



THE INTERNATIONAL EMF PROJECT

**10th Anniversary Progress Report
June 2004-June 2005**



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1. OVERVIEW

In May 1996, in response to growing public concern in many Member States over possible health effects from exposure to an ever-increasing number and diversity of EMF sources, the World Health Organization (WHO) launched an international project to assess the health and environmental effects of exposure to electric and magnetic fields, which became known as **the International EMF Project**.

The International EMF Project brings together current knowledge and available resources of key international and national agencies and scientific institutions in order to arrive at scientifically-sound recommendations for health risk assessments of exposure to static and time varying electric and magnetic fields in the frequency range 0-300 GHz.

This Project has been devised to provide authoritative and independent peer-review of the scientific literature. Since its inception, the objectives of the EMF Project have been to:

- review the scientific literature on biological effects of EMF exposure;
- identify gaps in knowledge requiring research that will improve health risk assessments;
- encourage a focused agenda of high quality EMF research;
- formally assess health risks of EMF exposure after the required research is completed;
- encourage internationally acceptable uniform and harmonized standards;
- provide information on risk perception, risk communication, risk management; and,
- advise national programs and non-governmental institutions on policies for dealing with the EMF issues.

An **International Advisory Committee (IAC)**, consisting of representatives of international organizations, independent scientific institutions and national governments supporting the Project, provides oversight. The IAC meets on a yearly basis, and this year is the 10th meeting, a significant landmark for this Project.

Over the last 10 years, activities have closely followed the original work plan, and most activities have or are being finalized. It is expected that all health risk assessments will be published by 2008.

1.1. MEMBERSHIP

The EMF Project is open to any WHO Member State government, i.e. department of health, or representatives of other national institutions concerned with radiation protection. Over 60 national authorities are currently involved in the Project.

Over the past year, eleven countries and entities have joined the Project, namely Bahrain, Ecuador, Egypt, Greece, Jordan, Lebanon, Morocco, Oman, Palestine National Authority, Portugal, and Sudan. This was in part thanks to an outreach program to all countries of the Eastern Mediterranean region (WHO EMRO), because of the increasing public concern about mobile telephony and health in the Middle East.

1.2. COLLABORATION

The EMF Project has *formal* collaboration with two types of entities, i.e. international agencies and independent scientific institutions (see below for details). It also collaborates in an *ad-hoc* manner with other institutes (e.g. co-sponsoring of meetings, etc) and with individuals. This year the Project would like to thank Dr Paolo Vecchia, Chair of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) for assisting WHO at a regional meeting in Bahrain and for contributing to the support of a Brazilian national agency. Dr Jorge Svarka is being called upon to assist in providing information on WHO activities and recommendations in South American countries. In addition many international experts have assisted WHO with presentations on specialized topics at national or regional meetings.

International agencies

Eight international agencies are involved in the Project (<http://www.who.int/peh-emf/project/intorg/en/index.html>). Over the reporting period, there has been active collaboration with most of the collaborating agencies (see Table 1 below).

Table 1 - Meetings and activities with international agencies (July 04-June 05)

Agency	Meeting	Activity
ICNIRP	<ul style="list-style-type: none"> - Annual meeting, Sept. 2004 (Munich) - Annual meeting, April 2005 (San Antonio, TX) 	<ul style="list-style-type: none"> - co-sponsor of Children workshop - co-sponsor of Hypersensitivity workshop - agreement on preliminary review on health effects for RF EHC
IARC	-	- Conduct Interphone study with 13 countries to identify any relationship between mobile phone use and head and neck cancer
UNEP	-	No EMF activities
ILO	Visit to China Standards Agency, April 2005 (Beijing)	- Assisting with the drafting of the brochure on occupational EMF management
EC	<ul style="list-style-type: none"> - EIS-EMF Advisory Board, July 2004 (Ispra, Italy) - Attended Risk Perception and Risk Communication workshop, July 2004 (Ispra, Italy) - EMF-NET Coordination committee, Oct. 2004 (Geneva) - EMF-NET Coordination committee, Jan 2005 (Luxembourg) 	<ul style="list-style-type: none"> - co-sponsor of Children workshop (EMF-NET and COST 281) and of special issue of BEMS Journal (EMF-NET) - co-sponsor of Hypersensitivity workshop (EMF-NET) - co-sponsor of Base Station workshop
ITU	Inter-agency meeting, May 2005 (Geneva)	special session organized in ITU/Arab League regional meeting, October 2004 (Cairo)
IEC		<ul style="list-style-type: none"> - Participation in mobile phone SAR measurement standard with IEEE - Preparation of standard measurement techniques for EMF fields - Preparation of base station emission standard.
NATO	Advanced Research Workshop,	Co-sponsor of Armenia meeting

	March 2005 (Yerevan, Armenia)	
IEEE	Various meetings related to EMF standards	Assisted with reviews and provision of graphs and documents

Collaborating centers

The EMF Project also works with independent scientific institutions that are recognized as collaborating centers of the WHO EMF Project (http://www.who.int/peh-emf/project/Org_Stru/en/index.html). Such designation follows a formal procedure within WHO, with specified terms of reference and annual reporting of joint activities. Collaboration with these institutions over the reporting period are described in Table 2 below.

