Poland

Report on EMF Activities

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In Poland research activities in the field of bioelectromagnetics are concentrated in in three **main centres**:

1. Department of Microwave Safety, Military Institute of Hygiene and Epidemiology, Warsaw, Poland (DMS-MIHE);

2. Laboratory for Electromagnetic Hazards, Institute of Occupational Medicine, Lodz, Poland (LEMH-IOM);

3. Institute of Electroenergetics and Institute of Telecommunication, University Technical School, Wroclaw (IE-UTSW; IT-UTSW).

There exist also research centres, affiliated at the University Medical School and Agricultural Academy in Lublin (UMS-AAL), Silesian Medical University School in Katowice (SMUSK) and at some other university departments, where certain projects on particular subjects in bioelectromagnetics are currently on-going.

Recently (2005) a Department of Bioelectromagnetics is being organized at the Central Institute for Labour Protection in Warsaw (DB-CILP) .

During 2004 – 2005 the following **main projects** were in progress in laboratories in Poland:

1. Assessment of individual exposure of residents to 50 Hz magnetic fields (IE-UTSW) and assessment of exposure of workers to ELF and RF fields, including transient exposures (DMS-MIHE, LEMH-IOM, IE-UTSW);

2. Improvement in construction of digital EMF meters (DMS-MIHE, IT-UTSW) and development of meters for pulse-modulated MW fields (DMS-MIHE);

3. Immunotropic and cytogenetic effects of pulse-modulated MW fields on isolated human mononuclear blood cells *in vitro* (DMS-MIHE);

4. Investigation of effects of pulse-modulated (radar) microwave radiation and GSM signals on human auditory function by means of distortion product otoacoustic emission (DMS-MIHE).

5. Assessment of functional abnormalities of cardiac function in workers exposed occupationally to EMFs of various frequency and modulation (LEMH-IOM, DMS-MIHE);

6. Influence of static and 50 Hz magnetic fields (5 – 10 mT) on free-radical formation and redox enzymes in various *in vitro* cellular systems (LEMH-IOM);

7. Influence of 50 Hz magnetic fields (0.5 – 5 mT) on permaeability, active transport and morphology of human placental barrier (UMS-AAL);

8. Clinical application of ELF magnetic fields at high (5 – 15 mT) (magnetotherapy) and low (20 – 50 μT) (magnetostimulatrion) inductivity with various modulations (SMUSK).

The EMF safety guidelines and levels which are in force in Poland were introduced in 2001 (occupational exposures) and 2003 (public and environmental exposures) in form of governmental ordinances. The guidlines assume a possibility of health risks from low-level exposures to RF (0.1 – 300 MHz) and MW (300 MHz – 300 GHz) radiation and of cumulation of harmful effects of EMFs.

In Poland there exist no official governmental commission for coordination and initiation of activities in the field of bioelectromagnetics and EMF safety, including safety of mobile phone systems. The present tasks are partially coordinated during meetings of the Commission for Biological Effects of Non-Ionizing Radiations at the Committee for Medical Physics, Polish Academy of Sciences. The Commission gathers representatives of all main research centers in Poland which are active in bioelectromagnetics and run or plan new projects in this field.

Recently a group of Polish scientists developed an idea of forming a cooperative batch for developing interdisciplinary projects in bioelectromagnetics and promote the present gaps and needs for research and harmonization of EMF safety standards. The group is affiliated at the Polish Society for Radiation Research and plans to cooperate with international commissions for EM safety.

For **occupational exposures** the Polish safety guidlines follow a concept of relatively high permissible levels for short-term (about 5-minute) exposures (levels close to those recommended by ICNIRP) and a time-dependent dose for longer exposures. In effect, permissible exposures for whole-day (8-hr) exposures are for certain RF/MW frequencies 10 - 20 times lower from the ICNIRP recommendations. Additionally, Polish EMF safety guidelines set permissible level for peak pulse power density of pulse-modulated (e.g. radar) MW radiation.

Border intensities of electric field E (f) in safety zones and permissible daily doses $Dd_E(f)$.

