

Campylobacter upsaliensis: Another Pathogen for Consideration in the United States

Jaime A. Labarca,^{1,a} Joan Sturgeon,^{2,a} Lee Borenstein,² Nancy Salem,³
Sydney M. Harvey,² Eleanor Lehnkering,² Roshan Reporter,¹
and Laurene Mascola¹

¹Acute Communicable Disease Control Unit, ²Public Health Laboratory,
and ³Perinatal HIV Reporting Unit, Los Angeles County Department of Health
Services, Los Angeles, California

While evaluating quinolone resistance in a sample of *Campylobacter* isolates recovered from patients with campylobacteriosis in Los Angeles County, California, in 1998, we discovered that the second most frequently isolated species was *Campylobacter upsaliensis* (6 [4%] of 155 isolates). The ability of laboratories to recover this species may be dependent on the culture conditions and the media used. Three dogs living in the households of 2 of these 6 patients had *C. upsaliensis* isolated in their stool specimens.

Most clinical microbiology laboratories in the United States routinely perform cultures for *Campylobacter* species. After a *Campylobacter* species is isolated on selective *Campylobacter* agar, colonies are subcultured for further identification. A hippurate hydrolysis test usually is performed to differentiate *Campylobacter jejuni* (the *Campylobacter* species that most frequently causes gastroenteritis in humans) from other members of the genus. Other *Campylobacter* species are not fully identified. Case series of *Campylobacter* infection reported from Europe, Africa, and Australia have shown the relative importance of *Campylobacter upsaliensis* as the second most likely *Campylobacter* species to cause disease in humans [1–3]

From 1 May through 31 September 1998, we conducted a study to evaluate quinolone resistance in a sample of *Cam-*

pylobacter isolates recovered from individuals with campylobacteriosis in Los Angeles County (LAC), California. During the study, 484 cases of campylobacteriosis for which no isolates were available were passively reported to the LAC Public Health Department from all areas of LAC. A total of 155 isolates were recovered from patient specimens submitted by the 5 clinical laboratories that participated in the study. Most isolates (98%) were recovered from stool specimens. Ninety-three percent of all isolates were identified as *C. jejuni*. The second most frequently isolated species was *C. upsaliensis* (6 [4%] of 155 isolates). Two isolates were classified as *Campylobacter jejuni/coli*, and 1 isolate was classified as *Campylobacter fetus* subspecies *fetus*. No differences were noted in the patterns of resistance of *C. jejuni* and *C. upsaliensis* to ciprofloxacin, erythromycin, or tetracycline. The mean age of the 6 patients whose isolates were identified as *C. upsaliensis* was 33 years (range, 13–48 years).

Although 6 (8.2%) of the 73 isolates that we received from 4 of the participating centers were identified as *C. upsaliensis*, none of the 82 isolates received from the fifth center (a large reference center) were identified as *C. upsaliensis* ($P = .009$). We compared the laboratory culture methods used at each site, including the plate medium and the incubation conditions, to assess whether there were differences between the laboratories that recovered *C. upsaliensis* isolates and the laboratory that did not. We found that the laboratory that did not recover *C. upsaliensis* isolates used Becton Dickinson culture medium and a shorter incubation time (24–36 h), compared with the other laboratories, which used culture media manufactured by Remel or Hardy Diagnostics and a longer incubation time (48–72 h; table 1).

C. upsaliensis is frequently found in both cats and dogs, regardless of whether the animals are sick or healthy (prevalence, 5%–66% in cats vs. 5%–48% in dogs) [4–6]. It has been postulated that these animals are the main source of *C. upsaliensis* that produces disease in humans [7, 8]; however, a definitive link has not been established [9–11]. Poultry probably has a low rate of *C. upsaliensis* colonization, but it is the main source of *C. jejuni* infection. Therefore, it is possible that these 2 *Campylobacter* species have different animal reservoirs and that they require different public health interventions.

Of the 6 patients from whom *C. upsaliensis* isolates were recovered (all isolates had different patterns revealed by pulsed-field gel electrophoresis), 5 had pets at home. Three patients had dogs, 1 had a cat, and 1 had a turtle. Although we could not obtain stool specimens from all of the pets, we were able

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^a Present affiliations: Internal Medicine Department, Pontificia Universidad Católica de Chile, Santiago, Chile (J.A.L.); and Long Beach City Public Health Laboratory, California (J.S.).

Reprints or correspondence: Dr. Laurene Mascola, Acute Communicable Disease Control Unit, Los Angeles County Dept. of Health Services, 313 N. Figueroa St., Rm. 212, Los Angeles, CA 90012 (lmascola@dhs.co.la.ca.us); or Dr. Roshan Reporter, same address (rreporter@dhs.co.la.ca.us).

