Metformin as a Novel Neurogenic Method of Methylmercury Neurotoxicity Symptom Mitigation in Danio rerio as a Model for Human Fetuses

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Methylmercury has become a prevalent issue in our environment as a result of chemical runoff. People around the world, primarily in developing coastal regions, are exposed to mercury by eating fish which have methylmercury bioaccumulation. This process is linked to neurodegenerative disorders such as Alzheimer's and Huntington's disease. Issues associated with methylmercury exposure are even more prevalent in fetuses whose rapid brain development makes them more susceptible to neural abnormalities that can lead to deficiencies in neurobehavior. Metformin has recently been suggested to promote neurogenesis by increasing neural stem cell function and enhancing spatial memory formation. Given these developments, this project hypothesized that Metformin may be able to counteract effects of mercury exposure in a Danio rerio. Five assays were used to asses locomotion, ability to react to a stimulant, sociability, anxiety levels, and circadian rhythm of the fish when exposed to either 30nm of Methylmercury, 10um of Metformin, or a combination of both. The results from each treatment group were then compared to a group of control fish. The assays found that methylmercury inhibited the ability of the zebrafish to exhibit instinctive behavior. These fish were less social, exhibited less locomotion, were over anxious, and were less responsive to stimulants. However, the treatment group that was treated with both methylmercury and Metformin exhibited very similar behavior to the control group. This project suggests that Metformin was able to lessen methylmercury induced symptoms in Danio rerio and provided insight into a potential role of Metformin in neurodegenerative disease remediation.

Awards Won:
First Award of $5,000
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