

BIOELECTROMAGNETICS

NEWSLETTER • A Publication of The Bioelectromagnetics Society

NUMBER 181

www.bioelectromagnetics.org

NOVEMBER/DECEMBER 2004



CALL FOR PAPERS FOR BIOELECTROMAGNETICS 2005

The Bioelectromagnetics Society (BEMS) and the European BioElectromagnetics Association (EBEA) will hold a joint meeting at the University College of Dublin (Ireland) on June 19–24, 2005 (<http://bioelectromagnetics2005.org>).

Original papers are solicited for presentation (in English) on the interaction of biological systems with electromagnetic energy from static fields through the visible light frequencies. Areas of interest include, but are not limited to, the following categories: clinical devices; medical applications; high-throughput screening; *in vitro* studies; *in vivo* studies; mechanisms of interaction; theoretical and practical modeling; instrumentation and methodology; dosimetry; occupational exposure; epidemiology; public policy.

Special sessions are planned on the following subjects:

- Electric fields in wound healing and influences on development
- Physical interaction mechanisms and experimental hypotheses
- Diagnostic and therapeutic uses of microwaves in the detection and treatment of breast cancer
- National programs on mobile telephony and health
- Cell phones and brain tumors
- Cell stress responses in connection with EMF exposure

A public information session on possible health effects of radiation from mobile phone masts is also planned.

—Abstract Deadline is Monday, Jan. 10, 2005—

Drs. Stefan Engström and Kjell Hansson Mild chair the Technical Program Committee (chair@bioelectromagnetics2005.org). The Technical Program will include plenary sessions, platform and poster presentations, workshops, mini-symposia, a student paper competition, and exhibits. Authors wishing to present papers should submit an abstract at <http://bioelectromagnetics2005.org>

For non-web submission and general information, contact the meeting project manager, Gloria Parsley +1 (301) 663-4252; Fax +1 (301) 694-4948; Email: BioEM2005@aol.com

SLOVENIA MEETING FOSTERS STANDARDS HARMONIZATION

One of the first major workshops to be sponsored by the EMF-NET, on “EMF Standards and Legislation within the New EU Member and Candidate States,” featured talks in November by representatives of ten nations—Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovenia and Turkey—on existing national EMF laws and the outlook for EMF standards harmonization with the European Union (EU).



Peter Gajsek

The EMF-NET Special Panel was organized by EMF-NET Coordinator Paolo Ravazzani of the Istituto di Ingegneria Biomedica, Milan, Italy, Gyorgy Thuroczy of Hungary’s National Public Health Centre and National Research Institute for Radiobiology and Peter Gajsek of the Institute of Non-Ionizing Radiation (INIS) in Ljubljana, Slovenia, during the “International Conference on Electromagnetic Fields: From Bioeffects to Legislation.” It was sponsored by INIS and the World Health Organization, among others.

See Slovenia Meeting Continued, p2

IN THIS ISSUE...

Call for Papers, BioEM2005	1
Slovenia Meeting Fosters Harmonization	1–2
EMF-NET Getting Organized, Moving Forward	3
OPINION	4
Authors Says Media Misuse Epidemiology	4
Crichton Book Addresses Modern Fears	4
WHO EMF Project Reports Recent Activities	4
WHO Moscow, Istanbul Meetings Notes	5
Comments Sought on Precaution Framework	5
Final Summary of REFLEX Offered	6
Denmark Launches New RF Research	7
Australian Communication Agency Fact Sheets	7
Italian National EMF Research Program	8–9
Australian Draft ELF Standard in Review	9
Static Field Review	9–10
MMF RFP for RF Dosimetry Program	10–11
COST281 Call for Contributions	11
CALENDAR	11–12

Slovenia Meeting, Continued

EMF-NET is the EU's new Coordination Action designed to provide a framework for interpretation and communication about special EMF-related topics—as well as results of research on possible EMF bioeffects, mainly to policy authorities and other decision makers in Europe. EMF-NET started on March 1, 2004 and will end on February 28, 2008 [see story, page 3].

In his introductory talk, Gajsek pointed out that new political and economic situations in Central and Eastern Europe have dramatically changed international relations and the geopolitical map. Now, democratically elected governments of nations choosing to join the EU will be expected to adapt their regulations and standards accordingly. “Both standards and existing legislation in the field of EMF in those countries are a subject for harmonization with EU legislation,” Gajsek observes. “This is, no doubt, the first step in a long-lasting process of the global harmonization of the EMF standards,” he predicts.

The next step, Gajsek suggests, will be to examine the scientific basis for Western exposure limits (the ICNIRP guidelines) compared to those reflected in Eastern European standards. This effort should address the following questions:

- Are biological effects induced by low intensity EMF exposure scientifically valid?
- Are biological effects of chronic exposure based on sound scientific criteria?
- What is the rationale for Eastern European standards?

“It is hoped that the harmonization process will benefit from ongoing research and health risk assessment such as those expected from the World Health Organization (WHO) and International Agency for Research on Cancer (IARC). Thus, the next generation of standards would be able to incorporate the latest information on health risks within the same harmonized standards framework,” Gajsek said.

The situation is different in each country represented at the international meeting last month in Slovenia, as reflected in talks by:

- Cristian Goiceanu of the Institute of Public Health, Romania
- Hiie Hinrikus of the Tallinn University of Technology, Estonia
- Michel Israel of the National Center of Hygiene, Medical Ecology and Nutrition, Bulgaria
- Jolanta Karpowicz of the National Research Institute Laboratory of Electromagnetic Hazards, Poland
- Anton Kolodynski of the Institute of Biology University of Latvia
- Luděk Pekárek of the Czech National Reference Laboratory for Non-Ionizing Radiation, Czech Republic
- Nesrin Seyhan of the Gazi University Faculty of Medicine and National Non-Ionizing Radiation Protection Center, Turkey
- Dina Simunic of the University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia
- György Thuróczy of Hungary's National Public Health Centre

and National Research Institute for Radiobiology and Radiohygiene, Budapest

Goiceanu, for example, said that since both public and occupational exposure standards in Romania are based on ICNIRP guidelines, there is a good agreement with those of the EU for human EMF exposure. However, in the future public pressure might influence Romanian regulations because there is increasing public concern over EMF and the possible impact on human health, Goiceanu added.

In Slovenia, according to Gajsek, even though concepts for EMF exposure limits originating in the former Soviet Union were never applied, public concern about the potential EMF health effects and political pressure led the government in 1996 to apply “protective measures” to EMF regulation and to use the principle of precaution in addition to ICNIRP guidelines. Thus for new systems and EMF installations in Slovenia, an additional reduction factor of 10 across the whole frequency spectrum (0–300 GHz) was introduced to the current ICNIRP limit values.

“Clearly, this represents a political decision, which does not rely on specific scientific knowledge,” Gajsek points out. And, having such a strict law for new EMF sources (put in service after 1996) over the past eight years has led to no improvement in general risk perception and public acceptability for EMF-based technology such as base stations, Gajsek said. “There is still a common opinion that current limit values are not protective enough against possible health hazards related to low level EMF exposure in the environment.”

