

FACTSHEET

Idiopathic Environmental Intolerance attributed to electromagnetic fields (IEI-EMF) or 'electromagnetic hypersensitivity'

What is the issue?

Some people believe that their health is affected by exposure to man-made electromagnetic fields (EMF). They report that exposure to EMF can cause any one of a number of symptoms, including headache, vertigo, sleeping problems, diminished concentration and itching or tingling feelings. While the type of symptoms that are reported is similar to the type of symptoms commonly experienced by many people in their day to day life, people who attribute symptoms to EMF often report more symptoms, or more severe symptoms, than other people.

The sources and types of EMF that are described as causing these symptoms vary from person to person. Some people experience symptoms when they are near to sources of extremely low frequency fields, such as power lines or domestic electric appliances. Others experience their symptoms when they are near to sources of high frequency fields, such as mobile phones, cordless phones and base stations.

Unfortunately, the people involved often consider themselves ignored or not taken seriously and are sometimes unable to find adequate medical or other help. This fact sheet provides an overview of the current scientific knowledge on this issue, including the evidence as to whether exposure to EMF can cause symptoms.

What do we call this condition?

People who attribute symptoms to EMF often describe themselves as being sensitive or hypersensitive to EMF. As a result, patients, self-help groups and the media often call the condition 'electrosensitivity,' 'electromagnetic hypersensitivity' or other, similar names. Because it is not scientifically proven that EMF can cause these type of symptoms, scientists and others working in the area often use the term Idiopathic Environmental Intolerance attributed to EMF (IEI-EMF; WHO, 2005). "Idiopathic" means that the mechanism and triggering factors for the symptoms are unknown. "Environmental Intolerance" refers to the fact that it is a factor in the environment that is reported as triggering the symptoms. In this fact sheet, we use the term IEI-EMF.

How many people experience IEI-EMF?

Few countries have reliable statistics about the number of people who attribute symptoms to exposure to EMF. The rates range from about 1% to 10% of people questioned [Schreier 2006; BfS 2008; HCN, 2009;]. In part, the difference may be because the number of people with the condition varies between countries. However, different definitions of IEI-EMF, different assessment methods and differences in media coverage at the time of the survey may also explain the differences in the estimates.

Does EMF cause symptoms?

Studies on the effect of EMF in people with IEI-EMF

Several dozens of experiments have tested the effect of exposure to EMF on volunteers who have IEI-EMF. These studies have typically taken place in laboratories, though a few studies have also been performed in the homes or work places of the participants. Various EMF emitting sources have been used, including visual display units, mobile phones and mobile phone base stations. Most studies have compared the effect of EMF exposure and no exposure on people with IEI-EMF. Exposure intensities have usually been similar to those re-

ported as triggering symptoms or at somewhat higher levels. Typically, each exposure condition has lasted minutes or hours, though in a few studies exposures have lasted for the whole night or the entire working day. These experiments have usually been performed under double-blind conditions, with neither the participant, nor the researcher, being told which experimental condition involves real EMF and which does not.

In most experiments, symptoms and/or the volunteer's ability to detect the EMF exposure have been investigated. In some studies the focus has been on outcomes that could be objectively measured, such as heart rate, blood pressure, temperature, sweating, memory or reaction times. For comparison, control groups of people who do not have IEI-EMF have also often been included.

Overall, the studies have not shown that EMF exposure can cause symptoms. In a few studies, an association between exposure and some symptoms has been observed. However, these results have not been confirmed in separate, independent studies.

There is no evidence that people with IEI-EMF are able to detect EMF. When comparing IEI-EMF participants with control groups, there is no indication that these groups differ in their ability to discriminate EMF exposure and non-exposure.

Most findings suggest no effect of EMF on physiological responses or performance in thinking tasks in people with IEI-EMF. There are a few exceptions for effects on cognitive performance and on measures of sleep, but similar changes are observed in people who do not have IEI-EMF. Overall, then, no responses that are unique to people with IEI-EMF have been found.

Other explanations for symptoms attributed to EMF

Different people with IEI-EMF experience different symptoms and at different times after exposure. These variations suggest that there may be different underlying causes for the ill health experienced by people with IEI-EMF. Two alternative explanations have been studied in detail. First, some people with IEI-EMF may have other, more well-known diseases that account for their symptoms. It is important that people with IEI-EMF discuss their symptoms with the family doctor, in case there is any other underlying problem that can be identified. However, physicians are not always able to find an obvious reason for the health problems.

Second, it has been reported in several studies that believing that you are being exposed to EMF can be enough to trigger the occurrence of symptoms, regardless of whether the EMF exposure actually occurs or not. This is sometimes called a nocebo effect, in contrast to the placebo effect where the expectation of a beneficial health effect increases well-being. Both are examples of the interplay between the mind and the body and they are well known in other medical conditions. It is also well known that when people believe an exposure causes symptoms, they tend to become more aware of and remember symptoms that occur in connection with the exposure, although they may not notice or recall symptoms appearing in other situations. This will strengthen their belief that they are 'sensitive' to the exposure.

Conclusions

In recent years, several scientific committees and research groups have evaluated the overall picture from all available studies [SSK 2008; ICNIRP, 2009; HCN 2009; van Rongen *et al.* 2009; Rubin *et al.*, 2010; ICNIRP 2010; Rubin *et al.*, 2011]. Their conclusions are in line with the facts outlined above: a relationship between EMF exposure and symptoms has not been established and studies on perception and physiological responses do not provide support for a causal link between EMF and the occurrence of symptoms.

