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# Natural Marine Toxins

Paralytic shellfish poisoning (PSP) toxins and domoic acid are naturally occurring marine toxins. Single-celled marine plants (phytoplankton) produce these toxins. Marine animals that filter their food from seawater may accumulate these toxins. The toxins do not appear to directly harm the animals, but people or some predatory animals eating toxic seafoods may become poisoned. PSP toxins and domoic acid are powerful nerve poisons. PSP toxins and domoic acid have no taste or odor. There is no visible difference between toxic and safe seafoods. Cleaning seafoods in many cases will not remove the toxins. Cooking does not destroy the toxins.

## Paralytic Shellfish Poisoning Toxins

Certain one-celled organisms called dinoflagellates produce PSP toxins. Bivalve shellfish (2 shells) filter these organisms from the water. PSP toxins accumulate in the dark digestive organs or viscera of most shellfish. In Washington clams, PSP toxins also accumulate in the siphons (necks). Mussels, oysters, clams, and scallops have caused PSP outbreaks in California, but abalone, crab, shrimp and fish have never been implicated as a source of PSP.

PSP symptoms begin within a few minutes to a few hours after eating toxic shellfish. Symptoms begin with tingling and numbness of the lips, tongue and fingertips. Later symptoms are lack of balance, lack of muscle coordination, slurred speech and problems in swallowing. Complete paralysis and death can occur in severe cases.

## Domoic Acid

Domoic acid was only recently discovered (1991) in California. Certain one-celled plants called diatoms produce domoic acid. Bivalve shellfish and some finfish filter these diatoms from the water. In most cases, domoic acid accumulates in the viscera of these animals. In razor clams, domoic acid also accumulates in the meat. Unsafe levels of domoic acid have been found in anchovies, mussels, razor clams and crab viscera, but not crab meat. Many other species have yet to be investigated.

Domoic acid poisoning symptoms begin within 30 minutes to 24 hours after eating toxic seafood. In mild cases, symptoms may include vomiting, diarrhea, stomach cramps, headache, dizziness and confusion. Difficulty breathing, seizures, coma and death can occur in severe cases. Survivors of severe cases have suffered permanent loss of short-term memory, a condition known as amnesic shellfish poisoning (ASP).

## California's Mussel Quarantine

The California Department of Health Services (CDHS) places a quarantine on sport harvesting of mussels for food from May 1 through October 31. This is the period when mussels are most likely to accumulate PSP toxins. If monitoring activities confirm unsafe levels of toxins, the quarantine may be expanded to include all bivalve shellfish in the affected area.

Local health officers enforce the quarantine. They post signs advising people of the quarantine. These signs also warn people that clams and scallops at times may contain toxins. During the quarantine period, sport harvesters should clean the viscera from clams and scallops and remove the siphons from Washington clams, eating only the remaining white meat. Absent or destroyed signs do not change the quarantine period.

## Marine Toxin Monitoring Program

CDHS monitors marine toxins in sport and commercial seafoods year-round. This program allows CDHS to follow changes in toxin levels and to alert the public and local health agencies if necessary. When CDHS finds unsafe toxin levels in seafoods, the Department does not allow them to be commercially harvested or sold. CDHS also issues public warnings for sport harvesters of these species.

Unsafe toxin levels sometimes occur outside the annual quarantine period. CDHS declares special local quarantines whenever unsafe levels of toxins appear. Almost all (over 99%) of the PSP cases in California have occurred during the annual quarantine months. Domoic acid poisoning has never been reported in humans in California.

## Commercially Harvested Shellfish

The annual mussel quarantine does not apply to companies licensed by the State as certified shellfish harvesters. CDHS tests and certifies the shellfish from these companies to be safe.

Oysters and mussels are the principal bivalve shellfish harvested commercially in California. Other shellfish are available in California retail food stores and restaurants throughout the year. These products come from both local and out-of-state sources. State and federal agencies regulate all commercially harvested bivalve shellfish in the United States. These regulations make certain that only safe and wholesome shellfish are available to the consumer.

Mussels may be harvested and sold for fish bait at any time. Labels on containers of mussels for fish bait state:

**"MUSSELS FOR BAIT ONLY  
UNFIT FOR HUMAN FOOD"**

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## Annual Mussel Quarantine May 1 - October 31

### Shellfish Information Line

CDHS provides a recorded current update on marine toxin activity in California. The messages also report any special quarantines or public warnings. The telephone number is:

510/ 540-2605 (callers in 510 area code, or out of state)  
800/ 553-4133 (Calif. callers outside the 510 area code)

The Department updates the message as needed. Callers may leave a message at this number to request more detailed information. Annual reports on the shellfish monitoring program are available from:

California Department of Health Services  
Environmental Management Branch  
601 North 7th Street, MS-396  
PO Box 942732  
Sacramento, CA 94234-7320

### Myths About Red Tides

During late spring, summer, or fall, localized patches or streamers of color appear in the ocean or bays along the California coast. These reddish areas or "red tides" appear suddenly and last from a few days to a few months before disappearing. The color of the water comes from the millions of tiny organisms in the water. Water color varies from brown to red depending on how many and what kinds of organisms are present.

Many people believe that red tides cause shellfish to be toxic. *Most red tides are harmless.* Toxin-producing organisms do not generally cause red tides. Although the presence of a red tide is a warning that shellfish may be toxic, *the absence of a red tide does not mean they are safe to eat.* Shellfish can consume enough toxic organisms to become toxic even when there is no visible red tide.

## Safety Tips For Sport Harvesters

### During a quarantine:

- Do not gather mussels or other quarantined shellfish for food. Toxic mussels are very dangerous because people eat the entire mussel including the viscera. In toxic razor clams, the toxin is present in the meat. In toxic Washington clams, the toxin is present in the siphons.
- Remove and discard the viscera of all clams and scallops, and the siphons of Washington clams.
- When domoic acid may be present, remove the viscera of anchovies and crabs immediately after capture. In fish and crabs, domoic acid is confined to the internal organs.

### During nonquarantine periods:

- Scallop viscera can remain toxic year-round. Do not eat scallop viscera at any time.
- Following an outbreak of PSP, the siphons of Washington clams may retain toxins for a year or more. If this occurs, CDHS sets and publicizes special local quarantines on Washington clams. Razor clams apparently retain domoic acid in their meat; this phenomenon is currently under study.
- Be familiar with the California Department of Fish and Game sport fishing regulations. These regulations are available in stores selling sporting goods.
- Gather shellfish only in areas free from sewage contamination. If in doubt, contact the local county environmental health agency to find out if the shellfish are safe to eat.

**Bivalve shellfish include  
clams, mussels, oysters and scallops**

The authors are:

Robert J. Price, Ph.D., Extension Specialist, Seafood Products  
Food Science & Technology, University of California, Davis, California 95616-8598

Kenneth H. Hansgen, Supervisor, Shellfish Sanitation Unit  
California Department of Health Services, Environmental Management Branch  
601 North 7th Street, MS-396, PO Box 942732, Sacramento, CA 94234-7320

Gregg W. Langlois, Coordinator, Marine Biotoxin Program  
California Department of Health Services, Environmental Management Branch  
2151 Berkeley Way, Room 118, Berkeley, CA 94704

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