**Mercury bioaccumulation and cortisol interact to influence endocrine and immune biomarkers in adult northern elephant seals.**S.H. Peterson: U.S. Geological Survey, Western Ecological Research Center, Dixon Field Station, Dixon, California, J.T. Ackerman:U.S. Geological Survey, Western Ecological Research Center, Dixon Field Station, Dixon, California, R.R. Holser:Institute of Marine Sciences, University of California Santa Cruz, Santa Cruz, California, B.I. McDonald: Moss Landing Marine Labs, San Jose State University, Moss Landing, California, D.P. Costa:Institute of Marine Sciences, University of California Santa Cruz, Santa Cruz, California and Department of Ecology and Evolutionary Biology, University of California Santa Cruz, Santa Cruz, California, D.E. Crocker: Department of Biology, Sonoma State University, Rohnert Park, California

Mercury bioaccumulation from deep-ocean prey in the North Pacific Ocean and the extreme life history strategies of adult female northern elephant seals (*Mirounga angustirostris*) provide a unique system to assess the interactive effects of mercury contamination and stress on animal health. We quantified blood biomarkers in relation to mercury (skeletal muscle and blood mercury) and cortisol concentrations. The thyroid hormone thyroxine (tT4) and the antibody immunoglobulin E were associated with mercury and cortisol concentrations interactively, where the magnitude and direction of the association of each biomarker with mercury or cortisol changed depending on the concentration of the other factor. For example, when cortisol concentrations were lowest, tT4 was positively related to muscle mercury, whereas tT4 had a negative relationship with muscle mercury in seals that had the highest cortisol concentrations. Additionally, we observed that two thyroid hormones were negatively (tT3) and positively (rT3) associated with mercury concentrations and cortisol in an additive manner. We also observed that immunoglobulin M, the pro-inflammatory cytokine IL-6, and a reproductive hormone, estradiol, were negatively related to muscle mercury concentrations, but were not related to cortisol. Specifically, estradiol concentrations in late molting seals decreased by 50% across the range of muscle mercury concentrations. These results indicate important physiological effects of mercury on free-ranging apex marine predators. Deleterious effects on marine mammals’ abilities to maintain homeostasis (thyroid hormones), fight off pathogens and disease (innate and adaptive immune system), and successfully reproduce (endocrine system) can have significant individual and population level consequences.

Platform Presentation