

Effects of Tributyltin on Marine Organisms and its Ecological Risk Assessment in the Marine Environment of Korea

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Since the early 1980s, tributyltin (TBT) has been one of environmental concerns due to its high toxicity and direct introduction into the aquatic environment mainly from antifouling paints applied for ship hulls. The high toxicities of TBT have been revealed in a number of aquatic animals. Although many countries, including Korea, regulated use of TBT for ships less than 25 m in length from the early 1980s, contamination persists at chronic levels. Furthermore, because there have been no regulations in most of Asian countries, TBT concentrations are still high in the waters of Asian countries and especially much higher in enclosed coastal seas.

Tributyltin is considered one of endocrine disrupting chemicals, as it is known to cause imposex (imposition of male sexual organ on female) in marine gastropod by inhibiting cytochrome P450 dependent aromatase. The interaction of TBT in vivo with different P450 isoforms, including those involved in organic pollutant metabolism and steroid metabolism, can therefore have consequences both for protection against other pollutants and reproduction.

In this study, we measured the extent of TBT contamination in the marine environment of Korea using imposex of gastropod. The degree of imposex and TBT body residue in gastropod (*Thais clavigera*) demonstrated strong positive correlations. The induction of imposex in the species was verified with a field transplanting and a laboratory exposure experiment. Both the experiments showed apparent induction of imposex at the well below ppb level of TBT concentrations (3.65 ng Sn/L). Another fish exposure experiment to TBT in the laboratory also demonstrated inhibition of cytochrome P450 at the TBT concentration of 3.65 ng Sn/L.

To assess the risk of marine organisms imposed by TBT in the marine environment of Korea, logistic regression risk assessment model (95010 species protection) was run with expected TBT concentrations in coastal waters and literature surveyed toxicological data of TBT. Based on the acute and chronic toxicity data, more than 95010 of marine species could be protected from TBT contamination. However, about 10 % of species could be affected by water TBT contamination in chronic threshold toxicity levels. The effects of TBT on marine organisms are confined near TBT source areas such as harbors and shipyards in Korea.