

BEMS



Fifteenth Annual Meeting Technical Program & Registration

**The Biltmore Hotel
Los Angeles, California
June 13-17, 1993**

BIOELECTROMAGNETICS SOCIETY
1992 - 1993
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FROM THE CHAIR OF THE TECHNICAL PROGRAM COMMITTEE

Welcome to Los Angeles and the 15th Annual Meeting of the Bioelectromagnetics Society. Every minute of our meeting is filled due to a record number of submissions (over 200 from 16 countries) for the platform and poster sessions and several invited presentations. We are pleased with the level of international participation because our 1994 meeting in Copenhagen will be the first BEMS meeting to be held outside of the United States. We also have new research news and discussion sections. I apologize that members will find times when they wish to be in two places at once.

Our invited speakers include Dr. David Bates, who will discuss EMF epidemiological data in the context of data on other known or suspected carcinogens. Dr. Martin Kavaliers will discuss his research on opioid mechanisms and suggest how they might apply to other insights on mechanisms of action for EMF. Dr. Larry Maltin will provide information on the correct and practical way to shield DC and low frequency magnetic fields. Dr. James Weaver will present an overview of electroporation and the implications for cancer research and treatment. A special symposium on methodology and statistics is intended to educate our membership on many of the newer and more appropriate models that may be used in designing experiments to get the maximum benefit from every piece of expensively collected data. There will be information of interest for those engaged in laboratory as well as clinical data collection.

There are several topics that have received considerable media attention but do not necessarily reflect new scientific evidence on EMF. We developed informal research news and discussion sections to discuss such current topics. The first session will focus on emerging health implications of radio frequency fields. The second session will acquaint members with the policies and procedures of the National Institutes of Health (NIH) and provide information on potentially expanding resources for grants from NIH for EMF research. The third session introduces the European Bioelectromagnetics Research Center and a progress report on its development. In the fourth session members will have an opportunity to discuss the implications of the recent epidemiological studies from Sweden and Denmark as well as any others that may have been completed by the time of our meeting. A moderator will direct each session so that everyone will have an opportunity to participate. The speakers will provide brief reports on the issues for members who do not have the expertise or background in a particular topic but the sessions will be focused on audience discussion. There will be no abstracts of these sessions.

Our lunch hours also offer some excellent opportunities for presentations and discussions. On Monday, the Society will honor Dr. Carl Durney, a charter member and former President of the Society, with the presentation of the D'Arsonval award. On Tuesday, there will be a conversation hour with Bioelectromagnetics Editor-in-Chief, Ben Greenebaum, his Associate Editors, and Bill Curtis, editor from Wiley-Liss. The 15th Annual Business Meeting will be held on Wednesday. Please make sure to purchase your lucheon tickets on your advance registration form.

I personally thank every member of the Technical Program Committee for their time and effort as well as for their excellent advice for our 1993 meeting. There is a listing of their names on the cover and I ask you to take an opportunity to thank them. However, if you have any complaints present them to me personally, so that I can forward your input to the 1994 Technical Program Committee.

As mentioned above, the 16th Annual Meeting of the Society is scheduled for June 12-16, 1994, in Copenhagen, Denmark. Holding the annual meeting outside of the U.S. will require additional preparation for our U.S. members, so begin planning NOW!

I hope that you enjoy Los Angeles and have a most productive and educational experience at the 15th Annual Meeting of the Society.



Mary Ellen O'Connor

GENERAL INFORMATION

TRAVEL ARRANGEMENTS

Hotel, air and car rentals can be made through UNIGLOBE Excel Travel, Inc., the official travel agency for BEMS '93. To take advantage of this one stop service call and refer to BEMS '93 (800) 533-9455 or fax (301) 663-9694.

- **United Airlines** is offering 40% off full Y coach unrestricted fare, 10% off discounted Y coach fare, 5% off the lowest available fare and 5% off first class. Call UNIGLOBE Excel Travel to receive your special discounted meeting fares. The meeting identifier is T536DC.

- **Discounted ALAMO** car rentals are available through UNIGLOBE Excel Travel (# 83705 GR).

ACCOMMODATIONS

Arrangements have been made with the **Biltmore Hotel**, 506 South Grand Avenue, Los Angeles, CA 90071, Tel # (213) 624-1011/800-245-8673, Fax # (213) 612-1545, for special room rates of \$89 single/\$109 double occupancy, inclusive of tax. **You are responsible for making your hotel reservations before May 18 to receive the special rate.** Each reservation requires one room night deposit by check or credit card. Deposits will be refunded if cancelled 24 hours or more before scheduled arrival. Check in time is 4:00 p.m. and check out time is 12:00 p.m.

The Society has reserved a block of rooms for this meeting. Housing requests received after this block has been filled may be subject to considerably higher rates or referred to alternate accommodations.

PARKING

There is considerable self and valet parking available at the Biltmore Tower Garage, as well as Pershing Square Garage behind the hotel. It is expensive.

Vehicles parked in violation of parking regulations are ticketed and towed very quickly in Los Angeles. Before you park, be sure to carefully read all posted signs that stipulate the days and times when parking restrictions are in effect. A red line on the curb means no parking; a green line indicates parking for 20 minutes only; a white line indicates passenger loading/unloading only.

GROUND TRANSPORTATION SERVICES

The Biltmore Hotel is located in downtown Los Angeles about 17 miles from the international airport. Taxis are expensive and sharing is advised. The Biltmore is served directly by Super Shuttle with frequent arrivals and departures and nominal fares. In-bound ground transportation is located outside the baggage claim areas.

HOSPITALITY DESK

For information on things to do in and around Los Angeles stop by the hospitality desk near the BEMS registration area.

ABSTRACTS OF PAPERS PRESENTED

The Fifteenth Annual Meeting Abstract Book will be distributed to all registrants for the Annual Meeting. Additional copies will be available for purchase at the meeting for \$10.00 each. Following the meeting copies will be available from the BEMS office for \$10.00 each (plus \$2.00 shipping for those outside of North America).

COMMERCIAL EXHIBITS

Some of the commercial firms associated with electromagnetic energies will be represented at this meeting. Please visit their displays before and after the Technical Sessions, during breaks, after lunch and during the Poster Sessions.

INFORMATION/MESSAGES

A message board for incoming calls and other messages will be located near the BEMS registration desk. Please encourage callers to leave messages with the hotel operator, except in emergencies.

ATTIRE

Casual sportswear is the preferred attire for most day time and evening activities in Los Angeles. For special evenings out, more formal attire is appropriate. Some restaurants require jackets and ties. A sweater or lightweight jacket is generally advisable as evenings may be cool.

CLIMATE

Los Angeles enjoys a temperate climate with a low humidity year-round. Midday readings in June average 80°F. The rainy season is typically November-March.

GRATUITIES

Tipping in Los Angeles is voluntary but typically ranges between 15% and 20% for restaurants and taxi service. Luggage handling is usually tipped at \$1-\$3 per bag. A \$1-\$2 tip is customary for parking lot attendants. When tipping maid service \$5-\$10 per week is a good guideline.

NO SMOKING POLICY

It is the policy of BEMS that smoking and the use of tobacco products is strictly prohibited in all meeting rooms and at the registration area. Your compliance is appreciated.

HEALTH CLUB

The Biltmore Health Club provides a complete fitness center including a sauna, steam room, Nautilus exercise equipment, swimming pool and health bar. Massage facilities are available.

SPECIAL EVENTS

Sunday

BEMS Board of Directors Meeting. BEMS members are encouraged to attend any meetings of the Board of Directors and/or to contact an officer or Board member regarding any issue. The Board meeting on Sunday is from 8:00am - 5:00pm in Imperial Suite A.

Informal Reception and Registration. An informal reception, cash bar and registration will be held Sunday, June 13, 5:00 pm-8:00 pm. in the Crystal Ballroom. The Biltmore Hotel will host the first 90 minutes of this event.

Monday

Spouses Breakfast. The spouses breakfast is a chance to get to know each other, renew old friendships and learn about Los Angeles. It will be held Monday, June 14, 8:00 am - 9:30 am in the Grecian room. Meal tickets should be purchased with your advance registration.

D'Arsonval Award Luncheon. Dr. Carl Durney will receive the prestigious D'Arsonval Award at a special luncheon 12:15pm - 1:45pm, Monday, June 14, in the Biltmore Bowl. Meal tickets should be purchased with your advance registration.

Tuesday

Conversation hour with the Editors. This is an opportunity to chat with, question or inform Ben Greenebaum, Editor-in-chief of Bio-electromagnetics, the Associate Editors and Bill Curtis, editor from Wiley-Liss. Box Lunches can be purchased with your advance registration, but are not required for participation in this unique opportunity to be held in the Crystal Ballroom from 12:00-1:30pm.

Social Activity. The Santa Monica State Beach Club is the site of our informal gathering. Used as a setting for the TV series "90210," there are paddle tennis and sand volleyball courts available. We will have a barbeque buffet including wine, beer and sodas. Buses will begin departing the Biltmore Hotel at 6:15pm. Fees for the social activity are included in your meeting registration, however, extra tickets for companions should be purchased with your advance registration.

Wednesday

Meet the Board. The Officers and Members of the Board of Directors will be available from 7:00am to 8:00am in the Crystal Ballroom to informally discuss any issues, and orient new and prospective members to the Society's goals and objectives.

Business Meeting Luncheon. The Annual BEMS Business Meeting and Luncheon will be held Wednesday, June 16, 12:15pm - 1:45 pm in the Gold Room. Box lunches may be ordered with your registration, but are not required for attendance.

Thursday

BEMS Board of Directors Meeting. 12:45pm - 3:30pm in the Imperial Suite A.

POSTER SESSIONS

Poster materials are to be assembled Sunday afternoon and Monday morning in the Emerald, Heinsbergen and Tiffany Rooms. Posterboards will be numbered to correspond with the poster numbers in the program. Posters will remain in place until Wednesday evening, but they must be removed by 7:00pm. Authors are to be present at the posters on the days and times scheduled in the program.

TOURS

Pleasant Hawaiian Vacations is offering attractive tour options at spectacular locations. Details may be obtained from our travel agency UNIGLOBE Excel Travel at (800) 533-9455 or by fax (301) 663-9694. This is not a BEMS sponsored activity nor do we assume any responsibility for the arrangements.

CHILDCARE

Check with the Biltmore concierge for childcare services. BEMS does not encourage children's attendance at technical sessions and exhibits. Registrants who elected to take their children with them into the exhibit and poster areas are asked to monitor their activities at all time to avoid injury to the children, damage to the equipment and distraction to other registrants.

LEISURE TIME

Los Angeles is a sprawling, cosmopolitan, international city with considerable ethnic diversity. There are basically five rather distinct regions; Downtown, Hollywood, Westside, Coastal and the Valleys, each with its own distinct character.

The Biltmore Hotel is located in downtown Los Angeles. Nearby are the cobblestones and Spanish adobe of Olvera Street at the center of El Pueblo de Los Angeles Historic Park, LA's birth place. One can also find nearby sushi or dim sum and Kabuki Theater. Chinatown's lavish architecture is in striking contrast to Little Tokyo's lushly landscaped plazas.

Getting around downtown LA is easily accomplished for 25 cents Monday through Saturday by DASH - Downtown Area Short Hop. Route maps are available at the hotel.

The Museum of Contemporary Art, Music Center and the Wells Fargo Museum, as well as the Garmet District, Little Tokyo, Chinatown and Covera Street are easily reached via DASH.

Putting on your walking shoes is one of the best ways to enjoy Los Angeles. Numerous walking tours showcase the city's diversity and cater to specific interests such as history, star gazing, Hollywood trivia or architecture. For architectural treasures, the LA Conservancy offers 2 hour downtown tours every Saturday at 10am. For reservations or more information call (213) 623-CITY. The Beverly Hills Visitors Bureau offers a self-guided tour map, which leads you on a two hour jaunt from the business district through Rodeo Drive. For more information call (800) 345-2210. Hollywood Heritage, a historical society, offers walking tours to trace the city's glamorous past along the Sunset Strip or Hollywood Boulevard. For reservations or tour information, call (213) 874-4005.

In the evening, Vertigo and Mayan dance clubs are 5 minutes away. For jazz the Nucleus Nuance, Dodsworth Bar & Grill and At My Place are recommended. Improvisation, Comedy Store and the Laugh Factory feature superstar comics. These are not within walking distance of the Biltmore and one needs to confirm that they are open on the night of your interest. There are reportedly over 20 good restaurants within walking distance of the hotel. A list should be available at registration.

LETTER OF INVITATION

If you require a letter of invitation for visa purposes, contact W/L Associates, Ltd at fax (301) 663-0043.

REGISTRATION INFORMATION

The meeting registration form for the Fifteenth Annual Meeting of BEMS is located in this program. Advanced registration is strongly recommended to take advantage of the reduced rates, to purchase any meal tickets and to save time at the conference.

