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Editor's note: Michael Murphy assumed the presidency of BEMS during the recent Davos meeting. For those who are unfamiliar with Mike and his work, here is a short bio and vision statement from the 2008 ballot when he was elected to office.

Michael R. Murphy received a BS in psychology in 1967 from Occidental College, Los Angeles, CA, and a PhD in neuroscience from MIT, Cambridge, MA, in 1972. After a 2 year Postdoc at the Smithsonian Institution in ethology, he spent 8 years at the National Institute of Mental Health conducting original research in neuroethology. During his years working on animal behavior he was the author of two cover articles in Science and did field research in Syria, Israel, and Romania. In 1982, he returned to his home town for a position with the U.S. Air Force, first working on prophylactics/treatments for chemical warfare agents, and then moving to radio frequency biological effects in 1992. From 1994-2004, Mike was Chief of the USAF Radio Frequency Radiation Branch. In addition to RFR research communication, transition, and management, he directly contributed to research on the biological effects of millimeter waves and UWB/HPM/nano pulses. Mike is an author or co-author of over 225 research publications, book chapters, abstracts, and technical reports. He served on the International Advisory Committee for the World Health Organization project on EMF for 10 years. He has chaired two multi-year, multi-national panels for the NATO Research and Technology Organization. He led his Branch in the organization of the 1999 NATO RFR Dosimetry meeting in Slovenia, the 2000 WHO EMF Project & ICNIRP meeting in San Antonio, ElectroMed 2003, an international meeting on non-thermal medical applications of EM Energy, and the 2004 Asia-Pacific EMF Conference in Bangkok. He negotiated the transfer of the ElectroMed group into a regular part of BEMS.

He is a member of the IEEE Society on the Social Implications of Technology, the IEEE Engineering in Medicine and Biology Society and the IEEE Standards Board. He

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STUDENT AWARDS AT BIOEM 2009 IN DAVOS

By Jeffrey Carson (Vice-president/president-elect of BEMS) and Micaela Liberti (EBEA Council Member)

At BioEM 2009 in Davos, a total of 87 student papers were presented. Of the 87 papers, 21 were presented in the platform category and 66 were presented in the poster category. The total student paper count at BioEM 2009 represented a record number when compared to past BEMS or Joint BEMS/EBEA meetings (Fig. 1). Of particular significance was the dramatic increase in the number of student papers at BioEM 2009 in Davos compared to BioEM 2005 in Dublin. Compared to BioEM 2005, the number of student papers increased by 32% at BioEM 2009.

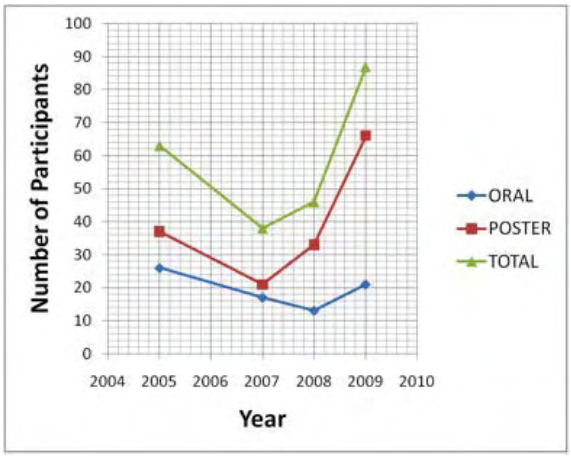

Figure 1. Graph indicating year versus student participation at the BEMS (2006, 2007, 2008) and BEMS/EBEA joint meeting (2005, 2009).

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The student award process was coordinated by Drs. Jeffrey Carson (BEMS representative) and Micaela Liberti (EBEA representative). The process began by identifying student papers in the technical program several weeks before the meeting. Each student paper was assigned to one of 6 subject areas: risk/epidemiology, human studies, medical applications, mechanisms, dosimetry, and in vitro/in vivo. Figure 2 indicates the proportion of student papers in each subject area.

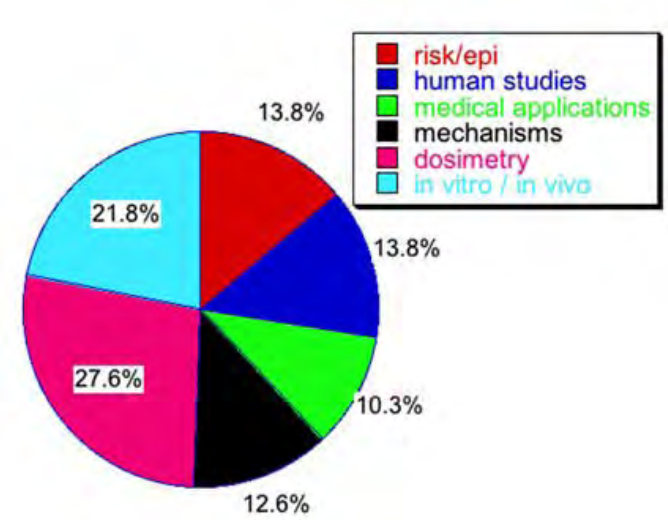

Figure 2. Breakdown of student papers by study area.

Prior to the start of BioEM 2009, Board and Council members from BEMS and EBEA, respectively, were provided student evaluation packages. Each package contained a list of 4 to 8 student presentations for evaluation grouped by subject area. Packages also contained score sheets used to evaluate each presentation. The evaluation sheets were closely scrutinized and approved by the BEMS Board and the EBEA Council prior to the meeting. Each student paper was judged on a number of criteria including: quality of the presentation, scientific content, scientific quality, and ability to answer questions. Several questions were incorporated into the evaluation sheets to minimize the potential for issues related to judges being in conflict of interest with respect to the student presentation.

