INVESTIGATING THE RELATION BETWEEN VALENCE AND LOCOMOTOR PERFORMANCE USING WELL ESTABLISHED OPTOGENETICS IN *DROSOPHILA MELANOGASTER*

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In affluent nations, depression is the single greatest burden on society and health care systems. Anhedonia, defined as the lack of positive affect and appetitive motivation, is the main component of depression and a symptom in many psychiatric disorders. It has been previously shown that chronic stress can induce anhedonia-like qualities, such as a lack of motivation and sleep disorders, in *Drosophila melanogaster,* the vinegar fly. In this commonly used genetic model, 60% of the genome is homologous to human genes and 75% of human disease-causing genes have functional homologs in flies.

In the fly's brain, the mushroom body (MB) is the central region for learning, locomotion, sleep, and appetitive motivation. It is possible that there is a connection between MB circuitry and anhedonia-related processes. The MB is thought to regulate valence, the degree to which something is approachable or aversive, a function conserved between flies and mammals. MB output neurons (MBONs) have been proposed to drive both learned and innate valence-related behaviours. However, our preliminary data indicate that, in addition to affecting valence-related behavior, the activation of specific MBON populations elicits direct changes in locomotor activity. Thus, I hypothesize that specific MBONs are involved in basic locomotion and motor function. I am testing this hypothesis with a behavioural genetic screen to assess which aspects of locomotion are modified by MBON activation or silencing to generate a bias between approach and avoidance. I will also investigate if the co-activation or co-silencing of MBONs is additive or subtractive in overall motor performance.

This study will advance our understanding of the MBON locomotor circuitry and the mechanisms of how MBON inputs guide approaching and avoidance behaviours, with the aim to further elucidate the link between anhedonia and MBONs.