUIDELINES

person with a substance use disorder (or SUD) will enter treatment, continue in treatment and adhere to a specific change strategy.

Motivation has been found to actually be dynamic rather than static and is: Purposeful, Intentional, Positive and Changeable.

Tolerance Tolerance, as defined by either of the following:

1. A need for markedly increased amounts of the substance to achieve intoxication or desired effect **or**
2. Markedly diminished effect with continued use of the same amount of the substance

Withdrawal: The unpleasant physical reaction that accompanies the process of ceasing to take an addictive drug:

- Withdrawal is the constellation of symptoms and a sign that a person experiences when, after a period of regular use, the quantity of available substance in the brain is reduced.
- Symptoms and signs of withdrawal are opposite to the main effect of the drug. For example:
 - Sedative withdrawal creates autonomic hyperactivity with dangerous medical complications.
 - Opioids withdrawal is accompanied by anxiety, powerful cravings and flu-like symptoms.
 - Stimulant withdrawal consists of depression, insomnia and cravings.

MANAGEMENT AND TREATMENT

Treatment of substance dependence patient refers to the whole range of services a client can receive directly from a treatment program or coordinated by the treatment program, the recovery oriented systems of care. These services or components, roughly in the order in which a client typically participates in them are as follows:

Components of Treatment

- ❖ Pre-treatment components
- ❖ Primary treatment
- ❖ Case management
- ❖ Continuing care, including ongoing recovery management

Pretreatment Components

- **Outreach** - SUD program outreach includes organized efforts to identify and screen individuals who might have a problem with substance use, rather than wait for them to be referred to treatment programs or to decide to enroll in a program themselves
- **Screening and brief intervention-**
 - Screening is the process of identifying individuals with possible SUDs. Screening provides an opportunity to initiate discussions with individuals about their substance use.
 - Brief intervention focuses on increasing a person's insight into and awareness of substance use and behavioral changes.
- **Assessment and treatment planning**
 - Assessment begins with engaging the client, obtaining the client's history, collecting data on the client, and observing the client during the first visit. It's important to remember that although it begins at the first visit, assessment is an ongoing process as the client's needs change over time.
 - The treatment plan needs to be:

APPENDIX 1 : TREATMENT GUIDELINES

- Individualized; Flexible; Realistic with behavioral objectives that are achievable, observable, and measurable;
 - Simple so that clients being served, their families, and staff members can understand them;
 - Focused on solutions and strengths and not on negative factors;
 - Clear in identifying the type and frequency of interventions; and Responsive to changes and progress.
- Detoxification- Detoxification is the process of
- Stopping substance use;
 - Clearing the substance from the body; and
 - Managing the withdrawal syndrome.

Primary Treatment:

Primary treatments help patients engage in the treatment process, modify their attitudes and behaviors related to drug abuse, and increase healthy life skills. These treatments can also enhance the effectiveness of medications and help people stay in treatment longer. Treatment for drug abuse and addiction can be delivered in many different settings using a variety of behavioral approaches. It includes-

- Group Counseling
- Individual Counseling
- Other Components of primary treatment
 1. Testing for drug use
 2. Pharmacotherapy
 3. Orientation to mutual-help groups
 4. Medical treatment-symptomatic treatment during withdrawal period and any other physical illness
 5. Treatment for mental disorders
 6. General schooling for adolescents or young adults
 7. Employment skills training

Case Management: An integral part of treatment begins with screening and assessment and continues throughout a person's treatment and into ongoing recovery. It is the coordination of professional, social, and medical services to assist people with complex needs, often for long-term care and protection. Case management functions include: assessment, service planning, linkage and referral, monitoring and advocacy.

Continuing care, including ongoing recovery management

The continuing care process begins with discharge planning. Discharge planning leads to development of a continuing care plan. The plan contains written, treatment-related, and measurable objectives for the client to, for example: Sustain abstinence, Develop continuing recovery supports and Gain community living.

Appendix-1g
Treatment Guidelines for Burn Injury

Admission Criteria to NIBPS:

1. Burns greater than 10% of TBSA in paediatric {<12ears} and geriatric group(>60years)
2. >15% TBSA in adults (partial thickness)
3. Full thickness burns >5% of TBSA
4. burns of special areas-face, hands, feet, genitalia, perineum and major joints
5. Electrical burns, also lighting injury
6. Chemical burns
7. Burns with associated inhalation injury
8. Circumferential burns of the limbs or chest, neck
9. Burns in the very young or very old
10. Burns in people with pre existing medical or psychological disorders that could complicate management, prolong recovery or increase mortality
11. Burns with associated trauma
12. Burns with pregnancy
13. Burns in patients who will require special social, emotional, rehabilitative intervention.

Criteria's for Burn Patient to be called "Critical"

1. 15% in a child
>30% in a adult partial thickness burns/full thickness burns
2. All Inhalation Burn
3. All Chemical Burn
4. Patients presenting late with inadequate resuscitation and or in a state of sepsis
5. All Electric Burn in First 24 hours

TRIAGE

On admission segregate the patients into groups and attach code to the file

- A. Outpatient:
<15% in adult<10% in children
- B. Inpatient for routine care:
15-30% in adult-10-25% in children
- C. Critical but salvageable:
>30%-50% in adult, >25%-50% in child
(Need HDU or ICU care in course of time)
- D. Critical but unpredictable outcome
>50-70% (HDU)
- E. Unsalvageable:
>70%, comfort care

APPENDIX 1 : TREATMENT GUIDELINES

Out Patient Burn Management:

1. Take Clinical Picture
2. Wound lavage with normal saline, wash with mild soap
Bister: if ruptured-debride if cause functional impairments-debride
3. Cover with moisture retaining no-adherent dressing/hydrocolloid dressing/Collagen/suframyl/silver sulfadiazine
4. If contaminated wound, devitalized skin-topical antibiotic, silver sulfadiazine, Instruct-Change dressing daily. 24-48 hours after first dressing, check infection, give antibiotic, See at 2-3days interval, Heals within 2-3 weeks (if partial thickness). Report on admission day of same unit.
5. Face open-bacitracin ointment/collagen
6. Analgesic
7. Elevation of affected extremity
8. Injection T.T. ± TIG
9. Discharged patient will Come for weekly fixed follow up days for one month or till all the wounds have healed and advice pressure garments if there is tendency to develop hypertrophy
10. Refer patients to physiotherapy department and do the exercise explained
11. Follow up till 2 Years and may come at any time when they have difficulties. If the outpatients require surgery they are either admitted or grafted as outpatient in outdoor/Emergency OT.

Monitoring in first 24 hours

Clinical-

(Value in bracket, be alert, look for signs of shock or heart failure)

1. Pulse -4hourly(<60->100/min)
2. BP -4 hourly (<100mm of Hg systolic)
3. Urine output - hourly
0.5ml/kg/hr adult
1ml/kg/hour child
2ml/kg/hour electric burn
Maintain I/O Chart
4. Respiratory rate -4 hourly
5. Pulse oximetry - hourly in patients with suspected inhalation, shock, ventilated patient (<90% saturation)
6. Temp->105° (Mild fever expected secondary to hypermetabolic state)
7. Pain-

VAS- utilize and document

- A) **If severe pain-** IV morphin 0.1-0.2mg/kg/dose children/2.5-10mg in adults/Oral/rectal. (titrate using patient response and respiratory rate) + diclofenac
Or, ibuprofen+ paracetamol (in combination)
A narcotic infusion can be commenced once the initial treatments have stabilized the patient.
- B) **Moderate pain – codeine 1mg/Kg + diclofenac 1mg/Kg/dose**
Or, Ibuprofen + Paracetamol
- C) **Mild Pain-**Ibuprofen 10mg/Kg + paracetamol oral 20mg/Kg/dose, per-rectal 30mg/kg/dose

APPENDIX 1 : TREATMENT GUIDELINES

(Narcotic IM Inj. should not be administered as if >10% TBSA burn in adult, >15% in child as there is peripheral shutdown is present, so no absorption occurs. When circulation improves then overdose occurs.)

Monitoring after 24 hours

A daily progress note will include:

1. All vital sign (Pulse, BP, Temp, RR)
2. Level of consciousness
3. Systemic Exam-Chest, abdomen, lower limb for DVT, pressure areas
4. Intake output
5. Pain scoring
6. Notes on dressing change, wound condition/Color/Discharge/ odor
7. Nutritional adequacy
8. Physiotherapy-required or not
9. Psychological aspects
10. To communicate with family if parameter deteriorates
11. Patency of all channels

Lab Parameters:

1. Weight –on admission then quickly
2. Wound culture/biopsy on admission and weekly
3. CBC, sugar, urea, creatinine, Electrolyte daily if critical or until stable then weekly
4. FDP, D-Dimer, on admission & weekly
5. LFT, Albumin, CRP-weekly
6. CXR on admission and as required
7. PT/PTT (on admission and as required)
8. Ca, Mg, Phos (on admission and as required)
9. S.HBs. Ag/HIV/Urine Drug screening (on adm)
10. Beta-HCG (If female of reproductive age)

Drugs

1. Analgesic- adjust according to pain score
2. Antiemetic-Metachlorpromide/ondansetron
3. Antiulcer
4. Antihistamine
5. DVT Prophylaxis-Heparin 5000 IU s/c bd or Clexane 0.5mg/kg s/c
6. Nystatin (200,000I.U.) -3 times daily PO/NGT
7. Folate 1mg PO/NGT once daily
8. If %50% burn MgSO4 500ml once a week
9. Codeine 30mg PO 6 hours (for diarrhea)
10. Antibiotics

See also for more details *CLINICAL PRACTICE GUIDELINES FOR BURN PATIENT MANAGEMENT*, Published by National Institute of Burn & Plastic Surgery, Dhaka Medical College

APPENDIX 1 : TREATMENT GUIDELINES

Appendix-1h Treatment Guidelines for Malaria

Uncomplicated Malaria (*Falciparum*): Fever or history of fever with high suspicion of malaria and positive BDT or Blood Slide Examination.

Treatment: Tablet artemether-lumefantrine, 20mg/120mg (6 doses over 3days) with single dose Tablet Primaquine (0.75mg/kg) on day 0.

Virax Malaria: Fever or history of fever with high suspicion of malaria and positive BDT or Blood Slide Examination.

Treatment: Tablet Chloroquine over 3 days (1500mg for adult) and Tablet Primaquine 0.25mg/kg daily for 14 days.

Severe Malaria: Fever or history of fever with high suspicion of malaria and positive BDT or Blood Slide Examination with unconsciousness and/or confused and/or convulsion and/or prostration and/or jaundice and/or severe anemia and/or Acidosis and or ABDS.

Treatment: Injection artesunate (2.4mg/kg body weight). 1st dose instantly and then second dose at 12hrs. Subsequent dose once daily (Total depends on the condition of the patient's improvement). Injection artesunate will be followed artemether-lumefantrine when patient can take orally (with single dose Primaquine)

Procedure for dilution of Injection artesunate:

- Inj. Artesunate 60mg/Vial should be mixed with 1ml 5% sodium bicarbonate solution and shaken for 2-3 min for better dissolution.
- For I/V: 5ml of 5% glucose or normal saline be added to make the concentration 10mg/ml for slow intravenous infusion.
- For I/M : 2ml 5% glucose or normal saline be added to make the concentration of Artesunate 20mg/ml for intramuscular injection.
- The total dose of intravenous infusion should be given within 3-4 minutes.

See also section 1.4.1 and for more details DIAGNOSIS AND MANAGEMENT OF SEVERE MALARIA, EARLY DIAGNOSIS AND PROMPT TREATMENT (EDPT), Learner's Guide, 2014; published by National Malaria Control Programme, Disease Control Division, DGHS, Ministry of Health & Family Welfare, Govt. of Bangladesh

Appendix-1i Treatment Guidelines for Kala-azar

The objective of treatment for Kala-azar is to cure the patient, prevent the complications of the disease and minimize side effects of medicines, restrain drug resistance and reduce the risk of spread of disease. Complications and concomitant disease(if any)should also be diagnosed and treated accordingly.

Drug treatment of Primary Kala-azar (PKA):

1st line treatment:

Following drugs are recommended as 1st line treatment for KA in Bangladesh:

Drug of Choice -
Liposomal Amphotericin B(10mg/kg single dose)
Alternative 1 st line choices-(Depending on availability in our country)
• Miltefosine • Paromomycin • Combination treatment: Combination of Miltefosine & Paromomycin will be 1st choice Other alternative combinations will be Liposomal Amphotericin B* + Miltefosine Or Liposomal Amphotericin B* + Paromomycin. *LAmB5mg/kg body weight on alternate days for 3 doses

2nd line treatment:

The following drug is recommended as 2nd line treatment for PKA patients (if the 1st line drugs are not available or not tolerated):

1. Amphotericin B deoxycholate
2. Sodium Stibogluconate(SSG)

Indications of 2nd line drugs:

3. When the first line drugs are not available or not tolerated.

Description of 1st line drugs for KPA

Liposomal Amphotericin B (LAmB):

APPENDIX 1 : TREATMENT GUIDELINES

Figure-1: Treatment Chart for Kala-azar

Treatment Chart	Primary Kala-azar (PKA)																																						
st 1 line treatment for PKA Drug of Choice 1. Liposomal Amphotericin B (10mg/kg single dose) Alternative 1st line choice – (Depending on availability in our country) • Miltefosine • Paromomycin • Combination Treatment : Combination of Miltefosine & Paromomycin will be 1st choice Other alternative combination will be Liposomal Amphotericin B* + Miltefosine Or, Liposomal Amphotericin B* + Paromomycin *LamB 5mg/kg body weight on alternative days for 3 doses	nd 2 line treatment for PKA Amphotericin -B deoxycholate Dose: 1mg/kg body wt IV daily or alternative day (in 5% Dextrose solution 500ml) Duration: 15 doses Sodium stibogluconate (SSG) Dose: 20mg/kg body wt IM daily. Duration: 30 Days <table border="1"> <thead> <tr> <th>Weight(kg)</th><th>SAG (ml)</th></tr> </thead> <tbody> <tr><td>up to 3</td><td>0.6</td></tr> <tr><td>4-5</td><td>0.8-1</td></tr> <tr><td>6-8</td><td>1.2-1.6</td></tr> <tr><td>9-10</td><td>1.8-2</td></tr> <tr><td>11-13</td><td>2.2-2.6</td></tr> <tr><td>14-15</td><td>2.8-3.0</td></tr> <tr><td>16-18</td><td>3.2-3.6</td></tr> <tr><td>19-20</td><td>3.8-4.0</td></tr> <tr><td>21-23</td><td>4.2-4.6</td></tr> <tr><td>24-25</td><td>4.8-5.0</td></tr> <tr><td>26-28</td><td>5.2-5.6</td></tr> <tr><td>29-30</td><td>5.8-6.0</td></tr> <tr><td>31-35</td><td>6.2-7.0</td></tr> <tr><td>36-40</td><td>7.2-8.0</td></tr> <tr><td>41-45</td><td>8.2-9.0</td></tr> <tr><td>46-50</td><td>9.2-10</td></tr> <tr><td>51-55</td><td>10.2-11</td></tr> <tr><td>56-60</td><td>11.2-12</td></tr> </tbody> </table>	Weight(kg)	SAG (ml)	up to 3	0.6	4-5	0.8-1	6-8	1.2-1.6	9-10	1.8-2	11-13	2.2-2.6	14-15	2.8-3.0	16-18	3.2-3.6	19-20	3.8-4.0	21-23	4.2-4.6	24-25	4.8-5.0	26-28	5.2-5.6	29-30	5.8-6.0	31-35	6.2-7.0	36-40	7.2-8.0	41-45	8.2-9.0	46-50	9.2-10	51-55	10.2-11	56-60	11.2-12
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Treatment Chart of PKTF, PKDL and RKA

Treatment Chart	KATF, PKDL & RKA
When LAmB is not available or contraindicated or in KATF 1st line drugs : 1. Miltefosine 28 days a. Age more than 12 years & weighing? 25kg: 100mg. (cap. 50mg in morning & 50mg in evening with meal) b. Age more than 12 years but weighing < 25kg: 50mg. (Cap 50mg in the morning with meal) c. 2-12 years: 2.5mg/kg body weight in two divided doses with meal, not exceeding 50mg/day) 2.Paromomycin: Dose: 15mg/kg/day Paromomycin for 21 days IM 3.Combination of 1st choice 2nd line drugs a. Amphotericin-B deoxycholate (1mg/kg daily or alternate day in IV for 15 doses) b. Sodium stibogluconate (SSG should be given at 20mg/kg daily IM for 30 days)	Rx for RKA 1. Combination 1st line drugs cap. Miltefosine (For adult dose:100mg daily in two divided doses for Children:2.5mg/kg body weight in two divided doses for10days) plus inj. Paromomycin at a dose 15mg/kg/day for 10 days.2.If fail then choose alternate combination- Inj.Liposomal Amphotericin B 5mg/kg body weight IV single dose on day 1 + Cap. Miltefosine following the above mention dose from day 2 to day 8 Or, Inj. Liposomal Amphotericin B 5mg/kg body weight IV single dose on day 1 + Inj. Paromomycin following the above mention dose from day 2 to day 11
Rx for PKDL 1st line- Miltefosine; ADULT dose: 100mg daily in two divided doses for 12 wks. Children: 2.5mg/kg/day in two divided doses, not exceeding 50mg/day for 12 weeks 2nd line a. Inj. Amphotericin b Deoxycholate Dose: 1 mg/kg body wt daily or alternate days IV for 15 doses per cycle with 6 cycle followed by 10days gap. b. Inj. Sodium stibogluconate (SSG) Dose: 20mg/kg body wt daily for 20days per cycle IM Duration : Six cycles with 10days interval between cycles	

PKTF : Primary Kala-azar Treatment failure

PKDL : Post Kala-azar Dermal leishmaniasis

RKA : Relapse Kala-azar

KATF : Kala-azar Treatment failure

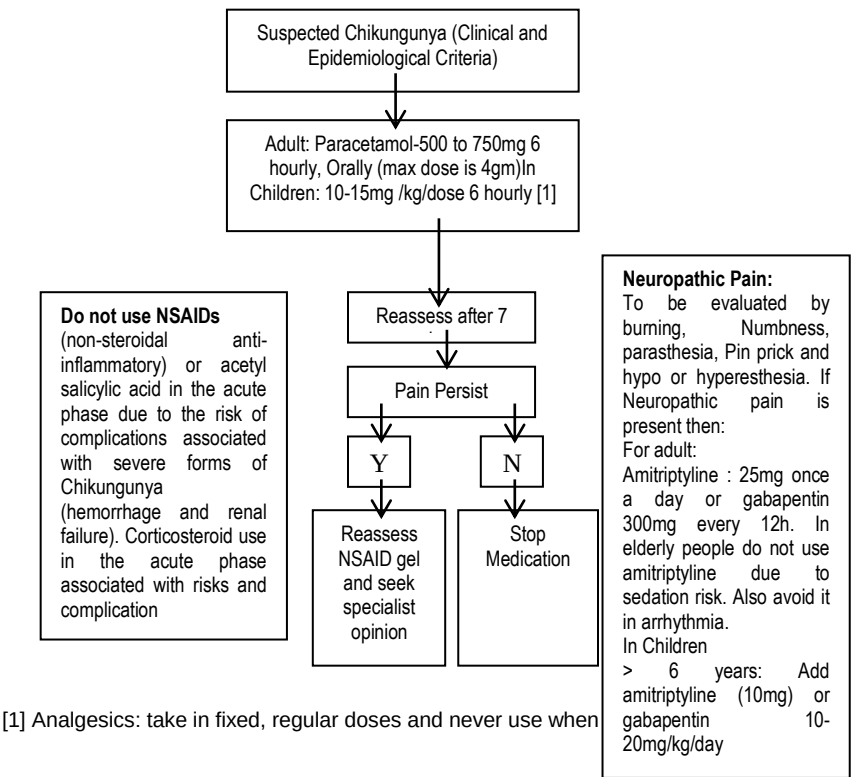
See also for more detail in NATIONAL GUIDELINE FOR KALA-AZAR CASE MANAGEMENT, MAY, 2013; published by Kala-azar Elimination program, Directorate General of Health Services, Ministry of Health & Family Welfare, Govt. of Bangladesh

Appendix-1j
Treatment Guidelines for Chikungunya

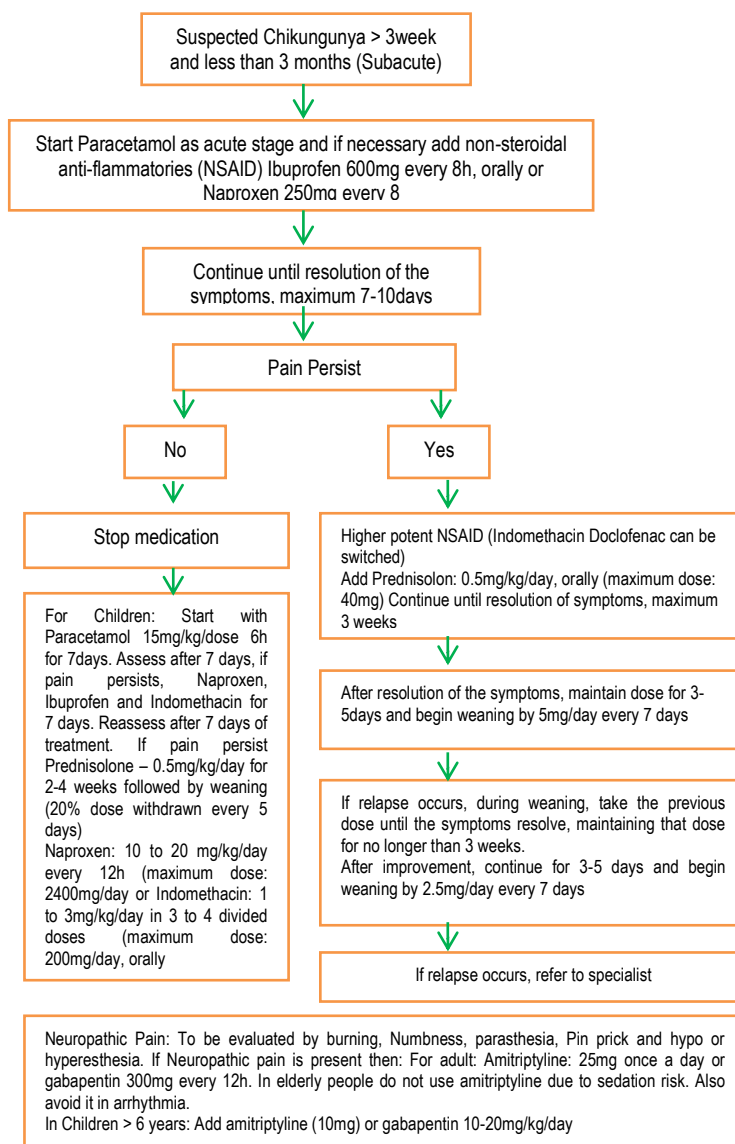
Chikungunya fever is an emerging viral disease transmitted to humans by mosquitoes. The disease may evolve in three phases; acute or febrile phase (lasting up to 21 days), sub-acute phase (21-90 days) and chronic phase (lasting more than 90 days). Outbreaks are most likely to occur in post-monsoon period.

Flow Chart 1 : Treatment of arthralgia in the acute phase of Chikungunya in Adult and Children

Flowchart for management of Chikungunya



Flow Chart 2 : Treatment of arthralgia in the Subacute phase of Chikungunya in Adult and Children



APPENDIX 1 : TREATMENT GUIDELINES

NSAIDs: Only to be used after the acute phase (>10-14 days). Be attentive to side effects. Renal function must be assessed in elderly people and in those with comorbidities, prior to starting treatment. Be alert for the higher risk for chronic degenerative diseases in patients such as the elderly, those with diabetes, peptic ulcer disease, nephropathy, liver disease, and cardiomyopathy, among others. Until the onset of corticosteroid action, prescribe analgesics according to protocol

Steroids: Anti-inflammatory dose of corticosteroid is – 0.5mg/kg/day

Exclusion criteria for the use of corticosteroids:

- Patients with diabetes.
- Difficult to control hypertension.
- History of fracture due to documented Osteoporosis.
- Bipolar Mood disorder.
- Chronic renal failure on dialysis.
- Cushing's syndrome.
- Obesity grade III.
- Arrhythmias, and coronary artery disease.

There is no risk of inducing adrenal insufficiency if used for 21 days, Corticosteroids may be prescribed for patients in the chronic phase if not yet used.

Appendix-2

DRUG INTERACTIONS

One of the factors that can alter the response to drugs is the concurrent administration of other drugs. Two or more drugs given at the same time may exert their effects independently or may interact. The interaction may be either potentiation, synergism or additive effect or may be antagonism of one drug by another, or occasionally some other effects. There are several mechanisms by which drugs may interact, but most can be categorized as pharmacodynamic, pharmacokinetic (absorption, distribution, metabolism, excretion) or combined toxicity.

Pharmacodynamic interactions occur between drugs which have similar or antagonistic pharmacological effects or side-effects. The two drugs may or may not interact on the same receptor to produce additive or synergistic effects. Conversely, drugs with opposing pharmacologic effects may reduce the response to one or both drugs. Pharmacodynamic interactions are usually predictable from knowledge on pharmacology of the interacting drugs. They occur in a greater or lesser extent in most patients who receive the interacting drugs.

On the other hand, pharmacokinetic interactions occur when one drug alters the ADME (absorption, distribution, metabolism or excretion) of another, thus increasing or reducing the amount of drug available to produce its pharmacological effects. Reduction in the total amount of drug absorbed may result in ineffective therapy. Induction of the hepatic microsomal enzymes system by one drug can gradually increase the rate of metabolism of another, resulting in lower plasma concentrations and a reduced effect. Conversely, inhibition of metabolism of one drug results in higher plasma concentrations and an increased effect with potential risk of toxicity. Drugs which share active transport mechanisms for elimination can delay excretion, resulting in toxicity of some drugs.

The combined use of two or more drugs, each of which has toxic effects on the same organ, can greatly increase the likelihood of organ damage.

Drug interactions are studied extensively in Clinical Pharmacy. Clinical Pharmacists of the developed countries deal with the case of drug interactions. But in Bangladesh, the importance of drug interaction is not yet fully appreciated. Although most drug interactions are harmless, many of those, which are potentially harmful, occur in a small proportion of patients. Moreover, the severity of an interaction varies from one patient to another. Patients at increased risk from drug interactions include the elderly and those with impaired renal or liver function.

Drugs with a small therapeutic ratio (e.g. digoxin) and those which require careful control of dosage (e.g. anticoagulants, antihypertensives and antidiabetics) are most often involved in the drug interactions. Most of the potentially hazardous drug interactions are listed in the following chart. The combined administration of the drug listed in the chart should be avoided or only undertaken with caution and appropriate monitoring and under supervision by clinicians as well as pharmacists.

List of drug interactions:

The following is an alphabetical list of drugs and their interactions. To avoid excessive cross-referencing each drug or group is listed twice: in the alphabetical list and also against the drug or group with which it interacts. It is to be mentioned that in this compilation, an asterisk mark (*) has been placed against interactions that are

APPENDIX 2: DRUG INTERACTIONS

potentially hazardous and where combined administration of the drugs involved should be avoided (or undertaken with caution and appropriate monitoring).

Abacavir

Use of alcohol with abacavir may result in decreased elimination of abacavir and consequent increases in exposure. Abacavir increases the systemic clearance of oral methadone and patients should be monitored for signs of withdrawal symptoms. The dose of methadone may need to be increased in some patients.

Acarbose see under Antidiabetics.

ACE inhibitors and Angiotensin-II antagonists

Alcohol: enhanced hypotensive effect.

Allopurinol: increased risk of toxicity with Captopril, especially in renal impairment.

* *Anesthetics*: enhanced hypotensive effect.

* *Analgesics*: antagonism of hypotensive effect and increased risk of renal impairment with NSAIDs; hyperkalaemia with Ketorolac and possibly other NSAIDs.

Antacids: absorption of Captopril, Enalapril, Fosinopril and possibly other ACE inhibitors reduced.

Anti-arrhythmics: Procainamide increases risk of toxicity with Captopril, especially in renal impairment.

Anticoagulant: increased risk of hyperkalaemia with Heparin.

Antidepressants: possibly enhanced hypotensive effect.

Antidiabetics: hypoglycemic effect possibly enhanced.

Other Antihypertensives: enhanced hypotensive effect.

Antipsychotics: enhanced hypotension effect.

Anxiolytics and Hypnotics: enhanced hypotensive effect.

Beta-blockers: enhanced hypotensive effect.

Calcium-channel blockers: enhanced hypotensive effect.

* *Cardiac Glycosides*: plasma concentration of Digoxin possibly increased by Captopril.

* *Ciclosporin*: increased risk of hyperkalaemia.

Corticosteroids: antagonism of hypotensive effect.

Cytotoxics: Azathioprine increases risk of leucopenia with Captopril.

* *Diuretics*: enhanced hypotensive effect (can be extreme); risk of severe hyperkalaemia with Potassium-sparing diuretics.

Dopaminergics: Levodopa enhances hypotensive effect.

Epoetin beta: antagonism of hypotensive effect: increased risk of hyperkalaemia.

* *Lithium*: ACE inhibitors and possibly Angiotensin-II antagonists reduce excretion of Lithium (increased plasma-lithium concentration).

Muscle Relaxants: Tizanidine enhance hypotensive effect.

Nitrates: enhance hypotensive effect.

Oestrogens and Progestogens: Oestrogens and combined oral contraceptives antagonize hypotensive effect.

* *Potassium Salts*: increased risk of hyperkalaemia.

Uricosurics: Probenecid reduces excretion of Captopril.

Acebutolol see Beta-blockers.

Aceclofenac see NSAIDs

Acetazolamide see Diuretics (Carbonic Anhydrase inhibitor).

Aciclovir

Note: Interactions do not apply to topical preparations.

APPENDIX 2: DRUG INTERACTIONS

Mycophenolate Mofetil: higher plasma concentrations of Aciclovir and of Mycophenolate Mofetil on concomitant administration.

Uricosurics: Probenecid reduces Aciclovir excretion (increased plasma concentrations).

Acitretin see Retinoids.

Acrivastine see Antihistamines.

Adenosine Possibility of interaction with drugs tending to impair myocardial conduction:

- Anaesthetics, Local: increased myocardial depression when anti-arrhythmics given with bupivacaine, levobupivacaine, prilocaine or ropivacaine.
- Anti-arrhythmics: increased myocardial depression when anti-arrhythmics given with other antiarrhythmics.
- Antipsychotics: increased risk of ventricular arrhythmias when anti-arrhythmics that prolong the QT interval given with antipsychotics that prolong the QT interval.
- Beta-blockers: increased myocardial depression when anti-arrhythmics given with beta-blockers.
- Dipyridamole: effect of adenosine enhanced and extended by dipyridamole (important risk of toxicity).
- Nicotine: effects of adenosine possibly enhanced by nicotine.
- Theophylline: anti-arrhythmic effect of adenosine antagonised by theophylline.

Adrenaline see Sympathomimetics.

Aliskiren

- ACE Inhibitors: avoid concomitant use of aliskiren with ACE inhibitors.
- Analgesics: hypotensive effect of aliskiren possibly antagonised by NSAIDs.
- Angiotensin-II Receptor Antagonists: avoid concomitant use of aliskiren with angiotensin-II receptor antagonists; plasma concentration of aliskiren possibly reduced by irbesartan.
- Antibacterials: plasma concentration of Aliskiren reduced by rifampicin.
- Anticoagulants: increased risk of hyperkalaemia when aliskiren given with heparins.
- Antifungals: plasma concentration of Aliskiren increased by itraconazole-avoid concomitant use.
- Calcium-channel Blockers: plasma concentration of aliskiren increased by verapamil.
- Ciclosporin: plasma concentration of Aliskiren increased by ciclosporin.
- Diuretics: aliskiren reduces plasma concentration of furosemide; increased risk of hyperkalaemia when aliskiren given with potassium-sparing diuretics and aldosterone antagonists.
- Potassium Salts: increased risk of Hyperkalaemia when aliskiren given with potassium salts.

Alcohol

ACE Inhibitors and Angiotensin-II Antagonists: enhanced hypotensive effect.

Analgesics: sedative and hypotensive effect of opioid analgesics enhanced.

* *Antibacterials*: Disulfiram-like reaction with Metronidazole, and possibly Tinidazole.

* *Anticoagulants*: see Warfarin.

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- * *Antidepressants*: sedative effect of Tricyclics (and related) enhanced; Tyramine (contained in some alcoholic and dealcoholised beverages) interacts with MAOIs (hypertensive crisis) - but if no Tyramine, enhanced hypotensive effect; effects of alcohol possibly enhanced by SSRIs.
Antidiabetics: enhanced hypoglycemic effect; flushing with chlorpropamide (in susceptible subjects); increased risk of lactic acidosis with Metformin.
Antiepileptics: CNS side-effects of Carbamazepine possibly enhanced.
Antihistamines: enhanced sedative effect.
Antihypertensives: enhanced hypotensive effect.
Antimuscarinics: sedative effect of Hyoscine enhanced.
Antipsychotics: enhanced sedative effect.
Anxiolytics and Hypnotics: enhanced sedative effect.
Barbiturates: enhanced sedative effect.
Beta-blockers: enhanced hypotensive effect.
Calcium-channel Blockers: enhanced hypotensive effect; plasma-alcohol concentration possibly increased by Verapamil.
Cytotoxics: disulfiram-like reaction with procarbazine.
Muscle Relaxants: Tizanidine enhanced sedative effect.
Nitrates: enhanced hypotensive effect.
Retinoids: Etretinate formed from Acitretin in presence of alcohol.

Albendazole

- * *Anthelmintics*: The plasma concentration of albendazole sulfoxide has been increased by praziquantel.
- * *Antiepileptics*: Phenytoin, carbamazepine, and phenobarbital appear to induce the oxidative metabolism of albendazole via the cytochrome P450 isoenzyme CYP3A by roughly the same extent, resulting in significantly reduced concentrations of albendazole sulfoxide.
- * *Corticosteroids*: plasma concentrations of the active metabolite of albendazole (albendazole sulfoxide) were reported to be raised by about 50% in a study in 8 patients receiving dexamethasone.
- * *Gastrointestinal drugs*: Concentrations of albendazole sulfoxide have been found to be raised in bile and hydatid cyst fluid when albendazole was given with cimetidine, which may increase efficacy in the treatment of echinococcosis.

Alendronate Sodium see Bisphosphonates.

Allopurinol

- * *ACE Inhibitors and Angiotensin-II Antagonists*: increased risk of toxicity with Captopril, especially in renal impairment.
- * *Antibacterials*: increased risk of rash with concomitant ampicillin and amoxicillin.
- * *Anticoagulants*: effects of Warfarin possibly enhanced.
- * *Ciclosporin*: plasma-ciclosporin concentration possibly increased (risk of nephrotoxicity).
- *Cytotoxics*: effects of Azathioprine and Mercaptopurine enhanced with increased toxicity (reduce dose when given with Allopurinol).
- *Theophylline*: plasma-theophylline concentration possibly increased

Alpha-Blockers

- * *ACE Inhibitors and Angiotensin-II Antagonists*: enhanced hypotensive effect.
- * *Anaesthetics*: enhanced hypotensive effect.
- * *Analgesics*: NSAIDs antagonize hypotensive effect.
- * *Antidepressants*: enhanced hypotensive effect.
- * *Other Antihypertensives*: additive hypotensive effect.
- * *Antipsychotics*: enhanced hypotensive effect.
- * *Anxiolytics and Hypnotics*: enhanced hypotensive and sedative effect.

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- * *Beta-blockers*: enhanced hypotensive effect; increased risk of first-dose hypotensive effect of post-synaptic alpha-blockers such as Prazosin.
- * *Calcium-channel Blockers*: enhanced hypotensive effect; increased risk of first-dose hypotensive effect of post-synaptic alpha-blockers such as Prazosin. *Corticosteroids*: antagonism of hypotensive effect of post-synaptic alpha-blockers such as Prazosin.
- * *Diuretics*: enhanced hypotensive effect; increased risk of first-dose hypotensive effect of post-synaptic alpha-blockers such as Prazosin. *Dopaminergics*: Levodopa enhances hypotensive effect. *Muscle Relaxants*: Tizanidine enhance hypotensive effect. *Nitrates*: enhanced hypotensive effect. *Oestrogens and Progestogens*: Oestrogens and combined oral contraceptive antagonize hypotensive effect.

Alprazolam see Anxiolytics and Hypnotics.

Aluminium Hydroxide see Antacids.

Ambrisentan

- *Antibacterials*: plasma concentration of ambrisentan possibly increased by rifampicin
- *Ciclosporin*: plasma concentration of ambrisentan increased by ciclosporin

Amikacin see Aminoglycosides.

Amiloride see Diuretics (potassium-sparing).

Aminoglycosides

- Analgesics*: Indomethacin possibly increases plasma concentration of Gentamicin and Amikacin in neonates.
- Other Antibacterials*: increased risk of ototoxicity and nephrotoxicity with Vancomycin; Neomycin reduces absorption of Phenoxymethyl Penicillin.
- * *Anticoagulants*: see Phenindione and Warfarin.
 - * *Antidiabetics*: Neomycin possibly enhances hypoglycemic effect of Acarbose and increases severity of gastro-intestinal effects.
 - * *Antifungals*: increased risk of nephrotoxicity with Amphotericin.
 - * *Botulinum Toxin*: neuromuscular block enhanced (risk of toxicity).
 - * *Ciclosporin*: increased risk of nephrotoxicity.
 - * *Cardiac Glycosides*: Neomycin reduces absorption of Digoxin.
 - * *Cytotoxics*: increased risk of nephrotoxicity and possibly of ototoxicity with Cisplatin.
 - * *Diuretics*: increased risk of ototoxicity with loop diuretics.
 - * *Muscle Relaxants*: effect of non-depolarizing muscle relaxants enhanced.
 - * *Parasympathomimetics*: antagonism of effect of Neostigmine and Pyridostigmine.

Aminophylline see Theophylline.

Amiodarone

Note: Amiodarone has a long half-life; there is a potential for drug interactions to occur for several weeks (or even months) after treatment with it has been stopped.

- * *Other Anti-arrhythmics*: additive effect with Disopyramide, Flecainide, Procainamide, and Quinidine (increased risk of ventricular arrhythmias - avoid concomitant use); increased plasma concentration of Flecainide, Procainamide and Quinidine; increased myocardial depression with any anti-arrhythmic.
- * *Antibacterials*: increased risk of ventricular arrhythmias with Erythromycin (parenteral) Co-trimoxazole and moxifloxacin (avoid concomitant use).
- * *Anticoagulants*: metabolism of Warfarin inhibited (enhanced anticoagulant effect).

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- * *Antidepressants*: increased risk of ventricular arrhythmias with Tricyclics (avoid concomitant use).
- * *Antiepileptics*: metabolism of Phenytoin inhibited (increased plasma concentration).
- * *Antimalarials*: increased risk of ventricular arrhythmias with Chloroquine, Hydroxychloroquine, Mefloquine and Quinine (avoid concomitant use); manufacturer of artemether with lumefantrine advises avoid concomitant use (risk of ventricular arrhythmias)
- * *Antipsychotics*: increased risk of ventricular arrhythmias with Phenothiazines and Haloperidol (avoid concomitant use).
- * *Beta-blockers*: increased risk of bradycardia, AV block, and myocardial depression (avoid concomitant use).
- * *Calcium-channel Blockers*: Diltiazem and Verapamil increase risk of bradycardia, AV block, and myocardial depression.
- * *Cardiac Glycosides*: increased plasma concentration of Digoxin (halve Digoxin maintenance dose).
Ciclosporin: plasma concentration of Ciclosporin possibly increased.
Diuretics: cardiac toxicity increased if hypokalaemia occurs with Acetazolamide, loop diuretics, and Thiazides.
Lithium: increased risk of hypothyroidism.
Ulcer-healing Drugs: Cimetidine increases plasma concentrations of Amiodarone.

Amitriptyline see Tricyclic Antidepressants.

Amlodipine see Calcium-Channel Blockers.

Amlodipine + Telmisartan see Calcium Channel Blockers and Angiotensin-II antagonist

Amoxycillin see Penicillins.

Ampicillin see Penicillins.

Anabolic Steroids

- * *Anticoagulants*: anticoagulant effect of Warfarin enhanced.
Antidiabetics: hypoglycaemic effect possibly enhanced.

Anaesthetics, General

- * *ACE Inhibitors and Angiotensin-II antagonist*: enhanced hypotensive effect.
Antibacterials: possible potentiation of Isoniazid hepatotoxicity; effect of Thiopental enhanced by Sulphonamides; hypersensitivity-like reactions can occur with concomitant intravenous Vancomycin.
Antidepressants: risk of arrhythmias and hypotension increased with Tricyclics: MAOIs.
- * *Antihypertensives*: enhanced hypotensive effect.
- * *Antipsychotics*: enhanced hypotensive effect.
- * *Anxiolytics and Hypnotics*: enhanced sedative effect.
- * *Beta-blockers*: enhanced hypotensive effect.
- * *Calcium-channel Blockers*: enhanced hypotensive effect and AV delay with Verapamil; hypotensive effect of Dihydropyridines enhanced by Isoflurane.
- * *Dopaminergics*: risk of arrhythmias if volatile liquid anaesthetics such as Halothane given with Levodopa.
Oxytocin: oxytocic effect possibly reduced by volatile anaesthetics (also enhanced hypotensive effect and risk of arrhythmias).
- * *Sympathomimetics*: risk of arrhythmias if adrenaline or Isoprenaline given with volatile liquid anaesthetics such as Halothane.
Theophylline: increased risk of arrhythmias with halothane.

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Anaesthetics, Local see Bupivacaine, Lignocaine.

Analgesics see Aspirin, NSAIDs, Opioid Analgesics, and Paracetamol.

Antacids

ACE Inhibitors: reduced absorption of captopril, enalapril, fosinopril and possibly other ACE inhibitors.

Analgesics: excretion Aspirin increased in alkaline urine.

Anti-arrhythmics: excretion of Quinidine reduced in alkaline urine (may occasionally increase plasma concentration).

Antibacterials: reduced absorption of Azithromycin, Cefaclor, Cefpodoxime, Ciprofloxacin, Isoniazid, Levofloxacin, Moxifloxacin, Nitrofurantoin, Norfloxacin, Ofloxacin, Rifampicin and most Tetracyclines.

Antiepileptics: reduced absorption of Gabapentin and Phenytoin.

Antifungals: reduced absorption of Itraconazole and Ketoconazole.

Antihistamines: reduced absorption of Fexofenadine

Antiplatelet Drugs: Dipyridamole patient information leaflet advises avoidance of antacids.

Antimalarials: reduce absorption of Chloroquine and Hydroxychloroquine; Magnesium trisilicate reduces absorption of Proguanil.

Antipsychotics: reduced absorption of Phenothiazines and of Sulpiride

Antivirals: reduced absorption of Zalcitabine.

Bisphosphonates: reduced absorption.

Cardiac Glycosides: possibly reduced absorption of Digoxin.

Iron: Magnesium trisilicate reduces absorption of oral iron.

Lithium: sodium bicarbonate increases excretion (reduced plasma-lithium concentration).

Penicillamine: reduced absorption.

Ulcer-healing Drugs: possibly reduced absorption of Lansoprazole.

Antazoline see Antihistamines.

Anthranol see dithranol

- Minoxidil: Absorption of minoxidil may be increased by the concurrent use of topical dithranol.

Anti-arrhythmics see Adenosine; Amiodarone; Disopyramide; Lignocaine; Procainamide; Quinidine.

Anticholinergics see Antimuscarinics.

Anticholinesterases see Parasympathomimetics.

Anticoagulants see Heparin, and Warfarin.

Antidepressants, SSRIs

Alcohol: effects possibly enhanced.

- * *Analgesics:* risk of CNS toxicity increased with Tramadol; increased risk of bleeding with aspirin and NSAIDs.
- * *Anticoagulants:* effect of Warfarin possibly enhanced.
- * *Other Antidepressant:* CNS effects of SSRIs increased by MAOIs (risk of serious toxicity), plasma concentration of some Tricyclics increased; agitation and nausea with Tryptophan; Fluoxetine increases plasma concentration of Nefazodone.
- * *Antiepileptics:* antagonism (convulsive threshold lowered); plasma concentration of Carbamazepine lowered by Fluoxetine; plasma concentration of Phenytoin increased by Fluoxetine; Phenytoin and possibly other antiepileptics reduce plasma concentration of Paroxetine.

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- * *Antimalarials*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use.
- * *Antipsychotics*: plasma concentration of Clozapine increased by Fluoxetine, Paroxetine and Sertraline; plasma concentration of Haloperidol increased by Fluoxetine; plasma concentration of Thioridazine increased by Paroxetine (risk of ventricular arrhythmias – avoid concomitant use); plasma concentration of Risperidone increased by Fluoxetine.
- * *Antivirals*: plasma concentration possibly increased by Ritonavir.
- * *Dopaminergics*: hypertension and CNS excitation with Fluoxetine, Paroxetine or Sertraline and Selegiline (Selegiline should not be started until 5 weeks after discontinuation of Fluoxetine for 2 weeks after stopping Selegiline).
- * *Lithium*: increased risk of CNS effects (lithium toxicity reported).
- * *Opioid Analgesics*: Tramadol possibly increases risk of convulsions.
- * *Theophylline*: plasma-theophylline concentration increased (concomitant use should usually be avoided, but where not possible halve Theophylline dose and monitor plasma-theophylline concentration).

Antidepressants, Tricyclic

- * *Alcohol*: enhanced sedative effect.
- * *Anaesthetics*: risk of arrhythmias and hypotension increased.
- * *Analgesics*: risk of CNS toxicity increased with Tramadol; possibly increased sedation with opioid analgesics.
- * *Anti-arrhythmics*: increased risk of ventricular arrhythmias with drugs that prolong QT interval, including Amiodarone (avoid concomitant use), Disopyramide, Procainamide and Quinidine.
Antibacterials: increased risk of ventricular arrhythmias with moxifloxacin (avoid concomitant use); plasma concentrations of some tricyclics reduced by Rifampicin (reduced antidepressant effect).
- * *other Antidepressants*: CNS excitation and hypertension with MAOIs; Tricyclic or related antidepressant should not be started until 2 weeks after stopping MAOI; conversely, MAOI should not be started until at least 1 week after Tricyclic or related antidepressant has been stopped; plasma concentrations of some Tricyclics increased by SSRIs.
- * *Antiepileptics*: antagonism (convulsive threshold lowered); plasma concentration of some Tricyclics reduced (reduced antidepressant effect).
- * *Antihypertensives*: in general, hypotensive effect enhanced, but antagonism of effect of adrenergic neurone blockers and of Clonidine (and increased risk of hypertension on Clonidine withdrawal).
Antimuscarinics: increased antimuscarinic side-effects.
- * *Antipsychotics*: increased risks of ventricular arrhythmias- avoid concomitant use with Pimozide; increased plasma concentrations of Tricyclic antidepressants and increased antimuscarinic side-effects with Phenothiazines.
Anxiolytics and Hypnotics: enhanced sedative effect.
- * *Barbiturates*: see under Antiepileptics, above.
Calcium-channel Blockers: Diltiazem and Verapamil increase plasma concentration Imipramine and possibly other Tricyclics.
Diuretics: increased risk of postural hypotension.
- * *Dopaminergics*: CNS toxicity reported with Selegiline.
Muscle Relaxant: enhanced muscle relaxant effect.
Nitrates: reduced effect of sublingual nitrates (owing to dry mouth).
Oestrogens and Progestogens: oral contraceptives antagonize antidepressant effect (but side-effects may be increased due to increased plasma concentrations of Tricyclics).

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- * *Sympathomimetics*: hypertension and arrhythmias with adrenaline (but local anaesthetics with adrenaline appear to be safe); hypertension with Noradrenaline.
Ulcer-healing Drugs: plasma concentrations of Amitriptyline, and probably other Tricyclics increased by Cimetidine (inhibition of metabolism).

Antidiabetics

Note: Includes Acarbose; Insulin; Metformin; Nateglinide; Repaglinide, Sulphonylureas.

ACE Inhibitors: possibly enhance hypoglycemic effect.

Alcohol: enhanced hypoglycemic effect; flushing with Chlorpropamide (in susceptible subjects); risk of lactic acidosis with Metformin.

Anabolic Steroids: possibly enhance hypoglycemic effect.

- * *Analgesics*: possibly NSAIDs enhance effect of Sulphonylureas.

- * *Antibacterials*: Chloramphenicol, Co-trimoxazole, and Sulphonamides enhance effect of Sulphonylureas; Ciprofloxacin possibly enhances effect of Glibenclamide; Neomycin possibly enhances hypoglycemic effect of Acarbose and increases severity of gastrointestinal effects; Clarithromycin enhances effect of repaglinide; Rifampicin reduces effect of Chlorpropamide, Tolbutamide and possibly other Sulphonylureas (accelerate metabolism); Rifampicin reduces plasma concentration of Repaglinide.

Anticoagulants: possibly enhanced hypoglycemic effects of Sulphonylureas and changes to anticoagulant effects of Warfarin and other Coumarins.

Antidepressants: MAOIs enhance hypoglycemic effect of Insulin, Metformin, Sulphonylureas and possibly other antidiabetics.

Antifungals: Fluconazole and Miconazole increase plasma concentrations of Sulphonylureas- avoid concomitant use Miconazole with Gliclazide or Glipizide.

Antihistamines: depressed thrombocyte count with concomitant use of Biguanides and Ketotifen.

Antihypertensives: hypoglycemic effect antagonized by Diazoxide.

Antipsychotics: Phenothiazines possibly antagonize hypoglycemic effect of Sulphonylureas.

Beta-blockers: enhanced hypoglycemic effect and masking of warning signs of hypoglycemia such as tremor.

Calcium-channel Blockers: Nifedipine may occasionally impair glucose tolerance

Corticosteroids: antagonism of hypoglycemic effect.

Diuretics: hypoglycemic effect antagonized by loop and Thiazide diuretics; Chlorpropamide increases risk of hyponatraemia with Thiazides in combination with potassium-sparing diuretics.

Hormone Antagonists: manufacturer advises metabolism of oral Antidiabetics possibly accelerated by Aminoglutethimide.

Lipid-regulating drugs: Fibrates may improve glucose tolerance and have an additive effect; increased risk of severe hypoglycaemia with Repaglinide and Gemfibrozil (avoid concomitant use)

Lithium: may occasionally impair glucose tolerance.

Oestrogens and Progestogens: oral contraceptives antagonize hypoglycemic effect.

Orlistat: manufacturer advises avoid concomitant use with Acarbose or Metformin.

Pancreatin: hypoglycemic effect of Acarbose reduced by Pancreatin.

Testosterone: hypoglycemic effect possibly enhanced.

Ulcer-healing Drugs: Cimetidine inhibits renal excretions of Metformin (increased plasma Metformin concentration); Cimetidine enhances hypoglycemic effect of Sulphonylureas.

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Antiepileptics see Carbamazepine; Clonazepam; Ethosuximide; Gabapentin; Lamotrigine; Phenytoin; Valproate.

Antifungals see Amphotericin; Imidazole, Triazole, Griseofulvin, Terbinafine.

Antifungals, Imidazole and Triazole

Note: Imidazole antifungals include Clotrimazole, Ketoconazole and Miconazole; Triazoles include Fluconazole and Itraconazole. In general, interactions relate to multiple-dose treatment.

- Analgesics*: metabolism of Alfentanil inhibited by Ketoconazole (risk of prolonged or delayed respiratory depression); plasma concentration of Celecoxib increased by Fluconazole (halve Celecoxib dose).
- Antacids*: Antacids reduce absorption of Itraconazole and Ketoconazole.
- * *Antibacterials*: Rifampicin accelerates metabolism of Fluconazole, Itraconazole and Ketoconazole (reduced plasma concentrations); plasma concentration of Rifampicin may be reduced by Ketoconazole; plasma concentration of Rifabutin increased by Fluconazole and possibly other Triazoles (risk of uveitis-reduce Rifabutin dose); plasma concentration of Ketoconazole may be reduced by Isoniazid.
- * *Anticoagulants*: effect of Warfarin enhanced by Fluconazole, Itraconazole, Ketoconazole, and Miconazole (note: oral gel and vaginal formulations absorbed).
- * *Antidiabetics*: plasma concentrations of Sulphonylureas increased by Fluconazole and Miconazole; Fluconazole, Itraconazole, and Ketoconazole possibly increase plasma concentration Repaglinide (manufacturer advises avoid concomitant use); avoid concomitant use of Miconazole with Glipizide.
- * *Antiepileptics*: effect of Phenytoin enhanced by Fluconazole and Miconazole; plasma concentrations of Itraconazole and Ketoconazole reduced by Phenytoin.
- Other Antifungals*: Imidazoles and Triazoles possibly antagonize effect of Amphotericin.
- * *Antihistamines*: manufacturer advises possibility of increased plasma-loratadine concentration with Ketoconazole; metabolism of Mizolastine inhibited by Ketoconazole and possibly other Imidazoles (avoid concomitant use).
- Antimuscarinics*: reduced absorption of Ketoconazole.
- * *Antipsychotics*: risk of ventricular arrhythmias if Imidazoles or Traizoles given with Pimozide (avoid concomitant use).
- * *Anxiolytics and Hypnotics*: plasma concentration of Midazolam increase by Itraconazole, Ketoconazole, and possibly Fluconazole (prolonged sedative effect).
- * *Calcium-channel Blockers*: Itraconazole inhibits metabolism of dihydropyridines (increased plasma concentration).
- * *Cardiac Glycosides*: plasma concentration of Digoxin increased by Itraconazole.
- * *Ciclosporin*: metabolism inhibited by Itraconazole, Ketoconazole and possibly Fluconazole and Miconazole (increased plasma-Ciclosporin concentration).
- Corticosteroids*: Ketoconazole inhibits metabolism of Methylprednisolone and possibly other Corticosteroids; Itraconazole possibly inhibits metabolism of Methylprednisolone.
- Cytotoxics*: Itraconazole may inhibit metabolism of Vincristine (increased risk of neurotoxicity); in vitro studies suggest possible interaction between Ketoconazole
- Diuretics*: plasma concentration of Fluconazole increased by Hydrochlorothiazide
- * *Lipid-regulating Drugs*: Itraconazole, Ketoconazole, and possibly other Imidazoles and Triazoles increase risk of myopathy with Simvastatin - avoid concomitant use of Itraconazole, Ketoconazole with Simvastatin, Itraconazole

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and possibly other Imidazole and Triazoles may increase risk of myopathy with Atorvastatin; Itraconazole increases plasma concentration of Cervistatin.

Oestrogens and Progestogens: anecdotal reports of contraceptive failure with Fluconazole, Itraconazole, Ketoconazole and possibly others.

- * *Theophylline*: plasma-theophylline concentration possibly increased by Fluconazole and possibly Ketoconazole.

Ulcer-healing Drugs: histamine H₂- antagonists reduce absorption of Itraconazole and Ketoconazole; proton-pump inhibitors reduce absorption of Ketoconazole and possibly Itraconazole; Sucralfate reduces absorption of Ketoconazole.

Antihistamines

Note: Sedative interactions apply to a lesser extent to the non-sedating antihistamines, and they do not appear to potentiate the effects of alcohol. Interactions do not generally apply to antihistamines used for topical action (including inhalation).

Alcohol: enhanced sedative effect.

- * *Anti-arrhythmics*: increased risk of ventricular arrhythmias with Mizolastine (avoid concomitant use with Amiodarone, Disopyramide, Procainamide and Quinidine).
- * *Antibacterials*: manufacturer advises possibility of increased plasma-loratadine concentration with Erythromycin.
Antidepressants: MAOIs and Tricyclics increase antimuscarinic and sedative effects.
- * *Antidiabetics*: depressed thrombocyte count with concomitant use of Biguanides and Ketotifen.
- * *Antifungals*: manufacturer advises possibility of increased plasma-loratadine concentration with Ketoconazole (avoid concomitant use).
Antimuscarinics: increased antimuscarinic side-effects.
Antivirals: plasma concentration of non-sedating antihistamines possibly increased by Ritonavir.
Anxiolytics and Hypnotics: enhanced sedative effect.
- * *Beta-blockers*: Sotalol increases risk of ventricular arrhythmias with Mizolastine.
Betahistine: antagonism (theoretical).
Ulcer-healing Drugs: manufacturer advises possibility of increased plasma-loratadine concentration with Cimetidine.

Antihypertensives see individual drugs or groups.

Antimalarials see individual drugs.

Antimuscarinics

Note: Many drugs have antimuscarinic effects; concomitant use of two or more such drugs can increase side effects such as dry mouth, urine retention, and constipation; concomitant use can also lead to confusion in the elderly; interactions do not generally apply to antimuscarinics used by inhalation.

Alcohol: sedative effect of Hyoscine enhanced.

Analgesics: increased antimuscarinic effects.

Anti-arrhythmics: increased antimuscarinic effects with Disopyramide; Atropine delays absorption of Mexiletine.

Antidepressants: increased antimuscarinic side-effects with Tricyclics and MAOIs.

Antidepressants: increased antimuscarinic side-effects with Tricyclics and MAOIs.

Antifungals: reduced absorption of Ketoconazole.

Antihistamines: increased antimuscarinic side-effects of Phenothiazines (but reduced plasma concentrations).

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Antipsychotics: increased antimuscarinic side-effects of Phenothiazines (but reduced plasma concentrations); increased side effects of Clozapine.

Dopaminergics: increased antimuscarinic side-effects with Amantadine; absorption of Levodopa possibly reduced.

Metoclopramide and Domperidone: antimuscarinics antagonize gastro-intestinal effects.

Nitrates: reduced effect of sublingual nitrates (failure to dissolve under tongue owing to dry mouth).

Parasympathomimetics: antagonism of effect.

Antiplatelet Drugs see Aspirin, Clopidogrel, Dipyridamole and Ticlopidine.

Antipsychotics

Note: Increased risk of toxicity with myelosuppressive drugs- Clozapine in particular should not be used concurrently with drugs associated with a substantial potential for causing agranulocytosis, such as Carbamazepine, Co-trimoxazole, Chloramphenicol, Sulphonamides, Pyrazolone analgesics such as Azapropazone, Penicillamine or Cytotoxics also avoid Clozapine with long-acting depot antipsychotics (have myelosuppressive potential).

ACE Inhibitors and Angiotensin-II antagonist: severe postural hypotension with Chlorpromazine and possibly other Phenothiazines.

Alcohol: enhanced sedative effect.

- * *Anaesthetics*: enhanced hypotensive effect.
- * *Analgesics*: enhanced sedative and hypotensive effect with opioid analgesics; severe drowsiness possible if Indomethacin given with Haloperidol; risk of ventricular arrhythmias if Levacetylmethadol given with Chlorpromazine, Haloperidol, Pimozide or Thioridazine (avoid concomitant use).
- Antacids and Adsorbents*: reduced absorption of Phenothiazines with antacids and possibly with Kaolin.
- * *Anti-arrhythmics*: increased risk of ventricular arrhythmias with drugs that prolong QT interval – avoid concomitant use of Pimozide or Thioridazine with Amiodarone, Disopyramide, Procainamide or Quinidine (also avoid Haloperidol with Amiodarone).
- * *Antibacterials*: risk of arrhythmias if Clarithromycin and possibly Erythromycin given with Pimozide (avoid concomitant use); Erythromycin possibly increases plasma concentration Clozapine (possible increased risk of convulsions); Rifampicin accelerates metabolism of Haloperidol (reduced plasma-Haloperidol concentration).
- * *Antidepressants*: increased risk of arrhythmias with Tricyclic antidepressants-avoid concomitant use of Pimozide with Tricyclics; increased plasma concentrations and increased antimuscarinic effects notably on administration of Tricyclics with Phenothiazines; Fluoxetine possibly increase plasma concentration of Clozapine; Fluoxetine increases plasma concentration of Haloperidol; Clozapine possibly enhances central effects of MAOIs.
- Antidiabetics*: hypoglycemic effect of Sulphonylureas possibly antagonized by Phenothiazines.
- * *Antiepileptics*: antagonism (convulsive threshold lowered); Carbamazepine accelerates metabolism of Clozapine and Haloperidol (reduced plasma concentrations); Phenytoin accelerates metabolism of Clozapine
- * *Antifungals*: risk of ventricular arrhythmias if Imidazoles or Triazoles given with Pimozide (avoid concomitant use).
- Antihypertensives*: enhanced hypotensive effect; increased risk of extrapyramidal effects on administration Methyl dopa.
- * *Antimalarials*: avoid concomitant use of Pimozide with Mefloquine and Quinine.

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Antimuscarinics: antimuscarinic side-effects of Phenothiazines increased (but reduced plasma concentrations).

- * *Antivirals*: Protease inhibitors possibly increase plasma concentration of Pimozide (risk of ventricular arrhythmias- avoid concomitant use); Ritonavir increases plasma concentration of Clozapine (risk of toxicity – avoid concomitant use); Ritonavir possibly increases plasma concentration of other antipsychotics.
- * *Anxiolytics and Hypnotics*: enhanced sedative effect; Diazepam increases plasma concentration of Zolpidem; Buspirone increases plasma concentration of Haloperidol.
- * *Beta-blockers*: Phenothiazines increase risk of ventricular arrhythmias with Sotalol; concomitant administration of Propranolol and Chlorpromazine may increase plasma concentration of both drugs.
Calcium-channel Blockers: enhanced hypotensive effect.
- * *Desferrioxamine*: manufacturer advises avoid Prochlorperazine (also Levomepromazine on theoretical grounds).
- * *Diuretics*: hypokalaemia increased risk of ventricular arrhythmias with Pimozide (avoid concomitant use).
Dopaminergics: antagonism of hypoprolactinaemic and antiparkinsonian effects of Bromocriptine; antagonism of effect of Apomorphine, Levodopa and Pergolide.
Lithium: increased risk of extrapyramidal effects and possibility of neurotoxicity with Clozapine, Haloperidol and Phenothiazines.
Metoclopramide and Domperidone: increased risk of extrapyramidal effects with Metoclopramide.
Sympathomimetics: antagonize pressor action.
Ulcer-healing Drugs: Cimetidine may enhance effects of Chlorpromazine, Clozapine, and possibly other antipsychotics.

Antivirals see Aciclovir; Saquinavir; Zalcitabine; Zidovudine.

Anxiolytics and Hypnotics

- Alcohol*: enhanced sedative effect.
- Anaesthetics*: enhanced sedative effect.
- Analgesics*: opioid analgesics enhance sedative effect.
- * *Antibacterials*: erythromycin inhibits metabolism of Midazolam (increased plasma-Midazolam concentration, with profound sedation) and Zopiclone; Isoniazid inhibits metabolism of Diazepam; Rifampicin increased metabolism of diazepam and possibly other Benzodiazepines.
Anticoagulants: Chloral Hydrate may transiently enhance anticoagulant effect of Warfarin.
Antidepressants: enhanced sedative effect; manufacturer contra-indicates Buspirone with MAOIs.
Antiepileptics: metabolism of Clonazepam accelerated (reduced effect); plasma-Phenytoin concentrations increased or decreased by Diazepam and possibly other Benzodiazepines.
- * *Antifungals*: Itraconazole, Ketoconazole, and possibly Fluconazole increase plasma concentration of Midazolam (prolonged sedative effect)
Antihistamines: enhanced sedative effect.
Antihypertensives: enhanced hypotensive effect; enhanced sedative effect with alpha-blockers.
Antipsychotics: enhanced sedative effects; Diazepam increases plasma concentration of Zolpidem.

Calcium-channel Blockers: Diltiazem and Verapamil inhibit metabolism of Midazolam (increased plasma-midazolam concentration, with increased sedation)

APPENDIX 2: DRUG INTERACTIONS

Disulfiram: metabolism of Benzodiazepines inhibited, with enhanced sedative effect.

Dopaminergics: Benzodiazepines occasionally antagonize effect of Levodopa.

Muscle Relaxants: Tizanidine enhance sedative effect.

Ulcer-healing Drugs: Cimetidine inhibits metabolism of Benzodiazepines and Chlormethiazole and Zaleplon (increased plasma concentrations); Omeprazole inhibits metabolism of Diazepam (increased plasma concentration).

Apremilast:

- YP3A4 Inducers (Moderate): May decrease the serum concentration of CYP3A4 Substrates (High risk with Inducers). Monitor therapy
- CYP3A4 Inducers (Strong): May decrease the serum concentration of Apremilast. Avoid combination
- Dabrafenib: May decrease the serum concentration of CYP3A4 Substrates (High risk with Inducers). Management: Seek alternatives to the CYP3A4 substrate when possible. If concomitant therapy cannot be avoided, monitor clinical effects of the substrate closely (particularly therapeutic effects). Consider therapy modification
- Deferasirox: May decrease the serum concentration of CYP3A4 Substrates (High risk with Inducers). Monitor therapy
- Pitolisant: May decrease the serum concentration of CYP3A4 Substrates (High risk with Inducers). Management: Combined use of pitolisant with a CYP3A4 substrate that has a narrow therapeutic index should be avoided. Other CYP3A4 substrates should be monitored more closely when used with pitolisant. Consider therapy modification
- Riociguat: Apremilast may enhance the hypotensive effect of Riociguat. Management: Riociguat is contraindicated with nonselective phosphodiesterase (PDE) inhibitors and PDE type 5 inhibitors. Other types of PDE inhibitors are not contraindicated, but caution is advised and patients should be monitored for hypotension. Monitor therapy
- Sarilumab: May decrease the serum concentration of CYP3A4 Substrates (High risk with Inducers). Monitor therapy
- Siltuximab: May decrease the serum concentration of CYP3A4 Substrates (High risk with Inducers). Monitor therapy
- Tocilizumab: May decrease the serum concentration of CYP3A4 Substrates (High risk with Inducers). Monitor therapy

Aripiprazole

- May reduce plasma levels w/ CYP3A4 inducers (e.g. carbamazepine).
- May increase plasma levels w/ CYP3A4 inhibitors (e.g. clarithromycin, ketoconazole) or CYP2D6 inhibitors (e.g. fluoxetine, quinidine).
- Concurrent admin w/ anticholinergic agents may disrupt body temp regulation. Additive effects w/ hypotensive agents.
- Increased sedative and orthostatic hypotensive effects w/ lorazepam and other benzodiazepines.
- Overlapping adverse reactions (e.g. sedation) w/ CNS agents.

Armodafinil

- Reduced plasma levels w/ potent CYP inducers (e.g. carbamazepine, phenobarbital).
- May reduce the effectiveness of steroidal contraceptives. May reduce ciclosporin blood levels.
- May decrease clearance of phenytoin, warfarin, diazepam, propranolol, omeprazole

Artemether with Lumefantrine

APPENDIX 2: DRUG INTERACTIONS

Note: Grapefruit juice possibly inhibits metabolism Artemether and Lumefantrine (manufacturer advises avoid)

- *Antiarrhythmics*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use with Amiodarone, Disopyramide, Procainamide and Quinidine (risk of ventricular arrhythmias)
- *Antibacterials*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use with Macrolides and Quinolones.
- *Antidepressants*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use.
- *Antifungals*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use with imidazoles and triazoles
- *Other Antimalarials*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use.
- *Antipsychotics*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use.
- *Beta-blockers*: manufacturer of Artemether with Lumefantrine advises avoid concomitant use with metoprolol.

Artesunate as of artemisinin

Use of artemisinin derivatives with drugs that prolong the QT interval should be avoided if possible; caution is advised when artemisinin derivatives are given with other antimalarials that have this propensity. Artemisinin has been reported to be a potent inhibitor of the cytochrome P450 isoenzyme CYP1A2, and might interact with drugs metabolised via this enzyme (such as theophylline). In contrast it is said to be an inducer of CYP2A6, although the clinical implications of this are unclear.

Aspirin

- * *Other Analgesics*: avoid concomitant administration of other NSAIDs (increased side-effects).
Antacids and Adsorbents: excretion of aspirin increased in alkaline urine; Kaolin possibly reduces absorption.
- * *Anticoagulants*: increased risk of bleeding due to Antiplatelet effect.
Antiepileptics: enhancement of effect of Phenytoin and Valproate.
Corticosteroids: increased risk of gastro-intestinal bleeding and ulceration; Corticosteroids reduce plasma-salicylate concentration.
- * *Cytotoxics*: reduced excretion of Methotrexate (increased toxicity).
Diuretics: antagonism of diuretic effect of Spironolactone; reduced excretion of Acetazolamide (risk of toxicity).
Leukotriene Antagonists: Aspirin increases plasma concentration Zafirlukast.
Metoclopramide and Domperidone: Metoclopramide enhances effect of Aspirin (increased rate of absorption).
Uricosurics: effect of Probenecid and Sulphinpyrazone reduced.

Atenolol see Beta-blockers.

Atorvastatin see Statins.

Atracurium see Muscle Relaxants (non-depolarizing).

Atropine see Antimuscarinics.

Azathioprine

- * *Allopurinol*: enhancement of effect with increased toxicity (reduce dose of Azathioprine when given with Allopurinol).
- * *Antibacterials*: manufacturer reports interaction with Rifampicin (transplants possibly rejected).

Azithromycin see Erythromycin and other Macrolides.

Aztreonam

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Caution is recommended in patients receiving aztreonam and oral anticoagulants because of the possibility of increased prothrombin time.

Barbiturates

Alcohol: enhanced sedative effect.

Anti-arrhythmics: metabolism of Disopyramide and Quinidine increased (reduced plasma concentrations).

Antibacterials: metabolism of Chloramphenicol, Doxycycline, and Metronidazole accelerated (reduced effect); Sulphonamides enhance effect of Thiopental

- * *Anticoagulants*: metabolism of Warfarin accelerated (reduced anticoagulant effect).
- * *Antidepressants*: antagonism of anticonvulsant effect (convulsive threshold lowered); metabolism of Mianserin and some Tricyclics accelerated (reduced plasma concentrations).
- * *Antiepileptics*: concomitant administration Phenobarbital with other antiepileptics may enhance toxicity without a corresponding increase in antiepileptics effect; moreover interactions can complicate monitoring of treatment; interactions include enhanced effects, increased sedation, and reductions in plasma concentrations.
- Antifungals*: Phenobarbital reduces absorption of Griseofulvin (reduced effect).
- * *Antipsychotics*: antagonism of anticonvulsant effect (convulsive threshold lowered); Phenobarbital accelerates metabolism of Haloperidol (reduced plasma concentration).
- * *Antivirals*: plasma concentration of Saquinavir possibly reduced.
- * *Calcium-channel Blockers*: effect of Felodipine and probably Nifedipine and other Dihydropyridines, Diltiazem, and Verapamil reduced.
- Cardiac Glycosides*: metabolism of Digitoxin only accelerated (reduced effect).
- * *Ciclosporin*: metabolism of Ciclosporin accelerated (reduced effect).
- * *Corticosteroids*: metabolism of Corticosteroids accelerated (reduced effect).
- * *Folic Acid and Folinic Acid*: plasma concentration of Phenobarbital possibly reduced by Folic acid and Folinic acid.
- Leukotriene Antagonists*: plasma concentration of Montelukast reduced by Phenobarbital.
- * *Oestrogens and Progestogens*: metabolism of oral contraceptives accelerated (reduced contraceptive effect).
- Theophylline*: metabolism of Theophylline accelerated (reduced effect).
- Thyroxine*: metabolism of Thyroxine accelerated (may increase Thyroxine requirements in hypothyroidism).
- Vitamins*: vitamin D requirements possibly increased.

Beclomethasone see Corticosteroids.

Bendrofluazide see Diuretics (thiazide).

Benzodiazepines see Anxiolytics and Hypnotics.

Benzoic acid There are no interaction messages

Benzoylperoxide There are no interaction messages

Benzylicillin see Penicillins.

Beta-Blockers

Note: Since systemic absorption may follow topical application of beta-blockers to the eye the possibility of interactions, in particular, with drugs such as Verapamil should be borne in mind.

ACE Inhibitors: enhanced hypotensive effect.

Alcohol: enhanced hypotensive effect.

- * *Anaesthetics*: enhanced hypotensive effect; increased risk of Bupivacaine toxicity with Propranolol.

Analgesics: NSAIDs antagonize hypotensive effect.

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- * *Anti-arrhythmics*: increased risk of myocardial depression and bradycardia; with Amiodarone increased risk of bradycardia and AV block; increased risk of Lignocaine toxicity with Propranolol; Propafenone increases plasma concentration of Metoprolol and Propranolol; risk of ventricular arrhythmias associated with Sotalol increased by Amiodarone, Disopyramide, Procainamide, and Quinidine (avoid concomitant use).
- * *Antibacterials*: increased risk of arrhythmias with Sotalol and Fluroquinolones (avoid concomitant use); Rifampicin accelerates metabolism of Propranolol (significantly reduced plasma concentration).
- * *Antidepressants*: risk of ventricular arrhythmias associated with Sotalol increased by Tricyclics.
Antidiabetics: enhanced hypoglycemic effect and masking of warning signs of hypoglycemia such as tremor.
- * *Antihypertensives*: enhanced hypotensive effect; increased risk of withdrawal hypertension with Clonidine (withdraw beta-blocker several days before slowly withdrawing Clonidine); increased risk of first-dose hypotensive effect with post-synaptic alpha-blockers such as Prazosin.
- * *Antimalarials*: risk of ventricular arrhythmias associated with Sotalol increased by Phenothiazines; concomitant administration of Propranolol and Chlorpromazine may increase plasma concentration of both drugs.
Anxiolytics and Hypnotics: enhanced hypotensive effect.
- * *Calcium-channel Blockers*: increased risk of bradycardia and AV block with Diltiazem; severe hypotension and heart failure occasionally with Nifedipine and possibly other Dihydropyridines; asystole, severe hypotension, and heart failure with Verapamil.
Cardiac Glycosides: increased AV block and bradycardia.
Corticosteroids: antagonism of hypotensive effect.
Diuretics: enhanced hypotensive effect; risk of ventricular arrhythmias associated with Sotalol increased by hypocalcaemia.
Ergotamine: increased peripheral vasoconstriction.
Muscle Relaxants: Propranolol enhances effect; possible enhanced hypotensive effect and bradycardia with Tizanidine.
Oestrogens and Progestogens: oestrogens and combined oral contraceptives antagonize hypotensive effect.
Parasympathomimetics: risk of arrhythmias possibly increased by Pilocarpine; Propranolol antagonizes effect of Neostigmine and Pyridostigmine.
- * *Sympathomimetics*: severe hypertension with Adrenaline and Noradrenaline and possibly with Dobutamine (especially with non-selective beta-blockers).
Theophylline: beta-blockers should be avoided on pharmacological grounds (bronchospasm).
Thyroxine: metabolism of Propranolol accelerated (reduced effect).
Ulcer-healing Drugs: plasma concentrations of Labetalol, Metoprolol and Propranolol increased by Cimetidine; hypotensive effect antagonized by Carbenoxolone.

Betahistine

Antihistamines: antagonism (theoretical).

Betamethasone see Corticosteroids.

Betaxolol see Beta-blockers

Bile Acids

Antacids: may reduce absorption of bile acids.

- * *Clofibrate group*: Clofibrate increases elimination of cholesterol in bile.

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- * *Oestrogens and Progestogens*: oestrogens increase elimination of cholesterol in bile.

Bismuth Chelate see Tripotassium Dicitratobismuthate.

Bisoprolol see beta blockers

Bisphosphonates

Analgesics: bioavailability of Tiludronic acid increased by Indomethacin.

Antacids: reduced absorption.

Antibacterials: increased risk of hypocalcaemia with Aminoglycosides.

Calcium salts: reduced absorption.

Iron: reduced absorption.

Bivalirudin May increase risk of bleeding when used with thrombolytics, oral anticoagulants or drugs that affect platelet function.

Bortezomib Bortezomib is a substrate of cytochrome P450 enzyme 3A4, 2C19 and 1A2.

CYP3A4 Inhibitors: Co-administration of ketoconazole, a strong CYP3A4 inhibitor, increased the exposure of bortezomib by 35% in 12 patients. Monitor patients for signs of bortezomib toxicity and consider a bortezomib dose reduction if bortezomib must be given in combination with strong CYP3A4 inhibitors (e.g. ketoconazole, ritonavir).

CYP2C19 Inhibitors: Co-administration of omeprazole, a strong inhibitor of CYP2C19, had no effect on the exposure of bortezomib in 17 patients.

CYP3A4 Inducers: Co-administration of rifampin, a strong CYP3A4 inducer, is expected to decrease the exposure of bortezomib by at least 45%. Because the drug interaction study (n=6) was not designed to exert the maximum effect of rifampin on bortezomib PK, decreases greater than 45% may occur.

Efficacy may be reduced when bortezomib is used in combination with strong CYP3A4 inducers; therefore, concomitant use of strong CYP3A4 inducers is not recommended in patients receiving bortezomib.

St. John's Wort (*Hypericum perforatum*) may decrease bortezomib exposure unpredictably and should be avoided.

Dexamethasone: Co-administration of dexamethasone, a weak CYP3A4 inducer, had no effect on the exposure of bortezomib in 7 patients.

Melphalan-Prednisone: Co-administration of melphalan-prednisone increased the exposure of bortezomib by 17% in 21 patients. However, this increase is unlikely to be clinically relevant.

Bosentan

- *Antibacterials*: plasma concentration of bosentan reduced by rifampicin
- *Antidiabetics*: increased risk of hepatotoxicity when bosentan given with glibenclamide
- *Antifungals*: plasma concentration of bosentan possibly increased by fluconazole; plasma concentration of bosentan possibly increased by itraconazole
- *Antivirals*: bosentan possibly reduces plasma concentration of indinavir; plasma concentration of bosentan increased by lopinavir ritonavir (consider reducing of bosentan); bosentan possibly reduces plasma concentration of telaprevir, also concentration of bosentan possibly increased; avoidance of bosentan advised by manufacturer of tipranavir
- *Ciclosporin*: plasma concentration of bosentan increased by ciclosporin (also plasma concentration of ciclosporin reduced)
- *Cytotoxics*: bosentan possibly reduces plasma concentration of bosutinib
- *Lipid-regulating Drugs*: bosentan reduces plasma concentration of simvastatin

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- Oestrogens: bosentan possibly causes contraceptive failure of hormonal contraceptives containing oestrogens (alternative contraception recommended)
- Progestogens: bosentan possibly causes Contraceptive failure of hormonal contraceptives containing progestogens (alternative contraception recommended)
- Sildenafil: bosentan reduces plasma concentration of sildenafil
- Tadalafil: bosentan reduces plasma concentration of tadalafil

Brinzolamide see diuretics (Carbonic anhydrase inhibitor)

Bromazepam see Anxiolytics and Hypnotics.

Bromfenac

Abciximab: Bromfenac may increase the anticoagulant activities of Abciximab.

Acebutolol: Bromfenac may decrease the antihypertensive activities of Acebutolol.

Aceclofenac: The risk or severity of adverse effects can be increased when Bromfenac is combined with Aceclofenac.

Acemetacin: The risk or severity of adverse effects can be increased when Bromfenac is combined with Acemetacin.

Acenocoumarol: Bromfenac may increase the anticoagulant activities of Acenocoumarol.

Acetylsalicylic acid: The risk or severity of adverse effects can be increased when Bromfenac is combined with Acetylsalicylic acid.

Bromocriptine

Alcohol: reduced tolerance to Bromocriptine.

Antibacterials: Erythromycin and possibly other Macrolides increase plasma concentration (increased risk of toxicity).

Antipsychotics: antagonism of hypoprolactinaemic and antiparkinsonian effects.

Metoclopramide and Domperidone: antagonize hypoprolactinaemic effect.

- * *Sympathomimetics*: increased risk of toxicity with Bromocriptine and Phenylpropanolamine.

Budesonide see Corticosteroids.

Bumetanide see Diuretics

Bupivacaine

Anti-arrhythmics: increased myocardial depression.

Beta-blockers: increased risk of Bupivacaine toxicity with Propranolol.

Butenafine there are no interaction messages

Butobarbitone see Barbiturates and Primidone.

Calcipotriol see vitamin D derivative

Calcium Salts

Antibacterials: reduced absorption of Ciprofloxacin and Tetracyclines.

Cardiac Glycosides: large intravenous doses of calcium can precipitate arrhythmias.

Diuretics: increased risk of hypocalcaemia with Thiazides.

Calcium-Channel Blockers

Note: Grapefruit juice increases plasma concentration of dihydropyridine calcium-channel blockers (except Amlodipine) and Verapamil; Dihydropyridine calcium-channel blockers include Amlodipine, Felodipine, Lacidipine, Nifedipine and Nimodipine.

ACE Inhibitors: enhanced hypotensive effect.

