Foodborne Botulism in British Columbia: A 30 Year history

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Background

Foodborne botulism is a rare but severe neuroparalytic disorder resulting from ingestion of preformed neurotoxin produced during the growth of *Clostridium botulinum* in contaminated food. *C. botulinum* strains differ in heat resistance and growth temperature requirements; two contributing factors that make this organism responsible for food poisoning. Only a few nanograms of the toxin can cause illness which usually presents with gastrointestinal symptoms, blurred or double vision, progressing to dry mouth, dysphagia and symmetrical flaccid paralysis. When the neurotoxin enters the gastrointestinal tract, it is absorbed into the blood and lymphatic circulation where it acts to block the release of acetylcholine from nerve synapses resulting in paralysis. A single case of foodborne botulism constitutes an outbreak and could represent significant public health implications by potentially heralding a larger outbreak if a commercial food product is involved.

Methods

Once approval to perform the test has been given by a BCCDC Medical Microbiologist, collection and submission of implicated food and clinical samples is coordinated through the B.C. Centre for Disease Control (BCCDC) Laboratory Services, the only laboratory in BC carrying out this testing. Rapid diagnosis of foodborne botulism is critical for the survival and treatment of the patient. Diagnosis of foodborne botulism is confirmed in the laboratory by identifying botulinum neurotoxin in implicated food, serum, feces, vomitus, gastric contents or post mortem samples. Currently, the only acceptable method for the identification and detection of botulinum neurotoxin is the mouse neutralization bioassay, which identifies the toxin type by using monovalent antitoxin. Finding viable *C. botulinum* organisms in an implicated food sample is not sufficient evidence to confirm botulism illness in the absence of other laboratory data. Detection of viable *C. botulinum* organisms by enrichment culture, followed by mouse neutralization bioassay in feces or vomitus samples also provides good confirmatory evidence of illness, as the organism is rarely encountered in healthy humans.

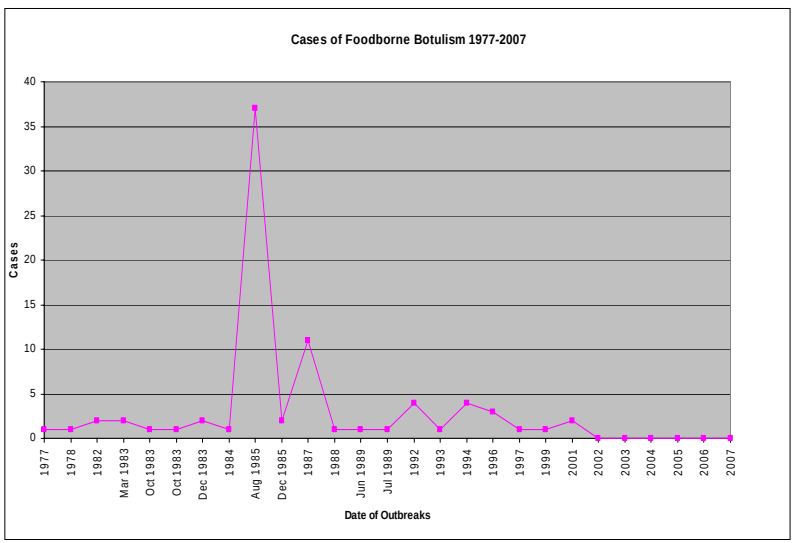

Figure 1: Number of cases of foodborne botulism in each outbreak that occurred from 1977-2007.

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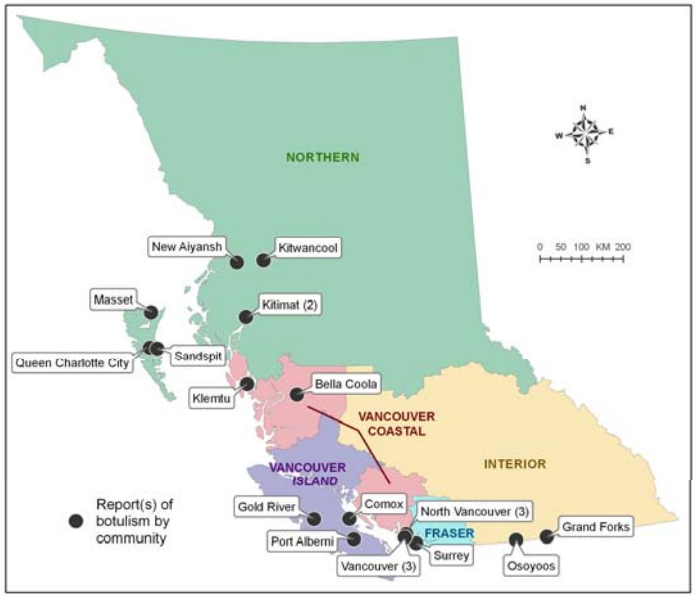

