
Executive summary

This is the fifth Annual Update of the Electromagnetic Fields Committee. After a brief overview of the advisory reports that have been published in the period under review, the Committee elaborates upon the approach and methods it uses in analysing scientific data. Following this, two themes are discussed:

- the influence of radiofrequency electromagnetic fields on brain activity and
- the relationship between exposure to such fields and the occurrence of symptoms.

How does the Committee evaluate information

The Committee's conclusions on health effects of exposure to electromagnetic fields are based on scientific data. It is very important for a correct interpretation of these data to have insight into the quality of the research, the way it has been designed and how the data have been collected and analysed. In its evaluation, the Committee puts a lot of weight on the quality of the research. In order to form an opinion on whether or not it is plausible that an association or effect exists, the Committee applies a number of specific criteria.

Epidemiological studies have a special place in the overall analysis because they consider effects in humans. Together with human experimental studies they are therefore very important. However, epidemiological studies suffer from the problem that it is often difficult to establish a causal relationship. One of the reasons for this is that the outcome of an epidemiological study can be distorted for

different methodological reasons. This may lead to a wrongful impression about cause and effect. Therefore, the Committee always considers possible confounders and biases in the evaluation of epidemiological studies; these are discussed in detail in this report.

The Committee bases its overall conclusions on *all* relevant scientific information at its disposal, both epidemiological data and data from human, animal and in vitro experimental studies. The scientific value of the individual studies is taken into account during this process. In that way a judgement is reached that is based upon the weight of evidence, a method that is considered as the most relevant by the scientific community and that is also used by other expert committees.

Biological versus health effects

A multicellular organism such as a human being is not simply the sum of individual cells or tissues, but has an added value that derives among others from the availability of mechanisms that neutralize possible harmful influences and circumstances. These mechanisms maintain the so-called homeostasis, the primary liferegulating function of multicellular organisms.

An effect on a biological system therefore does not necessarily have to lead to an adverse health effect. A health effect will only occur when homeostasis can no longer be maintained, that is, when a biological effect is potentially harmful and cannot or not sufficiently be compensated.

Brain activity

When a mobile phone is held against the head during a call, the brain is exposed to the electromagnetic fields emitted by the device, primarily in the part of the brain closest to the telephone. In recent years many studies have been performed into possible effects of this on the functioning of the brain.

In some studies subtle changes in natural electrical processes in the brain have been observed as a result of exposure to the electromagnetic fields emitted by a mobile telephone. However, these are very minor effects without any health influence on health, according to prevailing knowledge. Studies into effects on cognitive functioning are equivocal: in some studies small and reversible effects have been observed, other studies found no effect. Auditory functioning and body balance do not seem to be influenced by signals from mobile telephones.

In short: some effects on brain functions have been observed, but there are no indications that these indicate, or lead to, health effects.

Symptoms

The number of people attributing a variety of symptoms to various sources of electromagnetic fields in the home and at work seems to increase. They report for instance headache and migraine, fatigue, sleeplessness, concentration problems, itch and sensations of warmth. The number of people that consider themselves to be electrosensitive on the basis of such symptoms seems to be on the increase as well. People particularly attribute their symptoms to mobile phones, base stations, DECT cordless telephones, and now increasingly also to wireless computer network systems.

The prevalence of the symptoms in question within the general population is high. Often no medical explanation can be found, in which case they are generally referred to as medically unexplained physical symptoms.

Both in the living environment and in the laboratory, studies have been performed into a possible link between exposure to electromagnetic fields and the occurrence of symptoms. Several of these studies were not properly designed and cannot be used for the analysis. From the good quality scientific data emerges the picture that there is no causal relationship between exposure to radiofrequency electromagnetic fields and the occurrence of symptoms. However, there is a relationship between symptoms and the *assumption* of being exposed and therefore most likely with the risk perception. Nevertheless, the symptoms do exist and require a solution.