SFPA
AN ÚDARÁS UM CHOSAINT IASCAIGH MHARA
SEA-FISHERIES PROTECTION AUTHORITY

HISTAMINE IN SEAFOOD

No.10

Industry Advice

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The Sea Fisheries Protection Authority is charged with enforcing conservation legislation for the protection of our fishery resources.

Seafood is a safe and nutritious food-group however like all foods, it needs to be handled correctly to minimise risks of food-borne illness. The most common problem associated with seafood consumption amongst European Union consumers is Histamine toxicity.

The most frequently implicated fish products are fin fish within the 'Scombroid' family, notably mackerel and tuna, however other fish and other food products can also be implicated. The problem is sometimes referred to as 'Scombroid toxicity'.

Overview of the Problem

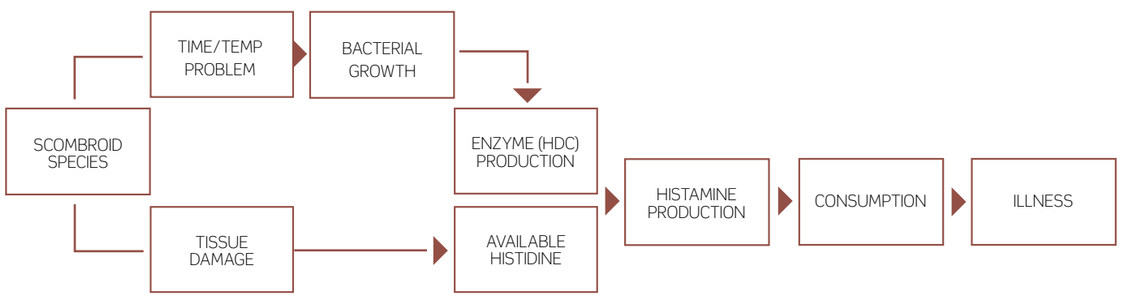
Muscles of all creatures contain amino acids and some fish muscle contains high levels of the amino acid Histidine. Some bacteria normally present throughout the environment, including in seawater and on the surface of fish, produce an enzyme, Histidine Decarboxylase (HDC) which can bring about a chemical reaction; decarboxylation of histidine which converts it into the substance Histamine. Histamine (often called scrombotoxin) is a substance mediating the immune response in mammals and is released from inflammatory cells to bring about allergic reactions in people. Consumption of fishery products which contain high levels of Histamine can cause illness in consumers, depending on the amount consumed.

Outcome in Consumers

Consumption of high levels of histamine causes a syndrome that presents as an allergic reaction centred around the mouth and gut. Typical symptoms include nausea, vomiting, diarrhea, oral burning sensation or peppery taste in the mouth; hives, redness or itching anywhere on the body but typically around the face and neck and hypotension. The onset of symptoms is usually within a few minutes of consuming the product and depending on amount ingested the symptoms can last from a few hours up to 24 hours. Subject to medical advice, the problem may be effectively treated with antihistamines.

Understanding the Problem

The problem arises when bacteria produce HDC and thereby decarboxylate histidine to produce histamine. High levels of bacteria are necessary to produce high levels of HDC and that requires high levels of the raw material histidine. Bacterial numbers on seafood are a result of initial load and any subsequent growth. These bacteria are normally present on external surfaces of the fish and can contaminate muscle tissue during gutting and filleting. Temperature control is extremely important in this context as prolonged high temperatures facilitate bacterial growth and enzyme production resulting in subsequent enzyme activity. The amount of available histidine is influenced by the type of fish, with particular risks around Scombrodid fish. Histidine is released in the fish as the process of spoilage progresses. Tissue damage through poor handling further accelerates the availability of histidine from muscle cells.



Once formed, the enzyme is relatively stable and has potential to produce histamine from any available histidine. Once histamine is formed it is very stable and is not destroyed by cooking or freezing. Sufficient bacteria can grow rapidly if temperatures are abused, without visible spoilage of the fish.

Risk Management

Warm temperatures at any stage of production from catching to consumption can result in histamine production. Even if it is adequately refrigerated in the later stages of the food chain, an earlier cold-chain issue can produce histamine. All operators have an obligation maintain food safety and particular attention to detail is required when catching, processing or distributing scombroid fishery products in warm weather. Key risk management strategies are temperature control, tissue handling, hygiene and testing for histamine.

Commercial Fishers

Consider ambient temperature when line-catching; long-lines create potential for a fish to be caught and sitting in warm water for prolonged periods before being brought on-board. Soak-times should be reduced when waters and weather are warm. Trawling or mid-watering creates potential for additional tissue bruising. Gutting should be done with sharp knives and gentle technique. Icing on-board should be done rapidly and completely with particular consideration to getting adequate chilling of large fish through icing of body cavity as well as outside. Refrigerated Sea Water (RSW) tanks should be pre-chilled before hauling to ensure that fish reach 3°C within six hours and 0°C within 16 hours of loading.

Storage and Transport

Ensuring the maintenance of the cold chain through all distribution channels is essential. Histamine is colourless and odourless and is not destroyed by freezing or cooking, therefore once histamine has formed it cannot be removed. Immediately on landing, the chilling process should be continued as rapidly as possible and the fish maintained at temperatures below 5°C through all stages of storage and transport.

Seafood Product	Maximum permitted level of histamine
Fishery products from fish species associated with a high amount of Histidine	A sample consists of nine sub units from a particular batch of which: - *the average histamine content must be 100mg/kg or less, and* - *no more than two samples may have levels between 100mg, to 200mg/kg, and* - *no sample may have a level above 200mg/kg.*
Fishery products manufactured from fish species associated with a high amount of Histidine, which have undergone enzyme maturation treatment in brine.	A sample consists of nine sub units from a particular batch of which: - *the average histamine content must be 200mg/kg or less, and* - *no more than two samples may have levels between 200mg, to 400mg/kg, and* - *no sample may have a level above 400 mg/kg*

Processors

Hygiene and cold chain control are important considerations. Cooling capacity should be planned when ambient temperatures are likely to result in greater challenge for at-sea chilling. Validation of the effectiveness of food safety management systems through histamine testing is an obligation in EU legislation, with a requirement for nine sample subunits. Non-compliances should result in withdrawal of implicated batches and also in a meaningful appraisal of how the problem arose followed by appropriate corrective action.

The maximum permitted levels of histamine in seafood as set down in EU Regulation 2073/2005, are outlined in the table above. These are the levels that apply to products placed on the market in the EU up to the end of their shelf life.

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Retailers including Shops, Catering Premises and Restaurants

Only purchase seafood from reputable suppliers where the provenance is apparent. Only purchase processed fisheries products bearing an approval number indicating the existence of adequate food safety systems in the processing plant. Cold-chain maintenance of fishery products is vital and scrombroid fishery products should be stored less than 5°C.

Summation

Tuna and mackerel are some of the most fantastic food products coming from the waters around Ireland. Our natural proximity to the waters in which they shoal is an inherent risk minimisation factor for problems such as histamine. Active attention to detail, particularly in warm weather, will ensure the safety of those products.

See Also

SFPA Leaflet Number 11: Histamine in Seafood: Advice for Consumers and Recreational Fishers.