

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 22 Organism 4:

Salmonella

The genus *Salmonella* is a member of the family *Enterobacteriaceae*. *Salmonella* is a Gram-negative facultative rod-shaped bacterium. It is composed of bacteria related to each other both phenotypically and genotypically. *Salmonella* DNA base composition is 50-52 mol% G+C, similar to that of *Escherichia*, *Shigella*, and *Citrobacter*. The bacteria of the genus *Salmonella* are also related to each other by DNA sequence. The genera with DNA most closely related to *Salmonella* are *Escherichia*, *Shigella*, and *Citrobacter*. Similar relationships were found by numerical taxonomy and 16S ssRNA analysis.

As with all *Enterobacteriaceae*, the genus *Salmonella* has three kinds of major antigens with diagnostic or identifying applications: somatic, surface, and flagellar.

Somatic (O) or Cell Wall Antigens

Somatic antigens are heat stable and alcohol resistant. Cross-absorption studies individualize a large number of antigenic factors, 67 of which are used for serological identification. O factors labeled with the same number are closely related, although not always antigenically identical.

Surface (Envelope) Antigens

Surface antigens, commonly observed in other genera of enteric bacteria (e.g., *Escherichia coli* and *Klebsiella*), may be found in some *Salmonella* serovars. Surface antigens in *Salmonella* may mask O antigens, and the bacteria will not be agglutinated with O antisera. One specific surface antigen is well known: the Vi antigen. The Vi antigen occurs in only three *Salmonella* serovars (out of about 2,200): Typhi, Paratyphi C, and Dublin. Strains of these three serovars may or may not have the Vi antigen.

Flagellar (H) Antigens

Flagellar antigens are heat-labile proteins. Mixing salmonella cells with flagella-specific antisera gives a characteristic pattern of agglutination (bacteria are loosely attached to each other by their flagella and can be dissociated by shaking). Also, anti-flagellar antibodies can immobilize bacteria with corresponding H antigens.

A few *Salmonella enterica* serovars (e.g., Enteritidis, Typhi) produce flagella which always have the same antigenic specificity. Such an H antigen is then called monophasic. Most *Salmonella* serovars, however, can alternatively produce flagella with two different H antigenic specificities. The H antigen is then called diphasic. For example, Typhimurium cells can produce flagella with either antigen i or antigen 1,2. If a clone is derived from a bacterial cell with H antigen i, it will consist of bacteria with i flagellar antigen. However, at a frequency of 10^{-3} - 10^{-5} , bacterial cells with 1,2 flagellar antigen pattern will appear in this clone.

Strains of nontyphoidal *Salmonella* usually cause an intestinal infection, accompanied by diarrhoeae, fever and abdominal cramps that often last 1 week or longer. Less commonly, nontyphoidal *Salmonella* can cause localized infections (e.g., osteomyelitis or urinary tract infection) or bacteraemia, especially in immunocompromised persons. People of all ages are affected; the incidence is highest in infants. *Salmonella* is ubiquitous in animal populations, and human illness is usually associated to food of animal origin. Salmonellosis is also transmitted by direct contact with animals, by water and occasionally by human contact. Each year, an estimated 1.4 million cases of illness and 600 deaths are caused by nontyphoidal salmonellosis in the USA.

Antimicrobial therapy is not recommended for uncomplicated *Salmonella* gastroenteritis. For *Salmonella* species and *Shigella* species, aminoglycosides may appear active *in vitro*, but are not effective clinically and should not be reported as susceptible.

Questions

1. What methods are used to isolate *Salmonella* species?
2. Name the methods used to identify a *Salmonella* to the species?
3. What is an "O" antigen, "H" antigen and a "Vi" antigen?