Arsenate exposure and hemoglobin gene expression in *D. magna*

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The metal-refining smelters that were present in the Tacoma area are the main cause of arsenic toxicity in both the soil and water around the Puget Sound region. Arsenic is a chemical element that is known for its negative health effects in both wildlife and humans, as it is associated with several different types of cancer. The negative health effects caused by arsenic poisoning can be correlated to its ability to bind to hemoglobin, a protein in the blood containing iron that binds to oxygen in order to provide nutrients to cells in the body. This led us to propose that arsenic exposure could potentially affect the hemoglobin levels in *Daphnia magna* by altering gene expression. We hypothesized that DNA analysis would point towards a significant change in the level of hemoglobin gene expression in the Daphnia. Six groups of adult *D. magna* were exposed to 0 µg/mL, 0.02 µg/mL and 0.2 µg/mL of arsenate and were exposed for three hours to measure the effect of acute toxicity. The Daphnia from each of the groups were then crushed and RNA was extracted using a reagent called Trizol to produce complementary DNA via PCR. This process was then repeated with a different population of Daphnia to measure the effect of chronic exposure to arsenate. The DNA samples were then analyzed using gel electrophoresis, where we observed the genes *Dhb1, Dhb2,* and *Dhb3*. The hypothesis proposed was supported in this study, as the gene expression of the hemoglobin gene *Dhb2* was significantly affected in both exposure groups in that the acute exposure group exhibited significantly lower gene expression while the chronic exposure group exhibited significantly higher gene expression.