**GAZİ BIOPHYSICS DEPARTMENT**
**GAZİ NON-IONIZING RADIATION PROTECTION CENTER – GNRK**

**TURKEY'S NATIONAL REPORT 2007**

## *ACTIVITIES ON EMF*

### *EMF Education Activities on EMF*

Gazi Biophysics Education Program on EMF and health effects has been giving to Medical Faculty students since 2001. Graduate programs on EMF -Master of Science and Doctorate- have been done since 1999. In 2006, one MSc and one doctorate student registered to these programs.

### *Gazi Non-Ionizing Radiation Protection Center (GNRK) Activities*

GNRK has been working on electromagnetic field measurements and counseling activities about Non-Ionizing Radiation (NIR) since 2005. In 2007, more than 15 measurement reports related to occupational exposure from industrial applications of NIR, residential exposure from base stations and High Power Lines are given to individuals and companies upon request. Since GNRK founded, totally 56 EM field measurements were realized due to personnel and/or institutional requests, 12 of them were done as expertise and their reports aimed at health and biological effects were prepared.

### *Organizations by GNRK*

GNRK had organized the first occupational health and safety (OHS) seminar in Ankara whose goal is to start the framework study on the legislations about occupational health and safety. It was **"Risk Evaluation in Occupational Health & Safety Seminar and Training"** and held on May 12, 2007 with the supports from Ministry of Labour and Social Security, Atılım University, Chamber of Mechanical Engineers, Chamber of Chemical Engineers, Chambers of Physicians in Ankara. GNRK aims to "Contribute to developing and forming national standards for occupational exposure to electromagnetic radiation". Workplace physicians, occupational safety experts, legal entities, people from industry came together in this seminar.

NATO Research and Technology Agency (RTA) has accepted the Gazi Bipohysics' request for two experts visit to GNRK to give seminars on "EMF Exposure Systems for in vivo, in vitro & Volunteer Studies, SAR Stimulation & Calculations". Within this frame, Prof. Dr. Niels Kuster ve Dr. Andreas Bitz will be in Gazi Biophysics seperately for 5 day-seminar on October and November.

### *Project Submissions to EU – FP7 on EMF*

**FP7 proposal of GNRK on Enlarging scientific and technological research & measurement capabilities of Gazi Non-Ionizing Radiation Protection Center (GNRK) was submitted to FP-INFRASTRUCTURES-2007-01.**

With this project, GNRK will

- enlarge the measurement and research capabilities by establishing ELF&RF anechoic rooms which will enable performing researches according to international standards.
- strengthen the scientific view of GNRK by sharing knowledge with invited EU scientists.
- arrange meetings in order to get researchers together working on EMF with Turkish colleagues by inviting EU scientists to GNRK, extraction of medical and technical
- contents from the relevant scientific publications in the knowledge-based literature database and know-how of information in seminars.
- provide a framework for the coordination and collaboration with European and Turkish scientists on the results of the EMF studies, considering both laboratory and epidemiological researches.
- discuss precautionary approach on EMF issues in cooperation with other centers.

### *Assessing the EM POLLUTION MAP Project*

GNRK EM Pollution Map Project is aiming to provide high quality EMF investigations and measurements, especially for the public concerned about the EMF levels at their property. Electromagnetic field measurements will be presented around the vicinity of overhead power lines and base stations located in residential areas of Ankara. First stage of the study has been done in Çayyolu, west part of the city. It is planned to extent it all over Turkey and constitute the EM Pollution maps for towns. In that respect, the study will be helpful in establishing more precise boundaries to regions around base stations and transformers.

## *General Research Activities Related to EMF Health Issues*

In Turkey, researches about health and biological effects, dosimetry and exposure assessment to EMF is performed in universities and research centers. Some of them are Istanbul University (Istanbul), Cumhuriyet University (Sivas), Dicle University (Diyarbakır), 19 Mayıs University (Samsun), Çukurova University (Adana). Corresponding results by several groups are published in scientific journals, magazines and presented in conferences.

