PERFORM-A – a European research study on wireless communication signals

In the late nineteen-nineties, the European Union initiated an extensive research program which included also an animal experimental project with the acronym PERFORM-A. The aim of this project was to help clarify by means of an animal model whether high-frequency electromagnetic fields (EMF) can possibly have a carcinogenic or co-carcinogenic effect. Indications thereof had been provided, for example, by an Australian group of researchers, who had found a two-fold increased cancer risk in an EMF long-term study in transgenic mice (Repa-choli et al. 1997).

Investigations conducted in four constituent projects

The German constituent project of PERFORM-A (A1) was started in November 2001 at the Fraunhofer ITEM in Hannover. In two carcinogenicity studies, young, healthy B6C3F1 hybrid mice were exposed to electromagnetic fields at 900 MHz or 1800 MHz on 5 days per week for 2 hours daily.

In spring 2002, two analogous carcinogenicity studies (exposure to 900 MHz and 1800 MHz) in healthy Wistar rats were initiated at the RCC in Itingen (Switzerland) (constituent project A2).

The two studies on a possible co-carcinogenic effect of EMF exposure were performed in Austria and Italy: the Austrian Research Center Seibersdorf (ARCS) investigated the influence of EMF exposure at 900 MHz on female Sprague Dawley rats in which mammary tumors had previously been induced by DMBA (7,12-dimethylbenz(a)anthracene). In this animal model, the impact of high-frequency EMF exposure...
on tumor growth, incidence, latency, and status was investigated (constituent project A3).

Finally, in a fourth constituent project LCG-RBM in Italy reproduced the Australian EMF investigations in transgenic mice (Tab. 1).

Studies in compliance with international regulatory guidelines

Responsibility for the design, construction, and operation of the animal exposure systems was with the Swiss foundation IT’IS (Federal Institute of Technology Zurich).

The individual exposure units within all systems consisted each of two parallel circular stainless steel plates with a central antenna and with polycarbonate tubes fixed at the outer edge between these plates (Fig. 1). The radial position of the exposure tubes (Fig. 2) guaranteed the most homogeneous possible exposure of all animals. In each experiment, three dose groups and one sham control group were investigated. The animals of this control group were also placed in exposure tubes, but not exposed to high-frequency EMF.

All animal experiments were conducted as blind studies according to the principles of Good Laboratory Practice (GLP) and in compliance with the international regulatory guidelines for carcinogenicity testing of the EU, OECD, and the U.S. Environmental Protection Agency (EPA). The animal experimental part of the carcinogenicity studies conducted in Hannover (constituent project PERFORM-A1) took two years each. Another year was required for histopathological examination according to the IARC nomenclature (International Agency for Research on Cancer of the WHO) and for the overall evaluation.

Results of PERFORM-A1 in Hannover

To monitor the B6C3F1 mice during the two-year long-term study at the Fraunhofer ITEM, body weight development and food consumption, as well as general health status and mortality of the animals were checked regularly.

Comparison between the four groups of each experiment did not reveal any marked differences in animal health, body weight development, and mortality. Histopathological investigation of all animals at the end of the experiment did not show any variations in the cancer spectrum, nor an increase in tumor incidence due to the long-term exposure in male and female B6C3F1 mice as compared to the sham-exposed control group. Consequently, the results obtained in these animal experiments are not suggestive of an increased cancer risk from the electromagnetic fields investigated at the Fraunhofer ITEM.

Results of PERFORM-A2 in Switzerland

The same result was obtained in most of the other PERFORM-A constituent projects: in two carcinogenicity studies, the Swiss laboratory RCC investigated the influence of mobile communication signals (GSM and DCS) on healthy rats and found no marked variations between the different experimental animal groups after two years of EMF exposure.
Results of PERFORM-A4 in Italy

The Italian RBM institute was not able to reproduce a promoting effect of wireless communication signals (GSM) on the incidence of lymphoma in transgenic mice – as suggested by the study by Repacholi and colleagues.

Results of PERFORM-A3 in Austria

Solely the PERFORM-A3 constituent project in Austria, which investigated a possible promotion of DMBA-induced mammary tumors by EMF in Sprague-Dawley rats, showed slight effects. Transferability of the results to humans, however, is doubtful, as opposed to results obtained in studies with healthy animals. It is therefore recommendable to reproduce this study once again in a different laboratory.

Results will support IARC in risk assessment

As it was agreed between all cooperating partners of the project to report and publish the results of all six studies at the same time after completion of all investigations, the corresponding publications did not become available until the year 2007 (see below). The complete report on all PERFORM-A studies (in English) can be downloaded at www.item.fhg.de/PERFORMA.pdf.

The results of the PERFORM-A project will help the IARC answer the question whether or not long-term exposure to high-frequency electromagnetic fields bears a (co-)carcinogenic risk. To this end, the IARC is currently analyzing all data that have been collected so far in this regard.

References


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