



**WHO International Electromagnetic Fields Project
Research Coordination Committee Meeting
Thursday 12 - Friday 13 June 2003**

Rapporteur's Report

Dr Michael Repacholi, Co-ordinator, Radiation and Environmental Health, welcomed the participants of the Research Coordination Committee (RCC) Meeting. He introduced Drs Leeka Kheifets, Emilie van Deventer and Larry Goldstein of the Radiation Programme. Dr Repacholi explained that this meeting of the RCC would be restricted to consideration of research needed to support the Environmental Health Criteria (EHC) being developed for Radio Frequency (RF) radiation. This is because data compilations and evaluations for the EHC for Static Fields and the EHC for Power Frequency EMF are already underway in anticipation of completion of these activities by the end of 2004. Research Agenda for Static Fields and Power EMF would therefore be based on gaps and uncertainties articulated in the EHC process.

Dr Kheifets presented the plans for a Risk Assessment for RF. The RF risk assessment is scheduled to be completed by 2006. The risk assessment will be supported by results from studies recommended in the 2003 WHO Research Agenda for Radio Frequency Fields.

Dr Repacholi introduced the meeting chairman, Dr Russell Owen of the United States Environmental Protection Agency. Dr Owen asked the members of the RF Research Review, Needs and Priorities Meeting to introduce themselves:

- Professor Anders Ahlbom, Karolinska Institute IMM, Stockholm, Sweden.
- Dr Larry Anderson, Battelle, Pacific Northwest National Laboratory, Richland Washington, United States of America.
- Professor Lawrie Challis, Professor Emeritus, Nottingham University, United Kingdom.
- Dr Camelia Gabriel, Microwave Consultants Ltd., London, United Kingdom.
- Professor Jim Horne, Loughborough University, Leicestershire, United Kingdom.
- Professor Michael Kundi, University of Vienna, Vienna, Austria.
- Dr Niels Kuster, Foundation for Research on Information Technologies in Society, Zurich, Switzerland.
- Professor Dariusz Leszczynski, STUK - Radiation and Nuclear Safety Authority, Helsinki, Finland.
- Dr George Neubauer, ARC Seibersdorf Research GmbH, Seibersdorf, Austria.
- Dr Rick Saunders, National Radiological Protection Board (NRPB), Chilton, Didcot, Oxfordshire, United Kingdom.
- Dr Joachim Schüz, University of Mainz, Mainz, Germany.
- Dr Bernard Veyret, University of Bordeaux, Pessac, Cedex, France.

Dr Owen then moved to a discussion of RF research now underway or planned by National programs.

United Kingdom (reported by Professor Lawrie Challis)

The Mobile Telecommunications and Health Research Programme (MTHR) and a separate programme on Terrestrial Trunked Radio (TETRA) were reported by Lawrie Challis. MTHR is currently funded by government and industry at about £7.4 million (10.5 million Euros) over

3 years and TETRA by government at about £7.0 million (10 million Euros). Research includes 3 case studies of cancer outcomes (adults) from handsets and 1 (early childhood) from base stations. It also includes a health monitoring study of 100,000 policemen from handsets as well as various studies of acute effects in human volunteers. Mechanistic studies of stress (heat shock) proteins, brain physiology, calcium efflux and cellular signalling are also supported. Ongoing studies include those concerned with exposure, dosimetry, dielectric properties of tissues and other areas relevant to human health risk assessment. There is also a program to measure exposure from pico-cell and micro-cell transmitters. New projects are likely to include studies of managing risks and self-diagnosed hypersensitivity. MTHR is also involved with the design of a cohort study and seeks collaborators in this endeavour.

France (reported by Dr Bernard Veyret)

Recommendations for research in France are found in several recent reports including the "Zmirou Report" to the French Health General Directorate (DGS, 2001), the Telecom Regulation Authority (ART, 2002), the Consumer Protection Commission (CSC, 2002), the Parliamentary Office for Assessment of Scientific and Technological Option (OPECST, 2002) and the French Agency for Health and Environment (AFSEE, 2003).

A research consortium "COMOBIO+" is undertaking studies in the areas of dosimetry (UMTS, children, etc.), epidemiology, human, animal and cellular studies. "COMOBIO+" Funding comes from the Ministries of Research and Industry. Research funding in France is also from the operators (2.3 million Euros per year).

