

TYMPANIC TEMPERATURE REACTION TO THE EXPOSURE TO ELECTROMAGNETIC FIELDS EMITTED BY CELLULAR PHONES

A. Bortkiewicz, E. Gadzicka, M. Zmyslony, W. Szymczak, S. Jarupat, A. Kawabata and H. Tokura, Department of Work Physiology, Institute of Occupational Medicine, Lodz, Poland.

Mobile phones have been in use since 1983, and the recent decade has seen their enormous proliferation. Their widespread use has caused that there has been a growing interest in the effect of electromagnetic fields (EMF) generated by the phones on the human organism. Mobile phones generate microwave radiation in the 450-1800 MHz frequency range. Although the exposure due to mobile phone use is below the admissible maximum values specified in the relevant standards, it is worth noting that the standards are based on expected thermal effects and do not take into account non-thermal effects. Accordingly, the admissible EMF radiation levels have been determined so as to prevent temperature growth of 2.2°C or higher in the exposed object. However, it would not be reasonable to assume that even less evident temperature growth (and within the brain in particular) is not able to cause harmful effects. Questionnaire surveys performed for example in Australia, Sweden and Norway on the subjective symptoms associated with the use of the mobile phones show that the most frequent symptoms include headache, vertigo, feeling of discomfort, sensation of warmth. The aim of the experiment was to assess the thermoregulatory response to EMF emitted by mobile phones. Studies of this subject are still sparse and incomplete. In our experiment seven young women, aged 19-29 (mean age 22.1 ± 4.8) years were examined twice: on a day without exposure (control day) and on a day with continuous exposure (60 min exposure from cellular phone, frequency 800 MHz, output power 5 mW/cm³). All participants were qualified for the experiment upon their written consent. All the subjects were examined by a physician. The study was performed in the climatic chamber, the ambient temperature was about 26°C, relative humidity was 69%. The experiment started at 7 p.m. From 7 to 8 p.m. the subjects used cellular phone (on the one day the telephone emitted electromagnetic fields and on the second day it did not). The subjects were not informed which day was exposed and which control (without exposure). Starting from 8 p.m. till midnight the subjects listened to music and then they slept till 7 a.m. the next day. During the experiment the arterial blood pressure (BP), heart rate (HR) and the tympanic temperature (T_{ty}) were monitored. Now we report data on the tympanic temperature. The tympanic temperature was measured every minute by thermistor probe (ST-21S, sensor Tecnica Co.) attached to the tympanic membrane from 7 p.m. to 12 p.m. hours. The data were analyzed using Wilcoxon matched-pairs signed-ranks test for each subject and for the whole group. We compared the tympanic temperature during the day with exposure (E) and during the control day (C) separately for 2 periods: (1) 7-8 p.m., (2) 8-12 p.m. Mean tympanic temperature during period 1 and period 2 differed significantly between E-day and C-day ($p=0.0000$). Differences, however statistical significant, were very slight (about 0.01°C). The analysis of tympanic temperature of each subject revealed individual variations. Further investigations are being performed to explain these differences.

alab@sunlib.p.lodz.pl