This has led to an industry initiative, Forum EMS, to be signed by operators in Slovenia during 2004. It sets out a best practice code for telecommunications operators to supplement government regulations. The goal is to open more dialogue between mobile operators and the community and reduce anxiety over EMF.

Also in Slovenia, the Ministry of Environment is preparing to revise its 1996 Decree on EMF and to harmonize with the European Council Recommendation on limiting exposure of the general public to EMF (0 Hz–300 GHz) as well as some precautionary measures. The Ministry is also preparing an open database on all EMF sources operating in Slovenia that exceed a certain threshold of radiated power. The database will offer a good background for mapping field strengths around EMF sources in real 3-D environments.

Finally, Gajsek said the Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004 on the minimum health and safety requirements regarding the EMF exposure of workers has been accepted by Slovenia, and will be used until a new national ordinance for workers can be published in about two years.

Abstracts of talks by Gajsek, Hinrikus, Goiceanu, Israel, Karpowicz, Kolodynski, Pekárek, Seyhan, Simunic, Thuróczy and of the whole Workshop are available from EMF-NET on the Web at <http://emf-net.isib.cnr.it> Click on the sub-page, Events/2004. Further, the conference statement can be found on the Web at www.who.int/peh-emf/meetings/bioeffects_slovenia04/en/

— by Janet Lathrop, with Peter Gajsek and Paolo Ravazzani

EMF-NET IS GETTING ORGANIZED, MOVING FORWARD

The EMF-NET, the Coordination Action of the European Commission 6th Framework Programme, led by Paolo Ravazzani of the Istituto di Ingegneria Biomedica, Consiglio Nazionale delle Ricerche, Milan, Italy, involves more than 40 participants, including all the coordinators of the European Union's Fifth Framework Programme, coordinators of national research projects in Finland, France, Germany, Greece, Hungary, Italy and the UK, plus representatives of other EC and international groups such as ICNIRP, COST Action 281 and the World Health Organization's International EMF Project, as well as industry associations, regulatory bodies, scientific associations and trade unions.

The four-year EMF-NET was formed to provide policy relevant interpretation/advice for the facilitation of policy development options by the EU and other bodies to support informed decision-making on EMF issues by health, environment and regulatory authorities. This means that EMF-NET will keep track of EMF research across the frequency spectrum, monitor emerging and third-generation (3G) technologies and help to identify research needs related to them, among other activities. Another task for EMF-NET is to help coordinate EMF research activities and dissemination of results between the European Union and acceding and other EU countries, with particular reference to Eastern Europe (see story on page 1).

One of the most focused and potentially effective initiative launched this year by EMF-NET is the "European Fast Response Team on EMF and Health." It is a team of scientists with expertise in various specialties related to electromagnetic field and/or health research, who can be contacted by members of the European Commission and its agencies for quick answers to urgent questions. Fast Response Team members include Elisabeth Cardis of the International Agency for Research on Cancer; Guglielmo D'Inzeo of the University of Rome "La Sapienza," Jukka Juutilainen of the University of Kuopio, Finland; Jolanta Karpowicz of Poland's National Research Institute Laboratory of EM Hazards; Norbert Leitgeb of the University of Graz, Austria; Demosthenes Papameletiou of the European Commission Joint Research Center and Coordinator of the European Information System on Electromagnetic Fields Exposure and Health Impacts (EIS-EMF); Ravazzani of EMF-NET; Paolo Vecchia of Italian National Institute of Health, Rome, and Chair of ICNIRP, and Bernard Veyret of the PIOM Laboratory at the University of Bordeaux, France.

In a recent presentation, Ravazzani also explained that to approach its goals in a systematic manner, EMF-NET is broken into five Main Task (MT) groups. For each, goals will be addressed by Technical Working Groups (TWG). These will identify and define key issues and produce a systematic update plus validation reports and interpretation reports, providing interpretation of key research results as building blocks for policy. A first set of Scientific Key Issue (SKI) and Interpretation Key Issue (IKI) reports by TWGs should be ready by Summer 2005, Ravazzani said.

The five MT groups are:

MT 1. Scientific evaluation of results of laboratory and epidemiology studies. Coordinators for *in vivo* studies are Jukka

Juutilainen of Finland and Jochen Buschmann of the Fraunhofer Institute, Germany. Coordinators for epidemiology are Cardis of IARC and Maria Feychting of the Karolinska Institute, Stockholm.

MT 2. EMF exposure-related risk in the work environment. Coordinator Jolanta Karpowicz; TWG on exposure assessment, Kjell Hansson Mild; TWG on health surveillance and examination, Maila Hietanen of the Finnish Institute for Occupational Health, Helsinki.

MT 3. Improve specific common aspects of research on EMF and health. Coordinator Theo Samaras of the University of Thessaloniki, Greece.

MT 4. Risk communication and perception. Coordinator Demosthenes Papameletiou of the JRC and EIS-EMF.

MT 5. Observer functions. Coordinator to monitor emerging technologies is Norbert Leitgeb; Coordinator to monitor EMF research plans in European Union and outside Europe is Bernard Veyret; Coordinator for liaison with new EU member states, candidate countries and other European countries is Gyorgy Thuroczy.

Industry association members of EM-NET include ETNO The European Telecommunications Network Operators' Association; EURELECTRIC—Union of the Electricity Industries; Federation of French Electrical, Electronic & Communication Industries; GSM Association and the Mobile Manufacturers Forum. A trade union association member is the Bureau Technique Syndical Européen pour la Santé et Sécurité.

More information on EMF-NET is available at the Coordination Action's Web site, <http://emf-net.isib.cnr.it>

— by Janet Lathrop, with Paolo Ravazzani

The Bioelectromagnetics Society newsletter is published and distributed to all members of the Society. Institutions and libraries may subscribe to the newsletter at an annual cost of \$58.50 (\$67.50 for overseas subscriptions). The newsletter serves the membership and subscribers in part as a forum of ideas and issues related to bioelectromagnetics research. All submission to the newsletter must be signed. It is understood that they reflect the views of individual authors and not those of the Society or the institutions with which the author may be affiliated. The editors welcome contributions to the newsletter from members and others in the scientific and engineering communities. News items as well as short research notes and book reviews are appreciated. Advertisements inserted or distributed with the newsletter are not to be considered endorsements.

To submit items for consideration, contact:

Dr. Mays Swicord, editor, Motorola Florida Research Laboratories, 8000 W. Sunrise Blvd., Ft. Lauderdale, FL 33322 USA. Tel. (954) 723-4898, FAX: (954) 723-5611. E-mail: ems029@email.mot.com

or

Janet Lathrop, managing editor, 750 Cherry Valley Rd., Gilford, NH 03249. Tel and FAX: (603) 293-6213 USA. E-mail: jlathrop@fcgnetworks.net

For other Society business or information, contact: Gloria Parsley, executive director, The Bioelectromagnetics Society, 2412 Cobblestone Way, Frederick, MD 21702-2626 USA. Tel. (301) 663-4252; FAX: (301) 694-4948. Email: bemsoffice@aol.com or see the BEMS Web site: www.bioelectromagnetics.org

OPINION

The views expressed in letters to this column are those of the contributors and do not necessarily reflect the opinions of the editorial staff or the organizations served by this newsletter. We encourage contributions which will further a discussion of important issues to the Society and assist in scientific progress in our area of interest. Your response to opinions expressed here are welcome. Letters on other matters are also encouraged.

