

Electromagnetic Fields - The ICNIRP View -

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Federal Office for Radiation Protection, Germany ICNIRP Chairman



Outline

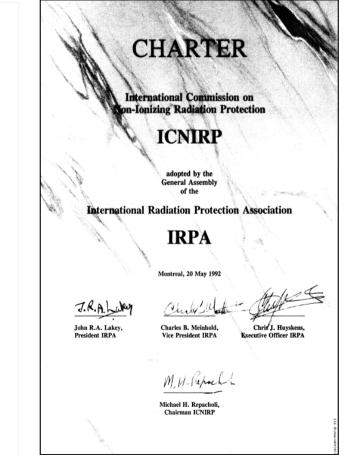
19th EMF day, Paris, December 20, 2012

- Approach to RF protection
- RF relevant topics
- RF revision schedule



ICNIRP International Commission on Non-Ionizing Radiation Protection

- independent group of experts
- emanated from IRPA/INIRC in May 1992
- members are not affiliated with commercial or industrial enterprises
- multidisciplinary
- balanced in terms of geography and gender
- formally recognized cooperation with WHO, ILO, and others
- registered not-for-profit

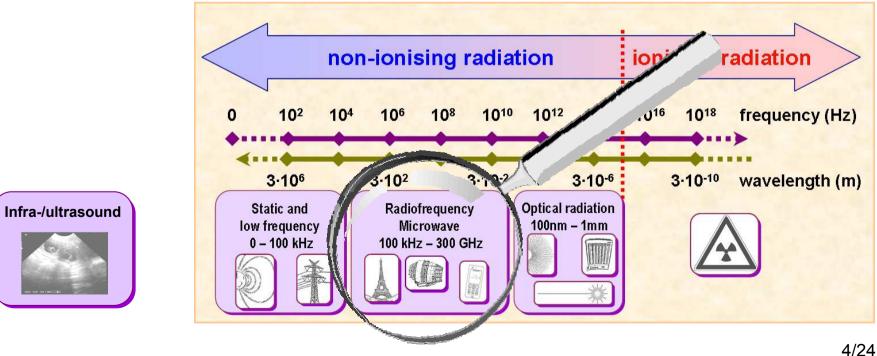






ICNIRP objectives

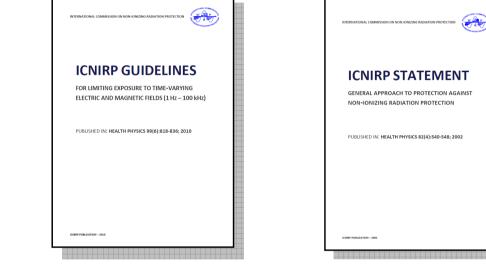
- advance non-ionizing radiation protection
- provide scientific guidance and recommendations
- focus on people and the environment
 - general public, workers, patients







ICNIRP activities







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INTERNATIONAL COMM	ISSION ON NON-IONIZING RADI	ATION PROTECTION) I
FACT	SHEET		
	OR LIMITING EXPOSURE TO TH PUBLISHED IN HEALTH PHYS S		CAND MAGNETIC
effects of non-ionizing i	ally recognized body that sets g adiation. It has recently publis gretic fields (1 Hz to 100 kHz); ritlic background.	hed Guidelines for limit	ting exposure to time-
derived from the curren World Health Organizat	arevious recommendation given t scientific knowledge as describ ion and ICNIRP. Some of the n s. Where appropriate, such differ	ed in extensive reviews ecommendations given	especially those of the in the new document
body is the induction of a	low frequency time-varying elec electric fields and associated curr can cause surface electric charge	ents in the tissues. In ad	
induced by exposure to a electric field threshold o	lectrically excitable nerve and n ow frequency electric and magne f about 4-6 V m ⁻¹ has been calco model and data from volunteer).	tic fields has been well i dated for peripheral ne	established. A minimum rve stimulation, using a
excitation is the induction of the visual field. They electrically excitable cell considered a good but co for induction of phosphe 20 Hz. The evidence for it	lished effect of electric fields b n of magnetic phosphenes, a per are thought to result from the is in the retina. This is formed inservative model of processes the nes in the retina has been estima bearobehavioral effects on brain w frequency electric and magnet	reption of faint flickerin interaction of the indi as an outgrowth of the nat occur in CNS tissue in ited to lie between abou electrical activity, cogni	ing light in the periphery used electric field with It forebrain and can be a general. The threshold it 50 and 100 mV m ⁻¹ at tion, sleep and mood in
affect the neuroendocrin There is no substantial e as Parkinson's disease, r between low frequence	able so far do not indicate that he system in a way that these wi widence for an association betwi multiple sclerosis, and cardiovas y exposure and Alzheimer's or co for an association between lo	culd have an adverse in een low frequency expo cular diseases. The evid disease and anyotropi	pact on human health. sure and diseases such ence for an association hic lateral sclerosis is

