

ACTIVITIES OF THE INTERNATIONAL NON-IONIZING RADIATION COMMITTEE OF IRPA

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It is now about 10 years ago that, during the 4th International Congress of IRPA in Paris, in 1977, the IRPA Executive Council and General Assembly amended the Constitution of IRPA to include non-ionizing radiation into its scope of activities and set up the International Non-Ionizing Radiation Committee (INIRC) to deal specifically with the different aspects of protection against non-ionizing electromagnetic radiation and ultrasonic waves.

To achieve in a rational way the tasks that the IRPA had imparted to it, the Committee agreed that the different types of NIR would be dealt with successively, each according to the following scheme :

- 1) compile all available background information and determine the basic health criteria for the relevant NIR.
- 2) develop guidelines on appropriate limits of exposure for workers and the general public.
- 3) provide guidance on the practical measures to be taken for the safe use of the various NIR.

During the ten years which have elapsed since INIRC was created, its members devoted their efforts to carrying out this programme and at the present time about 15 reports have been produced by IRPA/INIRC either alone or in cooperation with other international organizations.

BASIC HEALTH CRITERIA

To assess the health risk associated with any noxious agent, it is first necessary to analyze all available data relating to its biological effects, the sources in use, the resulting levels of exposure and the people at risk. The collection of the necessary background data requires the contribution of a number of experts, institutions and countries. Although on an incomparably smaller scale, this task is in some way similar to that achieved by UNSCEAR in the field of ionizing radiation.

Therefore, the IRPA, the World Health Organization (WHO) and the United Nations Environment Programme (UNEP) agreed that the IRPA/INIRC and the WHO/Environmental Health Division would cooperate in the development of Environmental Health Criteria documents relating to the different NIR within the frame of the Environmental Health Criteria programme for chemical and physical noxious agents which was carried out by the WHO with the

financial support of the UNEP. The purpose of these documents is to provide information for health authorities and regulatory agencies on the possible effects of exposure to the relevant NIR on human health and to give guidance on the assessment of risks from occupational and general population exposure.

The first four UNEP/WHO/IRPA documents - E.H.C. 14 for Ultraviolet Radiation (1979), E.H.C. 16 for Radiofrequency and Microwaves (1981), E.H.C. 22 for Ultrasound (1982) and E.H.C. 23 for Lasers and Optical Radiation (1982) - are already well known, and I shall therefore only present briefly the two last ones which were published respectively in 1984 and 1987.

E.H.C. 35 for Extremely Low Frequency Fields (1984) is mainly concerned with the effects of ELF electric fields at the power frequencies of 50 and 60 hertz. Some of the main conclusions drawn by the Task Group after a careful review of laboratory studies and observations made on human subjects are that :

- adverse human health effects from exposure to ELF electric fields, normally encountered in the environment or the workplace, have not been established ;

- whilst it would be prudent in the present state of scientific knowledge not to make unqualified statements about the safety of intermittent exposure to electric fields, there is no need to limit access to regions where the field strength is below about 10 kV/m. Even at this field strength, some individuals may experience uncomfortable secondary physical phenomena such as spark discharge, shocks, or stimulation of the tactile sense;

- it is not possible from present knowledge to make a definitive statement about the safety or hazard associated with long-term exposure to sinusoidal electric fields, in the range of 1-10 kV/m. In the absence of specific evidence of particular risk or disease syndromes associated with such exposures, and in view of experimental findings on the biological effects of exposure, it would be prudent to limit exposure, particularly for members of the general populations.

The last document, E.H.C. 69 for Magnetic Fields (1987) includes a detailed review of the data on biological effects of static and time varying magnetic fields at extremely low frequencies.

For static fields, available knowledge indicates the absence of any adverse effects on human health due to exposure to fields up to 2 teslas. Time-varying magnetic fields generate internal electric currents which may perturb biological functions. Levels of induced current densities (and correlated magnetic flux densities) are given for which biological effects ranging from minor to hazardous have been reported.

Several recent epidemiological reports present preliminary data suggesting an association of an increase in cancer incidence, with exposure to very weak 50 or 60 Hz magnetic fields. The preliminary nature of the epidemiological evidence, and the relatively small increment in reported incidence, suggest that, although these epidemiological data cannot be dismissed, there must be considerable further study before they can be accepted.

