

Control Measures for Harvesters to Prevent Scombrotxin Fish Poisoning

National Sea Grant Training and Education Project

Scombrotxin (Histamine) Poisoning: Frequently Asked Questions

What is scombrotxin?

Scombrotxin is histamine and other related compounds formed in certain fish by naturally occurring bacteria.

What is the issue?

Scombrotxin poisoning is one of the top three recurring seafood-borne illnesses reported in the United States.

What is scombrotxin poisoning?

Scombrotxin poisoning occurs when people eat fish with elevated levels of histamine and related compounds.

What are the symptoms of scombrotxin poisoning?

Flushing of the face and neck, swelling of the mouth and throat as well as vomiting and diarrhea can occur. Symptoms occur within 2 to 4 hours and may last up to 2 days if not treated. Asthmatics may experience more severe cases, which can lead to anaphylactic shock and possibly death.

What can relieve symptoms of scombrotxin poisoning?

An over-the-counter antihistamine.

How much scombrotxin can cause an illness?

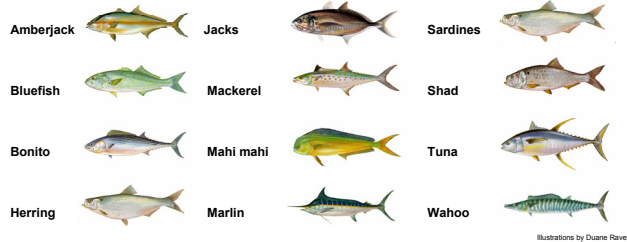
The level of histamine and related compounds that can cause human illness varies with the individual. Histamine concentrations at or above 50 parts per million (ppm) are not allowed in seafood by the U.S. Food and Drug Administration (FDA).

How is scombrotxin produced in fish?

Scombrotxin may be produced in fish due to improper handling and chilling. Delay in chilling or temperature abuse of fish in distribution may lead to scombrotxin formation. Certain naturally-occurring bacteria may grow and produce enzymes in the fish. These enzymes convert histidine in the fish muscle into histamine and other compounds.

What fish are known to support scombrotxin production?

Fish in the Scombridae family and certain others have naturally high levels of free histidine in the muscle. Examples include:



Can scombrotxin be removed from fish once it is formed?

No, scombrotxin cannot be removed once it has formed, even by washing, freezing or cooking.

How can scombrotxin production in fish be controlled?

Rapidly chill fish after harvest. Gutting fish is recommended for certain species to reduce the spread of bacteria. If gutted, pack the belly cavity with ice to chill fish below 40°F.

What are the requirements for controlling scombrotxin?

The FDA requires seafood dealers and processors to demonstrate control of scombrotxin development in histamine-forming fish.

One control strategy is the Hazard Analysis and Critical Control Point (HACCP) program. HACCP recommends that dealers and processors assess proper temperature control on board the vessels.

Processors may request monitoring records from vessels that fish were properly chilled at harvest and maintained below 40°F.

Other control strategies may include sensory evaluation and rapid chemical testing for the presence of histamine.

On-Board Fish Handling

Choose Proper Tackle

When fishing by hook and line, use adequate tackle to reduce excessive struggling that may cause elevated body temperatures.

Land Fish Gently

Handle fish gently to reduce bruising and internal bleeding. Avoid gaffing if possible. If you must gaff, place it in the head of the fish avoiding muscles and the gut.



Stun, Bleed and Eviscerate

Stun the fish with a sharp blow to the head using a club or mallet. Stunning makes fish easier to handle and prevents bruising and internal bleeding. Bleed fish by cutting throat to sever the artery between the gills and heart. Place fish into an ice water slurry for 15 to 20 minutes, which will cool fish rapidly and improve the appearance of the muscle. Bleeding some species of fish may significantly increase shelf life. Gutting fish is optional, but preferred for some species. For example, gutting large fish, such as tuna, may be necessary to speed the cooling process. Gut fish after bleeding so that heart is not punctured or removed before pumping any remaining blood from fish. Remove gut intact so that digestive enzymes do not come in contact with edible flesh and rinse the gut cavity and fish exterior.



