19th EMF day, Paris, December 20, 2012

Electromagnetic Fields
- The ICNIRP View -

Rüdiger Matthes

Federal Office for Radiation Protection, Germany

ICNIRP Chairman

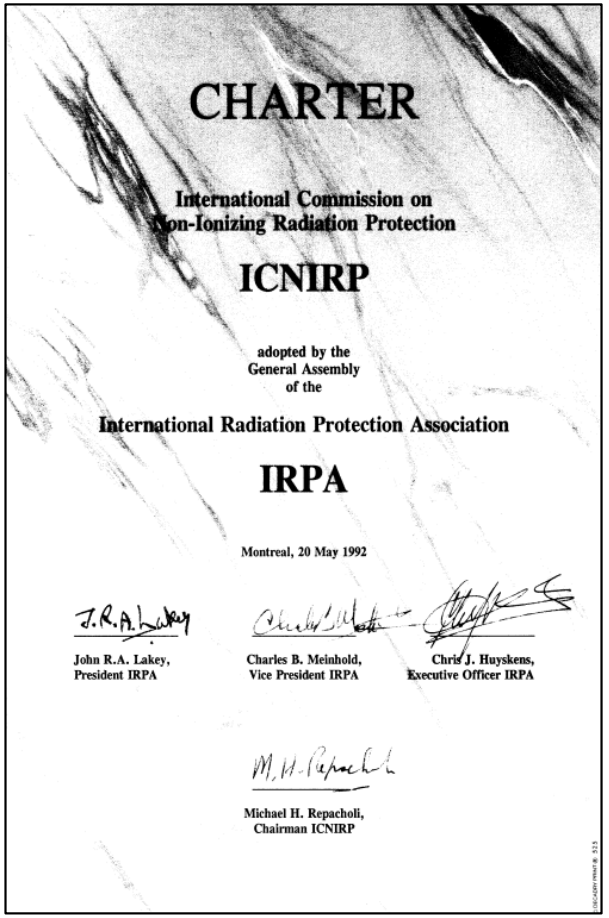
Outline

- ICNIRP
- 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



CHARTER

International Commission on Non-Ionizing Radiation Protection

ICNIRP

adopted by the General Assembly of the

International Radiation Protection Association

IRPA

Montreal, 20 May 1992

John R.A. Lakey, President IRPA

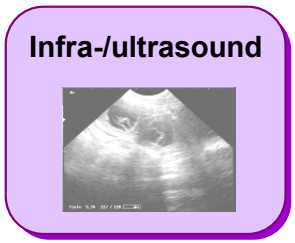
Charles B. Meinhold, Vice President IRPA

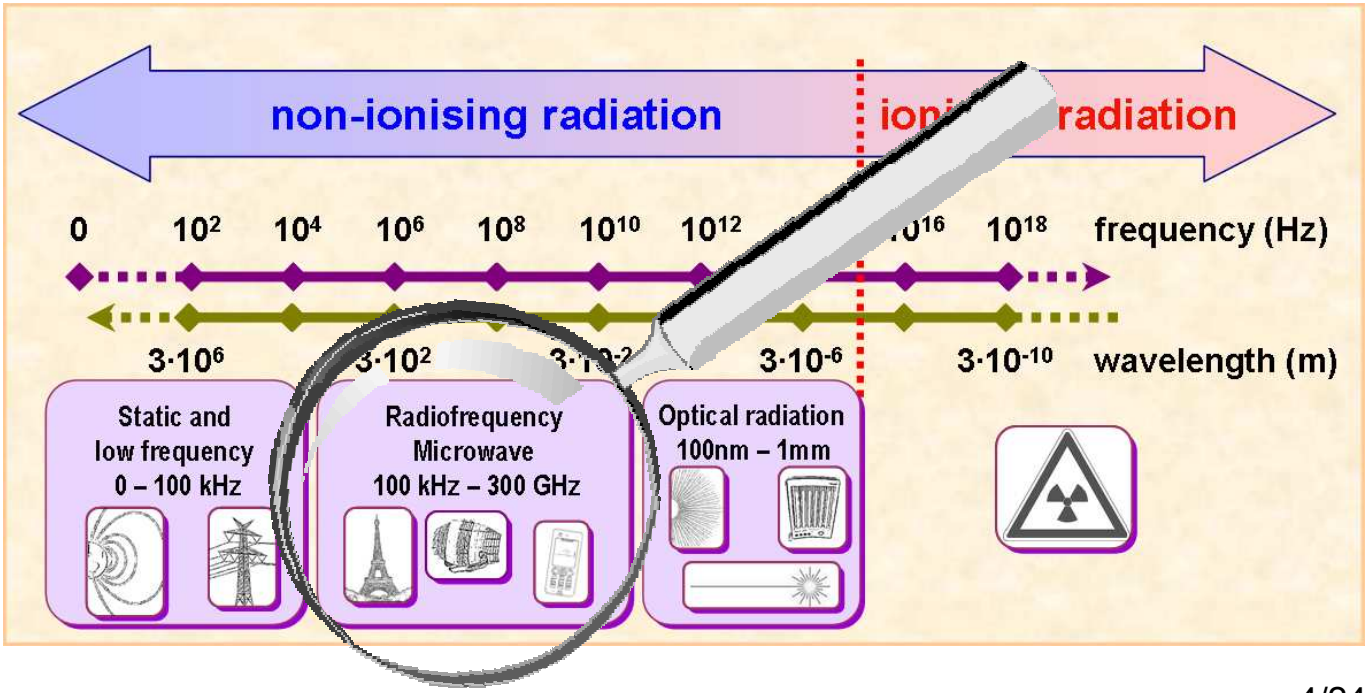
Chris J. Huyskens, Executive Officer IRPA

