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Monday, August 7, 2006

Poster Session

Final Abstracts

M-145

Mercury and Selenium Speciation in Fish Tissues

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Little is known about the cellular speciation of mercuric ion or methylmercury. Chemically, both should bind exclusively to sulfhydryl groups and rapidly equilibrate among them within cells and between tissues. It is hypothesized that nutrient selenium, perhaps as selenide, forms an adduct with mercurial species in vivo that competes with mercurial binding to sensitive sites. We have used inductively coupled mass spectrometry (ICPMS) to detect Hg and Se at sub ppb concentrations to analyze the distribution of Hg and Se in tissue samples from King Salmon and Walleye. Tissues contained between 0.2-1.4 ppm Hg and Se and 5-33 ppm Zn, for comparison. Tissues were homogenized and fractionated by gel filtration (Sephadex G-75) chromatography and the fractions examined for Hg and Se. The analysis of Salmon muscle revealed similar concentrations of Hg associated with high molecular weight (HMW) protein, possibly metallothionein, and low molecular weight (LMW) molecules. The Walleye distribution was qualitatively similar with most of the Hg in the LMW fractions. In both tissues, Se was largely confined in LMW forms. The Walleye profiles of Hg and Se showed strong overlap, suggesting the possible presence of a Hg-Se complex. Salmon heart also revealed Hg distributed across the molecular weight range with Se localized in the LMW region. The distributions of Hg and Se were different in Salmon liver. Most of the Hg appeared in fractions between the HMW (ca. ≥ 75 kDa) and metallothionein (10 kDa) bands; a small peak was also associated with LMW molecules. A HMW and a dominant LMW Se peak were detected. These results encourage the hypotheses that Hg displays tissue specific binding site distribution and that in muscle Hg and Se may form complexes. More refined separation of cytosol is needed to define the actual sites of binding of Hg. Once this is done, we can begin to consider in molecular detail how Hg species contribute to its toxicity. Supported by NIH-ES-04026 and NIH-ES-04184