EXTERNAL SEMINAR

INMED Conference Room

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Sensations driving oxytocin neurons towards sociality

The hypothalamic neuropeptide oxytocin (OT) promotes social communication via its central release in the mammalian brain. However, how social interaction affects electrical activity of OT neurons remains unknown.

To address this question, we used cell-type specific viral vectors in combination with optoelectrode techniques. We performed the in vivo single-unit recording of optogenetically identified OT neurons in the paraventricular nucleus (PVN) of adult female rats during their social interactions with unfamiliar female conspecifics. Simultaneously, we monitored behavior and recorded ultrasonic vocalizations.

Our results showed that active social interaction induced an increase in PVN theta rhythmicity, as well as in the firing rate of individual PVN OT neurons. The spikes of simultaneously recorded OT neurons were synchronised and phase-locked with the PVN theta rhythm precisely at the time of social interactions, but not during non-social exploratory behavior. To decipher which sensory stimuli trigger OT neuron activity, we performed experiments with total or partial derivation of socially-relevant visual, olfactory and somatosensory signals. We found that direct physical contact between rats, or even gentle skin stimulation, led to a profound increase in OT firing rates. In contrast, visual, auditory and olfactory signals did not significantly alter OT neuron activity. Our results indicate that somatosensory signalling is essential to activate OT neurons and, hence, induce central neuropeptide release in socially interacting female rats.

This opens perspectives for studying functional and anatomical connectivity between the somatosensory and OT systems in normal and psychopathological conditions.

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