Michael H. Repacholi, Chairman ICNIRP

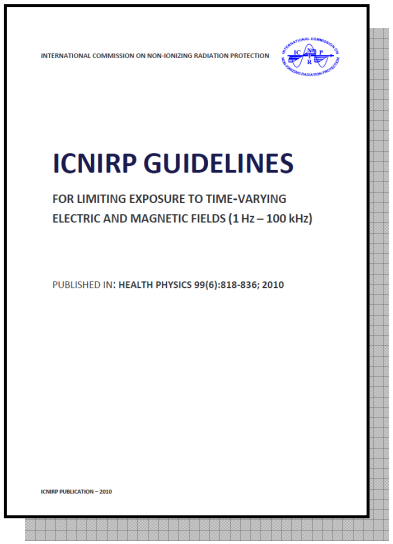
ICNIRP objectives

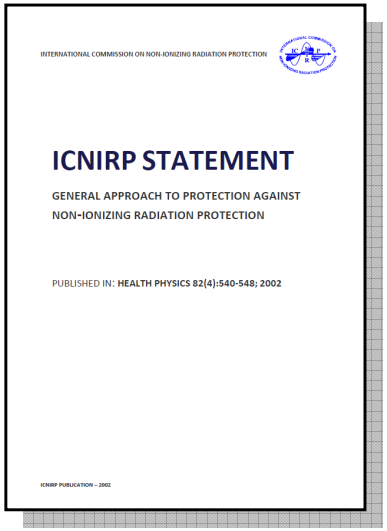
- advance non-ionizing radiation protection
- provide scientific guidance and recommendations
- focus on people and the environment
  - general public, workers, patients

