EMF AND HEALTH: SCIENTIFIC UPDATE

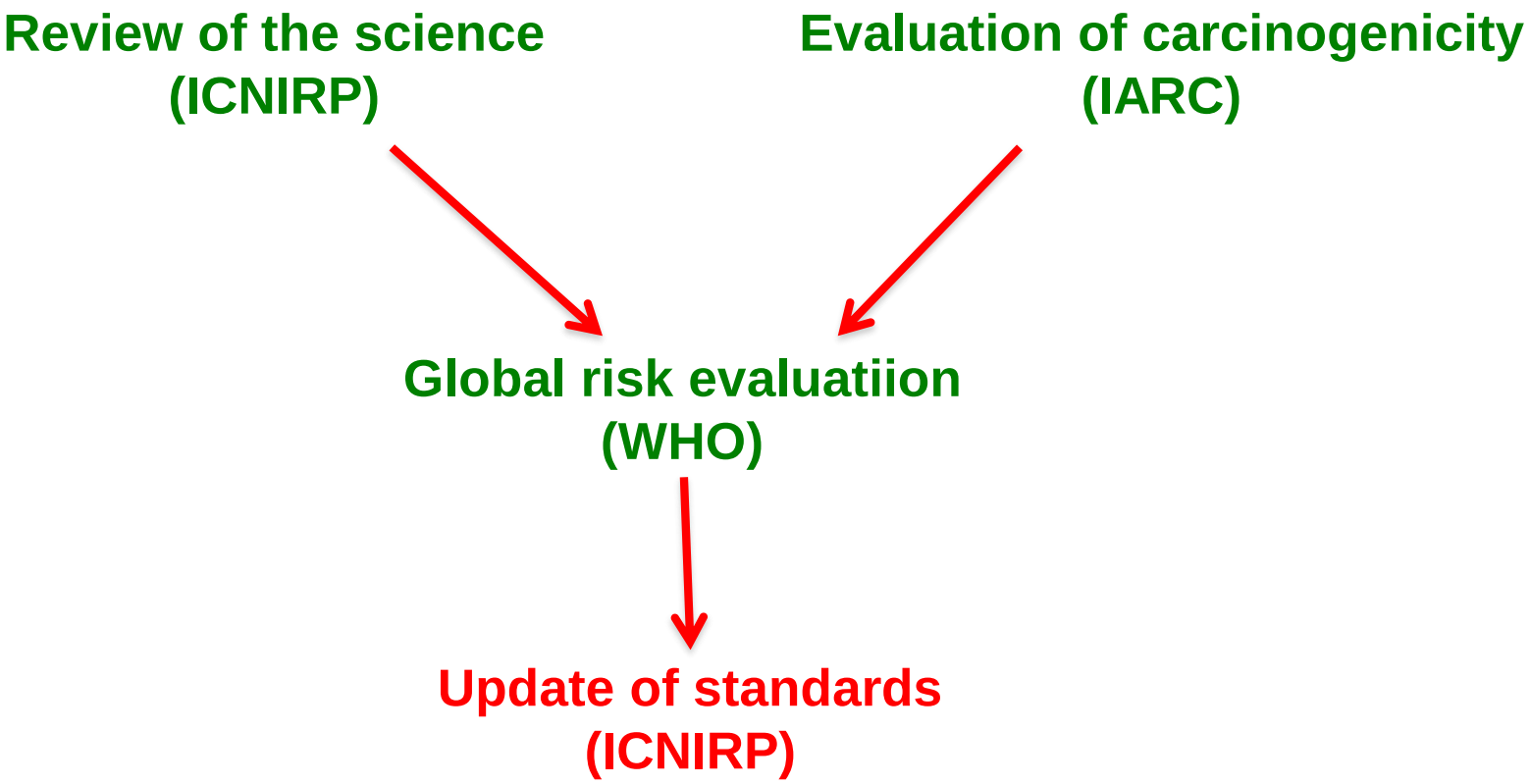
Paolo Vecchia

Chairman of ICNIRP

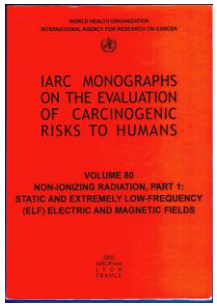
IRPA13

Glasgow, UK, 13-18 May 2012

REVISION OF ICNIRP STANDARDS



STATIC FIELDS



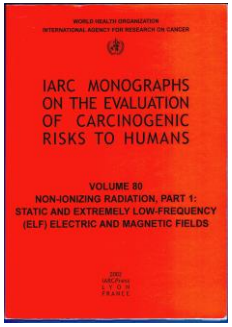
IARC 2002

ICNIRP 2003

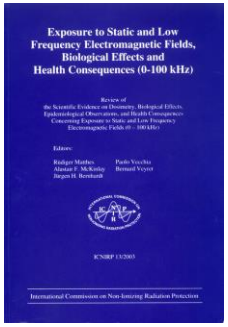
WHO 2006

