Streptococcus pyogenes Characteristics

Streptococcus pyogenes is a gram-positive cocci that causes group A streptococcal infections. Strep pyogenes typically produces large zones of beta hemolysis, and can be distinguished from other streptococcal organisms because it is catalase-negative and bacitracin-sensitive. Diseases caused by Streptococcus pyogenes include skin infections like impetigo, cellulitis, pharyngitis, scarlet fever and toxic shock-like syndrome. Streptococcus pyogenes infections can also precipitate episodes of rheumatic fever and acute glomerulonephritis.

PLAY PICMONIC

Characteristics

Group A Streptococci (GAS)

A-Apples

Group A Streptococci, commonly referred to as GAS, are infections caused by the bacterium Streptococcus pyogenes. Diseases caused by Streptococcus pyogenes infections include skin conditions such as impetigo and cellulitis, as well as pharyngitis, scarlet fever, and toxic shock-like syndrome. S. pyogenes infections can also lead to episodes of rheumatic fever and acute glomerulonephritis.

Gram-Positive

Graham-cracker Positive-angel

This organism stains positive on a Gram stain due to its thick peptidoglycan layer, which absorbs crystal violet.

Cocci

Cockeyed

This bacterium has a spherical shape and appears on a histological slide as cocci arranged in chains.

Beta-Hemolytic

Beta-fish in Petri-dish

S. pyogenes typically causes large zones of beta hemolysis, which is the complete lysis of red blood cells in the culture media. Streptolysin O, an exotoxin produced by the bacteria, causes complete lysis of red blood cells by interacting with the cholesterol membrane.

Catalase-Negative

Negative-cat

Characteristically, S. pyogenes is catalase-negative, which helps distinguish it from Staphylococcal species that are catalase-positive.

Bacitracin-Sensitive

Bass Sensitive-crying

Bacitracin can be used to differentiate Streptococcus pyogenes from other beta-hemolytic Streptococci, such as Streptococcus agalactiae. Streptococcus pyogenes is bacitracin-sensitive, whereas Streptococcus agalactiae is resistant.

Hyaluronic Acid Capsule

Hay Capsule

Many strains of Streptococcus pyogenes have a hyaluronic acid capsule, which aids this organism in resisting phagocytosis. Another defensive factor against phagocytosis is M protein.

Streptolysin O

Stripper with O Earrings

Streptolysin O is an oxygen-labile exotoxin that S. pyogenes releases. It is often tested for using an ASO, or antistreptolysin O titer.

DNase

DNA Lace

Streptococcus pyogenes produces DNase, an enzyme that cleaves the DNA backbone, degrading DNA. This allows the organism to infect pharyngeal tissues and skin, while also degrading the DNA of neutrophil extracellular traps, which would normally kill these bacteria.

Streptokinase

Stripper with Kite-ace

Streptokinase is an enzyme that inhibits the coagulation cascade in humans. S. pyogenes produces this enzyme, causing blood clots to dissolve, enabling the bacteria to spread easily throughout the body.

Exotoxin A

Exploding Apples

Exotoxin A produced by S. pyogenes aids in virulence by decreasing the production of antibodies and potentiating the likelihood for necrotizing fasciitis and streptococcal toxic shock syndrome. The expression is highly variable among different strains of this bacteria.

Pyrrolidonyl Arylamidase (PYR) Positive

Positive Pyro

The pyrrolidonyl arylamidase (PYR) test is a rapid test, which has largely replaced the bacitracin test. Streptococcus pyogenes is a positive control, and is well known to be positive for PYR, which can be tested for in 10-15 minutes.