Persistent organic pollutants (POP), such as polychlorinated biphenyls (PCB) and the main DDT metabolite, dichlorodiphenyldichloroethylene (pp'-DDE), have an anthropogenic origin and are widely spread in the environment. These compounds accumulate in the fatty tissues of living organisms and are concentrated through dietary exposure in high rank predators, including men. Even though their use has been banned in Europe, they can still be found in human blood, fat tissues, or breast milk. Previous studies on wildlife and laboratory animals have shown that these compounds have adverse effects on the reproductive and endocrine functions, although their impact on male fertility is still unknown. There is limited and contradictory epidemiological data on whether PCB, and possibly pp'-DDE, can damage human sperm genetic integrity, which is essential for the accurate transmission of the genetic information.

In a recently accomplished EU-funded research project, scientists have explored the potential association between altered human sperm DNA integrity and the presence of POP in blood. A cross-sectional study was carried out involving 707 adult males from Greenland (Inuit population), Sweden, Poland, and Ukraine, which represents the largest survey ever attempted in molecular epidemiology. Serum levels of CB-153, a PCB congener which represents the overall PCB concentration, and pp'-DDE were determined. In order to evaluate the sperm DNA integrity, the present study used a sperm chromatin structure assay.

The results of the study show that an increase risk of sperm DNA damage is associated with elevated serum levels of CB-153 across all exposure ranges for the European men involved in the study, reaching statistical significance in the highest exposure group. Therefore, dietary exposure to PCB might have a negative impact on reproductive male capabilities. On the contrary, no association was observed for DDE, at least in the studied exposure ranges. These findings agree with the three previous studies that have investigated the association between these compounds and the sperm genetic damage in humans.

An interesting finding of the present study is that no association was found between serum levels of CB-153 and sperm DNA damage in the men from Greenland, who paradoxically presented high exposure levels. This suggests that other factors, not considered in the study, such as the genetic background or certain substances associated with Inuit diet and lifestyle, might make Inuit men less susceptible to the toxic effects of PCB. Further investigation on this issue is needed.

\[1\] INUENDO project “Biopersistent organochlorines in diet and human fertility. Epidemiological studies of time to pregnancy and semen quality in Inuit and European populations” (http://www.inuendo.dk), supported by the European Commission 5th Framework Programme.


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