ABSTRACT

Introduction and aim: Investigation of neuropeptides became in the center of research activities due to extensive peripheral and central modulatory effects of these peptides and due to their possible therapeutic use. Our laboratory is involved in the study of oxytocin (OT) and its analogs under physiological state and under stress, our studies ranged from the molecular-biological to behavioral studies. The aim of this work was the study of central regulatory role of OT and its analogs together with newly discovered neuropeptides galanin and galanin like peptide in the hypophysis. Recently, OT was included into the cardiovascular hormones. The aim of this work was also the study of OT, Gal, GalLP and their receptors in the heart under physiological state and under stress. Central effects of neuropeptides we tested in the behavioral studies. Another aim was synthesis of Gal, GalLP and its analogs and chimeric molecule of oxytocin with flurescent marker.

Methods: We elaborated methods for immunofluorescent estimation of expression of neuropeptides and their receptors, Western blot procedure and method of RT qPCR for the expression of mRNA of estimated genes. We used behavioral tests to detect central effects of peptides. We used acute stress developed in our lab. Peptides and chimera with OT-fluorescencent marker, synthesized in our laboratory, allow experiments that would otherwise be unaffordable.

Results: We have shown antistress and anxiolytic effects after systemic administration of Gal. In all sections of pituitary we identified mRNA and gene expression of Gal, GalLP and three GalR subtypes and their colocalization with neuronal tissues and pituicyties under physiological condition and after stress. In anterior pituitary we identified colocalization of Gal, GalLP and their receptors with ACTH and in posterior pituitary with OT and AVP. In the heart, we have demonstrated the existence of OT and Gal systems and changes in mRNA expression of OTR and expression of its genes after stress. We found the movement of OTR from the plasma membrane to the nuclei. We have demonstrated the functionality of a chimera OT as a binding ligand that can be used to identify OTR instead of specific antibodies.

Conclusion: We have shown antistress and anxiolytic effect of galanin with the perspective of therapeutic uses. We first performed a comprehensive study on the prevalence galaninergic system in the pituitary and in the heart under physiological conditions and stress. For unique result is regarded OTR translocation from the plasma membrane to the nuclei of cardiomyocytes. Our synthesis investigated neuropeptides and OT chimeric molekule with fluorescent marker enabled behavioral and binding studies.

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Keywords: Oxytocin, galanin, galanin like peptide, G-protein coupled receptors, rat, stress, heart, pituitary, chimeric molecule.