

**QUICK LINKS****Seafood Poisoning—TRAVELER INFORMATION**

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## Traveler Information

**SEAFOOD POISONING****INTRODUCTION**

Seafood poisoning appears to be increasing, due to increasing seafood consumption, international trade, and tourism. In the United States, 1 out of every 6 food poisoning outbreaks is caused by consumption of fish, shellfish, or other marine organisms. Seafood poisoning can be caused by toxins, bacteria, viruses, and parasites. Travelers should be aware of the risks and learn what steps they can take to prevent seafood poisoning.

**MARINE TOXINS**

Marine poisoning is caused by toxins that have accumulated in fish or shellfish. These toxins are produced by minute algae (ciguatera and shellfish poisoning), bacteria (tetrodotoxin poisoning), or decomposition by bacteria (scombroid poisoning). Marine toxins can't be smelled or tasted, and typical food preparation procedures such as cooking, freezing, salting, drying, smoking, or marinating will not eliminate them.

**FISH POISONING****Ciguatera Poisoning**

**Risk:** Ciguatera fish poisoning is caused by small sea algae that adhere to dead coral, seaweed, and other surfaces, where they are consumed by fish. It is the most frequently reported food-borne disease associated with eating fish in the U.S. and Canada. Ciguatera is endemic throughout the Caribbean and South Pacific islands and is common in tropical or subtropical regions between 35°N and 35°S. Approximately 50,000 cases are reported each year. In the U.S., ciguatera is almost exclusively present in Hawaii, south Florida, and the northern Gulf of Mexico; however, outbreaks have occurred from eating contaminated fish in restaurants in other parts of the country. The disease has been linked to more than 400 species of fish, particularly large carnivorous reef fish.

**Symptoms** can occur within minutes or up to 12 hours after eating infected fish, depending on the amount and parts of the fish consumed, as well as the species and size. Symptoms become more severe with each exposure to the toxin.

- Early symptoms include diarrhea, abdominal cramps, and vomiting. Numbness, tingling, burning, and/or prickling feelings in the lips, mouth, throat, legs, or arms; tooth pain; itching; muscle pain; blurred vision; painful urination; depression; and fatigue occur within hours after the early symptoms.
- Heat and cold reversal may occur; this involves feeling a burning sensation when touching something cold and a cold sensation when touching something hot.
- In severe cases, problems with coordination, limb paralysis, respiratory failure, seizures, or coma may occur.
- Cardiac symptoms include irregular heartbeat, low blood pressure or vacillation of blood pressure, and shock.

Neurologic symptoms usually resolve within weeks but may persist for months, especially weakness and feelings of prickling, tingling, or burning. Symptoms may recur after eating saltwater or freshwater fish, ethanol, caffeine, and nuts for up to 6 months. Death occurs in 0.1-12% of reported cases.

**Seeking medical help:** If ciguatera poisoning is suspected, seek medical help. Obtain a sample of the fish for analysis, if possible. Treatment is mainly symptomatic and includes inducing vomiting and emptying the stomach, followed by ingesting activated charcoal. Medications may be given to correct slow heart rate and shock, and to reduce the severity and duration of neurological symptoms.

**Prevention:** Travelers should never eat barracuda or moray eel and should not eat the flesh or viscera of grouper, jacks, red snapper, sea bass, mullet, or other large reef fish from warm waters where ciguatera is known to occur.

## Tetrodotoxin Poisoning and Fugu

**Risk:** Tetrodotoxin is one of the most potent toxins known. The toxin is tasteless and is not destroyed by cooking. It exists in a variety of animals, including poison dart frogs, salamanders, blue-ringed octopuses (see *Marine Hazards*), and some reef fish and crabs, but most importantly in puffer fish. More than 100 species of puffers inhabit coral reefs and coastal waters in all temperate and tropical seas, as well as some tropical estuaries and rivers.

Most cases of poisoning have been reported from Indo-Pacific waters, but also from the Gulf of Mexico and the Gulf of California. Japan reports the greatest number of cases, about 50 per year, with an average case fatality rate of 7%. *Takifugu* species, which are used to make the Japanese delicacy *fugu*, are caught in tropical and sub-tropical Southeast Asian waters. *Fugu* is a highly prized dish of raw puffer meat, cut into thin slices. The taste is normal, but just the right quantity of *fugu* induces burning, tingling, and numbness of the tongue, mouth, and genitals. Too much *fugu* may prove fatal; however, cases are rare because in registered *fugu* restaurants puffers are expertly prepared by licensed chefs.

