



# Botulism: Biological Weapon BACKGROUND

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## Biological Weapon

Botulinum toxin is the most potent lethal substance known to man (lethal dose 1ng/kg). Botulism toxin is made by the bacterium *Clostridium botulinum*.

Botulinum toxin was developed as an aerosol weapon by several countries. No human data exist on the effects inhaling botulinum toxin, but it may resemble the foodborne syndrome.

People intentionally exposed, in a bioterrorist attack, who breathe in the toxin or ingest the toxin via contaminated food or water might develop a serious illness (foodborne botulism).

Spores of *C. botulinum* are found in soil worldwide. Terrorists with the technical capacity to grow cultures of the bacteria, and harvest and purify the toxin could use it as a bioterrorism agent.

Botulism is not spread person-to-person.

## The Disease

About 25 cases of foodborne botulism occur each year, usually due to improperly prepared home-canned or Alaskan Native foods such as fermented fish heads and sea mammal. Outbreaks from commercial products and foods prepared improperly in restaurants have also occurred in the U.S.

Botulism is a muscle paralyzing disease caused by a nerve toxin made by *Clostridium botulinum*. The toxin types most commonly associated with human disease are types A, B, E.

There are three main kinds of botulism.

1. **Foodborne botulism** occurs when a person ingests PRE-FORMED toxin that leads to illness within a few hours to days. Only foodborne botulism is a public health emergency, because it could indicate that a food is still available to other persons (besides the patient).
2. **Infant botulism is a condition that** occurs in a small number of susceptible infants each year. For unknown reasons the botulism bacteria is able to grow in their intestines. Infant botulism is not a public health emergency because the infants are not consuming food with toxin; rather they are consuming *C. botulinum* spores (which are everywhere in the environment), but for unknown reasons these few infants are susceptible to gut colonization.
3. **Wound botulism** is caused by the growth of living botulism bacteria in a wound, with ongoing secretion of toxin that causes the paralytic illness. In the United States this syndrome is seen almost exclusively in injecting drug users.

Symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness which always descends the body: first shoulders, then upper arms, then lower arms, then thigh, calves, etc.

Paralysis of breathing muscles can cause a person to stop breathing and die, unless assisted by a ventilator.

For foodborne botulism, symptoms begin from six hours up to two weeks after eating toxin-containing food; most commonly the delay is about 12-36 hours.

Infants with botulism appear lethargic, feed poorly, are constipated, and have a weak cry and muscle tone.

## **The Risk**

Foodborne botulism can occur in all age groups.

Botulism is not spread person-to-person.

Botulism can result in death due to respiratory failure if appropriate medical care is not available. However, in the past 50 years the proportion of patients with botulism who die has fallen from about 50% to 8% because of improved medical care in intensive care units.

## **Treatment**

Botulinum antitoxin is a preparation of equine (horse) antibodies against botulism toxin. If given to a person with botulism soon after they develop symptoms, it will make the illness less severe and shorter. It does not, however, produce instant cure. While antitoxin helps patients recover faster, the most important factors for survival are meticulous ICU care and the availability of ventilators.

CDC maintains the national botulism anti-toxin supply. A physician diagnosing a case of botulism and wishing to treat the patient with anti-toxin must contact the CDC through their state health department. This way public health officials are alerted immediately about potential cases of botulism.

The paralysis and respiratory failure that occur with botulism may require a patient to be on a breathing machine (ventilator) for weeks, plus intensive medical and nursing care. The paralysis slowly improves, usually over several weeks.

If diagnosed early, foodborne and wound botulism can be treated with antitoxin which blocks the action of toxin circulating in the blood. This can prevent patients from worsening, but recovery still may take many weeks.

*Additional information about biological agents is available online at <http://www.bt.cdc.gov/bioagents.asp>*