Figure 2: Geographic distribution of foodborne botulism cases in British Columbia from 1977-2007.

Food [1]confirmed both clinically and in food [2]confirmed clinically only	Number of Outbreaks	Toxin Type
Salmon eggs[1]	10	Type E
Smoked salmon[1]	4	3 Type E, 1 Type B* *(non-proteolytic)
Home canned corn[1]	1	Type A
Suspected home canned vegetables[2]	1	Type A
Garlic in oil[1]	1	Type B
Chanterelle mushrooms[1]	1	Type A
Suspected sausages[2]	1	Type E
Bean soup[1]	1	Type A
Suspected beef and vegetable soup[1]	1	Type A

Table 1: Description of the food types responsible in botulinum outbreaks and *C. botulinum* toxin type.

Results

21 outbreaks of foodborne botulism involving 80 cases and four fatalities have been investigated by the BCCDC Environmental Microbiology Laboratory since 1977. Figure 1 shows the number of cases comprising each outbreak over the last thirty years. There have been no recorded outbreaks of foodborne botulism in BC since August 2001. 60% of all cases were caused by two separate restaurant outbreaks – the first involving unacidified garlic-in-oil, stored at room temperature (n=37) and the second outbreak involved chanterelle mushrooms which were subjected to an in-house bottling process at the restaurant, also stored at room temperature (n=11).

A considerable number of recorded outbreaks have been scattered amongst rural or remote coastal areas of BC where there is a higher population of First Nations, Inuit and Doukhobor communities (Figure 2). A total of 86% of foodborne botulism outbreaks since 1977 have been traced to home-processed foods. 67% of the total outbreaks have been caused by traditional Aboriginal foods such as fermented salmon eggs and smoked salmon, which are delicacies for the West Coast Aboriginal people and 19% have been caused by improperly home canned products containing vegetables and soups (Table 1).

Of the 21 outbreaks in BC, 67% have been caused by *C. botulinum* Type E (Figure 3), involving 26 cases and all but one outbreak has been traced to marine products (Table 1). 23% of outbreaks were caused by Type A, involving only 15 cases, the majority of which were caused by home canned products. 9% of outbreaks consisted of only two outbreaks but involved 39 cases and were caused by *C. botulinum* Type B and resulted in the largest single outbreak seen in BC.

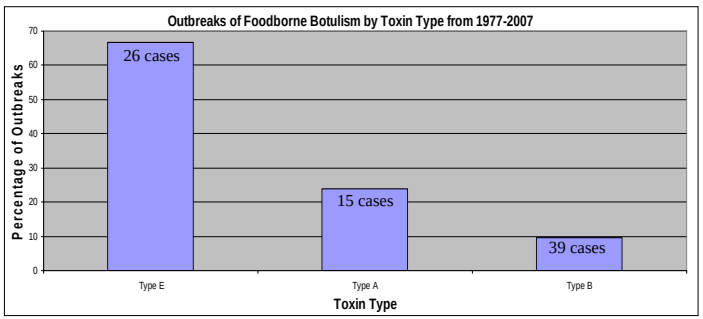

Figure 3: Type E has been the predominate toxin causing illness since 1977 in BC.

Conclusions

BC's last outbreak of foodborne botulism was in 2001. Over the last few years, there have been efforts made by public health to discourage the fermentation and improper smoking of salmon products which may have attributed to the decline in *C. botulinum* cases caused by Type E. A decline in the number of foodborne botulism incidents in home processed foods may also be attributed to the efforts made by province-wide public health agencies to further educate the public on proper food handling and preparation practices. Luckily, no foodborne botulism outbreaks in commercial products in BC have been documented during this time which has been largely controlled by a better understanding of safe canning and food manufacturing processes.

References

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