Institute of virology, vaccines and sera „Torlak“
Belgrade, Republic of Serbia
The Institute "Torlak" is a national manufacturer of high-quality, safe and effective vaccines, sera and other immunobiologica ls, established by the Government of the Republic of Serbia.
SCOPE OF ACTIVITIES

1. Production of high-quality, safe and effective vaccines, sera and other immunobiological and diagnostic products, medical devices and food supplements

2. Storage and distribution of vaccines

3. Prevention, treatment and monitoring of infectious diseases

4. Scientific research and educational activities
The Institute "Torlak" is run by:
- the Acting Director of the Institute
- the Management Board
- the Supervisory Board

Divisions at the Institute "Torlak" are:
- Quality Assurance Division,
- Quality Control Division,
- Division for bacteriological production,
- Division for virological production,
- Diagnostic preparations production division,
- Laboratory diagnostics division,
- Scientific research division,
- Division for legal, economic and financial affairs,
- Division for technical and other similar affairs.

appointed by the Government of the Republic of Serbia supported by the Ministry of health and the Ministry of science

219 employees - experts of various profiles:
doctors,
pharmacists,
molecular biologists, biologists,
biochemists, chemists,
veterinarians,
technologists, physicochemists,
mechanical engineers, electrical engineers, IT engineers,
lawyers, economists, etc.

Luka Dragačević, PhD
Acting Director
HISTORY OF THE INSTITUTE “TORLAK”

The first sera and vaccines were produced in Central Hygiene Institute by the Serovaccinal Department which was established in October 1924.

1927 Production of BCG vaccine in the Central Hygiene Institute started.

1930 Production of vaccine against diphtheria by Ramon and production of diphtheria and tetanus serum started,

1934 Production of vaccine against tetanus by Ramon started,

1958 Vaccine against whooping cough from local isolates was produced,

1959 Production of dehydrated culture media started,

1960 Dr Albert Sabin donated to the “Torlak” Institute his original vaccinal trains and the production of live, oral polio vaccine (OPV) began,

1962 Production of inactivated influenza vaccine started,

1965 Production of allergens started,

1968 Production of lactic acid preparations started,

1995 Production of viper venom antiserum started
HISTORY OF THE INSTITUTE “TORLAK”

Production of inactivated influenza vaccine started in **1962**.

**1962 - 2005**, whole virus, inactivated, trivalent influenza vaccines had been produced in embryonated chicken’s eggs.

**2005** Institute "Torlak" started reconstructing the facility according to GMP.

**2009**: Institute "Torlak" became a part of the WHO’s Global Action Plan for Influenza Vaccines (GAP) strategy with the goal of sustainably manufacture seasonal and pandemic influenza vaccines.

**2013**: Split, inactivated seasonal and pandemic influenza vaccines have been developed.

**2020**: TorVaxFlu® INFLUENZA VACCINE FRAGMENTED VIRUS, INACTIVATED has been licenced.
TorVaxFlu® - INFLUENZA VACCINE (FRAGMENTED VIRUS, INACTIVATED)

The Institute “Torlak” is one among 14 manufacturers who has successfully accomplished the project under the WHO’s Action Plan.

The Institute “Torlak” has Good Manufacturing Practice Certificate for TorVaxFlu®

Capacity of the current plant is 500,000 doses of the vaccine per year

Quadrivalent influenza vaccine development
**BACTERIAL VACCINES**

**MONO VACCINES**

**TETAVAKSAL-T®** - tetanus vaccine, adsorbed

**BCG vaccine, lyophilized®** – vaccine against tuberculosis

**COMBINED VACCINES**

**DITEVAKSAL-T®** - diphtheria and tetanus vaccine, adsorbed

**DITEVAKSAL-T®** - diphtheria and tetanus vaccine for adults, adsorbed

**ALDIPETE-T®** - diphtheria, tetanus and pertussis vaccine, adsorbed
IMMUNOBIOLOGICAL PREPARATIONS

SERA

**TOTEKVIN®** - Tetanus antitoxin purified and concentrated (equine)

**VIEKVIN®** - Viper venom antitoxin (equine) - used in the therapy after the bite of a venomous snake of the genus *Vipera* (*V. ammodytes, V. berus*)

Export markets: Sweden, Germany, Belgium, Austria, Italy, Croatia, Bosnia and Herzegovina, Montenegro, North Macedonia, Albania

OTHER PREPARATIONS

**PPD-T® tuberculin** - A purified protein derivative for skin testing (tuberculosis diagnostics).

**Liobif®** - live, lyophilized lactic bacteria for human use
ALLERGENS

The allergens for *in vivo* testing
- Prick test
- Intradermal test
- Bronchoprovocation test

Allergens for allergen specific immunotherapy
- Depo solutions
- Solutions for sublingual immunotherapy - SLIT
The Institute "Torlak" produces over 90 types of microbiological media:

- Dehydrated bacteriological media
- Ready to use bacteriological media
- Viral transport medium
The Institute „Torlak“ has an important role in diagnostics of different communicable diseases and outbreaks.

