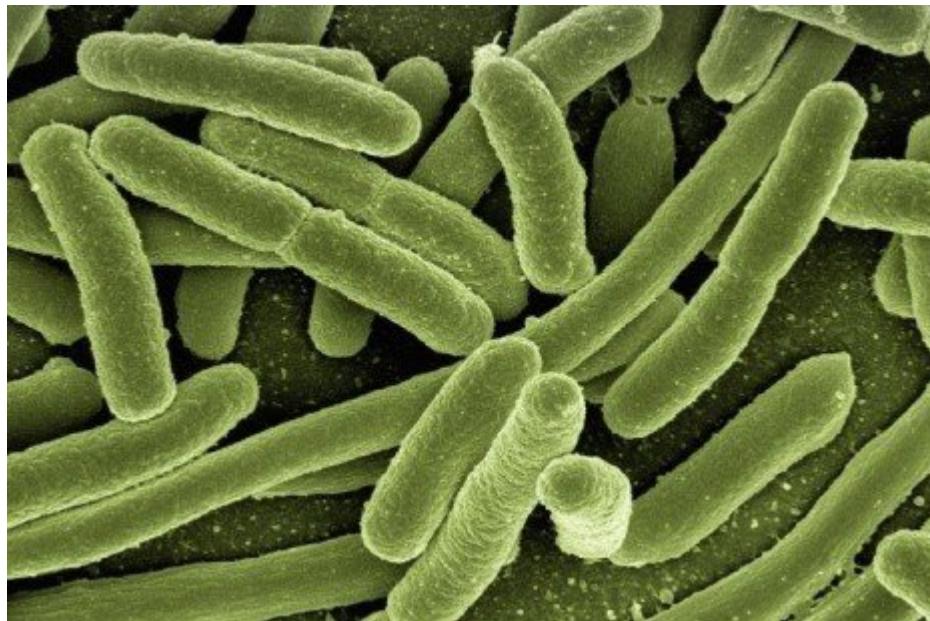




What is Botulism?

Botulism is a food-borne illness caused by a toxin produced when the spores of the bacteria *Clostridium botulinum* grow and develop under favorable conditions.

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Clostridium botulinum, a bacteria, and its spores are readily found in the soil and can be present on the foods we regularly prepare and eat. The bacteria are destroyed at boiling water temperatures. The danger comes when the spores (a means of survival under adverse conditions) of these bacteria, which are not destroyed at boiling water temperatures,

germinate to produce new bacteria. When the spores germinate, they produce a deadly toxin that is one of the most toxic substances known. The conditions that favor the growth (germination) of *C. botulinum* spores include low acidity, moisture, the absence of oxygen, and storage at room temperature, all factors involved in canning low acid foods.

Recommendations for home canning are designed to control and prevent the growth of *C. botulinum* spores.

Control Acidity

A key component of preventing botulism is to control acidity during the canning process. *C. botulinum* spores cannot germinate and produce toxin in products with a pH level of 4.6 or below.

Follow tested recipes to properly acidify (decrease the pH) of low acid vegetables.

- Can all high acid foods in a boiling water or atmospheric steam canner.
- Add vinegar to vegetables to make pickled products such as cucumber pickles and relishes.
- Add bottled lemon juice or citric acid to tomatoes, figs, and Asian pears to raise the pH of these foods that are borderline line between high and low acid foods.
- Add bottled lemon or lime juice and/or vinegar to salsa to raise the pH of the combined high and low acid ingredients in salsa.
- Select good quality produce that is of ideal ripeness and that is free of disease. Over-ripe produce and produce affected by blight or disease is lower in acidity.

Note: Foods that have a pH below 4.6 will not support the growth of botulism spores. These include most fruits and acidified products.

Control Temperatures

Be mindful of the water temperature during the canning process. *C. botulinum* spores can survive the boiling point of water (212°F), but are destroyed at 240°F.

Process all low acid foods in a pressure canner that is calibrated to 240°F.

- At altitudes between 0 and 1,000 feet, that temperature is reached in a weighted gauge pressure canner at 10 pounds pressure.
- At altitudes above 1,000 feet, process foods at 15 pounds pressure in a weighted gauge canner.
- At altitudes between 0 and 2,000 feet, process foods at 11 pounds pressure in a dial gauge pressure canner.
- Add an additional pound pressure for each additional 2,000 feet of altitude.
- Vent the pressure canner for 10 minutes before applying the pressure regulator or the pressure weight. Venting drives air out of the canner replacing it with steam.
- Have dial gauges tested for accuracy each year. If the dial gauge tests higher than the control, it indicates that the temperature inside the canner is lower than what it should be.
- Process for the recommended amount of time based upon research based recipes such as those from Penn State Extension *Let's Preserve* series or National

[Center for Home Food Preservation.](#)

- Botulism spores grow at room temperature. Properly pressure canning low acid foods destroys the spores.
- If there are concerns about the safety of canning a product, it can be frozen. Most bacteria do not grow at freezing temperatures.

What is an anaerobic environment?

- Anaerobic means the absence of oxygen.
- *C. botulinum* spores can only grow in a very low-oxygen environment. They will not grow in the presence of oxygen.
- A vacuum sealed jar has very little oxygen and will support the growth of *C botulinum* spores if they have not been destroyed.
- The canning process removes air from the jar when a vacuum seal is formed.

Signs of Spoilage.

A jar that contains botulism toxin does not appear spoiled. It does not have masses of growth, mold or yeast; it does not have an odor; it is not slimy; and it does not taste funny. These signs of spoilage are likely pointing to other microorganisms, such as molds or yeast.

Tasting is not OK.

- **Do not** taste any food that is questionable. Tiny amounts of the botulism toxin can cause serious illness, paralysis, or death.
- To prevent botulism, use approved processing methods and times.
- If you are concerned, the [Centers for Disease Control and Prevention](#) recommends boiling home-canned products in a saucepan on the stove for ten minutes before serving. Add one minute for each additional 1,000 feet of elevation.
- If you know foods were not prepared according to recommended methods, follow the [National Center for Home Food Preservation](#) guidelines for identifying and handling spoiled canned foods.

Additional Information:

Less known cases of botulism have come from unrefrigerated salsa, baked potatoes in aluminum foil, garlic in oil, fermented fish. In each case, conditions that foster the

growth of botulism spores were present—low acidity, lack of oxygen, room temperature.

Cases of botulism have been reported where symptoms have shown up in as little as 4 hours or up to 8 days after eating foods containing the toxin.

Infant botulism, although rare, can occur in infants under 12 months old. The most common cause is consumption of honey which may contain *C. botulinum* spores. For adults and older children, consuming this food is not a problem, however children under the age of one year may develop botulism. The [American Academy of Pediatrics](#) and other government organizations recommend that children under one year of age not be given honey in any form. Also, be sure to thoroughly wash fruits and vegetables before feeding to infants.