Editors' Note: A sentence in Hermann Berg's Letter to the Editor on "Milestones of Bioelectromagnetics: Monographs and Proceedings," was inadvertently truncated in the last newsletter. The full sentence near the end of his letter should read:

"This situation is characterized by V. Binhi (33) concerning his model: 'It is quite likely that the theory of the interference of angular molecular states (quantum interference) will only be a small step in the right direction.' "

Our apologies to Dr. Berg for the loss of this phrase from the original letter.

DOES MEDIA MISUNDERSTANDING LEAD TO HEALTH SCARES?

In his most recent book (2004), *The Epidemiologists: Have They Got Scares For You*, British "science watchdog" and skeptic John Brignell takes a critical look at some practices of modern epidemiology and suggests they have been misused by media to scare the public, and may have encouraged junk science. One chapter features a discussion of what Brignell calls "the delights and disasters associated with electromagnetic fields."

A PhD engineer trained at London University, Brignell is also the author of the book, *Sorry, Wrong Number! The abuse of measurement*, and is the maintainer of the Number Watch website at www.numberwatch.co.uk There, he keeps tabs on the faulty use of statistics by the media. One of the major themes of Brignell's latest book is that epidemiology can speak only of correlations, but the public and media have consistently missed the point and regularly misinterpret epidemiologic results as proof of causation. For more information on Brignell and his new book, see www.numberwatch.co.uk/

CRICHTON BOOK ADDRESSES MODERN FEARS, INCLUDING EMF

The best-selling author of techno-thrillers and physician who created the long-running American television show, *ER*, Michael Crichton, has written a new book, *State of Fear*. In it, he uses research information and scientific principles to debunk some modern fears, including what he sees as the myth of world overpopulation, "killer bees," the fizzled "Y2K" crisis and purported health risks of EMF. The 624-page book is described as offering page-turning suspense, cutting-edge technology and extraordinary research, with thought-provoking commentary on how information is manipulated in the modern world.

WHO PROJECT'S STATIC FIELD EHC DRAFT EXPECTED SOON

The World Health Organization's (WHO) International EMF Project released a 13-page progress report on activities and accomplishments during 2003 to June 2004. It announces that WHO plans to issue separate Environmental Health Criteria (EHC) for static and ELF fields, rather than a single monograph which had been planned earlier to cover both.

"Based on the large literature on static fields which has never been thoroughly reviewed, we have decided to develop two separate monographs, one for static fields and one for ELF fields," the WHO report states. A draft of the ELF fields monograph was expected to be complete before the end of this year, to be reviewed by a formal WHO Task Group at an April 2005 meeting. Former WHO staff member Leeka Kheifets, now of the University of California-Los Angeles, is coordinating work on the ELF EHC monograph, and Eric van Rongen of the Health Council of the Netherlands has been coordinating the Working Group on Static Fields. [See related story, Static Field Review, on p9.]

Regarding ELF EMF, the report states, "From our knowledge 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."

And regarding RF EMF, the WHO roundup reports that the process of conducting health risk assessments of exposure to RF fields for a new EHC monograph in 2006 or 2007 is continuing. By the end of 2004, perhaps, a rationale and list of RF studies needed to fill knowledge gaps as identified at a Geneva meeting in June 2003 may be posted on the WHO EMF Project Website.

Over the past 18 months, WHO has been collaborating with the U.S. National Institute of Occupational Safety and Health (NIOSH) to draft a report on "Occupational EMF Management." This year's directive on EMF and worker safety from the European Commission plus a monograph by the Finnish Institute of Occupational Health will contribute to this report, as will the International Labour Organization, the WHO report says. As a complement to the occupational management program, WHO will begin work on a "Public Health Management of EMF" report soon. It will summarize policy options from various countries and a range of possible precautionary approaches.

Overall, the WHO plan on EMF standards is "to comply with the World Trade Organization recommendation that any standards that affect trade should be developed in conjunction with both developed and developing countries." WHO points out that it has sponsored meetings in all its geographical regions to allow scientists to have a say in the a process leading to a common international EMF standard.

Further, WHO is moving toward proposing a Model Act and Model Regulations to address the lack of a legal framework for adopting human EMF exposure limits in member states who wish

See WHO Annual Report Continued, next page

to adopt such legislation. The draft laws are scheduled to receive wide review before they are finalized in 2005.

New items in the WHO EMF Fact Sheet series have been updated and could be released soon—on microwave ovens and environmental effects of EMF, for example—while others on “Children and EMF” and “Electrical Hypersensitivity” were drafted after this year’s workshops and will be circulated for comment.

The WHO report offers a list of publications in the peer-reviewed literature that report on its EMF Project-related research and related topics. The full report in pdf format is available at the WHO EMF Project home page, www.who.int/peh-emf/publications/reports/en/progressreport2003_2004.pdf

WHO MOSCOW, ISTANBUL MEETING NOTES NOW AVAILABLE ON LINE

The World Health Organization’s Working Group report containing the results and conclusions from the meeting “Sensitivity of Children to EMF,” held in Istanbul in June 2004 is now posted on the EMF Project website at www.who.int/peh-emf/research/children/en/

Michael Repacholi chaired the Working Group, and rapporteurs were Emilie van Deventer, Leeka Kheifets and Rick Saunders. Other contributors were Alastair McKinlay, Arwel Barrett, Robert Brent, Lawrie Challis, John Collins, Maria Feychting, Camelia Gabriel, Denis Henshaw, Jukka Juutilainen, Shaiela Kandel, Rob Kavet, Isabelle Lagroye, Stelian Ghelberg, Tracy Lightfoot, Gail Lundell, Gabor Mezei, Patricia McKinney, Chiyoji Ohkubo, Christof Olivier, Ludek Pekarek, Agnette Peralta, Carlos de Pozo, Eric van Rongen, Colin Roy, Tomohiro Saito, John Scholes, Joachim Schüz, Nesrin Seyhan, Riti Shimkhada, Zenon Sienkiewicz, John Swanson, Leon du Toit, Hilary Walker, Joe Wiart, Barney de Villiers and Zhengping Xu.

Also, a two-page summary in Russian and English is available from the September 2004 meeting in Moscow, “Mobile Communication & Health: Medical, Biological & Social Problems,” sponsored by WHO and the Russian National Committee on Non-Ionizing Radiation Protection. Representatives of WHO, the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and scientists from 14 countries also discussed the need to fully characterize public RF exposure levels around base stations, to check compliance with national and international exposure standards and to assess possible health risks of public exposure were debated within the conference, according to the summary. After “comprehensive discussion,” several conclusions were agreed upon, including:

- The level of safety of electromagnetic sources, including base stations for mobile communication, should be evaluated with reference to accepted, science-based standards;
- From a comprehensive review of the large body of scientific literature, a consensus exists that international guidelines, as well as Russian national regulations, ensure adequate protection against all established health effects of radiofrequency fields according to current knowledge level;

- However, large discrepancies exist between Russian and international standards—in particular in the frequency region of interest for mobile communication—that justify actions towards harmonization;

- To this purpose, participation of Russian scientists in the actions for world-wide harmonization of standards promoted by WHO’s International EMF Project, is highly recommended;

Other recommendations are for further research keeping in mind WHO’s research agenda and seeking active contribution of Russian scientists. Also, to respond to public concern, it is recommended that mobile communication operators, as well as national agencies, consider precautionary actions, perhaps with guidance by the WHO Precautionary Framework (see article below).

