Paralytic Shellfish Poisoning (PSP)

Disease Name: Paralytic shellfish poisoning syndrome

Organism: Saxitoxins produced by *Alexandrium* species and other dinoflagellates present in shellfish especially during algal blooms known as red tides; however, may occur without red tides.

Incubation period: 5 min - 12 hours after consumption of shellfish.

Infectious period: No secondary transmission documented.

Transmission routes: Foodborne. In Alaska, all documented cases associated with consumption of cockles, clams, mussels, and crab (toxin found in crab viscera).

Treatment for patient: There is no antidote for the toxin. Individuals who experience the first symptoms of PSP should seek immediate medical attention. In severe cases, dyspnea, dysphagia, muscle weakness or frank paralysis, ataxia and respiratory insufficiency may occur. Symptomatic treatment, including ventilatory support, is crucial for successful outcomes. Recovery is usually complete, symptoms usually resolve within hours to days after shellfish ingestion.

Information Needed for the Investigation

Verify the Diagnosis

- Interview ill person or others who shared meal for symptoms: paresthesias (mouth, lips, face, extremities), nausea, vomiting, floating sensation.
- Symptoms, coupled with history of eating shellfish from Alaska beaches equals probable PSP, a public health emergency.

Determine the Extent of Illness

- Obtain list of persons who shared meal from ill patient if possible. Contact local health care provider, PHN, or family member.
- Interview all who shared meal for symptoms, using PSP interview form.

Laboratory Specimens

Patient

- Obtain 25 ml urine within 7 days of consumption of suspect food; ideally as soon as possible. Urine should be labeled with the patient name, DOB, the date and time collected. **Freeze urine until it can be shipped to ASPHL.** Include an ASPHL lab slip with "PSP testing" and date collected written on the upper right-hand corner of the lab slip (see example; form available on-line: http://www.dhss.alaska.gov/dph/Labs/Documents/publications/AncSupplyReq.pdf). ASPHL will forward to CDC for testing (see below).

- Shipping to CDC:
  - Send official Epi email (on behalf of Joe) to CDC (contacts below) to request saxitoxin testing.
  - Contact ASPHL (Dave Verbrugge 334-2156). ASPHL will send urine to CDC lab.
    - Jerry D. Thomas, MD, FACEP, FACMT
      Medical Toxicologist
      Senior Medical Officer
      Centers for Disease Control and Prevention
      National Center for Environmental Health
      Division of Laboratory Sciences
      Emergency Response and Air Toxicants
      Phone : 770-488-7279
      Email: ciq1@cdc.gov; Fax: 770-488-0181
    - Other CDC contact: Rudolph Johnson
      Email: rmj6@cdc.gov

Food

- Obtain suspect shellfish or crabs. Contact DEC, PHN, CHAs or family and ask to save suspect food in refrigerator until notified by state for further instructions.
- Notify DEC Environmental Health Officer who will usually work with you to obtain package, and send food to DEC Environmental Health Lab (EHL) for testing.
- Notify EHL (main number 375-8200 or Matt Forester 375-8204) regarding anticipated delivery of shellfish specimens. Environmental Health Officer may do this.
- Protocol for specimen collection:
  - Collect portions of the meal (15 animals is an adequate number for testing) and store it in a Ziploc® freezer bag.
  - If the shellfish is still in the shell and can be sent immediately to EHL, refrigerate, do not freeze.
  - If any delay is anticipated, freeze the samples.
  - Animals are the preferred specimen. If broth is the only specimen that is available, this may be collected and sent for testing, but will likely have a lower yield for saxitoxin detection.
- Fill out Marine Toxins Form: http://dec.alaska.gov/eh/lab/lab-submission-manual-forms/. Document the date, time, and exact location where the shellfish were collected. Don't worry about the commercial info such as permit #, expected sales etc.; just give as much other information as possible (date/time/ type of shellfish (butter clam, cockle, etc).
- Note: Gastric contents are acceptable for saxitoxin testing at the Environmental Health Lab (EHL) **only** if the gastric contents contain whole animals.