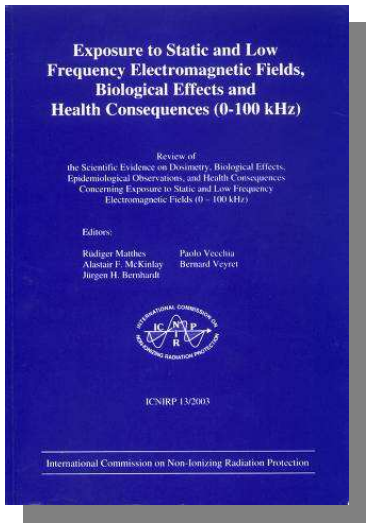


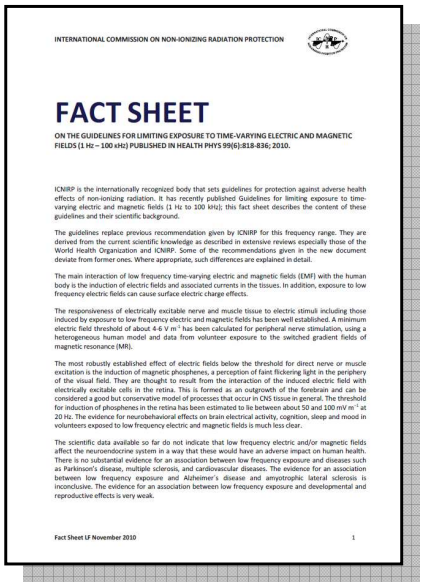


ICNIRP activities









ICNIRP Commission 2012-2016

Rodney Croft

Adèle C. Green

Kari Jokela

James C. Lin

Carmela Marino

Agnette Peralta

Zenon Scienkiewicz

Per Söderberg

Bruce E. Stuck

Eric Van Rongen

Soichi Watanabe

Chairperson
Rüdiger Matthes

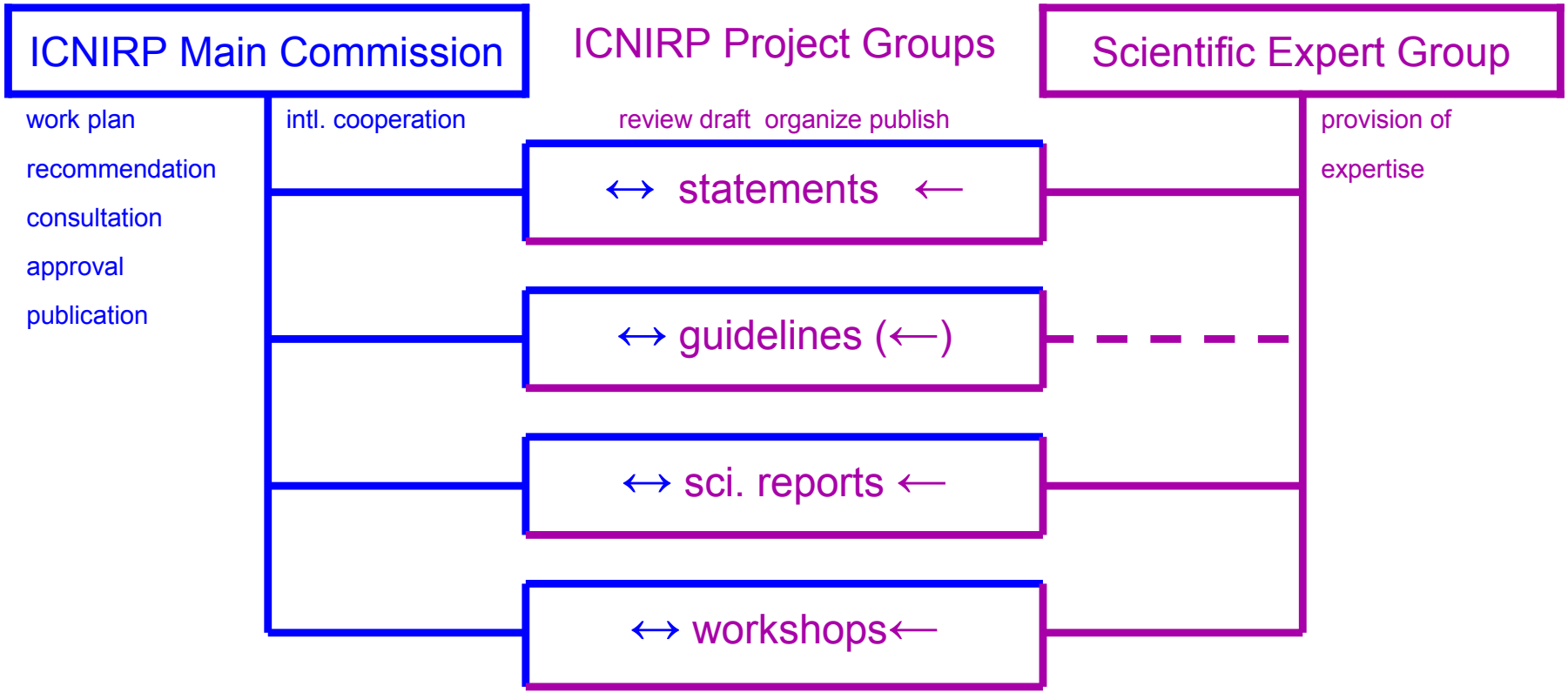
Vice Chairperson
Maria Feychting

Sekretariat
Gunde Ziegelberger
Karine Chabrel

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

- 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.

