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((Microbiology))

stage 2

Seventh lecture

Diagnosis of Staphylococcus and Streptococcus

By

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Staphylococcus

Family: Micrococceae (consists of Gram-positive cocci, arranged in tetrads, clusters)

Genus: Staphylococcus Term "staphylococcus" derived from Greek: Staphyle = bunch of grapes and Kokkos = berry, meaning bacteria occurring in grapelike clusters or berry .

Classification

Based on pathogenicity :

Pathogenic: includes only one i.e., *S. aureus*

Non-pathogenic: includes *S. epidermidis*, *S. saprophyticus*, *S. albus*, *S. citus*, *S. hominis* ,etc .

Based on coagulase production : Coagulase positive: *S. aureus*

Coagulase negative: *S. epidermidis*, *S. saprophyticus*

Based on pigment production :

- S. aureus*: golden-yellow pigmented colonies
- S. epidermidis* : white colonies
- S. citus*: lemon yellow colonies

S. aureus

Natural habitat: Nostril and skin

Morphology: - Gram-positive, cocci, 0.5-1.5 μ m in diameter; occur characteristically in group, also singly and in pairs.

- Form irregular grapelike clusters (since divide in 3 planes). - Non-motile, non- sporing and few strains are capsulated.



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Laboratory Diagnosis

Specimens :

- **Pus:** from wound or abscess or burns
- **Nasal Swab:** from suspected carrier
- **Food:** to diagnose staphylococcal intoxication.
- **Blood:** to diagnose endocarditis and bacteremia .
- **Sputum:** to diagnose lower respiratory tract infection
- **Milk:** To detect mastitis.

Gram's Stain :

- These are spherical cocci .
- Approximately 1 μm in diameter .
- Arranged characteristically in grape like clusters .
- They are non-motile and non-sporing .
- A few strains possess capsules .

Culture

- Aerobes and facultative anaerobes .
- Opt. Temp. For growth= 37°C .
- Opt. pH for growth= 7.5
- On Nutrient agar, - golden yellow and opaque colonies with smooth glistening surface, 1-2 mm in diameter .



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On nutrient agar

Staph. aureus form golden yellow colonies .



On blood agar - *Staph. aureus* :

produce complete haemolysis (clear zone around the growth)



Staph epidermidis & *Staph saprophyticus* :

non-haemolytic (no change on blood agar)





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Streptococcus:

Family Streptococcaceae

Genus Streptococcus

General characteristics:

1. Gram-positive cocci, arranged in chains or pairs.
2. Non motile, non spore forming.
3. Some strains are capsulated, which are important in pathogenicity.
4. Catalase-negative.
5. Majority are facultative anaerobes, few are obligate anaerobes.
6. They are fastidious microorganisms grow on enriched media such as blood agar, have small, pin head, opaque, circular colonies.
7. Sensitive to drying, heat, and disinfectant.

Classification:

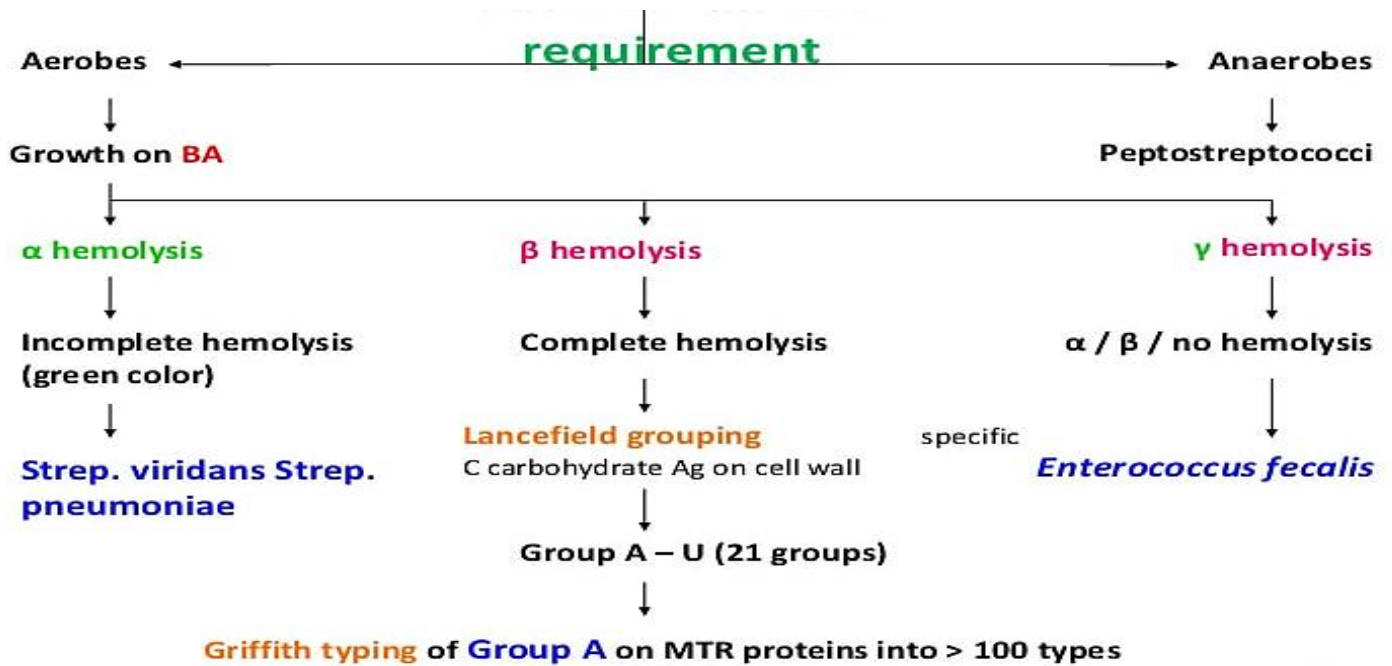
Species of this genus is classified according to the following:

I. Hemolysis:

- β -hemolysis: complete destruction of RBCs. e.g. *S. pyogenes*
- α -hemolysis: partial destruction of RBCs e.g. *S. mutans* , *S. pneumoniae*.
- γ -hemolysis: non-hemolysis.



Classification of streptococcus based on O₂



lab diagnosis of streptococcus

Tests	Results	Tests	Results
Catalase	-ve	Sorbitol	+ve
Motility	-ve	Maltose	+ve
Arginine dihydrolase	-ve	Lactose	+ve
Aceton	+ve	Sucrose	+ve
Urea	-ve	Glucose	+ve
Mannitol	+ve	Esculin hydrolysis	+ve