Mobile Manufacturers Forum

EMF Health and Safety Scientific Research Program

March 2012

Introduction

The Mobile Manufacturers Forum is an international not for profit association with scientific purpose. Consistent with its constitution, the MMF maintains an active research program to promote high quality bio-electromagnetic, dosimetric or related social research, which is designed to enhance the scientific database relevant for health risk assessment or which is relevant to the development of sound public policy.

The effects of radio waves have been extensively researched over many years and this research has been used to develop safety standards for all wireless products. In addition, many national and international independent expert panels have reviewed the literature over the years, consistently concluding that scientific research has not confirmed any public health risks from living near mobile phone base stations or from the phones themselves or indeed any other radio products operating within internationally accepted exposure guidelines.

Notwithstanding the lack of scientific evidence of any health effects associated with the use of mobile and wireless communications devices, the industry remains committed to continuing to support research in this field. The MMF's role in this area is to co-ordinate research contributions on behalf of member companies, and the program that has been implemented and detailed here, is directed towards the fulfillment of the World Health Organization (WHO) EMF Research Agenda.

This document therefore provides a brief overview of the various projects supported by the MMF. In supporting research in this area, the MMF is acutely aware of the sensitivities involved, and to this end, the MMF undertakes its support for research within a framework designed to ensure the complete scientific independence of the work undertaken and actively encourages all results, whatever they are, to be published in peer-reviewed scientific journals.

Promoting Scientific Discussion

Consistent with its own objectives, the MMF sponsors a range of meetings, conferences, presentations and other initiatives that promote scientific discussion and debate in this important field. In particular the MMF supports:

Annual or Bi-Annual Conferences

Bioelectromagnetics Society Annual Conference

The annual meeting of the Bioelectromagnetics Society (BEMS) is the leading scientific conference on bioelectromagnetics with participants attending from around the world. It provides an opportunity for scientists to meet and discuss recent scientific, medical and developments in biological effects and uses of electromagnetic energy at non-ionising frequencies. The MMF has provided sponsorship for the conference every year since 2001.

International Congress of the European Bioelectromagnetics Association (EBEA)

The purpose of this bi-annual scientific congress is to summarize present scientific knowledge about the biological effects of electromagnetic fields, their interaction mechanisms and implications for human health.

Recent Workshops

Dosimetry meets Epidemiology Paris, France December 2011

Large scale epidemiological studies such as INTERPHONE, CEPHALO, COSMOS, and MOBIKIDS that have been carried out or are on going face many challenges in relation to exposure assessment. Usage variations, technological evolution, call duration, output power variations, different communication protocols, environmental exposure and age are just some of the parameters that can play an important part in determining accurate subject exposure. This workshop hosted by COST BM0704 involved epidemiologists and engineers to review these issues and to discuss what may required for future studies.

Phase II Dosimetry Research Program: Results Workshop, Bordeaux, France, 2010

This workshop was held to review the outcomes from the second phase of the MMF and GSMA's Dosimetry Research Program as well as to identify issues and areas for further investigation.

Thermal Aspects of Radio Frequency Exposure Maryland, USA, January 2010

An international workshop co-sponsored with the US Food and Drug Administration invited experts from around the world to review current knowledge of the effects of heat on the body that are of potential relevance to setting limits for human exposure to RF energy. Specific goals for the workshop were to identify the most appropriate health endpoints for a given tissue/system, the most appropriate time periods for acute and chronic exposure, any well established time–temperature thresholds for adverse effects, and recommendations for future research to better define time–temperature thresholds in support of development of human exposure standards.

Overview of MMF Supported Research Projects

PROGRAM 1: EPIDEMIOLOGY PROGRAM

Overall cost of program 1: €7.3 Million (to date)

1.1 INTERPHONE: International Case-Controlled Studies of Cancer in Relation to Mobile Telephone Use

The INTERPHONE study was a major multi-national case- control study that was coordinated by the International Agency for Research on Cancer (IARC) – part of the World Health Organization (WHO). The overall project involved separate national studies in each of the participating countries as well as a final overall assessment of all the combined data. Participating countries included Australia, Canada, Denmark, Finland, France, Germany, Israel, Italy, Japan, New Zealand, Norway, Sweden and the UK. By examining and comparing the data on phone use among cancer cases and healthy control groups, the overall aim was to determine whether or not mobile telephone use increases the risk of certain head and neck cancers.

