COMPARATIVE CHARACTERISTICS OF THE NEUROPIL OF THE CA1 AND CA3 LAYERS OF THE HIPPOCAMPUS OF WHITE RATS IN THE NORM AND POST-ISCHEMIC PERIOD

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In the norm, the neuropil of the CA1 and CA3 layers of the hippocampus differs in density and size of synaptic terminals. After ischemia (occlusion of the common carotid arteries), additional differences in the organization of the neuropil appear, especially in the molecular lacunar layer (ML). An immunohistochemical study was carried out with the protein synaptophysin, which is located in the presynaptic vesicles of neurons. The most pronounced changes occurred in the ML layer: a decrease in the numerical density, high variability in the sizes of synaptic terminals on days 1–3, an increase in reactive changes in these indicators occurred by days 7–14 (compensatory plasticity), partial recovery was observed by day 30 of the post-ischemic period with the preservation of abnormal bursts of values in individual visual fields. In CA3 of the hippocampus, the changes are less pronounced than in CA1, which probably indicates its greater resistance to ischemia or other manifestations of adaptation and compensation mechanisms in this zone. Data processing was performed using ImageJ 1.53 (morphometry), StarDist (segmentation), Ilastik (classification), statistical analysis - nonparametric methods (Wilcoxon rank-sum test, Kruskal- Wallis test) in the R environment. Ischemia leads to the death of some neurons, enhances the layered differentiation of the neuropil, especially in ML, with critical timing of changes at 3-14 days of the post-ischemic period. This is important for understanding the patterns of reorganization of interneuronal connections in the process of structural and functional recovery of the hippocampus after ischemia. The molecular lacunar layer in the hippocampus is the most sensitive area to ischemia, which can affect its functions through synaptic compensatory and restorative reorganization of the neuropil against the background of the death of some pyramidal neurons in the post-ischemic period.