PRIMARY BIOCHEMICAL AND PHYSIOLOGICAL *IN VITRO* EFFECTS OF NON-IONIZING RADIATION IN ANIMAL CELLS

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To study the mechanism of action of constant electric and alternating electromagnetic fields in animal tissues there were formed groups from laboratory and domestic animals (cats, dogs, horses, rats, mice), in accordance with sex, age and state of health according to the principle of physiological and biochemical analogues. The work was carried out in accordance with the "International Recommendations for the conduct of biomedical research using animals."

There were studied effects of fields named on the activity of serum, plasma, and cytosolic enzymes; on the changes in the functional characteristics of blood elements, permeability of erythrocyte membranes for glucose, dynamics of hemoglobin oxygenation. Optimal conditions for exposure to an electrostatic field and the concentration of blood cells were chosen experimentally: intensity — $8{,}3 \cdot 10^2$ W/m, 3×10^9 RBC per 1 ml of 0,15 M NaCl or per 1 ml of blood diluted with serum of the same animal, exposure time — from 5 to 60 min.

Results. The values of the permeability constant of erythrocyte membranes for glucose were obtained. These constants were used as quantitative criterion for the effects of electric and alternating electromagnetic fields in animals' cells. As a result of comparison of constants, it was established ($p < 0.05$), that after exposure for 15–25 min, membrane permeability to glucose increased by 3.8–5.2 times relative to the control.

Analysis of the results of the influence of the electric field on the activity of enzymes of healthy animals showed ($p < 0.05$) that depending on the species, irradiation of more than 5 minutes causes a significant increase in the activity of lactate dehydrogenase (EC 1.1.1.27) in the blood plasma of cats from 2.5 to 4 times; aspartate aminotransferase (EC 2.6.1.1) and lactate dehydrogenase in the blood plasma of dogs from 2 to 3.8 times; and activity of aspartate aminotransferase (EC 2.6.1.1) in plasma of horses from 1.5 to 2.7 times. Morphological changes in the cells were determined by light microscopy. Aniso- and poikilocytosis, an increase in the area of platelets, cell aggregation, karyolysis, fragmentation, and several other physiological destructive changes were recorded. Qualitative and quantitative changes in cellular characteristics and parameters were dose-dependent. We have identified the presence of species characteristics of the cellular response: precipitation of methemoglobin on the inner side of the CPM is noted only in the erythrocytes of cats and horses Changes in the dynamics of hemoglobin oxygenation were recorded in blood samples of all animals. The analysis of non-ionizing radiation affect indicates the changes in the permeability of the membranes of blood cells as well as the possibility of directed activation of respiration of target cells due to, inter alia, the regulation of oxygen transport.