The Moscow meeting emphasized the importance of open and transparent communication for the public, plus easy access to information. Independent and scientifically qualified institutions should be identified and made legally responsible for providing unbiased information, checking compliance with the standards, and providing advice in cases of controversy. The full meeting summary is available on the Web at www.who.int/peh-emf/meetings/archive/moscow04/en/

WHO SEEKS COMMENTS ON PRECAUTION TO ADDRESS SCIENTIFIC UNCERTAINTY

The World Health Organization’s International EMF Project is seeking comments by **January 15, 2005**, on its “Framework to Develop Precautionary Measures in Areas of Scientific Uncertainty” and related Case Studies on ELF and RF EMF Exposure.

The Framework is substantially expanded since its last version and includes new case studies, in Appendices B and C, on applying precaution to ELF and RF EMF. In Appendix B, the Framework states that despite IARC’s designation of a 50/60-Hz magnetic field as a 2B carcinogen, exposure limits are not an appropriate mechanism for implementing precautionary approaches. WHO specifically rejects a 0.4 microT (4 mG) exposure limit. The Framework also suggests that “even after fully allowing for the legitimate desire by society to err on the safe side, it seems likely that only very low-cost measures will be justified.” This is because childhood leukemia is a rare disease, only a small fraction of the population is exposed at levels associated with increased risk, and there are many uncertainties about whether mitigation or intervention would be effective.

In the RF EMF case study, the WHO draft Framework suggests that interventions related to base stations are unlikely to be justified, but for mobile phones, several possibilities such as more public information on emission levels or improved hands-free design for children could limit exposure at a genuinely low cost.

Comments should be sent to Dr Emilie van Deventer at WHO, e-mail: vandeventere@who.int

The draft is available at www.who.int/peh-emf/publications/reports/en/precautionary_framework_october2004.pdf

FINAL SUMMARY OFFERED FOR EUROPE'S REFLEX PROJECT

Project Coordinator Franz Adlkofer of the VERUM Foundation, Munich, recently summarized major results and milestones of the European Commission's Risk Evaluation of Potential Environmental Hazards from Low Energy Electromagnetic Field (EMF) Exposure Using Sensitive in vitro Methods—the REFLEX Project. It began on Feb. 1, 2000 and was completed on May 31, 2004.



Franz Adlkofer

Briefly, objectives were to use powerful toxicology and molecular biology technologies to investigate cellular and sub-cellular responses of living cells exposed to EMF in vitro. As Adlkofer notes in a section on benefits of the project, “The REFLEX data have made a substantial addition to the data base relating to genotoxic and phenotypic effects of both ELF-EMF and RF-EMF on in vitro cellular systems. The data neither preclude nor confirm a health risk due to EMF exposure nor was the project designed for this purpose. Its value lies in providing new data that will enable mechanisms of EMF effects to be studied more effectively than in the past. Furthermore, the REFLEX data provide new information that will be used for risk evaluation by WHO, IARC and ICNIRP.”

For the 11 participating laboratories, he summarizes results: “The data obtained in the course of the REFLEX project showed that ELF-EMF had genotoxic effects on primary cell cultures of human fibroblasts and on other cell lines. These results were obtained in two laboratories and confirmed in two additional laboratories outside the REFLEX project, while no such effects could be observed in a further laboratory. ELF-EMF generated DNA strand breaks at a significant level at a flux density as low as 35 μ T. There was a strong positive correlation between both the intensity and duration of exposure to ELF-EMF and the increase in single and double strand DNA breaks and micronuclei frequencies. Surprisingly this genotoxic effect was only observed when cells were exposed to intermittent ELF-EMF, but not to continuous exposure.

Responsiveness of fibroblast to ELF-EMF increased with the age of the donor and in the presence of specific genetic repair defects. The effect also differed among the other types of cells examined. In particular, lymphocytes from adult donors were not responsive. Chromosomal aberrations were also observed after ELF-EMF exposure of human fibroblasts.

The following observations were made in different REFLEX laboratories: 1) ELF-EMF at a flux density of about 2 mT upregulated the expression of early genes, such as p21, c-jun and egr-1, in p53-deficient mouse embryonic stem cells, but not in healthy wild type cells;

2) ELF-EMF (0.1 mT) increased the proliferation rate of neuroblastoma cells; and 3) ELF-EMF (0.8 mT) enhanced the differentiation of mouse stem cells into cardiomyocytes.

However, no clear-cut and unequivocal effects of ELF-EMF on DNA synthesis, cell cycle, cell differentiation, cell proliferation or apoptosis were found.

“With respect to radiofrequency EMF, some REFLEX data showed that RF-EMF produced genotoxic effects in fibroblasts, granulosa cells and HL60 cells. Cells responded to RF-EMF exposure between SAR level 0.3 and 2 W/kg with a significant increase in single and double strand DNA breaks and in micronuclei frequency. Chromosomal aberrations in fibroblasts were observed after RF-EMF exposure. RF EMF at a SAR of 1.5 W/kg downregulated the expression of neuronal genes in neuronal precursor cells and upregulated the expression of early genes in p53-deficient embryonic stem cells, but not in wild type cells. Proteomic analyses on human endothelial cell lines showed that exposure to RF-EMF changed the expression and phosphorylation of numerous, largely unidentified proteins. Among these proteins is the heat shock protein hsp27, a marker for cellular stress responses. There was no evidence that RF-EMF affected processes such as cell proliferation, apoptosis or immune cell functionality.”

“For both ELF-EMF and RF-EMF, the results of the whole genome cDNA micro-array and proteomic analyses indicated that EMF may activate several groups of genes that play a role in cell division, cell proliferation and cell differentiation. At present the biological relevance of these findings can not be assessed.”

Strengths of REFLEX, according to the coordinator, are use of a common technological platform for exposure, allowing replication of positive findings between collaborating laboratories. A second strength was use of post-genomic technologies (DNA micro-arrays and proteomics) to allow very large numbers of potential cellular effects to be examined simultaneously without prejudice as to mechanisms.

In some cases, the REFLEX project has created novel results, the coordinator notes. “From a scientific point of view, it has to be stated very clearly that the REFLEX data do not prove a causal link between EMF exposure and any adverse health effects. The genotoxic and phenotypic effects which have been reported within REFLEX clearly require further studies. These studies should include extensive external replications of the key observations reported, initially using the same technological platform. A further objective should be the extension of REFLEX investigations to appropriate animal models (e.g. genetically modified mice) and human volunteer studies.”

