EUROPEAN CO-OPERATION IN THE FIELD OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH

POTENTIAL HEALTH IMPLICATIONS FROM MOBILE TELECOMMUNCATION SYSTEMS

Watchdog Report 2003

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COST Action 281 started its activities in September 2001. It constitutes a network of leading European research groups in the field of biologic effects of electromagnetic fields. For the time being, 23 European countries formally decided to participate in this action. Among other activities this watchdog report is the second of a series of annual reports intended to give a comprehensive overview to decision makers and the public on the progress in the field of potential health implications from mobile communication systems made during the past year.

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Abstract

In 2003 main attention was devoted to electromagnetic fields from mobile telecommunication systems while discussions on adverse effects of ELF fields decreased. There has been an ongoing debate whether significant health risks may be caused by electromagnetic fields below existing limits despite no major new studies justify increased concern. Previous indications for possible risks in several aspects could not be confirmed neither by new epidemiological studies nor by actual laboratory investigations. However, there is still a need for replication and confirmation of previous inconclusive studies. Specific attention has been given to questions and problems that may arise from new technologies and the widespread use of new mobile telecommunication services. The awareness increased about the existing deficit in adequate risk communication to the various stakeholders. First steps for improvements have been made.
Also in the year 2003 problems with CENELEC's interpretation of the EU mandate M/305 remained unsolved.

Social Aspects

Among the new technologies, mobile telecommunication systems, in particular EMF from base station antennas led to ongoing public concern about possible health effects of electromagnetic fields (EMF). In the year 2003 the next generation of mobile communication systems (UMTS) started to be rolled out.

A risk perception study[1] showed that public risk perception is not the result of lack of information but of disinformation. It was concluded that inadequate risk communication can result in considerable costs. Furthermore, experience showed that introduction of precautionary limits does not necessarily lead to reduction of public concern.
Since health concern stem from lack of confidence rather than from lack of information, an increasing need for adequate risk communication and for participation of different stakeholders in this process has been identified. As a result, an European Coordination Action (EMF-NET) was proposed as a link from science to public, involving, among others, COST Action 281.

Basic research

The debate on the existence of health-relevant non-thermal interaction mechanisms was still ongoing. However, no dramatic new steps were made neither in regard to propose new interaction mechanisms nor towards verification of interaction mechanisms which were already proposed in the past. There was an ongoing debate whether relevant health effects could be caused without an associated temperature increase just by dielectric absorption.

In vitro investigations

Despite the publication of several interesting papers no major break-through was obtained. Preliminary reports from EC's 5th framework

[1] *Binder, S., Keller, F. (2003): Radiation fear- Risk and Chances for Telecommunication Industry. Soreon Inc., Research Report*

program REFLEX stimulated the discussion on possible EMF-related DNA damage. While in the past initial positive findings published by Lai and Singh were contradicted by other research (Roti-Roti), preliminary reports on two cell lines, investigated by one group of the REFLEX project, showed increased single- and double-strand DNA-breaks following both continuous and intermittent exposure to 1.8 GHz GSM radiation, as measured by comet assay. Other results on this matter are about to come.

A new series of experiments showed that high throughput screening techniques of transcriptomics and proteomics could be interesting tools for investigating potential EMF-induced genomic effects. Although such an expensive and time consuming approach can hardly provide information on health risks, it could indicate what physiologically processes might potentially be affected.[2]

COST 281 concluded that co-ordinated biological studies with a common design should have priority over uncoordinated single individual studies. A proposal for a common approach to study genotoxic effects can be expected early 2004.

In-vivo investigations

In a preliminary study[3] on small groups of rats, leakage of the blood brain barrier and evidence or neuronal damage following a single 2h-GSM-EMF exposure with a delay of 50 days after exposure was reported. In a workshop specifically dedicated to the BBB issue, organised by COST 281 in co-operation with FGF, it was concluded that due to the preliminary nature of the study and in the light of the results of other studies, for the time being the existing data do not justify to conclude that such GSM-EMF exposure could affect the blood brain barrier.

Epidemiology

The probably most powerful epidemiological study on use of mobile phones and brain tumors, the international INTERPHONE study involving over 6.000 cases and a similar number of controls made good progress. The results of this project are expected for the year 2004.

In a new Swedish questionnaire-based study on cancer registry-selected brain tumor cases[4], an elevated risk was reported in regard to the side of the head against which analogue and cordless telephones were held. Furthermore, an indication for a dose-dependence was concluded although from very few cases. In view to the several limitations of the study in regard to selection of cases and controls, restriction to survivors and possible recall bias, no firm conclusions can be drawn from this study.