Biological research within "COMOBIO+" will include studies with 1800 and 2000 MHz signals and assessments of subjective symptoms, damage to the blood-brain-barrier and meninges, new imaging techniques, effects on the vestibular system, sleep rhythms, cellular mechanisms in nerve and glial cells, stress proteins, and genotoxicity.

Germany (reported by Dr Gunde Ziegelberger)

A research program was initiated by the Federal Ministry of Environment, Nature and Nuclear Safety. It started in 2002 and is scheduled to run until 2006. Funding is 17 million Euros over this time, equally shared between the Federal Ministry and the operators.

Currently 24 projects are funded with about half of them in the area of biological effects. Studies include the role of demodulation of the RF signal, influence on cell cycle and DNA synthesis, role of reactive oxygen species, influence of RF on incidence of spontaneous leukemias in AKR/J-mice, melatonin synthesis, cognitive changes in rats, developing a calculation for estimating exposures at base stations, feasibility study for occupationally exposed individuals, participation in Interphone, a pilot cross-sectional study of effects due to exposures by base stations, feasibility study of exposure evaluation in humans, and others.

Finland (reported by Professor Dariusz Leszczynski)

Funding for research for the period 200-2003 was about 1.3 million Euros (70% from government and 30% from industry).

Studies included effects of RF on cognitive functions, vascular responses in humans, effects on pacemakers (electrocompatibility), enzyme (ornithindecaboxylase) activity in cells, developing budding yeast as a test organism, development of dosimetric techniques and biomarkers for in vivo studies, modelling RF absorption in the human body, numerical simulations of human RF

absorption, case-control study of brain tumor etiology, and development of high throughput screening techniques including microarrays for diagnostics and hypothesis generation.

Japan (reported by Professor Chiyoji Ohkubo, National Institute of Public Health)
Support for research into RF effects is divided among one governmental and two industrial sectors. Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT) support is currently about 3 million Euros.

Research areas include studies of cerebral microcirculation in rats, effects on learning and memory in rats, development of animal exposure set-ups, participation in the Interphone study, effects on the eye in rabbits, long term study of brain carcinogenesis following chemical (ENU) induction, real time observation of effects in brain due to age change. In addition to these studies, there are two industry programs (supported by ARIB and NTTDoCoMo) involving 4 ongoing studies. Research areas include studies of effects on BBB in juvenile rats, effects on central nervous system in human, dosimetry and effects on cell proliferation and DNA synthesis.

China (reported by Dr Zhengping Xu, Zhejiang University School of Medicine, Hangzhou China)

China is currently participating in the Perform A studies on possible cocarcinogenic effects of RF in rats following treatment with the chemical carcinogen 7,12 dimethylbenzanthracene.

Studies utilizing DNA microarray technologies and proteomics are underway as are studies to localize the site of action of RF in cells and studies of possible effects of RF on degeneration of the central nervous system. Other studies are planned to evaluate effects of base stations. Researchers in China intend to form collaborations with other research institutions and organizations.

Italy (reported by Dr Carmela Marino, Italian National Agency for New Technologies, Rome Italy)

Studies of Human and Environmental Protection from Electromagnetic Emissions are conducted through the MURST project. Currently there are 5 research lines comprising 59 'units'. Studies of effects on acoustical cells, T & B lymphocyte production, interleukin production and cell proliferation are underway. No epidemiological studies are planned.

Australia (reported by Colin Roy, Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Australia).

Research program commenced in 1996 and is funded to the amount of 0.4 million Euros annually - derived from a 1% levy on radiocommunications license fees.

Current research includes participation in Interphone, and independent studies of effects of RF on cognition in humans (pilot), studies of lymphomagenesis in transgenic (Pim1) mice, studies of human physiological response, neurological effects in humans and laboratory animals and effects of mobile phone on vision and hearing.

Australia has announced that the National Health and Medical Research Council would fund a consortium from Victoria and South Australia to establish a *Centre of Research Excellence in Electromagnetic Energy*. The Centre will receive \$AUD 0.5m a year over five years to conduct research on possible health risks and boost research expertise in this area by providing research training and career development programs in EME-related areas.