ICNIRP 2009

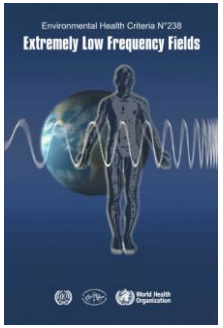
ELF FIELDS



IARC 2002



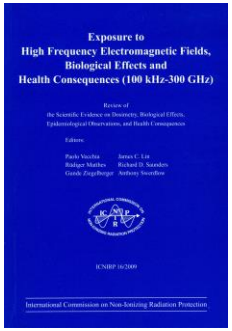
ICNIRP 2003



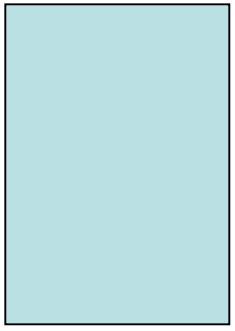
WHO 2007

ICNIRP 2010

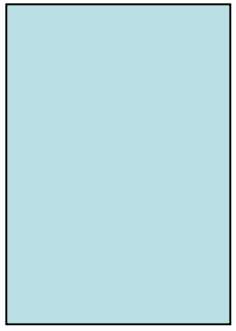
RF FIELDS



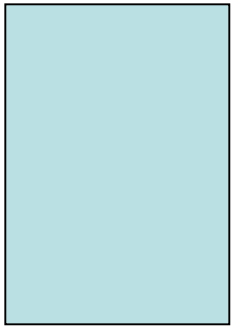
ICNIRP 2009



IARC 2012



WHO 2013



ICNIRP 2013 (?)

