UNIVERSITY of WASHINGTON TACOMA

Effect of sodium perchlorate on lipid accumulation of *Daphnia magna*

Joy Deller, Hashim Hashi, Dr. Alison Gardell

Why Perchlorates?

- Widely used in society
- High water solubility (Acevedo-Barrios et al., 2018)
- Persistent contaminant in aquatic environment (Zhou et al., 2021)
- Alter metabolism, reproduction, development, & absorption

Why *Daphnia magna*?

- Pollutant sensitivity (Acevedo-Barrios et al., 2018)
- Shares most genes with humans (Jordao et al., 2016)
- Perchlorate increased lipid droplet accumulation in stickleback fish (Gardell et al,. 2017)
- Transparent carapace
- TBT or tributyltin disrupted lipid metabolism (Jordao et al., 2016)

For More Information:

Please contact: joy4869@uw.edu

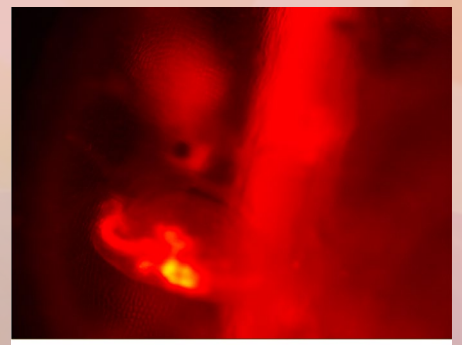

Figure 1: Gravid *D. magna* with two parthenogenetic embryos in its brood.

Methods & Materials:

- Adult *D. magna*
- perchlorate treatments: 0, 10, & 100 mg/L
- Food levels: low (10 ul) & high (100 ul) instant algae
- Exposure times: 3 & 5 days
- Fluorescent microscope
- Nile red staining
- Sonication & Microplate reader analysis

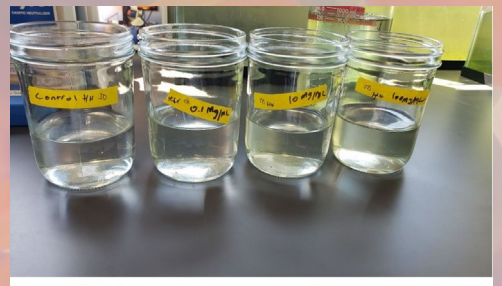

Figure 2: Serial dilution of sodium perchlorate with ADaM, an artificial fresh water for the culture of zooplankton. Actual concentrations used after refinements of protocol are: 0, 10, & 100 mg/L of sodium perchlorate.

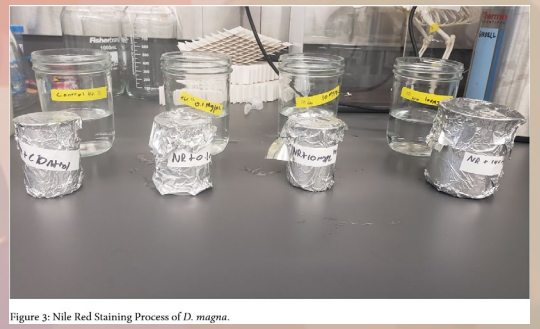

Figure 3: Nile Red Staining Process of *D. magna*.

Results:

Qualitative assay in figure 4 exhibited lipid accumulation in 0 and 10 mg/L in which it was difficult to count individual droplets. Quantitative assay showed 100 mg/L treatment had the most lipid accumulation.

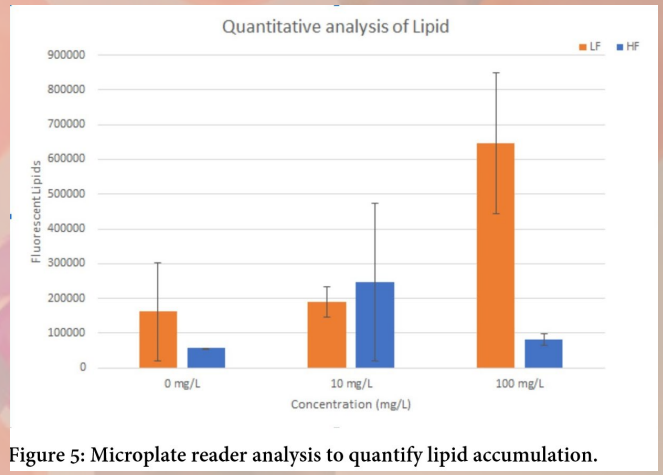

Figure 5: Microplate reader analysis to quantify lipid accumulation.

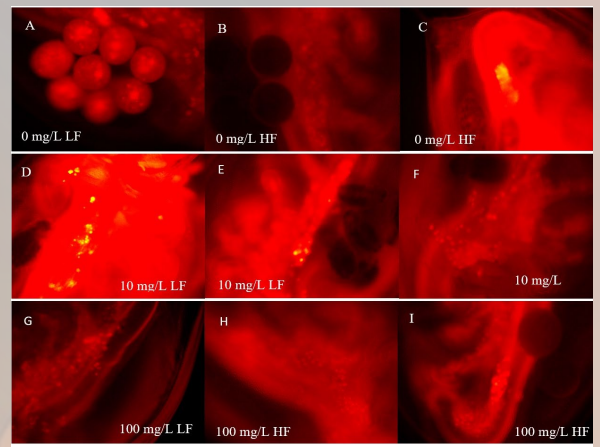

Figure 4: Fluorescent microscope used for observation of lipid accumulation in *D. magna*.

Conclusion:

Qualitative analysis illustrated mixed results. Quantitative analysis showed 100 mg/L had the most lipid accumulation. Further research is necessary.

References:

- Barrios, R., Marco, C., & Verbel, J. 2018. Ecotoxicological assessment of perchlorate using in vitro and in vivo assays. Environmental Science and Pollution Research. 25: 13697-13708
- Gardell, A., von Hippel, F., Adams, E., Dillon, D., Peterson, A., Postlethwait, J., Cresko, W., & Loren Buck, C. 2016. Exogenous iodide ameliorates perchlorate-induced thyroid phenotypes in threespine stickleback. General & Comparative Endocrinology. 243: 60-69.
- Jordao, R., Garreta, E., BCampos, M., Soares, A., Tauler, R., & Barata, C. 2016. Compounds altering fat storage in *Daphnia magna*. *Science of the total Environment.* 545-546: 127-136.
- Zhou, J., Du, N., Li, D., Qin, J., & Chen, G. 2021. Combined effects of perchlorate and hexavalent chromium on the survival, growth and reproduction of *Daphnia carinata*. Science of the Total Environment. 769: 144676.