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INFLUENCE OF THIAMINE DEFICIENCY AND ITS CORRECTION BY VITAMIN B₁ ON THE EXPRESSION OF THE NACHR CLUSTER GENES IN RATS

Background/Aim. Thiamine (vitamin B₁) is a water-soluble molecule that is rapidly excreted from the body in the urine. It plays a key role in carbohydrate metabolism and cellular energy balance, and its deficiency causes serious metabolic disorders, including changes in gene expression. The study of the molecular mechanisms of thiamine action and its effect on gene expression is becoming increasingly relevant. It has been found that the thiamine-binding protein is the Agrin-LRP4 complex, which is part of the nicotinic acetylcholine receptor (nAChR), which is important for the transmission of nerve impulses and the development of neurodegenerative diseases. Therefore, this research is devoted to the study of changes in the expression of nAChR genes under conditions of thiamine deficiency and its correction. **Methods.** An experimental model of thiamine deficiency in rats was used. Animals were divided into: control, thiamine-deficient and with correction by vitamin B₁ groups. RNA isolation was performed from brain tissues with subsequent cDNA synthesis. The level of gene expression was determined by quantitative real-time PCR with the CX96 Biorad device. The following genes were used as references: 18sRNA, TERT. **Results.** It was established that thiamine deficiency leads to a decrease in the expression of the LRP4, AGRN, MuSK and RAPSN genes, which are involved in the formation of the postsynaptic apparatus. At the same time, an increase in the expression of the DVL1 gene was observed (by 254.68%), which indicates the activation of all types of the Wnt signaling pathway (canonical, non-canonical and calcium-dependent). Correction with thiamine contributed to the normalization of the expression of most of the studied genes. A tendency to increase heart weight in thiamine deficiency (+15% of normal) was also noted, which may indicate the development of hypertrophic processes. **Conclusions.** Thiamine deficiency is accompanied by a violation of the expression of genes that regulate neuromuscular transmission and cell signaling pathways. Correction with thiamine contributes to the normalization of these processes, which emphasizes the important role of thiamine in maintaining the normal functioning of the body, in particular, indicates the non-coenzyme functions of vitamin B₁.

Keywords: thiamine, avitaminosis, gene expression, nAChR cluster, LRP4, AGRN, MuSK, DVL1, Wnt signaling pathway, real-time PCR, rats.

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