

Epidemiology Bulletin

REPUBLIC OF CHINA

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An Outbreak of Type A Botulism Due to Commercially Preserved Peanuts - Chang Hwa County

On October 14, 1986, the Bureau of Disease Control (BDC) was notified by a physician at the National Taiwan University Hospital about a possible outbreak of botulism among workers at a printing factory in Chang Hwa City. This physician had been called to investigate a group of workers with neurologic symptoms thought to be caused by exposure to an industrial chemical. He concluded that the illness was not due to an occupational exposure, and workers' symptoms were compatible with acute botulism intoxication. An epidemiologic investigation by the Department of Health (DOH) revealed that seven of 40 factory workers were ill, including the factory cook who had no exposure to industrial chemicals. Onset of symptoms occurred from September 28-30 (Table 1). Signs and symptoms among the seven ill workers included ptosis (7), diplopia (6), difficulty swallowing (6), slurred speech (5), proximal muscle weakness (5), and dyspnea (3). Four cases were hospitalized; two required prolonged mechanical ventilation. Among these, one (the factory cook) died from respiratory complications three weeks after onset. Sera from all seven cases were negative for botulinal toxin, however, the specimens were collected 2-3 weeks after onset of symptoms. Rapid repetitive stimulation electromyography tests performed on two cases revealed an electro-

Table 1 Characteristics of 7 Cases of Botulism, Factory X, Chang-Hwa City, September 28-30, 1986

Cases	A	B	C	D	E	F	G	
Date of onset	Sept 28	Sept 28	Sept 29	Sept 29	Sept 29	Sept 29	Sept 30	
Incubation Time (hours)	23	34	48	48	50	58	74	Median=48
Symptoms & Signs								Percent
Ptosis	+	+	+	+	+	+	+	100%
Diplopia	+	+	+	-	+	+	+	86%
Dysphagia	+	+	+	+	+	+	-	86%
Dysphonia	+	+	-	+	+	+	-	71%
Muscle weakness	+	+	-	+	-	+	+	71%
Dyspnea	+	+	-	-	-	+	-	43%
Hospitalized	Yes	Yes	No	No	Yes	Yes	No	
Outcome	Died	Well	Well	Well	Well	Well	Well	

incremental response consistent with a diagnosis of botulism intoxication.

A food history questionnaire administered to all factory employees revealed a significant association between illness and eating breakfast in the factory cafeteria on September 26 or 27: 7 of 7 ill workers compared to 7 of 32 non-ill workers ate breakfast in the factory cafeteria on these two days: $p=2.23 \times 10^{-4}$ (Fisher's Exact Test). Although a list of the 9 food items served on these days was available, no food items were significantly associated with illness. The items served on these days included several commercially preserved foods and one home-made preserved food. Specimens of all foods remaining in the factory cafeteria were sent to the laboratory for testing. Only one food, an unopened jar of preserved peanuts produced by the Sheng Pao Company on September 10, 1986, was positive for type A botulinum toxin.

A product recall was initiated, however, two more cases of botulism occurred in Chang Hwa County. A 68 year-old woman and her 6 year-old grandson developed symptoms of botulism within 24 hours of eating peanuts produced by the Sheng Pao Factory on September 10. The woman died at home on November 29, and the grandson was hospitalized with severe respiratory depression on November 30. A serum specimen

collected shortly after admission was positive for type A botulinal toxin. A specimen from the partially eaten jar of Sheng Pao peanuts found in the boy's home was also positive for type A botulinal toxin. The boy was placed on mechanical ventilation and treated with antitoxin provided by the Department of Health. He required prolonged mechanical ventilation, but recovered completely.

An investigation of the Sheng Pao Company revealed it was not licensed to produce canned foods. The company was a small, family-run business with fewer than 15 full-time employees. It had been processing preserved foods in bulk quantity for more than 20 years, however, it had been canning foods for only about six years. The factory owner supervised all food processing and relied only on his memory for ingredients and steps in processing. There were no production records available to compare batches of peanuts produced on September 10 with other batches prepared on other days. There were also no sales or distribution records to assist in the product recall. The only food processing equipment in the factory were several large caldrons and a labeling machine. The factory did not have a retort device or other pressurization equipment required by law for thermal processing of low-acid foods such as peanuts.

The mass media was used to inform the public not to eat any Sheng Pao products, and to return any products already purchased to the nearest government health facility. The six year-old boy in Chang Hwa County was the last known case in this outbreak.

Laboratory analysis of samples of product recalled as of November 26 revealed that 9 of 12 jars of peanuts produced on September 10 were positive for toxin, compared to none of 32 jars from batches produced on other days.

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Editorial Note: Human intoxication with botulism occurs in three forms: foodborne, infant, and wound botulism. Foodborne botulism is by far the most common form, and results from the ingestion of toxin produced by spores of *Clostridium botulinum*. There are seven antigenically distinct types of botulinal toxins (A-G). These toxins are among the most powerful neurotoxins known - as little as one microgram of purified toxin can be lethal for man. Botulinal toxins interfere with the release of acetylcholine at the presynaptic terminals of cholinergic nerves. Soon after ingestion, neurologic manifestations begin. Most fatalities result from respiratory complications. Antitoxin, if given early, may neutralize circulating "unfixed" toxin, but probably does not alter the clinical course of type A or B botulism if paralysis has already occurred. With early diagnosis and aggressive supportive care, even severe cases can recover fully.

The organism *C. botulinum* is ubiquitous in the soil and on vegetation. The spores are relatively heat-resistant, and require pressure sterilization to ensure their destruction. In contrast to spores, the toxin is relatively heat-labile, and is completely inactivated at 100°C in 10 minutes. In the Sheng Pao Factory, peanuts were boiled for 1-2 hours before canning, however, the system was not pressurized. For reasons undetermined by this investigation, spores survived in the September 10 batch and subsequently produced toxin.