Contact and Control Measures

- Identify and evaluate all who shared suspect meal. Anyone with symptoms should be advised to seek medical care immediately.
- Advise all involved not to eat any of suspect food nor food collected from same area.

- Notify DEC Seafood (George Scanlan, 269-7638), DEC Food Safety program Mgr (Kim Stryker 269-7583) and HSS PIO to discuss issuance of PSP alert press release. They will want to know the beach area name and number of cases.

Important Information

- PSP is a public health emergency. The goal is to identify others at risk and evaluate for symptoms of PSP. Notify the regional PHN of a possible outbreak.
- Shellfish sold commercially are routinely tested and safe for consumption. PSP occurs widely in Alaska in connection with ingestion of non-commercial shellfish. Recreational beaches are not considered safe for shellfish gathering and consumption.
- Urine testing by CDC is not considered strict diagnostic testing. There are no standards, i.e., reference ranges, for results; a detection of any STX is considered abnormal, although data do not exist about what if any level might be found in an asymptomatic person or a regular shellfish consumer, etc.

Reporting Requirements

- FTR: write up all confirmed and probable cases.
- Write up case summary and file for all suspected negative cases.
- AK-STARS: enter all suspected, probable and confirmed cases.
- Track saxitoxin results and scan these documents to append to the specific patient in AK-STARS

References

"Paralytic Shellfish Poisoning: The Alaska Problem", UAF School of Fisheries and Ocean Sciences, 1996. http://seagrant.uaf.edu/features/PSP/PSP.pdf.

Section of Epidemiology PSP website, including PSP FactSheet: http://dhss.alaska.gov/dph/Epi/id/Pages/dod/psp/default.aspx

DEC Shellfish website: http://dec.alaska.gov/eh/fss/shellfish/

Case Definition: Saxitoxin

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Clinical description

Exposure to saxitoxin most commonly occurs following ingestion of certain fish that contain it in their tissues. Ingestion of saxitoxin can cause numbness of the oral mucosa as quickly as 30 minutes after exposure. In severe poisoning, illness typically progresses rapidly and may include gastrointestinal (nausea, vomiting) and neurological (cranial nerve dysfunction, a floating sensation, headache, muscle weakness, parasthesias and vertigo) signs and symptoms. Respiratory failure and death can occur from paralysis (1-5).

Laboratory criteria for diagnosis

- *Biologic*: A case in which saxitoxin in urine is detected, as determined by the CDC laboratory. (1-5)

– OR-

- *Environmental*: Detection of saxitoxin in ingested compounds or seafood. (7-10)

Case classification

- *Suspected*: A case in which a potentially exposed person is being evaluated by health-care workers or public health officials for poisoning by a particular chemical agent, but no specific credible threat exists.
- *Probable*: A clinically compatible case in which a high index of suspicion (credible threat or patient history regarding location and time) exists for saxitoxin exposure, or an epidemiologic link exists between this case and a laboratory-confirmed case.
- *Confirmed*: A clinically compatible case in which laboratory tests have confirmed exposure.

The case can be confirmed if laboratory testing was not performed because either a predominant amount of clinical and nonspecific laboratory evidence of a particular chemical was present or the etiology of the agent is known with 100% certainty.

Additional resources

1. Gessner BD, Middaugh JP, Doucette GJ. Paralytic shellfish poisoning in Kodiak, Alaska. West J Med 1997:67:351-3.
2. Janiszewski L. The action of toxins on the voltage-gated sodium channel. Pol J Pharmacol Pharm 1990;42:581-8.
3. Rodrigue DC, Etzel RA, Hall S, et al. Lethal paralytic shellfish poisoning in Guatemala. Am J Trop Med Hyg 1990;42:267-71.
4. Shoff WH, Shepherd SM. Scombroid, ciguatera, and other seafood intoxications. In: Ford MD, Delaney KA, Ling LJ, Erickson T, eds. Clinical toxicology. Philadelphia, PA: W.B. Saunders; 2001:959-69.
5. Tunik MG. Chapter 45: Food Poisoning. In: Nelson LS, Lewin NA, Howland MA, Hoffman RS, Goldfrank LR, Flomenbaum NE, eds. Goldfrank's Toxicologic Emergencies. 9th ed. New York, NY: McGraw-Hill; 2011: 668-81.

