Perchlorate Exposure and Its Effects on *Daphnia magna* Morphology, Hemoglobin Expression, and Lipid Metabolism

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Perchlorate contamination is an emerging health concern in aquatic ecosystems and has the potential to disrupt physiological processes in vertebrates. *Daphnia magna*, a freshwater zooplankton, are particularly sensitive to chemical stressors. Perchlorate is a widely known endocrine disruptor, but its effects on invertebrate molecular and physiological responses are limited. This study investigated the overarching question: How does exposure to an environmentally relevant concentration of perchlorate affect the morphology, hemoglobin gene expression and lipid synthesis in *Daphnia magna*? We hypothesized that perchlorate exposure will decrease body morphometrics, alter hemoglobin expression, and interrupt lipid homeostasis. We exposed *D. magna* to 10ppm of perchlorate for a 7-day period. Morphological measurements (body size, body width, apical spine length, & head length) were recorded using microscopy and ImageJ software. Hemoglobin gene expression was quantified utilizing RT-PCR and total lipid content was analyzed using Nile Red staining and fluorescence microscopy. Perchlorate exposure did not lead to any significant changes in morphology. Out of the 3 hemoglobin genes (*dhb1*, *dhb2*, *dhb3*) tested, *dhb1* was found to be significantly downregulated following a 48hr exposure to 10ppm perchlorate. Lipid analysis demonstrated an increase in lipid accumulation in female *D.magna* exposed to 10ppm perchlorate. Perchlorate exerted multi-level effects on *D.magna*, with implications for survival, oxygen transport, and lipid metabolism. For future research, we aim to incorporate larger sample sizes and conduct long-term exposures (multi-week) to further evaluate morphological effects,molecular, and metabolic impacts.