



ICNIRP 7th International NIR Workshop

Edinburgh, United Kingdom, 9-11 May 2012



EVOLUTION OF ICNIRP GUIDELINES: SCIENTIFIC AND PHILOSOPHICAL ASPECTS

PAOLO VECCHIA
ICNIRP CHAIRMAN



WHAT IS ICNIRP

ICNIRP is an **independent** group of international experts responsible for providing scientific advice to international bodies, national authorities and the public on possible health effects of non ionizing radiation and for assisting in the development of protection policies.



INDEPENDENCE OF ICNIRP

Economic independence

- Financial support from public bodies only
- Public declaration of interest

Scientific independence

- No consideration for social or economic factors



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MAIN COMMISSION 2012 – 2016

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ICNIRP ACTIVITIES

- Analysing physical characteristics of NIR and reports of biological aspects from exposure to NIR;
- Recommending appropriate terminology, quantities, units and methods of measurements;
- Developing protection criteria;
- Recommending systems of protection against NIR, including appropriate exposure limits;
- Giving guidance for the protection of workers, members of the public, patients and the environment;
- Issuing statements, recommendations or papers on selected topics as appropriate, including reports on the application of Commission recommendations.

ICNIRP Charter, 1992



"PHILOSOPHY" DOCUMENTS

Review of Concepts, Quantities, Units and Terminology for Non-Ionizing Radiation Protection

Health Physics 49(6): 1329-1365, 1985

General Approach to Protection Against Non Ionizing Radiation

Health Physics 82(4): 540-548, 2002

www.icnirp.org



WORKSHOPS ON ICNIRP "PHILOSOPHY"

International Workshop "15 Years on: Reviewing the Past and Looking Forward.
ICNIRP Workshop on Basic Radiation Protection Principles"

Prague (Czech Republic), 15-16 September 2008

International Workshop on "Evaluation and Communication of Scientific Evidence
and Uncertainty - Towards a Consistent Terminology in Non-Ionizing Radiation"

Salzburg (Austria), 23-24 November 2009



DEVELOPMENT OF ICNIRP GUIDELINES – EMF

- 1984 Interim guidelines on RF fields (100 kHz – 300 GHz)
- 1988 Guidelines on RF fields (100 kHz – 300 GHz)
- 1990 Interim guidelines on ELF fields (60/60 Hz)
- 1994 Guidelines on static magnetic fields
- 1998 Guidelines on EM fields (up to 300 GHz)
- 2009 Revision guidelines on static magnetic fields
- 2010 Revision guidelines on LF fields (1 Hz - 100 kHz)



DEVELOPMENT OF ICNIRP GUIDELINES – OPTICAL RADIATION

- 1985 Guidelines on UV radiation (180 – 400 nm)
- 1986 Guidelines on laser radiation (180 nm – 1 mm)
- 1989 Minor changes to guidelines on UV radiation
- 1996 Guidelines on laser radiation (180 nm – 1 mm)
- 1997 Guidelines on incoherent optical radiation (0.38 – 3 μm)
- 2000 Revision of guidelines on laser radiation (400 nm – 1.4 μm)



STATEMENTS

- 1988 Alleged risks from VDUs
- 1990 Fluorescent lights and malignant melanoma
- 1991 Health issues of UV sunbeds
- 1991 **Protection of MRI patients**
- 1996 Health issues of mobile phones and RBS
- 2000 Hazard assessment of LEDs
- 2003 Health issues of UV tanning
- 2003 Compliance test for complex waveforms
- 2004 Health issues of security devices
- 2008 EMF-emitting new technologies
- 2009 **Statement on 1998 guidelines**
- 2012 Health issues of body scanners



TO BE PUBLISHED

Guidelines on incoherent optical radiation (380 nm – 1 mm) – **Final editing**

Guidelines on laser radiation (180 nm – 1 mm) – **Final editing**

Guidelines on electric and magnetic fields (< 1 Hz) and movement in a static magnetic field – **Open consultation**



IN PREPARATION

Guidelines on radiofrequency EMF

Background documents:

ICNIRP “Blue Book”	Published 2009
IARC Monograph	Expected 2012
WHO Environmental Health Criteria	Expected 2013

Expected publication of revised RF Guidelines: 2013-2014



A GOOD PROTECTION STANDARD SHOULD BE ..