- * *Anaesthetics*: Verapamil increases hypotensive effect of general anaesthetics and risk of AV delay; Isoflurane enhances hypotensive effect of Dihydropyridines

APPENDIX 2: DRUG INTERACTIONS

- * *Anti-arrhythmics*: Amiodarone-induced risk of bradycardia, AV block, and myocardial depression increased by Diltiazem and Verapamil; plasma-concentration of Quinidine reduced by Nifedipine; increased risk of myocardial depression and asystole if Verapamil given with Disopyramide; with Verapamil raised plasma concentration Quinidine (extreme hypotension may occur).
- * *Antibacterials*: Erythromycin possibly inhibits metabolism of Felodipine (increased plasma concentration); Rifampicin increases metabolism of Diltiazem, Nifedipine, Verapamil and possibly Nisoldipine (plasma concentrations significantly reduced).
Antidepressants: Diltiazem and Verapamil increase plasma concentration of Imipramine and possibly other Tricyclics.
Antidiabetics: Nifedipine may occasionally impair glucose tolerance.
- * *Antiepileptics*: effect of Carbamazepine enhanced by Diltiazem and Verapamil; Diltiazem and Nifedipine increase plasma concentration of Phenytoin; effect of Felodipine and probably Nifedipine and other Dihydropyridines reduced by Carbamazepine, Phenobarbitone, Phenytoin; effect of Diltiazem and Verapamil reduced by Phenobarbital and Phenytoin.
- * *Antifungals*: Itraconazole inhibits metabolism of Felodipine (increased plasma concentration).
- * *Antihypertensives*: enhanced hypotensive effect, increased risk of first-dose hypotensive effect of post-synaptic alpha-blockers such as Prazosin
Antimalarials: possible increased risk of bradycardia with some calcium-channel blockers and Mefloquine.
Antipsychotics: enhanced hypotensive effect.
Anxiolytics and Hypnotics: Diltiazem and Verapamil inhibit metabolism of Midazolam (increased plasma-midazolam concentration, with increased sedation)
- * *Barbiturates*: see under Antiepileptics, above.
- * *Beta-blockers*: increased risk of bradycardia and AV block with Diltiazem; occasionally severe hypotension and heart failure with Nifedipine and possibly other dihydropyridines; asystole, severe hypotension, and heart failure with Verapamil.
- * *Other Calcium-channel Blockers*: clearance of Nifedipine reduced by Diltiazem (increased plasma Nifedipine concentration).
- * *Cardiac Glycosides*: plasma concentration of Digoxin increased by Diltiazem, Verapamil and possibly Nifedipine; increased AV block and bradycardia with Verapamil.
- * *Ciclosporin*: plasma-ciclosporin concentrations increased by Diltiazem and Verapamil; possibly increases plasma concentration of Nifedipine.
Diuretics: enhanced hypotensive effect.
Lithium: neurotoxicity may occur without increased plasma-lithium concentrations in patients given Diltiazem and Verapamil.
Muscle Relaxants: Nifedipine and Verapamil enhance effect of non-depolarizing muscle relaxants, hypotension, myocardial depression, and hyperkalaemia with Verapamil and intravenous Dantrolene; risk of arrhythmias with Diltiazem and intravenous Dantrolene; enhanced hypotensive effect with Tizanidine.
- * *Theophylline*: Diltiazem, Verapamil and possibly other calcium-channel blockers enhance effect (increased plasma-theophylline concentration).
Ulcer-healing Drugs: Cimetidine inhibits metabolism of some calcium-channel blockers (increased plasma concentration).

Candesartan see ACE Inhibitors and Angiotensin-II Antagonists.

Capecitabine see Fluorouracil (prodrug of fluorouracil)

Capreomycin care should be taken when capreomycin is used with other drugs that have neuromuscular blocking activity. It should not be given with other drugs that are ototoxic or nephrotoxic.

Captopril see ACE Inhibitors.

Carbamazepine

Alcohol: CNS side-effects of Carbamazepine possibly enhanced.

- * *Analgesics:* Dextropropoxyphene enhances effect of Carbamazepine; effect of Methadone and Tramadol decreased by Carbamazepine.
- * *Antibacterials:* metabolism of Doxycycline accelerated (reduced effect); plasma-Carbamazepine concentration increased by Clarithromycin, Erythromycin and Isoniazid (also Isoniazid hepatotoxicity possibly increased).
- * *Anticoagulants:* metabolism of Warfarin accelerated (reduced anticoagulant effect).
- * *Antidepressants:* antagonism of anticonvulsant effect (convulsive threshold lowered); plasma concentration of Carbamazepine increased by Fluoxetine; metabolism of Mianserin and Tricyclics accelerated (reduced plasma concentrations); manufacturer advises avoid with MAOIs or within 2 weeks of MAOIs.
- * *Other Antiepileptics:* concomitant administration of two or more antiepileptics may enhance toxicity without a corresponding increase in antiepileptic effect; moreover interactions between individual antiepileptics can complicate monitoring of treatment; interactions include enhanced effects, increased sedation, and reductions in plasma concentrations.
- * *Antimalarials:* Chloroquine and Mefloquine antagonize anticonvulsant effect
- * *Antipsychotics:* antagonism of anticonvulsant effect (convulsive threshold lowered); metabolism of Clozapine, Haloperidol and Olanzapine accelerated (reduced plasma concentrations).
- * *Antivirals:* plasma concentration of Saquinavir possibly reduced.
- * *Calcium-channel Blockers:* Diltiazem and Verapamil enhance effect of Carbamazepine; effect of Felodipine and probably Nifedipine and other Dihydropyridines reduced.
- * *Corticosteroids:* metabolism accelerated (reduced plasma-ciclosporin concentration).
- * *Diuretics:* increased risk of hyponatraemia; Acetazolamide increases plasma-Carbamazepine concentration.
- * *Hormone Antagonists:* Danazol inhibits metabolism of Carbamazepine (enhanced effect).
Lithium: neurotoxicity may occur without increased plasma-lithium concentration.
Muscle Relaxants: effect of non-depolarizing muscle relaxants antagonized (recovery from neuromuscular blockade accelerated).
Oestrogens and Progestogens: Carbamazepine accelerates metabolism of oral contraceptives (reduced contraceptive effect).
Retinoids: plasma concentration possibly reduced by Isotretinoin.
Theophylline: metabolism of theophylline accelerated (reduced effect).
Thyroxine: metabolism accelerated (may increase Thyroxine requirements in hypothyroidism).
- * *Ulcer-healing Drugs:* metabolism inhibited by Cimetidine (increased plasma-Carbamazepine concentration).
Vitamins: Carbamazepine possibly increases vitamin D requirements.

Carbonic Anhydrase Inhibitors see Diuretics.

Cardiac Glycosides

ACE Inhibitors: Captopril possibly increases plasma concentration Digoxin.

Analgesics: NSAIDs may exacerbate heart failure reduce GFR and increase plasma-cardiac glycoside concentrations.

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Antacids and Adsorbents: Antacids and Kaolin possibly reduce absorption of Digoxin.

- * *Anti-arrhythmics:* plasma concentration of Digoxin increased by Amiodarone, Propafenone, and Quinidine (halve maintenance dose of Digoxin).
- Antibacterials:* Erythromycin and possibly other Macrolides enhance effect of Digoxin.
- * *Antifungals:* plasma concentration Digoxin increased by Itraconazole.
- * *Antimalarials:* quinine (includes use of quinine for cramp), hydroxychloroquine and possibly Chloroquine raise plasma concentration of Digoxin; possible increased risk of bradycardia with Mefloquine.
- Barbiturate:* see under Antiepileptics, above.
- Beta-blockers:* increased AV block and bradycardia.
- * *Calcium Salts:* large intravenous doses of calcium can precipitate arrhythmias.
- * *Calcium-channel Blockers:* plasma concentration Digoxin increased by Diltiazem, Verapamil and possibly Nifedipine; increased AV block and bradycardia with Verapamil.
- Corticosteroids:* increased risk of hypokalaemia.
- * *Diuretics:* increased toxicity if hypokalaemia occurs with Acetazolamide, loop diuretics, and Thiazides; effects of Digoxin enhanced by Canrenoate and Spironolactone.
- * *Lipid-regulating Drugs:* plasma concentration of Digoxin possibly increased by Atorvastatin.
- * *Muscle Relaxants:* arrhythmias with Suxamethonium.
- * *Sulphasalazine:* absorption of Digoxin possibly reduced.
- * *Ulcer-healing Drugs:* plasma concentration of Digoxin possibly increased by proton pump inhibitors; absorption possibly reduced by Sucralfate.

Carteolol see Beta-blockers

Carvedilol see Beta-blockers.

Cefaclor see Cephalosporins.

Cefazoline see Cephalosporins.

Cefdinir see Cephalosporins.

Absorption of cefdinir is decreased by antacids or iron supplements and doses should be separated by an interval of at least 2 hours. Probenecid reduces the renal excretion of cefdinir.

Cefditoren see Cephalosporins.

Absorption of cefditoren after oral doses is decreased by antacids or histamine H₂-receptor antagonists. Probenecid reduces the renal excretion of cefditoren.

see Cephalosporins.

Cefetamet see Cephalosporins.

Cefixime see Cephalosporins.

Cefoperazone see Cephalosporins.

Unlike many other cephalosporins, the renal clearance of cefoperazone is not affected by probenecid.

Cefotaxime see Cephalosporins.

cefprome Cephalosporins.

Probenecid reduces the renal clearance of cefprome.

Cefpodoxime see Cephalosporins.

Ceftazidime see Cephalosporins.

Ceftibuten see Cephalosporins.

Ceftriaxone see Cephalosporins.

Cefuroxime see Cephalosporins.

Celecoxib see NSAIDs.

Cephalosporins

APPENDIX 2: DRUG INTERACTIONS

- * *Anticoagulants*: anticoagulant effect of Warfarin enhanced by Cephamandole and possibly others.
Diuretics: Loop diuretics may increase nephrotoxicity of Cephalosporins.
Uricosurics: excretion of Cephalosporins reduced by Probenecid (increased plasma concentrations).

Cephalexin see Cephalosporins.

Cephadrine see Cephalosporins.

Cetirizine see Antihistamines.

Chloramphenicol

- Other Antibacterials*: Rifampicin accelerates metabolism (reduced Chloramphenicol-plasma concentration).
- * *Anticoagulants*: anticoagulant effect of Warfarin enhanced.
- * *Antidiabetics*: effect of Sulphonylureas enhanced.
- * *Antiepileptics*: metabolism accelerated by Phenobarbital (reduced Chloramphenicol-plasma concentration); increased plasma concentration of Phenytoin (risk of toxicity).
- * *Barbiturates*: see under Antiepileptics, above.

Chloroquine and Hydroxychloroquine

- * *Analgesics*: Chloroquine and Hydroxychloroquine increase risk of ventricular arrhythmia with Levacetylmethadol (avoid concomitant use).
Antacids and Adsorbents: antacids reduce absorption of Chloroquine and Hydroxychloroquine; Kaolin reduces absorption of Chloroquine.
- * *Antiarrhythmics*: Chloroquine and Hydroxychloroquine increase risk of ventricular arrhythmias with Amiodarone (avoid concomitant use).
- * *Antiepileptics*: antagonism of anticonvulsant effect of other Antimalarials; increased risk of convulsions with Mefloquine; increased risk of arrhythmias with Halofantrine.
- * *Cardiac Glycosides*: Hydroxychloroquine and possibly Chloroquine increase plasma concentration of Digoxin.
- * *Ciclosporin*: Chloroquine increases plasma-Ciclosporin concentration (increased risk of toxicity).
Parasympathomimetics: Chloroquine and Hydroxychloroquine have potential to increase symptoms of myasthenia gravis and thus diminish effect of Neostigmine and Pyridostigmine.
Ulcer-healing Drugs: Cimetidine inhibits metabolism of Chloroquine (increased plasma concentration).

Chlorpheniramine see Antihistamines.

Chlorpromazine see Antipsychotics.

Chlorpropamide see Antidiabetics (Sulphonylureas).

Cilazapril see ACE Inhibitors.

Cilostazol

Cilostazol is extensively metabolised to active and inactive metabolites by cytochrome P450 isoenzymes, mainly CYP3A4 and to a lesser extent CYP2C19. Therefore use with other drugs that inhibit or are metabolised by these hepatic enzymes may result in changes in plasma concentrations of either drug and, possibly, adverse effects. Cilostazol should therefore be used with caution in patients taking drugs metabolised by these enzymes; in patients taking enzyme inhibitors it should be avoided or a reduced dose should be considered.

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The risk of bleeding is increased if cilostazol is given with clopidogrel and aspirin; its use, therefore, is contra-indicated in patients receiving two or more other antiplatelet or anticoagulant drugs.

Cimetidine see Histamine H₂-antagonists.

Cinnarizine see Antihistamines.

Ciprofloxacin see Quinolones.

Cisatracurium see Muscle Relaxants (non-depolarizing).

Cisplatin

* *Antibacterials:* Aminoglycosides increased risk of nephrotoxicity and possibly of ototoxicity.

Diuretics: increased risk of nephrotoxicity and ototoxicity.

Citalopram see Antidepressants, SSRI

Clarithromycin see Erythromycin and other Macrolides.

Clindamycin

Muscle Relaxants: enhancement of effect of non-depolarizing muscle relaxants.

Parasympathomimetics: antagonism of effect of Neostigmine and Pyridostigmine.

Clobazam see Anxiolytics and Hypnotics.

Clofazimine

Some preliminary data have suggested that the anti-inflammatory action of clofazimine in Type 2 lepra reactions may be reduced by dapsone, although US licensed product information (Lamprone; Novartis, USA) states that these findings have not been confirmed; the antimycobacterial effect was not affected.

Elevated plasma and urine concentrations of clofazimine have been detected in patients receiving high doses of clofazimine with isoniazid, although skin concentrations were found to be lower.

For a report of the effect of clofazimine on rifampicin absorption.

Clomipramine see Antidepressants, Tricycles.

Clonidine

- ACE Inhibitors: enhanced hypotensive effect when clonidine given with ACE inhibitors;
- Adrenergic Neurone Blockers: enhanced hypotensive
- Alcohol: enhanced hypotensive effect
- Aldesleukin: enhanced hypotensive effect
- Alpha-blockers: enhanced hypotensive effect
- Anaesthetics, General: enhanced hypotensive effect
- Analgesics: hypotensive effect
- Angiotensin-II Receptor Antagonists: enhanced hypotensive effect
- Antidepressants: enhanced hypotensive effect when clonidine given with MAOIs; hypotensive effect of clonidine possibly antagonised by mirtazapine, tricyclics, also increased risk of hypertension on clonidine withdrawal
- Antipsychotics: enhanced hypotensive effect when clonidine given with phenothiazines
- Anxiolytics and Hypnotics: enhanced hypotensive effect when clonidine given with anxiolytics and hypnotics
- Beta-blockers: increased risk withdrawal hypertension when clonidine given with beta-blockers
- Calcium-channel Blockers: enhanced hypotensive effect
- Corticosteroids: hypotensive effect of clonidine antagonized by corticosteroids

APPENDIX 2: DRUG INTERACTIONS

- Cytotoxics: possible increased risk of bradycardia when clonidine given with crizotinib
- Diazoxide: enhanced hypotensive effect when clonidine given with diazoxide
- Diuretics: enhanced hypotensive effect when clonidine given with diuretics
- Dopaminergics: enhanced hypotensive effect when clonidine given with levodopa
- Histamine: avoidance of clonidine advised by manufacturer of histamine
- Methyldopa: enhanced hypotensive effect when clonidine given with methyldopa
- Moxisylyte: enhanced hypotensive effect when clonidine given with moxisylyte
- Moxonidine: enhanced hypotensive effect when clonidine given with moxonidine
- Muscle Relaxants: enhanced hypotensive effect when clonidine given with baclofen or tizanidine
- Nitrates: enhanced hypotensive effect when clonidine given with nitrates
- Oestrogens: hypotensive effect of clonidine antagonized by oestrogens
- Prostaglandins: enhanced hypotensive effect when clonidine given with alprostadil.
- Sympathomimetics: possible risk of hypertension when clonidine given with adrenaline (epinephrine) or noradrenaline (norepinephrine); serious adverse events reported with concomitant use of clonidine and methylphenidate (causality not established)
- Vasodilator Antihypertensives: enhanced hypotensive effect when clonidine given with hydralazine, minoxidil or sodium nitroprusside

Clonazepam (general sedative interactions as for Anxiolytics and Hypnotics).

Clopidogrel

Analgesics: increased risk of bleeding with NSAIDs (including aspirin)

- *Anticoagulants:* enhanced effect due to antiplatelet action of Clopidogrel; manufacturer advises avoid concomitant use of Warfarin.
- *Other Antiplatelet drugs:* increased risk of bleeding.

Clotrimazole see Antifungals, Imidazole and Triazole.

Clozapine see Antipsychotics.

Co-amoxiclav see Penicillins.

Codeine see Opioid Analgesics.

Cold and Cough Remedies see Antihistamines and Sympathomimetics.

Colestipol as for Colestyramine

Contraceptives, Oral

Note: Also covers Oestrogens taken alone; interactions unlikely with low dose hormone replacement therapy.

ACE Inhibitors: Oestrogens and combined oral contraceptives antagonize hypotensive effect.

- * *Antibacterials:* Rifampicin accelerate metabolism of both combined and Progestogen-only oral contraceptives (reduced contraceptive effect); when broad-spectrum antibiotics such as Ampicillin and Tetracycline given with combined oral contraceptives possibility have reduced contraceptive effect (risk probably small).
- * *Anticoagulants:* antagonism of anticoagulant effect of Nicoumalone, Phenindione, and Warfarin.
Antidepressants: antagonism of antidepressant effect has been reported, but side-effects of Tricyclics may be increased due to higher plasma concentration.
Antidiabetics: antagonism of hypoglycemic effect.
- * *Antiepileptics:* Carbamazepine, Phenobarbital and Phenytoin accelerate metabolism (reduce effect of both combined and Progestogen-only contraceptives).

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- * *Antifungals*: Griseofulvin accelerates metabolism (reduced contraceptive effect) anecdotal reports of contraceptive failure with Fluconazole, Itraconazole, Ketoconazole and possibly others.
Antihypertensives: combined oral contraceptives antagonize hypotensive effect
- * *Barbiturates*: see under Antiepileptics, above.
Beta-blockers: Oestrogens and combined oral contraceptives antagonize hypotensive effect.
- * *Bile Acids*: Oestrogens increase elimination of cholesterol in bile.
- * *Ciclosporin*: increased plasma Ciclosporin concentration.
Corticosteroids: oral contraceptives increase plasma concentration of Corticosteroids.
Diuretics: combined oral contraceptives antagonize diuretic effect.
- * *Retinoids*: oral Tretinoin reduces efficacy of Progestogen-only and possibly combined oral contraceptives.
Tacrolimus: efficacy of oral contraceptives possibly decreased.
Theophylline: combined oral contraceptives delay excretion (increased plasma-theophylline concentration).
Ulcer-healing drugs: manufacturer advises Lansoprazole possibly accelerates metabolism.

Corticosteroids

Note: Do not generally apply to Corticosteroids used for topical action (including inhalation).

- Analgesics*: increased risk of gastro-intestinal bleeding and ulceration with aspirin and NSAIDs. Corticosteroids reduce plasma-salicylate concentration.
- * *Antibacterials*: Rifampicin accelerate metabolism of Corticosteroids (reduced effect); Erythromycin inhibits metabolism of Methylprednisolone and possibly other Corticosteroids.
Antihypertensives: antagonism of hypoglycemic effect.
Antivirals: plasma concentration of Saquinavir possibly reduced by Dexamethasone.
- * *Barbiturates*: see under Antiepileptics, above.
- * *Cardiac Glycosides*: increased toxicity if hypokalaemia occurs with Corticosteroids.
- * *Ciclosporin*: plasma-Ciclosporin concentration increased by high-dose of Methylprednisolone (risk of convulsions); Ciclosporin increases plasma concentration of Prednisolone.
Diuretics: antagonism of diuretic effect; Acetazolamide, loop diuretics, and Thiazides increase risk of hypokalaemia.
Hormone Antagonists: Aminoglutethimide accelerates metabolism of Corticosteroids (reduced effect).
Oestrogens and Progestogens: oral contraceptives increase plasma concentration Corticosteroids.
Somatropin: growth promoting effect may be inhibited.
Sympathomimetics: increased risk of hypokalaemia if high doses of Corticosteroids given with high doses of Ritodrine, Salbutamol, Salmeterol and Terbutaline; Ephedrine accelerates metabolism of Dexamethasone.
Ulcer-healing Drugs: Carbenoxolone increases risk of hypocalcaemia.

Co-Trimoxazole and Sulphonamides

Note: For interactions with co-trimoxazole see also under Trimethoprim.

- Anesthetics*: effect of Thiopental enhanced.
- * *Anti-arrhythmics*: Co-trimoxazole increases risk of ventricular arrhythmias with Amiodarone (avoid concomitant use).

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- * *Anticoagulants*: effect of Warfarin enhanced.
- * *Antidiabetics*: effect of Sulphonylureas enhanced.
- * *Antiepileptics*: antifolate effect and plasma concentration of Phenytoin increased by Co-trimoxazole and possibly other Sulphonamides.
- * *Antimalarials*: increased risk of antifolate effect with Pyrimethamine (includes Fansidar and Maloprim).
- * *Ciclosporin*: increased risk of nephrotoxicity; plasma Ciclosporin concentration possibly reduced by Sulphadiazine.
- * *Cytotoxics*: antifolate effect of Methotrexate increased by Co-trimoxazole; risk of Methotrexate toxicity increased by Sulphonamides.

Cyclophosphamide

- * *Anticoagulants*: possibly enhances effect of Warfarin.
- * *Muscle Relaxants*: Cyclophosphamide enhances effect of Suxamethonium.

Cycloserine

Patients receiving cycloserine and taking alcohol are at increased risk of convulsions; for reference to increased blood-alcohol concentrations in patients receiving cycloserine. Neurotoxic effects may be potentiated by use of cycloserine with ethionamide, and concurrent use of cycloserine and isoniazid may result in increased CNS toxicity, such as dizziness and drowsiness.

Ciclosporin

Note: Grapefruit juice increases plasma-Ciclosporin concentration (risk of toxicity).

- * *ACE Inhibitors*: increased risk of hyperkalaemia.
- * *Allopurinol*: possibly increases plasma-ciclosporin concentration (risk of toxicity).
- * *Analgesics*: increased risk of nephrotoxicity with NSAIDs; Ciclosporin increases plasma concentration of Diclofenac (halve diclofenac dose).
- * *Anti-arrhythmics*: Amiodarone and Propafenone possibly increase plasma-Ciclosporin concentration.
- * *Antibacterials*: Aminoglycosides, Co-trimoxazole (and Trimethoprim alone), and Quinolones increase risk of nephrotoxicity; Doxycycline possibly increases plasma-Ciclosporin concentration; Erythromycin, Clarithromycin and possibly other Macrolides increase plasma-Ciclosporin concentration; Erythromycin; Clarithromycin and possibly other Macrolides increase plasma-Ciclosporin concentration; Rifampicin, intravenous Trimethoprim (and possibly Sulphadiazine) reduce plasma-ciclosporin concentration.
- * *Antiepileptics*: Carbamazepine, Phenobarbitone, Phenytoin, and Primidone accelerate metabolism (reduced plasma-Ciclosporin concentration).
- * *Antifungals*: Griseofulvin possibly reduces plasma-Ciclosporin concentration; Itraconazole, Ketoconazole, and possibly Fluconazole and Miconazole inhibit metabolism (increased plasma-Ciclosporin concentration).
- * *Antimalarials*: Chloroquine increases plasma-Ciclosporin concentration (risk of toxicity).
- * *Barbiturates*: see under Antiepileptics, above.
- * *Calcium-channel Blockers*: Diltiazem and Verapamil increase plasma-Ciclosporin concentration; Ciclosporin possibly increases plasma concentration of Nifedipine.
- * *Corticosteroids*: high-dose Methylprednisolone increases plasma-Ciclosporin concentration (risk of convulsions); Ciclosporin increases plasma concentration Prednisolone.
- * *Cytotoxics*: increased risk of neurotoxicity with Doxorubicin, increased toxicity with Methotrexate; in vitro studies suggest possible interaction with Docetaxel-consult product literature.
- * *Diuretics*: potassium-sparing diuretics increase risk of hyperkalaemia.
- * *Hormone Antagonists*: Danazol inhibits metabolism (increased plasma-Ciclosporin concentration).

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- * *Lipid-regulating Drugs*: increased risk of myopathy with statins.
- * *Oestrogens and Progestogens*: Progestogens inhibit metabolism (increased plasma-Ciclosporin concentration).
- * *Potassium Salts*: increased risk of hyperkalaemia.
- * *Tacrolimus*: plasma-Ciclosporin half-life prolonged (increased risk of toxicity).
- * *Ulcer-healing Drugs*: Cimetidine possible increased plasma-Ciclosporin concentration.

Cytarabine

Flucytosine: plasma-flucytosine concentration possibly reduced.

Cytotoxics see under individual drugs.

Daclatasvir

May cause severe bradycardia and heart block when concomitantly used with amiodarone (in conjunction with sofosbuvir). Decreased plasma concentration and therapeutic effect with moderate CYP3A4 enzyme inducers. Increased plasma concentration with strong CYP3A4 enzyme inhibitors (e.g. clarithromycin, itraconazole, ketoconazole, ritonavir, etc.). May increase systemic exposure to drugs that are substrates of P-gp transporter (e.g. digoxin), OATP 1B1/1B3, and BCRP. **Potentially Fatal**: Decreased plasma concentration and therapeutic effect with strong CYP3A4 enzyme inducers (e.g. carbamazepine, phenytoin, rifampicin, etc.).

Dalteparin see Heparin.

Danazol

- * *Anticoagulants*: effect of Warfarin enhanced (inhibits metabolism).
- * *Antiepileptics*: inhibits metabolism of Carbamazepine (increased plasma-Carbamazepine concentration).
- * *Ciclosporin*: inhibits metabolism (increased plasma-ciclosporin concentration).

Dantrolene see Calcium-Channel Blockers and Muscle Relaxants.

Dapagliflozin

- Increased risk of dehydration and hypotension when used w/ diuretics.
- Additive hypoglycaemic effect if concomitantly used w/ insulin and insulin secretagogues (e.g. sulfonylureas).

Dapsone

Antibacterials: plasma concentration reduced by Rifampicin.

Probenecid: Dapsone excretion reduced (increased risk of side-effects).

Darbepoetin alfa Antagonism of hypotensive effect and increased risk of hyperkalemia with ACE inhibitors and angiotensin II receptor antagonists. Ethanol.

Dasatinib

Concomitant use w/ drugs that have narrow therapeutic index (e.g. alfentanil, cisapride, ciclosporin, fentanyl, pimozide, quinidine, simvastatin, sirolimus, tacrolimus, ergot alkaloids) as it may increase the serum levels of these drugs. Increased risk of bleeding and thrombocytopenia w/ antiplatelet drugs, anticoagulants, and NSAIDs.

Potentially Fatal: May reduce plasma levels w/ antacids, administer antacid 2 hr apart from the admin of dasatinib. May increase plasma levels w/ CYP3A4 inhibitors (e.g. atazanavir, clarithromycin, erythromycin, indinavir, itraconazole, ketoconazole, nefazodone, nelfinavir, ritonavir, saquinavir, telithromycin or voriconazole). May reduce plasma levels w/ CYP3A4 inducers (e.g. carbamazepine, dexamethasone, phenytoin, phenobarbital or rifampicin).

Deflazacort

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Desferrioxamine

Antipsychotics: manufacturer advises avoid Prochlorperazine (also Methotrimeprazine of theoretical grounds).

Desloratadine see Antihistamines

Desmopressin

Analgesics: effect of Desmopressin potentiated by Indomethacin.

Desogestrel see Progestogens.

Dexamethasone see Corticosteroids.

Dexamethasone + Moxifloxacin see Dexamethasone and Moxifloxacin

Dextromethorphan Hydrobromide + Phenylephrine Hydrochloride + Triprolidine Hydrochloride see de

- Additive CNS effect when used w/ antihistamines, psychotropics and other CNS depressants.
- Increased toxic effect when used w/ potent CYP2D6 enzyme inhibitors (e.g. fluoxetine, paroxetine, quinidine, terbinafine).
- Potentially Fatal: Increased risk of serotonin syndrome (e.g. hyperpyrexia, hallucinations, gross excitation or coma) when concomitantly used w/ MAOIs or SSRIs.

Diazepam see Anxiolytics and Hypnotics.

Diclofenac see NSAIDs.

Diclofenac Diethylamine see NSAIDs.

Diethylcarbamazepine

- * Ammonium chloride: Making the urine acidic with ammonium chloride appears to markedly increase the excretion of diethylcarbamazepine.
- * Sodium bicarbonate: Making the urine alkaline with sodium bicarbonate appears to markedly increase the retention of diethylcarbamazepine.

Digoxin see Cardiac Glycosides.

Diltiazem see Calcium-channel Blockers.

Dimenhydrinate see Antihistamines.

Diosmin Metabolism of metronidazole may be reduced by concurrent admin of diosmin.

Diphenhydramine see Antihistamines.

Dipivefrine see Sympathomimetics (as for adrenaline).

Dipyridamole

Antacids: patient information leaflet advises avoidance of antacids.

- * *Anti-arrhythmics:* effect of adenosine enhanced and extended (important risk of toxicity).
 - * *Anticoagulants:* enhanced effect due to antiplatelet action of Dipyridamole.
- Cytotoxics:* efficacy of Fludarabine possibly reduced.

Disopyramide

- * *Other Anti-arrhythmics:* Amiodarone increases risk of ventricular arrhythmias (avoid concomitant use); increased myocardial depression with any antiarrhythmic.
 - * *Antibacterials:* plasma concentration of Disopyramide reduced by Rifampicin but increased by erythromycin and possibly Clarithromycin (risk of toxicity).
 - * *Antidepressants:* increased risk of ventricular arrhythmics with Tricyclics.
- Antiepileptics:* plasma concentration of Disopyramide reduced by Phenobarbital, Phenytoin.
- Antihistamines:* increased risk of ventricular arrhythmias with Mizolastine (avoid concomitant use).

APPENDIX 2: DRUG INTERACTIONS

- * *Antimuscarinics*: increased antimuscarinic side-effects.
- * *Antipsychotics*: increased risk of ventricular arrhythmias –avoid concomitant use with Pimozide or Thioridazine.
Barbiturates: see under Antiepileptics, above.
- * *Beta-blockers*: increased myocardial depression; increased risk of ventricular arrhythmias associated with Sotalol (avoid concomitant use).
- * *Calcium-channel blockers*: increased myocardial depression with Verapamil.
- * *Diuretics*: cardiac toxicity of Disopyramide increased if hypokalaemia occurs with Acetazolamide, Loop diuretics, and Thiazides.
- * *Nitrates*: reduced effect of sublingual nitrates (failure to dissolve under tongue owing to dry mouth).

Diuretics

- * *ACE Inhibitors*: enhanced hypotensive effect (can be extreme) risk of severe hyperkalaemia with potassium-risk of severe hyperkalaemia with potassium-sparing diuretics.
- * *Analgesics*: diuretics increase risk of nephrotoxicity of NSAIDs; NSAIDs notably Indomethacin and Ketorolac antagonize diuretic effect; Indomethacin and possibly other NSAIDs increase risk of hyperkalaemia with potassium-sparing diuretics; occasional reports of decreased renal function when Indomethacin given with Triamterene; diuretic effect of Spironolactone antagonized by Aspirin; Aspirin reduces excretion of Acetazolamide (risk of toxicity).
- * *Anti-arrhythmics*: cardiac toxicity of Amiodarone, Disopyramide and Quinidine increased if hypokalaemia occurs; action of Lignocaine and Mexiletine antagonized by hypokalaemia; Acetazolamide reduces excretion of Quinidine (increased plasma concentration).
- * *Antibacterials*: loop diuretics increase ototoxicity of Aminoglycosides and Vancomycin.
- * *Antidepressants*: increased risk of postural hypotension with Tricyclics.
Antidiabetics: hypoglycemic effect antagonized by Loop and Thiazide diuretics; Chlorpropamide increases risk of hyponatraemia associated with Thiazides in combination with potassium-sparing diuretics.
- * *Antiepileptics*: increased risk of hyponatraemia with Carbamazepine; Acetazolamide increases plasma concentration of Carbamazepine; carbonic anhydrase inhibitors possibly increase risk of osteomalacia with antiepileptics such as Phenytoin.
Antifungals: Hydrochlorothiazide increases plasma concentration Fluconazole.
- * *Antihypertensives*: enhance hypotensive effect; increased risk of first-dose hypotensive effect of post-synaptic alpha-blockers such as Prazosin.
- * *Antimalarials*: electrolyte disturbances increase risk of ventricular arrhythmias with Halofantrine.
- * *Antipsychotics*: in hypokalaemia increased risk of ventricular arrhythmias with Pimozide (avoid concomitant use).
Beta-blockers: enhanced hypotensive effect: in hypokalaemia increased risk of ventricular arrhythmias with Sotalol.
Calcium Salts: increased risk of hypercalcaemia with Thiazides.
Calcium-channel Blockers: enhanced hypotensive effect.
- * *Cardiac Glycosides*: increased toxicity if hypokalaemia occurs with Acetazolamide, Loop diuretics, and Thiazides; effect enhanced by Canrenoate and Spironolactone.
Corticosteroids: increased risk of hypokalaemia with Acetazolamide, Loop diuretics, and Thiazides, antagonism of diuretic effect.
- * *Ciclosporin*: increased risk of hyperkalaemia with potassium-sparing diuretics.
Cytotoxics: increased risk of nephrotoxicity and ototoxicity with Cisplatin.

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Other Diuretics: increased risk of hypokalaemia if Acetazolamide, Loop diuretics or Thiazides given together; profound diuresis possible if Metolazone given with Frusemide.

Hormone Antagonists: increased risk of hyponatraemia with Aminoglutethimide.

- * *Lithium:* Lithium excretion reduced by Loop diuretics, potassium-sparing diuretics and Thiazides (increased plasma-lithium concentration and risk of toxicity-loop diuretics safer than Thiazides); lithium excretion increased by Acetazolamide.

- * *Oestrogens and Progestogens:* Oestrogens and combined oral contraceptive antagonize diuretic effect.

- * *Potassium Salts:* hyperkalaemia with potassium-sparing diuretics.

Sympathomimetics: increased risk of hypokalaemia if Acetazolamide, Loop diuretics, and Thiazides given with high doses of Ritodrine, Salbutamol, Salmeterol and Terbutaline.

Ulcer-healing Drugs: increased risk of hypokalaemia if Acetazolamide, Loop diuretics, and Thiazides given with Carbenoxolone; Carbenoxolone antagonizes diuretic effect; Amiloride and Spironolactone antagonize ulcer-healing effect of Carbenoxolone.

Vitamins: increased risk of hypercalcaemia if Thiazides given with vitamin D.

Dobutamine see Sympathomimetics.

Docetaxel Trihydrate

Antibacterials: in-vitro studies suggest possible interaction with erythromycin-consult product literature.

Antifungals: in-vitro studies suggest possible interaction with Ketoconazole-consult product literature.

Ciclosporin: in-vitro studies suggest possible interaction with Ciclosporin.

Dofetilide

Increased plasma concentration when used w/ drugs secreted by renal tubular cationic transport (e.g. amiloride, metformin, triamterene). Increased risk of toxicity when used w/ QT prolonging agents (e.g. class I/III antiarrhythmics, bepridil, cisapride, phenothiazines, TCAs, certain fluoroquinolones and oral macrolides).

Potentially Fatal: Increased risk of torsade de pointes when used w/ hydrochlorothiazide (w/ or w/o triamterene), verapamil, and renal cation transport inhibitors (e.g. cimetidine, dolutegravir, trimethoprim, ketoconazole, prochlorperazine, megestrol).

Domperidone

Analgesics: opioid analgesics antagonize effect on gastro-intestinal activity; absorption of Paracetamol accelerated (enhanced effect).

Antimuscarinics: antagonism of effect on gastrointestinal activity.

Dopaminergics: possible antagonism of hypoprolactinaemic effect of Bromocriptine.

Dopamine see sympathomimetics

Dopaminergics see Bromocriptine and Levodopa.

Doxazosin see Alpha blockers (post-synaptic).

Doxepin

Increased plasma concentration when concurrently used w/ CYP2D6 inhibitors (e.g. quinidine, SSRIs), methylphenidate, and anxiolytics. Cimetidine may fluctuate steady-serum concentration of doxepin. Increased risk of arrhythmias, hypotension, or HTN if given w/ anaesthetics. Increased rate of metabolism w/ barbiturates. May decrease antihypertensive effects of clonidine, guanethidine, debrisoquine, and bethanidine. May reduce effect of sublingual nitrates owing to dry mouth.

Potentially Fatal: May cause serious adverse effects w/ MAOIs.

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Doxofylline This drug should not be administered together with other xanthine derivatives, including beverages and foods containing caffeine. Toxic synergism with ephedrine has been documented for xanthines. Concomitant therapy with erythromycin, troleandomycin, lincomycin, clindamycin, allopurinol, cimetidine, propranolol and anti-flu vaccine may decrease the hepatic clearance of xanthines causing an increase in blood levels.

Doxorubicin

Note: Antivirals may inhibit effect of Stavudine.

* *Ciclosporin*: increased risk of neurotoxicity.

Doxycycline see Tetracycline.

Doxylamine Succinate + Pyridoxine Hydrochloride

Drospirenone + Estradiol see oral contraceptives.

Econazole

Econazole is a known inhibitor of CYP3A4/2C9. Due to the limited systemic availability clinically relevant interactions are unlikely to occur but have been reported with oral anticoagulants. In patients taking oral anticoagulants, such as warfarin or acenocoumarol, caution should be exercised and the anticoagulant effect should be monitored more frequently.

Adjustment of the oral anticoagulant dosage may be necessary during and after the treatment with econazole.

Ecothiophate see Parasympathomimetics.

Efavirenz

Efavirenz is metabolised mainly by cytochrome P450 isoenzymes including CYP3A4. Consequently, it may compete with other drugs metabolised by this system, potentially resulting in mutually increased plasma concentrations and toxicity. Enzyme inducers may decrease plasma concentrations of efavirenz; efavirenz itself acts as an enzyme inducer and can reduce plasma concentrations of other drugs. Inhibition of some P450 isoenzymes has also been found in vitro.

Efavirenz is contra-indicated with drugs that are highly dependent on CYP3A4 for clearance and for which elevated plasma concentrations are associated with serious or life-threatening events. These drugs include antihistamines (astemizole and terfenadine), calcium-channel blockers (bepridil), ergot derivatives (dihydroergotamine, ergometrine, ergotamine, methylergometrine), gastrointestinal prokinetics (cisapride), antipsychotics (pimozide), and sedatives and hypnotics (midazolam and triazolam). St John's wort decreases the concentration of efavirenz; use with the antiretroviral is not recommended due to the possible loss of its activity and development of resistance.

Empagliflozin Additive hypoglycaemic effect if concomitantly used w/ insulin and insulin secretagogues (e.g. sulfonylureas). Increased risk of dehydration and hypotension when used w/ diuretics (e.g. thiazides, loop diuretics).

Eltrombopag

- Antacids decrease the absorption of eltrombopag
- Oral calcium salts decrease the absorption of eltrombopag.
- Dairy products are predicted to decrease the absorption of eltrombopag.
- Iron (oral) is predicted to decrease the absorption of eltrombopag.
- Selenium is predicted to decrease the absorption of eltrombopag
- Eltrombopag is predicted to increase the exposure to statins. Monitor and adjust dose.
- Zinc is predicted to decrease the absorption of eltrombopag.

Eluxadoline

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- Alcohol (Ethyl): May enhance the adverse/toxic effect of Eluxadoline. Specifically, alcohol use may increase the risk of pancreatitis. Avoid combination
- Alosetron: May enhance the constipating effect of Eluxadoline.
- Anticholinergic Agents: May enhance the constipating effect of Eluxadoline. Avoid combination
- Atazanavir: May increase the serum concentration of Eluxadoline. Management: Decrease the eluxadoline dose to 75 mg twice daily if combined with atazanavir and monitor patients for increased eluxadoline effects/toxicities. Consider therapy modification
- Cyclosporine (Systemic): May increase the serum concentration of Eluxadoline. Management: Decrease the eluxadoline dose to 75 mg twice daily if combined with cyclosporine and monitor patients for increased eluxadoline effects/toxicities. Consider therapy modification
- Loperamide-Loperamide Oxide: May enhance the constipating effect of Eluxadoline. Monitor therapy
- Lopinavir: May increase the serum concentration of Eluxadoline. Management: Decrease the eluxadoline dose to 75 mg twice daily if combined with lopinavir and monitor patients for increased eluxadoline effects/toxicities.
- Opioid Analgesics: May enhance the constipating effect of Eluxadoline. Avoid combination
- RifAMPin: May increase the serum concentration of Eluxadoline. Management: Decrease the eluxadoline dose to 75 mg twice daily if combined with rifampin and monitor patients for increased eluxadoline effects/toxicities. Consider therapy modification
- Ritonavir: May increase the serum concentration of Eluxadoline. Management: Decrease the eluxadoline dose to 75 mg twice daily if combined with ritonavir and monitor patients for increased eluxadoline effects/toxicities. Consider therapy modification
- Rosuvastatin: Eluxadoline may increase the serum concentration of Rosuvastatin. Management: Use the lowest effective dose of rosuvastatin if combined with eluxadoline. Consider therapy modification
- Saquinavir: May increase the serum concentration of Eluxadoline.
- Teriflunomide: May increase the serum concentration of OAT3 Substrates. Monitor therapy

Enalapril see ACE Inhibitors.

Fnfuvirtide no clinical data is available

Enoxaparin see Heparin.

Entacapone

Antidepressants: manufacturer advises avoid concomitant use of MAOIs, Tricyclics or Maprotiline.

Antihypertensives: effect of Methyldopa possibly enhanced.

Iron: absorption of Entacapone reduced.

Sympathomimetics: effect of Adrenaline, Dobutamine, Dopamine, Isoprenaline and Noradrenaline possibly enhanced.

Entecavir

Ephedrine see Sympathomimetics.

Caution should be exercised when entecavir is given with other drugs eliminated by active tubular secretion as competition for the elimination pathway may increase the serum concentrations of either drug.

Eplerenone see Diuretics

Epoetin Beta

APPENDIX 2: DRUG INTERACTIONS

ACE Inhibitors and Angiotensin-II Antagonists: antagonism of hypotensive effect; increased risk of hyperkalaemia.

Eptifibatide

**Warfarin and dipyridamole:* Eptifibatide did not appear to increase the risk of major and minor bleeding associated with concomitant use of warfarin and dipyridamole. Eptifibatide-treated patients who had a prothrombin time (PT) > 14.5 seconds and received warfarin concomitantly did not appear to be at an increased risk of bleeding.

**Eptifibatide and thrombolytic agents:* Data are limited on the use of eptifibatide in patients receiving thrombolytic agents. There was no consistent evidence that eptifibatide increased the risk of major or minor bleeding associated with tissue plasminogen activator in either a PCI or an acute myocardial infarction study; Eptifibatide appeared to increase the risk of bleeding when administered with streptokinase in an acute myocardial infarction study. The combination of reduced dose tenecteplase and eptifibatide compared to placebo and eptifibatide significantly increased the risk of both major and minor bleeding when administered concomitantly in an acute ST-elevation myocardial infarction study.

In an acute myocardial infarction study involving 181 patients, eptifibatide (in regimens up to a bolus injection of 180 microgram/kg, followed by an infusion up to 2 microgram/kg/min for up to 72 hours) was administered concomitantly with streptokinase (1.5 million units over 60 minutes). At the highest infusion rates (1.3 microgram/kg/min and 2.0 microgram/kg/min) studied, eptifibatide was associated with an increased incidence of bleeding and transfusions compared to the incidence seen when streptokinase was given alone.

Ergometrine see Ergotamine and Ergometrine

Ergotamine and Ergometrine

- * *Anaesthetics:* Halothane reduces effect of ergometrine on the parturient uterus
- * *Antibacterials:* increased risk of ergotism with Azithromycin, Clarithromycin and Erythromycin – avoid concomitant use; increased risk of ergotism with Tetracyclines.
- * *Antivirals:* risk of ergotism with Nelfinavir and Ritonavir-avoid concomitant use
- * *Beta-blockers:* increased peripheral vasoconstriction.

Ertapenem

Probenecid inhibits the renal excretion of ertapenem thereby increasing its plasma concentrations and prolonging its elimination half-life.

Erythromycin and Other Macrolides

Note: Interactions do not apply to small amounts used topically.

Antacids: antacids reduce absorption of Azithromycin.

- * *Anti-arrhythmics:* plasma concentration of Disopyramide increased by erythromycin and possibly Clarithromycin (risk of toxicity); erythromycin (parenteral) increases risk of ventricular arrhythmias with Amiodarone (avoid concomitant use).
- * *Other Antibacterials:* Clarithromycin and possibly other Macrolides increase plasma concentration of Rifabutin (risk of uveitis-reduce Rifabutin dose).
- * *Anticoagulants:* effect of Warfarin enhanced by Erythromycin and possibly enhanced by Clarithromycin and some other Macrolides.
Antidiabetics: Erythromycin possibly increase plasma concentration of Repaglinide (manufacturer advises avoid concomitant use).
- * *Antihistamines:* manufacturer advises possibility of increased plasma-loratadine concentration with erythromycin and possibly other Macrolides (avoid concomitant use).
- * *Antipsychotics:* risk of arrhythmias if Clarithromycin and possibly erythromycin given with Pimozide (avoid concomitant use); Erythromycin possibly increases plasma concentration Clozapine (possible increased risk of convulsions).

APPENDIX 2: DRUG INTERACTIONS

- * *Antivirals*: Clarithromycin tablets reduce absorption of Zidovudine; Ritonavir possibly increases plasma concentration Macrolides.
- * *Anxiolytics and Hypnotics*: Erythromycin inhibits metabolism of Midazolam (increased plasma-Midazolam concentration, with profound sedation) and Zopiclone.
Calcium-channel Blockers: erythromycin possibly inhibits metabolism of Felodipine (increased plasma concentration).
Cardiac Glycosides: effect of Digoxin enhanced by Erythromycin and possibly enhanced by other Macrolides.
Corticosteroids: Erythromycin inhibits metabolism of Methylprednisolone and possibly other Corticosteroids.
- * *Ciclosporin*: Erythromycin, Clarithromycin and possibly other Macrolides inhibit metabolism (increased plasma-ciclosporin concentration).
Cytotoxics: in-vitro studies suggest possible interaction between Erythromycin and Docetaxel- consult product literature.
Dopaminergics: plasma concentration of Bromocriptine increased by Erythromycin and possibly other Macrolides.
- * *Ergotamine*: ergotism reported.
Leukotriene Antagonists: erythromycin reduces plasma concentration of Zafirlukast.
Lipid-regulating Drugs: Clarithromycin and erythromycin increase risk of myopathy with Simvastatin.
- * *Tacrolimus*: Clarithromycin and Erythromycin increase plasma-tacrolimus concentration.
- * *Theophylline*: Clarithromycin and Erythromycin inhibit metabolism (increased plasma-Theophylline concentration (if Erythromycin given by mouth also decreased plasma-erythromycin concentration).
Ulcer-healing Drugs: Cimetidine increases plasma-erythromycin concentration (increased risk of toxicity, including deafness).

Erythropoietin see Epoetin.

Escitalopram see Antidepressants, SSRI.

Esomeprazole see Proton pump Inhibitors.

Estradiol see Contraceptives, Oral

Ethacrynic Acid see Diuretics (loop).

Ethinylestradiol see Contraceptives, Oral.

Ethambutol none

Ethionamide

The adverse effects of other antimycobacterials may be increased when ethionamide is used see Effects on the Liver, and under Cycloserine, Interactions.

Etidronate Disodium see Bisphosphonates.

Ezetimibe

- Anticoagulants: ezetimibe possibly enhances Anticoagulant effect of coumarins
- Ciclosporin: plasma concentration of both drugs may increase when ezetimibe given with ciclosporin
- Lipid-regulating Drugs: increased risk of cholelithiasis and gallbladder disease when ezetimibe given with fibrates - discontinue if suspected

Famotidine see Histamine H₂-antagonists.

Felodipine see Calcium-channel Blockers.

Fenofibrate see Fibrates.

Fentanyl see Opioid Analgesics.

APPENDIX 2: DRUG INTERACTIONS

Ferric Carboxymaltose see Iron (injectables).

Ferrous Salts see Iron.

Fexofenadine See Antihistamines

Fibrates

- * *Anticoagulants*: enhancement of effect of Nicoumalone, Phenindione, and Warfarin.
Antidiabetics: may improve glucose tolerance and have additive effect; increased risk of severe hypoglycaemia with gemfibrozil (avoid concomitant use)
- * *Cyclosporin*: possible increased risk of renal impairment with fenofibrate.
- * *Other Lipid-regulating Drugs*: increased risk of myopathy with statins (preferably avoid concomitant use of gemfibrozil with statins)

Filgrastim

Note: Use not recommended in period from 24 hours before to 24 hours after chemotherapy - for further details consult product literature.

Cytotoxics: possible exacerbation of neutropenia with Fluorouracil.

Finasteride

Note: No clinically important interactions reported.

Flucloxacillin see Penicillins.

Fluconazole see Antifungals, Imidazole and Triazole.

Flucytosine

Flucytosine is commonly used with amphotericin B. Amphotericin B can cause a deterioration in renal function, which can result in raised flucytosine blood concentrations and increased toxicity. However, the two drugs are generally regarded as having synergistic antifungal activity. Cytarabine has been claimed to reduce blood concentrations of flucytosine and to antagonise its antifungal activity, although the evidence is limited.

Fluorouracil

Antibacterials: Metronidazole inhibits metabolism (increased toxicity)

Filgrastim: possible exacerbation of neutropenia.

Ulcer-healing Drugs: Cimetidine inhibits metabolism (increased plasma-fluorouracil concentration).

Fluoxetine see Antidepressants, SSRI.

Flupenthixol see Antipsychotics.

Fluphenazine see Antipsychotics.

Flurazepam see Anxiolytics and Hypnotics.

Flutamide

- * *Anticoagulants*: effect of Warfarin enhanced.

Fluticasone see Corticosteroids.

Fluticasone Propionate + Formoterol Fumarate Dihydrate

- Fluticasone: Increased plasma concentration w/ CYP3A4 inhibitors (e.g. ketoconazole, HIV protease inhibitors, clarithromycin, ketoconazole).
- Formoterol: May induce hypokalaemia w/ xanthine derivatives, steroids and diuretics. Increased risk of ventricular arrhythmias w/ digitalis glycoside, halogenated hydrocarbon anaesthetics. May prolong QTc-interval w/ TCAs, MAOIs, antipsychotics, quinidine, disopyramide, procainamide, and antihistamines. Reduced therapeutic effect w/ β -blockers. May impair cardiac tolerance w/ L-dopa, L-thyroxine, oxytocin.

Fluvastatin see Statins.

Folic Acid and Folinic Acid

- * *Antiepileptics*: plasma concentrations of Phenobarbital and Phenytoin possibly reduced.

Formoterol See *Sympathomimetics*, Beta₂

APPENDIX 2: DRUG INTERACTIONS

Fosfomycin

Additive or synergistic effect w/ β -lactam antibiotics (e.g. penicillin, ampicillin, cefazolin, carbapenems) and anti-staphylococcal agents (e.g. linezolid, quinupristin/dalfopristin, moxifloxacin). Reduced serum levels w/ drugs which increase GI motility (e.g. metoclopramide).

Fosinopril see ACE inhibitors.

Frusemide see Diuretics, Loop.

Gabapentin

- *Antacids*: reduced Gabapentin absorption.
- *Antidepressants*: antagonism of anticonvulsive effect (convulsive threshold lowered)
Other Antiepileptics: none demonstrated with Carbamazepine, Phenobarbital, Phenytoin, or Valproate.
Antimalarials: Mefloquine antagonises anticonvulsant effect; Chloroquine occasionally reduces convulsive threshold.

Gallamine see Muscle Relaxant (non-depolarizing).

Gemfibrozil see Fibrates.

Gemifloxacin as for Ciprofloxacin

Gentamicin see Aminoglycosides.

Gestrinone

Antibacterials: Rifampicin accelerates metabolism (reduced plasma concentration)

Antiepileptics: Carbamazepine, Phenobarbital, and Phenytoin accelerate metabolism (reduced plasma concentration)

Glibenclamide see Antidiabetics (Sulphonylureas).

Gliclazide see Antidiabetics (sulphonylurea).

Glimepiride see Antidiabetics (sulphonylurea).

Glimepiride + Metformin Hydrochlorid see Glimepiride and Metformin.

Glipizide see Antidiabetics (sulphonylurea).

Glyceryl Trinitrate

Note: General hypotensive interactions as for Hydralazine.

Anti-arrhythmics: Disopyramide may reduce effect of sublingual nitrates (owing to dry mouth).

- * *Anticoagulants*: excretion of heparin increase by Glyceryl Trinitrate infusion (reduced anticoagulant effect).

Antidepressants: Tricyclics may reduce effect of sublingual nitrates (owing to dry mouth).

Antimuscarinics: Antimuscarinics such as Atropine and Propantheline may reduce effect of sublingual nitrates (owing to dry mouth).

Griseofulvin

- * *Anticoagulants*: metabolism of Nicoumalone and Warfarin accelerated (reduced anticoagulant effect).

Antiepileptics: absorption reduced by Phenobarbital (reduced effect).

Barbiturates: see under Antiepileptics above.

Ciclosporin: plasma-ciclosporin concentration possibly reduced.

- * *Oestrogens and Progestogens*: metabolism of oral contraceptives accelerated (reduced contraceptive effect).

Halofantrine

APPENDIX 2: DRUG INTERACTIONS

- * *Anti-arrhythmics*: increased risk of ventricular arrhythmias with drugs that prolong QT interval (including Amiodarone, Disopyramide, Flecainide, Procainamide and Quinidine).
- * *Antidepressants*: increased risk of ventricular arrhythmias with Tricycles.
- * *Other Antimalarials*: increased risk of arrhythmias with Chloroquine, Mefloquine and Quinine (important: see also advice under Halofantrine).
- * *Antipsychotics*: increased risk of ventricular arrhythmias with Phenothiazines.
- * *Beta-blockers*: increased risk of ventricular arrhythmias with Sotalol.
- * *Diuretics*: increased risk of ventricular arrhythmias if electrolyte disturbances occur.

Haloperidol see Antipsychotics.

Halothane see Anaesthetics, General (volatile liquid).

Heparin

- * *ACE Inhibitors and Angiotensin-II Antagonists*: Increased risk of hyperkalaemia
- * *Analgesics*: aspirin enhances anticoagulant effect; increased risk of hemorrhage with parenteral Diclofenac and Ketorolac (avoid concomitant use, including low-dose Heparin).
Antiplatelet Drugs: Aspirin, Dipyridamole and possibly Clopidogrel enhance anticoagulant effect.
- * *Nitrates*: Glyceryl Trinitrate infusion increases excretion (reduced anticoagulant effect).

Histamine H₁-Antagonists see Antihistamines.

Histamine H₂-Antagonists

- * *Analgesics*: Cimetidine inhibits metabolism of opioid analgesics notably Pethidine (increased plasma concentrations) Cimetidine possibly increases plasma concentration of Azapropazone.
- * *Anthelmintics*: Cimetidine possibly inhibits metabolism of Mebendazole (increased plasma concentration).
- * *Anti-arrhythmics*: Cimetidine increases plasma concentrations of Amiodarone, Flecainide, Lignocaine, Procainamide, Propafenone, Quinidine, and possibly Moracizine.
- * *Antibacterials*: Cimetidine increases plasma-erythromycin concentration (increased risk of toxicity, including deafness); Rifampicin accelerates metabolism of Cimetidine (reduced plasma-cimetidine concentration); Cimetidine inhibits metabolism of Metronidazole (increased plasma-metronidazole concentration).
- * *Anticoagulants*: Cimetidine enhances anticoagulant effect.
- * *Antidepressants*: Cimetidine inhibits metabolism of Amitriptyline, Doxepin, Imipramine, Moclobemide, Nortriptyline and Sertraline (increased plasma concentration).
- * *Antidiabetics*: Cimetidine inhibits renal excretion of Metformin (increased plasma concentration; Cimetidine enhances hypoglycemic effect of Sulphonylureas).
- * *Antiepileptics*: Cimetidine inhibits metabolism of Carbamazepine, Phenytoin, and Valproate (increased plasma concentration).
- * *Antifungals*: absorption of Itraconazole and Ketoconazole reduced; plasma concentration of Terbinafine increased by Cimetidine.
- * *Antihistamines*: manufacturer advises possibility of increased plasma-loratadine concentration with Cimetidine.
- * *Antimalarials*: Cimetidine inhibits metabolism of Chloroquine and Quinine (increased plasma concentration).

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Antipsychotics: Cimetidine possibly enhance effect of chlorpromazine, Clozapine, and possibly other antipsychotics.

Antivirals: plasma concentration of Zalcitabine possibly increased by Cimetidine.

Anxiolytics and Hypnotics: Cimetidine inhibits metabolism of Benzodiazepines and Chlormethiazole and Zaleplon (increased plasma concentration).

Beta-blockers: Cimetidine inhibits metabolism of beta-blockers such as Labetalol, Metoprolol and Propranolol (increased plasma concentrations).

Calcium-channel Blockers: Cimetidine inhibits metabolism of some calcium-channel blockers (increased plasma concentration).

* *Ciclosporin*: Cimetidine possibly increases plasma-ciclosporin concentration.

Cytotoxics: Cimetidine increases plasma concentration of Fluorouracil.

Hormone Antagonists: Octreotide possibly delays absorption of Cimetidine.

5HT₁- Agonists: Cimetidine inhibits metabolism of Zolmitriptan (reduce dose of Zolmitriptan).

* *Theophylline*: Cimetidine inhibits metabolism (increased plasma-theophylline concentration).

Homatropine see Antimuscarinics.

Hormone Antagonists see Aminoglutethimide; Bicalutamide; Danazol; Finasteride; Flutamide; Gestrinone; Octeotide; Tamoxifen; Toremifene; Trilostane.

5HT₁ -Agonists

Note: There are currently no recognized drug interaction with Naratriptan.

Antibacterials: Quinolones possibly inhibit metabolism of Zolmitriptan (reduce dose of Zolmitriptan).

* *Antidepressants*: risk of CNS toxicity with MAOIs including Lobemide (avoid Rizatriptan or Sumatriptan for 2 weeks after MAOI, reduce dose of Zolmitriptan when given with Moclobemide); Sumatriptan increases risk of CNS toxicity with SSRIs (avoid concomitant use); Fluvoxamine possibly inhibits metabolism of Zolmitriptan (reduce dose of Zolmitriptan).

Beta-blockers: Propranolol may increase plasma concentration of Rizatriptan (reduce Rizatriptan dose).

* *Ergotamine*: increased risk of vasospasm (avoid Ergotamine for 6 hours after Rizatriptan, Sumatriptan or Zolmitriptan, avoid Rizatriptan or Sumatriptan for 24 hours and Zolmitriptan for 6 hours after Ergotamine).

* *Lithium*: Sumatriptan increases risk of CNS toxicity (avoid concomitant use)

Ulcer-healing Drugs: Cimetidine inhibits metabolism of Zolmitriptan (reduce dose of Zolmitriptan (reduce dose of Zolmitriptan)).

Hydralazine

ACE Inhibitors: enhanced hypotensive effect.

Alcohol: enhanced hypotensive effect.

* *Anaesthetics*: enhanced hypotensive effect.

Analgesics: NSAIDs antagonize hypotensive effect.

Antidepressants: enhanced hypotensive effect.

Other Antihypertensives: additive hypotensive effect.

Antipsychotics: enhanced hypotensive effect.

Anxiolytics and Hypnotics: enhanced hypotensive effect.

Beta-blockers: enhanced hypotensive effect.

Calcium-channel Blockers: enhanced hypotensive effect.

Corticosteroids: antagonism of hypotensive effect.

Diuretics: enhanced hypotensive effect.

Dopaminergics: Levodopa enhanced hypotensive effect.

Muscle Relaxant: Baclofen and Tizanidine enhances hypotensive effect.

APPENDIX 2: DRUG INTERACTIONS

Nitrates: enhanced hypotensive effect.

Oestrogens and Progestogens: Oestrogens and combined oral contraceptives antagonize hypotensive effect.

Thymoxamine: enhanced hypotensive effect.

Hydrochlorothiazide see Diuretics (Thiazide).

Hydrocortisone see Corticosteroids.

Hydroxyprogesterone Caproate see Corticosteroids

Hydroxychloroquine see Chloroquine and Hydroxychloroquine.

Hydroxyprogesterone see Progestogens.

Hyoscine see Antimuscarinics (for general sedative interactions see also Antihistamines).

Hypnotics see Anxiolytics and Hypnotics.

Ibuprofen see NSAIDs.

Ifosfamide see Cyclophosphamide.

Imatinib

- *Analgesics*: manufacturer of imatinib advises restriction or avoidance of concomitant regular paracetamol.
- Anticoagulants*: manufacturer of imatinib advises replacement of Warfarin with a Heparin (possibility of enhanced Warfarin effect)
- Antiepileptics*: plasma concentration of Imatinib reduced by Phenytoin.
- Antifungals*: plasma concentration of Imatinib increased by Ketoconazole.
- Lipid-regulating Drugs*: plasma concentration of Simvastatin increased by Imatinib.

Imidapril see ACE Inhibitors and Angiotensin-II Antagonists.

Imipramine see Antidepressants, Tricyclic.

IMMUNOGLOBULINS

Note: for advice on Immunoglobulins and live virus vaccines, see under Normal Immunoglobulin section.

Indapamide see Diuretics (thiazide-related).

Indinavir

Indinavir is metabolised mainly by the cytochrome P450 isoenzyme CYP3A4. It may compete for the same metabolic pathways with many drugs that are metabolised similarly, often resulting in mutually increased plasma concentrations. A drug that is a significant inducer of microsomal enzymes, particularly CYP3A4, may reduce plasma concentrations of indinavir. HIV-protease inhibitors may themselves induce metabolism and may reduce plasma concentrations of other drugs.

Although specific guidance varies between licensing authorities, licensed product information generally contra-indicates the use of HIV-protease inhibitors, including indinavir with drugs that are highly dependent on CYP3A4 for clearance and for which elevated plasma concentrations are associated with serious or life-threatening events. These include

- the alpha1-adrenoceptor antagonist alfuzosin
- antiarrhythmics (amiodarone)
- antihistamines (astemizole and terfenadine)
- antipsychotics (pimozide)
- ergot derivatives (dihydroergotamine, ergometrine, ergotamine, and methylethergometrine)
- gastrointestinal prokinetics (cisapride)
- sedatives and hypnotics (alprazolam, oral midazolam, and triazolam)
- statins (lovastatin and simvastatin)

When indinavir is boosted with ritonavir, use with bepridil, clozapine, dextropropoxyphene, fusidic acid, diazepam, estazolam, flurazepam, quinidine, pethidine, and piroxicam should also be avoided. Similarly, ritonavir-boosted indinavir

APPENDIX 2: DRUG INTERACTIONS

should not be used with drugs having narrow therapeutic windows that are highly dependent on CYP2D6 for clearance, such as the antiarrhythmics encainide, flecainide, and propafenone. Owing to the potential for increased serum concentrations of sildenafil, indinavir should be avoided with sildenafil when given at the doses needed for the treatment of pulmonary hypertension. Similarly, indinavir may increase serum concentrations of inhaled salmeterol and the combination is not recommended. Use of indinavir with rosuvastatin should also be avoided. Rifampicin and St John's wort decrease the concentration of indinavir; use with the antiretroviral is contra-indicated due to the possible loss of its activity and development of resistance. Use of indinavir with atazanavir is contra-indicated as both drugs have been associated with indirect hyperbilirubinaemia.

Indomethacin see NSAIDs.

Inositol no interaction of clinical significance is available.

Insulin see Antidiabetics

Interferons

Note: Consult product literature for interactions of interferon beta and gamma.

Theophylline: interferon alpha inhibits metabolism of Theophylline (enhanced effect).

Ipratropium see Antimuscarinics.

Irbesartan see ACE Inhibitors and Angiotensin-II Antagonists.

Iron

Antacids: Magnesium Trisilicate reduces absorption of oral iron.

Antibacterials: Tetracyclines reduce absorption of oral iron (and vice versa); absorption of Ciprofloxacin, Norfloxacin, and Ofloxacin reduced by oral iron

Bisphosphonates: reduced absorption.

Dopaminergics: absorption of Entacapone and Levodopa may be reduced.

Penicillamine: reduced absorption of Penicillamine.

Trientine: reduced absorption of oral iron.

Zinc: reduced absorption of oral iron (and vice versa).

Isoflurane see Anaesthetics, General (volatile liquid).

Isoniazid

Anaesthetics: hepatotoxicity possibly potentiated by Isoflurane.

Antacids and Adsorbents: antacids reduce absorption.

Other Antibacterials: increased CNS toxicity with Cycloserine.

- * *Antiepileptics*: metabolism of Carbamazepine, Ethosuximide, and Phenytoin inhibited (enhanced effect); also, with Carbamazepine, Isoniazid hepatotoxicity possibly increased.

Antifungals: plasma concentration of Ketoconazole may be reduced.

Anxiolytics and hypnotics: metabolism of diazepam inhibited.

Theophylline: Isoniazid possibly increases plasma-theophylline concentration.

Isoprenaline see Sympathomimetics.

Isosorbide Dinitrate see Glyceryl Trinitrate.

Isosorbide Mononitrate see Glyceryl Trinitrate.

Isotretinoin see Retinoids.

Isradipine see Calcium-Channel Blockers.

Itraconazole see Antifungals, Imidazole and Triazole.

Ivabradine

- Anti-arrhythmics: increased risk of ventricular arrhythmias when ivabradine given with amiodarone or disopyramide

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- Antibacterials: plasma concentration of Ivabradine possibly increased by clarithromycin and telithromycin — avoid concomitant use; increased risk of ventricular arrhythmias when ivabradine given with erythromycin—avoid concomitant use
- Antidepressants: plasma concentration of Ivabradine reduced by St John's wort
- Antifungals: plasma concentration of ivabradine increased by fluconazole—reduce initial dose of vabradine; plasma concentration of ivabradine possibly increased by itraconazole
- Antimalarials: increased risk of ventricular arrhythmias when ivabradine given with mefloquine
- Antipsychotics: increased risk of ventricular arrhythmias when ivabradine given with pimozide
- Antivirals: plasma concentration of ivabradine possibly increased by ritonavir
- Beta-blockers: increased risk of ventricular arrhythmias when ivabradine given with sotalol
- Calcium-channel Blockers: plasma concentration of ivabradine increased by diltiazem and verapamil
- Grapefruit Juice: plasma concentration of ivabradine increased by grapefruit juice
- Pentamidine Isetionate: increased risk of ventricular arrhythmias when ivabradine given with pentamidine isetionate

Ivermectin

- * Levamisole: Levamisole appears to increase the exposure to ivermectin. Ivermectin does not alter the pharmacokinetics of levamisole.
- * Acenocoumarol: A patient showed a marked increase in his response to acenocoumarol when exposed to insecticides containing ivermectin and methidathion.
- * Warfarin: The US manufacturer notes that cases of raised INRs have been rarely reported with ivermectin and warfarin.
- * Alcohol: Alcohol may increase the bioavailability of ivermectin, which could increase adverse effects such as postural hypotension.

Kanamycin as for Gentamicin Sulfate

Kaolin

Analgesics: absorption of aspirin possibly reduced.

Anti-arrhythmics: absorption of Quinidine possibly reduced (possibly reduced plasma concentration).

Antibacterials: absorption of Tetracyclines possibly reduced.

Antimalarials: absorption of Chloroquine reduced.

Antipsychotics: absorption of Phenothiazines possibly reduced.

Cardiac Glycosides: absorption of Digoxin possibly reduced.

Ketamine see Anaesthetics, General.

Ketoconazole see Antifungals, Imidazole and Triazole.

Ketoprofen see NSAIDs.

Ketorolac see NSAIDs.

ketorolac Tromethamine see ketorolac

Ketotifen see Antihistamines.

Lacidipine see Calcium-channel Blocker.

Lactic Acid + Salicylic Acid see salicylic acid

Labetalol see Beta-blockers

Lamivudine

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Antibacterials: Trimethoprim increases plasma concentration.- avoid concomitant use of high-dose co-trimoxazole.

Lamotrigine

- * **Other Antiepileptics:** concomitant administration of two or more Antiepileptics may enhance toxicity without a corresponding increase in antiepileptic effect; moreover interactions between individual antiepileptics can complicate monitoring of treatment; interactions include enhanced effects, increased sedation, and reductions in plasma concentrations.

Lansoprazole see Proton Pump Inhibitors.

Leflunomide

Note: Increased risk of toxicity with other haematotoxic and hepatotoxic drugs.

Lenograstim

Note: Use not recommended from 24 hours before until 24 hours after chemotherapy; for further details consult product literature.

Lercanidipine see Calcium channel Blockers

Leukotriene Antagonists

Analgesics: aspirin increases plasma concentration of Zafirlukast.

Antibacterials: Erythromycin reduces plasma concentration of Zafirlukast.

Anticoagulants: anticoagulant effect of Warfarin enhanced by Zafirlukast.

Barbiturates: plasma concentration of Montelukast reduced by Phenobarbital.

Theophylline: Zafirlukast possibly increases plasma-theophylline concentration; plasma-Zafirlukast concentration reduced.

Levamisole

***Alcohol:** US licensed product information states that levamisole can produce a disulfiram-like reaction with alcohol.

***Anticoagulants:** Increase in the activity of warfarin when given with levamisole and fluorouracil.

***Antiepileptics:** Increased phenytoin concentrations when given with levamisole and fluorouracil.

Levocetirizine see Antihistamines

Levodopa

* **Antidepressants:** hypertensive crisis with MAOIs (including Moclobemide)- avoid for at least 2 weeks after stopping MAOI.

* **Antihypertensives:** enhanced hypotensive effect.

* **Antipsychotics:** antagonism of effect.

Anxiolytics and Hypnotics: occasional antagonism of effect by Chlordiazepoxide, Diazepam, Lorazepam and possibly other Benzodiazepines.

Iron: absorption of Levodopa may be reduced.

Metoclopramide and Domperidone: Levodopa-plasma concentrations increased by Metoclopramide.

Vitamins: effect of Levodopa antagonized by pyridoxine unless a dopa-decarboxylase inhibitor also given.

Levofloxacin see Quinolones

Levonorgestrel see Progestogens.

Lignocaine

Other Anti-arrhythmics: increased myocardial depression.

Beta-blockers: increased risk of myocardial depression; increased risk of Lignocaine toxicity with Propranolol.

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Diuretics: effect of Lignocaine antagonized by hypokalaemia with Acetazolamide, loop diuretics, and Thiazides.

Muscle Relaxants: action of Suxamethonium prolonged.

Ulcer-healing Drugs: Cimetidine inhibits metabolism of Lignocaine (increased risk of toxicity).

Linagliptin + Metformin Hydrochloride

- Concomitant cationic drugs that interfere w/ renal tubular transport systems (e.g. ranolazine, vandetanib, dolutegravir, cimetidine) may increase metformin levels.
- Thiazides and other diuretics, corticosteroids, phenothiazines, thyroid products, OCs, sympathomimetics, phenytoin, niacin, Ca channel blockers and isoniazid may produce hyperglycaemia which may lead to loss of glycaemic control.
- Increased risk of lactic acidosis w/ topiramate or other carbonic anhydrase inhibitors (e.g. zonisamide, acetazolamide, dichlorphenamide).
- Plasma concentration of linagliptin may be decreased by strong inducers of P-glycoprotein (e.g. rifampicin) and may be increased by strong P-glycoprotein inhibitors (e.g. ritonavir).
- Linagliptin may increase risk of hypoglycaemia when used in combination w/ sulfonylureas or insulin.

Linezolid see MAOIs

Note: Linezolid is a reversible, non-selective MAO inhibitor.

Lipid-regulating Drugs see Cholestyramine and Colestipol; Clofibrate Group; Nicotinic Acid; Statins.

Lisinopril see ACE Inhibitors.

Lithium

- * *ACE Inhibitors:* lithium excretion reduced (increased plasma-lithium concentration).
- * *Analgesics:* excretion of lithium reduced by Azapropazone, Diclofenac, Ibuprofen, Indomethacin, Ketorolac (avoid concomitant use), Mefenamic acid, Naproxen, Piroxicam and probably other NSAIDs (risk of toxicity).
- * *Antacids:* Sodium bicarbonate increases excretion of Lithium (reduced plasma-lithium concentrations).
- * *Anti-arrhythmics:* increased risk of hypothyroidism with Amiodarone.
- * *Antibacterials:* lithium toxicity reported with Metronidazole and Spectinomycin.
- * *Antidepressants:* SSRIs increase risk of CNS effects (lithium toxicity reported).
- * *Antidiabetics:* Lithium may occasionally impair glucose tolerance.
- * *Antiepileptics:* neurotoxicity may occur with Carbamazepine and Phenytoin without increased plasma-lithium concentration.
- * *Antihypertensives:* neurotoxicity may occur with Methyldopa without increased plasma-lithium concentration.
- * *Antipsychotics:* increased risk of extrapyramidal effects and possibility of neurotoxicity (notably with Haloperidol).
- * *Calcium-channel Blockers:* neurotoxicity may occur with Diltiazem and Verapamil without increased plasma-lithium concentration.
- * *Diuretics:* Lithium excretion reduced by loop diuretics, potassium-sparing diuretics, and Thiazides (increased plasma-lithium concentration and risk of toxicity- loop diuretics safer than Thiazides); lithium excretion increased by Acetazolamide.
- * *5HT₁ -Agonists:* Sumatriptan increases risk of CNS toxicity.

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Metoclopramide and Domperidone: increased risk of extrapyramidal effects and possibility of neurotoxicity with Metoclopramide.

Muscle Relaxants: muscle relaxant effect enhanced, Baclofen possibly aggravates hyperkinesia.

Parasympathomimetics: Lithium antagonizes effect of Neostigmine and Pyridostigmine.

Theophylline: lithium excretion increased (reduced plasma-lithium concentration).

Loratadine see Antihistamines.

Lorazepam see Anxiolytics and Hypnotics.

Losartan as for ACE Inhibitors.

Loteprednol May increase the risk of intraocular pressure with cycloplegics and other ocular hypotensive agents.

Lumefantrine see Artemether with Lumefantrine.

Lurasidone HCl

Strong CYP3A4 Inhibitors: increased exposure to lurasidone, should not be used concomitantly with such drugs (e.g. clarithromycin, ketoconazole, mibefradil, ritonavir, voriconazole, etc.).

Moderate CYP3A4 Inhibitors: increased exposure to lurasidone when used concomitantly with such drugs (e.g. atazanavir, diltiazem, erythromycin, fluconazole, verapamil, etc.). Lurasidone HCl dose should be reduced to half of the original level when used concomitantly.

Strong CYP3A4 Inducers: decreased exposure to lurasidone when used with strong CYP3A4 inducers, viz. avasimibe, carbamazepine, phenytoin, rifampin, St. John's wort, etc. So, strictly avoid concomitant use with these drugs.

Moderate CYP3A4 Inducers: decrease the exposure of lurasidone, drugs that should not be used concomitantly include bosentan, efavirenz, etravirine, modafinil, nafcillin, etc. Dose of Lurasidone HCl should be increased when used concomitantly with such moderate inducers of CYP3A4.

Macrogol 3350 (a component of bowel cleansing preparations). Other oral drugs should not be taken 1 hour before, or after, administration of bowel cleansing preparations because absorption may be impaired. Consider withholding ACE inhibitors, angiotensin-II receptor antagonists, and NSAIDs on the day that bowel cleansing preparations are given and for up to 72 hours after the procedure. Also consider withholding diuretics on the day that bowel cleansing preparations are given.

Macrolides see Erythromycin and other Macrolides.

Magnesium Salt (see also Antacids and Adsorbents)

Muscle Relaxants: effect of non-depolarizing muscle relaxants enhanced by parenteral magnesium salts.

Magnesium Trisilicate see Antacids.

MAOIs

Note: For interactions of reversible MAO-A inhibitors (RIMAs), see Moclobemide, and for interactions of MAO-B inhibitors see Selegiline.

- * *Alcohol*: some alcoholic and dealcoholised beverages contain Tyramine which interacts which interacts with MAOIs (hypertensive crisis)-but if no Tyramine, enhanced hypotensive effect; foods, see section.
- * *Alpha₂-adrenoceptor Stimulants*: manufacturers of Apraclonidine and Brimonidine advise to avoid concomitant use.
- * *Altretamine*: risk of severe postural hypotension.

APPENDIX 2: DRUG INTERACTIONS

- * *Analgesics*: CNS excitation or depression(hypertension or hypotension) with Pethidine and possibly other opioid analgesics- avoid concomitant use and for two weeks after MAOI discontinued; manufacturer advises avoid Nefopam
- * *Anorectics*: see Sympathomimetics, below.
- * *Other Antidepressants*: enhancement of CNS effects and toxicity with other MAOIs (avoid for at least a week after stopping previous MAOIs then start with reduced dose); increased risk of toxicity with Nefazodone (important: if MAOIs discontinued shortly before, initiate Nefazodone cautiously with gradual dose increase); CNS effects of SSRIs increased by MAOI should not be started until at least 1 week after Citalopram or Fluvoxamine have been stopped, at least 5 weeks for Fluoxetine, at least 2 weeks for Paroxetine and Sertraline; CNS excitation and hypertension with most Tricyclics and related antidepressants (avoid for at least 2 weeks after stopping MAOI, and avoid MAOI for at least 1 week 1 week after stopping Tricyclic); CNS excitation and confusion with Tryptophan (reduce Tryptophan dose); enhancement of CNS effects and toxicity possible with Reboxetine and Venlafaxine (avoid for at least 2 weeks after stopping MAOI, and avoid MAOI for at least 1 week after stopping Reboxetine or Venlafaxine).
- * *Antidiabetics*: effect of Insulin, Metformin, and Sulphonylureas enhanced
- * *Antiepileptics*: antagonism of anticonvulsant effect (convulsive threshold lowered); manufacturer advises avoid Carbamazepine with or within 2 weeks of MAOIs.
- * *Antihypertensives*: hypotensive effect enhanced; manufacturer advises avoidance of Indoramin; manufacturer advises avoid concomitant use with Methyl dopa.
- * *Antihistamines*: increased antimuscarinic and sedative effects.
- * *Antimuscarinics*: increased side-effects.
- * *Antipsychotics*: CNS excitation and hypertension with Oxypertine; Clozapine possibly enhances central effects.
- * *Anxiolytics and Hypnotics*: manufacturer advises avoidance of Buspirone
- * *Barbiturates*: see under Antiepileptics, above.
- * *Dopaminergics*: hypertensive crisis with Levodopa (avoid for at least 2 weeks after stopping MAOI); hypotension with Selegiline; manufacturer advises avoid concomitant use with Entacapone.
- * *5HT₁Antagonists*: risk of CNS toxicity (avoid Rizatriptan or Sumatriptan for 2 weeks after MAOI).
- * *Sympathomimetics*: hypertensive crisis with sympathomimetics such as Dopamine, Dopexamine, Ephedrine, Isometheptene, Methylphenidate, Phentermine, Phenylephrine, Phenylpropanolamine, and Pseudoephedrine
- * *Tetrabenazine*: CNS excitation and hypertension.

Maprotiline see Antidepressants, Tricyclic.

Maraviroc

Maraviroc is a substrate for the cytochrome P450 isoenzyme CYP3A4 and for P-glycoprotein, and may therefore have several clinically significant interactions. Inhibitors of CYP3A4, such as HIV-protease inhibitors (other than tipranavir), increase the serum concentration of maraviroc. Inducers of CYP3A4 such as efavirenz may decrease serum maraviroc concentrations. No clinically significant interaction is expected between maraviroc and NRTIs, nevirapine, or boosted fosamprenavir or tipranavir.

Non-antiretroviral medications that significantly alter maraviroc metabolism include the CYP3A4 inhibitors ketoconazole, itraconazole, clarithromycin, and nefazodone and the CYP3A4 inducers rifampicin and St John's wort. Maraviroc does not appear to cause clinically significant changes in concentrations of other medications.

Mebendazole

APPENDIX 2: DRUG INTERACTIONS

Ulcer-healing Drugs: metabolism possibly inhibited by Cimetidine (increased plasma-mebendazole concentration).

Medroxyprogesterone see Progestogens.

Mefenamic Acid see NSAIDs.

Mefloquine

- * *Anti-arrhythmics*: increased risk of ventricular arrhythmias with Amiodarone (avoid concomitant use) and Quinidine.
- * *Antiepileptics*: antagonism of anticonvulsant effect.
- * *Other Antimalarials*: increased risk of convulsions with Chloroquine and Quinine, but should not prevent use of intravenous quinine in severe cases; increased risk of ventricular arrhythmias with Halofantrine (important: see also advice under Halofantrine).
- * *Antipsychotics*: increased risk of ventricular arrhythmias-avoid concomitant use with Pimozide.
Beta-blockers: possible increased risk of bradycardia with some calcium-channel blockers.
Cardiac Glycosides: possible increased risk of bradycardia with Digoxin.

Megestrol see Progestogens.

Megestrol Acetate

- Indinavir: Due to the significant decrease in the exposure of indinavir by Megestrol acetate, administration of a higher dose of indinavir should be considered when coadministering with Megestrol acetate
- Zidovudine and Rifabutin: No dosage adjustment for zidovudine and rifabutin is needed when Megestrol acetate is coadministered with these drugs

Meloxicam see NSAIDs

Melphalan

Antibacterials: increased toxicity with Nalidixic acid.

- * *Ciclosporin*: increased risk of nephrotoxicity.

Mercaptopurine

- * *Allopurinol*: enhancement of effect (increased toxicity-reduce dose of Mercaptopurine).

Meropenem

Antiepileptics: plasma concentration of Valproate reduced.
Uricosurics: excretion reduced by Probenecid (concomitant use not recommended by manufacturer)

Mestranol see Contraceptives, Oral.

Metformin see Antidiabetics.

Methotrexate

- * *Analgesics*: excretion reduced by aspirin, Azapropazone (avoid concomitant use), Diclofenac, Ibuprofen, Indomethacin, Ketoprofen, Meloxicam, Naproxen and probably other NSAIDs (increased risk of toxicity).
Antibacterials: antifolate effect increased by Co-trimoxazole and Trimethoprim; risk of Methotrexate toxicity increased by Sulphonamides; excretion reduced by Penicillins (increased risk of toxicity).
Antiepileptics: Phenytoin increases antifolate effect.
Antimalarials: antifolate effect increased by Pyrimethamine (ingredient of Fansidar ®).

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- * *Ciclosporin*: increased toxicity.
- * *Retinoids*: plasma concentration of Methotrexate increased by Acitretin (also increased risk of hepatotoxicity).

Methyldopa

Alcohol: enhanced hypotensive effect.

- * *Anaesthetics*: enhanced hypotensive effect.
Analgesics: NSAIDs antagonize hypotensive effect.
Antidepressants: enhanced hypotensive effect.
Other Antihypertensives: enhanced hypotensive effect.
Antipsychotics: increased risk of extrapyramidal effects; enhanced hypotensive effect.
Anxiolytics and Hypnotics: enhanced hypotensive effect.
Beta-Blockers: enhanced hypotensive effect.
Calcium-channel Blockers: enhanced hypotensive effect.
Corticosteroids: antagonism of hypotensive effect.
Diuretics: enhanced hypotensive effect.
Dopaminergics: antagonism of antiparkinsonian effect; Levodopa enhances hypotensive effect; effect of Methyldopa possible enhanced by Entacapone
Lithium: neurotoxicity may occur without increased plasma-lithium concentration
Muscle Relaxants: enhanced hypotensive effect with Baclofen and Tizanidine
Nitrates: enhance hypotensive effect.
Oestrogens and Progestogens: Oestrogens and combined oral contraceptives antagonize hypotensive effect.
Sympathomimetics: see Sympathomimetics (main list).
Ulcer-healing Drugs: Carbenoxolone antagonizes hypotensive effect.

