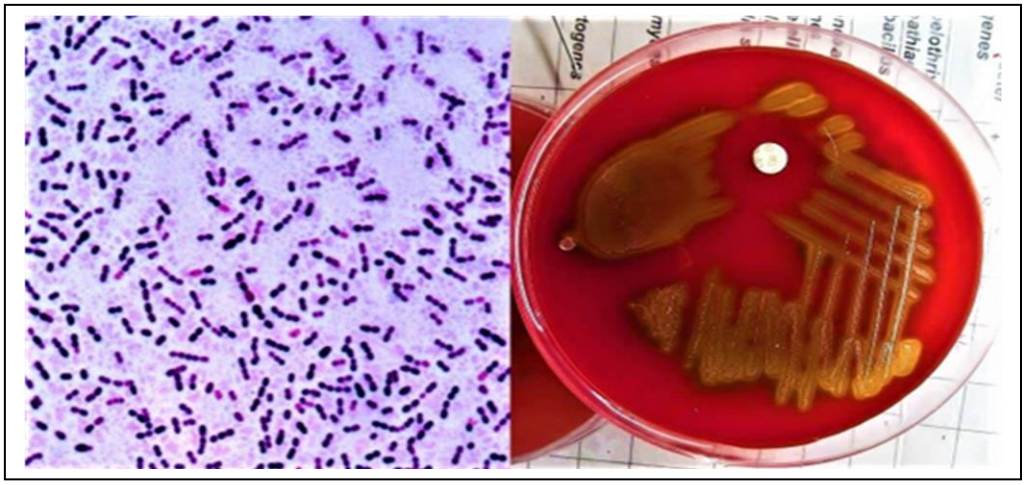
Streptococcus pneumoniae

Streptococcus pneumoniae, or pneumococcus, is a Gram-positive, spherical bacteria, alpha-hemolytic (under aerobic conditions) or beta-hemolytic (under anaerobic conditions), aerotolerant anaerobic member of the genus Streptococcus. They are usually found in **pairs (diplococci)** , do not form **spores** and are **non-motile.**

general characteristics:

1. lancet-shaped, gram-positive, facultative anaerobic bacteria with more than 100 known serotypes. Most S. pneumoniae serotypes can cause disease, but only a minority of serotypes produce the majority of pneumococcal infections.
2. S. pneumoniae may occur intracellularly or extracellularly as gram-positive lanceolate diplococci, but can also occur as single cocci or in short chains of cocci.
3. It is usually cultured on media that contain blood, but can also grow on a chocolate agar plate (CAP).
4. fastidious bacterium, growing best at 35-37°C with ~5% CO_2 (or in a candle-jar).
5. Non-motile bacterium / non-flagellated bacterium.



Laboratory diagnosis:

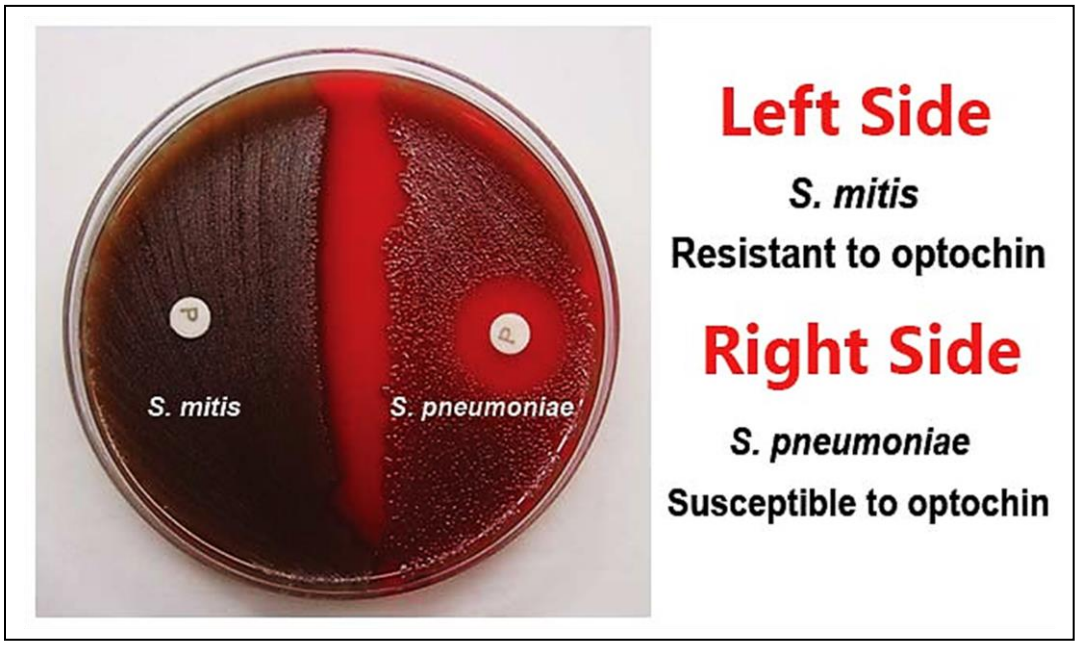
Differentiation of Streptococcus pneumoniae from other viridans streptococci depends on demonstrating optochin susceptibility, bile solubility, reaction with a specific DNA probe, or detection of species-specific capsular polysaccharides. Most clinical microbiology laboratories today depend on the optochin susceptibility test.

Although optochin susceptibility was first described for differentiating pneumococci from other α-hemolytic streptococci in 1915, the test was virtually unused by laboratories until the mid-1950s.

The optochin test is widely used in the form of filter paper discs, impregnated with ethylhydrocupreine hydrochloride, which are applied directly to inoculated plates before incubation. The optochin test is less time-consuming than the bile solubility test.

Principle of Optochin Susceptibility Test

A positive presumptive identification of S. pneumoniae is made when a well-defined zone of inhibition results around the impregnated disk. Other alpha-hemolytic streptococci do not display this clear zone of inhibition when in the presence of optochin. The chemical tests the fragility of the bacterial cell membrane and causes S. pneumoniae to lyse due to changes in surface tension.

Procedure of Optochin Susceptibility Test

1. Using an inoculating loop, select three to four well-isolated colonies of the alpha-hemolytic organism to be tested. An 18-24-hour culture of isolated organism can also be used for testing.
2. Streak the isolate onto one-half of a TSA-5% sheep blood agar plate so as to obtain confluent growth.
3. Important: Use of media other than TSA-5% sheep blood agar is not recommended, as false identification may result.
4. Using sterile forceps, place an optochin disk onto the inoculated surface of the agar.
5. Press disk gently with the sterile forceps or loop so that the disk adheres firmly to the agar surface.
6. Incubate the plate at 35 +/- 2.0 degrees C. for 18-24 hours in 5-10% CO2 enriched environment.
7. If zone of inhibition is present, measure the diameter with a millimeter ruler or caliper.