

7 Heavy metals in marine mammals

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Introduction

During the past few decades, increasing concern about environmental pollution has led to many investigations on heavy metals and their distribution in the sea, air or biological materials. The distribution of xenobiotics in the marine environment is not homogeneous and a considerable variation of the concentrations may occur regionally and temporally. The use of bioindicators offers a useful alternative for pollution monitoring studies. Marine mammals appear to be potentially valuable indicators of the level of heavy metals accumulated in the marine environment: according to their top position in the trophic network, their long life span and their long biological half-time of elimination of pollutants, these animals accumulate high levels of chemicals such as organochlorines (Kamrin and Ringer, 1994; Tanabe *et al.*, 1994), or heavy metals (Bouquegneau and Joiris, 1988, 1992; André *et al.*, 1991a; Dietz *et al.*, 1998). The increased interest in studying contaminants in marine mammals is due to large-scale die-off (Sarokin and Schulkin, 1992; Forcada *et al.*, 1994) or impaired reproduction (De Guise *et al.*, 1995), which could lead to population declines of some pinniped and small cetacean species in Europe and North America, and the finding of relatively large contaminant burdens in these animals. In many cases, morbillivirus infections were the primary cause of the disease outbreaks (Heide-Jørgensen *et al.*, 1992; Thompson and Hall, 1993; de Swart *et al.*, 1995a). These mass mortalities among seals and dolphins inhabiting contaminated marine areas have led to speculation about the possible involvement of immunosuppression associated with environmental pollution.

Controlled experiments are unavailable to establish any definite causal relation between these pollutant concentrations and any physiological problem. Moreover, the data are always difficult to interpret because of the presence of other chemical contaminants and other stressors. The physiological status of the organisms (e.g. pregnancy, moulting, fasting, etc.) also modulates the toxicity of heavy metals. In addition, the available measurements have almost been all performed on animals found dead, which leaves doubts about the general applicability of collected values at which an effect at individual or population level might be expected.