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

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) Updated Their Exposure Guidelines

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Contents

Tampere University of Technology, Department of Energy and Process Engineering
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Editorial

While compiling this situation report, I was surprised to find so many new studies on topics I thought had already been studied quite extensively. Perhaps researchers are now more intrigued by the potential health effects related to extremely low-frequency fields than they were a few years ago.

The actual piece of news is that the International Commission on Non-Ionizing Radiation Protection (ICNIRP) published their new exposure guidelines in December 2010. The new guidelines have been revised to reflect the changed biological basis, as the exposure guidelines are no longer presented as current densities but as values for internal electric fields. You can read more about the changes in section two.

The bulletin also includes a brief report from the Bioelectromagnetics Society's annual meeting in South Korea last summer. I mainly focus on presenting some papers published at the conference by the Tampere University of Technology. What I remember best about the conference was the way in which electromagnetic fields will be applied in future technologies. For example, MRI image quality can be clearly improved if the scanning is done using higher fields than today. Another interesting application is to use magnetic fields for supplying power for buses. Electromagnetic fields can be utilised in a wide range of technical innovations. It is quite easy to overlook the positive aspects related to these fields when you only focus on exploring their potential harmful health effects.

The other scientific articles in this bulletin mainly focus on the possible relationship between magnetic fields and childhood leukaemia, childhood and adult brain tumours, and other cancers. Research has been carried out in a number of places, including Wales, England, France and Iran. The bulletin also includes a few articles related to occupational exposure. Two of them are based on Italian studies that examined workers' peripheral blood lymphocytes to find out the mechanism for the potential carcinogenic effect. Some interesting discoveries were made in these studies.

I conclude the bulletin with my own publication. It is a follow-up on my articles that discussed measurements carried out at 400 kV substations. The results were earlier examined by analysing the maximum values for electric fields, measured currents and calculated current densities. This time we investigated work tasks carried out on service platforms, studying mean values for the entire measurement period and not just the maximum values. You can read more about the results in the last section of the bulletin.

I did not manage to get an update on the EU employee directive for this bulletin. The directive pertaining to occupational exposure is still being prepared, and it can also be expected to be incorporated into Finnish legislation at some stage. The situation is quite interesting as such, since there are currently no regulations in Finland that would limit occupational exposure to extremely low-frequency electromagnetic fields. Recommendations on public exposure were published a few years ago. It will be interesting to see the final formulation of the directive and the length of time it will take before the directive will be fully implemented in practice.

Hope you enjoy reading this summary in English!

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

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

No. 02

ICNIRP Updated Their Exposure Guidelines

Editor-in-chief's comment: The ICNIRP exposure guidelines were updated. The reference levels for public and occupational exposure as regards magnetic fields were doubled to 200 microtesla and 1,000 microtesla, respectively. The electric field levels remained at 5 kV/m and 10 kV/m. The guidelines employ the concepts of 'basic restrictions' and 'reference levels'. However, these concepts are not yet commonly known so their application may be slightly vague.

Source:

ICNIRP. (2010). ICNIRP statement - guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz to 100 kHz). International Commission on Non-Ionizing Radiation Protection. Health Phys. 99(6):818-836.

No. 03

Articles on Public Exposure to Magnetic Fields Presented at the Conference in South Korea

Editor-in-chief's comment: Finnish research data were presented at the Bioelectromagnetics Society's annual meeting. The magnetic fields measured were quite low. Methods of measuring exposure to electric fields were studied in the work task of "changing a bulb from a man hoist" at a 110 kV substation. No significant differences were found between the different methods.

Sources:

Holm, A. & Korpinen, L. 2010. Long-term measurement of free time exposure to low frequency magnetic fields in Finland. Bioelectromagnetics Society 32nd Annual Meeting (BEMS), June 14-18, 2010, Seoul, Korea 2 p.

