МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ

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професорсько-викладацького колективу
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CHARACTERISTICS OF CHANGES IN THE DENSITY OF ENDOTHELIAL CELLS IN THE VESSELS OF THE FRONTAL LOBE CORTEX OF THE CEREBRAL HEMISPHERES IN RATS WITH DIABETES UNDER CONDITIONS OF ISCHEMIA-REPERFUSION

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Introduction. More than one million diabetes mellitus (DM) patients are officially registered in Ukraine, but the actual number of people with undiagnosed pathology exceeds this number by 3-4 times. One of the main causes of mortality in patients with diabetes is cardiovascular complications, in particular, impaired cerebral circulation. There are no reports in the scientific literature on the early and delayed effects of ischemia-reperfusion on the endothelial cell density in the vessels of the frontal lobe cortex of the hemispheres against the background of DM.

The aim of the study. To study the features of changes in the density of endothelial cells of the frontal lobe cortex of the cerebral hemispheres before incomplete global ischemia-reperfusion under the conditions of streptozotocin-induced diabetes.

Material and methods. The study was conducted on 6-month-old male rats, from which the following experimental groups were formed: 1. Control animals; 2. Laboratory rats, which were simulated 20-minute bilateral carotid ischemia-reperfusion with one-hour reperfusion; 3. Animals that were removed from the experiment on the 12^{th} day after simulation of 20-minute bilateral carotid ischemia-reperfusion; 4. Rats with diabetes; 5. Animals with diabetes, which were simulated 20-minute bilateral carotid ischemia-reperfusion with one-hour reperfusion; 6. Rats with DM, which were removed from the experiment on the 12^{th} day after simulation of 20-minute bilateral carotid ischemia-reperfusion. To carry out research, the brain was fixed in Buen's solution for 24 hours, then histological wiring was carried out according to the standard scheme and the tissue was embedded in paraffin, serial sections with a thickness of 5 mkm were prepared. Images of the cerebral cortex were obtained on an AXIOSKOP microscope (Zeiss, Germany) and entered into a VIDAS-386 computer image analysis system (Kontron Elektronik, Germany) using video camera (COHU Inc., USA). Calculation of cell density (number of cells per 1 mm2 area of the cerebral cortex section) was performed automatically using the VIDAS-2.5 program (Kontron Elektronik, Germany).

Results. The density of endotheliocytes in the vessels of the frontal lobe cortex of the cerebral hemispheres of rats without diabetes in the early post-ischemic period did not change compared to that in animals of the control group. In the late ischemic-reperfusion period (12^{th} day), the density of the location of endothelial cells in the studied part of the cerebral cortex increased by 25% in relation to this indicator in rats without impaired cerebral circulation and by 32% in relation to the early period of observation. In rats with streptozotocin-induced diabetes, the density of endothelial cells in the vessels of the large hemispheres was significantly lower (by 16%) compared to a similar indicator in animals of the comparison group (without disturbance of carbohydrate metabolism).

In the early and late ischemic-reperfusion periods, the density of endothelial cells in the vessels of the frontal lobe cortex of animals with diabetes remained lower compared to the same indicator in rats with uncomplicated diabetes.

A comparative analysis of the consequences of acute cerebrovascular accident in rats without and with diabetes showed that in the early and late stages of ischemia-reperfusion injury in the vessels of the studied part of the hemispheres of animals with diabetes, the density of the location of endothelial cells was lower by 18 and 37%, respectively, relative to the indicators for such an intervention in non-diabetic rats.

Conclusions. It was shown that the density of endotheliocytes in the frontal lobe cortex of the cerebral hemispheres increased in animals in the late postischemic-reperfusion period. However, there was a probable decrease in this indicator against the background of diabetes.