



BOTULISM

(See also **INFANT BOTULISM** and **WOUND BOTULISM**, below.)

1. **Agent:** Toxin produced by *Clostridium botulinum* (and rarely other clostridium species), a gram-positive bacillus. Most cases due to type A, B or E toxin, rarely F, G, and H cause human disease. *Clostridium butyricum* and *C. barati* can also produce E and F toxins. Heat-labile toxin is produced under anaerobic conditions extrinsically (food-borne botulism) or intrinsically in the gastrointestinal tract (adult intestinal botulism, infant botulism) or wound (wound botulism). Iatrogenic cases of botulism have occurred rarely in patients who have received botulism toxin for cosmetic purposes.

2. Identification:

a. **Symptoms:** Clinical manifestations are characterized by acute onset of bilateral cranial neuropathies associated with symmetric descending weakness (e.g. extreme dryness of the mouth, dysarthria, dysphonia, difficulty swallowing, facial weakness, blurry vision, ptosis, difficulty breathing, trunk and extremity weakness followed by lower extremities). Severity appears dose related. Nonspecific gastrointestinal symptoms may be seen. Usually fever is absent (unless wound has bacterial infection). Patient remains responsive with no sensory deficits (except blurred vision).

Death may occur from respiratory failure or superimposed infections.

b. **Differential Diagnosis:** Guillain-Barré syndrome (Miller-Fisher variant), myasthenia gravis (Tensilon edrophonium) tests are often falsely positive in patients with botulism), Lambert-Eaton myasthenic syndrome, cerebrovascular accident, tick paralysis (perform tick check), neoplasia, or heavy metal intoxication.

c. **Diagnosis:** Demonstration of toxin in stool, gastric aspirate/vomitus, wound or

serum of the patient or in a suspected food item. Isolation of the organism from stool, wound, or suspected food item is indicative of source.

3. **Incubation period:** Usually within 18-36 hours of eating contaminated food but may range 6 hours to 10 days. Wound botulism incubation is longer, approximately 10 days).

4. **Reservoir:** Spores are found in soil, aquatic sediments, the intestinal tract of birds, animals and fish, and agricultural products, including honey and vegetables.

5. **Source:** Toxins are produced by *C. botulinum* and rarely other clostridium species under anaerobic conditions, usually by improperly home-canned foods, especially low acid food (e.g. corn, beans, potatoes, fish and seafood, all meats) or mishandled foods that should have been refrigerated or improper handling during manufacturing (e.g. carrot juice, chopped garlic in oil, canned cheese sauce, and baked potatoes wrapped in foil). Also in contaminated, closed wounds, similar to tetanus (*C. tetani*).

6. **Transmission:** Ingestion of toxin or production of toxin in infected wound or GI tract.

7. **Communicability:** Not communicable person to person.

8. **Specific Treatment:** Heptavalent (A-B-C-D-E-F-G) equine-based botulinum antitoxin (HBAT) is available as an Investigational New Drug (IND) treatment protocol. For adults, one vial should be administered intravenously (IV). There does not appear to be any benefit from additional doses. ACDC or CA Dept. of Public Health (CDPH) must authorize release of antitoxin. Contact the CDC Emergency Operations Center, 770-488-7100 for all such requests. If there is a problem, contact the local CDC Quarantine Station directly at 310-215-2365. Guidance for skin testing, desensitization, and dosing are included in the antitoxin prescribing information.



Antibiotics (e.g. penicillin G or alternatively metronidazole) are recommended for wound botulism in addition to debridement if needed. Therapy may need to be broadened due to risk of polymicrobial infection. The use of aminoglycosides is contraindicated since they have been reported to induce neuromuscular blockade.

9. **Immunity:** None.

