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
Evolution of ICNIRP Guidelines: Scientific and Philosophical Aspects

Paolo Vecchia, ICNIRP
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


Salzburg (Austria), 23-24 November 2009
<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
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<tbody>
<tr>
<td>1984</td>
<td>Interim guidelines on RF fields (100 kHz – 300 GHz)</td>
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<tr>
<td>1988</td>
<td>Guidelines on RF fields (100 kHz – 300 GHz)</td>
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<td>1990</td>
<td>Interim guidelines on ELF fields (60/60 Hz)</td>
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<tr>
<td>1994</td>
<td>Guidelines on static magnetic fields</td>
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<td>1998</td>
<td>Guidelines on EM fields (up to 300 GHz)</td>
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<td>2009</td>
<td>Revision guidelines on static magnetic fields</td>
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<td>2010</td>
<td>Revision guidelines on LF fields (1 Hz - 100 kHz)</td>
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<tr>
<td>Year</td>
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<td>----------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1985</td>
<td>Guidelines on UV radiation (180 – 400 nm)</td>
</tr>
<tr>
<td>1986</td>
<td>Guidelines on laser radiation (180 nm – 1 mm)</td>
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<tr>
<td>1989</td>
<td>Minor changes to guidelines on UV radiation</td>
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<tr>
<td>1996</td>
<td>Guidelines on laser radiation (180 nm – 1 mm)</td>
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<tr>
<td>1997</td>
<td>Guidelines on incoherent optical radiation (0.38 – 3 μm)</td>
</tr>
<tr>
<td>2000</td>
<td>Revision of guidelines on laser radiation (400 nm – 1.4 μm)</td>
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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

- Established health effects
- Reduction factor
- “Safe” exposure

Threshold of effects
Exposure limit
EXPOSURE LIMITS – NOAEL APPROACH

Exposure limit

Exposure level

? No Data Available
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)?
THANK YOU
FOR YOUR ATTENTION