Principal Investigator: E.Cardis France
Institution: Various

1.2 COSMOS: Cohort Study of Mobile Phone Use and Health (Contract Currently Under Discussion)

The study will investigate the possible health effects of long term mobile phone use. It is an international study being conducted in five European countries – UK, Denmark, Sweden, Finland and the Netherlands, and aims to follow approximately 250,000 Europeans over a period of up to 25 years.

Principal Investigator: TBC
Institution: Various

PROGRAM 2: DOSIMETRY PROGRAM

Overall cost of program 2: €6.65 Million (to date)

These projects are designed to support the biological research programs (through improved dosimetry controls as well as suitable exposure systems) in addition to enhancing the measurement technology used by the industry in compliance testing.

2.1 IT'IS

The MMF has supported the work of the Foundation for Research on Information Technologies in Society (IT'IS) in Switzerland over many years, with the Foundation itself conducting a wide variety of dosimetry and measurement projects. It has designed and constructed state-of-the-art exposure systems that have been used in many of the biological research projects discussed above.

Principal Investigator: N. Kuster
Institution: IT'IS, Switzerland

2.2 Development of Simulated Tissue Equivalent Dielectric Materials

This program developed materials that effectively simulated the dielectric properties of the human body. Such materials are used in SAR testing in order to demonstrate compliance with relevant safety standards

Principal Investigator: TBC
Institution: University of Bordeaux, France

2.3 International Inter-laboratory SAR comparison program

A program established with the University of Maryland and undertaken in conjunction with the United States Food and Drug Administration through a Co-operative Research and Development Agreement (CRADA).

The program has developed a replicable Specific Absorption Rate (SAR) assessment protocol that is being used for inter-laboratory verification of mobile handset SAR values.

Principal Investigator: C. Davis
Institution: University of Maryland, United States

2.4 Thermal and RF Modeling of Cellular Phone Exposure

This is a four-year research project that was carried out by the Department of Radiotherapy at Utrecht's University Medical Centre in the Netherlands. The principal objective of the project was to further investigate the temperature rise induced by mobile phone exposure using newly developed 3D high-resolution imaging techniques.

Principal Investigator: J.J.W. Lagendijk
Institution: University of Utrecht, Netherlands

2.5 Evaluation of Electromagnetic Field and SAR Distributions from EEG Electrode Cap

The use of conductive EEG leads in presence of a radiofrequency field may generate induced currents on the leads and potential changes of RF power absorbed in the human head. The use of the leads may prove to be an important factor in observed changes in EEG and sleep quality studies.

The study aimed to perform a systematic analysis on the effect of the use of EEG on the electromagnetic field and SAR in a human head exposed to the RF field of a mobile phone.

Principal Investigator: L. Angelone
Institution: Massachusetts General Hospital, United States

2.6 Procedures, Validation, System Verifications and Uncertainty Analysis for the reliable use of fast SAR Methods

This project defined the specifications and procedures for the effective use of Fast SAR Methods, including performance verification, system validation, measurement uncertainty that were then incorporated into IEC62209.

Principal Investigator: N. Kuster
Institution: IT'IS Foundation, Switzerland

2.7 Virtual Family

This project involved the development of a set of highly detailed whole-body models of a male, female and two children for use in scientific research where the possible impact of RF emissions upon humans needs to be assessed. The models offer unprecedented detail gained through high resolution MRI scans and include organ and tissue level detail. The results of the project have been made available to the scientific community to assist in research. The IT'IS Foundation in Switzerland undertook the project in conjunction with the US FDA.

Principal Investigator: A. Christ
Institution: IT'IS Foundation, Switzerland

2.8 Low Exemption Rationale for Wireless Transmitters at Distances of 25 mm or Greater from the User

The objective of this project was to develop a low-power exemption rationale for wireless transmitters operating at distances between 25 to 200 mm from a person's head or body, taking into account different antenna performance metrics yet ensuring inherent compliance with relevant standards.