The research topics are categorized as Epidemiological studies, Studies on biological systems, Engineering studies, Field measurements and monitoring of electromagnetic radiation

Biophysics Department of Gazi University Faculty of Medicine is leader on the studies of biological and health effects of EMF and exposure standards. Studies of Gazi Biophysics are summarized below:

- Cooperated studies with Telecommunication Authority, Turkish Standards Institution (TSE), Ministry of Health, Ministry of Energy, Ministry of Labor & Social Security and Ministry of Environment and Forestry.
- Animal studies for analyzing several biochemical parameters such as oxidative stress, antioxidants, natural killer cell activity, tissue levels of hydroxyproline etc. continue. Study on the Effects of RFR on permeability of Blood Brain Barrier (BBB) has been recently finished.
- In addition to the epidemiologic study done in 2005 which was published with the title; **"**The Prevalence of Cellular Phone Usage in Turkish Secondary and High School Students" in European Biology and Bioelectromagnetics, another survey among children using mobile phone is planned.
- SAR and current density is being evaluated in human models with different size and electrical properties of tissues for ELF and RF radiation. The study is being funded by Gazi University.
- Simulation of RF exposure from mobile phones with Semcad X RF simulation software, MRI based two phantoms and SAM phantom is being studied.
- Research studies on investigating Collagen synthesis; radical synthesis and antioxidant enzyme levels of male guineapigs under the effects of mobile phone with 0.81 W/kg SAR operating in the frequency band of 1800 MHz and the influence of the antioxidants, NAC and EGCG on the oxidative effects resulted by mobile phone exposure are completed.
- Effects of RF radiation on pregnant rabbits and their offspring will be evaluated in the "Ocular Effects of Radio Frequency Fields" Project funded by Gazi University Scientific Research Council. In content of this project, it is aimed to analyze radical synthesis and antioxidant enzyme levels of pregnant rabbits and their offspring by biochemical and pathological methods. Results might be used in adopting special approach to the protection of pregnants.
- The main issues of EMF concern appear to be the health effects from base stations, mobile phones, high power lines and transformers, especially ones on the bottom floor of the buildings.

## *Studies About Policies and Legislations Regarding EMF Exposure*

- Still no standard for 0 – 10 kHz and 60 GHz – 300 GHz frequency ranges.
- No occupational exposure standard for ELF and RF. GNRK is preparing a regulation and going to discuss it with Ministry of Labor and Social Security.

## *Public Information Activities*

Turkish people can get information on the various aspects of the EMF from several sources. Some of these are:

- Web sites : GNRK web site informing people about the electromagnetic fields, measurement and counseling activities: www.gnrk.gazi.edu.tr and EM Pollution web site www.emk.gazi.edu.tr. Gazi Biophysics Department web site announcing Departments' general activities and education programs: www.biyofizik.gazi.edu.tr
- GNRK brochures on measurement and counseling about NIR
- Publications in newspapers and wide circulation magazines
- Discussion programs organized in radio and TV
- Talks, seminars and conferences addressed to special audiences, mainly school students and teachers.

## *Some of the 2006-2007 Publications on EMF and biological effects*

### I. Gazi Biophysics' Publications


- **Tohumoglu G, Canseven AG, Cevik A, Seyhan N.;** Formulation of ELF magnetic fields' effects on malondialdehyde level and myeloperoxidase activity in kidney using genetic programming. Comput Methods Programs Biomed. 2007 Apr;86(1):1-9.
- **Canseven, A.G., Z. Aktuna Keskil, S. Keskil ve N. Seyhan**, "Pentylenetetrazol-induced seizures are not altered BY pre- or post-drug exposure to a 50 Hz magnetic field," International Journal of Radiation Biology, 83 (4), 231-235 (2007).
- **Seyhan N, Canseven AG.;** In vivo effects of ELF MFs on collagen synthesis, free radical processes, natural antioxidant system, respiratory burst system, immune system activities, and electrolytes in the skin, plasma, spleen, lung, kidney, and brain tissues. Electromagn Biol Med. 2006;25(4):291-305.
- **Canseven AG, Seyhan N, Mirshahidi S, Imir T.;** Suppression of natural killer cell activity on Candida stellatoidea by a 50 Hz magnetic field. Electromagn Biol Med. 2006;25(2):79-85.
- **Seyhan N, Guler G.;** Review of in vivo static and ELF electric fields studies performed at Gazi Biophysics Department. Electromagn Biol Med. 2006;25(4):307-23.

