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Effects of Radio Frequency Radiation on Pregnancy, Newborns and Permeability of Blood Brain Barrier

Nesrin SEYHAN, G. GÜLER ÖZTÜRK, B. SIRAV ARAL, A. TOMRUK, E. OZGUR
Gazi University Faculty of Medicine Biophysics Dept.
Gazi Non-Ionizing Radiation Protection Center

nesrin@gazi.edu.tr

There is more and more use of electricity and RF (Radio Frequency) communication frequencies in both civilian life and for military purposes. In vivo and in vitro studies are continuing to be performed in order to investigate the biological consequences and to assess health risks of RFR generated especially from mobile phones on oxidative stress, antioxidant enzyme levels and permeability of Blood Brain Barrier (BBB). These investigations are significant on constituting guidelines in order to prevent the harmful effects by considering experimental and modeling researches on RFR. Although there are guidelines comprise the RFR exposure of general public and workers, there are still no international and national standards devoted to pregnant women and their infants who are exposed to these fields whether at work or home during pregnancy which are now begun to take into consideration in all over the world.

In this study we analyzed the effects of RFR on pregnant and their infants. With this aim, we investigated the effects of 1800 MHz pulsed RFR (217 Hz GSM Modulation, 20 dBm) with 7 days' of exposure on the pregnant rabbits and their offsprings. Daily exposure was taken as 15 min. Oxidative damage in biomolecules and the natural antioxidants in the liver tissue of pregnant rabbits' and their offsprings were analyzed. Lipid peroxidation which is a biomarker of oxidative damage was analyzed with Thiobarbituric acid Reactive Substances (TBARS), DNA damage was analyzed with 8 Hydroxy-Deoxyguanosine (8OHdG) and natural antioxidants were analyzed with measuring Glutathione and Glutathione-dependent Enzymes which are GSH-Px; 6-PGD; G-6PD; GR; GST; TR. A total 140 New Zeland White rabbits were randomly divided into 14 groups with 10 rabbits in each group: Group I (Sham, n=10), Group II (RF exposed, n=10), Group III (Pregnant, n=10), Group IV (Pregnant-RF, n=10). Offsprings of Group III and Group IV are studied in 5 different sub-groups separately; Sham Female offspring – one month old (n=10), Sham Male offspring – one month old (n=10), RF-Female offspring – one month old (n=10), RF-Male offspring – one month old (n=10), and newborns - max. 2 days old (n=10).

The results have shown that lipid peroxidation, DNA damage and Glutathione-dependent Enzymes are all affected with 1800 MHz RF exposure:

In the all exposed groups, TBARS levels were found significantly increased ($p<0.05$). 8OHdG formation increased ($p<0.05$) in one-month-old exposed offsprings which is an indicator of DNA damage.

The activity of Glutathione-dependent enzymes reduced in all of the exposure groups ($p<0.05$).

Our findings on DNA damage and lipid peroxidation showed that even short term exposure of RFR may lead to suppression of antioxidant defense mechanism.

Another study performed was on the effects of both CW and GSM modulated RFR on BBB. 125 Wistar albino rats in totally 14 groups were studied. The studies were carried out with CW and GSM modulated RF frequencies and two E field exposure values for both male and female rats. Results of the first six groups with four exposure and two controls will be given here. Group I: control-male (n = 8), Group II: control-female (n= 9), Group III: 900 MHz-CW-male (n = 8), Group IV: 900 MHz-CW-female (n = 9), Group V: 1800 MHz-CW-male (n = 9) and Group VI: 1800 MHz-CW-female (n = 9). Exposure period was 20 min. measured E field values were 13.9 – 12.8 V/m and 13 – 12.3 V/m in the near field condition for 900 MHz and 1800 MHz respectively. The permeability of BBB was determined by Evans Blue (EB) dye spectrophotometrically.

Results have shown that 900 MHz and 1800 MHz – CW RFR increases the permeability of BBB of male rats ($p < 0.01$).

The second part of our BBB study with GSM Modulated and CW reduced RF exposure (approx. 4 V/m) have been recently finished. Results will be discussed soon.