PHYSIOLOGY

Examining the role of muscarinic acetylcholine receptors in regulation of larval *Drosophila melanogaster* feeding and locomotion*.*

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Acetylcholine (ACh) is an abundant neurotransmitter found in many species across various taxa.  In mammals, it is integral in modulating neural circuits underlying processes such as learning, memory, and reward processing.  In *Drosophila melanogaster*, ACh exhibits comparable importance and is known to influence a number of behaviors, including locomotion and feeding; however, the receptor subtypes through which ACh imparts its modulatory influence in this model is poorly understood. The receptors that facilitate synaptic transmission at cholinergic synapses and beyond are divided into two broad subtypes: the ionotropic nicotinic acetylcholine receptors (nAChRs) and the metabotropic muscarinic acetylcholine receptors (mAChRs).   Here, we have utilized combined pharmacological and genetic approaches to assess the role of muscarinic receptors (mAChRs), specifically, in regulating two essential behaviors: locomotion and feeding in larval *Drosophila*.  We have revealed that acute and chronic exposure to a mAChR agonist, muscarine, and receptor antagonist scopolamine, significantly alters both behaviors.  Moreover, tissue-specific mAChR knockdown also significantly modifies both locomotion and feeding.  The results suggest these receptors play an integral role in mediating ACh regulation of these fundamental behaviors.  Additionally, we are currently adding to this knowledge by testing the impact on developmental rates with reduced mAChR expression and developmental exposure to receptor agonists and antagonists.

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