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In vitro effects of polychlorinated biphenyls on the AhR and ER activity

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Polychlorinated biphenyls (PCBs) are persistent environmental contaminants that elicit a broad spectrum of toxic effects in mammals and other vertebrate species. Because of their lipophilicity, chemical stability and resistance to biodegradation, PCBs tend to accumulate in the human body via food chain and environmental matrices including human adipose tissues, blood and milk.

It has been reported that some PCB congeners exert dioxin-like activities such as immuno-, reproductive-, neuro-, dermal-, and hepatotoxicity and carcinogenesis through interacting with aryl hydrocarbon receptor (AhR). In vivo and in vitro studies have shown that some PCB mixtures, individual congeners and their metabolites exhibit estrogenic or/and antiestrogenic activity. However, evidence for interaction of single PCB congeners with nuclear receptors has been sparce.

Here we examined the effects of four PCB congeners, PCB118(2,3',4,4'5-pentachlorobiphenyl), PCB138 (2,2',3',4,4'5-hexachlorobiphenyl), PCB153 (2,2',4,4',5,5'-hexachlorobiphenyl) and PCB180 (2,2'3,4,4'5,5'-heptachlorobiphenyl) and mixture effects of PCB congeners and TCDD on the AhR mediated gene expression (cytochrome P450 1A1 mRNA level and AhR responsive reporter gene assay) and enzyme activity (EROD activity) in the two hepatocarcinoma cell lines: HepG2 and Hepa1c1c 7. In addition, we also evaluate the effects of PCB congeners on the estrogen receptor (ER) activity by E-screen assay.