Pack and Chill

Remove fish from ice water slurry and rinse off blood before packing with clean, crushed or flake ice. Place several inches of ice on bottom of container before adding fish and surround each fish to minimize fish-to-fish contact. Pack belly of eviscerated fish with clean ice. Containers should drain easily to keep fish out of melt water. Amount of ice needed depends on number and species of fish, air and water temperatures, and length of time fish will be stored. Two pounds of ice per pound of fish is a good starting point. It is always better to have too much ice than not enough!



Fish should be placed in ice or refrigerated seawater as soon as possible. HACCP guidelines recommend histamine-forming fish to be placed in cooling media within 6 to 12 hours after death, depending on species, and then rapidly chilled to an internal temperature of 40°F or less. The amount of time for cooling depends on the chilling method, size of the fish, air and water temperature, and whether the fish was bled and or gutted.

HACCP Control Measures

The FDA requires all seafood dealers and processors who sell histamine-forming fish to follow strict monitoring and control procedures to prevent the development of histamine. HACCP is a food safety program dealers and processors use to protect their seafood against bacterial, chemical or physical hazards that could harm consumers.

To comply with HACCP, dealers first evaluate both their seafood and their processing operations to determine where they are most vulnerable to food safety hazards.

Next, processors identify as *critical control points (CCPs)* the characteristics of their seafood and the steps in their manufacturing process where they can apply specific controls to prevent, eliminate or minimize risk of food safety hazards. Typical manufacturing CCPs are receiving, cooking, cooling or storing seafood.

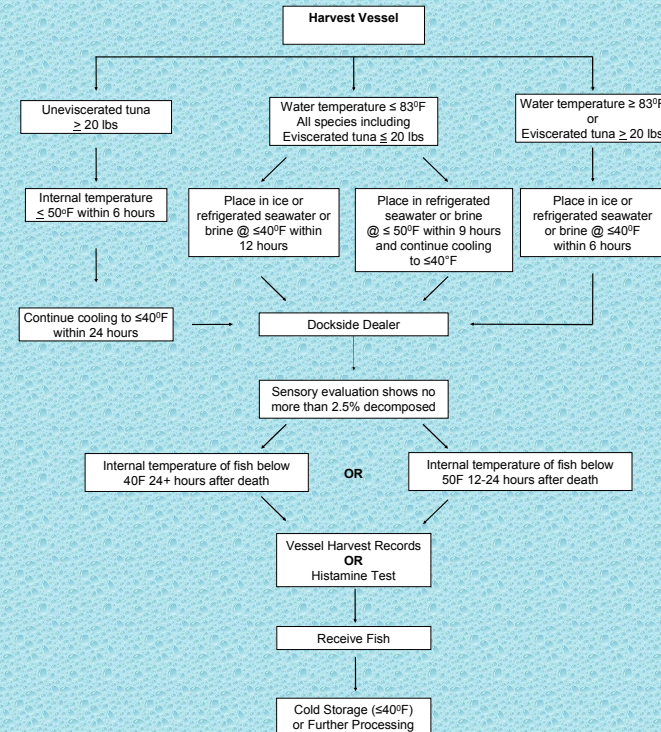
Dealers then establish maximum or minimum boundaries, called *critical limits*, at a CCP to ensure safe products are produced. Time and temperature limits or rapid chemical tests help monitor CCPs. For instance, the maximum storage temperature at which histamine can be prevented is 40°F.



Processors must implement *corrective actions* whenever monitoring shows that a CCP critical limits have been violated. If a cooler fails, for example, a dealer could ice fish to keep it cold or move it to another cooler.

All monitoring activities must be documented on paper, and records are reviewed weekly by a HACCP-trained individual.

All wholesale seafood dealers and processors are subject to the HACCP regulation. Cooperation of the commercial fishing industry is vital to ensure that domestic seafood is safe and that the HACCP seafood safety program succeeds.

FDA Guidelines for First Receivers of Histamine-Prone Fish





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