- Based on solid science
- Based on consensus
- Updated to present knowledge
- Transparent in its development
- Clear and concise
- Adequately conservative
- Practically implementable
- Stable over time



SCIENTIFIC BASES OF GUIDELINES

The scientific rationale of guidelines results from an analysis of the pertinent literature that is at the same time:

- **Comprehensive**

All papers are considered

- **Selective**

Papers are weighed based on

- Scientific quality
- Reproducibility
- Consistency



THE WAY TO CONSENSUS

- Draft prepared by an ad hoc working group
- Discussion and approval by the Main Commission
- **Open consultation**
- Incorporation of comments
- Final approval and publication



TRANSPARENCY

- Procedure steps explicit and defined a priori
- Deliverables at every step (Blue Books, EHC, Draft document)
- Open consultation



PROTECTION SYSTEMS

- **Health threshold based systems**

Adequate for well established, threshold effects

- **Optimization systems**

Adequate for no-threshold known hazards

- **Precautionary measures**

Adequate for suspected, not established hazards

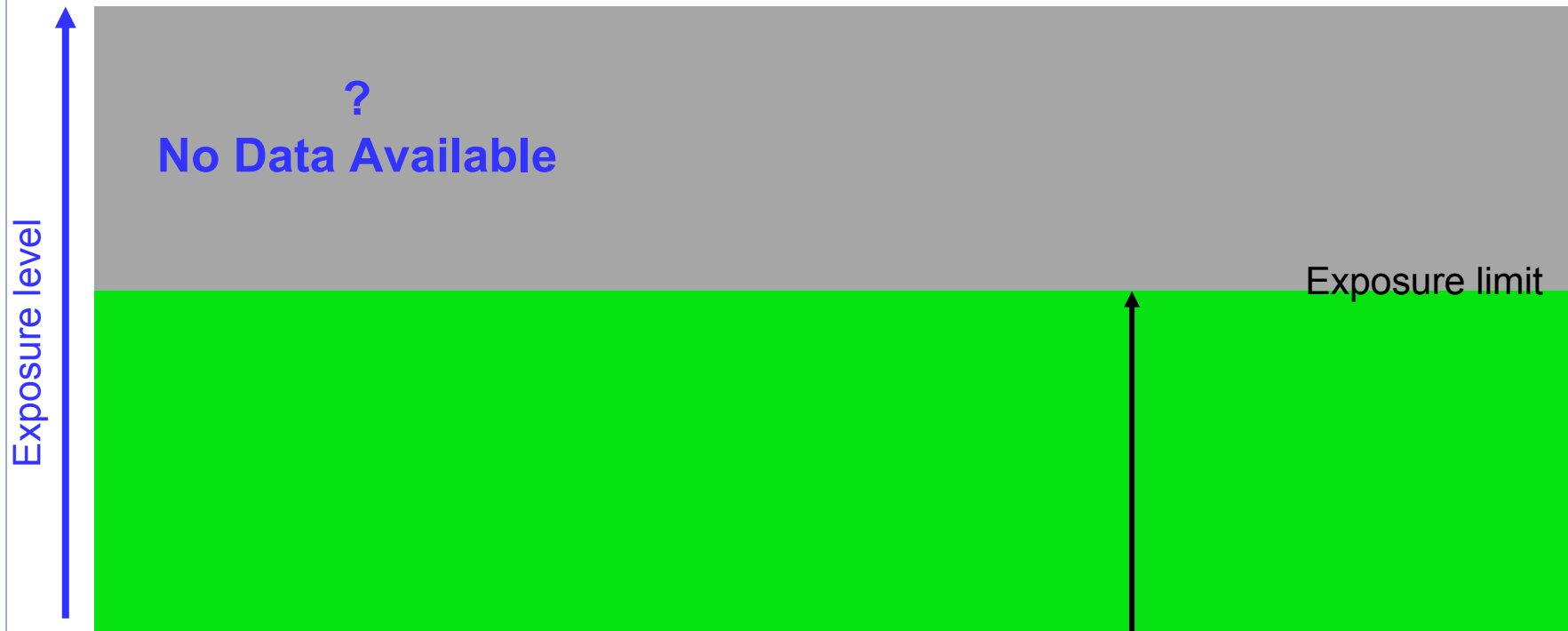


EXPOSURE LIMITS – THRESHOLD-EFFECT APPROACH





EXPOSURE LIMITS – NOAEL APPROACH





PRACTICAL IMPLEMENTABILITY

Some disturbance symptoms (e.g. nausea, vertigo, phosphenes) have been established that **are not health effects per se** but, if prolonged, may result in adverse health conditions.

In such cases, **exposures above limits** recommended for general exposure, and up to a defined level, are acceptable if justified by the technology, and provided adequate measures are adopted (consensus, training, medical control)



CONSIDERATION OF NON-ESTABLISHED EFFECTS

Painful as it may be to elicit, radiation protection bodies have a responsibility to develop quantitative expressions of their collective assessment of EMF risk.