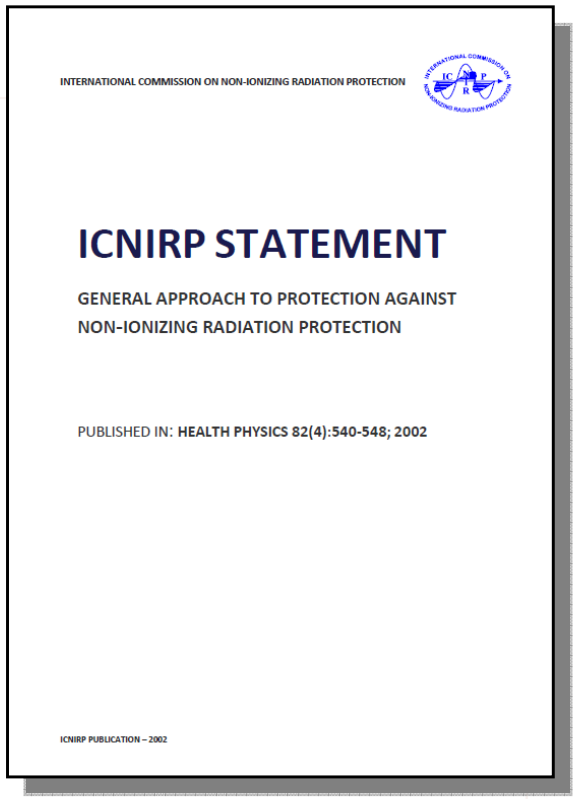
Statuten der WHO, 1946

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

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:

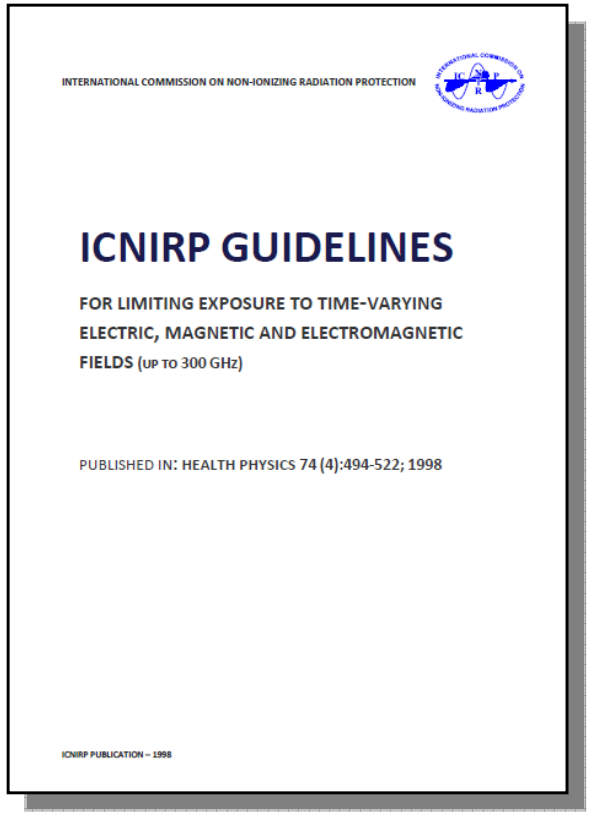
- approach of national authorities responsible for risk management
- such approaches should not undermine evidence based guidelines
- the clarification afforded by the European Commission

Basic restrictions (SAR)

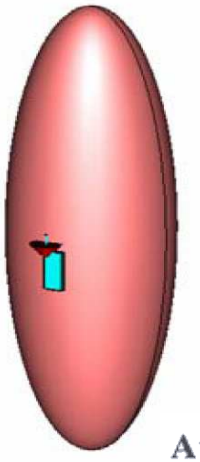
Workers	
Whole body exposure	0.4 W/kg
Local exposure – head and trunk	10 W/kg
Local exposure – limbs	20 W/kg
General public	
Whole body exposure	0.08 W/kg
Local exposure – head and trunk	2 W/kg
Local exposure – limbs	4 W/kg

