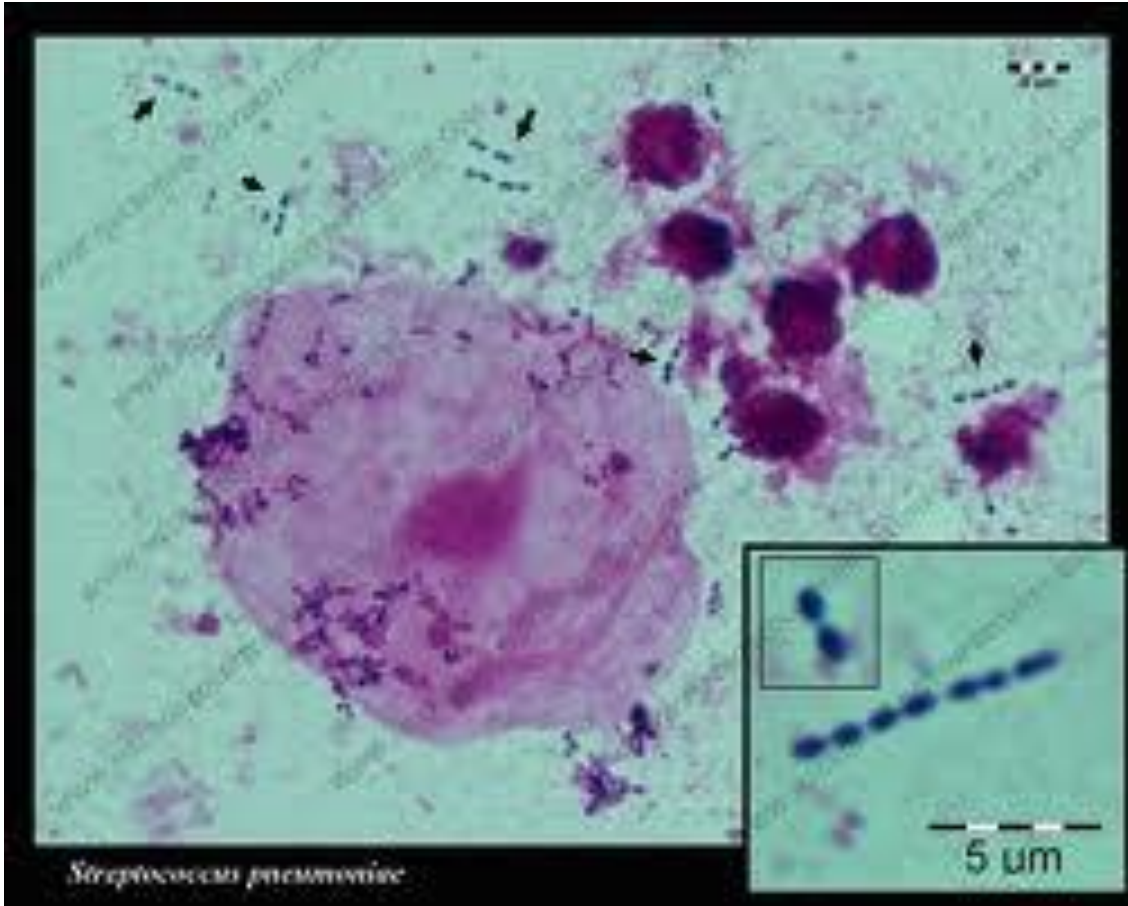


Streptococcus pneumoniae

Dr. Shehab Ahmed Lafi

A decorative graphic consisting of several horizontal lines of varying lengths and colors (teal, white, and light blue) extending from the right side of the slide towards the center.

- **They are Gram positive lanceolate diplococcic , non motile , non spore forming and it is capsulated , capsule enclose each pair.**
- **Pneumococci occur primarily in the human throat and are causing pneumonia when they descend to the lower respiratory tract .**



Stereococcium rhenanense

Culture:

- **It is delicate organism , it grows on blood agar , chocolate agar and media contain serum. It grows under aerobic and facultative anaerobic conditions . Growth is improved by adding 5-10% CO₂ and it grows best at 37c.**

Colony morphology:

- **Colonies on blood agar are small pin point and produce alpha hemolysis. On further incubation , colonies become flat with raised edges and central Pit , thus known as Draughtsman appearance.**

Biochemical reactions:

Pneumococci ferment inulin and they are bile soluble , bile solubility means that Ox bile (10%) or Sod Deoxy Cholate (2 %) shifts turbid broth to clear broth . It is sensitive to optochin (Ethyl hydro cuprein). *Streptococcus pneumoniae* is oxidase and catalase negative .

