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Urinary Arsenic Speciation After Controlled Seafood Consumption in Volunteers

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Arsenic(As) is widely distributed in environment and has been known as a human carcinogen. The main route of As in general population is an oral exposure through food and drinking water. Seafood is containing high levels of As, which are much less harmful organoarsenicals, such as arsenobetaine, arsenocholine and arsenosugar. However, it is important to understand whether seafood consumption affects the urinary level of inorganic As metabolites, arsenite, arsenate, monomethylarsonic acid(MMA) and dimethylarsinic acid(DMA), in Korean, who eat seafood much. In this study, we investigated effects on the urinary total arsenic and inorganic metabolites (inorganic As, MMA, DMA), and some biological indices, such as AST, GSH, GPX, lipid peroxidation and uric acid, after consumption of seafood by volunteers(7 males and 9 females). Urinary total As was analyzed by hydride generation method after microwave digestion, and arsenic speciation was performed by using HPLC with ICP-mass spectrometry. The study subjects ingested seafood daily for 6 days consecutively, and the first voided urine in the morning was collected before seafood ingestion and at day 1, 2, 3, 4, 5, 6, 7, 10, and 14 after seafood ingestion, respectively. They were refrained from eating seafood for 3 days prior to the urine collection and during urine collection. We purchased seafood from the market. The daily mean intake of total As was 6.97 mg, which was 4.69 mg of seaweed(67%), 1.75mg of flat fish(25%) and 0.53 mg of conch(8%). We observed substantial increases of urinary total As and DMA from day 1 and recovered to control level at day 10 after the consumption of seafood in volunteers. DMA is more harmful metabolite than organoarsenicals. This result suggests that it is necessary to consider As metabolism in assessing the health effect of seafood consumption in Korean.

Keyword : Arsenic, Seafood, Inorganic As(As³⁺, As⁵⁺), Monomethylarsonic acid(MMA), Dimethylarsinic acid(DMA)