Closing the Brief Case: *Salmonella enterica* Serovar Typhi in a Central American Refugee

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**ANSWERS TO SELF-ASSESSMENT QUESTIONS**

1. Which of the following statements is true regarding culture for diagnosis of *S.* Typhi using current methods?
   a. Stool culture is the most sensitive.
   b. Bone marrow culture is the least sensitive.
   c. Blood culture is a sensitive method.
   d. Urine culture is a sensitive method.

   Answer: c. Improved culture media and continuous monitoring systems have improved the sensitivity of blood cultures. Stool culture sensitivity remains low. Multiple stool specimens may improve sensitivity, but even then, they are less sensitive than blood and bone marrow culture. Urine has a very low sensitivity for *S.* Typhi isolation.

2. Which of the following is true regarding the laboratory workup of *S.* Typhi?
   a. Hemolysis is often present on 5% sheep’s blood agar.
   b. MacConkey II agar shows no lactose fermentation.
   c. Triple sugar iron agar slant shows abundant H₂S production.
   d. Spot oxidase and indole tests are positive.

   Answer: b. Growth on MacConkey II agar shows no lactose fermentation. Hemolysis is not present on 5% sheep’s blood agar. Growth on triple sugar iron agar slant often shows weak production of H₂S, sometimes described as a “wisp” or a “mustache.” Spot oxidase and indole tests are both negative in *Salmonella* spp. isolates.

3. Which of the following is true regarding the presentation and course of *S.* Typhi infection?
   a. The white blood cell count is often normal.
   b. Incubation time is 1 to 6 days.
   c. Rose spots are commonly seen on the extremities.
   d. Transmission from respiratory droplets is common.

   Answer: a. Total white blood cell count is often normal in individuals infected with *S.* Typhi, which may confound the inexperienced clinician. The incubation period of *S.* Typhi is 1 to 6 weeks, not 1 to 6 days. Rose spots, the blanching, erythematous rash typically seen in *S.* Typhi infection, are rarely seen on the extremities and are common on the chest and abdomen. Transmission of *S.* Typhi is typically fecal-oral via contaminated food and water.
TAKE-HOME POINTS

- S. Typhi should be considered in the differential of patients presenting with abdominal complaints and with a travel history to endemic regions, such as Central and South America, Africa, the Middle East, and Southeast Asia.
- Patients presenting with S. Typhi may be afebrile at initial presentation, with a normal total white blood cell count.
- S. Typhi is an oxidase-negative, indole-negative lactose nonfermenter. This organism will grow as green colonies with slight or absent H₂S production on Hektoen enteric agar. Serological testing of the isolate will be positive for serogroup D and Vi antigen.
- S. Typhi is showing increasing resistance to fluoroquinolones, and susceptibility testing to ciprofloxacin using updated interpretive breakpoints is necessary to guide therapy. Initial antimicrobial susceptibility testing for S. Typhi isolates should include ampicillin, trimethoprim-sulfamethoxazole, and a third-generation cephalosporin, in addition to a fluoroquinolone (generally ciprofloxacin).
- Blood cultures and bone marrow cultures are the most sensitive methods for recovering S. Typhi. Other potential specimens for culture include rose spots, stool, and cerebrospinal fluid (children).