

Modification of nitric oxide synthase immunoreactivity in female mouse limbic system during the estrous cycle

Stefano Gotti^{1,2}, Mariangela Martini¹, Monica Sica¹, and GianCarlo Panzica^{1,2,3}

¹Laboratory of Neuroendocrinology, Department of Anatomy, Pharmacology, and Forensic Medicine, University of Turin, Italy.

²Neuroscience Institute of Cavalieri Ottolenghi Foundation (NICO)

³National Institute of Neuroscience-Italy (INN)

Nitric oxide (NO) is a gaseous neuronal messenger, synthesized by the enzyme nitric oxide synthase (NOS), and implicated in the regulation of several physiological and behavioral functions.

NO-producing neurons have been localized in numerous regions of the mammalian and non-mammalian central nervous system. In rodents, NOS-immunoreactive neurons and fibers were described in hypothalamic and limbic nuclei belonging to neural circuits implicated in the control of reproductive behavior.

Fluctuating levels of estradiol and progesterone during the estrous cycle may induce structural changes in several brain nuclei, where some neurons express estrogen receptors. Various reports indicate that the expression of nNOS is influenced by estrogens in the female. Therefore, to clarify if the nitrergic system is a target for gonadal hormones in physiological conditions, we have investigated the effects of estrous cycle in the expression of nNOS immunoreactivity in different nuclei of the limbic system on two-month-old intact female mice. Changes were observed in the medial preoptic area (significantly higher number in estrus) and in the arcuate nucleus (significantly higher number in proestrus). In the ventrolateral part of the ventromedial nucleus and in the bed nucleus of the stria terminalis no significant changes have been observed. In hippocampus the number of nNOS positive neurons fluctuates during the estrous cycle, reaching its peak during proestrus and metaestrus, and these variations were statistically significant. These results suggest that, in mice, the expression of nNOS in some limbic regions, involved in the control of reproduction and characterized by a large number of estrogen receptors, is under the control of gonadal hormones and may vary according to the short-term variations of hormonal levels that take place during the estrous cycle.

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