**Yersinia pseudotuberculosis** and **Y. enterocolitica** Infections, FoodNet, 1996–2007

To the Editor: *Yersinia pseudotuberculosis*, a gram-negative zoonotic bacterial pathogen, causes acute gastroenteritis and mesenteric lymphadenitis, which are often accompanied by fever and abdominal pain. Although *Y. pseudotuberculosis* infections are distributed worldwide, little is known about their incidence and epidemiology in the United States. *Y. pseudotuberculosis* was first reported in the United States in 1938 and has rarely been identified since then (1). No outbreaks have been reported, and only 14 cases were documented from 1938 through 1973 (2). Although not reportable nationally, yersiniosis is a notifiable disease in all Foodborne Diseases Active Surveillance Network (FoodNet) sites. We describe the *Y. pseudotuberculosis* infections reported through FoodNet surveillance sites and compare these infections with those caused by the more commonly identified *Yersinia* species, *Y. enterocolitica*.

During 1996–2007, FoodNet conducted active surveillance for laboratory-confirmed *Yersinia* spp. infections (excluding *Y. pestis*) in Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, Tennessee, and selected counties in California, Colorado, and New York. All clinical laboratories in these areas were routinely contacted to ascertain cases. Demographic and outcome (e.g., hospitalization and death) information was collected for all cases. On the basis of the source of specimen collection, infections were categorized as invasive (isolated from cerebrospinal fluid, blood, or another normally sterile site) or noninvasive (isolated from urine, stool, or other site). Data were analyzed by using SAS version 9.2 (SAS Institute, Cary, NC, USA). Differences were evaluated by using χ² and Fisher exact tests, and medians were compared by using the Wilcoxon rank-sum test. A 2-tailed p value of <0.05 was considered significant.

During 1996–2007, 1,903 *Yersinia* infections were reported in FoodNet sites. Of these, 1,471 (77%) had species information available. Most of the isolates were *Y. enterocolitica* (1,355; 92%); 18 (1%) *Y. pseudotuberculosis* infections were identified. The average annual incidence of *Y. pseudotuberculosis* infections was 0.04 cases per 1,000,000 persons. Most *Y. pseudotuberculosis* cases were reported from the western FoodNet areas of California (5 cases) and Oregon (5 cases).

The median age of persons with *Y. pseudotuberculosis* infection was 47 years (range 16–86 years), and 67% were male (Table). Of the 13 *Y. pseudotuberculosis* cases for which race was reported, 10 (77%) were in whites. Eight (44%) *Y. pseudotuberculosis* cases occurred in the winter months (December–February). Thirteen (72%) persons with *Y. pseudotuberculosis* infection required hospitalization; the median hospital stay was 9 days (range 2–35 days). Two deaths were reported, yielding a case-fatality rate of 11%. Twelve (67%) of the *Y. pseudotuberculosis* isolates were recovered from blood specimens, and only 1 isolate was recovered from stool.

In comparison, the average annual incidence of *Y. enterocolitica* infections in FoodNet was 3.5 cases per 1,000,000 persons, and many of the cases occurred in the southern FoodNet site of Georgia (443 cases, 33%) (Table). Persons with *Y. enterocolitica* infection were significantly younger than those with *Y. pseudotuberculosis* infection (median age 6 years, p = 0.0002), and unlike *Y. pseudotuberculosis* infections, *Y. enterocolitica* infections were evenly distributed among male and female patients and among whites and blacks. Compared with those with *Y. enterocolitica* infection, persons with *Y. pseudotuberculosis* infection were more likely to be hospitalized (p = 0.0003), have longer hospital stays (p = 0.0118), die (p = 0.0248), and have an isolate recovered from an invasive site (p < 0.0001).

Most of the *Y. pseudotuberculosis* infections reported in FoodNet sites appeared to be severe and invasive. The rarity of diagnosed *Y. pseudotuberculosis* infections is consistent with earlier reports from North America (3,4), but

---

**Table. Comparison of *Yersinia pseudotuberculosis* and *Y. enterocolitica* infections, FoodNet, 1996–2007**

| Characteristic                        | *Y. pseudotuberculosis* | *Y. enterocolitica* | p value |
|---------------------------------------|-------------------------|---------------------|---------|
| No. infections                        | 18                      | 1,355               |         |
| Annual average incidence† (range)     | 0.04 (0.00–0.10)        | 3.45 (0.77–7.87)    | <0.0001 |
| Median patient age, y (range)         | 47 (16–86)              | 6 (0–94)            |         |
| Male sex, no. (%) patients            | 12 (67)                 | 672 (50)            | 0.1638  |
| White race, no. (%) patients          | 10 (56)                 | 480 (35)            | 0.0115  |
| Western region of USA (CA, OR), no. (%)| 10 (56)                 | 308 (22)            | 0.0024  |
| Winter season, no. (%)                | 8 (44)                  | 536 (40)            | 0.8091  |
| Invasive specimen collection site, no. (%)| 12 (67)                 | 106 (8)             | <0.0001 |
| Hospitalized, no. (%) patients        | 13 (72)                 | 411 (30)            | 0.0003  |
| Median hospitalization, d (range)     | 9 (2–35)                | 4 (0–107)           | 0.0118  |
| Died, no. (%) patients                | 2 (11)                  | 15 (1)              | 0.0248  |

†Cases per 1,000,000 persons.
this rarity remains unexplained. This rarity contrasts with the observation that cases and outbreaks are more common in other parts of the developed world, particularly in northern climes (1,5,6–8). The recent appearance of epi-
zootic Y. pseudotuberculosis in farmed deer in the southern United States sug-
gests that this could change (9).

