

## New Radiation Act and NIR Decree in Force since December 2018



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#### Contents

01: Editorial

02: Reanalysis of risks of childhood leukemia with distance from overhead power lines in the UK

03: Proximity to overhead power lines and childhood leukemia: an international pooled analysis

04: Characterization of children's exposure to extremely low frequency magnetic fields by stochastic modeling

05: Magnetocarcinogenesis: is there a mechanism for carcinogenic effects of weak magnetic fields?

06: A meta-analysis on residential exposure to magnetic fields and the risk of amyotrophic lateral sclerosis

07: Measurement and analysis of power-frequency magnetic fields in residences: results from a pilot study

08: Exposure levels of ELF magnetic fields in the residential areas of Mäntsälä Metropolitan Municipality

09: Amyotrophic lateral sclerosis and occupational exposures: a systematic literature review and meta-analyses

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No. 01

### ***Editorial***

We are now there: The new Radiation Act came into force in Finland on December 15, 2018, and along with it, the decree of the Ministry of Social Affairs and Health on restricting public exposure to non-ionizing radiation (NIR). The new decree imposes binding restrictions on electric and magnetic fields with frequencies below 100 kHz but does not apply to electric-field exposure from high-voltage overhead power lines as per the Electrical Safety Act (1135/2016). Moreover, as regards indoor distribution substations, there will reportedly be a transitional period of 15 years.

The CIGRE Session 2018, held in August in Paris, discussed, among other things, health issues relating to electromagnetic fields and how they are dealt with in the electricity sector. September 10–13, 2018, the first EMF-Med World Conference was held in Split, within the framework of the project COST EMF-MED (Action BM1309): European network for innovative uses of EMFs in biomedical applications.



Once again, I have found new scientific publications of interest for this bulletin. The bulletin starts with a number of papers on the possible association between power lines and childhood leukemia. The papers report on studies involving reanalysis of data, finer exposure categories, and an attempt at a more precise characterization of exposure.

“Magnetocarcinogenesis: is there a mechanism for carcinogenic effects of weak magnetic fields?” is an interesting paper, where Professor Jukka Juutilainen, from the University of Eastern Finland, and his colleagues share their thoughts on a possible mechanism.

Amyotrophic lateral sclerosis (ALS), a familiar topic from earlier bulletins, is now discussed in two papers. The first one is a meta-analysis on residential exposure to magnetic fields and the risk of ALS, while the second one (the last paper in this bulletin) is a comprehensive review of studies on the association between various occupational exposures and ALS. The latter paper was included because of its wider perspective, beyond electromagnetic fields, which makes it highly recommended reading.

Hope you enjoy reading this summary in English!

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Editor-in-chief, Situation Report Bulletin

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No. 02

### ***Reanalysis of Risks of Childhood Leukemia with Distance from Overhead Power Lines in the UK***

Editor-in-chief's comment: The results of a previous study conducted by the researchers on childhood leukemia and power lines were included in a pooled analysis that used different distance categories. The researchers now re-analyzed their subjects by 50 m distance bands, while they had earlier used three distance categories. Based on the new analysis, the leukemia risk was not at its highest close to a power line but at a distance of 100–200 meters from it. The researchers concluded that this weakens the evidence that any elevated risks are related to magnetic fields.

Source:

Swanson J, Bunch K J. Reanalysis of risks of childhood leukaemia with distance from overhead power lines in the UK. *Journal of Radiological Protection* 38 (2018) N30–N35 (6 pp).

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No. 03

### ***Proximity to Overhead Power Lines and Childhood Leukemia: an International Pooled Analysis***

Editor-in-chief's comment: The authors presented a pooled analysis combining individual-level data from 11 record-based studies of childhood leukemia and power lines. They found no association between childhood leukemia and distance to power lines, all voltages combined. When power lines of 200 kV or more were examined separately, a small but imprecise risk was found among children who lived less than 50 meters away from power lines. According to the authors, this was not explained by high magnetic fields, but the reason remains to be elucidated.

Source:

Amoon A T, Crespi C M, Ahlbom A, Bhatnagar M, Bray I, Bunch K J, Clavel J, Feychting M, Hémon D, Johansen C, Kreis C, Malagoli C, Marquant F, Pedersen C, Raaschou-Nielsen O, Rööslä M, Spycher B D, Sudan M, Swanson J, Tittarelli A, Tuck D M, Tynes T, Vergara X, Vinceti M, Wunsch-Filho V, Kheifets L. Proximity to overhead power lines and childhood leukaemia: an international pooled analysis. *British Journal of Cancer* (2018) 119:364–373.