The evaluation packages were distributed by the Board and Council Members to qualified colleagues on the first day of BioEM 2009. Board and Council members also held back one or more packages so that they could participate as judges. The approach resulted in the participation of 86 judges in the student evaluation process. Furthermore, the approach to judge selection ensured that papers within each subject area were evaluated by meeting attendees with suitable expertise and qualifications. The participation by more than 80 expert judges from a multitude of disciplines and the use of standardized score sheets ensured that the student evaluations were performed to the best of each Society's ability.

As the meeting progressed and student presentations were evaluated, evaluation packages were returned and the score for each student from each judge was entered into a spreadsheet. Prior to the close of the meeting, scores for all student presentations were entered and validated. Validation was performed by Drs Carson and Liberti, acting co-chairs of BioEM 2009 Awards Committee. In total, 443 scores were received, which resulted in an average of five separate evaluations per student paper. The individual scores for each student were then averaged. The average scores were sorted from highest to lowest and the top four scores in each category (oral or poster) were used to assign the awards based on rank. The ranked list was further reviewed and validated by the Award Committees of EBEA and BEMS. The awards were then announced prior to the closing ceremony by Drs. Carson and Liberti. The winning students were welcomed on stage by the Technical Program Co-Chairs, Drs. Dariusz Leszczynski and Guglielmo D'Inzeo.

Each award consisted of a certificate and a cash prize $500 USD for first, $300 for second, $200 for second and $100 for fourth place.

Both EBEA and BEMS commend and thank the students who participated and presented research results at BioEM 2009 in Davos. The record number of student papers compared to previous meetings is a healthy sign that that the number of young researchers in bioelectromagnetics is growing. Everyone looks forward to seeing the students return to present new research results at future meetings.

BIOEM 2009 STUDENT AWARDS

First Place Platform Presentation:
"EVALUATION OF ARTIFACTS BY EEG ELECTRODES DURING RF EXPOSURES"
Manuel Murbach, IT'IS Foundation, Zeughausstrasse 43, 8004 Zurich, Switzerland
Preceptor: Niels Kuster

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First Place Poster:
"DOSIMETRIC ASSESSMENT OF C. ELEGANS EXPOSURE IN VIVO TO 900 MHZ ELECTROMAGNETIC FIELDS"
Manuel Murbach
Preceptor: Niels Kuster

2nd Place Platform Presentation:
"HYBRID SAR ANALYSIS OF VARIOUS HUMAN MODELS IN FRONT OF BASE STATIONANTENNAS IN THE FREQUENCY RANGE FROM 300 MHZ TO 5000 MHZ"
Marie-Christine Gosselin, IT'IS Foundation
Preceptor: Niels Kuster

2nd Place Poster Presentation:
"ASSESSMENT OF THE SAR FROM HANDS-FREE KITS FOR MOBILE PHONES"
Sven Kuehn, IT'IS Foundation
Preceptor: Niels Kuster

3rd Place Platform Presentation:
"EFFECTS OF A 60 HZ, 3000 MICROTESLA MAGNETIC FIELD ON HUMAN COGNITIVE PROCESSING: PRELIMINARY RESULTS"
Michael Corbacio, Lawson Health Research Institute, 268 Grosvenor St., London, Ontario
Preceptor: Alexandre Legros, Alex W. Thomas

3rd Place Poster Presentation:
"THERMOSENSOR PROTEIN GRPE OF THE HEAT SHOCK PROTEIN HSP70 SYSTEM AS TARGET FOR ELECTROMAGNETIC FIELDS"
Christian Beyer, ETZ K 87 , Zurich, 8092 , Switzerland
Preceptor: Ilian Jelesarov, Philipp Christen, Jürg Fröhlich

4th Place Platform Presentation:
"DEVELOPMENT OF A PREDICTIVE MODEL FOR PERSONAL RF-EMF EXPOSURE"
Patrizia Frei, Institute of Social and Preventive Medicine at Swiss Tropical Institute Basel, Steinengraben 49, Basel, Switzerland CH-4051
Preceptor: Martin Röösli

4th Place Poster Presentation
"CORRELATION OF THE EXPOSURE OF MOBILE PHONES ASSESSED IN SAM BY APPLYING STANDARD PROCEDURES WITH THE SAR IN ANATOMICAL HUMAN HEADS"
Marie-Christine Gosselin, IT'IS Foundation
Preceptor: Niels Kuster

STUDENT PLATFORM AWARDS

Manuel Murbach

First Place Platform presentation (5-2): EVALUATION OF ARTIFACTS BY EEG ELECTRODES DURING RF EXPOSURES.

Co-authors: M. Murbach[1,3], S. Kuehn[1,3], M. Christopoulou[1,2], A. Christ[1], P. Achermann[4], N. Kuster[1]; [1]IT'IS Foundation, Zurich, Switzerland, [2]Biomedical Simulations and Imaging Lab, Nat'l Tech Univ, Athens, Greece, [3]Swiss Federal Inst of Tech (ETH), Zurich, Switzerland. [4]Inst of Pharmacology and Toxicology, Univ of Zurich, Zurich, Switzerland

EMF Risk and Exposure Assessments

The initial projects of Manuel Murbach's PhD studies at the IT'IS Foundation comprise developing novel exposure systems for biomedical research as well as improving/enhancing our current systems. Highlights include novel RF exposure assessments for the C.elegans nematode on AGAR substrate (BioEM 2009 poster), and human epidermis layers on dermis samples to GSM900 signals in vitro, as well as human exposure to higher carrier frequencies and highly pulsed signals in vivo (BioEM 2009 poster and platform). The human sleep studies (currently conducted within the Swiss National Research Program, NFP57) will be enhanced this year for ELF magnetic field exposure of the subjects' heads. The intention is to compare the effects of RF exposure with exposure to the ELF-pulsed magnetic signals that are identical to the modulation envelopes of the RF exposure.

