

ICNIRP AND INTERNATIONAL STANDARDS

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THE INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION

ICNIRP is an independent scientific organization that:

- provides **guidance and advice** on the health hazards of non-ionizing radiation
- develops **international guidelines** on limiting exposure to non-ionizing radiation that are independent and science based
- provides **science based guidance** and recommendations on protection from non-ionizing radiation exposure



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THE INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION

ICNIRP:

- is the recognized non-governmental organization in non-ionizing radiation for **WHO** and **ILO**
- maintains close liaison and working relationship with **all international bodies** engaged in the field of non-ionizing radiation protection



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STRUCTURE OF ICNIRP

Main Commis

SC I
Epidemiolo

SC II
Biology

SC III
Physics &
Engineering

SCIV
Optical
Radiation



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ICNIRP Statement

GENERAL APPROACH TO PROTECTION AGAINST NON-IONIZING RADIATION

Health Physics 82:540-548 (2002)
www.icnirp.org



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FUNDAMENTALS OF ICNIRP GUIDELINES

- Procedures and criteria are defined *a priori*
- Restrictions are **based on science**.
No consideration for economic or social issues
- **Only established effects** are considered

The guidelines are developed in such a way as to be general, and **flexible**. They can be adapted in principle to any realistic condition of exposure



OTHER GUIDELINES

Guidelines for safe exposure to electromagnetic fields have also been developed by other international organizations, in particular the Institute of Electrical and Electronics Engineers (IEEE).

Apart from some differences in terminology and numerical values of the limits, these guidelines are based on the **same methodological approach**, the **same structure**, and the **same scientific database** as ICNIRP.



STEPS IN THE DEVELOPMENT OF GUIDELINES

- Critical review of the literature
- Identification of health and biological effects relevant for health
- Identification of the critical effect
- Establishment of basic restrictions
- Derivation of reference levels



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APPROACH TO HEALTH RISK ASSESSMENT

Any single observation or study may indicate the possibility of a health risk related to a specific exposure.

However, risk assessment requires information:

- From studies that meet **quality criteria**
- From the **totality** of science



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OVERALL EVALUATION

A decision must be made whether the available evidence allows the identification of an exposure hazard, i.e. an adverse health effect that is caused by an NIR exposure.

By this identification, the effect becomes “established”.

Science-based exposure limits are set with regard to established effects



ESTABLISHED EFFECTS

Effects are considered as **established** based on:

- Quality of the studies (peer review)
- Consistency
- Replicability
- Cause-effect relationship



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RANKING OF EVIDENCE

EVIDENCE

≠

PROOF

humans

animals

ASSOCIATION

≠

CAUSALITY

BIOLOGICAL EFFECT

≠

HEALTH EFFECT

biological models
Dosimetry

Courtesy of B. Veyret



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ESTABLISHED EFFECTS FOR ELF FIELDS

- Induction of internal electric fields and currents
- Stimulation of electrically excitable tissues

The effects are related to the internal electric field (V/m)
or the internal current density (A/m²)

ESTABLISHED EFFECTS FOR RF FIELDS

- Absorption of electromagnetic energy
- Increase of body temperature (general or local)
- Thermal effects

Thermal effects are related to SAR, i.e. to the energy absorbed per unit time and per unit body mass (W/kg)

ICNIRP Guideline

GUIDELINES FOR LIMITING EXPOSURE TO TIME-VARYING ELECTRIC, MAGNETIC, AND ELECTROMAGNETIC FIELDS (UP TO 300 GHZ)

Health Physics 74:494-522 (1998)

www.icnirp.org



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EXPOSURE GUIDELINES

What they are

- Living documents subject to ongoing review
- Advice based on comprehensive reviews of the science
- Frameworks for practical radiation protection policies
- Summaries of (but not reviews of) the science
- Advisory quantitative limits (basic restrictions) on exposure
- Field (reference levels) values for hazard assessment
- One scientific input into the formulation of societal policies