Table 2 - Activities with collaborating centers (July 2004-June 2005)







Institution	Activity
Brooks Air Force Base, TX (USA)	<ul style="list-style-type: none"> ▪ Co-sponsor of regional meeting in Bangkok (Jan. 2005) ▪ Co-sponsor of and provision of resources for the Dosimetry Workshop in Moscow (Dec. 2005)
ARPANSA (Australia)	<ul style="list-style-type: none"> - Static fields EHC document preparation (C. Roy) - Upcoming RF brochure for local authorities (C. Roy)
BfS (Germany)	<ul style="list-style-type: none"> - Reviews of EHC on static fields
FDA (USA)	<ul style="list-style-type: none"> - Reviews of EHC on static fields
Karolinska Institute (Sweden)	<ul style="list-style-type: none"> - Pilot cohort study (A. Ahlbom) - Support for the mobile phone cohort study
NIES (Japan)	<ul style="list-style-type: none"> - Case control study of childhood leukaemia and residential power frequency magnetic fields(in press)
NIEHS (USA)	<ul style="list-style-type: none"> - Hosted working group on protective policies for ELF EHC - Reviews of EHC on static fields
NIOSH (USA)	<ul style="list-style-type: none"> - Brochure on occupational EMF management (G. Lotz)
NRPB/HPA (UK)	<ul style="list-style-type: none"> - Static Magnetic Field Health Risk Assessment Task Group (R Saunders and A McKinlay) - ELF EHC document preparation (40% of R. Saunders time) - Upcoming RF brochure for local authorities (A. McKinlay) - Information sheet on mobile phone base stations (A McKinlay) - Agreement on future review on health effects for RF EHC

Over the past year, applications have been filed for two new collaborating centers to become involved with the EMF Project, namely the McLaughlin Centre for Population Health Risk Assessment at the University of Ottawa, Canada (focal point: Daniel Krewski), which has just been formally approved by WHO, and the Spanish Association Against Cancer, Madrid, Spain (focal point: Ana Fernández-Marcos), which should be approved in 2005.

1.3. SECRETARIAT

WHO acts as the Secretariat to coordinate, facilitate and implement the Project's workplan. The International EMF Project is part of the Radiation and Environmental Health Unit (RAD), within the Department of Protection of the Human Environment (PHE). RAD has the responsibility for all WHO activities related to ionizing and non-ionizing radiations.

Personnel

	Dr. Michael Repacholi is the Coordinator of the RAD Unit. He proposed the EMF Project to the World Health Organization in 1995 and set it up the following year. Mike continues to organize meetings, attend conferences on behalf of WHO and provide overall management of the many activities under the EMF Project.
	Professor Emilie van Deventer oversees most of the activities of the EMF Project. Emilie works closely with Mike to complete key activities such as the Standards and Policy Frameworks and the Model Legislation (in conjunction with Dr Tom McManus). She has also written many of the publications resulting from the WHO workshops. In addition to being Mike's right hand "man", Emilie is a professor of electrical engineering at the University of Toronto.
	Professor Chiyoji Ohkubo joined the team from April 2005. He retired from the National Institute of Public Health, Japan in March 2005. He has been the Japanese representative to the IAC since 1996 and has participated at several WHO expert working groups. Chiyoji currently responds to EMF questions from the general public, is updating the base station fact sheet and providing material for the local authorities brochure.
	Dr Richard Saunders joined the team from March 2004 to February 2005, on sabbatical from the National Radiological Protection Board (now called the Health Protection Agency Radiation Protection Division), United Kingdom. Rick was responsible for the local oversight of the EHCs on static and ELF fields. He also represented the EMF Project at various meetings. Since his return to the HPA-RPD, Rick has been contracted to continue to support the EMF Project for 2 days per week from March 2005 to February 2007, assisting in the preparation, development and editing of the draft ELF and RF EHCs.
	Professor Leeka Kheifets, UCLA (USA) was contracted to assist the EMF Project with the development of the EHC monographs on static and ELF fields, and was assisting with research related activities and scientific programs for workshops. Leeka was also asked to coordinate the mobile phone cohort study. Her contract ended in December 2004.
	Dr Eric van Rongen has been working part-time for the EMF Project, on secondment from the Health Council of the Netherlands. He has been actively involved in the Static Fields EHC monograph and is now collaborating on the ELF fields EHC document.
	Ms Sarah Bullock provides the administrative support for the Unit's NIR activities. She organizes meetings and workshops, and maintains the Project web page. Unfortunately she will be leaving WHO in August 2005 to return to a position in the UK. Her competent administrative support for the EMF Project will be greatly missed. A new administrative officer is currently being recruited.

A new scientist (P4) post was been advertised, and attracted widespread interest with over 300 applicants. Unfortunately, it had to be cancelled because of a lack of funding.

WHO attempts to fulfill requests with priority given to national authorities. This year, the staff of the secretariat have been very busy with requests for presentations on the state of science and the EMF Project well in excess of what could be handled. For the list of meetings with presentations by WHO staff, see below.

Funding

The project is funded only by extra-budgetary contributions from participating countries and agencies. WHO provides in-kind funding through office space and services, and has very strict requirements regarding funds from non-government agencies. All contributions and accounting are strictly audited by WHO.

In-kind contributions of staff time are provided by some countries. These have included contributions from Dr Colin Roy from the Australian Radiation Protection and Nuclear Safety Agency, Dr Eric van Rongen from the Health Council of the Netherlands, Dr Tom McManus from the Government of the Republic of Ireland, Dr Victor Cruz, from Peruvian National Institute for Research and Training in Telecommunications (INICTEL) and others who have provided translations of fact sheets and other documents free of charge, for example, Dr Adnan Lahham, Radiation Research Unit, Al-Quds University, Palestinian Authority has recently translated a number of fact sheets into Arabic. In addition some countries will host meetings or provide funds to third parties to cover costs of meetings. Entities such as the European Commission, through EMF-NET and COST 281 provide funds for speakers to attend WHO meetings. Various government or government funded agencies such as the Swedish Radiation Protection Institute (SSI) and Forschungsgemeinschaft Funk e.V. (FGF) contribute to the costs of meetings either directly or by supporting the travel costs of speakers. FGF also supports updating the research database.

