First Isolation of *Yersinia enterocolitica* Serotype O:8 in Japan

HYOBUICHINOHE,1 MINEOYOSHIKA,1 HIROSHIFUKUSHIMA,2* SEIIJIKANEKO,3

AND TSUTOMUMARUYAMA1

Serious Diseases Institute, Kosei Hospital, 46 Oita, Kuroishi, Aomori 036-03,1 Public Health Institute of Shimane Prefecture, Nishihamasada, Matsue, Shimane 690-01,2 and Tokyo Metropolitan Research Laboratory of Public Health, 3-24-1 Hyakunichou, Shinjuku, Tokyo 160,3 Japan

Received 3 December 1990/ Accepted 17 January 1991

A 4-year-old Japanese boy was infected with *Yersinia enterocolitica* serotype O:8, H:befiv, biotype 1B, phage type X1, restriction endonuclease analysis of plasmid DNA type B, restriction endonuclease analysis of chromosomal DNA type 8. He presented with acute gastroenteritis with elevated body temperature (40°C), rigor, and shivers. The diagnosis was sepsisemia. This is apparently the first report of this serotype from a human infection outside North America.

Since the first clinical isolation of *Yersinia enterocolitica* serotype O:8 by Schleifstein and Coleman (16) in New York State in 1939, numerous reports of human infections due to *Y. enterocolitica* serotype O:8, which often produces severe gastroenteritis (6), mesenteric lymphadenitis (3), and septicemia (10), have been published, and all of these infections were in North America. In countries on five continents, but not North America, an increasing number of cases of gastrointestinal disease caused by only three serotypes, O:3, O:9, and O:5,27, of *Y. enterocolitica* have been reported (4).

We report here the first case outside North America of human infection due to *Y. enterocolitica* serotype O:8, biotype 1B, which occurred in a young boy in Japan. We also discuss the potential for transmission of *Y. enterocolitica* serotype O:8, biotype 1B, via raw pork.

In the afternoon of 26 September 1990, a 4-year-old boy touched and tasted raw pork and then ate cookies from the pork-contaminated hand of his mother. This family lives in Kuroishi City, Aomori Prefecture, northern Japan. At 8 p.m. on 27 September he became ill with an 40°C body temperature, abdominal pain around the navel, rigor, and shivers and was admitted to the nearby clinic of a general practitioner. None of the other five members of his family became ill. On 1 October, he was admitted to the Serious Diseases Institute, Kosei Hospital. On admission, his temperature was 38.6°C, he had abdominal pain and diarrhea, and he could not walk because of lethargy. A tentative diagnosis of septicemia was made, and he was given (intravenously) 5% glucose (500 ml) with moxalactam (500 mg), amikacin (50 mg), and dexamethasone (2 mg) for 3 days and (orally) kanamycin (600 mg) for 10 days. Fever and diarrhea persisted for three days after admission. On 10 October, he recovered and was discharged.

Laboratory data on 1 October included the following: pulse, 120/min; blood pressure, 100/50 mm Hg; erythrocyte count, 453 × 10⁶/mm³; leukocyte count, 11,700/mm³ with 42% polymorphonuclear leukocytes, 30% band cells, 18% lymphocytes, and 10% monocytes; hemoglobin, 11.6 g/dl; hematocrit, 36.2%; erythrocyte sedimentation rate, 76 mm/h; glucose, 78 mg/dl; blood urea nitrogen, 10 mg/dl; C-reactive protein, 4+; Na, 136 meq/liter; K, 3.4 meq/liter; Cl, 101 meq/liter; Mg, 2.1 mg/liter; and Ca, 8.5 mg/liter. Acetone bodies and leukocytes were present in urine samples. Stool specimens, obtained on the day of admission and cultured directly on brain heart infusion agar, sheep blood agar, MacConkey agar, and Brom Thymol Blue lactose agar at 4°C for 5 days, produced *Y. enterocolitica* serotype O:8, biotype 1B (20), and confirmation was done by S. Aleksić (Institute of Hygiene, National Center of Salmonella, Hamburg, Germany), who also performed H-antigenic typing (2); E. Carniel (Unité d’Ecologie Bactérienne, Institut Pasteur, Paris, France) who also performed phage typing (14); G. Wauters (Microbiology Unit, Catholic University of Louvain, Brussels, Belgium), who also performed the agglutination test with an anti-P₁ protein antiserum (18); and G. Kapperud (National Institute of Public Health, Oslo, Norway), who also performed restriction endonuclease analysis of plasmid DNA (REAP) (9, 13) and restriction endonuclease analysis of chromosomal DNA (REAC) (9). Other enteric bacterial pathogens, however, were not isolated from the stool by cultivation on the four agar plates at 37°C for 48 h. Blood culture was not done, as antibiotic therapy had been given at the aforementioned general practitioner’s clinic prior to admission to Kosei Hospital. On 15 October, *Y. enterocolitica* serotype O:8 was absent from the boy’s stool, and the O agglutinin titer of his serum against the isolate was 1:320. The erythrocyte sedimentation rate was 10 mm/h. The isolate (strain Pa 12986), identified as *Y. enterocolitica* serotype O:8, H:befiv, biotype 1B, phage type X₁, showed a positive reaction for several plasmid pYV-mediated properties (presence of a 42-MDa virulence plasmid [8], autoagglutination [11], calcium dependency at 37°C [7], and Congo red uptake [15]) and positive agglutination with an anti-P₁ protein antiserum (18). Oral infection of mice with the isolate was carried out as described by Laird and Cavanaugh (11). Four mice were deprived of water for 24 h and then allowed to drink freely from a 50-ml water suspension of the isolate (10⁹ organisms per ml) grown at 25°C. The isolate produced diarrhea, and subsequently all four mice died on day 4 postinfection. The inoculated organism was detected in cardiac blood of all four mice. The REAP pattern was determined to be REAP type B. The REAC pattern was very similar to that of REAC type 8 but not identical. The phenotypic and genotypic characteristics of the isolate were similar to a strain (YE10.121) isolated from a human in Canada (9).

Almost all *Y. enterocolitica* serotype O:8 strains have been isolated from pigs (5), wild animals (17), and food (17) in the United States. Some strains recently were isolated...
from cattle in Nigeria (1) and from raw pork in Taiwan (19). *Y. enterocolitica* serotype O:8, however, has yet to be confirmed as occurring naturally in Japan (12). In our patient, the source of infection with *Y. enterocolitica* serotype O:8 was suspected to be raw pork; however, the presence of this serotype in the raw pork was not examined. This tentative conclusion was reached because the boy had not been exposed to animals or untreated water, no other family member had tasted the raw pork, and no family member had traveled to a foreign country. This raw pork, the putative source of infection, had been imported from another country. Whether the source of infection with this serotype was raw pork contaminated in Japan or raw pork contaminated before being exported from its country of origin remains unclear. However, these findings do show that *Y. enterocolitica* serotype O:8 is gradually spreading around the world.

REFERENCES