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Endocrine disruption in rat and zebrafish of TBBPA

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Tetrabromobisphenol-A (TBBPA) is a large production volume brominated flame retardant. It is an environmental contaminant and observed in human breast milk. In vitro bioassays showed activities of TBBPA in the thyroid hormone and estrogen domains. Here, the in vivo endocrine disrupting activity of TBBPA was studied in rats and zebrafish.

Parental rats were exposed via the diet prior to mating and throughout pregnancy and lactation, and F1 animals until young adulthood, to doses between 0 and 3000 mg/kg bw/day. A major effect was decreased circulating thyroxine, which was statistically associated with developmental effects (delayed female sexual development, decreased mortality, impaired auditory functions). A second cluster of associations was related to reduced weight of testis, and included testosterone in males, and female gonad weight, endometrium height, aromatase activity. These two association clusters suggest a dual action of TBBPA.

Adult zebrafish were exposed to water-borne TBBPA in concentrations between 0 and 1.5 µM during 30d, and offspring up to 47 days post hatching. Egg production was decreased at low concentrations. Adult ovaries showed a relative increase of premature oocytes in the highest concentration. Hatching ratio of TBBPA exposed eggs was decreased and early post hatching mortality was high in the highest concentration; surviving juveniles in this group showed feminization.

These assays indicate TBBPA-induced effects on reproduction and development related parameters in two different species, probably through interactions with endocrine systems, at relevant levels for human and environmental health. The different endpoints in these assays are complementary regarding potential actions of this pollutant.

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