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Botulism Associated with Commercial Carrot Juice — Georgia and Florida, September 2006

On September 8, 2006, the Georgia Division of Public Health (GDPH) and CDC were notified of three suspected cases of foodborne botulism in Washington County, Georgia. On September 25, the Florida Department of Health and CDC were notified of an additional suspected case in Tampa, Florida. This report describes the joint investigation and control measures undertaken by state and local health departments, CDC, and the Food and Drug Administration (FDA).

On September 8, the three patients from Washington County, Georgia, went to a local hospital with cranial nerve palsies and progressive descending flaccid paralysis resulting in respiratory failure; the patients had shared meals on September 7. On the evening of September 8, physicians suspected foodborne botulism, notified the state health department, and collected clinical specimens for testing at CDC. On the same evening, CDC provided clinical consultation and dispatched botulinum antitoxin, which was administered to each of the patients the following morning. After receiving antitoxin, the patients had no progression of neurologic symptoms, but they remain hospitalized and on ventilators.

On September 9, the Washington County Health Department, Richmond County Health Department, and GDPH launched an investigation. The three patients had consumed several food items during their two meals together on September 7, including juice from a single 1-liter bottle of Bolthouse Farms carrot juice. The bottle had a "best if used by" date of September 18, 2006. Clinical specimens and leftover food and juice were collected and sent to CDC for testing. On September 13, botulinum toxin type A was identified in the serum and stool of all three patients. On September 15, leftover carrot juice recovered from the home of one of the patients also tested positive for botulinum toxin type A.

During September 8–15, FDA, the Georgia Department of Agriculture, the Georgia Hospital Association, and public health officials in all 50 states were notified of the outbreak and the implicated product as information became available. After these notifications, no additional cases of botulism in Georgia were reported to the state and local health departments or to CDC. During this time, FDA launched an investigation of the Bolthouse Farms, Inc., manufacturing plant in Bakersfield, California. FDA and CDC tested other bottles of the implicated brand of carrot juice, including bottles from different lots, and all were negative for botulinum toxin. Because botulinum toxin was found only in the bottle of carrot juice consumed by the three patients, a lapse in refrigeration of the carrot-juice bottle during transport or storage was suspected, which would have allowed for growth of *Clostridium botulinum* and subsequent production of botulinum toxin. Based on the CDC test results, on September 17, FDA issued a consumer advisory on the importance of keeping carrot juice refrigerated. However, information obtained from patient interviews regarding storage and transport of the carrot juice did not confirm mishandling by the patients.

On September 25, officials at the Florida Department of Health, the Hillsborough County Health Department, and CDC were notified that a patient had been hospitalized in Tampa, Florida, on September 16, with respiratory failure and descending paralysis. On September 28, botulinum toxin type A was identified in the patient's serum. Circulating toxin persisted more than 10 days after illness onset in this completely paralyzed patient, indicating ingestion of a massive toxin dose. Accordingly, the patient was treated with antitoxin, which prevents binding of circulating botulinum toxin to nerve endings. The patient remains hospitalized, paralyzed, and on a ventilator. The Hillsborough County Health Department collected an open, 450-milliliter bottle of Bolthouse Farms carrot juice, which had been found by a family member in the hotel room where the patient had been staying during the month before being hospitalized. The hotel room had no refrigerator. The bottle, which had a "best if used by" date of September 19, 2006, had a different lot number than the bottle associated with the Georgia cases. On September 29, botulinum toxin was identified in carrot juice from the bottle found in the patient's hotel room; the toxin was subsequently identified as botulinum toxin type A. The Hillsborough County Health Department and CDC notified FDA, public health

officials in all 50 states, and infection-control practitioners in Hillsborough County about the botulism case and implicated product. The manufacturer provided FDA with bottles of carrot juice from the same lot as the bottle found in the patient's room. FDA tested juice from all of these bottles, and it was negative for botulinum toxin.

C. botulinum spores are found in the environment and can be present naturally in carrot juice and other foods that have not undergone the retort canning process, which involves high temperatures and high pressure. Anaerobic conditions, low acidity (pH>4.6), low salt and sugar concentrations, and temperatures >39°F (>4°C) promote germination of *C. botulinum* spores and botulinum toxin production. Carrot juice has low acidity, with a natural pH of approximately 6.0; therefore, in the absence of another inhibitor, refrigeration at temperatures <40°F (<4°C) is necessary to prevent germination of *C. botulinum* spores and production of botulinum toxin. Inhibiting *C. botulinum* growth in other ways, such as through acidification, can retard its growth in juice that is not properly refrigerated.

Acidification has been used as a solution to previous foodborne botulism outbreaks. In 1985, 36 patients in the United States and Canada were identified with botulism after eating at a restaurant in Vancouver, British Columbia. A case-control study implicated commercially produced, chopped garlic in soybean oil stored at room temperature as the source of the outbreak (*1*). In 1989, a second outbreak of botulism associated with chopped garlic in oil occurred when three patients in New York were identified with botulism after consuming a meal containing unrefrigerated, commercially produced, chopped garlic in virgin olive oil (*2*). After these outbreaks, FDA rules were altered to require that garlic-in-oil products contain an acidifying agent such as phosphoric or citric acid.

The carrot juice consumed by these four patients was manufactured by Bolthouse Farms, Inc., and distributed in all 50 states, Mexico, Canada, and Hong Kong with the labels "Bolthouse Farms 100% Carrot Juice," "Earthbound Farm Organic Carrot Juice," and "President's Choice Organics 100% Pure Carrot Juice." Investigations of these cases by state and local health departments and investigations of the manufacturer by FDA are ongoing. On September 29, GDPH and the Georgia Department of Agriculture recommended that Georgia residents not purchase or consume Bolthouse Farms carrot juice. The same day, the FDA warned consumers not to drink Bolthouse Farms carrot juice with "best if used by" dates of November 11, 2006 or earlier (i.e., all bottles produced before the date the warning was issued), and Bolthouse Farms issued a voluntary recall of these products. Additional information regarding the recall is available from the Bolthouse Farms website at http://www.bolthouse.com/bolthouserecallFAQ.pdf or from FDA (telephone, 888-723-3366).

Suspected botulism cases should be reported immediately to local or state public health officials, who then should call the 24-hour CDC Emergency Operations Center at 770-488-7100; the center will immediately connect them with an on-call botulism specialist. Health-care providers and public health officials are encouraged to inquire specifically about consumption of carrot juice as part of the food history of suspect botulism cases. Additional information on botulism is available at http://www.cdc.gov/ncidod/dbmd/diseaseinfo/botulism_g.htm.

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