**Symptoms** develop 10-30 minutes after eating a puffer meal but can be delayed for hours. Tingling and numbness of the tongue, lips, and face is followed by difficulty swallowing, walking, speaking, and breathing, due to muscle paralysis. Mild cases will usually resolve after 24 hours, but in severe cases, death can occur by suffocation due to paralysis of the diaphragm. There is no antidote.

**Seeking medical help:** Persons with trouble swallowing, speaking, walking, or breathing should be taken to the hospital immediately. Artificial respiration may be required en route.

**Prevention:** Travelers should not eat any kind of puffer fish. Puffer fish can usually be recognized by their globular or elongated globular shape, eyes set high on the head, skin covered in prickles, and teeth fused into a beak. In Japan, travelers who want to try the "thrill" of eating *fugu* should choose a restaurant with a licensed *fugu* chef.

## Scombroid Poisoning

**Risk:** Scombroid poisoning is the second most commonly reported fish-borne illness worldwide after ciguatera. It is fairly common in countries with diets high in fish. Typically it results from eating spoiled fish (fresh or canned) of the *Scombroidea* or *Scomberesocidae* families, such as tuna, mackerel, skipjack, and bonito. However, non-scombroid fish also have produced scombroid poisoning, including: mahi-mahi (dolphin fish), bluefish, amberjack, swordfish, herring, sardines, anchovies, salmon, and trout.

Scombroid is caused by bacterial overgrowth associated with inadequate storage of fish; once the bacteria have started to grow, neither refrigeration nor cooking can prevent scombroid. Contaminated fish may look normal but may taste peppery or strong and make one's mouth tingle.

**Symptoms** occur rapidly, usually within an hour of eating spoiled fish. Symptoms typically include: flushing, itching, rash, headache, palpitations, dizziness, sweating, and burning of the mouth and throat. Gastrointestinal symptoms can include diarrhea, nausea, vomiting, and abdominal cramps. Rash usually lasts about 2-5 hours, and other symptoms resolve within 3-36 hours.

Scombroid often is mistakenly diagnosed as "fish allergy" because the symptoms respond rapidly to antihistamines.

**Seeking medical help:** Antihistamines provide symptomatic relief, as do bronchodilators, when necessary. In rare severe cases, adrenaline may be required.

### Prevention

Travelers should:

- Keep fresh tuna, mackerel, grouper, and mahi-mahi refrigerated to prevent development of histamine.
- Avoid eating fish that have a peppery taste or cause the mouth to tingle.

## SHELLFISH POISONING

**Risk and symptoms:** Shellfish poisoning can occur after eating mussels, oysters, scallops, or hard- and soft-shelled clams that have fed on toxic algae. Outbreaks occur around the North Atlantic Ocean, Japan, Chile, and South Africa, generally in association with algae blooms ("red tides"). There are 4 types of poisoning:

- *Paralytic shellfish poisoning* (PSP) occurs worldwide and is characterized by rapid onset of tingling, numbness, drowsiness, and respiratory paralysis.
- *Neurotoxic shellfish poisoning* (NSP) occurs off the coast of Florida and the Gulf of Mexico and causes a mild illness resembling ciguatera poisoning.
- *Amnesic shellfish poisoning* (ASP), which occurs on the Pacific and Atlantic coasts of Canada and the U.S. and the Atlantic coast of northern Europe, causes acute gastrointestinal symptoms followed by neurologic symptoms, including short-term memory loss and seizures.
- *Diarrhetic shellfish poisoning* (DSP), which causes acute vomiting and diarrhea, occurs worldwide, especially around the Atlantic coasts of northern Europe and in the Mediterranean. In addition, some species of marine snails that are an important part of the diet in Southeast Asia and the Pacific islands, many species of crabs mostly found on coral reefs of the Indo-Pacific and served locally in soup, and sea cucumbers collected for the East Asian trepang market and improperly prepared can be poisonous and cause a variety of sometimes serious syndromes.