6. Etheridge SM. Paralytic shellfish poisoning: seafood safety and human health perspectives. Toxicon. 2010 Aug 15; 56(2): 108-22.
7. NIOSH. NIOSH manual of analytical methods [online]. 2003. [cited 2013 Apr 5]. Available from URL: https://www.cdc.gov/niosh/docs/2003-154/.
8. OSHA. Sampling and analytical methods [online]. 2010. [cited 2013 Apr 5]. Available from URL: http://www.osha.gov/dts/sltc/methods/index.html.
9. FDA. Food: Laboratory methods [online]. 2013. [cited 2013 Apr 5]. Available from URL: http://www.fda.gov/Food/FoodScienceResearch/LaboratoryMethods/default.htm.
10. EPA. Selected analytical methods: chemical methods query [online]. 2013. [cited 2013 Apr 5]. Available from URL: http://www.epa.gov/sam/searchchem.htm.

https://emergency.cdc.gov/agent/saxitoxin/casedef.asp (11/18/2015)

Paralytic Shellfish Poisoning Outbreak Questionnaire

Date ____/____/_____ Time_____

Healthcare provider reporting _____ Phone ( ) _____

Name of patient_____ Phone ( ) _____

Address_____ City_____ State_____

DOB ____/____/_____ Sex: M ☐ F ☐ Race_____

If caller is not a healthcare provider and reports PSP symptoms, was the caller advised to seek immediate medical evaluation? Yes_____ No_____ Comments_____

Symptoms:				**Date/time on onset:**	**Duration:**
Paresthesias	☐ Yes	☐ No	☐ Unk	__/___/_____ ____AM/PM	
(mouth, lips, face, extremities)					
Nausea	☐ Yes	☐ No	☐ Unk	__/___/_____ ____AM/PM	
Vomiting	☐ Yes	☐ No	☐ Unk	__/___/_____ ____AM/PM	
Weakness	☐ Yes	☐ No	☐ Unk	__/___/_____ ____AM/PM	
Ataxia	☐ Yes	☐ No	☐ Unk	__/___/_____ ____AM/PM	
Shortness of breath	☐ Yes	☐ No	☐ Unk	__/___/_____ ____AM/PM	
Difficulty with speech (dysarthria)	☐ Yes	☐ No	☐ Unk	__/___/_____ ____AM/PM	
Dysphagia	☐ Yes	☐ No	☐Unk	__/___/_____ ____AM/PM	
Dizzy	☐ Yes	☐ No	☐Unk	__/___/_____ ____AM/PM	
Headache	☐ Yes	☐ No	☐Unk	__/___/_____ ____AM/PM	
Floating sensation	☐ Yes	☐ No	☐Unk	__/___/_____ ____AM/PM	

Location of beach where shellfish were gathered_____

Date shellfish gathered ____/____/_____ Date shellfish consumed ____/____/_____

Time shellfish consumed _____AM/PM Number of shellfish eaten _____

Type of shellfish: Butter clams Mussels Cockles Razor clams Little neck clams Crabmeat

Cooked: Yes ☐ No ☐ Method_____

If boiled, was shellfish juice consumed separately? Yes ☐ No ☐

Were siphons or viscera removed prior to eating shellfish? Yes ☐ No ☐

If crabmeat, were any of the intestines eaten? Yes ☐ No ☐

Specimens collected for shipping? Yes ☐ No ☐

How many other people consumed the shellfish? _____ How many became ill? _____

Protocol for specimen collection

Collect portions of the meal and store it in a Ziploc® freezer bag.
If shellfish is still in the shell and can be sent immediately to DEC laboratory, refrigerate. If any delay anticipated, freeze the samples.
If shellfish were steamed or boiled, collect and store the broth separately.
Document the date, time of day, and exact the location where shellfish were collected.
If gastric contents have been collected, freeze and save (only if gastric contents contain whole animals).
If onset of patient symptoms occurred within past 7 days, collect urine and immediately freeze. Ship frozen to ASPHL.