Participating investigators in the 3.15 million € program besides Adlkofer were:

Rudolf Tauber, Universitätsklinikum Benjamin Franklin, Berlin
Hugo W. Rüdiger, Universitätsklinik für Innere Medizin IV, Vienna
Anna M. Wobus, Institut für Pflanzengenetik und Kulturpflanzenforschung, Gatersleben, Germany
Angeles Trillo, Ramon y Cajal Hospital, Madrid, Spain
Dariusz Leszczynski, Radiation and Nuclear Safety Authority (STUK), Helsinki, Finland
Hans-Albert Kolb, Universität Hannover, Germany
Ferdinando Bersani, Università degli Studi di Bologna, Italy
Isabelle Lagroye, Laboratoire PIOM, ENSCPB, Pessac, France
Niels Kuster, Institut für Integrierte Systeme, Zürich, Switzerland
Francesco Clementi, Università degli Studi di Milano, Italy
Christian Maercker, Ressourcenzentrum für Genomforschung GmbH, Heidelberg, Germany

DENMARK LAUNCHES NEW RF RESEARCH PROGRAM

Grants to fund a national RF research program sponsored by the Danish government and worth overall 15 million Danish crowns, about 2 million US\$, were announced in November, according to Kjell Hansson Mild, a member of the program committee.

Five principal investigators received grants to lead several studies, on topics ranging from theoretical mechanisms of biological effects to volunteer human studies and epidemiology. The money will also support the country's participation in the first stage of a major international epidemiologic cohort investigation.

Besides Mild of Sweden's National Institute for Working Life in Umeå, the four-member oversight committee includes chairman Phillippe Grandjean of Odense University who is an occupational health physician; Olav Breinbjerg, an associate professor of Electromagnetic Systems and a specialist on applied electromagnetic theory at the Technical University of Denmark, Lyngby, and Jörn Olsen of the Danish Epidemiology Science Centre, Aarhus. A second round of grants is expected to be awarded next year, Mild said in a recent interview.

One of the largest grants went to an experienced EMF epidemiologist, Jørgen H. Olsen, Director of the Institute of Cancer Epidemiology, Copenhagen. He and colleagues received support to begin setting up the cohort for the Danish arm of the World Health Organization's planned international cohort study of various health endpoints in mobile phone users. Olsen et al. also received two smaller grants—first, to join in a pooled analysis among Nordic countries of brain tumor risk and second, to follow up Christoffer Johansen's study of brain tumor risk among Danish mobile phone users, Mild said.

Another project will look at possible effects of exposure to both a GSM and 3G-type (UMTS) mobile base station signal in 40 adults and 40 adolescents, led by Søren Kjærgaard, chair of the Department of Environmental and Occupational Medicine at the University of Aarhus. Mild said that Jørgen Bach Anderson of Aalborg University will consult with Kjærgaard and colleagues on the exposure setup for this study, which is an attempt to explore and replicate findings of the unpublished TNO study (also known as COFAM) by Zwamborg et al. in The Netherlands.

A study using human volunteers is the "PET Study of the Cerebro-metabolic Effects on Nonionizing Radiation from Mobile Phones." Principal investigator is physician Albert Gjedde of Århus Hospital, who will use positron emission tomography to monitor brain metabolic changes in subjects while they use a mobile phone.

Another of the five grants is for a study of geomagnetic field and RF interaction and exposure on biochemical reactions by the radical pair mechanism, "the only known potentially active mechanism," in the words of principal investigator, Jørgen Boiden Pedersen, a physicist at the University of Southern Denmark.

Finally, a study of semen quality and reproductive hormones among young Danish mobile phone users was supported by the program. Niels Jørgensen of the Department of Growth and Reproduction, Rigshospitalet, Copenhagen, will lead it.

AUSTRALIAN COMMUNICATIONS AGENCY OFFERS FACTS SHEETS

To address community concern about possible health effects, Australia's government regulatory agency for telecom and radio communications, the Australian Communications Authority (ACA), recently released a public information package on electromagnetic radiation and mobile phone base stations.

The kit aims "to address community concerns about EMR and health issues, particularly those associated with the installation of mobile phone infrastructure, by providing information on electromagnetic emissions, the deployment of mobile phone towers, use of mobile phone handsets and associated health issues," according to an ACA press release.

"As mobile networks expand to deliver new services, the ACA recognises that there is community concern about mobile phones and mobile phone towers," ACA Acting Chairman Bob Horton said. "As well as providing information on mobile phones and towers, the package outlines related codes, regulatory arrangements and electromagnetic energy standards. As such it provides a comprehensive reference to facts, details and processes which the community has in the past shown some anxiety over."

"And while it is designed to increase awareness in the community of EMR issues, the package also includes information on how local government can work with industry on the placement of mobile phone towers," Horton added.

Titled "Mobile Phone Towers and EMR—Information for Communities and Local Councils," the information packet was developed by ACA with the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and features ACA and ARPANSA fact sheets and frequently asked questions (FAQ).

In these, ARPANSA and ACT state, "The weight of national and international scientific opinion is that there is no substantiated evidence that using a mobile phone causes harmful health effects. Although there have been studies reporting biological effects at low levels, there has been no indication that such effects might constitute a human health hazard, even to long-term exposure."

ARPANSA tested mobile phone base stations throughout the country and found emissions were usually many times lower than allowable limits, it announced. Communications Minister and Senator Helen Coonan was quoted in the media as saying, "The standard is set at a limit thousands of times below the level at which adverse health effects are known to occur."

The packet plus information on how to complain about placement or operation of mobile phone towers is at www.emr.aca.gov.au

The ACA press release, "Australian Communications Authority. Media release No. 86, 8 November 2004," is available at www.emr.aca.gov.au/aca_home/media_releases/media_enquiries/2004/04-86.htm

A media article is at www.theage.com.au/news/Breaking-News/Mobile-phones-not-health-risk-says-kit/2004/11/08/1099781313855.html?oneclick=true

ITALIAN NATIONAL EMF PROGRAM NOTES ACCOMPLISHMENTS



Carmela Marino

ergy and the Environment (ENEA). Carmela Marino of the Bioelectromagnetics Lab at ENEA, C.R. Casaccia and coordinator of WP 3 described below, summarizes the program here. Some of the work was also part of the European Commission's CEMFEC, GUARD, RAMP 2001, REFLEX and Perform B projects.

Italy's MIUR program was a comprehensive research project devoted to the prediction of environmental impact of wireless telecommunication systems and other systems producing EMF. Researchers addressed the characterization of EMF sources, possible effects of exposure on biological systems and the development of new techniques for the control and mitigation of existing sources. Some aspects of the research focused on questions related to extremely low-frequency (ELF) EMF exposure, as well.

Some of the work in the Italian national program focused on evaluation of power absorption in a human body exposed to base-station antennas and mobile phones. Notably, a human female model for dosimetry studies was developed, along with a small sensor for the measurement of EMF inside a phantom, plus a virtual bioelectromagnetics laboratory should be mentioned, as well, Marino notes in a recent report on program accomplishments.

Groups participating in the MIUR / CNR-ENEA Italian National Program were from 14 universities, 6 public research bodies, 7 Italian National Research Council (CNR) institutes, 3 Italian National Agency for New Technologies, Energy, and the Environment) divisions (ENEA), and 7 industries or private agencies, for a total of 37 research groups. The Program started in June 2000, and a conference in October 2004 was its official conclusion. Research was divided into the following work packages (WP):

WP 1 Characterization and modeling of EMFs and their sources

In this work package, software for the evaluation of EMF in several operating conditions was developed. The EMEF software can handle different techniques for evaluating EMF such as FDTD and ray tracing. Several groups worked on this task, developing numerical solutions of Maxwell's equations or integrating the different numerical codes within the global EMEF framework. Further, some groups devoted attention to EMF associated with railway trains, modeling the field values inside coaches and in the neighbourhood of the train line.