**Seeking medical help:** Persons experiencing neurologic symptoms such as tingling, numbness, weakness, or respiratory distress should be transported rapidly to a hospital. Patients with diarrhea and vomiting require fluid replacement.

**Prevention:** Commercially grown and marketed shellfish are usually safe to eat in developed countries. Elsewhere, shellfish should be consumed only in reliable restaurants or when caught in waters known to be free of red tides and away from sewage outlets. Do not eat shellfish sold as bait.

## Bacterial Toxins

Seafood diseases caused by bacterial toxins generally result from improperly prepared or stored fish, and can occur in both fresh and canned fish. Scombroid poisoning is the most common of these.

*Clostridium botulinum* type E produces a toxin on smoked fish, fish eggs, and uneviscerated and salted whitefish. *Staphylococcus aureus* produces a toxin on improperly stored seafood, especially if the fish is garnished with cream sauces or mayonnaise.

## Chemical Toxins

Industrial activities release heavy metals from the earth and send them into fresh water and salt water, where they bioaccumulate through the food chain, accumulate in seafood, and are eaten by humans. Well-known toxins include methylmercury, polychlorinated biphenyls (PCBs), organochlorides, pesticides, and radioactive waste. King mackerel, tile fish, tuna, shark, and swordfish contain the highest concentration of methylmercury, which can cross the placenta; pregnant women should avoid eating these fish.

## Bacteria

The *Vibrio* class of bacteria is an important cause of bacterial seafood poisoning. *Vibrio cholerae* (cholera) is often acquired from unhygienic food handling in the home and on the street. In Latin America, *ceviche* (raw fish) is a common source. Because the organism requires an alkaline medium for growth, adding citrus juice (an acid) can help reduce but not eliminate the risk.

Other vibrios include *V. parahaemolyticus*, an organism that causes diarrhea, and *V. vulnificus*, which can cause fatal septicemia in persons with liver disease or compromised immunity. *V. vulnificus* is the leading cause of seafood-related deaths in the U.S. Wound infections may occur after swimming in contaminated waters. *Listeria monocytogenes*, found on the surface of fish, may cause severe illness in newborn babies born to infected mothers. *Salmonella* and *Aeromonas* species are also a risk through consumption of seafood.

## Viruses

Shellfish harvested in waters contaminated with raw or inadequately treated sewage are extremely efficient carriers of seafood pathogens because shellfish are filter feeders that concentrate the organisms. Many viral outbreaks have occurred in eastern Asia, notably in Japan. Hepatitis A virus is the most common cause of seafood-associated viral hepatitis and is most often acquired from the consumption of raw or inadequately prepared shellfish. Norovirus, the most common viral cause of gastroenteritis, is not reliably eliminated by cooking shellfish.

## Parasites

Parasite infections from eating inadequately cooked fish are relatively uncommon but are preventable. *Anisakiasis* (caused by a rare roundworm) is acquired by eating raw fish, especially cod, herring, mackerel, and salmon. It is associated with abdominal pain and an increase in a certain type of white blood cell in symptomatic individuals. Fish tapeworm infection has been reported with the ingestion of raw Pacific salmon and gefilte fish.

## TIPS FOR PREVENTING SEAFOOD POISONING

- Do not eat raw or undercooked fish or shellfish.
- Don't eat any fish considered to be dangerous by the local population.
- Avoid eating fish that has a "peppery" taste or that causes tingling in the mouth.
- Do not eat barracuda or moray eel.
- Do not eat the flesh or viscera of grouper, jacks, red snapper, sea bass, mullet, or other large reef fish from warm waters where ciguatera is known to occur.
- Avoid eating any kind of puffer fish. In Japan, travelers who want the "thrill" of eating *fugu* should choose a restaurant with a licensed *fugu* chef.
- Keep all fresh fish refrigerated, especially fresh tuna, mackerel, grouper, and mahi-mahi.
- It is usually safe to eat commercially grown and marketed shellfish in developed countries. Elsewhere, eat shellfish only in reliable restaurants or when caught in waters known to be free from red tides and away from sewage outlets.
- Hepatitis A, the most common cause of seafood-associated hepatitis, is vaccine preventable. Ask a health care provider about the suitability of this vaccine based on any medical conditions, travel habits, and the destination.

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