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Table 1. Primary laboratory culture methods used at each of the 5 laboratories submitting isolates for a study of quinolone resistance among *Campylobacter* isolates recovered from individuals with campylobacteriosis in Los Angeles County (LAC), California.

Isolation condition	Laboratory 1	Laboratory 2	Laboratory 3	Laboratory 4	Laboratory 5
Medium	Campy-CVA ^a	Campy-CVA ^a	Campy-CVA ^a	Campy-CVA ^a	Campy-CVA ^a
Manufacturer	Remel	Hardy Diagnostics	Hardy Diagnostics	Hardy Diagnostics	Becton Dickinson
Incubation temperature, °C	38 ± 1	42	42	36 ± 1	42
Length of incubation, h	72	48	48	48–72	24–36
Specimen transport (stool)	ParaPak C&S ^b	Nonpreservative or transport gel	Nonpreservative, refrigerate	Nonpreservative	Campy-thioglycolate broth ^c or ParaPak C&S ^b

^a *Campylobacter* isolation medium that incorporates the following antimicrobials: cefoperazone (20 mg/L), vancomycin (10 mg/L), and amphotericin B (2 mg/L).

^b Manufactured by Meridian Diagnostic (catalog no. 900612).

^c Contains cephalothin (15 mg/L), vancomycin (10 mg/mL), amphotericin B (2 mg/L), trimethylprim (5 mg/L), and polymyxin B (2500 U/L). Manufactured by Becton Dickinson (catalog no. 221747).

to obtain them from 3 dogs living in the households of 2 patients with pets. *C. upsaliensis* was isolated in cultures of all of these specimens. Molecular typing (by pulsed-field gel electrophoresis) of the *C. upsaliensis* isolates recovered from the patients and their pets did not show clonality. However, the pets' stool specimens were cultured 3–6 months after isolates had been recovered from the pet owners.

Our study points out several important issues. First, *C. upsaliensis* was the second most frequently isolated *Campylobacter* species. Second, the ability to recover this species may be dependent on the culture conditions used. It is known that *C. upsaliensis* is susceptible to some antibiotic combinations used in selective-culture media isolation of *Campylobacter* species in enteric specimens. Third, for the 4 laboratories that recovered *C. upsaliensis* isolates, the overall rate of recovery of these isolates was 8.2%. Fourth, although the sample size was small, all cultures of stool specimens obtained from patients' dogs were positive for *C. upsaliensis*, a finding that suggests frequent colonization of the stool of these canines. Further investigation is needed to evaluate the importance of this pathogen in humans in the United States.

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References

1. Bourke B, Chan VL, Sherman P. *Campylobacter upsaliensis*: waiting in the wings. Clin Microbiol Rev **1998**; 11:440–9.
2. Lastovica A, Le Roux E. Prevalence of *Campylobacter* spp. in the diarrhoeic stools and blood cultures of pediatric patients. Acta Gastro-Enterologica Belgica **1993**; 56:34.
3. Lindblom G, Sjögren E, Hansson-Westerberg J, Kaijser B. *Campylobacter upsaliensis*, *C. sputorum sputorum* and *C. concisus* as common causes of diarrhoea in Swedish children. Scand J Infect Dis **1995**; 27: 187–8.
4. Hald B, Madsen M. Healthy puppies and kittens as carriers of *Campylobacter* spp., with special reference to *Campylobacter upsaliensis*. J Clin Microbiol **1997**; 35:3351–2.
5. Moreno GS, Griffiths PL, Connerton IF, Park RWA. Occurrence of campylobacter in small domestic and laboratory animals. J Appl Bacteriol **1993**; 75:49–54.
6. Burnens AP, Nicolet J. Detection of *Campylobacter upsaliensis* in diarrheic dogs and cats, using a selective medium with cefoperazone. Am J Vet Res **1992**; 53:48–51.
7. Goossens H, Vlaes L, De Boeck M, et al. Is “*Campylobacter upsaliensis*” an unrecognised cause of human diarrhoea? Lancet **1990**; 335:584–6.
8. Patton CM, Shaffer N, Edmonds P, et al. Human disease associated with “*Campylobacter upsaliensis*” (catalase-negative or weakly positive *Campylobacter* species) in the United States. J Clin Microbiol **1989**; 27:66–73.
9. Goossens H, Vlaes L, Butzler J, et al. *Campylobacter upsaliensis* enteritis associated with canine infections. Lancet **1991**; 337:1486–7.
10. Da Silva Tatley FM, Lastovica AJ, Steyn LM. Plasmid profiles of “*Campylobacter upsaliensis*” isolated from blood cultures and stools of paediatric patients. J Med Microbiol **1992**; 37:8–14.
11. Stanley J, Jones C, Burnens A, Owen RJ. Distinct genotypes of human and canine isolates of *Campylobacter upsaliensis* determined by 16S rRNA gene typing and plasmid profiling. J Clin Microbiol **1994**; 32: 1788–94.