You Take My Breath Away: The Influence of Heavy Metal Exposure on Metabolism in Rotifers

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Abstract:

Anthropogenic activities introduce heavy metals into aquatic habitats. Metals are persistent and can harm organisms through alterations to metabolic rate and, by extension, changes to respiration rate. Here, we determine if exposure to heavy metals influences respiration rates and if prior long-term exposure to toxicants impacts the degree of change. To investigate this, we isolated *Epiphanes brachionus* and *E. chihuahuaensis* from a polluted habitat and from a non-polluted habitat, respectively, and determined the concentrations of copper that result in 50% mortality (LC50) of exposed animals. Probit analysis indicated an LC50 of 0.042 mg $CuSO_4$/L for *E. brachionus* and 0.067 mg $CuSO_4$/L for *E. chihuahuaensis*, slightly lower than the average seen across monogonont species (~0.096 mg $CuSO_4$/L). Next, we exposed rotifers to 70% of the LC50 for 24 hrs and then monitored the resulting changes in respiration rate that occurred over a subsequent 2 hr recovery period. Trials are ongoing, but the average control respiration rates are 2.26 pmol/min/ind (SD=1.01) and 2.87 pmol/min/ind (SD=1.16) for *E. brachionus* and *E. chihuahuaensis,* respectively. Following copper exposure, *E. brachionus* showed a reduction in respiration rate by approximately 66%. Trials are ongoing for *E. chihuahuaensis.* While no studies have examined rotifer respiration responses to toxicant exposure, research on *Daphnia longispina* showed that less resistant lineages had increased respiration when exposed to sub-lethal levels of copper. These results will help inform researchers of how prior exposure to toxicants may mediate rotifer physiological responses to future exposures.

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