The second part of his PhD research will focus on exposure assessment in clinical MRI environments. The goal of our ambitious project MRI+ is to derive scientifically sound guidelines/standards with respect to RF exposure for the safe operation of MR scanners (1, 1.5 and 3T) for patients with and without implants. This is necessary as the generally applicable international safety guidelines for RF exposure are exceeded during normal MR investigations and interventional operations. In order to operate the system beyond the established protocols/limits, novel procedures, testing and validations techniques must be developed. The various objectives of the project range from the development of comprehensive patient models

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through to the development of scanning parameter guidelines for the various classes of MRI scanners to optimize benefits/risks in MRI applications for patients and to prevent risks for workers.

Marie-Christine Gosselin

2nd Place Platform Presentation (1-2): HYBRID SAR ANALYSIS OF VARIOUS HUMAN MODELS IN FRONT OF BASE STATION ANTENNAS IN THE FREQUENCY RANGE FROM 300 MHZ TO 5000 MHZ.

Co-authors: M. Gosselin[2], V. Kellerman[3], G. Vermeeren[4], S. Benkler[5], S. Kuehn[1,2], A. Hadjem[6], A. Gati[6], W. Joseph[4], M. Wong[6], J. Wiart[6], F. J. Meyer[3], L. Martens[4], N. Kuster[1,2]; [1]BioEM Group, Integrated Systems Laboratory, ETH Zurich, Zurich, Switzerland. [2]IT'IS Foundation, Zurich, Switzerland. [3]EMSS, Stellenbosch, South Africa. [4]INTEC, Ghent University /IBBT, Ghent, Belgium. [5]SPEAG, Zurich, Switzerland. 6Orange Labs (FT RD), Paris, France.

Marie-Christine's initial research at the IT'IS Foundation is focused on compliance with safety limits of human exposure to mobile phones and base station antennas. In particular, this includes numerical and experimental assessment of the interaction mechanisms between electromagnetic fields and biological tissues, as well as evaluation of the temperature increase caused by absorbed energy.

A recent project presented at the 2009 Joint BEMS and EBEA Meeting entitled "Hybrid SAR Analysis of Various Human Models in Front of Base Station Antennas in the Frequency Range from 300MHz to 5000MHz'' has been realized to assist the International Electrotechnical Commission (IEC) in the elaboration of a new international standard regarding exposure to base station antennas and was funded by the MMF/GSMA. A set of formulae has been developed to estimate the whole-body average SAR and peak spatial average SAR in human bodies exposed to base station antennas. These equations, based on physical considerations and on plane-wave simulations using anatomical human body models, are mainly dependant on the dimensions of the human body and the size and radiating properties of the antenna. Exhaustive simulations have been performed in order to validate the SAR estimation equations.

Michael Corbacio

3rd Place Platform Presentation (15-2): EFFECTS OF A 60 HZ, 3000 MICROTESLA MAGNETIC FIELD ON HUMAN COGNITIVE PROCESSING: PRELIMINARY RESULTS.

Coauthors: Michael Corbacio[1,2], Alexandre G. Legros[1,2], Anne Beuter[3], Julie Weller[1], Stephanie Dubois[1], Samantha Brown[1], Daniel Goulet[4], Jacques Lambrozo[5], Michel Plante[4], Martine Souques[5], Frank S. Prato[1,2], and Alex W. Thomas[1,2]; [1]Bioelectromagnetics, Imaging Program, LHRI, London, ON, Canada. [2]Dept of Medical Biophysics, Univ of Western Ontario, London, ON, Canada. [3]Bio-electromagnetisme, IMS, CNRS, Bordeaux, France. [4]Lignes, cebles et environnement, Hydro-Quebec, Montreal, QC, Canada. [5]Service des Etudes Medicales, EDF, Paris, France.

Michael Corbacio began work on a Master's degree in Medical Biophysics at the University of Western Ontario under the joint supervision of Drs. Alexandre Legros and Alex Thomas in September 2008. At BioEM 2009, Michael presented this ongoing project in which participants were recruited to perform select validated psychometric tests. He did this to determine if there are any detectable effects from exposure to a 60 Hz, 3000 μT magnetic field (MF) on human cognitive performance. The frequency of the MF being studied (60 Hz) is the same as the North American power-line distribution system. This research builds on the previous work of his lab which presented material on the neurobehavioural effects of exposure to a 60 Hz, 1800 μT MF at earlier meetings.

Individuals participating in the double-blind counterbalanced protocol came into the lab for two different sessions. The first session (which never has a MF exposure) established baseline values of anxiety, depression, and intelligence through the participant's performance of the Beck Anxiety Inventory, Beck Depression Inventory-II, and Wechsler Adult Intelligence Scale. The second session (held on a later date) is when the MF exposure may or may not occur. During this session the participant performed two blocks of testing each preceded by a 30 minute rest period. Each testing block consists of the following psychometric tests performed in the same sequence: Digit Symbol Encoding, Block Design, Arithmetic, Digit Span, Trail Making Test A & B, Stroop, Mental Rotation, and

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Fitts' Motor Task. When present the MF exposure was continuous and lasted for 1 hour either during the first rest period and testing block or during the second rest period and testing block. The homogeneous region of MF exposure is centered at the level of the participants' head and is produced by a whole-body Helmholtz-like coil system.

In preparation for BioEM 2009, the results of 36 participants were analyzed. At the completion of the study at least 99 participants will have been tested. The preliminary results of the Stroop, Mental Rotation, and Fitts' tasks were reported at the conference and they did not show any significant effect of the MF exposure on performance. This suggests that 1 hour of exposure to a 60 Hz, 3000μT MF does not modulate the cognitive processes involved in the Stroop (selective attention), Mental Rotation (mental imagery rotation), or Fitts' (perceptivomotor control) tasks. In future work, MF exposure and task induced brain activation will be further investigated using functional Magnetic Resonance Imaging.