Principal Investigator: M. Ali and G. Schmid
Institution: University of South Carolina, USA and ARC Seibersdorf, Germany

2.9 RF Thermal Response: Parameters Sensitivity and SAR vs Temperature Distributions

This project involved a sensitivity analysis of thermal parameters particularly the most sensitive tissues in the human head and also investigated the most appropriate averaging volumes and masses that would provide a best estimate of resultant temperature rise.

Principal Investigator: R. Croft
Institution: Swinburne University of Technology, Australia

2.10 Thermal Effects Review (2 Projects)

This project involved the production of a review of thermal tissue damage thresholds and dose response relationships in the most sensitive animal and human organs along with recommendations on thermal thresholds for adverse health effects in a form that could be considered in future revisions of standards.

I. Principal Investigator: M.Dewhirst and M. Zisken
Institution: Duke Medical Center and Temple Medical School, USA

II. Principal Investigator: J. Morrissey
Institution: Nova Southeastern University, United States

2.11 Dielectric Parameters for Tissue Simulating Liquids - 30MHz to 6GHz

This project extends the parameter set defined for head tissues in the frequency range between 300MHz and 3GHz to the frequencies relevant for IEC 62209-2 taking into account models of anatomically correct humans.

Principal Investigator: J Hyttinen
Institution: Tampere University of Technology, Finland

2.12 RF Safety Compliance Testing of Multiple Input Multiple Output (MIMO) Antennas

The project aimed to develop reliable and practical assessment methodologies for determining the compliance of MIMO device and base station antennas with international RF human exposure limits, that could be submitted to standards committees.

Principal Investigator: R Croft
Institution: Swinburne University, Australia

2.13 Determining Maximum Allowable Emitted Power Level from Low-Power Transmitters for SAR Compliance

This project examined low powered devices and aimed to explore and develop a relationship between antenna performance metrics such as bandwidth and directivity or gain with specific absorption rate. The ultimate goal was to predict threshold power levels as functions of frequency, distance, and one or more antenna performance metrics to satisfy compliance requirements under the respective regulatory standards for distances below 25 mm. Low power exclusion formulas have subsequently been included in the standard IEC-62479 based on the research published in this project.

Principal Investigator: M. Ali
Institution: University of South Carolina, USA

2.14 Exposure patterns caused by RF emissions of low power transmitters

This project involved the investigation of relationships between basic characteristics of wireless devices (emitted power, bandwith, frequency, antenna gain and distance to the body) and the basic restrictions of the standards in order to develop a sound scientific rationale for low power exclusion clauses for different wireless product-families in the frequency range between 300 MHz and 6 GHz.

Principal Investigator: G. Schmid
Institution: ARC Seibersdorf, Austria

2.15 Scientific Basis for Base Station Exposure Compliance Standards (2 Projects)

Project 1
This project had the objective to improve accuracy and efficiency of free space measurements and protocols and to determine accurate correlations between basic restriction SAR levels and free field measurements in the vicinity of mobile radio base stations. The project added to the content of the EUREKA project "BASEXPO".

Principal Investigator: G. Neubauer
Institution: ARC Seibersdor, Austria

Project 2
The aim of the project was to assist the user of the IEC standard 62232 in evaluating the uncertainties of induced SAR with respect to variations in human anatomy and phantom posture. The variability was assessed by calculating the whole-body and localized SAR in anatomically correct human models of the Virtual Family exposed to electromagnetic fields in the near-field of two representative base station antennas in the frequency range of 300 MHz to 5 GHz. The evaluation involved large-scale numerical evaluations of humans exposed to plane waves while in the near-field of mobile communication base station antennas.