Österholm, L., Pääkkönen, R., Lehtelä, R., Holm, A. & Korpinen, L. 2010. An example of exposure to magnetic fields in the home. Bioelectromagnetics Society 32nd Annual Meeting (BEMS), June 14-18, 2010, Seoul, Korea 2 p.

Pääkkönen, R., Holm, A. & Korpinen, L. 2010. Exposure to electric and magnetic fields at 110 kV substation while performing the task 'Changing a bulb from a man hoist' in the

Tampere region. Bioelectromagnetics Society 32nd Annual Meeting (BEMS), June 14-18, 2010, Seoul, Korea 2 p.

No. 04

A Pooled Analysis of Extremely Low-Frequency Magnetic Fields and Childhood Brain Tumours

Editor-in-chief's comment: The researchers conducted an analysis based on earlier research data to assess whether exposure to extremely low-frequency magnetic fields relates to childhood brain tumours. According to the researchers, the results provided little evidence for an association between ELF-MF exposure and childhood brain tumours.

Source:

Kheifets L, Ahlbom A, Crespi C. M, Feychting M, Johansen C, Monroe J, Murphy M. F. G, Oksuzyan S, Preston-Martin S, Roman E, Saito T, Savitz D, Schüz J, Simpson J, Swanson J, Tynes T, Verkasalo P and Mezei G. A Pooled Analysis of Extremely Low-Frequency Magnetic Fields and Childhood Brain Tumors. Am J Epidemiol 2010;172:752-761

No. 05

Extremely Low Frequency-Magnetic Fields Occupational Exposure and Natural Killer Activity in Blood Lymphocytes

Editor-in-chief's comment: The article discusses a study on workers exposed to extremely low-frequency magnetic fields and their natural killer (NK) cell activity, and reports some changes that could explain why extremely low-frequency magnetic fields might be carcinogenic. The researchers say the results support the need for further investigation in the field.

Source:

Gobba F, Bargellini A, Scaringi M, Bravo G, Borella P. Extremely Low Frequency-Magnetic Fields (ELF-EMF) occupational exposure and natural killer activity in peripheral blood lymphocytes. Science of the Total Environment 2009;07:1218–1223

No. 06

Natural Killer Cell Activity Decrease in Workers Occupationally Exposed to Extremely Low Frequency Magnetic Fields Exceeding 1 µT

Editor-in-chief's comment: The researchers came to an interesting conclusion: NK cell activity decreased in workers who were occupationally exposed to extremely low-frequency

magnetic fields exceeding 1 µT. The result might explain some of the health effects attached to magnetic field exposure.

Source:

Gobba F, Bargellini A, Bravo G, Scaringi M, Cauteruccio L, Borella P. Natural Killer Cell Activity Decreases in Workers Occupationally Exposed to Extremely Low Frequency Magnetic Fields Exceeding 1 µT. International Journal of Immunopathology and Pharmacology 2009;22 (4):779–786

No. 07

Risk of Haematological Malignancies Associated with Magnetic Fields Exposure from Power Lines: a Case-Control Study in Two Municipalities of Northern Italy

Editor-in-chief's comment: The study focused on North-Italian children's exposure to magnetic fields from power lines and its association with leukaemia and other haematological malignancies. The results were in line with earlier observations on a possible link to the risk of leukaemia. The researchers concluded, however, that the number of exposed children in this study was too low to allow firm conclusions.

Source:

Malagoli C, Fabbi S, Teggi S, Calzari M, Poli M, Ballotti E, Notari B, Bruni M, Palazzi G, Paolucci P, Vinceti M. Risk of hematological malignancies associated with magnetic fields exposure from power lines: a case-control study in two municipalities of northern Italy. Environmental Health 2010; 9:16

No. 08

A Precautionary Public Health Protection Strategy for the Possible Risk of Childhood Leukaemia from Exposure to Power Frequency Magnetic Fields

Editor-in-chief's comment: The researchers investigated how to assess the possible risk if leukaemia attached to exposure to low-frequency magnetic fields. The analysis was carried out using the Precautionary Principle outlined by the European Commission. According to the researchers, the method can be applied to small and uncertain health risks, such as the possible health effects associated with magnetic fields.