IRPA13

Glasgow, UK, 13-18 May 2012

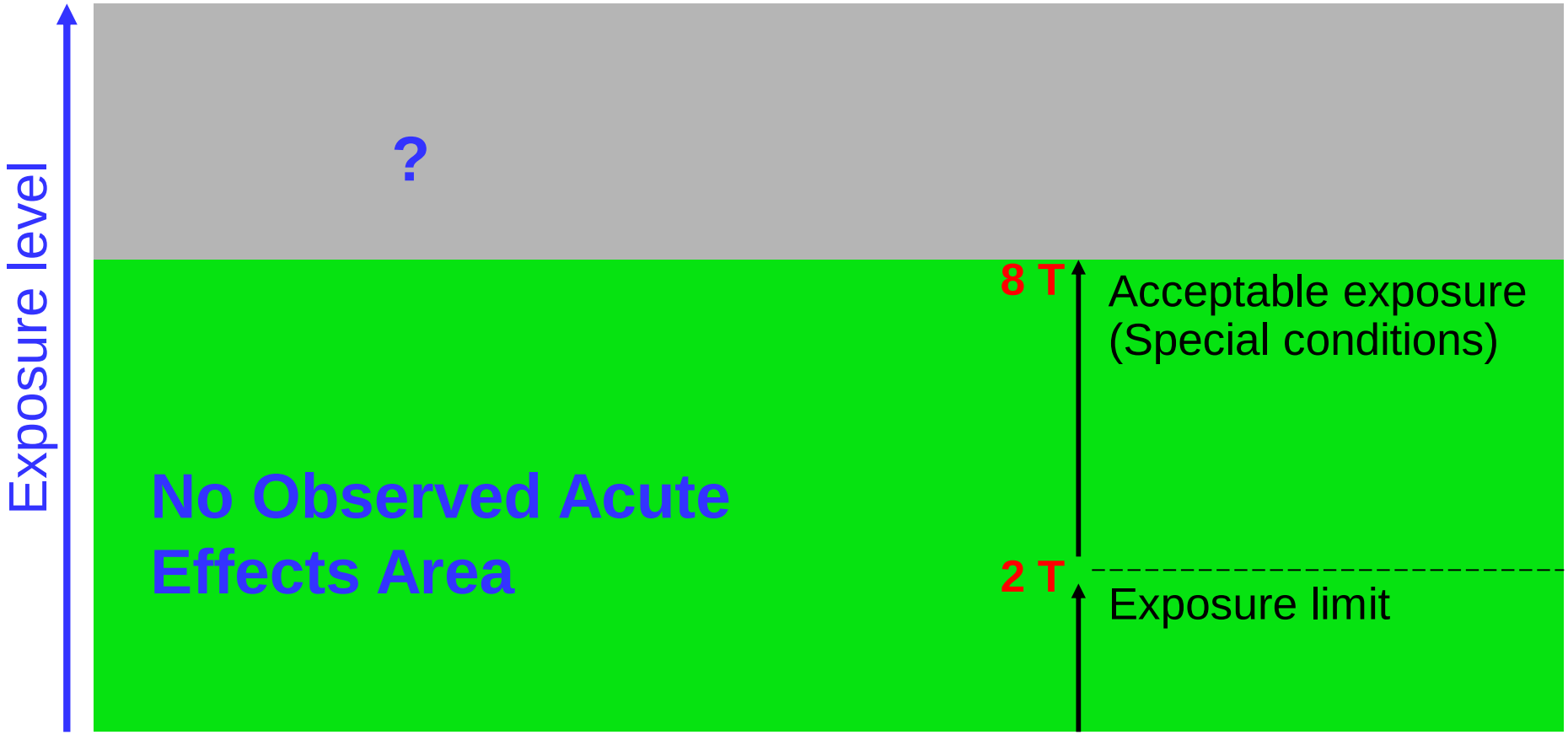
INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION
IC N I R P

STATIC MAGNETIC FIELDS

- Biological effects theoretically predicted: orientation of macromolecules, charge polarization (Hall effect), magneto-hydrodynamic forces
- No evidence of health effects up to the maximum attainable exposure levels
- Theoretically predicted threshold levels higher than field strengths presently attainable (≈ 8 T)
- Some disturbances (phosphenes, vertigo, nausea) reported by some individuals above 2 T

Protection system based on the maximum no-observable acute effect level (NOAEL)

STATIC MAGNETIC FIELDS ("NOAEL" APPROACH)



