

Outbreak of Staphylococcal Food Poisoning in a Tour Group - Hwalien and Ilan Counties

On July 22, 1986, an outbreak of gastroenteritis occurred in a tour group of 95 farmers from Pingtung County visiting northern Taiwan. On July 21, the group stayed in a hotel in Hwalien City and departed for Ilan County the following morning with lunch boxes prepared by the hotel restaurant. The lunch boxes were prepared at 5 am, held all day at room temperature, and eaten around noon. Eighty-five (89%) of the 95 farmers were

available for interview. Among these, 26 (31%) did not eat lunch boxes and none became ill. By comparison, 27 (46%) of 59 persons who ate the lunch boxes, became ill ($p < 0.001$). Symptoms included vomiting (78%), abdominal pain (67%), and diarrhea (56%). The median incubation period was 3 hours (Figure 1). Although duration of illness was brief (<24 hours), symptoms were severe and 11 persons were hospitalized. Vomitus was collected from 22 persons treated in an Ilan City emergency room and was positive for *Staphylococcus aureus*.

The lunch boxes contained a total of 9 food items. A comparison of illness rates among persons who ate and did not eat specific food items showed a significant association with 5 out of 9 foods (Table 1). However, a multivariate analysis showed fish cakes were the only food item significantly associated with illness ($R^2 = 0.52$, $T = 7.81$; $p < 10^{-4}$); the other 4 food items were highly correlated with eating fish cakes, but not with illness. Three leftover lunch boxes were available for laboratory examination. Fish cakes were located in the center of each lunch box, and the other food items were placed either around or directly on top of the fish cakes. *S. aureus* ($> 10^6$ organisms per gm) was isolated from all 9 food items in the lunch boxes.

The implicated fish cakes were sold to the restaurant by a merchant in a local market on July 21. Frozen fish was purchased on July 20 and allowed to thaw at room temperature for approximately 12 hours. At 4 am on July 21, the fish was cut into small pieces, ground, mixed with meal and shaped by hand into cakes by the merchant and his wife. The fish cakes stood at room temperature for another 1-2 hours and were then deep-fried for "a few minutes" in hot oil. The cooked fish cakes stood at room temperature for another 8-9 hours before they were sold to the restaurant and placed in the refrigerator. They were removed from the refrigerator on the morning of July 22, reheated,

Fig 1 Incubation period for 27 persons with gastroenteritis, Hwalien and Ilan Counties July 22, 1986

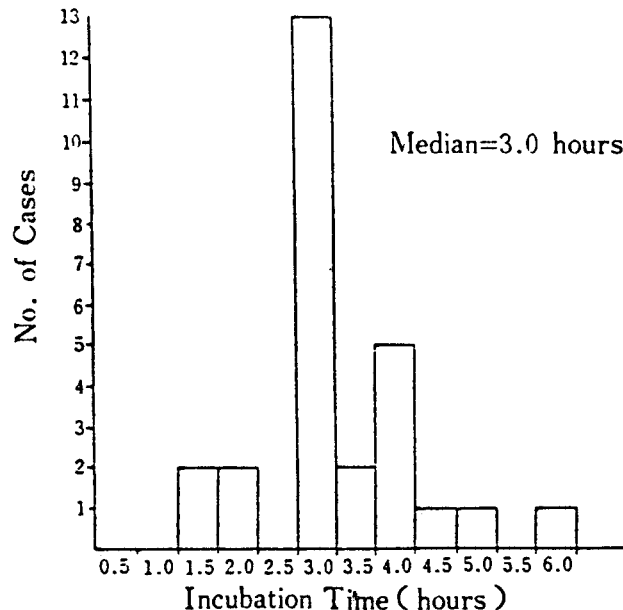


Table 1 Food history attack rates for items contained in the lunch boxes.

Food	Ate			Did not eat			p
	ill	well	%ill	ill	well	%ill	
Pork	24	22	52	3	10	23	NS*
Fish	23	17	58	4	15	21	< 0.025
Beans	20	20	50	2	12	14	NS*
Carrots	23	19	55	4	13	24	NS*
Tofu	20	12	63	7	20	26	< 0.025
Rice	27	31	47	0	1	0	NS*
Fish cake	26	8	76	1	24	4	< 0.005
Egg	24	18	57	3	14	18	< 0.025
Vegetable	25	20	56	2	12	14	< 0.025

*Not significant

placed in styrofoam lunch boxes designed to keep ingredients warm, and eaten 7-8 hours later. Hand cultures of the fish cake merchant grew *S. aureus*. The merchant's wife, and the restaurant food handlers who prepared the lunch boxes were all negative for *S. aureus*. The *S. aureus* isolates from the fish cake, the vomitus, and the merchant's hands, all had identical antibiotic susceptibility patterns, and all produced type A enterotoxin. Results of phage typing are currently pending.

Reported by Food Sanitation and Disease Control Sections, Ilan and Hwalien County Health Bureaus, Food Sanitation Section, Provincial Health Department, Eastern Mobile Surveillance Team, National Institute of Preventive Medicine, Food and Drug Laboratory Bureau, Bureau of Food Sanitation, and Disease Control, Department of Health, Executive Yuan.

Editorial Note: This outbreak was most likely caused by improper foodhandling practices the preparation and storage of the fish cakes. *S. aureus* organisms from the hands of the merchant had 1-2 hours to incubate at room temperature and produce heat-stable enterotoxin before the fish cakes were cooked on the July 21. If the cooking time was short, some organisms in the center of the fish cakes could have survived frying and incubated an additional 8-9 hours at room temperature producing more enterotoxin. After re-warming, the lunch box ingredients were held for 7 more hours at a warm temperature probably ideal for incubating microorganisms. Thus, there were multiple opportunities for microorganisms to grow from the time the fish cakes were prepared to the time they were eaten. This outbreak illustrates the lack of knowledge of both foodhandlers and consumers regarding the need to store foods at proper temperatures (less than 4°C, or more than 60°C). More effort in health education is needed to prevent foodborne outbreaks.

This investigation was unusually complete because the Ilan County Health Bureau promptly notified the Provincial Health Department by telephone, who in turn notified the Bureau of Food Sanitation of the Department of Health while the outbreak was still in progress. This prompt report led to the proper collection and handling of food and patient specimens, and enabled the Department of Health to dispatch an epidemiologist to im-