Source:

Maslanyj M, Lightfoot T, Schüz J, Sienkiewicz Z, McKinlay A. A precautionary public health protection strategy for the possible risk of childhood leukaemia from exposure to power frequency magnetic fields. BMC Public Health 2010;10:673

No. 09

Occupational and Residential Exposure to Electromagnetic Fields and Risk of Brain Tumours in Adults: a Case-Control Study in Gironde, France

Editor-in-chief's comment: A study conducted in France analysed the relationship between electromagnetic field exposure and brain tumours. The researchers say there might be some kind of a connection between the two. It will be interesting to see whether other research groups will take interest in the same topic and shed more light on it.

Source:

Baldi I, Coureau G, Jaffre A, Gruber A, Ducamp S, Provost D, Lebailly P, Vital A, Loiseau H, Salamon R. Occupational and Residential Exposure to Electromagnetic Fields and Risk of Brain Tumours in adults: a Case-Control Study in Gironde, France. International Journal of Cancer. 2010 Nov 12. [Epub ahead of print]

No. 10

Living Near Overhead High Voltage Transmission Power Lines as a Risk Factor for Childhood Acute Lymphoblastic Leukaemia: a Case-Control Study

Editor-in-chief's comment: An Iranian study investigated the association of living near high-voltage power lines and the occurrence of acute lymphoblastic leukaemia (ALL). The impetus for the study was the fact that the annual mortality rate from leukaemia in Iran is almost twofold compared to Sweden. The researchers found evidence that living near power lines is associated with ALL. It would be interesting to find out what other factors might contribute to such a significant difference between Iran and Sweden.

Source:

Sohrabi M-R, Tarjoman T, Abadi A, Yavari P. Living Near Overhead High Voltage Transmission Power Lines as a Risk Factor for Childhood Acute Lymphoblastic Leukemia: a Case-control Study. Asian Pacific J Cancer Prev 2010;11:423-427

No. 11

Exploring Exposure-Response for Magnetic Fields and Childhood Leukaemia

Editor-in-chief's comment: The researchers combined data sets to discover the exposure-response relationship between magnetic field exposure and childhood leukaemia. In their view, the possible threshold (0.3 or 0.4 μT) seems biologically unlikely. According to their analyses, threshold dose-response relationships performed only moderately, and linear

relationships were generally even poorer. The fit of the data sets was improved by adding quadratic terms or performing non-linear regression.

Source:

Kheifets L, Afifi A, Monroe J and Swanson J. Exploring exposure-response for magnetic fields and childhood leukemia. Journal of Exposure Science and Environmental Epidemiology 2010:1–9

No. 12

Childhood Cancer and Magnetic Fields from High-Voltage Power Lines in England and Wales: a Case-Control Study

Editor-in-chief's comment: A UK research group conducted a case-control study to explore the relationship between childhood leukaemia and exposure to magnetic fields from high-voltage power lines. The researchers came to the conclusion that magnetic field exposure in the year of birth was unlikely to be the whole cause for the increased risk of childhood leukaemia that they had reported in their previous study.

Source:

Kroll ME, Swanson J, Vincent TJ and Draper GJ. Childhood cancer and magnetic fields from high-voltage power lines in England and Wales: a case-control study. British Journal o f Cancer 2010;103:1122–1127.

No. 13

Occupational Exposure to Electric Fields at 400 kV Substations when Working on Different Service Platforms

Editor-in-chief's comment: A Finnish study with a more detailed investigation into occupational exposure at 400 kV substations when working on different service platforms. The measured electric fields correlated quite well with current densities and contact currents.

Source:

Korpinen, L., Elovaara, J. A. and Kuisti, H. A. 2011. Occupational Exposure to Electric Fields and Induced Currents Associated With 400 kV Substation Tasks From Different Service Platforms. Bioelectromagnetics 32, 1, pp. 79-83.

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