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Beitrag zum National Report 2024 "Optical Radiation"

WHO NIR IAC Committee – Electromagnetic fields and Ultrasound

Germany – National Report 2024

1. Agreement to small cell communications

In 2023, the voluntary self-commitment made by German mobile network operators in 2001 regarding information, communication and health protection measures for the expansion of mobile networks was reaffirmed and extended. It has now been agreed that the same protection standards will be ensured for all small cell communications with an EIRP of 2 to 10 watts, both indoors and outdoors, as for cellular base stations with an EIRP of more than 10 watts, which are subject to statutory regulations.

2. Research

Novel measurement technology for the detection of static and low-frequency electric fields: Overhead power lines for high-voltage direct current (HVDC) and high-voltage alternating current (HVAC) transmission emit static, quasistatic and alternating electric fields. The measurement of undisturbed electric fields using conventional, potential-based methods proves to be particularly challenging, as the current measurement technology distorts the field to be measured and thus biases the measurement result. Therefore, a study was conducted that aimed at identifying and adapting novel measurement technology for the detection of static and low-frequency electric fields and to test and validate it for measurements in the vicinity of HVDC and HVDC-HVAC hybrid lines. Results can be found at the Digital Online Repository and Information System (DORIS; http://nbn-resolving.de/urn:nbn:de:0221-2023091839246)

Effects on cells of the body surface when exposed to centimetre and millimetre waves: Due to the ever-increasing amount of wirelessly transmitted data, the development of new transmission standards and higher frequencies in the 5G NR FR2 band (24.3 – 27.5 GHz and 39.5 – 43.3 GHz) is required. With the rapidly growing use of wireless communication technologies, public concern about possible health effects of electromagnetic fields has increased. Therefore, a blinded, temperature-controlled transcriptomics and methylation study in human keratinocytes and human dermal fibroblasts exposed to 5G electromagnetic fields at different frequencies (27 GHz and 40.5 GHz) was conducted. Results will be published at the Digital Online Repository and Information System (DORIS; https://doris.bfs.de/jspui/).

Childhood leukaemia – influence of the immune system on the development of the disease: Pediatric acute lymphoblastic precursor B-cell leukaemia (pB-ALL) has been associated with exposure to extremely low frequency magnetic fields (ELF-MF), which were classified as "possibly carcinogenic to humans" by IARC in 2001. Previous experiments in two different strains of mice, CD1 and Sca1-ETV6-RUNX1, consistently showed transiently reduced numbers of CD8+ T cells in juvenile animals after exposure in utero and early in life to ELF-MF. This alteration could impair the ability of the organism to eliminate preleukaemic clones of hematopoietic progenitor cells and consequently lead to clinical

manifestation of pB-ALL. In order to investigate the potential effects of in utero and early life exposure to ELF-MF on the developing immune system of juvenile Sca1-ETV6-RUNX1 mice and to highlight possible immunomodulatory changes that favour the development of pB-ALL a short-term animal study was conducted. Results will be published at the Digital Online Repository and Information System (DORIS; https://doris.bfs.de/jspui/).

"Risks of electromagnetic fields from the perspective of general medical practitioners and paediatricians in Germany II": Although there is little evidence for adverse health effects due to exposure to electromagnetic fields (EMF) below legal limits, worries regarding these effects are relatively frequent in the general population. In the survey "What does Germany think about radiation?", e.g., 62% of the participants indicated that they have a lot of contact with 'radiation from cell phones', with only 30% feeling that it is possible to adequately protect themselves from this exposure. For many individuals, general practitioners (GPs) and paediatricians are the first point of contact with the health system. Therefore, it is essential to understand physicians' risk perception and knowledge regarding EMF as well as the relevance of EMF in their everyday work. Therefore, a cross-sectional study consisting of a quantitative online survey and qualitative focus groups was conducted. Results can be found at the Digital Online Repository and Information System (DORIS; http://nbn-resolving.de/urn:nbn:de:0221-2024042343246)

"5G: Risk perception of the population and possibilities of dialogue-oriented science communication": The project pursued two main objectives. Firstly, citizen workshops were to be held in four cities in which randomly selected citizens were informed about mobile radio, electromagnetic fields and individual risk assessment. The results of these workshops were to provide suggestions for the future communication practice of the BfS from the citizens' perspective. Secondly, an evaluation was to analyse how citizen participation processes can help to communicate difficult topics and empower participants in their risk assessment in the long term. Overall, the results show that citizens' workshops are suitable for strengthening citizens' skills and having a lasting influence on their risk assessment. Results will be published at the Digital Online Repository and Information System (DORIS; https://doris.bfs.de/jspui/).

"2nd survey to determine public concern – How important are magnetic fields in the public perception of electricity grid expansion": The aim of the study is to determine and explain the risk perception of low-frequency electromagnetic fields, especially caused by high-voltage power lines, among the German population. The study is based on a representative population survey of N=2,500 people aged 18 and over in Germany and on a survey of N=200 people living near existing or planned high-voltage power lines. Both surveys were conducted in a mixed-mode design by telephone/online. The results show that around a fifth of the population consider themselves to be affected by magnetic fields from high-voltage power lines, and another fifth are concerned about this. Key factors influencing risk perception stem primarily from the personality traits of the respondents (general risk perception, affinity for technology etc.), but a higher level of subjective exposure perception also leads to greater concern. Results will be published at the Digital Online Repository and Information System (DORIS; https://doris.bfs.de/jspui/).

"Multinational collaboration on risk communication": A multinational collaboration on comparative risk communication and activities is ongoing, including JEIC/Japan, PIIT/PTZE/Poland and BfS/Germany. A comparative risk awareness survey is planned for 2024. Other states are welcome to join the survey by contacting JEIC (Chiyoji Ohkubo; ohkubo@jeic-emf.jp)

3. Spotlight on EMF research:
Every month, well over 100 scientific articles are published in peer-reviewed international journals that are related to electromagnetic fields (EMF) and their possible health-relevant effects. With "Spotlight on EMF Research", specific current publications are presented, assessed by BfS in the

context of the existing state of knowledge and evaluated in terms of their relevance for radiation protection.

"Spotlight on EMF Research" offers:

- Assessment of scientific publications
- Literature suggestions to further publications
- A list of new publications every 3 months

Link: http://www.bfs.de/spotlight

3. Rental of personal exposimeters and evaluation of measurement data

Since 2024, the BfS offers an EMF personal exposure assessment service to the public. To this end personal exposimeters can be rented from BfS which measure either low-frequency magnetic fields or high-frequency electromagnetic fields. The measuring devices are worn directly on the body and record the fields continuously for 24 hours. Using the measurement data and the information from a questionnaire, the BfS experts then compile a detailed scientific measurement report. In this report, the customers personal exposure is analyzed and assessed. This service costs 45 €, including the dispatch and return as well as the data analysis and preparation of the measurement report.
Link: www.bfs.de/messgeraeteverleih

4. Communication activities

BMUV and BfS face a constantly high public demand for information regarding RF-EMF and LF-EMF, though currently significantly more for RF-EMF and in 2023 especially on 5G. Thus, several new communication activities were set up by BfS: Regular online information events take place for local/regional public servants as well as for citizens (LF-EMF and RF-EMF). In addition, on site events in cooperation with state-sponsored intermediary organisations are organized to facilitate the public discourse regarding mobile communication and power grid expansion. Usually these events are prompted by actual local concern if new base stations or new power lines are planned. In addition to these ad-hoc events a mobile exhibition is currently produced serving as an easily accessible interactive learning platform on EMF. These activities are complemented by regular social media information (mostly LinkedIn, Instagram).