Acute toxicity and bioaccumulation of arsenic in tilapia Oreochromis mossambicus from blackfoot disease area in Taiwan.

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Abstract

The general objective of our work was to determine the acute toxicity and bioaccumulation of arsenic (As) in tilapia (Oreochromis mossambicus) from the blackfoot disease (BFD) area in Taiwan. The average concentration of As in pond water ranged from 17.8 to 49 microg L(-1). Acute toxicity tests showed that the As concentration that caused toxicity to tilapia ranged from 69 060 microg As L(-1), in the 24-h toxicity test, to 28 680 microg As L(-1), in the 96-h toxicity test. We measured As concentrations in various tissues of tilapia to identify the affinities of tissues for As. Significant correlations were found among the As concentrations in all tissues. The highest bioconcentration factor (BCF) was found in the intestine (maximum value: 2270). The order of BCFs was: intestine > stomach > liver approximately gill > muscle. Arsenic concentrations in all tissues were allometric, negatively correlating with fish body weight [r(2) = 0.63 +/- 0.045 (mean +/- SE), p < 0.05]. Our results also revealed that As concentrations in muscle tissue were positively correlated with As accumulation in the viscera (r(2) = 0.85, p < 0.05). Significantly higher concentrations of As were obtained in the viscera of tilapia [12.65 +/- 10.17 microg g(-1) dry wt (mean +/- SD)] than in the muscle tissue (3.55 +/- 0.42 microg g(-1) dry wt). Our results suggest that a simple way of reducing the health risk associated with consuming tilapia is to trim and cook the fish properly, that is, removing the viscera of tilapia can greatly reduce the amount of As ingested and consequently reduce the health risks.