

STEROID EFFECT OF TRIBUTYLTIN ON ZEBRAFISH

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Tributyltin (TBT) is an organometallic compound identified as a Persistent Organic Pollutant (POP) in the environment. TBT has widespread dispersion, high hydrophobicity, and long-term persistence in the environment and results in bioaccumulation, bio-magnification in food webs, and negative consequences on the ecosystem, including reproductive toxicity. The zebrafish model was used as a model organism in this study to reveal the reproductive hormonal effects of TBT that are predictive of similar outcomes in humans. Different TBT concentrations (1, 10 and 100 ng/l) were exposed to the zebrafish model for three months. Zebrafish, without being exposed to TBT, were used as the control (n=6). Steroid hormone measurements were performed using the Enzyme-Linked Immuno-Sorbent Assay (ELISA). TBT-treated fish at 10 and 100 ng/l reported significantly decreased 17 β -estradiol levels, while 1 ng/l treated fish reported no significant changes compared to the control. In control and 1 ng/l TBT-treated fish, 17 β -estradiol levels in plasma were recorded as 94.17 \pm 13.10 pg/ml and 78.75 \pm 7.70 pg/ml, respectively. On exposure to TBT (10 ng/l), 17 β -estradiol levels were reduced to 30.42 \pm 10.94 pg/ml. However, at a higher concentration of TBT (100 ng/l), the 17 β -estradiol levels decreased drastically in plasma at 12.92 \pm 8.60 pg/ml. Though Testosterone levels in fish exposed to 100 ng/l were significant ($p < 0.05$) with control, fish exposed to 1 and 10 ng/l were not substantial. Therefore, the results revealed that at a higher concentration of TBT (100 ng/l), 17 β -estradiol levels drastically decreased, which was inverse for the testosterone in plasma. The changes in sex hormone levels would finally affect ovarian development and maturation in fish with the potential to induce masculinization effects. This hormonal balance between estradiol and testosterone appears to be crucial in the development of fish. It has been suggested that the reproductive toxicity of TBT compounds is due to the inhibition of the steroid pathways of animals. Therefore, an extended monitoring programme is needed to assess the toxic mechanisms of TBT and its long-term reproductive effect.

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