4 National Reference Laboratories (NRL) for diagnostics (3 of 4 are certified by the WHO):

- NRL for Influenza and other respiratory viruses
- NRL for Poliomyelitis and Enteroviruses
- NRL for Rubella, Measles, Chickenpox and other rash
- NRL for Viral Hemorrhagic Fever and ARBO Viruses

International networks - WHO laboratory networks, SECID, EVD-LabNet, MedilabSecure
The new diagnostic and research facility will:

✓ meet all the required regulations related to biosafety and biosecurity
✓ increase the capacity of existing laboratories
✓ improve the conditions of reception and safety of patients
✓ improve working conditions and employee safety
✓ provide the opportunity for further development of diagnostics, in accordance with the continuous growth of scientific knowledge and biotechnological progress

The „Torlak“ will return to the world map of modern diagnostics, where it belongs
CERTIFICATES OF “TORLAK” INSTITUTE

The Institute “Torlak” has certificates for ISO standards:

- ISO 14001:2015 Certificate for Production of medicines, medical devices, food supplements and providing of diagnostic services,
- ISO 22000:2018 Certificate for Production and delivery of solid forms of food supplements,
- ISO 13485:2016 Certificate for Development, production and sales of bacteriological culture media and virological transport medium (CE mark)
- We are in process of obtaining ISO15189 Medical laboratories - Requirements for quality and competence
The Institute "Torlak" has received a certificate of accreditation as a health institution that meets the standards for accreditation of secondary and tertiary healthcare institutions.

The certificate has been issued for the period from December 2016 to December 2023.
On 26 April 2021, the Institute "Torlak" received permission in drug production site and Good Manufacturing Practice Certificate for the manufacturing TorVaxFlu® - INFLUENZA VACCINE (FRAGMENTED VIRUS, INACTIVATED)
Storage and distribution in different cold chain temperature range of:

- Vaccines from the obligatory immunization program
- Covid-19 vaccines
mRNA VACCINE TECHNOLOGY TRANSFER OF THE INSTITUTE „TORLAK”

On August 24th, 2022 “Torlak” Institute signed the mRNA Vaccine Technology Transfer Agreement

➢ the Serbian Ministry of Health,
➢ the Medicines Patent Pool (MPP),
➢ the World Health Organization (WHO),
➢ Afrigen Biologics (PTY) Limited,
➢ the Biologicals and Vaccines Institute of Southern Africa (Biovac).

The aim of the program is establishing a sustainable production of mRNA vaccines in countries with low and middle income countries.
INTRO TRAINING TO mRNA TECHNOLOGY IN SOUTH AFRICA

Feb 20-22 2023
LAYOUT of PRODUCTION AREA for mRNA VACCINES
R&D EQUIPMENT at THE INSTITUTE „TORLAK“
THE INSTITUTE "TORLAK" HAS FILL&FINISH ON SITE

- 2 ml injection vial (2R)
- 6 ml injection vial (6R)
- Ampules
- Prefilled syringes

In accordance with GMP requirements
DEVELOPMENT OF MULTIVALENT mRNA VACCINE FOR INFLUENZA

Worldwide, annual epidemics are estimated to result in about 3 to 5 million cases of severe illness, and about 290 000 to 650 000 respiratory deaths associated with influenza.

Comparative study*

new mRNA influenza vaccine

vs

TorVaxFlu® INFLUENZA VACCINE FRAGMENTED VIRUS, INACTIVATED

Feasibility studies, Immunological studies, Sustainability studies, Deliverables. - to ensure the quality and efficacy of the final mRNA vaccine
DEVELOPMENT OF MULTIVALENT mRNA VACCINE FOR TB

According to the Global Tuberculosis Report 2022 released by the WHO, an estimated 10.6 million new cases of TB and 1.4 million TB-related deaths occurred among human immunodeficiency people in 2021.

The reasons for variable protective efficacy of BCGs might be genetic differences in BCG strains:

- French Pasteur strain (Pasteur 1173P2)
- Brazil strain (BCG Mearou RJ)
- Bulgarian substrain (Sofia SL222)
- Denmark 1331 strain (Danish 1331).
- Russian strain (Moscow-368).
- Japan 172 strain (Tokyo 172-1)

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<thead>
<tr>
<th>Vaccine Type</th>
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<th>Ref</th>
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<tbody>
<tr>
<td>H56 + IC1 and ID93 + GLA-SE</td>
<td>Prophylactic subunit vaccines</td>
<td>(Andersen, 2007; Ottenhoff and Kauffman, 2012)</td>
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<tr>
<td>RV5351</td>
<td>Antigen for multi-antigen subunit vaccine</td>
<td>(Lu et al., 2022)</td>
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<tr>
<td>AEC/BCO2</td>
<td>Subunit vaccine</td>
<td>(Rai et al., 2018)</td>
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<tr>
<td>L91</td>
<td>Lipidated multistage epitope-based vaccine</td>
<td>(Khademi et al., 2018)</td>
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<tr>
<td>Latency antigens incorporated in Modified anka virus vector</td>
<td>Multi-antigenic, multibasic vaccine</td>
<td>(Koon et al., 2017)</td>
</tr>
<tr>
<td>RUTI</td>
<td>Therapeutic vaccine</td>
<td>(Cardona, 2006; Leung-Theng-Long et al., 2015)</td>
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Rabies is included in WHO's 2021–2030 Roadmap for the global control of neglected tropical diseases, which sets regional, progressive targets for the elimination of this disease.

Very effective vaccines are available to immunize people after an exposure to rabies or pre-exposure prophylaxis (recommended for people whose activities might lead to direct contact with mammals that may be infected with rabies).
FOR A SUCCESSFUL PARTNERSHIP

The World Health Organization

The Medicines Patent Pool
- Afrigen Biologics (PTY) Limited,
- the Biologicals and Vaccines Institute of Southern Africa (Biovac)

The Institute „Torlak“ supported by the Serbian Ministry of Health

Thank you for attention!