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Food Poisoning Attributable to *Staphylococcus aureus* Deficient in All of the Staphylococcal Enterotoxin Gene So Far Reported

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In August 2005, there was an outbreak of food poisoning in a hotel under the jurisdiction of the Minamikaga Health Center, Ishikawa Prefecture, Japan. The health center's investigation revealed that there were a total of 10 infected individuals. Two to 12 h (average 7 h) after the dinner that was considered responsible for the food poisoning, the patients developed diarrhea (100%), abdominal pain (40%) and nausea or vomiting (30%).

The health center conducted bacteriological investigation on one specimen of a patient's vomit, six stool specimens of the cooks, 11 preserved food specimens, one specimen taken from a finger swab of the cooks, and one specimen from a refrigerator handle swab. *Staphylococcus aureus* was isolated from the vomit specimen, the three food specimens (sea bream sashimi, frozen boiled crab, pickled radish), the finger swab and the refrigerator handle swab. The bacterial counts of the three preserved foods were relatively low, i.e., 50 cfu/g for the sashimi, 100 cfu/g for the frozen crab, and 50 cfu/g for the pickled radish. The vomit specimen tested positive for staphylococcal enterotoxin (SE), but negative for SEA to SED by SET-RPLA (Denka Seiken, Tokyo, Japan). A similar investigation on the patients' stool specimens could not be done as they were all residents of other prefectures.

We conducted coagulase typing and detection of SE gene(s) on 12 isolates, including those from the patient's vomit and the sashimi. With the exception of the finger swab isolate, all other isolates were coagulase type V, and were negative for SEA to SEE (Table 1). All the examined coagulase V isolates showed an identical pattern in the pulsed-field gel electrophoresis (Fig. 1), which suggested that the same bacteria caused the food poisoning.

The isolates were submitted to a multiplex PCR that detects 17 different SE genes (*sea* to *see*, *seg* to *selr*) and to search for TSST-1 gene (conducted at Iwate University, Iwate, Japan). All the tests gave negative results. A possibility remains that the bacteria produced an SE(s) other than SEA to SElR, i.e., a new type of SE, and this possibility is currently under investigation.

The possible involvement of *S. aureus* with an unidentified type SE in food poisoning should be further investigated. For this purpose, a method for detecting a variety of SEs, including unknown ones, must be developed.

Table 1. Staphylococcal enterotoxin genotypes and coaglase types of *S. aureus*

No.	Source	Enterotoxin type	Coaglase type
1	Patient's vomit	non A-E	V
2		non A-E	V
3		non A-E	V
4	Food (sea bream sashimi)	non A-E	V
5	Food (frozen boiled crab)	non A-E	V
6		non A-E	V
7	Food (pickled radish)	non A-E	V
8	Finger swab of employee	non A-E	V
9		non A-E	V
10		C	VII
11	Refrigerator handle swab	non A-E	V
12		non A-E	V

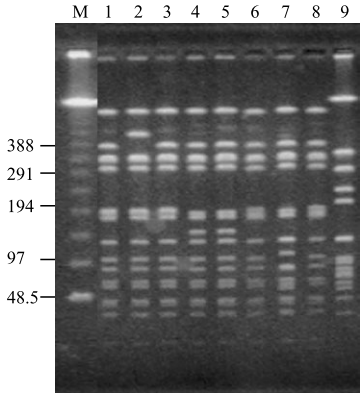

Fig. 1. PFGE patterns of *S. aureus* chromosomal DNA digested with *Sma*I. 1-3, patient's vomit; 4, sliced of raw bream; 5, frozen boiled crab; 6, Japanese radish pickle; 7, finger swab of employee; 8, refrigerator handle swab; 9, contrast; M, lambda ladder.

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