Frequency range (f)	Border intensities of electric field E (f) [V/m] the zone			Permissible daily dos electric field $Dd_E(f)$
	Safe and intermediat	Intermediat and hazardo	Hazardous and dangero	
0 - 0.5 Hz (static fields)	10000	20000	40000	3200 $(kV/m)^2h$
0.5 – 300 Hz	5000	10000	20000	800 $(kV/m)^2h$
0.3 – 1 kHz	$100/3f$	$100/f$	$1000/f$	$0.08/f^2$ $(kV/m)^2h$
1 kHz – 3 MHz	33.3	100	1000	0.08 $(kV/m)^2h$
3 – 15 MHz	$100/f$	$300/f$	$3000/f$	$0.72/f^2$ $(kV/m)^2h$
15 – 3000 MHz	6.66	20	200	3200 $(V/m)^2h$
3 – 300 GHz	$0.053f+6.$	$0.16f+19.$	$1.6f+195$	$(f/2+55)^2$ $(V/m)^2$

Border intensities of magnetic field H (*f*) in safety zones and permissible daily doses $Dd_H(f)$.

Frequency range (*f*)	Border intensities of magnetic field H (*f*) [A for the zone			Permissible daily dose of electric field $Dd_H(f)$
	Safe and intermediat	Intermediat and hazardo	Hazardous a dangerou	
0 - 0.5 Hz (static fields	2666	8000	80000	512 $(kA/m)^2h$
0.5 – 50 Hz	66.6	200	2000	0.32 $(kA/m)^2h$
0.05 – 1 kHz	$10/3f$	$10/f$	$100/f$	$800/f^2$ $(A/m)^2h$
1 – 800 kHz	3.3	10	100	800 $(A/m)^2h$
0.8 – 150 MHz	$8/3f$	$8/f$	$80/f$	$512/f^2$ $(A/m)^2h$
150 – 3000 MHz	0.018	0.053	0.53	0.022 $(A/m)^2h$

Public and environmental exposures are limited in the 2003 ordinance and are at present a subject of amendments in view of emerging technologies and spread of mobile telecommunication.

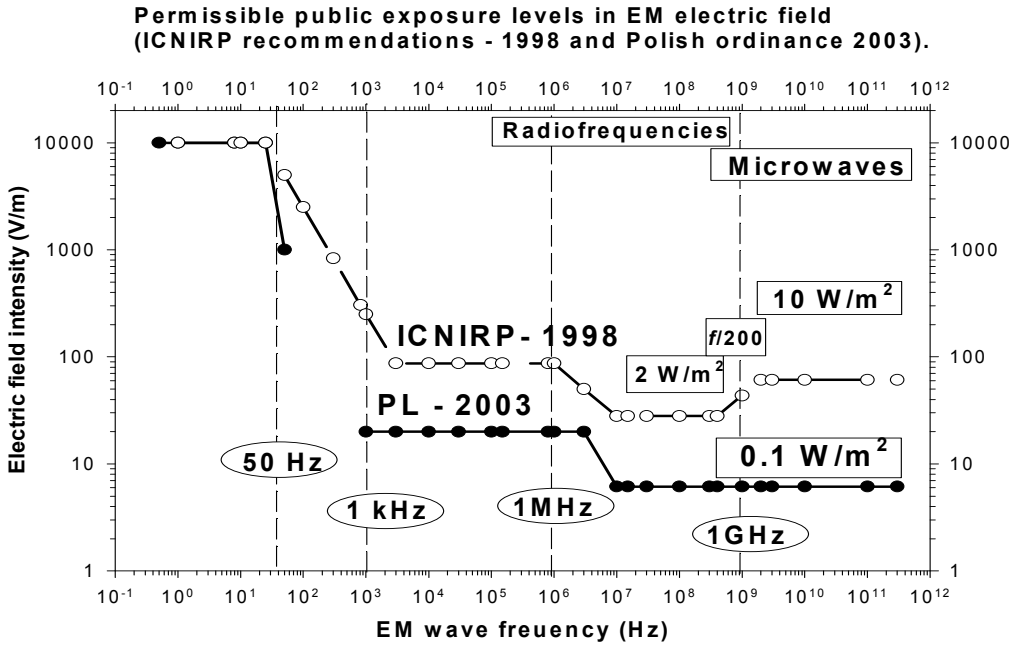
Two problems are main subjects of the discussion:

