

A Description of ICNIRP'S Independent, Best Practice System of Guidance on the Protection of People and the Environment from Exposure to Non-Ionizing Radiation

International Commission on Non-Ionizing Radiation Protection

Abstract—In this statement, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) presents its structure, its activities, and general approach to providing guidance on NIR protection. The statement highlights ICNIRP's independence and presents the principle and requirements of no commercial or other vested interests. ICNIRP's funding arrangements and collaboration with other advisory bodies and radiation protection authorities are also described. The statement also presents the types of guidance documents that are produced by ICNIRP and the general approach in assessing scientific evidence. *Health Phys.* 122(5):625–628; 2022

Key words: International Commission on Non-Ionizing Radiation Protection (ICNIRP); radiation, non-ionizing; radiation safety; safety standards

INTRODUCTION

THE INTERNATIONAL Commission on Non-Ionizing Radiation Protection (ICNIRP) is an independent body that develops and disseminates science-based advice on protecting people and the environment against adverse effects of non-ionizing radiation (NIR). The scope of ICNIRP's remit includes electromagnetic radiation and fields lower than three petahertz (PHz) (consisting of static, extremely low frequency and radio-frequency fields; and infrared, visible and ultraviolet radiation)

International Commission on Non-Ionizing Radiation Protection (ICNIRP)

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) collaborators are listed in the Acknowledgement section.

The authors declare no conflicts of interest.

(Manuscript accepted 31 January 2022)

0017-9078/22/0

Copyright © 2022 The Author(s). Published by Wolters Kluwer Health, Inc. on behalf of the Health Physics Society. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: 10.1097/HP.0000000000001561

www.health-physics.com

as well as mechanical waves in the form of infrasound (frequencies below 20 Hz) and ultrasound (frequencies above 20 kHz).

ICNIRP is formally recognized as a collaborative and consultative body on NIR protection by the World Health Organization (WHO), the International Labour Organization (ILO), and the European Union (EU). ICNIRP carries out its main objective of advancing NIR protection by:

- Developing NIR protection principles based on science;
- Providing independent scientific guidance and recommendations on NIR protection;
- Publishing scientific reports on NIR and health;
- Conducting scientific seminars and educational workshops and conferences; and
- Informing the scientific community and the general public about protection against NIR.

As with all science and scientific evaluation, it is crucial that ICNIRP's work is conducted objectively and without bias for the benefit of people and the environment. The aim of this paper is to describe ICNIRP's governance and independent system of NIR protection in order to increase awareness and address any misinformation about its conduct and work.

WHO FORMS ICNIRP?

The ICNIRP Commission is established as an independent and neutral scientific body, which prepares its guidance and recommendations based on established scientific principles. To achieve this goal, ICNIRP relies on the scientific knowledge and judgment of independent experts. Commission members are experts in the scientific disciplines relevant to NIR protection including biology, epidemiology, physics, engineering, chemistry, and medicine. Membership in ICNIRP is limited to scientific experts who have no commercial or other vested interests. Candidates can be proposed by national and international radiation protection bodies such

as the International Radiation Protection Association (IRPA) and by current ICNIRP members.

In order to assist the Commission with the assessment of the evidence and the preparation of appropriate NIR guidance, ICNIRP has established the Scientific Expert Group (SEG), which consists of eminent scientists with different expertise deemed helpful in current and near-future activities of the Commission. SEG members, together with members of the Main Commission, form Project Groups that prepare guidance documents.

The appointment of ICNIRP Commission or SEG members is made to achieve an appropriate balance of expertise and to ensure the scientific independence of members. Consideration is also given to gender balance and geographical representation. It is important to note, however, that ICNIRP members do not represent either their country of origin or their organization.

ICNIRP is governed by a Charter which outlines the statutes of its activities and ICNIRP's commitment to independence and transparency, which are fundamental to carrying out its scientific mission. The Charter as well as other information on ICNIRP is available on its website (www.icnirp.org).

INDEPENDENCE AND TRANSPARENCY

For ICNIRP it is imperative to avoid interests of its members from affecting the independence of ICNIRP's guidance. The general principle of ICNIRP's approach is that its members do not have any professional or financial ties with entities having commercial activities relevant to NIR, or any other NIR interest groups, that have the risk of influencing their judgement on NIR safety issues. Such judgement should only be guided by scientific motives.