- **Guler G, Seyhan N, Aricioglu A.;** Effects of static and 50 Hz alternating electric fields on superoxide dismutase activity and TBARS levels in guinea pigs. Gen Physiol Biophys. 2006 Jun;25(2):177-93.
- **Canseven A.G., Coşkun Ş., Seyhan N.** (2006): In vivo effects of ELF magnetic fields on antioxidant defense system in kidney. Proceedings, Vol. II., ISBN: 960-233-173-9. Editor: P. Kostarakis (Proceedings of the 4th International Workshop on Biological Effects of EMFs, Crete, Greece, 16-20.10 2006). pp: 1394-1398
- **Canseven A.G., Tomruk A., Coşkun** Ş., **SEYHAN N.** (2006): Effect of intemittent and continuous exposure to 50 Hz, 1.5 mT on lipid peroxidation in liver. Proceedings, Vol. II., ISBN: 960-233-173-9. Editor: P. Kostarakis (Proceedings of the 4th International Workshop on Biological Effects of EMFs, Crete, Greece, 16-20.10 2006). pp: 1399-1402
- **Canseven A.G., Tüysüz M.Z., Coşkun Ş., Seyhan N**. (2006): Intermittent exposure to 50 Hz, 1.5 mT and increase in nitric oxide (NO) levels in kidney. Proceedings, Vol. II., ISBN: 960-233-173-9. Editor: P. Kostarakis (Proceedings of the 4th International Workshop on Biological Effects of EMFs, Crete, Greece, 16-20.10 2006). pp:1403-1406
- **Canseven A.G., Coşkun Ş., Seyhan N.** (2006): Effects of continuous exposure to 50 Hz magnetic fields on nitric oxide levels in lung. Proceedings, Vol. II., ISBN: 960-233-173-9. Editor: P. Kostarakis (Proceedings of the 4th International Workshop on Biological Effects of EMFs, Crete, Greece, 16-20.10 2006). pp: 1407-1411
- **Özgür E., Güler G., Seyhan,N**., Effects Of Electromagnetıc Fıeld From Power Lines on the Oxidant and Antioxidant Levels in Guinepigs, International Conference and COST 281 Workshop on Emerging EMF Technologies, Potential Sensitive Groups and Health, April 20/21, 2006, Graz, Avusturya
- **Coskun S., Seyhan N., Canseven A.G.,** Alterations Induced in The Lipid Peroxidation Levels of Heart and Liver Tissues with ELF Magnetic Fields, International Conference and COST 281 Workshop on Emerging EMF Technologies, Potential Sensitive Groups and Health, April 20/21, 2006, Graz, Avusturya

**II. Other publications**

- **Akdag MZ, Dasdag S, Aksen F, Isik B, Yilmaz F.;** Effect of ELF magnetic fields on lipid peroxidation, sperm count, p53, and trace elements. Med Sci Monit. 2006 Nov;12(11):BR366-71.
- **Aksen F, Akdag MZ, Ketani A, Yokus B, Kaya A, Dasdag S.;** Effect of 50-Hz 1-mT magnetic field on the uterus and ovaries of rats (electron microscopy evaluation). Med Sci Monit. 2006 Jun;12(6):BR215-20.
- **Oktay MF, Dasdag S**.; Effects of intensive and moderate cellular phone use on hearing function. Electromagn Biol Med. 2006;25(1):13-21.
- **Yurekli AI, Ozkan M, Kalkan T, Saybasili H, Tuncel H, Atukeren P, Gumustas K, Seker S.;** GSM base station electromagnetic radiation and oxidative stress in rats. Electromag. Biol Med. 2006;25(3):177-88.
- **Ozguner F, Bardak Y, Comlekci S;** Protective effects of melatonin and caffeic acid phenethyl ester against retinal oxidative stres in long-term use of mobile phone: A comparative study, *Molecular and Cellular Biochemistry* 282: 83–88, 2006.
- **Oral B, Guney M, Ozguner F, Karahan N, Mungan T, Comlekci S, Cesur G;** Endometrial apoptosis induced by a 900-MHz mobile phone: preventive effects of vitamins E and C. Adv Ther. 2006 Nov-Dec;23(6):957-73.
- **Comlekci S.;** Induced dielectric-force-effect by 50 Hz strong electric field on living tissue. Biomed Mater Eng. 2006;16(6):363-7.
- **Okudan B, Keskin AU, Aydin MA, Cesur G, Comlekci S, Suslu H**.; DEXA analysis on the bones of rats exposed in utero and neonatally to static and 50 Hz electric fields. Bioelectromagnetics. 2006 Oct;27(7):589-92.
- **Aydin MA, Comlekci S, Ozguner M, Cesur G, Nasir S, Aydin ZD.;** The influence of continuous exposure to 50 Hz electric field on nerve regeneration in a rat peroneal nerve crush injury model. Bioelectromagnetics. 2006 Jul;27(5):401-13.
- **Ozguner F, Bardak Y, Comlekci S.;** Protective effects of melatonin and caffeic acid phenethyl ester against retinal oxidative stress in long-term use of mobile phone: a comparative study. Mol Cell Biochem. 2006 Jan;282(1-2):83-8.

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