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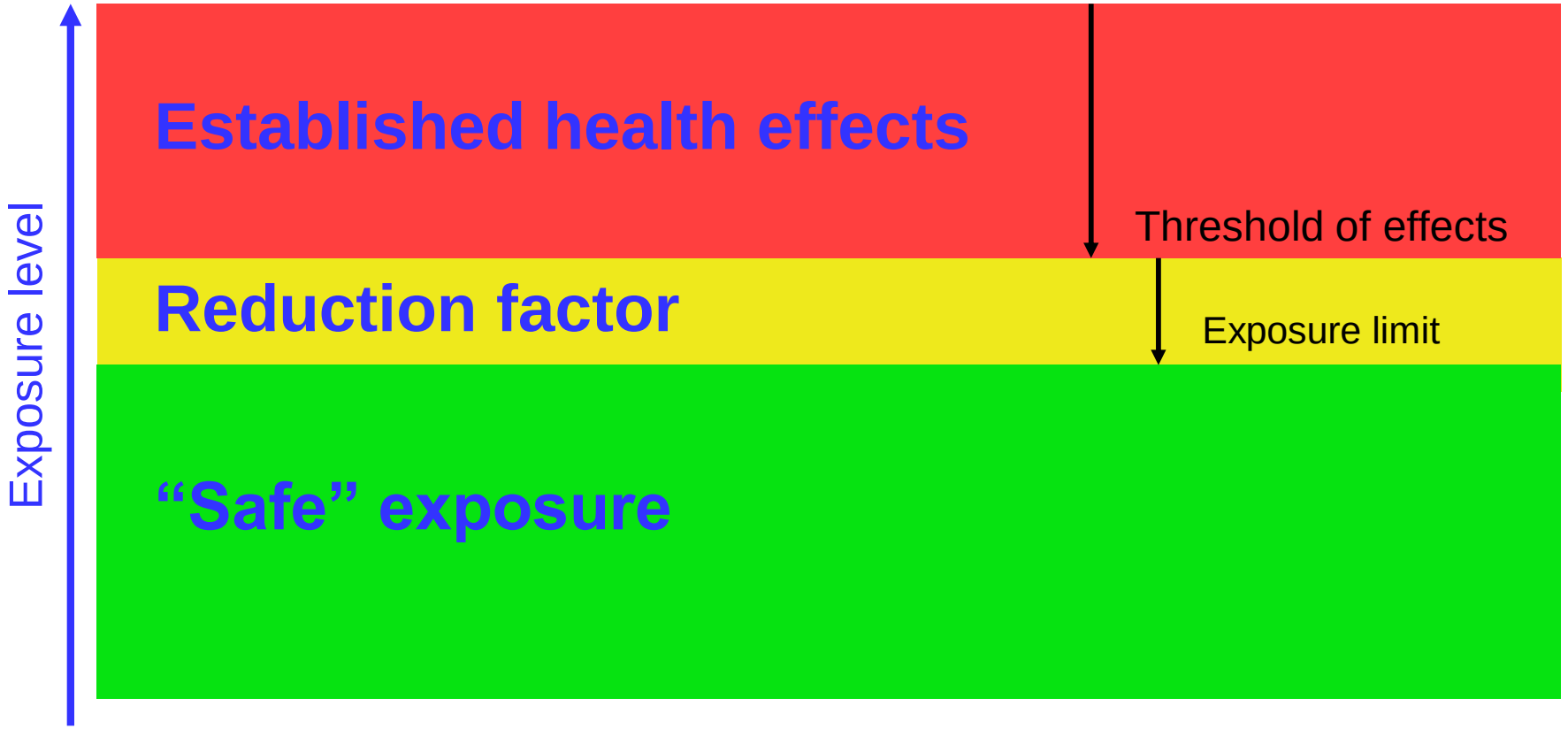
IC N I P R

TIME-VARYING ELECTROMAGNETIC FIELDS

- Acute effects established since a long time
- Mechanisms and thresholds clearly identified
- Effects and thresholds confirmed by most recent studies

