Websites

Food Blog Code of Ethics: http://foodethics.wordpress.com
Technorati: http://www.technorati.com

Botulism

Botulism is a potentially fatal paralytic illness caused by a highly potent toxin produced by the bacterium *Clostridium botulinum*. The word *botulism* originates from the Latin *botulus*, meaning sausage, a reference to the historical association of this illness with home-fermented sausages in Europe in the 17th and 18th centuries. Botulism occurs in five forms: (1) foodborne, (2) infant, (3) wound, (4) adult intestinal toxemia, and (5) iatrogenic. The most relevant is foodborne botulism, a serious type of food poisoning caused by ingesting foods contaminated with botulinum toxin. In the United States, inadequately sterilized low-acid canned foods such as string beans were frequent sources of botulism. Although foodborne botulism now occurs relatively infrequently, it is considered to pose a serious public health threat; a centralized food source of botulism could, in theory, poison many individuals. This entry examines types of botulinum toxins, foodborne botulism, and recommendations to reduce the risk of botulism in foods prepared at home.

Botulinum Toxins

The bacteria that produce botulinum toxins are found in soil, marine sediments, and other anaerobic (low-oxygen) environments. These bacteria produce durable spores that can withstand harsh conditions such as the heating and drying that constitute common food preservation methods. To produce the toxin, the spores must germinate under specific conditions: (a) a low-oxygen environment, (b) the right temperatures for incubation and activation, and (c) appropriate levels of moisture, nutrients, and acidity. Seven distinct types of botulinum toxins (designated A through G) cause illness in humans and animals. Only Types A, B, E, and, in extremely rare cases, F, cause human sickness. Types A and B are usually associated with ingestion of home-canned low-acid vegetables and meat products, while Type E has been traced to home-preserved marine products such as fish and marine mammals.

Estimates of Botulism Illness in the United States

On average, 145 individual cases of foodborne botulism are reported to the Centers for Disease Control and Prevention (CDC) in the United States each year. Since 1950, an average of 9.4 confirmed foodborne botulism outbreaks (more than one case from a single food source) have occurred annually, with an average of 2.5 individual cases per outbreak. The geographical distribution of foodborne botulism in the United States is concentrated in four western states (California, Colorado, Oregon, and Washington) and Alaska, which together account for more than half of all outbreaks. This is explained in part by the high concentration of (Type A) botulism in western soils. It is also explained by lower boiling points in high-altitude western states. Canning pressures for low-acid foods must be higher to compensate for lower boiling temperatures. Forgetting to account for these conditions can increase the risk of botulism in home-canned foods. In Alaska, where 16% of national outbreaks occur, all confirmed botulism cases have been associated with the improper preparation and storage of traditional Native Alaskan foods.

Causes of Foodborne Botulism

C. botulinum causes illness in humans by producing heat-resistant spores that survive food preservation methods. Although different types and strains of spores are resistant to different levels of heat, many can survive temperatures above boiling. Due to the difficulty in achieving sufficiently high temperatures and pressure in a home kitchen, foodborne botulism is most commonly attributed

to home-preserved foods. Few outbreaks have been traced to commercially processed or prepared foods. Most commercial food-manufacturing operations follow strict guidelines to ensure that canned products are free of toxin-producing spores. The Food and Drug Administration adopted Hazard Analysis and Critical Control Point regulations for low-acid foods in the 1970s to reduce the risk of botulism in commercially manufactured foods.

Symptoms and Treatment of Botulism Intoxication

Symptoms of botulism typically include abdominal pain, nausea, vomiting, and diarrhea. If untreated, foodborne botulism can lead to additional neurological symptoms, including blurred vision, drooping eyelids, slurred speech, dry mouth, difficulty swallowing, and muscle weakness. The incubation period for foodborne botulism is typically 18 to 36 hours after ingestion of contaminated food, although symptoms can manifest as early as 6 hours or as late as 10 days. Treatment for botulism includes the administration of antitoxin and intensive medical care, often including aggressive respiratory care. Compared with other foodborne illnesses, the mortality rate of botulism is high—5% to 10% for treated victims and as high as 60% for untreated individuals.

Recommendations to Reduce Home-Induced Botulism

Home cooks can reduce their risk of botulism by adhering to recommended cooking time, temperature, and pressure required to destroy *C. botulinum* spores. Additional techniques such as stirring, adequate refrigeration, acidification, and reheating of home-canned foods can also help reduce the risk. Consumers and home cooks should refer to the home-canning guide and food preparation procedures that are included on the U.S. Department of Agriculture's websites listed in the Further Readings section of this entry.