A summary of funds received and spent is given in Table 3 below. It should be noted that the aim of the Project has been to receive approximately equal contributions from national authorities and non-government agencies. This has largely been achieved over the years, however greater government contributions are needed to maintain this balance.

While there appears to be an excess of income over expenditure, most funds are spent on staff salaries, and WHO requires funds to be available at least one-year in advance to cover salaries. Because of the large volume of work, more staff time is needed to complete activities. A staff vacancy was recently advertised, but because of the large reduction in projected contributions this position had to be cancelled.

A significant problem has been that the funds contributed to the Project have fallen over the years. While a small reserve of funds was built up, this has now been depleted. A concerted funding drive is now necessary to complete Project activities already started.

**Table 3 - Funding Summary for the International EMF Project
(July 2004- June 2005)**

\$1,220,850.00	INCOME
	EXPENDITURE
\$140,397.75	11.5% taken at source for WHO Program Support Costs
\$34,101.00	EMF Project staff travel
\$557,287.00	Salaries for EMF Project Staff

\$14,707.00	EMF Project management, administration, IT equipment
\$37,300.00	Activities (contributions to meetings, APWs etc)
\$96,852.00	Temporary Advisers (non-WHO staff members) travel
\$880,644.75	TOTAL EXPENDITURE

From a managerial perspective, WHO's budget is set on a bi-annual basis. The EMF Project program budget will shortly be developed for the 2006-2007 biennium. In addition, there is a new WHO policy requesting a certain proportion of activities/funds to be transferred to regional offices. The EMF project is currently considering moving part of its activities to the European Regional Office, although it is recognized that there is also a great need for local expertise and activities in other regions, particularly in South America.

2. RISK ASSESSMENT AND SCIENTIFIC ACTIVITIES

The primary goal of the International EMF Project is to assess the health risks from EMF within the frequency range 0 to 300 GHz and to develop policy options for protection of people from EMF exposure. The key **scientific objectives** of the Project are to:

- ❖ Incorporate research results into WHO's Environmental Health Criteria (EHC) monographs where formal health risk assessments are conducted on exposure to EMF
- ❖ Assess the scientific literature and make a status report on health effects,
- ❖ Identify gaps in knowledge needing further research to make better health risk assessments,
- ❖ Encourage a focused research program in conjunction with funding agencies and the global scientific community,
- ❖ Provide a coordinated international response to concerns about possible health effects of exposure to EMF

2.1. HEALTH RISK ASSESSMENTS

Health risk assessments, published as EHC monographs, are the result of in-depth weight-of-evidence critical reviews conducted at independent, scientific group meetings on various topics related to exposure of people to static and time varying electric and magnetic fields.

Once the draft chapters are completed, they are circulated among experts and comments are incorporated. The reviewed report is then subjected to a formally constituted WHO Task Group meeting. Membership of WHO Task Groups are approved by the Executive Director (Sustainable Development and Healthy Environments) of WHO and comprises representatives of the drafting committees and experts appointed by specialty, gender and geographical distribution, representing a wide range of diverse opinions on the subject under deliberation. WHO staff cannot be members of any EMF Project Working Group but are present at meetings to facilitate reaching consensus agreement on conclusions or recommendations. Following WHO technical review and editing, the final document is published by WHO.

The EHC monographs are intended to assist national and international authorities in making risk assessments and subsequent risk management decisions. They represent a thorough evaluation of risks and are not, in any sense, recommendations for regulation or standard setting. These latter are the exclusive purview of national and regional governments. However, the EMF EHCs do provide bodies such as ICNIRP with the scientific basis for reviewing their international exposure guidelines.

Static Fields

Based on the large literature on static fields, which has never been thoroughly reviewed, it was decided to draft separate monographs for static fields and another for ELF fields. A small working group met in September 2004 in Geneva to incorporate comments on the draft document. The EHC on static fields was further reviewed by a Task Group meeting in Geneva, December 2004. The document has since been scientifically and language edited by the Health Council of the Netherlands. Special thanks for bring this monograph to the point of publication are due to Dr Eric van Rongen, Dr Richard Saunders and Dr Colin Roy. The WHO Static EHC will be published in Summer 2005. In order to make the monograph as useful as possible to

other countries, the summary and recommendations chapter has been translated into several other languages (French, Spanish and Russian).

Extremely Low Frequency (ELF) fields

In February 2005, the last working group for input to the ELF EHC was held at NIEHS, North Carolina, USA, and the output of this meeting will serve as the basis for the chapter on protective measures. A preliminary draft for the EHC on ELF fields has been compiled with the assistance of Drs Leeka Kheifets and Richard Saunders. It was widely distributed for comments in May 2005. The WHO Task Group meeting has been scheduled for October 2005 in Geneva.

Radio Frequency (RF) fields

The draft monograph containing the health risk assessment of exposure to RF fields has now been scheduled. Preliminary reviews of the health effects of RF fields are being conducted by ICNIRP. These reviews will then be updated by the Health Protection Agency Radiation Protection Division (HPA-RPD, formerly the National Radiological Protection Board in the UK) and put into the format of the EHC monographs prior to extensive reviews and final assessment by a WHO RF Task Group in late 2006 or 2007. The exact timing for the RF EHC review will depend on publication of the INTERPHONE study and other key EC-funded studies and completion of the IARC carcinogen identification and classification process for RF fields.

