

CONCENTRATIONS AND INTERACTIONS OF SELECTED ESSENTIAL AND NON-ESSENTIAL ELEMENTS IN MARINE MAMMALS OF ARCTIC ALASKA

Victoria M. Woshner,^{1,2} Todd M. O'Hara,² Gerald R. Bratton,³ Robert S. Suydam,² and Val R. Beasley¹

¹Department of Veterinary Biosciences, University of Illinois, Urbana, IL 61802, USA

²North Slope Borough Department of Wildlife Management, Barrow, AK 99723, USA

³Department of Veterinary Anatomy and Public Health, Texas A&M University, College Station, TX 77843, USA

ABSTRACT: In this study, we evaluated concentrations of twelve essential and non-essential elements (As, Cd, Co, Cu, Pb, Mg, Mn, Hg, Mo, Se, Ag, and Zn) in tissues of four subsistence-harvested marine mammal species from arctic Alaska: bowhead whales (Balaena mysticetus), beluga whales (Delphinapterus leucas), ringed seals (Phoca hispida), and polar bears (Ursus maritimus). We collected samples between 1983 and 1997, mostly in 1995-97. The essential elements are reported to help develop "normal ranges" for health status determination and to help assess known or suspected interactions affecting toxicoses of cadmium (Cd) and mercury (Hg). In some tissues, Cd, Hg, and selenium (Se) were present at concentrations that have been associated with toxicoses in some domestic animals. Nevertheless, tissue levels of all elements were within ranges that have been reported previously in other marine mammals. While mean Ag concentrations in beluga whale liver were high (15.91 µg/g ww), Ag was not associated with Se hepatic levels or age contrary to previous findings. Significant associations included: Cd with age, Zn, or Cu; Cu with age, Zn or Ag; and Hg with age, Se, Zn, or Cu. This study found hepatic Hg:Se molar ratios to be consistently lower than unity and different for each species. Possible explanations for observed elemental correlations (i.e., interactions) and ancillary mechanisms of Cd and Hg detoxification are discussed.

Key words: Beluga whale, bowhead whale, cadmium, elements, marine mammals, mercury, molar ratio, polar bear, ringed seal, selenium, silver