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Signaling mechanisms in the accessory olfactory system

In most mammals, conspecific chemical communication controls complex behaviors. Information about individuality, social and reproductive status is conveyed by an elusive class of chemical cues –pheromones. The highly reproducible character of pheromone responses offers a unique opportunity to uncover the neuronal basis of genetically programmed behavior. The accessory olfactory system is a key component in rodent conspecific chemical communication. However, sensory detection and coding of socially relevant chemosignals within the vomeronasal organ and downstream brain areas - the accessory olfactory bulb, the 'vomeronasal'amygdala and the hypothalamus - is poorly understood. Combining molecular, biochemical, (electro)physiological, and live-cell imaging methods, as well as behavioral techniques in wildtype and mutant mouse models, we have extended existing models of sensory signal transduction in the vomeronasal organ, analyzed aspects underlying the principle coding logic of pheromone detection, and have, thus, shed light on the physiological basis of social behavior. More recently, we have begun to address the physiological signaling mechanisms in the rodent accessory olfactory bulb. Both in and ex vivo approaches from different electrophysiological angles reveal unexpected intrinsic as well as stimulation-dependent mitral cell properties.

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