

## Please read this section 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.

## MICROBIOLOGY LEGEND

### CYCLE 29 - ORGANISM 3

## Staphylococcus saprophyticus

Staphylococci (Staph) are Gram-positive spherical bacteria that occur in microscopic clusters resembling grapes. Bacteriological culture of the nose and skin of normal humans invariably yields staphylococci. The main classification of staphylococci is based on their ability to produce coagulase, an enzyme that causes blood clot formation. Staphylococci are facultative anaerobes that grow by aerobic respiration or by fermentation that yields principally lactic acid. The bacteria are catalase-positive and oxidase-negative.

*Staphylococcus saprophyticus* is a coagulase-negative species of *Staphylococcus*. Like other Staphylococci, it is Gram-positive, is globular shaped, and is a facultative anaerobe. It has abundant transporter systems to adapt to ever changing pH, osmolarity, and concentration of urea in human urine. *S. saprophyticus* contains urease, which hydrolyzes urea and produces a derivative of ammonia. This is how the cell metabolizes Nitrogen. Urease activity is known to be an infection causing factor in UTIs. *S. saprophyticus* is also phosphatase-negative and lipase-positive. *S. saprophyticus* is resistant to the antibiotic Novobiocin, a characteristic that is used in laboratory identification to distinguish it from *S. epidermidis*, which is also coagulase-negative.

It is implicated in 10-20% of urinary tract infections (UTI). In females between the ages of 17-27 it is the second-most-common cause of UTIs. It is referred to as "honeymooner's" UTI due to its association with intercourse. It may also reside in the urinary tract and bladder of sexually active females. Some of the symptoms of this bacteria are burning sensation when passing urine, the urge to urinate more often than usual, the 'dripping effect' after urination, weak bladder, bloated feeling with sharp razor pains in the lower abdomen around the bladder and ovary areas, and razor-like pains during sexual intercourse.

Until the last decade, coagulase-negative staphylococci occurring in urine specimens were usually regarded as a contaminant. In the early 1970s, more than ten years after the original demonstration of *Staphylococcus saprophyticus* in urine specimens, this species became recognized as a frequent cause of urinary tract infections (UTI). In young women, *S. saprophyticus* is, after

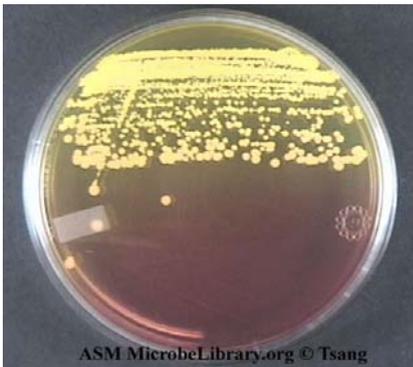
*Escherichia coli*, the most frequent causative agent of acute UTI. Patients with UTI caused by *S. saprophyticus* usually present with symptomatic cystitis.

Signs and symptoms of renal involvement are also often registered. The urine sediment of a patient with UTI caused by *S. saprophyticus* has a characteristic appearance under the microscope. Chemical screening methods for bacteriuria do not always succeed in diagnosing UTI caused by *S. saprophyticus*. Even when such an infection occurs above the neck of the bladder, low numbers of colony-forming units (less than  $10^5$  cfu/ml) of *S. saprophyticus* are comparatively often found in the bladder and voided urine.

*S. saprophyticus* is usually susceptible to antibiotics commonly prescribed for patients with UTI, with the exception of nalidixic acid. The bacterium has a capacity for selective adherence to human urothelium. It causes direct hemagglutination. The adhesin for *S. saprophyticus* is a lactosamine structure.

This staphylococcal species produces an extracellular enzyme complex that can inhibit growth of both gram-positive and gram-negative bacteria. Quinolones are commonly used in treatment of *S. saprophyticus* urinary tract infections.

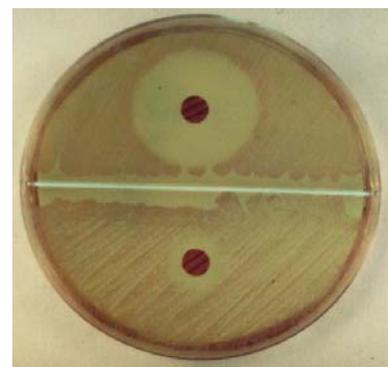
## Staphylococcus saprophyticus



Mannitol salt agar showing Mannitol fermentation



non-haemolytic, bright white, creamy colonies



Novobiocin resistance

## References

1. [http://en.wikipedia.org/wiki/Staphylococcus\\_saprophyticus](http://en.wikipedia.org/wiki/Staphylococcus_saprophyticus)
2. Kuroda, M., A. Yamashita, et al 2005. Whole genome sequence of *Staphylococcus saprophyticus* reveals the pathogenesis of uncomplicated urinary tract infection.

## Questions

1. Discuss the morphological characteristics of the genus *Staphylococcus*?
2. How would you distinguish between *S. epidermis* and *S. saprophyticus* in the laboratory?
3. What antibiotics can be used to treat a patient diagnosed with a *S. saprophyticus* infection?