2. 2. SCIENTIFIC REVIEWS

WHO workshops

Over the past year, two WHO specialized workshops have been conducted to assist the development of the Environmental Health Criteria monographs for EMF fields, and to provide information useful for development of EMF exposure standards.

- **Sensitivity of Children to EMF Exposure** (9-11 June 2004, Istanbul, Turkey) to review available evidence to determine if children, at any age, could be more sensitive to EMF exposure than adults. The meeting was co-sponsored by the European Commission Coordination Action EMF-NET, the Swedish Radiation Protection Authority (SSI), the Electric Power Research Institute (EPRI), European Cooperation in the Field of Scientific and Technical Research (COST 281), the Research Association for Radio Applications (FGF), International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the Medical Faculty of Gazi University (Turkey).

The outputs of this meeting are:

- A Rapporteur's report (by Dr T. McManus). See: http://www.who.int/peh-emf/meetings/children_turkey_june2004/en/index1.html
 - A special issue of the Bioelectromagnetics Journal to be published in late 2005.
 - A peer-reviewed paper summarizing the results of the workshop: Kheifets, L, Repacholi, M, Saunders, R and van Deventer, E, *Sensitivity of children to electromagnetic fields*, Pediatrics (in press -August 2005).
 - A WHO Information or Fact Sheet to be issued and published by WHO before the end of 2005.
- **EMF Hypersensitivity** (25-27 October, 2004, Prague, Czech Republic) to review scientific evidence that certain people may be sensitive to EMF and display symptoms resulting from their exposure. The main conclusion of the workshop

was that there is no scientific evidence to indicate that the various hypersensitive reactions or symptoms can be attributed to EMF. Because EMF has not been established as a causative factor for symptoms of hypersensitive individuals, the focus of research should be on characterizing their physiological responses.

The meeting was co-sponsored by the European Commission Coordination Action EMF-NET, the European Cooperation in the Field of Scientific and Technical Research (COST 281), the European Commission, and the Ministry of Health, Czech Republic.

The outputs of this meeting are:

- A Rapporteur's report (by Dr K Hansson Mild). See: http://www.who.int/peh-emf/meetings/hypersens_rapporteur_rep_oct04.pdf
- A working group report and the PowerPoint presentations (http://www.who.int/peh-emf/meetings/hypersensitivity_prague2004/en/index1.html)
- Proceedings of papers presented at the workshop will be published by WHO if sufficient papers are submitted by speakers
- A WHO Information or Fact Sheet to be issued and published by WHO before the end of 2005.
- A peer-reviewed paper (currently under development).

The International EMF Project scientific review meetings are open to any interested party, but working group (WG) membership is restricted to independent (non-industry) experts. WG conclusions and recommendations are published in scientific peer-review journals to ensure that the information is made available to as wide an audience as possible. Once a scientific review is completed WHO uses the conclusions and recommendations in its information for national authorities and the public.

Other workshops and meetings partially sponsored by WHO

Washington, USA - BEMS, June 2004: This is a meeting of researchers that provides a forum for announcing preliminary results and discussing research methodology and projects. WHO is pleased to support this important meeting and to encourage scientists to complete projects that contribute towards WHO's research agenda.

Moscow, Russia - Mobile communication and health: medical, biological and social problems, 20-22 September 2004: This workshop reviewed standards and current research. Important discussions focused on the scientific evidence for Eastern European standards and review standards in the different parts of Eastern Europe. The Ministry of Public Health of Russia in 2003 issued a standard on mobile phones where limits were measured in the far field. A basic misunderstanding of dosimetry has been identified, which prompted the organization of a dosimetry workshop scheduled for the first week of December 2005. At this workshop the basic concepts of near-field exposure and the measurement of SAR will be discussed and practical demonstrations provided.

Kos, Greece - 3rd International Workshop on Biological Effects of Electromagnetic Fields, 4-8 October 2004: This workshop is a biannual scientific meeting that provides researchers and policy makers with the opportunity to discuss their results and to review their policies with respect to managing EMF issues. This

popular meeting also provides an opportunity for the EMF project to give an update of the results of activities to a wide geographical audience.

Ljubljana, Slovenia - From Bioeffects to Legislation, 8-9 November 2004

This meeting was held to review current scientific evidence and introduce new member states of the EU to international (and EU) EMF standards and protective measures. It also provided the opportunity for the EMF Project to expand its network of Member States and involve them in the Project.

Armenia - Mechanisms for Biological effects from EMF, 1-5 March 2005

This meeting was held to review current and proposed mechanisms of action of EMF in the frequency range >0 to 300 GHz. Keynote speakers reviewed established and proposed mechanisms for EMF action. Proposed mechanisms were discussed in the light of there being able to be experimentally verified. The health impact of these mechanisms was also discussed.

As can be seen from the list above, scientific meetings are often held in countries having large research programs, but where most of the results are published in a language other than English and so are not widely available for the scientific review process. These meetings provide the opportunity to allow key scientists to summarize their results so that they can become part of WHO's world wide review process for determining possible EMF health risks.

2. 3. RESEARCH COORDINATION

Research database

The EMF Project has assembled a web-based database of research projects as a service to the research community. Its purpose is to inform researchers about ongoing projects relevant to the EMF Project's mandate. It is important to stress that the database is accurate only if researchers provide timely information to the EMF Project. The Research Database is being updated and maintained with the support of COST 281 and Forschungsgemeinschaft Funk e.V. (FGF). WHO sincerely appreciates the help provided for such an important and time-consuming task.

