ICNIRP AND INTERNATIONAL STANDARDS

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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
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
STRUCTURE OF ICNIRP

Main Commis

- SC I Epidemiology
- SC II Biology
- SC III Physics & Engineering
- SC IV Optical Radiation
ICNIRP Statement

GENERAL APPROACH TO PROTECTION AGAINST NON-IONIZING RADIATION

www.icnirp.org
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.
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
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
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
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)
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)

www.icnirp.org
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
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
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
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*
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
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.
ALARA FOR EMF?

<table>
<thead>
<tr>
<th>Cost of Health Detriment</th>
<th>Social Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNKNOWN</td>
<td>COUNTRY-DEPENDENT</td>
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</tbody>
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Total Cost

Exposure Level

Cost

TOTAL COST

EMF & HEALTH - A GLOBAL ISSUE
London, UK, 8-9 September 2008
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)
- 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
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
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

Sponsor: 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.