**DEPARTMENT OF THE AIR FORCE**
**Air Force Research Laboratory**

**WORLD HEALTH ORGANIZATION COLLABORATING CENTER**
**on the Biological Effects of Electromagnetic Radiation**

**International Advisory Committee**
**June 7-9 2006**

**Expert Support to WHO Activities:**

**WHO Oversight Committee for the International Bordeaux-Moscow Project**

- Dr. Sypniewski (AFRL/HEDR – General Dynamics) was invited to Bordeaux (France) for a site visit on November 3-4, 2005, as a member of an external WHO Oversight Committee for the International Bordeaux-Moscow Project titled: "Confirmation Studies of the Russian Data on Immunological Effects of Microwaves".
- During the meeting, the plan of the proposed research was presented by French and Russian scientists and a tour of the research facility was provided to the members of the Oversight Committee. The details of the protocol were discussed and a few changes were made when a consensus was reached. The decision was made, to make a similar site visit and presentations in Moscow at a later date.

**WHO Workshop on Radio Frequency Dosimetry in Moscow**

- While attending the WHO Workshop on Radio Frequency Dosimetry in Moscow, December 5-7, 2005, Dr. Sypniewski and Dr. Mason joined the WHO Oversight Committee on a tour of Russian laboratories including exposure chambers, animal facilities and chemistry and immunology labs involved in the International Bordeaux-Moscow Project. The remaining details of the protocol were discussed by all scientists involved and after a compromise was reached some small changes were included in the grant proposal.

**Research Activities:**

**Air Force Research Laboratory "Blood Brain Barrier" study**

- In response to reports out of Sweden that low levels of 915MHz radiation causes neuronal damage, a validation study was conducted at the Radiofrequency Radiation Branch of the Air Force Research Laboratory (AFRL/HEDR). In this study, rats were exposed to 915 MHz Global System for Mobile Communications (GSM) energy at SAR's of 0.002, 0.02, 0.2, or 2.0 W/kg for 120 minutes in either a transverse electromagnetic (TEM) cell or a circular waveguide. An additional group of rats was exposed at SAR of 20 W/kg for 30 minutes in the TEM cell. Both sham and home cage negative controls were included in the study. Following exposure, rats were sacrificed after either 14 or 50 days, the brains were removed and histology was performed. To examine the brain sections for neurodegeneration, hematoxylin & eosin (H&E) and Fluoro-Jade stains were performed. No neuronal damage was observed in any of the exposure groups. Neuronal damage was only observed in the positive control animals, which were injected with 12 mg/kg kainic acid, i.p. and survived for 2, 14 or 50 days.

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**Terahertz**

- The Terahertz (THz) region of the electromagnetic spectrum (0.3 THz-30 THz) lies between the millimeter wave and optic regions. Due to advances in technology, systems and applications in the THz region are currently being rapidly developed while the knowledge of the safety margins and bioeffects is minimal. To address these concerns, AFRL/HED has established a group to study the safety margins for THz emissions. Thus far, modeling work that utilizes both radiofrequency models and laser models has been performed to establish theoretical skin damage thresholds. A Memorandum of Understanding (MOU) with DOE at Jefferson Laboratory in Newport News, VA will allow AFRL/HED scientists to validate this theoretical work by providing access to the most powerful THz source in the world.

**Health and Safety Publications:**

- Jauchem JR, The role of autacoids and the autonomic nervous system in cardiovascular responses to radio-frequency-energy heating [Invited review], Autonomic and Autacoid Pharmacology 26:121-140, 2006.
- Jauchem JR, Cook MC, The potential use of high-intensity acoustics for military and law-enforcement non-lethal applications, Military Psychology, submitted.
- Draft was completed of the following: Jauchem JR, Effects of radio-frequency energy on the human reproductive, immune, and cardiovascular systems: A review of the recent (1998-2004) literature, International Archives of Occupational and Environmental Health, in preparation.

**Standards Setting Activities:**

- Provided technical support to the revision of the IEEE C95.1 2005; 19 April 2006.
- As the Standardization Function of the DoD Radio Frequency Radiation Working Group is working to update the DoD RF safety instructions.
- Continued over 20 years as technical expert to the NATO Standardization Agency Medical Standardization Working Group (previously General Medical WG) and liaison from NATO MedSTDs WG to WHO EMF Project. AFRL/HEDR was appointed Custodian of Standardization Agreement 2345: "Evaluation and Control of Personnel Exposure to Radio Frequency Fields – 3kHz to 300 GHz" (CU:US) Ref: NSA(ARMY)0120-MED/2345: 13 Feb 2003. NATO STANAGs must be reviewed and reaffirmed or revised every three years. AFRL/HEDR has led three international meetings reviewing the STANAG in comparison to new international standards Directive 2004/40/EC which is based on the ICNIRP guidelines and the new IEEE ICES C95.1. Meetings were held in London 30 Aug – 1 Sep 2005, San Antonio 10-11 January 2006, and Bremerhaven, Germany 24-25 April 2006. Nations responses to a questionnaire on impacts of the EU Directive and the IEEE C95.1 standards on military operations and missions were reviewed. Reductions in permissible contact current limits were identified as having the greatest impacts requiring reductions in communication range especially on shipboard operations including man overboard rescue scenarios and crane operations with use of VHF and HF whip antennas. Mitigation strategies including use of time averaging are being assessed. The Bremerhaven meeting concluded that that STANAG 2345 would continue as a minimal safety standard allowing each Nation to institute more restrictive National standards, thereby meeting the minimal guideline while facilitating interoperability and ensuring personnel safety. A report on the proposed changes will be delivered to the NATO Medical Standards Working Group 20 June 2006.

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