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THE NEURAL CELL ADHESION MOLECULES IN THE RAT BRAIN AFTER WATER-IMMOBILIZATION STRESS AND AFTER THE RECOVERY PERIOD

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Introduction. Stress is one of the main factors of the disturbance of the functioning of the central nervous system. However, the stressfulness of modern society increases over time. The most important intercellular compounds are adhesive proteins. The system of intercellular adhesion provides main mechanisms for the development of nerve cells, including their migration, formation of the axons, synapses and neuron-glial networks, which totally affect neuronal function. The purpose of this work was to investigate changes of the ratio of the soluble and membrane forms contents of neural cell adhesion molecules (NCAM) under water-immobilization stress and after a period of physiological recovery.

Methods. The experiment was conducted on 18 Wistar rats divided into 3 groups ($n = 6$). 1 – control; 2 – water-immobilization stress (WIS); 3 – rats that had a recovery period of 14 days. The animals were withdrawn from the experiment under a weak anesthetic according to the ethical rules of handling of laboratory animals. Different areas of the brain were isolated, from which the cytosolic and membrane fractions of proteins were obtained by differential ultracentrifugation. The quantity of NCAM was measured by competitive ELISA using monospecific antibody (Abcam, UK). Statistical processing of the results was performed with one-factor ANOVA dispersion analysis.

Results. The impact of WIS for 3 days led to different change of the content of both soluble and membrane NCAM in different studied brain areas. The level of NCAM in the hippocampus and cerebellum did not change at the moment of stress procedure compared with the control group. However, it was decreased to 32% in hippocampus at the distant time after stress. More critical decrease to 53% level of soluble NCAM was detected in the thalamus of stressed animals just after the stress procedure. The physiological recovery of rats after stress for 14 days did not result in the absolute restoration of NCAM pool.

Discussion. Soluble NCAMs regulate more quick mechanism of adaptation of neural cells after stress to have impact to the strength of adhesive contact between them. A short-term stress leads to the decreased level of membrane NCAM at the distant time that can affect the synaptic plasticity and can be a trigger for the neural community disturbance.

Conclusions. The impact of water-immobilization stress on the NCAM level depends on time after stress and can provoke neurodegeneration at the long remote period.

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