II. Principal Investigator: N. Kuster
Institution: IT'IS Foundation, Switzerland and 7 other institutes.

2.16 Local SAR Versus Power Density between 1 and 10 GHz

The objective of this project was to establish the optimal frequency crossover point (or range) for localized SAR and power flux density as RF safety exposure metrics in the frequency range of 1-10 GHz principally through the use of numerical RF and heat transfer modeling

Principal Investigator: R. Croft
Institution: Swinburne University

2.17 An Assessment of Passenger Exposure to the Radiation of Trunk Mounted Antennas

While the IEEE P62704-2 standard defines the methodology for the evaluation of exposure of passengers and bystanders to the electromagnetic fields of vehicle mounted antennas using numerical techniques, the quantification of the exposure, the local and whole body SAR values have to be evaluated numerically using a validated model of the antenna under test and an anatomical reference body model. Since the actual exposure will vary depending on the anatomical features of the exposed person, correction factors need to be applied to the various models used, and the determination of these correction factors is the subject of this project.

Principal Investigator: A. Christ

2.18 Low Power Exemption for Wireless Transmitters Based on Temperature

In this project temperature increase in a nearby person was assessed using different antennas and realistic anatomically based human head models. The objective of the study was to correlate temperature rise with antenna performance characteristics and output power to develop a robust low power exemption.

Principal Investigator: M Ali and R Zaridze
Institution: University of South Carolina, USA and Tbilisi State University, Georgia

PROGRAM 3: ANIMAL STUDIES

Overall cost of program 3: €8.45 Million

The first four projects consisted of six 2-year (or life-time) animal studies and were jointly funded by the MMF, the GSM Association and with the European Commission under the 5th Framework Program.

3.1 Two combined toxicity/carcinogenicity studies of 900 MHz CSM and 1800 MHz DCS wireless communication signals in B6C3F1 mice

This 2-year bioassay study was performed as a 'classical' combined chronic toxicity and carcinogenicity study using three different dose levels.

Principal Investigator: C. Dasenbrock
Institution: Fraunhofer Institute, Germany

3.2 Two combined toxicity/carcinogenicity studies of 900 MHz GSM and 1800 MHz DCS wireless communication signals in WISTAR rats

This 2-year bioassay study was also performed as a 'classical' combined chronic toxicity and carcinogenicity study using three different dose levels.

Principal Investigator: E. Ruedin
Institution: RCC, Switzerland

3.3 Evaluation of 900 MHz CSM wireless communication signals on DMBA-induced mammary tumors in Sprague Dawley rats

This study used a well-known carcinogen that allows for the analysis of tumor promoting effects. It also examined possible effects of low-level RF exposure on a similar DMBA mammary tumor model.

Principal Investigator: R. Hruby
Institution: ARCS, Austria

3.4 Evaluation of 900 MHz GSM wireless communication signals on Lymphoma induction in Eμ-PIM 1 transgenic mice

This study attempted to replicate an earlier study by Repacholi *et al* reporting an increased lymphoma incidence following daily exposure to 900 MHz RF fields. In this study, tumors other than lymphomas were also analyzed.

Principal Investigator: G. Oberto
Institution: RBM, Italy

3.5 DMBA Replication

This program involved a further replication study performed in the same manner as the Perform–A3 animal project. This study was conducted by the Zhejiang University Medical School in Hangshou, China.

Principal Investigator: C. (J.) Huai
Institution: Zhejiang University, China

3.6 France-Russia Study

This project was designed to have two separate laboratories attempt to verify early Russian and Ukrainian reports of microwave effects on the immune system of rats. The project was supported by the CNRS (France), the French Health and Radiofrequency Foundation, the MMF and GSM Association.

French Part of Study
Principal Investigator: B. Veyret
Institution: PIOM Laboratory, ENSCPB, France

Russian Part of Study
Principal Investigator: O. Grigoriev
Institution: Institute of Biophysics, State Research Centre, Moscow, Russia

PROGRAM 4: IN-VIVO AND IN-VITRO REPLICATION STUDIES

Overall cost of program 4: €2.97 Million

4.1 Activity of the enzyme ODC in cell cultures following RF exposure

This was a replication study of work by the Litovitz group suggesting a temporary increase in ODC activity in L929 fibroblasts after exposure to NAD phone signal.

Laboratory 1
Principal Investigator: B. Billaudel
Institution: CNRS, France

Laboratory 2
Principal Investigator: J. Naarala
Institution: Univ Kuopio, Finland

4.2 Genotoxicity studies following RF exposure

This study attempted to replicate the work undertaken by the Maes group suggesting increased sister chromatid exchange in human lymphocytes.