Patrizia Frei

4th Place Platform Presentation (17-4): DEVELOPMENT OF A PREDICTIVE MODEL FOR PERSONAL RF-EMF EXPOSURE

Co-authors: P. Frei[1,2], E. Mohler[1,2], A. Bürgi[3], G. Neubauer[4], A. Hettich[5], G. Theis[5], J. Fröhlich[6], C. Braun-Fahrländer[2], M. Egger[1], M. Röösli[1,2]; [1]Inst of Social and Preventive Medicine, Univ of Bern, Bern, Switzerland. [2]Inst of Social and Preventive Medicine, Univ of Basel, Basel, Switzerland. [3]ARIAS umwelt. forschung.beratung, Bern, Switzerland. [4]Smart Systems Division, Austrian Research Centers GmbH, Seibersdorf, Austria. [5]Air Quality Management Agency of Basel, Basel, Switzerland. [6]Laboratory for Electromagnetic Fields and Microwave Electronics, ETH Zurich, Zurich, Switzerland.

Patrizia Frei presented a prediction model for personal radio frequency electromagnetic field exposure (RF-EMF), which is part of the QUALIFEX study (Health related quality of life and radio frequency electromagnetic field exposure: prospective cohort study). The QUALIFEX project aims at measuring and modeling exposure of a general population sample to different RF-EMF sources. It addresses the question of whether RF-EMF exposure under real life conditions can cause symptoms or impair health-related quality of life.

In the first part of the QUALIFEX project, the exposimeter study, Patrizia collected personal measurements and corresponding diary data from 166 study participants living in Basel (Switzerland) and surroundings. These volunteers carried a personal exposure meter (exposimeter) measuring 12 different frequency bands and filled in a questionnaire on potential exposure relevant factors. In addition, RF-EMF from fixed site transmitters (mobile phone base stations and broadcast transmitters) was modeled at the homes of the study participants by means of a geospatial propagation model which was developed within the QUALIFEX framework (Bürgi et al., 2008). For a validation study, the exposure measurements of 31 study participants were repeated during a second week's period. Mean exposure levels over all frequency bands were 0.22 V/m, ranging from 0.07 V/m to 0.58 V/m (Frei et al., 2009). Exposure was mainly due to mobile phone handsets, mobile phone base stations and DECT cordless phones and was highest in public transports and at airports.

Based on the data collected in the exposimeter study, Patrizia developed a prediction model for personal RF-EMF exposure. Relevant exposure predictors, which were identified by means of multiple regression analysis, were the modeled RF-EMF at the participants' home from the propagation model, housing characteristics, ownership of communication devices (wireless LAN, mobile and cordless phones) and behavioral aspects such as amount of time spent in public transports. The validation study showed that the model can also be used to assess average exposure over several months. The exposure prediction model will be applied to a larger study population of approximately 1400 randomly selected study participants in order to investigate possible health effects from RF-EMF exposure in everyday life.

References:

Bürgi, A., Theis, G., Siegenthaler, A., Röösli, M., 2008. Exposure modeling of high-frequency electromagnetic fields. J Expo Sci Environ Epidemiol 18, 183-191.

Frei, P., Mohler, E., Neubauer, G., Theis, G., Burgi, A., Frohlich, J., et al., 2009. Temporal and spatial variability of personal exposure to radio frequency electromagnetic fields. Environ Res 109, 779-785.

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STUDENT POSTER AWARDS

Manuel Murbach *(see page 3)*

First Place Poster presentation (P-40): DOSIMETRIC ASSESSMENT OF C. ELEGANS EXPOSURE IN VIVO TO 900 MHZ ELECTROMAGNETIC FIELDS. *Co-authors: M. Murbach[1,3], M. Mevissen[2], N. Kuster[1]; [1]IT'IS Foundation, Zurich, Switzerland. [2]Dept Clinical Research and Veterinary Public Health, Bern, Switzerland. [3]Swiss Federal Inst of Tech (ETH), Zurich, Switzerland.*

Sven Kuehn

2nd Place Poster Presentation (P-78): ASSESSMENT OF THE SAR FROM HANDS-FREE KITS FOR MOBILE PHONES. *Co-authors: S. Kuehn, E. Cabot, A. Christ, M. Capstick, N. Kuster; IT'IS Foundation / ETH Zurich, Zurich, Zurich, Switzerland.*

EMF Risk Assessment of Hands-free Kits used with Mobile Phones

Sven Kuehn's PhD research focused on the evaluation of human exposure to radio-frequency electromagnetic fields. The topics included the development of procedures, methods and instrumentation to support dosimetry in epidemiological studies, the development of procedures for compliance testing as well as the characterization of human exposure from various communication devices in general.

A recent study, presented at the 2009 Joint BEMS and EBEA meeting in Davos, aimed at the evaluation of hands-free kits used with mobile phones. The main objectives of the study were to evaluate the reduction or enhancement of human exposure when using mobile phones with hand-free kits and whether hands-free kits require compliance testing since ambiguous information existed in the literature.

In this study procedures for the testing of hands-free kits under worst-case and realistic usage conditions were developed and applied to a set of devices under test. From the results it can be concluded that hands-free kits reduce the exposure of the entire head compared to the mobile phone operated at the head, but there might be a very localized exposure enhancement in the ear. Specific compliance testing of hands-free kits is not necessary. Future research concerning hands-free kits as well as other body and head mounted devices is required in order to more accurately quantify the exposure of specific tissue and brain regions. This can then be applied to estimate the exposure of specific functional regions in epidemiological studies as well as to establish a more meaningful dosimetry for non-thermal biological effects.