ICNIRP Commission and SEG members are required to comply with the ICNIRP policy of independence and declare any personal interests in relation to their activities for ICNIRP and to update these annually. Specifically, ICNIRP members are required to report past, current and negotiated future activities, relationships and assets, as well as anything else that could be perceived as potentially representing a conflict of interest in relation to the activities of ICNIRP, including:

- Positions of employment;
- Paid and unpaid consultancy, advisory positions and services;
- Research support received from commercial entities;
- Investments and commercial interests;
- Intellectual property; and
- Relevant interests of people with whom the member has personal or professional ties.

ICNIRP does not permit people to become a member if they are employed by industry or another organisation that could benefit financially from any particular ICNIRP advice. Paid consultancy for a conflicted organization would

also be viewed as a potential conflict of interest by ICNIRP, and so a person working as a consultant for such an organization would normally not be able to contribute to ICNIRP activities. In rare situations it may be possible to contribute to ICNIRP activities (for example, if remuneration is too small or is unrelated to the particular ICNIRP activity to represent a conflict of interest). Where this occurs the reason for ICNIRP's decision is provided in conjunction with the declaration of interest to ensure transparency.

All declarations of interests, along with their assessment by ICNIRP, are publicly available on the ICNIRP website. Further, ICNIRP publications contain an acknowledgement with regard to the online availability of the declaration of personal interests.

HOW IS ICNIRP FUNDED?

In accordance with its Charter, ICNIRP is a non-profit scientific body. ICNIRP does not receive any funds from industry. ICNIRP's funds stem from grants provided by non-profit governmental and scientific organisations and institutions. Funding is only accepted on the understanding that ICNIRP retains its scientific independence. The funding organisations are listed on the ICNIRP website and in the annual reports accessible from there.

ICNIRP members are not paid for the time that they dedicate to ICNIRP activities. In some cases their employers, which are typically academic institutions or radiation protection bodies, allow some work time to be used for ICNIRP activities. In other cases, ICNIRP members work on ICNIRP activities in their own time without any financial remuneration.

COLLABORATION WITH OTHER ORGANIZATIONS

Collaboration between different scientific bodies is an important element in ensuring a comprehensive and consistent system of NIR protection. ICNIRP maintains strong collaboration ties with a number of international and national non-commercial organizations with interests in NIR protection. Those include the International Radiation Protection Association (IRPA), the World Health Organization (WHO), the International Labor Organization (ILO), the World Meteorological Organization (WMO) and the European Commission (EC). ICNIRP also collaborates from time to time with national radiation protection authorities, such as the German Federal Ministry for the Environment, the Radio-Protection Division of Public Health England and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

TYPES OF GUIDANCE PRODUCED BY ICNIRP

ICNIRP's NIR protection guidance is formulated in its Guidelines, Reviews, and Statements, which are publicly and freely available online.

Guidelines are designed to provide radiation protection guidance in a way that can be used by regulatory and health authorities to establish regulations that reduce or avoid the risk of harm caused by NIR exposure. Guidelines consider all potential adverse health effects and take uncertainties in the scientific evidence into consideration. Guidelines are underpinned by the ICNIRP Principles for Non-Ionizing Radiation Protection (ICNIRP 2020) that include, where relevant, the justification, optimization, and limitation of NIR exposure. Due to the importance of the Guidelines to health and safety, they undergo substantial peer and community review through a public consultation. In preparing recommendations, ICNIRP considers the principles upon which protection measures can be based, while leaving to the various international and national authorities/institutions the responsibility of formulating appropriate regulations and codes of practice.

ICNIRP also produces Reviews and Statements on a range of issues. These may provide supplementary information to ICNIRP Guidelines, assessments on the scientific evidence on NIR and health, critiques of research papers that are important to NIR protection debates, or evaluations of documents more generally that ICNIRP considers to be important in order to enable appropriate discussion of NIR protection.

To provide general information to society, ICNIRP also publishes background NIR information, Notes and Frequently Asked Questions on its website. These are intended to provide readers with information that may help them understand a range of NIR radiation safety issues. As they have a particularly strong focus on reaching the needs of the reader, they focus on the main questions received by ICNIRP or that ICNIRP believes may be of greatest interest to the community, and accordingly are written in everyday language with very little reference to the detailed scientific literature underlying what is said.

ICNIRP also organizes workshops to inform a range of audiences about current scientific knowledge and to provide an opportunity to advance the dialogue on NIR protection.

HOW DOES ICNIRP ASSESS THE SCIENTIFIC EVIDENCE?

