

## 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 20 Organism 11:

# *Klebsiella pneumonia*

## **Description of the pathogen**

The genus *Klebsiella* is a member of the family *Enterobacteriaceae*. Members of the family *Enterobacteriaceae* are Gram-negative, non-spore-forming, facultative anaerobes that ferment glucose and other sugars, reduce nitrate to nitrite, and produce catalase but do not produce oxidase. Most are motile by means of peritrichous flagella. Members of the genus *Klebsiella* are not motile. *Klebsiella* species are positive for Voges-Proskauer, and most are negative for ornithine decarboxylase test<sup>1</sup>.

There are three species in the genus *Klebsiella* that are usually associated with infections in humans: *Klebsiella pneumoniae*, *Klebsiella oxytoca* and *Klebsiella granulomatis*. *Klebsiella ozaenae* and *Klebsiella rhinoscleromatis* are usually considered non-fermenting subspecies of *K. pneumoniae*. Most species produce mucoid colonies on solid agar media<sup>1</sup>.

## **Epidemiology**

Although the natural habitat of medically important members of the family *Enterobacteriaceae* is the gastrointestinal tract of humans and other animals, they may also be found in nature, such as in water and soil.

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## Clinical manifestations

*K. pneumoniae* is a primary pathogen causing urinary tract infections as well as pneumonia in healthy persons. Most infections caused by *K. pneumoniae* are nosocomial infections or occur in individuals who are compromised. Nosocomial infections caused by *K. pneumoniae* include, wound infections, intravascular infections, biliary tract infections, peritonitis and meningitis. *K. pneumoniae* is also a common cause of Gram-negative bacteraemia<sup>2</sup>.

The principle virulence factor associated with *K. pneumoniae* is its polysaccharide capsule. The capsule is thought to be able to prevent phagocytosis<sup>3</sup>.

## Treatment

All strains are resistant to ampicillin as a result of the presence of a chromosomal gene encoding for a penicillin-specific beta-lactamase. *K. pneumoniae* is one of the most common organisms to carry plasmids encoding extended-spectrum beta-lactamases (ESBLs). These strains are being isolated with increasing frequency. For non-multidrug resistant strains of *K. pneumoniae* infections may be treated with 1<sup>st</sup> generation cephalosporins, penicillin-beta-lactamase-inhibitor combinations, trimethoprim-sulfamethoxazole, fluoroquinolones, and aminoglycosides. For multidrug resistant strains, especially those expressing ESBLs, the carbapenems are the antibiotics of choice<sup>4</sup>.

## References

1. Abbott SL. *Klebsiella*. In Murray PR, ed. Manual of Clinical Microbiology. Washington, DC: ASM Press; 2003: 684-700.
2. Jarvis WR, *et al*. The epidemiology of nosocomial infections caused by *Klebsiella pneumoniae*. Infect Control. 1985;6:68-74.
3. Sahly H, *et al*. *Klebsiella* infections in the immunocompromised host. Adv Exp Med Biol. 2000; 479:237-249.
4. Burwen DR, *et al*. Ceftazidime resistance among selected nosocomial gram-negative bacilli in the United States. J Infect Dis. 1994;170:1622-1625.

## Questions

1. How would you differentiate between *Klebsiella pneumoniae* and *Enterobacter aerogenes*?
2. How would you isolate *Klebsiella pneumoniae*?
3. What characteristics are used to identify *Klebsiella pneumoniae*?
4. What infections are caused by *Klebsiella pneumoniae*?