REPORTING PROCEDURES

1. Report any case or suspect case by telephone immediately, Title 17, Section 2500, *California Code of Regulations*.

- a. Call Morbidity Unit during working hours.
- b. Call Chief, ACDC, and Chief, Food and Milk Section if foodborne suspected. After working hours, contact Administrative Officer of the Day (AOD) through County Operator.
- c. Suspected foodborne botulism case to be reported to CDC Emergency Operations Center (770-488-7100) within 4 hours of receipt of initial report. Notification of CDPH is considered a notification of CDC.

2. **Report Form:**

SUSPECT BOTULISM INTAKE AND CHECKLIST

BOTULISM CASE REPORT (CDPH 8547)

Upon consultation with the reporting clinician, the AOD is to complete both intake/checklist and the case report (as much of pages 1-3 as possible). AOD is to report to Chief or Deputy Chief of ACDC to determine actions to follow. Case report to be faxed to CDPH on next business day to 510-620-3425. If the case is confirmed or probable, complete the entire case report pages 1-3 for submission to CDPH, who will contact treating physician to complete pages 4-5 (Antitoxin Treatment; Antitoxin Reactions) after administration of antitoxin.

3. **Epidemiologic Data:**

- a. Date and hour of onset of symptoms. Duration of symptoms. Record symptoms in order of their development.
- b. Food history for past 96 hours and method of food preparation. For instance, did they taste any home-canned foods after opening, but before cooking the food?
- c. Ingestion of aged fish and marine mammals (e.g. native Alaskan/Arctic foods associated with toxin E)
- d. Ingestion of improperly home-canned or preserved foods poses a high risk. Commercially canned foods are rarely involved unless mishandled.
- e. Location of remaining suspected food.
- f. Names, addresses, and ages of others that ate suspected food and time this occurred in addition to presence of any symptoms
- g. For wound botulism - onset of wound infection, how original wound occurred. (e.g. puncture, subcutaneous, deep space, abrasions, lacerations, fractures, incisions)
- h. For history of drug use: injection drugs, history of “black tar” heroin, inhaled cocaine use.
- i. Cosmetic or therapeutic use of botulinum toxin.
- j. For adult intestinal botulism: history of achlorhydria, gastrointestinal diseases, post-operative state.

CONTROL OF CASE, CONTACTS & CARRIERS

Immediate investigation is required, regardless of time of day. Confiscate suspected food(s) for possible laboratory testing and notify others who may have suspected food in their possession.

CASE:



Precautions: None

1. Immediate hospitalization at hospital with intensive care unit is essential.
2. Use of antitoxin must not await laboratory diagnosis if clinical findings are highly suggestive of botulism. Follow IND protocol carefully for dosage and allergic precautions.
3. A case of suspected foodborne botulism should receive cathartics to hasten elimination of lower intestinal contents, provided no significant ileus is present.
4. A case of suspected wound botulism must be examined carefully to locate the site of infection for surgical debridement; appropriate antibiotics should be administered (see above).

CONTACTS: Household members or persons who shared a common food source.

1. Search for missed cases and those at risk of illness, and refer them for medical evaluation if symptomatic.
2. For persons known to have eaten suspected food within 96 hours, purge with cathartics, give enemas, and maintain close observation. If symptomatic, treat as case.

CARRIERS: Not applicable

PREVENTION-EDUCATION

1. Follow recommended procedures in canning and preparing foods at home.
2. Boil home-canned vegetables and meat products for at least 10 minutes with thorough stirring, prior to tasting or eating.
3. Avoid contamination of wounds with soil or non-sterile substances.

DIAGNOSTIC PROCEDURES

Prior notification of ACDC required. See **SPECIMEN SUBMISSION GUIDELINES FOR SUSPECTED BOTULISM** for complete

instructions on specimen collection and submission. In brief:

1. **Stool Samples:** Submit at least 25g of unpreserved feces specimen. Sterile water enemas may be necessary to obtain specimens. Fecal specimens should be refrigerated.

Container: Sterile container with lid.

Laboratory Form: **Test Requisition Form H-3021.**

Examination Requested: Botulism.

