Haemophilus influenzae Characteristics

Haemophilus influenzae is a gram-negative coccbacilli that can cause several diseases, including meningitis, pneumonia, otitis media and epiglottitis. There are two major categories of H. influenzae, including the encapsulated strains and the unencapsulated strains. Encapsulated strains are classified based on their distinct capsular antigen: A,B,C,D,E,G,. Type B is known to cause the most severe disease including meningitis and epiglottitis. H. influenzae organisms require nutrient supplementation to grow in laboratory cultures. Specifically, they grow on chocolate agar, which is an enriched growth medium containing red blood cells that have been lysed, providing growth factors like NAD (factor V) and hematin (factor X). Virulence mechanisms include an antiphagocytic PRP capsule and IgA protease.

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Characteristics

Gram-Negative
Graham-cracker Negative-devil
This organism stains Gram negative due to relatively thin peptidoglycan layer in the cell wall.

Coccobacilli
Cockeyed-rod
Coccobacilli are a type of rod-shaped bacteria that are short and wide, so they resemble spherical cocci.

PRP Capsule in Type B
PRP Capsule with a B
The polyribosyl ribitol phosphate (PRP) capsule is the most important virulence factor of type B Haemophilus influenzae infections, because it plays a role in resisting phagocytosis.

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. Haemophilus influenza has a positive Quellung reaction.

IgA Protease
(IgA) Apple Globulin-Goblin with Propeller-ace
An IgA protease is an enzyme that cleaves certain amino acid sequences of proteins including immunoglobulin A. Haemophilus influenzae releases IgA proteases which destroy IgA, leading to increased pathogenicity. Other IgA protease producers include Neisseria gonorrhoeae and Streptococcus pneumoniae.

Chocolate Agar
Chocolate-bar
Haemophilus influenzae organisms require nutrient supplementation to grow in laboratory cultures. Specifically, they grow on chocolate agar, which is an enriched growth medium containing red blood cells that have been lysed, providing growth factors like NAD and hematin. The agar is named for the chocolate color of the medium and does not actually contain chocolate.

Factor V is NAD
(NAD) Nicotine Character giving (5) Hand high five
Haemophilus influenzae requires two accessory growth factors when cultured, including factor X and factor V. Factor V is NAD (nicotinamide adenine dinucleotide).

Factor X is Hematin
(10) X-factor sign held by 10 He-men
Haemophilus influenzae requires two accessory growth factors when cultured, including factor X and factor V. Factor X is hematin.

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Staph Aureus Provides Factor V

Staff-of-Oreos with NAD factor V

H. influenzae can grow in the hemolytic zone of Staph aureus on blood agar plates, because hemolysis of cells by Staph aureus releases factor V, which is needed for growth.

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