Abstract

Introduction and Aim: Neuropeptides are widely distributed group of biologically active substances and their effects depend on their activity and localization of specific receptors. The mechanism of the regulatory / modulatory effects of neuropeptides has not been fully elucidated yet, and these gaps in our knowledge make it difficult for them to influence them therapeutically. Our hypothesis was that similar to the effects of the galaninergic system on the cardiovascular system, the galaninergic system may be one of the important modulators of the hypothalamic-pituitary-adrenal axis and may therefore modulate the stress response or pathophysiology of selected neurological diseases. The aim of our study was to investigate presence and expression of CRH and Galanin receptors in the basal conditions and in stress in adenohypohysis and in hypophysis and in pathological conditions - in the spinal cords in the murine model of multiple sclerosis, experimental autoimmune encephalomyelitis (EAE) and determine GalR1 cellular localization (oligodendrocytes, microglia, astrocytes, ependymal cells, and endothelial cells in the capillaries).

Results: The expression of all tested galaninergic peptides was determined in the adenohypophysis. It was found that the expression of the GalR2 mRNA in adenohypophysis under basal conditions was much higher than the GalR1 and GalR3 mRNA expression. Acute stress did not induce any alterations in GalR2 expression in adenohypophysis, whereas GalR1 receptor expression increased on the contrary and GalR3 receptor expression decreased. CRH receptors expression was studied in hypophysis. In control WT and CRH-KO animals, relative expressions of mRNA for CRH-R1 was not significantly different, while expression of mRNA for CRH-R2 was significantly higher in WT animals. Expression of mRNA of both CRH receptors in acute stress interval 30 min did not differ from the control values. Stress in the interval of 120 min revealed the significant decrease of both CRH-R1 and CRH-R2. This finding supported the determination of expression of CREB mRNA, which levels also decreased after 120 min interval of acute stress. In EAE model, immunohistochemical analyses revealed GalR1 expression in the ependymal and endothelial cells in the spinal cords, with a weak immunoreactivity detected in the oligodendrocytes. GalR1 mRNA expression was decreased in the spinal cords. The distribution of GalR1 in the glial cells in the EAE model was determined.

Conclusion: We demonstrated the presence of galanin, galanin-like peptide and all three galanin receptors in the adenohypophysis and CRH receptors in hypophysis in basal conditions and after stress. We demonstrated the involvement of galaninergic and CRH system in the adenohypo-physis and hypophysis in the stress regulation. We also determined the distribution of GalR1 in the glial cells in the EAE model and found decrease in mRNA of GalR1 in the spinal cords.