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Botulism: What You Don't See or Smell Can Still Hurt You

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Consuming the toxin of the bacteria *Clostridium botulinum* (*C. bot*) can cause botulism. The toxin is lethal in minuscule amounts. Botulism is a rare but serious foodborne disease that can be fatal. Two types of botulism poisoning are associated with foods—adult and infant botulism.

Key Facts

- Botulinum toxin cannot be seen, smelled, or tasted.
- The toxin is one of the most lethal substances in the world.
- Home-canned foods are not the only foods associated with botulism.
- Botulism symptoms are different than other foodborne illnesses.

Where Does Botulism Come From?

The bacteria, *C. bot*, grow anaerobically, meaning they grow in the absence of air—in places like home-canned products and in the intestines of humans. The bacteria produce spores (i.e., dormant/inactive seeds) that are extremely resistant to heat and

chemicals. Under the right environmental conditions, spores transform into active bacteria. Spores are not dangerous as long as they are not able to germinate/become active. In fact, we consume spores regularly. Spores can be found in soil all over the world and can contaminate vegetables in the field and other natural foods like honey. The toxin that *C. bot* produces is among the deadliest known toxins. Fortunately, heat destroys the toxin.

Symptoms of Illness

The severity of symptoms may vary depending on the amount of toxin consumed. In adults, symptoms may resemble those of a stroke:

- difficulty swallowing
- difficulty speaking
- difficulty breathing
- double vision

The onset of botulism is usually 18 to 36 hours after eating the contaminated food, although it can be as soon as four hours and as long as eight days. In infants, signs of botulism include constipation, muscle weakness, breathing problems, and loss of head control, also called “the floppy baby.”

How Can Botulism Be Prevented?

C. bot spores can produce the toxin if food is improperly canned. Home canning should follow tested recipes from trustworthy and reputable sources. Pressure canners should be used for all



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foods that are naturally low in acid (i.e., have a high pH). The *C. bot* spores can only be killed by the high heat of a pressure canner.

Are Home-Canned Foods the Only Concern?

Infant botulism is a concern for children under one year of age. It is possible for bees to pick up the *C. bot* spores from flowers or soil. These spores are not destroyed during the processing of honey. They grow in the infant's intestinal tract and then produce the toxin. This is less likely to occur after the age of one when the infant's digestive tract matures. Therefore, it is recommended that infants under one year of age do not consume honey or products containing honey, such as honey graham crackers.

Flavored oils also can be a concern if not prepared correctly, <https://extension.psu.edu/how-to-safely-make-infused-oils>. When herbs, garlic, or tomatoes are placed in oils, the spores on the plant material can produce the toxin in the anaerobic mixture of flavored oils. To be safe, refrigerate flavored oils and make an amount of herbal oils and butters that will be used in a few days. Using dried herbs and vegetables also reduces the risk.

Baked potatoes wrapped in foil and kept at room temperature occasionally form the anaerobic conditions the spores need to produce their toxin. For this reason, leftover potatoes should be refrigerated. Potato salad made from leftover baked potatoes that have been improperly refrigerated has been implicated in botulism poisoning.

How Can I Control the Pathogen in My Home?

1. If all canning guidelines are followed properly, it is safe to eat low-acid, home-canned foods without heating. However, as an extra precaution, boil all home-canned, low-acid foods 20 minutes before eating. Low-acid foods are most vegetables, some tomatoes, and meat or poultry. At altitudes below 1,000 feet, boil foods for 10 minutes. Add one minute for each additional 1,000 feet of elevation.
2. Discard all raw or canned food that shows any sign of being spoiled. Do not feed to pets, livestock, or other animals.
3. Discard all bulging or swollen cans of food, and food from glass jars with bulging lids.
4. Do not taste food from swollen containers or food that is foamy or has a bad odor.
5. Process low-acid foods at temperatures above boiling (which can only occur using a pressure canner) and for the time recommended for the size of jar.
6. Can low-acid foods in a pressure canner. Do not can low-acid foods in the oven, in a water-bath canner, in an open kettle, or in a vegetable cooker.
7. If you suspect that home-canned food has spoiled, heat the food to boiling to destroy any possible *C. bot* toxin, then



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discard the food. Do not eat this food. If a leaky container may have contaminated an area, clean all surfaces with a chlorine/water solution (one tablespoon of bleach per gallon of water). Then boil any sponges or cloths used for clean-up to destroy the toxin. Finally, discard the sponges or clean-up cloths.

8. Do not give honey or foods with honey to infants under one year of age.

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- For more information about food safety, visit [Foodsafety.osu.edu](https://www.foodsafety.gov).

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