Threshold-based protection system confirmed

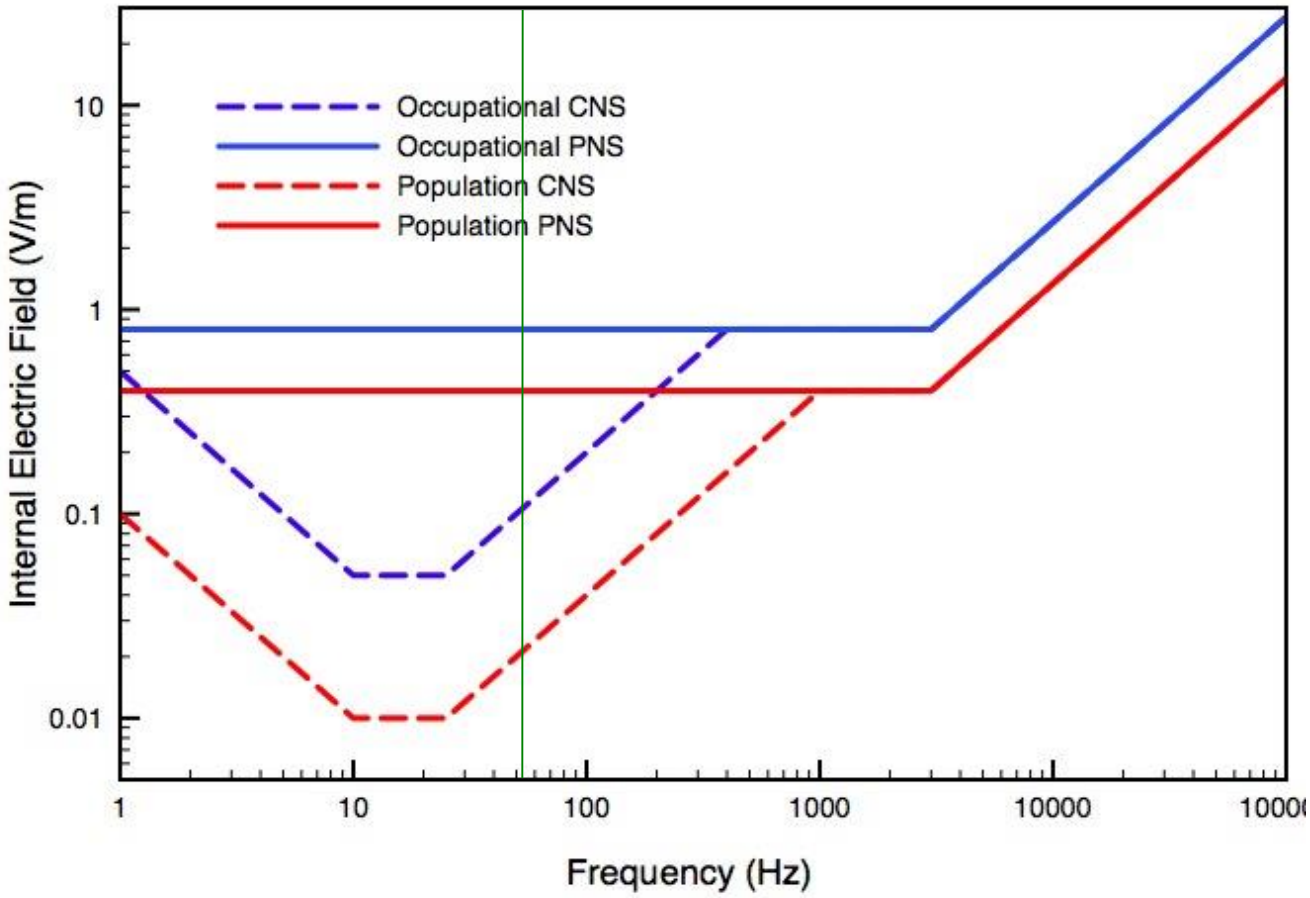
TIME-VARYING ELECTROMAGNETIC FIEL FIELDS (THRESHOLD-BASED APPROACH)



LOW-FREQUENCY ELECTRIC AND MAGNETIC FIELDS (1 Hz – 100 kHz)

- Health effects due to stimulation of electrically excitable tissues (nerves and muscles)
- Advances in numerical dosimetry
- Improved knowledge of frequency dependence of thresholds
- Disturbances (phosphenes) reported below the thresholds for health effects at extremely low frequencies (around 20 Hz)
- Consideration of phosphenes in the revision of guidelines (with possible relaxation)

