

Abstract

Activity of the hypothalamic-pituitary-adrenal (HPA) axis is adaptively changed in lactating animals, and suckling is involved in this process. In the recent years, it has been showed that suckling increases the salsolinol concentration in the extracellular matrix of the infundibular nucleus/median eminence (IN/ME) of lactating sheep. This compound is one of the putative hypothalamic prolactin-releasing factors. The aim of the presented doctoral thesis was to verify a hypothesis that salsolinol regulates basal and stress-induced activity of the HPA axis in lactating sheep. The first experiment was performed during the fifth week of lactation, to check whether salsolinol affects stress-induced activity of the HPA axis in nursing sheep. According to the experimental groups, sheep stayed with their offspring and accompanying sheep, or were isolated either from accompanying sheep or both from accompanying sheep and their offspring. During the experiment, animals received infusions of Ringer-Locke's (RL), salsolinol, or 1-MeDIQ solutions into the third ventricle of the brain. Simultaneously, the IN/ME was perfused with the push-pull technique. In the collected perfusates, corticotropin-releasing hormone (CRH), salsolinol, noradrenaline and dopamine concentrations were measured. Additionally, blood samples were collected to measure adrenocorticotrophic hormone (ACTH) and cortisol concentrations. It has been demonstrated that: 1) the isolation stress significantly increased plasma ACTH and cortisol concentrations, as well as noradrenaline and dopamine concentrations in perfusates from the IN/ME; 2) suckling significantly decreased plasma ACTH and cortisol concentrations in sheep isolated from accompanying sheep; 3) salsolinol significantly decreased ACTH and cortisol concentrations in blood as well as noradrenaline and dopamine concentrations in the IN/ME of sheep isolated from accompanying sheep and their offspring; 4) suckling and salsolinol did not significantly affect the CRH concentration in the IN/ME in the aforementioned conditions; 5) 1-MeDIQ significantly increased perfusates CRH and plasma cortisol concentrations, but decreased plasma ACTH concentration in sheep isolated from accompanying sheep; 6) salsolinol and 1-MeDIQ did not significantly affect plasma prolactin concentration in isolation-stressed sheep. The aim of the second experiment, performed also during the fifth week of lactation, was to study the effect of 1-MeDIQ on basal activity of the HPA axis in 9 nursing sheep. Unstressed sheep received intracerebroventricular infusions of RL or 1-MeDIQ solutions. Simultaneously, the IN/ME was perfused and blood samples were collected. ACTH and cortisol concentrations were measured in blood samples, and CRH concentration was measured in perfusates. It has been demonstrated that 1-MeDIQ significantly increased plasma ACTH and cortisol concentrations, but did not significantly affect the CRH concentration in the IN/ME. The third experiment was performed to

study the effect of salsolinol on HPA axis activity in postweaning sheep. The experiment was performed 48 hours after weaning of 8 weeks old lambs. Sheep received intracerebroventricular infusions of RL or salsolinol solutions, and blood samples were collected to measure ACTH and cortisol concentrations. After the experiment, sheep were slaughtered and proopiomelanocortin (POMC; precursor of ACTH) mRNA level was measured in the anterior pituitary. During the first half of the experiment, postweaning sheep received RL solution had higher plasma concentrations of ACTH and cortisol than animals received the same infusions, but in the fifth week of lactation. There were no significant differences in plasma ACTH and cortisol concentrations between these groups in the second half of the experiment. Salsolinol significantly decreased ACTH and cortisol concentrations, while did not significantly affect POMC mRNA level in postweaning sheep. Based on the presented results, it is concluded that salsolinol regulates basal and stress-induced HPA axis activity in sheep during lactation. It is suggested that, in the case of stress-induced HPA axis activity, salsolinol reduces noradrenergic and dopaminergic systems' activity which may lead to decrease in the HPA response to stress. Furthermore, presented study suggests that the peripheral prolactin does not mediate the salsolinol regulation of stress-induced HPA axis activity in lactating sheep.