

## 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 21 Organism 3:

### *Serratia marcescens*

Serratia species are members of the family Enterobacteriaceae, they are motile, rarely ferment lactose, and produce an extracellular DNase. *S. marcescens* is the most commonly isolated species from human infections, while *S. liquefaciens* is the second most important isolate in human infections. Serratia species is widespread in the environment, but not a common isolate of human faeces. Most infections are therefore acquired from an exogenous source. Many environmental and some clinical strains produce a red pigment, prodigiosin<sup>1</sup>.

Virulence factors have not been studied in great detail, but strains may have fimbriae for adherence to erythrocytes and well as uroepithelial cells. Certain strains may also be cytotoxic to tissue culture cells<sup>2</sup>. These organisms can survive under hostile conditions, which include surviving in a variety of disinfectants, some of which have been the source of nosocomial infection outbreaks. Most infections caused by *S. marcescens* begin from an exogenous source and spread within the hospital on the hands of the health workers. The most common site of infection is the urinary tract, especially catheterized patients. *S. marcescens* is also frequently isolated from the respiratory tract and from wounds. Cases of osteomyelitis, infectious arthritis, and endophthalmitis may follow haematogenous spread. Meningitis may occur after neurological procedures. Injection drug users are at particular risk of *S. marcescens* infections, which include endocarditis<sup>3</sup>.

Serratia isolates are resistant to ampicillin, 1<sup>st</sup> generation cephalosporins because of an inducible chromosomal AmpC beta-lactamase similar to those found in the genus Enterobacter. Mutants that produce high levels of these enzymes as a result of stable derepression may arise during treatment, resulting in resistance to all beta-lactam antibiotics, except the 4<sup>th</sup> generation cephalosporins and carbapenems. Many isolates possess plasmids encoding resistance to penicillins, cephalosporins, carbapenems, and aminoglycosides. Fluoroquinolone resistance and resistance to trimthoprim-sulfamethoxazole may also be encountered. Treatment of infections caused by *S. marcescens* can therefore be difficult, indicating the importance of controlling the spread of nosocomial infections<sup>4</sup>.

### References

1. Grimont F., Grimont AD. 1981. The genus *Serratia*, p. 2822-2848. In MP Starr, et al. (ed), *The Prokaryotes: a Handbook on Habitats, Isolation, and Identification of Bacteria*. Springer-Verlag KG, Berlin, Germany.
2. Livrelli V., et al. 1996. Adhesive properties and antibiotic resistance of *Klebsiella*, *Enterobacter*, and *Serratia* clinical isolates involved in nosocomial infections. *J Clin Microbiol.* 34: 1963-1969.
3. Yu VL. 1979. *Serratia marcescens*: Historical perspective and clinical review. *N Engl J Med.* 300:887-893.
4. Mahlen SD., et al. 2003 Analysis of ampC gene expression in *Serratia marcescens* reveal new regulatory properties. *J Antimicrob Chemother.* 51: 791-802.

### Questions

1. How would you isolate and identify a *Serratia marcescens* isolate?
2. Why is *Serratia marcescens* an important pathogen in hospitals?
3. What infections are caused by *Serratia marcescens*?
4. Why are most strains of *Serratia marcescens* resistant to the beta-lactam antibiotics?