Methylphenidate see Clonidine, MAOIs and Sympathomimetics. Methylphenidate is predicted to increase the risk of elevated blood pressure when given with linezolid and increase the risk of a hypertensive crisis when given with moclobemide and monoamine-oxidase A and B inhibitors. Methylphenidate is predicted to decrease the effects of apraclonidine.

Methylprednisolone see Corticosteroids.

Metolazone see Diuretics.

Metoclopramide

Analgesics: increased absorption of aspirin and Paracetamol (enhanced effect); opioid analgesics antagonize effect on gastro-intestinal activity.
Antipsychotics: increased risk of extrapyramidal effects.
Atovaquone: plasma concentration reduced by Metoclopramide.
Dopaminergics: antagonism of hypoprolactinaemic effect of Bromocriptine; increased plasma concentration of Levodopa; antagonism of antiparkinsonian effects of Pergolide.
Lithium: increased risk of extrapyramidal effects and possibility of neurotoxicity.
Tetrabenazine: increased risk of extrapyramidal effects.

Metolazone see Diuretics.

Metoprolol see Beta-Blockers.

Metronidazole

Alcohol: Disulfiram-like reaction.

- * *Anticoagulants*: effect of Nicoumalone and Warfarin enhanced.
- * *Antiepileptics*: Metronidazole inhibits metabolism of Phenytoin (increased plasma-Phenytoin concentration); Phenobarbital accelerates metabolism of Metronidazole (reduced plasma-metronidazole concentration).
- * *Barbiturates*: see under Antiepileptics, above.
Cytotoxics: Metronidazole inhibits metabolism of Fluorouracil (increased toxicity)

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Disulfiram: psychotic reactions reported.

Lithium: increased toxicity reported.

Ulcer-healing Drugs: Cimetidine inhibits metabolism (increased plasma-metronidazole concentration).

Mianserin

Alcohol: enhanced effect.

Alpha₂-Adrenoceptor Stimulants: manufactures of Apraclonidine and Brimonidine advise to avoid concomitant use.

Other Antidepressants: as for Antidepressants, Tricyclic.

- * *Antiepileptics*: antagonism (convulsive threshold lowered); metabolism accelerated by Carbamazepine, Phenobarbital, and Phenytoin (reduced plasma-mianserin concentration).

Anxiolytics and Hypnotics: enhanced effect.

- * *Barbiturates*: see under Antiepileptics, above.

Miconazole see Antifungals, Imidazole and Triazole.

Midazolam see Anxiolytics and Hypnotics.

Mirabegron

Increased exposure w/ strong CYP3A inhibitors (e.g. ketoconazole). May increase exposure to CYP2D6 substrates (e.g. desipramine, metoprolol), digoxin, and warfarin. Increased risk of urinary retention w/ antimuscarinic agents (e.g. solifenacin, darifenacin) due to additive pharmacologic effect.

Mirtazapine

Alcohol: enhanced sedative effect.

Anticoagulants: Mirtazapine enhances anticoagulant effect of Warfarin.

Other Antidepressants: as for Antidepressants, tricyclic.

Antiepileptics: Carbamazepine and Phenytoin reduce plasma concentration of Mirtazapine.

Antifungals: Ketoconazole increases plasma concentration of Mirtazapine.

Antimalarials: manufacturer of Artemether with Lumefantrine advises avoid concomitant use.

Anxiolytics and Hypnotics: enhanced sedative effect.

Ulcer-healing Drugs: Cimetidine increases plasma concentration of Mirtazapine.

Misoprostol

Analgesics: increased risk of CNS toxicity with Phenylbutazone.

Monoamine-oxidase Inhibitors see MAOIs, Moclobemide, and Selegiline.

Montelukast see Leukotriene Antagonists.

Morphine see Opioid Analgesics.

Moxifloxacin see Quinolones

Moxonidine

The hypotensive effect of moxonidine may be enhanced by other antihypertensives and drugs that cause hypotension. The effect of sedatives and hypnotics, including benzodiazepines, may be enhanced by moxonidine.

Muscle Relaxants

ACE Inhibitors and Angiotensin-II Antagonists: enhanced hypotensive effect with Baclofen and Tizanidine.

Alcohol: enhanced sedative effect with Baclofen and Tizanidine.

Analgesics: ibuprofen and possible other NSAIDs reduce excretion of Baclofen (increased risk of toxicity).

- * *Anti-arrhythmics*: Procainamide and Quinidine enhance muscle relaxant effect; Lignocaine prolongs action of Suxamethonium.

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- * **Antibacterials:** effect of non-depolarizing muscle relaxants enhanced by Aminoglycosides, Azlocillin, Clindamycin, Colistin and Piperacillin.
Antidepressants: Tricyclics enhance muscle relaxant effect of Baclofen.
Antiepileptics: effect of non-depolarizing muscle relaxants antagonized by Carbamazepine and Phenytoin (recovery from neuromuscular blockade accelerated).
Antihypertensives: enhanced hypotensive effect with Baclofen and Tizanidine.
Anxiolytics and Hypnotics: enhanced sedative effect with Baclofen and Tizanidine.
Beta-blockers: Propranolol enhances muscle relaxant effect; possible enhanced hypotensive effect and bradycardia with Tizanidine.
- * **Botulinum Toxin:** neuromuscular block enhanced by non-depolarizing muscle relaxants (risk of toxicity).
Calcium-channel Blockers: Nifedipine and Verapamil enhance effect of non-depolarizing muscle relaxants; hypotension, myocardial depression, and hyperkalaemia reported with intravenous Dantrolene and Verapamil; risk of arrhythmias with Diltiazem and intravenous Dantrolene.
Cardiac Glycosides: arrhythmias if Suxamethonium given with Digoxin; possible bradycardia if Tizanidine given with Digoxin.
Cytotoxics: Cyclophosphamide and Thiopeta enhance effect of Suxamethonium.
Diuretics: enhanced hypotensive effect with Baclofen and Tizanidine.
Lithium: lithium enhances muscle relaxant effect; Baclofen possibly aggravates hyperkinesia.
Magnesium Salts: parenteral magnesium enhances effect of non-depolarizing muscle relaxants.
Parasympathomimetics: Ecothiophate eye-drops, Edrophonium, Neostigmine, Pyridostigmine, Rivastigmine and possibly Donepezil enhance effect of Suxamethonium but antagonize effect of non-depolarizing muscle relaxants.
Sympathomimetics: Bambuterol enhances effect of Suxamethonium.

Mycophenolate Mofetil

- Anion-exchange Resins:** Cholestyramine reduces absorption.
- Antacids:** reduced absorption of Mycophenolate Mofetil.
- Antivirals:** higher plasma concentrations of Mycophenolate Mofetil and of Aciclovir on concomitant administration.

Nalidixic Acid see Quinolones.

Nandrolone see Anabolic Steroids.

Naproxen see NSAIDs.

Nateglinide see Antidiabetics.

Nebivolol see Beta-blockers

Nelfinavir

Nelfinavir is reported to be metabolised in part by cytochrome P450 isoenzymes CYP3A4 and CYP2C19. Drugs that induce these isoenzymes may reduce the plasma concentration of nelfinavir. Conversely, when nelfinavir is given with drugs that inhibit CYP3A4 plasma concentrations, nelfinavir concentrations may be increased. It may also alter the pharmacokinetics of drugs metabolised by this isoenzyme system and possibly cause serious adverse effects.

Although specific guidance varies between licensing authorities, licensed product information generally contra-indicates the use of nelfinavir with drugs that are highly dependent on CYP3A4 for clearance and for which elevated plasma concentrations are associated with serious or life-threatening events. These drugs include

- the alpha1-adrenoceptor antagonist alfuzosin
- antiarrhythmics (amiodarone and quinidine)

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- antihistamines (astemizole and terfenadine)
- antipsychotics (pimozide)
- ergot derivatives (dihydroergotamine, ergometrine, ergotamine, and methylergometrine)
- gastrointestinal motility agents (cisapride)
- sedatives and hypnotics (triazolam and oral midazolam)
- statins (simvastatin and lovastatin)

Owing to the potential for increased serum concentrations of sildenafil, nelfinavir should be avoided with sildenafil when given at the doses needed for the treatment of pulmonary hypertension. Similarly, nelfinavir may increase serum concentrations of inhaled salmeterol and the combination is not recommended. Omeprazole, rifampicin, and St John's wort decrease the concentration of nelfinavir; use with the antiretroviral is not recommended due to the possible loss of its activity and development of resistance.

Neomycin see Aminoglycosides.

Neostigmine see Parasympathomimetics.

Nevirapine

Nevirapine is metabolised mainly by the cytochrome P450 isoenzymes CYP3A4 and CYP2B6. Consequently it may compete with other drugs metabolised by this system, possibly resulting in mutually increased plasma concentrations and toxicity.

Alternatively, enzyme inducers may decrease plasma concentrations of nevirapine; nevirapine itself acts as a mild to moderate enzyme inducer and may thus reduce plasma concentrations of other drugs.

Rifampicin and St John's wort decrease the concentration of nevirapine; use with the antiretroviral is not recommended due to the possible loss of its activity and development of resistance.

Netilmicin see Aminoglycosides.

Nicorandil

Nicorandil should not be used with phosphodiesterase type-5 inhibitors such as sildenafil as the hypotensive effect of nicorandil may be significantly enhanced.

Nicotinic Acid

Note: Interactions apply to lipid-regulating doses of nicotinic acid.

Other Lipid-regulating Drugs: increased risk of myopathy with Statins.

Nifedipine see Calcium-channel Blockers.

Nimodipine see Calcium-channel Blockers.

Nitazoxanide see antiprotozoal

Nitrofurantoin

Antacids and Adsorbents: Magnesium Trisilicate reduces excretion of Nitrofurantoin (risk of toxicity).

Nitrous Oxide see Anaesthetics, General.

Nizatidine see Histamine H₂ – antagonists.

Noradrenaline see Sympathomimetics.

Norethisterone see Progestogens.

Norgestrel see Progestogens.

Nortriptyline see Antidepressants, Tricyclic.

NSAIDs (see also Aspirin).

Note: Interactions do not generally apply to topical NSAIDs.

- * *ACE Inhibitors:* antagonism of hypotensive effect; increased risk of renal impairment and increased risk of hyperkalaemia on administration with Ketorolac and possibly other NSAIDs.

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- * *Other Analgesics*: avoid concomitant administration of two or more NSAIDs, including Aspirin (increased side effects).
Antacids: absorption of Diflunisal reduced.
- * *Antibacterials*: NSAIDs possibly increase risk of convulsions with Quinolones; Indomethacin possibly increases plasma concentration of Gentamicin and Amikacin in neonates.
- * *Anticoagulants*: anticoagulant effect of Nicoumalone, Warfarin (and possibly Phenindione) seriously enhanced by Azapropazone (avoid concomitant use) and possibly enhanced by Diclofenac, Diflunisal, Flurbiprofen, Ibuprofen, Mefenamic acid, Meloxicam, Piroxicam, Sulindac, and other NSAIDs; increased risk of hemorrhage with parenteral Diclofenac and Ketorolac and all anticoagulants, including low-dose heparin (avoid concomitant use).
Antidepressants: Moclobemide enhances effect of Ibuprofen and possibly other NSAIDs.
- * *Antidiabetics*: effect of Sulphonylureas enhances effect of ibuprofen and possibly other NSAIDs.
- * *Antiepileptics*: effect of Phenytoin enhanced by Azapropazone (avoid concomitant use) and possibly other NSAIDs.
Antihypertensives: antagonism of hypotensive effect.
Antiplatelet Drugs: possibly increased risk of gastrointestinal bleeding with Clopidogrel.
Antipsychotics: severe drowsiness possible if Indomethacin given with Haloperidol.
- * *Antivirals*: plasma concentration of Piroxicam increased by Ritonavir (risk of toxicity-avoid concomitant use); plasma concentration of other NSAIDs possibly increased by Ritonavir.
Beta-blockers: antagonism of hypotensive effect.
Bisphosphonates: bioavailability of Tiludronic acid increased by Indomethacin; Alendronic acid possibly increases gastro-intestinal side-effects of NSAIDs.
Cardiac Glycosides: NSAIDs may exacerbate heart failure, reduce GFR, and increase plasma-cardiac glycoside concentration.
Corticosteroids: increased risk of gastro-intestinal bleeding and ulceration.
- * *Ciclosporin*: increased risk of nephrotoxicity; Ciclosporin increases plasma concentration of Diclofenac (halve Diclofenac dose).
Cytotoxics: excretion of Methotrexate reduced by Aspirin, Azapropazone (avoid concomitant use), Diclofenac, Ibuprofen, Indomethacin, Ketoprofen, Meloxicam, Naproxen and probably other NSAIDs (increased risk of toxicity).
Desmopressin: effect potentiated by Indomethacin.
Diuretics: risk of nephrotoxicity of NSAID increased; NSAIDs notably Indomethacin and Ketorolac antagonize diuretic effect; Indomethacin and possibly other NSAIDs increase risk of hyperkalaemia with potassium-sparing diuretics; occasional reports of decreased renal function when Indomethacin given with Triamterene.
- * *Lithium*: excretion of Lithium reduced by Azapropazone, Diclofenac, Ibuprofen, Indomethacin, Ketorolac (avoid concomitant use), Mefenamic acid, Naproxen, Piroxicam, and probably other NSAIDs (risk of toxicity).
Muscle Relaxants: Ibuprofen and possibly other NSAIDs reduce excretion of Baclofen (increased risk of toxicity).
- * *Tacrolimus*: Ibuprofen increases risk of nephrotoxicity.
Ulcer-healing drugs: plasma concentration of Azapropazone possibly increased by Cimetidine.
- * *Uricosurics*: Probenecid delays excretion of Indomethacin, Ketoprofen, Ketorolac (avoid concomitant use), and Naproxen and increases plasma – NSAID concentration.

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- * *Vasodilators*: risk of Ketorolac-associated bleeding increased by Oxpentifylline (avoid concomitant use).

Oestrogens see Contraceptives, Oral.

Ofloxacin see Quinolones.

Olanzapine see Antipsychotics.

Olmesartan see Angiotensin-II Receptor Antagonists

Omeprazole see Proton Pump Inhibitors.

Opioid Analgesics

Alcohol: enhanced sedative and hypotensive effect.

Antiarrhythmics: delayed absorption of Mexiletine.

Antibacterials: Rifampicin accelerates metabolism of methadone (reduced effect); Erythromycin increases plasma concentration of Alfentanil; manufacturer of Ciprofloxacin advises avoid premedication with opioid analgesics (reduced plasma-Ciprofloxacin concentration).

- * *Anticoagulants*: Dextropropoxyphene may enhance effect of Nicomumalone and Warfarin.
- * *Antidepressants*: CNS excitation or depression (hypertension or hypotension) if Pethidine and possibly other opioid analgesics given to patients receiving MAOIs (including Moclobemide)-avoid concomitant use and for 2 weeks after MAOI discontinued; Tramadol possibly increases risk of convulsions with SSRIs and Tricyclics.
- * *Antiepileptics*: Dextropropoxyphene enhances effect of Carbamazepine; effect of Methadone and Tramadol decreased by Carbamazepine; Phenytoin accelerates Methadone metabolism (reduced effect and risk of withdrawal effects)
Antifungals: metabolism of Alfentanil inhibited by Ketoconazole (risk of prolonged or delayed respiratory depression).
Antipsychotics: enhanced sedative and hypotensive effect.
- * *Antivirals*: Methadone possibly increases plasma concentration of Zidovudine; plasma concentration of Dextropropoxyphene and Pethidine increased by Ritonavir (risk of toxicity — avoid concomitant use); plasma concentration of other opioid analgesics possibly increased by Ritonavir.
Anxiolytics and Hypnotics: enhanced sedative effect.
- * *Dopaminergics*: hyperpyrexia and CNS toxicity reported if Pethidine given to patients receiving Selegiline (avoid concomitant use).
Metoclopramide and Domperidone: antagonism of gastro-intestinal effects.
Ulcer-healing Drug: Cimetidine inhibits metabolism of opioid analgesics notably Pethidine (increased plasma concentration).

Orciprenaline see Sympathomimetics.

Ornidazole

* *Alcohol*: A disulfiram-like reaction has been reported in a patient taking ornidazole after drinking alcohol.

* *Rifampicin*: Rifampicin slightly decreases ornidazole exposure.

Orlistat

Antidiabetics: manufacturer advises avoid concomitant use with Acarbose or Metformin.

Lipid-regulating Drugs: manufacturer advises avoid concomitant use with Clofibrate group; Orlistat increases plasma concentration of Pravastatin (increased risk of toxicity-reduce dose of Pravastatin).

Sympathomimetics: manufacturer advises avoid concomitant use with Phentermine.

Oseltamivir

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Pharmacokinetic properties of oseltamivir, such as low protein binding and metabolism independent of the CYP450 and glucuronidase systems, suggest that clinically significant drug interactions via these mechanisms are unlikely.

Oxazepam see Anxiolytics and Hypnotics.

Oxcarbazepine

- *Antibacterials*: see Linezolid
- *Antidepressants*: antagonism of anticonvulsant effect (convulsive threshold lowered); manufacturer advises avoid concomitant use with MAOIs.
- *Other Antiepileptics*: interactions include enhanced effects, increased sedation, and reductions in plasma concentrations.
- *Antimalarials*: Mefloquine antagonises anticonvulsant effect; Chloroquine and hydroxychloroquine occasionally reduce seizure threshold.
- *Oestrogens and Progestogens*: Oxcarbazepine accelerates metabolism of oral Contraceptives (reduced contraceptive effect)

Oxprenolol see Beta-blockers.

Oxybutynin see Antimuscarinics

Oxymetazoline see Sympathomimetics.

Oxytetracycline see Tetracyclines.

Oxytocin

Anaesthetics: inhalational anaesthetics possibly reduce oxytocic effect (also enhanced hypotensive effect and risk of arrhythmias).

Prostaglandins: uterotonic effect potentiated.

Sympathomimetics: enhancement of vasopressor effect of vasoconstrictor sympathomimetics.

Paclitaxel

Antifungals: Ketoconazole possibly inhibits metabolism of Paclitaxel.

Paliperidone Increased risk of QT prolongation with class IA (e.g. quinidine, disopyramide) and class III (e.g. amiodarone, sotalol) antiarrhythmics. Additive effects with drugs that cause orthostatic hypotension (e.g. other antipsychotics, tricyclics). May antagonise actions of levodopa and other dopaminergics. Additive effect with drugs known to lower seizure threshold (e.g. phenothiazines or butyrophenones, clozapine, tricyclics or SSRIs, tramadol, mefloquine). May reduce plasma levels with carbamazepine. Enhanced central effects with other CNS depressants. May increase plasma levels with valproate. May affect the absorption with metoclopramide.

Pancreatin

Antidiabetics: hypoglycemic effect of Acarbose reduced.

Pancuronium see Muscle Relaxants (non-depolarizing).

Pantoprazole see Proton Pump Inhibitors.

PARA-Aminosalicylic acid same as Aminosalicilyc acid

The adverse effects of aminosalicilylates and salicylates may be additive. Probenecid may also increase toxicity by delaying renal excretion and enhancing plasma concentrations of aminosalicilylate. The activity of aminosalicilyc acid may be antagonised by ester-type local anaesthetics such as procaine.

Paracetamol

Anion-exchange Resins: Cholestyramine reduces absorption of Paracetamol.

Anticoagulants: prolonged regular use of Paracetamol possibly enhances Warfarin.

Metoclopramide and Domperidone: Metoclopramide and Domperidone accelerate absorption of Paracetamol (enhanced effect).

APPENDIX 2: DRUG INTERACTIONS

Parasympathomimetics

Anti-arrhythmics: Procainamide, Quinidine and possibly Propafenone antagonize effect of Neostigmine and Pyridostigmine.

Antibacterials: Aminoglycoside, Clindamycin and Colistin antagonize effect of Neostigmine and Pyridostigmine.

Antimalarials: Chloroquine and Hydroxychloroquine have potential to increase symptoms of myasthenia gravis and thus diminish effect of Neostigmine and Pyridostigmine.

Antimuscarinics: antagonism of effect.

Beta-blockers: Propranolol antagonizes effect of Neostigmine and Pyridostigmine.

Lithium: antagonism of effect of Neostigmine and Pyridostigmine.

Muscle Relaxants: Ecothiophate eye-drops, Edrophonium, Neostigmine, Pyridostigmine, Rivastigmine and possibly Donepezil enhance effect of Suxamethonium, but antagonize effect of non-depolarizing muscle relaxants.

Paroxetine see Antidepressants, SSRIs

Pefloxacin see fluoroquinolone

Penicillamine

Antacids: reduced absorption of Penicillamine.

Iron: reduced absorption of Penicillamine.

Zinc: reduced absorption of Penicillamine.

Penicillins

Antacids: reduced absorption of Pivampicillin.

Anticoagulants: see Phenindione and Warfarin.

Cytotoxics: reduced excretion of Methotrexate (increased risk of toxicity).

Muscle relaxants: enhanced by Azlocillin and Piperacillin.

Oestrogens and Progestogens: see Contraceptives, Oral.

Uricosurics: excretion of Penicillins reduced by Probenecid.

Pentazocine see Opioid Analgesics.

Perindopril see ACE Inhibitors and Angiotensin-II Antagonists.

Perphenazine see Antipsychotics.

Pethidine see Opioid Analgesics.

Pheniramine see Antihistamines.

Phenobarbital see Barbiturates.

Phenothiazines see Antipsychotics.

Phenoxymethyl Penicillin see Penicillins.

Phenylephrine see Sympathomimetics.

Phenytoin

* *Analgesics:* plasma-phenytoin concentration increased by Aspirin, Azapropazone (avoid concomitant use) and possibly other NSAIDs; metabolism of Methadone accelerated (reduced effect and risk of withdrawal effects).

Antacids: reduced Phenytoin absorption.

* *Anti-arrhythmics:* Amiodarone increases plasma-phenytoin concentration; phenytoin reduces plasma concentrations of Disopyramide, Mexiletine, and Quinidine.

* *Antibacterials:* plasma-phenytoin concentration increased by Chloramphenicol, Cycloserine, Isoniazid, and Metronidazole; plasma-phenytoin concentration and antifolate effect increased by Co-trimoxazole and Trimethoprim and possibly by other Sulphonamides; plasma-phenytoin concentration reduced by Rifampicin;

APPENDIX 2: DRUG INTERACTIONS

- plasma concentration of Doxycycline reduced by Phenytoin; plasma-phenytoin concentration possibly altered by Ciprofloxacin.
- * *Anticoagulants*: metabolism of Nicoumalone and Warfarin accelerated (possibility of reduced anticoagulant effect, but enhancement also reported).
 - * *Antidepressants*: antagonism of anticonvulsant effect (convulsive threshold lowered); Fluoxetine, Fluvoxamine, and Viloxazine increase plasma-phenytoin concentration; Phenytoin reduces plasma-concentrations of Mianserin, Paroxetine, and Tricyclics.
 - * *Antidiabetics*: plasma-phenytoin concentration transiently increased by Tolbutamide possibility of toxicity; Phenytoin possibly reduces plasma concentration of Repaglinide (manufacturer advises avoid concomitant use).
 - * *Other Antiepileptics*: concomitant administration of two or more antiepileptics may enhance toxicity without a corresponding increase in Antiepileptic effect; moreover interactions between individual Antiepileptics can complicate monitoring of treatment; interactions include enhanced effects, increased sedation, and reductions in plasma concentrations.
 - * *Antifungals*: plasma-phenytoin concentration increased by Fluconazole and Miconazole; plasma concentration of Itraconazole and Ketoconazole reduced.
 - * *Antimalarials*: antagonism of anticonvulsant effect; increased risk of antifolate effect with Pyrimethamine (includes Fansidar® and Maloprim®).
 - * *Antiplatelet Drugs*: plasma-phenytoin concentration increased by aspirin.
 - * *Antipsychotics*: antagonism of anticonvulsant effect (convulsive threshold lowered); Phenytoin accelerates metabolism of Clozapine and Quetiapine (reduced plasma concentrations).
 - * *Antivirals*: plasma concentration of Indinavir, Nelfinavir and Saquinavir possibly reduced; plasma-phenytoin concentrations increased or decreased by Zidovudine.
 - * *Anxiolytics and Hypnotics*: Diazepam and possibly other Benzodiazepines increase plasma-phenytoin concentration.
 - * *Calcium-channel Blockers*: Diltiazem and Nifedipine increase plasma concentration of Phenytoin; effect of Felodipine, Isradipine and probably Nifedipine and other Dihydropyridines, Diltiazem, and Verapamil reduced.
 - * *Cardiac Glycosides*: metabolism of digitoxin only accelerated (reduced effect).
 - * *Corticosteroids*: metabolism of Corticosteroids accelerated (reduced effect).
 - * *Ciclosporin*: metabolism of Ciclosporin accelerated (reduced plasma concentration).
 - * *Cytotoxics*: reduced absorption of Phenytoin; increased antifolate effect with Methotrexate.
 - * *Disulfiram*: Plasma-phenytoin concentration increased.
 - * *Diuretics*: increased risk of osteomalacia with Carbonic Anhydrase inhibitors.
 - * *Folic Acid and Folinic Acid*: plasma-phenytoin concentration possibly reduced by Folic acid and Folinic acid.
 - * *Hormone Antagonists*: metabolism of Toremifene possibly accelerated.
 - * *Lithium*: neurotoxicity may occur without increased plasma-lithium concentration.
 - * *Muscle Relaxants*: effect of non-depolarizing muscle relaxants antagonized (recovery from neuromuscular blockade accelerated).
 - * *Oestrogens and Progestogens*: metabolism of Gestrinone, Tibolone, and oral contraceptives accelerated (reduced contraceptive effect).
 - * *Sympathomimetics*: plasma-phenytoin concentration increased by Methylephenidate.
 - * *Theophylline*: metabolism of Theophylline accelerated (reduced plasma-theophylline concentration).

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- * *Thyroxine*: metabolism of Thyroxine accelerated (may increase Thyroxine requirements in hypothyroidism).
- * *Ulcer-healing Drugs*: Cimetidine inhibits metabolism (increased plasma-phenytoin concentration); Sucralfate reduces absorption; Omeprazole enhances effect of Phenytoin (interaction with Lansoprazole possibly differs).
- * *Uricosurics*: Plasma-phenytoin concentration increased by Sulphinpyrazone.
- * *Vaccines*: effect enhanced by influenza vaccine vitamins D requirements possibly increased.

Phytomenadione see Vitamins (Vitamins K).

Pilocarpine see Parasympathomimetics.

Pimecrolimus

Alcohol intolerance, described as flushing, rash, burning, itching, or swelling, has occurred rarely after the consumption of alcohol by patients using topical pimecrolimus.

Pindolol see Beta-blockers.

Pioglitazone see Antidiabetics

Piroxicam see NSAIDs.

Pitavastatin

The interactions of statins with other drugs are described under simvastatin. Pitavastatin is only marginally metabolised by the cytochrome P450 isoenzyme CYP2C9 and may not have the same interactions with CYP3A4 inhibitors as simvastatin. However, ciclosporin significantly increases pitavastatin exposure and the combination should be avoided. On theoretical grounds, use with ritonavir-boosted lopinavir is also contra-indicated. Rifampicin and erythromycin also increase pitavastatin exposure; if such combinations must be used, lower doses of pitavastatin should be used.

Pizotifen

Antihypertensives: hypotensive effect of adrenergic neurone blockers antagonized.

Polymyxins see Colisten.

Potassium Salts (including salt substitutes)

- * *ACE Inhibitors*: increased risk of hyperkalaemia.
- * *Ciclosporin*: increased risk of hyperkalaemia.
- * *Diuretics*: hyperkalaemia with potassium-sparing diuretics.

Prasugrel

- Analgesics: possible increased risk of bleeding when prasugrel given with NSAIDs
- Anticoagulants: possible increased risk of bleeding when prasugrel given with coumarins or phenindione
- Clopidogrel: possible increased risk of bleeding when prasugrel given with clopidogrel

Prazosin see Alpha-blockers (post synaptic).

Prednisolone see Corticosteroids.

Primaquine

Mepacrine: increased plasma concentration of Primaquine (risk of toxicity).

Primidone see Barbiturates and Primidone.

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Probenecid

- * *ACE Inhibitors*: reduced excretion of Captopril.
- * *Analgesics*: Aspirin antagonizes effect; excretion of Indomethacin, Ketoprofen, Ketorolac (avoid concomitant use), and Naproxen delayed and increased plasma-NSAID concentrations.
- * *Antibacterials*: reduced exertion of Cephalosporins, Cinoxacin, Ciprofloxacin, and Penicillins (increased plasma-concentrations); antagonism by Pyrazinamide.
- * *Antivirals*: reduced excretion of Aciclovir, Vanciclovir, Zidovudine, and possibly Famciclovir and Zalcitabine (increased plasma concentrations).
- * *Cytotoxics*: reduced excretion of Methotrexate (increased risk of toxicity).

Procainamide

- ACE Inhibitors*: increased risk of toxicity with captopril, especially in renal impairment.
- * *Other Anti-arrhythmics*: Amiodarone increases Procainamide-plasma concentrations (increased risk of ventricular arrhythmias-avoid concomitant use); increased myocardial depression with any anti-arrhythmic.
 - * *Antibacterials*: increased risk of arrhythmias with Grepafloxacin (avoid concomitant use); Trimethoprim increases plasma concentration of Procainamide.
 - * *Antidepressants*: increased risk of ventricular arrhythmias with Tricyclics.
 - * *Antihistamines*: increased risk of ventricular arrhythmias with Mizolastine (avoid concomitant use).
 - * *Antimalarials*: increased risk of ventricular arrhythmias with Halofantrine.
 - * *Antipsychotics*: increased risk of ventricular arrhythmias –avoid concomitant use with Pimozide, Sertindole or Thioridazine.
 - * *Beta-blockers*: increased risk of ventricular arrhythmias associated with Sotalol (avoid concomitant use).
 - * *Muscle Relaxants*: muscle relaxant effect enhanced.
 - * *Parasympathomimetics*: antagonism of effect of Neostigmine and Pyridostigmine.
 - * *Ulcer-healing Drugs*: Cimetidine inhibits excretion increased plasma-procainamide concentration).

Procarbazine

Alcohol: Disulfiram-like reaction.

Prochlorperazine see Antipsychotics.

Procyclidine see Antimuscarinics.

Progestogens (see also Contraceptives, Oral).

- Antibacterials*: metabolism accelerate by Rifampicin (reduced effect).
- * *Antivirals*: Nevirapine accelerates metabolism of hormonal contraceptives (reduced contraceptive effect).
 - * *Ciclosporin*: increased plasma-ciclosporin concentration (inhibition of metabolism).
 - * *Hormone Antagonists*: Aminoglutethimide reduces plasma concentration of Medroxyprogesterone.

Promethazine see Antihistamines.

Propafenone

Propafenone is extensively metabolised by the cytochrome P450 enzyme system, mainly by the isoenzyme CYP2D6, although CYP1A2 and CYP3A4 are also involved. Interactions may therefore occur with other drugs that are metabolised by these

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enzymes. Plasma-propafenone concentrations may be reduced by enzyme inducers such as rifampicin; enzyme inhibitors, such as cimetidine, fluoxetine, quinidine, and HIV-protease inhibitors, may increase plasma-propafenone concentrations. Propafenone itself may alter the plasma concentrations of other drugs, including beta blockers, ciclosporin, desipramine, digoxin, theophylline, venlafaxine, and warfarin. The absorption of propafenone may be reduced by orlistat. There may be an increased risk of arrhythmias if propafenone is given with other antiarrhythmics or arrhythmogenic drugs.

Propantheline see Antimuscarinics.

Propofol see Anaesthetics, General.

Propranolol see Beta-blockers.

Prostaglandins

Oxytocin: uterotonic effect enhanced.

Proton Pump Inhibitors

Analgesics: plasma concentration of Omeprazole increased by Valdecocib.

Antacids: possibly reduced absorption of Lansoprazole.

* *Anticoagulants*: effect of Warfarin enhanced by Omeprazole; interaction with Lansoprazole possibly differs.

* *Antiepileptics*: effects of Phenytoin enhanced by Esomeprazole and Omeprazole; interaction with Lansoprazole possibly differs.

Antifungals: absorption of Ketoconazole and possibly Itraconazole reduced.

Anxiolytics and Hypnotics: metabolism of diazepam possibly inhibited by Omeprazole and Esomeprazole (increased effect possible).

Cardiac Glycosides: plasma concentration of Digoxin possibly increased.

Oestrogens and Progestogens: manufacturer advises that Lansoprazole possibly accelerates metabolism of oral contraceptives.

Tacrolimus: Omeprazole possibly increases plasma-tacrolimus concentration.

Ulcer-healing Drugs: Sucralfate reduces absorption of Lansoprazole.

Protriptyline see Antidepressants, Tricyclic.

Pseudoephedrine see Sympathomimetics.

Pyrantel

* Piperazine: Piperazine opposes the anthelmintic actions of pyrantel.

* Aminophylline: A single case report describes rapidly increased theophylline levels in a child given pyrantel.

Pyrazinamide

Uricosurics: antagonism of effect of Probenecid and Sulphinpyrazone.

Pyridoxine see Vitamins.

Pyrimethamine

* *Antibacterials*: increased antifolate effect with Co-trimoxazole and Trimethoprim.

Antiepileptics: increased antifolate effect with Phenytoin.

Cytotoxics: increased antifolate effect with Methotrexate.

Quinidine

Antacids and Adsorbents: reduced excretion in alkaline urine (plasma-quinidine concentration occasionally increased); absorption possibly reduced by Kaolin (possibly reduced plasma concentration).

* *Other Anti-arrhythmics*: Amiodarone increases plasma-quinidine. Concentrations (and increases risk of concentration of Propafenone increased; increased myocardial depression with any anti-arrhythmic.

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- * *Antibacterials*: Rifampicin accelerates metabolism and leads to reduced plasma-quinidine concentration.
Antidepressants: increased risk of ventricular arrhythmias with Tricyclic antidepressants.
Antiepileptics: Phenobarbitone, Phenytoin, and Primidone accelerate metabolism (reduced plasma-quinidine concentration).
- * *Antihistamines*: increased risk of ventricular arrhythmias with Mizolastine (avoid concomitant use).
- * *Antimalarials*: increased risk of ventricular arrhythmias with Halofantrine and Mefloquine.
- * *Antipsychotics*: increased risk of ventricular arrhythmias- avoid concomitant use with Pimozide, Sertindole or Thioridazine.
- * *Antivirals*: increased risk of ventricular arrhythmias with Nelfinavir and Ritonavir (avoid concomitant use).
Barbiturates: see under Antiepileptics.
- * *Beta-blockers*: increased risk of ventricular arrhythmias associated with Sotalol (avoid concomitant use).
- * *Calcium-channel Blockers*: Nifedipine reduces plasma-quinidine concentration; Verapamil increases plasma-quinidine concentration (possibility of extreme hypotension).
- * *Cardiac Glycosides*: plasma concentration of Digoxin increased (halve Digoxin maintenance dose).
- * *Diuretics*: Acetazolamide reduces excretion (plasma-quinidine concentration occasionally increased); Quinidine toxicity increased if hypokalaemia occurs with Acetazolamide, loop diuretics, and Thiazides.
- * *Muscle Relaxants*: muscle relaxant effect enhanced.
- * *Parasympathomimetics*: antagonism of effect of Neostigmine and Pyridostigmine.
- * *Ulcer-healing Drugs*: Cimetidine inhibits metabolism (increased plasma-quinidine concentration).

Quinine

- * *Anti-arrhythmics*: plasma concentration of Flecainide increased; increased risk of ventricular arrhythmias with Amiodarone (avoid concomitant use).
- * *Antipsychotics*: increased risk of ventricular arrhythmias-avoid concomitant use with Pimozide.
- * *Other Antimalarials*: see Halofantrine, Mefloquine.
- * *Cardiac Glycosides*: plasma concentration of Digoxin increased (halve Digoxin maintenance of Digoxin increased use of quinine for cramps).
- * *Ulcer-healing Drugs*: Cimetidine inhibits metabolism (increased plasma-quinine concentration).

Quinolones

- * *Analgesics*: possible increased risk of convulsions with NSAIDs; manufacturer of Ciprofloxacin advises to avoid premedication with opioid analgesics (reduced plasma-Ciprofloxacin concentration).
Antacids and adsorbents: Antacids reduce absorption of Ciprofloxacin, Levofloxacin, Moxifloxacin, Norfloxacin and Ofloxacin.
- * *Anti-arrhythmics*: increased risk of arrhythmias with drugs that prolong QT interval (avoid concomitant use with Moxifloxacin, Amiodarone, Disopyramide, Procainamide and Quinidine).
Other Antibacterials: increased risk of ventricular arrhythmias with Moxifloxacin and parenteral Erythromycin (avoid concomitant use)
Anticoagulants: anticoagulant effect of Warfarin enhanced by Ciprofloxacin, Nalidixic acid, Norfloxacin and Ofloxacin.

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Antidepressants: increased risk of ventricular arrhythmias with Moxifloxacin and tricyclic antidepressants (avoid concomitant use)

Antidiabetics: effect of Glibenclamide possibly enhanced by Ciprofloxacin.

Antiepileptics: Ciprofloxacin possibly alters plasma concentration of Phenytoin.

Antimalarials: manufacturer of Artemether with Lumefantrine advises avoid concomitant use; increased ventricular arrhythmias with Moxifloxacin and Chloroquine, Mefloquine or Quinine (avoid concomitant use)

Antipsychotics: increased risk of ventricular arrhythmias with Moxifloxacin and Haloperidol, Phenothiazines (avoid concomitant use).

- * *Beta-blockers*: increased risk of ventricular arrhythmias with Moxifloxacin and Sotalol, avoid concomitant use.

Calcium Salts: reduced absorption of Ciprofloxacin.

- * *Ciclosporin*: increased risk of nephrotoxicity.

Cytotoxics: toxicity of Melphalan increased by Nalidixic acid.

- * *5HT₁-Agonists*: Quinolones possibly inhibit metabolism of Zolmitriptan (reduce dose of Zolmitriptan).

Iron: absorption of Ciprofloxacin, Levofloxacin, Moxifloxacin, Norfloxacin, and Ofloxacin reduced by oral iron.

- * *Theophylline*: possible increased risk of convulsions; Ciprofloxacin and Norfloxacin increase plasma-theophylline concentration.

Ulcer-healing Drugs: Sucralfate reduces absorption of Ciprofloxacin, Levofloxacin, Moxifloxacin, Norfloxacin, and Ofloxacin.

Uricosurics: Probenecid reduces excretion of Ciprofloxacin, Nalidixic acid and Norfloxacin.

Zinc Salts: Zinc reduces absorption of Ciprofloxacin, Moxifloxacin and Norfloxacin.

Rabeprazole see Proton Pump Inhibitors

Racecadotril No interactions with other medicinal products have been described in humans to date. In humans, joint treatment with racecadotril and loperamide, or nifuroxazide does not modify the kinetics of racecadotril.

Raloxifen

Anticoagulants: antagonism of anticoagulant effect of Warfarin.

Raltegravir

Raltegravir is not a substrate for cytochrome P450 isoenzymes, and does not appear to interact with drugs metabolised by this mechanism. However, rifampicin induces the glucuronidase responsible for raltegravir metabolism (UGT1A1) and reduces plasma concentrations of raltegravir; if use with rifampicin cannot be avoided, increasing the dose of raltegravir may be considered.

- *Antivirals*: Plasma concentrations of raltegravir were modestly increased by atazanavir and ritonavir-boosted atazanavir in healthy subjects; this increase is not considered to be clinically significant.
In a pharmacokinetic study, use of raltegravir and maraviroc together resulted in decreased plasma concentrations of both drugs, although these changes were also not thought to be clinically significant.
- *Gastrointestinal drugs*: The solubility of raltegravir is pH-dependent, and use of omeprazole has been noted to increase plasma concentrations of raltegravir in healthy subjects. However, some HIV-infected patients (and particularly those with AIDS) have increased gastric pH relating to their illness, and data from HIV-infected patients suggests acceptable safety and only modest pharmacokinetic interaction when gastric-acid reducing drugs are used with raltegravir. US licensed product information for raltegravir therefore suggests that no dose adjustment is needed when raltegravir is used with gastric-acid

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reducing drugs, although UK licensed information has advised that such combinations should be avoided unless considered essential.

Ramipril see ACE Inhibitors.

Ranitidine see Histamine H₂-antagonists.

Ranolazine

- Anti-arrhythmics: manufacturer of ranolazine advises avoid concomitant use with disopyramide.
- Antibacterials: plasma concentration of ranolazine possibly increased by clarithromycin and telithromycin; plasma concentration of ranolazine reduced by rifampicin.
- Antidepressants: plasma concentration of ranolazine increased by paroxetine.
- Antifungals: plasma concentration of ranolazine possibly increased by itraconazole, posaconazole and voriconazole.
- Antivirals: plasma concentration of ranolazine possibly increased by atazanavir, darunavir, fosamprenavir, indinavir, lopinavir, ritonavir, saquinavir and tipranavir.
- Beta-blockers: manufacturer of ranolazine advises avoid concomitant use with sotalol.
- Calcium-channel Blockers: plasma concentration of ranolazine increased by diltiazem and verapamil (consider reducing dose of ranolazine).
- Cardiac Glycosides: ranolazine increases plasma concentration of digoxin.
- Ciclosporin: plasma concentration of both drugs may increase when ranolazine given with ciclosporin.
- Grapefruit Juice: plasma concentration of ranolazine possibly increased by grapefruit juice - manufacturer of ranolazine advises avoid concomitant use.
- Lipid-regulating Drugs: ranolazine increases plasma concentration of simvastatin.
- Tacrolimus: ranolazine increases plasma concentration of tacrolimus.

Remifentanyl see Opioid Analgesics.

Repaglinide see Antidiabetics.

Retinoids

Alcohol: Etretinate formed from Acitretin in presence of alcohol.

Antibacterials: possible increased risk of benign intracranial hypertension with Tetracyclines and Acitretin, Isotretinoin and Tretinoin.

- * *Anticoagulants:* Acitretin possibly reduces anticoagulant effect of Warfarin.
- * *Antiepileptics:* plasma concentration of Carbamazepine possibly reduced by Isotretinoin.
- * *Cytotoxics:* Acitretin increases plasma concentration of Methotrexate (also increased risk of hepatotoxicity).
- * *Oestrogens and Progestogens:* Tretinoin reduces efficacy of Progestogen only and possibly combined oral contraceptives.
- Vitamins:* risk of hypervitaminosis A with vitamin A and Acitretin, Isotretinoin and Tretinoin.

Ribavirin May exacerbate immunosuppression w/ azathioprine. Increased risk of mitochondrial toxicity and lactic acidosis in HIV-positive patients taking nucleoside reverse transcriptase inhibitor (e.g. didanosine, stavudine). Increased risk of anaemia w/ zidovudine. Decreased bioavailability w/ antacids containing Mg, Al and simethicone. Increased risk of lactic acidosis w/ other nucleoside analogues.

Rifabutin as for Rifampicin.

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Rifampicin

Analgesics: metabolism of methadone accelerated (reduced effect).

Antacids: reduced absorption of Rifampicin.

- * *Anti-arrhythmics:* metabolism accelerated-reduced plasma concentrations of Disopyramide, Mexiletine, Propafenone, and Quinidine.
- * *Other Antibacterials:* metabolism of Chloramphenicol accelerated by Rifampicin (reduced plasma concentration); plasma concentration of Dapsone reduced; plasma concentration of Rifabutin increased by Clarithromycin and possibly other Macrolides (risk of uveitis-reduce Rifabutin dose).
- * *Anticoagulants:* metabolism of Nicoumalone and Warfarin accelerated (reduced anticoagulant effect).
- * *Antidepressants:* metabolism of some Tricyclics accelerated by Rifampicin (reduced plasma concentration).
- * *Antidiabetics:* metabolism of Chlorpropamide, Tolbutamide and possibly other Sulphonylureas accelerated (reduced effect); Rifampicin possibly reduces plasma concentration of Repaglinide (manufacturer advises avoid concomitant use).
- * *Antiepileptics:* metabolism of Carbamazepine and Phenytoin accelerated (reduced plasma concentration).
- * *Antifungals:* metabolism of Fluconazole, Itraconazole and Ketoconazole accelerated by Rifampicin (reduced plasma concentrations); plasma concentration of Rifampicin may be reduced by Ketoconazole; plasma concentration of Terbinafine reduced plasma concentration of Terbinafine reduced by Rifampicin; plasma concentration of Rifabutin increased by Fluconazole and possibly other Triazoles (risk of uveitis - reduce Rifabutin dose).
- * *Antipsychotics:* metabolism of Haloperidol accelerated by Rifampicin (reduced plasma concentration).
- * *Antivirals:* concomitant administration of Indinavir and Rifabutin increases plasma-Rifabutin concentration and decreases plasma-indinavir concentration (reduce dose of Rifabutin and increase dose of Indinavir); metabolism of Indinavir enhanced by Rifampicin (plasma-indinavir concentration significantly reduced - avoid concomitant use); plasma concentration of Nelfinavir significantly reduced by Rifampicin (avoid concomitant use); plasma concentration of Rifabutin increased by Nelfinavir (halve Rifabutin dose); plasma concentration of Rifabutin increased by Ritonavir (risk of uveitis-avoid concomitant use); plasma concentration of Saquinavir reduced (avoid concomitant use).
- * *Anxiolytics and Hypnotics:* metabolism of Diazepam and possibly other Benzodiazepines accelerated (reduced plasma concentration).
- * *Atovaquone:* plasma concentration reduced by Rifampicin (possible therapeutic failure of Atovaquone).
- * *Beta-blockers:* metabolism of Bisoprolol and Propranolol accelerated by Rifampicin (plasma concentrations significantly reduced).
- * *Calcium-channel Blockers:* metabolism of Diltiazem, Nifedipine, and Verapamil and possibly Isradipine, Nicardipine (plasma concentrations significantly reduced).
- * *Cardiac Glycosides:* metabolism of Digitoxin only accelerated (reduced effect).
- * *Corticosteroids:* metabolism of Corticosteroids accelerated (reduced effect).
- * *Ciclosporin:* metabolism accelerated (reduced plasma-ciclosporin concentration).
- * *Cytotoxics:* manufacturer reports interaction with Azathioprine (transplants possibly rejected).
- * *Lipid-regulating Drugs:* metabolism of Fluvastatin accelerated (reduced effect).
- * *Oestrogens and Progestogens:* metabolism accelerated (contraceptive effect of both combined and Progestogen-only oral contraceptives reduced).
- * *Tacrolimus:* Rifampicin decreases plasma-tacrolimus concentration.

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Theophylline: metabolism accelerated by Rifampicin (reduced plasma-theophylline concentration).

Thyroxine: metabolism of Thyroxine accelerated by Rifampicin (may increase requirements in hypothyroidism).

Ulcer-healing Drugs: metabolism of Cimetidine accelerated by Rifampicin (reduced plasma concentration).

Rifaximin

There is no experience regarding administration of rifaximin to subjects who are taking another rifamycin antibacterial agent to treat a systemic bacterial infection. In vitro data show that rifaximin did not inhibit the major cytochrome P-450 (CYP) drug metabolizing enzymes (CYPs1A2, 2A6, 2B6, 2C8, 2C9, 2C19, 2D6, 2E1, and 3A4). In in vitro induction studies, rifaximin did not induce CYP1A2 and CYP 2B6 but was a weak inducer of CYP3A4.

In healthy subjects, clinical drug interaction studies demonstrated that rifaximin did not significantly affect the pharmacokinetics of CYP3A4 substrates, however, in hepatic impaired patients it cannot be excluded that rifaximin may decrease the exposure of concomitant CYP3A4 substrates administered (e.g. warfarin, antiepileptics, antiarrhythmics), due to the higher systemic exposure with respect to healthy subjects.

An in vitro study suggested that rifaximin is a moderate substrate of P-glycoprotein (P-gp) and metabolized by CYP3A4. It is unknown whether concomitant drugs which inhibit P-gp and/or CYP3A4 can increase the systemic exposure of rifaximin.

The potential for drug-drug interactions to occur at the level of transporter systems has been evaluated in vitro and these studies suggest that a clinical interaction between rifaximin and other compounds that undergo efflux via P-gp and other transport proteins is unlikely (MDR1, MRP2, MRP4, BCRP and BSEP).

Riluzole

Caffeine, theophylline, amitriptyline, quinolones may decrease the rate of riluzole elimination. Cigarette smoke, rifampin, omeprazole may increase the rate of riluzole elimination.

Risedronate sodium see Bisphosphonates

Risperidone see Antipsychotics

Ritodrine see Sympathomimetics, Beta₂ Sympathomimetics.

Ritonavir

- * *Analgesics*: plasma concentration of Dextropropoxyphene, Pethidine and Piroxicam increased (risk of toxicity - avoid concomitant use); plasma concentrations of other opioid analgesics and other NSAIDs possibly increased.
 - * *Anti-arrhythmics*: increased plasma concentration of Amiodarone, Flecainide, Propafenone and Quinidine 9 increased risk of ventricular arrhythmia-avoid concomitant use).
 - * *Antibacterials*: plasma concentration of Rifabutin increased by Ritonavir (risk of uveitis - avoid concomitant use); plasma concentration of Macrolides possibly increased.
 - * *Anticoagulants*: plasma concentration of Warfarin and other anticoagulants possibly increased.
 - * *Antidepressants*: plasma concentration of SSRIs and Tricyclics possibly increased.
- Antidiabetics*: plasma concentration of Tolbutamide possibly increased.

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- * Antiepileptics: plasma concentration of Carbamazepine possibly increased.
- * *Antifungals*: plasma concentration of Imidazoles and Triazoles possibly increased.
- * *Antihistamines*: plasma concentration of non-sedating antihistamines possibly increased.
- * *Antipsychotics*: increased plasma concentration of Pimozide (risk of ventricular arrhythmias - avoid concomitant use); increased plasma concentration of Clozapine (risk of toxicity - avoid concomitant use); possibly increased plasma concentration of other antipsychotics.
- * *Other Antivirals*: combination with Nelfinavir may lead to increased plasma concentration of either drug; Ritonavir increases plasma concentration of Saquinavir.
- * *Anxiolytics and Hypnotics*: plasma concentration of Alprazolam, Clorazepate, Diazepam, Flurazepam, Midazolam and Zolpidem increased (risk of extreme sedation and respiratory depression – avoid concomitant use); plasma concentration of other anxiolytics and hypnotics possibly increased.
- * *Calcium-channel Blockers*: plasma concentration of calcium-channel blocker possibly increased.
Corticosteroids: plasma concentration of Dexamethasone and Prednisolone (and possibly other Corticosteroids) possibly increased.
- * *Ciclosporin*: plasma-ciclosporin concentration possibly increased.
- * *Ergotamine*: risk of ergotism - avoid concomitant use.
- * *Oestrogens and Progestogens*: metabolism accelerated by Ritonavir (contraceptive effect of combined oral contraceptives reduced).
- * *Tacrolimus*: plasma-tacrolimus concentration possibly increased.
- * *Theophylline*: metabolism accelerated by Ritonavir (reduced plasma-theophylline concentration).

Rivaroxaban

Rivaroxaban is metabolised by the cytochrome P450 isoenzyme CYP3A4 and is also a substrate for P-glycoprotein. It should not be given with potent inhibitors of both CYP3A4 and P-glycoprotein, such as ketoconazole, itraconazole, posaconazole, voriconazole, or HIV-protease inhibitors, although it may be used cautiously with fluconazole. Drugs that inhibit only one of these pathways or are less potent inhibitors, such as clarithromycin and erythromycin, do not appear to have clinically relevant effects. Potent inducers of CYP3A4, such as rifampicin, may reduce the effect of rivaroxaban.

Caution is needed if rivaroxaban is given with other anticoagulants or with drugs that affect bleeding, including NSAIDs and antiplatelet drugs.

Rivastigmine see Parasympathomimetics.

Rizatriptan see 5HT₁ Agonists.

Rocuronium see Muscle Relaxants (non-depolarizing).

Rofecoxib see NSAIDs.

Rosiglitazone see Antidiabetics.

Roxithromycin see drug interactions of macrolide antibacterials, or see Erythromycin

Salbutamol see Beta₂ Sympathomimetics.

Sacubitril + Valsartan

- Additive hypotensive effect with sildenafil and other PDE5 inhibitors. Increased risk of acute renal failure with NSAID(s).
- Increased serum concentration with rifampicin, ciclosporin, ritonavir.
- May reduce serum concentration of metformin.
- Sacubitril: May increase serum concentration of OATP1B1, OATP1B3 substrates (e.g. atorvastatin). Increased concentration of statins.
- Valsartan: May increase serum lithium concentration and toxicity.

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- Increased risk of hyperkalaemia with potassium-sparing diuretics (e.g. triamterene), mineralocorticoid antagonists (e.g. spironolactone), K supplements, or other K-containing salt substitutes (e.g. heparin).
- Potentially Fatal: Increased risk of angioedema with ACE inhibitors/ARBs. Increased risk of hypotension, hyperkalaemia, and acute renal failure with aliskiren in patients with diabetes mellitus.

Salicylic acid there are no interaction messages.

Salmeterol see Beta₂ Sympathomimetics.

Saquinavir

Note: Limited clinical data available, but possibly of interactions with number of drugs consult product literature for details.

- * *Antibacterials*: metabolism accelerated by Rifampicin (reduced plasma concentration - avoid concomitant use).
- * *Antiepileptics*: plasma concentration possibly reduced by Carbamazepine, Phenobarbitone and Phenytoin.
- * *Other Antivirals*: Nevirapine reduces plasma concentration of Saquinavir (avoid concomitant use); combination with Nelfinavir may lead to increased plasma concentration of Saquinavir.
Barbiturates: see under Antiepileptics above.
- * *Corticosteroids*: plasma concentration possibly reduced by Dexamethasone.

Selegiline

Note: Selegiline is an MAO-B inhibitor.

- * *Analgesics*: hyperpyrexia and CNS toxicity with Pethidine (avoid concomitant use).
- * *Antidepressants*: hypertension and CNS excitation with Fluoxetine, Paroxetine and Sertraline (Selegiline should not be started until 5 weeks after discontinuation of Fluoxetine, avoid Fluoxetine for 2 weeks after stopping Selegiline); hypotension with MAOIs; CNS toxicity reported with Tricyclic antidepressants.

Sertraline see Antidepressants, SSRIs.

Sildenafil

- Alpha-blockers: enhanced hypotensive effect when sildenafil given with alpha-blockers (avoid alpha-blockers for 4 hours after sildenafil)
- Anti-arrhythmics: avoidance of sildenafil advised by manufacturer of disopyramide (risk of Ventricular arrhythmias)
- Antibacterials: plasma concentration of sildenafil increased by clarithromycin, erythromycin and telithromycin—reduce initial dose of sildenafil
- Antifungals: plasma concentration of sildenafil increased by itraconazole
- Antivirals: side-effects of sildenafil possibly increased by atazanavir; plasma concentration of sildenafil reduced by efavirenz; plasma concentration of sildenafil possibly increased by fosamprenavir; plasma concentration of sildenafil increased by indinavir—reduce initial dose of sildenafil; plasma concentration of sildenafil significantly increased by ritonavir—avoid concomitant use; increased risk of ventricular arrhythmias when sildenafil given with saquinavir—avoid concomitant use; avoidance of sildenafil advised by manufacturer of telaprevir Bosentan: plasma concentration of sildenafil reduced by bosentan
- Calcium-channel Blockers: enhanced hypotensive effect when sildenafil given with amlodipine
- Cobicistat: plasma concentration of sildenafil possibly increased by cobicistat manufacturer of cobicistat advises avoid concomitant use of

APPENDIX 2: DRUG INTERACTIONS

sildenafil for pulmonary arterial hypertension or reduce dose of sildenafil for erectile dysfunction

- Dapoxetine: avoidance of sildenafil advised by manufacturer of dapoxetine
- Grapefruit Juice: plasma concentration of sildenafil possibly increased by grapefruit juice
- Nicorandil: sildenafil significantly enhances hypotensive effect of nicorandil (avoid concomitant use)
- Nitrates: sildenafil significantly enhances hypotensive effect of nitrates (avoid concomitant use)
- Ulcer-healing Drugs: plasma concentration of sildenafil increased by cimetidine (consider reducing dose of sildenafil)

Simvastatin see Statins.

Sodium Aurothiomalate

Note: Increased risk of toxicity with other nephrotoxic and myelosuppressive drugs.

Sodium Bicarbonate see Antacids.

Sodium Fusidate

Although the exact metabolic pathways of fusidic acid are not known, an interaction has been suspected with drugs metabolised by the hepatic cytochrome P450 isoenzyme CYP3A4, and UK licensed product information suggests avoiding their use with fusidic acid.

Sodium Valproate see Valproate.

Somatropin

Corticosteroids: may inhibit growth promoting effect of Somatropin.

Sotalol see Beta-blockers.

Sparfloxacin see *Ciprofloxacin*

Spectinomycin

- * *Botulinum Toxin*: neuromuscular block enhanced (risk of toxicity).
- * *Lithium*: increased toxicity reported.

Spiramycin see drug interactions of macrolide antibacterials, or see Erythromycin

Spirolactone see Diuretics (potassium-sparing).

Statins

Note: Grapefruit juice increases plasma concentration of Simvastatin.

- * *Antibacterials*: metabolism of Fluvastatin accelerated by Rifampicin (reduced effect); Clarithromycin and Erythromycin increase risk of myopathy with Simvastatin (avoid concomitant use); Erythromycin possibly increases risk of myopathy with Atorvastatin; Clarithromycin increases plasma concentration of Atorvastatin.
- * *Anticoagulants*: effect of Nicoumalone and Warfarin enhanced by Simvastatin.
- *Antifungals*: Itraconazole, Ketoconazole and possibly other Imidazoles and Triazoles increase risk of myopathy with Simvastatin – avoid concomitant use of Itraconazole, Ketoconazole or Miconazole with Simvastatin; Itraconazole and possibly other Imidazoles and Triazoles increase risk of myopathy with Atorvastatin – avoid concomitant use of Itraconazole with Atorvastatin.
- *Cardiac Glycosides*: plasma-digoxin concentration possibly increased by Atorvastatin.
- * *Ciclosporin*: increased risk of myopathy.
- *Cytotoxics*: plasma concentration of Simvastatin increased by Imatinib.
- * *Other Lipid-regulating Drugs*: increased risk of myopathy with Fibrates and Nicotinic acid.

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Streptomycin see Aminoglycosides.

Sucralfate

Antibacterials: reduced absorption of Ciprofloxacin, Grepafloxacin, Levofloxacin, Norfloxacin, Ofloxacin, and Tetracycline.

- * *Anticoagulants:* absorption of Warfarin possibly.
- * *Antiepileptics:* reduced absorption of Phenytoin.
- Antifungals:* reduced absorption of Ketoconazole.
- Cardiac Glycosides:* absorption of Cardiac Glycosides possibly reduced
- Thyroxine:* reduced absorption of Thyroxine.
- Other Ulcer-healing Drugs:* reduced absorption of Lansoprazole.

Sulfadoxine see Co-trimoxazole and Sulphonamides.

Sulindac see NSAIDs.

Sulphadiazine see Co-trimoxazole and Sulphonamides.

Sulphadimidine see Co-trimoxazole and Sulphonamides.

Sulphasalazine

Cardiac Glycosides: absorption of Digoxin possibly reduced.

Sulphonamides see Co-trimoxazole and Sulphonamides.

Sulphonylureas see Antidiabetics.

Sulpiride see Antipsychotic.

Sumatriptan see 5HT₁ Agonists.

Suvorexant Suvorexant is primarily metabolized by CYP3A. Therefore, decreased systemic exposure of suvorexant may occur during concurrent use with CYP3A inducers. Thus, suvorexant exposure can be substantially decreased when co-administered with strong CYP3A inducers (e.g., rifampin, carbamazepine and phenytoin). On the otherhand, concomitant use of Suvorexant with strong inhibitors of CYP3A (e.g., ketoconazole, itraconazole, posaconazole, clarithromycin, nefazodone, ritonavir, saquinavir, nelfinavir, indinavir, boceprevir, telaprevir, telithromycin and conivaptan) is not recommended.

Suxamethonium see Muscle Relaxants.

Sympathomimetics (see below for Beta₂- Sympathomimetics).

Alpha₂-adrenoceptor Stimulants: possible risk of hypertension with Adrenaline and Noradrenaline.

- * *Anaesthetics:* risk of arrhythmias if adrenaline and Isoprenaline given with volatile liquid anaesthetics such as halothane.
- * *Antidepressants:* with Tricyclics administration of adrenaline and Noradrenaline may cause hypertension and arrhythmias (but local anaesthetics with adrenaline appear to be safe); methylphenidate may inhibit metabolism of Tricyclics; with MAOIs administration of inotropics such as Dopamine and Dopexamine may cause hypertensive crisis; also with MAOIs administration of dexamphetamine and other Amphetamines, Ephedrine, Isometheptene, Methylphenidate, Phentermine, Phenylephrine, Phenylpropanolamine, and Pseudoephedrine may cause hypertensive crisis (these drugs are contained in anorectics or cold and cough remedies).
- Antiepileptics:* methylphenidate increases plasma concentration of Phenytoin and possibly of Phenobarbitone and Primidone.
- * *Antihypertensives:* Sympathomimetics in anorectics and cold and cough remedies (see above) and methylphenidate antagonize hypotensive effect of adrenergic neurone blockers.
- Barbiturates:* see under Antiepileptics, above.

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- * *Beta-blockers*: severe hypertension with Adrenaline and Noradrenaline and possibly with Dobutamine (especially with non-selective beta-blockers).
Corticosteroids: ephedrine accelerates metabolism of Dexamethasone.
- * *Dopaminergics*: increased risk of toxicity when Isometheptene or Phenylpropanolamine given with Bromocriptine; effect of Adrenaline, Dobutamine, Dopamine, Isoprenaline and Noradrenaline possibly enhanced by Entacapone.
Orlistat: manufacturer advises avoid concomitant use with Phentermine.
Doxapram: risk of hypertension.
Oxytocin: hypertension with vasoconstrictor Sympathomimetics.
- * *Other Sympathomimetics*: Dopexamine possibly potentiates effect of Adrenaline and Noradrenaline.

Sympathomimetics, Beta₂

Corticosteroids: increased risk of hypokalaemia if high doses of Corticosteroids given with high doses of Bambuterol, Eformoterol, Fenoterol, Reprotol, Ritodrine, Salbutamol, Salmeterol, Terbutaline and Tulobuterol.
Diuretics: increased risk of hypokalaemia if with high doses of Bambuterol, Eformoterol, Fenoterol, Reprotol, Ritodrine, Salbutamol, Salmeterol, Terbutaline, and Tulobuterol.
Muscle Relaxants: effect of Suxamethonium enhanced by Bambuterol.
Theophylline: increased risk of hypokalaemia if given with high doses of Bambuterol, Eformoterol, Fenoterol, Reprotol, Ritodrine, Salbutamol, Salmeterol, Terbutaline, and Tulobuterol.

Tamoxifen

- * *Anticoagulants*: anticoagulant effect of Nicoumalone and Warfarin enhanced.
Other Hormone Antagonists: Aminoglutethimide reduces plasma-tamoxifen concentration.

Tedizolid

- * Tedizolid is predicted to increase the exposure to imatinib, lapatinib, methotrexate, sulfasalazine, statins, topotecan.
- * Monoamine-oxidase A and B inhibitors, moclobemide are predicted to increase the risk of side-effects when given with tedizolid.

Tenofovir

Decreased plasma concentrations of atazanavir and increased plasma concentration of tenofovir when given concomitantly. Increased plasma concentration w/ ritonavir-boosted lopinavir. Tenofovir increases the plasma concentrations of didanosine. Increased risk of nephrotoxicity w/ drugs that reduce renal function (e.g. cidofovir, aciclovir, valaciclovir, aminoglycosides, high-dose or multiple NSAIDs). Decreased therapeutic effect of adefovir.

Terazosin see Alpha-blockers (post-synaptic).

Terbinafine

Antibacterials: plasma concentration reduced by Rifampicin.
Ulcer-healing Drugs: plasma concentration increased by Cimetidine.

Terbutaline see Sympathomimetics, Beta₂.

Testosterone

- * *Anticoagulants*: anticoagulant effect of Warfarin, Nicoumalone and Phenindione enhanced.
Antidiabetics: hypoglycemic effect possibly enhanced.

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Tetrabenazine see MAOIs and Metoclopramide

Tetracyclines

ACE Inhibitors: Quinapril reduces absorption (tablets contain Magnesium Carbonate excipient).

Antacids and Adsorbents: reduced absorption with antacids and possibly with Kaolin.

Anticoagulant: see Phenindione and Warfarin.

Antiepileptics: Carbamazepine, Phenobarbitone and Phenytoin increase metabolism of Doxycycline (reduced plasma concentration).

Atovaquone: plasma-atovaquone concentration reduced by tetracycline.

Barbiturates: see under Antiepileptics.

Calcium Salts: reduced absorption of Tetracyclines.

- * *Ciclosporin:* Doxycycline possibly increases plasma-ciclosporin concentration.

Dairy products: reduced absorption (except Doxycycline and Minocycline).

Iron: absorption of oral iron reduced by Tetracyclines and vice versa.

Oestrogens and Progestogens: see Contraceptives, Oral (main list).

Retinoids: possible increased risk of benign intracranial hypertension with Tetracyclines and Acitretin, Isotretinoin and Tretinoin.

Ulcer-healing Drugs: Tripotassium Dicitrate-bismuthate and Sucralfate reduce absorption.

Zinc Salts: reduced absorption (and vice versa).

Theophylline

Anaesthetics: increased risk of arrhythmias with halothane.

Anthelmintics: Thiabendazole may increase plasma-theophylline concentration.

Anti-arrhythmics: antagonism of anti-arrhythmic effect of adenosine; plasma-theophylline concentration increased by Mexiletine and Propafenone; plasma-theophylline concentration reduced by Moracizine.

- * *Antibacterials:* possible increased risk of convulsions with Quinolones; plasma-theophylline concentration increased by Ciprofloxacin, Clarithromycin, Erythromycin (if erythromycin given by mouth, also decreased plasma-erythromycin concentration), and Norfloxacin and possibly increased by Isoniazid; plasma-theophylline concentration reduced by Rifampicin.

- * *Antidepressants:* plasma-theophylline concentration increased by Fluvoxamine (concomitant use should usually be avoided, but where not possible halve theophylline dose and monitor plasma-theophylline concentration) and Viloxazine.

Antiepileptics: plasma-theophylline concentration reduced by Carbamazepine, Phenobarbital and Phenytoin.

- * *Antifungals:* plasma-theophylline concentration possibly increased by Fluconazole and Ketoconazole.

- * *Antivirals:* plasma-theophylline concentration reduced by Ritonavir.

Barbiturates: see under Antiepileptics.

Beta-blockers: should be avoided on pharmacological grounds (bronchospasm).

- * *Calcium-channel Blockers:* plasma-theophylline concentration increased by Diltiazem, Verapamil, and possibly other calcium-channel blockers.

Disulfiram: increased plasma-theophylline concentration.

Doxapram: increases CNS stimulation.

Hormone Antagonists: plasma-theophylline concentration reduced by Aminoglutethimide.

Interferons: plasma-theophylline concentration increased by interferon alfa.

Leukotriene Antagonists: Zafirlukast possibly increases plasma-theophylline concentration; plasma-zafirlukast concentration reduced.

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Lithium: Lithium excretion accelerated (reduced plasma-lithium concentration).

Nicotine and Tobacco: plasma-theophylline concentration reduced by tobacco smoking.

Oestrogens and Progestogens: plasma-theophylline concentration increased by combined oral contraceptives.

Sympathomimetics: increased risk of hypokalaemia if theophylline given with high doses of Bambuterol, Eformoterol, Fenoterol, Reproterol, Ritodrine, Salbutamol, Salmeterol, Terbutaline and Tulobuterol.

- * *Ulcer-healing Drugs*: plasma-theophylline concentration increased by cimetidine.
- Uricosurics*: plasma-theophylline concentration increased by Cimetidine.
- Vaccines*: plasma-theophylline concentration occasionally increased by influenza vaccine.

Thiabendazole

Theophylline: plasma concentration may be increased.

Thioacetazone may enhance the ototoxicity of streptomycin

Tioconazole there are no interaction messages

Thiopentone see Anaesthetics, General.

Thioridazine see Antipsychotics.

Thyroxine

Anion-exchange Resins: Cholestyramine reduces absorption of Thyroxine.

Antibacterials: Rifampicin accelerates metabolism of Thyroxine (may increase requirements in hypothyroidism).

- * *Anticoagulants*: effect of Nicoumalone, Phenindione and Warfarin enhanced.

Antidepressants: manufacturer of Lofepamine advises avoid Thyroxine.

Antiepileptics: Carbamazepine, Phenobarbital and Phenytoin accelerate metabolism of Thyroxine (may increase requirements in hypothyroidism).

Barbiturates: see under Antiepileptics.

Beta-blockers: metabolism of Propranolol accelerated (reduced effect).

Ulcer-healing Drugs: Sucralfate reduces absorption of Thyroxine.

Timolol see Beta-blockers.

Tinidazole

Alcohol: possibly Disulfiram-like reaction.

Trihexyphenidyl Hydrochloride see Anticholinergics.

Tizanidine see Muscle Relaxants.

Tobramycin see Aminoglycosides.

Tofacitinib Potent CYP3A4 inhibitors (e.g., ketoconazole) & inducers (e.g., rifampin), moderate CYP3A4 & potent CYP2C19 inhibitors & immunosuppressive drugs (e.g., azathioprine, tacrolimus, cyclosporine).

Tolbutamide see Antidiabetics (sulphonylurea).

Torsemide see Diuretics (loop)

Tramadol see Opioid Analgesics.

Tranexamic Drugs with actions on haemostasis should be given with caution to patients on antifibrinolytic therapy. The risk of thrombosis may be increased if tranexamic acid is given with factor IX complex concentrates or factor VIII inhibitor bypassing fraction, and such combinations are not recommended. Antifibrinolytics and thrombolytics have antagonistic effects, and concomitant use may reduce the efficacy of both. The potential for thrombus formation may be increased by oestrogens.

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*Retinoids: Antifibrinolytics should be used with caution in patients receiving oral tretinoin as thrombotic events have been reported in patients being treated with tranexamic acid and tretinoin.

Tretinoin see Retinoids.

Triamcinolone see Corticosteroids.

Trifluoperazine see Antipsychotics

Trimetaphan

Trimetaphan should be used with caution in patients being treated with other antihypertensives, drugs that depress cardiac function, or muscle relaxants, and in those taking NSAIDs or corticosteroids. The hypotensive effect is enhanced by general and spinal anaesthetics. Adrenaline should not be infiltrated locally at the site of incision when trimetaphan is being given since this may antagonise the effect of trimetaphan.

Trimetazidine no clinically significant drug interaction is reported.

Trimethoprim

Anti-arrhythmics: plasma concentration of Procainamide increased.

Anticoagulants: effect of Nicoumlone and antifolate effect of Phenytoin increased.

- * *Antimalarials*: increased risk of antifolate effect with Pyrimethamine (in Fansidar® and Maloprim).

Antivirals: plasma concentration of Lamivudine and possibly Zalcitabine increased - avoid high-dose Co-trimoxazole with Lamivudine.

- * *Ciclosporin*: increased risk of nephrotoxicity; plasma-ciclosporin concentration possibly reduced by intravenous Trimethoprim.

Cytotoxics: antifolate effect of Methotrexate increased.

Trimipramine see Antidepressants, Tricyclic.

Tropicamide see Antimuscarinics.

Tulobuterol see Sympathomimetics, Beta₂.

Ulcer-healing Drugs see individual drugs.

Uricosurics see individual drugs.

Vaccines

For a general warning on live vaccines and Immunoglobulins, see under Normal Immunoglobulin.

Valdecoxib see NSAIDs

Valproate

Analgesics: aspirin enhances effect.

Anion- exchange Resins: Cholestyramine possibly reduces absorption.

Antibacterials: erythromycin possibly inhibits metabolism (increased plasma-valproate concentration).

Anticoagulants: anticoagulant effect of Nicoumalone and Warfarin possibly increased.

- * *Antidepressants*: antagonism of anticonvulsant effect (convulsive threshold lowered).
- * *Other Antiepileptics*: concomitant administration of two or more antiepileptics may enhance toxicity without a corresponding increase in antiepileptics effect; Moreover, interactions between individual antiepileptics can complicate monitoring of treatment; interactions include enhanced effects, increased sedation, and reductions in plasma concentrations.
- * *Antimalarials*: Chloroquine and Mefloquine antagonize anticonvulsant effect.
- * *Antipsychotics*: antagonism of anticonvulsant effect (convulsive threshold lowered).

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Antivirals: plasma concentration of Zidovudine possibly increased (risk of toxicity).

Ulcer-healing Drugs: Cimetidine inhibits metabolism (increased plasma-valproate concentration).

Valsartan see ACE Inhibitors and Angiotensin-II Antagonists.

Vancomycin

Anaesthetics: hypersensitivity-like reactions can occur with concomitant Vancomycin infusion.

Anion-exchange Resins: Aminoglycosides and Capreomycin.

Diuretics: increased risk of ototoxicity with Loop diuretics.

Vecuronium see Muscle Relaxants (non-depolarizing).

Verapamil see Calcium-channel Blockers.

Vincristine

Antifungals: Itraconazole may inhibit metabolism (increased risk of neurotoxicity).

Vitamins

* *Anticoagulants:* anticoagulant effect of Nicoumalone, Phenindione, and Warfarin antagonized by vitamin K (present in some enteral feeds).

Antiepileptics: Vitamin D requirements possibly increased by Carbamazepine, Phenobarbital and Phenytoin.

Barbiturates: see Antiepileptics.

Diuretics: increased risk of hypercalcaemia if Thiazides given with vitamin D.

Dopaminergics: effect of Levodopa antagonized by pyridoxine (unless a dopa decarboxylase inhibitor also given).

Retinoids: risk of hypervitaminosis A with Vitamin A and Acitretin, Isotretinoin and Tretinoin.

Voglibose

May enhance effects of other antidiabetics including insulin.

Warfarin and Other Coumarins

Note: Change in patient's clinical condition particularly associated with liver disease, intercurrent illness, or drug administration, necessitates more frequent testing. Major changes in diet (especially involving salads and vegetables) and in alcohol consumption may also affect Warfarin control.

* *Alcohol:* enhanced anticoagulant effect with large amounts (see also above).

* *Allopurinol:* anticoagulant effect possibly enhanced.

* *Anabolic Steroids:* Oxymetholone, Stanozolol and others enhance anticoagulant effect.

* *Analgesics:* Aspirin increases risk of bleeding due to antiplatelet effect ; anticoagulant effect seriously enhanced by Azapropazone (avoid concomitant use) and possibly enhanced by Diclofenac, Diflunisal, Flurbiprofen, Ibuprofen, Mefenamic acid, Meloxicam, Piroxicam, Sulindac, and other NSAIDs; anticoagulant effect possibly also enhanced by Dextropropoxyphene and by prolonged regular use of Paracetamol; increased risk of hemorrhage with parenteral Diclofenac and Ketorolac(avoid concomitant use).

* *Anion-exchange Resins:* Cholestyramine may enhance or reduce anticoagulant effect.

* *Anti-arrhythmics:* Amiodarone and Propafenone enhance anticoagulant effect; Quinidine may enhance anticoagulant effect.

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- * **Antibacterials:** anticoagulant effect reduced by Rifampicin; anticoagulant effect enhanced by Cephmandole, Chloramphenicol, Ciprofloxacin, Co-trimoxazole, Erythromycin, Metronidazole, Ofloxacin, and Sulphonamides; anticoagulant effect possibly also enhanced by Aztreonam, Clarithromycin and some other Macrolides, Nalidixic acid, Neomycin, Norfloxacin. Tetracyclines, and Trimethoprim; although studies have failed to demonstrate interaction, common experience in anticoagulant clinics is that INR can be altered following course of oral broad-spectrum antibiotic, such as Ampicilli (may also apply to antibiotics given for local action on gut such as Neomycin).
- * **Antidepressants:** SSRIs and Viloxazine possibly enhance anticoagulant effect
- * **Antidiabetics:** possibly enhanced hypoglycemic effects of Sulphonylureas and changes to anticoagulant effect.
- * **Antiepileptics:** reduced anticoagulant effect with Carbamazepine and Phenobarbital; anticoagulant effect possibly increased by Valproate; both reduced and enhanced effects reported with Phenytoin.
- * **Antifungals:** anticoagulant effect reduced by Griseofulvin; anticoagulant effect enhanced by Fluconazole, Itraconazole, Ketoconazole, and Miconazole (note: oral gel absorbed).
- * **Antimalarials:** anticoagulant effect possibly enhanced by Proguanil.
- * **Antiplatelet Drugs:** Aspirin, Clopidogrel and Dipyridamole increase risk of bleeding due to antiplatelet effect.
- * **Antivirals:** Ritonavir possibly increases plasma concentration.
- * **Anxiolytics and Hypnotics:** Chloral may transiently enhance anticoagulant effect
- * **Barbiturates:** Anticoagulant effect reduced.
- * **Corticosteroids:** anticoagulant effect possibly altered.
- * **Cytotoxics:** anticoagulant effect possibly enhanced by Ifosfamide.
- * **Disulfiram:** enhanced anticoagulant effect.
- * **Hormone Antagonists:** Aminoglutethimide reduces anticoagulant effect; Danazol, Flutamide, Tamoxifen and possibly Bicalutamide and Toremifene enhance anticoagulant effect.
- * **Leukotriene Antagonists:** Zafirlukast enhances anticoagulant effect of Warfarin.
- * **Lipid-regulating Drugs:** Fibrate group and Simvastatin enhance anticoagulant effect.
- * **Raloxifene:** antagonism of anticoagulant effect.
- * **Retinoids:** Acitretin possibly reduces anticoagulant effect.
- * **Rowachol:** possibly reduced anticoagulant effect.
- * **Testosterone:** anticoagulant effect of Warfarin and Nicoumalone enhanced.
- * **Thyroxine:** enhanced anticoagulant effect.
- * **Ulcer-healing Drugs:** Sucralfate possibly reduces anticoagulant effect (reduced absorption); Cimetidine and Omeprazole enhance anticoagulant effect.
- * **Uricosurics:** Sulphinpyrazone enhances anticoagulant effect.
- * **Vaccines:** Influenza vaccine occasionally enhances anticoagulant effect.
- * **Vitamins:** Vitamin K reduces anticoagulant effect; major changes in diet. (especially involving vegetables) may affect control; vitamin K also present in some enteral feeds.

Xamoterol

Beta-blockers: antagonism of effect of Xamoterol and reduction in beta-blockade.

Xylometazoline see Sympathomimetics.

Zafirlukast see Leukotriene Antagonists.

Zalcitabine

Note: Clinical data limited. Avoid use with other drugs that have potential to cause

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peripheral neuropathy or pancreatitis-for further details consult product literature.

Antacids: possibly reduce absorption.

Antibacterials: Trimethoprim possibly increases plasma concentration of Zalcitabine.

Uricosurics: Probenecid possibly increases plasma concentration of Zalcitabine.

Zidovudine

Note: Increased risk of toxicity with nephrotoxic and myelosuppressive drugs; for further details, consult product literature.

Analgesics: increased risk of haematological toxicity with NSAIDs; methadone possibly increases plasma-zidovudine concentration.

Antibacterials: Clarithromycin tablets reduce absorption of Zidovudine.

Antiepileptics: plasma-phenytoin concentrations increased or decreased; plasma-Zidovudine concentration possibly increased by Valproate (risk of toxicity).

Antifungals: plasma concentration of Zidovudine increased by Fluconazole (increased risk of toxicity).

* *Other Antivirals:* profound myelosuppression with Ganciclovir (if possible avoid concomitant administration, particularly during initial Ganciclovir therapy).

Uricosurics: Probenecid increases plasma-zidovudine concentration and risk of toxicity.

Zinc

Antibacterials: reduced absorption of Ciprofloxacin, Moxifloxacin and Norfloxacin, Tetracyclines reduce absorption of zinc (and vice versa).

Iron: reduced absorption of oral Iron (and vice versa).

Penicillamine: reduced absorption of Penicillamine.

Zinc Orotate see Zinc above.

Zoledronic Acid see Bisphosphonates.

Zonisamide Reduced plasma concentration with phenytoin, phenobarbital, and carbamazepine. Increased risk of metabolic acidosis with carbonic anhydrase inhibitors (e.g. acetazolamide).

Zopiclone see Anxiolytics and hypnotics.

Zuclopenthixol see Antipsychotics.

Appendix- 3

LIVER DISEASES

Drug induced hepatotoxicity has been associated with over 600 drugs. Drugs can cause direct cellular injury to the liver or otherwise interfere with its function. Acute liver injury can be cytotoxic or cholestatic. Cytotoxic injury involves direct injury to the hepatocytes with necrosis that can be localized or diffuse throughout the liver. Prominent signs and symptoms include fatigue, anorexia, nausea and jaundice. Cholestatic injury results in a characteristic decrease in bile flow. Hepatic injury of this type leads to jaundice and pruritus. Chronic liver damage consists of a group of disorders including chronic hepatitis, steatosis. Pseudo-alcoholic liver diseases, granulomatous disease and cirrosis. Chronic lesions can result from continued or repeated exposure to hepatotoxic agents.

