

# Development of a new high-throughput assay for behavioral sensitization to psychostimulants in *Drosophila melanogaster*

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Addiction to psychostimulants is a serious behavioral disorder that leads to a cascade of neurochemical changes in the brain associated with pathological form of neuroplasticity. Studying these changes is important in order to understand long-term effects that drug have on the brain, with the goal to define treatments which will prevent or cure addiction. Behavioral sensitization is defined as stronger behavioral response to repeated drug administration of the same dose and it is related to sensitize craving for drugs in humans. Because, behavioral sensitization is caused by long-term changes in the brain functioning, it is often studied in the model organisms.

In *Drosophila*, behavioral sensitization is traditionally measured using video recordings followed by visual analysis, which is time consuming process and prone to subjectivity. In this study we are defining a new, high-throughput assay for measuring behavioral sensitization in *Drosophila*. The assay is an adaptation of “*Drosophila* Activity Monitoring System” (DAMS), which allows long term monitoring of the changes in locomotor activity and sleep in large numbers of flies.

We are testing different protocols with the aim of achieving a reproducible stronger locomotor response to the second exposure of the drug in same concentration. In the process we are varying drug concentrations, duration of exposure to the drug and the length of the time between exposures. We are testing responses to cocaine and methamphetamine which are delivered through food. Both of these drugs interact with the mechanisms of arousal in mammals and flies, and lead to increased wake activity and decreased sleep.

Our aim is to undertake a behavioral screen for genes which are involved in the process of behavioral sensitization. Identification of such genes will enable investigation of mechanisms which underlie sensitization, and are related to craving and development of addiction in mammals.

Keywords: addiction, psychostimulants, *Drosophila*, behavioral sensitization, locomotor activity

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