Christian Beyer

3rd Place Poster Presentation (P-180): THERMOSENSOR PROTEIN GRPE OF HEAT SHOCK PROTEIN HSP70 SYSTEM AS TARGET FOR ELECTROMAGNETIC FIELDS. *Co-authors: Christian Beyer[1], Ilian Jelesarov[2], Philipp Christen[2] and Jürg Fröhlich[1]; [1]Information Tech and Electrical Engineering, ETH Zurich, Zurich, Switzerland. [2]Biochemistry, Univ of Zurich, Zurich, Switzerland.*

Christian Beyer's project is carried out as a collaborative effort of the 'Group for Electromagnetics in Medicine and Biology' hosted by the Laboratory for Electromagnetic Fields and Microwave Electronics at the ETH Zurich(1) and the Department of Biochemistry at the University of Zurich(2), bringing together engineers and biologists. The experimental set-up for the exposure of the protein solution to electromagnetic fields (EMF) has been constructed in the workshop at ETH and installed in the circular dichroism (CD) spectropolarimeter of the Department of Biochemistry at the University of Zurich, where experiments and evaluations are also carried out by collaborators of both institutions.

The 'Group for Electromagnetics in Medicine and Biology' conducts research toward applications of electromagnetic and optical principles in medical technology as well as in biomedical research. In close collaboration with academia and industry various projects are run covering magnetic resonance technology, optical spectroscopy, bio-impedance spectroscopy, wireless technologies for health care as well as risk assessment of electromagnetic fields. Regarding bioelectromagnetics, different projects including the potential effects of electromagnetic fields on biomolecular structures and cells as well as contributions to exposure assessment for epidemiological studies are conducted.

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The focus of the research group of the Department of Biochemistry participating in this project is on molecular chaperones, in particular the DnaK/DnaJ/GrpE-system of Escherichia coli. GrpE, the experimental object in the project, is the nucleotide exchange factor in that system. In the past 12 years, the group has made several definitive contributions to the field, such as the introduction of fluorescence-labelled peptides for assessing the kinetics of molecular chaperone action, the discovery of the thermosensor function of GrpE, the concept of cis-action of DnaJ on DnaK in ternary (ATPDnaK)proteinDnaJ complexes, and the direct heat-shock response of the DnaK/DnaJ/GrpE-system.

The aim of the project presented at BioEM 2009 in Davos, Switzerland, is to design a novel real-time experiment with high reproducibility for the investigation of potential interaction of EMF on well-defined biological macromolecules, like proteins, in particular GrpE. By utilising proteins the complexity of the investigated object is reduced from the cellular to the molecular level. The new experimental set-up consists of a thermostatted exposure chamber mounted in the measurement compartment of a spectropolarimeter. With this arrangement solutions of biomacromolecules proteins can be exposed to EMF while simultaneously monitoring their conformational equilibrium in terms of secondary structure content (via measurement of the ellipticity), and the effect of the temperature on that equilibrium. Thus, the point of observation becomes identical with the potential interaction site in space and time, which will allow for the detection of even small effects of EMFs. The novel experimental unit facilitates the performance of strictly controlled real-time measurements, supports all commonly used study protocols, and allows for arbitrary pulsed exposure durations with user defined EMFs including DVBT, GSM and UMTS signals. The protein GrpE belonging to the Hsp70 chaperone system of E. coli turned out to be long-term stable for this kind of experiment. The well-defined temperature-dependence of the conformational equilibrium of GrpE may be expected to allow unequivocal differentiation between thermal and non-thermal effects of irradiation.

Future work will focus on investigating potential direct effects of RF and ELF electromagnetic field exposure on GrpE's conformation and the kinetics of its change. If a potential effect is observed, the threshold in terms of the magnitude of the electromagnetic field can be obtained together with the frequency ranges where it occurs. Once an effect is defined and its thresholds are found, the molecular mechanisms may be explored in detail by genetic engineering of GrpE, e.g. by deleting or introducing positively or negatively charged residues.

Marie-Christine Gosselin *(see page 4)*

4th Place Poster Présentation (P-33): CORRELATION OF THE EXPOSURE OF MOBILE PHONES ASSESSED IN SAM BY APPLYING STANDARD PROCEDURES WITH THE SAR IN ANATOMICAL HUMAN HEADS. *Co-authors: M. Gosselin[1], M. Zefferer[1], P. Crespo Valero[3], A. Christ[2], S. Kuehn[1], N. Kuster[1]; [1]BioEM Group, Integrated Systems Laboratory, ETH Zurich, Zurich, Switzerland. [2]IT'IS Foundation, Zurich, Switzerland. 3SPEAG, Zurich, Switzerland.*

Also presented at this meeting was the NFP57 study "Correlation of the Exposure of Mobile Phones Assessed in SAM by Applying Standard Procedures with the SAR in Anatomical Human Heads''. Using various virtual brain regions on SAM, correlation factors have been developed to estimate the exposure of certain brain regions in an anatomical head. This set of correlation factors has been tested by exposing SAM and two anatomical heads to three realistic mobile phones. Future work will aim at optimizing these factors and implementing the outcome in SAR assessment systems used to estimate the tissue region specific SAR. This implementation will provide novel dosimetric measures, i.e., brain-region specific SAR, to epidemiological research as well as better information to the general public about which regions of the head are dominantly exposed by mobile phone usage.

BIOELECTROMAGNETICS PHD POSITION

The Institute of Electronics and Telecommunications of Rennes, University of Rennes 1, France is looking for candidates for a PhD position in bioelectromagnetics. Candidates must have earned an MS or equivalent degree in electromagnetics, and be proficient in French and/or English. This position is funded for three years by the French National Research Agency at a rate of around 1350 € net / month.