What they are not

- Mandatory prescriptions for safety
- The “last word” on the issue
- Defensive walls for industry or others

McKinlay 2002



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EXPOSURE GUIDELINES

What they are based on

- Comprehensive critical reviews of the published science
- Avoiding adverse health effects - plausible - consistent - coherent
- Practical hazard assessment experience

What they are not based on

- Results of single (unreplicated) studies
- Results of studies not satisfying accepted quality criteria
- Anecdotal reports or self reported effects
- Effects other than those understood to be harmful
- Anything other than the science

McKinlay 2002



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BASIC RESTRICTIONS AND REFERENCE LEVELS

Basic restrictions are recommended limits to the exposure of the individual

Reference levels are environmental values, often interpreted (or used) as exposure limits

Lower environmental levels (either as average values or local maxima) do not necessarily imply lower overall exposure



SYSTEMS OF PROTECTION

- **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



ICNIRP ON LONG-TERM EFFECTS

ELF

In the absence of support from laboratory studies, the epidemiological studies are **insufficient** to allow an exposure guideline to be established.

RF

Although there are deficiencies in the epidemiological work, [...] the studies have yielded **no convincing evidence** that typical exposure levels lead to adverse reproductive outcomes or an increased cancer risk in exposed individuals.

ICNIRP Guidelines, 1988



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SCIENCE AND CAUTIONARY MEASURES

A **principle requirement** is that such policies be adopted only under the condition that **scientific assessments** of risk and science-based exposure limits should not be **undermined by** the adoption of **arbitrary cautionary approaches**. That would occur, for example, if limit values were lowered to levels that bear no relationship to the established hazards or have **inappropriate arbitrary adjustments** to the limit values to account for the extent of scientific uncertainty.

WHO 2000



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PRECAUTIONARY LIMITS AND WORRIES

- Adoption of very restrictive and arbitrary EMF exposure limits by countries tends to **increase public concern** rather than reducing worries and controversies.
- **Difference between limits** tends to create **confusion and mistrust** of authorities.
- Choosing exposure limits that **cannot be justified, either scientifically or logically**, have already created some mistrust of the science, and in the authorities.

Cognetti Commission (Italy), 2002



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WHAT IF LONG-TERM EFFECTS WERE ESTABLISHED?

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.

[...] 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.

