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## Is brain estradiol a hormone or a neurotransmitter?

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Mounting evidence indicates that, besides their well-known hormonal mode of action at the genetic level, estrogens such as 17 $\beta$ -estradiol also influence brain function by direct effects on neuronal membranes. Experimentally induced rapid changes in estradiol bioavailability in the brain have been shown to alter the expression of male sexual behavior significantly within minutes – probably too quickly to be accounted for by conventional genetic mechanisms. In parallel, recent studies indicate that aromatase, the enzyme that converts testosterone to estradiol in the brain, is expressed in presynaptic terminals and modulated within minutes by Ca<sup>2+</sup>-dependent phosphorylation. In this article, we develop the hypothesis that brain estrogens display many, if not all, functional characteristics of neuromodulators or even neurotransmitters.



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