



## Common Foodborne Pathogen: *Clostridium botulinum*



### What is *Clostridium botulinum*?

*Clostridium botulinum* is a spore forming bacterium. A spore is a phase that some cells enter when conditions become unfavorable. Spores are resistant to extreme temperatures, drying, and UV light and can be found in soil and water. Spore are found everywhere in the environment.

Under the right conditions (no oxygen **and** pH > 4.6) *C. botulinum* spores are able to grow new vegetative cells which produce the deadly botulism toxin. **Foodborne botulism** is a serious type of food poisoning caused by ingesting the toxin (intoxication). While incidence of the disease is low, the mortality rate is high in those who do not receive treatment. Most outbreaks that occur in the United States are attributed to inadequately processed, home-canned foods.

### Symptoms of *Clostridium botulinum* Intoxication

Individuals contract **foodborne botulism** from the consumption of foods containing preformed toxin. Symptoms appear within 6 hours to 10 days and include double and blurred vision, drooping eyelids, slurred speech, difficulty swallowing, and muscle weakness. Paralysis of breathing muscles can cause a person to stop breathing and die, unless mechanical ventilation is provided. Individuals with any of these symptoms should seek immediate medical assistance.

**Infant botulism**, which only occurs in children under the age of 12 months, is caused by consuming *C. botulinum* spores, which then grow in the intestines and release toxin (this cannot occur in individuals > 12 months). In addition to the symptoms described above, poor feeding, pooled oral secretions, and wailing or altered cries may be symptoms of infant botulism.

### Preventing *Clostridium botulinum* Toxin Production

There are two general strategies for preventing foodborne botulism; inactivate the spores or inhibit the growth of *C. botulinum* within a food product.

A pH below 4.6 prevents growth of *C. botulinum* spores, making low-acid (pH > 4.6) canned foods the primary reservoir for this bacterium. Canned foods are also oxygen free environments, another condition that contributes to the growth of *C. botulinum*. Pressure canning of low-acid foods is necessary because the temperatures generated under pressure are required to destroy heat resistant spores. Vegetative cells are easily killed by normal cooking temperatures.

Boiling water bath canning is sufficient for processing high-acid canned foods such as fruit. With adequate time, boiling water is hot enough to kill vegetative cells and the acid found in fruit is acidic enough to prevent the germination of spores.

Children under the age of 12 months should never consume honey or corn syrup, which have been determined to be the primary sources of infection for infants.

Keep low-acid oxygen free foods, such as unprocessed herb or garlic infused oil and foil wrapped baked potatoes, out of the temperature danger zone (40-140°F) to prevent the growth of spores into cells which produce toxin.

### Commonly Associated Foods

- Low-acid canned foods
 

Meat	Poultry
Seafood	Vegetables
- Herb or garlic infused oil
- Potatoes baked in foil
- Honey and corn syrup



### Preventing Botulism

- ✓ Pressure Can low-acid foods
- ✓ Boiling Water Bath Can high-acid foods
- ✓ Use canning recipes **ONLY** from approved sources
  - UGA So easy to Preserve
  - USDA Complete Guide to Home Canning
- ✓ Inspect cans for signs of spoilage (leakage, swelling)
  - Discard if spoilage is suspected
- ✓ Boil home canned foods for at least 3 minutes prior to consumption
- ✓ Keep foods out of the danger zone(40-140°F)

For More Information Contact:  
Renee R. Boyer, Ph.D.  
Extension Specialist  
[rraidn@vt.edu](mailto:rraidn@vt.edu)