

# Paralytic Shellfish Poisoning — Southeast Alaska, May–June 2011

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## Background



*When the tide goes out, the table is set* — Traditional saying

- Paralytic shellfish poisoning (PSP) is a potentially fatal neuroparalytic illness that results from consuming saxitoxins, produced by dinoflagellate algae, that have accumulated in bivalve mollusks.
- Signs and symptoms of PSP range from mild, short-lived paresthesias to life-threatening paralysis.
- Saxitoxins are heat-stable toxins that are not destroyed at cooking temperatures.
- PSP is a public health emergency and is immediately reportable in Alaska.
- Shellfish species commonly associated with PSP in Alaska include the following:



## Shellfish Testing

- Many coastal states provide both noncommercial beach monitoring programs and commercially harvested shellfish testing.
- Due to the vast coastline and the remote locations of many noncommercial harvesting locations, noncommercial beach monitoring has not historically been feasible in Alaska (Figure 1).
- All commercially harvested shellfish are tested for saxitoxins at the Alaska Department of Environmental Conservation (DEC).

Figure 1. The size of Alaska relative to the size of the contiguous United States



The Alaska coastline is greater than the combined coastlines of all other states (1).

## An outbreak of paralytic shellfish poisoning

- On June 6, 2011, the Alaska Section of Epidemiology (SOE) was notified of a case of PSP in Southeast Alaska.
- We launched an immediate onsite investigation to confirm and characterize the outbreak, and provide PSP education to the community and regional health care providers.



## Methods

### Investigation

- Investigators...
- Conducted active case finding
  - Interviewed ill persons using a standard questionnaire
  - Collected clinical specimens and shellfish for testing



### Outbreak case definitions

- Probable:** Compatible illness in a person after consumption of noncommercially harvested shellfish from Alaska during May–June 2011
- Confirmed:** Probable case definition + detectable saxitoxins in urine or had consumed shellfish with  $\geq 80$   $\mu\text{g}$  saxitoxins/100 g of meat before illness onset

### Laboratory methods

When available, leftover shellfish from persons with suspected PSP were shipped frozen to the DEC lab where laboratorians used a mouse bioassay to determine the presence and quantity of saxitoxins.

When available, urine samples from persons with suspected PSP were shipped frozen to the Division of Laboratory Sciences at CDC's National Center for Environmental Health for saxitoxin testing (2).

### Public health response

- Alaska Division of Public Health...
- Posted warnings at local beaches in collaboration with DEC
  - Created educational materials in multiple languages
  - Issued press releases
  - Conducted interviews with local & statewide media
  - Coordinated with NOAA weather radio to issue warnings on regional maritime channels



## Results

Eight confirmed and 13 probable PSP cases were identified in two communities in Southeast Alaska (Figure 2). Ill persons ranged in age from 13–72 (median: 52) years; 62% (13/21) were male.

Two of the cases were seasonal workers at a local fish processing plant.

Of the 21 persons who met the confirmed or probable case definitions:

- 15 (71%) consumed cockles
- 4 (19%) consumed blue mussels
- 1 (5%) consumed butter clams and cockles
- 1 (5%) consumed unspecified clams

Shellfish from both communities tested positive for high levels of saxitoxins and urine from two ill persons was positive for saxitoxins. All 21 patients reported experiencing paresthesias. Clinical details of the 8 confirmed cases are presented below (Table). Four patients were hospitalized; none died.

FIGURE 2. Number of paralytic shellfish poisoning cases (N = 21), by location and date of symptom onset — Southeast Alaska, May–June 2011

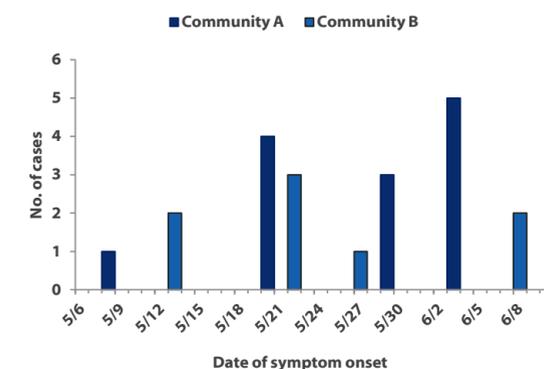


TABLE. Characteristics of the laboratory-confirmed cases of paralytic shellfish poisoning PSP (n = 8) — Southeast Alaska, May–June 2011