Consumers should also avoid all commercial or home-canned food products that have a bulging lid or off-odors, signs that may indicate possible contamination. Not all spoiled food products display these indicators, however, and new sources of botulism contamination are discovered every decade. Recent foodborne botulism cases have been attributed to chopped garlic in oil, baked potatoes wrapped in foil, and canned cheese sauce, chili peppers, and tomatoes. Consumers should always refrigerate oils that contain garlic or other herbs, and promptly refrigerate leftover potatoes baked in aluminum foil. Thorough boiling of food products—particularly home-canned foods—for at least 10 minutes prior to consumption can help reduce the risk of botulism.

Infant Botulism

Infant botulism has been the most common form of botulism in the United States since 1980. This illness occurs when infants directly ingest *C. botulinum* spores from dust, soil, or honey. The first symptom is constipation, usually followed by neurological and muscular problems that include dull face, weak cry, weak suckling, slow movements, trouble swallowing, unusually excessive drooling, and breathing problems. Factors such as exposure to dust and soil have been documented as potential sources of infant botulism, but their role as transmission vehicles for infant botulism remain unclear. The best preventive measure is to avoid feeding honey to children under the age of 12 months.

Diana Caley and Marion Nestle

See also Food Safety; Hazard Analysis and Critical Control Point (HACCP)

Further Readings

Centers for Disease Control and Prevention. (1998). *Botulism in the United States, 1899–1996: Handbook for epidemiologists, clinicians, and laboratory workers.* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

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U.S. Department of Agriculture. (2009). *Complete guide to home canning*. Retrieved from http://nchfp.uga.edu/publications/publications_usda.html

U.S. Department of Agriculture. (n.d.). *Food safety resources*. Retrieved from http://www.usda.gov/wps/portal/usda/usdahome?navid=FOOD_SAFETY

U.S. Food and Drug Administration. (2012). *Bad bug book: Handbook of foodborne pathogenic microorganisms and natural toxins* (2nd ed.). Silver Spring, MD: Author.

Website

U.S. Department of Health and Human Services: http://www.foodsafety.gov/poisoning/causes/bacteriaviruses/botulism/index.html

Bovine Spongiform Encephalopathy

See Mad Cow Disease

Boycotts

A boycott is a form of political statement in which a person or group of persons acting in concert refrain from the purchase or use of something. A boycott is a political and social tool that can be used to adversely affect a company, whether large or small, by stopping a flow of money to the company through sales. It is also a practice that can affect an industry, not just a single company. This entry examines boycotts pertaining to the food industry.

Boycotts have been used on many occasions against businesses in the food industry. Unlike a strike, which is a political action undertaken by employees of a company that directly affects the relationship between a company and its workers, a boycott is a political action in which consumers at any level refrain from buying a product. The boycott is designed to (a) force a company to stop producing or selling a product; (b) require the company to alter the product or its policies in order to comply with a political agenda or to induce a change in the product; (c) protest the product itself, to induce change in the way the product is produced; or (d) change company policies that are unrelated to the product.

Boycott activism may be motivated by economic, environmental, or health issues as well as other humanitarian political issues. It has been said that a boycott is a nonviolent form of consumer coercion; however, especially when coordinated with employees who participate in a larger strategy by engaging in strikes and with market interference, the boycott can cause frustration in its participants, which can result in violence.

Early Examples of Boycotts

The Boston Tea Party is perhaps the most famous American boycott, in which prerevolutionary citizens of Boston in 1773 dumped a shipment of tea in Boston Harbor in protest of what the citizens considered to be unfair taxes being levied by the British crown on the colonies. It was not aimed at a traditional corporate entity, but nonetheless, the action was motivated by a political agenda. This boycott encouraged consumers to not drink the tea being taxed, and the boycotters ensured that there was no tea to drink by destroying the tea. There was no aspect of marketing to convince consumers not to drink tea. This boycott prevented the behavior. The Boston Tea Party can be considered the inciting incident of the American Revolution. It certainly legitimizes the history of the boycott in America. It may also have influenced the drinking habits of Americans. While it was not successful in changing the taxation practices of the British government, this boycott was a clear message to the authorities that the British subjects were unhappy with the taxation.

Almost two decades later, in 1791, antislavery forces in England organized a boycott of sugar produced through slave labor. Sugar produced in India was produced by paid agricultural workers. Consumers switched their sugar purchases to sugar advertised to be made by free men. This is an early example of a successful fair-trade style of boycott.