



# Synaptotagmin I, a molecular target for steroid hormone signaling controlling the maturation of sexual behavior in an insect

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As in vertebrates, the insect steroid hormones, especially 20-hydroxyecdysone (20E), initiate and regulate sexual behavior by acting on the central nervous system. This 20E action is, in part, triggered by transcriptional events mediated through the binding of 20E to a heterodimer comprising the ecdysone receptor (EcR) and ultraspiracle (USP). However, to date, our knowledge about this genomic steroid pathway remains incomplete. In moths, males detect female sex pheromones, eliciting stereotyped sexual behavior. In *Agrotis ipsilon* males, the behavioral response and the neuronal sensitivity to sex pheromone in the olfactory center, the antennal lobe (AL), increase with age. We recently showed that 20E controlled this age-dependent olfactory plasticity via the activation of an EcR/USP-dependent pathway in the AL. Here, we cloned the gene encoding *A. ipsilon* synaptotagmin I (Aisytl), a presynaptic vesicle protein known to act as a calcium sensor in neurotransmitter release. Aisytl was expressed in the AL, where its amount increased with age, whereas its knockdown inhibited the sex pheromone-oriented flight of males. 20E administration to males induced AL Aisytl expression in a dose-dependent and time-dependent manner. Moreover, *A. ipsilon* EcR silencing caused decreases in AL Aisytl expression and the behavioral response to sex pheromone. Our results show that the synaptotagmin I gene is a target gene for the genomic steroid signaling that controls the expression of insect sexual behavior by acting on central sex pheromone processing. This study thus represents a significant advance in our understanding of the steroid actions that influence neural functions, and thereby behavioral plasticity, in various organisms.

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