This task might be made more palatable by breaking it into parts that would poll scientific opinion on

- (i) the probability that environmental EMFs are at all harmful**
- (ii) the magnitude of the EMF hazard, conditional on the existence of a harmful effect.**

H. Keith Florig, Science, 1992



PROTECTION AGAINST NO-THRESHOLD EFFECTS

If available data permit the identification of an adverse effect, but not the detection of a threshold, other risk reducing strategies will have to be used.

The role of ICNIRP as a scientific advisory body would be to provide the general recommendation that the occurrence of the adverse effect should be minimized, e.g. by minimizing the exposure. ICNIRP should also attempt to analyze the risk in terms of levels of consequences that could be quantified.

The acceptability of such risks would, however, be based also on social and economic considerations, and as such, fall outside the remit of ICNIRP.



LONG-TERM EFFECTS OF NON IONIZING RADIATION

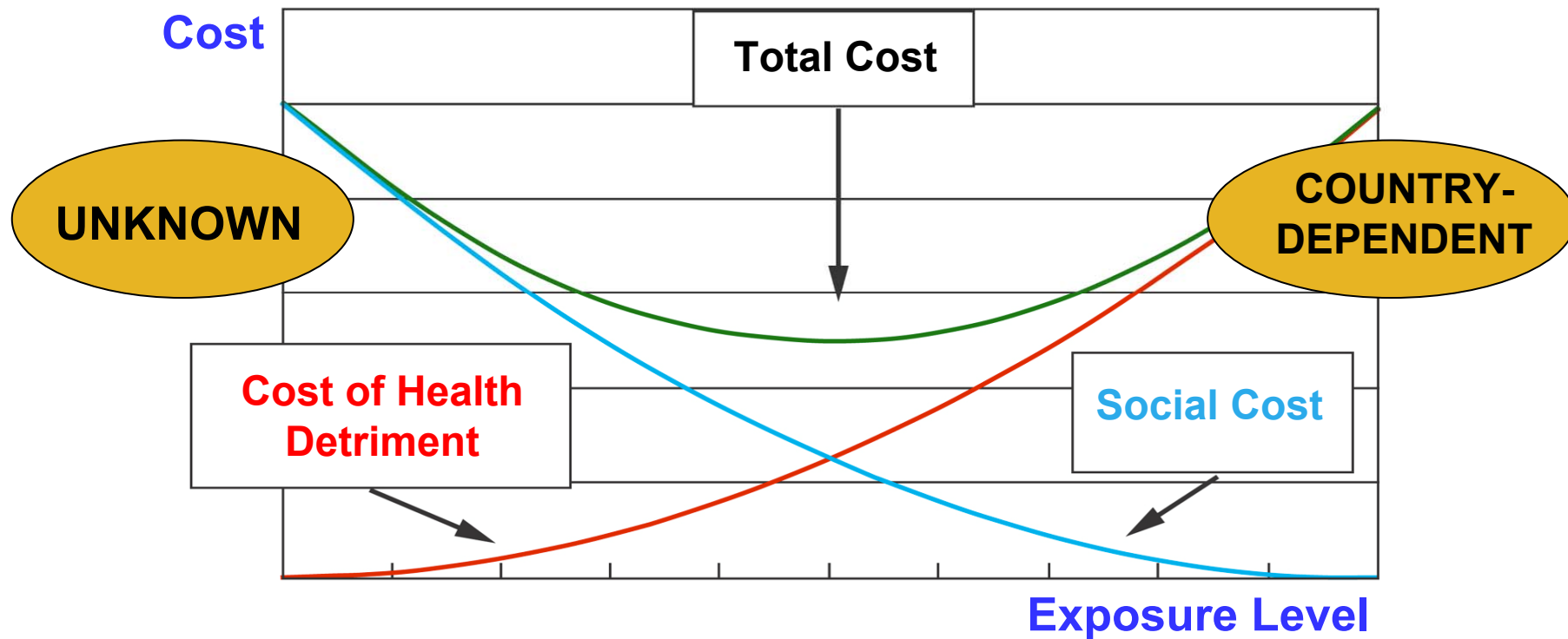
Have long-term effects been scientifically established?

Is the health impact quantifiable? (based on an established exposure-effect relationship)

The answers are different for the different types of NIR (EMF vs optical radiation, see IARC classification)



IS THE ALARA PRINCIPLE APPLICABLE TO NIR?