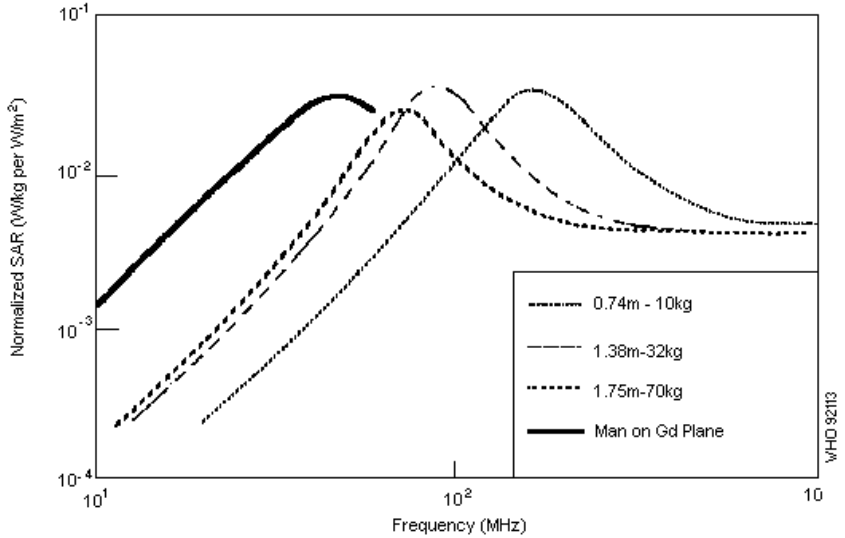
All values averaged over 6 minutes

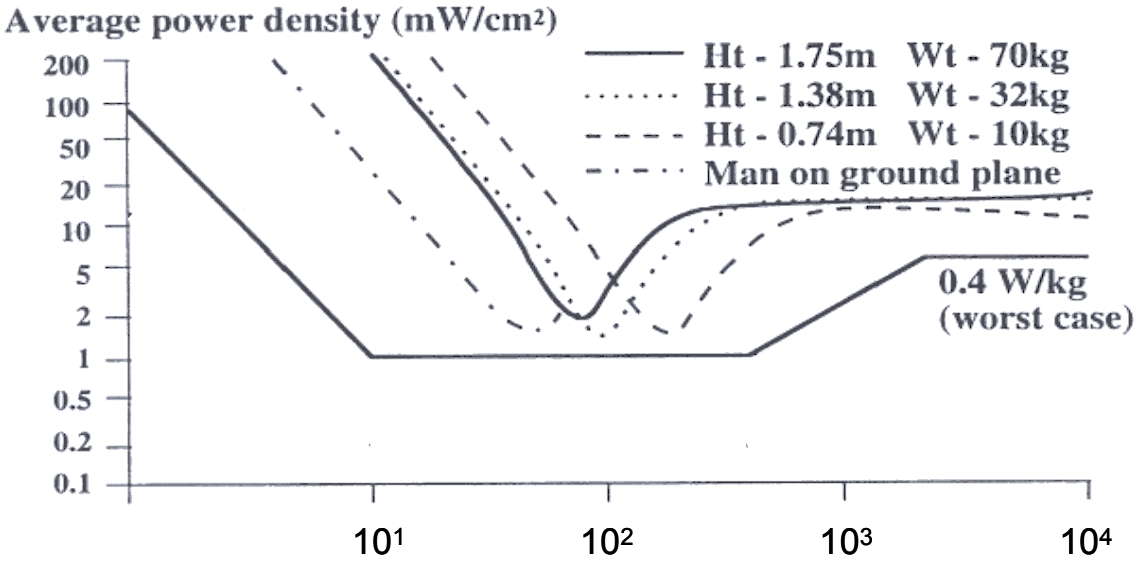
All local exposure is to be averaged over 10 g

