



Patuxent Science Meeting 2004 Poster Abstract

Hepatic oxidative stress in young and adult waterfowl species exposed to lead-contaminated sediment.

D.J. Hoffman, R. Mateo, G.H. Heinz, and D.J. Audet

Lead (Pb) exposure can result in lipid peroxidation of cell membranes and variations in glutathione (GSH) concentration, accounting for some of the adverse effects of Pb on vertebrate tissues. The toxicity of Pb-contaminated sediment, related to mining activity in the Coeur d'Alene River Basin (CDARB) in Idaho, was studied with respect to hepatic oxidative stress in two species of waterfowl. The relationship among liver Pb, thiobarbituric acid-reactive substances (TBARS), and GSH in growing young of Canada geese (*Branta canadensis*) and mallards (*Anas platyrhynchos*), and in adult mallards was examined. Day-old goslings and ducklings received control diets, or CDARB sediment (3449 ug/g lead) in diets at 12% or 24% (414 and 828 g Pb/g of final diet) for the first six weeks post-hatching. Adult mallards received similar diets over a ten week exposure period. When goslings and ducklings were compared: Liver Pb concentrations increased more in mallard ducklings than in goslings; the highest lead exposure caused a greater and more significant increase in TBARS in goslings (86%) than in ducklings (20%). Hepatic TBARS concentration was correlated with liver Pb concentration in goslings ($r=0.78$); Although both species showed an increase in hepatic GSH concentration with Pb exposure, GSH levels at the highest exposure level were higher in ducklings than in goslings. Within treatment groups, hepatic GSH concentrations were inversely related to liver Pb concentration in both species, which may correspond to the role of GSH in Pb excretion. A negative relationship between hepatic GSH and TBARS was observed in ducklings, but not in goslings. In adult mallards an increase in hepatic TBARS concentration similar to that in ducklings occurred with an increase in GSH, which was half of that found in ducklings. The apparent lower resistance to lipid peroxidation of Canada geese may explain why geese found dead in the field by Pb shot ingestion often have a lower number of shot in the gizzard and lower liver Pb concentrations than mallards.