



EUROPEAN COMMISSION
DIRECTORATE-GENERAL HEALTH AND CONSUMER PROTECTION
Directorate C - Scientific Opinions
Unit C2 – Management of Scientific Committees; scientific co-operation and networks

Scientific Committee on Toxicity, Ecotoxicity and the Environment

Brussels, C2/VR/csteop/EMF 17122002/D(02)

**SCIENTIFIC COMMITTEE ON TOXICITY, ECOTOXICITY AND
THE ENVIRONMENT (CSTEE)**

**OPINION OF THE CSTEE ON
“EFFECTS OF ELECTROMAGNETIC FIELDS ON HEALTH”
Reply to question B – Appendix to the opinion expressed on 24 September 2002**

Opinion expressed at the 35th CSTEE plenary meeting

Brussels, 17 December 2002

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Priorities for research

Two previous opinions of the CSTEEN (Oct 30 2001 and Sept 24 2002) were addressed to the scientific findings on the health effects of EMF. These were gathered subsequently to the opinion of the Scientific Steering Committee of June 26 1998 and to the appropriateness of the ICNIRP guidelines for a system of health protection against risks from non-ionising radiation.

In the preparation of such opinions, the CSTEEN has come across a number of critical gaps in present knowledge, the filling of which requires indications for research priorities. The present document is addressed to this issue. For this purpose, a major reference has been the WHO International EMF Project. This project is indeed intended to facilitate the development of international acceptable standards for EMF exposure. It is strongly recommended for any European scientific programme in the area to be coordinated with the WHO project.

A major concern for CSTEEN is the evidence, albeit limited, for an excess of childhood leukaemia associated to exposure to extremely low electromagnetic fields (ELF). As pointed out in a previous document (Sept 24 2001), the nature of such evidence does not allow for a scientifically based procedure of risk assessment (accordingly, ICNIRP, while acknowledging the relevant epidemiological reports, decided not to use them in the process of deriving limit values). Whereas the need for additional knowledge on this issue is compelling, future studies must be of high methodological quality, designed in order to test specific hypotheses, including the mechanism(s) which might explain the increase in leukaemia and the possible consequences of aspects of the epidemiological studies such as the role of selection bias or aspects of exposure not previously captured. Little is to be expected from further repetition of investigation of low statistical power and low exposure levels.

In general, the association of exposure to EMF with disease ought to be investigated only in studies allowing for reliable exposure assessments, preferably in populations exposed at high levels (e.g. occupational groups exposed to radiofrequencies).

As for short and long-term animal experiments additional to those which have already been completed, CSTEEN believes that their focus should be on the identification of any critical effects, the dose-response relationships of such effects and the underlying mechanisms. Thus, this type of studies should be encouraged if carried out in biological systems allowing to test specific and plausible biological hypotheses. A strategy based on blind testing of biological systems for screening purposes should be avoided.

CSTEEN also stresses the need for harmonisation between the strategies to be developed in the assessment of risks induced by chemical and by physical agent, an issue which is addressed by an *ad hoc* task force of the Scientific Steering Committee. The goal should be understanding the

extent to which similar margins of safety (to allow for uncertainties and variations in the available data, in particular those intended to take into account interindividual variability) should be applied to the two types of risk factors.

CSTEE has become aware of comments by ICNIRP and by WHO on the opinion expressed on September 24 2002 on the current adequacy of ICNIRP's limit values for a system of health protection. While acknowledging that some of these comments will be helpful for any additional consideration of risks from EMF by CSTEE, CSTEE takes notice that the conclusions expressed in its opinion have not been challenged.

Specific recommendations on priority areas for research are given below.

Specific recommendations

Higher priority

- For EMF of any frequency, studies intended to improve the validity of assessment of human exposure for example the use of biomarkers.
- With regard to the postulated association between ELF and childhood leukaemia, there is a need for studies intended to better characterise the actual electromagnetic fields and to determine their prevalence in the environment (including transient exposures) in different European areas (say, exposed to median levels above 0.5 microtesla).
- Future studies should address the mechanism(s) explaining the postulating association between ELF and childhood leukaemia. There is also a need for assessment of selection bias, if any, and aspects of exposure assessment not previously captured in the major epidemiological studies, which have already been carried out.
- *In vitro* studies aimed particularly at investigating effects on cell cycle kinetics, proliferation, gene expression, membrane changes etc
- Theoretical modelling of possible mechanisms of interaction with biological systems
- Short and long-term animal experiments designed to test specific mechanistic hypotheses including dose-response relationships.
- Assessment of the reliability of reported subjective symptoms in persons suspected to be hypersensitive

Medium priority (i.e. requiring valid exposure estimates)

- Well designed epidemiological studies (of adequate statistical power) on end-points other than cancer, such as neurodegenerative diseases, effects on the eye, inner ear and cochlea, loss of memory, changes in hormone levels.
- Exploration of the possibility to design properly controlled trials on "hypersensitive" individuals
- Effects on certain hormone levels (e.g. melatonin) on human volunteers

- Epidemiological and laboratory studies investigating effects of recent radar technology (e.g. ultra-wide band radars)