Liver injury occurs as the dose of some drugs is increased causing *centrizonal necrosis* with paracetamol in overdose and also carbon tetrachloride., Isoniazid, Methyl dopa and Phenytoin have been associated with direct cytotoxic reactions that led to mortality rates over 10% or hogher. *Hepatocellular necrosis* with salicylates, particularly in patients with collagen diseases, when more than 2gm/day are taken. *Fatty change* in liver cells and *Hepatic failure* occur with tetracyclines with high doses. *Acute Hepatocellular necrosis* can be induced by several drugs including general anaesthetics (halothane), antiepileptics (carbamazepine, phenytoin, sodium valporate, phenobarbitone), antidepressants (MAO inhibitors), anti-inflammatory drugs (indomethacin, ibuprofen), antimicrobials (isoniazid, sulphonamides, nitrofurantoin) and cardiovascular drugs (methyldopa, hydralazine). *Chronic active hepatitis* may develop with prolonged use of methyldopa, isoniazid, dantrolene. *Hepatic fibrosis or cirrhosis* may be caused by prolonged intake of excess of alcohol and therapeutic use of methotrexate (for psoriasis). *Benign liver tumours* may develop when synthetic androgen, e.g. anabolic steroids usually in high doses and oral contraceptives are used for more than five years; there is also increased risk of hepatocellular carcinoma, although the absolute risk of either complication is very low.

It is especially important that drugs should be prescribed for patients with liver disease only if there is a real need. Patients at greatest risk are those with ascites, jaundice or evidence of encephalopathy. Pharmacokinetic and pharmacodynamic changes are caused by liver diseases which may affect adversely to other cells and organs.

Central Nervous System. The brain receives concentrations of toxic substances (ammonia, amines) to which it is normally not exposed, as a result of failure of liver cells to metabolise naturally occurring substances and also of shunting of blood from the portal to the systemic circulation.

Opioids should be avoided as comma may occur, but if an opioid is essential, pethidine is probably less dangerous than morphine. Lorazepam and oxazepam are preferred as anxiolytics and temazepam as a hypnotic. Antiepileptic drugs should be monitored with particular care. Phenobarbitone may induce comma. A tricyclic antidepressant may be used when anti-depressant therapy is deemed necessary but MAO inhibitors are hazardous.

Cardiovascular System. Beta-adrenoceptor blockers (e.g. propranolol, labetalol etc) that are metabolized by liver should be given in reduced initial oral dose, as should calcium channel antagonists, e.g. nicardipine, nifedipine, or verapamil.

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Gastrointestinal System. Antacids that contain much sodium may cause fluid retention and those containing aluminium and calcium may constipate, which predisposes to encephalopathy as there is greater opportunity for absorption of toxic substances from the gut.

Infections. Avoid or use in reduced doses of drugs that have known risk of hepatotoxicity, e.g. isoniazid, erythromycin, rifampicin, tetracyclines.

Endocrine System. Avoid C-17 α -substituted androgens and anabolic steroids which are hepatotoxic. It is better to avoid combined oral contraceptives especially in cholestatic liver disease. Metformin is normally inactivated by the liver and should be avoided as it may cause lactic acidosis.

Ascites. Abrupt diuresis, e.g. with large doses of a loop diuretic, may precipitate electrolyte imbalance, renal dysfunction and hepatic encephalopathy. In patients who fail to respond or who develop adverse effects of diuretic therapy, up to 4-6 litres of ascitic fluid may be removed per day by paracentesis, with simultaneous IV infusion of albumin (6-8 gm per litre of ascitic fluid) to prevent hypovolaemia.

Portal hypertension and variceal bleeding. Bleeding from rupture of varices is serious, the mortality from an initial event being up to 50%, and 30% for subsequent bleeds. If endoscopic expertise is available, bleeding from oesophageal varices can be stopped by injection of a sclerosing substance or by band ligation.

Viral hepatitis. Chronic hepatitis caused by hepatitis B, C or D may lead to cirrhosis, hepatocellular failure or hepatocellular carcinoma. Collectively, hepatitis is probably the commonest of serious viral diseases in general, and constitutes a major health problem.

The list of drugs to be avoided or used with caution in liver disease is given below based on current information concerning the use of these drugs in therapeutic dosage:

Drugs	Comment
Acamprosate	Avoid.
Acarbose	Avoid.
ACE inhibitors	Most of the ACE inhibitors are associated with liver injury on chronic use. Use cilazapril, enalapril, fosinopril, imidapril, moexipril, perindopril, quinapril, ramipril, trandolapril and monitoring is required for the patients with impaired liver functions.
Acitretin	Avoid, further impairment of liver function may occur.
Alprazolam	See Anxiolytics and Hypnotics.
Altretamine	Rare reports of hepatotoxicity.
Aminophylline	See Theophylline.
Amitriptyline	See Antidepressants, Tricyclics.
Amlodipine	Half-life prolonged, may need dose reduction.
Anabolic Steroids	Preferably avoid, dose related toxicity.
Androgens	Avoid, dose related toxicity with some, and produce fluid retention.
Antacids	In patients with fluid retention, avoid those containing large amounts of sodium e.g. magnesium trisilicate mixture.
Anticoagulants, Oral	Avoid in severe liver disease, especially if prothrombin time already prolonged.

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Antidepressants, SSRI	Reduce dose or avoid in severe liver disease.
Antidepressants, tricyclic (and related)	Tricyclics preferable to MAOIs but sedative effects are increased (avoid in severe liver disease.)
Antipsychotics	All can precipitate coma; phenothiazines are hepatotoxic.
Anxiolytics and hypnotics	All can precipitate coma; small dose of oxazepam or temazepam is probably the safest; reduce oral dose of clomethiazole or zopiclone or avoid in liver injury).
Aspirin	Avoid, increased risk of gastro-intestinal bleeding.
Atorvastatin	See Statins.
Azathioprine	May need dose reduction.
Azithromycin	Avoid; jaundice is reported.
Bendroflumazid	See Thiazides.
Bromazepam	See Anxiolytic and Hypnotics.
Budesonide	Plasma concentration of Budesonide may increase on oral administration.
Bupivacaine	See Lidocaine.
Buprenorphine	See Opioid Analgesics.
Carbamazepine	Metabolism is impaired in advanced liver disease.
Carvedilol	Avoid.
Ceftriaxone	Reduce dose and monitor plasma concentration in both hepatic and severe renal impairment.
Celecoxib	See NSAIDs.
Chloramphenicol	Avoid. Increased risk of bone-marrow depression.
Chlorpheniramine	Sedation inappropriate in severe liver disease, avoid.
Chlorpromazine	See Antipsychotics.
Chlorpropamide	See Sulphonylureas.
Cilazapril	See ACE Inhibitors.
Cimetidine	Increased risk of confusion; reduce dose.
Cinnarizine	Sedation inappropriate in severe liver disease;-avoid.
Ciprofloxacin	See Quinolones.
Clarithromycin	Hepatic dysfunctions including jaundice are reported.
Clobazam	See Anxiolytics and Hypnotics.
Clomipramine	See Antidepressants, Tricyclic.
Clozapine	Initial dose of 12.5mg daily can be increased slowly with regular monitoring of liver function; avoid in symptomatic or progressive liver disease or liver failure.
Cyclophosphamide	Reduce dose.
Cyclosporin	May need dose adjustment.
Cytarabine	Reduce dose.
Dalteparin	See Heparin.
Daunorubicin	Reduce dose.
Dextromethorphan	See Opioid Analgesics.
Diazepam	See Anxiolytics and Hypnotics.
Diclofenac	See NSAIDs.
Diltiazem	Reduce dose.
Diphenhydramine	Caution in mild to moderate liver disease; avoid in severe liver disease if sedation is inappropriate.
Disopyramide	Half-life is prolonged; may need dose reduction.
Docetaxel	Monitor liver function; reduce dose according to liver enzymes; avoid in severe hepatic impairment.
Doxazosin	No information, manufacturer advises caution.
Doxycycline	See Tetracycline.
Droperidol	See Antipsychotics.

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Enalapril	See ACE Inhibitors.
Enoxaparin	See Heparin.
Entacapone	Avoid.
Epoetin	Manufacturers advise caution in chronic liver failure.
Ergometrine	Avoid in severe liver disease.
Ergotamine	Avoid in severe liver disease; risk of toxicity is increased.
Erythromycin	May cause idiosyncratic hepatotoxicity.
Estradiol	See Oestrogens.
Estriol	See Oestrogens.
Felodipine	Reduce dose.
Fentanyl	See Opioid Analgesics.
Flucloxacillin	May cause cholestatic jaundice.
Fluconazole	Toxicity with related drugs.
Fluoxetine	See Antidepressants, SSRI.
Flupentixol	See Antipsychotics.
Fluphenazine	See Antipsychotics.
Flurazepam	See Anxiolytics and Hypnotics.
Flutamide	Use with caution (hepatotoxic).
Fluvastatin	See Statins.
Fosfestrol	See Oestrogens.
Frusemide	See Loop Diuretics.
Fusidic Acid	Impaired biliary excretion; may increase risk of hepatotoxicity; avoid or reduce dose.
Gemfibrozil	Avoid in liver disease.
Glibenclamide	See Sulphonylureas.
Glimepiride	Manufacturer advises avoid in severe liver impairment.
Glipizide	See Sulphonylureas.
Gold (auranofin, aurothiomalate)	Avoid in severe liver diseases.
Griseofulvin	Avoid in severe liver diseases.
Haloperidol	See Antipsychotics.
Halothane	Avoid in the history of unexplained pyrexia or jaundice .
Heparin	Reduce dose in severe liver disease.
Hydralazine	Reduce dose.
Hydrochlorothiazide	See Thiazides.
Hydroxyprogesterone caproate	See Progesteron.
Hydroxyzine	Sedation inappropriate in severe liver disease; avoid.
Ibuprofen	See NSAIDs.
Ifosfamid	Avoid.
Imidapril	See ACE Inhibitors.
Imipramine	See Antidepressants, Tricyclic.
Indapamide	See Thiazides.
Indometacin	See NSAIDs.
Interferon alfa	Close monitoring in mild to moderate liver impairment; avoid in severe liver disease.
Interferon beta	Avoid in decompensated liver disease.
Irinotecan	Monitor closely for neutropenia if plasma-bilirubin concentration increases up to 1.5 times upper limit of normal range; avoid if plasma-bilirubin concentration is greater than 1.5 times upper limit of normal range.
Isoniazid	Avoid if possible; idiosyncratic hepatotoxicity is common.
Isotretinoin	Avoid; further impairment of liver function may occur.
Isradipine	Reduce dose.

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Itraconazole	Half-life is prolonged; dose reduction may be necessary.
Ketoconazole	Avoid.
Ketoprofen	See NSAIDs.
Ketorolac	See NSAIDs.
Ketotifen	Sedation inappropriate in severe liver disease; avoid.
Lacidipine	Antihypertensive effect is possibly increased.
Lamotrigine	Try to avoid.
Lansoprazole	In severe liver disease dose should not exceed 30mg daily.
Levonorgestrel	See Progesterones.
Lidocaine	Avoid (or reduce dose) in severe liver disease.
Lignocaine	See Lidocaine.
Loop Diuretics	Hypokalaemia may precipitate coma (use potassium-sparing diuretic to prevent this); increased risk of hypomagnesaemia in alcoholic cirrhosis.
Maprotiline	See Antidepressants, Tricyclic (and related).
Mefenamic Acid	See NSAIDs.
Mefloquine	Avoid for prophylaxis in severe liver disease.
Meloxicam	See NSAIDs.
Meropenem	Monitor transaminase and bilirubin concentrations.
Mesterolone	See Androgens.
Metformin	Avoid; increased risk of lactic acidosis.
Methyldopa	Manufacturer advises caution in history of liver disease; avoid in active liver disease.
Metoclopramide	Reduce dose.
Metronidazole	In severe liver disease reduce total daily dose to one-third, and give once daily.
Mainserin	See Antidepressants, Tricyclic (and related).
Miconazole	Avoid.
Morphine	See Opioid Analgesics.
Nalidixic Acid	See Quinolones.
Nandrolone	See Anabolic Steroids.
Naproxen	See NSAIDs.
Neomycin	Increased risk of ototoxicity.
Nefedipine	Reduce dose.
Nimodipine	Elimination is reduced in cirrhosis; monitor blood pressure
Nitrazepam	See Anxiolytics and Hypnotics.
Nitrofurantoin	Cholestatic jaundice and chronic active hepatitis are reported
Nitroprusside	Avoid in severe liver disease.
Norethisterone	See Progesterone.
Norfloxacin	See Quinolones.
Norgestrel	See Progesterone.
Nortriptyline	See Antidepressants, Tricyclic.
NSAIDs	Increased risk of gastro-intestinal bleeding and can cause fluid retention; avoid in severe liver disease; aceclofenac; use initially 100 mg daily; rofecoxib max 12.5 mg daily in mild impairment.
Oestrogens	Avoid; See also Contraceptives (Oral).
Ofloxacin	See Quinolones.
Olanzapine	Consider initial dose of 5mg daily.
Omeprazole	Not more than 20 mg daily should be used.
Ondasetron	Reduce dose; use not more than 8 mg daily in severe liver disease.
Opioid Analgesics	Avoid or reduce dose, may precipitate coma.

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Oxazepam	See Anxiolytics and Hypnotics.
Oxcarbazepine	No dosage adjustment required in mild to moderate impairment; no information in severe impairment
Oxprenolol	Reduce dose.
Oxytetracycline	See Tetracyclines.
Paclitaxel	Avoid in severe liver disease.
Pancuronium	Possibly slower onset, higher dose requirement and prolonged recovery time.
Paracetamol	Dose-related toxicity; avoid large doses.
Pentazocine	See Opioid Analgesics.
Pethidine	See Opioids Analgesics.
Pheniramine	Sedation inappropriate in severe liver disease, avoid.
Phenobarbital	May precipitate coma.
Phenytoin	Reduce dose to avoid toxicity.
Pholcodine	See Opioids Analgesics.
Pilocarpine	Reduce initial oral dose in moderate or severe cirrhosis.
Piracetam	Avoid.
Piroxicam	See NSAIDs.
Prazosin	Initial 500 microgram daily dose can be increased with caution.
Prednisolone	Side-effects are more common.
Prochlorperazine	See Antipsychotics.
Progesterone	Avoid.
Promethazine	Avoid; may precipitate coma in severe liver disease; hepatotoxic.
Propranolol	Reduce dose.
Propylthiouracil	May cause chronic active hepatitis
Pyrazinamide	Avoid; idiosyncratic hepatotoxicity is more common.
Quinolones	Hepatitis with necrosis is reported with ciprofloxacin; hepatitis is also reported for norfloxacin; nalidixic acid is partially conjugated in liver; reduce dose of ofloxacin in severe liver disease.
Ranitidine	Increased risk of confusion; reduce dose.
Rifampicin	Impaired elimination; may increase risk of hepatotoxicity; avoid or do not exceed 8 mg/kg daily.
Risperidone	Manufacturer advises initial dose of 500 micrograms twice daily; stepwise increase of dose to 1-2 mg twice daily is possible.
Rivastigmine	No information available;-manufacturer advises avoid in severe liver disease.
Rofecoxib	See NSAIDs.
Saquinavir	Plasma concentration is possibly increased; manufacturer advises caution with zidovudine (Zidovudine) in moderate impairment; avoid zidovudine in severe impairment.
Sertraline	See Antidepressants, SSRI.
Simvastatin	See Statins.
Sodium aurothiomalate	See Gold.
Sodium Fusidate	See Fusidic Acid.
Sodium Nitroprusside	See Nitroprusside.
Sodium Valproate	See Valproate.
Statins	Avoid in active liver disease or unexplained persistent elevations in serum transaminases.

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Sulindac	See NSAIDs.
Sulpiride	See Antipsychotics.
Sulfonamides	Increased risk of chronic hepatitis; AIDS patients are more sensitive
Sulphonylureas	Increased risk of hypoglycemia in severe liver disease; avoid or use small dose; can produce jaundice.
Suxamethonium	Prolongd apnoea may occur in severe liver disease due to reduced hepatic synthesis of pseudocholinesterase.
Tenoxicam	See NSAIDs.
Terbinafine	Reduce dose.
Testosterone	See Androgens.
Tetracyclines	Avoid (or use with caution).
Theophylline	Reduce dose.
Thiazides	Avoid in severe liver disease; hypokalaemia may precipitate coma (potassium sparing diuretic can prevent); increased risk of hypomagnesaemia in alcoholic cirrhosis.
Thiopental	Reduce dose for induction in severe liver disease.
Thioridazine	See Antipsychotics.
Ticlopidine	Manufacturer advises caution; discontinue if hepatitis or jaundice develop.
Tramadol	See Opioid Analgesics.
Tretinoin (Oral)	Reduce dose.
Trifluoperazine	See Antipsychotics.
Trimipramine	See Antidepressants, Tricyclic.
Valproate	Avoid if possible, hepatotoxicity and liver failure may occasionally occur.
Valsartan	Halve dose in mild to moderate hepatic impairment; avoid if severe.
Verapamil	Reduce oral dose.
Vinblastine	Dose reduction may be necessary.
Vincristine	Dose reduction may be necessary.
Warfarin	See Anticoagulants, oral.
Zafirlukast	Manufacturer advises avoid in liver diseases.
Zalcitabine	Further impairment of liver function may occur.
Zaleplon	See Anxiolytics and Hypnotics.
Zidovudine	Accumulation may occur.
Zopiclone	See Anxiolytics and Hypnotics.
Zuclopenthixol	See Antipsychotics.

Appendix- 4

RENAL IMPAIRMENT

Kidney is an important organ in regulating body fluid levels, electrolyte balance and removal of metabolic waste products and drugs (intact and/or metabolites) from the body.

Renal impairment or renal failure (chronic and acute) is a reduced functional activity of kidney. Some common causes or renal impairment are pyelonephritis, hypertension, diabetes mellitus, nephrotoxic drugs/metals, hypovolemia or hypoperfusion and nephroallergens.

Problems faced by renal impaired patient on drugs :

As most of the drugs and their metabolites have to encounter kidney prior to excretion from the body, the rate and extent of their excretion from the body largely depend on the functional activity of the kidney. Therefore a patient with reduced renal function (renal insufficiency) develops primarily accumulation of drugs and or metabolites (inactive or active) or both in his/her body and eventually gets exposed to the following problems:

- Accumulation of drugs and / or its metabolites may produce toxicity.
- Sensitivity to some drugs may be increased.
- Poor tolerance to many common and new side-effects.
- Reduction in efficacy of some drugs.

However many of the before mentioned problems can be avoided by simply adjusting (reducing) the dose or using an alternative drug which is therapeutic equivalent.

Diagnosis and assessment of renal failure:

Renal function is indicated by Glomerular Filtration Rate (GFR), which is in turn clinically measured by the creatinine clearance or blood urea nitrogen (BUN) levels. The serum creatinine concentration provides only a rough guide for the assessment of renal impairment unless corrected for age, weight and sex. For prescribing purpose, renal impairment is divided into five stages of chronic kidney disease and GRF including :

Stages	Grade	GFR	Serum Creatinine level
Normal	No protein in the urine	90-130 mL/min/ 1.73m ²	Men: 0.6–1.2 (mg/100mL) Women: 0.5–1.1 mg/100mL Child: 0.3–0.7 mg/100mL
Stage 1	Protein in the urine	> 90 mL/min/ 1.73m ²	1.2-1.5 (mg/100mL), men
Stage 2	Mild CKD	60-89 mL/min/ 1.73m ²	1.6-2.8 (mg/100mL), men
Stage 3A	Moderate CKD	45-59 mL/min/ 1.73m ²	2.9 -3.9 (mg/100mL), men
Stage 3B	Moderate CKD	30-44 mL/min/ 1.73m ²	4.0-5. 0 (mg/100mL), men
Stage 4	Severe CKD	15-29 mL/min/ 1.73m ²	5.1-7.5 (mg/100mL), men
Stage 5	End Stage Renal Disease (ESRD)	<15 mL/min/ 1.73m ²	7.6 (mg/100mL) and above, men

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Principles of dose adjustment in renal impairment :

Alteration in renal clearance of drugs in renal impairment is by far the most important parameter to consider while making dosage calculation. In clinical practice the estimation of the appropriate drug dosage regimen in renally impaired patient is primarily focused on the remaining renal function of the patient and a prediction of the total body clearance (Cl_T). The loading dose of a drug is based on apparent volume of distribution (V_D) of the patient. Generally, drugs in patients with uremia or kidney impairment have prolonged elimination half-lives and a change in the apparent volume of distribution. But practically the apparent volume of distribution of drug in renally impaired patient is assumed to be same as that of normal patients. Consequently, the methods for dose adjustment in renally impaired patients are based on an accurate estimation of the drug clearance in these patients.

The maintenance dose is based on the clearance of the drug in the patient and hence it has to be individualized for such patients. Generally two pharmacokinetic approaches for dosage adjustment in clinical situation have been used monitoring kidney function which includes:-

a) dosage adjustment method based on drug clearance-

To maintain the same desired C_{av}^u , the dose must change to D_0^u or the dosage interval must change to τ^u , as shown in the following equation.

$$C_{av}^u = D_0^N / Cl_T^N \cdot \tau^N = D_0^R / Cl_T^R \cdot \tau^R \dots (i)$$

(normal) (renally impaired)

$$D_0^R = D_0^N \times \frac{Cl_T^R \cdot \tau^R}{Cl_T^N \cdot \tau^N}$$

Where,

- C_{av}^u = average plasma concentration
- D_0^R = dose for renally impaired patient
- D_0^N = dose for normal patient
- Cl_T^R = Clearance for renally impaired patient
- Cl_T^N = Clearance for normal patient
- τ^R = Dosing interval for renal impaired patient
- τ^N = Dosing interval for normal patient

If dosing interval (τ) is kept unchanged ($\tau^R = \tau^N$), the adjusted dose of renally impaired patients (D_0^R) will be equal to a fraction (Cl_T^R / Cl_T^N) of the normal dose, as shown in the equation-

$$D_0^R = D_0^N \times \frac{Cl_T^R}{Cl_T^N} \dots \dots \dots (ii)$$

b) dosage adjustment method based on changes in drug elimination rate constant-

The overall elimination rate constant for many drugs is reduced in the renally impaired patients. A dosage regimen may be designed for such renally impaired patients either

1. by reducing the normal dose of the drug and keeping the frequency of dosing or dosage interval (τ) constant or
2. by decreasing the frequency of dosing (prolong the dosage interval) and keeping the dose constant.

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According to above equations, keeping dosing interval (τ) unchanged ($\tau^R = \tau^N$), the usual approach to estimate a multiple-dosage regimen in the renally impaired patients the maintenance dose will be-

$$D_0^R = D_0^N \times \frac{Cl_T^R}{Cl_T^N} \dots\dots\dots (ii)$$

Putting the $Cl_T = K \cdot V_D$ in both normal and renally impaired patients the equation is -

$$D_0^R = D_0^N \times \frac{K_R \cdot V_D^R}{K_N \cdot V_D^N}$$

Where,

- K_N = elimination rate constant of normal patient
- K_R = elimination rate constant of renally impaired patient
- V_D^N = volume of distribution of normal patient
- V_D^R = volume of distribution of renally impaired patient

Assuming V_D is same in both normal and uremic patients, the uremic dose D_0^u is a fraction (k^R/k^N) of the normal dose-

$$D_0^R = D_0^N \times \frac{K_R}{K_N} \dots\dots\dots (iv)$$

N.B.: Drugs with known nephrotoxicity should be, if possible, avoided in patients with renal failure or disease.

Drugs	Degree of Impairment	Comment
Acarbose	Moderate to severe	Avoid; no information available.
Acebutolol	Mild to moderate	See Beta-blockers.
Acetazolamide	Mild	Avoid; metabolic acidosis.
Aciclovir	Moderate to severe	Reduce intravenous dose.
Acrivastine	Moderate	Avoid; excreted by kidney.
ACE inhibitor	Mild to moderate	Use with caution and monitor response. Hyperkalemia and other side-effects more common. Captopril :12.5 mg b.i.d. Cilazapril: 500 microgm once daily. Enalapril: 2.5 mg once daily. Imidapril: 2.5 mg once daily. Moexipril: 3.75 mg once daily. Perindopril: 2 mg once daily. Quinapril: 2.5 mg once daily. Ramipril: 1.25 mg once daily. Trandorapril: 500 micrograms daily.
Alprazolam	Severe	See Anxiolytics and Hypnotics.
Amikacin	Mild	See Aminoglycosides.
Aminoglycosides	Mild	Reduce dose and monitor plasma concentrations.
Amoxicillin	Severe	Reduce dose; rashes more common.
Ampicillin	Severe	Reduce dose; rashes more common.

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Anxiolytics and hypnotics	Severe	Start with small dose; increased cerebral sensitivity.
Anti psychotics	Severe	Start with small doses; increased cerebral sensitivity.
Aspirin	Severe	Avoid; sodium and water retention; deterioration in renal function; increased risk of gastro-intestinal bleeding.
Atenolol	Mild, Moderate	See Beta Blockers.
Azithromycin	Moderate	No information available
Balsalazide	Moderate	Avoid.
Beta-Blockers	Mild, moderate	Start with 2.5 mg of nebivolol.
		Start with small dose; acebutolol reduce dose of atenolol, nadolol, pindolol, sotalol.
		All excreted unchanged.
	Severe	Start with small dose; higher plasma concentrations after oral administration; may reduce renal blood flow and adversely affect renal function in severe impairment.
Bendrofluazide		See Thiazide.
Betaxolol		See Beta Blockers.
Bleomycin	Moderate	Reduce dose.
Bromazepam		See Anxiolytics and Hypnotics.
Captopril		See ACE Inhibitors.
Carbamazepine		Take caution.
Cefalexin	Severe	Max. 500 mg daily.
Cefazolin	Mild	Reduce dose.
Cefotaxime	Severe	Use half dose.
Ceftazidime	Mild	Reduce dose.
Ceftriaxone	Severe	Reduce dose; also monitor plasma concentration if both severe renal and hepatic impairment.
Cefuroxime	Moderate to Severe	Reduce parenteral dose.
Celecoxib		See NSAIDs.
Cetirizine	Moderate	Use half dose.
Chloramphenicol	Severe	Avoid unless no alternative; dose-related depression of haematopoiesis.
Chloroquine	Mild to Moderate Severe	Reduce dose.
		Avoid (but for malaria prophylaxis adjust dose).
Chlorpromazine		See Antipsychotics.
Chlorpropamide		Avoid.
Chlortetracycline		See Tetracyclines.
Cilazapril		See ACE Inhibitors.
Cimetidine	Mild to Moderate	600-800 mg daily; occasional risk of confusion
	Severe	400 mg daily.
Ciprofloxacin	Moderate	Use half dose.
Cisplatin	Mild	Avoid if possible; nephrotoxic and neurotoxic.
Clarithromycin	Moderate	Use half dose.

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Clavulanic Acid	to Severe	neurotoxic. See Coamoxiclav.
Clobazam		See Anxiolytics and Hypnotics.
Clozapine	Mild to Moderate	Initial dose 12.5 mg daily.
Cotrimoxazole	Moderate	Reduce dose; rashes and blood disorder may cause further deterioration in renal function.
Cyclophosphamide		Reduce dose.
Cyclosporin		See Ciclosporin.
Dalteparin		See Heparin.
Dextromethorphan		See Opioid Analgesics.
Diazepam		See Anxiolytics and Hypnotics.
Diclofenac		See NSAIDs.
Digoxin	Mild	Reduce dose; toxicity increased by electrolyte disturbances.
Disopyramide	Mild	100 mg every 8 hours or 150 mg every 12 hours.
	Moderate	100 mg every 12 hours.
	Severe	150 mg every 24 hours.
Doxycycline		See Tetracyclines.
Droperidol		See Antipsychotics.
Enalapril		See ACE Inhibitors.
Ergometrine	Severe	Avoid.
Ergotamine	Moderate	Avoid; nausea and vomiting; risk of renal vasoconstriction.
Erythromycin	Severe	Max. 1.5 gm daily (ototoxicity).
Ethambutol	Mild	Reduce dose; if creatinine clearance less than 30 ml/minute; monitor plasma ethambutol concentration; optic nerve damage.
Famotidine	Severe	Reduce dose.
Fenoprofen		See NSAIDs.
Flucloxacillin	Severe	Reduce dose.
Fluconazole	Mild to Moderate	Usual initial dose then halve the subsequent doses.
Fluoxetine	Mild to Moderate	Reduce dose (give on alternate days).
	Severe	Avoid.
Flupenthixol		See Antipsychotics.
Fluphenazine		See Antipsychotics.
Flurazepam		See Anxiolytics and Hypnotics.
Fluvastatin	Severe	Avoid.
Fosinopril		See ACE Inhibitors.
Floxacin	Mild	Usual initial dose, then use half dose.
	Moderate	Usual initial dose, then 100 mg every 24 hours.
Frusemide		See Furosemide.
Gallamide	Moderate	Avoid; prolonged paralysis.
Gemfibrozil	Severe	Start with 900 mg daily.
Gentamicin		See Aminoglycosides.
Glimepiride	Severe	Avoid.
Glipizide	Mild to moderate	Increased risk of hypoglycaemia; avoid if hepatic impairment also present.

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Haloperidol	Severe	Avoid.
Heparin	Severe	See Antipsychotics. Risk of bleeding increased.
Hydrochlorothiazide		See Thiazides.
Ibuprofen		See NSAIDs.
Ifosfamide	Mild	Avoid if serum creatinine concentration greater than 120 µmol/litre.
Imidapril		See ACE Inhibitors.
Indapamide		See Thiazides.
Indometacin		See NSAIDs.
Insulin	Severe	May need dose reduction; insulin requirements fall; compensatory response to hypoglycaemia is impaired.
Interferon alfa	Mild to Moderate	Close monitoring required.
Interferon beta	Severe	Avoid. No information available-monitoring advised.
Irinotecan		No information available.
Isoniazid	Severe	Max. 200 mg daily; peripheral neuropathy.
Isotretinoin	Mild	Avoid; Increased risk of toxicity
Itraconazole		Bioavailability possibly reduced.
Kanamycin		See Aminoglycosides.
Ketoprofen		See NSAIDs.
Ketorolac		See NSAIDs.
Lamotrigine	Moderate to Severe	Metabolite may accumulate.
Lamivudine	Mild	Reduce dose; consult product literature.
Lisinopril		See ACE Inhibitors.
Lithium	Mild	Avoid if possible or reduce dose and monitor plasma concentration carefully.
Lorazepam		See Anxiolytics and Hypnotics.
Losartan	Moderate to Severe	Start with 25 mg once daily.
Mefenamic Acid		See NSAIDs.
Meloxicam		See NSAIDs.
Melphalan		Reduce dose initially; avoid high doses in moderate to severe impairment.
Mercaptopurine	Moderate	Reduce dose.
Meropenem	Mild	Increase dose interval to every 12 hours.
Metformin	Mild	Avoid; increased risk if lactic acidosis.
Methyldopa	Moderate	Start with small dose; increased sensitivity to hypotensive and sedative effect.
Metoclopramide	Severe	Avoid or use small dose; increased risk of extrapyramidal reactions.
Metoprolol		See Beta Blockers.

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Midazolam		See Anxiolytics and Hypnotics.
Morphine		See Opioid Analgesics.
Naproxen		See NSAIDs.
Neomycin	Mild	Avoid; ototoxic; nephrotoxic.
Neostigmine	Moderate	May need dose reduction.
Netilmicin		See Aminoglycosides.
Nicotine	Severe	May affect clearance of nicotine or its metabolites.
Nitrazepam		See Anxiolytics and Hypnotics.
Nitrofurantoin	Mild	Avoid; peripheral neuropathy; ineffective because of inadequate urine concentrations
Norfloxacin	Mild to Moderate	Halve dose if creatinine clearance less than 30 ml/minute.
NSAIDs	Mild	Use lowest effective dose and monitor renal function; sodium and water retention ; deterioration in renal function possibly leading to renal failure; deterioration also reported after topical use.
	Moderate to Severe	Avoid if possible.
Olanzapine		Consider initial dose of 5 mg daily.
Oxazepam		See Anxiolytics and Hypnotics.
Oxytetracycline		See Tetracyclines.
Pancuronium	Severe	Prolonged duration of block.
Penicillamine	Mild	Avoid if possible or reduce dose; nephrotoxic.
Pentazocine		See Opioid Analgesics.
Pentoxifylline (oxpentifylline)	Mild	Reduce dose by 30-50% if creatinine clearance less than 30 ml/minute.
Pethidine		See Opioid Analgesics.
Pholcodine		See Opioid Analgesics.
Pilocarpine		Caution with tablets.
Pindolol		See Beta blockers.
Pipotiazine		See Antipsychotics.
Piroxicam		See NSAIDs.
Povidone Iodine	Severe	Avoid regular application to inflamed or broken mucosa.
Prazosin	Moderate to Severe	Initially 500 microgram daily; increase with caution.
Procarbazine	Moderate	Reduce dose.
Prochlorperazine		See Antipsychotics.
Promazine		See Antipsychotics.
Propranolol		See Beta Blockers.
Pseudoephedrine	Severe	Avoid; increased CNS toxicity.
Quinine		Reduce parenteral maintenance dose for malaria treatment.
Ramipril		See ACE Inhibitors.
Ranitidine	Severe	Use half normal dose; occasional risk of confusion.
Risperidone		Initial dose of 500 micrograms twice daily increased in steps of 500 micrograms twice daily to 1-2

APPENDIX 4 : RENAL IMPAIRMENT

Rofecoxib		mg twice daily. See NSAIDs.
Simvastatin	Moderate to Severe	Doses above 10 mg daily should be used with caution.
Sodium Bicarbonate	Severe	Avoid; specialised role in some forms of renal disease.
Sodium Clodronate		See Clodronate Sodium.
Sodium Nitroprusside		See Nitroprusside.
Sodium Salts	Severe	Avoid.
Sodium valproate		See Valproate.
Spirolactone		See Diuretics, potassium-sparing.
Sucralfate	Severe	Avoid; aluminium is absorbed and may accumulate.
Sulfadiazine	Severe	Avoid; high risk of crystalluria.
Sulfasalazine	Moderate	Risk of toxicity including .
	Severe	crystalluria-ensure high fluid intake
	Moderate	Avoid.
Sulpiride		Avoid if possible, or reduce dose.
Tenoxicam		See NSAIDs.
Terbinafine	Mild	Use half normal dose.
Tetracycline (except doxycycline and minocycline mild)		Avoid, use doxycycline or minocycline if necessary; anti-anabolic effect, increased plasma urea, further deterioration in renal function.
Thiazides and related diuretics	Moderate	Avoid; ineffective (metolazone remains effective but risk of excessive diuresis).
Timolol		See Beta blockers.
Tobramycin		See Aminoglycosides.
Tramadol		See Opioid Analgesics.
Triamterene		See Diuretics, potassium-sparing.
Trimethoprim	Moderate	Reduce dose.
Valsartan	Moderate to Severe	Start with 40 mg once daily.
Warfarin		See Anticoagulants, Oral.
Zafirlukast	Moderate to Severe	Caution to be taken.
Zalcitabine	Mild to Moderate	750 micrograms every 12 hours.
	Severe	750 micrograms daily.
Zidovudine	Severe	Reduce dose; manufacturer advises oral dose of 300-400 mg daily.
Zopiclone		See Anxiolytics and Hypnotics.
Zuclopenthixol		See Antipsychotics.

Fluids/Solutions used in Haemodialysis

Acetic Acid 0.469 % + Calcium Chloride 1.008 % + Magnesium Chloride 0.754 % + Potassium Chloride 0.554 % + Sodium Chloride 21.968 %

Proprietary Preparations

Not Available in the market

APPENDIX 4 : RENAL IMPAIRMENT

Dextrose Anhydrous 7 % + Sodium Chloride 0.561 %

Proprietary Preparations

Not available in the market

Calcium Chloride 9 mg + Dextrose Anhydrous 70 mg + Magnesium Chloride 1.189 mg + Potassium Chloride 594.57 mg + Sodium Acetate 0.03 mg + Sodium Chloride 5.94 mg in 100 mL

Proprietary Preparations

Not available in the market

Calcium Chloride 22 mg + Dextrose Anhydrous 1.5 gm + Magnesium Chloride 15 mg + Potassium Chloride 22 mg + Sodium Acetate 476 mg + Sodium Chloride 556 mg in 100 mL

Proprietary Preparations

Not available in the market

Calcium Chloride 257 mg + Dextrose Anhydrous 3.86 gm + Magnesium Chloride 15.2 mg + Sodium Acetate 369 mg + Sodium Chloride 561 mg in 100 mL

Proprietary Preparations

Not available in the market.

Calcium Chloride 9.74 gm + Glacial Acetic Acid 8.84 gm + Magnesium Chloride 3.74 gm + Potassium Chloride 5.50 gm + Sodium Chloride 161.43 gm in 1000 mL

Proprietary Preparations

Dialyte-A 10L; Maximum retail price: Tk. 450.87/=; Popular Pharmaceuticals Ltd
Renal Care –A 10L, MRP: Tk. 409.93/=; Greenland Pharmaceuticals Ltd

Calcium Chloride Dihydrate 5.14 gm + Magnesium Chloride 3.56 gm + Potassium Chloride 5.2 gm + Sodium Acetate 181.01+ Sodium Chloride 198.4gm in 1000 mL

Proprietary Preparations

Dialyte-AC 10L; Maximum retail price: Tk. 490.29/=; Popular Pharmaceuticals Ltd
Renal Care-AC 10L; MRP: Tk. 462.26/=; Greenland Pharmaceuticals Ltd

Sodium Bicarbonate 66 gm + Sodium Chloride 30.5 gm in 1000 mL

Proprietary Preparations

Renal Care-B; Retail price: Tk. 358.93/= for 10L solution, Popular Pharmaceuticals Ltd
Renal Care-B 10L; MRP: Tk. 327.07/= Greenland Pharmaceuticals Ltd

Appendix- 5

PREGNANCY

When prescribing it should be kept in mind that drugs can have harmful effects on the embryo or fetus at any time during pregnancy, so the expected benefit to the mother must be greater than the risk to the fetus. Drugs that have been extensively used in pregnancy and appear to be usually safe should be prescribed in preference to new or untried drugs. Lists of drugs are mentioned below that should be avoided or used with caution in pregnancy. Absence of a drug from the list does not imply safety.

The US FDA has divided all the drugs in 6 categories depending upon the studies undertaken on human and animal, which are much good implication of safety and easier to understand, so FDA pregnancy drug category is included here for quick access. Whereas category 'A' stands for the safest drug category 'X' stands for potentially harmful drugs which must be avoided. Category 'B' and 'C' drugs have shown toxicity in animals but category 'B' has failed to prove toxicity in humans. Category 'D' drugs are dangerous.

Drugs	FDA pregnancy drug category	Comments (Trimester risks 1,2,3)
Abacavir	C	All treatment options need careful assessment.
Acamprosate calcium	C	Avoid
Acarbose	B	Avoid; insulin is substituted 1, 2, 3
Aceclofenac	D	Avoid the use of NSAIDs during pregnancy or avoid them unless the potential benefit outweighs the risk. It should be avoided during the third trimester because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn. 3
Acemetacin	D	Avoid the use of NSAIDs during pregnancy or avoid them unless the potential benefit outweighs the risk. It should be avoided during the third trimester because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn.
Acetazolamide	C	Toxicity in animal studies; avoid, especially in first trimester.
Acetylcysteine	B	Acetylcysteine is only recommended for use during pregnancy when benefit outweighs risk.

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Acetylsalicylic acid or Aspirin	D	Delayed onset and increased duration of labour with increased blood loss; avoid in last few weeks at analgesic doses; low doses probably not harmful; high doses cause closure of fetal ductus arteriosus in utero and persistent newborn. ³
Acitretin	X	Avoid—teratogenic; effective contraception must be used
Acrivastine	B	No evidence of teratogenicity except for hydroxyzine where toxicity has been reported with high doses in animal studies. The use of sedating antihistamines in the latter part of the third trimester may cause adverse effects in neonates such as irritability, paradoxical excitability and tremor.
Acyclovir	B	Use only when potential benefit outweighs the risks; limited absorption from topical preparations.
Adefovir dipivoxil	C	Toxicity in animal studies , use only if potential benefit outweighs risk; effective contraception needed during treatment
Adenosine	C	Large doses may produce fetal toxicity; use only if potential benefit outweighs risk.
Adrenaline	C	May reduce placental perfusion and can delay 2nd stage of labour; use only if benefit outweighs risk
Agomelatine		Avoid
Albendazole	C	Should not be used in pregnant women except in clinical circumstances where no alternative management is appropriate.
Alcohol		Regular intake is teratogenic (fetal alcohol syndrome) and may cause growth retardation. Withdrawal syndrome may occur in babies of alcoholic mother. 1, 2, 3
Alendronate sodium	C	Avoid.
Alendronic acid	C	Avoid.
Alfuzosin	B	Alfuzosin should only be given during pregnancy when need has been clearly established.
Aliskiren	D	Avoid, no information available; other drugs acting on the renin-angiotensin system have been associated with fetal malformations and neonatal death.
Allopurinol	C	Avoid; use only when there is no alternative and disease carries risk for mother or child. 3

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Allystrenol	C	Use only when potential benefit outweighs the risks;
Almotriptan	C	Limited experience of using 5HT ₁ -receptor agonists during pregnancy; they should be avoided unless the potential benefit outweighs the risk.
Alprazolam	D	Avoid (during late pregnancy or labour, high doses may cause neonatal hypothermia, hypotonia and respiratory depression). 1,2,3
Alverine citrate		Use with caution.
Amantadine	C	Avoid; toxicity in animal studies.
Ambrisentan	X	Avoid (teratogenic in animal studies); exclude pregnancy before treatment and ensure effective contraception during treatment; monthly pregnancy tests advised.
Amikacin	D	Chance of damage of 8 th cranial nerve; if prescribed then monitor plasma concentration. 2,3
Amiloride	B	Avoid. 1,2,3
Aminocaproic acid	C	Aminocaproic acid is only recommended for use during pregnancy when benefit outweighs risk.
Aminophylline	C	Asthma should be well controlled during pregnancy.
Amiodarone	D	Possible risk of neonatal goitre; use only if no alternative is available.
Amitriptyline	C	Use only if potential benefit outweighs risk
Amlenox	B	Should be used during pregnancy only if clearly needed.
Amlodipine	C	Avoid, but risk to fetus should be balanced against risk of uncontrolled maternal hypertension.
Amoxicillin	B	Not known to be harmful
Amphotericin	B	Avoid unless potential benefit outweighs risk.
Anastrozol	D	Avoid.
Aprepitant	B	Avoid unless potential benefit outweighs risk.
Aripiprazole	C	Use only if potential benefit outweighs risk.
Artemether with lumefantrine	C	Toxicity in animal studies with artemether; use only if potential benefit outweighs risk.

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Artesunate		Use only if potential benefit outweighs risk.
Asenapine	C	Use only if potential benefit outweighs risk, toxicity in animal studies.
Atenolol & acebutolol	D	Cause intrauterine growth retardation, neonatal hypoglycemia and bradycardia. ³
Atomoxetine	C	Avoid unless potential benefit outweighs risk.
Atorvastatin	X	Should be avoided in pregnancy as congenital anomalies have been reported and the decreased synthesis of cholesterol possibly affects fetal development. Adequate contraception is required during treatment and for 1 month afterwards.
Atracurium	C	Avoid unless benefit outweighs risk. There may be fetal distress (slower to start breathing) ^{1,2}
Atropine	C	Prescribe with caution.
Azathioprine	C	Treatment should not generally be initiated during pregnancy. Transplant patients immuno-suppressed with this drug should not be discontinued if not becoming pregnant; intra-uterine growth retardation; there is on evidence that this drug is teratogenic. (see cytotoxic drugs) ^{1,2,3}
Azelaic Acid	B	Should only be used during pregnancy when need has been clearly established.
Azilsartan medoxomil	C	Should be avoided in pregnancy unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydranios have also been reported.
Azithromycin	B	No adverse fetal outcomes were reported.
Aztreonam	B	Avoid unless essential.
Bacitracin	C	Potential benefits may warrant use of the drug in pregnant women despite potential risks.
Baclofen	C	Potential benefits may warrant use of the drug in pregnant women despite potential risks.
Bambuterol	C	Asthma should be well controlled during pregnancy.
Beclometasone dipropionate	C	Asthma should be well controlled during pregnancy.

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Benzalkonium Chloride	N	Prescribe with caution.
Benzocaine	C	Benzocaine topical is only recommended for use during pregnancy when benefit outweighs risk.
Betahistine hydrochloride	B	Manufacturers advise to avoid.
Betaine	C	Avoid; manufacturer advises effective contraception during and for at least 1 month after treatment in men or women.
Betamethasone	C	Transient effect on fetal movements and heart rate.
Betaxolol	C	Use when benefit outweighs risk.
Bevacizumab	C	Avoid, toxicity in animal studies; effective contraception required during and for at least 6months after treatment in women.
Bimatoprost	C	Use only if potential benefit outweighs risk.
Bisacodyl	B	Animal studies have failed to reveal evidence of teratogenicity or fetotoxicity.
Bismuth subcitrate/subsali cylate	X	Avoid.
Bisoprolol fumarate	C	Beta-blockers may cause intra-uterine growth restriction, neonatal hypoglycaemia, and bradycardia; the risk is greater in severe hypertension. If beta-blockers are used close to delivery, infants should be monitored for signs of beta-blockade.(and alpha-blockade with labetalol or carvedilol).
Bosentan	X	Avoid (teratogenic in animal studies); effective contraception required during administration (hormonal contraception not considered effective); monthly pregnancy tests are advised.
Bromazepam	D	Prescribe with caution; discourage regular use; high doses during late pregnancy or labour may cause neonatal hypothermia, hypotonia and respiratory depression.
Brimonidine tartrate	B	Use only if benefit outweighs risk.
Brinzolamide	C	Avoid; toxicity in animal studies.
Bromfenac	C	Should be avoided during late pregnancy.
Bromocriptine	B	Exclude pregnancy before starting and discontinue 1 month before intended

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		conception (ovulatory cycles persist for 6 months), discontinue if pregnancy occurs during treatment (specialist advice needed).
Budesonide	B,C	Transient effect on fetal movements and heart rate.
Bumetanide	C	Avoid, should not be used to treat gestational hypertension because of the maternal hypovolemia associated with this condition.
Bupivacaine	C	Large doses during delivery can cause neonatal respiratory depression, hypotonia, and bradycardia after epidural block; use lower doses for intrathecal use during late pregnancy.
Buprenorphine	C	Acute withdrawal of opioids should be avoided in pregnancy because it can cause fetal death. Opioid substitution therapy is recommended during pregnancy because it carries a lower risk to the fetus than continued use of illicit drugs.
Bupropion hydrochloride	C	Manufacturer advises avoid.
Buspirone hydrochloride	B	Manufacturer advises avoid.
Busulphan	D	Avoid; toxicity in animal studies; effective contraceptive measure must be taken during administration in women.
Butenafine	B	Use only if benefit outweighs risk.
Cabergoline	D	Exclude pregnancy before starting and discontinue 1 month before intended conception (ovulatory cycles persist for 6 months), discontinue if pregnancy occurs during treatment (specialist advice needed).
Calcipotriol	C	Avoid if possible.
Calcitonin	C	Avoid unless benefit outweighs risk; toxicity in animal studies.
Candesartan cilexetil	D	Should be avoided in pregnancy unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydramnios have also been reported.
Capecitabine	D	Women of childbearing potential be advised to avoid becoming pregnant while receiving treatment with it.
Capsaicin	B	Should be used during pregnancy only when benefit outweighs risk.
Captopril	D	Avoid; may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydramnios;

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		toxicity in animal studies. 1, 2, 3
Carbamazepine	D	Teratogenic; increased risk of neural tube defects if used in first trimester; neonatal bleeding if used in third trimester. 1, 3
Carbimazole		Neonatal goitre and hypothyroidism if used in second or third trimester 2,3
Carbocysteine		Avoid. 1
Carboplatin	D	Avoid.
Carvedilol	C	Beta-blockers may cause intra-uterine growth restriction, neonatal hypoglycaemia, and bradycardia; the risk is greater in severe hypertension. Information on the safety of carvedilol during pregnancy is lacking. If beta-blockers are used close to delivery, infants should be monitored for signs of beta-blockade (and alpha-blockade with labetalol or carvedilol).
Cefaclor	B	Not known to be harmful.
Cefadroxil	B	Not known to be harmful.
Cefdinir	B	Should be given during pregnancy only if need is clearly established.
Cefditoren	B	Recommended for use during pregnancy when benefit outweighs risk.
Cefepime	B	Should only be given in pregnancy when the need has been clearly established.
Cefotaxime	B	Should be given during pregnancy only if need is clearly established.
Cefoxitin	B	Should be given during pregnancy only if need is clearly established.
Cefpodoxime	B	Should only be given in pregnancy when the need has been clearly established.
Cefprozil	B	Recommended for use during pregnancy when benefit outweighs risk.
Ceftazidime	B	Should only be given in pregnancy when the need has been clearly established.
Ceftriaxone	B	Should only be given in pregnancy when the need has been clearly established.
Cefuroxime	B	Manufacturers advise to avoid.
Celecoxib	D	Avoid (teratogenic in animal studies).

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Celiprolol hydrochloride	C	Should not be used to treat gestational hypertension. They may cause neonatal thrombocytopenia, bone marrow suppression, jaundice, electrolyte disturbances, and hypoglycaemia; placental perfusion may also be reduced. Stimulation of labour, uterine inertia, and meconium staining have also been reported.
Cephalexin	B	Should only be given in pregnancy when the need has been clearly established.
Cephadrine	B	Should only be given in pregnancy when the need has been clearly established.
Cetirizine hydrochloride	B	No evidence of teratogenicity except for hydroxyzine where toxicity has been reported with high doses in animal studies. The use of sedating antihistamines in the latter part of the third trimester may cause adverse effects in neonates such as irritability, paradoxical excitability and tremor.
Cetrimide	B	Not known to do any harm.
Chloramphenicol	C	Avoid; Grey baby syndrome may occur. 3
Chlorhexidine gluconate	B	Should only be given in pregnancy when the need has been clearly established.
Chloroquine phosphate	N	Prescribe with caution; potential teratogenic effect; for malaria if benefit outweighs risk. 1,3
Chloroxylenol	C	Use during pregnancy when benefit outweighs risk.
Chlorpheniramine maleate	B	No evidence of teratogenicity except for hydroxyzine where toxicity has been reported with high doses in animal studies. The use of sedating antihistamines in the latter part of the third trimester may cause adverse effects in neonates such as irritability, paradoxical excitability and tremor.
Chlorpromazine	C	Prescribe with caution; possibility of lethargy an extrapyramidal effect due to slow elimination. 3
Chlorpromazine hydrochloride	C	Extrapyramidal effects and withdrawal syndrome have been reported occasionally in the neonate when antipsychotic drugs are taken during the third trimester of pregnancy. Following maternal use of antipsychotic drugs in the third trimester, neonates should be monitored for symptoms including agitation, hypertonia, hypotonia, tremor, drowsiness, feeding

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		problems, and respiratory distress.
Chlorambucil	D	Avoid; effective contraceptive measure must be taken during administration.
Chlortetracycline	B	Should be used only if benefit outweighs risk.
Chlorthalidone	B	Should not be used, may cause neonatal thrombocytopenia, bone marrow suppression, jaundice, electrolyte disturbances and hypoglycaemia.
Ciclesonide	C	Only recommended for use during pregnancy when there are no alternatives.
Cilastatin	C	Should be used only if benefit outweighs risk.
Cilostazol	C	An increase in the incidence of stillbirth and of cardiovascular, renal, and skeletal defects has been reported in animal. Should be used only if benefit outweighs risk.
Cimetidine	B	Avoid unless benefit outweighs risk.
Cinacalcet	C	Patient taking the drug should be under observation.
Cinnarizine	C	Most manufacturers of antihistamines advise avoiding their use during pregnancy; however there is no evidence of teratogenicity. The use of sedating antihistamines in the latter part of the third trimester may cause adverse effects in neonates such as irritability , paradoxical excitability , and tremor.
Ciprofloxacin	C	Prescribe with caution; 1, 2, 3
Cisatracurium	B	Non-depolarising neuromuscular blocking drugs are highly ionised at physiological pH and are therefore unlikely to cross the placenta in significant amounts. Contact with physician before use.
Cisplatin	D	Avoid; toxicity in animal studies.
Citalopram	C	SSRIs should not be used during pregnancy unless the potential benefit outweighs the risk. There is small increased risk of congenital heart defects when SSRIs are taken during early pregnancy. If SSRIs are of neonatal withdrawal symptoms , and persistent pulmonary hypertension in the newborn has been reported.

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Citicoline	D	Avoid.
Clarithromycin	C	Avoid unless potential benefit outweighs risk.
Clindamycin	B	Use when benefit outweighs risk.
Clioquinol	C	Potential benefits may warrant use of the drug in pregnant women despite potential risks.
Clobazam	C	Use during pregnancy when benefit outweighs risk. Avoid in late pregnancy.
Clobetasol propionate	C	Use when there are no alternatives.
Clomifene citrate	X	Exclude pregnancy before treatment; possible effects on fetal development.
Clomipramine	C	Neonatal withdrawal symptoms reported if used during third trimester.
Clonazepam	D	Risk of neonatal withdrawal symptoms when benzodiazepines are used during pregnancy. Avoid regular use and use only if a clear indication such as seizure control. High doses administered during late pregnancy or labour may cause neonatal hypothermia, hypotonia and respiratory depression.
Clonidine hydrochloride	C	Use when benefit outweighs risk.
Clopidogrel	B	Use when the need is clearly established.
Cloprostenol		Use with caution.
Clotrimazole	B	Use when established need is clearly. No proven risk in human.
Cloxacillin	B	Use when established need is clearly. No proven risk in human.
Clozapine	B	Potential benefit should outweigh the potential risk.
Colestipol hydrochloride	N	Should be used with caution as although the drugs are not absorbed, they may cause fat-soluble vitamin deficiency on prolonged use.
Colistin sulphate	C	Use only if benefit outweighs risk.
Crotamiton	C	Avoid especially during the first trimester. 1
Cyanocobalamin	C	Administer as recommended dose.

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Cyclizine	B	Use only if benefit outweighs risk. However there is no evidence of teratogenicity.
Cyclobenzaprine	B	Use of drug is not recommended unless clearly needed.
Cyclopentolate	C	Discuss with physician before use.
Cyclophosphamide	D	Avoid; evidence of embryotoxicity and fetotoxicity.
Cyclosporine	C	Evidence of toxicity in animals. Use with caution.
Cypermethrin	C	Evidence of toxicity in animals. Use with caution.
Cytarabine	D	Most of the manufacturers advises to avoid.
Danazol	X	Avoid; has weak androgenic effects and virilisation of female fetus reported.
Dactinomycin	X	Avoid; teratogenic in animal studies.
Dapsone	C	Neonatal haemolysis and methaemoglobinaemia; adequate Folate supplements should be given to mother.
Darifenacin	C	Only recommended for use during pregnancy when benefit outweighs risk.
Daunorubicin	D	Avoid; teratogenic and carcinogenic in animal studies.
Deferasirox	B	Use only when the need is established.
Deferiprone	D	Women of reproductive potential should be advised to avoid pregnancy when taking deferiprone.
Demeclocycline	D	Only recommended for use during pregnancy when there are no alternatives and benefit outweighs risk.
Desferrioxamine	C	Toxicity in animal studies.
Desloratadine	C	No evidence of teratogenicity except for hydroxyzine where toxicity has been reported with high doses in animal studies. The use of sedating antihistamines in the latter part of the third trimester may cause adverse effects in neonates such as irritability, paradoxical excitability and tremor.
Desmopressin	C	Small oxytocic effect if used in third trimester.

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Desogestrel	X	Avoid.
Desonide	C	Should only be used during pregnancy when benefit outweighs risk.
Dexamethasone	C	The benefit of treatment with corticosteroids during pregnancy and breast-feeding outweighs the risk; pregnant women with fluid retention should be monitored closely.
Dexibuprofen	C	Should be avoided during the third trimester because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn.
Dexketoprofen	C	Should be avoided during the third trimester because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn.
Dexlansoprazole	B	No evidence of human toxicity, use with caution.
Dexpanthanol	C	Discuss with physician before use.
Dextran 70	C	Avoid , reports of anaphylaxis in mother.
Dextromethorphan	C	Prescribe with caution.
Dextromethorphan	C	Use when benefit outweighs risk.
Diacerein	N	Contraindicated in pregnancy.
Diazepam	N	Prescribe with caution; neonatal withdrawal symptoms or floppy infant syndrome may develop if used in third trimester.
Dibromopropamine isethionate	N	Avoid; no information available.
Diclofenac	D	Avoid unless benefit outweighs risk.
Dicloxacillin	B	Use when the need is clearly established.
Dicycloverine hydrochloride	C	Use when no alternative is available.
Diethylstilbestrol	C	In first trimester, high doses associated with vaginal carcinoma, urogenital abnormalities and reduced fertility in female offspring; increased risk of hypospadias in male offspring.
Diflorasone diacetate	C	Consult with physician before use.

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Digoxin	C	Dosage adjustment is required.
Dihydroergotamine		Oxytocic effects on pregnant uterus. 1, 2, 3
Diloxanide fuorate	C	Avoid.
Diltiazem hydrochloride	C	Avoid; teratogenic in animal studies.
Dimethothiazine mesylate	C	Avoid.
Dinoprostone	C	Use during pregnancy when benefit outweighs risk.
Diosmin	B	No evidence of toxicity. Use with caution.
Diphenhydramine	B	Use only if potential benefit outweighs risk.
Dipyridamole	B	Use only if potential benefit outweighs risk.
Disopyramide	C	Avoid; may induce labor due to uterine contraction if used in third trimester.
Dobutamine	B	Use only if potential benefit outweighs risk.
Docetaxel	D	Avoid; toxicity in animal studies.
Docosanol	N	Consult with physician before use.
Domperidone	N	Avoid.
Donepezil hydrochloride	C	Use only if potential benefit outweighs risk.
Dopamine hydrochloride	C	Use only if potential benefit outweighs risk.
Dorzolamide	C	Use only if potential benefit outweighs risk.
Doxepin	C	Use with caution.
Doxorubicin hydrochloride	D	Avoid; teratogenic in animal studies.
Doxycycline	D	When travel to malarious areas is unavoidable during pregnancy, doxycycline can be used for malaria prophylaxis if other regimens are unsuitable and if the entire

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		course of doxycycline can be completed before 15 weeks gestation.
Dronedarone	X	Avoid, toxicity in animal studies.
Drospirenone	X	Avoid.
Drotaverine hydrochloride	C	Use only if potential benefit outweighs risk.
Duloxetine	C	Toxicity in animal studies, use only if potential benefit outweighs risk; risk of neonatal withdrawal symptoms.
Dutasteride	X	Avoid.
Dydrogesterone	B	Use with caution.
Ebastine	B	Use with caution.
Econazole nitrate	C	Use only if potential benefit outweighs risk.
Efavirenz	D	Avoid (effective contraception required during treatment and for 12 weeks after treatment); use efavirenz only if no alternative available.
Enalapril maleate	D	Should be avoided in pregnancy unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydramnios have also been reported.
Enoxaparin	B	Manufacturer advises avoid.
Enrofloxacin	C	Use only if benefit outweighs risk.
Entacapone	C	Avoid.
Entecavir	C	Toxicity in animal studies, use only if potential benefit outweighs risk effective contraception required during treatment.
Ephedrine hydrochloride	C	Use only if benefit outweighs risk.
Epinastine hydrochloride	C	Use only if benefit outweighs risk.
Epirubicin hydrochloride	D	Use of epirubicin is not recommended unless there are no alternatives and benefit outweighs risk.
Eplerenone	B	Use only if needed clearly.

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Epoetin	X	Avoid.
Eprosartan	D	Should be avoided in pregnancy unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydramnios have also been reported.
Eptifibatide	B	Use only if potential benefit outweighs risk.
Ergometrine maleate	X	Avoid.
Ergotamine		Oxytocic effects on pregnant uterus. 1, 2, 3
Erlotinib	D	Avoid; harmful for fetus.
Ertapenem	B	Avoid; unless potential benefit outweighs risk.
Erythromycin	B	Avoid; unless potential benefit outweighs risk.
Escitalopram	C	Should not be used during pregnancy unless the potential benefit outweighs the risk. A small increased risk of congenital heart defects when SSRIs are taken during early pregnancy. If SSRIs are used during the third trimester a risk of neonatal withdrawal symptoms and persistent pulmonary hypertension in the newborn has been reported.
Eslicarbazepine acetate	C	Women of child-bearing potential should discuss with a specialist the impact of both epilepsy and its treatment, on the outcome of pregnancy. An increased risk of teratogenicity associated with the use of antiepileptic drugs (especially if used during the first trimester and particularly if the patient takes two or more antiepileptic drugs).
Esomeprazole	C	Use with caution.
Eszopiclone	C	Use only if potential benefit outweighs risk.
Ethambutol	C	Use only if potential benefit outweighs risk.
Ethosuximide	N	Women of child-bearing potential should discuss with a specialist the impact of both epilepsy and its treatment on the outcome of pregnancy.
Etodolac	C	Avoid during pregnancy or avoid unless the potential benefit outweighs the risk, should be avoided during the third trimester

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		because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn.
Etomidate	C	May depress neonatal respiration if used during delivery.
Etoposide	D	Avoid, teratogenic in animal studies.
Etoricoxib	X	Avoid.
Etravirine	B	Treatment of HIV infection in pregnancy aims to reduce the risk of toxicity to the fetus (although the teratogenic potential of most antiretroviral drugs is unknown) to minimize the viral load and disease progression in the mother and to prevent transmission of infection to the neonate.
Everolimus	D	Avoid.
Ezetimibe	C	Use only if potential benefit outweighs risk.
Famotidine	B	Avoid unless benefit outweighs risk.
Febuxostat	C	Avoid unless benefit outweighs risk.
Felodipine	C	Avoid.
Fenofibrate	C	Avoid , embryo toxicity in animal studies.
Fentanyl	C	Depress neonatal respiration; withdrawal effects in neonates of dependent mothers; gastric stasis and risk of inhalation pneumonia in mother during labour. 3
Fenticonazole nitrate	C	Use only if potential benefit outweighs risk.
Filgrastim	C	There have been reports of toxicity in animal studies and not to use granulocyte-colony stimulating factors during pregnancy unless the potential benefit outweighs the risk.
Finasteride	X	Unprotected intercourse may cause feminisation of male fetus 1, 2, 3
Flavoxate hydrochloride	B	Use during pregnancy when there are no alternatives and benefit outweighs risk.
Flucloxacillin	B	Use during pregnancy when there are no alternatives and benefit outweighs risk.

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Fluconazole	C,D	Avoid; teratogenic, craniofacial and limb abnormality with long term high doses.
Fludrocortisone acetate	C	The benefit of treatment with corticosteroids during pregnancy and breast-feeding outweighs the risk; Pregnant women with fluid retention should be monitored closely.
Fluocinolone acetonide	C	Avoid.
Fluorescein sodium	C	Use during pregnancy when there are no alternatives and benefit outweighs risk.
Fluorometholone	C	Only recommended for use during pregnancy when benefit outweighs risk.
Fluorouracil	X	Avoid.
Fluoxetine	C	Should not be used during pregnancy unless the potential benefit outweighs the risk. a small increased risk of congenital heart defects when SSRIs are taken during early pregnancy. If SSRIs are used during the third trimester a risk of neonatal withdrawal symptoms, and persistent pulmonary hypertension in the newborn has been reported.
Flupenthixol	C	Only recommended for use during pregnancy when benefit outweighs risk.
Fluphenazine hydrochloride	C	Prescribe with caution. 3
Flurazepam	N	Prescribe with caution; discourage regular use.
Flurbiprofen	C	Avoid during pregnancy or avoid unless the potential benefit outweighs the risk, should be avoided during the third trimester because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn.
Flutamide	D	Should only be given during pregnancy when there are no alternatives and benefit outweighs risk.
Fluticasone furoate	C	Prescribe with caution.
Fluvastatin	X	Avoid, teratogenic

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Fluvoxamine maleate	C	Should not be used during pregnancy unless the potential benefit outweighs the risk, a small increased risk of congenital heart defects when SSRIs are taken during early pregnancy. If SSRIs are used during the third trimester a risk of neonatal withdrawal symptoms and persistent pulmonary hypertension in the newborn has been reported.
Folinic acid	C	Should only be given during pregnancy when there are no alternatives and benefit outweighs risk.
Follitropin alfa & beta	X	Avoid.
Formoterol fumarate	C	It is particularly important that asthma should be well controlled during pregnancy.
Frusemide	C	Should not be used to treat gestational hypertension because of the maternal hypovolemia associated with this condition.
Fusidic Acid	C	Use with caution.
Gabapentin	C	Women of child-bearing potential should discuss with a specialist the impact of both epilepsy and its treatment on the outcome of pregnancy, an increased risk of teratogenicity associated with the use of antiepileptic drugs (especially if used during the first trimester and particularly if the patient takes two or more antiepileptic drugs).
Gadodiamide	C	Use with caution.
Gadoversetamide	C	Should only be given during pregnancy when there are no alternatives and benefit outweighs risk.
Galantamine	C	Use with caution.
Ganciclovir	C	Avoid; women of childbearing potential should use effective contraception during ganciclovir therapy.
Gatifloxacin	C	Should only be given during pregnancy when there are no alternatives and benefit outweighs risk.
Gemcitabine	D	Avoid.

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Gemefloxacin	C	Use with caution.
Gemfibrozil	C	Avoid; theoretical possibility of interference with embryonic growth and development due to anti-cholesterol effect.
Gentamicin	C, D	Avoid unless benefit outweighs risk; probably very small auditory or vestibular nerve damage. 1, 2, 3
Glibenclamide		Insulin is substituted. 3
Gliclazide	C	Insulin is substituted. 3
Glimepiride	C	Avoid; toxicity in animal studies. 3
Glipizide	C	Insulin is substituted.
Glycerin	C	Use with caution.
Glycopyrrolate	B	Use only when benefit outweighs risk.
Gonadorelin	B	Consult with physician.
Granisetron	B	Use during pregnancy when there are no alternatives and benefit outweighs risk.
Griseofulvin	C	Avoid; teratogenic. 1, 2, 3
Guaiphenesin	C	Potential benefits may warrant use of the drug in pregnant women despite potential risks.
Halcinonide	C	Potential benefits may warrant use of the drug in pregnant women despite potential risks.
Halobetasol propionate	C	Potential benefits may warrant use of the drug in pregnant women despite potential risks.
Haloperidol	C	Prescribe with caution; extra pyramid effects reported in neonates if administered in third trimester. 3
Halothane		Depress neonatal respiration if administered in third trimester.
Heparin sodium	C	Safer than warfarin for fetus; mother may develop haemorrhage, thrombocytopenia; osteoporosis may develop after prolonged use. does not cross the placenta; maternal osteoporosis reported after prolonged use;

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		multi dose vials may contain benzyl alcohol , some avoid. 1, 2, 3
Hexachlorophene	C	Use when benefit outweighs risk.
Homatropine hydrobromide	C	Use when benefit outweighs risk.
Hydrochlorothiazide	B	Not recommended to treat hypertension; causes neonatal thrombocytopenia if used in third trimester. 3
Hydrocortisone	C	The benefit of treatment with corticosteroids during pregnancy and breast-feeding outweighs the risk; pregnant women with fluid retention should be monitored closely.
Hydroquinone	C	Consult with physician before use.
Hydroxocobalamin	C	Use when benefit outweighs risk.
Hydroxyurea	D	Avoid.
Hydroxychloroquine	N	It is not necessary to withdraw an antimalarial drug during pregnancy if the rheumatic disease is well controlled; however, the manufacturer of hydroxychloroquine advises avoiding use.
Hydroxyzine hydrochloride	C	Avoid; may associate with fetal abnormality.
Hyoscine butyl bromide	C	Avoid unless benefit outweighs.
Hyoscine hydrobromide	C	Use only if potential benefit outweighs risk, injection may depress neonatal respiration.
Hypromellose	X	Avoid.
Ibandronic Acid	C	Avoid unless benefit outweighs risk.
Ibuprofen	C,D	Avoid unless benefit outweighs risk. 3
Idoxuridine	C	Toxicity in animal studies.
Ifosfamide	D	Avoid.
Imatinib	D	Avoid, potential benefits may warrant use of the drug in pregnant women despite potential risks.
Imipramine hydrochloride	N	Tachycardia, irritability and muscle spasm in neonate. 1, 2, 3

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Indapamide	B	Prescribe with caution.1, 3
Indomethacin	C	Most avoiding the use of NSAIDs during pregnancy or avoiding them unless the potential benefit outweighs the risk. NSAIDs should be avoided during the third trimester because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn.
Inositol	C	Avoid unless potential benefit outweighs risk.
Insulin	B	Dose should be adjusted frequently 1, 2, 3
Interferons	C	Avoid unless compelling reasons.
Iodixanol	B	Use with caution.
Iohexol	B	Use with caution.
Iopamidol	B	Use with caution.
Ipratropium bromide	B	It is particularly important that asthma should be well controlled during pregnancy.
Irbesartan	D	Should be avoided in pregnancy unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydramnios have also been reported.
Isoflurane	C	May depress neonatal respiration if used during delivery.
Isoniazid	C	There are no controlled data in human pregnancies. Embryocidal effects were noted in both rats and rabbits after administration of isoniazid orally during pregnancy. While cases of suspected isoniazid induced anomalies have been reported, causality is unknown and retrospective analyses have failed to document significant teratogenic risk. It should only be given during pregnancy when need has been clearly established.
Isosorbide dinitrate	C	May cross placenta, avoid unless potential benefit outweighs risk.
Isosorbide mononitrate	C	Avoid unless potential benefit outweighs risk.
Isotretinoin	X	Topical retinoids are contra-indicated in pregnancy; women of child-bearing age must use effective contraception (oral

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		progestogen-only contraceptives not considered effective).
Itraconazole	C	Use only in life threatening situations (toxicity at high doses in animal studies); ensure effective contraception during treatment and until the next menstrual period following end of treatment.
Ivabradine	D	Avoid, toxicity in animal studies.
Ivermectin	C	Consult physician before use.
Ketamine	C	Depress neonatal respiration if used during delivery.
Ketoconazole	C	Teratogenicity in animal studies; packs carry a warning to avoid in pregnancy.
Ketoprofen	C	Toxicity in animal studies.
Ketorolac trometham	C	Avoid; manufacturer advises use only if potential benefit outweighs risk.
Ketotifen	C	Prescribe with caution.
Levothyroxine sodium	A	Monitor maternal serum-thyrotropin concentration, levothyroxine may cross the placenta and excessive maternal concentration can be detrimental to fetus.
Labetalol hydrochloride	C	Use only if potential benefit outweighs risk.
Lacidipine		Avoid; may inhibit labour.
Lacosamide	C	Increased risk of teratogenicity, associated with the highest risk of major and minor congenital malformations.
Lactulose	B	Use only when need has been clearly established.
Lamivudine	C	Avoid during first trimester.
Lamotrigine	C	Prescribe with caution; increased risk when used more than one antiepileptic drug.
Lansoprazole	B	Avoid.
Latanoprost	C	Use only if potential benefit outweighs risk.
Leflunomide	X	Avoid.
Letrozole	D	Avoid (isolated cases of birth defects reported).

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Levamisole	C	Use only if potential benefit outweighs risk.
Levetiracetam	C	Use when the potential benefits justify the potential risk to the fetus.
Levobunolol hydrochloride	C	Use only if potential benefit outweighs risk.
Levobupivacaine hydrochloride		Large doses during delivery can cause neonatal respiratory depression, hypotonia and bradycardia after epidural block; avoid if possible in the first trimester, toxicity in animal studies.
Levocarnitine	B	Use only if potential benefit outweighs risk.
Levocetirizine hydrochloride	B	Use only if potential benefit outweighs risk.
Levofloxacin	C	Avoid-shown to cause arthropathy in animal studies.
Lidocaine	B	Use only if potential benefit outweighs risk.
Linagliptin	B	Linagliptin is only recommended for use during pregnancy when there are no alternatives and benefit outweighs risk.
Linezolid	C	Use only if potential benefit outweighs risk.
Lisinopril	D	Animal studies show still birth, renal failure and oligohydramnios. 1,2,3
Lithium carbonate	D	Avoid in possible if first trimester, risk of teratogenicity including cardiac abnormalities; dose requirement is increased if necessary as because of the risk of toxicity in neonate. 1,2, 3
Lomefloxacin	C	Use only if potential benefit outweighs risk.
Lomustine	D	Use only when there are no alternatives and benefit outweighs risk.
Loperamide	C	Avoid.
Loratidine	C	Avoid.
Lorazepam	D	Risk of neonatal withdrawal symptoms high doses administered during late pregnancy or labour may cause neonatal hypothermia, hypotonia and respiratory depression.
Losartan potassium	D	Use only if potential benefit outweighs risk.
Loteprednol etabon	C	Use only if potential benefit outweighs risk.

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Lovastatin	X	Use only if potential benefit outweighs risk.
Lubiprostone	C	Use only if clearly needed and benefit outweighs potential risk.
Magaldrate		Use only if potential benefit outweighs risk.
Magnesium hydroxide		Use only if potential benefit outweighs risk.
Magnesium sulphate		Not known to be harmful for short-term intravenous administration in eclampsia but excessive doses in third trimester cause neonatal respiratory depression.
Mannitol	C	Use only if clearly needed and benefit outweighs potential risk.
Maprotiline hydrochloride	B	Use only when need has been clearly established.
Mebendazole	C	Manufacturer advises to avoid, toxicity in animal studies.
Mebeverine hydrochloride		Prescribe with caution.
Meclizine hydrochloride	B	Use only if potential benefit outweighs risk.
Medroxyprogesterone acetate	X	Avoid, genital malformations and cardiac defects reported.
Mefenamic acid	C	See Acetylsalicylic acid. 3
Mefloquine	B	Adequate contraception during prophylaxis and for 3 months after stopping (teratogenicity in animal studies).
Melatonin	N	Avoid.
Meloxicam	C	Avoid; use only if potential benefit outweighs risk.
Memantine hydrochloride	B	Use only if potential benefit outweighs risk.
Mercaptopurine	D	Avoid (teratogenic).
Meropenem	B	Use only if potential benefit outweighs risk.
Mesalazine		Negligible quantities cross placenta.
Mesna disulfide	B	Use only if potential benefit outweighs risk.
Metaraminol	C	May reduce placental perfusion, manufacturer advises use only if potential benefit outweighs risk.

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Metformin	B	Avoid; insulin is substituted. 1, 2, 3
Methionine	C	Use only when need has been clearly established.
Methotrexate	X	Avoid; teratogenic; fertility may be reduced during therapy which may be reversible.
Methyl prednisolone	C	Use when there are no alternatives and benefit outweighs risk.
Methyldopa	C	Use only if potential benefit outweighs risk.
Methylphenidate hydrochloride	C	Use only if potential benefit outweighs risk.
Metoclopramide hydrochloride	B	Use only when compelling reasons.
Metoprolol tartarate	C	Prescribe with caution.
Metronidazole	B	Avoid high doses; increased risk of teratogenicity if used during first trimester.
Miconazole	C	Avoid unless essential.
Miconazole nitrate		Absorbed from skin in small amounts; manufacturer advises caution.
Midazolam	D	Increased risk of teratogenicity , associated with the highest risk of major and minor congenital malformations
Mifepristone	X	Avoid.
Miglitol	B	Use only when need has been clearly established.
Milnacipran hydrochloride	C	Use only if potential benefit outweighs risk.
Minoxidil	C	Avoid , possible toxicity including reduced placental perfusion; neonatal hirsutism reported.
Mirtazapine	C	use with caution—limited experience.
Misoprostol	X	Avoid; teratogenic; potent stimulant of uterus. 1, 2, 3
Mitomycin		Avoid (teratogenic in animal studies).
Mizolastine		Avoid.
Mometasone furoate	C	Use when there are no alternatives and benefit outweighs risk.
Montelukast	B	Avoid unless essential.

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Morphine sulphate	C	Use only if potential benefit outweighs risk.
Moxifloxacin	C	Cause arthropathy in animal studies.
Moxonidine		Avoid—no information available.
Mupirocin	B	Use only when need has been clearly established.
Mycophenolate mof	D	Avoid; toxicity in animal studies; effective contraceptive measures must be taken during and for 6 weeks of treatment.
Nalbuphine hydrochloride	B	Use only if potential benefit outweighs risk.
Nalidixic acid	C	Shown to cause arthropathy in animal studies.
Naloxone	C	Use only if potential benefit outweighs risk.
Naltrexone	C	Use only if potential benefit outweighs risk.
Nandrolone	X	Avoid, masculinization of female fetus. 1, 2, 3
Naphazoline nitrate	C	Prescribe with caution.
Naproxen	C	Prescribe with caution. 3
Natamycin	C	Prescribe with caution.
Nateglinide	C	Avoid, toxicity in animal studies.
Nebivolol	C	Use only if potential benefit outweighs risk.
Nefopam hydrochloride		Avoid unless no safer treatment.
Nelfinavir	B	Use only if potential benefit outweighs risk.
Neomycin	D	Prescribe with caution. 2, 3
Neostigmine	C	Neonatal myasthenia with large doses. 3
Nepafenac	C	Use only if potential benefit outweighs risk.
Nevirapine	B	Use only when need has been clearly established.
Niacin	C	Use when there are no alternatives and benefit outweighs risk.

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Nicorandil		Use only if potential benefit outweighs risk.
Nicotine	D	Use only if potential benefit outweighs risk.
Nifedipine	C	Prescribe with caution.
Nimodipine	C	Use only if potential benefit outweighs risk.
Nitazoxanide	B	Use only if potential benefit outweighs risk.
Nitrazepam		Prescribe with caution.
Nitrofurantoin	B	Avoid at term, may produce neonatal Hemolysis.
Nitroglycerin	C	Use only if potential benefit outweighs risk.
Nitrous oxide		May depress neonatal respiration if used during delivery.
Nizatidine	B	Avoid unless essential.
Noradrenaline/ norepinephrine	C	Avoid, may reduce placental perfusion.
Norethisterone		Masculinization of female fetuses and other defects reported.
Norgestrel	X	Use only if potential benefit outweighs risk.
Nortriptyline		Prescribe with caution. 3
Ofloxacin	C	Should be avoided in pregnancy because they have been shown to cause arthropathy in animal studies; safer alternatives are available; however , a single dose of ciprofloxacin may be used for the prevention of a secondary case of meningococcal meningitis.
Olanzapine	C	Use only if potential benefit outweighs risk;neonatal lethargy, tremor, and hypertonia reported when used in third trimester.
Olmesartan medox	D	Avoid unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydranios have also been reported.
Olopatadine	C	Only recommended when there are no alternatives and benefit outweighs risk.

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Omega-3 acid ethyl esters	C	use only if potential benefit outweighs risk—no information available.
Omeprazole	C	Not known to be harmful.
Ondansetron	B	avoid unless potential benefit outweighs risk.
Orlistat	X	Use with caution.
Oseltamivir	C	use only if potential benefit outweighs risk.
Oxaliplatin	D	Avoid, toxicity in animal studies; effective contraception required during and for 4 months after treatment in women and 6 months after treatment in men.
Oxaprozin	C	Avoid; only recommended when benefit outweighs risk.
Oxazepam	N	Risk of neonatal withdrawal symptoms when benzodiazepines are used during pregnancy. Avoid regular use and use only if a clear indication such as seizure control. High doses administered during late pregnancy or labour may cause neonatal hypothermia, hypotonia, and respiratory depression.
Oxybutynin hydrochloride	B	Avoid unless essential, toxicity in animal studies.
Oxcarbazepine	C	Teratogenic, if used in first trimester; neonatal bleeding occur if used in third trimester.
Oxiconazole	B	No controlled data in human pregnancy. Oxiconazole topical should only be used when need has been clearly established.
Oxymetazoline hydrochloride	C	Use when benefit outweighs risk.
Oxytetracycline		Should not be given to pregnant women. Effects on skeletal development when tetracyclines have been used in the first trimester in animal studies. Administration during the second or third trimester may cause discoloration of the child's teeth and maternal hepatotoxicity. However, when travel to malarious areas is unavoidable during pregnancy.
Oxytocin		Avoid.
Paclitaxel		Avoid (toxicity in animal studies); ensure effective contraception during and for at least

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		months after treatment in men or women.
Palonosetron	B	Avoid , no information available.
Pancreatin		Not known to be harmful.
Pancuronium bromide	C	Non-depolarising neuromuscular blocking drugs are highly ionised at physiological pH and are therefore unlikely to cross the placenta in significant amounts.
Pantoprazole	B	Avoid unless potential benefit outweighs risk , fetotoxic in animals.
Paracetamol	C	not known to be harmful.
Paricalcitol	C	Avoid unless potential benefit outweighs risk.
Paroxetine	D	Increased risk of congenital malformations , especially if used in the first trimester.
Pegfilgrastim	C	There have been reports of toxicity in animal studies and not to use granulocyte-colony stimulating factors during pregnancy unless the potential benefit outweighs the risk.
Peginterferon alfa-2	C,X	Use when potential benefit outweighs risk.
Pemirolast potassium	C	Only recommended for use during pregnancy when benefit outweighs risk.
Pentazocine hydrochloride	C	Use when need has been clearly established.
Pentoxifylline	C	Use when benefit outweighs risk.
Peppermint oil		Not known to be harmful.
Perindopril erbumine	C, D	Avoid unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydramnios have also been reported.
Permethrin	B	Only use when benefit outweighs risk.
Pethidine		Respiratory depression and withdrawal symptoms can occur in the neonate if opioid analgesics are used during delivery; also gastric stasis and inhalation pneumonia has been reported in the mother if opioid analgesics are used during labour.
Pheniramine maleate	B	Unlikely to harm an unborn baby.