Following lunch, the meeting reconvened to hear a review of research conducted through collaborative national research programmes and collaborative research programs involving industry.

European Union (reported by Dr Franz Adlkofer, VERUM Foundation, Munich, Germany) REFLEX, a 3.6 million Euro research programme mainly funded by the EU Commission is almost completed. Studies focused on RF-EMF effects on genotoxicity, expression of genes and proteins, cell proliferation and apoptosis in vitro. Various cell systems were investigated. The results demonstrate that RF-EMF is able to increase micronuclei frequency, the number of single and double DNA strand breaks and the rate of chromosomal aberrations in some, but not all cell types in vitro. An unambiguous effect on cell proliferation and apoptosis could not be detected. These findings need to be confirmed by research groups outside the REFLEX Consortium.

COST 281 (reported by Dr Gerd Friedrich, Forschungsgemeinschaft Funk e. V. Bonn, Germany) COST 281 provides a platform to facilitate the exchange of research results and to develop a coordinated research plan to investigate possible health effects due to RF exposure. COST 281 has conducted a series of Workshops and Symposia to further these aims. Research needs identified by this process include effects of mobile communications in children, base station monitoring, and continued efforts in possible genetic and cytogenetic effects.

Cellular Telecommunications and Internet Association (CTIA) (reported by Ms Jo-Anne Basile, CTIA, Washington DC, USA)

Cellular Telecommunications & Internet Association (CTIA) is currently participating in a Cooperative Research and Development Agreement (CRADA) with the US Food and Drug Administration. The project has built in safeguards to ensure the independence and integrity of the research. Research is in three areas: Toxicology follow up of previous findings, Epidemiology and global assessment of future research needs. Contracts have been awarded for Phase I and II of the CRADA. Phase I research has three contracts to study the effects of RF exposure on micronucleus formation In-vivo and In-vitro. Phase II of the CRADA has two contracts awarded that will study improved exposure systems for epidemiology studies concerning mobile phones and health effects.

Mobile Manufacturers Forum (MMF) (reported by Dr Sakari Lang, MMF, Brussels Belgium) Mobile Manufacturers Forum (MMF) uses the WHO Research Agenda as a framework to cofund projects with government, industry, university researchers and others. Currently MMF participates in Perform A(6 long-term bioassays) and Perform B (in vivo and in vitro replication studies), Interphone, several human studies (skin hypersensitive reactions, brain electrical activity, sleep disturbance, cognitive performance, and blood pressure), DMBA (7,12 dimethylbenzanthracene)induced mammary tumor study in China, partial support for the programs in the UK under the MTHR program, theoretical studies examining the plausibility of different biophysical mechanisms for RF interactions with biological material, SAR-temperature relationship in partial-body (near-field) exposure, and SAR intercomparison & measurements and dosimetry support for experimental studies and standards.

GSM Association (reported by Dr Jack Rowley, GSM Association, Dublin, Ireland) GSM Association is aligned with the WHO research priorities. It has committed 5.6 million Euros for the period 2000-2006. Research interests focus on health risk assessments and therefore emphasizes human and animals studies over in vitro studies.

Following this presentation, the Chairman, Dr Russ Owen, adjourned the meeting.

The Meeting was reconvened Friday, 13 June 2003 chaired by Acting Chairman Dr Bernard Veyret.

Dr Veyret distributed the synopsis of the draft 2003 WHO Research Agenda for Radio Frequency Fields. This was followed by presentations by the RF Research Review, Needs and Priorities Meeting subgroup chairmen:

- Dr Rick Saunders, Laboratory Studies in Animals, Tissues, Cells and Cell-free systems
- Dr Niels Kuster, Dosimetry
- Dr Joachim Schüz, Epidemiology and Human Studies

Discussion followed each presentation. Drs Owen and Veyret and the subgroup chairmen were to develop a Draft Research Agenda based on this synopsis and the subsequent discussions. This will be presented to WHO staff who will develop the Research Agenda.

Following a short discussion of the WHO Research Database, Dr Veyret turned the meeting over to Dr Repacholi who thanked all the contributors. The meeting was adjourned at 12.30.