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**COGNITIVE DISABILITY IN ESTROGENECTOMIZED AND OLD RATS WITH
DIABETES MELLITUS**

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In recent years there have been many works concerning the study of the effects of sex hormones on cognitive function. Clinical studies have found that in menopausal women the tendency to develop type 2 diabetes will increase, the spatial and short-term working memory worsens, and there is a tendency to develop depression. The findings suggest that estrogens are involved in the mechanisms of insulin resistance in tissues, in the synthesis of mediators in the catecholaminergic systems of the brain, but many questions remain unresolved. Therefore, the aim of our study was to establish the effect of estrogens on the indices of spatial memory in ovariectomized and old rats against the background of the development of experimental diabetes. The study was conducted on 30 adult female rats, 4-5 months and 20 months. The study groups were ovariectomized and experimental type 2 diabetes mellitus with protamine sulfate was reproduced. The study of spatial memory was carried out in an eight-sleeved radial labyrinth. Menopause is closely associated with memory loss and cognitive impairment. Estrogen plays an important role in neuroplasticity, for example, an increase in the population of the dendritic CA₁ segment in the hippocampus, prolonged potentiation and neurogenesis. In the experiments, the memory and density of dendritic spines are reduced in the prefrontal cortex and the hippocampus after ovariectomy; the ability to recognize the object was found to decrease after 1 week of ovariectomy and spatial memory decreases after 4 weeks.

Studies have shown that physical activity and stress influences upon the improvement of spatial memory of ovariectomized rats and are associated with increased extragranular aromatisation. In their turn, they affect the expression of estrogen receptors. The data we obtained on ovariectomized animals indicate that on the second day the cognitive function is somewhat improved compared with the first day of testing, which is associated with physical activity in the labyrinth. There is a similar tendency in the old animals on the second day, but indicators of spatial memory are much worse. Diabetes causes a significant memory deterioration.

Changes occurring after ovariectomy suggest estrogen involvement in the regulation of cognitive functions. In patients with type 2 diabetes cognitive dysfunction has been detected in the form of memory reduction, attention, and optic-spatial activity interrelated with chronic hyperglycemia. With an increase in the level of HbA_{1c} in patients with type 2 diabetes, BDNF (brain neurotrophic factor) in blood plasma decreases and affects cognitive function.

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**GENETICALLY MEDIATED SYSTEMIC AND TISSUE MECHANISMS OF
ADAPTATION TO HYPOBARIC HYPOXIA**

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Today there is no doubt that the body possesses both congenital and acquired regulatory programs that allow realization of both urgent and long-term compensatory adjustments aimed at eliminating oxygen deficiency. Of all the causes of exogenous hypoxia, high-altitude and experimental hypobaric hypoxia are the most studied, as the controlled use of hypoxic effects is considered a promising direction to prevent the development of many diseases involving the so-called hypoxic cascade. High-altitude hypoxia caused by low barometric pressure challenges human ability to survive and reproduce due to exerting constant selective pressure on the mechanisms of the evolution of adaptive responses.

This study summarizes the mechanisms of response to hypobaric hypoxia, including population characteristics of compensatory reactions of oxygen transport systems, reproductive mechanisms of adaptation in the population of highland regions and cellular mechanisms of