LF - BASIC RESTRICTIONS



HIGH-FREQUENCY ELECTROMAGNETIC FIELDS (100 kHz – 300 GHz)

- Health effects due to absorption of electromagnetic energy (thermal effects)
- Substantial advances in dosimetry
- Some indications of non-thermal effects below basic restrictions. Replication needed. Health consequences unclear

LONG-TERM EFFECTS
LOW-FREQUENCY FIELDS

- ELF magnetic fields classified by IARC as “possibly carcinogenic” (Group 2B) in 2002
- Classification based on limited evidence in humans (epidemiology) and inadequate evidence in animals

UPDATE OF EPIDEMIOLOGY

Our results are in line with previous pooled analyses showing an association between magnetic fields and childhood leukaemia. Overall, the association is weaker in the most recently conducted studies, but these studies are small and lack methodological improvements needed to resolve the apparent association.

We conclude that recent studies on magnetic fields and childhood leukaemia do not alter the previous assessment that ELF magnetic fields are possibly carcinogenic.

L. Kheifets et al. Pooled analysis of recent studies on magnetic fields and childhood leukaemia. B. J. Cancer, 2011

ICNIRP ON LONG-TERM EFFECTS

A causal relationship between magnetic fields and childhood leukemia has not been established nor have any other long term effects been established.

The absence of established causality means that this effect cannot be addressed in the basic restrictions.