2. **Blood Sample:** Treating facility obtains three 10 cc red-top or serum-separating vacutainer tubes from patient prior to the administration of antitoxin and submits it to Public Health Laboratory (PHL) with other clinical specimens. Post-treatment serologic testing of botulism cases and suspects is not indicated.

Mouse bioassay is performed by the PHL.

Matrix Assisted Laser Desorption/Ionization Time of Flight Mass Spectrometry (MALDI-TOF) can be performed by the CDC.

3. **Food Samples:** Must be collected by a Food and Milk environmental specialist under ACDC direction.

Container: Original container or a clean, covered container.

4. **GASTRIC CONTENTS, ASPIRATE or VOMITUS - for both foodborne AND wound botulism**
Submit 25-50 ml of gastric material taken before lavage in a clean, dry container without transport media.

Only samples taken within 48 hours of admission will be accepted.

Label as GASTRIC ASPIRATE or VOMITUS with 1) patient name, 2) date and time collected, and 3) medical record number.



Laboratory Form: [Test Requisition Form H-3021](#).

Examination Requested: Botulism.

Material: Suspected food.

Storage: Refrigerate.

5. **Wound Culture:** Treating facility obtains anaerobic cultures of wounds or abscesses

for processing by the hospital laboratory. If possible, collect with a laboratorian in attendance for immediate anaerobic processing. Sample any evident wounds, including fracture sites; submit aspirate, excisional biopsy, or swab. Place in anaerobic transport pouch, keeping chilled at all times. If a clostridium species is isolated, consult Public Health Laboratory for instructions on submission.



INFANT (INTESTINAL) BOTULISM

Botulism in infants less than 12 months of age was first described in 1976. Infant botulism, correctly known as intestinal botulism, affects children under 1 year of age almost exclusively but can affect adults (see below) who have altered GI anatomy and microflora. Following ingestion of spores, production of toxin occurs within the gut lumen. The illness usually begins with constipation followed by lethargy, listlessness, poor feeding, ptosis, poor head control, and difficulty in swallowing; it has been termed "floppy baby" syndrome. Identified food sources, such as honey and corn syrup, should never be fed to infants.

The local health department's only responsibility is immediate telephone reporting of suspected cases to the CDPH. All suspected cases are investigated by the Infant Botulism Treatment and Prevention Program, in the California Department of Public Health's Division of Communicable Disease Control. Call (510) 231-7600 (24 hours a day, 7 days a week, including holidays). Excellent background information and family materials in English and Spanish are available on the program website at <http://www.infantbotulism.org/>.

ADULT INTESTINAL BOTULISM

In vivo botulinum toxin production in the non-infant gastrointestinal tract has been rarely reported. This has also been termed adult intestinal or enteric botulism. Persons with intestinal abnormalities such as previous surgery, inflammatory bowel disease or diverticulosis may have a blind intestinal pouch that does not empty normally, allowing GI contents to remain for longer than normal. If spores of *C. botulinum* are present, they may germinate and produce botulinum toxin.

WOUND BOTULISM

Wound botulism results when spores of *C. botulinum* germinate in a wound, producing botulinum toxin. Previously this was extremely rare and usually associated with traumatic injuries such as punctures or open fractures. Wound botulism attributable to injecting drug use was first reported in 1982 in New York City.

Since 1995, California has seen an explosion of wound botulism among injectors of illicit substances, principally a form of heroin called "black tar." Unlike botulinum toxin, which is destroyed by heating, spores of *C. botulinum*, which may be in the heroin or one of the solvents employed by injecting drug users, are NOT destroyed by briefly boiling the heroin-solvent mixture. In most cases, injection is subcutaneous rather than intravenous, allowing for abscess formation and toxin production in the wound. Wound botulism has also been described in persons with intranasal abscesses who sniff cocaine chronically.

A thorough physical examination for an occult wound is indicated when the food history does not suggest a typical source for botulism. Debridement and drainage of infected wounds plus antibiotic treatment are crucial to stopping further toxin production. Treatment with heptavalent botulinum antitoxin is also indicated.