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Hypothesis of the Lead Defense Mechanism of Carp(*Cyprinus carpio*)

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Abstract:

We examined the recovery mechanisms of carp(*Cyprinus carpio*) in response to severe lead poisoning by exposure over 28 and 114 days. Based on the findings, we developed a hypothesis to explain the main defense mechanisms employed by carp. Under conditions of acute lead poisoning using lead concentrations exceeding 1.0 mg/L, the mechanism employed to prevent the absorption of lead in solution through the gill epithelia was the formation of a mucous membrane on the surface of the gills and body, which acted as a ligand for lead. Conversely, for lead concentrations lower than those required to induce acute lead poisoning, carp may prevent lead uptake by hematopoietic organs by elevating production of 5-aminolevulinic acid dehydratase(ALA-D), which has a high affinity for lead, in the erythrocytes. Since this mechanism is thought to occur in conjunction with hemoglobin biosynthesis, the general defense mechanism employed by carp is thought to be a cumulative response using the two aforementioned physiological mechanisms.

Key words: fish, lead, poisoning, defense, acclimatization, carp

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