Postmark deadline for advanced registration is May 14, 1993.

Registrations will be accepted after that date but at the higher rates. The registration fee includes participation in all scientific sessions, the welcoming reception Sunday evening June 13, refreshment breaks daily, and the social event Tuesday evening, June 15.

Participants are encouraged to purchase separate tickets for the D'Arsonval Award luncheon on Monday, June 14, the Conversation hour with the Journal editors box lunch on Tuesday, June 15, and the BEMS Business Meeting box lunch on Wednesday, June 16.

One day registration includes participation in the scientific sessions only for the specific day of registration.

Speakers must pay a registration fee unless attending only to deliver a report.

ANNUAL MEETING REGISTRATION FEES

	<u>Before May 14</u>	<u>After May 14</u>
Member	\$220	\$245
Non-Member	\$270	\$295
One-Day	\$150	\$175
Student/Emeritus	\$ 75	\$100

BEMS REGISTRATION DESK

The BEMS registration desk at the Biltmore Hotel will be open during the following hours:

Sunday, June 13	5:00 p.m. - 8:30 p.m.
Monday, June 14	7:00 a.m. - 5:00 p.m.
Tuesday, June 15	7:00 a.m. - 5:00 p.m.
Wednesday, June 16	7:30 a.m. - 5:00 p.m.
Thursday, June 17	7:30 a.m. - 11:30 a.m.

REGISTRATION CANCELLATION POLICY

Written cancellation must be received by BEMS *no later than* June 1, 1993, for a full refund. After **June 1, 1993** a 75% refund will be given. No refunds will be given on or after **June 7, 1993**. There are no refunds for no shows other than a medical emergency.

THE IRS

Dues, subscriptions, donations and other payments to the Bioelectromagnetics Society are not deductible as charitable contributions for federal income tax purposes. The foregoing may be deductible as professional or business expenses. Discuss with your accountant or tax advisor.

Thursday, June 10, 1993

Room	1:00pm - 5:00pm	
Biltmore Bowl	Gene Workshop	

Friday, June 11, 1993

Room	8:00pm - 5:00pm	6:00pm - 8:00pm	8:00pm - 10:00pm
Emerald	Gene Workshop		
Roman		SCC28 Subcommittee 1	SCC28 Subcommittee 2

Saturday, June 12, 1993

Room	8:00am - 12:00noon	1:00pm - 5:00pm
Roman	SCC28: Subcommittee 4	SCC28: Subcommittee 3

Sunday, June 13, 1993

Room	8:00am - 5:00pm	1:00am - 5:00pm	3:00pm - 5:00pm	5:00pm - 8:00pm	
Imperial Suite A	BEMS Board Meeting				
Heinsbergen		SCC28 Full Committee			
Emerald & Tiffany Rooms		Poster Setup			
Crystal Ballroom				Registration Informal Reception	
Corsican			COMAR Power Frequency Subcommittee		

Monday, June 14, 1993

Room	7:30 - 8:50	8:00 - 9:30	9:00 - 12:00	12:15 - 1:45	2:00 - 4:30	4:30 - 5:30	4:30 - 6:00	6:00 - 11:00
Grecian		Spouses Breakfast						
Biltmore Bowl				D'Arsonval Luncheon				
Gold Room			Session A-1 Nervous System		Session A-2 Calcium	Research News Discussion #1		
Crystal Ballroom	Opening Session Invited Presentation I-1 Bates		Session B-1 Models & Measuremts		Session B-2 Exposure from Applicances and Devices			
Emerald, Heinsbergen & Tiffany Rooms							Exhibits and Posters	
Roman								COMAR Dinner
Cordoban								Steering Committee 6:00-7:00
Corinthian								URSI Comm K 6:00-7:00

Tuesday, June 15, 1993

Room	7:00 - 8:00	8:00-10:00	10:30-12:00	12:00 - 1:30	1:30 - 4:15	4:15 - 5:45	6:15 - 11:00
Emerald, Heinsbergen & Tiffany Rooms	Exhibits and Posters		Poster Session A P-1 to P-36				
Corsican	Editorial Board Breakfast						
Gold Room		Session C-1: Methodology and Statistics Symposium			Session C-2 Genetics	Research News Discussion #2	
Crystal Ballroom		Session D-1 Exposure: Environmental & Occupational		Conversation hour with the Journal Editors	Session D-2 Exposure: Environ & Occupational		
					3:00 - 4:15		
					Session D-3 Risk Models		Social Event

Wednesday, June 16, 1993

Room	7:00 - 8:00	8:00 - 8:50	9:00 - 12:15	12:15 - 1:45	2:00 - 2:50	3:00 - 4:15	4:15 - 5:15	5:20 - 6:15
Gold Room			Session E-1 Behavior	BEMS Business Meeting			Research News Discussion #3	Research News Discussion #4
Crystal Ballroom	Meet the Board	Invited Presentation I-2 Kavaliers	Session F-1 Mechanisms		Invited Presentation I-3 Maltin			
Emerald, Tiffany & Heinsbergen Rooms	Exhibits and Posters					Poster Session B P-37 to P-80		

Thursday, June 17, 1993

Room	7:00 - 7:50	8:00 - 12:15	12:15 - 12:30	12:45 - 3:30	1:00 - 5:00
Gold Room		Session G-1: Cancer Session G-2: Medical Applications Session G-3: Epidemiology			
Crystal Ballroom	Invited Presentation I-4 Weaver	Session H-1: Cells, Enzymes and Bone	Student Paper Awards		
Imperial Suite A				BEMS Board Meeting	
Cordoban					EMF Group

Friday, June 18, 1993

Room	8:00 - 5:00				
Cordoban	EMF Group				

TECHNICAL PROGRAM FIFTEENTH ANNUAL MEETING

MONDAY, JUNE 14

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A
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OPENING SESSION

7:30am - 7:50am Crystal Ballroom

Welcome and Introductions - Om Gandhi, BEMS President
Program Highlights - Mary Ellen O'Connor, Program Chair
General Announcements - William Wisecup, Executive Director

INVITED PRESENTATION

8:00am - 8:50am Crystal Ballroom

EPIDEMIOLOGICAL DATA ON EMF - IN CONTEXT.

David Bates. Univ of British Columbia, Faculty of Medicine, Vancouver, BC V6T 1Z3 Canada

Moderator: Jeffrey Saffer

SESSION A-1: NERVOUS SYSTEM

9:00am - 12:00 noon Gold Room

Moderators: Asher Sheppard and Ron Seaman

SESSION B-1: MODELS AND MEASUREMENTS

9:00am - 12:00 noon Crystal Ballroom

Moderators: Maria Stuchly and Jim Lin

Co-Sponsor: URSI

A-1-1 MAGNETIC FIELD EXPOSURE AT 60 HZ ATTENUATES ENDOGENOUS OPIOID-INDUCED ANALGESIA IN A LAND SNAIL CONSISTENT WITH THE QUANTUM MECHANICAL PREDICTIONS OF THE LEDNEV MODEL. F.S. Prato, M. Kavaliers*, J.J.L. Carson and K-P. Ossenkopp*. Bioelectromagnetics Western, Univ of Western Ontario and Lawson Research Institute, Dept of Nuclear Medicine & Magnetic Resonance, London, Ontario, Canada N6A 4L6.

9:00

B-1-1 THREE DIMENSIONAL SPECIFIC ABSORPTION RATE DISTRIBUTION MEASUREMENT FOR A LATTICE STRUCTURE OF INTERSTITIAL MICROWAVE APPLICATORS. J.C. Lin*, Y. Wang* and C-L. Chiang*. Dept of Electrical Engineering and Computer Science, Univ of Illinois, Chicago, IL 60607-7053.

A-1-2 PROTEIN KINASE C (PKC) ACTIVATORS AND EXPOSURE TO A 60-HZ MAGNETIC FIELD SIMILARLY ENHANCE AVOIDANCE CONDITIONING IN THE LAND SNAIL, *CEPAEA NEMORALIS*. M. Kavaliers*, K-P. Ossenkopp* and F.S. Prato. Bioelectromagnetics Western, Univ of Western Ontario, London, Ontario, Canada N6A 5B7.

9:15

B-1-2 ABSORPTION AND DISTRIBUTION PATTERNS OF RF MAGNETIC FIELDS USED OR PLANNED FOR MRI WITH FREQUENCIES UP TO 200 MHz. O.P. Gandhi and J.Y. Chen*. Dept of Electrical Eng, Univ of Utah, Salt Lake City, UT 84112.

A-1-3 HOW DO HIGH INTENSITY MAGNETIC PULSES EXCITE THE HUMAN BRAIN? V.E. Amassian*, P.J. Macabee*, L. Eberle*, R.Q. Cracco* and J.B. Cracco*. Sponsor Mary E. O'Connor¹. Depts of Physiology and Neurology, SUNY Health Science Center, Brooklyn, NY 11203. ¹Dept of Psychology, Univ of Tulsa, Tulsa, OK 74104-3189.

9:30

B-1-3 VIDEO DISPLAYS OF CURRENTS INDUCED IN THE HUMAN BODY FOR EXPOSURE TO ULTRAWIDEBAND EMPULSES. C.M. Furse*, O.P. Gandhi, V. Sarvepalli* and R.J. McDermott*. Univ of Utah, Salt Lake City, UT 84112.

A-1-4 A NOVEL METHOD FOR IMPROVING FOCALITY OF MAGNETIC STIMULATION OF THE BRAIN. J.P. Reilly¹, H.A. Eaton*¹ and D. Gluck*². ¹The Applied Physics Laboratory, Johns Hopkins Univ, Laurel, MD 20723; ²Dept of Neurosurgery, Johns Hopkins Univ, Baltimore, MD 21205.

9:45

B-1-4 A SIMPLE CONVOLUTION PROCEDURE FOR CALCULATING COUPLING TO THE HUMAN BODY FOR EM FIELDS OF PRESCRIBED TIME AND SPACE VARIATIONS. O.P. Gandhi, J-Y. Chen*, C.M. Furse* and Y. Cui*. Dept of Electrical Engineering, Univ of Utah, Salt Lake City, UT 84112.

Break and Exhibits

10:00

Break and Exhibits

A-1-5 BLOCKADE OF ACTION POTENTIALS OF SENSORY NEURONS BY AN ARRAY OF FOUR PERMANENT MAGNETS OF ALTERNATING POLARITY M.J. McLean^{1,2}, R.R. Holcomb², A.W. Wamil² and A.V. Cavopol³. ¹Depts of Neurology, Veterans Administration and ²Vanderbilt Univ Medical Cntr, Nashville, TN; ³NE Missouri St Univ, Kirksville, MO.

10:30

B-1-5 CYLINDRICAL MODEL FOR NEURAL STIMULATION WITH MAGNETIC FIELDS. K.P. Esselle¹ and M.A. Stuchly². ¹School of Mathematics, Physics, Computing and Electronics, MacQuarie Univ, Sydney, NSW 2109, Australia; ²Dept of Electrical and Computer Eng, University of Victoria, Victoria, BC, V8W 3P6 Canada.

A-1-6 EXPLANATORY MECHANISM FOR BLOCKADE OF ACTION POTENTIALS IN NEURAL CELLS BY EXTERNAL MAGNETIC FIELD. A.V. Cavopoli, M.J. McLean* and R.R. Holcomb*. Department of Physics, N.M.S.U., Kirksville MO 63501; *Vanderbilt Neurology Associates, Nashville, TN 37212.

10:45

B-1-6 HIGHLY SENSITIVE BROAD BAND E-FIELD PROBES WITH DIGITAL DATA ACQUISITION FOR AUTOMATED DOSIMETRIC SCANNING. T. Schmid*, K. Meier* and N. Kuster. Electromagnetics Group, Swiss Federal Institute of Technology (ETH), 8092 Zurich, Switzerland.

A-1-7 THE INFLUENCE OF PEMF ON cAMP LEVELS IN PC12 CELLS. B.F. Sissen¹, *D. Morrison¹, R. Mullins¹ and *R. Stach². ¹Center for Biomedical Engineering and Dept of Anatomy and Neurobiology, Univ of Kentucky, Lexington, KY 40506; ²Dir. Research, Univ of Michigan-Flint, Flint, MI 48502.

11:00

B-1-7 DESIGN OF A NOVEL HAZARD METER FOR SIMULTANEOUS MEASUREMENTS OF RF ELECTRIC AND MAGNETIC FIELDS. L. Puranen* and K. Jokela. Finnish Centre for Radiation and Nuclear Safety, SF-00101 Helsinki, Finland.

A-1-8 INTERACTION-SITE LOCALIZATION OF MAGNETIC-FIELD INTERFERENCE WITH NERVE-GROWTH-FACTOR-INDUCED DIFFERENTIATION IN PC-12 CELLS. C.F. Blackman and S.G. Benane*. US Environmental Protection Agency, Research Triangle Park, NC 27711.

