

Lab10: Food Poisoning by Gram negative Bacteria:

- *Salmonella*
- *E.coli*
- *Shigella*
- *Campylobacter*
- *Yersinia*

1. *Campylobacter jejuni*

Campylobacter jejuni is a non-sporeforming, Gram-negative rod with a curved- to S shaped morphology. Many strains display motility, microaerophilic most grow optimally at oxygen concentrations from 3% to 5%.

Infective dose: In general, the minimum number of ingested *Campylobacter* cells that can cause infection is thought to be about 10,000.

Onset: The incubation period, from time of exposure to onset of symptoms, generally is 2 to 5 days.

Disease / complications: The disease caused by *C. jejuni* infections is called campylobacteriosis. The most common manifestation of campylobacteriosis is selflimiting gastroenteritis, termed “*Campylobacter* enteritis,” without need for antimicrobial therapy.

Symptoms: Fever, diarrhea, abdominal cramps, and vomiting are the major symptoms. The stool may be watery or sticky and may contain and fecal leukocytes (white cells). Other symptoms often present include abdominal pain, nausea, headache, and muscle pain.

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Duration: Most cases of campylobacteriosis are self-limiting. The disease typically lasts from 2 to 10 days.

Route of entry: Faecal-oral route {food (milk or meat products) and water contaminated with animal feces}. Human to human transmission can occur but is less frequent.

How do you get Campylobacter infection?

A Campylobacter infection starts after someone eats or drinks something with the bacteria. Uncooked or undercooked food can lead to an infection. Some common foods that can have Campylobacter are:

- Chicken.
- Dairy products that have not been pasteurized (sterilized to kill bacteria).
- Seafood.
- Untreated water.

How is Campylobacter infection diagnosed?

Specimen: Diarrhoeal or a dysenteric specimen containing blood, pus, and mucus. If immediate processing is not feasible specimen can be refrigerated up to 24 hours before culture as the organism are resistant to cold temperature.

Campylobacter Selective Agar (CAMPY), Blood agar plate containing antibiotics (to inhibit the fecal flora) is the media of choice. Inoculated plates are incubated at **42°C** in a microaerophilic atmosphere containing 5% oxygen and 10% carbon dioxide.

- Failure to grow at 25°C
- Oxidase test: positive
- Catalase test: Positive

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- Sensitive to Nalidixic acid.

2. *Yersinia enterocolitica*

Are small, rod-shaped, gram-negative bacteria, belonging to the family of Enterobacteriaceae, is psychrotrophic (i.e., a microorganism that grows well at low temperature) and has the ability to grow at temperatures below 4°C.

Infective dose: The medium infective dose for humans is not known, but is estimated to be between 10⁴ to 10⁶ organisms.

Onset: Incubation times from 1 to 11 days have been observed, but occasionally last for several months.

Illness / complications: In some patients, complications arise due to the strain type causing the initial infection and specific human immunologic leukocyte antigen, HLAB27. *Y. enterocolitica* has been associated with reactive arthritis, which may occur even in the absence of obvious symptoms.

Symptoms: Infection with *Y. enterocolitica* manifests as nonspecific, self-limiting diarrhea, but may cause a variety of autoimmune complications, as noted above. Yersiniosis in these children is frequently characterized as gastroenteritis, with diarrhea and/or vomiting; however, fever and abdominal pain are the hallmark symptoms. A small proportion of children (less than 10%) produce bloody stools. Children usually complain of abdominal pain and headache and sore throat at the onset of the illness.

Duration: The illness might last from a few days to 3 weeks, unless it becomes chronic enterocolitis, in which case it might continue for several months.

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Identification and isolation of *Yersinia*

Yersiniosis may be misdiagnosed as appendicitis. Diagnosis of yersiniosis begins with isolation of the organism from the human host's feces, blood, or vomit, Confirmation occurs with the isolation, as well as biochemical and serological identification, of *Y. enterocolitica* from both the human host and the ingested food.

- **Cefsulodin-Irgasan-Novobiocin (CIN)** agar is a differential and selective medium used in qualitative procedures for the isolation of *Yersinia enterocolitica*. Colonies are red with deep red color in center surrounded by clear zone.
- On the Bismuth sulfite Agar *Yersinia* can be differentiated from *Salmonella* because it is not able to produce hydrogen sulphide

Staining Characteristics:

- Gram staining of culture smear reveals gram-negative rods or coccobacilli (pleomorphism).

Biochemical Properties:

1. Catalase positive and oxidase negative (property of *Enterobacteriaceae* family)
2. Capsulated
3. Sugar fermentation: It ferments glucose, mannitol, and maltose with the production of acid but no gas. Lactose and sucrose are not fermented.
4. **Non-motile:** *Yersinia pestis* is non-motile both at 25°C and 37°C; in contrast to other *Yersinia* species which are motile at 25°C but non-motile at 37°C.
5. Indole: Negative
6. Urease: Negative

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7. Citrate utilization test: Negative
8. Methyl-Red: Positive
9. Voges-Proskauer (VP): Negative