Mercury exposure in humboldt (Spheniscus humboldti) and chinstrap (pygoscelis antarcticus) penguins throughout the chilean coast and Antarctica

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Abstract

Penguins are reliable sentinels for environmental assessments of mercury (Hg) due to their longevity, abundance, high trophic level, and relatively small foraging areas. We analyzed Hg concentrations from blood and feathers of adult Humboldt penguins (Spheniscus humboldti) and feathers of chinstrap penguins (Pygoscelis antarcticus) from different reproductive colonies with variable degrees of urbanization and industrialization along the Chilean and Antarctic coasts. We evaluated Hg concentration differences between species, sexes (Humboldt penguins), and localities. Our results showed significantly greater levels in Humboldt penguins than in chinstrap penguins and nonsignificant differences between sexes among Humboldts. Penguin Hg concentrations showed a latitudinal pattern, with greater values of the metal at lower latitudes, independent of the species. Both studied penguin species showed elevated Hg concentrations compared to their congeners, highlighting the necessity to investigate potential negative effects on their populations. Although differences between species are possibly due to variation in diet and trophic level, our results suggest an important effect of the degree of Hg pollution adjacent to foraging areas. Further research on Hg content in prey species and environmental samples, together with a larger overall sample size, and investigation on penguin's diet and trophic level are needed to elucidate Hg bioavailability in each location and the role of local Hg pollution levels. Likewise, it is important to monitor Hg and other heavy metals of ecotoxicological importance in penguin populations in vulnerable regions of Chile.