

Trace metals in swordfish caught within Seychelles waters: bioaccumulation and risk assessment for consumers

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Swordfish (*Xiphias gladius*) are large long-lived migratory mesopelagic predators widely distributed in tropical and subtropical oceans approximately between latitudes 45°N and 45°S. Swordfish has been the main target species of the Seychelles semi-industrial longline fishery (60% of total catch) from the 1980's until 2013, when the main importer, the European Union, imposed a ban on the importation of Seychelles swordfish products due to mercury (Hg) levels being above the EU maximum limit. This study aimed to investigate the effects of biological factors (size; sex; trophic ecology as per $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$) on the bioaccumulation of three toxic metals, Hg, cadmium (Cd) and lead (Pb) in the muscle, liver and gonads of 74 swordfish caught in the Seychelles exclusive economic zone in 2013-2014. Tissue distribution of selenium (essential metal, Se) was also studied, and we used the Se-Hg molar ratio and Se health benefit values (SeHBV and HBVSe) to balance the risks and benefits of swordfish consumption. Liver had the highest concentrations of the three metals compared to muscle and gonads. Both Hg and Cd levels increased with size, and were significantly different between sex. Regarding Se, it was in molar excess of Hg in all three tissues, and positive significant correlations between molar Hg and molar Se were observed in muscle and liver. Similarly, only positive SeHBV and HBVSe values were obtained in swordfish muscle reflecting the excess of molar Se that confers protection against Hg toxicity. Thus, we showed that swordfish caught in Seychelles waters had Pb and Cd well below the maximum safety limits; and although 25% showed concerns regarding Hg threshold, the co-investigation of Se and Hg confirmed the specific accumulation of Se in swordfish tissues and consequently the potential of this species to provide natural protection against Hg by consumption of its flesh.