11:15

B-1-8 HAZARD METER FOR PULSED MICROWAVE RADIATION. L. Puranen* and K. Jokela. Finnish Centre for Radiation and Nuclear Safety, SF-00101 Helsinki, Finland.

A-1-9 RECOVERY OF REDUCTION OF NEURON SPECIFIC ENOLASE GENE TRANSCRIPTION CAUSED BY 60 Hz ELECTROMAGNETIC, ELECTRIC, AND MAGNETIC FIELDS USING GROWTH FACTORS. M. Verma and S.K. Dutta¹. Dept of Biochemistry, Georgetown University School of Medicine, Washington, DC 20007; and ¹Dept of Biology, Howard Univ, Washington, DC 20059.

11:30

B-1-9 NUMERICAL SIMULATION OF THE INTERACTION OF NEARFIELD OF DIPOLE WITH HUMAN BODY BY USING THE FD-TD METHOD. Chang-qing Wang*, Xili Zhu*. Dept of Radio-Electronics, Peking University, Beijing 100871, P.R. China.

A-1-10 STRONG STATIC MAGNETIC FIELDS AND BIOMEMBRANES: EFFECT OF EXPOSURE DURATION. A.D. Rosen. Dept of Neurology, State Univ of New York, Stony Brook, NY 11794-8121.

11:45

B-1-10 THE RELATIONSHIP BETWEEN STRUCTURE STABILITY OF CELL MEMBRANE AND TRANSMEMBRANCE POTENTIAL. Niu Zhong-qi*. Department of Electromagnetic Field Engineering, Xidian Univ, Xian, China, 710071.

D'ARSONVAL AWARD LUNCHEON

Recipient: CARL DURNEY

12:15pm - 1:45pm Biltmore Bowl

SESSION A-2: CALCIUM

2:00pm - 4:30pm Gold Room

Moderators: Jan Walleczek and Dan Lyle

SESSION B-2: EXPOSURE FROM APPLIANCES AND DEVICES

2:00pm - 4:30pm Crystal Ballroom

Moderators: Bary Wilson and Neils Kuster

A-2-1 ELECTROMAGNETIC INTERACTIONS WITH HUMAN LYMPHOCYTE CALCIUM REGULATION STUDIED BY DIFFERENTIAL REAL-TIME FLUORESCENCE SPECTROSCOPY. J. Walleczek, P.L. Miller and W.R. Adey. Jerry L. Pettis Memorial Veterans Hospital, Loma Linda, CA 92357.

2:00

B-2-1 CURRENTS INDUCED IN THE ARM AND THE BODY BY THE MAGNETIC FIELDS OF AN ELECTRIC HAND DRILL. D. Wu*, J. Ren* and O.P. Gandhi. Department of Electrical Engineering, University of Utah, Salt Lake City, UT 84112.

A-2-2 THE SIGNAL TRANSDUCTION CASCADE IN LYMPHOCYTES DURING 60-Hz MAGNETIC FIELD EXPOSURES: CALCIUM INFLUX, $[Ca^{2+}]_i$, [pH]_i AND c-MYC mRNA. R.P. Liburdy, D.E. Callahan, T.S. Sloma*, J.D. Harland* and P. Yaswen*¹. Bioelectromagnetics Research Facility, ¹Department of Cell & Molecular Biology, Life Sciences Division, Lawrence Berkeley Laboratory, UC Berkeley, Berkeley, CA 94720.

2:15

B-2-2 CURRENTS INDUCED IN THE HUMAN BODY BY ELECTRIC BLANKETS. J. Ren*¹, O.P. Gandhi¹, J.P. Casamento*² and H.I. Bassen². ¹Department of Electrical Engineering, University of Utah, Salt Lake City, UT 84112. ²CDRH, FDA, Rockville, MD 20857.

SESSION A-2: CALCIUM (Continued)

2:00pm - 4:30pm Gold Room

Moderators: Jan Walleczek and Dan Lyle

SESSION B-2: EXPOSURE FROM APPLIANCES

AND DEVICES (Continued)

2:00pm - 4:30pm Crystal Ballroom

Moderators: Bary Wilson and Neils Kuster

A-2-3 EFFECT OF 50-Hz MAGNETIC FIELDS ON Ca²⁺-HOMEOSTASIS OF ISOLATED CARDIAC MYOCYTES.

R. Meyer, C. Huning, U. Pohl and S-Y. Wang. Institute of Physiology, Wilhelmstr. 31, D-5300 Bonn 1, Germany.

2:30

B-2-3 MAGNETIC FIELD FLUX DENSITY AND SPECTRAL CHARACTERISTICS OF PERSONAL APPLIANCES.

B. Wilson, R. Lovely, K. Davis and N. Hansen. Pacific Northwest Laboratory, Richland, WA 99352.

A-2-4 EFFECTS OF 60-HZ INJECTED CURRENT ON FITC-CONA BINDING AND CALCIUM SIGNAL TRANSDUCTION IN RAT THYMOCYTES: SINGLE-CELL FLUORESCENCE MICROSCOPE IMAGING. D.E. Callahan, R.P. Liburdy, J.D. Harland* and M.F. Maestre*¹. Bioelectromagnetics Research Facility, Dept of Cell & Molecular Biology and ¹Dept. of Subcellular Structure, Life Sciences Division, Lawrence Berkeley Laboratory, Berkeley, CA 94720.

2:45

B-2-4 HEALTH ASSESSMENT AND REDUCTION OF ELECTRIC AND MAGNETIC FIELD FROM ELECTRIC BLANKETS. H. Chiang, G.D. Yao*, Q.E. Yang*, D.Q. Lu* and Y.D. Fu*. Microwave Institute, Zhejiang Med. Univ., Hangzhou 310006, P.R. China.

Break and Exhibits

3:00

Break and Exhibits

A-2-5 HIGH FIELD NMR AND CALCIUM SIGNALING IN LYMPHOCYTES: EFFECTS OF SWITCHED MAGNETIC FIELDS ON [Ca²⁺]. R.P. Liburdy and J.D. Harland*. Bioelectromagnetics Research Facility, Dept of Cell & Molecular Biology, Life Sciences Division, Lawrence Berkeley Laboratory, UC Berkeley, Berkeley, CA 94720.

3:30

B-2-5 ELECTRIC FIELD AND CURRENT DENSITY DISTRIBUTIONS INDUCED IN AN ANATOMICALLY BASED MODEL OF THE HUMAN HEAD BY MAGNETIC FIELDS OF A HAIR DRYER. S. Tofani*¹, P. Ossola*¹, G. d'Amore*¹ and O.P. Gandhi*². ¹Laboratorio di Sanita' Pubblica, 10015, Ivrea, Italy; ²Department of Electrical Engineering, University of Utah, Salt Lake City, UT 84112.

A-2-6 DO WEAK LOW-FREQUENCY ELECTROMAGNETIC FIELDS HAVE CYCLOTRON RESONANCE EFFECTS ON CALCIUM/CALMODULIN INTERACTIONS WITH MYOSIN LIGHT CHAIN KINASE? S. Hendee*, D.A. Christensen*, D.K. Blumenthal* and C.H. Durney. Depts of Bioengineering, Electrical Engineering, and Pharmacology and Toxicology, University of Utah, Salt Lake City, UT 84112.

3:45

B-2-6 EFFECTS FUNCTION SIMULATION OF RESIDENTIAL APPLIANCE FIELD EXPOSURES. J. Zhang, M.G. Morgan and I. Nair. Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA 15213.

A-2-7 CALCIUM OSCILLATIONS AND THE ELF MAGNETIC FIELD INTERACTION. A.R. Liboff¹, S. Cherng*¹ and M.D. Sevilla*². ¹Depts of Physics and ²Chemistry, Oakland University, Rochester, MI 48309.

4:00

B-2-7 THE EFFECT OF OPERATOR POSTURE AND WORKSTATION FURNITURE ON FOOT CURRENT FOR RF HEATER OPERATORS. D.L. Conover, R.M. Edwards*, W.G. Lotz and D.L. Snyder*. M/S C-27, RS, PAEB, DBBS, NIOSH, 4676 Columbia Pkwy., Cincinnati, OH 45226.

4:15

B-2-8 STANDARDIZED DOSIMETRIC TESTS OF MOBILE COMMUNICATION DEVICES. K. Meier* and N. Kuster. Electromagnetics Group, Swiss Federal Institute of Technology (ETH), 8092 Zurich, Switzerland.

**RESEARCH NEWS DISCUSSION #1
RECENT ISSUES IN RADIOFREQUENCY HEALTH EFFECTS**

4:30pm - 5:30pm Gold Room

Moderator: Tom Rozzell

**EXHIBITS
AND POSTERS
4:30pm - 6:00pm
Emerald, Heinsbergen & Tiffany Rooms**

RADIOFREQUENCY DOSIMETRY. C.K. Chou. City of Hope National Medical Center, Duarte, CA 91010.

4:30

RADIOFREQUENCY BIOEFFECTS. Joe Elder. Health Effects Research Lab, US EPA, Research Triangle Park, NC 27711.

4:45

DISCUSSION

5:00

SESSION C-1: METHODOLOGY AND STATISTICS SYMPOSIUM

8:00am - 12:00 noon Gold Room

Moderator: Lee Rosen

SESSION D-1: EXPOSURE: ENVIRONMENTAL AND OCCUPATIONAL

8:00am - 10:00am Crystal Ballroom

Moderators: Jukka Juutilainen and Frank Barnes

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8:00

C-1-1 ISSUES IN STATISTICS AND SCIENCE. Mary Ellen O'Connor. Univ of Tulsa, Tulsa, OK 74104-3189.

8:00

D-1-1 AN EMPIRICAL EVALUATION OF ALTERNATIVE ELF MAGNETIC FIELD EXPOSURE INDICES. J. Juutilainen and T. Hatfield. Department of Environmental Sciences, University of Kuopio, SF-70211 Kuopio, Finland.

8:15

C-1-2 EXPLORATORY DATA ANALYSIS. Andrew Siegel. Dept of Managerial Science, Univ of Washington, Seattle, WA 98155.

8:15

D-1-2 CHARACTERISTICS OF MAGNETIC FIELDS PRODUCED FAR FROM ELECTRIC POWER LINES. W.T. Kaune¹ and L.E. Zaffanella². ¹EM Factors, 530 Lee Blvd, Richland, WA 99352. ²High Voltage Transmission Research Center, Lenox, MA 01240.

8:45

C-1-3 STATISTICAL DESIGN. Jack Sahl. Occupational Studies, Southern California Edison, Rosemead, CA 93108.

8:30

D-1-3 LONG TERM MONITORING OF THE ELECTRICAL ENVIRONMENT OF A +450 kV HVDC TRANSMISSION LINE. T.D. Bracken, R.S. Senior* and R.L. Layman*. T. Dan Bracken, Inc., Portland, OR 97202.

8:45

D-1-4 MEASUREMENT OF INTENSE, ELECTROMAGNETIC, 1 TO 100 MHZ TRANSIENTS DURING SWITCHING OF SIMULATED HOUSEHOLD 60-HZ ELECTRICAL WIRING. J.E. Bridges. IIT Research Institute, Chicago, IL 60616.

9:00

D-1-5 ESTIMATION OF TRANSMISSION AND DISTRIBUTION SYSTEM EXPOSURE REDUCTION SUPPLY CURVES. J. Adams, M.G. Morgan, J. Zhang and I. Nair. Dept of Engineering and Public Policy, Carnegie Mellon Univ, Pittsburgh, PA 15213.

9:15

D-1-6 CIRCUIT MODELS, DIAGNOSTICS, AND CURES FOR GROUND CURRENT MAGNETIC FIELDS. S.J. Maurer. Department of Electrical Engineering, New York Institute of Technology, 1855 Broadway, New York, NY 10023.

9:25

C-1-4 TIME SERIES ANALYSIS. George Tiao. Univ of Chicago, Chicago, IL 60637.

9:30

D-1-7 EXPERIMENTAL VERIFICATION OF THEORETICAL MODEL FOR GROUND CURRENTS ON MULTI-GROUNDED NEUTRAL DISTRIBUTION LINES. S.J. Maurer¹ and G.B. Johnson². ¹Department of Electrical Engineering, New York Institute of Technology, New York, NY 10023; ²EPRI High Voltage Transmission Research Center, Lenox, MA 01240.

9:45

D-1-8 THEORETICAL METHOD FOR POWER LINE MAGNETIC FIELD EVALUATION AND ITS UTILITY FOR RESIDENTIAL EXPOSURE ASSESSMENT. S. Tofani*¹, G. d'Amore*¹, G. Bonazzola*², and G. Flandino*². ¹Laboratorio di Sanita Pubblica - Sezione Fisica, Ivrea (To), Italy, 10015. ²Dipartimento di Fisica Sperimentale, Universira di Torino, Italy.