Laboratory 1
Principal Investigator: C. Marino
Institution: ENEA, Italy

Laboratory 2
Principal Investigator: D. Lloyd
Institution: NRPB, United Kingdom

4.3 Spatial working memory in rodents

This study was a replication of Lei *et al* research suggesting decreased maze performance ability in rodents.

Laboratory 1
Principal Investigator: Z. Sienkiewicz
Institution: NRPB, United Kingdom

Laboratory 2
Principal Investigator: J.-C. Cassel
Institution: ULP, France

4.4 Investigation of 900 MHz Electromagnetic Radiation for Effects on Permeability of the Blood Brain Barrier

This study attempted to replicate earlier work on the permeability of the blood brain barrier (BBB) in animals exposed to GSM RF signals, while also incorporating improvements in the study design.

Principal Investigator: J. Morris
Institution: Batelle, United States

4.5 Heat Shock Protein (HSP27) Study

This study evaluated the potential effects of RF energy on the stress response pathway in animal cells and attempted to replicate earlier findings.

Principal Investigator: J. Roti Roti
Institution: Washington University, United States

PROGRAM 5: HUMAN STUDIES

Overall cost of program 5: €1 Million

There have been several studies looking at whether exposure to RF energy can have any impact on the quality of our sleep, whether it can be associated with headaches and whether exposure has any impact upon blood pressure.

This project was not designed to be a specific replication of these earlier studies, but it looked at the same questions using an improved study design and exposure systems.

5.1 The effects of 900MHz GSM Wireless communication signals on subjective symptoms, physiological reactions, alertness, performance and sleep

The objective of this project is to establish whether exposure to radiofrequency fields (RF) caused by mobile phone use during the day has any acute effect on: self reported symptoms as headache, biological correlates to subjective symptoms such as stress hormones, vertigo, skin irritation and sensation of heat; the cardiovascular system with regard to blood pressure, heart rate and heart rate variability; sleepiness and performance; and subsequent night sleep.

Principal Investigator: B. Arnetz
Institution: Uppsala University, Sweden

PROGRAM 6 MECHANISM PROGRAM

Overall cost of program 6: €300,000

Speculations about non-thermal or micro-thermal effects of radiofrequency (RF) emissions have in part been driven by hypothetical physical mechanisms that may not be directly testable in experiments. This program saw five prominent physical scientists examine the plausibility and/or limits for speculations involving heating within cells and molecules, accumulation of small effects during long durations of exposure, field enhancements created by the detailed anatomy of tissues and cells, and ion motions at the molecular scale.

6.1 Effects of RF fields on ion transport and on DNA

This program was undertaken to investigate whether ongoing natural molecular processes can be affected by an electric field. As is well known from classical dielectric theory and metallic conduction, even small fields may bias a process over a length of time if the effect does not average to zero. Therefore the project looked at what are the time, intensity, and frequency limits for electric field effects on processes such as conduction in ion channels, ion transport enzymes, and transcription of codes from DNA?

Principal Investigator: D. Astumian
Institution: University of Maine, United States

6.2 Modeling and simulating RF energy absorption in cellular systems

This program undertaken at the looked at whether the anatomical and microanatomical structure of tissues, cells and cell membranes of RF-exposed matter enhance internal fields enough to lower the threshold for an effect on cell function. The project also looked at whether RF fields can introduce physicochemical signals larger than inherent background noise.

Principal Investigator: J.C. Weaver
Institution: Massachusetts Institute of Technology, United States

6.3 Energy accumulation in biologically active models due to RF absorption and possible biological effects

The research objective in this project was to look at whether resonant absorption can occur in macromolecules at radiofrequencies. That is, can RF energy persist long enough in a macromolecule to change its function or structure before being converted to heat?

Principal Investigator: E. W. Prohofsky
Institution: Purdue University, United States

6.4 A theoretical investigation of the effects of low-level RF fields on molecular transport, chemical reaction rates and rectification

The objective of this program was to answer the question: Can gradients in the strength of an applied RF electric field at the interface between the cell membrane and extra cellular fluid result in forces large enough to effect ionic motions with possible subsequent effects on cellular function?

