

Genus: *Streptococcus*

The streptococci are Gram-positive spherical bacteria that characteristically form pairs or chains of cocci during its growth, *capsulated, non motile, non spore forming. Some are members of the normal human microbiota; others are associated with important human diseases.

***Bacterial capsule:** protective structure that completely surrounded the bacterial cell, consist of a layer, usually polysaccharide, attached to the cell wall via covalent attachments. Capsule formation correlate with pathogenicity, it has serves in bacterial adhesion, permeability barrier, defense mechanism against phagocytosis and evasion from immune system.

Classification of streptococci

The classification of streptococci into major categories has been based on:

- (1) hemolytic reactions on blood agar.
- (2) serologic specificity of the cell wall group-specific substance (Lancefield antigens).

Types of hemolysis

One of the most important characteristics for identification of streptococci is the type of hemolysis.

1. α -Hemolysis: streptococci form a green zone around their colonies as a result of incomplete lysis of red blood cells in the agar, e. g. *Streptococcus pneumoniae*.

2. β -Hemolysis: streptococci form a clear zone around their colonies because complete lysis of the red blood cells occurs, e. g. *Streptococcus pyogenes*, *Streptococcus agalactiae*.

3. γ -hemolysis: some streptococci are non-hemolytic, it does not break down the red blood cells, so there is no hemolysis, e. g. *Streptococcus mutans*.

Lancefield Classification or Lancefield grouping

A serological method for classifying streptococci into groups (designated by a letter) based on the carbohydrate composition of bacterial antigens found on their cell wall of many streptococci, and forms the basis of serologic grouping that divides streptococci into 20 **Lancefield groups A** through H and K through U (**Lancefield groups A–H** and **K–U**).

Streptococcus pyogenes

Medically important species that related with variety of diseases. The infections associated with *Streptococcus pyogenes* can be divided into several categories as follows:

- 1. Streptococcal sore throat:** the most common infection caused by β -hemolytic *Streptococcus pyogenes* is streptococcal sore throat or pharyngitis.
- 2. Streptococcal pyoderma:** local infection of superficial layers of skin, especially in children, is called impetigo.
- 3. Post-Streptococcal glomerulonephritis (PSGN):** is a rare kidney disease that can develop after group A strep infections. The main way to prevent PSGN is to prevent group A strep infections. The disease develops from 1 to 5 weeks after *Streptococcus pyogenes* skin infection (pyoderma, impetigo) or pharyngitis, then the body's immune system fighting off strep throat, scarlet fever, or impetigo and leading to complications caused infection of kidneys.

4. Rheumatic fever: an autoimmune inflammatory process that develops as a sequela of *Streptococcus pyogenes* infection. It results in damage to heart muscle and valves. Certain strains of group A streptococci contain cell membrane antigens that cross-react with human heart tissue antigens.

Transmission

Direct person-to-person transmission occurs through the inhalation of respiratory droplets from saliva or nasal secretions of an infected person or through skin contact. Symptomatic people are much more transmit the bacteria than asymptomatic carriers. Also, through direct contact with contaminated objects and surfaces or through dust particles.

Diagnostic Laboratory Tests

A. Specimens

Specimens to be obtained depend on the nature of the streptococcal infection. A throat swab, pus, cerebrospinal fluid or other sterile body fluid, or blood is obtained for culture.

B. Smears

Smears from pus often show single cocci or pairs rather than definite chains.

C. Culture

Specimens suspected of containing streptococci are cultured on blood and chocolate agar plates, after that staining can differentiate them exactly with specific biochemical tests.

Streptococcus pneumoniae* and *Streptococcus viridans

Streptococcus pneumoniae: is a primary cause of bacterial pneumonia, meningitis, and otitis media.

Streptococcus viridans: viridans (greening) streptococci are generally considered to be opportunistic pathogens of low virulence. These organisms are not known to produce any factors that facilitate invasion of the host. When access is gained, a transient bacteremia occurs and endocarditis and infections at other sites in compromised patients may result.

Treatment

Most of the streptococci are susceptible to penicillin G.

Macrolides, such as erythromycin and clindamycin, have often been recommended for penicillin-allergic patients. Resistance to macrolide antibiotics has been developed. **Antibiotics susceptibility test is the first choice on the path to correct treatment.**

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