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Title

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Publication Date

2006-07-10

Exposure of Santa Cruz Wharf Anglers to Domoic Acid

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Background

Sea Grant researchers have documented the presence of the potent human toxin domoic acid in sport fish caught from a popular fishing pier in California. The discovery has led to further studies aimed at quantifying the public health risk of eating recreationally caught fish, especially for socioeconomic groups whose seafood consumption and culinary practices may put them at greater risk.

Domoic acid is a neurotoxin produced by certain kinds of one-celled plants called diatoms. Unsafe levels of domoic acid have been found in anchovies, mussels, razor clams and crab viscera, but never before in sport fish.

Severe cases of domoic acid poisoning can cause seizures and coma as well as a permanent loss of short-term memory, a condition known as amnesic shellfish poisoning.

Project

Professor Mary Silver of the Ocean Sciences Department at UC Santa Cruz tested fish caught from the Santa Cruz Wharf for domoic acid.

Among the species tested, the viscera (guts) of white croaker and staghorn sculpin were found to be contaminated with domoic acid. The toxin was not detected in the muscle tissue of either fish. Muscle is the primary edible portion of fish. However, in some cultures people cook and eat whole fish.

A person can dramatically reduce the risk of poisoning by removing a fish's head, tail and viscera before

cooking and eating it. Cooking does not necessarily neutralize the toxin.

Silver said she does not want to scare the public about the risks from exposure to the toxin because only a limited number of fish have been collected and tested. Additionally, the toxin was detected in fish only during the relatively infrequent times when it is also present in seawater.

The preliminary findings, however, do present compelling evidence of the need for further study, as domoic acid was found in white croaker specimens four of the 13 times the fish were caught off the wharf. The toxin was found in staghorn sculpin on only one of the 10 sampling dates. It was not detected in any samples of surfperch or bocaccio, the only other sport fish sampled in numbers sufficient for scientific analysis.

Silver and her graduate student Spencer Fire, also at UC Santa Cruz, recently published their findings in a report for the California Department of Fish and Game.

Further Studies

To expand the study and more fully document public health risks, California Sea Grant has awarded a grant (R/MA-45) to Silver, Sea Grant Marine Advisor Carrie Pomeroy and Raquel Prado, a statistician at UC Santa Cruz. Besides analyzing many more fish, the investigators



Santa Cruz Wharf. Photo ©2002–2004 Kenneth & Gabrielle Adelman, www.Californiacoastline.org/

will begin to quantify toxin exposure rates for different sub-groups of anglers at the wharf.

Motivating the study is the concern that consumption patterns and cooking methods vary significantly along socioeconomic and cultural lines. As a result, some people may be ingesting toxins in amounts exceeding federal safety limits.

"Domoic acid has been studied in the natural environment but there is no systematic understanding of people's risk from consuming contaminated fish," said Pomeroy, who will be leading a pilot survey of anglers' seafood consumption patterns. "We want to look at what people are catching and what they are eating," she said. "There may be people who are at risk because of the way they prepare and consume what they catch."

Domoic acid has caused die-offs of marine mammals and sea birds in California and elsewhere. The toxin is ingested by fish and is poisonous

to people. Although commercially sold fish and shellfish are tested for domoic acid, similar safeguards for protecting public health are not in place for recreationally caught fish. In fact, very little is known about how much domoic acid recreational fishers consume.

Culinary practices, however, are thought to play a large role in exposure rates, Silver said. In some cultures, anchovies and other fish are eaten whole. Crab “butter” (the liver) is also prized in some cultures and could be a source of toxins. Even cooking techniques influence toxicity, she said. While boiling can help remove domoic acid, assuming the broth is not consumed, frying does not. Stir-frying in a wok can thus seal in toxins.

“Once we figure out the cultural and economic dimensions of the situation, we can work with health officials and community groups to target public education efforts,” Pomeroy said.



Professor Mary Silver, UC Santa Cruz (left) and California Sea Grant Marine Advisor Carrie Pomeroy plan to study the extent of domoic acid exposure to anglers in the Monterey Bay area. Photos UCSC and CSG archives

Publications

Fire, S., and M.W. Silver. 2005. Domoic acid in the Santa Cruz wharf fishery. California Department of Fish and Game. 91:179–192.

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July 2006

This publication is sponsored in part by a grant from the National Sea Grant College Program, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, under grant number NA04OAR4170038, Project number A/P-1. The views expressed herein are those of the author and do not necessarily reflect the views of NOAA or any of its subagencies. The U.S. Government is authorized to reproduce and distribute for governmental purposes.

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