

Oxygenated Metabolites of DDT and PCBs in Marine Sediments and Organisms

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ABSTRACT

Microorganisms in sediments and many fish and invertebrates can rapidly transform some xenobiotic (synthetic organic) compounds into oxygenated metabolites. These oxygenated metabolites may comprise the major form of organic compound contamination in marine sediments and biota. In marine sediments from the highly contaminated Palos Verdes Shelf in coastal southern California, the oxygenated metabolites [2,2-*bis*(*p*-chlorophenyl) acetic acid (DDA) and 2,2-*bis*(*p*-chlorophenyl) ethanol (DDOH)] comprised of 90% of the total of all measured forms of 1,1,1-trichloro-2,2-*bis*(chlorophenyl) ethane (DDT). In addition, these oxygenated metabolites represented 99% of all measured forms of DDT in mussel soft parts, 85% in shrimp muscle, 48% in croaker liver, and 49% in scorpion fish liver. Similar ratios of polychlorinated biphenyl (PCB) parent compounds and their oxygenated metabolites (PCBsols) were found in mussel soft parts. Since some of these compounds (for example, DDT) are known to be metabolized very slowly or not at all by mussels and fish, it seems likely that microbial transformations in marine sediments are serving as the main source of these metabolites. There is some evidence to suggest that oxygenated metabolites. There is some evidence to suggest that oxygenated metabolites may not necessarily represent detoxified forms of xenobiotic compounds. Studies of tissue extracts separated into fractions according to molecular weight indicate that metabolites in organisms from relatively uncontaminated control stations are partitioned into a low-molecular-weight glutathione-containing pool. However, in fish from Palos Verdes with fin erosion and other disorders, there is a significant portion of these metabolites bound to both a medium-molecular-weight metallothionein-containing pool and, to a lesser extent, to a high-molecular-weight enzyme-containing pool. Since enzymes are affected and metal binding is decreased in these pools, this may represent toxification from oxygenated metabolites.

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