

NEUROANATOMY AND NEUROCHEMISTRY OF SEXUAL ATTRACTION IN RODENTS

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In rodents, sexual signals are mainly chemical cues detected by the vomeronasal system. Vomeronasal information is processed in the amygdala and transferred directly to the nucleus accumbens. The chemosensory investigation of male pheromones elicited the release of dopamine in the nucleus accumbens of female rats, a finding consistent with the reinforcing nature of sexual pheromones (even in sexually naïve animals with no previous experience with adult male pheromones). However, selective neurotoxic lesions of the tegmento-striatal dopaminergic projection did not affect the attraction that females showed towards male pheromones contained in soiled bedding. The same result was obtained with systemic administration of either dopamine or opioid antagonists. Since the amygdaloid projection to the ventral striatum is mainly glutamatergic, we tested the effect of the glutamate antagonist kynurenic acid in the nucleus accumbens. The local infusion of kynurenic acid in the nucleus accumbens shell reduced the time females spent investigating the male pheromones as well as the associated dopamine release. Therefore, glutamatergic amygdaloid projections to the nucleus accumbens, apparently bypassing the dopaminergic tegmento-striatal pathway, mediate the reinforcing effects of male pheromones in the female brain. A thorough analysis of the amygdaloid pathways to the ventral striatum revealed important projections to the olfactory tubercle and the associated islands of Calleja. Consistent with these neuroanatomical data, lesions of the medial olfactory tubercle and ventromedial island of Calleja abolished the female preference towards male pheromones. In summary, sexual pheromones elicit unconditioned appetitive responses (even in sexually naïve animals) by means of glutamatergic projections from the vomeronasal amygdala to the medial ventral striatum. Although sexual attraction in humans is mediated mainly by visual cues, similar amygdalo-striatal projections do exist and are activated by visual erotic stimuli.

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