

Effect of leptin on hypothalamic release of GnRH and neurotransmitter amino acids during sexual maturation in female rats.

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The purpose of the present study was to analyse the effect of leptin treatment on the hypothalamic release of GnRH, GABA, and the excitatory amino acids (EAA), aspartate (ASP) and glutamate (GLU) involved in NMDA neurotransmission in prepubertal (15 day old) and peripubertal (30 day old) female rats. The animals were treated with a single dose of leptin (30 microg/kg i.p.) and sacrificed 60 min later. Hypothalamic samples were incubated in Earle's medium; GnRH was determined by RIA and GLU, ASP and GABA by HPLC by UV detection. The hypothalamic release of GnRH was increased by leptin at both ages, the release being significantly higher in peripubertal than in prepubertal rats. The levels of hypothalamic GABA release were different in the two groups; whereas in prepubertal rats the hypothalamic release of GABA increased with leptin administration, the neurotransmitter release decreased in the peripubertal group. On the other hand, the release of ASP was modified only in the peripubertal group, where leptin significantly increased its hypothalamic release. No modifications in leptin-induced hypothalamic release of GLU were observed at the two ages studied. In conclusion, the results showed that leptin increased GnRH release by the hypothalamus of prepubertal and peripubertal rats. In peripubertal rats this increase was accompanied by a significant decrease in the hypothalamic release of GABA as well as an enhanced release of ASP. These results and previous reports suggest that at this stage of sexual maturation, leptin exerts a stimulatory effect on GnRH by inducing release of excitatory amino acids (ASP) and reducing release of inhibitory amino acids (GABA) involved in GnRH control. In prepubertal rats the stimulating effect of the adipocyte hormone on GnRH appears to be related to its stimulative action on GABA which at this age increases GnRH release.