Differences between *S. Pneumoniae* and viridans Streptococcus

S. Pneumoniae

- Lanceolate diplococcic

Draughtsman appearance of colony

Bile soluble

Ferments inulin

Optochin sensitive

- Virulence in mice is positive (kill mice)

Streptococcus viridans

spherical arranged
in chains

raised colony

not bile soluble

not ferments

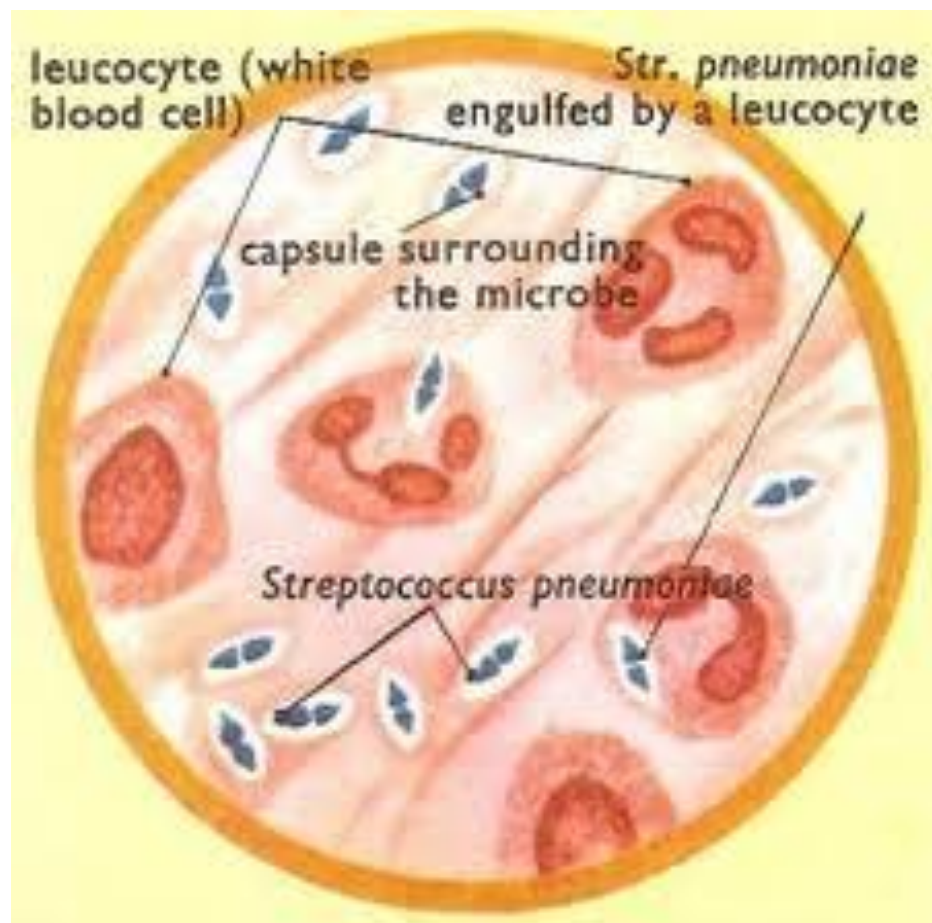
inulin

optochin

resistant

negative

Quellung reaction : when we add polyvalent capsular antiserum to *S. Pneumoniae* colonies on a slide , positive reaction will show swelling of the test bacterial capsule . so we consider the serotype of the test *S. Pneumoniae* when matches the type of capsular antiserum which cause positive swelling or Quelling test.



Virulence factors :

- 1- Capsule : it is polysaccharide in nature and it acts as antiphagocytic and antigenic , antigenic means it is able to induce immune reaction in the host body. Regarding capsule antigen there are 100 distinct serotypes . According to capsular swelling test or Quellung reaction pneumococci can be classified into above serotypes.**

2-Autolysin : it is cell associated enzyme, it is peptidoglycan hydrolase present in bacterial cell wall.

3-Pneumolysin: it is thought to be an important virulence factor through ability to attach mammalian cell membranes causing lyses once released by autolysin .

Disease caused by *S. Pneumoniae*.

Acute pneumonia :

Bronchopneumonia is always secondary to viral infections of respiratory tract .
type 1-8 cause 75% of pneumococcal pneumonia in adults while types
6,14,19,23 serotypes cause pneumonia in children.

Bacteremia :

About 15-25% of pneumococcal pneumonia , organisms spread from the respiratory route to the blood leading to bacteremia and cause complications like endocarditis , sinusitis meningitis , peritonitis and septic arthritis .

***S. Pneumoniae* may expand to the nose and ears leading to rhinitis and otitis.**

Laboratory diagnosis of :

Specimen collection :

Sputum is indicated in case of pneumococcal pneumonia and it is rusty in color in such infection . **Laryngeal swab** is indicated in child infections. Other specimens are indicated like **blood** in case of **bacteremia** , **cerebro- spinal fluid (CSF)** in meningitis , **ear swab** when otitis is present and **body fluids** when other infections are expected.

- **Specimens should be manipulated properly as soon as possible regarding WHO guidelines.**
- **Gross inspections and microscopical investigations are required for sputum**
- **Sputum which contains more **than 10** epithelial cells per high power field is unfit for investigation .**

Treatment :

- **Penicillin G** is the drug of choice for the treatment of *S. Pneumoniae* infections. Antimicrobial sensitivity test is indicated before antimicrobial therapy to reach the choice of optimal antibiotic for treatment.

- **Penicillin resistant strains appear and seem resistant to cefotaxime .**
- **Resistance to tetracycline and erythromycin occurs also .**
- **Pneumococci remain susceptible to vancomycin.**

Prevention :

Polyvalent vaccine against *S. Pneumoniae* is available (**Pneumo 23 vaccine). It is indicated for children, aged individuals and immunocompromised patients . this vaccine gives immunity for 5 years .**

