Methylene Blue May Mitigate Symptoms of Traumatic Brain Injury

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The goals of this study were to develop a Drosophila melanogaster model of traumatic brain injury (TBI) using the “High Impact Trauma” (HIT) device to inflict injury and induce vacuolar lesions in the neuropil, incapacitation, and compromised mobility post-injury. In addition, the goal was to treat specimens with methylene-blue as a preventative measure to mitigate the severity of TBI. Traumatic brain injury is a worldwide cause of irreversible injury or death. The most common causes include falls, vehicle collisions, sports injuries, and armed or unarmed assault, and emergency room visits due to TBI have been increasing for all age groups. Currently, no effective, treatment for TBI exists, and there are limited preventative measures. Consequently, a readily-available treatment such as methylene-blue should be investigated. Prior to injury, D. melanogaster were treated with 1 or 5 mg/kg doses of methylene-blue. The HIT device was constructed and standard procedure of four strikes was used to inflict specimens with mild to moderate TBI. All specimens underwent incapacitation and climbing assays, and specimens were histologically analyzed to detect morphological changes to the brains, primarily vacuolar lesions and damage to the retina and fenestrated membrane. Results were graphically and statistically analyzed to compare uninjured/untreated controls, injured/untreated groups, and injured/treated groups. Injured specimens exhibited significantly greater incapacitation and loss of mobility than controls, which was significantly ameliorated by treatment with 5 mg/kg of methylene-blue. Injured groups also seemed to exhibit more severe neurodegeneration than treated and control groups. Thus, methylene blue may be an effective preventative treatment for TBI.

Awards Won:
Second Award of $2,000