Miling Li, Alicia Juang, Maria Dam, Bjarni Mikkelsen, Clifton Dassuncao, Elsie Sunderland

Title: Toxicokinetics of inorganic and methylmercury in North Atlantic pilot whales (*Globicephala melas*)

Methylmercury (MeHg) is a neurotoxin that biomagnifies in food chains. High levels of MeHg have been observed in both marine mammals and humans. Although the adverse health effects of MeHg are well-documented, the toxicokinetics of MeHg in mammals are not as well understood. The main objective of this study is to better understand MeHg metabolism in long-finned pilot whales (*Globicephala melas*). To do this, we constructed a toxicokinetic model parameterized by analytical measurements of total Hg, MeHg and stable Hg isotope in various organs (brain, heart, kidney, liver, muscle, placenta, and spleen) from seven individuals. We also investigated how physical characteristics like age, sex, and length affect metabolism. Results show the liver had the highest total mercury and MeHg concentrations (adult mean total Hg = 146.5 μg/g ww, MeHg = 7.3 μg/g ww) but also the lowest fraction of MeHg (adult mean percentage = 5.4%). The highest percentages of MeHg were found in the heart and muscle. Additionally, estimated age (range: 2-32 years) is strongly positively correlated with several organs' total mercury concentration (R^2 = 0.84 for brain, 0.58 for heart, 0.83 for kidney, 0.85 for liver, 0.79 for muscle) and MeHg concentrations (R^2 = 0.71 for liver, 0.62 for muscle). The fraction of methylmercury, however, significantly decreases with age for brain (R^2 = 0.91), heart (R^2 = 0.61), kidney (R^2 = 0.58), and liver (R^2 = 0.61), suggesting that whales' demethylation capability may improve with growth. Stable Hg isotope measurements in each organ will be presented to enhance understanding of potential mechanisms affecting metabolism and variability of *in situ* demethylation among whale individuals. The findings of this study will extend our understanding of how metabolism alters the internal body burden of MeHg and will shed light on sources of currently unexplained MeHg variability observed in marine mammals and human populations.