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Phenobarbitone	C	Congenital abnormality occurs if used in first trimester; neonatal bleeding occurs if used in third trimester. 1, 2, 3
Phenoxymethyl pen	B	Only be given when need has been clearly established.
Phenytoin hydrochl	D	Changes in plasma-protein binding make interpretation of plasma-phenytoin concentrations difficult, monitor unbound fraction.
Pholcodine		Avoid unless potential benefit outweighs risk.
Phytomenadione		Use if potential benefit outweighs risk.
Pilocarpine hydrochl	C	Avoid; stimulation of smooth muscle; toxicity in animal studies.
Pioglitazone	C	Avoid.
Pindolol	D	See Atenolol.
Piracetam		Avoid.
Piroxicam	C	Avoid
Pitavastatin	X	Avoid
Pivmecillinam		Avoid; not known to be harmful.
Pizotifen		Avoid unless potential benefit outweighs risk.
Podophyllotoxin		Avoid.
Poly ethylene glycol 3350	C	Use when benefit outweighs risk.
Potassium chloride	C	Use only when benefit outweighs risk.
Potassium citrate	C	Use only when benefit outweighs risk.
Potassium guaiacol sulphonate	C	Use only when benefit outweighs risk.
Potassium iodide	D	Avoid.
Povidone		Use only when benefit outweighs risk.
Povidone iodine		Sufficient iodine may be absorbed to affect the fetal thyroid in the second and third

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		trimester.
Pralidoxime chlorid	C	Use only when benefit outweighs risk.
Prazosin	C	No evidence of teratogenicity; use only if potential benefit outweighs risk.
Prednisolone	C	Use only when benefit outweighs risk
Pregabalin	C	Increased risk of teratogenicity, associated with the highest risk of major and minor congenital malformations.
Primaquine		Risk of neonatal haemolysis and methaemoglobinaemia in third trimester.
Procarbazine	X	al studies.
Prochlorperazine maleate		Use only when benefit outweighs risk.
Prochlorperazine mesilate		Extrapyramidal effects and withdrawal syndrome have been reported occasionally in the neonate when antipsychotic drugs are taken during the third trimester of pregnancy. Following maternal use of antipsychotic drugs in the third trimester, neonates should be monitored for symptoms including agitation, hypertonia, hypotonia, tremor, drowsiness, feeding problems, and respiratory distress.
Procyclidine hydrochloride		Use only if potential benefit outweighs risk.
Progesterone		Not known to be harmful.
Promethazine hydrochloride	C	Avoid.
Promethazine theoc	C	Avoid.
Propafenone hydrochloride	C	use only if potential benefit outweighs risk.
Propantheline brom	C	Avoid.
Propofol	B	May depress neonatal respiration if used during delivery; max. dose for maintenance of anaesthesia 6 mg/kg/hour.
Propranolol hydrochloride	C	May cause intra-uterine growth restriction, neonatal hypoglycaemia and bradycardia; the risk is greater in severe hypertension.If beta-blockers are used close to delivery,

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		infants should be monitored for signs of beta-blockade.
Protamin sulphate	C	Use only when need has been clearly established.
Pseudoephedrine hydrochloride		defective closure of the abdominal wall (gastroschisis) reported very rarely in newborns after first trimester exposure.
Pyrazinamide	C	Use only if potential benefit outweighs risk.
Pyridostigmine	C	Use only if potential benefit outweighs risk.
Pyridoxine hydrochloride	A,C	Use only if potential benefit outweighs risk.
Pyrimethamine	C	Theoretical teratogenic risk in first trimester (folate antagonist); adequate folate supplements should be given to mother.
Quetiapine	C	Use only if potential benefit outweighs risk. Extrapyramidal effects and withdrawal syndrome have been reported.
Quinine dihydrochloride	C	High doses are teratogenic in first trimester; but in malaria benefit of treatment outweighs risk.
Quinine sulphate	C	High doses are teratogenic in first trimester; but in malaria benefit of treatment outweighs risk.
Rabeprazole sodium		Avoid—no information available.
Raloxifene hydrochloride		Avoid.
Ramipril		Should be avoided in pregnancy unless essential; may adversely affect fetal and neonatal blood pressure and renal function; skull defects and oligohydramnios have been reported.
Ranitidine	B	Avoid unless essential, but not known to be harmful.
Ranolazine	C	Avoid unless essential— no information available.
Repaglinide	C	Avoid; insulin is substituted.
Retapamulin	B	Use only if potential benefit outweighs risk.
Ribavirin	X	Avoid; teratogenicity in animal studies.
Riboflavin	A,C	Use with caution.
Rifampicin		Teratogenic in animal studies in first trimester; risk of neonatal bleeding may be increased in third trimester.

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Rifaximin	C	Avoid, toxicity in animal studies.
Rimexolone	C	Use only if potential benefit outweighs risk.
Risedronate sodium	C	Use only if potential benefit outweighs risk.
Risperidone	C	Use only if potential benefit outweighs risk.
Ritodrine hydrochloride	B	Not for use in first or third trimester.
Rituximab	C	Use only if potential benefit outweighs risk.
Rivaroxaban	C	Avoid.
Rivastigmine	B	Use only if potential benefit outweighs risk.
Rizatriptan	C	Avoid unless the potential benefit outweighs the risk.
Rofecoxib	C	Prescribe with caution.
Rocuronium bromide	C	Use only if potential benefit outweighs risk.
Roflumilast	C	Avoid.
Ropinirole	C	Avoid unless potential benefit outweighs risk.
Rosiglitazone	C	use only if potential benefit outweighs risk.
Rosuvastatin	X	Avoid.
Rupatadine		Take caution—limited information available.
Salmeterol	C	Use only if potential benefit outweighs risk.
Salmon calcitonin	C	Avoid unless potential benefit outweighs risk.
Salsalate	C	Use only if potential benefit outweighs risk.
Saxagliptin	B	Avoid unless essential , toxicity in animal studies.
Sennosides	C	Use only if potential benefit outweighs risk.
Sertraline	C	Avoid unless potential benefit outweighs risk.

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Sevelamer hydrochloride	C	Use only if potential benefit outweighs risk.
Sibutramine hydrochloride	C	Use only if potential benefit outweighs risk.
Sildenafil	B	Use only if potential benefit outweighs risk.
Silver sulphadiazine	B	Use only if potential benefit outweighs risk.
simethicone		Use only if potential benefit outweighs risk.
Simvastatin	X	Avoid.
Sitagliptin	B	Avoid.
Sodium bicarbonate	C	Use only if potential benefit outweighs risk.
Sodium fusidate		Not known to be harmful; use only if potential benefit outweighs risk.
Sodium hyaluronate		Use only if potential benefit outweighs risk.
Sodium stibogluconate		Use only if potential benefit outweighs risk.
Sodium thiosulfate	C	Use only if potential benefit outweighs risk.
Sodium valproate	D, X	Avoid, increased risk of teratogenicity, associated with the highest risk of major and minor congenital malformations.
Somatropin		Discontinue if pregnancy occurs.
Solifenacin succinate	C	Caution—no information available.
Sorafenib	D	Avoid unless essential.
Sotalol hydrochloride	B	Beta-blockers may cause intra-uterine growth restriction, neonatal hypoglycaemia, and bradycardia; the risk is greater in severe hypertension. For the treatment of hypertension in pregnancy.
Sparfloxacin	C	Use only if potential benefit outweighs risk.

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Spectinomycin	B	Take caution.
Spironolactone	C	Use only if potential benefit outweighs risk.
Streptokinase	C	Thrombolytic drugs can possibly lead to premature separation of the placenta in the first 18 weeks of pregnancy, risk of maternal haemorrhage throughout pregnancy and post-partum, and also a theoretical risk of fetal haemorrhage throughout pregnancy.
Streptomycin	D	Avoid unless essential; greatest risk of auditory or vestibular nerve damage in the infant.
Sulfasalazine	B	Theoretical risk of neonatal haemolysis in third trimester; adequate folate supplements should be given to mother.
Sulfinpyrazone		Caution—no information available.
Sulindac	C	Avoid unless the potential benefit outweighs the risk.
Sulphanilamide	C	Use only if potential benefit outweighs risk.
Sumatriptan	C	Use only if potential benefit outweighs risk.
Sunitinib	D	Avoid unless the potential benefit outweighs the risk.
Suxamethonium ch		Mildly prolonged maternal neuromuscular blockade may occur.
Tacrolimus	C	Exclude before treatment; avoid unless potential benefit outweighs risk, risk of premature delivery, intra-uterine growth restriction, and hyperkalaemia.
Tadalafil	B	Avoid
Tamoxifen	D	Avoid , possible effects on fetal development; effective contraception must be used during treatment and for 2 months after stopping.
Tamsulosin hydrocl	B	Consult physician.
Tapentadol	C	Respiratory depression and withdrawal symptoms can occur in the neonate if opioid analgesics are used during delivery; also gastric stasis and inhalation pneumonia has been reported in the mother if opioid analgesics are used during labour.
Tazarotene	X	Avoid.

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Tegaserod	B	Use only if potential benefit outweighs risk.
Teicoplanin		Use only if potential benefit outweighs risk.
Telmisartan	D	Should be avoided in pregnancy unless essential. They may adversely affect fetal and neonatal blood pressure control and renal function; skull defects and oligohydramnios have also been reported.
Temazepam	X	There is a risk of neonatal withdrawal symptoms when benzodiazepines are used during pregnancy. Avoid regular use and use only if a clear indication such as seizure control. High doses administered during late pregnancy or labour may cause neonatal hypothermia , hypotonia , and respiratory depression.
Temozolomide	D	Avoid (teratogenic and embryotoxic in animal studies); manufacturer advises adequate contraception during treatment; men should avoid fathering a child during and for at least 6 months after treatment.
Tenofovir disoproxil fumarate	B	Use only if potential benefit outweighs risk.
Tenoxicam		Avoid unless the potential benefit outweighs the risk.
Terazosin	C	No evidence of teratogenicity; use only when potential benefit outweighs risk.
Terbinafine		Avoid.
Terbutaline sulphate	B	Use only if potential benefit outweighs risk.
Testosterone		Avoid; causes masculinisation of female fetus.
Tetanus vaccines		Live vaccines should not be administered routinely to pregnant women because of the theoretical risk of fetal infection.
Tetracosactide		Avoid.
Tetracycline		Avoid; effects on skeletal development in animal studies; dental discoloration if used in second and third trimester. 1, 2, 3
Theophylline	C	Prescribe with caution; neonatal irritability and apnoea. 3
Thioridazine		Prescribe with caution.
Thiamine hydrochloride	A	Use only if potential benefit outweighs risk.

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Thiopentone sodium		May depress neonatal respiration when used during delivery.
Tibolone		Avoid , toxicity in animal studies.
Ticlopidine hydrochloride		Avoid unless essential.
Tigecycline	D	Should not be given to pregnant women. Effects on skeletal development have been documented when tetracyclines have been used in the first trimester in animal studies. Administration during the second or third trimester may cause discoloration of the child's teeth, and maternal hepatotoxicity has been reported with large parenteral doses.
Timolol maleate	C	Beta-blockers may cause intra-uterine growth restriction, neonatal hypoglycaemia and bradycardia; the risk is greater in severe hypertension.If beta-blockers are used close to delivery, infants should be monitored for signs of beta-blockade.
Tinidazole		Avoid in first trimester.
Tioconazole	C	Manufacturer advises avoid.
Tiotropium	C	Manufacturer advises use only if potential benefit outweighs risk.
Tizanidine	C	Avoid.
Tobramycin		Prescribe with caution.
Tolfenamic acid		Avoid the use of NSAIDs during pregnancy or avoiding them unless the potential benefit outweighs the risk. NSAIDs should be avoided during the third trimester because use is associated with a risk of closure of fetal ductus arteriosus in utero and possibly persistent pulmonary hypertension of the newborn. In addition , the onset of labour may be delayed and its duration may be increased.
Tolmetin	C	Avoid; use only if potential benefit outweighs risk.
Tolnaftate		Use only if potential benefit outweighs risk.
Tolterodine tartrate	C	Avoid.

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Topiramate	D	Use only if potential benefit outweighs risk ;increased risk of cleft palate if taken in the first trimester of pregnancy.
Torsemide	B	Manufacturer advises avoid , toxicity in Animal studies.
Tramadol hydrochloride	C	Embryotoxic in animal studies, avoid.
Tranexamic acid		Use only if potential benefit outweighs risk.
Trastuzumab	D	Manufacturer advises avoid, oligohydramnios reported; effective contraception must be used during treatment and for 6 months after stopping.
Travoprost	C	Avoid.
Tretinoin		Teratogenic, effective concentration must be used for at least 1 month before oral treatment, during treatment and at 1 month after stopping also avoid topical treatment. 1, 2, 3
Triamcinolone acetate	C	use only if potential benefit outweighs risk.
Trifluoperazine		Prescribe with caution.
Trihexyphenidyl hydrochloride		Use only if potential benefit outweighs risk.
Trimethoprim	C	Avoid;teratogenic risk in first trimester (folate antagonist).
Trimipramine	C	Use only if potential benefit outweighs risk.
Tropicamide	C	Use only if potential benefit outweighs risk.
Ulipristal acetate	X	Manufacturer advises avoid , no information available.
Urokinase	B	Thrombolytic drugs can possibly lead to premature separation of the placenta in the first 18 weeks of pregnancy. There is also a risk of maternal haemorrhage throughout pregnancy and post-partum, and also a theoretical risk of fetal haemorrhage throughout pregnancy.
Ursodeoxycholic acid		No evidence of harm but manufacturer Advises avoid.
Valacyclovir	B	Use only if potential benefit outweighs risk.
Valsartan		Avoid.

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Sodium valproate	D, X	Avoid, increased risk of teratogenicity, associated with the highest risk of major and minor congenital malformations.
Vancomycin	B	Use only if potential benefit outweighs risk.
Vasopressin		Oxytocic effect in third trimester.
Varenicline	C	Avoid, toxicity in animal studies.
Vecuronium bromide	C	Highly ionised at physiological pH and are therefore unlikely to cross the placenta in significant amounts.
Venlafaxine	C	Avoid unless potential benefit outweighs risk, toxicity in animal studies; risk of withdrawal effects in neonate.
Verapamil hydrochloride	C	May reduce uterine blood flow with fetal Hypoxia; manufacturer advises avoid in first trimester Unless absolutely necessary; may inhibit labour.
Vildagliptin		Avoid , toxicity in animal studies.
Vinblastine	D	Avoid (teratogenicity and fetal loss in animal studies).
Vincristine	D	Avoid (teratogenicity and fetal loss in animal studies).
Vinorelbine	D	Avoid unless essential (teratogenicity, and fetal loss in animal studies); manufacturer advises effective contraception during and for 3 months after treatment; men must avoid fathering a child during and for at least 3 months after treatment.
Vinpocetine		Avoid.
Vitamin A	X	Excessive doses may be teratogenic.
Vitamin C	A	use only if potential benefit outweighs risk.
Vitamin E	A	Use only if potential benefit outweighs risk.
Voriconazole	D	Toxicity in animal studies. Manufacturer advises avoid unless potential benefit outweighs risk; effective contraception required during treatment.
Warfarin sodium	X	Teratogenic.
Xylometazoline		Manufacturer advises to avoid.

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Zalcitabine	C	Use only if potential benefit outweighs risk.
Zafirlukast	B	Avoid.
Zaleplon		Avoid in first trimester; neonatal withdrawal symptoms if used in third trimester.
Zidovudine	C	Use only if potential benefit outweighs risk.
Zinc oxide		Use only if potential benefit outweighs risk.
Zinc sulfate	C	Crosses placenta; risk theoretically minimal, but no information available.
Zinc sulphate monohydrate	C	Use only if potential benefit outweighs risk.
Ziprasidone	C	Use only if potential benefit outweighs risk.
Zoledronic acid	D	Avoid , toxicity in animal studies.
Zolmitriptan	D	Limited experience of using 5HT ₁ -receptor agonists during pregnancy; that they should be avoided unless the potential benefit outweighs the risk.
Zolpidem tartrate	C	Avoid regular use (risk of neonatal withdrawal symptoms); high doses during late pregnancy or labour may cause neonatal hypothermia, hypotonia, and respiratory depression.
Zopiclone		Avoid regular use (risk of neonatal withdrawal symptoms); high doses during late pregnancy or labour may cause neonatal hypothermia, hypotonia, and respiratory depression.

Appendix- 6

BREAST-FEEDING

When nursing mothers take some categorical drugs that affect the newborn, most of the drugs are found in breast milk. Some in too small quantity to be harmful for the neonate but some are found pharmacologically toxic to the infants. Some drugs also inhibit the infant's sucking reflex (e.g. phenobarbitone). Concentration of some drugs in milk may exceed those in (like iodides) the maternal plasma so that therapeutic doses in the mother may cause toxicity to the infant.

For some drugs information available is so insufficient that providing guidance is difficult. It is better to use only essential drugs by a breast-feeding mother.

The following table of information about drugs can be used as a guideline; absence of drugs from the table does not imply safety.

Chemotherapeutics, though harmful to infant, must be administered to the affected mother in certain cases like HIV, cancer etc. In such cases, breast-feeding of children must be suspended.

Drugs present in breast milk :

Drug	Comment
Abacavir	breast feeding recommended first six months if no safe alternative to breast milk.
Acarbose	Avoid.
ACE inhibitors.	Avoid.
Aceclofenac	Avoid; no information available.
Atenolol & Acebutolol	Grater amount found in the milk, avoid.
Acetazolamide	Can be used, very small amount found in the milk.
Acetylsalicylic acid or Aspirin	Avoid, because regular intake has a possible risk of Raye's syndrome; regular use of high doses could impair platelet function and produce hypoprothrombinaemia in infant if neonatal vitamin K stores low.
Acitretin	Avoid.
Aciclovir	Significant amount is found in milk after systemic administration.
Alendronate sodium	Avoid.
Allopurinol	Present in milk.
Alprazolam	Present in milk; avoid.
Alcohol	Large amount may affect infant and reduce milk consumption.
Amantadine	Should not be used
Amiodarone	Should not be used
Androgens	Avoid; may cause masculinisation in the female infant or precocious development in the male infant; high dose suppresses lactation.
Amiloride	Avoid, no information available
Antidepressants	Amount of tricyclic antidepressants (including related drugs such as mianserin and trazodone) too small to be harmful; avoid.

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Atracurium	Avoid, no information available.
Atropine	Use with caution, very small amount available in milk.
Azithromycin	Prescribe with caution; no harmful effect is known; use only if adequate alternatives not available.
Bendrofluazide	Amount too small to be harmful; large doses may suppress lactation.
Beta-blockers	Monitor infants; possible toxicity due to beta-blockade but amount of most beta-blockers excreted in milk too small to affect infant; acebutolol. Atenolol, nadolol and solatol are present in higher amounts than other beta-blockers; manufacturers advice to avoid celiprolol and nebivolol.
Bismuth	
Subcitrate/Subsalicylate	Avoid.
Benzoiazepines	Present in milk; avoid if possible.
Benzylpenicillin	Trace amount present in milk; safe in usual dosage; monitor infant.
Betamethasone	Systemic effect in infant unlikely with maternal dose of less than equivalent of Prednisolone 40mg daily; monitor infants adrenal function with higher dosage.
Bromazepam	See benzoiazepines.
Bupivacaine	Amount too small to be harmful.
Busulphan	Discontinue breast-feeding.
Calcipotriol	Avoid if possible; no information available.
Carbamazepine	Amount too small to be harmful; but 1-2 cases of reported skin rashes in infants.
Carbimazole	Amounts in milk may be sufficient to affect neonatal thyroid function, therefore lowest effective dose should be used.
Carbocysteine	Avoid.
Ceftriaxone	Excreted in low concentration; safe in usual dosage; monitor infant in higher dosage.
Clindamycin	Should avoid.
Clomiphene	May inhibit lactation; Avoid.
Clonidine	May decrease milk supply; Avoid.
Clozapine	Should not be used.
Carboplatin	Discontinue breast-feeding.
Chloramphenicol	Use replacement, may cause bone-marrow toxicity in infants; concentration in milk usually insufficient to cause Grey syndrome.
Chlorthalidone	May inhibit lactation; Avoid.
Chlorambucil	Discontinue breast-feeding.
Chloroquine	Amount too small to be harmful; inadequate for reliable protection against malaria.
Chlorpromazine	Drowsiness in infants reported.
Chlorpropamide	Caution; theoretical possibility of hypoglycemia in infants.
Cilazapril	Avoid; excreted in milk.
Cimetidine	Significant amount present in milk; till not known to be harmful; but better to avoid.
Citalopram	Can cause infant drowsiness; should avoid.
Ciprofloxacin	High concentrations in breast milk; avoid.
Cisatracurium	No information available.
Cisplatin	Discontinue breast-feeding.

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Contraceptives (oral)	Combined OCP inhibit lactation; Should avoid.
Co-trimoxazole	Small risk of kernicterus in jaundiced infants and of haemolysis in G6PD-deficient infants.
Clarithromycin	Avoid; excreted in milk.
Dactinomycin	Discontinue breast-feeding.
Dalteparin	No information available.
Dapsone	Haemolytic anaemia; although significant amount in milk risk to infant very small.
Daunorubicin	Discontinue breast-feeding.
Diazepam	Present in milk, avoid if possible.
Diclofenac	Amount too small to be harmful.
Digoxin	Amount too small to be harmful.
Dihydroergotamine	Avoid, ergotism may occur in infants; repeated doses may inhibit lactation.
Diloxanide	Avoid.
Diltiazem	Avoid; significant amount present in milk.
Disopyramide	Present in milk; use only if essential and monitor infant for antimuscarinic effects.
Docetaxel	Discontinue breast-feeding.
Domperidone	Amount probably too small to be harmful.
Doxepin	Should avoid.
Doxorubicin	Discontinue breast-feeding.
Doxycycline	Avoid, or if necessary, discontinue breast-feeding.
Droperidol	Although amount excreted in milk probably too small to be harmful, animal studies indicate possible adverse effects of these drugs on developing nervous system, therefore avoid unless absolutely necessary.
Enoxaparin	Avoid, no information available.
Epoetin	Avoid, no information available.
Ergotamine	Avoid, ergotism may occur in infant; repeated doses may inhibit lactation.
Erythromycin	only a small amount is present in breast milk; safe in usual dosage; monitor infant.
Ethosuximide	Should avoid.
Etoposide	Discontinue breast-feeding.
Famotidine	Present in milk, not known to be harmful; avoid.
Felodipine	Appears in milk; avoid.
Fentanyl	Avoid.
Filgrastim	Avoid, no information available.
Fluconazole	Avoid; present in milk.
Fluorouracil	Discontinue breast-feeding.
Fluoxetine	Should Avoid.
Fluphenazine	Amount excreted in milk too small to be harmful. Animal studies showed harmful effect.
Flurazepam	See benzodiazepine.
Fluvastatin	Manufacturer advises to avoid.
Fosinopril	Present in milk; avoid.
Frusemide	Too small to be harmful.
Gemcetabine	Discontinue breast-feeding.
Gemfibrozil	Avoid; no information available.
Gentamicin	Avoid.
Glibenclamide	See sulphonylureas.
Gliclazide	See sulphonylureas.

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Glimepiride	See sulphonylureas.
Glipizide	See sulphonylureas.
Haloperidol	Excreted in milk, but too small to be harmful.
Halothane	Excreted in milk.
Heparin	Avoid, risk of haemorrhage in infants.
Hydralazine	Present in milk but not known to be harmful. Monitor infants.
Hydrocortisone	Systemic effect in infant unlikely with maternal dose of less than equivalent of Prednisolone 40mg daily; monitor infants adrenal function with higher dosage.
Hydrochlorothiazide	Amount too small to be harmful, large doses may suppress lactation.
Hydroxyzine	Avoid; significant amount found in milk.
Hyoscine butylbromide	Amount too small to be harmful.
Ibuprofen	Too small to be harmful, but better if avoided.
Idoxuridine	May possibly make taste of milk unpleasant.
Imipramine	May cause respiratory depression; avoid.
Indapamide	Avoid; no information available.
Indomethacin	Avoid; too small amount found in milk; convulsion reported in some infants.
Insulin	Amount too small to be harmful.
Interferons	Avoid; no information available.
Iodine	Stop breast-feeding; danger of neonatal hypothyroidism or goitre; appears to be concentrated in milk.
Irinotecan	Discontinue breast-feeding.
Isoniazide	Monitor infants for possible toxicities; theoretical risk of convulsion and neuropathy; prophylactic Pyridoxine is advisable for mother and infant.
Isotretinoin	Avoid.
Ivermectin	Avoid until infant is 1 week old.
Itraconazole	Small amount found in milk, not harmful.
Ketorolac	Avoid.
Ketotifen	Significant amount present in milk, not harmful but drowsiness in infants reported.
Lacidipine	Avoid; no information available.
Lamivudine	Breast-feeding not advised in HIV infection.
Lamotrigine	Small amount found in milk, not harmful.
Lignocaine	Amount too small to be harmful.
Lipid lowering agents	Should not be used.
Lisinopril	Caution to be taken; no information available.
Lithium	Present in milk, and risk of toxicity in infant.
Loperamide	Amount found in milk not harmful for infant.
Mebendazole	No information available.
Mebeverine	Amount in milk too small to be harmful.
Mefloquine	Present in breast milk but risk to infant is minimal.
Melphalan	Discontinue breast-feeding.
Mercaptopurine	Discontinue breast-feeding.
Meropenem	Avoid.
Methadone	Withdrawal symptoms in infant; breast-feeding permissible during maintenance but dose should be as low as possible and infant monitored to avoid sedation.
Methotrexate	Discontinue breast-feeding.
Metoclopramide	Although amount in milk is small, avoid unless essential.
Metronidazole	Significant amount in milk; do not take single large doses.

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Mianserin	Risk of respiratory depression in infants.
Miconazole	Take caution; no information available.
Misoprostol	Avoid; no information available.
Mitomycin	Discontinue breast-feeding.
Morphine	Therapeutic doses unlikely to affect infants; withdrawal symptoms in infants of dependent mothers.
Mycophenolate	Avoid; no information available.
Nadolol	Should avoid.
Naloxone	Avoid; no information available.
Naproxen	Amount too small to be harmful.
Neostigmine	Amount too small to be harmful. Monitor infant.
Nifedipine	Amount too small to be harmful.
Nitrazepam	See benzodiazepam.
Nitrofurantoin	Only small amounts in milk but could be enough to produce G6PD-deficient infant.
Nortryptiline	Risk of respiratory depression in infants.
Ofloxacin	Avoid.
Olanzapine	Avoid; adverse reactions occur.
Omeprazole	Avoid; no information available.
Orlistat	Avoid; no information available.
Oxcarbazipine	See benzodiazepam.
Oxytetracycline	Avoid; teeth deformity in infants.
Paclitaxel	Discontinue breast-feeding.
Penicillamine	Trace amount in milk, use with caution.
Pethidine	Avoid.
Phenobarbital	Avoid.
Phenytoin	Small amount present in milk, avoid.
Piroxicam	should avoid.
Pilocarpine	Avoid; no information available.
Pindolol	Too small amount found in milk to be harmful; monitor infants.
Praziquantel	Avoid breast feeding during and 72 hours after treatment.
Prazosin	Amount probably too small to be harmful.
Primaquine	Avoid; risk of haemolysis in G-6PD deficit infant.
Procarbazine	Discontinue breast-feeding.
Propafenone	Avoid. No information available.
Propranolol	Monitor infant; possible toxicity due to beta-blockade but amount of most beta-blockers excreted in milk too small to affect infants.
Pyrazinamide	Amount too small to be harmful.
Pyrimethamine	Significant amount, avoid administration of other folate antagonists to infants.
Quinidine	Significant amount, but not known to be harmful.
Ranitidine	Significant amount present in breast milk but not known to be harmful.
Repaglinide	Avoid.
Reserpine	Should avoid.
Retinol	Theoretical risk of toxicities in infants of mother taking larger dose.
Rifampicin	Amount too small to be harmful.
Ritonavir	Breast-feeding not advised in HIV infections.
Recuronium	Avoid.
Rofecoxib	Avoid. Present in milk in animal studies.
Simvastatin	Avoid.

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Sodium autiothiomalate	Avoid.
Sodium valproate	Amount too small to be harmful.
Somatropin	Avoid, no information available.
Sotalol	Should avoid.
Sulphonylureas	Caution, theoretical possibility of hypoglycaemia in infants.
Sulphasalazine	Small amounts in milk. Theoretical risk of neonatal haemolysis especially in G6PD- deficient infants.
Sulpride	Significant amount in milk; avoid.
Tamoxifen	Avoid; no information available.
Terbinafne	Present in milk; avoid.
Tetracycline	Avoid; deformity and dental discolourisation in infants.
Theophylline	Irritability in infant reported; modified release preparations probably safe.
Thioridazine	Avoid.
Ticlopidine	Avoid.
Timotol	Avoid.
Tinidazole	Avoid.
Trimethoprim	Present in milk; short-term use not harmful.
Tretinoin	Avoid.
Trifluoperazine	Avoid.
Valsartan	Avoid.
Valproic acid	Amount too small to be harmful.
Vancomycin	Avoid; present in milk.
Verapamil	Amount probably too small to be harmful.
Venlafaxine	Should avoid.
Vinblastine	Discontinue breast-feeding.
Vincristine	Discontinue breast-feeding.
Warfarin	See anticoagulant.
Zafirlukast	Avoid; present in milk.
Zalcitabine	Breast-feeding not advised in HIV infections.
Zaleplon	Avoid.
Zidovudine	Breast-feeding not advised in HIV infections.

Appendix-7

POISONING

A BRIEF OVERVIEW

Poisoning occurs when any substance interferes with normal body functions after it is swallowed, inhaled, injected, or absorbed. In 80% of the cases, the victim is a child under the age of five. Curiosity, inability to read warning labels, a desire to imitate adults, and inadequate supervision lead to childhood poisonings. The elderly are the second most likely group to be poisoned. Mental confusion, poor eyesight, and the use of multiple drugs are the leading reasons why this group has a high rate of accidental poisoning. A substantial number of poisonings also occur as homicide, suicide attempts or drug overdoses.

There are basically two major types of poisons. One group consists of products that are never meant to be ingested or inhaled, such as shampoo, paint thinner, pesticides, toxic plant leaves, and carbon monoxide. The other group contains products that can be ingested in small quantities, but which are harmful if taken in large amounts, such as pharmaceuticals, medicinal herbs, or alcohol. Other types of poisons include the bacterial toxins that cause food poisoning, such as *Escherichia coli*; heavy metals, such as the lead found in the paint on older houses; and the venom found in the bites and stings of some animals and insects.

On the basis of severity, the types of poisoning are 1) **Acute poisoning** – excessive single dose, or several smaller doses of a poison taken over a short interval of time; 2) **Chronic poisoning** – smaller doses over a period of time, resulting in gradual worsening; 3) **Sub-acute poisoning** – the poisoning lies between acute and chronic poisoning, resulting in gradual worsening and 4) **Fulminate poisoning** – a very high or massive dose of poison at a time results death with or without any sign and symptom and patient become collapse suddenly. There have some nature of poisoning which are- a) **Homicidal** – killing of a human being by another human being by administering poisonous substance deliberately without other one's notice. b) **Suicidal** – when poisoning is created by himself/ herself to end his/ her life; c) **Accidental** – any poisonous substance taken/administered unknowingly by the person or children. Eg. Household poisons- nail polish remover, acetone etc; and d) **Occupational** – poisoning occurs as professional workers. Eg. insecticides, noxious fumes.

The effects of poisons are as varied as the poisons themselves; however, the exact mechanisms of only a few are understood. Some poisons interfere with the metabolism. Others destroy the liver or kidneys, such as heavy metals and some pain relief medications, including acetaminophen and nonsteroidal anti-inflammatory drugs. A poison may severely depress the central nervous system, leading to coma and eventual respiratory and circulatory failure. Potential poisons in this category include anesthetics (e.g. ether and chloroform), opiates (e.g., morphine and codeine), and barbiturates. Some poisons directly affect the respiratory and circulatory system. Carbon monoxide causes death by binding with hemoglobin that would normally transport oxygen throughout the body. Certain corrosive vapors trigger the body to flood the lungs with fluids, effectively drowning the person. Cyanide interferes with respiration at the cellular level. Another group of poisons interferes with the electrochemical impulses that travel between neurons in the nervous system. Yet another group, including cocaine, ergot, strychnine, and some snake venoms, causes

APPENDIX-7 : POISONING

potentially fatal seizures. Severity of symptoms can range from headache and nausea to convulsions and death. The type of poison, the amount and time of exposure, and the age, size, and health of the victim are all factors which determine the severity of symptoms and the chances for recovery.

Some general principles for diagnosing and treating poisoning are discussed first. Highlights of symptoms and treatment for individual chemicals and drugs, or groups of substances follow alphabetically. Poisoning from snakebites and other life-forms are discussed.

GENERAL PRINCIPLES OF TREATMENT:

DIAGNOSIS

Poisoning should be considered in the differential diagnosis of any unexplained symptoms or signs, especially in children < 5 yr. Similarly, in the young adult, any disparity between expected history and clinical findings should suggest poisoning. Often the type and speed of onset of the total clinical picture will conform or refute a suspicion of poisoning. Occasionally, the absence of a specific finding will be as important as its presence. Any pertinent history should be secured and the person and premises inspected for traces of drugs, i.e. imprint identifications on solid medication forms, alcohol, etc., particularly for the unconscious patient.

IMMEDIATE CARE/ FIRST AID MEASURES

1. Remove patient from further exposure to pain.
2. Determine adequacy of cardiac and respiratory function and begin resuscitation if needed.
3. Determine quickly what has happened. Identify the substance ingested, its route of entry into the body, and its toxicity potential. *Save any containers and appropriate specimens of the product or of emetic returns.*
4. Determine the need for medical care, recognizing that many substances need no further treatment. At all times, it should be recalled that over treatment per se may be a hazard. Unless contraindicated, immediately dilute and remove the toxic substance from the body. A person who has ingested a toxic substance may also have spilled it on the skin and may be inhaling fumes as well.
5. Maintain body temperature and blood pressure.
6. Fluid balance should be maintained.

Ingested poison: Emesis will usually remove more of the toxic substance than will gastric lavage. Immediately induce vomiting with ipecac syrup 15 to 30 mL (1 to 2 tbsp for children and adults taken with water or soft drinks (orally: 15 mL/kg for infants: 1 qt [1 L] for adults); and keep the patient actively moving if possible. The dose of ipecac may be repeated in 15 min if necessary. If ipecac is not available, give soapy water, anionic or non-anionic detergent (hand-washing liquid detergent) plus water and induce vomiting by inserting a finger or blunt instrument into the patient's throat. Avoid being bitten. Place a child in the head-down position. Save a portion of the vomitus for analysis. (*CAUTION : Do not induce vomiting if the patient is comatose, is having convulsions [or is likely to], or has ingested petroleum distillates or corrosive substances. Emesis of petroleum distillates is hardly ever indicated unless some other compound has been dissolved in the distillates that requires evacuation [eg. parathion]*).

When **gastric lavage** is carried out (do not use lavage if the patient is convulsing or if the ingested substance is corrosive), use the largest tube appropriate for the patient. For comatose or sedated patients > 2 yr of age, use a cuffed endotracheal tube to

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prevent aspiration. For those < 2, no cuff is needed on the endotracheal tube because of the snug fit. Have the patient in a head-low position. For adults, physiologic (0.9%) sodium chloride solution or tap water may be used; for children, 0.45% sodium chloride solution is recommended. Introduce lavage fluids in 20 to 30 mL aliquots and remove the stomach contents by siphon or syringe after each installation. Continue the rinsing procedure until washings return free of toxin. After the return is clear, instill a specific antidote if one is available; otherwise instill a slurry of activated charcoal (see below).

The use of **cathartics** remains controversial; some evidence suggests that they may actually enhance absorption rather than promote excretion. If a cathartic is used, it is best limited to sodium sulfate 30gm dissolved in 250 mL water, with proportionally reduced amounts for children.

When taken internally, **activated charcoal** with its molecular configuration and large surface area adsorbs significant amounts of many poisons, precluding their absorption from the gut. The earlier the charcoal is used, the more effective it is. From 5 to 10 times the amount of charcoal as that of poison suspected of being ingested should be used. For children < 5 yr the usual dose is 25 gm; for older children and adults, 50 to 100 gm.

Specific antidotes: While not numerous, specific antidotes are remarkably effective eg., naloxone in opioid overdoses, atropine and pralidoxime in organo-phosphate encounters, methylene blue for methemoglobinemia, N- acetylcysteine for acetaminophen, protamine sulphate for heparine, flumazenil for benzodiazepine.

Inhaled poison: The patient should be removed from the contaminated environment, his/her respiration supported and other personnel protected from contamination.

Skin and eye contamination: Contaminated clothing (including shoes and socks) should be removed. The skin should be thoroughly washed and the eyes flushed with water. Helpers should also be taken care of being protected from contamination.

CNS stimulation by the poison may require **sedation**. Usually, diazepam or a barbiturate is used. In pure amphetamine poisoning, chlorpromazine is the drug of choice. To terminate convulsions, diazepam (5 to 10 mg for adults; 0.1 to 0.2 mg/kg for children) is given slowly IV. Phenobarbital (100 to 200 mg for adults and 4 to 7 mg/kg for children) may be used IV or IM to either terminate or prevent the recurrence of a convulsion.

CONTINUING CARE

Symptomatic and supportive treatment depends on symptoms and signs and on anticipation of the clinical course, based upon identification of the poison. Continuation of the appropriate measures already begun and attempts to enhance excretion of poison already absorbed are basic considerations. Stimulants are unlikely to be effective and are generally *contraindicated*. **Severe CNS depression** requires support of the circulation and ventilation. Endotracheal intubation and rarely tracheostomy may be necessary. In suspected or known narcotic poisoning, naloxone-an potent opioid antagonist should be used.

Cerebral edema is common in poisoning due to sedatives, carbon monoxide, lead, and other CNS depressants. A 20% mannitol solution (5 to 10 mL/kg) is given slowly IV over a 30- to 60 min period. Corticosteroids are also used (dexamethasone 1 mg/sq m of BSA q 6 h by IV drip). The use of intracranial monitoring with hyperventilation to alter the degree of cerebral edema enjoys widespread favor. The use of "barbiturate coma" in cerebral edema associated with hypoxic episodes has been advocated but the practice must be considered experimentally.

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Renal failure may occur in poisoning, and dialysis may be required. Elimination of poisons sometimes can be hastened either by augmenting normal excretory pathways or by using artificial means such as dialysis, depending upon the nature of the poisoning, the availability of the facilities and the condition of the patient. Flushing out the poison by simply increasing urine volume is rarely helpful. Alkalinization or acidification of the urine can occasionally be helpful (eg. in acute salicylate ingestions, giving 2 to 3 mEq/kg of sodium bicarbonate IV will augment excretion significantly). In general, weak acids are captured in alkalinized urine and weak bases in acidified urine.

Over the past decade, **hemo-** and peritoneal dialysis have been augmented by the development of “**lipid dialysis**” aimed at removal of lipid-soluble substances from the blood and **hemoperfusion**, to provide an even more rapid and efficient clearance of toxic substances from the blood. However, these techniques are useless if the involved substance has a large “apparent volume of distribution” – i.e. if it is stored in fatty tissue or extensively bound to tissue protein. In select circumstances these techniques may be effective, but in many instances their yield is negligible. Thus while digoxin is rapidly cleared from the blood via hemoperfusion, such a small amount (3 to 5%) of the total body digoxin is present in the blood that hemoperfusion is ineffective.

TREATMENT OF COMMON POISONING:

ACETAMINOPHEN or PARACETAMOL

SYMPTOMS

Early: Often asymptomatic; mild nausea, vomiting, diaphoresis, pallor, beginning signs of hepatotoxicity; oliguria; Later (at 24-48h): Nausea & protracted vomiting, right upper quadrant pain, jaundice, coagulation defects, hypoglycemia, encephalopathy, hepatic failure; renal failure, myocardiopathy may occur.

TREATMENTS

Emesis: gastric lavage. Monitor plasma drug levels for prognosis;

If > 160-200 µg/ mL at 4 h. hepatic necrosis may occur; if plasma level > 300 µg/ mL at 4 h. hepatic damage is almost certain. If given before 18 h. oral N-acetylcysteine (Mucomyst®) 140 mg/ kg to start and 70 mg/ kg q 4 h for 4 to 18 doses have been effective in preventing significant hepatotoxicity.

ASPIRIN AND SALICYLATES

SYMPTOMS

Nausea, vomiting, dizziness, tinnitus, headache, confusion, hyperventilation, tachycardia, fever. In severe case: delirium, hallucination, convulsion, coma and respiratory crisis may occur.

TREATMENTS

Supportive treatment: Fluid/ electrolyte management: Rehydrate with 0.9 % saline at the rate of 10-20 cc / hr over 1-2 hrs until urine flow is 3-6 cc/kg/ hr. For preventing absorption: Ipecac, Gastric lavage, charcoal and cathartic administration. For enhancing elimination, perform forced alkaline diuresis, hemodialysis, hemoperfusion

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BARBITURATES

Amobarbital, Pentobarbital, Phenobarbital, Secobarbital

SYMPTOMS

Headache, confusion, ptosis, excitement, delirium, loss of corneal reflex, respiratory failure, coma

TREATMENT

Empty stomach up to 24 h after ingestion. If immediately after, use ipecac emetic; if sedated, use lavage with cuffed endotracheal tube. Consider saline cathartic (sodium sulphate 15-30gm); good nursing care; support respirations, give O₂; correct any dehydration. Rarely hemodialysis or peritoneal lavage, especially for long-acting barbiturates.

NAPHTHALENE

SYMPTOMS

On contact, dermatitis and corneal ulceration occur. Inhalation results in headache, confusion, vomiting, dyspnea. On ingestion, abdominal cramps, nausea, vomiting, headache, confusion; dysuria; intravascular hemolysis; convulsions occurs. Hemolytic anemia results in persons with G6PD deficiency

TREATMENT

For poisoning due to contact, remove clothing if formerly stored with naphthalene, flush skin and eyes. If ingested, perform ipecac emesis, gastric lavage; blood transfusion for severe hemolysis; alkalize urine for hemoglobinuria; for severe hemolysis, blood transfusions is necessary; control convulsions

NARCOTICS

Alpharodine, codeine, heroin, meperidine, methadone, morphine, opium, propoxyphene.

SYMPTOMS

Pinpoint pupils, drowsiness, shallow respirations, spasticity and respiratory failure.

TREATMENT

Do not give emetics. Gastric lavage, respiratory support. Naloxone 5 µg/ kg IV to awaken & improve respiration; if patient does not respond, give 2-20 mg naloxone (dosage must be repeated as many as 10- 20 times); fluids IV to support circulation.

PESTICIDES

PARAQUAT preparations are available to farmers and horticulturists. It has local and systemic effects. Splashes in the eyes irritate and ulcerate the cornea and conjunctiva. Washing of the eye and installation of antibacterial eye drops, should promote healing. Skin irritation, blistering and ulceration can occur from prolonged contact.

Nausea, vomiting and diarrhoea follow ingestion of concentrated paraquat solutions. Painful ulceration of the mucous membranes may appear within 36-48 hours.

The single most useful measure of immediate treatment is the oral administration of activated charcoal. The first dose of 100 gm is given with magnesium sulfate followed

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by activated charcoal 50 gm every 4 hours. Fluid and electrolyte balance to be maintained. Oxygen therapy in early stages may make paraquat more toxic.

ORGANOPHOSPHOROUS INSECTICIDES

These are usually supplied as powders or as dissolved in organic solvents. All are absorbed through the bronchi and intact skin as well as through the gut and inhibit cholinesterase activity, thereby prolonging and intensifying the effects of acetylcholine.

TREATMENT

The patient should be removed from source of poisoning and the contaminated clothing should be removed immediately. Emptying the stomach with gastric lavage should prevent further absorption, contaminated skin should be washed. In severe poisoning the airway is to be established. Artificial respiration is to be started with air or oxygen if necessary. The excess bronchial secretions are to be removed. Atropine injection IV or IM 2 mg is to be given. It should be repeated every 20-30 minutes until signs of atropinisation (hot dry skin, dry mouth, widely dilated pupils and flat pulse). Up to 12 mg of atropine can be given safely during the first 2 hours of treatment.

Pralidoxime mesilate, a cholinesterase reactivator is indicated, as an adjunct to atropine, in moderate or severe poisoning but is only effective if given within 24 hours. A dose of 30 mg/ kg diluted with 10-15 ml water for injections by slow intravenous injections should produce improvement in muscle power within 30 minutes.

Pralidoxime mesilate available as: Protopam (Ayerst), Tab. 500mg ; Inj. 1 gm/ vial.

PARAFFIN, PETROL AND OTHER PETROLIUM PRODUCTS

(Including paint thinners, organic solvents etc.)

Gastric lavage should be performed, using activated charcoal. Before lavage is carried out a cuffed endotracheal tube should be inserted to prevent pulmonary aspiration.

ETHANOL

Unabsorbed ethanol to be removed by gastric lavage. Activated charcoal is to be given to reduce absorption of any remaining ethanol. Adequate airway should be maintained. If patient is in coma, naloxone IV 0.01 mg/ kg to be given. Normal body temperature to be maintained.

In acute alcoholic mania, Inj. diazepam 10 mg IV slowly to be given, followed by 5 mg slow IV every 5-10 minutes until mania is controlled. The blood glucose should be measured and injection glucose IV to be given if indicated.

CARBON MONOXIDE

The patient should be removed from further exposure. 100 % oxygen is given by mask for several hours. Blood pressure and body temperature is to be maintained. Mannitol 20% IV is given to reduce cerebral oedema and prednisolone is to be given by slow IV. To control convulsions, IV diazepam should be given slowly.

VENOMOUS BITES AND STINGS POISONOUS SNAKES

A good number of snake varieties are poisonous. Among the poisonous snakes, members of *Crotalidae*, *Elapidae* and a few species of *Colubridae* families are important. Small scale studies indicate that, about 25% snakebite is poisonous and the highest bite rates are in the hilly areas of the country. Severity of any venomous snakebites depends on the size and variety of the snake, the amount and toxicity of the venom injected and underlying medical conditions of the victim, among other factors.

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CHEMISTRY, PHARMACOLOGY, AND PATHOLOGY

Snake venoms are complex mixtures, chiefly proteins, many having enzymatic activity. Although the enzymes contribute to the deleterious effect of the venom, some of the more important toxic components are smaller polypeptides, which are more toxic than the crude venom. Most venom components appear to have specific chemical and physiologic receptor sites.

Envenomation may be further complicated by the release of autopharmacologic substances (eg. histamine, serotonin) that can make diagnosis and treatment difficult. *Arbitrary grouping of snake venoms into categories such as "neurotoxins," "hemotoxins," "cardiotoxins" is pharmacologically superficial and can lead to grave errors in clinical judgment.* A so-called neurotoxic venom can produce marked cardiovascular changes or direct hematologic effects. The so-called hemotoxin venoms can also produce changes in the nervous system, or in vascular dynamics. A patient with snake venom poisoning must be considered as a victim of a complex poisoning.

SYMPTOMS, SIGNS AND DIAGNOSIS

Venomous snake bites are medical emergencies, requiring immediate attention and considerable judgment. Before any treatment is begun, it must be determined whether the snake was venomous and whether envenomation occurred, since a venomous snake may bite and not inject venom. When no envenomation occurs, or the bite inflicted by a nonvenomous snake, it should be treated as a puncture wound.

Symptoms and signs vary considerably, depending on the species of snake, the amount of venom injected and other factors. If there is evidence of poisoning soon after a bite, the possible consequences must not be underestimated.

Contrary to popular opinion, severe pain is not a constant finding; it may be mild or absent.

Untreated the edema progresses rapidly and may involve the entire extremity within hours. There may be lymphangitis and enlarged, tender, regional lymph nodes. Skin temperature over the injured part and body temperature are usually elevated. Although the patient may complain of chills. Weakness, a rapid and weak pulse, syncope, sweating, nausea and vomiting may be present. BP often drops and shock may develop early. Respiratory distress may occur.

There may be hemorrhage from the gums, hematemesis, melena, and hematuria. Bleeding and clotting times are prolonged and platelet counts may fall sharply in moderate or severe envenomations.

Laboratory Tests

In all but trivial cases, a CBC (including platelets), coagulation profile (PT, PTT, fibrinogen), blood typing, and urinalysis are essential. Other tests, such as ESR, serum electrolytes, BUN, creatinine, and RBC fragility tests, may be useful. An ECG is indicated in all severe cases.

TREATMENT

When bitten by poisonous snakes and if the patient is within 30 to 40 min of a medical facility, he/she should be put at rest, reassured, kept warm, and transported there as quickly as possible. The injured part should be loosely immobilized in a functional position just below heart level, and all rings, watches and constrictive clothing removed. If the patient is > 40 min from medical care, single incision can be made through the fang marks (no longer than 1/4 inch and no deeper than 1/8 inch) within the first 5 min. Suction, using Sawyer's "extractor", applied directly over the incisions or

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even over the fang punctures is of value only during the first 30 to 60 min following the bite. The wound should be cleansed and covered with a sterile dressing.

If antivenin is needed, a skin test for horse serum sensitivity should be performed as described in the antivenin brochure. If the patient is mildly sensitive to horse serum and the poisoning is serious, diphenhydramine IV may be indicated before given the antivenin. When a patient is 3+ or 4+ sensitive and life or limb are at stake, the patient should be placed in a critical or intensive care unit, carefully monitored, and antivenin given in the presence of a physician. A tourniquet, O₂, epinephrine, and other drugs and equipment for treating for treating anaphylaxis should be available during antivenin therapy.

BEES, WASPS, HORNETS, ANTS

The venoms of these insects (order *Hymenoptera*) contain, among other components peptides and nonenzymatic proteins (eg, apamin and melittin and/or kinins), enzymes (eg, phospholipase A and B and hyaluronidase), and amines (eg, histamine and 5-hydroxytryptamine).

While it may take over 100 bees to inflict a lethal dose of venom in most adults, one sting can cause a fatal anaphylactic reaction in a hypersensitive person.

TREATMENT

The stings of many hymenoptera may remain in the skin and should be removed by teasing or scraping rather than pulling. An ice cube placed over the sting will reduce pain; an antihistamine – analgesic – corticosteroid balm is often useful. Persons with known hypersensitivity to such stings should carry a kit containing an antihistamine and epinephrine when in endemic areas. Desensitization can be carried out using insect whole-body antigens or preferably, whole-venom antigens.

OTHER BITING ARTHROPODS

Among the more common biting and sometimes blood sucking arthropods the ticks and mites, mosquitoes; fleas; lice; bedbugs are most prominent. The composition of the saliva of these arthropods varies considerably, and the lesions produced by the bites of these animals vary from a small papule to a large ulcer with swelling and acute pain. Dermatitis may also occur. Most serious bites are complicated by sensitivity reaction or infection. In hypersensitive persons, bites can be fatal.

TREATMENT

The offending arthropod should be quickly removed. For ticks and some of the bugs, this is best accomplished by direct application of a petroleum products or other irritant to the animal or by slowly withdrawing the arthropod while twisting it slowly with forceps. Care should be taken not to leave the capitulum in the wound, as it may induce chronic inflammation or migrate into deeper tissues and give rise to a granuloma. The bite should be cleansed and a corticosteroid lotion applied.

TICKS AND MITES

Ticks are vectors of many diseases. In addition to the reactions noted above under BITING ARTHROPODS, ticks are also involved in poisonings. In North America, some species of *Dermacentor* and *Amblyomma* cause tick paralysis. Symptoms and signs include anorexia, lethargy, muscle weakness, incoordination, nystagmus, and ascending flaccid paralysis. Bulbar or respiratory paralysis may develop.

Mite infestations are quite common and are responsible for “chiggers” (intensely pruritic dermatitis caused by the mite larva, or chigger) , various forms of scabies, demodicidosis and a number of other diseases. The bites produce varying degrees of local tissue reaction with or without sensitization.

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TREATMENT SCHEDULE FOR BITE BY TICKS AND MITES

Treatment of tick paralysis is symptomatic. O₂ and respiratory assistance may be needed. An antitoxin is presently under study. Pajaroello tick lesions should be cleansed, soaked in 1:20 Burow's solution, debrided, and painted with the aqueous triple dye as used for viper bites. Corticosteroids are of value in severe reactions. Infections are common during the ulcer stage but rarely require more than local antiseptic measure.

CENTIPEDES AND MILLIPEDES

Some of the large centipedes of the genus *Scolopendra* can inflict bite with some localized swelling and erythema. Lymphangitis and lymphadenitis are common. Necrosis is rare and infection almost unknown. Symptoms and signs seldom persist for 48 h. Millipedes do not bite but when handled may secrete a toxin that can cause local skin irritation and in severe cases, tissue changes.

TREATMENT

An ice cube will control the pain of most centipede bites. Toxic secretions of millipedes should be washed from the skin with copious amounts of soap and water; alcohol should not be used. A topical corticosteroid should be applied if a skin reaction develops. Eye injuries require immediate irrigation and the application of a corticosteroid – analgesic ointment.

SCORPIONS

Most of the scorpions except *Centruroides exilicauda* (*sculpturatus*) are relatively harmless, their stings usually causing no more than some localized pain with minimal swelling, some lymphangitis with regional lymph gland swelling and increased skin temperature and tenderness around the wound. Children become tense, restless, and abnormal and random head, neck, and eye movements. In adults, tachycardia, hypertension, increased respirations, weakness and motor disturbances may predominate. Respiratory difficulties may occur in both children and adults often complicated by excessive salivation.

TREATMENT

An ice cube over the wound area reduces pain. Hypertension can be controlled with diazoxide in doses of 5 mg/kg by slow IV push. For convulsions, diazepam is given IV 0.1 to 0.2 mg/kg up to 10 mg in adults and repeated q 15 min prn; in children the total dose is 10 mg. Muscle spasms usually respond to calcium gluconate, methocarbamol, or diazepam. Complete bed rest is indicated and no food for the first 8 to 12 h. Antivenin should be used in all severe cases.

Appendix-8

IMMUNIZATION SCHEDULE

Appendix- 8a :

IMMUNIZATION SCHEDULE FOR CHILDREN UNDER ONE YEAR WITH DOSAGE AND MODE OF ADMINISTRATION OF VACCINE

Disease	Vaccine	Quantity for each dose	Number of dose	Interval between doses		Age of starting	Age of completion	Site of Vaccination	Route of administration
				Mini-mum	Maxi-mum				
Tuberculosis	BCG	0.05 ml	1	-	-	After birth	Within one year	Upper part of left arm	Intradermal
Diphtheria, Pertussis & Tetanus	DPT	0.5 ml	3	4 weeks	None	6 weeks	Do	Anterolateral part of mid-thigh	Intra-muscular (IM)
Poliomyelitis	OPV	2-3 drops*	4**	4 weeks	None	6 weeks	Do	Mouth	Oral route (by dropper)
Measles	Measles vaccine	0.5 ml	1	-	-	Just after completion of 9 months***	Do	Anterolateral part of mid-thigh	Sub-cutaneous

* According to manufacturer's instruction.

** (4th dose is to be given with Measles vaccine).

*** Currently available vaccine is not given before the age of 9 months because it interferes with the maternal antibodies passively transferred to the child.

Source: EPI Head Quarter, Mohakhali, Dhaka.

Appendix- 8b :

**IMMUNIZATION SCHEDULE FOR PREGNANT WOMEN & OTHER WOMEN
OF CHILDBEARING AGE (15-49 years) WITH
DOSAGE AND MODE OF ADMINISTRATION OF VACCINE**

Disease	Vaccine	Quantity for each dose	Number of dose	Interval between doses		Age of starting	Age of completion	Site of Vaccination	Route of administration
				minimum	Maxi-mum				
Neonatal tetanus	TT-1	0.5 ml.	Total 5 doses	-	-	15 years /As early as possible in pregnancy	As early as possible	Upper part of arm (Deltoid muscle)	IM
	TT-2			4 weeks after TT-1	none	4 weeks after TT-1			
	TT-3			6 months after TT-2	none	6 months after TT-2			
	TT-4			1 year after TT-3	none	1 year after TT-3			
	TT-5			1 year after TT-4	none	1 year after TT-4			

Source: EPI Head Quarter, Mohakhali, Dhaka

Appendix-8c :
VACCINATION SCHEDULE FOR TRAVELLERS

Country	Hepatitis A	Typhoid	Yellow Fever	Meningo-coccal Meningitis	Japanese Encephalitis	Recommended Malaria prophylaxis regimen
Afghanistan	*	*	*, I			C+P
Albania	*	*	•			
Algeria	*	*	•			-
American Samoa	*	*	•			
Angola	*	*	•	*		Mef
Antigua & Barbuda	*	*	•			
Argentina	*	*	-	-	-	Chl
Armenia	*	*	-	-	-	
Australia			(6)			
Austria		-	-	-	-	
Azerbaijan	*	*	-	-	-	Chl
Bahamas	♣		•			
Bahrain	*	*				
Bangladesh	*	*	*, I, E	•	*	C+P/Mef
Barbados	♣		•			
Belarus		-	-	-	-	
Belgium		-	-	-	-	
Belize	*	*	*I			Chl
Benin	*	*	•	*		Mef
Bermuda		-	-	-	-	
Bhutan	*	*	*, I, E			C+P
Bolivia	*	*	*, I, E			Chl/Mef
Bosnia & Herzegovina		*	-	-	-	
Botswana	*	*	-	-	-	C+P
Brazil	*	*	>9	*		Mef
British Virgin Islands		-	-	-	-	
Brunei Darussalam	*	*	(6)			
Bulgaria	*	*	-	-	-	
Burkina Faso	*	*	•	*		Mef
Burundi	*	*	•	*		Mef
Cambodia	*	*	*I		*	Mef/Dox
Cameroon	*	*	•	*		Mef
Canada	-	*	*, I, E	-	-	
Cape Verde Islands	*	*	*, I, E			-

APPENDIX 8 : IMMUNIZATION SCHEDULE

Country	Hepatitis A	Typhoid	Yellow Fever	Meningo-coccal Meningitis	Japanese Encephalitis	Recommended Malaria prophylaxis regimen
Cayman Islands	*	*	-	-	-	
C. African Republic	*	*	●	*		Mef
Chad	*	*	●	*		Mef
Chile	*	*	-	*	-	
China	*	*	*		*	Chl/Mef
Christmas Island			(6)			
Colombia	*	*	♣			C+P
Congo	*	*	●	*		Mef
Costa Rica	*	*	-	-	-	Chl
Cuba		*	-	-	-	
Cyprus	*	*	-	-	-	
Czech Republic	*	*	-	-	-	
DPR Korea	*	-	-	-	-	
Denmark		-	-	-	-	
Djibouti	*	*	●			Mef
Domonica	*		●			
Domonican Republic	*		-	-	-	Chl
Ecuador	*		●			C+P
Egypt	*	*	●			Chl
El Salvador	*	*	>6			Chl
Equatorial Guinea	*	*	*, I			Mef
Eritrea	*	*	*, I			Mef
Estonia		-	-	-	-	
Ethiopia	*	*	●	*		Mef
Fiji	*	*	●			
Finland		-	-	-	-	
France		-	-	-	-	
French Guyana	*	*	●			Mef
French Polynesia	*	*	●			
Gabon	*	*	●	*		Mef
Gambia	*	*	● E	*		Mef
Georgia	*	*	-	-	-	
Germany		-	-	-	-	
Ghana	*	*	*	*		Mef
Gibraltar		-	-	-	-	
Greece	*	*	>6			
Greenland		-	-	-	-	
Grenada	*		●			

APPENDIX 8 : IMMUNIZATION SCHEDULE

Country	Hepatitis A	Typhoid	Yellow Fever	Meningo-coccal Meningitis	Japanese Encephalitis	Recommended Malaria prophylaxis regimen
Guatemala	*	*	●			Chl
Guinea	*	*	●	*		Mef
Guinea Bissau	*	*	● E	*		Mef
Guyana	*	*	*, I, E			Mef
Haiti (including Ports)	*	*	*, I			Chl
Honduras	*	*	*, I			Chl
Hong Kong	♣		-	-		
Hungary		-	-	-	-	
Iceland		-	-	-	-	
India	*	*	>6 E	*	*	C+P
Indonesia	*	*	*, I, E		*	C+P/Mef
Iran	*	*	-	-	-	Chl/C+P
Iraq	*	*	*, I			Chl
Ireland		-	-	-	-	
Israel	*	*	-	-	-	
Italy		-	-	-	-	
Jamaica	*		●			
Japan	♣	-	-	-	-	
Jordan	*	*	●			
Kazakhstan	*	*	*, I			
Kenya	*	*	●	*		Mef
Kirbati	*	*	●			
Kuwait	*	*	-	-	-	
Kyrgyzstan	*	*	-	-	-	
Laos	*	*	*, I		*	Mef
Latvia		-	-	-	-	
Lebanon	*	*	*, I			
Lesotho		*	*, I			
Liberia	*	*	●			Mef
Libyan Arab Jamahiriya	*	*	●			
Lithuania		-	-	-	-	
Luxembourg		-	-	-	-	
Macao	*	-	-	-	-	
Madagascar		*	*, I, E			Mef
Malawi	*	*	*, I	*		Mef
Malaysia	*	*	● E		*	C+P/Mef
Maldives	*	*	*, I			
Mali	*	*	●	*		Mef

APPENDIX 8 : IMMUNIZATION SCHEDULE

Country	Hepatitis A	Typhoid	Yellow Fever	Meningo-coccal Meningitis	Japanese Encephalitis	Recommended Malaria prophylaxis regimen
Malta	*		>9			
Marshal Islands	*	*	-	-	-	
Martinique			•			
Mauritania		*	•	*		C+P
Mexico		*	>6			Chl
Mongolia		*	-	*	-	
Morocco	*	*	-	-	-	-
Mozambique	*	*	•			Mef
Myanmar	*	*	*, I		*	Mef
Namibia	*	*	*, I, E			C+P
Nepal	*	*	*, I	*	*	C+P
Netherlands		-	-	-	-	
New Zealand		-	-	-	-	
Nicaragua	*	*	•			Chl
Niger	*	*	•			Mef
Nigeria	*	*	•	*		Mef
Norway		-	-	-	-	
Oman	*	*	*, I			C+P
Pakistan	*	*	>6, E			C+P
Panama	*	*	♣			Chl
Papua New Guinea	*	*	•			Mef
Paraguay	*	*	*, E			Chl
Peru	*	*	>6, E		*	C+P/Mef
Philippines	*	*	(6)			C+P
Poland	♣	-	-	-		
Portugal		*	•			
Polynesia, French	*	*	•	-	-	
Puerto Rico	*	-	-			
Qatar	*	*		-	-	
Romania	*	-	-			
Rwanda	*	*	•	-	-	Mef
Samoa	*	*	•	-	-	
San Marino		-	-			
Saudi Arabia	*	*	*, I	*		C+P
Senegal	*	*	*, E			Mef
Singapore	*	*	(6)	-	-	
Slovakia		-	-	-	-	
Slovenia		-	-			

APPENDIX 8 : IMMUNIZATION SCHEDULE

Country	Hepatitis A	Typhoid	Yellow Ffever	Meningo-coccal Meningitis	Japanese Encephalitis	Recommended Malaria prophylaxis regimen
Solomon Islands	*	*	*, I	*		Mef
Somalia	*	*	*, I	*		Mef
South Africa	*	*	• E	-	-	C+P
Spain		*	-		*	
Sri Lanka	*	*	•	*		C+P
Sudan	*	*	• E			Mef
Surinam	*	*	*, I			Mef
Sweden		-	-	-	-	
Switzerland		-	-			
Taiwan	*	*		-	-	
Tajikistan	*	*	-		*	Chl
Thailand	*	*	• E			Mef/Dox
Togo	*	*	•			Mef
Tonga	*	*	•			
Trinidad and Tobago	*	*	•			
Tunisia	*	*	•			
Turkey	*	*	-	-	-	Chl
Turkmenistan	*	*	*, I	-	-	
Uganda	*	-	• E	*		Mef
Ukraine	*	-	-	-		
United Arab Emirates	*	-	-	-	-	C+P
United Kingdom			-	-	-	
United Republic of Tanzania	*	-	• E	-		Mef
United States of America		*	-	-	-	
Uruguay	*	-	-	-	-	
Uzbekistan	*	*	-	-	-	
Venezuela	*	*	-	-	*	Chl/C+P
Vietnam	*	-	•		*	Mef
Virgin Islands	*	-	-	-	-	
Yemen	*	*	•			C+P
Yugoslavia	*	*	-	-	-	
Zaire	*	*	•	*		Mef
Zambia	*	*	-	*		Mef
Zimbabwe	*		*, I	*		Mef

APPENDIX 8 : IMMUNIZATION SCHEDULE

**POSITIVE RESULTS OF AFP CASES
(1996 - November 2000)**

Year		1996	1997	1998	1999	2000*
No. of AFP Cases		71	267	505	824	1135
+ve Polio Cases	P ₁	16	13	12	41	-
	P ₂	0	3	7	17	-
	P ₃	0	4	6	11	-
	Mix	0	3	3	14	-
	Non type	0	0	0	2	-
	Total	16	23	28	85	68
+ve NPEV cases	Single	10	20	38	121	-
	Mix	0	2	0	8	-
	Total	10	22	38	129	98**
Wild Polio Virus	P ₁	14	8	6	27	1***
	P ₂	0	0	0	0	0
	P ₃	0	0	3	2	0
	Total	14	8	9	29	1

* Up to November 2000 except **

** Up to June 2000

*** Detected in August 2000

Source: National Polio Lab, IPH, Mohakhali, Dhaka (Personal Communication)

LEGEND :

- * Vaccination recommended for all travelers to that country.
- I Coming from infected areas.
- E Coming from Endemic areas.
- Vaccination required from travelers over 1 year of age coming from infected areas.
- ♣ Vaccination required to certain areas of the country.
- >6 Vaccination required from travelers over 6 months of age coming from infected areas.
- >9 Vaccination required from travelers over 9 months of age coming from infected areas.
- No Vaccination (or chemoprophylaxis in case of malaria) required for any international travelers.
- (6) Vaccination required from travelers over 1 year of age entering the country within 6 days of having stayed overnight or longer in an infected country.
- Chl Chloroquine.
- C+P Chloroquine plus Proguanil
- Mef Mefloquine
- Dox Doxycycline

Appendix–9

ESSENTIAL DRUG LIST

LIST OF 285 ESSENTIAL DRUGS

Sl. #	1. ANAESTHETICS	
	1.1 General anaesthetics and oxygen	
	1.1.1 Inhalational medicines	
1	Halothane	
2	Nitrous Oxide-Oxygen for Anaesthesia	
3	Oxygen	Inhalation
	1.1.2 Injectable medicines	
4	Thiopental Sodium	Injection
5	Ketamine	Injection
	1.2 Local anaesthetics	
6	Lignocaine with or without Adrenaline	Injection 1% and 2%
7	Procaine Hydrochloride	Injection (Various Strengths)
8	Bupivacaine Hydrochloride	Injection
	1.3 Preoperative medication and sedation for short-term procedures	
9	Atropine Sulphate	Injection
10	Morphine Sulphate	Injection
	2. ANALGESICS, ANTIPYRETICS, NON-STEROIDAL ANTI-INFLAMMATORY MEDICINES (NSAIDs), MEDICINES USED TO TREAT GOUT AND DISEASE MODIFYING AGENTS IN RHEUMATOID DISORDERS (DMARDs)	
	2.1 Non-opioids and non-steroidal anti-inflammatory medicines (NSAIDs)	
11	Aspirin	Tablet 75-100 mg
12	Paracetamol	Tablet/Syrup/Suspension/Suppository
13	Pethidine Hydrochloride	Injection
14	Indomethacin	Capsule/Suppository/Sustained Release Tablet
15	Ibuprofen	Tablet
16	Naproxen	Tablet
	2.2 Opioid analgesics	
	SL No - 10	
	2.3 Medicines used to treat gout	
17	Allopurinol	Tablet
18	Colchicine	Tablet
	2.4 Disease modifying agents used in rheumatoid disorders (DMARDs)	
19	Penicillamine	Tablet
20	Sulphasalazine	Tablet
21	Sodium Aurothiomalate	Injection

APPENDIX 9 : ESSENTIAL DRUG LIST

22	Methotrexate	Tablet/Injection
23	Chloroquine	Oral liquid/Tablet
3. ANTIALLERGICS AND MEDICINES USED IN ANAPHYLAXIS		
24	Chlorpheniramine Maleate	Tablet/Syrup/Injection
25	Prednisolone	Tablet
26	Dexamethasone	Tablet/Cream/Injection
27	Hydrocortisone	Injection/Cream/Ointment
28	Promethazine Hydrochloride	Tablet/Injection
4. ANTIDOTES AND OTHER SUBSTANCES USED IN POISONINGS		
4.1 Non-specific		
29	Activated Charcoal	Tablet
4.2 Specific		
30	Naloxone Hydrochloride	Injection
31	Pralidoxime Mesylate	Injection
	SL No - 09	Injection/Eye drop/ointment
5. ANTICONVULSANTS/ANTIEPILEPTICS		
32	Phenobarbitone	Tablet/Injection
33	Phenytoin	Tablet/Capsule/Elixir
34	Ethosuximide	Capsule
35	Magnesium Sulphate 50%	Injection
6. ANTI-INFECTIVE MEDICINES		
6.1 Anthelmintics		
6.1.1 Intestinal anthelmintics		
36	Mebendazole	Tablet
37	Albendazole	Chewable Tablet
38	Levamisole	Tablet/Syrup
39	Niclosamide	Tablet
6.1.2 Antifilarials		
40	Diethylcarbamazine	Tablet/Suspension
	SL No - 37	
6.2 Antibacterials		
6.2.1 Beta Lactam medicines		
41	Amoxycillin	Capsule/Dry Syrup/Injection
42	Ampicillin	Capsule/Dry Syrup/Injection
43	Phenoxymethyl Penicillin	Tablet/Syrup
44	Benzathine Penicillin	Injection
45	Flucloxacillin	Capsule/Syrup/Injection
46	Procaine Penicillin	Injection
47	Cephadrine	Capsule/Syrup/Injection
48	Cephalexin	Capsule/Tablet/Syrup
49	Benzyl Penicillin	Injection
50	Cloxacillin	Capsule/Syrup/Injection
51	Amoxiclav	Tablet/Capsules/ Dry

APPENDIX 9 : ESSENTIAL DRUG LIST

		Syrup/Injection
	6.2.2 Other antibacterials	
52	Erythromycin	Tablet/Oral Suspension /Injection
53	Chloramphenicol	Eye/Ear Drops/Ointment
54	Doxycycline	Capsule
55	Co-Trimoxazole	Tablet/Suspension
56	Metronidazole	Tablet/Oral Liquid/Injection
57	Tetracycline/Oxytetracycline Hydrochloride	Capsule/Injection
58	Nalidixic Acid	Tablet/Syrup
59	Trimethoprim	Tablet/Suspension/Injection
	6.2.3 Antileprosy medicines	
60	Clofazimine	Capsule
61	Dapsone	Tablet
	6.2.4 Antituberculosis medicines	
62	Ethambutol	Tablet
63	Isoniazid with or without Ethambutol	Tablet
64	Pyrazinamide	Tablet
65	Rifampicin with or without Isoniazid	Tablet
66	Streptomycin Sulphate	Injection
67	Rifampicin + Isoniazid + Pyrazinamide with or without Ethambutol	combination tablet
68	Rifampicin + Isoniazid + Ethambutol	Tablet
	6.3 Antifungal medicines	
69	Griseofulvin	Tablet
70	Clotrimazole	Cream/Pessaries/Solution/Dusting Powder
71	Nystatin	Tablet/Suspension/Cream/Gel
72	Preparations of Imidazole or Nystatin for Vaginal and Vulval Candidiasis	
	6.4 Antiviral medicines	
73	Acyclovir	Tablet/Cream /Eye ointment/ Intravenous Infusion
74	Nelfinavir (NVP)	Oral powder/tablet
	6.4.1 Antiherpes medicines	
75	Idoxuridine	Eye Drops
	6.4.2 Antiretrovirals	
	6.4.2.1 Nucleoside/Nucleotide reverse transcriptase inhibitors	
76	Abacavir (ABC)	Oral Liquid/ Tablet
77	Lamivudine (3TC)	Oral liquid,/Tablet
78	Tenofovir disoproxil fumarate (TDF)	Tablet
79	Zidovudine (ZDV or AZT)	Capsul/ Oral liquid/ IV infusion/ injection/Tablet
	6.4.2.2 Non-nucleoside reverse transcriptase inhibitors	
80	Efavirenz	Capsule/ Oral Liquid/ Tablet
81	Nevirapine (NVP)	Oral Liquid/ Tablet

APPENDIX 9 : ESSENTIAL DRUG LIST

	6.4.3 Other antivirals	
82	Oseltamivir	Tablet
	6.5 Antiprotozoal medicines	
	6.5.1 Antiamoebic and anti giardiasis medicines	
83	Diloxanide	Tablet
	6.5.2 Antileishmaniasis medicines	
84	Sodium Stibogluconate	Injection
	6.5.3 Antimalarial medicines	
	6.5.3.1 For curative treatment	
85	Artemether with Lumefantrine	Tablet
86	Primaquine	Tablet
87	Sulfadoxin with Pyrimethamine	Tablet
88	Artesunate	Injection,/ Tablet
89	Mefloquine	Tablet
90	Quinine	Injection,/Tablet
	6.5.4 Antipneumocystosis and antitoxoplasmosis medicines	
91	Pyrimethamine	Tablet
	7. ANTIMIGRAINE MEDICINES	
	7.1 For treatment of acute attack	
92	Sumatriptan Succinate	Tablet/Injection/ Nasal Spray
93	Acetylsalicylic acid	Suppository/Tabl et
	SL No - 11	
	SL No - 12	
	7.2 For prophylaxis	
94	Propranolol	Tablet
	8. ANTINEOPLASTIC, IMMUNOSUPPRESSIVES AND MEDICINES USED IN PALLIATIVE CARE	
	8.1 Immunosuppressive medicines	
95	Azathioprine	Tablet/Injection
96	Cyclosporin	Capsule/Oral Solution/IV Infusion
	8.2 Cytotoxic and adjuvant medicines	
97	Actinomycin D/Dactinomycin	Injection
98	Bleomycin	Injection
99	Calcium Folate/Calcium Leucovorin	Tablet/Injection
100	Cyclophosphamide	Tablet
101	Busulphan	Tablet
102	Cisplatin	Injection
103	Chlorambucil	Tablet
104	Crisantaspase/L-asparaginase	Injection
105	Thioguanine	Tablet
106	Vinblastine Sulphate	Injection
107	Vincristine Sulphate	Injection
108	Doxorubicin	Injection
109	Mercaptopurine	Tablet
110	Lomustine	Capsule
111	Melphalan	Tablet/Injection
112	Mitomycin	Injection

APPENDIX 9 : ESSENTIAL DRUG LIST

113	Mustine Hydrochloride	Injection
8.3 Hormones and antihormones		
114	Tamoxifen	Tablet/Capsule
115	Vasopressin	Injection
116	Liothyronine Sodium	Tablet/Injection
117	Stilboestrol/Diethylstilboestrol	Tablet
	SL No - 26	Injection
	SL No - 27	Injection
8.4 Medicines used in palliative care		
118	Hyoscine Butylbromide	Tablet/Injection
119	Amitypyline	Tablet
120	Propantheline Bromide	Tablet
121	Lactulose	Powder/Solution
	SL No - 26	Tablet/ Injection
9. ANTIPARKINSONISM MEDICINES		
122	Levodopa with Carbidopa	Tablet
10. MEDICINES AFFECTING THE BLOOD		
10.1 Antianaemia medicines		
123	Ferrous Sulphate/Fumarate, with or without Folic Acid	Tablet/Syrup
124	Folic Acid	Tablet
10.2 Medicines affecting coagulation		
125	Heparin	Injection
126	Dipyridamole	Tablet/Oral Suspension/Injec tion
127	Protamine sulfate	Injection
11. BLOOD PRODUCTS AND PLASMA SUBSTITUTES		
11.1 Plasma substitutes		
128	ACD Blood Pack/Double Bag/Triple Bag	
129	Plasma Substitutes/Dextran-40/ Succinylated Gelatin Intravenous Infusions	
130	Dextran 70	Injection
11.2 Plasma fractions for specific use		
131	Plasma Fractions/Human Albumin	Solution for IV infusion
12. CARDIOVASCULAR MEDICINES		
12.1 Antianginal medicines		
132	Metoprolol Tartrate	Tablet
133	Glyceryl Trinitrate	Tablet /Spray
134	Isosorbide dinitrate	Tablet /Injection
135	Isosorbide Mononitrate	Tablet
12.2 Antiarrhythmic medicines		
136	Procainamide	Injection/Capsul e
137	Digoxin	Tablet/Injection
138	Disopyramide	Tablet/Capsule
12.3 Antihypertensive medicines		
139	Atenolol	Tablet
	SL No 94	Tablet /Injection
140	Methyldopa	
141	Captopril	Tablet
142	Diazoxide	Injection

APPENDIX 9 : ESSENTIAL DRUG LIST

143	Sodium Nitroprusside	Injection
144	Prazocin Hydrochloride	Tablet
145	Enalapril	Tablet
146	Spironolactone	Tablet
147	Hydrochlorothiazide	Tablet
12.4 Medicines used in heart failure		
148	Dopamine	Injection
	SL No - 137	
	SL No - 144	
12.5 Antithrombotic medicines		
149	Clopidogrel	Tablet
12.6 Lipid-lowering agents		
150	Simvastatin	Tablet
12.7 Anti- Hypotensive medicine		
151	Metaraminol	Injection
13. DERMATOLOGICAL MEDICINES (topical)		
13.1 Antifungal medicines		
152	Miconazole	Cream/ Dusting Powder/Spray/Oral Gel
153	Sodium thiosulfate	Solution
13.2 Anti-infective medicines		
154	Potassium Permanganate	Crystal/Solution (0.1%)
	SI No 57	Ointment
155	Silver sulfadiazine	Cream
13.3 Anti-inflammatory and antipruritic medicines		
156	Calamine	Lotion
157	Betamethasone	Ointment, Cream
158	Betamethasone with Neomycin	Ointment
159	Neomycin sulfate with Bacitracin	Ointment/Powder
	SL No - 26	Cream
	SL No - 27	Cream/ Ointment
13.4 Medicines affecting skin differentiation and proliferation		
160	Salicylic Acid + Benzoic Acid	Ointment, Cream
161	Fluorouracil	Capsule/Injection/Cream
162	Salicylic acid	Solution
13.5 Scabicides and pediculicides		
163	Benzyl Benzoate	Lotion
164	Permethrin	Cream/ Lotion
14. DIAGNOSTIC AGENTS		
14.1 Ophthalmic medicines		
165	Fluorescein	Eye drops
166	Tropicamide	Eye drops
14.2 Radiopaque media		
167	Barium Sulphate (X-Ray Grade)	
168	Iodipamide	Injection
169	Iothalamic Acid with Meglumine	Oral Solution
15. DISINFECTANTS AND ANTISEPTICS		

APPENDIX 9 : ESSENTIAL DRUG LIST

	15.1 Antiseptics	
170	Chlorhexidine with or without Cetrimide	Solution/Cream
171	Povidone-Iodine 10%	Alcoholic Solution
172	Bismuth, Iodoform and Paraffin Paste (BIPP)	For Nasal Pack
	15.2 Disinfectants	
173	Chloroxylenol	Solution/Cream
	16. DIURETICS	
174	Frusemide	Tablet/Injection
175	Bendroflumazide	Tablet
	SL No - 146	Tablet/Capsule
176	Mannitol Infusion Solution	10% and 20%
	SL No - 147	
	17. GASTROINTESTINAL MEDICINES	
	17.1 Antiulcer medicines	
177	Aluminium Hydroxide Gel with or without Magnesium Trisilicate	Tablet/ Suspension
178	Ranitidine	Tablet /Injection
179	Omeprazole	Capsule/Tablet /Injection
	17.2 Antiemetic medicines	
180	Cinnarizine	Tablet
181	Metoclopramide Hydrochloride	Tablet/Oral Solution/Injection
182	Prochlorperazine	Tablet/Injection
	SL No - 28	
	17.3 Anti-inflammatory medicines	
	SL No-20	Suppository
	17.4 Laxatives	
183	Glycerin/Glycerol	Suppository for adult/child/infant
184	Senna/Sennosides	Tablet
	17.5 Medicines used in diarrhoea	
	17.5.1 Oral rehydration	
185	Potassium Chloride	Tablet/Syrup
186	Sodium Chloride 0.9%, without or with Dextrose	Intravenous Infusion
187	Sodium Bicarbonate	Infusion (Various Strengths)
	17.5.2 Medicines for diarrhoea in children	
188	Zinc sulfate	Oral liquid/Tablet
	18. HORMONES, OTHER ENDOCRINE MEDICINES AND CONTRACEPTIVES	
	18.1 Adrenal hormones and synthetic substitutes	
189	ACTH	Injection
	SL No - 26	Injection
	18.2 Androgens	
190	Danazol	Capsule
	18.3 Contraceptives	
	18.3.1 Oral hormonal contraceptives	
191	Ethinylestradiol + Levonorgestrel	Tablet : 30 micrograms +

APPENDIX 9 : ESSENTIAL DRUG LIST

		150 micrograms
192	Ethinylestradiol + Lynestrenol	Tablet 0.0375mg+0.75 mg
193	Desogesterol + Ethinylestradiol	Tablet:0.15mg+0.03mg
194	Levonorgestrel	Tablet 750microgram
	18.3.2 Injectable hormonal contraceptives	
195	Depot Medroxyprogesterone	Injection
	18.3.3 Intrauterine devices	
196	Copper-T containing device	
	18.3.4 Barrier methods	
197	Condoms	
	18.3.5 Implantable contraceptives	
198	Levonorgestrel-releasing implant	
	18.4 Estrogens	
199	Oestrogens with or without Progestogens for HRT	
	18.5 Insulins and other medicines used for diabetes	
200	Glibenclamide	Tablet
201	Insulin	Various preparations
202	Chlorpropamide	Tablet
203	Metformin Hydrochloride	Tablet
	18.6 Ovulation inducers	
204	Clomiphene Citrate	Tablet
	18.7 Progestogens	
205	Medroxyprogesterone acetate	Tablet: 5 mg.
	18.8 Thyroid hormones and antithyroid medicines	
206	Carbimazole	Tablet
207	Aqueous Iodine	Oral Solution (Lugol's Solution)
208	Thyroxine Sodium	Tablet
209	Levothyroxine	Tablet
	19. IMMUNOLOGICALS	
	19.1 Diagnostic agents	
210	Sodium Diatrizoate with Meglumine Sodium	Injection
211	Tuberculin, purified protein derivative	Injection
	19.2 Sera and immunoglobulins	
212	Diphtheria Antitoxin	
213	Polyvalent Antivenoms	
214	Tetanus Antitoxin	Injection (Minimum 10,000 IU Dose)
215	Human Normal Immunoglobulin	Injection
	19.3 Vaccines	
216	BCG Vaccine	
217	DPT Vaccine	
218	Pentavalent vaccine(DPT,HepatitisB ,Hib)	
219	Pneumococcal Vaccine(PCV)	

APPENDIX 9 : ESSENTIAL DRUG LIST

220	Poliomyelitis Vaccine(OPV &IPV))	
221	MR Vaccine (Mesales &Rubella)	
222	Measles vaccine	Injection
223	Hepatitis- B Vaccine	Injection
	20. MUSCLE RELAXANTS (PERIPHERALLY-ACTING) AND CHOLINESTERASE INHIBITORS	
224	Neostigmine	Tablet/Injection
225	Suxamethonium Chloride	Injection
226	Pancurium Bromide	Injection
227	Gallamine Trithiodide	Injection
	21. OPHTHALMOLOGICAL PREPARATIONS	
	21.1 Anti-infective agents	
228	Framycetin Sulphate	Eye Drops/Ointment
229	Gentamycin	Injection/Eye Drops/Ointment
230	Tetracaine/Amethocaine	Eye Drops
	SL No - 53	Eye Drops/Ointment
	21.2 Anti-inflammatory agents	
231	Corticosteroid	Eye drops/Ointment
	SL No - 158	Eye Drops
	21.3 Local anaesthetics	
	SL No - 230	
	21.4 Miotics and antiglaucoma medicines	
232	Pilocarpine	Eye Drops (Various Strengths)
233	Acetazolamide	Tablet
234	Carbachol	Tablet/Eye Drops
	SL No - 151	
	21.5 Mydriatics	
235	Phenylephrine Hydrochloride	Eye drops
236	Homatropine	Eye drops
	SL No - 09	Injection/eye drop/ointment
	22. OXYTOCICS AND ANTIOXYTOCICS	
	22.1 Oxytocics	
237	Trifluoperazine	Tablet/Oral

APPENDIX 9 : ESSENTIAL DRUG LIST

		Solution
238	Oxytocin	Injection
239	Ergometrine	Injection
	22.2 Antioxytocs (tocolytics)	
240	Nifedipine	Capsule
	23. PERITONEAL DIALYSIS SOLUTION	
241	Intraperitoneal dialysis solution (of appropriate composition)	Parenteral solution.
	24. MEDICINES FOR MENTAL AND BEHAVIOURAL DISORDERS	
	24.1 Medicines used in psychotic disorders	
242	Chlorpromazine Hydrochloride	Tablet/Syrup/Injection
243	Haloperidol	Tablet/Capsule /Oral Liquid
	24.2 Medicines used in mood disorders	
	24.2.1 Medicines used in depressive disorders	
244	Imipramine Hydrochloride	Tablet/Syrup
245	Nortriptyline	Tablet
246	Flupenthixol Dihydrochloride/Decanoate	Tablet/Injection
	SL No - 119	
	24.2.2 Medicines used in bipolar disorders	
247	Carbamazepine	Tablet/Oral Liquid/Suppository
248	Lithium Carbonate/Citrate	Tablet/Oral liquid
	24.3 Medicines for anxiety disorders	
249	Diazepam	Tablet/Injection
250	Clobazam	Tablet
	24.4 Medicines used for obsessive compulsive disorders	
251	Clomipramine Hydrochloride	Tablet/Syrup/Capsule/Injection
	24.5 Medicines for disorders due to psychoactive substance use	
252	Methadone Hydrochloride	Tablet/Injection
	25. MEDICINES ACTING ON THE RESPIRATORY TRACT	
	25.1 Antiasthmatic and medicines for chronic obstructive pulmonary disease	

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253	Salbutamol	Tablet/Elixir
254	Adrenaline/Epinephrine	Injection
255	Aminophylline	Tablet/Injection
26. SOLUTIONS CORRECTING WATER, ELECTROLYTE & ACID-BASE DISTURBANCES		
26.1 Oral		
256	Oral Rehydration Salts (ORS)	Sachet for 500 ml
257	Cholera Fluid	Intravenous Infusion
258	Sodium hydrogen carbonate	Injection
26.2 Parenteral		
259	Dextrose in Water	Intravenous Infusion, 5%, 25% and 50%
260	Supplemental Parenteral Nutrients	For adding to Infusion
261	Glucose	Injectable solution
262	Glucose with sodium chloride	Injectable solution
263	Sodium chloride	Injectable solution
264	Sodium chloride 3%	I/V fluid
265	Sodium chloride quartat strength (0.225%) + Dextrose 5%	I/V fluid
	SL No 259	Injectable solution
26.3 Miscellaneous		
266	Water for Injection (sterile/pyrogen free)	
267	Dialysis Fluid	
27. VITAMINS AND MINERALS		
268	Ascorbic Acid/Vitamin C	Tablet
269	Vitamin A	Capsule 50,000-2,00,000 IU (Injection 100,000 IU for SL and above)
270	Vitamin B ₁	Tablet /Injection
271	Vitamin K	Tablet /Injection
272	Vitamin E	Tablet
273	Vitamin B-Complex	Tablet/Drops

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274	Calcium Gluconate	Tablet/Injection
275	Iodized Oil	Injection
276	Vitamin B ₁₂	Injection
277	Nicotinamide	Tablet
278	Pyridoxine	Tablet
279	Retinol	Capsule/ Tablet/ Oral oily solution/Water- miscible injection
280	Riboflavin	Tablet
281	Thiamine	Tablet
	SL No - 124	
28. EAR, NOSE AND THROAT CONDITIONS IN CHILDREN [c]		
282	Ciprofloxacin	Eye drops for SL and above
283	Gentamicin + Hydrocortisone	Ear Drops
284	Xylometazoline	Nasal drops
	SL No - 53	Ear Drops/ Ointment
29. SPECIFIC MEDICINES FOR NEONATAL CARE [c]		
30. MUCOLYTICS, EXPECTORANTS AND COUGH SUPPRESSANTS		
285	Dextromethorphan	Syrup

Appendix–10

LIST OF OVER-THE-COUNTER (OTC) DRUGS (ALLOPATHIC)

1. Albendazole Chewable Tablet
2. Antacid Chewable Tablet/ Suspension
3. Ascorbic Acid Chewable Tablet/ Syrup
4. Benzyl Benzoate Lotion
5. Calcium Tablet
6. Chloramphenicol Eye/Ear Ointment/Drops
7. Chlorhexidine Lotion/ Cream
8. Chloroxylenol Lotion/ Cream
9. Chlorpheniramine Maleate Tablet/ Syrup
10. Condoms
11. Diclofenac Gel
12. Dextromethorphen Syrup
13. Ferrous (Sulphate, Gluconate & Fumarate) Tablet/ Capsule/ Syrup
14. Gentian Violet
15. Glycerin Suppository
16. Low Dose Contraceptive Pills
17. Mebendazole Tablet
18. Metronidazole Tablet/ Suspension
19. Methyl Salicylate Gel
20. Milk of Magnesia Suspension
21. Mouthwash Preparations
22. Multivitamin Tablet/ Capsule/ Drops
23. Neomycin/ Gentamycin/ Bacitracin or combination Ointment/ Cream/ Dusting Powder
24. Omeprazole capsule
25. Oral Rehydration Salt (ORS) (with or without glucose or flavours) Sachets
26. Paracetamol/Acetaminophen Tablet/ Syrup/ Suspension/Suppository
27. Permethrin Ointment/ Cream
28. Potassium Permanganate Granules for Gargle
29. Povidone Iodine
30. Promethazine Theoclate Tablet
31. Ranitidin Tablet
32. Riboflavine tablet
33. Salbutamol Tablet
34. Salicylic Acid + Benzoic Acid Ointment
35. Silver Sulphadiazine Ointment
36. Sunscreen Preparations
37. Vitamin A Capsule
38. Vitamin B Complex (individual or combinations) Tablet/ Syrup/ Drops
39. Xylometazoline 0.1% Nasal Drops

Appendix-11

LIST OF CONTROLLED DRUGS

Controlled drugs are classified in this list according to the First Schedule of the Narcotics Control Act, 1990. Note that the said Schedule contains also the names of other narcotic and psychotropic substances that are not used either in their crude forms or otherwise in the preparation of pharmaceutical or medicinal products. The penalties applicable for offences involving the different classes of the listed drugs are graded broadly according to the degree of harmfulness attributable to a drug when it is misused. For details of such offences, see the Narcotics Control Act, 1990.

