

THE APPROACH OF ICNIRP TO THE PROTECTION OF CHILDREN

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ELECTROMAGNETIC FIELDS AND CHILDREN
Istanbul, 9-10 June 2004



ICNIRP

The International Commission on Non-Ionizing Radiation:

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

ICNIRP Statement

GENERAL APPROACH TO PROTECTION AGAINST NON-IONIZING RADIATION

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

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ICNIRP Guidelines

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

Health Physics 74:494-522 (1998)

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BASIC CRITERIA OF ICNIRP GUIDELINES

Based on established health effects or biological effects relevant for health

Two-level protection system

- ◆ **Basic restrictions**
- ◆ **Reference levels**

THE CRITICAL EFFECT

If several effects occur, it may be possible to rank them according to the exposure level at which each effect becomes relevant.

The **critical effect** is the established adverse health effect that is relevant at the **lowest level of exposure**

General Approach to Protection Against Non-Ionizing Radiation (1998)

THE TWO-LEVEL SYSTEM

- **Basic restrictions**
in terms of biologically effective quantities
- **Reference levels**
in terms of an external exposure metric

Exposure below reference levels ensures compliance with basic restrictions, since the relations between them have been developed under worst-case conditions.

If the reference level is exceeded, the basic restriction is not necessarily exceeded.

SPECIAL GROUPS OF THE POPULATION

Different groups in a population may have **differences in their ability to tolerate** a particular NIR exposure.

For example, **children**, the elderly, and some chronically ill people might have a lower tolerance for one or more forms of NIR than the rest of the population.

Under these circumstances, it may be useful or necessary to develop separate guideline levels for different groups within the general population, but it may be **more effective** to adjust the guidelines for the general population **to include these groups**.

STEPS IN THE DEVELOPMENT OF GUIDELINES

- ◆ Analysis of biological/health effects
- ◆ Identification of the critical effect
- ◆ Establishment of basic restrictions
- ◆ Derivation of reference levels

How does the process work in the case of children?

ANALYSIS OF BIOLOGICAL/HEALTH EFFECTS

Does any health effect, or any biological effect relevant for health, exist that is specific for children?

If yes, the effect is included in the database for guidelines

IDENTIFICATION OF THE CRITICAL EFFECT

Does any health effect, or biological effect relevant for health, occur in children at exposure levels lower than adults?

If yes, the effect in children is considered as the critical effect.

ESTABLISHMENT OF BASIC RESTRICTIONS

Is the threshold for a given effect lower for children than for adults?

If yes, the threshold for children is assumed as the criterion.

