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MORPHOLOGICAL CHANGES IN THE BRAIN ON A HIGH-FAT DIET

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Introduction. Non-alcoholic fatty liver disease (NAFLD) is the most prevalent liver disorder globally, affecting almost a quarter of the world's population [1]. NAFLD represents a metabolic syndrome that affects other organs and is a multisystemic disease. In addition to its hepatic manifestations, NAFLD is associated with significant extrahepatic complications, including alterations in brain morphology and function [2]. In the decompensated stages of NAFLD, liver failure and hepatic encephalopathy develop. These processes can result in cognitive impairments, memory decline, and an increased risk of neurodegenerative diseases.

Purpose – to study the morphological changes in the brain in NAFLD.

Material and methods. As research subjects, 8–10-week-old male Wistar rats were used. To achieve the research goals, the rats were given a high-fat diet and a glucose-fructose mixture instead of water, and fatty liver disease was modeled. On the relevant days of the study, the rats were decapitated in a cold room at 0°-+2°C. The morphological examinations were performed on the brain sections on the 8 th,12th, 16th, and 20th weeks.

Results. In the brain tissue of rats that were fed a high-fat diet for 8 weeks, were observed signs of pericellular and perivascular edema. Some pyramidal cells in the cortex were shriveled, with hyperchromatic nuclei and a reduction in the area and volume of the perikaryon.

In the brain cortex tissue of rats fed a high-fat diet for 12 weeks were also noted signs of pericellular and perivascular edema. Some pyramidal cells in the cortex were shriveled, with hyperchromatic nuclei and a reduction in the area and volume of the perikaryon. Single foci of satellitosis (the "adhesion" of microgliocytes to the surface of dead neurons) were found.

In the brain cortex tissue of rats fed a high-fat diet for 16 weeks, signs of pericellular and perivascular edema were most pronounced. Moderate reactive gliosis was observed. A large number of pyramidal cells in the cortex were shriveled, with hyperchromatic nuclei and a reduction in the area and volume of the perikaryon.

Signs of pericellular and perivascular edema were also observed in the brain cortex tissue of rats fed a high-fat diet for 20 weeks. Some pyramidal cells in the cortex were shriveled, with hyperchromatic nuclei and a reduction in the area and volume of the perikaryon. In some cells, the nuclear material was not visualized, and signs of karyorexis were observed. The results of our studies confirm that NAFLD has a significant impact on brain morphology. Future research should focus on further studying these changes and developing effective methods of prevention and treatment.

Conclusion. A high-fat diet resulted in perivascular and pericellular edema, hyperchromia, a decrease in the neuronal density of the molecular and pyramidal layers in the brain.

References:

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ОЦЕНКА УСТОЙЧИВОСТИ СКЕЛЕТНЫХ МЫШЦ К ОКСИДАТИВНОМУ ПОВРЕЖДЕНИЮ: РОЛЬ МАЛОНОВОГО ДИАЛЬДЕГИДА И СОКРАТИТЕЛЬНЫХ ХАРАКТЕРИСТИК

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