

Campylobacter

Objectives of *Campylobacter*

Campylobacter jejuni

Morphology and Identification

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Campylobacter

Campylobacters cause both diarrheal and systemic diseases, and are among the most widespread causes of infection in the world. *Campylobacter* infection of domesticated animals also is widespread. *C jejuni* is the prototype organism in the group and is a very common cause of diarrhea in humans.

Campylobacter jejuni

- *C jejuni* has emerged as common human pathogen, causing mainly enteritis and occasionally systemic infection.
- These bacteria are at least as common as *salmonellae* and *shigellae* as a cause of diarrhea; an estimated 2 million cases occur in the United States each year.

Morphology and Identification

Typical Organisms

C jejuni are Gram-negative rods with comma, S, or “gull wing” shapes. They are motile, with a single polar flagellum, and do not form spores.

Culture

- The culture characteristics are most important in the isolation and identification of *C jejuni*. Selective media are needed, and incubation must be in an atmosphere with reduced O₂ (5% O₂) with added CO₂ (10% CO₂). A relatively simple way to produce the incubation atmosphere is to place the plates in an anaerobe incubation jar without the catalyst and to produce the gas with a commercially available gas-generating pack or by gas exchange.
- Incubation of primary plates for isolation of *C jejuni* should be at 42°C. Although *C jejuni* grows well at 36–37°C, incubation at 42°C prevents growth of most of the other bacteria present in feces, thus simplifying the identification of *C jejuni*.
- Several selective media are in widespread use. Skirrow’s medium contains vancomycin, polymyxin B, and trimethoprim to inhibit growth of other bacteria, but this medium may be less sensitive than other commercial products that contain charcoal, other inhibitory compounds, and cephalosporin antibiotics. The selective media are suitable for isolation of *C jejuni* at 42°C.
- The colonies tend to be colorless or gray. They may be watery and spreading or round and convex, and both colony types may appear on one agar plate.

Growth Characteristics

- *C jejuni* are positive for both oxidase and catalase.
- Campylobacters do not oxidize or ferment carbohydrates.
- Gram-stained smears show typical morphology.
- Nitrate reduction, hydrogen sulfide production,

- hippurate tests, and antimicrobial susceptibilities can be used for further identification of species.

Antigenic Structure and Toxins

- The campylobacters have lipopolysaccharides with endotoxic activity.
- Cytopathic extracellular toxins and enterotoxins have been found, but the significance of the toxins in human disease is not well defined.

Pathogenesis and Pathology

- The infection is acquired by the oral route from food, drink, or contact with infected animals or animal products, especially poultry.
- *C jejuni* is susceptible to gastric acid, and ingestion of about 10^4 organisms is usually necessary to produce infection. This inoculum is similar to that required for *Salmonella* and *Shigella* infection but less than that for *Vibrio* infection.
- The organisms multiply in the small intestine, invade the epithelium, and produce inflammation that results in the appearance of red and white blood cells in the stools.
- Occasionally, the bloodstream is invaded, and a clinical picture of enteric fever develops. Localized tissue invasion coupled with the toxic activity appears to be responsible for the enteritis.

Clinical Findings

- Clinical manifestations are acute onset of crampy abdominal pain, profuse diarrhea that may be grossly bloody, headache, malaise, and fever. Usually the illness is self-limited to a period of 5–8 days, but it continues longer.
- *C jejuni* isolates are usually susceptible to erythromycin, and therapy shortens the duration of fecal shedding of bacteria.
- Most cases resolve without antimicrobial therapy; however, in about 5–10% of patients, symptoms may recur.
- Certain serotypes of *C jejuni* have been associated with postdiarrheal Guillain-Barre syndrome, a form of ascending paralytic disease. Reactive

arthritis and Reiter's syndrome may also follow acute *Campylobacter* diarrhea.

Diagnostic Laboratory Tests

A. Specimens

Diarrheal stool is the usual specimen. *C jejuni* may occasionally be recovered from blood cultures usually from immunocompromised or elderly patients. Other extra-intestinal infections are uncommon.

B. Smears

Gram-stained smears of stool may show the typical "gull wing"-shaped rods. Dark-field or phase contrast microscopy may show the typical darting motility of the organisms.

C. Culture

Culture on the selective media described earlier is the definitive test to diagnose *C jejuni* enteritis. If another species of *Campylobacter* is suspected, medium without a cephalosporin should be used and incubated at 36–37°C.