CYTOSOLIC DISTRIBUTION OF Cd^{2+} , Cu^+ , AND Zn^{2+} AMONG METALLOTHIONEIN-LIKE PROTEINS IN LOBSTER HEPATOPANCREAS

Joseph Schultz, Zhiwu Zhu, David H. Petering, and C. Frank Shaw III

Department of Chemistry, University of Wisconsin-Milwaukee, Milwaukee, WI-53201-0413, USA

Zinc and Cu metabolism in crustacea changes dramatically during the molt cycle. Metallothionein (MT) and MT-like proteins are implicated in the handling of both metal ions as well as in the detoxification of Cd. Distribution of Cd^{2+} , Cu^+ , and Zn^{2+} in cytosol and among MT-like species has been determined. Lobsters were treated to induce MT as in mammals with dexamethasone (dex) or stress from the surgical removal of a small walking toe both with and without a subsequent injection of CdCl_2 . Untreated tissue contains only $\text{Cu-MT}_{\text{III}}$ and no other significant amounts of metal-bound MTs. Exposure to dex or surgery alone causes no change in the MTs. Exposure to Cd^{2+} retains the $\text{Cu-MT}_{\text{III}}$ and produces little $\text{Cd-MT}_{\text{I,II}}$. When dex or surgery is combined with Cd^{2+} injection, $\text{Cu-MT}_{\text{III}}$ is unaffected and large quantities of $\text{Cd-MT}_{\text{I,II}}$ are made. Preliminary results indicate that dex or surgery induces the synthesis of apo-MT in the hepato-pancreas which serves as a site for binding cadmium.

Supported by NIH grants ES-04026 and ES-04184.