Lectures at BEMS 2000

How compatible are electromagnetic fields?

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On June 16th 2000 during the meeting of the Bioelectromagnetics Society (BEMS) in Munich scientists from all over the world talked about different aspects of eletromagnetic compatibility. At the start of the public event Gerd Friedrich, managing director of the FGF (Forschungsgemeinschaft Funk e.V., Research Association for Radio Applications), remarked on aims and contents of the subsequent lectures.

In his opening speech Gerd Friedrich from the Research Association for Radio Applications referred to several aspects of the controversial debate on electromagnetic environmental compatibility in Germany revolving around the popular catchword „electrosmog" putting the main emphasis on conflicting interests of the public. The fact that authorities not only have to protect the general population from health damages but should also provide for a secure und orderly use of radio and energy technology, causes disagreement. There is much tension between supporters and opponents of an increased technical use of electric energy. Producers and operators are met with often not very objectively discussed reservations and misgivings of the population, as Friedrich reported. Therefore, the lectures should be seen as an attempt to look into the recent developments of scientific discussion from the angle of various scientific approaches. Of course, the individual lectures can offer only a rough survey of the different aspects of electromagnetic compatibility. Concluding, Gerd Friedrich pointed out that scientific evidence often is thought insufficient to answer urgent questions of health related relevance, thus leaving people unsatisfied.

Lecturers:

- Dr. Ulf Bergqvist, National Institute for Working Life, Solna, Sweden
- Dr. Gerd Friedrich, Research Association for Radio Applications (Forschungsgemeinschaft Funk e.V., Bonn, Germany)
- Dr. James Lin, University of Illinois, Chicago, United States of America
- Dr. Mary McBride, British Columbia Cancer Agency, Vancouver, Canada
- Dr. Alan Preece, Bristol Oncology Centre, Great Britain

Low frequency EMF and childhood leukemia

British scientist Alan Preece spoke about research projects, among others about the „EMF-Rapid Program" carried out from 1992 to 1999 in the United States.

According to Preece, the wide range of electromagnetic fields requires a sub-classification according to frequency. Electromagnetic fields of frequencies less than 100 Hz are called „extremely low frequency electromagnetic fields", commonly abbreviated as ELF-EMF. To these ELF-EMF belong for example the frequencies of national power supply networks. In Germany this frequency lies at 50 Hz, in North America at 60 Hz. High voltage facilities, i.e. lines or transformers, but also household appliances produce electric, magnetic and electromagnetic fields. In the United States a large-scale study was carried out to investigate possible health hazards due to these fields. In the following Preece particularly referred to the results of this study.

Past years' increased scientific activity has been prompted by an epidemiological study, carried out in 1979 in the United States by Wertheimer and Leeper. The two scientists then reached the conclusion that certain types of tumors, particularly childhood leukemia and chronic lymphacitic leukemia in adults are favoured by electromagnetic fields produced by high voltage power lines. In 1992 the federal government of the United States of America initiated the „EMF-Rapid Program" with a funding of 35 million dollars. The program was aimed to investigate possible adverse health effects of extremly low frequency electromagnetic fields by means of various scientific methods including measurements, studies on interaction mechanisms as well as laboratory and epidemiological studies. The final results of the „EMF-Rapid Program" were summarised in a report for the public and the United States Congress. These results were reviewed and compared to the findings of other studies. Conclusions were published in 1998 by C. Portier and M. Wolfe called „Assessment of Health Effects from Exposure to Powerline Frequency Electric and Magnetic Fields - NIEHS" (NIEHS = National Institute of Environmental Health Sciences).

Based upon the IARC criteria as well as the available literature the scientific evidence was evaluated by a group of experts. The results were again summarised in 1999 by C. Portier and M. Wolfe in the so-called NIEHS Report („NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields").

One of the results of a further evaluation of the „EMF-Rapid Program" was that „ELF-EMF are potentially cancer-promoting." However, this conclusion derived from epidemiological research until now could not be either confirmed nor disproved by laboratory studies. In addition, the NIEHS Report shows that to date no individual epidemiological study did succeed in establishing a connection between electromagnetic field exposure and childhood leukemia. There seems to be very weak scientific evidence for associating ELF-EMF with health risks. The strongest evidence for possible health hazards is given in the study on high voltage power lines suggesting „sporadic biological effects, including an increased probability of tumors in experimental animals". NIEHS draws the conclusion that ELF-EMF cannot be seen as altogether safe, based upon the though weak scientific evidence that associates exposure with leukemia. In Preeces personal opinion, however, there seems to be no connection between magnetic fields and cancer, as follows from further epidemiological studies.

