Comparison of Rectal Swabs and Stool Cultures in Detecting *Campylobacter fetus* subsp. *jejuni*

RAYMOND L. KAPLAN,1,* LARRY J. GOODMAN,2 JEAN E. BARRETT,1 GORDON M. TRENHOLME,2 AND WILLIAM LANDAU1

Section of Clinical Bacteriology, Mycology and Parasitology, Department of Immunology/Microbiology,1 and Section of Infectious Diseases, Department of Medicine,2 Rush-Presbyterian-St. Luke’s Medical Center, Chicago, Illinois 60612

Received 4 September 1981/Accepted 31 December 1981

Rectal swabs and stool specimens were compared for the detection of *Campylobacter fetus* subsp. *jejuni* in marmosets. Rectal swabs were superior to stool specimens for detection of *Campylobacter fetus* subsp. *jejuni* (P = 0.016). Preliminary human data are also presented.

*Campylobacter fetus* subsp. *jejuni* (Cfj) is one of the most common bacterial causes of acute diarrhea in both pediatric and adult populations (1, 3, 5). Although rectal swabs have been used in the evaluation of a Cfj outbreak (7), there has been no reported study comparing their use and conventionally collected stool specimens for detecting this organism. The presence of Cfj in the stool of a large percentage of marmosets in our colony led us to select this animal to compare rectal swabs and stool specimens for the detection of this organism.

Several species of marmoset were used in this study, including red-belly (*Saguinus labiatus* subsp. *labiatus*), cotton-top (*Saguinus oedipus* subsp. *oedipus*), white moustache mystax (*Saguinus mystax* subsp. *mystax*), and white lip (*Saguinus fasciollis* and *Saguinus nigricollis*). Animals living singly in cages were cultured, regardless of the presence or absence of diarrhea.

The Transwab (Medical Wire and Equipment Company, Cleveland, Ohio) was used as the rectal swab and transport system. The medium in this system consists of sodium mercaptoacetate (0.5 g/liter), calcium chloride (0.1 g/liter), potassium chloride (0.2 g/liter), and agar (3.5 g/liter at a pH of 7.4). The swab was inserted into the anal canal and rotated circumferentially to sample as much of the mucosa as possible. At the same time, stool was obtained from the bottom of the cage and placed in a stool specimen cup. Cages had been cleaned within the previous 24 h, ensuring a recent stool specimen. Rectal swabs and stool specimens were then transported to the laboratory.

Upon arrival in the laboratory, specimens were immediately plated. The basic plate medium was Campy-BAP (BBL Microbiology Systems, Cockeysville, Md.) (1). Plates were incubated at 42°C in an atmosphere of 5% O2–10% CO2–85% N2 using the polyethylene bag method. The polyethylene bag system utilizes a tank of gas containing the previously mentioned concentrations of oxygen, carbon dioxide, and nitrogen, a regulator to reduce tank pressure to approximately 15 to 20 lb/in2, a polyethylene bag (8 by 15 in. [20.3 by 38.1 cm]); Levin Bros. Paper Co., Chicago, Ill.) and a rubber band. Six to eight plates are placed in the polyethylene bag, which is then inflated with gas from the tank. The bag is then collapsed to expel the atmosphere, reinfalted, tied with a rubber band, and placed upright in the incubator. The plates were examined at 24 and 48 h. Identification of Cfj was based on colonial morphology, Gram-stain morphology, and biochemical tests (4).

Quantitative cultures were performed on the feces from five animals. freshly passed stool was collected (approximately 0.5 g) and emulsified in 5 ml of brucella broth. We then plated 0.1 ml of 10-fold serial dilutions of this mixture directly onto Campy-BAP (in duplicate), which was incubated as previously described. Colonies were counted after 24 and 48 h of incubation. All animals had at least 104 colony-forming units per g of feces (2.4 × 107, 8.3 × 107, 4.2 × 107, 3.6 × 107, and 1.0 × 106).

Cfj was detected in 27 animals, some on multiple occasions, producing 61 opportunities for comparison of the two different methods of specimen collection. Of the 61 positive Cfj cultures, 50 were detected by both methods, 10 were detected by rectal swab only, and 1 was detected by stool specimen only. In this study, rectal swab cultures were superior to stool cultures for the detection of Cfj (P = 0.016, McNemar Test) (6).

Thus far in our human study, Cfj was detected in all six humans from both rectal swabs and freshly passed stool specimens. On one patient a quantitative culture was performed which yield-
ed 8.6 \times 10^7 \text{ colony-forming units per g of feces.}

In this study, a significantly higher rate of recovery of Cfj was obtained with rectal swabs compared with conventional stool specimens. Whether this was owing to decreased survival of Cfj in marmoset stool, enhanced survival in the swab transport medium, increased concentration of Cfj along the mucosal surface, or some other factor(s) is not known. As stated previously, stool specimens were less than 24 h old. The vast majority, in fact, were less than 6 h old. Quantitative counts of Cfj would not be expected to drop significantly in a stool stored at room temperature for this period of time (2, 4). Notably, the 11 instances where cultures were positive from only 1 of the 2 culture specimens (rectal swab or stool specimen) were from 10 different animals. Therefore, skewing of results due to a single animal being swab culture positive and stool culture negative on multiple occasions did not occur. Additionally, there was no difference in the delay to stool culture for these specimens. In several instances, rectal swab cultures were positive even when no stool was visible on the tip of the swab, suggesting that cultures are worthwhile even under these conditions.

Since animals cultured quantitatively were shown to have the organism present in numbers similar to those reported in humans with acute Cfj enteritis (2), it is possible that rectal swab cultures may be an effective method in detecting this organism in patients. In all six patients examined thus far, rectal swabs and freshly passed stool specimens detected the organism. Additionally, all patients preferred the rectal swab, owing to the technical difficulties involved in stool specimen collection and transport. Rectal swabs offer assurance of a fresh specimen and ease of specimen collection and transport. Rectal swabs also appear to be as effective as culturing freshly passed stool in the detection of Cfj.

**LITERATURE CITED**