WP 2 Measurement of EMF values in the environment

A mobile EMF monitoring station was developed by several collaborating groups from universities and industry. After the prototype

was built, measurements were conducted in an open site where different EMF signals were emitted simultaneously. These were then analyzed by an independent group, which acted as a formal review of the product. Also, this WP developed a "foot current" meter to measure such current in humans exposed to fields in typical open environments.

WP 3 Interaction between EMF sources and exposed subjects

Here, investigation coordinated by Marino focused on interaction between EMF and biological systems; in particular, dosimetric and mechanistic work was carried out in addition to biological studies. This WP was subdivided in four areas—experimental measures, modelling EMF, interaction mechanisms and research on biological effects in vivo and in vitro. Some highlights of all WP are listed below.

WP 4 Techniques to control, protect, and clear

Control or mitigation of EMF in various environments was the focus of this WP. For example, EMF sources at home such as induction cookers and microwave ovens, as well as in work environments and possible interference in hospitals was investigated. Researches developed codes to obtain the optimal dislocation of antennas of wireless systems. At 50 Hz a low emission cable for energy distribution was developed and built.

WP 5 Coordination and dissemination of results

Some Highlights of ELF Studies

Several biological assays were used and endpoints investigated, including artificial liposomes related to membrane permeability; nerve cell line, tumor cell line, gene expression and differentiation in cardiomyocytes; transposition activity, viability, heat shock protein (HSP) expression in *E. coli* and neurochemical effects in the rat brain. Very briefly, some key findings included:

- Results suggesting that 50-Hz EMF exposure contributed to a premature expression of glutamate receptors, reducing the life span of granule cells and leading to more rapid cell maturation and differentiation. Studies looked at possible changes in glutamate acid receptors, proteins and mRNA expression with exposure to a 1-mT 50-Hz magnetic field in newborn rat CNS development, assessed by Western blot and RT-PCR.
- Results seeming to indicate that a 50-Hz magnetic field can influence the expression of adhesion molecules with important roles in tumor metastasis in one type of human osteosarcoma cell line but not in another. No difference in expression of cell adhesion molecules, morphology or apoptosis control was seen after exposure to a 0.5-milliT 50-Hz magnetic field for 7 or 14 days in one cell line, but changes in cell growth and in cell cycle phase distribution as well as in VLA-5 and CD44 expression were seen in the other.
- Data suggesting that the wave shape of an ELF magnetic field may be critical for biological effects, from studies in bacteria. Bacteria exposed for 58 hours to a sinusoidal 0.1mT–1 mT 50-Hz magnetic field showed a significantly lower transposition activity as compared to sham-exposed bacteria. Unexpectedly, the bacteria exposed to a pulsed magnetic field showed a higher transposition activity compared to sham-exposed bacteria. The two different trends observed were positively correlated to the intensity of the field in a dose-effect manner. Other changes were noted in cell viability, as well.

• Evidence that a 50-Hz magnetic field increased the expression of genes involved in coaxing embryonic stem cells to differentiate to cardiac lineage. The field affected differentiation of stem cells in a line of murine embryonic stem cells (GTR1) engineered for gene trapping selection of a virtually pure population of stem cells-derived cardiomyocytes.

• A time-dependent effect of 50-Hz EMF: Short-term exposure stimulated serotonin and the μ -opiate system, while prolonged exposure had an inhibitory effect on these systems in the rat brain exposed from conception to adulthood.

Some Highlights of RF Studies

A variety of biological systems were used for genotoxic assays in human lymphocytes, and studies of immune function in human and murine immune cells and function of the cochlear epithelium. For in vitro experiments several exposure setups were used, including a wire patch cell, Crawford TEM cell, a coplanar waveguide and a modified stripline suitable for evaluation of the rate of enzyme reactions by spectrophotometer, Marino summarizes.

For in vivo experiments, an array of 4-loop antennas was used for local exposure of the rat auditory system and brain, plus a long TEM cell for total body exposure of 12 mice simultaneously. All systems were fully characterized and the dosimetry validated. Among the experimental results reported from RF studies:

• Results indicating an absence of genotoxic effects (chromosomal aberration, Sister Chromatid Exchange, Micronucleus) and molecular (comet assay) in mammalian cell cultures following exposure to 900 or 1800 MHz GSM signal. Several cell types were used and, in some cases, possible cooperative effects between EMF and chemical mutagens or a physical agent were considered.

• Human peripheral blood mononuclear cells (PBMCs) from a healthy donor were exposed to a GSM signal generated by a commercial cellular phone, to 900-MHz GSM or continuous wave (CW) RF 1 hour/day for three days in a TEM cell system (70–76mW/Kg average SAR) for 72 hours. Data showed that the GSM-modulated signal induced a slight decrease in cell proliferation, when PBMCs were stimulated with the lowest concentration of phytohaemoagglutinine.

• Data suggesting that an animal immune system might have adapted to RF exposure as it can with other stressing agents. The in vivo data indicate that the T- and B-cells were not substantially affected by exposure to RF radiation and that a clinically relevant effect of RF radiation on the immune system is unlikely to occur. This is based on studies in C57BL/6 mice with daily whole body exposure to 900 MHz GSM-modulated signal.

• Results of a study showing no statistically significant differences between Distortion Product Otoacoustic Emissions (cochlear function) in Sprague-Dawley rats exposed to RF at typical GSM mobile phones (900 and 1800 MHz) frequencies.

Anyone with questions about any of the experiments or results reported in a brief, edited form here are encouraged to contact Marino directly for more information about the exposure setups, experimental protocols, statistical methods and other details, at the Bioelectromagnetics lab, Biotec, ENEA, C.R. Casaccia, Rome. E-mail: marino@casaccia.enea.it

AN AUSTRALIAN DRAFT ELF STANDARD IS BEING REVIEWED

The first draft of a new Australian ELF standard for limiting exposure to extremely low frequency 0 Hz–3 kHz electric and magnetic fields was circulated to the Australian Radiation Protection and Nuclear Safety Agency's (ARPANSA) Radiation Health Committee in November, at the same time it is undergoing editorial review for accuracy and consistency, according to the chair of the ARPANSA ELF Working Group, Andrew Wood of Swinburne University of Technology, Victoria.

The draft standard has been circulated to the ELF Consultative Group for their comments as well. Wood called the draft "substantially complete," and remarked that some comments have already been received and discussed at an ELF Working meeting on November 29. A version will be prepared for presentation to the Radiation Health Committee at their meeting in March, he added. "It is hoped that this committee will approve the release of this version for public comment."

