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Title: Accumulation of Heavy Metals in Freshwater Fish-An Assessment of Toxic Interactions with Calcium

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Abstract: The present investigation deals with the interaction between accumulation of waterborne lead, cadmium and chromium with different calcium concentration (1.0, 2.0, 3.0 and 4.0 mM L⁻¹) in *Cirrhina mrigala* fingerlings in the laboratory. There was no mortality occurred in metal alone and metal treated with calcium. At the beginning there was no significant differences observed between Pb, Cd and Cr alone and combination with calcium in muscle as well as whole body at lower calcium concentration, but with increasing exposure period marked differences were observed. In muscle tissue accumulations was very much lower compared to whole body and significantly lower below human consumption level. In binary mixtures of Pb, Cd and Cr with calcium, the calcium compound was found to consistently reduce the toxic effect as well as accumulation of Pb, Cd and Cr compounds. Increased Ca levels showed lower transfer of Pb, Cd and Cr from water to the gills which resulted slower transfer of metal from the gills to the blood indicated lower accumulation rates in muscle tissue compared to metal without Ca. An increase in calcium concentration of approximately 3 and 4 mM L⁻¹ resulted in a 46 and 54% decrease of Pb uptake, 55 and 58% of Cd and 41 and 53% of Cr uptake in whole fish at 28 days exposure period. There is an inverse relationship between calcium concentration in the water and metal uptake in whole body, muscle as well as gills of the *Cirrhina mrigala*. Calcium has strong antagonistic effect on Pb, Cd and Cr accumulation and toxicity. Predicted and experimental values of Pb, Cd and Cr concentration in fish body treated with calcium verified in terms of root mean square percent deviation and correlation coefficient which exhibit fair agreement.

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