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The English version is a summary of the more extensive situation report bulletin in Finnish.

Possible Effects of Exposure to Electric and Magnetic Fields on Both Children and Adults Being Investigated



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Tampere University of Technology, Department of Electronics and Communications Engineering
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No. 01

Editorial

As usual, I start the editorial by sharing the latest about the EU Directive being prepared on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields). As far as I know, further progress has been made in the matter, and I expect the completed directive to be published in the next few months. At the BioEM2013 conference in Thessaloniki on 10–14 June, there was a session on the forthcoming directive, but it has not been officially published yet. After it has been finalised, the directive will need to be implemented in the member states, so the work will not actually end upon its completion but will continue at national level, including in Finland.

In addition to the BioEM2013 conference, some other events related to electromagnetic fields have been organised in the past six months. In February, the European Commission discussed risk communication by hosting the “Workshop on risk communication – electromagnetic



fields and human health”. The presentation on risk communication in Finland was given by STUK – the Radiation and Nuclear Safety Authority. The workshop presentations are available on the conference website. There have been some seminars in Finland related to our theme too. In addition, the EMF advisory board just launched a new website (www.mobiilijaterveys.fi, in Finnish only) that discusses mobile devices and the effects of electromagnetic fields on humans.

Again, I found some fascinating new scientific articles for this bulletin. This time I included more articles on occupational exposure, as more of them were available than usual – and this was the case with articles related to adults in general too. I also thought that with the new directive right around the corner, occupational exposure is now of even more interest than usual.

I start, however, with an article dealing with childhood leukaemia. This study was conducted in France, and it seems they will continue their research on this topic there. From children, I move on to adults and to a study that investigated the potential association of exposure to overhead power lines with adult cancers. The next two articles deal with studies related to men. The first one examines the effects of long-term magnetic field exposure on the immune system and blood counts in healthy men, and the latter uses meta-analysis to study the association with male breast cancer and electromagnetic field exposure.

Magnetic field exposure caused by cars has also attracted researchers’ attention, so I chose two vehicle-related articles for this bulletin. The first one compares the magnetic field exposure caused by electric and petrol-driven vehicles, and the latter one focuses on occupational exposure in the automotive industry. Magnetic fields seem to be low in electric cars, yet somewhat higher than in petrol-driven vehicles.

I conclude the bulletin with a slightly more theoretical article on analysing human brain exposure to low-frequency magnetic fields. If you read it, I think you will see how rigorously researchers conduct numerical exposure assessment today. This kind of assessment provides useful guidelines for the standardisation and preparation of legislation.

Hope you enjoy reading this summary in English!

Leena Korpinen,
Editor-in-chief, Situation Report Bulletin
Tampere University of Technology, Environmental Health

The Finnish situation report bulletin includes summaries of the following publications, preceded by the editor-in-chief’s comments.



No. 02

Childhood Leukaemia Close to High-Voltage Power Lines – the Geocap study, 2002–2007

Editor-in-chief's comment: The group studied the association of childhood leukaemia with living close to overhead power lines in France. The writers think their results support the previous international findings of a slight increase in acute leukaemia incidence close to high-voltage overhead power lines. The next step for the researchers is to use calculation models based on the annual current loads and local characteristics of the lines.

Source:

Sermage-Faure C, Demoury C, Rudant J, Goujon-Bellec S, Guyot-Goubin A, Deschamps F, Hemon D, Clavel J. Childhood leukaemia close to high-voltage power lines – the Geocap study, 2002–2007. *British Journal of Cancer* (2013) 108: 1899–1906.

No. 03

Adult Cancers Near High-Voltage Overhead Power Lines

Editor-in-chief's comment: This study focused on adult cancers and investigated their association with high-voltage overhead power lines. The study included cases of leukaemia, brain or central nervous system cancer, female breast cancer and malignant melanoma. According to the research group, the results do not support an epidemiologic association of adult cancers with residential magnetic fields in proximity to high-voltage overhead power lines.

Source:

Elliott P, Shaddick G, Douglass M, de Hoogh K, Briggs D J, Toledano M B. Adult Cancers Near High-voltage Overhead Power Lines. *Epidemiology* 24 (2013): 184–190
Schüz J. Power Lines and Cancer in Adults. Settling a Long-standing Debate? *Epidemiology* 24 (2013), 191–192.

