Clostridium botulinum Fact Sheet

What is Clostridium botulinum?

Clostridium botulinum is a naturally occurring bacterium and is one of the most important pathogens in foods. It can be characterised by its anaerobic growth requirements, ability to form heat resistant spores and potential for growth across a wide range of temperatures. Some strains are capable of producing a potent neurotoxin that can cause severe illness in humans and animals.

What strains are considered a risk in seafood?

C. botulinum Type E is considered the most common form detected in freshly harvested seafood and has been associated with illnesses due to seafood consumption in other countries.

What seafood presents the highest risk?

Packaging formats that contain environments that are conducive to anaerobic growth and allow production of the neurotoxin, such as improperly canned product, vacuum packaged and modified atmosphere packaged seafood.

What outbreaks have occurred?

There have been no documented cases of botulism from the consumption of Australian seafood. Furthermore, there have been no documented reports of this organism in Australian seafood.

How much *C. botulinum* is a harmful dose?

The dose response of the botulism neurotoxin is unknown. For neurotoxins of *C. botulinum* Type E (the most common type associated with seafood), approximately 10 µg of toxin is estimated to result in death. However, the production of toxins depends on the strain, the numbers of spores present and the storage conditions.

Who is at risk?

All consumers are susceptible to the neurotoxins produced by *C. botulinum*, although, the immuno-compromised, the elderly and young children may require less toxin to become ill.

What are the symptoms?

- Initial symptoms include nausea, vomiting, and diarrhoea.
- Neurological symptoms following that begin with cranial nerve areas including eye, throat and mouth, followed by paralysis of motor nerves down the body.
- Constipation and abdominal pain persists throughout.
- Severe symptoms include lack of muscle co-ordination, fatigue and respiratory impairment and failure.

What can be done to inactivate or eliminate *C. botulinum*?

- The first line of defence for products that are considered a risk is strict temperature control of the product by storage at temperatures at or below 3 °C.

- For canned product, temperature profiles should be achieved during canning that will achieve a 12 log cycle reduction of *C. botulinum*.
- For lightly preserved and fresh product a 3% water phase salt content should be used.

Regulatory standards

- There is no specific Australian limit for *C. botulinum* Type E in seafood. Although, other countries such as India and Thailand do set limits for *C. botulinum*; International regulatory limits can be found in the Trade & Market Access Database, available at www.frdc.com.au/trade

How can we test for *C. botulinum*?

- There is no Australian standard method for testing *C. botulinum*. However testing methods such as traditional culture, PCR and ELISA are available.
- Neurotoxin detection can be performed by mouse bioassay, immunoassays, and DNA based techniques.

Where can I access more information?

BATES, J. R. & Bodnaruk, P. W. 2003. *Clostridium botulinum*. *In:* HOCKING, A. D. (ed.) *Foodborne Microorganisms of Public Health Significance.* Sixth ed. New South Wales: Australian Institute of Food Science and Technology Inc.

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Contact us:

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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 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

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