The Effect of Traumatic Brain Injury and Metformin on Drosophila Learning

Bilton, Hannah

Bilton, Emma

Traumatic brain injury (TBI), whether mild, moderate or severe, can alter one's everyday life. One of the major foci of initial treatment after TBI is the design and implementation of interventions to train individuals to learn new knowledge and skills or new ways to access previously acquired knowledge and skills. Drosophila melanogaster, or fruit flies, are used as an animal model due to their fast reproductive cycle and their similar nervous system to that of a human. Metformin, a drug typically used for patients with type 2 diabetes, recently has been shown to promote neurogenesis in mice. This increase could potentially reverse the effects of a TBI by creating new nervous tissue to repair the lesion area. It was hypothesized that Metformin would increase Drosophila's ability to learn after sustaining a TBI due to increased neurogenesis. The Drosophila were starved over a 16-hour period and either given water (as a control) or a mixture of Metformin and water. During this period, they were injured using a gyro-mini and a vortex mixer. Learning was tested using two odors, both unpleasant, but one associated with a reward, sucrose. Then, they were put in a T-Maze with both odors in order to determine learning occurred. TBIs significantly decreased learning in flies with and without Metformin ($p<0.05$). Additionally, the overall average of Drosophila that made the correct choice decreased with the addition of Metformin. In the future, examining different dosages of Metformin would help to determine the effectiveness of the drug on learning.

Awards Won:

American Psychological Association: Certificate of Honorable Mention