

ARSENIC METABOLITES IN HUMAN URINE AFTER INGESTION OF SASHIMI TSUNA FISH

Akihisa Hata, *Chiba Institute of Science, Japan*

Kenzo Yamanaka, *Nihon University, Japan*

Yuko Yamano, *Showa University, Japan*

Yoko Endo, *Japan Labour Health and Welfare Organization, Japan*

Fujitani Noboru, *Chiba Institute of Science, Japan*

Endo Ginji, *Osaka City University, Japan*

Background and Aims: The consumption of seafood including tuna is increasing in the world. Seafood contains large amounts of various arsenic compounds but the risk from seafood ingestion is not clear. After the development of arsenic speciation analysis of seafood, we examined sashimi-grade tuna fish ingestion experiment using volunteers.

Methods: Arsenic content of tuna was measured after bead-beating treatment and 50% methanol extraction. Four volunteers ingested 300 g of sashimi-grade tuna fish, after refraining from eating seafood for 5 days. Arsenic metabolites in urine were monitored over 5-day period after the ingestion. Speciation analysis of arsenic in tuna and urine was performed by high-performance liquid chromatography and inductively coupled plasma mass spectrometry (HPLC-ICP-MS).

Results: Total arsenic (T-As) concentration of the tuna was 8.6 mgAs/kg. The compounds detected were arsenobetain (AsBe) and two unidentified arsenic compounds, but dimethylarsinic acid (DMA), monomethylarsonic acid, trimethylarsine oxide, arsenocholine, and inorganic arsenics (iAs) were not detected in 50% methanol extract. In 2.6 mg of arsenic ingested, 1.4 mg (54%) was AsBe and 0.4 mg (16%) of arsenic was insoluble arsenic. Approximately 40% of the ingested T-As was excreted in the urine during 5 days of the observation. The major urinary arsenics were AsBe and DMA, and the excreted total amounts were $948 \pm 201 \mu\text{g}$ and $94 \pm 38 \mu\text{g}$, respectively. Approximately 70% of the ingested AsBe was excreted into the urine. Urinary AsBe excretion rate reached to $66.5 \mu\text{g/h}$ at 4 h after ingestion and that of DMA was $1.47 \mu\text{g/h}$ at 9 h.

Conclusion: Tuna, one of the most popular seafood, contains not only AsBe but also at least two kinds of soluble organic arsenic compounds and 16% of insoluble arsenic. Since neither DMA nor iAs detected in tuna, urinary DMA may be produced metabolically from unidentified arsenics or insoluble arsenic compounds.