

## Planar Chlorinated Hydrocarbons in Southern Ocean Marine Mammals.

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### Introduction

Limited information is available on the occurrence and distribution of planar chlorinated hydrocarbons (PCHs) such as polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) in the southern hemisphere. PCHs are known to bioaccumulate and biomagnify and recent studies have linked these compounds to reproductive deficiencies in some wildlife species. Marine mammal species have been shown to bioaccumulate PCHs to high concentrations<sup>(1,2)</sup> and are therefore at particular risk from the effects of these contaminants. This ability to accumulate high levels of PCHs also makes marine mammals excellent sentinel species for contamination of the environment by PCHs<sup>(2)</sup>. We present initial results for the concentrations of PCHs in a number of marine mammals collected around the New Zealand coast.

### Methods

Samples of marine mammal tissues have been collected from the New Zealand coastline over several years. The analysis of specimens of Hector's Dolphin for PCDD and PCDF has been reported previously<sup>(3)</sup>. PCHs are extracted from blubber, after the addition of <sup>13</sup>C<sub>12</sub> standards, with 2:1 acetone:hexane by homogenizing in the presence of anhydrous sodium sulphate. Extracts are concentrated and a small portion is used for lipid determination. Extracts are purified by treatment with concentrated sulphuric acid followed by chromatography on a column of sulphuric acid silica gel and sodium hydroxide silica gel. PCDF and PCDD are isolated from the extract using a carbon column and the extract is then subject to chromatography on Florisil to isolate coplanar PCBs from other PCB congeners. PCDDs, PCDFs and PCBs are determined by HRGC/HRMS on a VG 70 mass spectrometer using

previously described methods<sup>(3)</sup>. Toxic equivalents are calculated using the Toxic Equivalency Factors of Safe<sup>(4)</sup>.

## Results

PCB congeners were detectable in all samples analysed. PCB concentrations were lowest (<50 ppb) in open ocean filter feeding animals (Minke, Blue, and Pygmy Right whales) intermediate (100 to 500 ppb) in open ocean carnivores (beaked whales and Common dolphin) and highest (750 to >1000 ppb) in the near shore carnivore (Hector's dolphin). Coplanar and mono-ortho substituted PCB congeners were detected in many of the samples analysed. These PCB congeners contributed the major portion (<75%) of the total calculated TCDD-TE in these samples.

PCDDs and PCDFs were detected at highest concentrations in Hector's dolphin with an average total Toxic Equivalents of 26 ppt. Some open ocean specimens had detectable levels of specific PCDD congeners however in general only higher chlorinated PCDDs were detectable in open ocean marine mammals.

## Discussion

Concentrations of PCHs in these animals are related to both food habit and proximity to the coast. Concentrations of PCBs detected in common dolphin and beaked whales in New Zealand are lower than in those reported for similar species in the northern hemisphere<sup>(5,6)</sup>. Except in Hector's dolphin PCDD and PCDF did not contribute a significant level of TE. In all the marine mammals analysed to date PCBs contribute the major portion of TE calculated using the Safe TEF values<sup>(4)</sup>. This data suggests that proximity to coastal areas increases the concentrations of PCDD PCDF and PCBs in marine mammals. This increase may be attributed to either human activity or closer association, both physically and via the food chain, with PCH contaminants bound to inshore sediments.

## References

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