The high proportion of Y. pseudotuberculosis cases that were diag-
nosed by blood culture suggests that less invasive Y. pseudotuberculosis
infections are underrecognized in the United States. Diagnosis of Yersinia
infections is difficult without specific culture. Yersinia is not routinely tested
for in the United States, and isolation of the organism by culture may be
difficult with standard media (2,10). Clinical diagnosis of Y. pseudotuberculosis
infections can be challenging because physicians are not aware that
Y. pseudotuberculosis is a potential cause of gastroenteritis (10). In the
syndrome of pseudoappendicitis, the distinctive findings found by surgi-
cal exploration of severe mesenteric lymphadenitis can be suggestive, but
diagnosis would require confirmation by culture of nodes or feces (2,3).

Unless the physician is both aware of Y. pseudotuberculosis as a cause of
gastroenteritis and knows which diagnostic test to order, Y. pseudotuberculosis
infections will go undiagnosed. Clinicians should consider Y. pseudotuberculosis
as a cause of gastroenteritis and pseudoappendicitis and request
appropriate microbiologic testing for patients with suspected cases. If
more cases are identified in the Unit-
ited States, another investigation of Y. pseudotuberculosis might clarify
the epidemiology of this infection.

Cherie Long, Timothy F. Jones, Duc J. Vugia, Joni Scheftel, Nancy Stockbline, Patrick Ryan, Beletshachew Shiferaw, Robert V. Tauxe, and L. Hannah Gould

Author affiliations: Georgia Department of Human Resources, Atlanta, Georgia, USA (C. Long); Atlanta Research and Educa-
tion Foundation, Atlanta (C. Long); Tennessee Department of Health, Nashville, Tennessee, USA (T.F. Jones); California
Department of Public Health, Richmond, California, USA (D.J. Vugia); Minnesota Department of Health, St. Paul, Minneso-
ta, USA (J. Scheftel); Centers for Disease Control and Prevention, Atlanta (N. Stockbline, R.V. Tauxe, L.H. Gould); Maryland
Department of Health and Mental Hygiene, Baltimore, Maryland, USA (P. Ryan); and Oregon Department of Human Services, Portland, Oregon, USA (B. Shiferaw)

DOI: 10.3201/eid1603.091106

References

1. Hnatko SI, Rodin AE. Pasteurella pseudotuberculosis infection in man. Can Med Assoc J. 1963;88:1108–12.
2. Paff JR, Trippett DA, Saari TN. Clinical and laboratory aspects of Yersinia pseudotuberculosis infections, with a report of two
cases. Am J Clin Pathol. 1976;66:101–10.
3. Hubbert WT, Petenyi CW, Glasgow LA, Uyeda CT, Creightson SA. Yersinia pseudotuberculosis infection in the United States.
Septicaemia, appendicitis, and mesenteric lymphadenitis. Am J Trop Med Hyg. 1971;20:679–84.
4. Toma S. Human and nonhuman infections caused by Yersinia pseudotuberculosis in Canada from 1962 to 1985. J Clin Micro-
biol. 1986;24:465–6.
5. Nuorti JP, Niskanen T, Hallanvuo S, Mikkoj J, Kela E, Hatakka M, et al. A widespread outbreak of Yersinia pseudotuberculosis
O:3 infection from iceberg lettuce. J Infect Dis. 2004;189:766–74. DOI: 10.1086/381766.
6. Jalava J, Hallanvuo S, Nakari UM, Ruutu P, Kela E, Heinasmaki T, et al. Multiple outbreaks of Yersinia pseudotuberculosis
infections in Finland. J Clin Microbiol. 2004;42:2789–91. DOI: 10.1128/JCM.42.6.2789-2791.2004
7. Vincent P, Leclercq A, Martin L, Duez JM, Simonet M, Carniel E. Sudden onset of pseudotuberculosis in humans, France,
2004–05. Emerg Infect Dis. 2008;14:1119–22. DOI: 10.3201/eid1407.071339
8. Tettari R, Granfors K, Lehtonen OP, Mertosa J, Makela AL, Valimaki I, et al. An outbreak of Yersinia pseudotuberculosis
infection. J Infect Dis. 1984;149:245–50.
9. Zhang S, Zhang Z, Liu S, Bingham W, Wilson F. Fatal yersiniosis in farmed deer caused by Yersinia pseudotuberculosis
serotype O:3 encoding a mannosyltransferase-like protein WhyK. J Vet Diagn Invest. 2008;20:356–9.
10. Knapp W. Mesenteric adenitis due to Pasteurella pseudotuberculosis in young people. N Engl J Med. 1958;259:776–8.

Address for correspondence: L. Hannah Gould, Centers for Disease Control and Prevention, 1600 Clifton Rd NE, Mailstop F22, Atlanta, GA
30333, USA; email: lgould@cdc.gov

Measles Outbreak, the Netherlands, 2008

To the Editor: From June 1 through October 16, 2008, an outbreak of 99 reported measles cases occurred in the Netherlands (1). This outbreak
was the largest measles outbreak in the Netherlands since 1999–2000, when ≥3,200 cases, including 3 deaths, were reported (2).

In the Netherlands, clinical symp-
toms compatible with measles in a person with laboratory-confirmed measles virus infection or an epidemiologic
link to a laboratory-confirmed case
are notifiable (i.e., must be reported
to public health authorities). The Na-
tional Measles Reference Laboratory
conducts genotyping and submits se-
quences to the World Health Organiza-
tion European Region Measles Nucleotide Surveillance database (www.
hrp-bioinformatics.org.uk/Measles/Public/Web_Front/main.php).

Of the 99 measles cases reported in
the 2008 outbreak, 40 were labora-
tory confirmed and 59 were notified
based on an epidemiologic link. The
first case-patient in the outbreak was a 6-year-old unvaccinated resident of
The Hague who had not been abroad
in the month before onset of illness.

LETTERS