Electromagnetic hypersensitivity

The lecture of Dr. Ulf Bergqvist from Sweden dealt with the question: „Does Electrosensivity exist?" The term electro-sensitivity refers to symptoms in humans which are supposed to be causally related to environmental power line fields and the use of electrical appliances. Bergqvist preferably uses the term „electromagnetic hypersensitivity". In his view society should fully accept the reports of people affected und provide appropriate support to end or at least ease their suffering. On the other side society has not necessarily to adopt individual explanations of health detriments, but should carry through scientific and individual studies on the issue.

In 1996/97 Bergqvists working group gathered reports from various European countries on electromagnetic hyper-sensitivity containing detailed information on health detriments, on conditions under which they occur as well as evidence to the extent of the problem. Between the individual countries there were differences regarding the importance given to electromagnetic hypersensitivity. In France and Great Britain the topic was scarcely noticed by the public, whereas in Germany and Sweden it met with great interest. But not only the significance attached to the problem distinguished the countries regarding the issue but claimed symptoms and triggers thought responsible for them as well. Over the years several hypothetical explanations of electromagnetic hyper-sensitivity have been discussed. These explanations can be subdivided into two categories: The first category stresses the individual factors of the person affected, while the other emphasizes external factors and influences. Bergqvist, for his part, thinks that explanations should be found in both categories, since the observed health detriments suggest multiple influences.

Considerable effort has been made to distinguish affected people by gender, age, personal factors, other illnesses, from which they suffer, dermatological disorders and the neurological status. Few studies investigated illness history, personality and other factors. According to Bergqvist, the interpretation of results is rather compli-cated, since the cause of health changes cannot be identified clearly. Swedish studies reported that the number of mast cells in blood increases compared to

controls. Bergqvist, however, pointed to the partly small number of study objects. A causally related connection between the alterations and electromagnetic fields therefore is not verified. Studies on the autonomic nervous system show that electrosensitive persons react particularly strongly for example against monitor screen flickering. Other studies demonstrate that affected persons also show an increased response to stimuli such as noise or mental stress.

Therefore, at present we still do not know which person because of which personal or physiological characteristics is at a special risk to develop a case of electromagnetic hypersensitivity, Bergqvist concluded. There is no evidence of a crucial factor causing electromagnetic hypersensitivity. Nonetheless, there is no denying the fact that there are people claiming to be electrosensitive, partly suffering from serious health problems, who need help. The ultimate cause of electromagnetic hypersensitivity remains in the dark. The best strategy to deal with the issue would be an individual approach combined with extensive studies on possible causes and remedies.

Health related effects of radio waves

In his paper Dr. James Lin, member of numerous scientific assocations and commissions in the United States, referred to health related effects of radio waves, i.e. fields of higher frequency than those of power supply (50 Hz, 60 Hz). He talked about scientific knowledge und results concerning the impact of radio waves on tumor initiation and promotion, the genotype (DNA), the visual system, the nervous system as well as human memory.

Childhood cancer and high voltage power lines

A differentiated approach to the issue of a connection between magnetic fields of high voltage power lines and childhood cancer presented the Canadian Mary McBride. Referring to the study of Wertheimer and Leeper (1979) she discussed the term „increased cancer risk“ questioning the validity of evidence and evaluation of certain individual studies. She stressed the particular importance of epidemiological studies. In this respect she pointed to the influence of the experimental strategy with set parameters demonstrating how different studies lead to different results and where there are their limitations.

McBride explained that from 26 studies carried out to this date on the topic „Childhood cancer and high voltage power lines“ in different countries you could draw following conclusion: In countries with a great share of above ground high voltage power lines (for example in the United States and Canada) generating higher magnetic fields; the contrary is true for countries where many cables run underground (Great Britain and other European countries).

A recent study from Great Britain concludes that there is no increased risk of childhood leukemia, acute lymphacitic leukemia, tumors in the CNS and other forms of childhood cancer at exposure to magnetic fields of high voltage power lines.

McBride is convinced that this study is an additional epidemiological proof of the hypothesis that high voltage power lines are no hazard factor concerning the diseases in question.

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