(<http://www.who.int/peh-emf/research/database/en/index.html>)

Research agenda

In 1997, the WHO International EMF Project developed a Research Agenda in order to facilitate and coordinate research on the possible adverse health effects of non-ionizing radiation. In subsequent years, this agenda has undergone periodic review and refinement. (<http://www.who.int/peh-emf/research/agenda/en/index.html>)

The WHO Research Agenda identifies gaps in knowledge and formulates research areas that will help inform health risk assessments of EMF fields. Research needs are identified on the basis of unconfirmed effects having implications for health, and replication of key studies to confirm effects.

Over the past year, research recommendations have been formulated following the WHO workshop on Children and the completion of the Static Fields EHC.

- **Studies on children:** Children Research recommendations needed to determine whether children are more sensitive to EMF were identified at the workshop in Istanbul (June 2004) and have been posted on the Project web site. The main conclusion of this meeting was that, while there did not seem to be any particular sensitivity of children to EMF, there was insufficient data to reach firm

conclusions. Thus the research agenda identified areas where more information was needed through a focused research program (<http://www.who.int/peh-emf/research/children/en/index.html>)

- **Static fields:** The Static Fields Environmental Health Criteria monograph identified specific research needs and an updated research agenda is now available on the web. A key conclusion of the Task Group was that very little useful research has been conducted in this area above 2 T. Many new technologies are using these fields at even higher strengths, especially magnetic resonance imaging for medicine (fields of 10 T and higher are now being used).
- **ELF fields:** Research needs for ELF will be updated during the Task Group meeting scheduled for October 2005. From information accumulated so far, the key area of research is to identify why the epidemiological studies show a relationship between ELF magnetic fields and childhood leukaemia, while laboratory studies do not support the possibility that these fields could initiate, promote or progress cancer.
- **RF fields:** The RF research agenda was last updated in 2003 following an expert meeting, and further in 2004 following the Workshop in Istanbul to include studies needed to determine whether children were more sensitive to EMF. (<http://www.who.int/peh-emf/research/rf03/en/index.html>). Several proposed studies have since been started, some of which are being promoted by the EMF Project:
 - **Pilot cohort study:** A pilot study was conducted in a few countries to determine whether a full cohort study could be carried to identify any adverse health consequences of using a mobile phone. The pilot study result concluded that appropriate information could be gathered in a full cohort study to yield useful information. A full cohort study is now being planned.
 - **Russian/French study:** Studies conducted in the former Soviet Union suggested that microwave irradiation of rats disrupted the antigenic structure of brain tissue. These results formed a basis for the Soviet microwave standard that continues to be used by Russia and China in their standards rationale. Replication of this study is to be carried jointly by Russian and French researchers. The study has received funding and agreement on the protocol has been reached. The study will commence about mid 2005 and take a year to complete.

WHO input to funding agencies

The EMF Project has actively worked with international donors and national authorities to promote and fund research needs identified by WHO.

- **European Commission:** WHO has asked the EC to consider possible health consequences from static magnetic fields as a priority research area for their 7th Framework. The EC used WHO's EMF Research Agenda as a basis for their 5th Framework research priorities 5 years ago, making almost 20 million euros available for important EMF research areas.
- **MTHR:** The EMF Project also works with national programs to encourage them to assist with the research needs identified by WHO. Outstanding among these has been the Mobile Telephone Health Research program (MTHR) in the UK where

research needs were broadly based on the WHO research agenda and approximately £18million is being spent. Results of this excellent program are now beginning to be published and are responding to key health issues raised by non-replicated studies and areas of concern not properly addressed by previous research. Meetings were held 8-10 November 2004, 12-16 January 2005 in London.

3. RISK MANAGEMENT ACTIVITIES

The key **risk management objectives** of the Project are to:

- ❖ Facilitate the development of internationally acceptable standards for EMF exposure,
- ❖ Provide information on the management of EMF protection programs for national and other authorities, including monographs on EMF risk perception, communication and management, and
- ❖ Provide advice to national authorities, other institutions, the general public and workers, about any hazards resulting from EMF exposure and any needed mitigation measures.

3.1. STANDARDS HARMONIZATION

WHO's International EMF Project provides a unique opportunity to bring countries together, identify criteria for science-based standards setting and develop a framework for developing health-based EMF standards. It is intended that this should encourage the establishment of exposure limits and other control measures that provide the same or similar level of health protection for all people.

While WHO strongly promotes the use of international (ICNIRP, 1998) standards, some countries feel the need to develop or refine their own standards. This Framework is intended for national advisory and/or regulatory bodies that are developing new standards for EMF, reviewing the basis of their standards, or reconsidering specific quantitative values such as reference levels and safety factors. The overall purpose of this framework is to provide advice on how to develop science-based exposure limits that will protect the health of the public and workers from EMF exposure.

After many regional meetings and reviews the Framework is now undergoing final edits prior to publication.

3.2. MODEL LEGISLATION

A need for Model Legislation to limit the exposure of people to electromagnetic fields has been expressed by members of the International Advisory Committee (IAC) to the WHO's International EMF Project. Such legislation would facilitate many countries in the introduction of appropriate measures to protect the public and workers from potential adverse effects of EMF.

The Model Legislation was developed by a WHO Working Group in consultation with IAC members, supported by WHO legal staff, in response to this need. It should be noted that the Model Legislation encompasses a wide range of options available to the lawmaker. The Model Legislation can, in effect, be applicable to all or to defined groups; it can apply everywhere or be confined to specific areas, it can incorporate additional measures that take account of scientific uncertainty or not. It is up to the user to decide which elements to adopt. While the Model Legislation covers the basic legislation needed to adopt international standards, WHO makes no recommendations on what should be included or excluded, except that where the material is included the approach recommended here should preferably be followed.