No. 04

Long-Term (up to 20 Years) Effects of 50-Hz Magnetic Field Exposure on Immune System and Hematological Parameters in Healthy Men

Editor-in-chief's comment: The writers studied male electrical workers chronically exposed to 50-Hz magnetic fields for a period of 1–20 years by examining the nocturnal profiles of their blood counts. The data was quite small; only 15 workers and the same number of controls. The exposure levels were also rather low. According to the writers, the results suggest that magnetic fields have no cumulative effects on the haematological or immune system functions.



Source:

Toutou Y, Djeridane Y, Lambrozo J, Camus F, Selmaoui B. Long-term (up to 20 years) effects of 50-Hz magnetic field exposure on immune system and hematological parameters in healthy men. *Clinical Biochemistry* 46 (2013): 59–63.

No. 05

Electromagnetic Field Exposure and Male Breast Cancer Risk: A Meta-Analysis of 18 Studies

Editor-in-chief's comment: The writers studied the possible association between male breast cancer and exposure to electromagnetic fields. They identified 18 studies and performed a meta-analysis. Based on this meta-analysis, they concluded that exposure to electromagnetic fields may be associated with the increased risk of male breast cancer. However, they think further high-quality epidemiological studies are needed for more solid conclusions.

Source:

Sun J-W, Li X-R, Gao H-Y, Yin J-Y, Qin Q, Nie S-F, Wei S. Electromagnetic Field Exposure and Male Breast Cancer Risk: A Meta-analysis of 18 Studies. *Asian Pacific J Cancer Prev* (2013) 14 (1): 523–528

No. 06

ELF Magnetic Fields in Electric and Gasoline-Powered Vehicles

Editor-in-chief's comment: The writers compared exposure to magnetic fields in electric and petrol-driven vehicles. In both types of cars, the exposure levels measured were quite low, but in electric vehicles they were slightly higher. For seven electric cars, the geometric mean of all measurements was 0.095 μT , which is generally speaking quite a low level of exposure.

Source:

Tell R A, Sias G, Smith J, Sahl J, Kavet R. ELF Magnetic Fields in Electric and Gasoline-Powered Vehicles. *Bioelectromagnetics* 34 (2013):156-161.

No. 07

Effects of Extremely Low Frequency Electromagnetic Field on the Health of Workers in Automotive Industry

Editor-in-chief's comment: The research group investigated workers' exposure to electromagnetic fields in the automotive industry. The actual exposure group was gathered from the welding workshop and the control group from the stamping workshop. The researchers think that exposure to extremely low-frequency electromagnetic fields might have effects on the nervous, cardiovascular, liver and haematology systems of the vehicle factory workers. To confirm the results, further studies are still needed, as the writers themselves note.



Source:

Liu X, Zhao L, Yu D, Ma S, Liu X. Effects of extremely low frequency electromagnetic field on the health of workers in automotive industry. *Electromagnetic Biology and Medicine* (2013), Early Online: 1–9

No. 08

Occupational Exposure to Extremely Low-Frequency Magnetic Fields and Neurodegenerative Disease. A Meta-Analysis

Editor-in-chief's comment: The writers conducted a meta-analysis of studies on the association of occupational magnetic field exposure with neurodegenerative diseases, such as Alzheimer's disease and motor neuron diseases. They observed a weak association between occupational magnetic field exposure and Alzheimer's disease as well as motor neuron diseases. They think, however, that the methods of exposure assessment need to be improved before drawing conclusions on potential risks.

Source:

Vergara X, Kheifets L, Greenland S, Oksuzyan S, Cho Y-S, Mezei G. Occupational Exposure to Extremely Low-Frequency Magnetic Fields and Neurodegenerative Disease. A Meta-Analysis. *JOEM* (2013) 55 (2): 135–146.

No. 9

Numerical Assessment of Human Brain Exposure to Low-Frequency Magnetic Fields

Editor-in-chief's comment: The writers studied exposure to magnetic fields using numerical assessment. The study can be used for further developing the standards for exposure limits.

Source:

Chen X-L, Benkler S, Chavannes N, De Santis V, Bakker J, van Rhoon G, Mosig J, Kuster N. Analysis of Human Brain Exposure to Low-Frequency Magnetic Fields: A Numerical Assessment of Spatially Averaged Electric Fields and Exposure Limits. *Bioelectromagnetics* 2013: 1–10.

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