



# Food Safety Advice on Prevention of Scombrototoxin Fish Poisoning

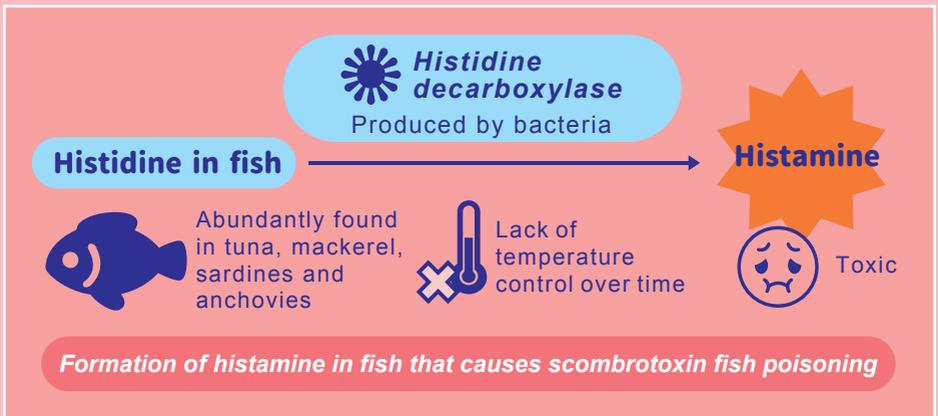




Fish is an important part of our everyday diet. However, the consumption of fish and fish products containing high levels of histamine may cause scombrotxin fish poisoning, also called histamine poisoning. This is mostly related to improper food handling.

## Histamine and Scombrotxin Fish Poisoning

Histamine is a toxic metabolite produced by histamine-producing bacteria during spoilage and fermentation of fish and fish products. Many of these bacteria are part of the natural microflora of the skin, gills and gut of freshly caught fish. Histidine decarboxylase, an enzyme produced by histamine-producing bacteria when they multiply, converts the amino acid histidine that are naturally present in fish into histamine.



**Fish in the Scombridae family like tuna and mackerel** naturally contain high levels of the amino acid histidine. When these fish are improperly stored, particularly soon after being caught, high levels of histamine may be formed due to the activities of histamine-producing bacteria. Other species, such as **sardines, anchovies, mahi-mahi, herring, marlin, bluefish, salmon, yellowtail and swordfish**, may also contain high levels of histidine.



*Examples of fish which contain high levels of naturally occurring histidine: ① mackerel, ② sardines, ③ tuna and ④ anchovies. Some of their products may also contain high levels of histamine if improperly stored.*

Adequate heat treatments (e.g. cooking, hot smoking) can kill histamine-producing bacteria and inactivate histidine decarboxylase enzymes. Yet histamine is heat stable. **Once formed, it cannot be destroyed by cooking, canning or freezing.** Histamine-contaminated fish may have a metallic off-flavour, a bad odour, or a discoloured or "honey-combed" appearance, but some of them can appear, smell, and taste normal. The consumer cannot ensure the presence or absence of the histamine toxin purely by making use of their senses.

# Symptoms of Scombrotxin Fish Poisoning

Symptoms of scombrotxin fish poisoning include tingling and burning sensation around the mouth, facial flushing and sweating, nausea, vomiting, headache, palpitations, dizziness and rash. Exacerbation of asthma and more serious cardiac manifestations were reported in more severe cases. The onset of symptoms is within a few hours after consumption and these symptoms will normally disappear in 12 hours without long-term effects.



Sweating



Palpitation



Headache



Dizziness



Rash

## Preventive Measures

Histamine found in fish muscles is formed by bacterial action in dead fish. Once histamine is formed, nothing can be done to eliminate it. Low temperature minimises histamine production by inhibiting the growth of histamine-producing bacteria and by reducing the activities of histidine decarboxylase enzymes. Hence, strict control of the cold chain ( $\leq 4^{\circ}\text{C}$ ) is essential to prevent the formation of histamine.

- Fish must be chilled immediately after catching.
- The cold chain must be maintained throughout all processing stages, including harvesting, transportation, delivery and sale.
- Records of cold chain integrity should be kept at all stages of the food chain.

Codex Alimentarius Commission has issued the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003) that includes information on how to minimise the risk of histamine build-up in fish and fish products (FFPs) through technical guidance for the control of histamine formation at key steps in the food chain from harvesting to processing.



*Sufficient ice is used to completely surround the fish to bring the internal temperature of fish to below 4°C.*

## Purchasing

- Purchase FFPs from reliable and hygienic sources.
- Do not purchase or eat fish with an off-odour, discoloured flesh or a “honey-combed” appearance.