REDUCTION FACTORS

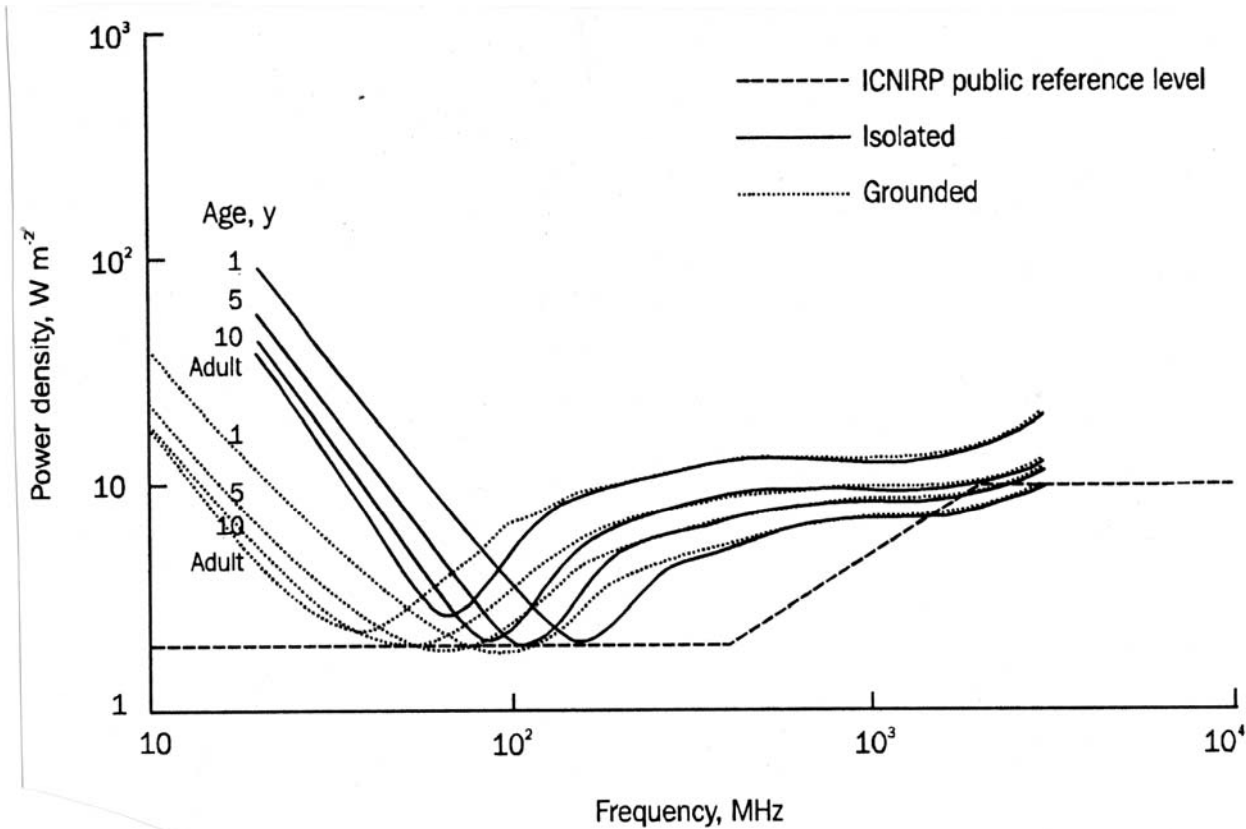
Reduction ("safety") factors are introduced in base restrictions to account for uncertainties in the data (e.g. experimental errors, limitations in dosimetry, extrapolation across species, frequencies, ages, etc.) .

Such factors provide margins for possible lack of data relative to specific population groups or exposure situations.

DERIVATION OF REFERENCE LEVELS

Is the dosimetry for children different from adults?

Yes. All the relevant parameters, and all exposure conditions are taken into consideration



Power density required to produce a whole-body SAR equal to the ICNIRP basic restriction (NRPB 2004)

IMPLICIT REDUCTION FACTORS

The collective impact of multiple “conservative” assumptions is to provide a degree of safety or freedom from hazard for a given human (including children) **much greater than is implied by the explicit reduction factors.**

(Adapted from IEEE std. C95.1, 1999 Edition)

How is ICNIRP expected to deal with progress in scientific knowledge on possible health effects of electromagnetic fields on children?

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EXAMPLE: THE STEWART REPORT

“If there are currently unrecognised adverse health effects from the use of mobile phones

No science-based action is possible at the moment

EXAMPLE: THE STEWART REPORT

“If there are currently unrecognised adverse health effects from the use of mobile phones, children may be more vulnerable because of their developing nervous system”

Specific health effect? To be identified

EXAMPLE: THE STEWART REPORT

“If there are currently unrecognised adverse health effects from the use of mobile phones, children may be more vulnerable because of their developing nervous system, the greater absorption in the tissues of the head”

Is that true? Dosimetry needed

EXAMPLE: THE STEWART REPORT

“If there are currently unrecognised adverse health effects from the use of mobile phones, children may be more vulnerable because of their developing nervous system, the greater absorption in the tissues of the head, and a longer lifetime of exposure”

Do degenerative effects exist?

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

(Berqvist 1996)

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STOCHASTIC EFFECTS

The role of ICNIRP as a **scientific advisory body** is to analyse the risks in terms of levels of consequences that can be quantified.

The acceptability of such risks is based also on social and economic considerations and fall **outside the remit of ICNIRP**.

General Approach to Protection Against Non-Ionizing Radiation (1998)

CONCLUSIONS

The protection system using basic restrictions and reference levels makes the ICNIRP guidelines flexible and applicable to virtually any exposure condition, and to **any group of the population**.

The flexibility of the protection system allows any specificity to be incorporated in a way that is straight, logical, transparent and conservative.

Therefore, there is **no need, or justification, for a special approach** to the protection of children.

CONCLUSIONS

ICNIRP guidelines are continuously revised and updated on the base of new scientific findings.

The research on health effects of electromagnetic fields on children **will be monitored with special attention.**

Any advice or recommendation that seems appropriate on the base of **scientific** data will be **timely** provided, in the frame of the established protection system.