Biological Psychiatry
A Journal of Psychiatric Neuroscience and Therapeutics

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Influence of estradiol, stress, and 5-HT2A agonist treatment on Brain-Derived Neurotrophic Factor expression in female rats

Idil Cavus, Ronald S. Duman

DOI: http://dx.doi.org/10.1016/S0006-3223(03)00236-1

Abstract **Full Text** Images References

Abstract

Background

Estradiol affects neuronal plasticity, mood, and cognition. We examined the effects of the estrous cycle, acute and chronic estradiol treatments on BDNF mRNA expression in the hippocampus and cortex of female rats. The roles of 5-HT2A receptors and of stress on the BDNF mRNA regulation were also explored.

Methods

BDNF mRNA levels were measured using in situ hybridization at proestrus and estrus, and following acute and chronic estradiol treatment of acutely and chronically ovariectomized (OVX) female rats. Some rats were pretreated with 5-HT2A agonist and antagonist, and another group was subjected to two-hour immobilization stress.

Results

BDNF mRNA levels in the dentate gyrus and the medial prefrontal cortex were decreased during estrus, when estradiol levels are highest. Acute estradiol treatment decreased hippocampal BDNF mRNA in acutely OVX rats, but neither acute nor chronic estradiol had effect in chronically OVX rats. Estradiol pretreatment reduced the 5-HT2A receptor-mediated cortical upregulation in BDNF mRNA and did not effect the stress-induced down-regulation of BDNF mRNA in the dentate gyrus.

Conclusions

The duration of the estradiol treatment and the duration of the ovarian hormone deprivation are important factors in the regulation of BDNF synthesis and possibly in the functional outcome of estrogen treatment.

Keywords:
Estradiol, BDNF mRNA, 5-HT2A, hippocampus, in situ hybridization, stress

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