Abstract

Salsolinol (1-methyl-6,7-dihydroxy-1,2,3,4-tetrahydro-isoquinoline) is an endogenous catecholamic compound synthesized in the dopaminergic system of humans and animals. In humans, salsolinol is involved in central nervous system pathogenesis, especially of Parkinson neuropathy. Salsolinol has been found in the pituitary of animals under physiological conditions when prolactin secretion is high. The present study performed on lactating ewes (5th week) was designed to determine: 1) the presence of salsolinol in the mediobasal hypothalamus (MBH) of ewes in early lactation; 2) whether the salsolinol concentration in the MBH changes in response to suckling concurrently with plasma prolactin concentrations; 3) the effect of exogenous salsolinol administered into the 3rd ventricle on prolactin release; 4) the effect of exogenous salsolinol on prolactin gene expression in the anterior pituitary and MBH; 5) whether salsolinol receptor blockade inhibits prolactin release stimulated by suckling. Ewes (n=34) were implanted with steel canullae into the MBH or 3rd ventricle during the second month of pregnancy. The MBH was perfused using the push-pull method to examine the salsolinol concentration and its changes influenced by suckling. Infusions of salsolinol or its antagonist (1-methyl-3,4-dihydroisoquinoline, 1-MeDIQ) into the 3rd ventricle were performed to study the effect of salsolinol on prolactin release and prolactin gene expression in the anterior pituitary and MBH. Simultaneously, blood samples were collected from 10.00 to 15.00 h at 10-min intervals through a catheter inserted into the jugular vein a day before the experiment. Salsolinol concentration in perfusates from the MBH was determined by HPLC. Prolactin concentration in blood samples was determined by RIA. Prolactin mRNA levels were estimated by real-time RT-PCR. This study provides the first data on the presence of salsolinol in the hypothalamus of lactating ewes. Salsolinol release in the MBH was stimulated by suckling and the increase in salsolinol concentration paralleled the rise of plasma prolactin concentration. It was shown that salsolinol infused into the 3rd ventricle enhanced prolactin release in a dose-dependent manner. Lactating ewes were shown to have high PRL gene expression in the anterior pituitary and, for the first time, also in the MBH, as compared with anestrous ewes. In the experimental design of this study, exogenous salsolinol did not significantly influence prolactin mRNA expression in the examined structures. 1-MeDIQ infused into the 3rd ventricle in lactating ewes effectively inhibited prolactin release and suppressed the prolactin surge under suckling stimulus. The presented results indicate that salsolinol is synthesized in the hypothalamus of lactating ewes and can be considered a key neurotransmiter stimulating prolactin secretion.

Keywords: salsolinol, prolactin, anterior pituitary, mediobasal hypothalamus, lactation, sheep endocrinology