

Role of trace elements and nutrients in cardiomyopathy in pygmy sperm whales (*Kogia breviceps*)

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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 the cases documented exhibit signs of cardiomyopathy. Many factors may contribute to the development of idiopathic cardiomyopathy in pygmy sperm whales, including genetics, infectious agents, chemical toxins, contaminants, and nutritional abnormalities. This study will focus on how trace elements and nutrients relate to the disease state. Nutritional deficiencies of a key trace element (selenium) and/or antioxidant vitamins, in combination with a diet high in polyunsaturated fatty acids (PUFAs) and free radicals, have been shown to contribute to cardiomyopathy. We hypothesize that the pygmy sperm whale diet consisting mainly of squid imparts a high dose of PUFAs that require effective antioxidant biochemistry to regulate free radical formation. Vitamin E (alpha tocopherol), vitamin B₁ (thiamine), and selenium (Se) will be examined in liver, blood, and heart tissue due to the roles these analytes can play in antioxidant biochemistry and protein formation. The contaminant mercury (Hg) will also be studied to determine if the Se/Hg detoxification pathway inhibits the bioavailability of Se. Se status may be impacted by sequestration chemistry wherein Se binds Hg making the Se less bioavailable for various biochemical processes, including selenium/antioxidant chemistries and selenoprotein formation. The goal of this research is to assess trace elements, vitamins, selenoproteins, and metabolites in a comparative context between animals exhibiting or lacking idiopathic cardiomyopathy to gain insight about the pathways driving the disease.

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