The Model Legislation follows the widely accepted practice among lawmakers of setting out an enabling Act which permits the responsible Minister to subsequently issue Regulations, Statutory Orders or Ordinances as appropriate to deal with specific areas of concern. The Model Legislation set out here comprises a Model Act and two

complementary Model Regulations.

To assist countries not having appropriate legislation to protect their population, the EMF Project has developed a model act and model regulations that provide the legal framework to provide this protection. An important aspect of this legislation is that it uses international standards that limits EMF exposure of people (ICNIRP exposure standards) and international standards that limit the emissions of EMF from devices (IEC and IEEE device emission standards). This model legislation will be on the Project web site shortly.

3.3. "PRECAUTIONARY" FRAMEWORK

The previously named Precautionary Framework has been renamed to: "Framework for Guiding Policy Options in Areas of Scientific Uncertainty" or "Policy Options Framework" as a short title. This has been necessary because of the misunderstanding about what the Framework was really trying to achieve and the belief that misuse of the word "precaution" would lead to unpredictable or unjustified outcomes.

The Framework is designed as a guide for decision-makers to develop policies that are rational and based on available science. Public health policy makers need to consider measures that are reasonable and cost-effective, taking account of the uncertainties in the science.

Scientific uncertainty over the potential health effects from EMF has led several governments to adopt a cautious approach when managing EMF risks. This represents challenges and opportunities for scientists, policy makers and the public but also leads to confusion.

Responding to the need of Member States to have guidance in this area, a Framework was developed following a 3 day meeting on "Application of the Precautionary Principle to EMF" in Luxembourg on February 24-26, 2003. The Framework has undergone a number of external and internal reviews and case studies developed for both ELF and RF fields.

Over the reporting period, the draft was posted for public consultation on the Project's website between October 2004 and January 2005. Over 50 comments were received from all groups of stakeholders. An internal working group meeting was held in April 2005 to incorporate comments received, and it was decided to have a separate Framework applicable to EMF and to expand the Framework to include more general public health issues.

To discuss and test the Framework in terms of practicality, usefulness and applicability to a range of other public health issues, a workshop will be held in Ottawa 11-13 July 2005. Following this meeting the Framework for EMF will be published and the general Framework will be subjected to extensive internal WHO review and approval.

3.4. STANDARDS DATABASE

The International EMF Project has compiled a database of EMF standards worldwide, with the help of Professor Dina Simunic, who continues to updated it. (<http://www.who.int/docstore/peh-emf/EMFStandards/who-0102/Worldmap5.htm>)

3.5. OCCUPATIONAL EMF MANAGEMENT

WHO is working with one of its collaborating centre, the US National Institute of Occupational Safety and Health (NIOSH), to draft a document entitled "Occupational EMF Management". Inputs from the directive issued by the European Commission on this topic and a monograph published by the Finnish Institute of Occupational Health will contribute to this report. In addition the International Labour Organization will provide input and cosponsor the final report. It is anticipated that the first draft will be completed before the end of 2005, at which time the draft will be sent for wide review before finalization and printing.

3.6. COUNTRY FOCUS

In line with WHO's greater focus on country work, the **Country focus initiative**, announced in May 2002, provides a basis for WHO at all levels to intensify its response to the needs of countries. For the EMF Project, this has translated into increased technical and economic support for meetings held in regions and countries that face a crisis with respect to EMF.

Countries visited over the past year to support national or regional EMF programs include: Argentina, Bahrain, Brazil, China, Egypt, Greece, Netherlands, Portugal, Russia, and Spain.

4. RISK COMMUNICATION ACTIVITIES AND RESOURCES

4.1. ENQUIRIES

A large number of enquiries are sent to the EMF Project from the general public, the media (newspapers, TV, radio) and governments. These enquiries are usually handled by the Project staff. However, due to staff shortage, Professor Ken Foster provided invaluable assistance in handling most public enquiries for several months during the reporting period. Dr Ohkubo is now helping with this task.

Dr Repacholi has been on TV in Brazil, Ireland, Japan, Peru and he has provided reports in many other national media programs and publications.

Dr E. van Deventer has been interviewed for the Slovenian newspaper "Dnevnik" in November 2004, for the Greek Patras local TV network (Nov. 2004) and on the *Radio Suisse Romande* (May 2005).

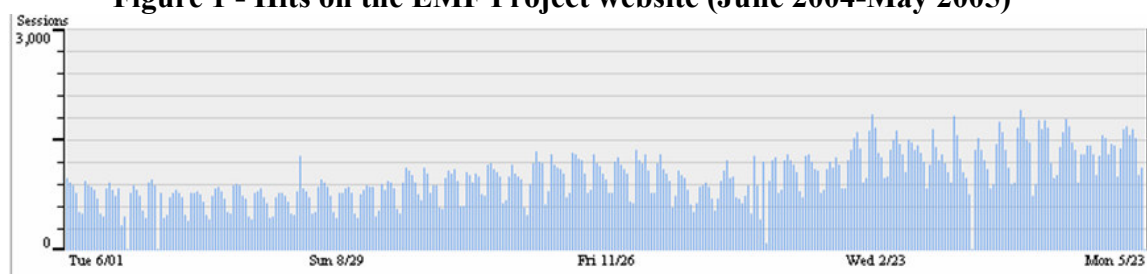
4.2. WEBSITE

The general WHO website is now set up to provide information in 6 languages (Arabic, Chinese, English, French, Russian, Spanish). The EMF Project website has partly been translated in some of these languages.