1. **A-Class Controlled Drugs**
Alfentanil; buprenorphine; cocaine and its salts; codeine phosphate; dextromoramide; dihydrocodeine tartrate; diphenoxylate; ethylmorphine; fentanyl; heroin (diamorphine) hydrochloride; hydromorphone hydrochloride; meptazinol; methadone hydrochloride; morphine and its salts; pentazocine; pethidine hydrochloride; phenazocine hydrobromide; pholcodeine; tetrahydro cannabinol or cannabis resin in any form; and remifentanyl.
2. **B-Class Controlled Drugs**
 - (a) Amphetamine/ methylamphetamine and related other drugs (these drugs are prohibited in Bangladesh for medicinal purposes); barbiturates (e.g. amylobarbitone, butobarbitone, methyl phenobarbitone, phenobarbitone, phenobarbitone sodium, quinalbarbitone/ secobarbital, etc.)
 - (b) Ethyl alcohol and all kinds of wine, spirit, liquor and beer; rectified spirit; any medicine or liquid containing more than 5% of ethyl alcohol.
 - (c) Herbal cannabis in any form; LSD or any other drug containing LSD.
3. **C-Class Controlled Drugs**
Benzodiazepines (e.g. alprazolam, bromazepam, chlorazepate, chlordiazepoxide, diazepam, flurazepam, loprazolam, lorazepam, lormetazepam, nitrazepam, oxazepam etc.); denatured spirit or methylated spirit; meprobamate; other tranquilizer or hypnotic drugs not included in B-Class.

Appendix-12

PHARMACOVIGILLANCE System and ADR Monitoring in BANGLADESH

Pharmacovigilance (PV) is defined by the World Health Organization (WHO) as -
“The science and activities relating to the **detection, assessment, understanding, and prevention of adverse effects or any other drug-related problem**”.

Major aims of Pharmacovigilance are-

- Early detection of unknown safety problems
- Identification and quantification of risk factors
- Preventing patients from being affected unnecessarily
- Collection of more information about safety of drugs
- To ensure Rational use of Medicines and Patient Safety

Some Drug Reactions Defined by WHO

Adverse Event (AE): any untoward medical occurrence that may be present during treatment with a pharmaceutical product but which does not necessarily have a causal relationship with this treatment.

Adverse Drug Reaction (ADR): “any response to a medicinal product that is noxious and unintended and which occurs at doses normally used for the prophylaxis, diagnosis or modification of physiological function.”

Side Effect: any unintended effect of a pharmaceutical product occurring at doses normally used by a patient which is related to the pharmacological properties of the product.

An ADR may therefore include any of the following:

- (a) a harmful drug response,
- (b) an unwanted effect on an organ system different from that being treated,
- (c) an allergic or hypersensitivity reaction,
- (d) an idiosyncratic reaction, or
- (e) a drug interaction that causes either an increased or diminished response.

A *side effect* and a drug allergy are both types of ADRs. A side effect is an example of a dose-related, predictable reaction to a drug. It is typically accepted that a side effect of a drug is known to occur in a given percentage of the population and has been observed with regular frequency. A *drug allergy* is an example of a non-dose-related, unpredictable adverse effect to a drug.

Any reaction to a new drug (e.g., a drug on the market 3 years or less), whether or not included in the product labeling and regardless of its severity, should be reported. Reporting for biologic agents (e.g., vaccines) as well as devices, and any reactions for these agents or products should be reported as well. Table-1 below shows the reportable adverse drug reactions.

Importance of Pharmacovigilance

- Adverse Drug Reactions are among the top ten causes of mortality

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- The percentage of hospital admissions due to drug related events is about or more than 10%. More than 50% of ADRs are preventable.
- Drug classes frequently involved in Adverse Drug Reactions (ADRs) related admissions include drugs of abuse, anticonvulsants, antibiotics, respiratory drugs, and pain medications. ADRs can also occur in hospitalized patients and require an increase in length of stay and treatment with medical and pharmacologic interventions.

Table 1: Reportable Adverse Drug Reactions.
• For “new” drugs – report all suspected reactions, including minor ones. • For established or well-known drugs – report all serious or unexpected (unusual) suspected ADRs; • Report if an increased frequency of a given reaction is observed; • Report all suspected ADRs associated with drug-drug, drug-food or drug-food supplements (including herbal and complementary products) interactions; • Report ADRs in special fields of interest such as drug abuse and drug use in pregnancy and during lactation; • Report when suspected ADRs are associated with drug withdrawals; • Report ADRs occurring from overdose or medication error; • Report when there is a lack of efficacy or when suspected pharmaceutical defects are observed.
An event is serious and should be reported when it: 1. resulted in death. 2. was life-threatening. 3. required prolonged hospitalization 4. directly resulted in disability. 5. resulted in congenital anomaly.

How to recognize ADRs

Since ADRs may act through the same physiological and pathological pathways as different diseases, they are difficult and sometimes impossible to distinguish. However, the following step-wise approach may be helpful in assessing possible drug-related ADRs:

1. Ensure that the medicine received as per prescription and actually taken by the patient at the dose advised;
2. Verify that the onset of the suspected ADR was after the drug was taken, not before and discuss carefully the observation made by the patient;
3. Do a thorough physical examination with appropriate laboratory investigations, when possible;
4. A full drug and medical history should be done, when possible;
5. Determine the time interval between the beginning of drug treatment and the onset of the event;
6. Evaluate the suspected ADR after discontinuing the drugs or reducing the dose and monitor the patient's status. If appropriate, restart the drug treatment and monitor recurrence of any adverse events.
7. Analyze the alternative causes (other than the drug) that could on their own have caused the reaction;
8. Use relevant up-to-date literature and personal experience as a health professional on drugs and their ADRs and verify if there are previous conclusive reports on this reaction.

9. Report any suspected ADR to the person nominated (if any) for ADR reporting in the hospital or directly to the ADRM Cell, Directorate General of Drugs Administration, Aushadh Bhabon, Mohakhali, Dhaka-1
10. Collected reports are primarily assessed by ADRM cell, then Technical sub-committee. Finally these are reviewed by ADR Advisory Committee (ADRAC) and pass comment. The ADRAC also make regulatory recommendation if needed to the DGDA. Thus ADRs are identified. All safety information are being disseminated to the relevant stakeholders through different means.
11. The reports are uploaded to Uppsala Monitoring Centre VigiBase (Global database) for further analysis in broader aspect. As a member country Bangladesh gets WHO-UMC collaboration in Pharmacovigilance activities.

Drug Induced Diseases

Disease management, collective management of all aspects of a patient's disease, rather than isolated drug treatment of a disease is rapidly becoming the accepted practice in health care. Adverse drug monitoring and management should be thought of in a similar fashion. It is impossible to consider the desired outcomes of drug therapy without taking into consideration all adverse, as well as beneficial, consequences of treatment. The remaining sections of this chapter will focus on major organ systems most commonly associated with adverse pharmacologic reactions. Throughout the remainder of this chapter, the reader may be referred to other chapters in this book that describe in detail the mechanism of specific drug-induced diseases.

Hypersensitivity Reactions: True hypersensitivity reactions are immunologically mediated through a series of reproducible steps. Hypersensitivity reactions are most frequently associated with β -lactam antibiotics, which include penicillin and cephalosporin. While allergic reactions to penicillin have been reported to occur in 0.7 to 8% of the general population, anaphylaxis only occurs in 0.01% of identified treatment courses.

Hypersensitivity reactions may manifest as acute urticaria, rhinitis, bronchial asthma, and angioedema. Depending on the severity of the reaction, there may also be peripheral circulatory collapse; therefore, immediate medical care should be sought. The offending agent should be removed. Epinephrine should be administered 0.1–0.2 mg IV over 2 to 3 minutes. This dose may be repeated every 15 to 20 minutes as needed up to 3 doses. Oxygen should be administered if available. Since the patient may be experiencing vascular collapse, fluid therapy should be initiated as needed to maintain blood pressure. If the patient is unresponsive to fluid replacement, a dopamine infusion may be necessary at a rate of 2 to 15 mg/kg. β -Agonists, diphenhydramine, and hydrocortisone should also be administered after the emergent situation is controlled.

Hepatotoxicity: Drug-induced hepatotoxicity has been associated with over 600 drugs. Hepatotoxicity can be difficult to diagnose because the literature consists primarily of case reports and because injury can present acutely or after prolonged drug administration. Table-2 illustrates some of the risk factors associated with developing hepatotoxic reactions. Table-3 lists a number of drugs that have been implicated in causing chronic active hepatitis. Acute liver injury can be cytotoxic or cholestatic. Cytotoxic injury involves direct injury to the hepatocytes with necrosis that can be localized or diffuse throughout the liver. Aminotransferase levels can be elevated to up to 500 times the normal levels. Prominent signs and symptoms include fatigue, anorexia, nausea, and jaundice. Drug-induced cytotoxic injury can progress to fulminant hepatic failure. Isoniazid, methyldopa, and phenytoin have been associated with direct

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cytotoxic reactions that have led to mortality rates of 10% or higher. Cholestatic injury results in a characteristic decrease in bile flow. Hepatic injury of this type leads to jaundice and pruritus, and aminotransferase levels are only moderately elevated. Cholestatic hepatic injury has a much better prognosis as compared to cytotoxic injury with a mortality rate of less than 1%.

Table 2 : Risk Factors Associated with Developing Hepatotoxic Reactions		
	Factor	Example
Age	Adult > Children	Isoniazid, halothane
	Elderly > others	NSAIDs
	Children > Adults	Valproic acid, aspirin
Sex	Female > Male	Methyldopa, Drug-induced chronic active hepatitis
Drugs	Alcohol & Phenobarbital	Can induce Cytochrome p 450 system and enhance the toxicity of agents converted to active metabolites
Pathological State	AIDS	Increased susceptibility to hepatotoxic effects of Sulfamethoxazole-Trimethoprim
	Diabetes	Enhances toxicity of carbon tetrachloride
	Hyperthyroidism	Enhances toxicity of carbon tetrachloride
Adapted from Zimmerman HJ. Hepatotoxicity. Disease-a-Month 39:675 787. 1993.		

Table 3 . Drugs Implicated in Causing Chronic Active Hepatitis		
Acetaminophen	Isoniazid	Papaverine
Dantrolene	Nitrofurantoin	Propylthiouracil
Diclofenac	Methyldopa	Sulfonamides
Adapted from Zimmerman HJ. Hepatotoxicity. Disease-a-Month 39:675 787. 1993.		

Pancreatitis: Pancreatitis can also be characterized as being either acute or chronic. A large number of medications can cause acute pancreatitis. Clinical symptoms of pancreatitis include acute abdominal pain and increased blood and urine pancreatic enzyme concentrations. Morphologic changes in the pancreas itself are minor or absent. Table-4 given below.

Table 4: Examples of Drugs Suspected in Drug-Induced Pancreatitis		
Asparaginase	Furosemide	Sulindac
Azathioprine	Mercaptopurine	Tetracyclines
Didanosine	Pentamidine	Thiazides
Estrogens	Sulfonamides	Valporic Acid

Nephrotoxicity: Drug-induced nephrotoxicity depends on the concentration of drug presented to the kidney and the biochemical or physiologic effect of the drug on the affected tissue. Factors that influence the concentration of given drugs in the kidney include mechanisms for the transport of drugs across the tubular epithelium, the rate of water versus drug reabsorption, plasma protein binding, and rate of urine flow. A list of drugs and chemicals associated with each of these lesions is provided in Table-5.

Table 5: Drugs Associated with Nephrotoxicity				
Acute tubular necrosis	Antibiotics	Acute tubulointerstitial disease	Penicillins	
			Amoxicillin	
	Aminoglycosides		Carbenicillin	
	Amphotericin B		Methicillin	
	Bacitracin		Nafcillin	
	Cephalosporins		Oxacillin	
	Polymixins		Penicillin	
	Sulfonamides		Other antibiotics	
	Metals		Cephalosporins	
	Antimony		Cotrimoxazole	
	Bismuth		Erythromycin	
	Mercurials		p-Aminosalicylate	
	Platinum		Polymixins	
	Chelates		Rifampin	
	Dimercaprol		Sulfonamides	
	EDTA		NSAIDs	
	Contrast media		Fenoprofen	
	Miscellaneous		Ibuprofen	
	Acetaminophen		Indomethacin	
	Aminocaproic acid		Mefenamic acid	
	Carbamazepine		Phenylbutazone Tolmetin	
	Cisplatin		Miscellaneous	
	Cyclosporine		Allopurinol	
	Methotrexate		Azathioprine	
	Methoxyflurane		Captopril	
	Phenazopyridine		Cimetidine	
	Streptozocin		Clofibrate	
Glomerulonephritis	Allopurinol	Chronic tubulointerstitial disease	Furosemide	
	Captopril		Phenytoin	
	Cyclophosphamide		Thiazides	
	Daunorubicin			
	Fenoprofen		Acetaminophen	
	Hydralazine		Aspirin	
	Rifampin		Lithium	
	Sulfonamides		Methyl-CCNU	
	Thiazides		Phenacetin	
	Trimethadone			

Gastrointestinal Diseases: Nausea and vomiting are among the most frequent drug-induced symptoms and they occur more often in women. Almost any orally administered drug can produce these symptoms by a direct irritant effect on the gastric or small-bowel mucosa, or by central stimulation of the chemoreceptor zones and vomiting center in the medulla. The most common drugs causing these reactions included potassium chloride, heparin, docusate and aluminum and magnesium hydroxide suspension. The most clinically significant ADRs affecting the upper

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gastrointestinal tract result from the use of nonsteroidal anti-inflammatory drugs (NSAIDs), partly because of their widespread use in this country. There are two types of gastrointestinal toxicity associated with NSAIDs: dyspepsia and ulceration of the gastric mucosa. Ulcerogenic properties of NSAIDs have received intensive study both in the laboratory and epidemiologically. The anti-inflammatory activity of these agents is derived from their ability to inhibit cyclooxygenases (prostaglandin synthetases), which, unfortunately, results in an impairment of the gastrointestinal mucosa to resist acid attack.

Hematologic Disorders: Drug-induced hematologic disorders encompass a wide variety of disorders, only some of which are mechanistically understood. Hematologic disorders such as, aplastic anemia, agranulocytosis, hemolytic anemia, megaloblastic anemia, and thrombocytopenia have been associated with drug-induced etiologies. Aplastic anemia is the most serious drug-induced blood disorder, and it has been estimated that drugs are responsible for nearly one-half of all cases of aplastic anemia. The first clinical manifestations of aplastic anemia usually are related to hemorrhage. Pancytopenia is observed in a majority of the patients on initial examination, and a hypocellular bone-marrow biopsy may be obtained at some time in the course of the illness. Many drugs can cause suppression of bone-marrow activity or aplasia in a dose-dependent manner, as is the case with cytotoxic drugs. For many other drugs, aplastic anemia can occur suddenly in the form of an idiosyncratic reaction, unrelated to the dose. Cytostatic drugs are used in the treatment of neoplastic disorders because of their action on dividing cells. All of these agents, which include alkylating agents, antibiotics, antimetabolites and vinca alkaloids, in large doses, can produce bone-marrow aplasia.

In agranulocytosis resulting from allergic mechanisms, signs and symptoms appear in a few days to weeks following administration. There is an abrupt onset of high fever, rigors and occasional episodes of localized infections. Drugs associated with this type of reaction include sulfonamides, sulfonyleureas, phenothiazines, antithyroid agents, phenylbutazone and semisynthetic penicillins. Drugs that can produce a lupus-like syndrome and result in agranulocytosis are procainamide, hydralazine, isoniazid, rifampicin and propylthiouracil.

Cardiovascular Effects: Adverse drug reactions involving the cardiovascular system are not specifically limited to those agents used to treat cardiovascular disease. For example, bronchodilator therapy and sympathomimetic effects of various cough and cold remedies often negatively affect cardiac rate and rhythm regulation. Many antiarrhythmic agents may also be proarrhythmic. Tricyclic antidepressants in an overdose situation cause ECG changes that can be life-threatening. In addition to certain cardiac medications, bradycardia can also be induced by agents such as carbamazepine, methyl dopa, and H₂ antagonists. Some agents used in chemotherapy regimens, such as the anthracyclines, have a dose limiting side effect of causing congestive cardiomyopathy. Additionally, some diuretics and β -blockers may adversely affect lipid risk profiles.

Pulmonary Effects: Pulmonary injury secondary to pharmacologic treatment has been shown to occur with the administration of over 150 medications. Table-6 lists agents known to cause pulmonary disease.

Table 6: Agents Known to Cause Pulmonary Disease		
Cardiovascular	Anti-inflammatory	Chemotherapeutic Agents
Amiodarone	Aspirin	Azathioprine
ACE inhibitors	Ifosfamide	Bleomycin
Anti-coagulants	Methotrexate	Busulphan
β -Blockers	NSAIDs	Chlorambucil
Dipyridamole	Penicillamine	Cyclophosphamide
Tocainide	Miscellaneous	Etoposide
Antibiotics	Bromocriptine	Melphalan
Amphotericin B	Dantrolene	Mitomycin
Nitrofurantoin	Oral Contraceptives	Nitrosoureas
Sulfasalazine	Hydrochlorothiazide	Procarbazine
Pentamidine	Tricyclic Antidepressants	Vinblastine
Adapted from Rosenow ECIII. Drug-induced pulmonary disease. Disease-a-Month. 5:258—310, 1994.		

Ototoxicity: Ototoxicity from drug therapy may be manifested in two ways, depending on the portion of the inner ear affected. Vestibular toxicity can result in dizziness or vertigo, while cochlear toxicity usually results in hearing loss. Manifestations of ototoxicity may range from mild tinnitus or dizziness to total bilateral irreversible hearing loss and/or permanent disabling vertigo. Aminoglycosides such as neomycin, streptomycin, gentamicin, amikacin and netilmicin are considered to be the most ototoxic, in terms of permanent damage. These drugs destroy the outer hair cells in the cochlea in such a way that high-frequency hearing loss occurs first; lower and midrange frequencies or conversational tones are affected later. Topically administered aminoglycoside antibiotics can be absorbed sufficiently to result in ototoxicity. Oral or peritoneal administration or topical use of neomycin for wound irrigation has also resulted in ototoxicity. Similarly ototoxicity has followed the application of a 0.1% gentamicin cream to the skin. Loop diuretics, ethacrynic acid, furosemide and bumetanide all possess the potential to produce ototoxicity. There have been numerous case reports of transient effects of ethacrynic acid on auditory function and reports of permanent deafness, even after oral administration. High intravenous doses of furosemide may cause vertigo and transient hearing loss, particularly in patients with renal impairment. Even in the absence of renal failure, oral doses of furosemide have been reported to result in permanent hearing impairment.

Ocular Toxicity: The list of drugs that are toxic to the eye is extensive. Nearly every structure of the eye has been affected adversely by drugs. Decreased tear production has been shown to have damaging effects on the eye. Tear secretion can be diminished by anticholinergic and by ganglionic blocking drugs. A decrease in tear production occasionally has been noted in patients receiving phenothiazines. Patients using chloroquine, or related aminoquinolines, for diseases such as systemic lupus erythematosus and rheumatoid arthritis take high doses for prolonged periods and are at risk of developing ocular toxicity. Ocular damage normally does not occur with lower dosages used in the suppression and treatment of malaria. Both chloroquine and hydroxychloroquine produce numerous forms of ocular toxicity, which include whitening of the lashes, extraocular muscle palsy, corneal deposits, decreased corneal sensitivity and retinal damage. Elevated intraocular pressure is a well-documented side effect of both local and systemic corticosteroid therapy. The increased intraocular pressure occurs a few weeks after topical application and a few months after systemic therapy. Severe increases in intraocular pressure, similar to those seen in acute glaucoma, have resulted in cupping of the optic discs and visual field defects similar to those seen in

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open-angle glaucoma. Corticosteroid-induced glaucoma develops more commonly in patients with a family history of glaucoma.

Sexual Dysfunction:

Normal sexual function is mediated by various physiologic mechanisms including neurogenic, psychogenic, vascular, and hormonal factors. It is expected, then, that medications that interfere with any of these systems may also interfere with sexual function. Sexual dysfunction is often associated with antihypertensive and antipsychotic medications.

Thiazide diuretics, peripheral and central sympatholytics, and β -blockers have all been associated with a decline in sexual function. The adverse events range from loss of libido to impotence, ejaculatory failure, and anorgasmia, with impotence being the most frequently reported. Calcium channel blockers and ACE inhibitors appear to have a relatively decreased potential for causing sexual dysfunction. Antipsychotic or antidepressant medications are also associated with a variety of effects on sexual function (e.g., impotence, priapism, anorgasmia, and diminished libido); however, ejaculatory failure is the most frequently reported.

Additional medications that have been associated with sexual dysfunction, although less frequently than the aforementioned agents, are the H_2 antagonists, metoclopramide, anticonvulsants (e.g., carbamazepine, phenytoin, phenobarbital, and primidone), and opioids when used chronically.

HISTORY OF ADVERSE DRUG REACTIONS MONITORING (ADRM)

Background

- In 1962, in the wake of the thalidomide disaster, World Health Assembly requested WHO to establish an international system of monitoring adverse reactions to drugs using information derived from national centres.
- The Sixteenth World Health Assembly in 1963 adopted a resolution (WHA 16.36)
- WHO Pilot Research Project started for International Drug Monitoring in 1968
- In 1978 International Drug Monitoring Centre (Uppsala Monitoring Centre, Sweden) has been established
- More than 147 countries are member of the WHO-UMC.
- Bangladesh is the 120th member of WHO-UMC.

Before an effective international system could become operative, a common reporting form had to be developed, agreed guidelines for entering information had to be formulated, common terminologies and classifications had to be prepared and compatible systems for transmitting, storing, retrieving and disseminating data had to be created. Upon the successful completion of these tasks the operational activities subserving the international data base were relocated in 1978 to a WHO collaborating centre situated in Uppsala, Sweden.

ADRM and Pharmacovigilance in Bangladesh

Under the guidance of WHO, an Adverse Drug Reaction Monitoring (ADRM) Cell was established in the Directorate of Drug Administration, now known as Directorate General of Drug Administration (DGDA) in 1996. Initially the Cell circulated posters bearing awareness slogans of drug use throughout the country, organized awareness meetings among the chemists of different area and also published awareness instructions in the daily newspapers and broadcasted these awareness slogans on

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Radio Bangladesh. The Cell has been trying since its inception to introduce a systematic mechanism for ADR monitoring in Bangladesh and for collection, analysis and compilation of ADRs, spontaneously reported by the medical and pharmaceutical professional of all health services outlets of the country. With this end in view, DGDA has been organizing ADR Monitoring Workshops/meetings in the Medical Colleges and Hospitals of the country and distributing printed ADR reporting forms to the doctors for spontaneous reporting of ADR cases since 2000. On 6 July 1997, the Ministry of Health & Family Welfare (MOHFW) formed a 10-Member ADR Advisory Committee (ADRAC) to evaluate, analyze and make recommendations for solving problems of medicinal hazards due to ADRs.

Present Position of PV

- It is functioning well after re-starting in 2013 with technical support of USAID funded MSH/SIAPS program.
- Adverse Drug Reaction Monitoring (ADRM) Cell of DGDA has been declared as **the National Drug Monitoring Centre (National PV Centre) for Bangladesh**
- Bangladesh has been awarded 120th Membership of the WHO-UMC in 2014.
- Standard Suspected AE Reporting form is available in the DGDA website and hard copies are also available in the Health facilities and in the Pharmaceutical Companies.
- WHO-UMC is providing support for using their tools VigiFlow, VigiBase etc
- PV newsletter, posters, pamphlets for risk communication and awareness building among stakeholders.
- Technical sub-committee and ADR Advisory Committee work for technical evaluation of Suspected AE reports and provide regulatory recommendation.
- ADRM cell first started PV activities with primarily selected 20 Pharma Industry and 20 Hospitals
- Then the number has been increased in 30 and 32 respectively. Now the area has been extended to all the Pharmaceutical Industries, all Govt. Medical College Hospitals & General Hospitals.
- Public Health Programs (specially Kala-azar Program) are also collaborating in this regard. They are providing reports regular basis.
- ADRM Cell is regularly meeting with stakeholders, visiting hospitals and companies for exchanging views to improve the PV awareness.

What to Report

The National Drug Monitoring Centre shall encourage reporting of all suspected adverse drug related events, whether it is seemingly insignificant or common adverse reactions, as it may highlight widespread prescribing problem. The reporter should made aware not to wait until he feels certain that a causal link can be considered proven or disproven. In any case of doubt it is better to report than not to report.

A case report in pharmacovigilance can be defined as: A notification relating to a patient with an adverse medical event (or laboratory test abnormality) suspected to be induced by a medicine. It should also be a comprehensive and complete medical description of the case.

An updated and standardized suspected adverse event reporting form has been developed and adopted by Bangladesh to report all cases of ADRs. The ADR form is available at DGDA and on the website in a fillable pdf format. ADR case report should (as a minimum to aim at) contain information on the following elements:

APPENDIX-12: Pharmacovigilance

1. The patient : name or initials, age, sex, contact information, and brief medical history
2. Suspected Adverse event: type of event, description (nature, localization, severity, characteristics), results of investigations and tests, start/end date, course and outcome.
3. Suspected drug(s) :name (brand or generic name, manufacturer) dose, dosage form, frequency, Batch number, start/stop date, indication for use, seriousness of event, outcomes attributed, other relevant history.
4. All concomitant drugs information (including self medication): names, doses, routes, indication, frequency, start/stop dates.
5. Relevant history of the patient (e.g., impaired renal function, previous exposure to suspected drug, previous allergies)
6. Name and address of the reporter (to be considered confidential and to be used only for date verification, completion and case follow-up)

NB: The mandatory fields of the Suspected AE Reporting form have been marked 'star'.

Who Should Report

12. **Government/Private Hospitals/Clinics/Pharmaceutical Companies:** Every hospitals and clinics must decide for itself how the reporting system should be operated and by whom. The arrangements will depend on the hospital's / clinic's own organization and traditions. Conversely, during the launch of Bangladesh as a National Pharmacovigilance Program on September 2, 2013, DGDA identified Focal Point persons at 20 public & private hospitals and 20 Pharmaceutical Companies, which has subsequently be increased to 30 in 2014 that would be responsible for collecting ADRs and submitting to DGDA. Recently this number has been increased to 50, although all the Pharmaceutical Companies have been served administrative order from DGDA to form functional PV team with focal (responsible) person for performing Pharmacovigilance of their own products. All The Medical College Hospitals and General Hospitals have been requested to form PV team also to perform PV activities at their own facilities. All pharmaceutical companies and hospitals/clinics are encouraged to do the same. Generally the Healthcare Providers (Doctors, Pharmacists, Nurses) themselves act as reporters, completing the reporting form, keeping a record and sending them to the Focal Person at the hospital, who will forward the report to: **ADRM Cell, Directorate General of Drug Administration, Aushadh Bhabon, Mohakhali, Dhaka-1212, Bangladesh.**

The hospital pharmacist may act as a reporter, completing the forms in consultation with the reporting physician. Patients/Consumers may also act as reporters and contact the pharmaceutical companies regarding any suspect adverse event or ADRM Cell directly.

A reporter should report

- (a) Apparent ADRs previously unknown to the reporter
- (b) Serious ADRs
- (c) All suspected ADRs to new drugs
- (d) Medication Errors
- (e) Suspected events due to product quality issues.

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Suspected AE reporting forms: are available as printed hard copy. It is also available in the DGDA website: www.dgda.gov.bd.com. It can be downloaded easily, then after filling up to be sent to the e-mail ids: adrmcell.dgda@gmail.com or dgda.gov@gmail.com

NB : *A Light green- coloured card for reporting Adverse Drug Reactions is available from the above address and also included in this book (inside back cover).*

Conclusion

Pharmacovigilance is an important task for patient safety. It is very much crucial and important to ensure the safety of marketed drug products. It can save us from any unwanted disaster for unidentified risks of drugs. So, we need to perform Pharmacovigilance intensely throughout the country.

Appendix-13

PHARMACEUTICAL ABBREVIATIONS

Communication of dosage instructions to patients

Physicians and Pharmacists have to devote considerable time and effort to the development and utilization of safe and cost-effective drug therapy. In order to gain maximum benefit from the use of drugs while minimizing their side effects, prescribers and pharmacists must maintain effective communications not only among themselves, but with their patients as well. The directions for drug use and other information which prescribers indicate on prescription orders must be transferred on the labels and explained by the pharmacists to the patients for safe and effective drug therapy. In order to assure that this information is conveyed clearly and effectively to the patients, the following guidelines have to be followed by the professionals.

Notes for prescribers

1. Whenever possible, specific times of the day for drug administration should be indicated (for example, Take one capsule at 8:00 am, 2:00 pm, and 8:00 pm is more preferable as compared Take one capsule three times daily).
2. The use of potentially confusing abbreviations, ie, qid, tid, bd, etc, is discouraged.
3. Vague instructions such as "take as necessary" or "take as directed" which are confusing to the patient's should be avoided.
4. If dosing at specific intervals around-the-clock is therapeutically important, this should specifically be stated on the prescription by indicating appropriate times for drug administration.
5. The symptom, indication, or the intended effect for which the drug is being used should be included in the instructions whenever possible (for example, Take one tablet at 6:00 am and 6.00 pm for high blood pressure, or Take one tablet at 7:00 am, 11:00 am, 4:00 pm, and 8.00 pm for cough).
6. The Metric System of weights and measures should be used.
7. The prescription order should indicate whether or not the prescription should be refilled and, if so, the number of refill(s) and the period of time for such renewal is recommended.
8. The prescriber should print his/her name, telephone number and registration number on the prescription blank.

Notes for Pharmacists

1. Instructions to the patient regarding directions for use of medication should be concise and precise, but readily understandable to the patient. The pharmacist should give verbal reinforcement and clarification of instructions to the patient when appropriate.
2. For those dosage forms where confusion may develop as to how the medication is to be administered, the pharmacist should clearly indicate the intended route of administration on the prescription label.
3. Where special storage conditions are required, the pharmacist should indicate appropriate instructions for storage on the prescription label and explain to the patient.

APPENDIX-13 : PHARMACEUTICAL ABBREVIATIONS

TABLE: Common Abbreviations of Prescriptions, Medical and Pharmaceutical orders.

ABBREVIATION	MEANING
a.d.	Right ear
a.s	left ear
Aa	of each
abd	abdomen
ac	before meals
ad lib	At pleasure, freely
ad	To, up to
amp	Ampoule of medication
aq	Water
as	directed
ATC	Around the clock
au	each ear
BCP	birth control pill
bid	Twice a day
BM	Bowel movement.
BP	Blood pressure
BPH	benign prostatic hypertrophy
BS	Blood sugar
BSA	Body surface area
CAD	coronary artery disease
caps	Capsule
cc	cubic centimeter [milliliter]
CHF	congestive heart failure
COPD	chronic obstructive pulmonary
CP	chest pain
DC	discontinue medication
dil	dilute
disp	dispense
div	divide
DJD	degenerative joint disease
DM	diabetes mellitus
dtd	Let such doses be given
DW	distilled water
DX	diagnosis
elix	elixir
Ft	Make,
GI	Gastrointestinal
grGrain	Sx symptom
gtt	A drop
GU	Genitourinary
HA	headache

APPENDIX-13 : PHARMACEUTICAL ABBREVIATIONS

HBP	High blood pressure
HR	heart rate
HRT	hormone replacement therapy
hs	at bedtime
HTN	Hypertension
ID	Intradermal injection
IM	intramuscular injection
inj	An injection
IU	international units
IV	Intravenous injection
JRA	juvenile rheumatoid arthritis
kg	kilogram
L	liter
let	it be made
m or min	Minimum
wk	week
m	Mix
mcg	microgram
mEq	milliequivalent
mg	milligram
mL	milliliter
mOsmol	milliosmole
N&V	Nausea and vomiting
noct	At night
non rep/NR	Do not repeat
OA	osteoarthritis
od	Right eye
os	Left eye
ou	Each eye
p	pulse
pc	After eating
PEFR	peak expiratory flow rate
po	by mouth
postop	after surgery
pr	rectally
prn	when necessary
pulv	A powder
PVD	peripheral vascular disease
q	every
qd	every day
qh	every hour
qid	four times daily
qod	every other day
qs ad	a sufficient quantity to
qs	as much as is sufficient disease (prepared)

APPENDIX-13 : PHARMACEUTICAL ABBREVIATIONS

RA	rheumatoid arthritis
Rect	Use rectally
s	without
Sig	write on label
SL	sublingual
SOB	shortness of breath
Sol	Solution
ss	One-half
stat	immediately
supp	Suppository
Susp	Suspension
Syr	Syrup
TB	tuberculosis
tbsp	tablespoon
TED	thromboembolic disease
TIA	transient ischemic attack
tid	three times a day
tiw	three times a week
top	(Use) topically
tsp	teaspoon
Tx	treatment
U	unit
UC	ulcerative colitis
Oint.	ointment
URI	upper respiratory infection
ut dict	as directed
UTI	urinary tract infection
WA	while awake
P.F	prefilled syringe

Appendix-14

MEDICINAL GASES

The following is a brief descriptions of the medical gases in common use, together with some details of their administration, health hazard information, contraindication, and color coding of cylinders.

1. OXYGEN (O₂)

Uses : Oxygen is used extensively in medical practice to increase oxygenation in patients with acute and chronic lung disease and cardiac disorders, for resuscitation, and for the treatment of victims of poisoning. It is always administered during anaesthesia. Oxygen therapy is also used in several applications: to supplement the breathing of patients whose respiratory system has become compromised from ailments such as bronchitis, or emphysema; to treat patients who are suffering from hemorrhage, shock, convulsions or other trauma; to administer atomized, liquid medication into the lungs; or as a treatment itself, due to pure oxygen's vasoconstrictive properties.

Administration: Oxygen is administered by mask, tent, endotracheal tube, nasal catheter and by special equipment for prolonged treatment. Masks are used for controlled flows which may give concentrations over 60% by volume. Tents are used when the concentration need not to exceed 50% by volume. Respiratory facemasks are used to provide oxygen concentrations of approximately 30% of inhaled air.

Humidification of the gas may be needed when nasal catheters are used with a flow rate of over 3 liters/minute. Dependent on whether masks, tents or nasal catheters are used the flow rate is determined by the clinician. The dosage is adapted to the patient on the basis of the clinical course of the illness and generally ranges from 1 to 10 litres of gas per minute. In circumstances where oxygen is being mixed with other gases (anesthetics and analgesics) it is essential that the proportion of oxygen in the inspired mixture never falls below the concentration in air.

Health Hazard Information: At normal atmospheric pressures, oxygen is non-toxic up to about 20 hours exposure. At increasing pressures, oxygen becomes toxic to the lungs and central nervous system. Oxygen toxicity may result from the long-term exposure to partially reduced oxygen products which alter the metabolic function and structure of lung cells.

Contraindications: Newly born and premature infants should be given oxygen only if absolutely necessary because of the risk of the development of retinal damage. Patients who have chronic respiratory disease with carbon dioxide retention may develop apnoea if given oxygen, due to the reduction in stimulation of the respiratory system by carbon dioxide. Careful monitoring of these patients for hypoventilation is required during oxygen therapy.

Color code of cylinders : Black body, white shoulder.

2. CARBON DIOXIDE (CO₂)

Uses: Carbon dioxide stimulates the respiratory centre directly and if its concentration is raised from the normal concentration in air, the rate and depth of respiration are increased. At 3 percent concentration the depth is doubled while at 5 percent it is trebled with a great increase in respiration rate. Its use is not without danger and, therefore, it is reserved mainly for emergencies; for example, to induce and improve respiration rate in new-born infants, drowning persons, and cases of poisoning by carbon monoxide, morphine, hypnotics and other depressants. Generally, concentrations of 5 to 7 percent mixed with oxygen are used. Solid carbon dioxide is used in tissue freezing techniques. Carbon dioxide is also used: to increase the depth of anaesthesia rapidly, when volatile agents are being administered, it increases depth of respiration and helps to overcome breathholding and bronchial spasm, to increase cerebral blood flow in arteriosclerotic patients undergoing surgery, in gynaecological investigation for insufflation into fallopian tubes and abdominal cavities.

Administration: Carbon dioxide should only be administered by medical personnel trained in the appropriate techniques. Cylinders should only be used in conjunction with medical carbon dioxide gas pressure regulators. Special medical equipment will be used if it is being used to inflate parts of the body during keyhole surgery or gynaecological procedures.

Health Hazard Information: Carbon dioxide regulates the rate of breathing. The occupational exposure limit is 5000 ppm. As the concentration of carbon dioxide rises it affects the rate of breathing, at 2% the rate is noticeably above normal, at 10% breathing is very rapid and headache, vomiting and death may occur in an unfit person, 15% will cause unconsciousness in a few minutes, 25% leads to rapid circulatory insufficiency and death.

Pregnancy and breast feeding: The use of Medical Carbon Dioxide is not recommended during pregnancy but is unlikely to influence lactation.

Contraindications: Carbon dioxide is contraindicated:

- In acidosis
- In respiratory obstruction, the administration of carbon dioxide may be dangerous since any further increase in respiratory effort increases negative intra-thoracic pressure
- During resuscitation, where it can be dangerous and should be avoided.

Color code of cylinders: Grey body, grey shoulder.

3. NITROUS OXIDE (N₂O)

Uses: Nitrous oxide is a non irritating anaesthetic gas, used as a carrier for the volatile anaesthetics, it may be used to insufflate body cavities and in cryosurgery as a refrigerant. It can also be used as an analgesic and in dental work to provide short-term analgesia for tooth extraction and other brief procedures, administered with 50% oxygen.

Administration: Nitrous oxide should only be administered by medical personnel trained in the appropriate techniques. Cylinders should only be used in conjunction with medical nitrous oxide gas pressure regulators. Nitrous oxide should not be used for more than a total of 24 hours, or more frequently than every 4 days, without close clinical supervision and haematological monitoring.

APPENDIX-14 : MEDICINAL GASES

Health Hazard Information: Nitrous oxide does not support life and when used for anaesthesia an adequate oxygen concentration must be ensured. Because it is much more soluble than nitrogen, nitrous oxide will diffuse into air filled body cavities much faster than nitrogen will diffuse out, increasing the pressure within them. Administration of nitrous oxide will, if continued for some hours, result in some inactivation of vitamin B₁₂, which is a co-factor of methionine synthase. Folate metabolism is consequently interfered with and DNA synthesis is impaired following prolonged administration of nitrous oxide. If administration is frequent, say every 2 days, this can result in megaloblastic changes in bone marrow, myeloneuropathy and sub acute combined degeneration of the spinal cord. Addiction can also occur. After a substantial period of time signs similar to those of sub acute combined degeneration of the spinal cord may develop. The suggested limits for continuous exposure range between 25-400 ppm. Nitrous oxide should never be given with less than 21% oxygen, but a maximum of 30% oxygen should be used during anaesthesia (except when used in combination with a volatile anaesthetic agent) and more at altitude and in the presence of disorders affecting oxygenation.

Absolute Contraindications:

- High and low atmospheric pressures.
- Unconsciousness.
- The first sixteen weeks of pregnancy.
- Artificial, traumatic or spontaneous pneumothorax.
- Gross abdominal distension
- During myringoplasty
- Air embolism

Care is required in the following conditions:

- Sedated patients.
- The very young and old due to mask fitting difficulties.
- Bowel obstruction.
- Having Vitamin B12 deficiency.

Color code of cylinders: Blue body, blue shoulder

4. HELIUM (He)

Uses: Helium is used in physiological investigations. The low density of helium compared to nitrogen enables it to provide a substitute for air when mixed with oxygen which is easier to breath in obstructive or dystrophic chest disease. It is indicated to assist flow of oxygen into the alveoli and to reduce the work of breathing in patients with severe airway obstruction. It is also used in some cryogenic applications.

Administration: By mask or endotracheal tube; cylinders should only be used in conjunction with medical oxygen gas pressure regulators. It may also be administered via nasal prongs if sufficiently high flow rate is employed to prevent air entrainment. It can be administered to spontaneously breathing patients or in combination with various forms of invasive and non-invasive ventilatory modes.

Health Hazard Information: Helium is an inert gas and will not support life. An adequate concentration of oxygen must be ensured when helium is administered. The risk for cooling should be taken into account, especially in smaller children. When using devices not designed for helium-oxygen mixtures, set ventilator tidal volumes and measured flow rates may not be accurate due to the physical properties of helium.

Contraindications: Not reported.

Color code of cylinders: Brown body, brown shoulder.

5. CYCLOPROPANE (C₃H₆)

Uses: Cyclopropane is a potent anaesthetic producing good muscular relaxation. It is non-irritating and induction and recovery are rapid. Mixtures of 4, 8 and 20 to 25 percent with oxygen produce analgesia, light analgesia and surgical analgesia respectively.

Administration: Cyclopropane should only be administered by anesthetists trained in the use of Cyclopropane. Because of the flammability and expense of cyclopropane, it is usually used in a closed (rebreathing) system, in which an absorbent chemical, such as soda lime, removes exhaled carbon dioxide, and the anesthetic is recirculated.

Health Hazard Information: Cardiac irregularities are possible if atropine or catecholamines are used with cyclopropane, nausea, vomiting and a degree of hypotension are common post-operative symptoms.

Contraindications: Not reported.

Color code of cylinders: Orange body, orange shoulder.

6. OXYGEN + CARBON DIOXIDE

Uses: Oxygen/carbon dioxide mixtures are used as a stimulant to the respiratory centre.

Administration: Usually by mask or endotracheal tube. Cylinders should only be used in conjunction with medical oxygen gas pressure regulators.

Health Hazard Information: Oxygen/carbon dioxide mixtures have similar toxicity to oxygen, but at normal atmospheric pressures the mixtures will induce a marked increase in breathing rate. The mixture should not be used at pressures above normal atmospheric pressure.

Contraindications: Newly born and premature infants should be given oxygen only if absolutely necessary because of the risk of the development of retinal damage.

Color code of cylinders: Black body, white and green shoulder.

7. HELIUM + OXYGEN

Uses: The low density of helium compared to nitrogen enables it to provide a substitute for air when mixed with oxygen which is easier to breath in obstructive or dystrophic chest diseases.

Administration: By mask or endotracheal tube; cylinders should only be used in conjunction with medical oxygen gas pressure regulators.

Health Hazard Information: Not reported.

Contraindications: Not reported.

Color code of cylinders: Brown and green.

8. Nitric Oxide (NO)

Uses: Nitric oxide is a powerful vasodilator, essential signaling molecule, and also a free radical. Since it dilates blood vessels, it is commonly prescribed to patients who suffer from circulation or heart ailments; however, it is prescribed as nitroglycerin and amyl nitrate pills which are metabolized into NO. In fact, the only instance for a NO gas prescription, which needs to be implemented in equal parts with oxygen, is for neonatal patients who suffer from pulmonary hypertension or post-meconium aspiration.

Administration: Nitric oxide is a gas available in concentrations of only 100 ppm and 800 ppm. The nitric oxide administration apparatus is to be used in conjunction with a ventilator or other breathing gas administration system. The concentration of nitric oxide is maintained approximately constant during the inspiratory flow regardless of the variation in flow rate within the inspiratory portion of the respiratory cycle. The concentration of inspired nitric oxide can be set, typically in the range of 0 to 80 parts per million (ppm). The administration apparatus includes a pressure regulator and connectors with fittings which are specific for nitric oxide gas cylinders, typically containing 400 or 800 ppm nitric oxide in nitrogen

Health Hazard Information: Overdosage with inhaled nitric oxide will be seen by elevations in methemoglobin and pulmonary toxicities associated with inspired nitric oxide. Elevated NO may cause acute lung injury.

Contraindications: Inhaled nitric oxide is contraindicated in the treatment of neonates known to be dependent on right-to-left shunting of blood.

Color code of cylinders: Nitric oxide lines and cylinders are frequently labeled with teal and black labels.

9. Medical air

Medical air cylinders are supplied to the following specification:

- oxygen content 20.9% Oxygen $\pm$ 0.5%
- nitrogen balance.

Uses: Medical air is used: as a replacement for atmospheric air when the atmosphere is contaminated by noxious fumes, vapours or gases, in anaesthesia as a carrier gas for volatile anaesthetic agents, as a power source for pneumatic equipment in ventilators and incubators to provide uncontaminated and controlled air flows.

Administration: For breathing purposes medical air is administered by various means, commonly by self contained or compressed air line breathing apparatus. In anaesthesia, medical air is administered via a cylinder and valve assembly through a face mask or endotracheal tube.

APPENDIX-14 : MEDICINAL GASES

Health Hazard Information: Medical air should never be administered to a patient if, when it is mixed with other gases, the oxygen content is less than 21%. Care is needed in the handling and use of medical air cylinders.

Contraindications: Medical air is contraindicated where oxygen or other gaseous combinations would be indicated (airways obstruction, pneumonia, and a myriad of cardio-respiratory conditions).

Color code of cylinders: Yellow

Appendix-15

NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

Introduction:

Nuclear Medicine is a medical specialty devoted to diagnostic, therapeutic and research applications of radionuclides utilizing nuclear gamma and positron emission and sometimes beta-ray which are used specially in therapy.

Radiopharmaceuticals have been defined as radioactive drugs that, when used for the purpose of diagnosis or therapy, typically elicit no physiological response from the patient.

The design of these compounds is based solely upon physiological function of the target organ. Unlike radiographic procedures, which depend almost entirely upon tissue density differences, external imaging of radiopharmaceuticals is essentially independent of the density of the target organ. The mechanism of localization of a radiopharmaceutical in a particular target organ can be as simple as the physical trapping of particles or as sophisticated as an antigen-antibody reaction or chemisorption of an inorganic phosphate on the hydroxyapatite crystals deposited in an acute myocardial infarction.

Properties of the ideal diagnostic radiopharmaceuticals

1. Pure gamma emitter.
2. $100 < \text{gamma energy} < 250 \text{ keV}$.
3. Effective half-life = 1.5 X test duration.
4. High target to non target ratio.
5. Minimal radiation dose to patient and Nuclear Medicine personnel
6. Patient safety.
7. Chemical reactivity.
8. Inexpensive, readily available radiopharmaceutical.
9. Simple preparation and quality control if manufactured in house.

Diagnostic approaches of Nuclear Medicine include both in vivo and in vitro procedures:

In vivo technique is the most common type of procedure, where radiopharmaceuticals/ radionuclides/ radiotracers are administered to the patients. Then patients are imaged from outside using the instruments- planar Gamma Camera and SPECT (Single Photon Emission Computed Tomography) by mapping radiotracer distribution in different target organs of the body. Characteristics of commonly used radiopharmaceuticals are shown in Table-I.

APPENDIX-15 : NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

PET (Positron Emission Tomography) images offer potentially more functional demonstration (cellular activity at molecular level) rather than simply anatomical information. A PET scan allows the physician to distinguish between living and dead tissue or between benign and malignant disease.

¹⁸F-fluorodeoxyglucose (FDG) is mostly used radiotracer in PET studies. ¹⁸F is produced by cyclotron and half life is 110 min. The uptake of ¹⁸F-FDG by tissues reflects the tissue uptake of glucose which correlates with certain type of tissue metabolism.

PET/CT:

PET/CT are both state of art imaging tools that allow physicians to pinpoint the location of cancer within the body before making treatment recommendations. The highly sensitive PET scan images the biology of disorders at the molecular level, while CT scan provides a detailed picture of the body's internal anatomy. The PET/CT scan combines the strengths of these two well-established imaging modalities into a single scan. A PET/CT scan can also help physicians monitor the treatment of disease and identify recurrence of disease. This PET/CT has become the fastest growing imaging modality since its introduction to clinical medicine in 2001.

SPECT/CT:

Hybrid SPECT/CT demonstrate added value to single imaging modality. With SPECT/CT scanners, lesions visualized by functional imaging can be correlated with anatomic structures. The addition of anatomic information increases the sensitivity as well as the specificity of scintigraphic findings.

In vitro procedure includes Radioimmunoassay (RIA) and Immuno-radiometric assay (IRMA), which are used to measure different hormone levels in serum such as free triiodothyronine (FT₃), free tetraiodothyronine (FT₄), Thyroid stimulating hormone (TSH), follicularstimulating hormone (FSH), Luteinizing hormone (LH), calcitonin and prolactin and antibodies. Sometimes radionuclides are introduced to the patients and samples of breath, urine and faeces are taken from the patient. Measurements of radioactivity in samples are made by gamma- or beta-sample counting techniques.

Therapeutic aspects of nuclear medicine mostly deal with radioiodine (¹³¹I) treatment of primary hyperthyroidism and carcinoma of thyroid. Low-energy beta-emitting radionuclides (¹⁵³samarium-ethylenediaminetetramethylenephosphonate (EDTMP) and ⁸⁹strontium (⁸⁹Sr) are used to relieve metastatic bone pain. ⁹⁰Sr are for the treatment pterygium. Furthermore, radionuclides are being used for cardiac stenting, synovectomy, liver cancer, ovarian and prostatic cancer. Radioimmunotherapy is the promising aspect of therapeutic Nuclear Medicine. In non-Hodgkins lymphoma radioimmunotherapy (Zevalin) has been approved by the FDA of USA since 2002.

APPENDIX-15: NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

Table I- Characteristics of commonly used radionuclides.				
Radionuclide	Mode of production	Type of decay	Principles of photon emissions (kev)	Half-life
^{99m} Tc	Generator	IT	140	6 h
¹³¹ I	Reactor	Gamma, Beta	360, 640	8 day
¹²³ I	Cyclotron	Ec	160	13 h
¹²⁵ I	Reactor	Gamma	35	60 day
⁶⁷ Ga	Cyclotron	EC	92, 182, 300, 390	78 day
²⁰¹ Tl	Cyclotron	EC	68-80b	73.5 h
¹¹¹ In	Cyclotron	EC	173, 247	2.8 day
¹³³ Xe	Reactor	Beta	81	5.3 day
^{81m} Kr	Generator	IT	191	13 s
¹⁸ F	Cyclotron	Positron	635	110 min

EC- Electron capture, IT- isomeric transition, b- Characteristic X-rays

Organ specific imaging procedures:

Some Nuclear Medicine imaging for different organs are described very shortly below which will provide introductory knowledge about Nuclear Medicine. Organ specific radiopharmaceuticals are given in Table-II and Table-III.

Thyroid gland

The oldest but most frequently performed nuclear medicine procedure is thyroid scan by ^{99m}Tc (Technetium), ¹³¹I (Iodine) or ¹²³I. Thyroid scan gives information about radiotracer uptake by thyroid gland and details about nodular goiter. Previously radioiodine uptake was used to evaluate thyroiditis, hypothyroidism and calculation of therapy dose for hyperthyroidism. But radioiodine uptake is no more use in most of the nuclear medicine departments. Commonly 37 or 74 MBq of ^{99m}Tc is injected intravenously and scan is taken after 20 minutes.

Most of the therapeutic nuclear medicine in our country deals with radioiodine treatment in primary hyperthyroid patients by giving 370 MBq-555 MBq ¹³¹I as outdoor patient.. About 1110 MBq -7400 MBq dose of ¹³¹I are usually given to differentiated thyroid carcinoma patient after total thyroidectomy at National Institute of Nuclear Medicine and Allied Sciences (NINMAS) and other Institutes of Nuclear Medicine under Bangladesh Atomic Energy Commission. These patients are followed up life long at the concerned institutes.

Skeletal System

Whole body bone scan represents main bulk of study in most of the nuclear medicine departments. This is a highly sensitive test to survey the entire skeletal system with less radiation in comparison to X-ray imaging. ^{99m}Tc phosphonate radiopharmaceuticals are highly sensitive to bone turnover and therefore are useful in the early detection of bone and joint abnormalities. About 740 MBq of ^{99m}Tc phosphonate is introduced intravenously to the patients and different spot views are taken after 2-3 hours.

APPENDIX-15 : NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

Renal System

Morphology and functional status of renal system can be well evaluated by ^{99m}Tc DMSA (Dimercaptosuccinate acid) scan and renogram by ^{99m}Tc DTPA (Diethylene triamine pentaacetic acid). These techniques are useful in diagnosing renal scar, obstructive uropathy and parenchymal disease of kidneys.

Cardiovascular System

Several nuclear medicinal techniques are available for the diagnosis and management of cardiovascular diseases. Myocardial perfusion study using Thallium-201 (^{201}Tl), ^{99m}Tc sestamibi, ^{99m}Tc teboroxime, ^{99m}Tc tetrofosmin are used to diagnose coronary artery disease. Radionuclide ventriculography by ^{99m}Tc labeled RBCs is used to evaluate by global and regional ventricular function before and after intervention.

Brain

In the late 1960s & early 1970s conventional brain scintigraphy by blood brain barrier agent, ^{99m}Tc DTPA was the method of choice. Now a days CT (Computed tomography) and MRI (Magnetic Resonance Imaging) have been playing important role in anatomical imaging. Rather, the role of nuclear medicine imaging for central nervous system has been redefined as functional brain imaging. ^{99m}Tc HMPAO (Hexamethyl propylene amine oxime) is currently the best agent to estimate regional cerebral blood flow (rCBF). SPECT imaging of ^{99m}Tc HMPAO is useful in cerebrovascular disease and psychiatric disorders. PET using both blood flow and metabolic agents ^{18}F FDG produces images of physiologic and biochemical processes in the brain that has both important research and clinical impacts. Radionuclide cisternography is a simple method to investigate differentiation of communicating and non-communicating hydrocephalous, CSF (cerebrospinal fluid) leaks and demonstration of CSF shunt patency.

Liver and Biliary Scan

Colloid liver scan is used to examine the liver, spleen and bone marrow. Now a days liver scan is rarely performed. Readily available ultrasound scan has replaced this procedure to see the liver focal lesions. Hepatobiliary imaging using several amino-diacetic acid compounds labeled with ^{99m}Tc has been used to investigate biliary excretion and the pathway from liver to small intestine. Indications of this scintigraphy are- cholecystitis, biliary atresia in newborn to assess the hepatic uptake, bile duct patency, cystic duct patency, and sphincter of Oddi dysfunction.

Lungs

Pulmonary imaging comprises ventilation scan & perfusion scan. Ventilation scan is usually performed by ^{81m}Kr (Krypton) gas / ^{133}Xe (Xenon) gas or Technegas (^{99m}Tc -labelled carbon particles). Perfusion imaging is done by ^{99m}Tc labeled ^{99m}Tc MAA (macroaggregate albumin). Combined ventilation/ perfusion (V/Q) study is mostly applied to diagnose the medical emergency condition pulmonary embolism. Conditions associated with V/Q mismatch are acute and chronic pulmonary embolism, bronchogenic carcinoma, mediastinal and hilar adenopathy, hypoplasia of pulmonary artery and vasculitis. V/Q matched abnormalities are seen in chronic obstructive pulmonary disease, bronchitis, blebs, congestive heart failure, pulmonary oedema, pleural effusion, asthma, pulmonary trauma and bronchogenic carcinoma.

Gastrointestinal tract

Gastric emptying studies by ^{99m}Tc DTPA combined with meal are most often performed on patients who have an unsatisfactory result from peptic ulcer surgery and in studying the physiology of the stomach. The milk scan using ^{99m}Tc –sulphur colloid in 100 ml milk or orange juice is applied orally to diagnose gastro-oesophageal reflux in children. Meckels' diverticulum, the commonest congenital anomaly of gastrointestinal tract could be evaluated by simple imaging technique by ^{99m}Tc -pertechnetate.

Tumour Imaging

Tumour imaging is the growing area of Nuclear Medicine application. Many radionuclide studies are performed for the detection of primary and metastatic tumours. These studies are divided into tumour specific imaging and tumour-non-specific imaging. Tumour specific imaging include ^{131}I whole body scan, ^{131}I MIBG (metaiodobenzylguanidine) radiolabeled monoclonal antibodies and peptides. Radionuclides those are not tumour specific are gallium –67 (^{67}Ga), thallium-201 (^{201}Tl) and ^{99m}Tc sestamibi. ^{18}F FDG PET imaging also helps in diagnosis of primary tumour and to assess metastases and prognosis of treatment.

Lymphoscintigraphy and sentinel lymphnodes

Lymphoscintigraphy is performed by injecting a small quantity of ^{99m}Tc labeled nanocolloid subcutaneously usually unilateral lymphoedema and lymphnodes metastases are diagnosed by this imaging procedure. 'Sentinel' node detection has become popular in recent years and routinely used in some Nuclear Medicine Departments to diagnose early stage of breast carcinoma and melanoma. This procedure is useful to surgeons to take decision about extent of operation.

Infection

There has been considerable improvement in the scintigraphic imaging of inflammation and infection over the last few years. Radiolabelled white blood cells have been used as an important diagnostic modality in the diagnosis of infection. The radionuclides available for leucocyte labeling for localization of infection are ^{111}In , ^{99m}Tc and ^{67}Ga .

Radiation safety issue:

As was the case with diagnostic radiopharmaceuticals, the goal is a *minimal radiation dose* absorbed by both the patient, who is probably having a one-time therapeutic procedure, and the Physician or Nuclear Medicine Technologist, who is routinely exposed to radioactive patients on a daily basis. The usual rules of the TDS concept apply: one should minimize TIME, maximize DISTANCE, and use the appropriate amount of SHIELDING. There should be specific rules governing the *release of patients from the hospital after administration of a therapeutic radiopharmaceutical*.

APPENDIX-15 : NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

Precautions for radiopharmaceuticals handling:

There are many precautions one must take during the preparation and use of radiopharmaceuticals, in general, and Tc-99m radiopharmaceuticals, in particular. Since most radiopharmaceuticals are intended to be administered intravenously, it is imperative to use aseptic technique in order to maintain sterility of the product. The vial septum must be wiped with 70% isopropanol prior to puncturing the septum with a needle. This is really a cleansing step rather than a true sterilization step since the alcohol doesn't remain on the septum long enough to kill all pathogens that might be present.

Air must NEVER be injected into any radiopharmaceutical vial, especially one containing a Tc-99m product. The oxygen contained in only 0.1 ml of air is enough to completely destroy the stannous ion used in many commercially available cold kits as a reducing agent. In addition, room air is not sterile so it is possible to introduce pathogens into the vial by using a preliminary injection of air to increase internal pressure in the vial and ease the removal of the contents.

Prior to reconstituting a cold kit with Tc-99m pertechnetate, oxidant-free pertechnetate must be diluted to the required final volume with 0.9% NaCl solution. Ideally, oxidant-free saline (Low Dissolved Oxygen Saline) should be used for the dilution step. Reconstitution of a cold kit with a small volume of pertechnetate followed a few minutes later by dilution with saline solution can cause dissociation of certain weak chelates, resulting in the formation of significant amounts of Free Tc. This is not a problem with sulfur colloid or other insoluble Tc-99m compounds.

Patient safety

Patient safety is also critical. Ideally, the therapeutic radiopharmaceutical should exhibit no toxicity to the patient. While most commonly used compounds are inherently safe and provide wide margins of safety, we routinely inject drugs that are potentially toxic. Thallous ion (Tl^{1+}), for example, is known to be a potent cardiotoxin and yet we routinely inject Tl-201 thallous chloride intravenously into our patients. This is an acceptable practice since the specific activity (activity per unit mass) of carrier-free Tl-201 is very high and the amount of Tl-201 contained in the typical 3 mCi dose (only 42 ng) is very small.

One of the concerns regarding treating a patient with I-131 NaI therapy solution is whether the patient is allergic to iodine. A calculation will show that 10 mCi of carrier-free I-131 contains only 80 ng of elemental iodine, far too small an amount to have a physiological effect on the patient.

APPENDIX-15: NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

Table II Commonly used radiopharmaceuticals for different organs.			
Target organ	Radiopharmaceuticals	Indications	Dose (MBq)
Skeletal System	^{99m} Tc HDP (disodium oxidronate) ^{99m} Tc MDP (Methylene diphosphonate)	Metastatic lesions, size and extent of primary bone tumour, osteomyelitis and fractures.	350-750
Kidneys	^{99m} Tc DTPA (diethylenetriamine pentacetic acid) ^{99m} Tc MAG (mercaptylacetyl triglycerine) ^{99m} Tc DMSA (dimercaptosuccinic acid)	Parenchymal function, evaluation of obstruction. Congenital anomaly, Tumour, Cortical scarring.	200-750 40-80
Thyroid	^{99m} Tc pertechnetate	Thyroid scan to see size of gland and uptake in nodule.	40-80
Thyroid	¹³¹ I	Therapy for hyperthyroidism. Carcinoma of thyroid.	~ 555 ~1700-5550
Cardiovascular system	^{99m} Tc sestamibi ^{99m} Tc Tetrofosmin ^{99m} Tc teboroxime ²⁰¹ Tl ^{99m} Tc RBC	Evaluation of ischaemia, infarction wall motion. Cardiac output.	370-1100 74-111
Lungs	^{99m} Tc Technegas ¹³³ Xe ^{81m} Kr	Pulmonary embolism Tumour	40-74 370
Brain	^{99m} Tc DTPA ^{99m} Tc HMPAO (hexamethylpropylene oxime)	Primary or secondary tumour, psychiatric problems	~740 555
Liver scan	^{99m} Tc Tin colloid	Tumour.	40-80
Biliary system	^{99m} Tc hepatic iminodiacetic acid	Biliary atresia, Acute cholecystitis.	40-80
Tumour	⁶⁷ Ga (Gallium citrate)	Tumour	100
Infection	¹¹¹ In White blood cell	Infection	12
Lymphoscintigraphy	^{99m} Tc nanocolloid	Lymphoedema, Metastases & 'sentinel node' detection	40

Clinical Utility

Radiopharmaceuticals have been used clinically for a wide variety of studies which generally fall into three categories. (Table III).

1. Static studies.
2. Dynamic studies.
3. In vivo non-imaging studies.

APPENDIX-15 : NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

Table III. Clinical use of Radiopharmaceuticals			
Study Type	Tracer	Region	Pathology
Static Studies With Radiotracers			
Bone Scan	Tc-MDP, Tc-HDP	Whole Body	Bone tumors, fractures, Paget's disease, spread of metastatic disease
Liver/Spleen Scan	Tc-SC, Tc-MIAA	Abdomen	Tumors, cysts, hepatocellular disease
Brain Scan	Tc-HMPAO	Brain	Tumors, trauma, dementia
Tumor Scan	Ga-67 citrate	Whole Body	Malignant Tumors
Dynamic Studies With Radiotracers			
Study Type	Tracer	Region	Pathology
Cardioangiography	Tc-RBC, Tc-HSA	Chest	Aneurysms, congenital heart defects; myocardial dyskinesia; cardiomegaly
Cerebral Blood Flow	TcO ₄	Head/neck	Cerebral death, AVM
Cholecystography	Tc-DISIDA	Abdomen	Obstructive disease
Cisternogram	In-111 DTPA	Head/neck	Blockage/slowed CSF flow
Dynamic kidney	Tc-DTPA	Back	Obstructive disease
Gastric emptying	Tc-ovalbumin	Abdomen	Abnormal GE Rates In-DTPA regurgitation
Pulmonary vent	Xe-133 gas	Upper back	obstructed airways
Renogram	I-131 hippuran	Back	renal dysfunction
Venogram	Tc-MAA	Legs	thrombosis
Voiding cystogram	Tc-sulfur colloid	Abdomen	reflux of urine incomplete bladder emptying
In Vivo Non-Imaging Tracer Kinetic Studies			
CO ₂ breath test	C-14 CO ₂	breath	glucose intolerance
Iron turnover	Fe-59 chloride	whole body	abnormal ferrokinetics
Ocular P-32 uptake	P-32 Na ₃ PO ₄	eyes	ocular melanoma
Platelet survival	In-111 platelets	blood	abnormal platelet loss

APPENDIX-15: NUCLEAR MEDICINE AND RADIOPHARMACEUTICALS

Radioactive iodine (RAIU)	*I-NaI	thyroid	abnormal uptake test, hyperthyroidism
RBC Survival	Cr-51 RBC's	blood	hemolytic anemias
Schilling Test	Co-57 B12	urine	pernicious anemia, Vitamin B12 malabsorption syndromes
Splenic Sequestration	Cr-51 RBC's	spleen	hypersplenism

Categories of Radiopharmaceuticals

Radiopharmaceuticals fall into several different categories:

- ready-to-use radiopharmaceuticals
- instant kits for preparation of Tc99m products
- kits requiring heating
- products requiring significant manipulation.

Examples of each of these categories are listed in the Table IV.

Table IV. Categories of Radiopharmaceuticals	
Prepared Products	Tc-99m Kits requiring heating
I-123 capsules	MAG3
I-131 hippuran	sestamibi
Ga-67 citrate	sulfur colloid
Tl-201 chloride	teboroxime
Xe-133 gas	Products requiring significant manipulation
Tc-99m pertechnetate	Cr-RBC's
Instant Tc-99m kits	Tc-99m RBC's
Disofenin	Tc-99m WBC's
DTPA	In-111 WBC's,
GH	In-111 Platelets
HDP	Xe-133 in saline
MDP	I-123 mIBG
mebrofenin	
MIAA	
MAA	
PYP	

Appendix-16

PARENTERAL DOSES (FOR ADULTS AND CHILDREN) OF DRUGS FOR MEDICAL EMERGENCIES

Drugs which are required immediate administration within minutes post or during a medical emergency. Medicines which have the potential to sustain life and/or prevent further complications.

DRUG	USE	DOSAGE
Adrenaline (1 mg/ml, i.e. 1:1,000)	Anaphylaxis or acute angioedema	Give intramuscularly (not intravenously): adults and 12-18 years olds: 500 microgram (0.25 ml) 6 months- 6 years: 120 microgram (0.12 ml) under 6 months: 50 microgram (0.05 ml)
Aminophylline	Reversible airways obstruction, severe acute asthma	Given Intravenously : Adults: 300 micrograms/kg/hour; CHILD under 12 years :1mg/kg/hour, adjusted according to plasma-theophylline concentration
Amiodarone	Arrhythmia (ventricular tachycardia)	Given Intravenously : initially 5 mg/kg over 20–120 minutes with ECG monitoring; subsequent infusion given if necessary according to response up to max. 1.2 g in 24 hours
Atropine (600 microgram/ml)	Bradycardia (arrhythmia) plus hypotension in myocardial infarction	adults: 0.3-1 mg intravenously; the dose may be repeated every 3-5 times if the first dose is not effective
Benzylpenicillin (600 mg vial for reconstitution with sodium chloride or water for injection)	Suspected bacterial meningitis or meningococcal septicemia	Give intravenously (or intramuscularly if venous access is not available) as a single dose: adults and children 10 years and over: 1.2 g 1-9 years: 600 mg under 1 year: 300 mg
Calcium Gluconate	In severe acute hypocalcaemia or hypocalcaemic tetany,	An initial slow intravenous injection of 10–20mL of calcium gluconate injection 10% (providing approximately 2.25–4.5 mmol of calcium) in adult with plasma Ca and ECG monitoring.
Cefotaxime (1 g vial for reconstitution with water for injection)	Suspected bacterial meningitis or meningococcal septicemia, in patients allergic to penicillin (on history of anaphylaxis)	Give intravenously or IM as a single dose: adults and children 12 years and over: 1 g children up to 12 years: 50 mg/kg
Chloramphenicol (1 g vial for reconstitution with water for injection)	Suspected bacterial meningitis or meningococcal septicemia, if there is a history of anaphylaxis due to penicillin	adults and children: 12.5-25 mg/kg intravenously
Chlorphenamine (10 mg/ml)	As an adjunct after adrenaline in the treatment of anaphylaxis	Give by slow intravenous injection over 1 min: adults and children over 12 years: 10-20

APPENDIX-16 : PARENTERAL DOSES OF DRUGS FOR MEDICAL EMERGENCIES

	or acute angioedema	mg 6-12 years: 5-10 mg 1-6 years: 2.5-5 mg 1 month-1 year: 250 microgram/kg (max 2.5 mg)
Cyclizine (50 mg/ml)	Vomiting due to vestibular disorders or with diamorphine (except in myocardial infarction)	adults: 50 mg IM or intravenously children over 1 month: 0.5-1 mg/kg intravenously (max single dose: 6-18 years, 50 mg: 1 month 6 years, 25 mg)
Diamorphine (5 mg or 10 mg powder for reconstitution with water for injection)	Severe pain (e.g. myocardial infarction) and acute left ventricular failure	Give by slow (1 mg/min) intravenous injection (particularly with shock or peripheral vasoconstriction): adults : 1.25-5 mg 12-18 years: 2.5-5 mg 1-12 years: 75-100 microgram/kg 6-12 months: 75 microgram/kg 3-6 months: 25 microgram/kg 1-3 months: 20 microgram/kg Or, IM (not in myocardial infarction) or subcutaneously (but not if tissue perfusion is impaired or if there is edema) in a dose of 5-10 mg in adults, or 5 mg in children aged 12-18 years
Diazepam (5mg/ml Injection)	Severe acute anxiety, control of acute panic attacks, and acute alcohol withdrawal, acute drug induced dystonic reactions,	Given by intramuscular injection or slow intravenous injection: for severe acute anxiety, control of acute panic attacks, and acute alcohol withdrawal, 10 mg, repeated if necessary after not less than 4 hours Given by slow intravenous injection: for acute drug induced dystonic reactions, 5–10mg repeated as necessary after at least 10 minutes; CHILD: 1 month–12 Years: 100 micrograms/kg repeated as necessary after at least 10 minutes
Diclofenac (25 mg/ml)	Analgesia (e.g. ureteric colic, bone pain, acute back pain)	adults: 75 mg IM deep into the gluteal muscle
Dobutamine	inotropic support in infarction, cardiac surgery, cardiomyopathies, septic shock, and cardiogenic shock; cardiac stress testing	Given by intravenous infusion, 2.5–10 micrograms/kg/minute, adjusted according to response
Dopamine	cardiogenic shock	Given by intravenous infusion, 2–5 micrograms/kg/minute initially
Flumazenil (100 microgram/ml)	To reverse respiratory depression caused by benzodiazepines	adults: 200 microgram intravenously over 15 seconds, then 100 microgram at 1 min intervals, if needed (max. 1 mg)
Furosemide (100 mg/ml)	To relieve pulmonary edema associated with acute left ventricular failure	adults: 20-50 mg by slow intravenous injection
Glucagons	Hypoglycaemia-first-line	Give subcutaneously, IM or

APPENDIX-16 : PARENTERAL DOSES OF DRUGS FOR MEDICAL EMERGENCIES

(1 mg/ml)	use, except in those who have been hypoglycaemic for some time and may have exhausted their supplies of liver glycogen	intravenously: adult: 1 mg children 2-18 years: 0.5-1 mg (i.e. weight <25 kg, 0.5 mg; >25 kg/1 mg) 1 month- 2 years: 500 microgram under 1 month: 20 microgram/kg
Glucose (10% and 20% solution)	Hypoglycaemia-second line use in unconscious patients	Give intravenously into a large vein over 3 min: adults: up to 50 ml to 20% infusion children:2-5 ml/kg of 10% infusion
Haloperidol (5 mg/ml)	Very agitated or violent patients with psychiatric illness	adults: 2-10 mg IM
Hydrocortisone (100 mg powder as sodium succinate)	Acute severe asthma Severe or recurrent anaphylaxis Hypoadrenalism	Give intravenously over at least 1 min: adults: 100 mg children: 4 mg/kg (max 100 mg) Give by slow intravenous injection: adults: 100-300 mg children: 1 month-18 years: 4-8 mg/kg (max 200 mg) Give by slow intravenous or IM injection: adults and children 12 years: 100 mg children: 1 month-12 years: 2-4 mg/kg
Lorazepam (4 mg/ml)	Very agitated or violent patients with psychiatric illness and convulsion	adults: 1-2 mg IM or 4 mg by slow intravenous injection into a large vein
Lidocaine 2% Injection	for the treatment of ventricular tachycardia in haemodynamically stable patients, and ventricular fibrillation and pulseless ventricular tachycardia in cardiac arrest refractory to defibrillation.	in patients without gross circulatory impairment, 100 mg as a bolus over a few minutes (50mg in lighter patients or those whose circulation is severely impaired), followed immediately - by infusion of 4 mg/minute for 30 minutes, 2 mg/minute for 2 hours, then 1 mg/minute;
Metoclopramide (5 mg/ml)	Nausea and vomiting, can be given with diamorphine in patients with myocardial infarction	adults: 10 mg IM or intravenously over 1-2 min
Midazolam 5mg/5ml and 15mg/5ml Injection	status epilepticus; febrile convulsions	Given by continuous subcutaneous infusion, it is given initially in a dose of 20-40 mg/24 hrs.
Morphine (100 mg/ml)	Severe pain	Adults: 10 mg (15 mg for heavier well-muscled patients) subcutaneously (but not if patient is edematous) or IM, or 2.5-7.5 mg by slow (2 mg/min) intravenous injection Children, subcutaneously or intramuscularly: 12-18 years: 10 mg 5-12 years: 5-10 mg 1-5 years: 2.5-5 mg 1-12 months: 200 microgram/kg children, intravenously (over at least 5 min): 12-18 years: 2.5-10 mg 1 month-12 years: 100-200 microgram/kg
Naloxone (400 microgram/ml)	Opioid overdose	Give intravenously (subcutaneously or IM and if intravenous route not feasible): Adults and children 12-18 years: 0.4-2 mg Dose can be repeated every 2-3 min up

APPENDIX-16 : PARENTERAL DOSES OF DRUGS FOR MEDICAL EMERGENCIES

		to a maximum of 10 mg Children 1 month- 12 years: 1 microgram/kg with a subsequent dose of 100 microgram/kg if there is no response
Phenobarbitone Sodium (200mg/ml Injection)	status epilepticus	Dilute injection 10 mg/kg at a rate of not more than 100 mg/minute; max. 1 g
Phenytoin (50mg/ml Injection)	acute symptomatic seizures associated with head trauma or neurosurgery, status epilepticus	By slow intravenous injection or infusion (with blood pressure and ECG monitoring), ADULT: 20 mg/kg (max. 2 g) at a rate not exceeding 1 mg/kg/minute (max. 50mg per minute), CHILD: 1 month–12 years, 20 mg/kg at a rate not exceeding 1 mg/kg/minute (max. 50mg per minute) as a loading dose; maintenance dose of 5–10 mg/kg daily (max. 300 mg daily) in 2 divided doses; NEONATE 20 mg/kg at a rate not exceeding 1 mg/kg/minute, as a loading dose; maintenance dose of 5–10 mg/kg daily in 2 divided doses
Potassium Chloride 15% Injection	Severe hypokalaemia	Ready-mixed infusion solutions should be used containing 1.5 g (K+ 20 mmol) in 10 mL, is thoroughly mixed with 500mL of sodium chloride 0.9% intravenous infusion and given slowly over 2 to 3 hours
Pralidoxime chloride (2-PAM) 25mg/ml Injection	In Organophosphorus poisoning as cholinesterase inhibitor	By intravenous infusion, ADULT and CHILD initially 30 mg/kg over 20 minutes, followed by 8 mg/kg/hour; usual max. 12 g in 24 hours.
Prochlorperazine (12.5 mg/ml)	Nausea and vomiting	Give by deep IM injection: Adults and children 12-18 years: 12.5 mg 5-12 years: 5-6.25 mg 2-5 years: 1.25-2.5 mg
Procyclidine (5 mg/ml)	Oculogyric crisis or acute dystonia	Give IM or intravenously: adults and children 10-18 years: 5-10 mg (occasionally more than 10 mg is needed) 2-10 years: 2-5 mg under 2 years: 0.5-2 mg
Salbutamol sulphate Inhalation	severe or life-threatening acute asthma	High-flow oxygen plus salbutamol 5mg via oxygen-driven nebuliser for ADULT; CHILD under 5 years 2.5 mg, 5–12 years 2.5–5 with prednisolone and inhaled ipratropium bromide.
Sodium bicarbonate 8.4% Injection	Severe metabolic acidosis (pH<7.1)	sodium bicarbonate (1.26%) should be infused over 3–4 hours with plasma-pH and electrolyte monitoring
Streptokinase Injection	acute myocardial infarction	MI (initiated within 12 hours of symptom onset), by intravenous infusion, 1.5 million units over 60 minutes

Table of ideal weight for age (kg)											
newborn	1month	3months	6months	1 years	3 years	5 years	7 years	12 years	adult female	adult male	
3.5	4.2	5.6	7.7	10	15	18	23	39	56	68	

Compiled from: British National Formulary (BNF) and BNF for Children

Appendix-17

DRUG AND FOOD INTERACTION

Drugs that interact with grapefruit

Examples of some of the most common grapefruit or grapefruit juice drug interactions include:

- Alprazolam
- Amiodarone
- Atorvastatin
- Carbamazepine
- Cilostazol
- Clarithromycin
- Colchicine
- Dronedarone
- Erythromycin
- Felodipine
- Fentanyl
- Fentanyl Transdermal System
- Fexofenadine
- Indinavir
- Loratadine
- Losartan
- Lovastatin
- Nilotinib
- Pazopanib
- Pimozide
- Ranolazine
- Saquinavir
- Sildenafil
- Simvastatin
- Tadalafil
- Vardenafil
- Verapamil

Drugs that interact with Apple and Orange Juice

- Amphetamines
- Fexofenadine
- Second-generation antihistamines, such as cetirizine and loratadine

Drugs that interact with cranberry juice

- Warfarin.