10:00

Break and Exhibits

10:00

Break and Exhibits

10:30

C-1-5 NONPARAMETRIC ANALYSIS. Scott Parker. Dept of Psychiatry, American Univ, Washington, DC 20016.

10:30

POSTER SESSION A: P-1 to P-36
10:30am - 12:00 noon *Authors Present*
Emerald, Heinsbergen & Tiffany Rooms
Moderators: Bill Guy and Ewa Herbst

11:10

C-1-6 CORRELATIONAL ISSUES IN MODELING EXPOSURE - RESPONSE RELATIONS. Duncan Thomas. Dept of Preventive Medicine, Univ of Southern California, Los Angeles, CA 90033.

11:50

DISCUSSION

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POLICY

P-A-1 THE 1992 SWEDISH AND DANISH EPIDEMIOLOGICAL STUDIES: IMPLICATIONS FOR INTERIM POLICY AND PRUDENT AVOIDANCE PROGRAMS AT SCHOOLS IN CALIFORNIA. C. Sage. Sage Associates, Montecito, CA 93108.

P-A-2 A PROTOCOL AND PAIR OF RISK-COMMUNICATION BROCHURES FOR USE IN FIELD MEASUREMENT PROGRAMS. M.G. Morgan, J. Adams and I. Nair. Dept of Eng and Public Policy, Carnegie Mellon University, Pittsburgh, PA 15213.

P-A-3 OPTIONS FOR EVALUATION OF ENVIRONMENTAL RADIOFREQUENCY RADIATION BY THE FEDERAL GOVERNMENT. R.F. Cleveland, Jr. Office of Engineering and Technology, Federal Communications Commission, Washington, DC 20554.

RADIO FREQUENCY

P-A-4 ANALYSIS OF A BILAYERED DIELECTRIC MEASUREMENT SYSTEM FOR BIOLOGICAL MATERIALS. Kang Li, Zhong Ji, Gang-wu Chen. Department of Electronics Engineering, Shandong University, Jinan, Shandong, P.R. China 250100.

P-A-5 ION ELF RESONANCE MODULATION OF CIRCULARLY POLARIZED MICROWAVE RADIATION. I.D. Fitian*, A.R. Liboff and O.P. Gandhi¹. Dept. of Physics, Oakland Univ, Rochester, MI 48309; ¹Dept of Electrical Eng, Univ. of Utah, Salt Lake City, UT 84112.

P-A-6 NUMERICAL VALIDATION OF POINT SOURCE MODEL OF SAR PATTERN AROUND INTERSTITIAL MICROWAVE HYPERTHERMIA APPLICATOR. A. Mesa, T.M. Babij. Department of Electrical & Computer Engineering, Florida International University, Miami, FL 33199.

P-A-7 A PHOTOGRAPHIC DOSIMETER FOR MEASURING RF BODY-TO-GROUND CURRENT INDUCED BY AN ELECTROMAGNETIC PULSE (EMP). J.R. Forstall* and R.G. Olsen. Naval Aerospace Medical Research Laboratory, Pensacola, FL 32508-1046.

P-A-8 MEASUREMENTS OF RF CURRENT AND LOCALIZED SAR NEAR SEVERAL NAVY HEAT SEALERS. R.G. Olsen, T.A. Griner and B.J. Van Matre. Naval Aerospace Medical Research Laboratory, Pensacola, FL 32508-1046.

EXPOSURE ASSESSMENT RESIDENTIAL

P-A-9 MAGNETIC FIELD EXPOSURE ASSESSMENT IN RESPECT OF THE GERMAN ENERGY DISTRIBUTION NETWORK. A.R. Stamm*¹, H.C. Karner¹, K. Brinkmann*¹ and J. Michaelis². ¹Institut für Hochspannungstechnik, TU Braunschweig, Germany. ²Institut für med. Statistik und Dokumentation, Universität Mainz, Germany.

P-A-10 SPECTRAL MEASUREMENTS OF RESIDENTIAL ELF MAGNETIC FIELDS. M.J. Bangay*, V. Delpizzo and Joanna L Borghesi*¹. Australian Radiation Laboratory; ¹Department of Community Medicine, University of Melbourne, Australia.

P-A-11 HISTORICAL VARIATIONS OF RESIDENTIAL POWER FREQUENCY MAGNETIC FIELDS. T. Dovan¹, R. Owen¹ and T. Boal². ¹State Electricity Commission of Victoria, Melbourne 3001, Australia; ²Health Department Victoria, Melbourne 3000, Australia.

P-A-12 REDUCTION OF MAGNETIC FIELDS FROM IN-HOUSE TRANSFORMER STATIONS. P.G. Forsgren*, K.H. Mild and A. Berlund. National Institute of Occupational Health, Umea, Sweden.

P-A-13 PRECAUTIONARY ASPECTS CONCERNING THE EXPOSURE OF THE POPULATION TO LOW FREQUENCY ELECTRIC AND MAGNETIC FIELDS. R. Matthes*. Institute for Radiation Hygiene, Federal Office for Radiation Protection, D-8042 Neuherberg, Germany.

EXPOSURE ASSESSMENT OCCUPATIONAL

P-A-14 MAGNETIC FIELDS EXPOSURE ASSESSMENT FOR EMPLOYEES OF THE STATE ELECTRICITY COMMISSION OF VICTORIA (SECV). T. Dovan and R. Owen. SECV, Melbourne 3001, Australia.

P-A-15 CHARACTERISTICS OF STATIC AND ELF MAGNETIC FIELDS FROM OCCUPATIONAL SOURCES. J.D. Bowman and C.A. Kardous*. National Institute for Occupational Safety and Health, Cincinnati, OH 45226.

P-A-16 METHODS FOR ASSESSING OCCUPATIONAL EXPOSURES TO ELECTRIC AND MAGNETIC FIELDS: A FRAMEWORK FOR THEIR COLLECTION AND DISSEMINATION. J.D. Bowman. National Institute for Occupational Safety and Health, Cincinnati, OH 45226.

MAGNETIC FIELD: INSTRUMENTATION AND MODELING

P-A-17 EPRI MAGNETIC FIELD RESEARCH FACILITY AND POWER FREQUENCY MAGNETIC FIELD INSTRUMENTATION. G.B. Johnson, L.E. Zaffanella* and J.H. Dunlap¹. General Electric, EPRI High Voltage Transmission Research Center, Lenox, MA 01240; ¹Electric Power Research Institute, Palo Alto, CA 94303.

P-A-18 SPECTROFLUORIMETRY SYSTEM FOR CELL SUSPENSION STUDIES IN CONTROLLED ELECTROMAGNETIC FIELDS. D. Allan*, B. Reipert, R.E. Dale* and T.M. Dexter*. Paterson Institute for Cancer Research, Christie Hospital, Manchester, M20 9BX, UK.

P-A-19 SOME MODELS FOR THE REDUCTION OF MAGNETIC FIELDS AT 60 Hz. F.S. Barnes, A.K. Banerjee* and P.J. Hatwick*. Univ of Colorado, Dept of Electrical Engineering, Boulder, CO 80309.

P-A-20 THE LOW-FREQUENCY DIELECTRIC PROPERTIES OF CRAYFISH TAIL MUSCLE, MEASURED *IN-VIVO*. V. Schmidt*¹, S. Dutta, Chowdhury*¹, F. Hart¹, L. Ray*² and E. James*². ¹Dept of Physics, The Univ of the South, Sewanee, TN 37375; ²Grundy County High School, Tracy City, TN 37387.

P-A-21 MODELING OF MAGNETICALLY-INDUCED ELECTRIC FIELDS MEASURED IN RATS. D.L. Miller and L.E. Anderson. Battelle, Pacific Northwest Laboratory, Richland, WA 99352.

P-A-22 MOTION CAN SIGNIFICANTLY ALTER THE INDUCED ELECTRIC FIELDS IN LABORATORY STUDIES WITH ELF MAGNETIC FIELDS. A.R. Sheppard and W.R. Adey. Research Service-151, J.L. Pettis VAMC, Loma Linda, CA 92357 and Loma Linda Univ, Loma Linda, CA 92354.

P-A-23 SUPPRESSION OF STRAY MAGNETIC FIELDS FROM A LABORATORY ANIMAL POWER FREQUENCY MAGNETIC FIELD EXPOSURE MODULE. J.R. Gauger¹, J.E. Bridges*¹, T.R. Johnson*¹ and R.C. Patterson*². ¹IIT Research Institute, Chicago, IL 60616; ²Electric Research and Management, Inc., Pittsburgh, PA 15238.

MEDICAL APPLICATIONS

P-A-24 PRELIMINARY STUDIES ON THE MECHANISM OF ELECTROCHEMICAL TREATMENT OF TUMOR. Li Kai-hua*, Gu Yinong* and Xin Yu-ling*. Institute of Atomic Energy, ¹China-Japan Friendship Hospital, Beijing, China.

P-A-25 THE CLINICAL PATHOLOGICAL OBSERVATION ON MALIGNANT TUMOUR TREATED BY ELECTRO-CHEMISTRY. Li Kai-hua¹ and Zhang Yao jie². ¹The Institute of Atomic Energy, Beijing, P.R. China; ²Surgical Department Central Outpatient Service Group of the Headquarters of the General Staff of Liberation Army, Beijing, P.R. China.

P-A-26 EXPERIMENTAL STUDY ON ANTI-INFLAMMATORY FUNCTION OF PULSED MICROWAVE. Bin-Jie Shao¹, Yi-Di Fu^{*1}, Huai Chiang¹ and Yong-Hao Shen^{*2}. ¹Microwave Institute, Zhejiang Medical University, Hangzhou 310006, P.R. China; ²Hangzhou Branch of Zhejiang Medical University, Hangzhou 310012, P.R. China.

P-A-27 LOW-FREQUENCY MAGNETIC FIELDS AS AN ADJUVANT TO ANTI-NEOPLASTIC CHEMOTHERAPY IN A HUMAN BREAST CARCINOMA CELL LINE. J.R. Salvatore¹, D. Blackington^{2*}, H. Wanebo^{2*}, C Polk³, D. Cherlin³ and S. Mehta². ¹Division of Hematology/Oncology, ²Division of Surgical Oncology Research, Roger Williams Medical Center and Brown University, Providence, RI 02908; ³Dept. of Electrical Engineering, Univ. of Rhode Island, Kingston, RI.

P-A-28 THE MICROWAVE THERAPY OF UTERINE CERVICAL EROSION: REPORT OF 24 CASES. Yang Yan-qing, Zhang Luchia, Li Gin-xiang, Shen Xiu-rong, Li Ping. Department of Gynecology and Obstetrics Xin xiang First People's Hospital, Henan, China.

P-A-29 THE APPLICATION OF MICROWAVE ON GYNECOLOGICAL DISEASES. Qian Hongsen Zhang. Nanjing Bestar Microwave Energy Laboratories Ltd., Nanjing, P.R. China.

P-A-30 MICROWAVE TREATMENT OF BENIGN ESOPHAGEAL STENOSIS WITH ENDOSCOPY. REPORT OF 19 CASES. Xu Ming-ce, Qiao Liu-jie, Zhang Wei-zhong, Liu Yi-ai, Zhang Xin-lan. Digestion Department of Medicine, No. 1 Hospital, Xinxiang, Henan, P.R. China.

P-A-31 THE MAGNETIC FIELD PRODUCED BY AN ARRAY OF FOUR MAGNETS OF ALTERNATING POLARITY DECREASED HUMAN SPERM MOTILITY *IN VITRO*. B.D. Wamil^{*1}, A.W. Wamil³, R.R. Holcomb³ and M.J. McLean^{2,3}. ¹Department of Obstetrics and Gynecology and Departments of Neurology, ²Veterans Administration and ³Vanderbilt University Medical Centers, Nashville, TN 37212.

P-A-32 TREATMENT OF OSTEOARTHRITIS WITH PULSED ELECTROMAGNETIC FIELDS. D.H. Trock*, A.J. Bollet and R. Markoll. Danbury Hospital, Danbury, CT 06810 and Bio-Magnetic Therapy Systems, Inc., Danbury, CT 06811.

P-A-33 PEMF CAN INFLUENCE ENZYME ACTIVITY OF WHEAT FLOUR. N. Pekaric-Nadj and D. Psodorov*. Faculty of Technical Sciences, *Faculty of Technology, Vojvodina, Yugoslavia, EU.

RADIO FREQUENCY DEVICES

P-A-34 EVALUATION OF A MICROWAVE-PROTECTIVE SUIT FOR SHIELDING EFFECTIVENESS AND THERMAL BREAKDOWN. B.J. Van Matre and R.G. Olsen. Bioengineering Division, Naval Aerospace Medical Research Laboratory, Pensacola, FL 32508-1046.

