

Exposure to Extremely Low-Frequency Electromagnetic Fields – Research Focus on Different Sources of Exposure



Situation Report Bulletin: 2/2017 – published 20 December 2017

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No. 01

Editorial

Since the summer, a few interesting international workshops have taken place. The one held by COST EMF-MED in October in Vienna dealt with topics such as the safety of medical, esthetic and cosmetic devices using electromagnetic fields. There, it was concluded that the use of body contouring & energy devices with EMFs is likely to increase significantly in the future.



Another international workshop, held by the German Federal Office for Radiation Protection (Bundesamt für Strahlenschutz) on 12–14 December in Munich, focused on the relationship between neurodegenerative diseases and magnetic field exposure. This topic has been discussed in earlier bulletins, and I will continue to keep track of it.

The new Finnish radiation legislation is still in preparation. The new radiation act and the decree on non-ionizing radiation are expected to come into force during 2018.

I have found interesting scientific publications for this bulletin. The first one is a CIGRE Reference Paper, basically a statement based on studies carried out on electric and magnetic fields so far. CIGRE, or the Council on Large Electric Systems, is an international non-profit association that actively monitors the health effects of electric power systems. According to the authors of the paper, the vast amount of reassuring research means that there is no reason to worry.

The CIGRE paper is followed by two studies on the association between magnetic fields and childhood leukemia. It has been found, for example, that high residential mobility may be a source of bias (errors) in the assessment of exposure to magnetic fields as well as in studies on ionizing radiation.

Paper No. 05 deals with the public acceptance and perception of high-voltage underground cables and whether it can be influenced by providing information. Suggesting that the type of information available seems to make a difference, the findings may well be applicable to practice.

The next papers explore topics such as the exposure of adolescents to magnetic fields in Israel and the investigation of electromagnetic hypersensitivity, with the help of participants using mobile exposure units at home. The final paper on neonatal incubators was included because electromagnetic fields, in this context, is an issue that has evoked some interest among researchers in recent years.

Hope you enjoy reading this summary in English!

Leena Korpinen, Professor
Editor-in-chief, Situation Report Bulletin

Leena Korpinen is currently a specializing physician in the field of clinical physiology and nuclear medicine at North Karelia Central Hospital, and an adjunct professor at the University of Tampere.



No. 02

Living with Electric and Magnetic Fields

Editor-in-chief's comment: This paper presents an overview of the views held by the international non-profit association CIGRE (Council on Large Electric Systems) on the basis of studies carried out on electric and magnetic fields. The authors point out that research on the health effects of electric and magnetic fields has been carried out for over 40 years now, with the results of the over 400 studies suggesting that a causal relationship between EMFs and different diseases is very unlikely. However, CIGRE will continue to monitor the issue.

Source:

Plante M, Arnera P, Brown D A, Bulcao J A, Lambrozo J, Nakasono S, Souques M, Tripp H. Living with electric and magnetic fields (EMF). ELECTRA No. 292, June 2017.

No. 03

Residential Magnetic Fields Exposure and Childhood Leukemia: A Population-Based Case-Control Study in California

Editor-in-chief's comment: This study aimed to address the uncertainty present in the results of earlier studies on the association of childhood leukemia with exposure to magnetic fields by minimizing bias, misclassification, and chance. The authors conclude that their study on childhood leukemia in California does not in itself provide clear evidence of leukemia risk associated with greater exposure to magnetic fields from power lines.

Source:

Kheifets L, Crespi C M, Hooper C, Cockburn M, Amoon A T, Vergara X P. Residential magnetic fields exposure and childhood leukemia: a population-based case-control study in California. *Cancer Causes Control* 28 (2017) 1117–1123. DOI 10.1007/s10552-017-0951-6.



No. 04

Comparative Analyses of Studies of Childhood Leukemia and Magnetic Fields, Radon and Gamma Radiation

Editor-in-chief's comment: The researchers analyzed epidemiologic studies on childhood leukemia from a number of countries where radiation exposure had been looked at from different perspectives, including exposure to extremely low-voltage magnetic fields and/or distance to high-voltage power lines, residential exposure to radon, and exposure to gamma radiation and/or distance to nuclear plants. According to the researchers, the influence of high residential mobility is complex and can manifest as a selection bias, confounding, or increased measurement error, and it could also be a potential risk factor in its own right. They conclude that other factors associated with distance to power lines and nuclear power plants should also be investigated for risk estimates.

