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ANIMAL STUDIES ON THE EFFECTS OF ELF AND STATIC EMF PERFORMED AT GAZI BIOPHYSICS

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Below investigations present the studies performed on 266 experimental animals in Bioelectromagnetic Laboratory of Biophysics Department of Medical Faculty of Gazi University since 1990. These studies include ELF magnetic (B) fields, static and ELF electric (E) field effects on immune system, brain electrolytes, plasma electrolytes, epilepsy, superoxide dismutase, skin and liver hydroxyproline, malonaldehyde, ascorbate, total protein, albumin, gamma glutamyl transferase, cholesterol, triglyceride, urea, uric acid, phosphate, glucose, creatinine, calcium, chlorine, functional enzymes of liver such as aspartate aminotransferase, alkaline phosphatase, lactate dehydrogenase and alanine aminotransferase.

ELF Magnetic Fields studies :

In all of the investigations, except epilepsy study, guinea pigs were used.

Skin hydroxyproline: Collagen synthesis under the effects of 50 Hz magnetic field of 10 G, 20 G and 30 G with the exposure period of 4 hours/day for 5 days were investigated. Magnetic fields of 10 G decreased skin hydroxyproline concentrations. Magnetic fields of 20 G and 30 G increased the hydroxyproline concentrations but 20 G was found more effective than 30 G. **Immune system :** Animals were exposed to 50 Hz, 20 G magnetic field with the exposure period of 4 hours/day for 5 days. NK (Natural Killer) cells cytotoxic activity were found decreased in the spleen. **Brain electrolytes :** 50 Hz, 20 G magnetic field with the exposure period of 4 hours/day was applied to the animals for 5 days. Ca⁺⁺, Mg⁺⁺, Cu⁺⁺ and Zn⁺⁺ ion concentrations increased in brain tissue. **Plasma electrolytes :** 50 Hz, 20 G magnetic field with the exposure period of 4 hours/day was applied to the animals for 5 days. Ca⁺⁺, Na⁺, Mg⁺⁺ concentrations increased, Zn⁺⁺ decreased, Cu⁺⁺ remained constant. **Epilepsy :** Pre and post drug exposure of 50 Hz, 2 G magnetic field effects were investigated on Pentylene tetrazol (PTZ) induced seizures in mice. No significant effects were observed.

Electric Fields studies :

In all of the investigation guinea pigs were used

Static Electric (E) Fields: Protein synthesis under the effect of static E fields applied in different directions and intensities were examined and the correlation, if any, between tissue levels of hydroxyproline (HP) and superoxide dismutase (SOD), malonaldehyde (MDA), ascorbate, functional enzymes such as aspartate aminotransferase (AST), alkaline phosphatase (ALP), lactate dehydrogenase (LDH) and alanine aminotransferase (ALT), total protein and albumin levels in liver under exogenous electrical fields were investigated. E fields of 1.9 kV/m and 0.9 kV/m were applied in vertical and horizontal directions. Horizontal and vertical application of E field of 0.9 kV/m decreased liver hydroxyproline, whereas 1.9 kV/m electric field increased the level in both application directions. These findings were also verified histologically. SOD, MDA, ascorbate, total protein, and albumin levels increased with the application of 1.9 kV/m E field in vertical and horizontal directions whereas a decrease was observed in the functional enzyme levels of liver. Ascorbate and functional enzymes, total protein and albumin levels decreased while liver SOD and MDA levels found increased with the application of 0.9 kV/m E field in both directions.

ELF Electric Fields: The correlation between tissue levels of liver and skin hydroxyproline and blood gamma glutamyl transferase, cholesterol, triglyceride, urea, uric acid, phosphate, glucose, creatinine, calcium, chlorine, aspartate aminotransferase, alkaline phosphatase, alanine aminotransferase, lactate dehydrogenase, total blood protein, albumin and malondialdehyde levels under ELF electric field with different application times were investigated. 1.35 kV/m electric field with 50 Hz frequency was applied to guinea pigs in 4 different application times being 1 day, 3 days, 5 days and 7 days with daily exposure period of 8 hours. Liver and skin hydroxyproline, blood gamma glutamyl transferase, cholesterol, triglyceride, urea, uric acid, phosphate, creatinine, chlorine, aspartate aminotransferase, alkaline phosphatase, alanine aminotransferase, lactate dehydrogenase and malondialdehyde levels were found decreased with the exposure of electric field of 50 Hz, 1.35 kV/m.