Principal Investigator: F. Barnes
Institution: University of Colorado, United States

6.5 Micro and macroscopic study of RF absorption

This project was undertaken to determine whether absorbed radiofrequency energy can create a large enough temperature gradient in cells and molecules to affect a biological process.

Principal Investigator: K. Foster
Institution: University of Pennsylvania, United States

PROGRAM 7: NATIONAL RESEARCH PROGRAMS

Overall cost of program 7: UK £7.3 Million

7.1 UK National Research Program

The United Kingdom's Mobile Telecommunications and Health Research Program (MTHR) was one of the largest national research programs when it was first established and it funded a large number of studies all looking into the possible health impacts of mobile telecommunications. The MMF jointly funded the program with UK operators and the UK Department of Health.

The first phase of the program saw funding for a variety of projects including:

- A Case-Control Study of Brain Tumours and Acoustic Neuromas in Relation to Use of Mobile Phones
- UK Case-Control Study of Adult Brain Tumours
- Cohort Study of Mobile Phone Users (Pilot Study)
- A Case Study of Leukaemia in Relation to Use of Mobile Phones
- Case-Control Study of Cancer Incidence in Early Childhood and Proximity to Mobile Phone Base Stations
- Mobile Cellular Communication and Cognitive Functioning
- The Effects of Mobile Phone Radiation on Blood Pressure
- Study to Evaluate the Effects of Mobile Telephone Usage on Labyrinthine Function
- The Effect of Mobile Phone Use on Symptoms and Neuroendocrine Function in 'Normal' and 'Hypersensitive' Users
- Conversations in Cars: The Relative Hazards of Mobile Phones
- The Effects of Radiofrequency Radiation on Brain Physiology and Function
- Cellular and Sub-Cellular Effects of Microwave Radiation in Simple Model Organisms
- The Effect of Pulsed Radiofrequency Electromagnetic Fields on Redox Signalling and Calcium Homeostasis
- Measurement of the Dielectric Properties of Biological Tissue in Vivo at Microwave Frequencies
- Interaction of Emerging Mobile Telecommunciations Systems with the Human Body
- Assessment of the SAR in the Head from TETRA Handsets

- Traceability for Mobile Telecommunications and Health Research in the UK
- Hypersensitivity Symptoms Associated with Electromagnetic Field Exposure
- Communicating Uncertainty: Mobile Telecommunication Health Risks

PROGRAM 8: SOCIAL AND SOCIETAL IMPACTS PROGRAM

Overall cost of program 8: €630,000 (to date)

8.1 The potential health impacts of increased mobile phone use for contacting emergency services in life threatening situations

This large epidemiological study investigated whether the increasing proliferation of mobile phone use is associated with shorter emergency services response times in the case of a life threatening situations, and the degree to which better health outcomes could be determined.

Principal Investigator: A. Briggs
Institution: Kadoorie Centre for Critical Care Research and Education, UK

8.2 Mobile communication technology: An international study of the impacts of precautionary measures on risk perception and trust

This multi-country study investigated the effectiveness of risk communication and management strategies associated with RF applications, and in particular, the way in which trust and risk perceptions are affected by precautionary measures with regards to both base stations and mobile phone handsets.

Principal Investigator: P. Wiedemann
Institution: Research Centre Juelich, INB-MUT, Germany

8.3 An Assessment of the Social Impact of Mobile Telephony in Brazil

Anecdotal evidence of everyday life points out that, many times, having a cellphone at hand for urgent calls in road accidents, sudden life-threatening disease onset, or getting lost or having a punctured tire in a dangerous neighborhood, etc., has been a decisive factor for saving lives or improving security. The aim of this research project was to evaluate objectively, by means of controlled social research methods, the impact of using mobile phones on the well-being, health and security of common citizens in selected cities in Brazil.

Principal Investigator: R. Sabbatini
Institution: The Edumed Institute, Brazil

8.4 Mobile Telephony and Health: Public Perceptions in Great Britain

This project involved the MMF, GSMA and the UK MOA in commissioning Ipsos MORI, a leading market research company in the UK, to analyze trends in the British public's awareness and perceptions of the alleged health risks and assess the effect of media coverage up to 2004. MOA has continued publishing updates since then.

