Toxic Metals Fact Sheet

What is Arsenic?

Arsenic is present in seafood mostly as an organic form, which is much less toxic than inorganic. Arsenic is a recognised human carcinogen.

What is Cadmium?

Cadmium is widely distributed in the environment, and can be found in many food items, including some seafood products. Cadmium is a carcinogen and is toxic to the kidneys.

What is Mercury?

Mercury in organic form, particularly methylmercury, is of greatest concern to public health. Methylmercury is fat-soluble, and therefore tends to be found in higher concentrations in large carnivorous fish such as shark, swordfish and some tuna. Methylmercury has harmful effects on the development of brain, so pregnant women and children are the main focus of seafood safety interventions.

What is Lead?

Lead causes harmful effects on the kidneys and nervous system. Children are particularly sensitive to the neurotoxic effects of inorganic lead because the blood-brain barrier is underdeveloped. Dietary exposure to lead occurs through a wide range of foods and beverages; some seafood products can contribute to lead intake.

What outbreaks have occurred?

Toxic metals are rarely found in seafood at concentrations likely to cause outbreaks of acute illness. Adverse human health effects arise from repeated, cumulative low-dose exposures from a wide range of dietary and non-dietary sources, of which seafood consumption may in some cases be a significant contributor.

How much toxic metal is a harmful dose?

Doses of toxic metals from seafood consumption alone are unlikely to cause acute illness. Harmful concentrations of specific metals in particular food items are assessed by food safety authorities based on information relating to typical consumption patterns and the known chronic health effects of exposure from dietary and other sources.

What are the symptoms?

- Overt signs and symptoms of acute metal poisoning are unlikely to be attributable to consumption of seafood alone.
- Foetal and childhood exposure to methylmercury and/or lead may manifest as subtle but measureable dose-related cognitive impairment.

Long-term excess exposure to particular toxic metals, from all sources (dietary and non-dietary), can cause:

- Chronic renal failure, cancers of the breast, prostate and uterus and bone disease – osteoporosis, osteomalacia and spontaneous fractures – associated with chronic cadmium poisoning; and

- Cancers of the skin, lungs, bladder and kidney, and chronic skin diseases – hyperkeratosis and dyspigmentation – associated with chronic arsenic poisoning.

What can be done to manage toxic metals in seafood?

- Metals in seafood tissues cannot be destroyed by cooking or processing.
- Fish meal is the principal source of toxic metals in farmed fish; alternative fish feeds produced from vegetable sources can considerably reduce fillet loads of arsenic and mercury.
- Toxic metals accumulate preferentially in crustacean hepatopancreas, so processes and/or advisories to eliminate or reduce consumption of crab, lobster or prawn "mustard" may be considered.
- Toxic metals may be present at high levels in some estuarine, coastal and marine waters and food webs from both natural and human-associated sources. Public health authorities may place controls or advisories around the collection of seafood, particularly shellfish and bottom dwelling fish, from these areas.

How can we test for toxic metals?

Modern chemical methods can accurately detect and quantify a range of toxic metals in seafood and water; several analytical laboratories offer these services. Inductively coupled plasma-mass spectrometry is one of the more widely adopted methods.

Regulatory standards

National and international food safety agencies monitor and regulate specific seafood products for toxic metal levels. Maximum allowable levels in Australia vary for different seafoods and can be found at http://www.foodstandards.gov.au.

International regulatory limits can be found in the Trade & Market Access Database, available at http://www.frdc.com.au/trade.

Where can I access more information?

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Considering the Benefits and Risks of Seafood Consumption

Eating seafood confers many benefits: it provides top-quality protein, and is an excellent source of important nutrients like iodine, selenium, vitamins A and D, and long-chain polyunsaturated omega-3 fatty acids. However like all foods, some seafood products may contain substances that are harmful to health. Illness from seafood is rare, so the benefits of seafood consumption must be weighed against the risks. For more information, see http://www.nap.edu/catalog.php?record_id=11762