Abstract

Eagle Harbor is a designated Superfund site due to high sediment concentrations of creosote-derived polycyclic aromatic hydrocarbons (PAHs) released chronically from a nearby creosoting facility. Studies with English sole Pleuronectes vetulus from this site (1984–1986) demonstrated high prevalences of toxicopathic liver lesions including neoplasms in resident sole. Inducibility of neoplasia-related lesions by injections of a PAH-rich fraction extracted from Eagle Harbor sediment has also been shown. Further studies (1986–1988) also sampled starry flounder Platichthys stellatus and rock sole Lepidopsetta bilineata, and incorporated biomarkers of PAH exposure and effect, including hepatic CYP1A expression, biliary fluorescent aromatic compounds (FACs), and hydrophobic DNA adducts in liver. Hepatic lesion prevalences and biomarker values in these species from Eagle Harbor were among the highest found at Puget Sound sites. A cap of uncontaminated sediment was placed (September 1993–March 1994) over the most contaminated portions of Eagle Harbor in an attempt to sequester PAH-contaminated sediments. Lesion prevalences and biomarker values just before capping began were generally reduced compared to historical data, consistent with creosoting facility closure and site-based source controls. Similar data from fish collected immediately after capping, and, at 3, 6, 12, 16, 19, 21, 31, 44, and 49 months after cap completion, are presented to determine the efficacy of the capping in ameliorating PAH exposure and associated effects in resident flatfish species.

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Multiple bioindicators of environmental pollution in a sentinel species, Chrysemys picta, on Cape Cod, MA

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Abstract

High-level environmental contamination has been documented as eliciting negative effects on endocrine, reproductive and developmental events across vertebrate groups in the wild. Of particular interest and importance is whether relatively low levels of mixtures of environmental pollutants may have long-term impacts. We are investigating responses to ground and
surface-water pollution from plumes on the MMR Superfund site on Cape Cod, MA, in the turtle *Chrysemys picta*. Parameters examined included hepatic cytochrome P450 1A (CYP1A) activity and protein, glutathione-S-transferase (GST) activity, plasma vitellogenin levels, and metallothionein protein. Hepatic microsomal EROD activity in both males and females was higher at the plume-impacted site than at the non-impacted site; a seasonal pattern of activity was seen at both sites. The level of CYP1A protein expression was greater at the impacted site. GST activity also followed a seasonal pattern, but there were no significant differences in activity between the two sites. Plasma vitellogenin levels, although influenced by endogenous estrogen, were significantly lower in animals from plume impacted than non-impacted sites. Serum vitellogenin levels were very low to non-detectable in males. Metallothionein levels show a sex-specific difference at the non-impacted site only; there were no significant differences between the sites. Taken together, the observed changes suggest a potential ground water pollution impact on the endemic biota. These changes are of concern since they suggest that chronic exposure to low level mixtures of contaminants may represent long-term impacts. [Supported by ES07381 to I.P.C. and J.J.S.]

Chambering in the Pacific oyster, *Crassostrea gigas*, and its relationship to tributyltin

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Abstract

Studies have documented a relationship between tributyltin (TBT) exposure and the occurrence of shell chambering in *Crassostrea gigas*. The studies conducted in the 1980s presented exposures where TBT water concentrations were many times higher than current concentrations in the USA. Through an ongoing field study, the incidence of chambering is evaluated to determine if it is correlated with current environmental concentrations of TBT, and to any declines in oyster health. Interestingly, condition and weight showed no significant relationship with TBT residues or number of chambers. In other words, despite increases in the number of chambers, neither the weight nor condition of the oysters declined from that observed in the baseline population or from those transplanted to fish/shellfish areas. This indicates that TBT may be eliciting a response, but perhaps not an ecologically significant effect.