Home page

The EMF Project home page (at <http://www.who.int/emf/>) is continually updated and has much useful current information. It is the second most visited website in the SDE cluster. Software is available to measure the "hits" on the Project web site, using relevant indicators (e.g. number of hit counts per page, downloads, etc). A graph showing the hits on the EMF Project website over the reporting period is given in Figure 1.

Figure 1 - Hits on the EMF Project website (June 2004-May 2005)



National contacts and information

Many enquiries to the EMF Project are of a local nature. Therefore a country-focused database of information, that lists the Member States of the EMF Project, has been set up thanks to the input of the IAC members (<http://www.who.int/peh-emf/project/mapnatreps/en/>).

The purpose of this database is threefold:

- to provide **national contact information** (of the country representative, or the department inside a ministry, i.e. whoever could respond to or direct queries at the national level) to allow the public to dialogue with their local representative on queries of a local/national nature
- to provide or link to **national information resources** available on the topic of EMF and health (pamphlets, brochures, reports, websites etc)
- to summarize **key activities and concerns** at the national level. Information on *EMF research activities, new policies and legislations* regarding EMF exposure, areas of *public concern* and national responses, is collected during the IAC

meeting and Project members are encouraged to keep the information updated by providing it regularly to WHO.

4.3. WHO PUBLICATIONS

All publications of the EMF Project are reviewed by the International Advisory Committee. Formal approval by WHO management is required of all publications.

Risk Handbook

A user-friendly handbook, *Establishing a dialogue on risks from electromagnetic fields* (ISBN 92 4 154571 2), developed for governmental and non-governmental organizations, and interested individuals was published in 2002. This handbook is available in print and on the EMF web site (http://www.who.int/peh-emf/publications/risk_hand/en/)

The handbook has since been translated in a number of other languages and is currently available on the EMF Project website in 8 languages, namely English, French, Spanish, German, Italian, Japanese, Dutch, Russian and Portuguese.

Over the reporting period, the Handbook has been prepared for publication into French, Spanish and Russian. Printed versions are currently available in English, Italian and Russian, and funds for the French printing are actively being sought. Anyone interested in translating the Handbook into other languages or contributing to the printing costs of booklets already translated into other languages should contact WHO.

EMF pamphlet

A colorful A3 size four-panel pamphlet describing the activities and outputs of the EMF Project has been completed and 2000 copies published.

Fact and Information sheets

Simple, easy to read information is currently provided through two formats: Fact Sheets and Information Sheets. Fact Sheets provide a list of facts only and are formally approved at the Director General's level. Information Sheets contain both facts and general recommendations for national authorities and are approved at Director level within WHO.

Information Sheets published on the Project web site over the past year see: <http://www.who.int/peh-emf/publications/facts/information sheets/en/index.html>

These include:

- Microwave ovens
- Environmental effects of EMF
- Health effects of Intermediate Frequency EMF

Over the past year, fact and information sheets have been translated into Slovenian, Greek, Arabic, Spanish and Japanese.

Several new fact sheets, resulting from activities over the past year, are being compiled and will be placed on the web site shortly, including

- Medical response to RF overexposure
- Children and EMF
- Electrical hypersensitivity
- Base station and wireless networks (to be published following the workshop in June 2005)

Refereed publications

- T. E. van Deventer, M Repacholi, Effet de la Téléphonie mobile sur la santé humaine: état des connaissances scientifiques, *Droit de l'environnement dans la pratique*, 8, 708-724, 2004
- T.E. van Deventer, R. Saunders, M Repacholi, WHO health risk assessment process for static fields, *Progress in Biophysics and Molecular Biology*, 87, 355-363, 2005
- L Kheifets, M Repacholi, R. Saunders, T.E. van Deventer, Sensitivity of Children to Electromagnetic Fields, *Pediatrics* (to be published August 2005)
- L Kheifets, T. E van Deventer, G. Lundel, J. Swanson, Le principe de précaution et les champs électriques et magnétiques : mise en oeuvre et évaluation, *Environnement, risques et santé*, (submitted)
- T.E. van Deventer, D. Simunic, M Repacholi, EMF standards for human health, chapter in *Handbook of Biological Effects of Electromagnetic Fields*, 3rd ed., F. Barnes and B Greenebaum, eds., (submitted)
- L Kheifets, J Sahl, R Shimkhada, M Repacholi, Developing policy in the face of scientific uncertainty: interpreting 0.3 µT or 0.4 µT cut points from EMF epidemiologic studies, *Risk Analysis* (to be published August 2005)

4. 4. MEETINGS

WHO staff members participated in a number of local, national and regional scientific meetings:

- July 2004** Ispra, Italy
EIS-EMF Advisory Board and "Risk perception and risk communication" workshop
- September 2004** Moscow, Russia
Meeting on "Mobile communication and health: medical, biological and social problems"
- September 2004** Lausanne, Switzerland
Seminar on "Téléphonie mobile et droit: quelles limites au déploiement du réseau d'antennes?"
- September 2004** Brussels, Belgium
Mobile Communications: Health, Environment and Society
- October 2004** Kos, Greece
3rd International Workshop on Biological Effects of Electromagnetic Fields
- October 2004** Cairo, Egypt
Regional Seminar "The role of ICT in protecting man and environment: How to limit the impact of its use"
- October 2004** Prague, Czech Republic
WHO Workshop on Electrical Hypersensitivity
- November 2004** Patras, Greece
International Conference on Electromagnetic Fields and possible health effects
- November 2004** Ljubljana, Slovenia
International Conference on EMF - From bioeffects to legislation
- November 2004** Moscow, Russia
Ministry of Health Russian workshop on IR and NIR research and protection
- November 2004** Lisbon, Portugal
EMF seminar, Portuguese Ministry of Health
- November 2004** Brasilia, Brazil
Chamber of Representatives, hearing on mobile telephony and health
- December 2004** Paris, France
Interactions of RF with the human being - State of knowledge.

