Amnesic Shellfish Poisons Fact Sheet

What is Domoic Acid/Amnesic Shellfish Poisoning?

Domoic acid (DA) is a neurotoxin produced by a group of marine microalgae known as diatoms, mostly of the genus *Pseudo-nitzschia*. The term "amnesic shellfish poisoning (ASP)" was coined to describe domoic acid intoxication, from the observation that many of the victims of the outbreak were affected by memory dysfunction. However, DA can cause a range of other severe neurological impacts, including chronic epilepsy, and can be found in many other marine food animals, including crustaceans, tunicates, fish, mammals and seabirds, as well as a range of gastropod and cephalopod molluscs.

What are the causative organisms?

In Australia the known causative diatoms are from the *Pseudo-nitzschia seriata* group (*P. multiseries* and *P. australis*) and the *P. delicatissima* group.

These species grow naturally in marine environments. When they are present in significant levels they may cause a hazard, particularly in bivalve shellfish as they are further concentrated through filter feeding.

What outbreaks have occurred?

- The first DA outbreak occurred in Canada in 1987, when 107 people who had eaten DA-contaminated mussels were sickened, four of whom became comatose and subsequently died. 14 individuals suffered long-term neurological damage.
- No reports of illness attributable to DA poisoning have been received in Australia.
- Short-term mussel fishery closures have occurred in South Australia due to excess *Pseudo-nitzschia* counts.
- In 2010 a toxic *Pseudo-nitzschia* bloom in Wagonga Inlet on the NSW far south coast resulted in a four-month oyster harvesting closure.

How much domoic acid is a harmful dose?

A dose of about 1 milligram of domoic acid per kilogram body weight is thought capable of initiating symptoms of poisoning, i.e. around 65 milligrams for a 65 kg adult. This equates to 325 milligrams DA per kg of seafood in a 200g portion.

What are the symptoms?

- Mild intoxication may involve only gastro-intestinal upset (nausea, vomiting, diarrhoea, gut pains).
- Symptoms of neuro-intoxication include headache, convulsive seizures, myoclonus (involuntary, irregular muscle contractions), cognitive impairment and disorientation, anterograde amnesia (inability to lay down new memories following neurological damage), respiratory difficulty and coma.

What can be done to reduce or manage the risk?

- DA is heat-stable and therefore not degraded or destroyed by cooking, although some leaching into cooking water may be expected.
- Shellfish production in Australia requires adherence to algal biotoxin management

plans to control this hazard. Each State monitors commercial shellfish areas for toxic algae in the water and/or toxins in the shellfish. Detection of either factor above compliance levels results in mandatory closure of fisheries until toxin concentrations return to safe levels.

- Longer term depuration treatments may facilitate the elimination of domoic acid, but should be confirmed with chemical and/or biological testing.
- Avoid consumption of crustacean tomalley ("mustard") during bloom events as crustaceans are known to concentrate domoic acid in the hepatopancreas.
- Public health authorities may caution or restrict recreational shellfishing when waters are affected by toxic microalgal blooms.

How can we test for domoic acid?

- Microscopy technique can be used to detect the presence of potentially toxic diatoms in water samples.
- Antibody-based screening test kits or confirmatory chemical testing conducted by specialist analytical laboratories can be used to detect DA in seafood tissue samples.

Regulatory standards

The Australian regulatory limit for DA in bivalve molluscs is 20 milligrams per kg (http://www.foodstandards.gov.au/). State food safety regulators may apply this limit in the case of other seafood products found to be contaminated with DA.

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

Where can I access more information?

FAO 2004. Marine Biotoxins. FAO Food and Nutrition Paper 80, Rome. Food and Agriculture Organization of the United Nations.

HALLEGRAEFF, G. M. 2003. Algal toxins in Australian shellfish. *In:* HOCKING, A. D. (ed.) *Foodborne Microorganisms of Public Health Significance.* Sixth ed. New South Wales: Australian Institute of Food Science and Technology Inc.

Pulido, O. M. 2008. Domoic acid toxicologic pathology: a review. *Marine Drugs* 6:180-219

US Food and Drug Administration: Fish and fishery products hazards and controls guidance – 4th edition 2011 http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Seafood/ucm2018426.htm

Contact us:

http://safefish.com.au

FRDC
FISHERIES RESEARCH & DEVELOPMENT CORPORATION

AUSTRALIAN SEAFOOD COOPERATIVE RESEARCH CENTRE

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 most people, following the recommended national dietary guidelines is the best means of balancing risks and benefits. For some groups such as pregnant women and children, specific advisories on healthy and safe seafood choices should apply. For more information, see http://www.nap.edu/catalog.php?record_id=11762