

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 called GAS, infections are caused by the bacteria *Streptococcus pyogenes*. 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.

Gram-Positive

Graham-cracker Positive-angel

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

Cocci

Cockeyed

This bacterium has a spherical shape.

Beta-Hemolytic

Beta-fish in Petri-dish

Strep pyogenes typically produces large zones of beta hemolysis, which is complete lysis of red cells in the blood culture media. An exotoxin called streptolysin O is the enzyme produced by the bacteria, which causes complete lysis of red blood cells via interaction with the cholesterol membrane.

Catalase-Negative

Negative-cat

Characteristically, *Streptococcus pyogenes* is catalase-negative, which is helpful in distinguishing *Streptococcus* from *Staphylococcal* species that are catalase- positive.

Bacitracin-Sensitive

Bass Sensitive-crying

Bacitracin can be used to distinguish *Streptococcus pyogenes* from other beta- hemolytic *Streptococci*, like *Strep agalactiae*. *Streptococcus pyogenes* is bacitracin- sensitive, while *Streptococcus agalactiae* is bacitracin-resistant.

Hyaluronic Acid Capsule

[Hay Capsule](#)

Many strains of *Streptococcus pyogenes* have a hyaluronic acid capsule, which aids this organism in resisting phagocytosis.

Streptolysin O

[Stripper with O Earrings](#)

Streptolysin O is an oxygen-labile exotoxin released by *Streptococcus pyogenes*. This is often tested for with an ASO, or antistreptolysin O titer.

DNase

[DNA Lace](#)

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

Streptokinase

[Stripper with Kite-ace](#)

Streptokinase is an enzyme which inhibits the coagulation cascade in humans. These bacteria produce this enzyme, causing blood clots to dissolve so the bacteria can easily spread 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.