

Botulism

Botulism is a rare but serious illness. It's caused by toxin produced by bacteria called '**Clostridium botulinum**'. The botulinum toxin is one of the most poisonous substances on earth and causes several different types of botulism. Usually foodborne botulism involves two or more persons and is caused by eating contaminated home-canned foods. The number of cases of foodborne and infant botulism has changed little in recent years, but wound botulism has increased because of the use of black-tar heroin, especially in California.

Types

Foodborne botulism

C. botulinum grows and produces the toxin in anaerobic environments (environments lacking oxygen), such as in canned food. Ingestion of the toxin causes the symptoms of food-borne botulism. This is more precisely called a food intoxication, because the toxin causes the disease rather than the bacteria directly.

Wound botulism

In severe, deep wounds, *C. botulinum* can cause a dangerous infection.

Infant botulism

In the United States, this is the most common form of botulism. It begins after *C. botulinum* bacteria grow in a baby's digestive system. It is often associated with ingestion of honey.

Infectious botulism in adults

The adult form of infant infectious botulism is rare and resembles infant botulism in its symptoms. It results from colonization of the intestinal tract by toxin-producing clostridia. People who have had abdominal surgery, prolonged use of antibiotics, or gastrointestinal wounds and abscesses are more vulnerable, since the normal microbes in their intestines have been disturbed.

Other Forms of Botulism

Inhalation botulism may result from aerosolization of the toxin. Only a few human cases have been reported. In rare cases improper administration or use of medical botox has resulted in some cases of local or generalized weakness and neuropathy.^[1]

Cause

Botulism is caused by *Clostridium botulinum* bacteria. These bacteria produce a toxin (poison), the toxin itself causes the disease: the bacteria don't have to be alive or present. This toxin affects your nerves and, if untreated, can cause paralysis and respiratory failure. *C. botulinum* toxin is one of the most powerful naturally occurring toxins. Exposure to the toxin, particularly in an aerosolized (spray) form, can be fatal.^[2]

C. botulinum has been made into bioweapons by rogue states and is one focus of current efforts to counter bioterrorism. Bacteria of the genus *Clostridium*, like *Bacillus* species (see Anthrax) produce endospores (spores) which are highly resistant to heat and other harsh conditions. When food is not heated to pasteurization conditions, such as may happen in home canning of foods, the *C. botulinum* spores can survive and subsequently germinate and produce toxin in the food.

C. botulinum toxin

The *C. botulinum* toxin (also called Botox) is an extremely potent **muscle paralyzing** agent. It has many medical uses. One of the most popular uses of **Botox** is for the reduction of wrinkles. Physicians use Botox to relax sphincter muscles in the esophagus and to reduce excessive sweating.

Foodborne Botulism

Transmission

Cases of foodborne botulism often originate with home-canned foods with low acid content, such as asparagus, green beans, beets, and corn. *C. botulinum* thrives in sealed containers because it is anaerobic, meaning it can survive and grow with little or no oxygen. Outbreaks of botulism, however, are often from more unusual sources such as baked potatoes wrapped in aluminum foil but not kept hot, and tomatoes.

Botulism from commercial food products is rare. Although, a recent outbreak occurred with commercial canned chili sauce in 2007; eight people were sickened.^[3]

Symptoms

Below are some symptoms of foodborne botulism:

- Double vision and drooping eyelids
- Slurred speech
- Dry mouth and difficulty swallowing
- Weak muscles

Symptoms usually begin within 18 to 36 hours after eating contaminated food, but they can occur in as few as 6 hours or as long as 10 days afterward.

Treatment

If botulism is caught early, an **antitoxin** is available for treatment. This antitoxin blocks the action of the bacterial toxin circulating in the blood. The antitoxin keeps the disease from becoming worse, but several weeks may pass before a full recovery. Contaminated food is sometimes removed from the body by forced vomiting or by an enema.

Prevention

Below are some tips on how to avoid getting foodborne botulism:

- Follow strict hygienic steps when canning foods at home.
- Refrigerate oils containing garlic or herbs.
- Keep baked potatoes wrapped in aluminum foil should either be kept hot until served or refrigerated.
- Boiling home-canned food before eating it to kill any bacteria lurking in the food.

Complications

If left untreated, botulism can cause temporary paralysis of the arms, legs, trunk, and the muscles that help you breathe. The paralysis usually improves slowly over several weeks. People who develop severe botulism experience breathing failure and paralysis and need to be put on ventilators (breathing machines).

Infant Botulism

A special type of foodborne botulism can occur in unpasteurized honey. Honey naturally contains small amounts of dust and dirt. As *C. botulinum* occurs naturally in soils, honey can be contaminated with *C. botulinum* spores. In older children and adults, the conditions in the stomach prevent germination of the spores, and they can consume this honey without problems. Infants (< **2 years**), however, don't have mature digestive systems, and the spores can germinate and produce the toxin.

In the United States, cases of infant botulism are more common than foodborne or wound botulism.

Symptoms

Symptoms of botulism typically appear between 18 and 36 hours after the infant consumes the bacteria. Constipation is often the first symptom of botulism that parents notice. The following symptoms can also occur, usually in the order listed below:

- constipation
- flat facial expression
- poor feeding (weak sucking)
- weak cry
- decreased movement
- trouble swallowing with excessive drooling
- muscle weakness
- breathing problems

Treatment

Infant botulism is treated in the hospital, usually in the intensive care unit, where doctors try to limit the problems the toxin causes in the baby's body. Because the toxin can affect the breathing muscles, for example, doctors may put the infant on a ventilator. Because the toxin can affect the swallowing muscles, they may give the baby intravenous (IV) fluids to provide nourishment.

With proper medical care, the infant will likely fully recover once the effects of the toxin wear off.

Prevention

Infant botulism is associated with ingestion of honey, especially 'natural' or organic honey. Botulism from honey is most likely to occur in infants under two years of age.

Diagnosis

Laboratory tests are used to identify *C. botulinum* toxin in blood or stools.

History

The symptoms of botulism have been recognized for several centuries. It was first associated with sausage in Germany in the mid 18th century. Improperly cooked or cured sausages periodically caused outbreaks of botulism. "botulinum" comes from the Latin word "botulus" meaning sausage. *C. botulinum* reproduce in environments lacking oxygen, such as stagnant swamps. Many cases of mass deaths of ducks, geese and other waterfowl have been reported in these areas.^[4]

Research

Research is helping scientists to better understand how microbes spread by contaminated food or water and cause disease in humans. National Institute of Allergy and Infectious Diseases (NIAID)-supported researchers are studying the bacterial genes that help pathogens (germs) establish themselves in the human body and cause disease. For example, scientists have identified genes that appear to be involved in signaling certain immune system cells to cause inflammation, which may contribute to the development of diarrhea.

Other NIAID-sponsored research focuses on methods by which the organism grows and interacts in cells. Scientists have discovered that some intestinal bacteria recognize when they are in a human and respond by activating a particular set of powerful genes that enable the organism to live in the body and cause disease. Future studies will define new ways to intervene, whether by prevention or treatment, in the disease process.

Epidemiology

Incidence

Each year, U.S. health care providers report an average of 110 cases of botulism to the Centers for Disease Control and Prevention (CDC). Of these, approximately 25% are foodborne, 72% are infant botulism, and the rest are wound botulism.^[1]

References

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