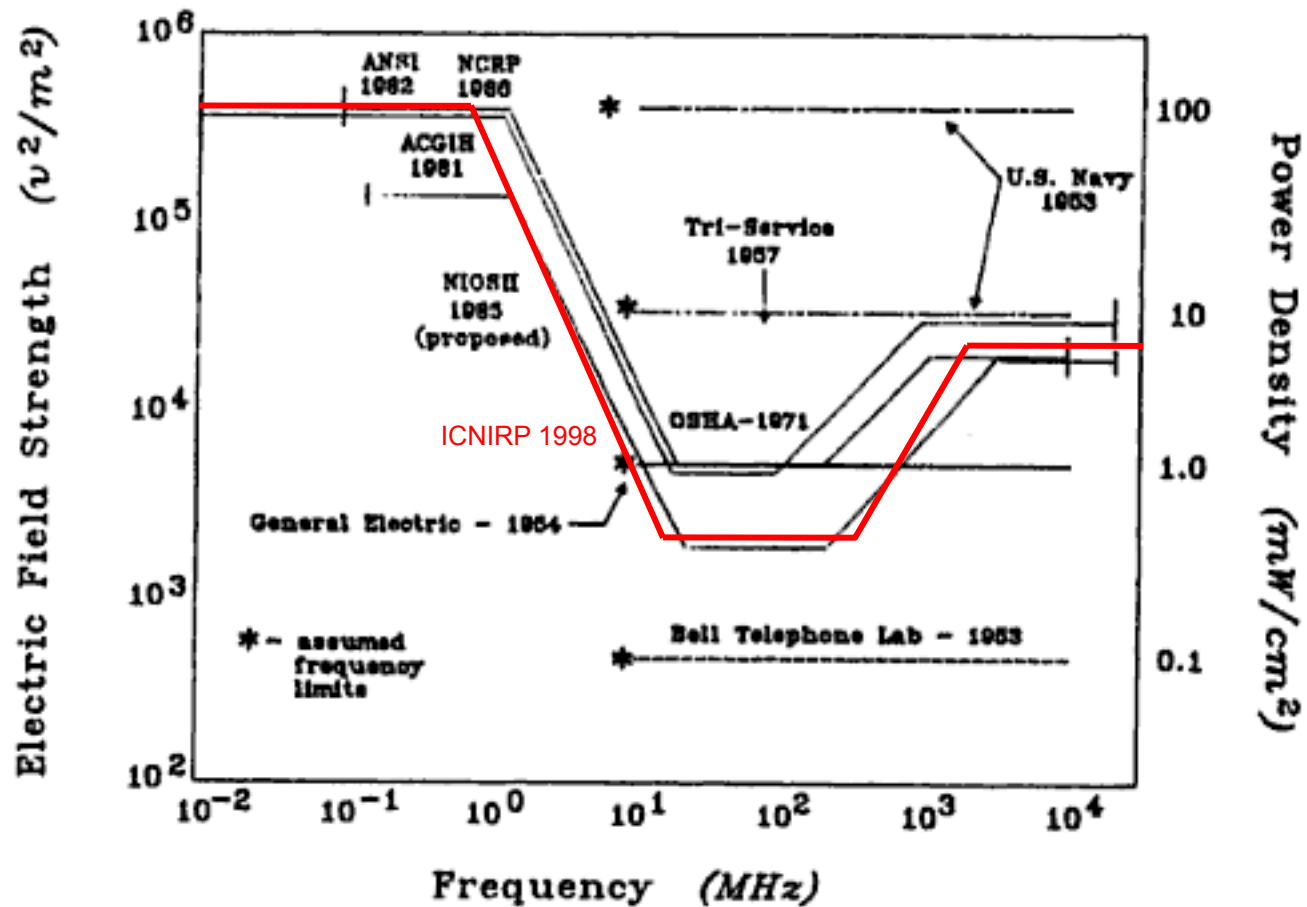


UPDATE OF PROTECTION GUIDELINES

- “Old” does not necessarily mean “not valid any longer”
- Long duration is in general a proof of good norms
- A balance between **stability** and **updating** is needed



STABILITY OF RF GUIDELINES



Adapted by Hitchcock and Patterson 1995



WHY TO REVISE A GUIDELINE?

Good reasons

- New scientific evidence (new effects, changes in thresholds, refinement of dosimetry)
- New technologies (revision of safety factors, possibility of relaxation)
- Outdated research database

Not good reasons

- Social pressure (from any side)
- Time passed from last revision
- Different regulations issued by national or local authorities



SCIENCE-BASED LAW OR LAW-BASED SCIENCE?

Une chose n'est pas juste parce qu'elle est loi.

Mais elle doit être loi parce qu'elle est juste.

(Any thing is not right because it is law.

But it must be law because it is right)

Montesquieu, De l'esprit des lois, 1748



MAIN ISSUES RELATED TO GUIDELINES

- Scientific basis
- Effectiveness
- Costs
- Health priorities
- Impact on technical development
- Practicallity
- Social implications (e.g. risk perception)
- Ethical issues
- Legal constraints

ROLE OF ICNIRP (AND OTHER STAKEHOLDERS)?



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THANK YOU
FOR YOUR ATTENTION