The draft includes advice offered by an expert panel on electrophysiology and neurophysiology organized by Wood and the ELF Working Group. A web summary of the relevant ARPANSA Radiation Health Committee meeting with a single paragraph about the ELF Working Group's progress to date can be downloaded at www.arpansa.gov.au/pubs/rhc/rhc_nov04.pdf

STATIC FIELD REVIEW

A special edition of the journal *Progress in Biophysics & Molecular Biology* dedicated to discussion of current knowledge from *in vitro*, *in vivo* and epidemiologic studies of static magnetic field exposure, plus identification of future research needs, was recently published with comments by Guest Editors Michael Repacholi of the WHO EMF Project and Alastair McKinlay of ICNIRP. Several bioelectromagnetics researchers contributed to the special issue.

Journal editor Denis Noble noted that questions raised in the special issue are of great practical importance and pose "some interesting fundamental problems in biophysics."

Repacholi and McKinlay say more research is needed to determine the safety of static magnetic fields. "To date there have been few research studies and little public interest in possible adverse health effects of static magnetic fields," they note, probably because several notable benefits, particularly in medicine, where MRI provides "exceptionally clear tissue images that can lead to more effective diagnosis of disease or injury.

An important conclusion of the Workshop was that scientific research can provide some measure of confidence that short-term, acute exposures up to about 1–2 T should be safe, they state.

But given the rapid addition of applications and great increases in field strengths used, especially in MRI where fields up to about 10 T could become more common, WHO, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the UK National Radiological Protection Board (NRPB) felt there

See Static Field Review continued, p10

Static Field Review continued

should be a specialist review of the technologies and possible health implications of exposure to workers, medical staff, patients and the public. With the UK Department of Health and the Health and Safety Executive, they supported an expert workshop in April 2004. The special issue presents papers from that workshop.

Articles summarize current high magnetic field technologies, with emphasis on those likely to produce the highest exposures to medical staff and patients—adults and children, pregnant women and the fetus. In addition, rapporteur reports touch on key concerns for health risk assessment such as dominant mechanisms of field interaction, levels of magnetic field strength and induced electric fields and currents that could result in adverse health consequences.

Repacholi and McKinlay point out that it is not possible to determine whether there are long-term health consequences even from exposure in the mT range because, to date, there are no well conducted epidemiological studies with sufficient power to come to a conclusion, and no good long-term animal studies.

While there are huge benefits to be gained from use of static magnetic fields, possible adverse health effects must be properly evaluated so that the true risks and benefits can be assessed. This said, WHO does not want to imply that all use of these fields should be restricted until appropriate research has been conducted and safety assured, the Guest Editors note. An analysis of the interaction mechanisms suggests that short-term health effects can be predicted and avoided. Further, there is no currently understood mechanism that would appear to lead to any long-term adverse health consequence, they note. Here is a partial list of articles in the special issue:

Junji Miyakoshi, "Effects of static magnetic fields at the cellular level."

Richard Saunders, "Static magnetic fields: animal studies."

Maria Feychting, "Health effects of static magnetic fields—a review of the epidemiological evidence."

Dariusz Leszczynski, "Rapporteur report: Cellular, animal and epidemiological studies of the effects of static magnetic fields relevant to human health."

Thomas S. Tenforde, "Magnetically induced electric fields and currents in the circulatory system."

Arun V. Holden, "The sensitivity of the heart to static magnetic fields."

John F. Schenck, "Physical interactions of static magnetic fields with living tissues."

R. Hinch, K.A. Lindsay, D. Noble and J.R. Rosenberg, "The effects of static magnetic field on action potential propagation and excitation recovery in nerve."

Eric van Rongen, "International workshop 'Effects of static magnetic fields relevant to human health': Rapporteurs report: dosimetry and volunteer studies."

T.E. van Deventer, R. Saunders and M.H. Repacholi, "WHO health risk assessment process for static fields."

Zenon Sienkiewicz, "Rapporteur report: implications for exposure guidelines."

See www.sciencedirect.com/science/journal/00796107 for more.

MMF CALLS FOR PROPOSALS FOR RF DOSIMETRY PROGRAM

The Mobile Manufacturers' Forum (MMF), Brussels, recently issued a Request for Proposals from laboratories interested and willing to further develop and enhance the scientific basis of RF standards by undertaking specified dosimetric research projects.

MMF has allocated a total of € 950,000 over two years to fund various work packages (WP) of €150,000 to €250,000 each over the period, with recognition that some work packages may go to more than one laboratory. It is permissible to form a consortium of laboratories to contribute to a project. Deadline for submitting a response to MMF is 5 p.m. Central European Time on January 17, 2005; a special e-mail protocol is provided. Approved proposals will be announced in February 2005.

A 10-page pdf file with instructions for submission, evaluation criteria, a full timetable and other information is available on the Web at www.mmf.org

Although proponents may submit responses to any or all of the following work packages, the MMF selection will be performed for each WP separately, the RFP states. It is therefore important that proposals are structured to allow for each WP to be readily identified and considered separately.

Brief versions of objectives of each WP are:

WP 1 Low power exclusion.

To develop relationships between the basic characteristics of wireless devices and the basic restrictions of the standards and to create a rationale to develop criteria that is broad enough to apply to a wide range of wireless devices. Scientific rationales for the relationships shall be established.

WP 2 Fast SAR compliance assessment.

To develop fast SAR compliance assessment techniques for wireless devices and provide the technical and scientific rationale so that they can be implemented in international standards and/or adopted by national regulatory agencies.

WP 3 Free space EM fields assessment.

To improve accuracy and efficiency of free space measurement techniques and protocols and to provide measurement or calculation data to derive accurate correlation between basic restrictions and EM fields in the vicinity of base stations in realistic exposure conditions.

WP 4 Local SAR vs. power density between 1 and 10 GHz.

Using existing models as well as those developed in WP5 as soon as they become available, investigate power absorption by the human body in this frequency range in order to derive a physical rationale, for example by taking temperature change into account, for the transition from SAR to power density. The main parameters for this transition are frequency, the SAR averaging volume, the power density averaging surface and the tissue dielectric and anthropometric parameters.

WP 5 Numerical models and tools.

To develop a set of numerical models (whole or partial body) for

See MMF RFP continued, p11

MMF RFP, Continued

a human family based on MRI and/or CT scans representing an average man, woman and two children (perhaps one child between ages 3 and 6, a second age 7–14), with appropriate accuracy to investigate penetration of EM fields and temperature changes. Models will be used for variation analysis as described earlier. Also consider additional, existing or newly developed models with significantly different anthropometric parameters (weight, height). Models will be made available to the scientific community via the Internet. Models should be provided with several different resolutions (e.g., 0.5 mm–5 mm), electromagnetic and thermal properties defined over specified frequency range (e.g., 300 MHz–10 GHz) and the accuracy and range of applicability (frequency, exposure metric) should be established for each. Tools to visualize and extract various parts of models should be provided.

The MMF RFP announced in November reflects both internal and external discussions and will serve to provide a strong platform of research for the coming years.

COST281 CALL FOR CONTRIBUTIONS

Europe's Cooperation on Science and Technology Action, COST281, announces a workshop on the role of the signal time course in potential EMF health effects—in particular sinusoidal versus non-sinusoidal signals including ultrashort high peak power and ultra wideband pulses. It will be in Zurich, Switzerland on Feb. 17–18, 2005.