Source:

Kheifets L, Swanson J, Yuan Y, Kusters C, Vergara X. Comparative analyses of studies of childhood leukemia and magnetic fields, radon and gamma radiation. *Journal of Radiological Protection* 37 (2017) 459–491. <https://doi.org/10.1088/1361-6498/aa5fc7>.

No. 05

Public Acceptance of High-Voltage Power Lines: The Influence of Information Provision on Undergrounding

Editor-in-chief's comment: The researchers investigated the difference in acceptance between high-voltage underground and overhead power lines and found that public acceptance is higher for underground than for overhead lines. Those participants in the study who were provided with more information viewed underground lines with lower acceptance, lower perceived benefits, higher perceived risks, and less positive feelings than control participants. The researchers, therefore, concluded that people should receive information on possible drawbacks related to undergrounding.

Source:

Lienert P, Sütterlin B, Siegrist M. Public acceptance of high-voltage power lines: The influence of information provision on undergrounding. *Energy Policy* 112 (2018) 305–315. <http://dx.doi.org/10.1016/j.enpol.2017.10.025>.



No. 06

24-h Personal Monitoring of Exposure to Power Frequency Magnetic Fields in Adolescents – Results of a National Survey

Editor-in-chief's comment: The research group collected data on the exposure of adolescents to magnetic fields by means of personal meters the participants carried for 24 h. The geometric mean of the daily time-weighted average of all the participants was 0.059 μT , while less than 4% of the participants were exposed to a TWA of over 0.2 μT . According to the research group, the results were similar to data reported in other countries.

Source:

Eliyahu I, Hareuveny R, Riven M, Kandel S, Kheifets L. 24-h personal monitoring of exposure to power frequency magnetic fields in adolescents – results of a national survey. *Environmental Research* 158 (2017) 295–300. <http://dx.doi.org/10.1016/j.envres.2017.06.027>.

No. 07

Human Exposure to Power Frequency Magnetic Fields up to 7.6 mT: An Integrated EEG/fMRI Study

Editor-in-chief's comment: The researchers assessed the effects of acute exposure to power-frequency (60 Hz) magnetic fields on human brain activity using simultaneous electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). They did not detect any effects on EEG alpha power or fMRI BOLD maps. After comparing the results with previous findings, they concluded that MF exposure in the low mT range (< 10 mT) might require a prolonged duration of exposure to induce detectable effects.

Source:

Modolo J, Thomas A W, Legros A. Human exposure to power frequency magnetic fields up to 7.6 mT: an integrated EEG/fMRI study. *Bioelectromagnetics* 38 (2017) 425–435. DOI: 10.1002/bem.22064.



No. 08

Effects of Personalized Exposure on Self-Rated Electromagnetic Hypersensitivity and Sensibility – a Double-Blind Randomized Controlled Trial

Editor-in-chief's comment: The researchers investigated whether subjects were able to identify when they were exposed to electromagnetic fields and whether the provision of feedback on personal test results altered the self-reported level of electromagnetic hypersensitivity. Mobile exposure units were used, allowing double-blind exposure conditions with personalized exposure settings at the home of the participants or another location of their choice. According to the researchers, the results suggest that a subgroup of persons profits from participation in a personalized testing procedure.

Source:

van Moorselaar I, Slottje P, Heller P, van Strien R, Kromhout H, Murbach M, Kuster N, Vermeulen R, Huss A. Effects of personalised exposure on self-rated electromagnetic hypersensitivity and sensibility – A double-blind randomised controlled trial. *Environment International* 99 (2017) 255–262.

No. 09

Electromagnetic Fields in Neonatal Incubators: The Reasons for an Alert

Editor-in-chief's comment: This paper is a review of earlier studies on the electromagnetic fields emitted by neonatal incubators and the resulting EMF exposure of newborns.

Source:

Belliemi C V, Nardi V, Buonocore G, Di Fabio S, Pinto I, Verrotti A. Electromagnetic fields in neonatal incubators: the reasons for an alert. *Journal of Maternal-Fetal and Neonatal Medicine*, October 2017. <https://doi.org/10.1080/14767058.2017.1390559>.

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The Finnish situation report bulletin is funded by Fingrid Oyj.

The next situation report bulletin will be published in summer 2018.

The archive is available at www.leenakorpinen.com.

