# The effect of chronic exposure of mercury, on the glutathione dependent enzymes of *Lymnaea natalensis* freshwater snails

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Contamination of water bodies by heavy metals poses a threat to the health of aquatic organisms. Heavy metals bioaccumulate within living organisms, and participate in biochemical reactions that result in oxidative stress. Mercury has a high affinity for thiol-containing molecules such as glutathione dependent enzymes, and tends to bind and interfere with the enzyme's biochemical activities for combating oxidative stress. The current study therefore was aimed at investigating the effect of chronic exposure of mercury on the glutathione dependent detoxifying enzymes: glutathione S-transferase (GST), glutathione peroxidase (GPx) and glutathione reductase (GR), of *Lymnaea natalensis* freshwater snails.

Groups of adult snails were exposed to tap water spiked with mercury to a final concentration of 0.002 mg/l for 28 days. Control had no mercury. Water and feed (lettuce) were changed daily, and samples collected at 1, 7, 14, 21 and 28 day intervals. Post mitochondrial fractions were used to measure enzyme activity.

Compared to the control, GST activity was significantly reduced throughout the exposure period where activity was 55.5, 39.4, 47.4, 20 and 68 mmoles/min/mg protein for day 1, 7, 14, 21 and 28 respectively ($p< 0.01$). Contrary to the trend observed with GST, GPx and GR demonstrated instances of either increased enzyme activity or unaltered activity. Relative to the control, GPx activity was significantly high on days 7 and 21, at 11.7 and 13.6 mmoles/min/g protein respectively ($p< 0.05$). Enzyme activity on days 1, 14 and 28 did not differ significantly from the control, and ranged between 8-10 mmoles/min/g protein. Glutathione reductase activity was significantly higher than that of the control on day 1, where activity was 62.7 mU/ml ($p< 0.01$). From day 7-28, GR activity did not differ significantly from the control, varying between 30-40 mU/ml.

The results demonstrate that in freshwater snails, GST is the most sensitive to the toxic effects of mercury evidenced by reduced enzyme activity throughout the exposure period. Glutathione peroxidase and GR on the other hand, may have better tolerance to mercury toxicity.

**Keywords**: Mercury, glutathione dependent enzyme, *Lymnaea natalensis*