

Genus Streptococcus

Streptococci are gram positive, non-motile, and catalase negative.

Clinically important genera

They are ovoid to spherical in shape and occur as pairs or chains

Aerotolerant anaerobes because they grow fermentative even in the

Presence of oxygen.

Because of their complex nutritional requirements, blood enriched medium is generally used for their isolation.

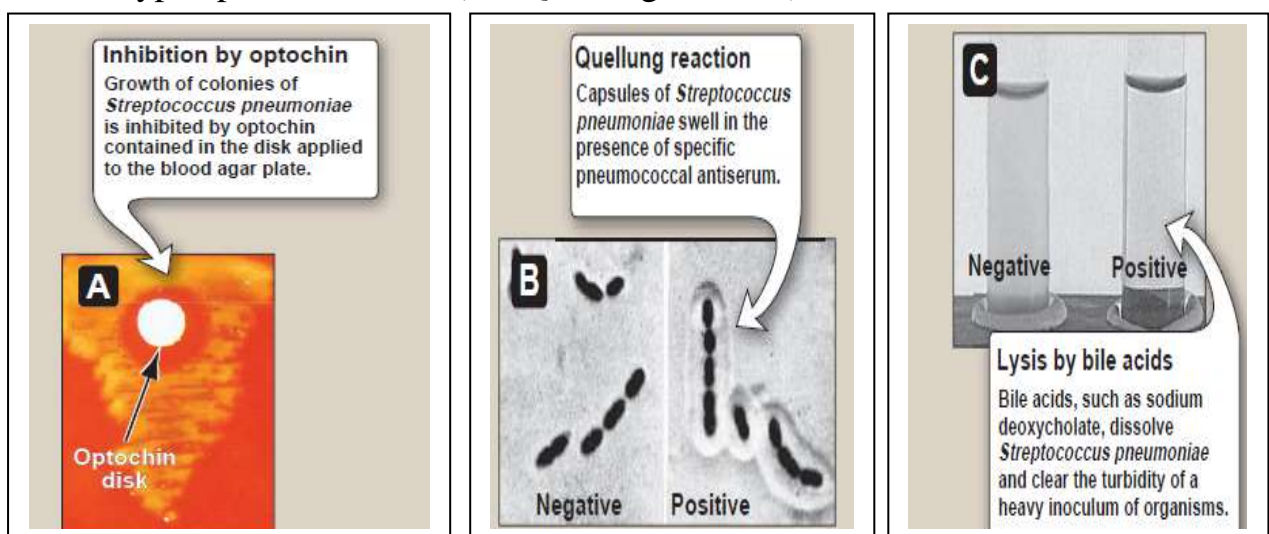
Diseases caused by this group of organisms include acute infections of the throat and skin caused by group A streptococci (*Streptococcus pyogenes*); female genital tract colonization, resulting in neonatal sepsis caused by group B streptococci (*Streptococcus agalactiae*); pneumonia, otitis media, and meningitis caused by *Streptococcus pneumoniae*; and endocarditis caused by the *S. viridans* group of streptococci.

Biochemical test

Specimens for laboratory evaluation can be obtained from a naso -Pharyngeal swab, blood, pus, sputum, or spinal fluid. α -Hemolytic colonies appear when *S. pneumoniae* is grown on blood agar overnight under aerobic conditions at 37°C. Lancet-shaped, gram positive diplococci are observed on a Gram stain of the sample.

Growth of these bacteria is inhibited by low concentrations of the surfactant optochin, and the cells are lysed by bile acids (Figure 7.1).

Capsular swelling is observed when the pneumococci are treated with type-specific antisera (the Quellung reaction).



(Figure 7.1). Biochemical test used for identification *S. pneumonia* group C.

