

يلا هانت ضايل 10 امتحانات وبنصير كلينيكال




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Bacterial infections of the Respiratory Tract 1

Streptococcus

- ✓ Gram (+) cocci, oval in shape and arranged in chains or pairs
- ✓ catalase negative
- ✓ can tolerate oxygen reactive species as they contain superoxide dismutase.
- ✓ Classification :

| According to | Description | Examples |
|--|---|---|
| Hemolysis pattern on blood agar  | β-Hemolytic → complete lysis of RBCs , due to presence of (hemolysins) called streptolysin O and streptolysin S α-Hemolytic → incomplete (partial) lysis of RBCs , oxidizes hemoglobin to biliverdin. γ-hemolysis → nonhemolytic | ----- |
| Serologic specificity of the cell wall (Lancefield antigens) | Only those that are Catalase (-) and coagulase (-) are grouped Groups A, B, C, F, and G are human pathogens | S.pyogenes → A , β-Hemolytic , bacitracin sensitive S.agalactia → B , β-Hemolytic , bacitracin resistance [most common cause of neonate sepsis] S.pneumoniae → α-Hemolytic ,bile soluble , inhibited by optochin Viridans → α-Hemolytic , not bile soluble , not inhibited by optochin |
| Biochemical reactions | most important reaction → bacitracin sensitivity reaction. [kills GAS] | Strep. Pyogenes is Bacitracin sensitive |

Group A Beta hemolytic streptococci (GAS) (strep. Pyogenes)



General information :

- most prevalent of human bacterial pathogen
- cause a wide range of suppurative (pus forming) infections
- Life-threatening soft tissue infections
- Most common cause of BACTERIAL pharyngitis

strep. Pyogenes

| Pathogenesis | Virulence factors | Transmission | Laboratory Diagnosis | Treatment | Prevention |
|---|---|--|---|--|---|
| <p>cause disease by three mechanisms:</p> <ul style="list-style-type: none"> - <u>Pyogenic inflammation</u>: pus forming - <u>Exotoxin production</u> - <u>Immunologic</u> | <ul style="list-style-type: none"> - <u>Adhesion (F protein)</u>: aided by surface-exposed lipoteichoic acid and M proteins - <u>M proteins</u>: Immunogenic+ prevent opsonisation of C3b [MOST IMPORTANT FACTOR.] - <u>Capsule</u>: are anti-phagocytic factors + not immunogenic. - <u>C5a peptidase</u>: present on the surface of all strains - <u>Streptolysins (hemolysins)</u>: diagnose GAS infection → use Streptolysin O as it's immunogenic - <u>SPE-A, SPE-B and SPE-C are pyrogenic (fever inducing) and erythrogenic (rash inducing) exotoxins .</u> - <u>Invasion/escape factor</u>: Hyaluronidase, Streptokinase, DNAase | <ul style="list-style-type: none"> - <u>direct contact with respiratory secretions</u> - <u>respiratory droplets</u> | <ul style="list-style-type: none"> - <u>Gram-stained</u> smears are useless in streptococcal pharyngitis - <u>Cultures</u>: translucent β-hemolytic colonies - <u>Stained smears</u> from skin lesions - <u>Rapid tests</u> : The specificity high, sensitivity is low - <u>Titers of anti-DNase B</u> are high in GAS skin infections [indicator of previous streptococcal infection] | <ul style="list-style-type: none"> - penicillin G or amoxicillin. - Patients of RF and AGN do not benefit from penicillin treatment. - Azithromycin للي عنده حساسية بنسلين | <p>There are no vaccines available against any of the streptococci except S. pneumoniae</p> |

S. pyogenes Diseases

| S. pyogenes Diseases | Description |
|---|---|
| Pharyngitis  | -the most common infection caused by Str. Pyogenes -symptoms: <ul style="list-style-type: none"> ✓ Abrupt onset of sore throat. ✓ Odynophagia → [enlarged tonsils ,grey–white exudate] ✓ Gray furry tongue - Untreated pharyngitis may develop tonsillar abscesses+ spread to neighboring regions [otitis media, sinusitis, mastoiditis, meningitis] - If untreated, spontaneous recovery often occurs in 10 days, but rheumatic fever may occur |
| Scarlet fever [toxigenic]  | -If the GAS causing pharyngitis produces exotoxins (SPE-A, SPE-B, SPE-C), the upper respiratory tract infection will be associated with a diffuse erythematous rash of the skin and mucous membranes -The formation of antigen-antibody aggregates called immune complexes that precipitate in the glomerular basement membrane. -characterized by : <ul style="list-style-type: none"> ✓ maculopapular rash / pathognomonic rash (sandpaper-like) develops within 1–2 days after the first symptoms of pharyngitis ✓ strawberry tongue |
| Streptococcal toxic shock syndrome | toxin-mediated [toxigenic] |
| Skin and soft tissue infections | Cellulitis [pyogenic], erysipelas , impetigo |
| Retropharyngeal Abscesse | ---- |
| Meningitis, mastoiditis & lymphangitis | ---- |

Poststreptococcal (Nonsuppurative) Diseases [immunologic]

Molecular mimicry: Antibodies raised against M proteins of GAS can cross-react with normal host tissues causing immune-mediated inflammation.

1. Acute Glomerulonephritis (AGN):

- ✓ occurs 2 to 3 weeks following infection by certain group A streptococcal types [following skin infections rather than after pharyngitis]
- ✓ Type 3 hypersensitivity reaction : [s immune-mediated and the organism itself may not even be present]
- ✓ clinical features
 - Hypertension , Edema of the face , “smoky” urine

2. Acute Rheumatic Fever (RF) :

- ✓ Occurs approximately 2 weeks after a GAS infection, usually pharyngitis.
- ✓ type 2 hypersensitivity reaction : due to an immunologic reaction
- ✓ reinfection must be prevented by long-term prophylaxis
- ✓ characterized by:
 - Fever , Migratory polyarthritis , Endocarditis [JOANS criteria] , brain tissue (chorea)
- ✓ Dx: Anti-streptolysin O (ASO) titers are elevated.