Drugs that interact with Caffeine

- Fluoroquinolones,

APPENDIX-17 : DRUG AND FOOD INTERACTION

- H₂ antagonist (e.g., ranitidine, famotidine),
- Oral contraceptives and prednisone,
- Theophylline.

Drugs that interact with Dairy Products/Calcium

- Calcium. Bisphosphonates (alendronate, risedronate, and ibandronate)
- Cefuroxime
- Fluoroquinolones (e.g., ciprofloxacin, levofloxacin)
- Methotrexate, tetracyclines

Drugs that interact with Protein-Rich Foods

- beta-Blockers
- Carbidopa/levodopa and theophylline

Drugs that interact with High-Fat Meals

- Griseofulvin

Drugs that interact with Fiber

- Digoxin
- Levothyroxine
- Metformin and
- Penicillin

Drugs that interact with Tyramine-Containing Foods (cheese and red wine)

- Monoamine oxidase inhibitors (MAOIs)
- Oxazolidinone antibiotic Linezolid

Drugs that interact with Alcohol

- Acetaminophen
- Anticonvulsants.
- Antidepressants,
- Antihistamines,
- Antipsychotics,
- Barbiturates,
- Benzodiazepines
- Isoniazid,
- Metronidazole,
- Muscle Relaxants,
- Opiates or

Sulfonylureas.

Appendix-18

SIDE EFFECT OF SOME COMMON DRUGS

Analgesics & Antipyretics	Side effects
<i>Non-opioid Analgesics-</i>	
Aspirin	Nausea, dyspepsia, gastrointestinal ulceration & bronchospasm, Prolong bleeding time, urticaria.
Ibuprofen	Epigastria pain, Edema, Heart Burn, Nausea, Constipation.
Paracetamol	Thrombocytopenia, leukopenia, and neutropenia.
Tolfenamic Acid	Tremor, constipation, confusion, dysuria specially in male.
<i>Opioid Analgesics-</i>	
Morphine sulphate	Urinary Retention, constipation, vomiting, purities, headache, depression, dyspnea, insomnia.
Tramadol Hydrochloride	Sweating, dizziness, constipation, GI bleeding, vomiting, nausea, dry mouth and fatigue.
Anti-bacterials	
Aminoglycosides	Nephrotoxicity, Ototoxicity, Neurotoxicity
Carbapenems	Constipation
Cephalosporins	Nephrotoxicity, Stevens j. syndrome, Toxic epidermal dermatitis, A.A. diarrhea
Clindamycin	Thrombocytopenia, Renal dysfunction
Colistimethate sodium	Nephrotoxicity, Neurotoxicity
Isoniazide	Elevated liver func. Tests, Loss of appetite, Weakness, Lethargy, Thrombocytopenia, peripheral neuropathy (dose related).
Linezolid, Tedizolid	Thrombocytopenia, Elevated blood pressure, Serotonin syndrome, Diarrhea in children, Headache, Nausea.
Nitrofurantoin	Urine discoloration, Anemia
Penicillins	Thrombocytopenia, Abdominal discomfort, Nephrotoxicity, Hypersensitivity reaction- fever, joint pain, rash.
Polymyxin B	Nephrotoxicity, Neurotoxicity
Rifampicin	Ataxia, Elevated liver func. Tests, Flu like syndrome.
Teicoplanin	Nephrotoxicity, Thrombocytopenia
Tigecycline	Systemic acidosis, Vit. K deficiency, Hepatotoxicity
Vancomycin	Nephrotoxicity, Ototoxicity, Thrombocytopenia
Macrolides (Azithromycin/Clarithromycin/ Erythromycin)	Diarrhea, nausea, abdominal pain, loose stool in high single dose therapy, Taste disturbance, Paresthesia, Pruritis, Cramping, Flatulence.
Fluoroquinolones (Ciprofloxacin/Levofloxacin/ Gatifloxacin)	Nausea, Headache, Diarrhea, Dizziness, Dyspepsia, Photo sensitivity.
Tetracycline	Children may develop permanent brown discoloration of teeth (>10%), Diarrhea, nausea, Antibiotic associated pseudomembranous colitis (1-2%)

APPENDIX-18 : SIDE EFFECT OF SOME COMMON DRUGS

Chloramphenicol	Leucopenia, Thrombocytopenia, Suppression of red cell production, Aplastic Anemia, Peripheral neuritis, Grey baby syndrome.
Anti-coagulants	
Enoxaparin	Anemia, Blood thin, hemorrhage, Fever.
Rivaroxaban	Abdominal pain, Back pain, Headache, Dizziness, Fatigue, peripheral edema.
Warfarin	Taste perversion, Rash, Diarrhea, Jaundice, and Fever, Hemorrhage.
Anti-fungals	
Azoles	Q-T prolongation, Hypokalemia, Increased ALT/AST, Thrombocytopenia, SJS, TEN, Spontaneous hypoglycemia
Echinocandins (Anidulafungin, Caspofungin)	Hepatotoxicity (Caspof.)
Anti-hypertensive	
Acetazolamide	Thirst, Confusion, Malaise, Polyuria, Anorexia.
Alfuzosin	Abdominal pain, Headache, constipation
Amlodipine	Edema, Headache, palpitation, abdominal pain,
Atenolol	Tiredness, Depression, Leg pain, Hypotension, Bradycardia, Cold extremities.
Bisoprolol	Dizziness. Upper Respiratory infection, Bradyarrhythmia.
Captopril	Hyperkalemia, Skin Rash
Carvedilol	Hypotension, Diarrhea, Vomiting, Weight gain, Dizziness, Fatigue, Hyperglycemia.
Eplerenone	Hypercalamia, Abdominal pain, Cough
Furosemide	Hypokalemia, Hyperuricemia
Hydrochlorothiazide	Weakness, vertigo, gastric irritation, Electrolyte disturbance, Hypotension.
Irbesartan	Dizziness, Diarrhea, Fatigue, Hyperkalemia.
Labetalol	Dizziness, Fatigue, Nausea
Losartan Potassium	Hypoglycemia, Weakness, Chest pain
Nifedipine	Heart Burn, Peripheral edema, Headache
Olmesartan Midoxomil	Back pain, Headache, Dizziness, Diarrhea, Fatigue
Prazosin	Palpitation, Weakness, Headache, Dizziness.
Ramipril	Cough, Hypotension, Headache
Telmisartan	Headache, Dizziness, Diarrhea, Fatigue
Terazosin	Dizziness, Hypotension, Impotence, edema
Valsartan	Vertigo, Dizziness, Upper abdominal pain
Verapamil HCl	Headache, Constipation, Sleep disturbance
Anti-virals	
Acyclovir	Elevated transaminase level, Abdominal pain, Anemia, Fatigue, Oral malaise
Oseltamivir	Nephrotoxicity, Arrhythmia, Delirium, Abnormal liver func. Tests, Abnormal pain.

APPENDIX-18 : SIDE EFFECT OF SOME COMMON DRUGS

Drugs for Cancer Therapy	
Bevacizumab	Dry mouth, cough, voice changes, and loss of appetite, diarrhea, nausea, vomiting, constipation, mouth sores, and headache, Weakness.
Bleomycin	Skin reaction, Pulmonary toxicity, Hypersensitivity reaction, Myelosuppression.
Carboplatin	Nausea& vomiting, Anemia, Elevation of ALT, AST, Blood urea & bilirubin level, Cardiac failure etc.
Cisplatin	Nausea &vomiting, Hair loss, Diarrhea, loss of appetite, Hiccup etc.
Cyclophosphamide	Anorexia, Nausea & vomiting, Anemia, Alopecia, Skin & nail pigmentation.
Dacarbazine	Myelosuppression, nausea and vomiting, Flu -like syndrome, CNS Toxicity, photosensitivity.
Docetaxel	Myelosuppression, Hypersensitivity reaction, Fluid retention, Alopecia, Mucositis, Peripheral neuropathy.
Doxorubicin	GI toxicity, Blurred vision, Headache, Seizure, Skin pigmentation, Myelosuppression, Cardiac toxicity.
Epirubicin	Alopecia, Diarrhea, Nausea & vomiting, Cardio toxicity, Skin rash, Leukopenia or Neutropenia.
Etoposide	Nausea &vomiting, Anorexia, Diarrhea, Stomatitis, CNS effects, Peripheral neuropathy, Thrombocytopenia, Leukopenia.
Folinic Acid(Leucovorin)	GI disturbances, Hypersensitivity reactions, Bronchospasm.
5-Flurouracil	Myelosuppression, Hand-foot syndrome, Neurologic toxicity, Dry skin, Metallic taste.
Gemcitabine	Leukopenia, Thrombocytopenia, Anemia, Mild GI effects, Rashes, Renal impairment, Pulmonary toxicity & edema, Proteinuria, Hematuria etc.
Irinotecan	Nausea & vomiting, skin reactions, Diarrhea, Cardiovascular toxicity, Neutropenia, Anemia, Abdominal Cramps etc.
Ifosphophamide	Nausea & vomiting, Depression, Hallucinations, Wound healing impairment, Nephrotoxicity, Cardiac toxicity etc.
Methotrexate	Myelosuppression, Mucositis, Uric acid nephropathy, Acute cerebral dysfunction, Skin rash, Arachnoiditis with intrathecal administration.
Oxaliplatin	Myelosuppression, Neurotoxicity, Nausea and vomiting, Diarrhea, Allergic reaction, Hepatotoxicity
Paclitaxel	Neutropenia, Anemia, Chest Pain, Neurotoxicity, Skin Discoloration, Alopecia.
Pemetrexed	Myelosuppression, Skin rash, Mucositis, Fatigue.
Rituximab	Headache, fever, chills, stomach pain, nausea, diarrhea, heartburn, flushing, night sweats, weakness, muscle or joint pain, back pain, dizziness.
Topotecan	Myelosuppression, Nausea, Vomiting, Headache, Fever, Myalgias, Alopecia.
Trastuzumab	Fever, Chills, Muscle aches, Nausea.

APPENDIX-18 : SIDE EFFECT OF SOME COMMON DRUGS

Vinblastin	Neurotoxicity, Constipation, Alopecia, Myelosuppression, Hypertension, Mucositis.
Vincristine	Neurotoxicity, Constipation, Alopecia, Myelosuppression, Azoospermia, Mucositis.
Drugs for Depression	
Amitriptyline HCL	Dry mouth, weight, vision problem, Sweating, Postural hypotension, Tachycardia.
Escitalopram	Somnolence, Insomnia, Headache, Nausea, Menstrual Disorder.
Flupenthixol Melitracen	Insomnia, Restlessness.
Mirtazepine	Weight gain, appetite, somnolence.
Nortriptyline	Anxiety, Palpation, Arrhythmias, panic.
Drugs for Epilepsy	
Carbamazepine	Dry mouth, Ataxia, Nausea, Vomiting.
Clonazepam	Somnolence, Depression, memory impairment, impotence, urinary frequency.
Diazepam	Diarrhea, Euphoria, Rash, Incoordination.
Gabapentin	Ataxia, Fatigue, Drowsiness, Somnolence.
Phenobarbitone	Drowsiness, Excitement, Vomiting, confusion.
Phenytoin	GI disturbance, Lack of appetite, Dizziness, tremor.
Piracetam	Depression, Sleep Disturbance, weight gain, Hyperkinesia, Nervousness.
Pregabalin	Ataxia, Fatigue, Drowsiness, Somnolence, Peripheral edema, weight gain, Tremor.
Drugs for Heart Failure (Inotropic-Sympathomimetic)	
Dopamine HCL	Angina pain, atrial fibrillation, ventricular arrhythmia, Ectopic beats, Tachycardia.
Dobutamine HCl	Angina, dyspnea, fever, nausea, Tachyarrhythmia.
Digoxin	Dizziness, Mental disturbance, Diarrhea, Headache, Nausea.
Drugs for Lipid Regulation	
Atorvastatin	Diarrhea, Nasopharyngitis, Arthralgia.
Fenofibrate	Abdominal Pain, Back Pain, Headache, constipation.
Omega -3 fatty Acid	Taste perversion, Rash, Infection, pain.
Rosuvastatin	Myalgia, Headache, pharyngitis.
Simvastatin	Myalgia, Headache, pharyngitis, abdominal pain, constipation.
Drugs for Psychosis	
Haloperidol	Parkinsonism, Dystonia, Erectile dysfunction, Sedation, Weight gain, Erectile dysfunction.
Trifluoperazin	Dry mouth, sedation, blurred vision.
Drugs for Respiratory System	
Aminophylline	Convulsion, vomiting, insomnia, Abdominal pain.
Glycopyrronium Bromide	Dry mouth, dehydration, immune system disorder.

APPENDIX-18 : SIDE EFFECT OF SOME COMMON DRUGS

Ipratropium Bromide	Dry mouth, Headache, Urinary retention, Buccal ulceration.
Ipratropium bromide + Salbutamol	Bronchitis, chest pain, nausea, URTI, Headache.
Rofumilast	Diarrhea, Weight loss, Back pain.
Salbutamol +Theophylline	Bronchitis, chest pain, nausea.
Drugs Used in the Alimentary Disease/Disorder	
Antacids & other Anti-Dyspeptics drugs	Diarrhea, Stomach cramps, milk-alkali syndrome, Chalky taste, Vomiting.
Domperidone	Dry mouth, nervousness, drowsiness, skin rash and itching.
Diosmin + Hesperidin	Routine gastric disorders and neurovegetative disorders (feeling of discomfort).
H ₂ -Receptor antagonists	Nausea, headache, dizziness and diarrhea, skin rashes.
Hydrocortisone + Aesculin + Cinchocaine + Framycetin/ Neomycin	Local atrophic changes in the skin.
Proton pump inhibitors	Diarrhea, headache (both may be severe); also nausea, constipation, flatulence, dizziness, somnolence, malaise, Abdominal pain.
Drug Used in Respiratory Diseases	
Adrenaline	Anxiety, tremor, tachycardia, cardiac arrhythmias, Dizziness, Dyspnea, Flushing.
Aminophylline	Gastric irritation, nausea, vomiting, epigastric pain and tremor.
Ephedrine	Tremor, tachycardia, insomnia, urinary retention, dry mouth, Palpitation, Restlessness.
Ipratropium Bromide	Dryness of the mouth, nausea, dizziness, blurred vision.
Ketotifen	Dry mouth, sedation, Weight gain, Rash.
Montelukast	Dizziness, headache, diarrhea, restlessness, abdominal pain.
Pizotifen	Weight gain, Dry mouth, muscle pain, Hepatic injury.
Salbutamol	Tremor, Palpitations, muscle cramps, and tachycardia.

Appendix-19

CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

Part A: Laboratory Reference Values for Adults:		
* Blood (B), Plasma (P), Serum (S)		
Test	Conventional units	SI units
Aminotransferase		
Alanine (ALT) SGPT	10-40 U/L (37°C)	0.22–0.68 mckat/L (37°C)
Aspartate (AST) SGOT	10-59 U/L	0.17–1.00 -2 to +3 kat/L (37°C)
-1 antitrypsin (P)	78–200 mg/dL	0.78–2.00 g/L
Albumin (P)	3.5–5.2 g/dL	35–52 g/L
Aldolase (S)	1.0–7.5 U/L (30°C)	0.02–0.13 mckat/L (30°C)
Alkaline phosphatase (P)	38–126 U/L (37°C)	0.65–2.14 mckat/L
Amylase (P)	27–131 U/L	0.46–2.23 mckat/L
Ammonia (B)	9–33 mcmol/L	9–33 mcmol/L
Angiotensin converting enzyme (ACE) (S)	12-35 u/L	
Acetone and acetoacetate(S)	0.3–2.0 mg/dL	0.05–0.34 mmol/L
Acid phosphatase (S)	<3.0 ng/mL	<3.0 mcg/L
Ascorbic acid (P)	0.4–1.5 mg/dL	23-85 micromol/L
Bicarbonate (S)	22–29 mEq/L	22–29 mmol/L
Bilirubin (S) Total	0.2-1.2 mg/dL	2-20 micromol/L
Direct (conjugated)	0.1-0.4 mg/dL	<7 micromol/L
Indirect (unconjugated)	0.2-0.7 mg/dL	<12 micromol/L
Blood volume	8.5-9% of body weight (kg)	80-85 ml/kg
Blood urea nitrogen (BUN) (S or P)	8-25 mg/dl	2.9-8.9 mmol/L
Calcium (S) Total	8.5-10.3 mg/dL	2.1-2.6 mmol/L
Ionized	4.25-5.25 mg/dL	1.05-1.3 mmol/L
Carcinoembryonic antigen (CEA)(S)	0-2.5 ng/ml	0-2.5microgram/l
CO ₂ content (S)	24-30 mEq/L	24-30 mmol/L
CO (B)	0.5–1.5% total Hb	0.005–0.015 HbCO fraction
Carotenoids (S)	50-300 microgram/dL	0.9-5.58 micromol/L
Ceruloplasmin (S)	27-37 mg/dL	1.8-2.5 pmol/L
Chloride (S)	96-106 mEq/L	96-106 mmol/L
Cholesterol (S)	120-220 mg/dL	3.1-5.68 mmol/L
Creatine kinase (S) female male	10-80 u/L 15-105 u/L	0.17–1.36 mckat/L (30°C) 0.26–1.79 mckat/L (30°C)

APPENDIX-19 : CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

Part A: Laboratory Reference Values for Adults:		
* Blood (B), Plasma (P), Serum (S)		
Test	Conventional units	SI units
Creatine kinase (MB) (S)	0–7 ng/mL	0–7 mcg/L
Copper (S)	70-155 pg/dL	11-24 micromol/L
Complement C3 (S)	64-166 mg/dl	640-1660 mg/L
Complement C4 (S)	15-45 mg/dl	150-450 mg/L
Cryoglobulins (S)	<0.12 mg/dl	
Creatinine (S)	<1.5 mg/dL	<133 micromol /L
Cyanocobalamin (S)	200pgm/mL	148 pmol/L
Digoxin (S)		
Therapeutic	0.8-2 ng/ml	1.0-2.6 nmol/L
Toxic	>2.5 ng/ml	>3.2 nmol/L
Erythropoietin (EPO) (S)	5-20 mU/ml	5-20 u/L
Ethanol	Not normally detectable 65-87 mmol/L (marked intoxication) 87-109 mmol/L (stupor) >109 mmol/L Coma	>21.7 mmol/L (Depression of CNS) >86.8 mmol/L (Fatalities reported)
□-fetoprotein (AFP) (S)	0-15 ng/ml	0-15 microgram/L
Ferritin (S)		
Female	4-161 ng/ml	4-161 microgram/L
Male	16-300 ngm/ml	16-300 microgram/L
Children to 15 years	7-140 ngm/ml	
Folic acid (S)	2-20 ngm/ml	4.5-45 nmol/L
Folic acid (RBC) (B)	165-760 ng/ml	370-1720 nmol/L
Glucose, fasting (S or P)	65-110 mg/dl	3.6-6.1 mmol/L
Gamma glutamyl transferase (GGT) (P)	2-30 u/l male 1-24 u/l female	0.03–0.51 mckat/L (37°C) 0.02–0.41 mckat/L (37°C)
Glycated haemoglobin (HbA1) (P)	4.2% – 5.9%	0.042–0.059
Haptoglobin (S)	46-316 mg/dl	0.5-3.2 g/L
Haemoglobin electrophoresis (B)	HbA->95% HbA ₂ 1.5-3.5%	>0.95 Hb fraction 0.015–0.035 Hb fraction
Haemoglobin, fetal (HbF) (B)	Adult <2% (varies with age)	<0.02 Hb fraction
β-hydroxybutyrate (S)	0.5-3 mg/dl	0.05-0.3 mmol/L
Insulin, immunoreactive (S)	6-35 microunit/ml	42-243 pmol/L
Insulin-like growth factor-1(P)	123-463 ng/ml	123-463 microgram/L
Iron (S)	50-150 mcg/dl	9-27 micromol/L
Iron binding capacity (S)	250-410 mcg/dl	45-73 micromol/L
Iron Percent saturation	20-55%	0.2-0.55

APPENDIX-19 : CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

Part A: Laboratory Reference Values for Adults:		
* Blood (B), Plasma (P), Serum (S)		
Test	Conventional units	SI units
Immunoglobulin A (P)	70–400 mg/dL	0.7–4 g/L
Immunoglobulin G (P)	700–1600 mg/dL	7–16 g/L
Immunoglobulin M (P)		
Male	30–220 mg/dL	0.3–2.2g/L
Female	40–250 mg/dL	0.4–2.5g/L
Lactic acid (lactate) (B)		
Venous	4.5–20 mg/dl	0.5–2.2 mmol/L
Arterial	4.5–14.4 mg/dl	0.5–1.6 mmol/L
Lactate dehydrogenase (LDH) (total)(S)	100–190U/L	1.7–3.2 mckat/L
Lead (B)	0–50 pg/dl	0–2.4 pmol/l
Lipase (S)	23–300 U/L (37°C)	0.39–5.1 mckat/L (37°C)
Lithium (S)		
Therapeutic	0.5–1.4 mEq/L	0.5–1.4 mmol/L
Toxic	2.0 mEq/L	>2.0 mmol/L
Lipid fractions (S or P)	HDL- Cholesterol >50 mg/dl, LDL- Cholesterol- <130mg/dl, VLDL- Cholesterol <40 mg/dl	** (to convert into mmol/l, multiply by 0.026)
Magnesium (S)	1.8–3 mg/dl	0.7–1.1 mmol/L
5'-Nucleotidase (S)	2–17 u/L	0.034–0.29 mckat/L
Osmolality (S)	280–296 mosm/kg water	280–296 mmol/kg water
Oxygen saturation (B)		
Arterial PO ₂ (PaO ₂)	96–100% of capacity	10–13.3 kPa
PCO ₂	80–100 mmHg	4.7–6 kPa
pH (Arterial, B)	7.35–7.45	7.35–7.45
Phosphorous (Inorganic) (S)	3–4.5 mg/dl	1–1.5 mmol/L
Potassium (S or P)	3.5–5 mEq/L	3.5–5 mmol/L
Protein (S)		
Total (S)	6–8 gm/dl	60–80 g/L
Albumin (S)	3.5–5.5 gm/dl	35–55 g/L
Globulin (S)	2.2–4.2 gm/dl	22–42 g/L
A/G Ratio	1.1–2.4	11–24 g/L
Fibrinogen (P)	0.2–0.6 gm/dl	2–6 g/L
Prostate-specific antigen (PSA) (S)	0–4 ng/ml	0–4 microgram/L
Protein S (P) (antigen)	76–178%	
Pyruvate (B)	0.6–1 mg/dl	70–114 micromol/L
Sodium (S or P)	136–145 mEq/L	136–145 mmol/L
Specific gravity (B)	1.056	
Specific gravity (S)	1.0254–1.0288	same
Sulphate (S)	2.9–3.5 mg/dl	0.3–0.36 micromol/L
Transferrin (S)	200–400 mg/dl	23–45 micromol/L
Triglycerides (S)	<165 mg/dl	1.9 mmol/L

APPENDIX-19 : CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

Part A: Laboratory Reference Values for Adults:		
* Blood (B), Plasma (P), Serum (S)		
Test	Conventional units	SI units
Troponin-I	<1.5 ng/ml	
Thyroglobulin (S)	3-42 ng/ml	3-42 microgram/L
Thrombin time (P)	24-35 seconds	
Urea (P)		2.5-6.6 mmol/L
Uric acid (S or P)	Male 3-9 mg/dl Female 2.5-7.5 mg/dl	0.18-0.54 mmol/L 0.15-0.45 mmol/L
Electrophoresis Globulin		
α1	0.1-0.4 gm/dl	1-4 gm/L
α2	0.4-1.1 gm/dl	4-11 gm/L
β	0.5-1.6 gm/dl	5-16 gm/L
γ	0.5-1.4 gm/dl	5-14 gm/L
Vitamin A (S)	20-60 pg/dl	0.7-2.1 micromol/L
Vitamin B 12 (S)	140-820 pg/ml	100-600 pmol/L
Vitamin D derivatives (S)		
1,25-dihydroxy	20-45 pg/ml	48-108 pmol/L
25- hydroxy	25-40 ng/ml	62.5-100 nmol/L
Zinc (S)	50-150 microgram/dl	7.65-22.95 micromol/L

A.2. Reference value for hormones in serum or plasma		
Test	Conventional units	SI units
Adrenal		
Aldosterone (P) Supine	2-9 ng/dl	56-250 pmol/L
Cortisol (S)	8.00AM 5-20 microgram/dl 8.00 PM <10 microgram/dl	0.14-0.55 micromol/L 0.28 micromol/L
Deoxycortisol (S)	After metyrapone >7 microgram/dl	>0.2 micromol/L
Dopamine(P)	<135pg/ml	
Epinephrine (P)	<0.1 ng/ml	<0.55nmol/L
Norepinephrine (P) supine	<500 pg/ml	<3 nmol/L
Follicle-stimulating hormone (FSH)	Male 1.5-9 u/L Female: 3-15 u/L (early follicular), Upto 17 mIU/mL (mid-cycle), 19-100 mIU/mL (postmenopausal)	1.4-15.4 IU/L (male) 1-10 IU/L (female-follicular phase), 6-17 IU/L (Mid cycle), 19-100 IU/L (postmanopausal)
Gastrin	<100 pg/mL	<100 ng/L
Growth Hormone (GH)	Male <5 ng/mL Female <10 ng/mL	Male, <5 mcg/L, Female<10 mcg/L
Gonad:		
Testosterone, free (S)	Male 10-30 ng/dl Female 0.3-2 ng/dl	

A.2. Reference value for hormones in serum or plasma		
Test	Conventional units	SI units
Testosterone, Total (S)	Prepubertal <100ng/dl Adult male 280–1100 ng/dL Adult female 20-80 ng/dl Luteal phase upto 120 ng/dl	0.52–38.17 nmol/L (adult male), 0.52– 2.43 nmol/L (adult female)
Estradiol (E2)(S)	Male 12-50 pg/ml Female menstrual cycle 1-10 days 24-68 pg/ml, 11-20 days 50-300pg/ml, 21-30 days 73-149 pg/ml (By RIA)	Male: 37-184 pmol/L Female: Varies with menstrual cycle
Progesterone (S)	Male : 13–97 ng/dL Female: Follicular phase 15– 70 ng/dL Luteal phase 200–2500 ng/dL Pregnancy Varies with gestational week	Male: 0.4–3.1 nmol/L Female: Follicular Phase: 0.5– 2.2 nmol/L Luteal Phase: 6.4– 79.5 nmol/L Pregnancy: Same
Islets:		
Insulin (S)	4-25 microunit/ml	29-181 pmol/L
C-peptide (S)	0.78–1.89 ng/mL	0.26–0.62 nmol/L
Glucagon(S) fasting	20-100 pg/ml	
Parathyroid hormone (PTH)	10-55 ng/L	
Lutenising hormone	Female: Follicular phase 1.68–15.0 mIU/mL 1.68–15.0 IU/L Mid-cycle peak 21.9–56.6 mIU/mL 21.9–56.6 IU/L Luteal phase 0.61–16.3 mIU/mL 0.61–16.3 IU/L Postmenopausal 14.2–52.5 mIU/mL 14.2–52.3 IU/L Male: 1.24–7.8 mIU/mL	Female: Follicular phase: 1.68– 15.0 IU/L Mid-cycle peak : 21.9– 56.6 IU/L Luteal phase: 0.61– 16.3 IU/L Postmenopausal: 14.2–52.3 IU/L Male: 1.24–7.8 IU/L
Prolactin (S)	1-25 ng/ml	0.4-10 nmol/L
Somatomedin C (P)	0.4-2 U/ml	
ADH (P)	Serum osmolality 285: mosm/kg 0-2pg/ml, Serum osmolality>290/kg: 2- 12+pg/mL	
Placenta Estriol (E3) (S)	Male and nonpregnant female <0.2 microgram/dl	<7nmol/L (by RIA)
Placenta Chorionic gonadotropin	Beta subunit male <9 mIU/ml, female pregnant after implantation >10 mIU/ml.	
Thyroid		
Thyroxine, free (FT4) (S)	0.8-2.4 ng/dl	10-30 pmol /L
Thyroxine, Total (TT4) (S)	5-12 microgram/dl	65-156 nmol/L (by RIA)

APPENDIX-19 : CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

A.2. Reference value for hormones in serum or plasma		
Test	Conventional units	SI units
Triiodothyronine (T3) (S)	80-220 ng/dl	1.2-3.3 nmol/L
Reverse Triiodothyronine (rT3)	30-80 ng/dl	0.45-1.2 nmol/L
Thyroid stimulating hormone(TSH) (S)	<10 microU/ml	<10 mU/L
Calcitonin (S)	<100 pg/ml	<29.2pmol/L

A.3. Reference value for urine		
Test	Conventional units	SI units
Acetone plus acetoacetate	negative	
Amylase	1-17 u/h	1-17 u/h
Calcium	100-300 mg/day	2.5-7.5 mmol/d
Copper	0-50 pg/d	0-0.8 pmol/d
Cortisol		9-50 micromol/mol creatinine
Creatinine		10-20 mmol/24 hour
Hemosiderin	Negative	
Hemoglobin and myoglobin	Negative	
Lead	<120 pg/d	<0.39 pmol/L
Osmolality	Random: 100-900 mosm/kg H ₂ O	Random: 100-900 mmol/kg H ₂ O
Oxalate	80-490 (M) mmol/24 hour 40-320 (F) mmol/24 hour	
Phosphate	15-50 mmol/d	
Porphyrins		
Delta-aminolevulinic acid	1.5-7.5 mg/24 hour	11-57 micromol/d
Porphobilinogen	<2 mg/24 hour	<8.8 micromol/d
Protein	<150 mg/day	<150mg/day
Potassium	25-100mmol/24 hour	
Sodium	100-200 mmol/24 hour	
Urobilinogen	0-2.5 mg/24 hour	70-470 micromol/d
Urate	1.2-3 mmol/24 hour	
Urea	170-600 mmol/24 hour	
Vanilylmandelic acid (VMA)	1-9 mg/d	5-45 micromol/d

A.4. Reference values for Cerebrospinal fluid		
Test	Conventional units	SI units
Cells	0–10 lymphocytes/mm ³ 0 RBC/mm ³	0–10 lymphocytes/mm ³ 0 RBC/mm ³
Chloride	118–132 mmol/L (20 mmol/L higher than serum)	Same
Glucose	40–70 mg/dL	2.2–3.9 mmol/L
Total protein	8–32 mg/dL	80–320 mg/L
Glutamine	6–16 mg/dL	60–160 mg/L

Part B. Conditions in which normal chemistry values may increase or decrease		
Analyte	Increase	Decrease
Alanine aminotransferase (ALT or SGPT)	It is an enzyme found primarily in the liver but also found in heart and other tissue. The value increases in hepatitis, cirrhosis of liver, obstructive jaundice, alcoholism, chemical pollutants, myocardial infarction.	Decreased ALT in combination with increased cholesterol levels is seen in cases of a congested liver. Vitamin B6 deficiency.
Aspartate aminotransferase (AST or SGOT)	It is an enzyme found primarily in liver, heart, kidney, pancreas and muscle. It increases in myocardial infarction, heart failure, myocarditis, pericarditis, myositis, muscular dystrophy, trauma, hepatic disease, pancreatitis, renal infarct, cerebral damage, seizure.	Vitamin B deficiency, pregnancy.
Alkaline phosphatase	Produced in the cells of the bone and liver with some activity in the kidney, intestine, and placenta. Growing children have higher levels of this enzyme also. It increases in bone growth, bone metastases, Paget's disease, ricket, healing fracture, bone injury, pregnancy, hepatic disease, obstructive jaundice.	Low levels are sometime found in protein deficiency, malnutrition, pernicious anaemia and a number of vitamin deficiencies.

Part B. Conditions in which normal chemistry values may increase or decrease		
Analyte	Increase	Decrease
Lactic dehydrogenase (LDH)	It is an intracellular enzyme found particularly in kidney, heart, skeletal muscle, brain, liver, and lungs. It can be useful in confirming myocardial or pulmonary infarction only in relation to other tests. It is raised in haemolytic anaemia, leukemia, lymphoma, hepatic disease, renal infarction, trauma, seizures, cerebral damage	Malnutrition, hypoglycaemia, adrenal exhaustion etc.
Bilirubin, Total	A byproduct of the breakdown of haemoglobin in the liver. It is excreted into bile; it gives the bile its pigmentation. It is raised in liver disease, obstructive jaundice, haemolytic anaemia, pulmonary infarct, neonatal jaundice.	Inefficient liver, excessive fat digestion.
Albumin	It is the major constituent of serum protein (usually over 50%). It is manufactured by liver from amino acids taken from diet. It helps in osmotic pressure regulation, nutrient transport and waste removal. High values are rarely found and are primarily due to dehydration.	Low levels are found in poor diets, diarrhea, fever, infections, liver disease, burn, edema. hypocalcaemia, multiple myeloma.
Globulin	A larger protein than albumin is important for its immunologic responses, particularly its gamma component. It has many diverse functions like carrier of some hormones, lipids, metals, and antibodies. T is elevated in chronic infections, liver disease, rheumatoid arthritis, myeloma.	Lower levels may be found in immune compromised patients, poor diet, malabsorption, liver and kidney disease.

Part B. Conditions in which normal chemistry values may increase or decrease		
Analyte	Increase	Decrease
Calcium	The most abundant mineral in the body and is involved in bone metabolism, protein absorption, muscular contraction, transmission of nerve impulse, blood clotting and cardiac function. It increases in hyperparathyroidism, bone metastases, myeloma, sarcoidosis, hypervitaminosis D.	It decreases in hypoparathyroidism, renal failure, malabsorption, pancreatitis, vitamin D deficiency, overhydration.
Phosphorous	Abundant element found in most tissue and cells in the body and is involved in calcium transport, buffering action and osmotic pressure. It is closely related to calcium with an inverse relationship. It is increased in renal failure hypoparathyroidism, diabetic acidosis, acromegaly.	Hyperparathyroidism, osteomalacia, cirrhosis, hypokalemia. Excess IV glucose.
Potassium	It is the major intracellular cation in the blood. It along with the help of sodium maintains osmotic balance and also involved in acid-base balance. It helps in nerve and muscle action. It is increased in hyperkalemic acidosis, cardiac arrhythmia, diabetic acidosis, hypoadrenalism.	Cirrhosis, malnutrition, vomiting, metabolic alkalosis, diarrhea, diuretics, hyperadrenalism, familial periodic paralysis.
Sodium	Most abundant cation in blood and its chief base. It is required to maintain osmotic pressure, acid-base impulse, and transmission of nerve impulse. It is increased in dehydration, diabetes insipidus, excessive salt ingestion.	Excess ADH, nephrosis, myxedema, congestive heart failure, diarrhea, vomiting, diuretics.
Chloride	Maintain cellular integrity through its influence on osmotic pressure. It also helps in acid-base balance and water balance. It is increased in acidosis.	

Part B. Conditions in which normal chemistry values may increase or decrease		
Analyte	Increase	Decrease
Cholesterol	It is a fat that is a structural component of cell membrane and plasma lipoproteins and is required for synthesis of steroid hormones, glucocorticoids and bile acids. Mostly synthesized in liver, some is absorbed through diet. HDL is desired as opposed to the LDL. Elevated levels are found in atherosclerosis, diabetes, obstructive jaundice, hypothyroidism, pregnancy.	Low levels are found in hyperthyroidism, depression, malnutrition, anaemia, infections, heart failure, malignancies.
Tryglycerides	It is stored in adipose tissue as glycerol, fatty acids and monoglycerides are reconverted as tryglycerides by liver.90% of dietary intake and 95% of fat stored in tissue are tryglycerides. Elevated levels are found in atherosclerosis, hypothyroidism, liver disease, pancreatitis, myocardial infarction, metabolic disorder, toxemia, nephrotic syndrome, hereditary.	Low levels are found in chronic obstructive pulmonary disease, brain infarction, hyperthyroidism, malnutrition and malabsorption.
Creatinine	It is the waste product of muscle catabolism. Elevated levels are found in kidney disease, muscle degeneration, drugs.	Low levels are found in kidney damage, protein starvation, liver disease, pregnancy.
Blood urea nitrogen	The nitrogen component of urea, is the end product of protein catabolism. Elevated levels are found in excessive protein intake, kidney damage, low fluid intake, intestinal bleeding, exercise, heart failure.	Lower levels may be found in poor diet, malabsorption, liver damage, low nitrogen intake.
Uric acid	It is the end product of purine metabolism. Elevated levels are found in gout, infections, kidney disease, alcoholism, high protein diet, diuretics, leukemia, lymphoma, polycythemia, psoriasis, toxemia of pregnancy.	Lower levels may be found in diet low in purine, liver damage, uricosuric drugs, allopurinol, large doses of vitamin C.

APPENDIX-19 : CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

Part B. Conditions in which normal chemistry values may increase or decrease		
Analyte	Increase	Decrease
Glucose (fasting)	Primary source of energy is elevated in diabetes, obesity, pancreatitis, steroid, stress, IV glucose, thiazides, Cushing syndrome, acromegaly, hyperthyroidism.	Lower levels may be found in excess insulin, insulinoma, liver disease, hypothyroidism, alcoholism, malabsorption.

Part: C. Clinical chemistry for paediatric range				
Test		Reference range		Age
C1. Blood chemistry				
Albumin g/dl		2.6-4.1(M) 2.8-4.6 2.8-4.8 3.2-4.7	2.7-4.3 (F) 2.9-4.2 3.3-4.8 2.9-4.2	1-30 days 31-days-6 months 6 months-1 year 1-18 years
Alkaline phosphatase (S) u/L		72-307 133-340 103-429 49-210 99-453 53-186 38-110 38-110		0-6 years 6-9 9-15 (male) 15-18 (male) 9-13 (F) 13-15(F) 15-18(F) 18 years and older
Alanine transaminase, u/L		13-45		Newborn
AST (Aspartate transaminase, U/L		20-60 20-40 14-40 5-40		0-6 years 6-10 10-18 18 years and older
Amylase (S) U/L		5-65 27-131		Newborn Adult
Ammonia micromol/L		20-100 20-60		<1 month >1month
Bicarbonate (arterial)		17-24 mmol/L 19-24 16-24 22-26		Newborn Infant 2 months-2 year Adult
Bilirubin (total) (S)		24-149 micromol/L 58-197 micromol/L 26-205 micromol/L		0-1 day 1-2 days 3-5 days
Bilirubin Direct (S)		1-25 micromol/L <10 micromol/L		<2 weeks >2 weeks
Carbon dioxide mEq/L		15-20 18-27		Cord blood Child
Calcium (ionized) mg/dL		4.2-5.9		Neonatal

APPENDIX-19 : CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

Part: C. Clinical chemistry for paediatric range		
Test	Reference range	Age
Calcium (S) (Total) (mg/dl)	8.5-10.6 (M) 8.4-10.6 (F) 8.7-10.5 8.9-10.5 8.8-10.6 8.5-10.5 8.7-10.3 8.5-10.3 8.5-10.2 8.4-10.0 8.4-10.3 8.6-9.8	Birth – 30 days 31 days- 1 year 1-6 years 7-12 years 13-15 years 16-18 years
Cholesterol Total (S or P) mmol/L	1.3-2.6 1.8-3.2 2.6-4.5 2.6-5.5	<1 month 1 month-2 years 2-10 years >10 years
Creatinine (mg/dl)	0.5-1.2(M) 0.5-0.9 (F) 0.4-0.7 0.4-0.7 0.5-0.8 0.5-0.8 0.6-1.0 0.6-1.0 0.6-1.2 0.7-1.1 0.8-1.4 0.8-1.2	Birth-30 days 31days-3 years 4-6 7-12 13-15 16-18
CK (creatine kinase)(S) U/L	10-200 15-105 10-80 20-110 16-18	Newborn Adult M Adult F >60 years M >60 years F
Total protein g/dl	4.6-7 4.4-7.6 5.1-7.3 5.6-7.5 6-8	Newborn 1 week 7 month-1 year 1-2 year >3years
Glucose (S) fasting mmol/L	1.1-3.3 1.7-3.3 2.2-3.3 2.8-4.5 3.3-5.6 4.1-5.9	Premature Neonate Newborn- 1day Newborn>1day Child Adult
GGT (Gamma glutamyl transpeptidase)	8-154 U/L 7-103 9-76 6-52 5-40 5-24 <45	0-1 wk 1-2 2-4 4-6 6-7 7wk-16 years >16 years
Lactate mmol/L	0.7-2.0	All ages
Magnesium mmol/L	0.71-0.96	All ages
Osmolality mmol/kg	265-295	All ages
Sodium (S or P) mmol/L	130-140 133-146 139-146 138-145 136-145	Premature Newborn Infant Child Thereafter

APPENDIX-19 : CLINICAL PATHOLOGY AND OTHER BIOMEDICAL TABLE

Part: C. Clinical chemistry for paediatric range		
Test	Reference range	Age
Potassium (S) mmol/L	3.7-5.9 4.1-5.3 3.4-4.7 3.5-5.1	Newborn Infant Child Thereafter
Chloride (S or P) mmol/L	98-113 98-107	Newborn (0-30 days) Thereafter
Urea	1-6 mmol/L	All ages
Uric acid mg/dL	2-7 2-6.5 2-7	0-2 years 2-12 years 12-14 years
Phosphorous mg/dL	4.2-9 3.8-6.2 3.5-6.8	Newborn 1 year 2-5 years
Triglyceride (fasting)	0.5-1.4 mmol/L 0.6-1.7	<5 years > 5 years
C.2. Reference values for cerebrospinal fluid in paediatric age ranges		
Glucose	>3.0 mmol/L	
Protein	<1.20 g/L 0.20-0.80 0.15-0.4	Full term newborn <1 month >1 month
C.3. Thyroid function test in paediatric age ranges		
TSH (S) Micro IU/mL	Male Female 0.52-16.0 0.72-13.1 0.55-7.10 0.46-8.10 0.37-6.0 0.36-5.80 0.40-5.00	0-30 days 1month-5 years 5-18 years 18 years and older.
Total T4 (microgram/dL)	Male Female 3.0-14.3 3.0-13.3 5.2-16.3 4.6-13.3 5.5-11.4 6.3-12.8 5.3-10.5 5.3-10.8 4.5-10.3 4.9-10.0 4.9-8.8 5.1-10 5.0-12.0	0-30 days 1-12 months 1-5 years 5-10 years 10-15 years 15-18 years 18 years and older.
Free T4 (ng/dL)	Male Female 0.8-2.8 0.9-1.9 0.5-2.3 0.6-1.9 0.8-2.0 0.9-1.9 0.9-1.6 1.0-1.7 0.8-1.7 0.9-1.6 0.9-1.6 0.8-1.5 0.9-1.6 0.9-1.5 0.8-1.6	0-2 days 3-30 days 1-12 months 1-5 years 5-10 years 10-15 years 15-18 years 18 years and older.

C.4. Pediatric haematology						
Value	At birth	Day-3	1 month	2-6 months	2-6 years	6-12 years
Red blood cell count ($\times 10^{12}/l$)	6.0 $\pm$ 1.0	5.3 $\pm$ 1.3	4.2 $\pm$ 1.2	3.8 $\pm$ 0.8	4.6 $\pm$ 0.7	4.6 $\pm$ 0.6
Haemoglobin (g/L)	165 $\pm$ 30	185 $\pm$ 40	140 $\pm$ 30	115 $\pm$ 20	125 $\pm$ 15	135 $\pm$ 20
Packed cell volume	0.54 $\pm$ 0.10	0.56 $\pm$ 0.11	0.43 $\pm$ 0.12	0.35 $\pm$ 0.07	0.37 $\pm$ 0.03	0.40 $\pm$ 0.05
Mean cell volume (MCV) (fl)	110 $\pm$ 10	108 $\pm$ 13	104 $\pm$ 19	91 $\pm$ 17	81 $\pm$ 6	86 $\pm$ 8
Mean cell haemoglobin (MCH) (pg)	34 $\pm$ 3	34 $\pm$ 3	34 $\pm$ 6	30 $\pm$ 5	27 $\pm$ 3	29 $\pm$ 4
Mean cell haemoglobin con. (MCHC) (g/l)	330 $\pm$ 30	330 $\pm$ 40	330 $\pm$ 40	330 $\pm$ 30	340 $\pm$ 30	340 $\pm$ 30
Reticulocytes (%)	2-5	1-4.5	0.3-1	0.4-1	0.2-2	0.2-2
WBC ($\times 10^9/l$)	18 $\pm$ 8	15 $\pm$ 8	12 $\pm$ 7	12 $\pm$ 6	10 $\pm$ 5	9 $\pm$ 4
Neutrophils ($\times 10^9/l$)	5-13	3-5	3-9	1.5-9	1.5-8	2-8
Lymphocytes ($\times 10^9/l$)	3-10	2-8	3-16	4-10	6-9	1-5
Monocytes ($\times 10^9/l$)	0.7-1.5	0.5-1	0.3-1	0.1-1	0.1-1	0.1-1
Eosinophils ($\times 10^9/l$)	0.2-1	0.1-2.5	0.2-1	0.2-1	0.2-1	0.1-1

C.5. Miscellaneous haematological tests	
Tests	Normal range
Prothrombin time (P)	11-15 seconds for children >6 months
International normalized ratio (INR)	1.0-1.3 for children >6 months
Activated partial thromboplastin time (P) (APTT)	27-39 seconds for children >6 months
Fibrinogen (P)	Above 1.5 g/L for children >6 months
D-Dimer (P)	<0.2 mg/L for children >6 months
Ferritin (S)	10-150 microgram/L for children >6 months
Iron	110-270 ug/dl Birth- 4 months 30-70 ug/dl 4 months-1 year 20-124 ug/dl 2-3 years 53-119 ug/dl 3-10 years
Iron binding capacity	59-175 ug/dl birth-4 months 250-400 ug/dl 4 months-10 years
Percent saturation	65% Newborn 25% 4-10 months 30% 3-10 years

Appendix-20

List of thermo labile product with recommended storage condition

SL. No.	Name of the product	Generic Name with Strength	Dosage form	Storage Condition
1	Eposis Injection	Erythropoietin Concentrated Solution (Erythropoietin Alfa) BP 2,000 IU/ 0.50 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
2	Eposis 3000 Injection	Erythropoietin Concentrated Solution (Erythropoietin Alfa) BP 3,000 IU/ 0.75 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
3	Eposis 4000 Injection	Erythropoietin Concentrated Solution (Erythropoietin Alfa) BP 4,000 IU/ 0.40 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
4	Eposis 5000 Injection	Erythropoietin Concentrated Solution (Erythropoietin Alfa) BP 5,000 IU/ 0.5 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
5	Filgrast Injection	Filgrastim INN 300 mcg/ 0.5 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
6	Interon Injection	Interferon Alfa-2a BP 4.5 MIU/ 0.5 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
7	Pegfilgrast Injection	Pegfilgrastim INN 6 mg/ 0.6 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
8	Pegin Injection	Peginterferon Alfa-2a INN 180 mcg/ 0.5 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
9	Pegin 135 Injection	Peginterferon Alfa-2a INN 135 mcg/ 0.5 ml	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
10	Darbesis 25 mcg Injection	Darbepoetin Alfa INN 25 mcg/ 0.42 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
11	Darbesis 40 mcg Injection	Darbepoetin Alfa INN 40 mcg/ 0.4 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
12	Darbesis 60 mcg Injection	Darbepoetin Alfa INN 60 mcg/ 0.3 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
13	Methoxy PEG Erythropoietin Beta 50 Injection	Methoxy PEG Erythropoietin Beta INN 50 mcg/ 0.3 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
14	Methoxy PEG Erythropoietin Beta 75 Injection	Methoxy PEG Erythropoietin Beta INN 75 mcg/ 0.3 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
15	Methoxy PEG Erythropoietin Beta 100	Methoxy PEG Erythropoietin Beta INN 100 mcg/ 0.3 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.

APPENDIX-20 : List of thermo labile product with recommended storage condition

SL. No.	Name of the product	Generic Name with Strength	Dosage form	Storage Condition
	Injection			
16	Erythropoietin Beta 2000 IU Injection	Erythropoietin Beta 2000 IU Injection/ 0.3 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
17	Erythropoietin Beta 3000 IU Injection	Erythropoietin Beta 3000 IU Injection/ 0.3 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
18	Erythropoietin Beta 5000 IU Injection	Erythropoietin Beta 5000 IU Injection/ 0.3 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
19	Sarilumab 100 Injection	Sarilumab 100 mg/1.14 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
20	Sarilumab 150 Injection	Sarilumab 150 mg/1.14 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
21	Dupilumab 300 Injection	Dupilumab 300 Injection/ 2 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
22	Brodalumab 210 Injection	Brodalumab 210 mg/ 1.15 ml Injection	Pre-filled Syringe	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
23	Rituximab 100 Injection	Rituximab 100 mg/10 mL Injection	Injection	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
24	Rituximab 500 Injection	Rituximab 500 mg/50 mL Injection	Injection	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
25	Bevastim Injection	Bevacizumab 100 mg/4 mL	Injection	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
26	Bevastim 400 Injection	Bevacizumab 400 mg/16 mL	Injection	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
27	Nab-Xelpac Injection (Lyophilized Powder)	Nanoparticle Albumin-Bound Paclitaxel USP 100 mg/ vial	Lyophilized Powder for Injection	Store the vials paclitaxel powder for injectable suspension (nanoparticle, albumin-bound [nab®] paclitaxel) in original cartons between 20°C and 25°C. Retain in the original package to protect from bright light
28	Heparin Injection	Heparin Sodium BP 25000 IU/ 5 ml	Injection	HEPARIN INJECTION BP 5,000 UNITS/ ML should be stored at a temperature below 25 °C. After first opening the preparation can be stored for four weeks at room temperature.
29	Cetuxim Injection	Cetuximab INN 100 mg/ 20 ml	Injection	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.
30		Cetuximab INN 200 mg/ 100 ml	Injection	Store in a refrigerator (2°C to 8°C), Do not freeze or shake.

APPENDIX-20 : List of thermo labile product with recommended storage condition

SL. No.	Name of the product	Generic Name with Strength	Dosage form	Storage Condition
31	Trastunix 150 Injection (Lyophilized Powder)	Trastuzumab INN 150 mg	Lyophilized Powder for Injection	Store in a refrigerator (2°C – 8°C).
32	Trastunix Injection (Lyophilized Powder)	Trastuzumab INN 440 mg	Lyophilized Powder for Injection	Store in a refrigerator (2°C – 8°C).
33	Nivolumab Injection	Nivolumab 40 mg/4 mL	Injection	Store in a refrigerator (2°C to 8°C), Do not freeze or shake. Protect from light

Appendix-21

WHO Model List of Essential Medicines (20th list, March 2017)

ACCESS, WATCH and RESERVE groups of Antibiotics

ANTIBIOTICS:

To assist in the development of tools for antibiotic stewardship at local, national and global levels and to reduce antimicrobial resistance, three different categories were developed– ACCESS, WATCH and RESERVE groups.

Group 1 - KEY ACCESS ANTIBIOTICS:

To improve both access and clinical outcomes antibiotics that were first or second choice antibiotics in at least one of the reviewed syndromes are designated as key ACCESS antibiotics, emphasizing their role as the antibiotics that should be widely available, affordable and quality- assured.
ACCESS antibiotics are listed below.

Selected ACCESS antibiotics may also be included in the WATCH group.

Beta-lactam medicines		Other antibacterials	
Amoxicillin	Cefotaxime*	Amikacin	Gentamicin
Amoxicillin + clavulanic acid	Ceftriaxone*	Azithromycin*	metronidazole
Ampicillin	Cloxacillin	chloramphenicol	nitrofurantoin
Benzathine benzylpenicillin	Phenoxymethylpenicillin	ciprofloxacin*	spectinomycin (EML only)
Benzylpenicillin	Piperacillin + tazobactam*	clarithromycin*	clarithromycin*
Cefalexin	Procaine benzyl penicillin	clindamycin	vancomycin (oral)*
Cefazolin	Meropenem*	doxycycline	vancomycin (parenteral)*
Cefixime*			

Italics = complementary list

*Watch group antibiotics included in the EML/EMLc only for specific, limited indications

The 2017 Expert Committee identified the following antibiotics or antibiotic classes that should be the subject of a specific stewardship focus. Antibiotics or antibiotic classes in these groups are designated accordingly in the EML/EMLc. The "WATCH" and "RESERVE" stewardship groups could assist in activities such as local, national and global monitoring of use; development of guidelines and educational activities.

Group 2 - WATCH GROUP ANTIBIOTICS

This group includes antibiotic classes that have higher resistance potential and so are recommended as first or second choice treatments only for a specific, limited number of indications. These medicines should be prioritized as key targets of stewardship programs and monitoring.

APPENDIX-21 : ACCESS, WATCH and RESERVE groups of Antibiotics

This group includes most of the highest priority agents among the Critically Important Antimicrobials for Human Medicine¹ and/or antibiotics that are at relatively high risk of selection of bacterial resistance.

Watch group antibiotics	
Quinolones and fluoroquinolones e.g. ciprofloxacin, levofloxacin, moxifloxacin, norfloxacin	
3rd-generation cephalosporins (with or without beta-lactamase inhibitor) e.g. cefixime, ceftriaxone, cefotaxime, ceftazidime	
Macrolides e.g. azithromycin, clarithromycin, erythromycin	
Glycopeptides e.g. teicoplanin, vancomycin	
Antipseudomonal penicillins + beta-lactamase inhibitor e.g. piperacillin-tazobactam	
Carbapenems e.g. meropenem, imipenem + cilastatin	
Penems e.g. faropenem	
1 http://apps.who.int/iris/bitstream/10665/251715/1/9789241511469-eng.pdf?ua=1	

Group 3 - RESERVE GROUP ANTIBIOTICS

This group includes antibiotics that should be treated as “last resort” options that should be accessible, but whose use should be tailored to highly specific patients and settings, when all alternatives have failed (e.g., serious, life-threatening infections due to multi-drug resistant bacteria). These medicines could be protected and prioritized as key targets of national and international stewardship programs involving monitoring and utilization reporting, to preserve their effectiveness.

Reserve group antibiotics	
Aztreonam	Fosfomycin (IV)
4th generation cephalosporins e.g. cefepime	Oxazolidinones e.g. linezolid
5th generation cephalosporins e.g. ceftaroline	Tigecycline
Polymyxins e.g. polymyxin B, colistin	Daptomycin

[c] symbol is placed next to the complementary list it signifies that the medicine(s) require(s) specialist diagnostic or monitoring facilities, and/or specialist medical care, and/or specialist training for their use in children.

Complementary List [c]

ceftazidime WATCH GROUP	Powder for injection: 250 mg or 1 g (as pentahydrate) in vial.	
meropenem* WATCH GROUP	Powder for injection: 500 mg (as trihydrate); 1 g (as trihydrate) in vial >3 months. <i>*imipenem + cilastatin is an alternative except for acute bacterial meningitis where meropenem is preferred.</i>	
	FIRST CHOICE	SECOND CHOICE - acute bacterial meningitis in neonates [c] - complicated intraabdominal infections (severe) - high-risk febrile neutropenia
vancomycin WATCH GROUP	Powder for injection: 250 mg (as hydrochloride) in vial.	
	FIRST CHOICE	SECOND CHOICE -high-risk febrile neutropenia

Complementary List – RESERVE GROUP	
aztreonam	Powder for injection: 1 g; 2 g in vial
fifth generation cephalosporins (with or without beta-lactamase inhibitor) e.g. ceftaroline	Powder for injection: 400 mg; 600 mg (as fosamil) in vial
fourth generation cephalosporins (with or without beta-lactamase inhibitor) e.g., cefepime	Powder for injection: 500 mg; 1g; 2g (as hydrochloride) in vial
daptomycin	Powder for injection: 350 mg; 500 mg in vial
fosfomycin	Powder for injection: 2 g; 4 g (as sodium) in vial

Complementary List – RESERVE GROUP	
oxazolidinones e.g., linezolid	Injection for intravenous administration: 2 mg/ mL in 300 mL bag. Powder for oral liquid: 100 mg/5 mL. Tablet: 400 mg; 600 mg.
polymyxins e.g., colistin	Powder for injection: 1 million I.U. (as colisthemethate sodium) in vial
tigecycline	Powder for injection: 50 mg in vial
Complementary List – RESERVE GROUP (Anti TB Medicine)	
Reserve second-line drugs for the treatment of multidrug-resistant tuberculosis (MDR-TB) should be used in specialized centres adhering to WHO standards for TB control.	
amikacin	Powder for injection: 100 mg; 500 mg; 1 g (as sulfate) in vial.
bedaquiline	Tablet: 100 mg.
capreomycin	Powder for injection: 1 g (as sulfate) in vial.
clofazimine	Capsule: 50 mg; 100 mg.
cycloserine*	Solid oral dosage form: 250 mg. *Terizidone may be an alternative
delamanid	Tablet: 50 mg. >6 years
ethionamide*	Tablet: 125 mg; 250 mg. *Protionamide may be an alternative.
kanamycin	Powder for injection: 1 g (as sulfate) in vial.
levofloxacin	Tablet: 250mg; 500 mg; 750 mg.
linezolid	Injection for intravenous administration: 2 mg/ mL in 300 mL bag. Powder for oral liquid: 100 mg/5 mL. Tablet: 400 mg; 600 mg.
moxifloxacin	Tablet: 400 mg.
p-aminosalicylic acid	Granules: 4 g in sachet. Tablet: 500 mg.
streptomycin [c]	Powder for injection: 1 g (as sulfate) in vial.

DENTAL PRACTITIONERS' FORMULARY

Dentistry as a profession continues to undergo changes including improvements in clinical treatment. Although the major part of the dentist's work is still of a restorative nature, the increasing improvements in prevention, diagnosis, and treatment of oral diseases and the oral manifestation of many systemic disease is becoming well recognized internationally. Recent views reflect the systemic implications of oral diseases is of great concern. Periodontal disease is being considered as a risk factor for developing ischemic heart disease, myocardial infarction, stroke, kidney disease,, pre matured child birth, malformed babies etc. So, oral rehabilitations including dental implants surgery has become a part of general dentistry.

The dentist's role has therefore been broadened to include the management of patients with soft tissue diseases such as oral cancer, and AIDS, facial pain, Temporomandibular Joint (TMJ) disorders and salivary dysfunction etc. In addition, dental caries and its sequel and periodontal disease still prevalent in Bangladesh.

The profession seems to feel that dentistry is currently in something of a state of transition. Dental caries once the main area of dental work has declined strikingly in the most developed nations, as the profession has come under the eagle eye of the Health and safety Executive. But the theme virtually does not reflect the present situation of dentistry in Bangladesh, due to lack of knowledge, integration, cooperation between the dental professionals and health executives. It can be regrettably said that unfortunately, oral health is still neglected in Bangladesh and not included in the primary health care system of the Government. Should oral health be the ninth component of primary health care system of Bangladesh! As without oral health we cannot think of a sound human being. Mouth is the gateway of health containing more than 740 species of microorganisms!

In this way dental and oral health is increasingly being seen as part of general health. In such circumstances the need for the dentists to have more of an oral physician's approach and to be more concerned with the patients' previous history, drug history and life style is obvious. Dentists must know much more about medical conditions that can affect the management of their patients.

Medically compromised patients who are attending for dental treatment require special needs. Other requires only routine dentistry, but their medical conditions may require it to be modified to varying degrees.

Therefore, it is essential that general dental practitioners keep up to date and this dental practitioners formulary is primarily intended to help them to do so in their daily clinical practice.

COMMON DENTAL DISEASES IN BANGLADESH

1. Dental caries	12. Cavernous sinus thrombosis
2. Gingivitis	13. Cysts of the jaw
3. Periodontitis	14. Odontogenic tumors of the jaw
4. Pericoronitis	15. Non-odontogenic tumors of the jaw
5. Pulpitis	16. Rickets
6. Osteomyelitis of the jaw	17. Scurvy
7. Alveolar osteitis (Dry Socket)	18. Temporomandibular joint disorders
8. Cervicofacial cellulitis	19. Primary herpetic stomatitis
9. Cancrum oris	20. Oral ulceration
10. Actinomycosis	
11. Infective endocarditis	

DENTAL PRACTITIONERS FORMULARY

21. Oral candidiasis 22. Recurrent aphthae (Aphthous stomatitis) 23. Lichen planus 24. Mucous membrane pemphigoid 25. Pemphigus vulgaris 26. Ulceration of the tongue 27. White oral mucosal lesions 28. Oral pre-malignant lesions 29. Oral cancer 30. Diseases of the salivary glands, salivary gland tumours.	31. Pyogenic granuloma and pregnancy epulis 32. Medically compromised patients 33. Oral Manifestations of many systemic diseases 34. Trigeminal neuralgia 35. Glossopharyngeal neuralgia 36. Bell's palsy 37. Emergencies in dental practice such as Faints, strokes, sudden loss of consciousness etc.

LIST OF DRUGS USED IN DENTISTRY

1. Acetylsalicylic Acid (Aspirin) 2. Acyclovir 3. Adrenaline 4. Aluminum Hydroxide + Magnesium Hydroxide + Simethicone 5. Ampicillin 6. Amoxicillin 7. Azithromycin 8. Erythromycin 9. Clindamycin 10. Betacarotene + Vitamin C + Vitamin E 11. Betamethasone + Neomycin 12. Bupivacaine 13. Calcium gluconate 14. Carbamazepine 15. Cefazoline 16. Ceftriaxone 17. Celecoxib 18. Cephradine 19. Chlorhexidine 20. Ciprofloxacin 21. Clarithromycin 22. Clobazam 23. Cloxacillin 24. Co- trimoxazole 25. Dexamethasone 26. Diazepam 27. Diclofenac 28. Diclofenac + Lignocaine 29. Dicloxacillin 30. Doxycycline 31. Ferrous Sulphate + Folic Acid + Zinc sulfate 32. Fluconazole 33. Folic Acid + Zinc Sulfate	34. Griseofulvin 35. Hydrocortisone 36. Ibuprofen 37. Indomethacin 38. Ketoconazole 39. Ketoprofen 40. Lignocaine 41. Lignocaine + Adrenaline 42. Mefenamic Acid 43. Metronidazole 44. Miconazole + Hydrocortisone 45. Multivitamine + Minerals 46. Naproxen 47. Neomycin + Bacitracin + Polymyxin-B 48. Nimesulide 49. Nystatin 50. Omeprazole 51. Oxytetracycline 52. Paracetamol 53. Phenoxymethyl penicillin 54. Phenytoin 55. Piroxicam 56. Povidone Iodine 57. Prednisolone 58. Ranitidine 59. Rofecoxib 60. Sodium Chloride Solution 61. Tetracycline 62. Tetanus Antitoxin (10,000 IU) 63. Tetanus Toxoid 64. Tinidazole 65. Tramadol 66. Tranexamic Acid 67. Triamcinolone 68. Vitamin B-Complex

LIST OF DENTAL PHARMACOLOGICAL AGENTS AND THERAPEUTICS

1. Antiplaque Agents- Chlorohexidine gluconate-
 - a) 0.2% mouth ringe
 - b) 0.2% mouth irrigator
 - c) 1% gels
 - d) 4% antiseptic in surgical scrub.
2. Anticaries Agents: Fluoride
 - a) Community water fluoridation
 - b) Fluoride supplements
 - Tablets
 - Drops
 - dentifriges
 - Lozens
 - Table salt
 - Milk
 - Mixed with vitamins
 - c) Topical fluoridation-
 - Mouth washes
 - gels
 - Dentrifriges
3. Mouth washes
 - a) 0.2% chlorohexidine gluconate
 - b) Sodium chloride and sodibicarbonate
 - c) Milk of magnesia
 - d) Potassium permanganate.
 - e) 1% Povidone iodine solution
 - f) Mixed solution of menthol, Thymol, eucalyptol etc.
4. Obtundents-
 - a) Essential oils- Eugenol, clove oil
 - b) Chlorobutanol- (Dentanol)
 - c) Zinc chlorite-
 - d) Zinc nitrate- as desensitizing agents
5. Haemostatic agents:
 - a) Local haemostatic agents-
 - Oxidized cellulose
 - Gel foam
 - Fibrin foam
 - Tannic acid
 - b) Systemic haemostatic agents-
 - Salts of zinc
 - Salts of iron, potassium
 - Tranexamic acid
 - Bone wax
 - Salts of nitrate
 - Calcium alginate
6. Local Anaesthetics:
 - a) Natural- Cocaine
 - b) Synthetic- Nitrogenous- Lidocaine
 - Non-nitrogenous- ethylalcohol
 - c) Short acting- procain, pyrrocaine
 - d) Medium acting- Lidocain, prilocaine
 - e) Long acting- Tetracaine, Mepivacaine
 - f) Surface anaesthetic- Lignocaine, Lidocaine
 - g) Infiltration Anaesthetic- Lignocaine 5%, 10%, 15% etc.
 - h) Block anaesthetic- 2%, Lignocaine, 2% mepivacaine
7. Mummifying agents
 - a) Formal dehyde
 - b) Para formal dehyde
 - c) Iodoform
 - d) Phenol
 - e) Para-chlonophenol
 - f) Cresol
 - g) Cresote
 - h) Formocresol
 - i) Resorsinol
 - j) Camphorated Mono-chloro-phenol (CMCP)
 - k) Pulp devitalizing agents (costinerve forte)

DENTAL PRACTITIONERS FORMULARY

8. Root canal medicaments
 - a) 5% sodium hypochlorite
 - b) Eugenol, Cresol
 - c) 15% EDTA (Ethelene di-amine Tetra acetic acid)
 - d) 0.9% NaCl
 - e) Phenol, parachlorophenol
 - f) 30% urea solution
 - g) 6% Hydrogen peroxide
 - h) 50% citric acid
 - i) 0.25% Metronidazole solution
 - j) 0.25% Tinidazole solution
 - k) Calcium hydroxide solution
 - l) MTA (Mineral trioxide aggregate)/MTD
 - m) 3 Drug mix (Ciprofloxacin + metronidazole + Minocycline + Polyethylene glycol)
 - n) Gutta percha, chloropercha points
 - o) Silver points, titanium points
 - p) Resorbable paste- iodoform, KRI-1 paste
 - q) BMP (Bone Morphogenetic Protein)
 -
- r) Frizzed dries hydroxytypeptide crystals
9. Agents affecting salivary secretion
 - a) Sialogogue (↑ Salivary secretion)
 - Prilocarpine
 - Volatile oils
 - Alcohol
 - Nicotine
 - Carbacol
 - b) Anti-sialogogue (↓ Salivary secretion)
 - Astringents
 - Hyocine
 - Beladona
 - Atropine
 - Opium
 - Morphine
 - Hexamithonium
10. Acidulated Caffeine phosphoprotein (ACPP) - Anti caries agents
 - Mixed with baby food Products

DRUGS USED FOR PERIODONTITIS AND PERICORONITIS

1. Doxycycline
2. Tetracycline
3. Metronidazole
4. Tinidazole
5. Cephalaxin
6. Cephradine
7. Amoxycillin
8. Phenoxymethyl penicillin
9. Erythromycin
10. Ibuprofen
11. Diclofenac Sodium
12. Ketoprofen
13. Povidone Iodine
14. Aspirin
15. Zinc-oxide engenol
16. Resorcinol

ANTIMICROBIALS USED FOR PERIODONTITIS AND PERICORONITIS

DOXYCYCLINE

This drug has a broad range of anti-microbial activity like tetracycline and administered orally and better absorbed in the gut. They are bacteriostatic.

Indications: Chronic periodontitis with deep periodontal pockets, Lyme disease of the T.M joint; *see also section 1.1.6*

Cautions: This drug should not be used with antacids and iron preparations as they reduce absorption.

Contraindications: Children below 12 years, pregnant and lactating mothers.

Interactions: *See Appendix-2*

Side-effects: Gastrointestinal disturbances, staining of developing teeth.

Dose: By oral route, in adult, 100 to 200 mg once daily

TETRACYCLINE

It is the drug having broadest spectrum of activity of all microbial drugs. It is bacteriostatic.

Indications: Chronic periodontitis with deep periodontal pockets; topical applications in mouth rinse for the treatment of aphthous ulcer; *see also section 1.1.6*

Cautions & Contraindications: *Same as for doxycycline.*

Side-effects: Gastrointestinal disturbances like nausea, vomiting, diarrhoea, super infection, renal and metabolic complications, staining of developing teeth.

Dose: Orally, 250-500 mg capsules 6 hourly for 5-7 days.

METRONIDAZOLE & TINIDAZOLE: See section 1.1.9

CEPHALEXIN and CEPHRADINE

The pharmacology of the cephalosporins in terms of absorption, action and excretion is similar to that of penicillin. They are acid stable and can be given orally. They are bactericidal drugs.

Indications: Mixed infections of oral cavity due to alveolar abscess, fascial cellulitis, septicemia, maxillofacial injury with soft tissue trauma; see section 1.1.2.1

Cautions: Should not be used in case of penicillin sensitivity, as the drug will produce 10% hypersensitivity reactions in penicillin sensitive patients.

Contraindications: In case of known hypersensitivity to penicillin.

Side-effects: See section 1.1.2.1

Dose: Adult dose, by oral route, 250-500 mg capsules 8 hourly for 5-7 days.

ERYTHROMYCIN

Erythromycin has a generally similar spectrum of action to penicillin and can be used as an alternative in patients allergic to penicillin. It is bacteriostatic.

Indications: As an alternative to patients allergic to penicillin; see also section 1.1.5

Cautions, Contraindications & Side-effects: See section 1.1.5

Dose: Adult dose, by oral route, 250 mg 6 hourly for 5-7 days.

IBUPROFEN: See section 9.1.1

This drug is a propionic acid derivative of NSAIDs, usually the drug of choice and are likely to be the most effective in most dental pain. It is well absorbed after an oral dose and is inactivated by metabolism.

Indications: Most painful condition of teeth, gingiva, oral mucosa and alveolar bone, inflammatory condition of pulp and periodontium like pulpitis, gingivitis, periodontitis, alveolitis, abscess etc., injury due to maxillofacial trauma.

Cautions: Should be used under coverage of gastric irritation with antacids or H₂ receptor blockers (e.g. Ranitidine).

Contraindications: Known peptic ulcer patients.

Side-effects: Epigastric discomfort, activation of peptic ulcer, bleeding, headache, dizziness, rashes etc.

Dose: Adult dose is 400-600 mg 3 times daily.

ANALGESICS USED FOR PERIODONTITIS AND PERICORONITIS

KETOPROFEN

This drug is similar in action to Ibuprofen and mostly used in painful conditions like rheumatoid disease, musculoskeletal disorders, toothache, and TMJ disorders.

Indications: *Like Ibuprofen.*

Caution, Contraindications & Side-effects: *Like Ibuprofen.*

Dose: Orally, 50-100 mg 3 times daily.

NOTE : Ibuprofen, Ketoprofen, Fenoprofen and Naproxen have almost same anti-inflammatory action but are to be used in different doses.

DICLOFENAC: *See 9.1.1*

Among the NSAIDs, this drug is one of the potent anti inflammatory and analgesic drug that is widely used in acute painful situation in dentistry.

Indications: Acute pulpitis, acute periapical periodontitis, acute painful conditions in the oral cavity including tooth ache .

Caution: *Like other NSAIDs.*

Contraindications: In case of known peptic ulcer diseases.

Side-effects: *Like other NSAIDs.*

Dose: Adult 25-100 mg 3 times daily.

DRUG USED FOR DENTAL CARIES

FLUORIDES have a caries-prevention action. They are as yet the only effective drugs for the purpose. The optimum effect is achieved when drinking water containing about 1 part per million (PPM) of fluoride ingested through out the period of dental development.

Indications: For prevention of dental caries, to prevent bacterial metabolism in dental plaque, for remineralization of tooth substance.

Cautions: Should be used cautiously by measuring the level of fluoride in community water.

Contraindications: Known hypersensitivity, tetany.

Side-effects: Dental fluorosis mottled enamel, skeletal fluorosis, osteoclerosis, acute fluoride poisoning.

Route of administration: **Ingestion by oral route**

- (a) In drinking water, other fluids or foods.
- (b) Fluoride tablets.

Local application :

- (a) Tooth pastes containing fluoride.
- (b) Fluoride Mouth rinse.
- (c) Topical application.

DENTAL PRACTITIONERS FORMULARY

Dose: If fluoride-content less than 0.3 ppm in water :
Up to 6 months – None.
6 months to 2 years - 0.5 mg NaF/day.
2-4 years - 1.1 mg NaF/day.
Over 4 years - 2.2 mg NaF/day.
If fluoride-content is 0.3 to 0.7 ppm in water :
Up to 2 years – None.
2-4 years - 0.5 mg NaF/day.

DRUGS USED FOR GINGIVITIS

1. Ampicillin; *see section 1.1.1.2.1*
2. Amoxicillin; *see section 1.1.1.2.1*
3. Tinidazole; *see section 1.1.9*
4. Metronidazole; *see section 1.1.9*
5. Acetamenophen (Paracetamol); *see section 7.5.2.1 & 9.1.1*
6. Chlorhexidine;

AMPICILLIN: *See section 1.1.1.2.1*

It is a broad-spectrum bactericidal drug that inhibit the cell wall synthesis of susceptible bacteria. It is acid stable and is moderately well absorbed when swallowed. It is highly effective in the infections caused by Gram-positive and Gram-negative organisms.

Indications: Orofacial infections like abscess, periodontal infections, osteomyelitis etc.; *see also section 1.1.1.2.1*

Cautions: Not to be given to those subjects hypersensitive to penicillin; *see also section 1.1.1.2.1*

Contraindications: In case of known penicillin hypersensitivity.

Side-effects: Diarrhoea, skin rash, urticaria; *see also section 1.1.1.2.1*

Dose: The usual adult dose by all routes is 250-500 mg 6 hourly for 5-7 days.

CHLORHEXIDINE has proven to be a useful effective and safe antiseptic with many applications. Aqueous chlorhexidine of 0.1% or 0.2% inhibit dental bacterial plaque formation. It is commercially available as a gel (1%) and as a 0.2% mouthwash.

Indications: Acute ulcerative gingivitis, chronic gingivitis and periodontitis, for the prevention of bacterial plaque, any infection of the oral tissues that is related to bacterial dental plaque, for prevention of oral sepsis.

Cautions: Before a course of chlorhexidine is started, all dental plaque and calculus should be removed to allow the drug a fair start.

Contraindications: It is not used in case of deep periodontal pocket, as it does not penetrate into subgingival pockets or stagnation area.

Side-effects: Prolonged use of chlorhexidine mouth washes produce tooth staining both natural and artificial teeth, restoration of composite, hypersensitivity reaction to some individuals, unpleasant taste in the month due to disturbance of taste buds.

Dose: Only topical application as gel or mouth rinse, external use as surgical scrub 0.2% chlorhexidine 2 spoon full mixed with water used 3 times daily for 5-7 days. 1% gel applied on gingival area for 5 mints twice daily in case denture stomatitis 4% chlorhexidine used as a surgical scrub.

ACETAMINOPHEN (PARACETAMOL): *see also section 7.5.2.1 & 9.1.1*

This is a popular domestic analgesic and antipyretic for adults and children. It inhibits prostaglandin synthesis in the brain but hardly in the periphery. It is the analgesic recommended for children under 12 years old.

Indications: As analgesic for headache, toothache, arthralgia, myalgia; as antipyretic in fever; *see also section 9.1.1*

Cautions: It should not be used in liver disease and kidney diseases. *See also section 9.1.1*

Contraindications: Severe liver diseases and kidney diseases.

Side-effects: Nausea, vomiting, anorexia, abdominal pain; hepatic necrosis, liver cell damage, renal tubular necrosis, hypoglycemic coma, pancytopenia, skin rash, urticaria; *see also section 9.1.1*

Dose: For adult, 500 mg 4 hourly; *see also section 9.1.1*

AMOXYCILLIN: *See also section 1.1.1.2.1*

This is semi-synthetic penicillin with a broad spectrum of antibacterial activity similar to that of ampicillin. It is better absorbed following oral administration and absorption is not influenced by food.

Indications: *See also section 1.1.1.2.1* Skin and soft tissue infections as mentioned in Ampicillin, infections caused by Gram-positive and Gram-negative cocci. For prophylaxis of bacterial endocarditis.

Cautions: *Like ampicillin.*

Contraindications: *Like ampicillin.*

Side-effects: *Like ampicillin.*

Dose: Normal adult dose, 250-500 mg 8 hourly for 5-7 days.

METRONIDAZOLE: *See also section 1.1.9 & 1.3.2*

It is active against a wide range of anaerobic bacteria and protozoa. It binds with DNA and prevents nucleic acid formation. It is bacteriostatic. It is well absorbed after oral and rectal administration.

Indications: Acute ulcerative gingivitis, dental infections like pericoronitis, osteomyelitis of the jaw, abscess; *see also section 1.1.9 & 1.3.2*

Cautions: Patients given metronidazole should be warned against taking alcohol during and for a week after completion of treatment; *see also section 1.1.9 & 1.3.2*

Contraindications: In case of known hypersensitivity to the drug, in case of chronic alcoholic patients; *see also section 1.1.9 & 1.3.2*

Side-effects: Metallic taste due to excretion of drug in saliva, nausea, vomiting, diarrhoea, headache, furred tongue, angioedema, peripheral neuropathy, flushing, sweating, palpitation due to interaction with alcohol.

Dose: In adult, ulcerative gingivitis, 200 mg 8 hourly for 3 days.

TINIDAZOLE: *see also section 1.1.9 & 1.3.2*

DENTAL PRACTITIONERS FORMULARY

It is similar to metronidazole but has a longer half-life (13 hour). It is excreted mainly through urine unchanged. Due to its longer action it is considered better than metronidazole in giardiasis, trichomoniasis and acute ulcerative gingivitis.

Indications: Any inflammatory conditions and pain in orofacial structures such as gingivitis, periodontitis, pulpitis, oral ulceration etc. like metronidazole.

Cautions : *Like metronidazole.*

Contraindications : *Like metronidazole.*

POVIDONE IODINE

This drug is widely used in dentistry as an antiseptic mouthwash prior to different orodental procedures such as extraction of tooth, scaling, minor surgical procedures to prevent post-operative infections. 1% povidone iodine is used as mouthwash to prevent bacteremia and bacterial endocarditis.

