Diarrhetic Shellfish Poisons Fact Sheet

What are Okadaic Acids/Diarrhetic Shellfish Poisons?

Okadaic acids (OA) and Dinophysistoxins (DTXs) are also known as diarrhetic shellfish toxins, DST's. They are a group of chemically-related lipophilic toxins that can contaminate shellfish and other seafood items and cause acute gastro-intestinal illness in humans, often referred to as diarrhetic shellfish poisoning (DSP). Pectenotoxin, an unrelated lipophilic toxin that is often detected with OA, is included in DST's for regulatory purposes in Australia, but there is some controversy over its toxicity to humans.

What are the causative organisms?

DSTs are produced by marine microalgae known as dinoflagellates. In Australia the known causative species are *Dinophysis acuminata, D. acuta, D. caudata, D. fortii* and *Prorocentrum lima*.

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

DST producing species are found in all states in Australia at various levels.

What outbreaks have occurred?

- Outbreaks of gastro-intestinal illness suspected to have been caused by consumption of pipis (*Plebidonax deltoides*) contaminated by heat-stable toxins have occurred in NSW.
- A six-week shellfish harvesting ban was imposed on leases in Smoky Bay, South Australia, after OA toxins were detected following a dinoflagellate bloom in 2003.
- A permanent ban on recreational harvesting of pipis from the Ballina area is in place due contamination with OA toxins.

How much okadaic acid is a harmful dose?

A dose of about 1 microgram per kilogram body weight is thought capable of initiating symptoms of okadaic acid poisoning, i.e. around 65 micrograms for a 65 kg adult. This equates to 325 micrograms OA per kg flesh in a 200g portion of seafood.

What are the symptoms?

- Nausea, diarrhoea, vomiting, abdominal pain and headache are the characteristic symptoms.
- Usually resolves by three days following consumption of contaminated shellfish.
- No fatalities have been reported
- May present a risk of dehydration requiring fluid and electrolyte replenishment, particularly in young children or the elderly.
- Okadaic acid is a potent tumour promoter, which raises concerns about the possibility of harmful effects from chronic, low-dose exposure. Such exposures are difficult to measure, so the concerns of public health agencies are currently directed toward concentrations of OA in shellfish that cause acute gastro-intestinal illness.

What can be done to manage DSTs?

- Commercial shellfish production in Australia requires adherence to algal biotoxin management plans to control this hazard. Detection in shellfish product of DSTs that exceed regulatory compliance levels results in mandatory closure of fisheries until toxin concentrations return to safe levels.
- Relaying shellfish to uncontaminated areas may facilitate the elimination of DSTs, but should be confirmed with chemical and/or biological testing.
- Public health authorities may caution or restrict recreational shellfishing when waters are affected by toxic microalgal blooms.
- DSTs are heat-stable, so cooking will not deactivate them.

Contact us:

http://safefish.com.au

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How can we test for DSTs?

- Monitoring source water samples by microscopy to detect the presence of potentially toxic dinoflagellates.
- Monitoring seafood tissues for DSTs either via antibody-based screening test kits or confirmatory chemical testing conducted by specialist analytical laboratories.

Regulatory standards

The Australian Food Standard maximum limit for DST in bivalve molluscs is 200 micrograms OA equivalence per kg, available at 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 DSTs.International regulatory limits for DSTs vary. Some countries may not include pectenotoxin, or may also have limits for Azaspiracid, Yessotoxin and Gymnodimine – related algal toxins that do not cause diarrhoea.

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.

Prego-Faraldo MV *et al* 2013. Okadaic acid meet and greet: an insight into detection methods, response strategies and genotoxic effects in marine invertebrates. *Marine Drugs* 11:2829-45.

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

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