P-A-35 RADIOFREQUENCY (RF) WARMING GLOVES WITH A HIGH-EFFICIENCY POWER SOURCE FOR DIVERS. J.R. Lloyd^{*1}, R.G. Olsen¹, N.O. Sokal^{*2} and K.L. Chu^{*2}. ¹Naval Aerospace Medical Research Laboratory, Pensacola, FL 32508-1046; ²Design Automation, Inc., Lexington, MA 02173-3992.

P-A-36 ACTION OF LASERBEAM ON CERTAIN ACUPUNCTURE POINTS I. Mamulas and V. Musat. Romanian Society of Bioelectricity and Bioradiations, Bucharest 71116, Romania.

12:00pm - 1:30pm Conversation hour with the Journal Editors in the Crystal Ballroom

NOTES

SESSION C-2: GENETICS

1:30pm - 4:15pm Gold Room

Moderators: Martin Blank and Betty Sisken

Co-Sponsor: Bioelectrochemistry Society

C-2-1 SIMILARITIES IN THE DISTRIBUTION OF PROTEINS FOLLOWING ELECTROMAGNETIC STIMULATION AND HEAT SHOCK OF SCIARA SALIVARY GLANDS. M. Blank¹, O. Khorkova² and R. Goodman². ¹Depts of Physiology and ²Pathology, Columbia University, New York, NY 10032.

C-2-2 TRANSCRIPT LEVELS FOR SOME GENES, INCLUDING A HEAT SHOCK GENE, ARE INCREASED IN SACCHAROMYCES CEREVISIAE CELLS EXPOSED TO ELF EM FIELDS. D. Weisbrot, O. Khorkova*, A. Henderson and R. Goodman. William Paterson College, Dept of Biology, Paterson, NJ; Columbia Univ Health Sciences, Pathology Dept, NYC, NY 10032; and Hunter College, Biological Sciences, NYC, NY 10021.

C-2-3 THE ROLE OF TRANSCRIPTIONAL REGULATION IN THE RESPONSE OF CELLS TO EM FIELDS. H. Lin*, R. Goodman and A. Shirley-Henderson. Columbia Univ Health Sciences, Pathology Department, New York, NY 10032 and Hunter College-City Univ of New York, Biological Sciences, New York, NY 10021.

C-2-4 INCREASED EXPRESSION OF HEAT SHOCK GENE HSP70 IS MEASURED IN CELLS EXPOSED TO ELECTRIC AND MAGNETIC FIELDS: IS EM FIELD EXPOSURE A CELLULAR STRESS? R. Goodman, M. Blank, O. Khorkova*, D. Weisbrot and A. Henderson. Columbia Univ Health Sciences, Depts of Pathology and Physiology and Cellular Bio-physics, New York, NY 10032; William Paterson College, Dept of Biology, Paterson, NJ; and Hunter College-CUNY, Biological Sciences, New York, NY 10021.

Break and Exhibits

C-2-5 STUDY ON THE POSSIBLE GENOTOXIC EFFECTS OF ELF MAGNETIC FIELD IN HUMAN LYMPHOCYTES. S. Tofani*¹, A. Ferrara*¹, L. Anglesio*¹, E. Carraro*² and G. Gilli*². ¹Laboratorio Sanira Pubblica, Sezione Fisica, Ivrea (To), Italy; ²Istituto di Igiene, Università di Torino, Italy.

C-2-6 EFFECTS OF 60-HZ MAGNETIC FIELD EXPOSURE ON THE DNA BINDING ACTIVITY OF SPECIFIC TRANSCRIPTION FACTORS IN HUMAN TLYMPHO-BLASTOID CELLS. J.L. Phillips, W. Haggren*, W.J. Thomas*, T. Ishida-Jones* and W.R. Adey. Pettis Memorial Veterans Hospital, Loma Linda, CA 92357.

C-2-7 ALTERED RNA SYNTHESIS IN A TOTAL SYNTHETIC SYSTEM EXPOSED TO A SINUSOIDAL MAGNETIC FIELD. J. Frederiksen*¹, E.M. Goodman¹, B. Greenebaum¹ and M.T. Marron². ¹Research Institute, Biomedical Univ of Wisconsin-Parkside, Kenosha, WI 53141; ²Office of Naval Research, Arlington, VA 22217.

C-2-8 EFFECTS OF LIGHT AND MAGNETIC FIELD EXPOSURE ON THE EXPRESSION OF GENES COMPRISING THE DJUNGARIAN HAMSTER BIOLOGICAL CLOCK. W. Haggren*, S.M. Yellon*, W.J. Thomas*, T. Ishida-Jones*, J.L. Phillips and W.R. Adey. J. L. Pettis Memorial Veterans Hospital, Loma Linda, CA 92357.

SESSION D-2: EXPOSURE: ENVIRONMENTAL AND OCCUPATIONAL

1:30pm - 2:30pm Crystal Ballroom

Moderators: Jack Sahl and Bill Kaune

D-2-1 MEASUREMENTS OF AMBIENT MAGNETIC FIELDS IN VARIOUS DOMESTIC ENVIRONMENTS IN ITALY. ¹R. Conti¹, P. Nicolini¹, G. Farina*², O. Bottauscio*² and G. Crotti*². ¹ENEL S.p.A., Electrical Research Center, I-20093 Cologno, Monzese MI, Italy; ²Istituto Elettrotecnico Nazionale Galileo Ferraris, I-10100 Torino, Italy.

D-2-2 SIMPLIFICATION OF THE WIRE CODING SYSTEM OF WERTHEIMER AND LEEPER. W.T. Kaune¹ and D.A. Savitz*². ¹EM Factors, 530 Lee Blvd, Richland, WA 99352; ²University of North Carolina, Chapel Hill, NC 27599.

D-2-3 MAGNETIC FIELD EXPOSURES AMONG ELECTRIC UTILITY WORKERS: CONSIDERATION OF OCCUPATIONS, JOB TASKS AND FACILITY TYPE. J.D. Sahl, J.B. Scarfuto*, M.A. Kelsh*, J. Pinneo* and D.A. Aseltine*. Southern California Edison Company, Rosemead, CA 91770 and EcoAnalysis, Inc., Ojai, CA 93023.

D-2-4 THE NEXT GENERATION OF WORK EXPOSURE ASSESSMENTS. M.A. Kelsh*, J.D. Sahl and R.W. Smith*. Eco-Analysis, Inc., Ojai, CA 93023 and Southern California Edison Company, Rosemead, CA 91770.

Break and Exhibits.

SESSION D-3: RISK MODELS

3:00pm - 4:15pm Crystal Ballroom

Moderators: Frank Hart and Tom Tenforde

D-3-1 NATIONAL RESEARCH COUNCIL COMMITTEE REPORT ON POTENTIAL HEALTH EFFECTS OF THE AIR FORCE GROUND WAVE EMERGENCY NETWORK. T.S. Tenforde. Life Sciences Center, Pacific Northwest Laboratory, Richland, WA 99352.

D-3-2 ESTIMATES OF CANCER RISK FROM THE GROUND WAVE EMERGENCY NETWORK. H.K. Florig. Center for Risk Management, Resources for the Future, Washington, DC 20036.

D-3-3 ¹METHODOLOGY DEVELOPMENT FOR THE RISK ASSESSMENT OF POTENTIAL CARCINOGENIC EFFECTS RESULTING FROM EXPOSURE TO MAGNETIC FIELDS. R.S. McColl, L. Zangwill*, J. Shortreed*, D. del bel Belluz* and J. Husted*. Institute of Risk Research and Dept of Health Studies, Univ of Waterloo, Waterloo, Ontario, Canada N2L 3G1.

D-3-4 MEDICAL AND BIOLOGICAL SUBSTANTIATION OF HIGH-FREQUENCY (3-30 MHz) ELECTROMAGNETIC FIELD'S STANDARDS FOR POPULATION. Y.D. Dumansky, I.S. Bezdolnaya, Y.A. Serdiuk, L.A. Tomashevskaya and S.V. Bitkin. Ukrainian Scientific Centre of the Environmental Health, Kiev-94, Ukraine 253660.

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C-2-9 DOMINANT LETHAL STUDIES IN MALE MICE AFTER EXPOSURE TO A 50-Hz MAGNETIC FIELD. C.I. Kowalczyk, L. Robbins* and R.D. Saunders. National Radiological Protection Board, Chilton, Didcot, Oxfordshire, OX11 0RQ, UK.

4:00

D-3-5 MEDICAL ESTIMATION OF ELECTROMAGNETIC AND RADIATION SITUATION IN NUCLEAR POWER STATIONS (NPS) AREAS. A.M. Serdiuk, I.S. Bezdolnaya, I.I. Karachev, S.V. Bitkin and N.D. Shabunina. Ukrainian Scientific Centre of the Environmental Health, Kiev-94, Ukraine.

**RESEARCH NEWS DISCUSSION #2
POTENTIAL NEW FUNDING SOURCES IN THE USA
GRANTMANSHIP vs CONTRACTS
4:15pm - 5:45pm Gold Room
Moderator: Michael Galvin**

OVERVIEW OF THE NIEHS EMF GRANT PROGRAM. Michael Galvin. NIEHS, National Toxicology Program, Research Triangle Park, NC 27709.

4:15

ISSUES ASSOCIATED WITH THE ENERGY POLICY ACT OF 1992. Gary Boorman. NIEHS, National Toxicology Program, Research Triangle Park, NC 27709.

4:30

THE NIH GRANT APPLICATION: THE BUDGET AND JUSTIFICATION. David Mineo. Division of Extramural Research and Training, NIEHS, Research Triangle Park, NC 27709.

4:45

THE NIH GRANT APPLICATION: THE REVIEW. Paul Struller. NIH Division of Research Grants, Bethesda, MD 20852.

5:00

DISCUSSION

5:15

**BUSES BEGIN BOARDING FOR BEMS
SOCIAL EVENT AT SANTA MONICA
STATE BEACH CLUB**

6:15

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WEDNESDAY, JUNE 16

EXHIBITS AND POSTERS

7:00am - 8:00am

Emerald, Heinsbergen & Tiffany Rooms

MEET THE BOARD

7:00am - 8:00am

Crystal Ballroom

INVITED PRESENTATION

8:00am - 8:50am Crystal Ballroom

OPIOID SYSTEMS AND THE BIOLOGICAL EFFECTS OF MAGNETIC FIELDS.

M. Kavaliers*, K-P. Ossenkopp* and F.S. Prato. Bioelectromagnetics Western, University of Western Ontario, London, Ontario, Canada N6A 5C1.

Moderator: W. Ross Adey

SESSION E-1: BEHAVIOR, PHYSIOLOGY, PINEAL, BIOLOGICAL RHYTHM

9:00am-12:15am Gold Room

Moderators: Charles Graham and Russ Reiter

SESSION F-1: MECHANISMS

9:00am - 12:00am Crystal Ballroom

Moderators: Bruce McLeod and Martino Grandolfo

E-1-1 RHESUS MONKEY CONTRAST SENSITIVITY DURING EXTENDED EXPOSURE TO HIGH PEAK POWER 1.3-GHz MICROWAVE PULSES. J.A. D'Andrea¹, A. Thomas¹, D.J. Hatcher¹ and T.L. DeVietti². ¹Naval Aerospace Medical Research Laboratory, Pensacola, FL 32508-1046; ²Central Washington University, Ellensburg, WA 98926.

9:00

F-1-1 A BIOPHYSICAL MODEL FOR THE EFFECTS OF ELF FIELDS ON CELLULAR GROWTH CONTROL. P.C. Gailey. Oak Ridge National Laboratory, Oak Ridge, TN 37831-6070.

E-1-2 ABSENCE OF COMPARABLE OCULAR EFFECTS IN ANIMALS EXPOSED TO PULSED MICROWAVE RADIATION FROM TWO SEPARATE SYSTEMS. H.A. Kues¹, S.A. D'Anna^{*2}, M.A. Johnson^{*2}, G.A. Luty^{*2} and J.C. Monahan³. ¹The Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723; ²The Johns Hopkins Wilmer Ophthalmological Institute, Baltimore, MD 21205; ³FDA Center for Devices and Radiological Health, Rockville, MD 20857.

9:15

F-1-2 THE USE OF GENETICALLY ENGINEERED BACTERIA AS A UNIVERSAL TEST SYSTEM FOR TESTING ELF, BIOLOGICAL SYSTEM INTERACTIONS. B.R. McLeod¹, S.J. Rogers^{*2} and P.J. Kosted^{*2}. ¹Depts of Electrical Engineering and ²Biochemistry, Montana State University, Bozeman, MT 59715-0378.

E-1-3 RESONANT CW AND PULSED RF FIELDS OF IDENTICAL AVERAGE POWER DENSITY PROVOKE SIMILAR THERMOREGULATORY ADJUSTMENTS BY SQUIRREL MONKEYS. E.R. Adair, B.W. Adams* and S.A. Kelleher*. John B. Pierce Laboratory, Inc., New Haven, CT 06519.

