ICNIRP PROTECTION PRINCIPLES

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ICNIRP Statement

GENERAL APPROACH TO PROTECTION AGAINST NON-IONIZING RADIATION

International Commission on Non-Ionizing Radiation Protection*

Health Physics 82(4):540-548; 2002
What is not covered?

• Social, economic, and political considerations → authorities
• Measurements, design of equipment, shielding to reduce exposure, setting emission limits for devices → technical standards bodies
Basic approach

- Good quality scientific research:
  - Peer reviewed papers
- Biological effects → beneficial, health effects
  - Annoyance, discomfort: potential health hazard
- Health effects: trivial – life threatening: balanced judgement
- Concern on unsubstantiated health effects:
  - Information
Hierarchy of data

- Epidemiological studies
- Human experimental studies
- Animal studies
- In vitro studies
- Clinical reports: complementary information
- Other data (e.g. dosimetry studies)
Process

- Review of all data
  - Standing committees → Project groups
- Overall evaluation, development exposure guidelines
  - Commission
    - Scientific data
    - Uncertainties
    - Expert judgement
Exposure–effect relations

• Threshold:
  – Limits + uncertainty factor
• No threshold:
  – Other risk reducing strategies
• ICNIRP: analyze risk in terms of levels of consequences that could be quantified
• Acceptability of risks: based also on social and economic considerations
  – Authorities
Critical effect

- Established adverse health effect that is relevant at the lowest level of exposure
Exposure characterization

- Biologically effective quantity:
  - Basic restrictions
- Direct measurement possible:
  - EMF > ~10 GHz, optical radiation
- Direct measurement not possible:
  - Lower frequencies
  - Mathematical modeling, extrapolation
  - Worst-case conditions
  - Reference levels (measurable quantities)
Reference levels

- Reference levels provided strictly as an aid for practical exposure assessments to determine whether the basic restrictions are likely to be exceeded
- ICNIRP recommends the use of reference levels as a general guidance for limiting exposures of workers and of the general public
Population groups

- General population
- Workers
- Patients
  - 2002: no guidance, medical trade-off
  - 2004: guidance MRI exposures

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**ICNIRP Statement**

**MEDICAL MAGNETIC RESONANCE (MR) PROCEDURES: PROTECTION OF PATIENTS**

The International Commission on Non-Ionizing Radiation Protection*
Reduction factors

- Uncertainties
- Size of reduction factors depends on:
  - Knowledge of effect
  - Expert judgement
- Uncertainty in measurements not considered
- Extra reduction basic restrictions → reference levels (worst-case situation)
Risk management

• Established health effects:
  – Guidelines (provided by ICNIRP)
• Suspected health effects:
  – Protective measures (as decided by National Authorities)
    • Reducing needless exposure
    • ICNIRP recommends that these “should not undermine or be to the
detriment of science based exposure guidelines”
  – Reference to guidance of European Commission on use of
Precautionary Principle
Current update

• Currently: working on update
• Issues to be discussed:
  – Stochastic / deterministic effects (threshold)
  – Safety / uncertainty factors
  – Risk perception: influence on protection principles / uncertainty factors
  – Workers vs. general public vs. patients
  – Cosmetic, wellness exposures
  – Environmental protection
  – Precaution / prevention