ICNIRP Guidelines, 2010

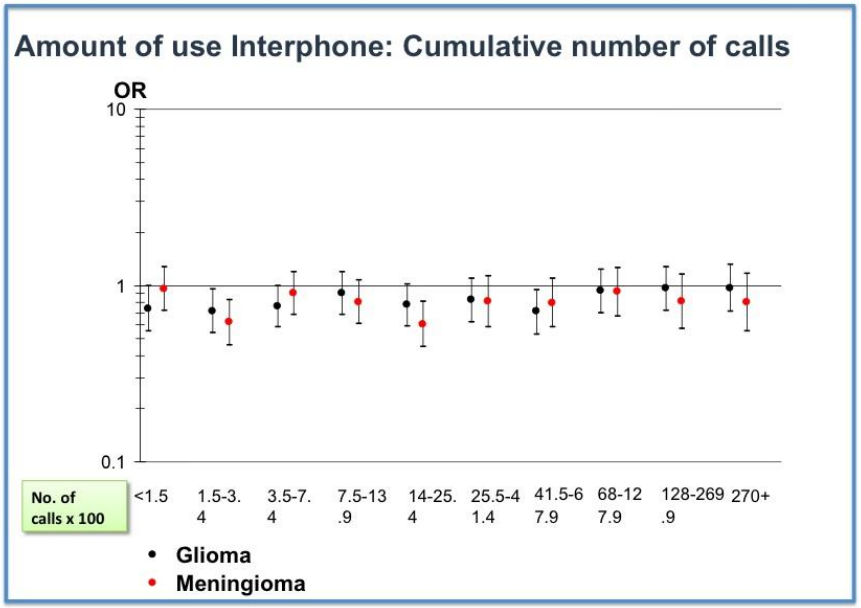
LONG-TERM EFFECTS
HIGH-FREQUENCY FIELDS

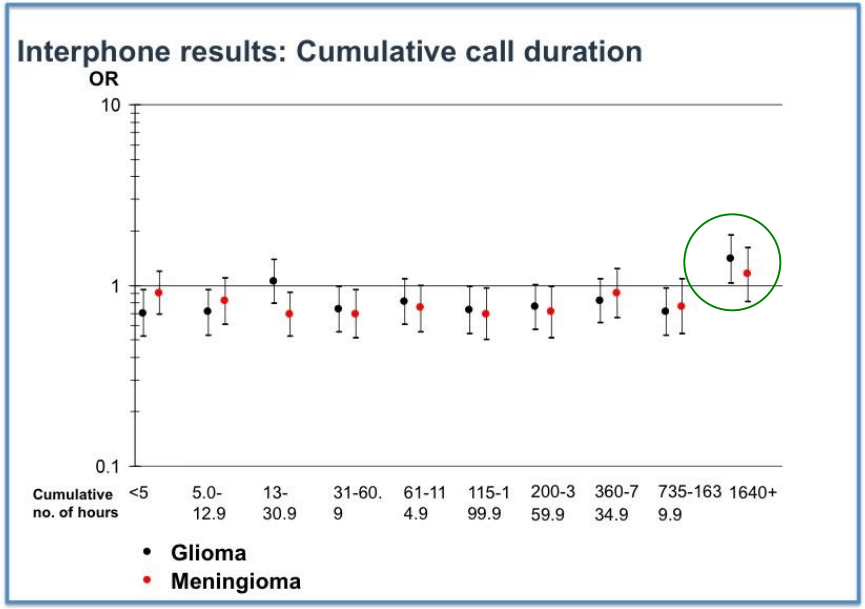
- RF electromagnetic fields classified by IARC as "possibly carcinogenic" (Group 2B) in 2011.
- Classification based on limited evidence in humans (epidemiology) and limited evidence in animals.
- Evaluation mostly based on studies on mobile phone use
- Publication of the monograph expected mid-2012

MOBILE PHONE EPIDEMIOLOGY

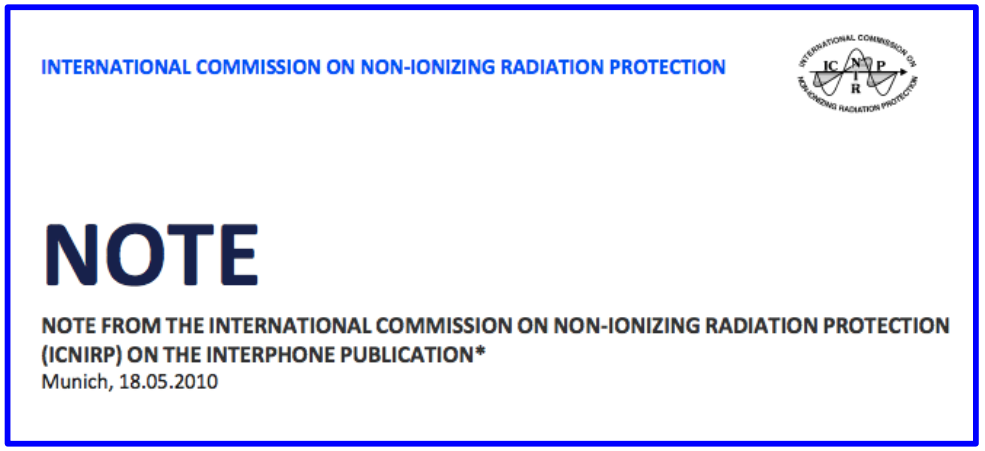
- Danish cohort study negative
- Increase of brain tumours reported by one research group (Hardell et al, Sweden)
- INTERPHONE case-control study mostly negative (some partial findings debated)

THE INTERPHONE STUDY





ICNIRP ON THE INTERPHONE STUDY (2010)



INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION

NOTE

NOTE FROM THE INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION (ICNIRP) ON THE INTERPHONE PUBLICATION*

Munich, 18.05.2010

www.icnirp.org

ICNIRP believes on preliminary review of the results that they do not change the overall conclusions

ICNIRP therefore concludes that the results of the Interphone study give no reason for alteration of the present guidelines.

ICNIRP ON LONG-TERM EFFECTS (2011)

[The Interphone data] combined with the results of biological and animal studies, other epidemiological studies, and brain tumour incidence trends, suggest that within the first 10-15 years after first mobile phone use there is unlikely to be a material risk of adult brain tumours resulting from mobile phone use.

ICNIRP - SC I. Mobile Phones, Brain Tumours, and the Interphone Study: Where Are We Now? Environ Health Perspect 2011

THANK YOU
FOR YOUR ATTENTION