Besides the INIRC cosponsored several International Symposia on the biological effects of electromagnetic waves with the Union Radioscientifique Internationale and the Bioelectromagnetics Society or of ultraviolet radiation with the Commission of the European Communities and the Radiation Protection Society of the Netherlands.

GUIDELINES ON EXPOSURE LIMITS

The recommendation of appropriate exposure limits for workers and for the general public is the chief objective that has been assigned to the Committee by the Executive Council and the General Assembly of IRPA. The IRPA/INIRC guidelines on limits of exposure to the different NIR are established on the basis of the scientific data collected for the relevant environmental health criteria and on any later published research data. The purpose of the guidelines is to deal with the basic principles of protection against the relevant NIR, so that they may serve as guidance to the various international and national bodies or individual experts who are responsible for the development of regulations, recommendations or codes of practice to protect the workers and the general public. All guidelines are published in Health Physics.

The first IRPA/INIRC Interim guidelines on limits of exposure to airborne ultrasound and to radiofrequency electromagnetic fields were published in 1984 (Health Physics, 46, 969-974 and 975-984). These represent the first attempt made at an international level to achieve harmonization of the exposure standards used for NIR in the different countries.

This topic was especially controversial in the case of radiofrequency radiation where the Committee had to reconcile very different scientific opinions and to reach consensus on exposure limits at a time when the values recommended in various countries varied over a range from 10 to 10,000 microwatts per square centimetre. Today, I think we can say that this objective has been achieved and the IRPA guidelines are recognized in many countries as a highly valuable reference in radiofrequency radiation protection. However, since 1984, significant new data were obtained concerning the interaction of radiofrequency fields and living systems. Therefore, some amendments were needed and a revised version has been published in the January 1988 issue of Health Physics. In particular, the occupational basic limits for partial-body energy absorption were amended on account of new dosimetric data showing

that the specific absorption rate in various body organs is much more heterogeneous than previously assumed. Except for pulsed fields, derived limits were only slightly modified, and some practical rules intended to facilitate the application of the guidelines were added.

Guidelines on limits of exposure to ultraviolet radiation and to lasers were published in 1985 (Health Physics, 49, 2, 331-340 and 341-359). In the field of optical radiation, because of better agreement on the basic health criteria, there were only minor differences in the few national standards already in use. The laser exposure limits are complex functions of wavelength, exposure duration and viewing conditions. Recently, the INIRC drafted some amendments to the laser guidelines, which simplify and clarify the rules for determining the applicable exposure duration and the additivity of repetitive pulses (Health Physics, 1988, in press). Several areas of concern still exist regarding exposure limits for ultrashort pulses and for long-term chronic or repeated exposures. It is also intended to update the guidelines for ultraviolet radiation taking into account new data on the relative spectral effectiveness in the UV-A region (315 to 400 nm).

These different guidelines together with a Review of concepts, quantities, units and terminology for NIR protection (Health Physics, 1985, 49, 1329-1362) will be available soon in the form of a single book.

Furthermore the Committee has made a Statement on the alleged radiation risks from visual display units (Health Physics, in press) and is completing Guidelines on limits of exposure to 50/60 Hz electric and magnetic fields as well as for the assessment of safety of patients during magnetic resonance diagnostic examinations.

GUIDANCE FOR SAFE OCCUPATIONAL PRACTICE

Concerning operational protection and the application of the guidelines in occupational practice the IRPA/INIRC collaborates with the International Labour Organization. Two reports on NIR have been issued up to now as part of the International Programme for the Improvement of Working Conditions and Environment (PIACT). Occupational hazards from non-ionising electromagnetic radiation, Occupational Safety and Health Series n°53, ILO 1985, and Protection of workers against radio-frequency and microwave radiation : a technical review, O.S.H.S. n°57, ILO 1986.

Finally, in the name of the INIRC, I want to express my most sincere thanks to all Committee members for the work they achieved during these 10 years, to the IRPA Executive Council for its continuous support, to the World Health Organization, the International Labour Office and the Commission of the European Communities for their cooperation and financial support.