Heavy Metal Snails: Arsenic Exposure and Bioaccumulation in Chinese Mystery Snails (CMS)

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The ~100 year operation of the ASARCO copper smelter in Tacoma, WA released emissions of arsenic (As) into the surrounding lakes before it was destroyed. Shallow lakes with As-contaminated sediment can release As into the water and contaminate primary consumers, such as Chinese mystery snails (CMS). In this study, we investigated the immune response to acute As exposure in juvenile CMS. We hypothesized that arsenic exposure would lead to higher hemocyte counts in the hemolymph as a result of immune response and elevated As levels in tissue samples. Following acute waterborne As(V) exposure, hemocyte cell counts and arsenic concentration in tissue samples were measured at the end of exposure. Snails exposed to 20 ppm of arsenic for nine days were compared to an untreated control group. Hemocytes were counted using a hemocytometer and tissue was processed for ICP-MS. We observed significantly higher hemocyte counts in the exposed group compared to the control group ($p < 0.05$) and a significantly higher concentration of arsenic in the whole tissue samples of the As exposed group compared to the control group ($p < 0.001$). Our study suggests a possible connection between As exposure and inflammation while highlighting the immune response of CMS to As contamination and suggests using hemocyte number as a biomarker for As-induced immune response. The findings also raise more questions about the connections of As exposure to disruption of the CMS gut microbiome, potentially worsening inflammation.