The Impact of Gut-Brain Neurotransmitter Signaling on Reproductive Success

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The signaling between the gastrointestinal (GI) tract and the brain is incredibly important, as it manages multiple processes, including hunger rates. This signaling impacts eating patterns which in turn affects reproductive success. The signaling process begins with a response to external and internal stimuli, via the release of neuropeptides from cells within the gut. From humans to the Drosophila melanogaster, this transmission system is extremely similar, and this interaction is crucial to the development of, quantity, and survivability of offspring. One of the critical signaling molecules is the neuromodulator octopamine (OA) for flies, which in humans is norepinephrine (NE), also called noradrenaline. Without the neurotransmitter, flies are predicted to consume less food, which may affect the copulation rates, the number of embryos laid by the females, and the survivability of the embryos. I performed gut dissections to learn of the anatomy, then fertility experiments with the necessary control females and experimental females. Cages were set up for the respective crosses (EE-splitGal4/+ females X Canton S (CS) males, UAS-OAalpha2R(RNAi)/+ females X Canton S males, and EE-splitGal4/UAS-OAalpha2R(RNAi) females X CS males, the experimental group where the Octopamine-alpha2R (OAa2R) receptors were suppressed). The OAa2R receptors of Drosophila were suppressed to identify the impact of OA signaling on reproductive success, and the number of embryos laid on the plates for three hours were counted, to demonstrate that OA signaling through the receptor, OAa2R, plays a critical role in everything from the females' fertility to the survivability of the embryos.

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