Organizers note that “already existing and emerging new technologies make increasing use of non-sinusoidal signals and even ultrashort pulses. This development stimulates the ongoing debate whether specific non-thermal effects should be considered to add to the thermal concept of EMF radiation protection and might lead to more public concern about such new technologies if sound scientific advice is lacking.”

Specific attention should be given to pulses with ultrashort rise time and/or duration which might induce biological effects on cells and tissues different from those produced by continuous sinusoidal fields. A question to be put to the workshop is, “Do ICNIRP limits deserve further development to account for the increasing prevalence of non-sinusoidal and ultra wide band signals?”

This workshop should review the state of the art, identify needs for future studies, and discuss potential implications for further development of exposure limits. Proposed topics of the workshop and schedule are available at www.cost281.org/events.php

CALENDAR

January 10, 2005. Abstract deadline, BioEM 2005. Dublin, IRELAND. See Call for Papers on p1.

January 12–14, 2005. The Society for Physical Regulation in Biology and Medicine 23rd Scientific Conference. Embassy Suites Resort, Lake Tahoe, Calif. USA. Contact: Christopher Jacobs, Program Chair, E-mail: chris.jacobs@stanford.edu Tel: (650) 736-0802 or Gloria Parsley, Executive Director, E-mail: gloriaparsley@aol.com Tel: 301-663-4556.

February 4–5, 2005. The Bioelectromagnetics Society Winter workshop and Board Meeting. Doubletree Guest Suites, 320 N. 44th St. Phoenix, Arizona, USA. Lodging \$119 single/double. Tel: +1 (602) 225-0500. Free airport shuttle. Contact: BEMS Executive Director Gloria Parsley, 2412 Cobblestone Way, Frederick, MD 21702-2626 USA. Tel. +1 (301) 663-4252; FAX: +1 (301) 694-4948. E-mail: bemsoffice@aol.com See: www.bioelectromagnetics.org

February 10, 2005. Abstract Deadline for UNESCO/WHO meeting. Yerevan, ARMENIA See March 1.

February 14–18, 2005. 16th International Symposium on Electromagnetic Compatibility (EMC), the Technical Exhibition on EMC and RF/Microwave Measurements & Instrumentation. Zürich, SWITZERLAND. Contact: Gregor Dürrenberger, the Swiss Federal Institute of Technology (ETH), Zürich. Tel. +41 1632 2815; Mobile: +41 78 721 7488, Fax: +41 1632 1198. E-mail: gregor@mobile-research.ethz.ch See: www.emc-zurich.ch

February 17–18, 2005. COST281 Workshop. Zürich, SWITZERLAND. See Call for Papers this page. See: www.cost281.org/events.php

March 1–5, 2005. UNESCO Seminar and Practical Workshop on Molecular and Cellular Mechanisms of Biological Effects of EMF. Yerevan, ARMENIA. Sponsored by WHO and European Office of Aerospace Research and Development (EOARD). Contact: Organizing Committee: Tel: (3741) 62 4170, Fax: (3741) 61 2461. E-mail: life@arminco.com See: www.biophys.am

May 16–18, 2005. ElectroMed 2005. Fourth International Symposium on Nonthermal Medical/Biological Treatments Using Electromagnetic Fields and Ionized Gases. Portland, Oregon, USA. Watch www.electromed2005.com for more information or contact: info@electromed2005.com for details.

June 15–16, 2005. WHO Meeting on Base Stations & Wireless Networks: Exposure and health consequences. Closed Working Group meeting June 17. WHO, Geneva, SWITZERLAND. Topics will include possible health consequences from exposure to mobile phone base stations (including micro and pico cells), WiFi networks now common in airports and cafes, future technologies and public risk communication. Watch www.who.int/peh-emf/ “Events” for details, or contact: The WHO International EMF Project, emfproject@who.int

June 19–24, 2005. Bioelectromagnetics 2005. Joint meeting of the European BioElectromagnetics Association (EBEA), BEMS. University College Dublin, IRELAND. Technical Program Co-chairs are Stefan Engström and Kjell Hansson Mild. Contact: BEMS Executive Director Gloria Parsley, 2412 Cobblestone Way, Frederick, MD 21702-2626 USA. Tel. +1 (301) 663-4252; FAX: +1 (301) 694-4948. E-mail: bemsoffice@aol.com See: www.bioelectromagnetics2005.org

June 19–25, 2005. The XVIII International Symposium on Bioelectrochemistry and Bioenergetics. Coimbra, PORTUGAL. Abstract deadline is Jan. 31, 2005. Early registration with reduced fee deadline will be May 31, 2005. For more information see: www.bes-ise-2005.uc.pt/

Calendar continued on p12

July 1–4, 2005. CEFBIOS 2005—Coherence and Electromagnetic Fields in Biological Systems. Prague, Czech Republic. Symposium organized by the Institute of Radio Engineering and Electronics, the Academy of Sciences of the Czech Republic, National Institute of Public Health and others will discuss biophysical principles of coherence, role of endogenous electromagnetic fields in organization of biological systems, biophysical mechanisms, and more. Contact: Jiri Pokorny, Institute of Radio Engineering and Electronics, Academy of Sciences, Chaberska 57, CZ 182 51 Praha 8, CZECH REPUBLIC. Tel.: 00420 266773432; Fax: 00420 284680222. E-mail: pokorny@ure.cas.cz See: www.ure.cas.cz/events/cefbios2005/

July 11–13, 2005. WHO International EMF Project Workshop: Applying precautionary measures to EMF public health policy. Ottawa, CANADA. Topics include a detailed review of the proposed WHO Precautionary Framework, and providing an opportunity for discussion on its practical application and case studies. Watch www.who.int/peh-emf/ “Events” for details, or contact: The WHO International EMF Project, emfproject@who.int

September 26–30, 2005. South American Regional meeting on Health Effects of EMF Fields. Location to be announced in BRAZIL. Topics to include review of evidence for possible health effects of RF fields, use of precaution and risk communication to the public. Watch www.who.int/peh-emf/ “Events” for details, or contact: The WHO International EMF Project, emfproject@who.int

November 14–18, 2005. WHO and the Australian Radiation Protection Society Workshop. Melbourne, AUSTRALIA. Topics to include review of evidence for possible health effects of RF fields, use of precaution and risk communication to the public. Watch www.who.int/peh-emf/ “Events” for details, or contact: The WHO International EMF Project, emfproject@who.int

October 30–November 1, 2005. Workshop on Application of Proteomics and Transcriptomics in EMF Research. Helsinki, FINLAND. Topics include use of the high-throughput screening techniques of proteomics and transcriptomics as an approach to determine all possible biological targets of EMF on the sub-cellular level. See: www.who.int/peh-emf/meetings/proteomics_helsinki05/en/

April 27–29, 2006. Conference on Electromagnetic Fields, Health and Environment—EHE06. Madeira, PORTUGAL. Call for Papers may be downloaded in pdf format at www.apdee.org/ehe06 Contact: ehe06-secretariado@apdee.org

THE BIOELECTROMAGNETICS SOCIETY

2412 COBBLESTONE WAY
FREDERICK, MD 21702-2626
USA

FIRST CLASS U.S. POSTAGE PAID FREDERICK, MD PERMIT NO. 269
--