

Arsenic Compounds in Marine Products before and after Cooking

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Summary

Marine organisms concentrate in their tissues various elements including arsenic, a well-known poison. Great attention has been paid to organic compounds of arsenic after they were identified as the major arsenic compounds in these organisms.

The first organic arsenic compound to be isolated and identified was a water-soluble compound, arsenobetaine, which was obtained from the western rock lobster *Panulirus longipes cygnus*. Since then this compound has been shown to occur in various other marine animals independently of their feeding habits and trophic levels. The isolation of arsenobetaine led to further studies that detected arsenocholine and tetramethylarsonium ion in various animals, and arsenosugars in various algae and phytoplankton. The toxicities of these compounds are considerably lower than inorganic arsenicals.

On the other hand, relatively little is known about lipid-soluble arsenic compounds: only two lipid-soluble arsenic compounds, phosphatidylarsenocholine and a phosphatidylarsenosugar in the brown algae *Undaria pinnatifida*, had been reported. We prepared the alkali-labile and alkali-stable arsenolipid fractions from twelve tissues of the starspotted shark *Mustelus manazo*. At least six arsenolipids were found in the shark. Two major alkali-labile arsenolipids (a dimethylated arsenic-containing lipid and an arsenocholine-containing lipid) were shown in ordinary muscle, dark muscle, etc, while a single major one, the dimethylated arsenic-containing lipid, was shown in brain, spleen, etc, as the major arsenolipid.

To study the food hygienic safety of the degradation products of non-toxic arsenobetaine formed on processing or cooking arsenicals generated by heating or roasting muscles of marine animals were investigated by us. As a result, a fish-meat jelly product, hanpen, from shark ordinary muscle is shown to have no water-soluble arsenic compounds other than arsenobetain. On the other hand, after exposure to fire, shark or lobster muscle were found to contain the tetramethylarsonium ion.