

## Please read this bit first

The HPCSA and the Med Tech Society have confirmed that this clinical case study, plus your routine review of your EQA reports from Thistle QA, should be documented as a “Journal Club” activity. This means that you must record those attending for CEU purposes. Thistle will **not** issue a certificate to cover these activities, nor send out “correct” answers to the CEU questions at the end of this case study.

The Thistle QA CEU No is: **MT00025**.

Each attendee should claim **THREE** CEU points for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

## Cycle 23 Organism 11:

# Shigella

*Shigella* is a genus of gamma proteobacteria in the family *Enterobacteriaceae*. Shigellae are Gram-negative, non-motile, non-spore forming, rod-shaped bacteria, very closely related to *Escherichia coli*.

People infected with *Shigella* develop diarrhoea, fever and stomach cramps starting a day or two after they are exposed to the bacterium. The diarrhoea is often bloody. Shigellosis usually resolves in 5 to 7 days, but in some persons, especially young children and the elderly, the diarrhoea can be so severe that the patient needs to be hospitalized. *Shigella* were discovered over 100 years ago by the Japanese microbiologist, Shiga, for whom the genus is named. There are four species of *Shigella*: *S. boydii*, *S. dysenteriae*, *S. flexneri*, and *S. sonnei*. *Shigella sonnei*, also known as Group D *Shigella*, accounts for over two-thirds of the shigellosis in the United States. *Shigella flexneri*, or Group B *Shigella*, accounts for almost all of the rest.

Determining that *Shigella* is the cause of the illness depends on laboratory tests that identify the bacteria in the stool of an infected person. Some of the tests may not be performed routinely, so the bacteriology laboratory should be instructed to look for the organism. The laboratory can also do tests to determine which type of *Shigella* is involved, and which antibiotics, if any, would be best for treatment.



**Figure 1.** Several media have been designed to selectively grow enteric bacteria and allow differentiation of *Salmonella* and *Shigella* from *E. coli*. The primary plating media shown here are eosin methylene blue (EMB) agar, MacConkey agar, ENDO agar, Hektoen enteric (HE) agar and Salmonella-Shigella (SS) agar.

Shigellosis can usually be treated with antibiotics. The antibiotics commonly used are ampicillin, trimethoprim/sulfamethoxazole (also known as Bactrim or Septra), nalidixic acid and the fluoroquinolone, ciprofloxacin. Appropriate treatment kills the bacteria present in the gastrointestinal tract and shortens the course of the illness.

Some *Shigella* have become resistant to antibiotics and inappropriate use of antibiotics to treat shigellosis can make the organisms more resistant in the future. Persons with mild infections will usually recover quickly without antibiotic treatment. Therefore, when many persons in a community are affected by shigellosis, antibiotics are sometimes used selectively to treat only the more severe cases.

Following host epithelial cell invasion and penetration of the colonic mucosa, *Shigella* infection is characterized by degeneration of the epithelium and inflammation of the lamina propria. This results in desquamation and ulceration of the mucosa, and subsequent leakage of blood, inflammatory elements and mucus into the intestinal lumen. Patients suffering from *Shigella* infection will therefore pass frequent, scanty, dysenteric stool mixed with blood and mucus, since, under these conditions, the absorption of water by the colon is inhibited.

The **Shiga toxin**, also called the **verotoxin**, is produced by *Shigella dysenteriae* and enterohemorrhagic *Escherichia coli* (EHEC), of which the strain O157:H7 has become the best known.

The syndromes associated with shiga toxin include dysentery, hemorrhagic colitis, and haemolytic uremic syndrome. The name is dependent upon the causative organism and the symptoms, which may include severe diarrhoea, abdominal pain, vomiting, and bloody urine (in the case of haemolytic uremic syndrome).

The onset of symptoms is generally within a few hours, with higher doses leading to more rapid onset. There is no antidote for the toxin. Supportive care requires maintenance of fluid and electrolyte levels, and monitoring and support of kidney function.

### **Shiga Toxin-Producing *Escherichia coli* (STEC)**

Shiga toxin-producing *Escherichia coli* is a type of entero-haemorrhagic *E. coli* (EHEC) bacteria that can cause illness ranging from mild intestinal disease to severe kidney complications. Enterohemorrhagic *E. coli* include the relatively important serotype *E. coli* O157:H7, but other non-O157 strains, such as O111 and O26, have been associated with shiga toxin production.

The incubation period for STEC ranges from 1 to 8 days, though typically it is 3 to 5 days. Typical symptoms include severe abdominal cramping, sudden onset of watery diarrhoea, frequently bloody, and sometimes vomiting and a low-grade fever. Most often the illness is mild and self-limited generally lasting 1-3 days. However, serious complications such as hemorrhagic colitis, Haemolytic Uremic Syndrome (HUS), or post-diarrhoeal thrombotic thrombocytopenic purpura (TTP) can occur in up to 10% of cases.

Cases and outbreaks of Shiga toxin-producing *Escherichia coli* have been associated with the consumption of undercooked beef (especially ground beef), raw milk, unpasteurized apple juice, contaminated water, red leaf lettuce, and alfalfa sprouts. The bacteria have also been isolated from poultry, pork and lamb. Person-to-person spread via faecal-oral transmission may occur in high-risk settings like day care centres and nursing homes.

Although anyone can get infected, the highest infection rates are in children under age 5. Elderly patients also account for a large number of cases. Outbreaks have occurred in child-care facilities and nursing homes.

For mild illness, antibiotics have not been shown to shorten the duration of symptoms and may make the illness more severe in some people. Severe complications, such as haemolytic uremic syndrome, require hospitalization.

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## **CPD Questions:**

1. It is best to treat *Shigella flexneri* infections with Imodium: true or false?
  2. Why is it necessary to treat shiga toxin infections differently to *Shigella flexneri* infections?
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