Selenium and mercury concentrations in liver of stranded pygmy sperm whales (Kogia breviceps) affected by cardiomyopathy

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Pygmy sperm whales are the second most frequently stranded toothed whale along the U.S. Atlantic and Gulf coasts. More than half of documented cases exhibit signs of cardiomyopathy (CMP). Many factors may contribute to the development of idiopathic CMP in *K. breviceps*, including genetics, infectious agents, contaminants, biotoxins, and dietary intake (vitamins, selenium, mercury, and pro-oxidants). Nutritional deficiencies of selenium (Se) have been shown in mouse and bovine models to contribute to CMP. This study assesses trace elements in *K. breviceps* (n = 62) exhibiting or lacking signs of CMP using liver samples collected from individuals that stranded along the coasts of MA, VA, NC, SC, GA, and FL between 1993-2007. Total Se was measured by inductively coupled plasma mass spectrometry (ICP-MS), and total mercury (Hg) was measured by pyrolysis atomic absorption (AA) to examine if the Se/Hg detoxification pathway inhibits the bioavailability of Se. Due to the important role Se can play in antioxidant biochemistry and protein formation, Se species were examined in addition to total Se by size exclusion chromatography coupled to UV visible spectrophotometry and ICP-MS (SEC/UV/ICP-MS). Mean total Se and Hg concentrations (wet mass fraction, ± SD) were 9.57 ± 4.33 μg/g and 11.5 ± 10.6 μg/g, respectively. Se concentrations ranged from 2.01-21.6 μg/g and Hg concentrations ranged from 0.385-56.9 μg/g. A strong positive correlation exists between total Se and Hg concentrations in liver ($p < 0.001$, r = 0.770). Data collected on trace elements and metalloproteins will be evaluated in the context of animal life history, disease state markers, and other complementary histological information to gain insight into the biochemical pathways contributing to the development of CMP in *K. breviceps*.

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