

Oxytocin mediated GABA synapse plasticity in the rat supraoptic nucleus

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Conceptualizations of the brain as a fixed structure after development have been successfully challenged by plasticity studies in adult mammals. GABA synapses of oxytocin neurons in the supraoptic nucleus (SON) are particularly 'plastic' during the reproduction cycle of female rats. Here we investigated two forms of short-term plasticity induced by non-genomal actions of locally released oxytocin (OT). First, we show rapid (2 h) *in vitro* GABA synapse formation induced by physiological levels of OT and 17- β -estradiol (E). Second, we show that OT renders GABA_A receptors insensitive to modulation by neurosteroids after the moment of parturition, by shifting the balance between postsynaptic PKC and phosphatase 1 and 2A. This loss of steroid sensitivity contributes largely to the elevated electrical and secretory activity of OT neurons after parturition.

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