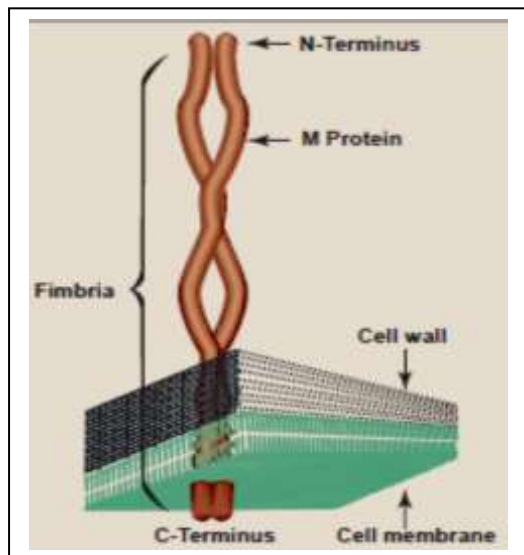
Antigenic characters

1-M protein: *S. pyogenes* is not infectious in the absence of M protein. M proteins extend from an anchor in the cell membrane, through the cell wall and then the capsule, with the N-terminal end of the protein exposed on the surface of the bacterium.

M proteins are highly variable, especially the N-terminal regions, resulting in over 80 different antigenic types.

Thus, individuals may have many *S. pyogenes* infections throughout their lives as they encounter new M protein types for which they have no antibodies. M proteins are antiphagocytic and they form a coat that interferes with complement binding.

2- Group A-specific C-substance: This component is composed of rhamnose and N-acetylglucosamine. [Note: All group A streptococci, by definition, contain this antigen.]

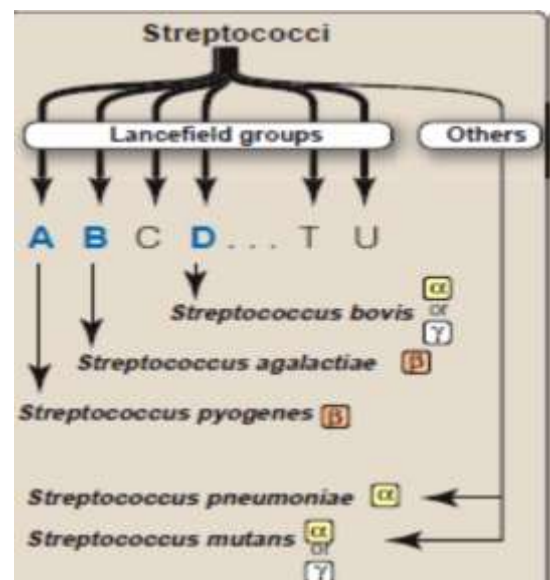


(Figure 7.2). Antigenic structure of *S. pyogenes*

Streptococcus groups

Serologic (Lancefield) groupings

Many species of streptococci have a polysaccharide in their cell walls known as C-substance, which is antigenic and easily extractable with dilute acid. The Lancefield scheme classifies primarily β -hemolytic streptococci into groups A through U on the basis of their C-substance.



Streptococcus pyogenes (Group A Streptococcus)

- Catalase (–), β -hemolytic, bacitracin sensitive, gram (+) cocci
- Pharyngitis: abrupt onset, tonsillar abscesses
- Scarlet fever: blanching, sandpaper rash, strawberry tongue
- Impetigo: honey-crusted lesions

Streptococcus agalactiae (Group B Streptococci)

- Gram (+), catalase (–), β -hemolytic, bacitracin resistant, CAMP test (+)
- Neonatal meningitis and septicemia: #1 cause, especially in prolonged labors

CAMP test positive (CAMP factor is a polypeptide which “complements” the sphingomyelinase of *S. aureus* to create an enhanced hemolytic pattern in shape of an arrowhead)

Enterococcus faecalis/faecium (Group D)

- *gram-positive cocci in chains
- PYR test positive
- Catalase-negative, varied hemolysis
- **Hydrolyze esculin in 40% bile and 6.5% NaCl** (bile esculin agar turns black)

Urinary/biliary tract infections-elderly males, Subacute bacterial endocarditis elderly males, follows surgery, preexisting heart valve damage

Streptococci viridans

- Gram (+), catalase (–), α -hemolytic, optochin resistant, bile insoluble
- Plaque and dental caries
- Subacute bacterial endocarditis-preexisting damage to heart valves; follows dental work.

Streptococci mutans

- α -hemolytic
- Optochin resistant
- PYR-negative
- Bile insoluble

Dental caries: *S. mutans* dextran-mediated adherence glues oral flora onto teeth, forming plaque and causing dental caries