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TRACE ELEMENTS IN LIVING ORGANISMS - AISETOV

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Department of Veterinary Medical Sciences DIMEVET
***Alma Mater Studiorum*, University of Bologna**

The role of trace elements in health: from healthy environments to healthy living organisms

ABSTRACT BOOK

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P-04. Biomarker responses to exposure of trace metals and a thiocarbamate fungicide in the pond snail *Lymnaea stagnalis*

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Freshwater pulmonate mollusks are commonly used for the study of neurotoxic effects and developmental disorders. Their biochemical responses to toxic substances have so far been studied to a much lesser extent. The goal of the present study was to evaluate the involvement in metal homeostasis and stress response of metallothioneins and a number of cellular biomarkers in the *Lymnaea stagnalis* upon exposure to typical environmental pollutants, including metals and a zinc and manganese containing thiocarbamate fungicide, called TATTOO (Bayer CropScience Inc., Alberta, Canada). The snails were subjected to copper (Cu^{2+}, 10 $\mu g \cdot L^{-1}$), zinc (Zn^{2+}, 130 $\mu g \cdot L^{-1}$), cadmium (Cd^{2+}, 15 $\mu g \cdot L^{-1}$) and the fungicide TATTOO (mixture of propamocarb and mancozeb (91 $\mu g\ L^{-1}$) during 14 days.

All exposures to metals caused the elevation of the concentration of metals (Zn, Cu or Cd) in the tissues and the level of metallothioneins detected from their thiols (MT-SH). TATTOO did not affect the levels of metals in the tissue and MT-SH. However, the rate of the metalation of MTs (MT-Me) increased only by Cd and TATTOO. Moreover, the expression of MTs detected as MT mRNA concentration was not changed in all exposures. These discrepancies in the MTs responses could be explained by some reasons: 1. shortcoming of the method of MT-SH determined after the ethanol/chloroform extraction from tissue (the extract can also contain other low weight cellular thiols); 2. imbalance in the MTs turnover. In any case, the elevation of MT-SH by exposures to metals was corresponding to the decrease in the lipid peroxidation rate, reflecting probably the scavenging activity of low weight thiols. The particular effect of TATTOO was the decrease of cholinesterase activity typical for thiocarbamates. Different manifestations of oxidative stress response were detected in each exposure. Most consecutive response was the depletion of Mn-superoxide dismutase.