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ICNIRP Commission 2012-2016







ICNIRP work plan (IPG) 2012-2016

Guidelines

- Movement in static magnetic fields (0-1 Hz)
- **RF**
- Ultrasound
- Protection principes for NIR and update of the general philosophy

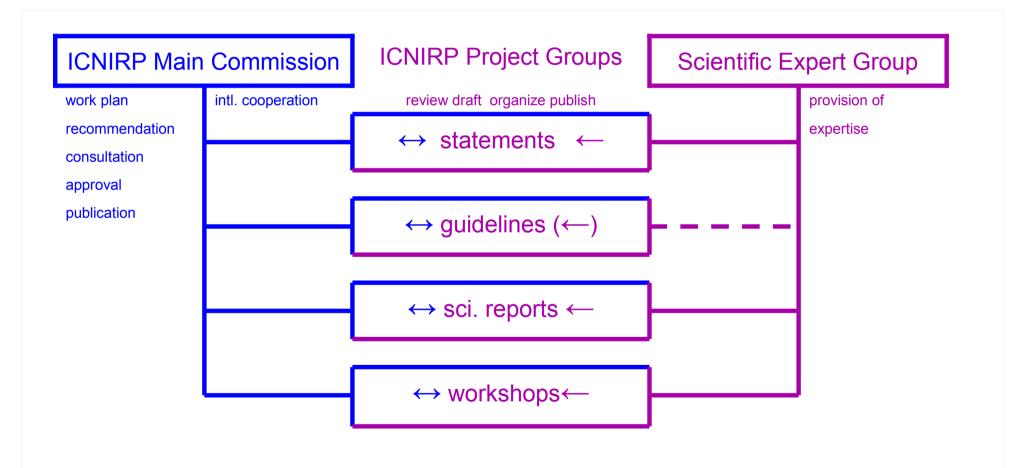
Statements

- Data gaps identified during guideline development
- Changes and impact of the revised optical guidelines
- Intended human exposure for medical and non-medical purposes
- Review of RF dosimetry
- Workshops
 - Workshop on NIR protection in medicine
 - 8th International ICNIRP NIR Workshop





Work organization





Outline

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ICNIRP

Approach to RF protection



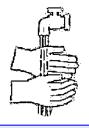
Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Statuten der WHO, 1946

ICNIRP's approach

- protection from established health hazards detectable impairment of the health
- result from a careful analysis of the literature rationale considers direct and indirect, acute and chronic effects
- risk assessment based on sound scientific evidence
 - studies that meet quality criteria
 - totality of science
- reduction (safety) factors to consider quantitative uncertainties in the database and biological variability
- two tier system
 - worker / general public





IONAL COMMISSION ON NON-IONIZING RADIATION PROTECTIO

ICNIRP STATEMENT

GENERAL APPROACH TO PROTECTION AGAINST NON-IONIZING RADIATION PROTECTION

PUBLISHED IN: HEALTH PHYSICS 82(4):540-548: 2002

ICNIRP PUBLICATION - 20

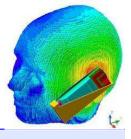
Precautionary approach

- precaution is an approach to risk management
- applied when:
 - health risks are suspected
 - sufficient scientific evidence is missing
- generally center on reducing needless exposure

ICNIRP notes:

- approach of national authorities responsible for risk management
- such approaches should not undermine evidence based guidelines
- the clarification afforded by the European Commission





Basic restrictions (SAR)

