PROGRESS IN NEUROSCIENCE PINS

Seminar Series of the
Brain & Mind Research Institute
Weill Cornell Medical College (WCMC)
&
The Graduate Program in Neuroscience of
WCMC and Sloan Kettering Institute

Thursday, 2/19/15, 4 PM, coffee at 3:45 PM
Weill Auditorium

"Oxytocin, Social Behavior, and Cortical Excitatory-inhibitory Balance"

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Abstract:

Oxytocin is important for social interactions and maternal behavior. However, little is known about when, where, and how oxytocin modulates neural circuits to improve social cognition. Here I will discuss new data from our lab on how oxytocin enables maternal behavior in new mother mice. Specifically I will focus on experience-dependent plasticity in the auditory cortex related to recognizing the significance of pup distress calls, which are important for mother mice retrieving lost pups back to the nest. Expression of retrieval behavior required left but not right auditory cortex, was accelerated by oxytocin in left auditory cortex, and oxytocin receptors were preferentially expressed in left auditory cortex. Neural responses to pup calls were also lateralized, with co-tuned and temporally-precise call-evoked excitatory and inhibitory responses in left cortex of maternal but not pup-naive adults. Pairing calls with oxytocin enhanced call-evoked responses by balancing the magnitude and timing of inhibition with excitation in virgins. Our results describe fundamental synaptic mechanisms by which oxytocin increases the salience of acoustic social stimuli. Furthermore, oxytocin-induced plasticity provides a biological basis for lateralization of auditory cortical processing.

Recent relevant publications:

Froemke, R.C. et al, "Long-term modification of cortical synapses improves sensory perception." Nature Neuroscience, (16)79-88 (2013).

Carcea, I, Froemke R.C., "Cortical plasticity, excitatory-inhibitory balance, and sensory perception." Prog Brain Res, (207)65-90 (2013).

Dorrn, A.L., Yuan, K., Schreiner, C.E., Froemke, R.C. "Developmental sensory experience balances cortical excitation and inhibition." Nature, (465)932-6 (2010).

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