Australian Government
Fisheries Research and Development Corporation

AUSTRALIAN SEAFOOD COOPERATIVE RESEARCH CENTRE

SafeFish

http://safefish.com.au

Scombroid Fish Poisoning
Essential Knowledge for Seafood Businesses

Q: What is the issue?

A: Several cases of Scombroid Fish Poisoning have been reported in Sydney, potentially associated with the consumption of canned tuna. Scombroid Fish Poisoning is caused by ingestion of histamine, a product of the degradation of the amino acid histidine. Histidine is found naturally in the muscles of some fish. Further information on Scombroid Fish Poisoning in seafood is contained in the attached SafeFish fact sheet.

Q: What types of fish can be implicated?

A: Scombridae are the family of fish such as tuna and mackerel, which are traditionally considered to present the highest risk (hence the name Scombroid Fish Poisoning). However, other species have also been associated with histamine poisoning; e.g. anchovies, sardines, Yellowtail kingfish, Amberjack and Australian salmon, Mahi Mahi and Escolar.

Q: How often are there Scombroid fish poisoning events in Australia?

A: In Australia only 38 outbreaks of Scombroid Fish Poisoning were reported between 1988 and 2010. Both domestically harvested and imported fish have been implicated in causing illness. Illnesses occurred from seafood consumed both from restaurants and also from home settings.

Q: What do I need to know?

A: Histamine levels can increase over a wide range of storage temperatures. However, histamine production is highest over 21.8 °C. Once the enzyme is present in the fish, it can continue to produce histamine at refrigeration temperatures. Thus, temperature control is a critical control point in your HACCP plan.

Q: What can I do about it?

A: Temperature control is an effective risk management tool for preventing histamine production. Chill fish rapidly after death. Ensure proper cool chain management prior to receival, during processing and in the supply chain.

Histamine Poisoning Fact Sheet

What is Histamine?

Scombroid food poisoning is caused by ingestion of histamine, a product of the degradation of the amino acid histidine. Histidine can be found freely in the muscles of some fish species and can be degraded to histamine by enzymatic action of some naturally occurring bacteria.

Which types of fish can be implicated?

The scombrid fish such as tuna and mackerel are traditionally considered to present the highest risk. However, other species have also been associated with histamine poisoning; e.g. anchovies, sardines, Yellowtail kingfish, Amberjack and Australian salmon, Mahi Mahi and Escolar.

Which bacteria are involved?

A variety of bacterial genera have implicated in the formation of histamine; e.g. *Clostridium, Morganella, Pseudomonas, Photobacterium, Brochothrix* and *Carnobacterium*.

What outbreaks have occurred?

In Australia, 38 outbreaks (148 cases) were reported between 1988 and 2010. Many of the outbreaks were associated with tuna, however other implicated species included Mahi Mahi, sardines, Escolar, anchovies and Australian Salmon. Both domestically harvested and imported fish have been implicated with disease. Illnesses occurred from seafood consumed both from restaurants and also from in a home setting.

How much histamine is a harmful dose?

A threshold dose is considered to be 90 mg/100 g. Although, levels as low as 5-20 mg/ 100 g could possibly be toxic; particularly in susceptible individuals.

What are the symptoms?

Initial symptoms resemble some allergic reactions which include sweating, nausea, headache and tingling or peppery sensation in the mouth and throat.

Other symptoms include urticarial rash (hives), localised skin inflammation, vomiting, diarrhoea, abdominal cramps, flushing of the face and low blood pressure.

Severe symptoms include blurred vision, severe respiratory distress and swelling of the tongue.

What can be done to manage histamine in seafood?

- Histamine levels can increase over a wide range of storage temperatures. However, histamine production is highest over 21.8 °C. Once the enzyme is present in the fish, it can continue to produce histamine at refrigeration temperatures.
- Preventing the degradation of histidine to histamine by rapid chilling of fish immediately after death followed by good temperature control in the supply chain is the most appropriate control. Although, a novel strain of *Morganella* has been demonstrated to possess the ability for growth at 0-2 °C. Thus, temperature control may not eliminate risks in all circumstances.

How can we test for histamine?

- There are several analytical techniques that have been described by the AOAC including: a biological method (AOAC 954.04), a chemical method (AOAC 957.07) and a fluorometric method (AOAC 977.13).
- Commercially available ELISA based kits can be used.
- Histamine concentration can vary considerably between anatomical locations and this should be considered in sampling plans.

Regulatory standards

A maximum level of histamine of 200mg/kg is permitted in fish and fish products in the Australia New Zealand Food Standards Code, available at:

http://www.comlaw.gov.au/Details/F2015C00052

Codex Alimentarius sets decomposition and also hygiene and handling limits for a variety of seafood products including sardines and sardine-type products; canned fish; salted herring and sprat; frozen finfish and products comprised of finfish; crumbed or battered fish and fish portions; boiled dry salted anchovies; and fish sauce.

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?

LEHANE , L. & OLLEY, J. 2000. Histamine fish poisoning revisited. *International Journal of Food Microbiology*, 58 (1-2), pp. 1-37. EMBORG, J., DALGAARD, P. & AHRENS, P. 2006. Morganella psychrotolerans sp nov., a histamine-producing bacterium isolated from various seafoods. *International Journal of Systematic and Evolutionary Microbiology,* 56**,** 2473-2479.

2012. Joint FAO/WHO Expert Meeting on the Public Health Risks of Histamine and Other Biogenic Amines from Fish and Fishery Products. Rome, Italy: Food and Agriculture Organization World Health Organization.

EMBORG, J., DALGAARD, P. & AHRENS, P. 2006. Morganella psychrotolerans sp nov., a histamine-producing bacterium isolated from various seafoods. *International Journal of Systematic and Evolutionary Microbiology,* 56**,** 2473-2479.

HAHN, S. & CAPRA, M. 2003. Fishborne illnesses: Scombroid and Ciguatera Poisoning. *In:* HOCKING, A. D. (ed.) *Foodborne Microorganisms of Public Health Significance.* Sixth ed. New South Wales: Australian Institute of Food Science and Technology Inc.

Contact us:

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FRDC FISHERIES RESEARCH & DEVELOPMENT CORPORATION

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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