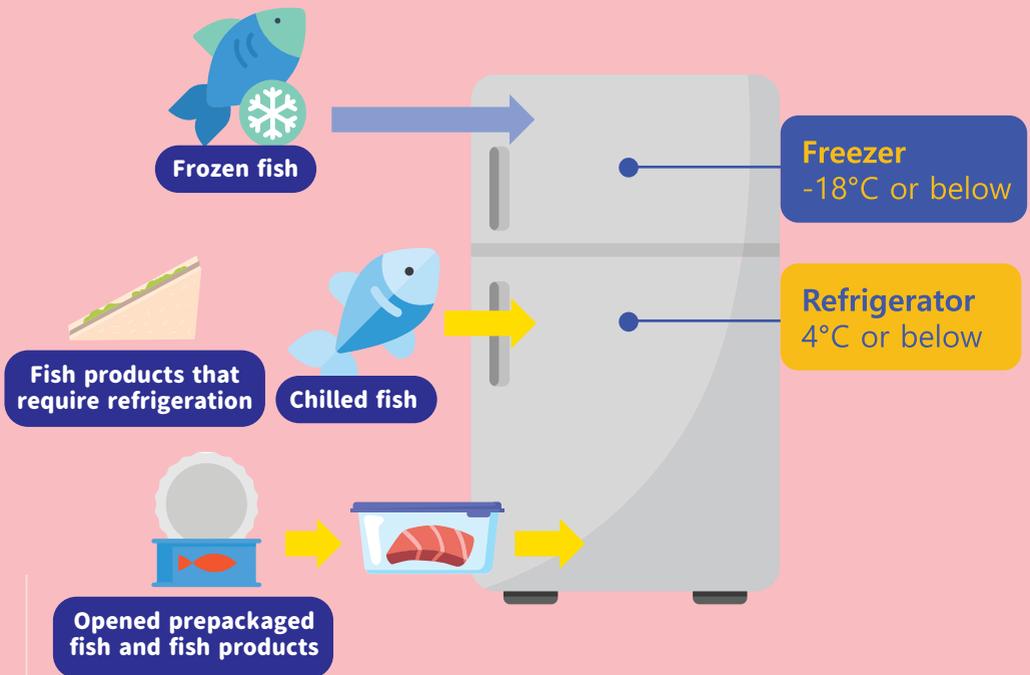
*Frozen cut fish stored in a freezer at a food store.*

## Receiving

- Inspect FFPs upon receipt to ensure that the cold chain is maintained. For example:
  - Transport vehicles should be adequately equipped to keep fish cold.
  - Chilled fish should be stored at a temperature of 4°C or below, preferably as close as possible to 0°C.
  - Frozen fish should be stored at -18°C or below.

## Storage

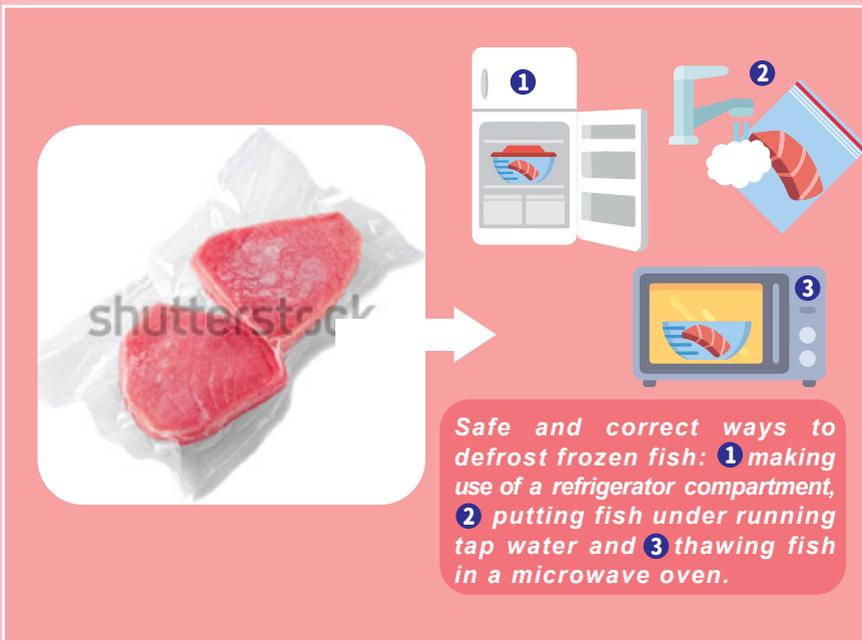
- On receipt, store FFPs under proper temperature control immediately. Chilled or frozen FFPs should not be left exposed to room temperature for an extended duration.
- If not cooked immediately, store FFPs:
  - At **4°C** or below for **chilled products**;
  - At **-18°C** or below for **frozen products**;
  - Follow the manufacturer's instructions on the package of prepackaged products. **Once opened, put them in clean containers before refrigerating and use them as soon as possible.**



- Keep raw and cooked FFPs in separate refrigerators to prevent cross-contamination. Alternatively, keep cooked foods in the compartment above the one for raw foods.

## Defrosting

- Thaw frozen fish in a safe and correct manner, such as **by making use of a refrigerator compartment, putting fish under running tap water or thawing fish in a microwave oven:**
  - Thaw frozen fish intended for raw consumption in the refrigerator compartment.
  - Wrap or put frozen fish in a clean container while defrosting.
  - Put frozen fish under running tap water for **no more than 4 hours**.
  - Do not refreeze the fish after defrosting.
  - Clean and disinfect all surfaces that come into contact with the juice of defrosted fish.
- Never defrost frozen fish at room temperature as it facilitates histamine production.



## Cooking

- Cook thawed fish immediately to a core temperature of at least 75°C or until they turn opaque and can be flaked and boned easily.
- For slow cooked (i.e., sous vide) fish, core temperature and time combination of not less than 60°C for 45 minutes is recommended. If the temperature is too low, bacteria can survive and convert the histidine in fish muscles to histamine.



## Good Hygiene Practices

- Wash hands thoroughly before handling food, after using the toilet and after touching the face or unclean substances (e.g. after disposing of rubbish). Rub hands with liquid soap for at least 20 seconds.
- Wash hands properly before wearing and after removing gloves if disposable gloves are used in handling ready-to-eat food. Change gloves frequently, e.g. between different jobs and processes or when they are soiled. Gloves should not be reused.
- Do not handle food if suffering from illnesses such as fever, diarrhoea and vomiting.

