

Abstract

The aim of this thesis was to clarify the influence of the stress on the adrenergic and muscarinic receptors in the heart and in the lungs. Research was performed on rat hearts and lungs and on the hearts and lungs of the CRH KO mice. First, we assessed mRNA levels of all α - and β -adrenergic receptor and muscarinic receptor subtypes. Subsequently, we performed the radioligand-binding studies to determine densities of these receptors.

We identified all three α_1 -adrenergic receptor subtypes in the rat lungs. In the lungs of WT mice, we found that the amount of α_1 -adrenergic and muscarinic receptors was sex-dependent. Densities of the former were higher in females and those of the latter were higher in males. There was no difference between males and females in β -adrenergic receptor density. As for CRH KO mice, the basal densities of studied receptors were lower than in CRH WT mice (except β_1 -adrenergic receptors in females).

The main purpose of the thesis was to detect the immobilization-induced changes in the studied receptors in the control (WT) and CRH KO mice. Short-term and long-term immobilization caused decrease in all α_1 -adrenergic receptor subtypes in females, whereas only α_{1A} -adrenergic receptors decreased in males. The amount of β_1 -adrenergic receptors decreased in males and remained without change in females while β_2 -adrenergic receptors decreased in both sexes equally. Decrease of the receptors after the stress exposure was more striking in WT mice than in those with disrupted CRH gene. Moreover, the decrease of the receptors in CRH KO males was less prominent than in CRH KO females. Adenylyl cyclase activity was decreased in WT mice after the immobilization, the PLC activity in WT mice did not change. In CRH KO mice there was no change in AC and PLC activity.

Furthermore, we detected immobilization-induced changes in expression and amount of the receptors in the rat and murine hearts.