

PERFLUORINATED ORGANOCEMICALS: NEW THREAT FOR MARINE MAMMALS

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The global marine ecosystem is continuously under pressure due to expanding anthropogenic activities and the development and release of new chemicals. Recently, it was suggested that many aquatic wildlife species contain high levels of perfluorinated organochemicals (FOCs) with concentrations increasing near shores and in estuaries. Perfluorooctane sulfonate (PFOS) seems to be the predominant compound. The fact that PFOS is hardly biodegradable, clearly accumulates in the liver and blood of wildlife and the fact that little toxicological information is available, makes this chemical an environmental pollutant of primary concern.

This is the first study to report on concentrations of FOCs in marine mammals stranded on the Belgian, French and Dutch North Sea coast between 1994 and 2000. PFOS concentrations were measured in liver tissue using combined liquid chromatography-mass spectrometry (LC-MS/MS). The highest PFOS concentrations were found in the liver of harbour seal compared to white-beaked dolphin, harbour porpoise, grey seal, sperm whale, white-sided dolphin, striped dolphin, fin whale and hooded seal. PFOS concentrations differed significantly between sexes and age-classes in harbour porpoises. The present results show clearly the difference in accumulation pattern of PFOS compared to that of persistent organochlorine chemicals.

In order to describe the behaviour of contaminants in food webs, we developed PFOS-trophic level relationships based on stable nitrogen and carbon isotope ratios ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$). We found a significant relationship between PFOS concentrations in livers of harbour porpoises and both muscle $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ measurements. Harbour and grey seals and white-beaked dolphin which displayed the highest trophic position contained highest PFOS levels while offshore feeders such as sperm whales, fin whales, striped dolphin and white-sided dolphin showed lower PFOS concentrations than inshore species.

In a second part of this study we have evaluated the occurrence of PFOS and related compounds in by-caught harbour porpoises from waters around Iceland, Denmark, Norway and from the German Baltic Sea. Of all perfluorinated chemicals measured, PFOS seemed to be the predominant compound (levels up to 1149 ng/g). A geographical difference could be observed with a decreasing trend in levels from south to north.