DRUG USED FOR PERICORONITIS

1. Ampicillin; see section 1.1.1.2.1
2. Amoxycillin; see section 1.1.1.2.1
3. Cephalexin; see section 1.1.2.1
4. Cephradin; see section 1.1.2.1
5. Metronidazole; see section 1.1.9 & 1.3.2 and notes above
6. Tetracycline (Topical use); see section 1.1.6 & notes above
7. Diclofenac and other NSAIDs; see section 9.1.1 & notes above
8. Povidone Iodine or Chlorhexidine mouthwash; see notes above

DRUGS USED FOR PULPITIS

1. Penicillin & its derivatives ; see section 1.1.1.1.2.1
2. Cephalexin; see section 1.1.2.1
3. Cephradine; see section 1.1.2.1
4. Anti-inflammatory drugs such as Diclofenac, Ibuprofen; see section 9.1.1 & notes above
5. Diazepam; see section 7.1
6. Eugenol (clove oil) as local sedative dressing into the pulp.
7. Pulp devitalizing agents
8. Intracanal medicinals
9. Root canal sealers

DRUGS USED FOR ALVEOLAR OSTITIS (DRY SOCKET)

1. Antibiotics such as Amoxycillin, Cephalexin, Cephradin; see section 1.1.1.2 & 1.1.2.1
2. NSAIDs; see section 9.1.1
3. Zinc oxide eugenol dressing

DRUGS USED FOR OSTEOMYELITIS OF THE JAW

1. Benzyl Penicillin; see section 1.1.1.1.1
2. Long-term Tetracycline; see section 1.1.6
3. Metronidazole; see section 1.1.9 & 1.3.2
4. Anti-inflammatory drugs; see section 9.1.1

DENTAL PRACTITIONERS FORMULARY

5. Cloxacillin; see section 1.1.1.1.1
6. Co-trimoxazole; see section 1.1.8

DRUGS USED FOR CERVICOFACIAL CELLULITIS

1. Penicillin & its derivatives; see section 1.1.1.1 & 1.1.1.2
2. Cephadrine & Cephalexin; see section 1.1.2.1
3. Metronidazole; see section 1.1.9 & 1.3.2 and notes above
4. Ciprofloxacin; see section 1.1.7
5. Azithromycin ;see section 1.1.5
6. Erythromycin; see section 1.1.5
7. Analgesics and anti-inflammatory drugs; see section 7.5.2.1, 7.5.2.2 & 9.1.1
8. Ceftriaxone; see section 1.1.2.3

DRUGS USED FOR ACTINOMYCOSIS

1. Long term antibiotics such as
 - (a) Penicillin; see section 1.1.1.1
 - (b) Tetracycline; see section 1.1.6 & notes above
 - (c) Erythromycin; see section 1.1.5
2. Analgesics and anti-inflammatory drugs; see section 9.1.1

DRUGS USED FOR CANCRUM ORIS

1. A combination of penicillins; see section 1.1.1.1
2. Metronidazole ; see section 1.1.9 & 1.3.2 and notes above
3. Analgesics; see section 7.5.2.1, 7.5.2.2 & 9.1.1
4. Povidone Iodine mouthwash; see notes above;
5. Multivitamins

DRUGS USED FOR CAVERNOUS SINUS THROMBOSIS

1. Anticoagulants drugs; see section 3.8
2. Antibiotics such as penicillin; see section 1.1.1.1
3. Analgesics such as aspirin; see section 7.5.2.1

DRUGS USED FOR PREVENTION OF BACTERIAL ENDOCARDITIS

1. Ampicillin; see section 1.1.1.2.1
2. Amoxycillin; see section 1.1.1.2.1
3. Cephalexin; see section 1.1.2.1
4. Cephadrin; see section 1.1.2.1
5. Azithromycin; see section 1.1.5
6. Clindamycin; see section 1.1.12
7. Cefazolin; see section 1.1.2
8. Povidone Iodine mouthwash reduce 50% chance of bacteremia; see notes above

DRUGS USED FOR RICKET

1. Vitamin D; see section 16.2.3.4

DENTAL PRACTITIONERS FORMULARY

DRUGS USED FOR SCURVY

1. Vitamin C; *see section 16.2.3.3*

DRUGS USED FOR T.M. JOINT DISORDERS

1. Analgesics such as Mefenamic acids; *see section 9.1.1*
2. Anti-inflammatory drugs; *see section 7.5.2.1, 7.5.2.2 & 9.1.1*
3. Muscle relaxants such as diazepam; *see section 7.1*

DRUGS USED FOR PRIMARY HERPETIC STOMATITIS

1. Antiviral drugs such as acyclovir; *see section 1.4.1*
2. Antibiotics to prevent secondary infection; *see section 1.1*
3. Analgesics; *see section 7.5.2.1, 7.5.2.2 & 9.1.1*
4. Chlorhexidine mouthwash; *see notes above;*

DRUGS USED FOR ORAL CANDIDIASIS

1. Nystatin HCl tablet or suspension; *see section 1.2.3*
2. Amphotericin lozenges
3. Chlorhexidine mouth wash; *see notes above;*

DRUGS USED FOR APHTHOUS ULCER

1. Topical salicylate preparations (e.g. lotio pyral vex)
2. Vitamin B₁₂; *see section 16.2.3.1*
3. Folic Acid & Iron preparations; *see section 15.1.1.2*
4. Tetracycline mouthwash ; *see section 11.3.2*
5. Hydrocortisone lozenges.
6. Analgesics and Anti-inflammatory drugs; *see section 7.5.2.1, 7.5.2.2 & 9.1.1*

DRUGS USED FOR ORAL ULCERATIONS

1. Antibiotics; *see section 11.3.1 & 11.3.2*
2. Analgesics; *see section 9.1.1*
3. Povidone Iodine mouthwash; *see notes above;*
4. Topical steroids.
5. Triamcinolone Acetonide; *see section 5.3.2*
6. Vitamin B₁₂; *see section 16.2.3.2*
7. Vitamin B₂; *see section 16.2.3.2*
8. Zinc Supplements; *see section 16.2.2.7*
9. Tetracycline mouthwash.

DRUGS USED FOR TRIGEMINAL NURALGIA

1. Carbamazepine; *see section 7.5.3*
2. Phenytoin; *see section 7.6.1*

DRUGS USED FOR BELL'S PALSY

1. Prednisolone tablet 20 mg 4 times a day is given for 5 days and the tapered off over the following 4 days; see section 5.3.2.

MEDICAL EMERGENCIES IN DENTAL PRACTICE

This section provides guidelines on the management of the more common medical emergencies which may arise in dental practice. Dental surgeons and their staffs should be familiar with standard resuscitation procedures, but in all circumstances it is advisable to summon medical assistance as soon as possible.

SYNCOPE

Insufficient blood supply to the brain results in loss of consciousness. The commonest cause is a vasovagal attack or simple faint (syncope) due to emotional stress.

Treatment

Lay the patient flat and raise the legs to improve cerebral circulation. Loosen any tight clothing around the neck. Once consciousness is regained, give sugar in water or a cup of sweet tea.

The drugs referred to in this section are:

Adrenaline injection, adrenaline 1 in 1000, (adrenaline 1gm/ml as acid tartrate), 1-ml amps.

Chlorpheniramine Injection, chlorpheniramine maleate 10mg/ml. 1-ml amps.

Diazepam Injection, diazepam 5mg/ml. 2-ml amps

Glucagon Injection, glucagon (as hydrochloride), 1-unit and 10-unit vials (with solvent)

Glucose-50g for one drink

Glucose injection, glucose 50% (500gm/mL), 50-mL amps

Hydrocortisone Injection, hydrocortisone 100mg (preferable as sodium succinate vials with 2-mL solvent)

Oxygen

Salbutamol Injection, salbutamol (as sulphate) 500 micrograms/mL, 1-mL amps

ANAPHYLAXIS

A severe allergic reaction may follow oral or parenteral administration of a drug. Allergic reaction in dentistry most commonly follows injections of penicillin but other drug may be implicated, including local anaesthetics. In general, the more rapid the onset of the reaction the more profound it tends to be. Symptoms may develop within minutes and rapid treatment is essential.

Treatment

First-line treatment includes restoration of blood pressure, laying patient flat, raising feet, and administration of **adrenaline**¹ injection. This is usually given intramuscularly in a dose of 0.50-1mg (0.5-1mL adrenaline injection 1 in 1000), repeated every 10 minutes, according to blood pressure and pulse, until improvement occurs.

Antihistamines given by slow intravenous injection are a useful adjunctive treatment (e.g. chlorpheniramine 10 to 20 mg diluted in syringe with 5 to 10 mL of blood and given over 1 minute).

Intravenous corticosteroids are of secondary value in anaphylactic shock as their onset of action is delayed for several hours but they should be used to prevent further deterioration in several affected patients. Usually hydrocortisone (preferable as sodium succinate) is given by intravenous injection in a dose of 100 to 300 mg.

CARDIAC EMERGENCIES

ANGINA, If there is a history of angina the patient will probably carry glyceryl trinitrate tables or spray (or isosorbide dinitrate tables) and should be allowed to use them.

MYOCARDIAL INFARCTION. The pain of myocardial infarction is similar to that of angina but generally more severe and more prolonged.

Treatment

Call for medical assistance or an ambulance immediately. Allow patient to rest in the position that feels most comfortable; in presence of breathlessness this is likely to be sitting position, whereas syncopal patient will want to lie flat; often an intermediate position (dictated by patient) will be most appropriate.

Intramuscular injection of drugs does not provide useful relief of pain because absorption is too slow (particularly when cardiac output is reduced) but a mixture of nitrous oxide 50% and oxygen 50% can be effective if given continuously; it is safe in this situation.

Reassure patient as much as possible to relieve further anxiety. If patient collapses and loses consciousness attempt standard resuscitation measures. For an algorithm of the procedure for cardiopulmonary resuscitation, see section p. 3.

Hypoglycaemia

Diabetic patients occasionally administer their standard dose of insulin before dental treatment but omit the usual meal (although they should not). This can lead to the blood glucose falling to an abnormally low level (hypoglycaemia). Patients can often recognise the symptoms themselves and this state responds to sugar in water or a few lumps of sugar. Children may not have such prominent changes but may appear unduly lethargic.

Treatment

In early stages, 4-6 teaspoons of sugar in water. If patient unconscious, up to 50 mL of 50% glucose intravenous injection, or glucagon 1 mg (1 unit) injected by any route (subcutaneous, intramuscular, or intravenous) (useful when intravenous injection of glucose difficult or impossible to administer).

EPILEPTIC SEIZURE

Patients with epilepsy must continue with their normal dosage of anticonvulsant drugs when attending for dental treatment. It is not uncommon for epileptic patients not to volunteer the information but there should be little difficulty in recognizing a tonic-clonic (grand mal) seizure.

Symptoms and signs

Treatment

During a convulsion try to ensure that patient is not at risk from further injury but make no attempt to put anything in mouth or between teeth (in mistaken belief that this will protect tongue).

Do not attempt to restrain convulsive movements. After convulsive movements have subsided place patient in coma position and check airway.

After convulsion patient may be confused (postictal confusion) and may need reassurance and sympathy. Patient should not be sent home until fully recovered but it is not necessary to seek medical attention or transfer to hospital unless convulsion was atypical, prolonged (or repeated), or in injury occurred.

Medication should only be given if convulsive seizures are prolonged (convulsive movements lasting 15 minutes or longer) or repeated rapidly. intravenous

DENTAL PRACTITIONERS FORMULARY

administration of diazepam 10 to 20 mg is often effective but should be used with caution because of risk of respiratory depression.

Partial seizures similarly need very little active management (in an automatism only minimum amount of restraint should be applied to prevent injury). Again patient should be observed until post-ictal confusion has completely resolved.

CARDIOVASCULAR DISEASE

Arrhythmias

Patients, especially those who have suffered a myocardial infarction, may have unstable cardiac rhythm or a degree of heart failure. Current medication should be carefully checked. Premedication (e.g. with temazepam) may be useful in some instances for very anxious patients.

See below for reference to vasoconstrictors and unstable cardiac rhythm.

Hypertension

Patients with hypertension may be under treatment with antihypertensive drugs. Their blood pressure may fall to dangerously low levels when they are given general anaesthesia and should only be administered in hospital when appropriate precautions can be taken.

See also under Vasoconstrictors (below).

Thrombo-embolic disease

Patients receiving heparin or oral anticoagulants such as warfarin, nicoumalone, or phenindione may be liable to excessive bleeding after extraction of teeth. Often dental surgery can be delayed until the anticoagulant therapy is discontinued.

Occasionally, an extraction during anticoagulant treatment may be unavoidable. The patient's physician should be consulted and the anticoagulant level adjusted (with laboratory control) so that the prothrombin time is not more than twice the control figure. If possible, a single simple extraction should be done first. If this goes well further teeth may be extracted, two or three at a time. Some dental surgeons suture the gum lightly over the socket to hold in place a haemostatic ash as oxidized cellulose.

Aspirin is contra-indicated in patients on anticoagulant therapy, and in those with any disorder of haemostasis.

Vasoconstrictors in local anaesthetic solutions

Lignocaine 2 per cent with adrenaline 1 in 80000 is probably the most used local anaesthetic agent. For the vast majority of patients, experience over many years indicates that it is a safe and effective preparation.

There is no indication for the use of noradrenaline as a vasoconstrictor for local anaesthetics since it presents no advantages. Administration of local anaesthetics containing noradrenaline 1 in 25000 has been followed by a small number of severe hypertensive episodes. These few episodes emphasise the possible danger of using local anaesthetics containing noradrenaline, especially in high concentrations.

In patients with severe hypertension or unstable cardiac rhythm, the use of adrenaline in a local anaesthetic may be hazardous if inadvertently given intravenously. For these patients prilocaine with or without felypressin can be used but there is no clinical evidence that it is any safer.

There is no clinical evidence of dangerous interactions between adrenaline containing local anaesthetics and monoamine-oxidase inhibitors (MAOIs) or tricyclic antidepressants.

INFECTIVE ENDOCARDITIS

Patients with cardiac defects (congenital, rheumatic, etc) or who have had a prosthetic replacement of a damaged valve are at risk from infective endocarditis following dental procedures. The risk is not related to the severity of the heart defect, as the onset of endocarditis is occasionally the first overt manifestation of a defects.

Those who have had one or more episodes of infective endocarditis in the past appear to be particularly susceptible.

There is no evidence that patients with prosthetic heart valves are nay more susceptible to infective endocarditis after dental operations than those with damaged natural valves, but if it develops treatment may be more difficult.

Although almost any dental procedure is capable of causing bacteraemia, infective endocarditis is a rare and unpredictable complication even in susceptible patients. It is virtually impossible therefore to assess the relative effectiveness of different prophylactic regimens; nevertheless there is now some consensus among cardiologists and microbiologists.

Although there are theoretical advantages in giving antibiotics by injection (to ensure rapid absorption and high plasma concentrations), this present difficulties in general dental practice. It is agreed therefore that wherever possible it is more practical to give antibiotics by mouth for prophylaxis in dental out-patients.

IDENTIFICATION OF PATIENTS AT RISK. All patients must be questioned about a history of rheumatic fever or heart defects and especially whether they have previously had infective endocarditis. The value of such a history is limited in that the patient may be unaware of a vulnerable heart lesion, but this is the best that can be done. Heart murmurs in children are often of no significance but whenever there is any doubt a cardiologist should be consulted.

The peak incidence of infective endocarditis is now in the sixth and seventh decades, so that the elderly are at greater risk than young persons.

PROCEDURES THAT NEED COVER. The main source of bacteria causing dentally related infective endocarditis is the bacteria of the gingival margins and periodontal pockets. Infective endocarditis can follow virtually any dental procedure but there appears to be a significant risk only after dental extractions, scaling, periodontal surgery, or the raising of mucogingival flaps for any other purpose.

REDUCTION OF ORAL SEPSIS. A history of a dental procedure preceding an attack of infective endocarditis is obtained in only a minority of patients but oral bacteria enter the blood stream on may other occasions. The frequency and severity of bacteraemia is also related to the severity of bacteraemia is also related to the severity of the gingival sepsis. Maintenance of the highest possible standards of oral hygiene in patients at risk reduces:

- need for dental extractions or other surgery;
- chances of severe bacteraemia if dental surgery has to be carried out;
- chance or frequency of 'spontaneous' bacteraemia.

Application of an antiseptic such as 0.2% chlorhexidine gluconate solution to the gingival margins before dental treatment reduces the severity of any resulting bacteraemia and may be used to supplement antibiotic prophylaxis in those at risk.

POSTOPERATIVE CARE. It is imperative to warn every patients at risk to report to the doctor or dentist if any minor illness develops after dental treatment, whether or

nor antibiotics have been given, as infective endocarditis has an insidious onset and many failures of treatment develops it is likely to be within a month of dental treatment.

RECOMMENDATIONS

Under local or no anaesthesia (taken in presence of dentist or dental nurse):

Patients not allergic to penicillin and who have not received a penicillin more than once in the previous month including those with a prosthetic heart valve (but not those who have had endocarditis)

ADULT single dose of amoxycillin¹ 3 g by mouth 1 hour before procedure

CHILD under 5 years, quarter adult dose; 5-10 years, half adult dose

Patients allergic to penicillin or who have received a penicillin more than once in the previous month ADULT erythromycin (as stearate) 1.5 g by mouth² 1-2 hours before procedure, then 500 mg 6 hours later

CHILD under 5 years, quarter adult dose; 5-10 years, half adult dose

or

ADULT single dose of clindamycin 600 mg by mouth 1 hour before procedure

CHILD under 10 years, 6 mg/kg as single dose by mouth 1 hour before procedure

Under general anaesthesia:

Patients not allergic to penicillin and who have not received a penicillin more than once in the previous month

ADULT amoxycillin 1 g by intramuscular injection³ (in 2.5 mL lignocaine hydrochloride 1% injection) just before induction then 500 mg by mouth 6 hours later

CHILD under 10 years, half adult dose⁴

or

ADULT amoxycillin 3 g by mouth 4 hours before procedure then a further 3 g as soon as possible after procedure

CHILD under 5 years, quarter adult dose; 5-10 years half adult dose

or

ADULT amoxycillin 3 g by mouth and probenecid 1 g by mouth 4 hours before procedure

Special risk patients who should be referred to hospital:

Patients who are to have a general anaesthetic and who are allergic to penicillin or have had a penicillin more than once in the previous month

Patients who have had a previous attack of endocarditis

For recommendations for these patients see BNF section 5.1, table 2

1. Amoxycillin is liable to cause irritating rashes, especially in people with infectious mononucleosis (glandular fever) in whom it should be avoided.

2. Erythromycin (stearate) 1.5g may cause nausea.

3. If the intramuscular route is considered necessary it may be preferable for the procedure to be carried out in hospital.

4. Whenever possible painful intramuscular injections should be avoided in children.

Oral Side-effects of Drugs

Drug-induced disorders of the mouth may be due to a local action on the mouth or to a systemic effect manifested by oral changes.

Oral mucosa

Medicaments applied directly to the oral mucosa can lead to inflammation and ulceration.

Elderly patients may have difficulty swallowing tablets; if left in the mouth, ulceration may develop. They should always take their tablets or capsules with fluid, and in some cases it may be wise to prescribe capsules if available.

Aspirin tablets allowed to dissolve in the sulcus for the treatment of toothache can lead to a white patch followed by painful ulceration. **Choline salicylate** gels are also irritant and are particularly troublesome if placed under dentures.

Potassium chloride sustained-release tablets are irritant to the mucosa.

Crystal violet, another irritant, is no longer used on mucous membranes.

Flavouring agents, particularly **essential oils**, may cause contact dermatitis, may cause contact hypersensitivity prominent.

The oral mucosa is particularly vulnerable to ulceration in patients treated with cytotoxic drugs, especially **methotrexate**.

An occasional complication of long-term **phenytoin** treatment is macrocytic anaemia, leading to oral manifestations such as sore tongue or severe aphthous stomatitis.

Systemic administration of some NSAIDs, e.g. indomethacin, may cause ulceration of the mucosa; this is not a topical effect but the precise mechanism is not clear. Other drugs capable of causing severe oral ulceration include **methyldopa**, **allopurinol**, **gold** (auranofin and aurothiomalate), and **penicillamine**. **Captopril** can cause stomatitis.

Erythema multiforme may follow the use of certain drugs, especially **suphonamides**, **co-trimoxazole**, **antiepileptics**, **penicillin**, and **chlorpropamide**. The oral mucosa may be extensively ulcerated, with characteristic target lesions on the skin. Oral lesions of toxic epidermal necrolysis have been reported for a similar range of drugs.

Lichenoid eruptions can be clinically indistinguishable from lichen planus. Drugs associated with the appearance of white striae and plaques, atrophic changes and ulceration include **NSAIDs**, **methyldopa**, **chloroquine**, **oral antidiabetics**, **diuretics**, **phenothiazines**, and **gold** (auranofin and aurothiomalate).

Thrush and other types of candidiasis complicate treatment with **antibiotics** and **immunosuppressants**. Oropharyngeal thrush is an occasional side-effect of **corticosteroid** inhalers.

Teeth

Brown staining of the teeth frequently follows the use of chlorhexidine mouthwash or gel; this can readily be removed by polishing at the end of the course of treatment. Ferric salts in liquid form can stain the enamel black.

Intrinsic staining of the teeth is most commonly due to tetracyclines. They will affect the teeth if given at any time from about the fourth month in utero until the age of twelve years. All tetracyclines cause this; the colour varies from yellow to grey.

Excessive ingestion of fluoride leads to dental fluorosis with mottling of the enamel and areas of hypoplasia or pitting; fluoride tablets or drops may cause mild mottling (white patches) if the dose is too large for the child's age or for the fluoride content of the local drinking water.

Periodontium

Gingivitis and ulceration are common in patients receiving cytotoxics or immunosuppressants.

Hyperplasia of the gingivae is a side-effect of phenytoin and sometimes of cyclosporin or nifedipine. The degree of hyperplasia varies but can reach the extent that the crowns of the teeth are virtually covered.

Thrombocytopenia may be drug related, and cause bleeding of the gingival margins, which may follow mild trauma, such as toothbrushing, or eventually be spontaneous.

Salivary glands

The main effect of drugs on the salivary glands is a reduction in flow (xerostomia). Patients with a persistently dry mouth may develop a burning or scalded sensation, and have poor oral hygiene, increased dental caries, periodontal disease, intolerance of dentures, and oral infections (particularly candidiasis).

Many drugs have been implicated in xerostomia, particularly antimuscarinics (anticholinergics) and tricyclic antidepressants. Excessive use of diuretics can also result in xerostomia.

Increased production of saliva is not a problem unless the patient has difficulty in swallowing.

Pain in the salivary glands has been reported following the use of some antihypertensives (e.g. bethanidine, clonidine, methyldopa) and the vinca alkaloids.

Swelling of the salivary glands may be idiopathic but it has been described rarely in association with iodides, antithyroid drugs, phenothiazines, and sulphonamides.

Taste

Taste acuity may be decreased or there can be an alteration in taste sensation. Drugs implicated include penicillamine, griseofulvin, captopril and enalapril, lincomycin, carbimazole, clofibrate, phenindione, lithium salts, gold (auranofin and aurothiomalate), and metronidazole.

Antiseptics and Cleansers (See Appendix-15 & also section 12)

Superficial infections of the mouth are often helped by warm mouthwashes; they have a mechanical cleansing effect and cause some local hyperaemia. However, they must be used both frequently and vigorously to have any effect, and some can lead to irritation of the oral mucosa.

DENTAL PRACTITIONERS FORMULARY

A warm saline mouthwash is ideal and can be prepared either by dissolving half a teaspoonful of salt in a tumblerful of warm water or by diluting sodium chloride compound mouthwash with an equal volume of warm water.

Mouthwashes containing an oxidising agent such as hydrogen peroxide, may be useful in the treatment of acute ulcerative gingivitis (Vincent's infection) as the organisms responsible are anaerobes. Hydrogen peroxide also has a mechanical cleansing action since it froths on contact with oral debris. Sodium perborate has a similar effect, but should not generally be used for periods longer than 7 days because of possible absorption of borate.

Chlorhexidine is an effective antiseptic which has the advantage of inhibiting plaque formation on the teeth. It does not, however, completely control plaque deposition and is not a substitute for effective toothbrushing. Moreover it does not penetrate significantly into stagnation areas and is therefore of little value in the control of dental caries or of periodontal disease once pocketing has developed.

Chlorhexidine can be used as a mouthwash for secondary infection in mucosal ulceration. The mouthwash or the gel may be used for controlling gingivitis, as an adjunct to other oral hygiene measures. The mouthwash or the gel may also be used as an alternative to toothbrushing where there is a painful periodontal condition (e.g. primary herpetic stomatitis) or if the patient has a haemorrhagic disorder, or is handicapped.

Povidone-iodine is another effective antiseptic. The mouthwash is a useful preparation in dealing plaque accumulation. Caution must be exercised in prolonged use as a significant amount of iodine is absorbed.

Neither chlorhexidine nor povidone-iodine mouthwashes have any beneficial effect in the control of acute ulcerative gingivitis.

Thymol is a weak antiseptic of negligible value for treating oral infections. Mouthwash solution tablets are used to rinse out the mouth to remove unpleasant tastes. Compound thymol glycerin may be used as a mechanical rinse instead of a saline mouthwash.

Zinc sulphate mouthwash is a traditional astringent mouthwash and has little antibacterial activity. Some also find it useful for palliating recurrent aphthae.

CHLORHEXIDINE GLUCONATE

Indications : oral hygiene (including endocarditis prophylaxis, p.5); plaque inhibition
side-effects : idiosyncratic mucosal irritation; reversible brown staining of teeth

Chlorhexidine Dental Gel, chlorhexidine gluconate 1%,

Brush on teeth once or twice daily

Chlorhexidine Mouthwash, chlorhexidine gluconate 0.2%. Aniseed- or mint-flavoured available; net price 300 mL = £ 1.25

Rinse mouth with 10 mL for about 1 minute twice daily.

OXIDISING AGENTS

Indications : oral hygiene

DENTAL PRACTITIONERS FORMULARY

Hydrogen Peroxide Mouthwash, consists of hydrogen peroxide solution (6% = approx, 20-volume) BP
Rinse mouth for 2-3 minutes with 15 mL in half a tumblerful of warm water 2-3 times daily

sodium Perborate Mouthwash, sodium perborate 70% (buffered).
Use 1 sachet in 30 mL of water 3 times daily; not recommended in renal impairment or for children under 5 years

POVIDONE-IODINE

Indications : oral hygiene

Cautions : pregnancy; breast-feeding

Side-effects : idiosyncratic mucosal irritation and hypersensitivity reactions

Povidone-iodine Mouthwash, povidoneiodine 1%.
Use undiluted or diluted with equal volume of warm water every 2-4 hours if necessary

SODIUM CHLORIDE

Indication : oral hygiene

Sodium Chloride Mouthwash, Compound, BP, sodium chloride 1.5%.
Use diluted with equal volume of warm water

THYMOL

Indications : oral hygiene

Compound Thymol Glycerin BP, glycerol 10%, thymol 0.05%, with colouring and flavouring
Use undiluted or diluted with 3 volumes of warm water

Mouthwash Solution-tablets, consist of tablets which may contain antimicrobial, colouring, and flavouring agents in a suitable soluble effervescent basis to make a mouthwash suitable for dental purposes.

Dissolve 1 tablet in a tumblerful of warm water

Note : Mouthwash solution-tablets may contain ingredients such as thymol.

CORTICOSTEROIDS AND OTHER DRUGS FOR ORAL ULCERATION AND INFLAMMATION

Ulceration of the oral mucosa be caused by trauma (physical or chemical), recurrent aphthae, infections, carcinoma, dermatological disorders, nutritional deficiencies, gastro-intestinal disease, haematopoietic disorders, and drug therapy. It is important to establish the diagnosis in each case as the majority of these lesions require specific management in addition to local treatment. Local treatment aims at protecting the ulcerated area, or at relieving pain or reducing inflammation.

DENTAL PRACTITIONERS FORMULARY

SIMPLE MOUTHWASHES. A **saline** or **compound thymol glycerin** mouthwash may relieve the pain of traumatic ulceration. The mouthwash is made up with warm water and used at frequent intervals until the discomfort and swelling subsides.

ANTISEPTIC MOUTHWASHES. Secondary bacterial infection may be a feature of any mucosal ulceration; it can increase discomfort and delay healing. Use of a **chlorhexidine** or **povidone-iodine** mouthwash is often beneficial and may accelerate healing of recurrent aphthae.

MECHANICAL PROTECTION. **Carmellse gelatin paste** may relieve some discomfort arising from ulceration, by protecting the ulcer site. The paste adheres to the mucosa, but is difficult to apply effectively to some parts of the mouth.

ZINC SULPHATE, Zinc sulphate mouthwash is an astringent. Some patients find it beneficial in recurrent aphthae.

CORTICOSTEROIDS. Topical corticosteroid therapy may be used for different forms of oral ulceration. In the case of aphthous ulcers it is most effective if applied in the "prodromal phase".

Thrush or other types of candidiasis are recognised complications of corticosteroid treatment.

Hydrocortisone lozenges are allowed to dissolve next to an ulcer and are useful in recurrent aphthae, orofacial lichen planus, discoid lupus erythematosus, and benign mucous membrane pemphigoid.

Triamcinolone dental paste is designed to keep the corticosteroid in contact with the mucosa for long enough to permit penetration of the lesion, but is difficult for patients to apply effectively to some parts of the mouth.

Hydrocortisone cream is used in treating uninfected inflammatory lesions on the lips and perioral skin. **Hydrocortisone and miconazole** cream or ointment is useful where infection by susceptible organism and inflammation co-exist, particularly for initial treatment (up to about 7 days). Organisms susceptible to miconazole include candida spp. and many Gram-positive bacteria including streptococcus and staphylococcus. Systemic corticosteroid therapy for severe conditions such as pemphigus vulgaris is best reserved for the physician because of potential side-effects.

LOCAL ANALGESICS. Local analgesics have a limited role in the management of oral ulceration. When applied topically their action is of a relatively short duration so that analgesia cannot be maintained continuously throughout the day. The main indication for a topical analgesic is to relieve the pain of otherwise intractable oral ulceration particularly when it is due to major aphthae. For this purpose **lignocaine 5% ointment** is applied to the ulcer. Care must be taken not to produce anaesthesia of the pharynx before meals as this might lead to choking.

Benzydamine mouthwash may be useful in palliating the discomfort associated with a variety of ulcerative conditions. It reduces the discomfort of post-irradiation mucositis. If the full-strength preparation causes some stinging it can be diluted with an equal volume of water. The spray may also be useful.

Choline salicylate dental gel has some analgesic action and may provide relief for recurrent aphthae, but excessive application or confinement under a denture irritates the mucosa and can itself cause ulceration. Benefit in teething may merely be due to pressure of application (comparable with biting a teething ring); excessive use can lead to salicylate poisoning.

DRY MOUTH. This condition may be caused by irradiation of the head and neck region, damage to or disease of the salivary glands, or by the administration of drugs

DENTAL PRACTITIONERS FORMULARY

with antimuscarinic (anticholinergic) side-effects, for example antispasmodics, tricyclic antidepressants, and some antipsychotic drugs. It may be relieved in many patients by simple measures such as frequent sips of cool drinks, sucking pieces of ice or sugar-free fruit pastilles, or by the use of an different hospitals and are commercially available. They are usually viscous, slightly flavoured, aqueous liquids.

BENZYDAMINE HYDROCHLORIDE

Indications : painful inflammatory conditions of oropharynx

Side-effects : occasional numbness or stinging

Benzylamine Mouthwash, benzylamine hydrochloride 0.15%. Rinse or gargle, using 15 mL, diluted if necessary, every $1\frac{1}{2}$ -3 hours as required, usually for not more than 7 days; not suitable for children under 12 years

Benzylamine Oral Spray, benzylamine hydrochloride 0.15%.

4-8 puffs onto affected area every $1\frac{1}{2}$ -3 hours; CHILD 6-12 years 4 puffs every $1\frac{1}{2}$ -3 hours

CARMELLOSE SODIUM

Indications : mechanical protection of oral and perioral lesions

Carmellose Gelatin Paste, gelatin, pectin, carmellose sodium, 16.58% of each in a suitable basis.

Apply a thin layer when necessary after meals

CORTICOSTEROIDS

Indications : mechanical protection of oral and perioral lesions

Contra-indications : untreated oral infection

Hydrocortisone Lozenges BP, hydrocortisone 2.5 mg (as sodium succinate).

Dissolve 1 lozenge slowly in the mouth in close contact with the lesion initially 4 times daily; if ulcers recur rapidly treatment may be continued for a period at reduced dosage

Hydrocortisone Cream BP, hydrocortisone 1%¹.

Apply sparingly 2-4 times daily

1. The BP does not specify one particular strength but when hydrocortisone cream is prescribed by a dental practitioner on form FP14 (GP14 in Scotland) a cream containing 1% will be dispensed.

Triamcinolone Dental Paste BP, triamcinolone acetonide 0.1% in an adhesive basis.

Apply a thin layer 2-4 times daily

With antifungal

Hydrocortisone and Miconazole Cream, hydrocortisone 1% and miconazole nitrate 2%,

Hydrocortisone and Miconazole Ointment, hydrocortisone 1% and miconazole nitrate 2%,

For angular cheilitis apply sparingly 2-3 times daily; do not use for longer use for longer than 7 days

DENTAL PRACTITIONERS FORMULARY

LIGNOCAINE HYDROCHLORIDE

Indications : relief of pain in oral lesions

Cautions : avoid prolonged use; hypersensitivity may occur

Lignocaine 5% Ointment, lignocaine 5% in a suitable basis. Rub gently into affected areas. Max. dose for 70 kg man 200 mg lignocaine ($= \frac{1}{4}$ tube)

SALICYLATES

Indications : mild oral and perioral lesions

Cautions : frequent application, especially in children, may give rise to salicylate poisoning

Note. The recent CSM warning on aspirin and Reye's syndrome does not apply to non-aspirin salicylates or to topical preparations such as teething gels.

Choline Salicylate Dental Gel BP, choline salicylate 8.7% in a flavoured gel basis. Apply ever 3-4 hours with gentle massage before food and at bedtime

ARTIFICIAL SALIVA

Indications : dry mouth

Artificial Saliva, consists of a suitable inert, slightly viscous, aqueous liquid; it may contain a suitable antimicrobial preservative, normal salivary constituents, small amounts of fluoride, and colouring and flavouring agents.

ZINC SULPHATE

Indications : see notes above

Zinc Sulphate Mouthwash, consists of zinc sulphate lotion BP
Dilute 1 part with 4 parts of warm water

VITAMINS

vitamin deficiency due to inadequate dietary intake is rare in Bangladesh but can develop in elderly people or alcoholics. Most other patients with develop a nutritional deficiency have malabsorption and if this is suspected the patient should be referred to a physician.

It is unjustifiable to treat stomatitis or glossitis with mixtures of vitamin preparations; this delays diagnosis and correct treatment.

Severe cases of scurvy cause gingival swelling and bleeding margins as well as petechiae on the skin. This is, however, exceedingly rare and a patient with this appearance is more likely to have leukaemia. Investigation should not be delayed by a trial period of vitamin treatment.

ASCORBIC ACID (Vitamin C)

Indications : prevention and treatment of scurvy

Dose : prophylactic, 25-75 mg daily; therapeutic, not less than 250 mg daily in divided doses

DENTAL PRACTITIONERS FORMULARY

Ascorbic Acid Tablets BP, ascorbic acid 25 mg; 50 mg, 20 = 6; 50 mg, 200 mg, 500 mg.

Vitamin B Tablets, Compound, strong, brown, f/c or s/c, nicotinamide 20 mg, pyridoxine hydrochloride 2 mg, riboflavine 2 mg, thiamine hydrochloride 5 mg.

Dose : treatment of vitamin D deficiency, 1-2 tablets 3 times daily

FLUORIDES

Availability of adequate fluoride confers significant resistance to dental caries. It is now considered that the topical action fluoride on enamel and plaque is more important than the systemic effect.

Where the natural fluoride content of the drinking water is significantly less than 1 mg per litre (one part per million) artificial fluoridation is the most economical method of supplementing fluoride intake.

Daily administration of tablets or drops is a suitable alternative, but systemic fluoride supplements should not be prescribed without prior reference to the fluoride contents of the local water supply; they are not advisable when the water contains more than 700 micrograms per liter (0.7 parts per million). In addition, it is now recommended that infants need not receive fluoride supplements until age of 6 months.

Use of dentifrices which incorporate sodium fluoride and/or monofluorophosphate is also a convenient source of fluoride.

Individuals who are either particularly caries prone or medically compromised may be given additional protection by use of fluoride rinses or by application of fluoride gets. Rinses may be used daily or weekly; daily use of a less concentrated rinse is more effective than weekly use of a more concentrated one. Gets must be applied on a regular basis under professional supervision; extreme caution is necessary to prevent the child from swallowing any excess. Less concentrated gets have recently become available for home use. Varnishes are also available and children since they adhere to the teeth and set in the presence of moisture.

SODIUM FLUORIDE

Note. Sodium fluoride 2.2 mg provides approx. 1 mg fluoride ion

Indications : prophylaxis of dental caries-see notes above

Contra-indications : not for areas where drinking water is fluoridated

Side-effects : occasional white flecks on teeth with recommended doses; rarely yellowish-brown discoloration if recommended doses are exceeded

Dose : Child, as fluoride ion :

Water content less than 300 micrograms/litre, up to 6 months none; 6 months-2 years, 250 micrograms daily; 2-4 years, 500 micrograms daily; over 4 years, 1 mg daily

Water content between 300 and 700 micrograms/litre, up to 2 years, none; 2-4 years, 250 micrograms daily; over 4 years, 500 micrograms daily

Fluoride preparations are listed below; they are not prescribable on form FP14 (GP14 in Scotland).

There are arrangements for health authorities to supply fluoride tablets in the course of preschool dental schemes, and they may also be supplied in school dental schemes, and they may also be supplied in school dental schemes.

Tablets

COUNSELLING. Tablets should be sucked or dissolved in the mouth and taken preferably in the evening.

En-De-Kay® (Safford-Miller)

Fluotabs 0-2 years, sodium fluoride 550 micrograms (250 micrograms F⁻).

DENTAL PRACTITIONERS FORMULARY

Fluotabs 2-4 years, natural orange-flavoured, scored, sodium fluoride 1.1 mg (500 micrograms F⁻).

Fluor-a-days[®] (Dental Health)

Tablets, buff, scored, sodium fluoride 2.2 mg (1 mg F⁻).

Fluorigard[®] (RMT)

Tablets 0.5, purple, sodium fluoride 1.1 mg (500 micrograms F⁻).

Tablets 1.0, sodium fluoride 2.2 mg (1 mg F⁻).

Oral-B Fluoride[®] (Oral-B Labs)

Tablets, sodium fluoride 1.1 mg (500 micrograms F⁻).

Zymafluor[®] (Zyma)

Tablets, sodium fluoride 550 micrograms (250 micrograms F⁻).

Tablets, yellow-grey, sodium fluoride 2.2 mg (1 mg F⁻).

Oral drops

Note. Fluoride supplements no longer considered necessary below 6 months of age.

En-De-Kay[®] (Safford-Miller)

Fluodrops[®] (=paediatric drops), sugar-free, sodium fluoride 500 micrograms (250 micrograms F⁻)/0.15 mL.

Fluorigard[®] (RMT)

Paediatric drops, sodium fluoride 275 micrograms (125 micrograms F⁻)/drop.

Oral-B Fluoride[®] (Oral-B Labs)

Drops, sodium fluoride 0.15% (250 micrograms F⁻/8 drops).

Mouthwashes

Rinse mouth for 1 minute and spit out COUNSELLING. Avoid eating, drinking, or rinsing mouth for 15 minutes after use

En-De-Day[®] (Stafford-Miller)

Fluorinse (= mouthwash), red, sodium fluoride 2%.

For daily use, dilute 5 drops to 10 mL of water; for weekly use, dilute 20 drops to 10 mL

Fluorigard[®] (RMT)

Daily dental rinse (= mouthwash), blue, sodium fluoride 0.5%.

Antihistamines (See Section 4)

There is no evidence that any one of the older antihistamines is superior to another in antihistamine activity but they differ in duration of action and incidence of the main side-effects, namely antimuscarinic (anticholinergic) effects and drowsiness.

Most antihistamines are relatively short acting but some, such as **promethazine hydrochloride**, are active for up to 12 hours. All are of potential value in nasal allergy, urticaria, and allergic rashes associated with drug allergy. The majority has the serious disadvantage of causing drowsiness (some of the newer antihistamines less so, see BNF section 3.4.1).

Antihistamines are widely used as antiemetics; it has been suggested that these drugs may be useful in dental surgery for patients with an over-active vomiting reflex, but diazepam is likely to be more effective.

INDEX OF PHARMACEUTICAL MANUFACTURERS IN BANGLADESH

Generic Suppliers to the Hospitals only:

1.	M/s. EDCL (Bogra)	Thonthonia, Bogra.
2.	M/s. EDCL (Dhaka)	395-397, Tajgoan I/A, Dhaka.

For National Pharma Market:

Name of the Pharmaceutical Manufacturer	Address and Licence No.
1. M/s. ACI HealthCare Limited	Treepordi, Sonargaon, Narayanganj Mfg. Licence No. Non-Biological-519, Biological-312
2. M/s. ACI Ltd.	Majeeganj Road, Godnail, Narayanganj Mfg. Licence No. Non-Biological-213, Biological-51
3. M/s. Acme Laboratories Ltd.	Dhamrai, Dhaka Mfg. Licence No. Non-Biological-250, Biological-115
4. M/s. Acmunio International Ltd.	Hemayetpur, Savar, Dhaka Mfg. Licence No. Biological-280
5. M/s. Active Fine Chemicals Ltd.	West Moktarpur, Munshiganj Mfg. Licence No. Biological-275
6. M/s. Ad-din Pharmaceuticals Ltd.	BSCIC I/A, Jessore. Mfg. Licence No. Non-Biological-53, Biological-202
7. M/s. Advent Pharma Ltd.	Plot No. B 50-54, BSCIC I/A, Dhamrai, Dhaka Mfg. Licence No. Non-Biological-493, Biological-289
8. M/s. Albion Laboratories Ltd.	South Rahmatnagar, Shitakunda, Chittagong Mfg. Licence No. Non-Biological-109, Biological-191
9. M/s. Alco Pharma Ltd.	House No. 3/B, Plot No. 33, Section-7, Mirpur, Dhaka Mfg. Licence No. Non-Biological - 430, Biological- 193
10. M/s. Alkad Laboratories	Alamnagar, Rangpur Mfg. Licence No. Non-Biological-372, Biological-218
11. M/s. Allied Pharmaceuticals Ltd.	Bogair, P.O. : Ashugonj, P.S.: Ashugonj, B.Barua Mfg. Licence No. Biological : 299, Non-Biological-498
12. M/s. Al-Modina Pharmaceuticals Ltd.	1/1. Tilargati, Tongi, Gazipur Mfg. Licence No. Biological : 266, Non-Biological-440
13. M/s. Ambee Pharmaceuticals Ltd.	184/1 Tejgaon I/A, Dhaka Mfg. Licence No. Non-Biological-124, Biological-383
14. M/s. Amico Laboratories Ltd.	Khagan, Burilia, Savar, Dhaka Mfg. Licence No. Non-Biological- 58, Biological-28
15. M/s. Amulet Pharmaceuticals Ltd.	Singdighi, Mauna, Sreepur, Gazipur Mfg. Licence No. Biological : 287, Non-Biological-418,
16. M/s. APC Pharma Ltd.	Lokhpur, Fakirhat, Bagerhat Mfg. Licence No. Non-Biological-36, Biological-164
17. M/s. Apex Pharmaceuticals Ltd	Shafipur, Kaliakair, Gazipur Mfg. Licence No. Non-Biological-363, Biological-132
18. M/s. Apollo Pharmaceutical Laboratories Ltd.	Plot No. 10, Sec.7, Mirpur I/A, Dhaka Mfg. Licence No. Non-Biological-330, Biological-92
19. M/s. Aristopharma Ltd.	Plot No. 21, Road 11, Shyampur, Kadamtali I/A, Dhaka Mfg. Licence No. Non-Biological-308, Biological-171
20. M/s. Aristopharma Ltd., Gazipur	Gachha, Gazipur Sadar, Gazipur Mfg. Licence No. Biological-304
21. M/s. Asiatic Laboratories Ltd.	253, Tongi I/A, Gazipur Mfg. Licence No. Non-Biological-151, Biological-69
22. M/s. Astra Biopharmaceuticals	Gouripur, Ashulia, Savar, Dhaka.

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23. M/s. Aztec Pharmaceuticals	Ujirpur, Damurhuda, Chuadanga Mfg. Licence No. Non-Biological- 396, Biological-155
24. M/s. Bangladesh Antibiotic Industries Ltd.	Mouchak, Kaliakoir, Gazipur Mfg. Licence No. Biological : 255
25. M/s. Bangladesh Industrial Gases	BSCIC I/A, Tarotia, Tangail Mfg. Licence No. Non-Biological-461
26. M/s. Bangla-German Latex Co., Ltd.	Plot No. 178 & 179, DEPZ, Savar, Dhaka Mfg. Licence No. Non-Biological-469
27. M/s. Beacon Pharmaceuticals Ltd.	Khatali, Bhaluka, Mymensingh Mfg. Licence No. Non-Biological-477, Biological : 258
28. M/s. Belsen Pharma Ltd.	Kamlapur, Faridpur Mfg. Licence No. Non-Biological-190, Biological-87
29. M/s. Bengal Drugs & Chemical Works Pharm. Ltd.	Kandirpar, Comilla. Mfg. Licence No. Non-Biological-105, Biological-242
30. M/s. Bengal Remedies Ltd.	A-114, BSCIC I/A, Tongi, Gazipur Mfg. Licence No. Non-Biological-502, Biological-300
31. M/s. Benham Pharmaceutical Ltd.	Plot No. 1, Aicha Nwaddah, Raja Shon Road, Savar, Dhaka. Mfg. Licence No. Non-Biological-212
32. M/s. Beximco Pharmaceuticals Ltd.	Tongi, Gazipur. Mfg. Licence No. Non-Biological-379, Biological-119
33. M/s. Beximco Pharmaceuticals Ltd.	Kaliakoir, Gazipur Mfg. Licence No. Biological : 262
34. M/s. Bio Pharma Ltd.	A-116, Tongi, Gazipur. Mfg. Licence No. Non-Biological-322, Biological-81
35. M/s. Biogen Pharmaceuticals Ltd.,	Plot No. 8, 9 and 10, BSCIC I/A, Patuakhali Mfg. Licence No. Non-Biological-243, Biological-121
36. M/s. Bios Pharmaceutical Ltd.	Gazipur Mfg. Licence No. Non-Biological-304
37. M/s. Bridge Pharmaceuticals Ltd.	West Tengra, Demra, Dhaka Mfg. Licence No. Non-Biological-54, Biological-292
38. M/s. Bristol Pharma Ltd.	Konabari, Gazipur Mfg. Licence No. Non-Biological-196, Biological-247
39. M/s. Celltron Electro Manufacturing Services Ltd.	Block-B, Road No. 2, House No. 206, Bosila, Mohammadpur, Dhaka, Mfg. Licence No. Non-Biological-516
40. M/s. Centeon Pharma Limited	Chawkpara, Mawna, Sreepur, Gazipur Mfg. Licence No. Non-Biological-510 & Biological-307
41. M/s. Central Pharmaceutical Ltd.	2A/1, South West Darus Salam Rd, Mirpur, Sec-1, Dhaka. Mfg. Licence No. Non-Biological-310 & Biological-76
42. M/s. Chemist Laboratories Ltd.	College Road, Barisal Mfg. Licence No. Non-Biological-133 & Biological-63
43. M/s. Cipla Ltd.	Jahangirabad, Fultola, Bogra. Mfg. Licence No. Non-Biological-305 & Biological-104
44. M/s. City Pharmaceutics	Nasirabad, Chittagong. Mfg. Licence No. Non-Biological-173
45. M/s. Concord Pharmaceuticals Ltd.	C-18, BSCIC I/A, Sonargaon, Narayanganj. Mfg. Licence No. Non-Biological-426 & Biological-187
46. M/s. Cosmic Pharmaceuticals Ltd.	Rupnagar I/A, Mirpur Dhaka-1216 Mfg. Licence No. Non-Biological-158 & Biological-210
47. M/s. Cosmo Pharma Laboratories Ltd.	BSCIC Industrial Estate, Konabari, Gazipur. Mfg. Licence No. Non-Biological-434, Biological-231
48. M/s. Crystal Pharmaceuticals Ltd.	BSCIC Industrial Estate, Comilla. Mfg. Licence No. Non-Biological-194, Biological-208
49. M/s. Decent Pharma Ltd.	Vill. - Raghpur, P.O.-Rajapur, Dist. - Comilla. Mfg. Licence No. Non-Biological-429, Biological-196
50. M/s. Delta Chemicals Ltd.	K/604, Dewliabari, College Gate, Konabari, Gazipur Mfg. Licence No. Non-Biological-447,
51. M/s. Delta Pharma Ltd.	Pakundia, Kishorganj

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52. M/s. Desh Pharmaceuticals Ltd.	Rupnagar, Mirpur, Dhaka Mfg. Licence No. Non-Biological-417, Biological-175
53. M/s. Doctor TIMS Pharmaceuticals Ltd.	Konabari, Joydapur, Gazipur Mfg. Licence No. Non-Biological-436, Biological-199
54. M/s. Doctor's Chemicals Works Ltd.	Fulbari, Bogra Mfg. Licence No. Non-Biological-85, Biological-35
55. M/s. Drug International Ltd. Unit-2	13A & 14/A, Tongi Industrial Area, Squib Road, Tongi, Gazipur Mfg. Licence No. Biological-220
56. M/s. Drug International Ltd.	Tongi I/A, Gazipur Mfg. Licence No. Non-Biological-389, Biological-127
57. M/s. EDCL (Bogra)	Thonthonia, Bogra. Mfg. Licence No. Non-Biological-399, Biological-146
58. M/s. EDCL (Dhaka)	395-397, Tajgoan I/A, Dhaka. Mfg. Licence No. Non-Biological-365, Biological-99
59. M/s. Edruc Ltd.	Sittai House, Pabna. Mfg. Licence No. Non-Biological-18, Biological-18
60. M/s. EMCS Pharma Ltd.	Dobadia, P.S: Uttarkhan, Dhaka-1230 Mfg. Licence No. Non-Biological-515
61. M/s. Eon Pharmaceuticals Ltd.	217/5, Chandana, Joydebpur, Gazipur Mfg. Licence No. Biological : 282, Non-Biological-57
62. M/s. Eskayef Bangladesh Ltd.	400, Tongi/ I/A. Squibb Road, Gazipur. Mfg. Licence No. Non-Biological-449, Biological-215
63. M/s. Eskayef Pharmaceuticals Ltd.	2/C, North East, Darus Salam, Mirpur, Dhaka. Mfg. Licence No. Non-Biological-130, Biological-385
64. M/s. Eskayef Pharmaceuticals Ltd.	Murapara, Rupganj, Narayanganj Mfg. Licence No. Non-Biological-509, Biological-306
65. M/s. Ethical Drug Ltd.	Godnail, Siddergonj, Narayanganj. Mfg. Licence No. Non-Biological-425, Biological-185
66. M/s. Euro Pharma Ltd.	385, West Jurain, Shampur, Dhaka Mfg. Licence No. Biological 256, Non-Biological 475
67. M/s. Everest Pharmaceuticals Ltd.	Plot No. 45-46, BSCIC I/A, Kanchpur, Sonargaon, Narayanganj Mfg. Licence No. Non-Biological-178
68. M/s. F N F Pharmaceuticals Ltd.	Rautoli, Nagarbathan, Jhenaidah. Mfg. Licence No. Non-Biological-463, Biological-240
69. M/s. GA Company Ltd.	Tejgoan I/A Dhaka. Mfg. Licence No. Non-Biological-102, Biological-24
70. M/s. Gemvio Pharma Ltd.	Village : Bagan, P.O. Trishal, District : Mymensingh Mfg. Licence No. Non-Biological-514, Biological-31
71. M/s. General Pharmaceutical Ltd.	Kaliakair, Gazipur Mfg. Licence No. Non-Biological-406, Biological-162
72. M/s. General Pharmaceutical Ltd. (Unit-2)	Karolsurichala, Mouchak, Kaliakair, Gazipur Mfg. Licence No. Non-Biological- , Biological-283
73. M/s. Gentry Pharmaceuticals Ltd.	Vangnahati, Sreepur, Gazipur Mfg. Licence No. Non-Biological-27, Biological-26
74. M/s. Get Well Limited	Habigonj Industrial Park, Olipur, Shjibazar, Syestagonj, Habiganj Mfg. Licence No. Non-Biological-518, Biological-305
75. M/s. Glaxo Smith kline (Bd) Ltd.	Fauzderhat I/A, Chittagong Mfg. Licence No. Non-Biological-182, Biological-42
76. M/s. Global Capsule Ltd.	Bogra Road, Rupatali, Barisal Mfg. Licence No. Biological-192
77. M/s. Global Capsule Ltd. (Gelatin Division)	Bogra Road, Rupatali, Barisal Mfg. Licence No. Biological-210
78. M/s. Global Heavy Chemicals Ltd.	Keranigonj, Dhaka. Mfg. Licence No. Non-Biological-466,
79. M/s. Globe Pharmaceuticals Ltd.	Begumgonj. I/A, Noakhali. Mfg. Licence No. Non-Biological- 455, Biological-226

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81.	M/s. Gonoshasthya Antibiotics Ltd.	Nayarhat, Savar, Dhaka Mfg. Licence No. Biological-232
82.	M/s. Gonoshasthya Chemicals Ltd.	Tongi I/A, Gazipur Mfg. Licence No. Non-Biological-452
83.	M/s. Gonoshasthya Pharmaceuticals Ltd.	Nayarhat, Savar, Dhaka Mfg. Licence No. Non-Biological-381, Biological-117
84.	M/s. Goodman Pharmaceuticals Ltd.	Bhagnahati, Sreepur, Gazipur Mfg. Licence No. Non-Biological-478, Biological-261
85.	M/s. Greenland Pharmaceuticals Ltd.	BSCIC I/A, Tongi, Gazipur. Mfg. Licence No. Non-Biological-09, Biological-67
86.	M/s. Guardian Healthcare Ltd.	Amtola, Kathgora, Zirabo, Ashulia, Savar, Dhaka Mfg. Licence No. Biological-490, Non-Biological-286
87.	M/s. Hallmark Pharmaceuticals Ltd.,	B-63, BSCIC I/E, Tongi, Gazipur Mfg. Licence No. Non-Biological-240, Biological-207
88.	M/s. Health Care Pharmaceuticals Ltd.	Rajendrapur, Gazipur. Mfg. Licence No. Non-Biological- 459, Biological-234
89.	M/s. Hope Pharmaceutical Ltd.	Bhairab Bazar, Kishorgong. Mfg. Licence No. Non-Biological-364, Biological-151
90.	M/s. Hudson Pharmaceutical Ltd.	Mouchak, Kaliakoir, Gazipur. Mfg. Licence No. Non-Biological-129, Biological-358
91.	M/s. Ibn Sina Pharmaceutical Ind. Ltd.	Kaliakoir, Gazipur Mfg. Licence No. Non-Biological-405, Biological-150
92.	M/s. Incepta Chemicals Ltd.	Barabaria, Dhankora, Satoria, Manikganj Mfg. Licence No. Non-Biological-520
93.	M/s. Incepta Hygiene & Hospicare Ltd.	Krishnapura, Sahabelishor, Dharmari, Dhaka Mfg. Licence No. Biological-303
94.	M/s. Incepta Pharmaceuticals Ltd.	Jirabo, Saver, Dhaka Mfg. Licence No. Non-Biological-108, Biological-193
95.	M/s. Incepta Pharmaceuticals Ltd. (Dhamrai Unit)	Krishnapura, Sahabelishor, Dhamrai, Dhaka Mfg. Licence No. Non-Biological-494, Biological-290
96.	M/s. Incepta Vaccine Ltd.	Bara Rangamatia, Zirabo, Ashulia, Savar, Dhaka Mfg. Licence No. Biological-284
97.	M/s. Incepta Vaccine Ltd. (Animal Vaccine Division)	Krishnapura, Sahabelishor, Dhamrai, Dhaka Mfg. Licence No. Biological-308
98.	M/s. Indo-Bangla Pharmaceuticals Ltd.	College Road, Barisal. Mfg. Licence No. Non-Biological-56, Biological-13
99.	M/s. Inova Pharmaceutical Ltd.	Plot No. I/8, & 9, Road No. 5, Section-7, Mirpur I/A, Pallabi, Dhaka, Mfg. Licence No. Non-Biological-324, Biological-153
100.	M/s. Institute of Public Health	Mohakhali, Dhaka Mfg. Licence No. Biological-177
101.	M/s. Institute of Public Health	46 Tejkunipara, Dhaka Mfg. Licence No. Non-Biological-442
102.	M/s. Islam Oxygen (Pvt) Ltd.	Tarabo, Rupganj, Narayanganj Mfg. Licence No. Non-Biological-500
103.	M/s. J & J Medical Bangladesh Ltd.	Plot No. 150, DEPZ, Ganakbari, Savar Dhaka Mfg. Licence No. Biological-264
104.	M/s. Jalalabad Pharmaceuticals Ltd.	Kanchpur, Sonargaon, Narayanganj Mfg. License No. Non-Biological-411, Biological 167
105.	M/s. Jayson Pharmaceuticals Ltd.	231, Tejgoan I/A, Dhaka. Mfg. Licence No. Non-Biological-82 , Biological-03
106.	M/s. JMI Hospital Requisite Manufacturing Ltd.	Vitikandi, Gozaria, Munshiganj Mfg. Licence No. Biological-298
107.	M/s. JMI Industrial Gas Ltd.	Maddam Bausia, Gajaria, Munshiganj Mfg. Licence No. Non-Biological-508
108.	M/s. JMI Syringes & Medical Devices Ltd.	Rajandrapur, Chaowddhagiam, Comilla Mfg. License No. Biological-237
109.	M/s. Julphar Bangladesh Ltd.	Faridpur, Sreepur, Gazipur

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110. M/s. Kemiko Pharmaceuticals Ltd.	Ticapara, Ghoramara, Rajshahi. Mfg. Licence No. Non-Biological-403 & Biological-152
111. M/s. Khulna Essential Latex Plant	Gilatola, Fultala, Khulna Mfg. Licence No. Non-Biological-485
112. M/s. Kumudini Pharma Ltd.	72, Sirajuddowla Road, Narayanganj Mfg. Licence No. Non-Biological-453, Biological-224
113. M/s. Labaid Pharmaceuticals Ltd.	15, Genda, Savar, Dhaka Mfg. Licence No. Non-Biological-496, Biological-293
114. M/s. Leon Pharmaceuticals Ltd.	Satkhamair, Sreepur, Gazipur Mfg. Licence No. Non-Biological-400, Biological-201
115. M/s. Libra Pharmaceuticals Ltd.	1/7, Section-2, Mirpur, Dhaka. Mfg. Licence No. Biological-140
116. M/s. Linde Bangladesh Ltd.	185, Tejgoan I/A, Dhaka. Mfg. Licence No. Non-Biological-398
117. M/s. Maks Drugs Ltd.	Konabari, Gazipur Mfg. Licence No. Non-Biological-319, Biological-82
118. M/s. Marker Pharmaceuticals Ltd. (Shamsul Alamin)	Kalampur, Gazipur Mfg. Licence No. Non-Biological-387, Biological-243
119. M/s. Marksman Pharmaceuticals Ltd.	Genda, Savar, Dhaka Mfg. Licence No. Non-Biological-468, Biological-245
120. M/s. Medicon Pharmaceuticals Ltd.	Plot No. 17/A/1, Avenue-1, Block-D, Section-10, Mirpur, Dhaka Mfg. Licence No. Non-Biological-402, Biological-148
121. M/s. Medimet Pharmaceuticals Ltd.	Rupatali, Barisal Mfg. Licence No. Non-Biological-341, Biological-159
122. M/s. MedRx Life Science Ltd.	Plot No. A-88 & A-89, BSCIC I/A, Nandanpur, B. Baria. Mfg. Licence No. Non-Biological-465, Biological-241
123. M/s. Millat Pharmaceuticals Ltd.	65-66, Postogol I/A, Dhaka Mfg. Licence No. Non-Biological-416, Biological-186
124. M/s. Modern Pharmaceuticals Ltd.	Jhenaidah Mfg. Licence No. Non-Biological-315, Biological-131
125. M/s. Momtaz Pharmaceuticals Ltd.	Plot No. 551(P), Bara Deora, Tongi, Gazipur Mfg. Licence No. Non-Biological-479, Biological-263
126. M/s. Monico Pharma Ltd.	South Dhanua, Sreepur, Gazipur Mfg. Licence No. Non-Biological-242, Biological-156
127. M/s. Monomedi Bangladesh Ltd.	Nagbari, Post. : K. Nagbari, Ghtail, Tangail Mfg. Licence No. Biological-336
128. M/s. MST Pharma and Healthcare Ltd.	Bishua Kuribari, Gazipur Sadar, Gazipur Mfg. Licence No. Non-Biological-181, Biological-43
129. M/s. Mundipharma Bangladesh (Pvt) Ltd.	Mirzapur, Sadar, Gazipur Mfg. Licence No. Non-Biological-495
130. M/s. Naafco Pharma Ltd.	Bandai, Bhaluka, Mymensingh Mfg. Licence No. Non-Biological-464
131. M/s. Navana Pharmaceuticals Ltd.	Rupshi, Rupganj, Narayanganj. Mfg. Licence No. Non-Biological-431, Biological-194
132. M/s. Newtec Pharmaceuticals Ltd.	Boro Dhormopur, Comilla Mfg. Licence No. Non-Biological-503, Biological-301
133. M/s. Nip Chemical and Pharmaceuticals Ltd.	Shahid Nagar, Daspara, Daudkandi, Comilla Mfg. Licence No. Non-Biological-471
134. M/s. Nipa Pharmaceuticals Ltd.	1/5, Rupnagar, Mirpur, Dhaka. Mfg. Licence No. Non-Biological-338, Biological-94
135. M/s. NIPRO JMI Company Ltd.	Vitikandi, Gozaria, Munshigonj Mfg. Licence No. Biological-294
136. M/s. NIPRO JMI Pharma Ltd.	Rajandrapur, Chaudagram, Comilla Mfg. Licence No. Non-Biological-486, Biological-278
137. M/s. Novartis (Bangladesh) Ltd.	Squibb Road, Tongi, Gazipur. Mfg. Licence No. Non-Biological-427, Biological-188
138. M/s. Novelta Bestway	Singair Road, Hemayetpur, Savar, Dhaka

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139. M/s. Novo Healthcare and Pharma Ltd.	Plot # 2, Road # 11, Block # C, Section # 6, Mirpur, Pallabi, Dhaka, Mfg. Licence No. Non-Biological: 474, Biological: 251
140. M/s. Novo Healthcare and Pharma Ltd. (Unit-2)	East Norshingha Pur, Savar, Dhaka Mfg. Licence No. Biological: 271, Non-Biological: 481
141. M/s. Novus Pharmaceuticals Ltd.	Tatul Jhara, Raj Fulbaria, Savar, Dhaka Mfg. Licence No. Non-Biological-309, Biological-113
142. M/s. Nuvista Pharma Ltd. (Organon Bd. Ltd.)	97-98, Tongi I/A, Gazipur. Mfg. Licence No. Non-Biological-375, Biological-38
143. M/s. Oasis Laboratories	Afzal Khan Road Sirajgonj. Mfg. Licence No. Non-Biological-352, Biological-102
144. M/s. OMC Healthcare Pvt. Ltd.	Rupnagar IA., Plot No. 44, Block-K, Mirpur, Dhaka Mfg. Licence No. Non-Biological-512
145. M/s. One Pharma Ltd.	Plot No. C-23-24, BSCIC I/A, Bogra Mfg. Licence No. Non-Biological-244, Biological-62
146. M/s. Opso Saline Ltd.	Bogra Road, Barisal Mfg. Licence No. Biological-158
147. M/s. Opsonin Chemical Industries Ltd. (Chemical Division)	Rupatali, Barisal. Mfg. Licence No. Non-Biological-448, Biological-212
148. M/s. Opsonin Pharma Ltd.	Bogra Road, Barisal. Mfg. Licence No. Non-Biological-80, Biological-12
149. M/s. Orbit Pharmaceuticals Ltd.	Shah Mirpur, P.S.:Karnaphufy, Chittagong Mfg. Licence No. Non-Biological-204, Biological : 253
150. M/s. Organic Health Care Ltd.	Gilar Chala, Sreepur, Gazipur Mfg. Licence No. Non-Biological-200, Biological-149
151. M/s. Orion Infusion Ltd.	Maikali Rupgonj, Narayanganj Mfg. Licence No. Biological-198
152. M/s. Orion Pharma Ltd.	154, Tejgaon I/A Dhaka. Mfg. Licence No. Non-Biological-179, Biological-46
153. M/s. Oyster Pharmaceuticals Ltd.	Borhan Uddin Road, Sylhet Mfg. Licence No. Biological-279; Non-Biological-162,
154. M/s. Pacific Pharmaceuticals Ltd.	BSCIC, Kanchpur, Narayanganj. Mfg. Licence No. Non-Biological-354, Biological-206
155. M/s. Paradise Chemical Industries.	Hospital Road, Barisal. Mfg. Licence No. Non-Biological-223, Biological-138
156. M/s. Peoples Pharma Ltd.	105-106, Tongi I/A, Gazipur. Mfg. Licence No. Non-Biological-386, Biological-126
157. M/s. Pharmacil Ltd.	B-34, BSCIC Industrial Area, Tangi, Gazipur. Mfg. Licence No. Non-Biological-395, Biological-134
158. M/s. Pharmadesh Laboratories Ltd.	239, Tejgaon I/A, Dhaka. Mfg. Licence No. Non-Biological-74, Biological-20
159. M/s. Pharmasia Ltd.	Gazariapara, Bhawal, Mirzapur, Gazipur Mfg. Licence No. Biological-267, Non-Biological-188
160. M/s. Pharmatek Chemicals Ltd.	Aushpara, Beximco Complex, Tongi, Gazipur. Mfg. Licence No. Non-Biological-377
161. M/s. Pharmik Laboratories Ltd.	4/5, Zakir Hossain Road, Khulshi, Chittagong. Mfg. Licence No. Non-Biological-371, Biological-174
162. M/s. Phoenix Chemical Laboratory (BD) Ltd.	16/1, Vagdi, Narshingdi Mfg. Licence No. Non-Biological-20, Biological-15
163. M/s. Popular Pharmaceuticals Ltd.	164, Tongi I/A, Gazipur Mfg. Licence No. Non-Biological-473, Biological-250
164. M/s. Premier Pharmaceuticals Ltd.	Anantapur, Begumgonj, Noakhali Mfg. Licence No. Non-Biological-370, Biological-205
165. M/s. Prime Pharmaceuticals Ltd.	Tapirbari, Shishu Polli Road, Sreepur, Gazipur Mfg. Licence No. Non-Biological-454, Biological-225
166. M/s. Quality Pharmaceuticals (Pvt.) Ltd.	9, Bhujango Bhusan Lane, Kushtia Mfg. Licence No. Non-Biological-439, Biological-204

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168. M/s. Rampart Power (BD) Ltd.	Porabari, Gazipur. Mfg. Licence No. Non-Biological-445, Biological-209
169. M/s. Rangs Pharmaceuticals Ltd.	226 Tejgaon I/A, Dhaka. Mfg. Licence No. Non-Biological-49, Biological-166
170. M/s. Reckitt & Benckiser Bangladesh Ltd.	58-59, Nasirabad I/A, Chittagong. Mfg. Licence No. Non-Biological-373
171. M/s. Reliance Pharmaceuticals Ltd.	Elixir Town Area, Utttar Khan, Uttara, Dhaka Mfg. Licence No. Non-Biological-367, Biological-112
172. M/s. Reman Drug Laboratories Ltd.	Plot No. 62-B, Block-C, Tongi, Gazipur. Mfg. Licence No. Non-Biological-168, Biological-52
173. M/s. Remo Chemicals Ltd.	235 Tejgaon I/A, Dhaka. Mfg. Licence No. Non-Biological-457, (Bio-246 Cancel)
174. M/s. Renata Ltd.	Sec-11, Mirpur, Dhaka. Mfg. Licence No. Non-Biological-197, Biological-45
175. M/s. Renata Ltd., Gazipur	Rajendrapur, Gazipur Mfg. Licence No. Biological-273, Non-Biological-501
176. M/s. Renata Oncology Limited	Noyapara, Dogri, Rajendrapur, Gazipur Mfg. Licence No. Non-Biological-499
177. M/s. Rephco Pharmaceuticals Ltd.	Mathuranath Public School Road, Nutan Bazar, Barisal. Mfg. Licence No. Non-Biological-229, Biological-58
178. M/s. RN Pharmaceuticals	Eidgah Compound, Kanchijuli, Mymensingh Mfg. Licence No. Non-Biological-361, Biological-291
179. M/s. S. N. Pharmaceuticals Ltd.	Plot No. B-35, BSCIC I/E, Kanchpur, Narayanganj Mfg. Licence No. Non-Biological 61, Biological-110
180. M/s. Salton Pharmaceuticals Ltd.	Rajfulbaria, Savar, Dhaka Mfg. Licence No. Non-Biological-397, Biological-197
181. M/s. Sanofi Aventis Ltd.	Tongi I/A, Gazipur. Mfg. Licence No. Non-Biological-176, Biological-39
182. M/s. Save Pharmaceuticals Ltd.	14, Cathalic Mission School Road, Mymensingh. Mfg. Licence No. Non-Biological-239, Biological-139
183. M/s. Seema Pharmaceuticals Ltd.	Shahid Cort, Fulbari, Savar, Dhaka Mfg. Licence No. Non-Biological-231, Biological-111
184. M/s. Sharif Pharmaceuticals Ltd.	Barabo, Tarabo, Rugganj, Narayanganj Mfg. Licence No. Non-Biological-481, Biological-281
185. M/s. Sheba Laboratories Ltd.	Bhadra, Kazla, Rajshahi Mfg. Licence No. Non-Biological-253, Biological-110
186. M/s. Silco Pharmaceuticals Ltd.	BSCIC I/E, Khadim Nagar, Sylhet Mfg. Licence No. Non-Biological-450, Biological-217
187. M/s. Silva Pharmaceuticals Ltd.	Plot No 137, Joykrishnampur, Majdi Court, Noakhali Mfg. Licence No. Non-Biological-456, Biological-227
188. M/s. SMC Enterprise Ltd.	Zamiradia, Bhaluka, Mymensingh Mfg. Licence No. Non-Biological-470
189. M/s. Sodical Chemical Ltd.	D-203, BSCIC I/A, Tongi, Gazipur Mfg. Licence No. Non-Biological-435,
190. M/s. Somatec Pharmaceutical Ltd.	Daila, P.O. Sharulia Bazar, Demra, Dhaka Mfg. Licence No. Non-Biological-246, Biological-64
191. M/s. Sonear Laboratories Ltd.	11/2, Toyenbi Circular Road, Dhaka Mfg. Licence No. Non-Biological-307, Biological-75
192. M/s. Spectra Oxygen Limited	64, Esail, P.O. : Uthaly, P.S. Shibalaya, Manikganj Mfg. Licence No. Non-Biological-483
193. M/s. Square Formulations Ltd.	Momin Nagar, Gorai, Mirzapur, Tangail Mfg. Licence No. Non-Biological-497, Biological-296
194. M/s. Square Pharmaceutical Ltd.	Salgaria, Pabna Mfg. Licence No. Non-Biological-114, Biological-33
195. M/s. Square Pharmaceuticals	Kaliakoir, Gazipur (Dhaka Unit)

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Ltd.	Mfg. Licence No. Non-Biological-460, Biological-235
196. M/s. Square Pharmaceuticals Ltd., (Chemical Division)	Salgaria, Pabna Mfg. Licence No. Non-Biological-202, Biological-438
197. M/s. Standard Laboratories Ltd.	85, Batali Hill, Flora Pass Road, Ambagan, Chittagong Mfg. Licence No. Non-Biological-55, Biological-30
198. M/s. Sun Pharmaceutical (Bangladesh) Ltd.	Chandana, Joydevpur, Gazipur, Dhaka Mfg. Licence No. Non-Biological-472
199. M/s. Sunman-Birdem Pharma Ltd.	Village-Hobirbari, Ward-07, Bhaluka, Mymensingh Mfg. Licence No. Non-Biological-513, Biological-310
200. M/s. Sunypun Organics Ltd.	North Daulatdia, Goalando, Rajbari Mfg. Licence No. Non-Biological-504
201. M/s. Super Power Pharmaceuticals Ltd.	Belabo, Narsingdi Mfg. Licence No. Non-Biological-443, Biological-269
202. M/s. Supreme Pharmaceuticals Ltd.	Palashbari, Ashulia, Dhaka Mfg. Licence No. Non-Biological-369, Biological-160
203. M/s. Team Pharmaceuticals Ltd.	Bscic I/E, Shapura Rajshahi Mfg. Licence No. Non-Biological-444, Biological-211
204. M/s. Techno Drugs Ltd.	Satipara, Narsingdi Mfg. Licence No. Non-Biological-446, Biological-211
205. M/s. Techno Drugs Ltd., Unit-2	BSCIC I/A, Kararchar, Narshingdi Mfg. Licence No. Non-Biological-482, Biological-274
206. M/s. Techo Drugs (Unit-2)	BSCIC Industrial Area, Kararchar, Narsingdi Mfg. Licence No. Biological-302
207. M/s. Therapeutics (BD) Ltd.	Kalurghat, BSCIC I/A, Chittagong Mfg. Licence No. Non-Biological-241, Biological-98
208. M/s. Unimed & Unihealth Manufacturers Ltd.	BK Bari, Gazipur Sadar, Gazipur Mfg. Licence No. Non-Biological-121, Biological-219
209. M/s. Union Pharmaceutical Ltd.	Sadhapur, Puranbari, Savar, Dhaka Mfg. Licence No. Non-Biological-321, Biological-228
210. M/s. Unique Pharmaceutical Ltd.	Barisur, Keraniganj, Dhaka. Mfg. Licence No. Non-Biological-335, Biological-195
211. M/s. United Chemical & Pharmaceuticals Ltd.	33/E, FIDC Road, Kalur Ghat, Chittagong. Mfg. Licence No. Non-Biological-138, Biological-32
212. M/s. Veritas Pharmaceuticals Ltd.	Vannara, Mouchak, Kaliakoir, Gazipur Mfg. Licence No. Non-Biological-492, Biological-288
213. M/s. Virgo Pharmaceuticals Ltd.	Kaultia, Gazipura, Gazipur Mfg. Licence No. Non-Biological-484, Biological-276
214. M/s. White Horse Pharma	Rajfulbaria, Savar, Dhaka Mfg. Licence No. Non-Biological-165, Biological-248
215. M/s. World Chemical Industry Ltd.	211, Taknogopara, Chandona, Gazipur-1702 Mfg. Licence No. Non-Biological-517
216. M/s. Zenith Pharmaceuticals Ltd.	Trunk Road, Feni. Mfg. Licence No. Non-Biological-39, Biological-221
217. M/s. Ziska Pharmaceuticals Ltd.	Karolsurichala, Shafipur, Kaliakoir, Gazipur Mfg. Licence No. Non-Biological-424, Biological-183

SOME OF THE ABBREVIATIONS & SYMBOLS USED IN THE FORMULARY

ASCO American Society of Clinical Oncology	DM Diabetes Mellitus
ACE Angiotensin Converting Enzyme	DU Dhaka University
ARI Acute Respiratory Tract Infection	DMC Dhaka Medical College
BBB Blood Brain Barrier	DMARD Disease Modifying Anti-Rheumatic Drugs
BIRDEM Bangladesh Institute for Research & Rehabilitation in Diabetes, Endocrine and Metabolic Disorders	(ED) Essential Drugs
BMC Bangladesh Medical College	ECG Electrocardiogram
BSMMU Bangladesh Sheikh Mujib Medical University	FAO Food and Agricultural Organization
BPS Bangladesh Pharmaceutical Society	GIT Gastrointestinal Tract
(CD) Controlled Drugs	gm Gram
CVS Cardiovascular System	HIV Human Immuno-deficiency Virus
CNS Central Nervous System	(I) Imported Drugs
CSF Cerebrospinal Fluid	IEH Islamia Eye Hospital
CTC Central Addiction Treatment Center	i.e. that means
DA Drugs Administration	IM Intramuscular
DGHS Director General of Health Services	IV Intravenous
	Ig Immunoglobulin

ABBREVIATIONS & SYMBOLS

HDL
High Density Lipoprotein

JU
Jahangirnagar University

Kg
Kilogram

LDL
Low Density Lipoprotein

MMC
Mymensingh Medical College

NHF
National Heart Foundation

NICVD
National Institute of Cardiovascular Diseases

NITOR
National Institute of Trauma, Orthopaedics & Rehabilitation

NIPSOM
National Institute of Preventive & Social Medicine

NSAIDs
Non-Steroidal Inflammatory Drugs

O/W
Oil-in-Water

PGA
Pharmacy Graduates' Association

®
Registered Drug, Proprietary Name

RU
Rajshahi University

RTI
Respiratory Tract Infection

SC
Subcutaneous

SR
Sustained Release

SSMC
Sir Salimullah Medical College

STD
Sexually Transmitted Diseases

USTC
University of Science & Technology, Chittagong

UTI
Urinary Tract Infection

VD
Venereal Diseases

Viz.
For example

VLDL
Very Low Density Lipoprotein

WHO
World Health Organization

Wt.
Weight

W/V
Weight by Volume

W/W
Weight by Weight

SIAPS
Systems for Improved Access to Pharmaceuticals and Services

MSH
Management Sciences for Health

PF
Prefilled Syringe

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Yellow Card

SUSPECTED ADVERSE EVENT REPORTING FORM

Identities of reporter, patient, institution, and product trade name(s) will remain confidential



FOR OFFICE USE ONLY

AE report number _____

Date received _____

A. PATIENT INFORMATION

Name/Initial:

Address:

Contact number:

*Age----- Weight(Kg)-----*Gender ☐ Male ☐ Female ☐ Other

Pregnant : ☐ Yes ☐ No ☐ Unknown ☐ Not applicable

B. SUSPECTED ADVERSE EVENT INFORMATION

*Type of event	Suspected product
☐ Adverse drug reaction	Brand/Trade name _____ * Generic name with strength _____
☐ Product quality problem	*Indication _____
☐ Medication error	*Medication Start Date _____ End Date _____
☐ Others(Please specify)	Dosage Form _____ * Frequency (Daily Dose) _____
	Batch/Lot number _____ Manufacturer _____

*Describe event including relevant tests and laboratory results:

*Event start Date _____

*Event stopped Date _____

Was the adverse event treated? ☐ Yes ☐ No

If yes, please specify:

Action taken after reaction:

- ☐ Dose stopped
☐ Dose reduced
☐ No action taken

Did reaction subside after stopping / reducing the dose of the suspected product? ☐ Yes ☐ No ☐ Not applicable

Did reaction appear after reintroducing the suspected product?
☐ Yes ☐ No ☐ Not applicable

Seriousness of the adverse event:

- ☐ Not serious
☐ Hospitalization or prolongation of hospitalization
☐ Disability or permanent damage
☐ Congenital anomaly / birth defect
☐ Life threatening
☐ Death
☐ Other Medically important

*Outcomes attributed to the adverse event:

- ☐ Recovered
☐ Recovered/resolved with sequela
☐ Not recovered
☐ Unknown
☐ Fatal (date of death: _____)

Other relevant history: (pre-existing medical history)

- ☐ Hypersensitivity ☐ Allergies ☐ Liver or kidney problems ☐ Smoking ☐ Alcohol ☐ Diabetes
☐ Others (Please specify) :

C. *OTHER CONCOMITANT MEDICINE INFORMATION

Brand/Trade Name	Generic name	Indication	Dosage form	Strength & Frequency

D. *REPORTER INFORMATION

*Name & Address _____

*Email address _____ *Mobile phone _____

*Occupation _____ *Signature _____

*Date of this report submission _____

Evaluation/Review Committee Comments:

ADRM Cell

TSC

ADRAC

*** Mandatory Information****General instructions for completing the form:**

- Detailed information about each field can be found in the instructions available in the DGDA website. (www.dgda.gov.bd).
- Fill in as much information as possible. Do not leave anything blank. If unknown, write "unknown" or "n/a" if not applicable.

What to report :

- Serious adverse drug reactions
- Unknown or unexpected ADRs
- All suspected reactions to new drugs
- Unexpected therapeutic effects
- All suspected drug interactions
- Product quality problems
- Treatment failures
- Medication errors

How to report :

Suspected and observed drug-related reactions must be reported using the electronic version of the reporting form in a fillable pdf available on the DGDA website (www.dgda.gov.bd).

Also submitted to the ADRM Cell by email (adrmcell.dgda@gmail.com / dgda.gov@gmail.com), post, or fax (+88029880854). In emergency cases or when forms are not readily available, reports can also be made to the ADRM cell by phone (+8802 9880803).

ঔষধ ব্যবহারকারীদের নির্দেশনাঃ

- চিকিৎসকের ব্যবস্থাপত্র ব্যতীয়েকে এন্টিবায়োটিক বা অন্য কোন ঔষধ ক্রয় ও ব্যবহার করবেন না।
- চিকিৎসকের ব্যবস্থাপত্র অনুযায়ী সঠিক মাত্রায়, সঠিক পদ্ধতিতে পূর্ণকোর্স এন্টিবায়োটিক ব্যবহার করুন।
- শারীরিকভাবে সুস্থতা অনুভব করলেও এন্টিবায়োটিকের পূর্ণকোর্স সম্পন্ন করুন।
- কোন ঔষধ ব্যবহারে বিরূপ প্রতিক্রিয়া দেখা দিলে ঔষধ প্রশাসন অধিদপ্তরকে অবহিত করুন।

**Send all completed forms to:
Directorate General of Drug Administration**

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Dhaka-1212, Bangladesh

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Cell No.: +8801728-349503

Fax: 8802 9880854

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dgda.gov@gmail.com

Suspected Adverse Drug Reaction (ADR) সংক্রান্ত আপনার একটি রিপোর্ট ঔষধটির Unknown Side Effects থেকে অসংখ্য মানুষকে রক্ষা করতে সাহায্য করবে।

নকল প্রতিরোধের নিমিত্তে সঠিক ঔষধ যাচাই, ঔষধের বিরূপ প্রতিক্রিয়ার রিপোর্টিং এবং ঔষধের মূল্য সংক্রান্ত তথ্য জানার জন্য

"DGDA Drug Verification" মোবাইল অ্যাপটি ব্যবহার করুন।