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No. 04

### ***Characterization of Children's Exposure to Extremely Low Frequency Magnetic Fields by Stochastic Modeling***

Editor-in-chief's comment: The aim of the research group was to present a new method of characterizing the exposure of children to magnetic fields. The method was based on personal exposure measurements. According to the research group, stochastic modeling facilitates comparison between different exposure conditions. Using a stochastic approach, they analyzed the personal measurements from two previous projects (ARIMMORA and EXPERS). They concluded that stochastic modeling allows for the identification of the parameters that most affect the exposure of children.

Source:

Bonato M, Parazzini M, Chiaramello E, Fiocchi S, Le Brusquet L, Magne I, Souques M, Rööslä M, Ravazzani P. Characterization of children's exposure to extremely low frequency magnetic fields by stochastic modeling. *International Journal of Environmental Research and Public Health* 2018, 15, 1963.

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No. 05

### ***Magnetocarcinogenesis: Is There a Mechanism for Carcinogenic Effects of Weak Magnetic Fields?***

Editor-in-chief's comment: In their effort to find out whether there is a mechanism for the possible carcinogenic effects of weak magnetic fields, the authors explored the possibility that the effects are based on the radical pair mechanism. According to the authors, this mechanism is assumed to be involved in the magnetic compass of birds and certain other animals, allowing them to sense static geomagnetic fields (of approx. 50  $\mu\text{T}$ ). They concluded, however, that it remains unclear how this could explain the human health effects of extremely low-frequency magnetic fields weaker than 1  $\mu\text{T}$ .

Source:

Juutilainen J, Herrala M, Luukkonen J, Naarala J, Hore P J. Magnetocarcinogenesis: is there a mechanism for carcinogenic effects of weak magnetic fields? *Proceedings of the Royal Society B* (2018) 285: 20180590.

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No. 06

### ***A Meta-analysis on Residential Exposure to Magnetic Fields and the Risk of Amyotrophic Lateral Sclerosis***

Editor-in-chief's comment: The authors conducted a meta-analysis to assess the association between residential exposure to extremely low-frequency magnetic fields and the risk of ALS. They found five studies that addressed the risk of ALS in relation to power lines and fulfilled their inclusion criteria. The meta-analysis did not provide any evidence for an association between residential exposure to ELF-MFs and an elevated risk of ALS. According to the authors, a limitation of the analysis was that the definition of the exposed group was different among the studies.

Source:

Röösli M, Jalilian H. A meta-analysis on residential exposure to magnetic fields and the risk of amyotrophic lateral sclerosis. *Reviews on Environmental Health* 2018; aop.

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No. 07

### ***Measurement and Analysis of Power-Frequency Magnetic Fields in Residences: Results from a Pilot Study***

Editor-in-chief's comment: The aim of the researchers was to be able to better assess exposure to magnetic fields. They analyzed the extremely low-frequency magnetic fields from 3,163 datasets collected from 100 houses in Australia. MF measurements were carried out in different geographical locations, and the results were assessed for compliance with the ICNIRP guidelines and compared with 23 peer-reviewed studies, published 1987–2015, reporting magnetic-field measurements in residences. Fields greater than 4 mG (0.4  $\mu$ T) were measured in, for example, beds (21.83%) and bedrooms (33.33%).

Source:

Halgamuge M N, McLean L. Measurement and analysis of power-frequency magnetic fields in residences: Results from a pilot study. *Measurement* 125 (2018) 415–424.

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No. 08

### ***Exposure Levels of ELF Magnetic Fields in the Residential Areas of Mangaung Metropolitan Municipality***

Editor-in-chief's comment: Having found that there is insufficient data on residential exposure to magnetic fields in South Africa, the researchers conducted measurements in the residential areas of the Mangaung metropolitan municipality. Magnetic fields were measured at different distances from and from different corners of distribution substations. One of the measurement sites was located close to a 200 kV power line. The exposure levels were below ICNIRP guidelines.

Source:

Rathebe P, Weyers C, Raphela F. Exposure levels of ELF magnetic fields in the residential areas of Mangaung Metropolitan Municipality. *Environmental Monitoring and Assessment* (2018) 190: 544.

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No. 09

### ***Amyotrophic Lateral Sclerosis and Occupational Exposures: a Systematic Literature Review and Meta-Analyses***

Editor-in-chief's comment: The research group conducted a review of earlier studies on the association between ALS and occupational exposure. The paper covers various exposures.

Source:

Gunnarsson L-G, Bodin L. Amyotrophic lateral sclerosis and occupational exposures: a systematic literature review and meta-analyses. *International Journal of Environmental Research and Public Health* 2018, 15, 2371.

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