# The Mechanism of Methylmercury Permeation Through the Blood-Brain Barrier Using C. elegans

Jaffery, Zehra (School: Jasper High School)

Methylmercury is a neurotoxin present in fish tissues that permeates the blood-brain barrier (BBB) after consumption. Previous research has shown that methylmercury is harmful to neurons, causing pH alterations, oxidative stress, excitotoxicity, and parenchymal damage. Methylmercury is a known factor of neurological disorders including Alzheimer's and Parkinson's. The method by which methylmercury passes through the BBB is unknown. According to preliminary studies, one way methylmercury crosses the BBB is by creating a complex with L-cysteine, which facilitates its passage by the LATs system through mimicking another amino acid existing in the body. The human BBB was studied using C. elegans as a model organism. It was hypothesized that if methylmercury passes through the BBB of C. elegans faster with L-cysteine present than without L-cysteine present, the methylmercury's adverse effects (death and locomotive difficulty) will occur sooner. Each of the four experimental groups contained one C. elegans: the control, the L-cysteine group, the methylmercury group, and the methylmercury and L-cysteine combination group. The effects of L-cysteine and methylmercury on C. elegans were studied using three metrics: viability, locomotive disability, and time for locomotive effects to occur. The group that received both methylmercury and L-cysteine had reduced viability rates and shorter time for locomotive difficulty to develop, supporting the hypothesis. These findings suggest that L-cysteine aids methylmercury permeation through the BBB. Because the experiment indicates how methylmercury penetrates the BBB, these results aid in finding a therapeutic solution to reverse methylmercury neurotoxicity in the brain.

**Awards Won:**

Second Award of $2,000