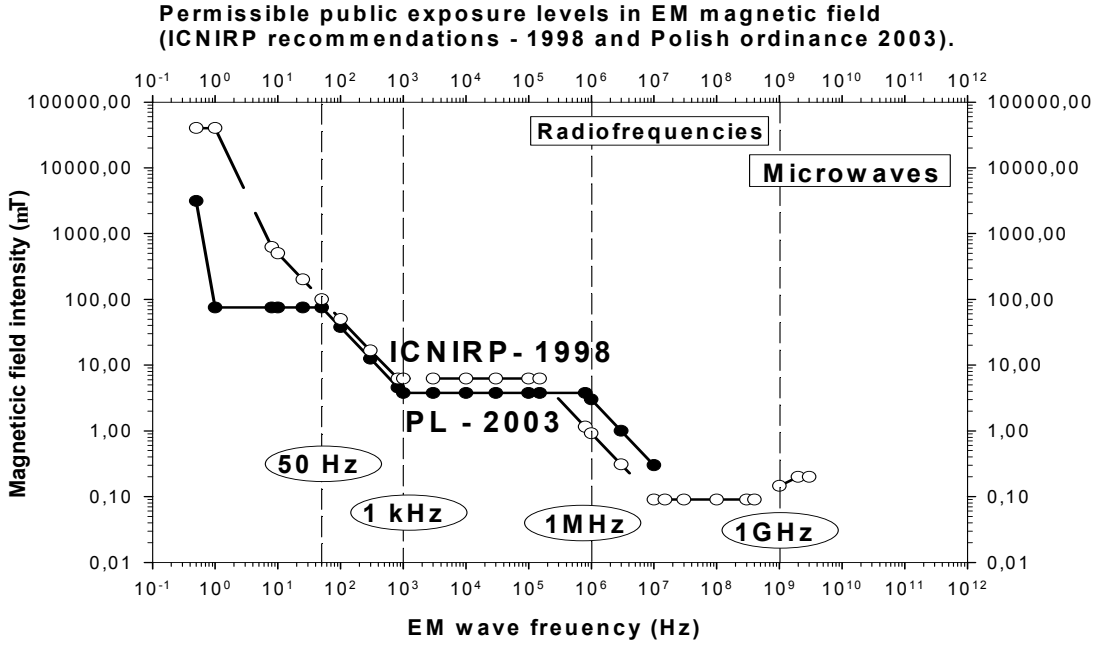
- limitation of exposure to ELF (50 Hz) magnetic fields and seting a reasonable permissible level of public exposure, taking into advance the known risks of low (> 0.4 μT) exposures and measured intensities in single human dwellings (1 – 3 μT);

- limitation of exposure to MW fields in view of the widespread use of mobile phones with generally low-level (< 0.05 W/m^2) continous environmental exposure and considerably higher (5 – 30 W/m^2) uncontrolled short-term local exposures of head during use of mobile phones.

Permissible levels of EMFs in the environment in places accessible for the public.

Frequency range of EMF (*f*)	Physical parameter of EMF		
	Electric component	Magnetic component	Power density
0 Hz	10 kV/m	2500 A/m	
>0 – 0.5 Hz	----	2500 A/m	
>0.5 – 50 Hz	10 kV/m	60 A/m	
>0.05 – 1 kHz	---	$3/f$ A/m	
>0.001 – 0.8 MHz	20 V/m	3 A/m	
>0.1 – 0.8 MHz	20 V/m	3 A/m	
>0.8 – 3 MHz	20 V/m	$2.4/f$ A/m	
>3 – 10 MHz	6.14 V/m	$2.4/f$ A/m	
>10 – 100 MHz	6.14 V/m	----	
>100 – 300 000 MHz	----	----	0.1 W/m^2





A comparison of permissible exposure levels for the public
of electric and magnetic components of EMF in recent Polish regulations (2003)
and ICNIRP recommendations.