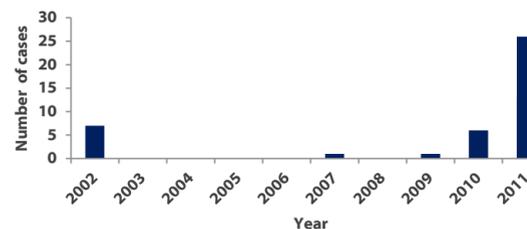
Patient	Location	Date of Onset	Symptoms	Time from consumption to symptom onset	Type of shellfish consumed	Toxin level in shellfish consumed ( $\mu\text{g}/100\text{g}$ of meat*)	Toxin level in urine (ng/mL)	Hospitalized
A	Community A	6/3/2011	Ataxia, difficulty swallowing, dizzy, difficulty moving, floating sensation, nausea, paresthesia, shortness of breath, weakness	3.5–4 hours	Cockles	528	N/A	Yes (ICU)
B	Community A	6/3/2011	Paresthesia	10–15 minutes	Cockles	528	N/A	No
C	Community A	6/3/2011	Paresthesia	2.5–3 hours	Cockles	528	N/A	No
D	Community A	6/3/2011	Ataxia, dysphagia, floating sensation, paresthesia, weakness	<1 minute	Cockles	528	N/A	No
E	Community A	6/3/2011	Paresthesia	<1 minute	Cockles	528	N/A	No
F	Community B	6/8/2011	Ataxia, dysphagia, floating sensation, paresthesia, shortness of breath, weakness	<1 minute	Blue Mussels	5,037	118	Yes (ICU)
G	Community B	6/8/2011	Dizzy, dysphagia, floating sensation, nausea, weakness	1 hour	Blue Mussels	5,037	15	Yes
H	Community B	5/22/2011	Ataxia, dizziness, floating sensation, paresthesia, vomiting, weakness	45 minutes	Butter / Littleneck Clams	1,321	N/A	Yes

\* The international safety limit of saxitoxin in shellfish is  $\leq 80$   $\mu\text{g}/100$  g. Abbreviations: ICU: intensive care unit; N/A: not available

## Results

19% (4/21) of ill persons were reported to SOE. There were more PSP cases identified in 2011 than in recent years (Figure 3).

Figure 3. Number of known cases of PSP — Alaska, 2002–2011



## Discussion

*"This is not a typical year by any stretch of the imagination."* — Kate Sullivan, University of Alaska Southeast

- The severity of disease experienced by several of the ill persons is a reminder that medical care must be sought urgently for anyone experiencing PSP signs or symptoms.
- The geographical and spatial clustering observed in this outbreak is an indication that even a single case of PSP warrants an immediate public health response as other consumers of noncommercially harvested shellfish are also at risk.
- The large number of cases identified in 2011 likely resulted from both enhanced surveillance through active case finding and environmental factors — levels of saxitoxins were higher during spring 2011 than in previous years, and in certain cases, orders of magnitude greater than the maximum allowable level for commercial shellfish.
- Many cases of PSP likely go unreported in Alaska.

## Recommendations for public health practice

- Respond immediately to all reports of PSP
- During outbreaks, provide warning signs in multiple languages at implicated areas
- Educate health care providers about PSP diagnosis, prevention, and immediate reporting
- Work with stakeholders to generate consistent, culturally-appropriate recommendations regarding subsistence shellfish harvesting and consumption
- People who choose to consume shellfish collected from unmonitored beaches despite the serious risk should be advised never to eat these shellfish alone, know the signs and symptoms of PSP, and seek medical care immediately if symptoms develop

## Next steps for Alaska

- Hold regular multi-agency meetings to coordinate PSP prevention and control efforts
- Request reporting by non-providers (e.g., community members, biologists, wildlife officials)
- Work with CDC to better understand the correlation between urine saxitoxin levels and disease severity
- Provide guidance to DEC regarding the development of a noncommercial shellfish beach monitoring pilot program at selected locations



## Acknowledgments

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### References:

- Alaska Science Forum <http://www2.galaska.edu/ScienceForum/ASF14/1404.html>.
- Johnson RC, Zhou Y, Statler K, Thomas J, Cox F, Hall S, et al. Quantification of Saxitoxin and Neosaxitoxin in Human Urine Utilizing Isotope Dilution Tandem Mass Spectrometry. *J Anal Toxicol*. 2009;33(1):8–14.

Totem illustrations provided by the Alaska Native Knowledge Network <[www.ankn.uaf.edu](http://www.ankn.uaf.edu)>.