ICNIRP aims to provide advice on protection against adverse health effects from both short- and long-term exposures to NIR and uses the WHO's definition of health: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (ICNIRP 2020). ICNIRP's advice is based on a detailed evaluation of all the available scientific evidence and does not ignore or overlook any scientific evidence.

However, it is important to note that no single study considered in isolation will provide a meaningful answer to the question of whether or not NIR can cause or contribute to adverse health effects in people or in the environment. In order to make an informed conclusion, it is important to weigh the science in its totality.

ICNIRP provides guidance only based on scientifically substantiated effects. In general, an effect needs to be observed in more than one study, and different types of studies (epidemiological or experimental) are considered. An obvious requirement is that studies are performed according to accepted scientific practice and quality criteria. Some criteria are common for all types of study, while others are specific for study type. For experimental studies these include, but are not limited to, adequate dosimetry and inclusion of a sham-exposed group. For epidemiological studies minimization of bias is essential, which includes an adequate description of the investigated population group, well-defined exposure contrasts, and adequate identification and control of confounding factors. For all types of studies, the analysis of data should be performed using appropriate statistical procedures. Overall, this means that the results should also be explicable more generally within the context of the scientific literature. In the ICNIRP documents, "evidence" is used within this context, and "substantiated effect" is used to denote reported effects that satisfy this definition of evidence.

ICNIRP considers it important to be transparent about why and how decisions are made on guidance that is provided. Descriptions of procedures and deliberations specific to various frequency or wavelength regions and sources of information are disseminated by ICNIRP in its scientific reviews, exposure guidelines, statements, and practical guidance, as well as during public presentations and forums.

Science continually evolves and ICNIRP continues to review all fields of research in order to ensure that any new evidence is incorporated into its guidance.

CONCLUSION

ICNIRP is an independent, non-profit scientific body that evaluates the state of knowledge about the effects of NIR on human health and on the environment and provides advice on NIR protection, including the provision of guidelines on limiting exposure. Membership in ICNIRP is limited to experts in scientific disciplines relevant to NIR protection who have no commercial or other vested interests. ICNIRP is funded from grants provided by non-profit governmental and scientific organisations and does not receive any funds from industry or other interested parties. In order to ensure a comprehensive and consistent system of NIR protection, ICNIRP maintains strong collaboration ties with a number of international and national non-commercial

organizations with interests in NIR protection. ICNIRP's advice is based on a detailed evaluation of all the available scientific evidence, and it provides guidance only on the basis of scientifically substantiated effects.

Acknowledgments—Collaborators: Ken Karipidis, ICNIRP and Australian Radiation Protection and Nuclear Safety Agency (ARPANSA); Rodney Croft, ICNIRP and Australian Centre for Electromagnetic Bioeffects Research, Illawarra Health & Medical Research Institute, University of Wollongong, Australia; Eric van Rongen, ICNIRP and Health Council, The Netherlands; Tania Cestari, ICNIRP and Hospital de Clínicas de Porto Alegre, Brazil; Nigel Cridland, ICNIRP and Public Health England; Guglielmo d'Inzeo, ICNIRP and "La Sapienza" University of Rome, Italy; Akimasa Hirata, ICNIRP and Nagoya Institute of Technology, Japan; Anke Huss, ICNIRP and Institute for Risk Assessment Sciences (IRAS) at Utrecht University, The Netherlands; Carmela Marino, ICNIRP and Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), Italy; Sharon Miller, ICNIRP; Gunnhild Oftedal, ICNIRP and Norwegian University of Science and Technology (NTNU); Tsutomu Okuno, ICNIRP; Martin Röösl, ICNIRP and Swiss Tropical and Public Health Institute, Switzerland; Soichi Watanabe, ICNIRP and National Institute of Information and

Communications Technology (NICT), Japan; Gunde Ziegelberger, ICNIRP Secretariat and Federal Office for Radiation Protection (BfS), Germany; Karine Chabrel, ICNIRP Secretariat, Germany.

The views expressed by the collaborators in this publication do not necessarily reflect the views or policies of the organizations they are professionally affiliated with.

The support received by the German Federal Ministry for the Environment (BMU), the International Radiation Protection Association (IRPA), the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), and the New Zealand Ministry of Health is gratefully acknowledged. All information concerning the support received by ICNIRP is available at www.icnirp.org.

REFERENCE

International Commission on Non-Ionizing Radiation Protection. ICNIRP statement on principles for non-ionizing radiation protection. *Health Phys* 118:477–482; 2020.

