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МАТЕРИАЛЫ КОНФЕРЕНЦИИ И ШКОЛЫ

PRENATAL HYPERHOMOCYSTEINEMIA DISTURBS THE MECHANISMS OF DEVELOPMENT OF THE CEREBRAL CORTEX IN RATS

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Maternal hyperhomocysteinemia is one of the common complications of pregnancy that causes cognitive deficits in offspring during postnatal development. In the present work, we evaluated the effect of prenatal hyperhomocysteinemia on the migration of neuroblasts into rat cortical plate, structural and ultrastructural organization of the cerebral cortex, the number of neuronal and glial cells, on the proinflamatory markers (tumor necrosis factor-α, interleukin-6 and interleukin-1β) in early ontogenesis. Wistar female rats received methionine (0.6 g/kg body weight) by oral administration during pregnancy. 5'-ethynyl-2'-deoxyuridine (EdU) was used to label the neurons of the lower cortical layers (generated on E14), in the fetuses of control and experimental females. Histological and biochemical analysis of the cortical tissue of 5- and 20-day-old pups was performed. In prenatal hyperhomocysteinemia, the total number of EdU-labeled cortical cells in pups was decreased relative to the control, while the number of labeled neurons scattered in the superficial cortical layers was increased, indicating a failure of the generation and migration of cortical neurons. Using electron microscopy, some delay in the development of cortical tissue, accumulation of lysosomes, and other neurodegenerative changes were observed in pups with impaired embryonic development. Immunochemical staining of the neuronal marker NeuN revealed a decrease in the number of viable cortical neurons in the first month after birth. Maternal hyperhomocysteinemia also caused an increase in the number of astroglial and microglial cells, as well as an increase in the level of proinflammatory cytokine interleukin-1β in the cortical tissue of the offspring, which indicates the development of neuroinflammatory processes. Thus, prenatal hyperhomocysteinemia causes a delay in the development of cerebral cortex tissue, disrupts the migration of neuroblasts into the cortical plate, induces neuronal death and development of neuroinflammation.

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