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Food Poisoning Outbreak Caused by Norovirus GII/4 in School Lunch, Tochigi Prefecture, Japan

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In December 2007, there was an outbreak of food poisoning caused by *Norovirus* (NV) in schools in northern Tochigi Prefecture, Japan.

On December 28, 2007, a local health and welfare center received a report that 18 children and 5 teachers at elementary school A had exhibited symptoms such as diarrhea and vomiting from December 26 to 27. An investigation by the health and welfare center revealed that many students also exhibited food poisoning symptoms at elementary school B and junior high school C. The onset of the symptoms was distributed from December 26 to 27. The school lunches at these 3 schools were made at different cooking facilities. The common foods used in the lunches were bread and pastry. Bread was delivered to a total of 34 schools. However, no symptoms appeared at the other schools. The pastry prepared by confectionery D was supplied to 4 schools on December 25, including the above 3 schools and 1 school where food poisoning did not occur. The pastry delivered to the school without food poisoning was produced by a different process and on a different date.

Twenty-six stool specimens (from 22 students, 1 cooking staff at elementary school A, and 3 employees at confectionery D) and 7 specimens (5 preserved meals served on December 25 at elementary school A and 2 preserved meals at junior high school C) were examined using real-time polymerase chain reaction (PCR) analysis. As a result, the NV GII was detected in 25 stool specimens (including those of cooking staff and 3 employees of confectionery D) and 1 specimen from the preserved food (salad) at elementary school A.

Samples found to be positive for GII by real-time PCR were subjected to reverse transcriptase (RT)-PCR using the primer set G2SKF and G2SKR. Sequences of amplicons were determined using an ABI PRISM 310 (Applied Biosystems, Foster City, Calif., USA) and aligned with Clustal W software. Based on these results, phylogenetic analysis was performed using the neighbor-joining method. A phylogenetic tree based on partial nucleotide sequences of the capsid region of NV GII is illustrated in Fig. 1. As shown in Fig. 1, all of the 26 samples were classified into GII/4. The nucleotide sequences of 24 of the samples were clustered, while those for the specimen from the salad and 1 stool specimen were not. All 26 samples

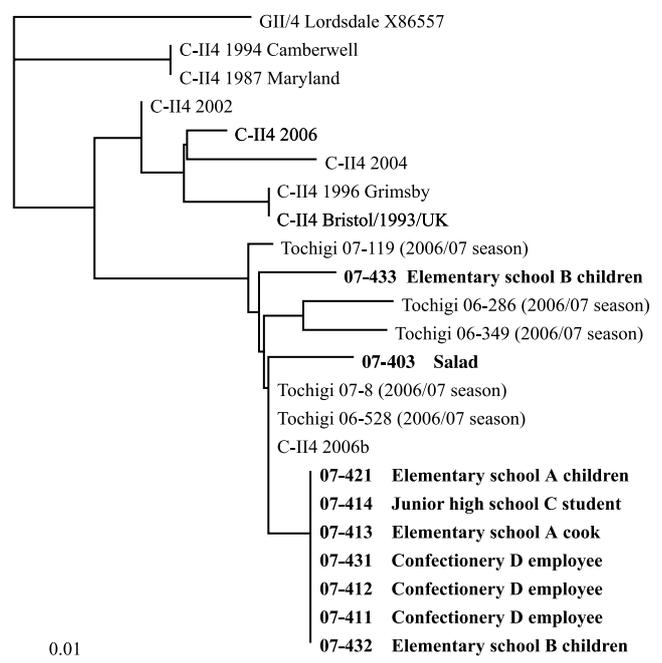


Fig. 1. Phylogenetic tree based on partial nucleotide sequences of the capsid region of NV genogroup II/4. The distance was calculated by Kimura's two-parameter method, and the tree was plotted by neighbor-joining method. Bold letters represent the strain of NV detected in this present case.

belonged to the same cluster as the NV strain in Tochigi Prefecture in 2006/07 (Fig. 1).

Three employees at confectionery D did not develop gastroenteritis symptoms around December 25, probably because they did not eat the pastry. The cooking staff at elementary school A ate the pastry.

NV is relatively stable in the environment (1) and its infectivity is rather strong. Recently many cases of people-to-people infection or people-to-food infection have been suspected (2). According to the survey (2), at an infectious gastroenteritis epidemic season (autumn and winter), many outbreaks caused by NV have been reported in Japan. Maintenance of good sanitary conditions is necessary in order to prevent mass outbreak caused by NV.

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