To express interest, or request additional information, please contact:

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MICHAEL MURPHY, *continued from page 1*

is active in the IEEE International Committee for Electromagnetic Safety, for which he serves as International Liaison and Membership Committee Chair. Mike has been recipient of many awards from the USAF, the most prestigious of which has been the 2002 Air Force Science and Engineering Award for Exploratory or Advanced Technology Development. In 2003 he was the recipient of the IEEE Standards Board Medallion and the 2004 International Award. He is a Fellow of the American Institute of Medical and Biological Engineers, the Air Force Research Laboratory, and the Directed Energy Professional Society. In 1995, he conceived and initiated the Air Force Workshop in conjunction with the Annual Meeting of the Bioelectromagnetics Society and organized and moderated this Sunday custom for 10 years. Mike is currently the Scientific Director, Directed Energy Bioeffects Division, where his purview includes both laser and RF bioeffects and protection.

VISION STATEMENT

The Bioelectromagnetics Society is the world's premier organization on the interaction of electromagnetic energy with biological systems and this status carries much responsibility. Our first responsibility is to uncompromising, high quality science and science communication. Beyond this foundation, we must pioneer a path between enabling safe new uses of electromagnetic energy and protecting society and the environment from the potential risks of such use. I view service as your president as an opportunity to meet these responsibilities and to give back to a society that has given so much to me. Some of my emphasis and goals during the next three years are:

• Leadership: I will seek a broad range of members to volunteer to run and serve as officers and Board Members of the society. I will encourage mentorship of the next generation of BEMS leaders. I also support a position of Student Representative on the Board of Directors.

• Long Term Planning: Our last Long Range Plan was approved in Feb 2005. It is time to review and update it. I will work on the Long Term Planning Committee throughout my tenure as Vice-President, President, and Past-President. This critical committee has usually been composed of senior leaders; I support its expansion to include some young members of our society.

• Membership and Sponsorship: I will develop a flexible PowerPoint presentation, a poster, and a brochure for advertising and promoting BEMS. These materials will be used to solicit new Members, new contributors to our Journal, and sponsors of our meetings. I envision that these materials will be easy to modify to the occasion. The Board of Directors will solicit requests to submit abstracts to meetings for a talk on the Bioelectromagnetics Society and then approve these requests. These materials will also be used to explain the Society and solicit new sponsors for our meetings.

• Management: I will work closely with your elected officers and Board of Directors to manage the Society's affairs responsibly to continue to build a strong, vital, financially secure, international organization.

• Annual Meetings: My guiding principals for our Annual meetings will be (1) scientific quality; (2) diversity and inclusiveness; (3) responsive to the demographics and interests of the membership; and (4) fun.

NOTE TO CONTRIBUTORS

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 $85USD.

The newsletter serves as a forum for ideas and discussion of issues related to bioelectromagnetics research. Contributions may include news items, meeting reports, short notes on reseach, book reviews, and relevant items of historical or other interest. All submissions must be signed. While it is understood that contributions by individual authors reflect the views of the contributor, the editors may require that contributing writers submit a statement of affiliation and/or disclosure of possible conflict of interest at the time an article is submitted for consideration. Advertisements included in the newsletter are not to be considered endorsed by the Society.

To submit items for the newsletter, please send electronic files to
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www.bioelectromagnetics.org

BEMS JOURNAL ARTICLE SUMMARIES

Editor's note: The Bioelectromagnetics Society recently implemented a "Best Paper" award. While not directly connected with that award, we have invited all authors of recently published full research articles in the Bioelectromagnetics journal to provide a short summary of the background and context of the research documented in their articles so that Society members from different disciples can better understand the reported work. For copyright reasons, these summaries are different from the abstracts published in the journal. In providing additional focus on the reported research, it is our hope that communication within the Society is enhanced, providing a stronger basis for assessing and selecting the best paper(s) published each year. These summaries are being printed in the order received by the newsletter office.

Study of Narrow Band Millimeter-Wave Potential Interactions with Endoplasmic Reticulum Stress Sensor Genes

Bioelectromagnetics, Volume 30, Issue 5, pp. 365-373.
Authors: Maxim Zhadobov, Ronan Sauleau, Christophe Nicolas Nicolaz, Yves Le Dréan

Nowadays, the saturation of the lower part of the microwave spectrum and need for higher data rate transmissions impose the use of broadband signals for communication purposes and the increase of operating frequencies up to the millimeter-wave frequency band (30-300 GHz). At millimeter waves, several sub-bands, including frequencies around 60, 120, and 190 GHz, are strongly attenuated in the atmosphere due to the resonant oxygen- and water-induced molecular absorptions. Atmospheric attenuation makes these frequency regions extremely attractive for secure short-range communications, decreasing thereby interferences between neighboring systems. In particular, the 57-64 GHz frequency range has been clearly identified by standardization committees (IEEE 802.15), and world-leading telecommunication companies consider it as extremely promising for high-data-rate communications particularly in indoor environments (WPAN, WiHD, wireless USB, wireless video, streaming data, etc.). Furthermore, the progress in millimeter-wave electronics has triggered a number of emerging applications for point-to-point and point-to-multipoint communications, intelligent transport systems, localization, imaging systems, etc. Simultaneously, public concerns about possible biological effects and related potential biological and health impacts have increased exponentially. From the scientific point of view, two facts suggest that millimeter waves around 60 GHz could interact with biological systems. First, these radiations were originally absent in our natural environmental electromagnetic spectrum. Second, these radiations have been used in several Eastern European countries for therapeutic purposes, providing scientific evidence for applications such as the Fröhlich theory and results of some scientific / clinical studies.

