Klebsiella
(Friedlander’ Bacillus)

Professor Md. Akram Hossain
Review Questions

- Both Klebsiella & Esch coli are LF, How can you differentiate?
- Why the colonies of Kelbsiella are mucoid? How they look like?
- Clinical importance of Klebsiella?
- What are species of klebsiella?
Friendlander first isolated the bacillus from lobar pneumonia in 1883.

Intestinal flora, cause only extraintestinal diseases
Taxonomy

Five accepted species: Based on DNA hybridization

1. *Klebsiella pneumoniae*
   a) *K. Pneumoniae pneumoniae*
   b) *K. Pneumoniae aerogenes*
   c) *K. Pneumoniae oezaenae*
   d) *K. Pneumoniae rhinoscleromatis*

2. *K. oxytoca*

3. *K. platicola*

4. *K. terrigena*

5. *K. group 7*
Biochemistry:

- Ferment glucose, Lactose, Maltose, sucrose, Mannitol by mixed acid fermentation
- positive for Indole and methyl red reaction.
- do not produce H2S, phenylalaninedeaminase or urease,
- do not utilize citrate

- LSS +++
- GMM +++
- IMViC - - ++

12/25/2013

Prof. Muhammad Akram Hossain,
Klebsiella
**Klebsiella Serology**

Serology:

- **Klebsiella** can be types by Capsular antigens
  - “K” 80 recognized types – (1-6 are most frequent in Respiratory tract)
  - Detected by capsular swelling test, agglutination, CFT& Fluorescent test
  - “O” 5 recognized types
  - Bacteriocin typing - klebocin
Morphology & cultural characters

Nonmotile with capsule

GNB 1-3umx0.4 um

- Lactose Fermenter, form pink mucoid colonies in MA medium.
Virulence factors

1. Endotoxin like other GNB.
2. Capsule - Interferers with phagocytosis

What is the Clinical significance of capsule?
- Capsule acts as virulence factor
- Helps in diagnosis by detecting the capsule
- Due to antigenicity
  - Serotyping – epidemiological importance
  - Vaccination – Therapeutics importance
Summary of Endotoxin

Details of endotoxin

Circulation

LPS

LPS-LBP

CD14

TLR4

TNFα

Fever
tissue damage

IL6

IL8

IL1

PAF

Toxic shock

12/25/2013

Prof. Muhammad Akram Hossain, Klebsiella
Structure of a Gram-Negative Cell Wall

- **LPS (Lipopolysaccharide)**
- **O Polysaccharide**
- **Lipid A**
- **Outer Membrane**
- **Lipoprotein**
- **Peptidoglycan**
- **Cytoplasmic Membrane**
- **Phospholipid**

**Structure of Gram-Negative Cell Wall**

- **Porin**
- **Protein**

**Klebsiella**
Clinical infections -1

Varies with different species

*K. oezaenae* – *Oezena*- a disease characterized by foul smelling nasal discharge with progressive atrophy of mucus membranes

*K. rhinoscleromatis* - *rhinoscleroma*- a chronic granulomatous disease of the nose and pharynx
Clinical infections by *K. pneumoniae*

1. Pneumonia - community acquired pneumonia & also hospital acquired pneumonia
2. Urinary tract infection (UTI) - 2\(^{nd}\) common cause especially in hospital acquired cases
3. Nosocomial infections
4. Other infections
   - Septicemia
   - Wound infections
Other important causes of UTI

1. *Escherichia coli*
2. *Klebsiella*
3. *Proteus*
4. *Providencia*
5. *Citrobacter*
6. *Acinetobacter*
7. *Pseudomonas*
8. *Staphylococcus saprophyticus* & *S. aureus*
9. *Streptococcus Gr. D* & *Streptococcus pyogenes*
Antimicrobial sensitivity

- UTI – fluoroquinolones- (ciprofloxacin, levofloxacin, Gatifloxacin)
- Sepsis – 3rd generation cephalosporin
Life is Short

They say it takes a minute to find a special person, an hour to appreciate them, a day to love them, but then an entire life to forget them.

Send this phrase to the people you'll never forget. It's a short message to let them know that you'll never forget them.