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Xenoestrogenic response of serum from PCB-exposed women

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PCBs are mainly deposited in the lipid compartments of the body and occur in the lipid fraction of human serum. These substances easily pass the placenta and are excreted in human milk. Prenatal and early postnatal exposure to PCBs or other endocrine disruptors may induce irreversible damage during the sensitive period of organogenesis and sexual differentiation. Thus, women in the reproductive age group is of special concern. We analyzed the cumulative xenoestrogenic activity in 200 serum samples from healthy pregnant women (third trimester) from the Faeroe Islands, a population group with considerable dietary exposure to PCBs from consumption of whale blubber. Furthermore, we analyzed serum from healthy pregnant women (third trimester) from Denmark as a reference group. Since PCBs and PCB metabolites may display different types of action, such as estrogenic, anti-estrogenic or anti-androgenic effects, we used an assay specifically designed to measure the integrated and functional xenoestrogenic response from complex mixtures. We used solid-phase extraction of the serum samples with a newly developed polymeric sorbent that exhibits both hydrophilic and lipophilic retention characteristics, thus allowing extraction of a wide polarity range of xenoestrogens and environmental toxicants. In order to separate xenoestrogens with polarities close to endogenous hormones, we applied a HPLC method using a gradient that covers the mid-polar area. The lipophilic fraction, which include the most dominant parent PCB congeners and hydroxylated PCB metabolites in biological extracts, are then tested in the E-screen bioassay, a sensitive and reliable screening system for functional estrogenicity in biological samples. Serum from the Faroese women had a higher estrogenic response than the reference group. The causative compounds have not yet been identified, but it is conceivable that a number of substances, such as PCBs and PCB metabolites, each present at low ineffective concentrations may act together to produce significant effects.