As there is no scientific evidence for a causal relationship between EMF exposure and the occurrence of symptoms, there are no diagnostic criteria for 'electromagnetic hypersensitivity' and no EU countries recognize it as a medical condition. Nonetheless, there

is a general consensus that patients who attribute their symptoms to EMF do have genuine healthcare needs, regardless of whether EMF causes their ill health or not.

What can be done?

People who describe themselves as hypersensitive to EMF experience real symptoms. Efforts should be made to improve their health condition. Such approaches are most effective when they are tailored to the specific situation and the individual. Consequently they might vary between people and between countries. In general a structured approach is advisable which should be designed to

- provide information
- offer help for people with symptoms at an early stage
- treat people with severe and long-lasting symptoms.

In the following some suggestions are made of what can be used for such a structured approach.

- Where requested, information should be provided to decision makers, health professionals and to the public which addresses the issue in a transparent and responsible manner, and which accurately reflects the weight of scientific evidence about the condition.
- People with IEI-EMF suffer from health symptoms and some of them may have other medically known and treatable conditions. As a first step, people with IEI-EMF should therefore be advised to obtain a thorough screening for medical conditions by a general practitioner or in some cases by an occupational health service specialist.
- If a more detailed evaluation of possible environmental triggers is required, a referral to an environmental health center and/or a health specialist may be of use, if such services are available.

It is not generally recommended to measure fields in connection with IEI-EMF since there is no scientific support for a causal relationship between EMF and symptoms. There is also no scientific evidence that reducing exposure to EMF alleviates the symptoms.

In the case of persisting symptoms for which a medical explanation cannot be found, focus should be put on reducing disability rather than searching for a specific causal factor. The choice of treatment should be based on a broad evaluation of the patient's symptoms and situation (including medical, psychosocial and environmental aspects) and taking the patient's motivation for different interventions into account. Cognitive therapy has been reported to improve the well-being and ability to cope with persisting symptoms in some patients.

Reference List

BfS (German Federal Office for Radiation Protection) 2008. German Mobile Telecommunication Research Programme, Wirtschaftsverlag NW. ISBN 978-3-86509-826-9.

HCN - Health Council of the Netherlands: Electromagnetic Fields Committee. 2009. Electromagnetic Fields: Annual Update 2008. Publication nr 2009/02. The Hague, Health Council of the Netherlands.

International Commission on Non-Ionizing Radiation Protection; 2009. Exposure to high frequency electromagnetic fields, biological effects and health consequences (100 kHz-300

GHz) - Review of the Scientific Evidence and Health Consequences. Munich: ISBN 978-3-934994-10-2.

International Commission on Non-Ionizing Radiation Protection; 2010. Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz - 100 kHz). Health Physics 99(6):818-836.

Röösli M, Frei P, Mohler E, Hug K; 2010. Systematic review on the health effects of exposure to radiofrequency electromagnetic fields from mobile phone base stations. Bulletin of the World Health Organization 2010; 88(12): 887-896.

Rubin GJ, Nieto-Hernandez R, Wessely S; 2010. Idiopathic environmental intolerance attributed to electromagnetic fields (formerly 'electromagnetic hypersensitivity'): An updated systematic review of provocation studies. Bioelectromagnetics 31:1-11.

Rubin GJ, Hillert L, Nieto-Hernandez R, van Rongen E, Oftedal G; 2011. Do people with Idiopathic Environmental Intolerance attributed to electromagnetic fields display physiological effects when exposed to electromagnetic fields? A systematic review of provocation studies. Bioelectromagnetics 32:593-609.

Schreier N, Huss A, Röösli M; 2006. The Prevalence of symptoms attributed to electromagnetic field exposure: a cross sectional representative survey in Switzerland. Sozial- und Präventivmedizin 51(4): 202-209.

SSK (German Commission on Radiological Protection) 2008. SSK Statement on the German Mobile Telecommunication Research Programme, English Translation on: <http://www.ssk.de/en/werke/2008/volltext/ssk0804e.pdf>

van Rongen E, Croft R, Juutilainen J, Lagroye I, Miyakoshi J, Saunders R, de Sèze R, Tenforde T, Verschaeve L, Veyret B, Xu Z; 2009. Effects of radiofrequency electromagnetic fields on the human nervous system. J. Toxicol. Environ. Health B. Crit. Rev. 12:572-597.

WHO - World Health Organization. 2005. Electromagnetic fields and public health - Electromagnetic hypersensitivity. WHO fact sheet 296. Available from: <http://www.who.int/mediacentre/factsheets/fs296/en/index.html>. Last accessed: 30.11.2011.

Acknowledgement and Disclaimer

This factsheet was written by the authors listed below. The development of the factsheet was carried out by them in collaboration with working groups on epidemiology, human studies and risk management of COST Action BM-0704 "Emerging EMF Technologies: Health Risk Management" (www.cost-bm0704.org). COST enables collaboration between researchers and allows the coordination of national research at a European level. The views and conclusions expressed in this factsheet are those of the authors.

Authors

Gregor Duerrenberger, Swiss Research Foundation on Mobile Communication, ETH Zurich, Switzerland

Lena Hillert, Karolinska Institutet, Stockholm, Sweden

Shaiela Kandel, Hebrew University of Jerusalem, Israel

Gunnhild Oftedal, Sør-Trøndelag University College (HiST), Trondheim, Norway

G. James Rubin, Kings College London, United Kingdom

Eric van Rongen, Health Council, The Hague, Netherlands

Evi Vogel, Bavarian State Ministry of the Environment and Public Health, Munich, Germany