9:30

F-1-3 RADICAL PAIR RECOMBINATION AS A PHYSICALLY-PLAUSIBLE MAGNETIC COUPLING SITE IN CELLS: EXPERIMENTAL TESTS. J. Walleczek, P.L. Miller, J.M. Tosk and W.R. Adey. Jerry L. Pettis Memorial Veterans Hospital, Loma Linda, CA 92357.

E-1-4 NEURAL MECHANISMS INVOLVED IN MICROWAVE-INDUCED DEFICIT IN RADIAL-ARM MAZE PERFORMANCE. H. Lai, A. Horita, A.W. Guy. Department of Pharmacology and Center for Bioengineering, University of Washington, Seattle, WA 98195.

9:45

F-1-4 THE LYMPHOCYTE CELL SURFACE AND MITOGEN BINDING DURING 60-Hz MAGNETIC FIELD EXPOSURES: QUANTITATIVE FITC-CON-A MEASUREMENTS. J.D. Harland*, D.E. Callahan, and R.P. Liburdy. Bioelectromagnetics Research Facility, Dept of Cell & Molecular Biology, Life Sciences Division, Lawrence Berkeley Laboratory, UC Berkeley, Berkeley, CA 94720.

Break and Exhibits

10:00

Break and Exhibits

E-1-5 BEHAVIOR OF RATS IN A RADIAL ARM MAZE DURING EXPOSURE TO MAGNETIC FIELDS: A TEST FOR ARTIFACT. R.H. Lovely, J.A. Creim*, D.L. Miller and L.E. Anderson. Pacific Northwest Laboratory, Richland, WA 99352.

10:30

F-1-5 MAGNETIC FIELD INDUCED ANOMALIES IN PLANARIA REGENERATION AT 60 HZ. K.A. Jenrow, C. Smith* and A.R. Liboff. Department of Physics, Oakland University, Rochester, MI 48309.

E-1-6 BEHAVIOR OF RATS IN A RADIAL ARM MAZE DURING EXPOSURE TO MAGNETIC FIELDS: EVIDENCE FOR EFFECTS OF MAGNESIUM ION RESONANCE. R.H. Lovely, J.A. Creim*, D.L. Miller and L.E. Anderson. Pacific Northwest Laboratory, Richland, WA 99352.

10:45

F-1-6 DEPENDENCE OF 60-HZ MAGNETIC FIELD STRENGTH ON COPROMOTION OF FOCUS FORMATION, *IN VITRO*. C.D. Cain, D.L. Thomas*, L. Jimenez*, R.A. Jones* and W. R. Adey. Jerry L. Pettis Memorial Veterans Administration Medical Center, Loma Linda, CA 92357.

E-1-7 MAGLEV-SPECTRUM MAGNETIC FIELDS DEPRESS CIRCADIAN PINEAL INDOLAMINE METABOLIC RHYTHMS IN RODENTS. K.R. Groh and P.M. Klingensmith*. Biological and Medical Research Division, Argonne National Laboratory, Argonne, IL 60439.

11:00

F-1-7 EFFECT OF INTERCELLULAR GAP JUNCTION IMPEDANCE ON THERMAL NOISE LIMITS FOR ELECTROMAGNETIC FIELD BIOEFFECTS A.A. Pilla, P.R. Nasser and J.J. Kaufman. Bioelectrochemistry Laboratory, Dept of Orthopaedics, Mount Sinai School of Medicine, New York, NY 10029.

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E-1-8 MELATONIN SUPPRESSION AND NOCTURNAL EXPOSURE TO 60-Hz MAGNETIC FIELDS IN HUMAN VOLUNTEERS. C. Graham, H.D. Cohen, M.R. Cook*, D.W. Riffle*, S.J. Hoffman* and M.M. Gerkovich*. Midwest Research Institute, Kansas City, MO 64110.

11:15

F-1-8 MICROWAVE RADIATION AND FREE RADICALS: FURTHER EVIDENCE FOR OXYGEN AND FREE RADICAL INVOLVEMENT IN LIPOSOME MEMBRANE SYSTEMS. R.P. Liburdy. Bioelectromagnetics Research Facility, Department of Cell & Molecular Biology, Life Sciences Division, Lawrence Berkeley Laboratory, UC Berkeley, Berkeley, CA 94720.

E-1-9 LOW INTENSITY 50-Hz MAGNETIC FIELD INFLUENCE Na AND K CONCENTRATIONS IN URINE OF RATS. N. Pekaric-Nadj, O. Hrubik*, and B. Lazetic*. Faculty of Technical Sciences, *Medical Faculty, Dept. of Physiology, 2100 Novi Sad, Vojvodina, Yugoslavia, EU.

11:30

F-1-9 A QUANTUM-MECHANICAL APPROACH TO ACOUSTIC EXPOSURE ON A CREVIX-ION SYSTEM. A. Chiabrera, B. Bianco*, E. Moggia* and T. Tommasi*. Department of Biophysical and Electronic Engineering, University of Genova, Via Opera Pia 11a, 16145 Genova, Italy.

E-1-10 LOCAL BLOCKADE DOESN'T INFLUENCE THE INDIRECT BIOEFFECTS OF MMWAVES. Li Jixi¹, Gao Yao*², Su Dezheng*² and Zhu Pengjiu*¹. ¹Electromagnetic Field Engineering Dept., Xidian University, Xi'an 710071, China; ²Research Lab 403-1, Fourth Military Medical University, Xi'an 710071, China.

11:45

DISCUSSION

E-1-11 EFFECTS OF WHOLE-BODY EXPOSURE TO 170MHz PULSED ELECTROMAGNETIC FIELD. Y.D. Dumansky, A.V. Gots, S.V. Bitkin, N.G. Nikitina, S.E. Chegrinets and Y.M. Spodobayev. Ukrainian Scientific Center of the Environmental Health, Kiev-94, Ukraine, 253660.

12:00

ANNUAL BUSINESS MEETING
12:15pm - 1:45pm Gold Room

INVITED PRESENTATION
2:00pm - 2:50pm Crystal Ballroom
A PRACTICAL GUIDE TO SHIELDING OF DC AND LOW FREQUENCY MAGNETIC FIELDS
Larry Maltin. Amuneal Manufacturing Corp., Philadelphia, PA 19124.
Moderator: Jamie Blanchard

POSTER SESSION B: P-37 to P-80
3:00pm - 4:15pm *Authors Present*
Emerald, Heinsbergen and Tiffany Rooms
Moderators: Arthur Rosen and Jerry Jacobson

CELLS

P-B-37 MAGNETIC FIELD INTERACTIONS WITH C6 GLIOMA CELLS: A COMBINED APPROACH OF DIGITAL IMAGE ANALYSIS OF INTRACELLULAR CALCIUM OSCILLATIONS AND PATCH-CLAMP RECORDINGS OF MEMBRANE CURRENTS. R.B. Stagg and W.R. Adey. Jerry L. Pettis Memorial VAMC, Loma Linda, CA 92357.

P-B-38 EFFECT OF PULSED AND SINE-WAVE ELECTRIC CURRENT ON THE PROLIFERATION OF HELA CELLS IN CULTURE. S. Tuffet¹, L-M. Liu², S.F. Cleary², G. Cao² and B. Veyret¹. ¹Laboratoire de Bioelectromagnetisme, Laboratoire PIOM, CNRS, ENSCPB, 33405 Talence, France. ²Physiology Dept, Medical College of Virginia, Richmond, VA 23298.

P-B-39 EFFECTS OF PULSED MAGNETIC FIELDS ON PROLACTIN RELEASE AND CYTOSOLIC Ca²⁺ CONCENTRATION IN RAT CLONAL PITUITARY CELLS (GH3) IN CULTURE. E. Barbier¹, B. Dufy¹, J-M. Moreau² and B. Veyret². ¹Laboratoire de Neurophysiologie, CNRS URA 1200, Universite Bordeaux II, 33076 Bordeaux Cedex, France; ²Laboratoire PIOM, CNRS URA 1506, ENSCPB, Universite Bordeaux I, 33405 Talence Cedex, France.

CALCIUM

P-B-40 INTRACELLULAR CALCIUM RESPONSE IN A T CELL LINE AFTER EXPOSURE TO ELF MAGNETIC FIELDS WITH VARIABLE FREQUENCIES. E. Lindstrom¹*, P. Lindstrom*, A. Berglund*, K.H. Mild and E. Lundgren*. ¹Dept of Cell & Molecular Biology, Umea Univ, S-901 87 Umea, Sweden.

P-B-41 EFFECTS OF 60-HZ ELECTRIC FIELD ON ATP-INDUCED CALCIUM TRANSIENTS OF HL-60 CELLS. Y.V. Kim, G. Cao, L-M. Liu and S.F. Cleary. Department of Physiology, Medical College of Virginia, Virginia Commonwealth University, Richmond, VA 23298.

P-B-42 FREQUENCY DEPENDENT ALTERATION OF ENOLASE ACTIVITY INDUCED BY ELF ELECTRIC, MAGNETIC AND ELECTROMAGNETIC FIELDS. A.S.M.I. Nazar and S.K. Dutta. Molecular Genetics Laboratory, Department of Biology, Howard University, Washington, DC 20059.

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BONE

P-B-43 INHIBITION OF PROTEIN KINASE C ACTIVITY IN BONE CELLS BY ONE-GAUSS, 60-Hz MAGNETIC FIELDS. R.A. Luben and D.P. Nguyen. Division of Biomedical Sciences and Dept of Biochemistry, University of California, Riverside, CA 92521.

P-B-44 TIME COURSE AND DOSE RESPONSE FACTORS IN THE MODULATION OF PROTEIN KINASE C ACTIVITY IN BONE CELLS BY 60-Hz, ONE-GAUSS MAGNETIC FIELDS. D.P. Nguyen, A. P. Morgan and R.A. Luben. Division of Biomedical Sciences and Dept of Biochemistry, University of California, Riverside, CA 92521.

GENETICS

P-B-45 EFFECTS OF LOW FREQUENCY ELECTROMAGNETIC FIELDS ON DNA TRANSCRIPTION IN HUMAN CELLS. J. Nafziger*, H. Desjobert*, M. Adolphe*, C. Larsen* and J. Lambrozo. Laboratoire d'Hematologie, U.F.R. des Sciences Pharmaceutiques et Biologiques -4, Avenue de l'Observatoire, 75006 Paris, France.

P-B-46 INFLUENCE OF A 60-Hz, 1-GAUSS MAGNETIC FIELD ON NEUROPEPTIDE Y GENE EXPRESSION. W.J. Thomas*^{1,2}, N. Bournias-Vardiabasis*¹, J.L. Phillips² and W.R. Adey². ¹Dept of Biology, California State University, San Bernardino; ²Jerry L. Pettis VA Medical Center, Loma Linda, CA.

P-B-47 C-MYC ONCOGENE EXPRESSIBILITY FOLLOWING EXPOSURES TO ELF AT DIFFERENT STRENGTHS AND MODES OF APPLIED FIELDS. E.M. Czerska¹ and C. Davis². ¹Division of Life Sciences, Office of Science and Technology, Center for Devices and Radiological Health, Rockville, MD 20857; ²Univ of Maryland Electrical Engineering Dept, College Park, MD 20742.

P-B-48 ELF MAGNETIC FIELDS INCREASE PHOSPHOINOSITIDE HYDROLYSIS. L.W. Cress*, D.P. Thomas* and M.L. Swicord. Center for Devices and Radiological Health, U.S. Food and Drug Administration, Rockville, MD 20857.

P-B-49 ALTERATION OF GENE EXPRESSION BY ELF FIELDS. J.D. Saffer and S.J. Thurston*. Department of Biology and Chemistry, Pacific Northwest Laboratory, Richland, WA 99352.

P-B-50 CHROMOSOMAL ABERRATIONS IN HUMAN AMNIOTIC CELLS AFTER EXPOSURE TO 50 Hz MAGNETIC FIELDS - MORE IS NOT WORSE! K.H. Mild, M-O. Mattsson, I. Nordenson, G. Andersson* and M. Sandstrom. Dept of Medical Genetics, Univ of Umea, and National Institute of Occupational Health, Umea, Sweden.

P-B-51 EVALUATION OF MUTAGENIC ACTIVITY OF STATIC AND TIME-VARYING MAGNETIC FIELDS. T. Koana* and M. Nakagawa. Magnetobiology Laboratory, Railway Technical Research Institute, Hikaricho 2-8-38, Kokubunji, Tokyo 185, Japan.