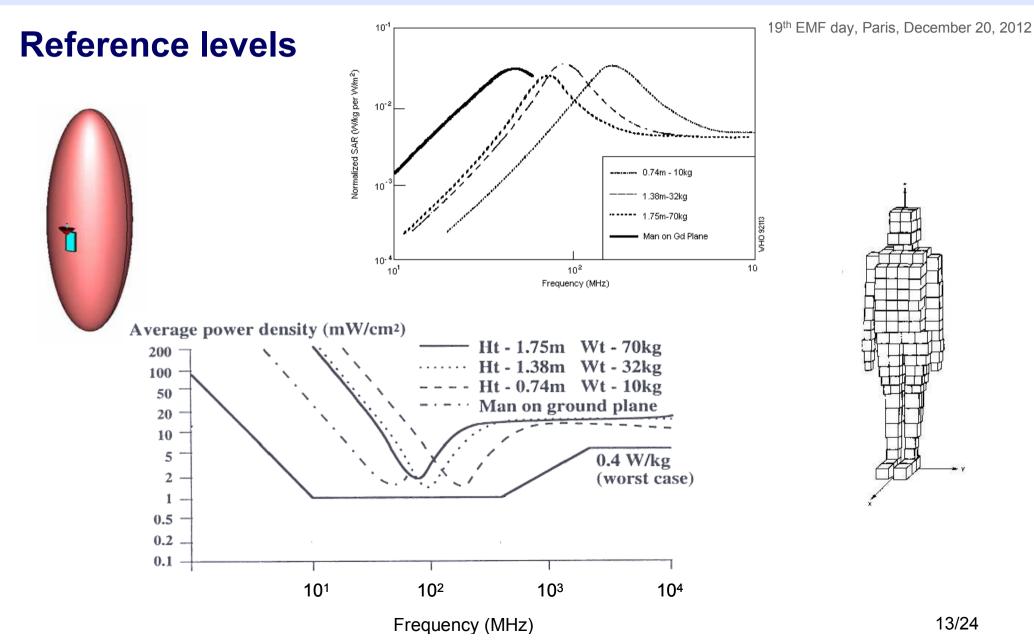
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Workers Whole body exposure 0.4 W/kg Local exposure – head and trunk 10 W/kg **ICNIRP GUIDELINES** Local exposure – limbs 20 W/kg FOR LIMITING EXPOSURE TO TIME-VARYING ELECTRIC, MAGNETIC AND ELECTROMAGNETIC FIELDS (UP TO 300 GHz) **General public** PUBLISHED IN: HEALTH PHYSICS 74 (4):494-522; 1998 0.08 W/kg Whole body exposure Local exposure – head and trunk 2 W/kg Local exposure – limbs 4 W/kg ONIRP PUBLICATION - 199

All values averaged over 6 minutes All local exposure is to be averaged over 10 g



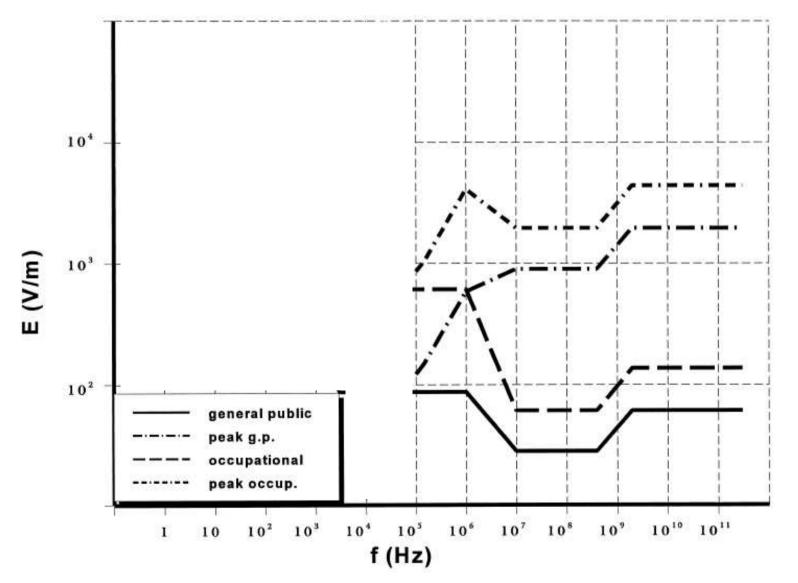






Reference levels

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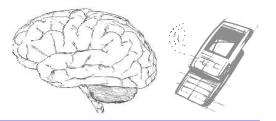
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ICNIRP

- Approach to RF protection
- RF relevant topics
 - cancer and mobile phone use
 - delayed effects at low levels
 - symptoms and well-being
 - age related effects
 - intermediate and THz frequencies





Mobile Phone use and cancer

IARC 2B "possibly carcinogenic to humans data for longerterm use are still limited no convincing evidence from laboratory no plausible mechanism no convincing evidence from epidemiology Nevertheless, while one cannot be certain, the trend in the accumulating evidence is increasingly against the hypothesis that mobile phone use causes brain tumors.