Human studies

In a provocation study[5], well-being and cognition at a group of electromagnetic hypersensitive people and controls was investigated. Statistically significant influences on well-being were not reported for GSM exposure (neither 900MHz nor 1.800MHz). For UMTS, the results did not considerably differ in both groups. Likewise single statistical significant results on cognitive functions and EMF exposure were reported, however, with inconclusive results when both groups were compared. These results deserve to be confirmed and the pertinence be established.

In a quantitative assessment of electro-magnetic hypersensitivity[6], it could be shown, that electromagnetic hypersensitivity does exist in terms of significantly increased perception ability. However, a considerable day-to-day variability of the individual electrosensitivity was observed.

Dosimetry

Mayor efforts have been undertaken in investigating EMF-related specific aspects,

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[2] Leszczynski, D., Kuolla, R., Joenväärä, S., Reinvinen, J (2003): New approach in EMF research- Proteomics and Transcriptomics. 6th Int. Conf. EBEA, Budapest 2003, 23…25

[3] Salford, L.G., Brun, A.E., Eberhardt, J.L., Malmgren, L. and Persson, R.R.: Nerve Cell Damage in Mammalian Brain after Exposure to Microwaves from GSM Mobile Phones. http://dx.doi.org

[4] Hardell, L., Hansson Mild, K., Carlberg, M., (2003): Further Aspects on Cellular and Cordless Telephones and Brain Tumors. Int.J.Oncol., 22, 399…407

[5] Zwamborn, A.P.M., Vossen, S.H.J.A., Leersum, B.J.A.M., Ouwens, M.A., Mäkel, W.N. (2003): Effects of GSM RF Fields on Well Being and Cognitive Functions of Human Sobjects with and without Complaints. TNO report FEL-03-C148

[6] Leitgeb, N., Schröttner, J. (2003): Electro-sensibility and Electromagnetic Hypersensitivity. Bioelectromagn., 24:387…394

such as considering children, body-worn sources and exposures to EMF from mobile telecommunication basestations. The absorption in heads of children was studied taking into account the different tissue parameters and the specific anatomical differences. Under the umbrella of IEEE an intercomparison on SAR calculations has been started involving 15 research groups world-wide.

The EUREKA project SARSYS II was started to account for body-worn sources and IEC, IEEE and CENELEC have finalised standardisation on exposure assessment of EMF from mobile telecommunication base stations.

In regard to exposure assessment of RF-EMF including that from basestations, COST 281 had established a short term mission, workshops have been organised and co-operation established with the EUREKA project 3093 to develop the exposure assessment methodology applicable to RF-EMF and strategies how to account for the spatial variation.
On national basis several programs were started or continued to monitor public RF-EMF exposure such as in Germany and Ireland, the latter including 400 sites in the vicinity of mobile phone basestations.

In regard to individual exposure assessment, the development of personal dosimeters was continued. First personal dosimeters were announced to be available early 2004 in France and Germany.

An initial report[7], stating that exposure limits could be exceeded by simultaneous operation of several mobile phones in conducting enclosures (elevators, cars, trains) was corrected by showing that for realistic assumptions the reported results do not hold[8].

Exposure limitation
Progress in harmonising exposure limits continued with Great Britain's NRPB recommending adoption of ICNIRP's guidelines[9].

In Europe the work on a directive covering occupational exposure to EMF resulted in a common position paper which was delivered to the European Parliament for discussion.
Although otherwise claimed, the EU draft is only partly based on ICNIRP's recommendations.

An important deviation occurs in particular in regard to the definition of occupational exposure. While ICNIRP defines occupationally exposed people as "healthy adults exposed as a necessary part of their work", in the EU draft paper occupational exposure limits apply to all workers, irrespective the nature of their work.

Furthermore, the EU draft defines "action levels" the excess of which require actions from the employer to ensure that exposure limits are met. However, this approach is compromised by equal levels, both for actions and maximum exposure, in certain frequency ranges.

The directive is expected to be issued in the first half of 2004.

In regard to product standardisation the debate was ongoing whether or not as a general rule one single device should be allowed to cause EMF exposures up to the overall exposure limits.

Limits are compromised since this should be allowed already under good conditions instead of worst case conditions of the intended use and because possible contributions from other sources, local or environmental, remain ignored.

Clarification by the EU Commission of CENELEC's puzzling interpretation of the mandate M/305 is needed.

[7] *Hondou, T. (2002): Rising Level of Public Exposure to Mobile Phones: Accumulation through Additivity and Reflectivity. J.Phys.Soc.Jpn., 71, 432…435*
[8] *Toropainen, A. (2003): Human Exposure by Mobile Phones in Enclosed Areas. Bioelectro-magnetics, 24, 63…65*
[9] *NRPB (2003): Proposal for Limiting Exposure to Electromagnetic Fields (0-300GHz). NRPB Consultation Document*