Institution: IpsosMORI

8.5 Handsets: Impact of Knowledge and Voluntary Precautionary Recommendations on Risk Perception

This project explored the impact of knowledge and voluntary precautionary recommendations on risk perception, through the use of four different information booklets on a sample of the Swiss population.

Principal Investigator: M. Siegrist
Institution: ETH Zurich, Switzerland

8.6 The Role of Mobile Phones in Family Relationships

This project by the examined how mobile phones (including texting) are used in communications between young people and their parents/carers. A particular focus was on how mobiles are used by parents and young people in relation to safety. The project involved qualitative research with 60 families containing young people aged 11-16.

Principal Investigator: D. Roker
Institution: Trust for the Study of Adolesence (now Young People in Focus)

8.7 An Evaluation of Public Understanding of Safety Compliance Information for Mobile Phones

The objective of this study was to test public understanding of safety compliance information for mobile phones in selected markets and to assess how well mobile phone compliance has been communicated to the public.
Institution: Circle Research, United Kingdom

Ensuring scientific independence

The scientific independence and credibility of the MMF research program and the work undertaken as part of it are paramount considerations for both the MMF and the individual researchers involved.

The MMF uses the WHO Research Agenda as the essential framework for determining what projects should be supported in the first instance. When the MMF moves on to discussing possible support for a project, the MMF seeks the involvement of national and international health agencies where ever possible – either as co-sponsors and/or as advisers or participants in the scientific management of the project. The MMF also utilizes universities or independent organizations to act as project/financial managers for projects, ensuring that there is a separation between researchers and industry.

In terms of the results and outputs from sponsored projects, the MMF actively encourages all research findings to be published in peer-reviewed scientific journals. While the decision to ultimately publish a paper is in the hands of a researcher and/or the journal in question, the MMF does all it can to encourage publication or, at the very least, presentation of the results at scientific conferences.

The MMF believes that these principles and procedures ensure openness and transparency in our support for research projects and at the same time ensure the scientific independence and credibility of the work undertaken.

Summary of MMF Principles Relevant to the Sponsorship of Biological Research

- The WHO Research Agenda provides the framework for what research should be supported
- That wherever possible projects are funded in conjunction with government or other third parties
- That wherever possible industry funding is limited to 50% of the project costs
- That independent project and/or financial management is implemented to provide a 'firewall' between researchers and industry sponsors
- That government research quality standards such as GLP are used
- That all results, irrespective of outcome, are published in peer reviewed journals

Program Related Publications

Program 1

Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study, Cardis *et al* , *Int J Epidemiol*, 39(3), 675-94. 2010.

The INTERPHONE Study: Design, Epidemiological Methods, and Description of the Study Population, Cardis *et al*, *Eur J Epidemiol,* 22(9), 647-64. 2007

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Mobile phones and brain tumours: a review of epidemiological research, Croft *et al*, Australasian Physical & Engineering Sciences in Medicine, 31(4):255-267, December 2008.

Dietary zinc intake and brain cancer in adults: a case-control study, Dimitropoulou *et al*, British Journal of Nutrition, Published Online: 2 October 2007.

Cell Phones and Risk of brain and acoustic nerve tumours: the French INTERPHONE case-control study, Hours *et al*, La Revue d'épidémiologie et de santé, 55(5):321-332, October 2007.

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Assigning exposure to pesticides and solvents from self-reports collected by a computer assisted personal interview and expert assessment of job codes: the UK Adult Brain Tumour Study, Hepworth *et al*, Occupational and Environmental Medicine, 63(4):267-272, 1 April 2006.

Mobile phone use and risk of glioma in adults: case-control study, Hepworth *et al*, British Medical Journal, 332(7546):883-887, 15 April 2006.

Validation of the questionnaire used in the INTERPHONE Study: Measuring mobile telephone use in France, Hours *et al*, Environnement, Risques & Santé, 6(2):101-109, Mars-Avril 2007.

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