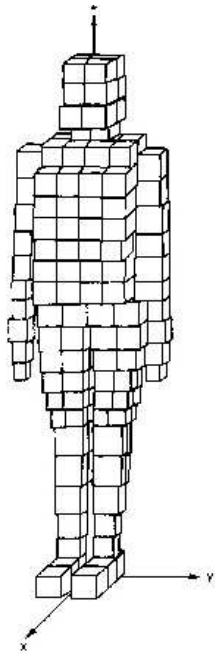


Reference levels









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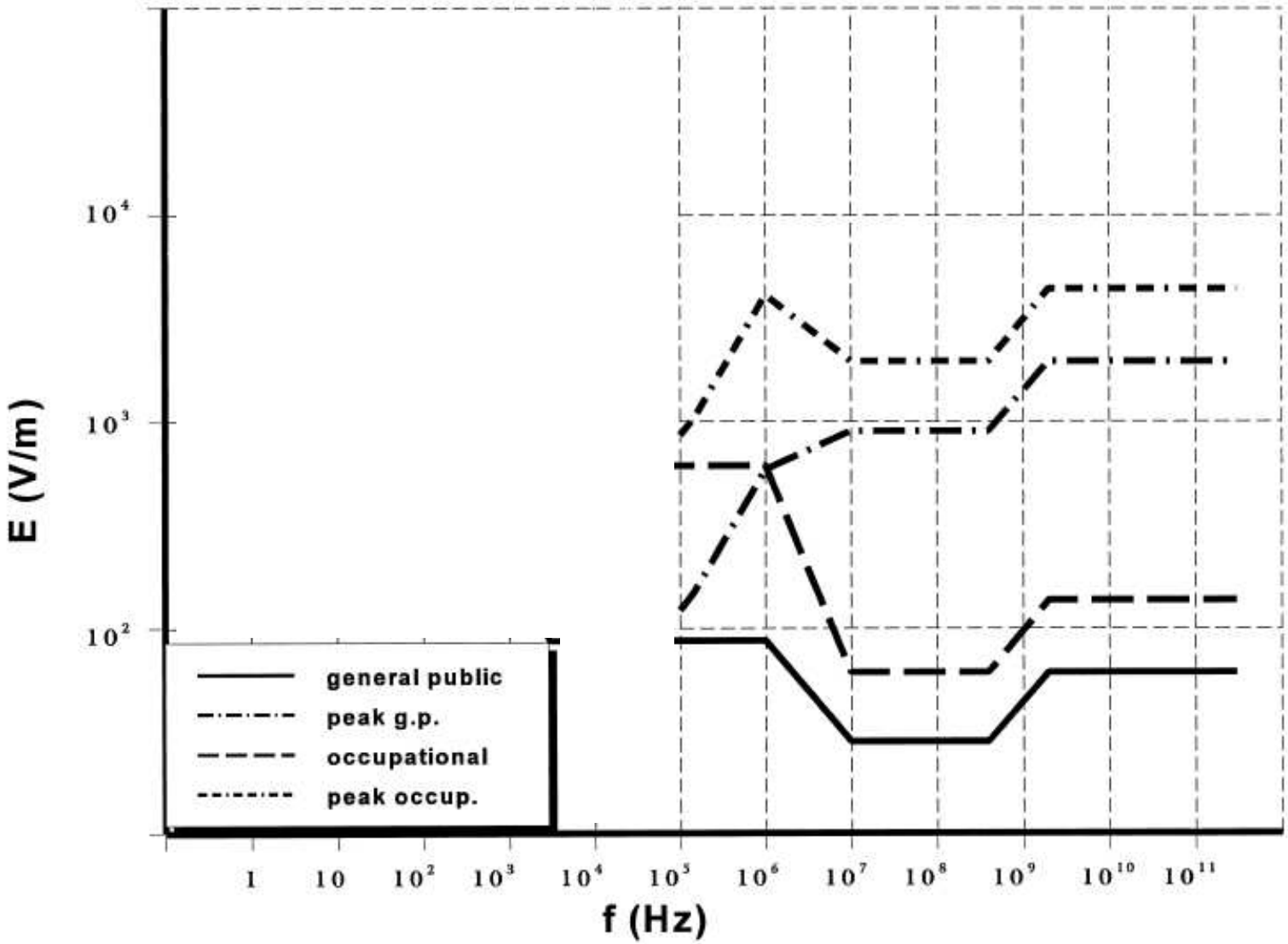
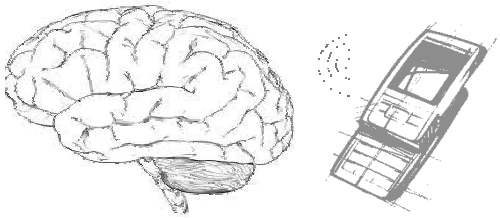