P-B-52 ENHANCED TRANSCRIPTION OF C-MYC, C-FOS, C-RAS, C-JUN, NEURON SPECIFIC ENOLASE, U6, AND rRNA GENES BY 915 MHz, CW 0.1 W/kg SAR MICROWAVE RADIATION REQUIRES DE NOVO RNA SYNTHESIS. S.K. Dutta¹ and M. Verma². ¹Molecular Genetics Laboratory, Department of Biology and Cancer Research Center, Howard University, Washington, DC 20059; ²Department of Biochemistry, Georgetown University Medical Center, Washington, DC 20007.

NERVOUS SYSTEM

P-B-53 INTERACTION OF NERVE GROWTH FACTOR AND PEMF: THE NON-DEPENDENCE OF PULSE FREQUENCY ON NEURITE OUTGROWTH FROM DORSAL ROOT GANGLIA. C.H. Sutton¹, M.S. Vadula¹, B. Greenebaum², B.F. Siskin³, J.H. Battocletti*¹, T. Swiontek*¹ and J. DeKeyser*¹. ¹Dept. of Neurosurgery, Medical College of Wisconsin and Research Service, VA Med. Center, Milwaukee WI 53295; ²BRI, Univ. of Wis.-Parkside, Kenosha WI 53141; ³Dept. of Anatomy, Univ of Kentucky, Lexington, KY 40506.

P-B-54 INCREASED FUNCTIONAL RECOVERY IN CRUSHED RAT SCIATIC NERVE USING PULSED ELECTROMAGNETIC FIELDS. P.P. Resig¹, J.L. Walker², J. Evans^{1*}, B.F. Siskin^{1,3}. ¹Center for Biomedical Engineering, ²Division of Orthopaedic Surgery, ³Department of Anatomy and Neurobiology, University of Kentucky, Lexington, KY 40506.

P-B-55 SPATIO-TEMPORAL DYNAMICS OF HUMAN CORTICAL EEG DURING SOMATOSENSORY PERCEPTION. C. Barczys¹ and W.J. Freeman^{2*}. ¹Biophysics Graduate Group, ²Neurobiology Division, Univ of California at Berkeley, Berkeley, CA 94720.

P-B-56 MODULATION OF SPONTANEOUS SPIKE-ACTIVITY EVOKED BY ELF FIELDS IN NEURONS OF HELIX POMATIA. J. Brix* and R. Matthes*. Institute for Radiation Hygiene, Federal Office for Radiation Protection, D-8042 Neuherberg, Germany.

CANCER

P-B-57 PROGRESSION OF LEUKEMIA IN YOUNG RATS RECEIVING LARGE GRANULAR LYMPHOCYTIC CELL TRANSPLANTS. L.B. Sasser, J.E. Morris*, G.E. Dagle* and L.E. Anderson. Battelle, Pacific Northwest Laboratories, Richland, WA 99352.

P-B-58 INTRACELLULAR CALCIUM SIGNALING BY T-LYMPHOCYTES EXPOSED TO 60-Hz MAGNETIC FIELDS. D.B. Lyle, L.A. Rosen, T.A. Fuchs and M.L. Swicord. CDRH, Food and Drug Administration, Rockville, MD 20857.

P-B-59 ORNITHINE DECARBOXYLASE ACTIVITY IN PANCREATIC CANCER CELLS EXPOSED TO 60-Hz MAGNETIC FIELDS. B.K. Chang¹ and W.W. Shelton². ¹Dept. of Medicine, Medical College of Georgia and VA Medical Center, Augusta, GA; ²Bioelectromagnetics Laboratory, Georgia Institute of Technology, Atlanta, GA.

P-B-60 THE EFFECT OF MAGNETIC FIELDS ON TUMOR CO-PROMOTION IN SENECAR MOUSE SKIN. J.R.N. McLean, A. Thansandote, D.W. Lecuyer*, C. Davidson*, M.J. Goddard* and R. Burnett*. Bureau of Radiation and Medical Devices & Biostatistics and Computer Applications Division, Health and Welfare Canada, Ottawa, Ontario K1A 1C1, Canada.

P-B-61 LIFE SPAN EXPOSURE TEST OF RATS TO 50-Hz SINUSOIDAL ALTERNATING MAGNETIC FIELDS. II. (CHRONIC CARCINOGENICITY EVALUATION.) M. Yasui*¹, T. Kikuchi*¹, M. Ogawa*¹, Y. Otaka², M. Tsuchitani² and H. Iwata*². ¹Engineering Development Center, Tokyo Electric Power Co., Tokyo 100, Japan; ²Mitsubishi Kasei Institute of Toxicological and Environmental Sciences, Ibaraki 314-02, Japan.

REPRODUCTION

P-B-62 NO SIGNIFICANT INCREASE IN STRUCTURAL ANOMALIES IN ZEBRA FISH EMBRYOS EXPOSED TO TIME VARYING MAGNETIC FIELD. T.M. Davidson*, I. Engen* and A.I. Vistnes. Biophysics Department, Institute of Physics, University of Oslo, Oslo, Norway.

P-B-63 REPRODUCTIVE TEST OF PARENTAL AND PRENATAL EXPOSURE OF ICR MICE TO 50-Hz SINUSOIDAL ALTERNATING MAGNETIC FIELDS. M. Yasui*¹, M. Ogawa*¹, Y. Otaka², F. Mizuno*² and T. Sato*². ¹Engineering Development Center, Tokyo Electric Power Co., Tokyo 100, Japan; ²Mitsubishi Kasei Institute of Toxicological and Environmental Sciences, Ibaraki 314-02, Japan.

BEHAVIOR

P-B-64 FAILURE TO GENERALIZE PERFORMANCE DECREMENTS IN A RADIAL ARM MAZE IN RATS EXPOSED TO A 0.5 G, 60-HZ PULSED MAGNETIC FIELD. J.A. Creim*, R.H. Lovely, D.L. Miller, B.W. Wilson and L.E. Anderson. Pacific Northwest Laboratory, Richland, WA 99352.

P-B-65 ABSENCE OF BEHAVIORAL AROUSAL IN RABBITS SUBJECTED TO A CRANIAL PULSED MICROWAVE TREATMENT. S-T. Lu, C.S. Gambrell* and E.C. Elson. Ogden BioServices Corporation, Gaithersburg, MD 20879. Department of Microwave Research, Walter Reed Army Institute of Research, Washington, DC 20307.

P-B-66 AUTOMATED MEASUREMENTS OF THE MICROWAVE-EVOKED WHOLE-BODY MOVEMENT. B. Akyel*¹, T.G. Raslear*², Y. Akyel*¹, R.L. Seaman³, S.-T. Lu¹, M. DeAngelis*¹, S. Pournagash*² and M. Belt*¹. ¹Ogden BioServices Corporation, Gaithersburg, MD 20879; ²WRAIR, Department of Microwave Research, Washington, DC 20307; ³Louisiana Tech University, Ruston, LA.

P-B-67 PROJECT OF SCHEDULE-CONTROLLED BEHAVIOR TESTS IN RATS AFTER PRENATAL EXPOSURE TO ELECTROMAGNETIC FIELDS. M. Bornhausen¹, R. Matthes² and H. Greim¹. ¹Institute of Toxicology, GSF-Forschungszentrum für Umwelt und Gesundheit; ²Institute of Radiation Hygiene, Bundesamt für Strahlenschutz, D-8042 München-Neuherberg, Germany.

P-B-68 INHIBITION OF NITRIC OXIDE SYNTHESIS DURING HYPOTENSION INDUCED BY 35-GHz RADIOFREQUENCY IRRADIATION OF ANESTHETIZED RATS. K.L. Ryan*, M.R. Frei, R.E. Berger* and J.R. Jauchem*. Dept. of Biology, Trinity University, San Antonio, TX 78212; Radiofrequency Radiation Division, Armstrong Laboratory, Brooks AFB, TX 78235; Operational Technologies Corp., San Antonio, TX 78229.

P-B-69 BLOOD CLINICAL CHEMISTRY AND HEMATOLOGY MEASUREMENTS OF BABOONS EXPOSED TO 60-Hz ELECTRIC AND MAGNETIC FIELDS. W.R. Rogers, H.D. Smith and J.L. Orr. South-west Research Institute, San Antonio, TX 78228-0510.

P-B-70 EXPOSURE OF SHEEP TO WHOLE BODY EMF REDUCES *IN VITRO* PRODUCTION OF THE IMMUNOREGULATORY CYTOKINE INTERLEUKIN 1. A.C. Freed*¹, S.L. McCoy*¹, B.E. Ogden*², A.S. Hall*², J. Lee³ and S.H. Hefeneider*¹. ¹Department of Immunology, Portland VA Medical Center; ²Department of Animal Care, Oregon Health Sciences University; ³Bonneville Power Administration, Portland, OR 97201.

P-B-71 HUMAN ENDOGENOUS 60-HERTZ B-FIELD. J.A. Bergeron. GE Corporate Research and Development, Schenectady, NY 12301.

P-B-72 PLANT GROWTH DEPENDS ON STATIC MAGNETIC FIELD. R.S. Brady*, A.I. Vistnes and A. Johnsson. Institute of Physics, University of Oslo, Oslo, Norway.

P-B-73 50-Hz ELECTRIC FIELD EXPOSURES AND ORGAN LIPID PEROXIDATION *IN VIVO*. I. Nishimura. Biology Department, Abiko Research Laboratory, Central Research Institute of Electric Power Industry, 1646 Abiko, Abiko, Chiba 270-11, Japan.

P-B-74 INCIDENCE OF 10 AND 500 HERTZ ELF MAGNETIC FIELD ON DIGESTIVE TRANSIT IN MICE. R. Santini. National Institute of Applied Sciences (INSA) Bat. 406, 20 av. A. Einstein, 69621 Villeurbanne Cedex, France.

P-B-75 INTERNAL VISION BROUGHT OUT BY LOW FREQUENCY FIELD. Yin Rui*, Chen Ying* and C.K. Zhou¹. Research Center of BME, Beijing University of Aeronautics and Astronautics, Beijing 100083, P.R. China; ¹Department of Radiation Research, National Medical Center.

P-B-76 PROGRESS OF ELECTRO-CHEMICAL THERAPY OF MALIGNANT TUMORS IN CHINA. Xin Yu-ling*. Department of Thoracic Surgery, China-Japan Friendship Hospital, Beijing, 100029, P.R. China.

P-B-77 AN ELECTROMAGNETIC EXPOSURE CHAMBER TO STUDY BIOLOGICAL EFFECTS ON EXPOSED COWS. D.H. Nguyen¹, L. Richard¹, E. Block² and J. Burchard². ¹Institut de recherche d'Hydro-Quebec (IREQ), Varennes; ²McGill University, Montreal, Quebec, Canada.

P-B-78 AFFECT OF EMF /50 Hz/ TO METABOLISM HUMORAL REGULATION STATE IN A HUMAN'S ORGANISM. L.A. Tomashevskaya. Ukrainian State Medical Center of the Environmental Health, Kiev-94, 253 660, Ukraine.

P-B-79 POPULATION'S MORBIDITY UNDER THE AFFECT OF EXTREMELY HIGH ELECTROMAGNETIC IRRADIATION. N.G. Nikitina. Ukrainian Scientific Center of the Environmental Health, 253 660, Kiev-94, Ukraine.

P-B-80 THE SEXUAL FUNCTION STATE OF 750 kV STATION PERSONNEL. L.G. Andrienko. Ukrainian Scientific Centre of the Environmental Health, Kiev-94, Ukraine 253660.

**RESEARCH NEWS DISCUSSION #3
EUROPEAN BIOELECTRO-
MAGNETICS RESEARCH
CENTER DEVELOPMENT
4:15pm - 5:15pm Gold Room
Moderator: Carl Blackman
Co-sponsor: European
Bioelectromagnetics Association**

**INTRODUCTION TO THE RESEARCH
CENTER.** Bernard Veyret

DISCUSSION

**RESEARCH NEWS DISCUSSION #4
THE SWEDISH EPIDEMIOLOGY
STUDIES AND THEIR
IMPLICATIONS
5:20pm - 6:15pm Gold Room
Moderator: Kjell Mild
Co-sponsor: European
Bioelectromagnetics Association**

OVERVIEW OF THE STUDIES

DISCUSSION

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THURSDAY, JUNE 17

INVITED PRESENTATION
7:00am - 7:50am Crystal Ballroom
TISSUE ELECTROPORATION FOR CANCER
TUMOR THERAPY: ISSUES AND PROSPECTS.
J.C. Weaver, Harvard-MIT Division of Health Sciences and Technology,
Massachusetts Institute of Technology, Cambridge, MA 02139.
Moderator: Eleanor Adair

SESSION G-1: CANCER
8:00am - 8:45am Gold Room
Moderator: Joseph Salvatore and Vincent Tomaselli

SESSION H-1: CELLS, ENZYMES AND BONE
8:00am - 12:15am Crystal Ballroom
Moderators: Ken McLeod and Stephen Cleary

G-1-1 MAGNETIC FIELDS, HUMAN BREAST CANCER GROWTH, AND MELATONIN: 60-Hz MAGNETIC FIELDS BLOCK MELATONIN'S ONCOSTATIC ACTION ON MCF-7 CELL GROWTH. R.P. Liburdy¹, T.S. Sloma¹ and P. Yaswen*. ¹Bioelectromagnetics Research Facility, Department of Cell & Molecular Biology, Life Sciences Division, Lawrence Berkeley Laboratory, UC Berkeley, Berkeley, CA 94720.

