

XENOBIOTICS IN SEALS FROM SWEDISH COASTWATERS

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Animals at high trophic levels with habitat in polluted areas around the world are species likely to suffer from effects of the contaminants in the environment¹. Fish consumers such as marine mammals and otter and mink have all been suspected to have suffered considerably due to high concentrations of organochlorines such as polychlorinated biphenyls (PCB)². In the Baltic the populations of grey, harbour and ringed seal have shown poor reproduction over the last 20 years. Severe pathological changes indicating a disease complex have been observed³. In 1988 a sudden outbreak of an epizootic (PDV) caused a mass mortality among harbour seals in the North Sea and the Baltic, and environmental pollution was suspected to have had influence on the cause of the disease. In the present study individual analysis of 109 individual specimens from different subpopulations of seals have been carried out for PCB and DDT. Pooled samples representative for various subpopulations have also been analyzed for presence of other xenobiotics (cf below). The seals have been divided in groups (subpopulations) to compare species, sex, age and geographical areas. Seals found dead during the PDV epizootic in 1988 were compared with uninfected animals collected before the epizootic. Grey seals suffering from the disease complex described in Baltic seals were also studied.

Concentrations of PCB and DDT, as determined by packed column gas chromatography (GC) and the corresponding values for PCB based on congener specific analysis by high-resolution GC, were determined. The levels of PCB and sDDT in juvenile seals ranged from 10 to 80 µg/g lipid and 2-30 µg/g, respectively. Adult animals showed in general higher levels. Concentrations of MeSO₂-PCB and MeSO₂-DDE in the juvenile animals were 1-10 µg/g and 0.1-0.4 µg/g, respectively, while higher levels were determined in the adult seals. For polychlorinated camphenes and sChlordane (oxychlordane + α-chlordane + γ-chlordane + *trans*-nonachlor + *cis*-nonachlor) the concentration range was fairly narrow (0.5-5 µg/g). Polybrominated diphenyl ethers were found in all samples but with only small variation between the different groups of seals (0.1-1 µg/g). Finally, the levels of PCDD and PCDF, measured as TEQ, were found to be in the range of 10 - 100 pg/g.

Several of MeSO₂-PCB congeners were identified by comparison to authentic references. Also, *trans*(p-chlorophenyl)methanol was identified in some of the samples.

The highest concentrations for most of the compounds was observed in the group representing severely diseased grey seal females. Most probably this reflects the low amount of fat in these seals due to starvation. None of the xenobiotics analyzed show significant differences in their concentration between juvenile harbour seals found dead during the epizootic and seals collected prior to the outbreak of the disease.

Acknowledgement

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References

- 1 DeLong, R.L., Gilmartin, W.G. and Simpson, J.G. Premature births in California sea lions; association with high organochlorine pollutant residue levels. *Science*, 1973, 181, 1168-1170.
- 2 Olsson, M. PCBs in the Baltic environment. In: *PCB and the environment*. (Waid, J.S. (ed)). CRC Press, Inc. Boca Raton, Florida, 1987, Vol III, Chapter 7, pp 181-208.
- 3 Bergman, A. and Olsson, M. Pathology of Baltic Grey Seal and Ringed Seal females with special reference to adrenocortical hyperplasia: Is environmental pollution the cause of a widely distributed disease syndrome? Proc. from the Symposium on the Seals in the Baltic and Eurasian Lakes. Savonlinna, 1984-06-05-08. *Finnish Game Research* 1986, 44, 47-62.