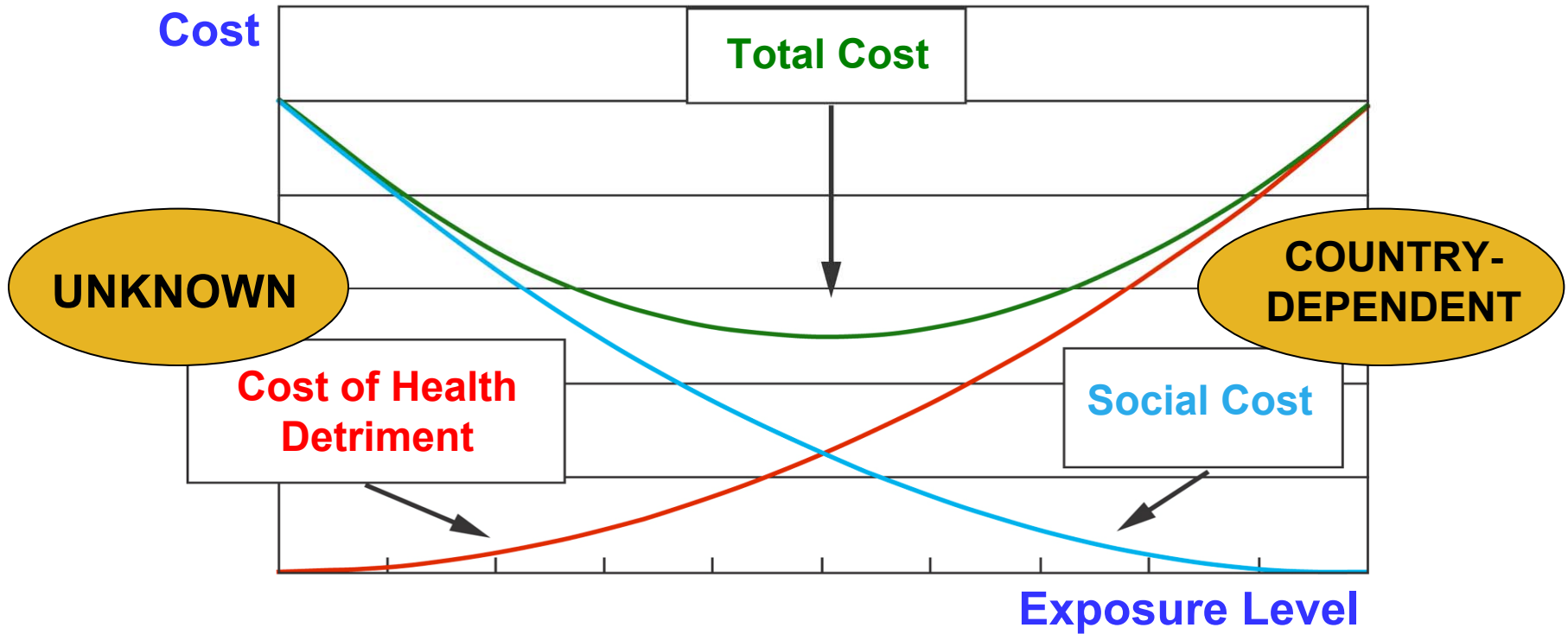
ICNIRP 2002



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ALARA FOR EMF?



Children's health and environment:
A review of evidence

Experts' corner
edited by:
G. Tamburlini
O. v. Ehrenstein
R. Bertolini



European Environment Agency



2002, 222 pages

Electromagnetic fields

Assuming that the association is causal, the number of cases in excess would be in the order of 1%. [...]

Whether or not this is to be considered acceptable (keeping in mind that the association is not proven) is an ethical matter, requiring a thorough and transparent discussion among different stakeholders.

(p. 89)



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REVISION OF ICNIRP STANDARDS

- ICNIRP is on the process of revising its guidelines
- Separate guidelines will be issued for static magnetic fields, ELF electric and magnetic fields, and RF electromagnetic fields



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WHY TO REVISE A STANDARD?

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

Social pressure should not be a reason for revising science-based standards



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6th International NIR Workshop of ICNIRP
14 - 17 October 2008, Rio de Janeiro, Brazil

6th International NIR Workshop of ICNIRP

In cooperation with the Ministry of Science and
Technology of Brazil and WHO

14-17 October 2008, Rio de Janeiro, Brazil

Scope: Electromagnetic fields of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. All populations are now exposed to varying degrees of electromagnetic fields, and the levels will continue to increase as technology advances. The social relevance of such non-ionizing radiation cannot be underestimated and the analysis and discussion of scientific findings are of the utmost importance.

Non-ionizing radiation protection is a broad field demanding knowledge of many scientific disciplines including epidemiology, medicine, biology and physics and engineering. Every four years, an international workshop is organized by the International Commission on Non-Ionizing Radiation (ICNIRP) to present an up-to-date overview of the advancement of science and protection in different areas of non-ionizing radiation.

The 6th International Non-Ionizing Radiation Workshop, jointly organized by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the Brazilian Ministry of Science and Technology, and the World Health Organization (WHO), will take place in Rio de Janeiro, Brazil, from 14 to 17 October 2008.

For more information, please visit www.icnirp.org or contact us at info@icnirp.org

Call for Posters: The scientific committee is calling for posters. Please send those to info@icnirp.org by the End of August.

www.icnirp.org



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