Delayed effects at low levels

- no convincing evidence from epidemiology
- key concerns
 - quality of exposure assessment, missing biological mechanism, short lag periods studied
- research focused on brain tumors
- only single studies on children
- recent high quality animal studies consistently report lack of an effect
- still insufficient evidence for firm conclusions





Symptoms and well-being

attribution of subjective symptoms to EMF (electrosensitivity)

- science does not support the attribution
- perception of EMF by EHS not better than chance
- no proof for changes in physiological functions
- effects related to awareness of exposure (nocebo)
- short term lab studies might be less suitable

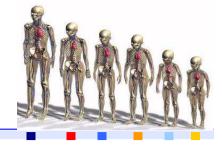




Age related effects

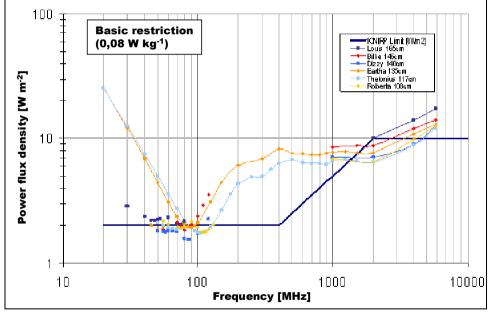
- Stewart report 2000 " ...children might be especially vulnerable ... "
- higher WBA SAR in small people (100 MHz, 1- 4 GHz)
- age related distribution of local SAR in the brain
- impaired thermoregulation in older people
- children may be more vulnerable to dehydration
- overall no robust evidence of age related health effects
- insufficient evidence from animal studies
- very young and elderly rarely included in experimental studies
- still insufficient evidence for firm conclusions





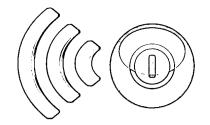
Reference values and age

induced SARs at recommended reference level could be up to 40% higher than the <u>current basic restriction under worst-</u>case conditions



- negligible compared with the large reduction factor of 50 (5,000%)
- the few studies with adequate exposure assessment in the far-field of RF transmitters did not reveal any health-related effects
- exposure levels due to cell phone base stations are generally around one-tenthousandth of the guideline levels
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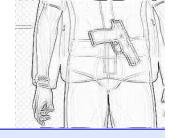




Intermediate frequencies

- exposures to these frequencies are increasing
- very few epidemiological data available (no recent studies)
 - older studies, limited quality, no particular risk identified
- biological effects have not been studied very well
- no long term animal studies
- guidelines are largely based on extrapolation
- **data are still too limited for an appropriate risk assessment**





THz frequencies

- numerous emerging applications (security, military, medical, ...)
- health risks not assessed so far by ICNIRP or WHO
- photo thermal effects well known
- spurious reports of non-thermal effects in vitro
- THz not covered by guidelines so far (except for Laser radiation)



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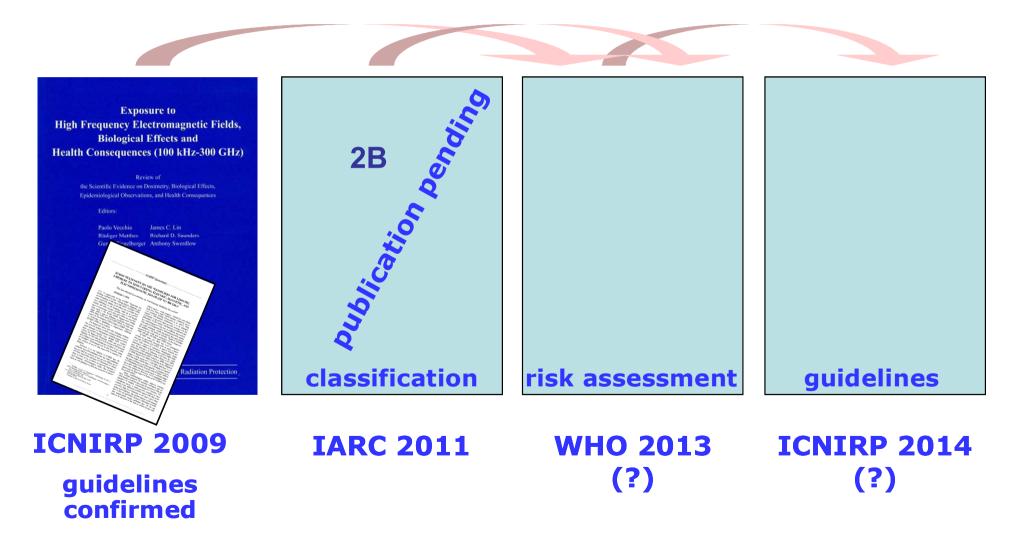
ICNIRP

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RF revision









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www.icnirp.net