



## **“DOSIMETRY MEETS EPIDEMIOLOGY”**

### **1<sup>st</sup> international workshop in the framework of NRP 57 “Non-Ionising Radiation – Health and Environment”**

A research programme of the Swiss National Science Foundation

- Organizer:** Swiss National Science Foundation, National Research Programmes
- Date:** January 11, 2008
- Venue:** Zurich, Hotel Zürichberg
- Chairs:** Anders Ahlbom, Alexander Borbély, Jørgen Bach Andersen, Elisabeth Cardis, Yngve Hamnerius
- Invited Speakers:** Joe Bowman, Andreas Christ, Michael Kelsh, Nino Künzli, Niels Kuster, Sven Kühn, Martin Rössli

For the agenda with further information on the affiliations of the speakers and the titles of their respective talks see [www.nfp57.ch](http://www.nfp57.ch).

### **General Conclusions**

This first scientific workshop “Dosimetry Meets Epidemiology” was aimed at an interdisciplinary approach exploring the difficulties as regards exposure assessment in EMF epidemiology. Despite 20 years of extensive epidemiologic investigation of the relation of ELF EMF to risk of chronic disease and in more recent years, the considerable effort devoted to research on RF EMF and brain cancer, sophisticated exposure assessment remains problematic due to ubiquitous exposure from multiple sources that can vary greatly over time and short distance. Particular difficulties are the incomplete characterisation of sources, how to combine exposures from different sources into one metric in the absence of an established biological mechanism, and more generally, how to combine dosimetric and epidemiologic principles to meaningfully determine personal exposure.

These scientific issues were presented and discussed in depth across the disciplines, which led to a fruitful exchange of views during the one-day workshop. The following reflects these views as expressed by the invited speakers and chairs in the final panel discussion.

The importance of epidemiologic studies received a special emphasis. While mechanistic approaches are crucial to determine the nature of potential adverse non-thermal effects of ELF and RF exposures on human health, openness to investigate effects in the absence of an established mechanism is important all the same and will eventually also lead to meaningful results through careful application of epidemiologic studies. In these studies, the use of standardized tools to maximize and optimize the assessment of real life exposure types, as



well as replicated measurements will generate outcomes, positive or negative, that cannot be replaced by mechanistic studies. Hence, a proper risk assessment of current and future technologies will only be efficient when taking into account the evidence provided by epidemiology, particularly with respect to subgroups in the population and potential interactions with other factors (e.g., smoking, chronic diseases, genetic factors and age).

The studies will have to be done regardless of all criticism, especially when considering the continuous development of new technologies and the increasing dominance of near-field exposures, such as the multitude of new wireless technologies that will become ever more prominent in the near range. In this context, it was also cautioned that too little information is available about DECT phone users and more focus should be directed on this group, particularly since exposure can be better assessed in comparison to exposure from mobile phones.

Another positive outcome of this interesting day was the realization that some conversion in thinking and experimental approaches (e.g., portable dosimetry) could be observed across labs, fields, and countries. The collective experience proves very instructive in defining a range of interesting hypotheses, and in defining what is feasible, which sources are relevant, how to deal with restrictions of EMF dosimeters, as well as which factors may be discriminating people for susceptibility. Thereby, complementary research from the US and EU needs to be fostered as well and the replication of negative studies should not be disregarded.

A recurrent theme during the workshop was how to define the critical thresholds and what constitutes low and high or rather, relevant exposure, at a time where little is known about the mechanism(s). In view of the evidence regarding the link between power lines and childhood leukaemia, environmental exposures may be more significant than e.g., high exposures at the workplace. However, a consensus could not be found on whether a classical toxicological approach with maximum exposures should be pursued, or whether it was legitimate to focus not only on the highly exposed groups, while also bearing in mind the increasing public concern.

Here, experience from air pollution may prove to be rather insightful. While the initial surge in this research area stemmed from the historically very bad smog situation, the necessity to monitor even low exposures became obvious with increasing availability of time series. Monitoring is a *sine qua non* to assess the public health situation and a parallel should be drawn in EMF research, where the question should focus not only on mechanisms but indeed on public health. In addition, knowledge about the extent of public exposure will be mandatory if consistent evidence of adverse non-thermal effects of ELF and RF exposures may be established eventually.

Meanwhile, convergence between dosimetry and epidemiology and their respective methods should be further facilitated in the pursuit of a good proxy, in particular the adoption of new dosimetric work in modelling that was regarded as important and helpful and that was presented at the workshop (e.g., modelling of anatomy and signal form). In fact, epidemiology should meet dosimetry in each and every study; a goal that everybody agreed was successfully reached during this very workshop.