Outline

- 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

data for longer-term use are still limited

IARC 2B "possibly carcinogenic to humans

no plausible mechanism

no convincing evidence from laboratory

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

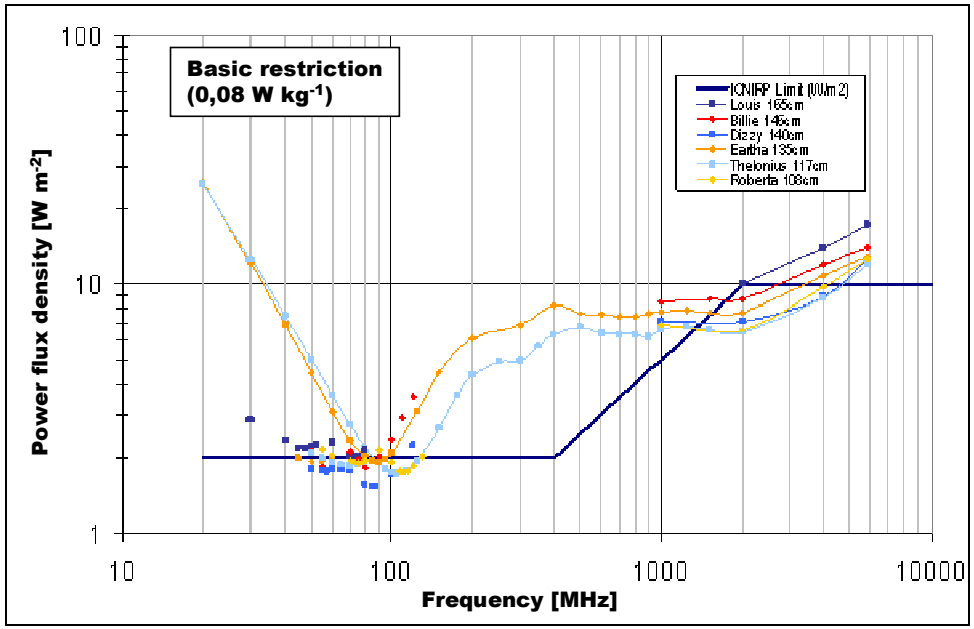
- Stewart report 2000 " ..children might be especially vulnerable …"
- higher WBA SAR in small people (100 MHz, 1- 4 GHz)
- age related distribution of local SAR in the brain
- impaired thermoregulation in older people
- children may be more vulnerable to dehydration
- overall no robust evidence of age 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 current basic restriction under worst-case conditions

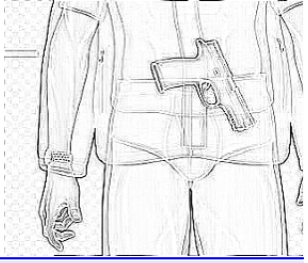


- **negligible compared with the large reduction factor of 50 (5,000%)**
- **the few studies with adequate exposure assessment in the far-field of RF transmitters did not reveal any health-related effects**
- **exposure levels due to cell phone base stations are generally around one-ten-thousandth of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

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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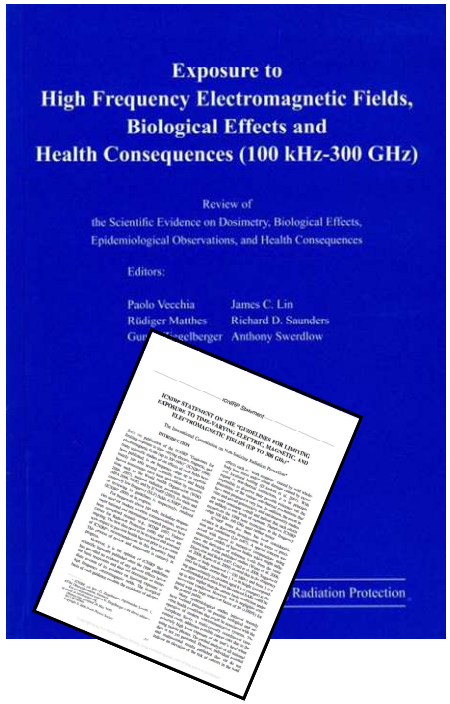
RF revision



ICNIRP 2009

guidelines confirmed

2B

publication pending

classification

IARC 2011

risk assessment

WHO 2013 (?)

guidelines

ICNIRP 2014 (?)

Thank you for your attention

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