In this context, a number of research groups in Europe, United States, and Asia have started to investigate different biological aspects of possible interactions, including in vitro studies at sub-cellular and cellular levels and in vivo studies on animals. Among them the contribution of the Institute of Electronics and Telecommunications of Rennes (IETR, www.ietr.org) and of the group of Cellular and Molecular Interactions (ICM, www.umr6026.univ-rennes1.fr), University of Rennes 1, France take a significant place, particularly regarding the identification of potential millimeter-wave-induced modifications at cellular and sub-cellular levels. One of the major challenges of these studies is to provide well-controlled and reproducible experimental protocols and dosimetry to ensure accurate experimental replication. This implies the implementation and adaptation of advanced numerical modeling approaches and the development of specific experimental techniques.

Most of the recently reported studies confirmed the absence of biological effects for power densities below the exposure limits for general public. However, the fundamental questions about the biological frequency-dependent power thresholds for the biological effects remain almost unexplored. Our joint IETR/ICM research team combines strong expertises in electromagnetics and cellular biology to address these important questions. Our paper recently published in *Bioelectromagnetics* entitled "Study of narrow band millimeter-wave potential interactions with endoplasmic-reticulum stress-sensor genes" continues a series of studies aiming to provide a key scientific insight into the physical mechanisms and biological issues of bioelectromagnetic interactions at millimeter waves. This article reports the results of the potential effects on the endoplasmic reticulum stress sensor genes for a set of the discrete frequencies within the 59-61 GHz frequency sub-band. Our results suggest that the endoplasmic reticulum homeostasis is not altered by low-power millimeter waves at the considered frequencies. However, we cannot exclude that other exposure parameters, such as intensity, polarization, modulation, or exposure duration may have direct or synergistic impact on cells. Additional investigations are now in progress to acquire deeper knowledge on interactions between millimeter waves and biological systems.

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Effects of radio frequency magnetic fields on iron release from cage proteins

Bioelectromagnetics, Volume 30, Issue 5, pp. 336-342.
Authors: O. Céspedes and S. Ueno.

Cells, tissues and organs are diamagnetic complex biosystems that interact only weakly with magnetic fields. Therefore, the effect of radio frequency (RF) radiation in biology is commonly attributed to the heating in a tissue or solvent generated by the electric component of the field [Barnes, 2005]. Nevertheless, nanoscale, iron-rich bioelements, such as biogenic magnetite nanocrystals and some iron proteins, are superparamagnetic, and increase their internal energy when exposed to alternated magnetic fields.

The iron cage protein ferritin [Harrison et al., 1996], present in almost all organisms from bacteria to humans, is composed of a natural superparamagnetic ferrihydrite nanoparticle inside a roughly spherical proteic cage. In our paper we hypothesize that this association between magnetic material and biomolecule allows for an effective energy transfer from the former to the later when an RF magnetic field is applied. We tested this novel mechanism of interaction by exposing horse spleen ferritin samples to magnetic fields with different frequencies and amplitudes, and then measuring the iron release rates from the proteins.

We found that ferritins previously exposed for several hours to magnetic fields of the order of 1 MHz and 30 mT released up to three times less iron that the control samples. The effect is dependent on the frequency-amplitude product of the magnetic field, as predicted by the superparamagnetic relaxation hypothesis. Given the essential role played by ferritin in iron chemistry, any functional unbalance induced by alternated magnetic fields has potentially a great relevance both in the study of radio/microwave field effects and biomedical engineering.

References:

Barnes FS. 2005. Mechanisms for electric and magnetic fields effects on biological cells. IEEE. Trans. Magn. 41: 4219-4224.

Harrison PM, Arosio P. 1996. Ferritins: Molecular properties, iron storage function and cellular regulation. Biochim. et Biophys. Acta 1275: 161-203.

No effects of UMTS exposure on the function of rat outer hair cells

Bioelectromagnetics, Volume 30, Issue 5, pp. 385-392.
Authors: Paulo Galloni, Vanni Lopresto, Marta Parazzini, Rosanna Pinto, Marta Piscitelli, Paulo Ravazzani, and Carmela Marino

In the last decade the European public concern has been growing on the possible adverse health effects related to the use of mobile communication handsets. The ear and the auditory system could be among the primary biological targets of cellular phones emission, due to their proximity to the electromagnetic field source.

Our research team was involved in two Projects, funded by European Community (EC,) which addressed the topic of the potential influence of mobile phones use on the hearing system function, actually a highly sensitive biological system to exogenous and endogenous agents. The former one, GUARD (1),was focused on GSM-related experiments; no effects on the main measures auditory system status, both in animals and in human volunteers, were observed. The present paper is in the framework of the EMF nEAR (2) Project, concluded in 2007, in which the effect of UMTS electromagnetic fields on hearing were addressed. The ENEA lab was in charge for animal studies.

Young Sprague-Dawley male rats were locally exposed (right ear) to a SAR (Specific Absorption Rate) of 10 W/kg, two hours per day, five days per week, four weeks, at the frequency of 1946 MHz; a positive control group, i.e. made up of animals treated with an ototoxic drug (kanamycin), causing an evident damage on cochlear cells, was also scheduled. Distortion Product Otoacoustic Emission (DPOAEs) were selected as cochlear status index. Significant reductions in DPOAEs level after the treatment may be an indicator of functional or structural damage suffered by Organ of Corti's outer hair cells (OHC), the inner ear sensory epithelium. Measurements were performed before, during and after the four weeks of treatment. Data analysis showed no change of DPOAEs level at any time of tests, neither in exposed nor in control animals. Only the ototoxic effect of kanamycin was confirmed. The same lack of effects was observed in the protocols involving human subjects scheduled in the Project.

