Streptococcus Pneumoniae Characteristics

Streptococcus pneumoniae is a gram-positive lancet-shaped diplococci that is a major cause of pneumonia, meningitis and otitis media. Characteristically, this bacteria is alpha-hemolytic, which causes dark green colonies on blood agar. It is catalase-negative, which allows it to be distinguished from catalase-positive Staph aureus. Strep pneumonia can be differentiated from Streptococcus viridans using an optochin test. Strep pneumoniae is optochin-sensitive while Strep viridans is optochin-negative. The bacterium can also be differentiated from Strep viridans because Streptococcus pneumoniae is bile-soluble while Strep viridans is not. This organism is encapsulated with a positive Quellung reaction. The capsule acts as a virulence factor for the organism.



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Characteristics

Gram-Positive
Graham-cracker Positive-angel
This organism stains positive on Gram stain due to thick peptidoglycan layer, which absorbs crystal violet.

Diplococci
Double-cockeyes
This bacterium has a spherical shape and usually occurs as two joined cells.

Lancet-Shaped
Lance
This organism has a distinctive morphology on Gram stain called “lancet-shaped” diplococci.

Catalase-Negative
Negative-cat
Characteristically, Streptococcus pneumoniae is catalase-negative, which is helpful in distinguishing Streptococcus from Staphylococcal species that are catalase- positive.

Optochin-Sensitive
Octopus Sensitive-crying
The optochin test aids in the differentiation between Streptococcus pneumoniae and Streptococcus viridans. Streptococcus pneumoniae is optochin-sensitive, meaning the growth of bacteria is inhibited around an optochin disc, while growth of bacteria that are optochin-resistant will not be affected.

Bile Soluble
Bile Melting
Streptococcus pneumoniae can be differentiated from Streptococcus viridans based on sensitivity to lysis by bile. Streptococcus pneumoniae is bile soluble and will lyse in presence of bile, while Streptococcus viridans will not.

Alpha-Hemolytic
Alpha Afro
This bacteria is alpha-hemolytic, which causes dark green colonies on blood agar. It is caused by hydrogen peroxide produced by bacterium, which oxidizes hemoglobin to green methemoglobin.

Polysaccharide Capsule
Polly-sack Capsule
This organism has a capsule, which has anti-phagocytic properties.

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Positive Quellung Reaction

Positive Quail-lungs

A Quellung reaction is a biochemical reaction in which antibodies bind to a bacterial capsule, allowing species with a positive Quellung reaction to be visualized under a microscope. Streptococcus pneumoniae has a positive Quellung reaction.

IgA Protease

(IgA) Apple-goblin with Propeller-ace

An IgA protease is an enzyme that cleaves certain amino acid sequences of proteins, including immunoglobulin A. Streptococcus pneumoniae releases IgA proteases which destroy IgA, leading to increased pathogenicity. Other IgA protease producers include Neisseria gonorrhoeae, Neisseria meningitidis, and Haemophilus influenzae type B.

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