Commission K (Electromagnetics in Biology & Medicine) Activity Report
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by
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1. Update on EMF safety issue

The fourth meeting of Japanese URSI-Commission K for the 21st term of the Science Council of Japan was held on January 21, 2011, at meeting room of National Institute of Information and Communications Technology (NICT). In this meeting, the progress of 6th meeting of Japan Committee for URSI, discussion on the election of the next chair of Japanese URSI-Commission, preparation of National Report of Commission K (Electromagnetics in Biology and Medicine), the participation of XXX URSI GA and Scientific Symposium, etc were introduced.

In parallel to regular Commission K meeting, 2nd symposium of the Society of Electromagnetics in Medical and Biology supported partly by TELECOM Engineering Center was held. This meeting had 7 presentations with one cancel. Before regular presentation, two special lectures were given by Prof. Ueno of the former chair of Commission K (URSI) and Dr. Nakamura of National Institute of Advanced Industrial Science and Technology (AIST). Prof. Ueno presented the recent advances in brain imaging and bioelectromagnetics. It covered TMS, MEG MRI, cell control with magnetic nanoparticle and the control of cell orientation using magnetic field. Dr. Nakamura talked about two topics, the development of manipulation tool of living cell at nano-scale resolution and the detection of intrinsic mRNA in a living cell using a molecular beacon-immobilized nano-needle. Among regular presentations, there were three topics including the development of MRI-based phantom model, the fundamental approach to study of dosimetry for the wireless power transfer system using magnetic resonance, the biological effects of RF and IF electromagnetic fields on gene expression and the formation of micronucleus and the development of humanized mice for human leukemia model in order to evaluate the effects of electromagnetic field. The presentations and discussions were highly successful.

As a second topic, researchers from the National Institutes of Health (NIH) have found that a cell phone's RF electromagnetic field can cause changes in brain activity, especially the higher rates of energy (or glucose) consumption in the region nearest to the antenna of closely held mobile devices (JAMA, vol.305, 808-812, February 22, 2011). Researchers used positron emission tomography (PET) to pick up hot spots where cells are consuming glucose. This paper shows that the human brain is sensitive to the electromagnetic radiation and it leads to the new questions about the health effect of low levels of radiation emitted from cellphones.

2. Meetings
(a) Past meetings
(1) 5th course: “Medical applications of electromagnetic fields”. 22-23 November 2010, Erice (Sicily), Italy (http://www.ebea.org/ebea_schol_2010.htm)
(b) Future meetings
(4) 33th BEMS Annual Meeting, June 12-17, 2011, Halifax, Nova Scotia, Canada
(5) 14th International Congress of Radiation Research (14th ICRR 2011). 28 August – 1 September,
3. Publications


Hattori S, Suzurikawa J, Kanzaki R, Jimbo Y, Hamaguchi T, Takahashi H, and Nakao M [2008], “Direction Control of Information Transfer between Neuronal Populations with Asymmetric


- Higashiyama J. and Tarusawa Y. [2009b], “Electric field distribution excited from indoor radio source for exposure compliance assessment,” EMC’09/Kyoto, 22S4-1, July


Ikehara T, Nishisako H, Ichinose Shiraishi T and M. Kitamura [2010], “Effects of exposure to a


• Iyama, T. and Onishi, T. [2009b], “SAR measurement procedure for multi-antenna transmitters,” EMC’09/Kyoto, 21S4-2, July.
• Kanezaki A., Hirata A, Watanabe S and Shirai H [2009], “Effects of dielectric permittivities on skin heating due to millimeter wave exposure.” Biomedical Engineerin online vol.8 (20) pp1-23.


Kogure S., Wada K and Suzuki Y [2009], “Development of a magnetic field generator at 20 kHz using a voltage-source inverter for biological research.”


Kotani K., Takamasu K., Jimbo Y, and Yamamoto Y. [2008], “Postural-induced phase shift of respiratory sinus arrhythmia and blood pressure variations - insight from respiratory-phase


Miyakoshi, J. [2008], “Effects of Static Magnetic Field at the Cellular Level,” ISMRM 16th Scientific Meeting and Exhibition and the SMRT 17th Annual Meeting, May.


magnetic fields did not have genotoxic and promotion potentials in vitro, nor reproductive and developmental toxicity in vivo”, Proceedings of the BEMS2010, T-1-2, June.


- Nishimura I., Imai T and Negishi T [2009], “Lack of chick embryotoxicity after 20 kHz, 1.1 mT magnetic field exposure,” Bioelectromagnetics vol.30 (7), pp.573-582.


- Ohkubo C and H.Okano [2010], “Clinical aspects of static magnetic field effects on circulatory system.” The Environmentalist (in press)

- Okano H, Tomita N and Ikada Y [2008a], “Spatial gradient effects of 120 mT static magnetic field on endothelial tubular formation in vitro.” Bioelectromagnetics, vol. 29, pp.233-236.


- Onishi, T., Iyama, T., and Kiminami, K. [2009b], “Faster specific absorption rate measurement techniques,” EMC’09/Kyoto, 21S1-6, June.


• Saito K., Tsubouchi K., Takahashi M., and Ito K. [2010d], “Practical evaluations on heating characteristics of thin microwave antenna for intracavitary thermal therapy,” 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS


Salama N., Kishimoto T and Kanayama HO [2009], “Authors response on letter to the editor on Effects of exposure to a mobile phone on testicular function and structure in adult Rabbit’ by Salama et al,” Int J Androl (in press)


passivation layer for stimulation of cultured neurons.” Appl. Phys. Lett. 90, 09390

cell-derived neuronal networks and mouse cortical networks co-cultured on microelectrode array.” 7th Int. Meeting on Substrate-Integrated Microelectrodes, Reutlingen, July.


- Tanaka K., Mizuno Y and Naito K [2009], “Quantification of low frequency magnetic fields generated by household appliances,” IEEJ vol.129(9), pp.627-632 (in Japanese)

- Tanaka K, Mizuno Y and Naito K [2010], “Effect of power frequency magnetic field on acute, chronic, and genetic toxicities of fruit flies.” IEEJ-A vol.130(12), pp.1053-1059


- Terashima, S., R. Yamauchi, T. Sakurai, T. Nakahara and J. Miyakoshi [2007], “Morphological
changes of cultured cells by the medium convection under strong static magnetic fields,” Bulletin of Health Sciences Hirosaki, vol. 6, pp. 115-120.


- Wang, Q and J. Wang [2010], “Performance of ultra wideband on-body communication based on


in budding yeast and possible effects of 2.45GHz RF electromagnetic field exposure,” 6th international NIR workshop of ICNIRP, p10, October.
