Mercury Levels in Sperm Whale (Physeter macrocephalus) Skin Biopsies Collected from around the Globe during the Voyage of the Odyssey

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Mercury is known to be toxic to both humans and animals affecting many different organ systems. It has no known beneficial effect in humans or marine mammals. Mercury pollution has been a major concern for many years, including marine mammals, but so far there have been no global studies of mercury pollution. To address this data gap, we conducted the Voyage of the Odyssey, a five year journey circumnavigating the equatorial regions of the globe. We collected sperm whale skin biopsies from 16 different regions in the Pacific, Indian and Atlantic Oceans and the Mediterranean Sea. The goal of the study was to define a baseline dataset of marine pollutants. We used the sperm whale as an indicator species because of its vast range and its status as top predator. Here we present the data from that Voyage concerning mercury levels. Biopsies were collected from healthy free-ranging whales and mercury levels were determined in sperm whale skin from these biopsies. 343 sperm whales were evaluated for mercury levels. Detectable levels ranged from 0.1 to 16 ug mercury/g tissue wet weight (ppm) with a global mean of 2.4 +/- 0.1 ug/g. All but three whales had detectable levels. Whales from the Mediterranean Sea had the highest mean level of mercury (6.1 ug/g) with the lowest average level (1.3 ug/g) found in whales from Sri Lanka. When consider by gender, detectable male mercury levels ranged from 0.1-11.6 ug/g with a global mean of 2.5 +/- 0.1 ug/g and female levels ranged from 0.1- 15.9 ug/g with a global mean of 2.4 +/- 0.1ug/g. These data indicate that mercury levels were not affected by size or gender. This is the first global toxicological dataset for mercury in marine mammals and the data confirm that mercury is a global environmental contaminant in marine mammals.

Lead Levels in Sperm Whale (Physeter macrocephalus) Skin Biopsies Collected from around the Globe during the Voyage of the Odyssey

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Lead is very commonly used metal. It is found in batteries, weights, bullets and building construction. Lead is known to be toxic to essentially all organ systems in the body, including the nervous, cardiovascular, immune and reproductive systems; however the extent of lead pollution in the world's oceans is poorly understood. To address this data gap, we conducted the Voyage of the Odyssey, a five year journey circumnavigating the equatorial regions of the globe. We collected sperm whale skin biopsies from 16 different regions in the Pacific, Indian and Atlantic Oceans and the Mediterranean Sea. The goal of the study was to define a baseline dataset of marine pollutants. We used the sperm whale as an indicator species because of its vast range and its status as top predator. Here we present a baseline for lead in this species. Biopsies were collected from healthy free-ranging whales and lead levels were determined in sperm whale skin from these biopsies. Lead levels were evaluated in 337 animals and was detectable in all but 24 whales. Detectable levels ranged from 0.1 to 129.6 ug Pb/g tissue wet weight (ppm) with a global average level equal to 1.9 +/- 0.6 ug/g. Considered by ocean, the average Pacific Ocean lead level was 2.73 +/- 1.02 ug/g; the average Indian Ocean lead level was 0.94 +/- 0.11 ug/g; and the average Atlantic Ocean lead level was 1.2 +/- 0.34 ug/g. When consider by gender, detectable male lead levels ranged from 0.1 - 9.5 ug/g with a global mean of 1.01 ug/g and female levels ranged from 0.1 - 129.6 ug/g with a global mean of 1.9 ug/g. This is the first global toxicological dataset for lead in marine mammals and the data confirm that lead is a global environmental contaminant in marine mammals.