February 2005 Brussels, Belgium
The new WHO approach towards precaution", at the European Policy Centre (EPC) Risk Forum.

February 2005 Zurich, Switzerland
COST 281/ MCM workshop on "Do sinusoidal versus non-sinusoidal waveforms make a difference?"

March 2005 Yerevan, Armenia
UNESCO Seminar: Mechanisms for Biological effects from EMF workshop
NATO Advanced Research Workshop: The mechanisms of the biological effect of extra high power pulses

May 2005 Bilthoven, Netherlands
International Workshop on health risk and impact assessment

May 2005 Stuttgart, Germany
German-Japanese Forum on Risk Management & Communication on EMF from mobile phones.

5. FUTURE ACTIVITIES

5.1. PUBLIC HEALTH MANAGEMENT

Several documents are planned for the coming year:

- As a complementary report to the occupational management brochure, a report on Public Health Management of EMF will be started soon and use the many inputs from national programs and especially the policy options drafted along with the EHC reviews. WHO will be approaching its collaborating centres to assist on the completion of this document.
- An updated version of an extensive booklet on Electromagnetic Fields, drafted for the WHO European Regional Office, is currently under consideration by WHO/EURO and the EMF Project.. The original booklet was written for the lay public and local authorities, and was published in early 1999. This booklet gives details on the physical characteristics and biological effects of EMF, standards and protective measures, and is presented in a glossy format with many colour pictures and diagrams for ease of comprehension. Copies can be ordered directly on the web site at: www.who.dk/environment/pamphlets or from the Chartered Institute of Environmental Health, Chadwick Court, 15 Hatfields, London SE1 8DJ, UK.
- A similar brochure for local authorities is planned to be published on Base Stations and Wireless Networks. This will be compiled and published following the Base Station meeting to be held at WHO HQ following the June 2005 IAC meeting. It is intended that this Brochure will provide local authorities with all the information they need to plan and approve the installation of mobile phone base stations. The Brochure is also intended to provide information on levels of RF fields and risks of exposure to all current wireless network fields. Drs Colin Roy (ARPANSA) and Alastair McKinlay (HPA) will assist in the preparation of the brochure.

5.2. INTERNATIONAL RECOMMENDATIONS

A booklet with the recommendations on EMF standards, protection and safety will be produced by the international organizations participating in the EMF Project. It is intended that a booklet, published by WHO, will have all the international logos will be completed in the first quarter of 2006.

5.3. DISTANCE LEARNING PROGRAMS

The next activity foreseen by the Project is a series of distance learning programs. Topics include:

- Quality criteria for studies to be useful in health risk assessments
- Children's web site to learn about EMF

WHO will be approaching its collaborating centres to assist in the development and production of these courses. Centres with expertise in distance learning courses will be contacted. Translation into a number of languages is foreseen.

5.4. UPCOMING MEETINGS

- **WHO workshop on base stations and wireless networks** (Geneva, June 15-17, 2005). Given the significant public concern about possible health effects caused by the fields emitted by these devices, a specialized workshop is being held to address all the issues of concern. This workshop will result in the publication of

the proceedings of all presentations, a WHO Fact or Information Sheet in many languages and a scientific paper.

- **Workshop on guiding public health policy in areas of scientific uncertainty** (Ottawa, Canada, 11-13 July 2005). This workshop will review in detail a draft framework guiding public health policy in areas of scientific uncertainty, and provide an opportunity for discussion on its practical application and case studies. The main objectives are to (i) review the draft framework, (ii) explore the use of measures in the development of public health policy, (iii) discuss the implications of the implementation of the draft framework with stakeholders
- 14th International Conference of Medical Physics (Nuremberg, Germany, Sept. 14-17, 2005). The conference will deal with all topics in medical physics, and it will take a very broad interdisciplinary approach (<http://www.icmp2005.org/>).
- **Fourth International Seminar on Electromagnetic Fields and Biological Effects** (Kunming, China, 12-16 September 2005). This meeting is important for the harmonization of EMF standards world wide and focused discussion will be held on the future of the Chinese EMF standard. It is also anticipated that key international agencies participating in the EMF Project will provide input to this meeting.
- **Workshop on Application of Proteomics and Transcriptomics in EMF Research** (Helsinki, Finland, 30 October - 1 November 2005). The workshop will address the use of high-throughput screening techniques (HTST) of proteomics and transcriptomics (so called 'Discovery Science') as an approach to determine all possible biological targets of EMF on the sub-cellular level.
- **WHO Workshop on Radiofrequency fields: Health effects and policy options for protection** (Melbourne, Australia, 17-18 November 2005). This WHO workshop is being held jointly between WHO and the Australasian Radiation Protection Society (ARPS). Cosponsoring a meeting with ARPS, a regional radiation protection society, allows an excellent opportunity to provide information to the south-east Asian region. It will review the health effects of RF fields, use of additional measures when dealing with uncertainty in the science, and communication of risks to the public.

Note: A WHO regional workshop on EMF and Health effects to be held in Brazil, September 2005, was cancelled

FOR FURTHER INFORMATION ON THE INTERNATIONAL EMF PROJECT

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