8:00

H-1-1 EFFECT OF RADIOFREQUENCY RADIATION ON SYNCHRONIZED CHO CELLS *IN VITRO*. G. Cao, L-M. Liu and S.F. Cleary. Physiology Department Medical College of Virginia, Virginia Commonwealth University, Richmond, VA 23298.

G-1-2 EXPOSURE OF RATS TO A 50-Hz, 100 μ T MAGNETIC FIELD INCREASES THE INCIDENCE OF MAMMARY TUMORS IN A DMBA-MODEL OF BREAST CANCER. M. Mevissen*, W. Loscher*, A. Weismann* and A. Stamm. Dept of Pharmacology, Toxicology, and Pharmacy, School of Veterinary Medicine, Hannover, and Dept of High Voltage Engineering, Technical University, Braunschweig, Germany.

8:15

H-1-2 COMBINED AC/DC MAGNETIC FIELDS INCREASE CELL PROLIFERATION DEPENDENT ON INSULIN-LIKE GROWTH FACTOR II SYNTHESIS AND RECEPTOR NUMBER. R.J. Fitzsimmons*, J.T. Ryaby¹, F.P. Magee¹ and D.J. Baylink*. Mineral Metabolism 151, Jerry L. Pettis VA Hospital, Loma Linda, CA 92357; ¹OrthoLogic Corp., Phoenix, AZ.

G-1-3 FOCUSING OF COSMIC RAYS, MAY THIS PARTLY EXPLAIN INCREASED CHILD CANCER RISK NEAR POWER LINES? A.I. Vistnes. Inst. of Physics, University of Oslo, Norway.

8:30

H-1-3 EXTREMELY LOW FREQUENCY MAGNETIC FIELDS: THE EFFECTS OF STATIC AND 50-Hz SINUSOIDAL FIELDS ON CELL MEMBRANES. M.T. Santini*, S. Paradisi*, E. Straface*, C. Cametti*, G. Donelli*, M. Grandolfo, P.L. Indovina* and W. Malorni*. Laboratori di Fisica ed Ultrastruttura, Istituto Superiore di Sanita, Viale Regina Elena 299, 00161 Rome, Italy.

SESSION G-2: MEDICAL APPLICATIONS
8:45am - 9:45am Gold Room
Moderators: Carl Sutton and Andrew Bassett
Co-sponsor: Bioelectrical Repair and Growth Society

G-2-1 TREATMENT OF CHILDREN'S RECURRENT RESPIRATORY INFECTIONS THROUGH PULSED MAGNETIC FIELDS. A. Bellossi¹ and R. Berget^{2*}. ¹Laboratoire de Biophysique, Faculte de Medecine, 2 Av. du Pt. L. Bernard 35043 Rennes; ²Locmine, France.

8:45

H-1-4 ORNITHINE DECARBOXYLASE ACTIVITY AND POLYAMINE LEVELS IN CELL LINES EXPOSED TO A 50-Hz SINE-WAVE MAGNETIC FIELD. M-O. Mattsson¹, K.H. Mild² and Ulrica Rehnholm^{*1}. ¹Dept. of Cellular and Developmental Biology, Univ. of Umea, S-901 87 Umea; ²National Institute of Occupational Health, S-907 13 Umea, Sweden.

G-2-2 GOLD CONCENTRATION IN SOLID MURINE TUMORS AFTER ELECTROTHERAPY BY DIRECT CURRENT DELIVERED VIA GOLD NEEDLE ELECTRODES. D. Miklavcic*, A. Fajgelj*, D. Konda*, L. Vodovnik* and G. Sersa*. Univ of Ljubljana, Faculty of Electrical and Computer Engineering, Trzaska 25, 61000 Ljubljana, Slovenia.

9:00

H-1-5 ELIMINATION OF 60-Hz MAGNETIC FIELD-INDUCED ENHANCEMENT OF ORNITHINE DECARBOXYLASE ACTIVITY IN CULTURED CELLS BY SIMULTANEOUS APPLICATION OF A RANDOM NOISE FIELD. J.M. Mullins, D. Krause, A. Desta* and T.A. Litovitz. Departments of Biology and Physics, The Catholic University of America, Washington, DC 20064.

G-2-3 CLINICAL EFFECTS OF LOW ENERGY EMISSION THERAPY. C. Guilleminault* and Boris Pasche. Stanford Sleep Disorder Center, Stanford University, Palo Alto, CA-94304; Symtonic Inc., USA, and Dept of Medicine, The New York Hospital-Cornell Medical Center, New York, NY 10021.

9:15

H-1-6 SUPERIMPOSING ELECTROMAGNETIC NOISE BLOCKS THE ALTERATION OF ORNITHINE DECARBOXYLASE ACTIVITY IN DEVELOPING CHICK EMBRYOS CAUSED BY A WEAK 60-Hz SINUSOIDAL FIELD. T.A. Litovitz, J.M. Farrell*, D. Krause, P. Doinov* and C.J. Montrose. Depts of Physics and Biology, The Catholic University of America, Washington, DC 20064.

G-2-4 PINEAL-HYPOTHALAMIC TRACT MEDIATION OF PICOTESLA MAGNETIC FIELDS IN THE TREATMENT OF NEUROLOGICAL DISORDERS. J.I. Jacobson. Alzheimer's Research Foundation, Jupiter, FL 33477.

9:30

H-1-7 TIME DEPENDENT EFFECTS OF 60-Hz MAGNETIC FIELD EXPOSURE ON PDGF-STIMULATED ORNITHINE DECARBOXYLASE ACTIVITY IN C3H/10T1/2 CELLS. C.D. Cain, D. Dong*, D.L. Thomas and W.R. Adey. Jerry L. Pettis Memorial Veterans Administration Medical Center, Loma Linda, CA 92357.

THURSDAY

SESSION G-3: EPIDEMIOLOGY

10:15am - 12:15pm Gold Room

Moderators: Ruth Douglas-Miller and Vincent Delpizzo

G-3-1 A NESTED CASE-CONTROL STUDY OF LEUKAEMIA AND BRAIN TUMOURS IN NORWEGIAN RAILWAY WORKERS. T. Tynes¹, H. Jynge² and A.I. Vistnes³. ¹Cancer Registry of Norway; ²Norwegian State Railways; ³University of Oslo.

G-3-2 EXPOSURES TO ELF MAGNETIC FIELDS, ELECTRIC FIELDS AND CHEMICALS IN "ELECTRICAL" OCCUPATIONS AND THE RISK OF LEUKEMIA. J.D. Bowman, E. Sobel*, S.J. London*, D.C. Thomas*, D.H. Garabrant*, N. Pearce* and J.M. Peters*. Department of Preventive Medicine, University of Southern California, Los Angeles, CA 90033.

G-3-3 THE EFFECT OF MISCLASSIFICATION OF EXPOSURE ON THE STATISTICAL POWER OF EPIDEMIOLOGICAL STUDIES OF MAGNETIC FIELD EXPOSURE AND CANCER. V. Delpizzo and Joanna L Borghesi*¹. Australian Radiation Laboratory and ¹Department of Community Medicine, University of Melbourne, Australia.

G-3-4 AN EPIDEMIOLOGICAL WINDOW DUE TO SCARCITY OF DATA. C.H. Shih. American Electric Power Service Corporation, Columbus, OH 43215.

G-3-5 A CRITICAL REVIEW OF THE EPIDEMIOLOGIC LITERATURE ON 50/60-HZ ELECTRIC AND MAGNETIC FIELDS AND HUMAN CANCER. R. Douglas-Miller¹, J.S. Neuberger*² and K.B. Gerald*³. ¹Department of Electrical and Computer Engineering, Kansas State University, Manhattan, KS 66506-5105; ²Department of Preventive Medicine, University of Kansas Medical Center, Kansas City, KS 66160-7313; ³Department of Statistics, Marion Merrell Dow Inc., Kansas City, MO 64134-0627.

G-3-6 HEALTH STATE; PHYSICAL DEVELOPMENT AND MORBIDITY OF ORGANIZED CHILDREN POPULATION SEGMENTS LIVING IN THE VICINITY OF TV - STATIONS. I.I. Karachev. Ukrainian State Medical Center of the Environmental Health, Popudrenko Street 50, Kiev - 94, 253 660, Ukraine.

G-3-7 50-Hz ELECTROMAGNETIC FIELD EFFECTS ON THE FUNCTIONAL STATE OF HUMAN ORGANISM. A.W. Serdiuk, N.G. Nikitina, A.L. Smolia and M.I. Miziuk. Ukrainian Scientific Centre of the Environmental Health, Kiev-94, Ukraine 253660.

G-3-8 CARDIOVASCULAR SYSTEM'S FUNCTIONAL DISTURBANCES IN 750 kV OPEN CURRENT DISTRIBUTORS' (OCB) STAFF. I.S. Bezdolnaya. Ukrainian Scientific Centre of the Environmental Health, Kiev-94, Ukraine 253660.

SESSION H-1 (Continued)

10:15am- 12:15pm Crystal Ballroom

Moderators: Ken McLeod and Stephen Cleary

10:15

H-1-8 THE ACTION OF ALTERNATING CURRENTS OF DIFFERENT FREQUENCIES UPON CYCLIC AMP AND CELL PROLIFERATION. G. Knedlitschek*, M. Noszvai-Nagy*, H. Dertinger* and J. Schimmelpfeng. Institute of Toxicology, Nuclear Research Centre, 7500 Karlsruhe, Germany.

10:30

H-1-9 WEAK STATIC MAGNETIC FIELD AFFECTS MYOSIN PHOSPHORYLATION IN A CELL-FREE PREPARATION. M.S. Markov and A.A. Pilla. Bioelectrochemistry Laboratory, Dept of Orthopaedics, Mount Sinai School of Medicine, New York, NY 10029.

10:45

H-1-10 HOW THE PRESENCE OF CELLS CHANGES THE INDUCED CURRENT DISTRIBUTION IN CULTURE DISHES. F.X. Hart. Dept of Physics, The University of the South, Sewanee, TN 37375-1000.

11:00

H-1-11 DIFFERENTIAL EFFECTS OF NORMAL AND TANGENTIAL ELF ELECTRIC FIELD EXPOSURE ON BONE CELLS (ROS 17/2.8) GROWING IN MONOLAYER. K.J. McLeod and F. Guilak*. Musculo-Skeletal Research Laboratory, Dept of Orthopaedics, State Univ of New York at Stony Brook, NY 11794-8181.

11:15

H-1-12 TIME, DOSE AND INTERMITTENCY OPTIMA ("WINDOWS") IN THE RESPONSES OF PARATHYROID HORMONE AND ISOPROTERENOL RECEPTORS IN BONE CELLS TO LOW ENERGY ELECTROMAGNETIC FIELDS. R.A. Luben, A.P. Morgan, A. Carlson, D.P. Nguyen and M. Duong. Division of Biomedical Sciences and Dept of Biochemistry, University of California, Riverside, CA 92521.

11:30

H-1-13 THE EFFECTS OF PULSED ELECTROMAGNETIC FIELD (PEMF) STIMULATION ON FRESH FRACTURE HEALING IN THE RABBIT MODEL. J.T. Baker*, D.C. Fredericks*, J. Abbott, R. Aper*, T. Brown* and J.V. Nepola*. Bone Healing Laboratory, Dept of Orthopaedics, Univ of Iowa Hospital and Clinics, Iowa City, IA 52242.

11:45

H-1-14 EFFECTS OF COMBINED AC/DC MAGNETIC FIELDS ON THE PREVENTION OF OSTEOPENIA IN THE RAT SKELETON. J.T. Ryaby, R.J. Fitzsimmons*¹, F.P. Magee and D.J. Baylink*¹. OrthoLogic Corp, Phoenix, AZ 85034; ¹Mineral Metabolism 151, Jerry L. Pettis VA Hospital, Loma Linda, CA 92357.

12:00

H-1-15 PEMF AND ULTRASOUND ACCELERATE BONE REPAIR IN A RABBIT OSTEOTOMY MODEL: A UNIFIED WOLFF'S LAW EFFECT? A.A. Pilla, P.R. Nasser and J.J. Kaufman. Bioelectrochemistry Laboratory, Dept of Orthopaedics, Mount Sinai School of Medicine, New York, NY 10029

12:15

STUDENT AWARD PRESENTATION

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