

Factors influencing exposure and availability of brominated flame retardants in free-ranging bottlenose dolphins (*Tursiops truncatus*)

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Brominated flame retardants, such as polybrominated diphenyl ethers (PBDEs), are chemical additives to consumer products which reduce their flammability and the risk of fire. Piscivorous marine mammals, including bottlenose dolphins, feed at top trophic levels within aquatic ecosystems and are therefore vulnerable to accumulating heavy burdens of many different organic contaminants, including PBDEs. Assessing the potential health effects of contaminant exposure in wild marine mammals has proven difficult, partly as a result of their chronic exposure to extremely complex contaminant mixtures. To assess the toxicity of these biologically relevant contaminant mixtures using lab based tests, a measure of exposure in wild marine mammal populations is needed and the variability of contaminant mixtures between individuals of a wild population must be understood to determine whether all individuals are exposed to comparable mixtures or whether subsets of the population are exposed differentially. To assess exposure to brominated flame retardant mixtures in a wild marine mammal population, 14 PBDE congeners were measured in 106 blubber biopsies, 40 plasma samples and 18 milk samples collected from free-ranging bottlenose dolphins during capture and release health assessments in Sarasota Bay, FL between 2000 and 2005. Total PBDE levels ranged from 20 to 1508 ng/g wet mass in blubber. Concentrations were detectable, but lower in plasma and milk. No relationship between age and total PBDE blubber concentrations was evident for male bottlenose dolphins. However, upon reaching sexual maturity at 10 years of age, PBDE levels in females appear to drop and remain low for life, suggesting substantial offloading of PBDEs during parturition and lactation. PBDE congener mixtures also appeared to vary with age and sex. Shifts in PBDE mixtures in male bottlenose dolphins may be a result of age related metabolism or ontogenetic changes in prey preference or location. In females, shifts in PBDE mixtures may result from a differential offloading of PBDE congeners during lactation as a comparison of PBDE profiles in milk and reproductive female blubber suggest that larger, higher brominated PBDEs are retained in blubber while smaller, less lipophilic PBDE congeners are offloaded through the milk.

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