By and large, studies regarding the effects of mobile phone emissions on the auditory system both in animals (rodents, rabbits) and in humans (epidemiological studies and exposure of volunteers), dealt with various end-points, such as auditory brainstem responses, otoacoustic emissions,

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vestibular function, acoustic neuroma development. Results are so far inconclusive and often contradictory.

Our study was the first to investigate the effects of UMTS emissions on hearing in this biological model (laboratory rat). Considering the standard emissions of common cellular phones, animals were subjected to a high level of SAR (10 W/kg vs below 1 W/kg). Despite this, we failed to demonstrate any impairment in the physiological behaviour of cochlear sensory cell due to exposure to the electromagnetic field. Possible minor or transitory effects on the same biological target (OHC) could be investigated by further morphological or molecular studies.

References:

(1) European Project GUARD "Potential adverse effects of GSM cellular phones on hearing". 5th Framework Programme. Quality of Life and Management of Living Resources. Key Action 4: Environment and Health (FP5, QLK4-CT-2001-00150, 2002-2004).

(2) EMF nEAR Project: "Exposure at UMTS electromagnetic fields: study on potential adverse effects on hearing", EU Commission, Framework of the program of community action in the field of public health of the EC, DG health and consumer protection (Grant Agreement n°2004127, Dec 2004 – July 2007).

ERRATA:

- In some printed versions of the May/June 2009 newsletter (Issue #207), Eric Van Rongen of the Netherlands was inadvertently omitted from the list of EBEA Council members on page 5. He is an At-Large member.

- On page 4 of the May/June 2009 newsletter (Issue #207) the speakers in the Hot Topic session were incorrectly identified. Official speakers for this session were: Joe Morrissey - Nova Southeastern University; Dariusz Leszczynski - Stuk: Scientist Perspective; Christopher Portier, NIEHS: Funding Agency Perspective

- At the conclusion of these speeches, Devra Lee Davis made an additional presentation before the panel discussion.

- The panel, as shown in that newsletter, included: Chair Niels Kuster and speakers Christopher Portier, Joe Morrissey, Jörg Baumann of the Swiss Office (Precautionary Principle Promoters), and Dariusz Leszczynski. Dr. Baumann was incorrectly identified as Lluis Mir. Panelist Emilie Van Deventer of the World Health Organization did not join the discussion.

- On page 7, Micaela Liberti is inappropriately identified as Isabelle Lagroye. Micaela Liberti of EBEA co-chaired the 2009 student awards program with Jeff Carson of BEMS.

CALENDAR

Conference on EU Directive on Occupational EMF Exposure
Date: Oct. 6-8, 2009
Location: Umeå, Sweden.
Notes: In association with the European Commission, the Swedish EU Presidency is holding a conference to discuss wording of a revised version of a 2004 EU directive on occupational exposure to EMF. "Occupational exposure to electromagnetic fields: paving the way for a future EU initiative" will provide an opportunity for debate and for discussion about practical implementation of the directive. The Swedish Work Environment Authority and Umeå University are organizing the conference.
Conference website: http://www.av.se/inenglish/aboutus/eu/electromagnetic.aspx

Occupational Exposure to Electromagnetic Fields: Paving the Way for a Future EU Initiative
Date: 6-9 October 2009
Location: Umeå University, Umeå, Sweden
Contact: kjell.hansson.mild@radfys.umu.se
Conference web site: www.av.se/occupEMF

Second Scientific Meeting of the Health and Radiofrequencies Foundation
Date: Oct. 20-21, 2009
Location: Paris, France.
Notes: The second scientific meeting of the Health and Radiofrequencies Foundation will review research carried out in France and elsewhere on RF EMF and health. The first results of research projects supported by the Foundation will also be presented.
Conference website: http://www.sante-radiofrequences.org/index.php?id=169&L=1

International Conference on Electromagnetic Fields, Health and Environment
Date: Nov 17-19, 2009
Location: São Paolo, Brazil.
Notes: Participants at this global forum will discuss ELF and

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RF EMF in relation to health and the environment. The agenda will cover a wide range of topics, including experimental and epidemiologic research, exposure assessment, exposure guidelines, health risk communication, and environmental safety and policy.
Conference website: http://www.ehe09.usp.br/

Progress in Electromagnetic Research Symposium (PIERS)
Date: 22 -26 March 2010
Location: Xi'an, China
Information: see article in May/June 2009 Newsletter
Submission Deadline Extended: October 7, 2009
Conference Web Site: http://piers.mit.edu/piers/

2010 Asia-Pacific Symposium on Electromagnetic Compatibility
Date: April 12-16, 2010
Location: Beijing, China
Notes: A Special Session on Biomedical EMC is planed on April 13-14, 2010. The topics are focused on but not limited to the three keywords: RF Dosimetry, Biological Effects and Medical Applications, and EMC in Medical Equipment. The aim is to provide a platform to discuss these common concerned biomedical EMC problems and promote the progress of this research area.
The registration fee for all participants is US$450. Kindly be aware that there is no financial subsistence provided by APEMC for our invitees. All the participants are required to register for the Symposium. Submission deadline, October 5, 2009.
Conference website: http://www.apemc2010.org/

Society for Thermal Medicine
Date: 23-26 April 2010
Location: Clearwater Beach, Florida
Information: www.thermalmedicine.org

ESHO 26th Annual Meeting
Date: 20-22 May 2010
Location: Rotterdam, The Netherlands
Information: http://www.esho.info/

BEMS 32nd Annual Meeting
Date: 13-18 June 2010
Location: Seoul KyoYuk MunHwa HoeKwan, South Korea
Co-Chairs: Dariusz Leszczynski and Nam Kim
Conference Web Site: http://www.bioelectromagnetics.org/bems2010

Sixth International Workshop on EMF
Location: Bodrum, Turkey
Dates: 11-16 October 2010
Contact/Information:
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