

SELENIUM'S PIVOTAL ROLE REGARDING THE HEALTH RISK OF MERCURY IN SEAFOOD

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Prior assumptions regarding effects of maternal MeHg exposures from seafood consumption were based on incomplete understanding of the molecular mechanism of MeHg toxicity. However, it is now clear that MeHg is a highly specific irreversible inhibitor of selenium (Se)-dependent enzymes (selenoenzymes). As a result, adverse effects of MeHg exposures will occur when MeHg intakes approach, and especially as they exceed dietary Se intakes during pregnancy. Since increased ocean fish improves the Se status of both the mother and her child, it is important to consider the beneficial effects of seafood as well as potentially adverse effects of increasing MeHg exposure. To assess the relationship between MeHg exposures and Se intakes, the Se-Health Benefit Value (Se-HBV) was developed. Negative Se-HBV's indicate the relative health risks while positive Se-HBV's reflect the relative benefits expected to accompany seafood consumption. This criterion is easy to understand and is intended to improve consumer safety while providing criteria that are appropriate for hypothesis testing. Predictions based on the molecular mechanism of MeHg toxicity have been confirmed by the consistent finding that adverse child outcomes accompany maternal consumption of seafoods with negative Se-HBV's, but that health benefits accompany maternal consumption of ocean fish with positive Se-HBV's. These results indicate that Se-HBV's provide a consistent basis for considering the results of the existing human studies, just as they have been proven to be far more accurate and reliable criteria in a series of controlled laboratory animal studies. Use of the Se-HBV as seafood safety criteria to replace criteria based on MeHg exposure alone will improve seafood safety while enhancing consumer understanding of the benefits of seafood consumption. The Se-HBV paradigm will alleviate misunderstandings that have occurred because of statistical confounding that occurred due to mistaken assumptions about the nature of Hg toxicity. Those mistaken assumptions led to the current Hg advisories regarding maternal seafood consumption, but are expected to soon be resolved. Seafood safety criteria that include a balanced consideration of nutrients and toxicants will protect and improve public health by properly limiting hazards while encouraging maternal consumption of seafoods that enhance healthy child development.