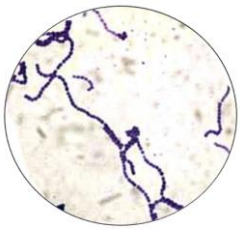
Streptococcus spp.

- Species
- Morphology and Staining
- Cultural Characteristics
- Biochemical Tests
- Diseases
- Diagnosis



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Species

Family *Streptococcaceae* consist of a large family of medically important species, including *Streptococcus* spp. and *Enterococcus* spp.

Beta-hemolytic streptococci neonatal meningitis and septicemia

- *Streptococcus pyogenes* (group A streptococci)
- *Streptococcus agalactiae* (group B streptococci)
- *Streptococcus pneumoniae* (Groups C, F, and G beta-hemolytic streptococci)

alpha-hemolytic (*Viridans streptococci*) oral dental caries

- *Streptococcus mutans* group
- *Streptococcus salivarius* group

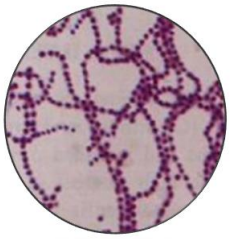
Enterococci (most commonly isolated) urinary tract infection fecal contamination

- *Enterococcus faecalis*
- *Enterococcus faecium*

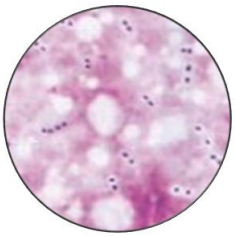
Morphology and Staining

- Streptococci and enterococci are Gram positive cocci.
- Each coccus is about 1 µm in diameter.
- They occur in pairs or chains of varying length.
- Usually capsulated.
- Non motile, non spore forming .

Gram positive Streptococci



Gram positive chain



Gram positive pairs

Classification of Streptococci

Streptococci can be classified according to:

Streptococci

- **Oxygen requirements**
  - **1- Anaerobic**
  - **2- Aerobic**
  - **3-facultative anaerobic**
- **Serology (Lanciefield Classification)**
- **Hemolysis on Blood Agar (BA)**

Cultural Characteristics

- Streptococci are aerobes or facultative anaerobes.
- They are fastidious and require the addition of blood or serum to cultural media.
- Optimum temperature for growth is 37 °C .

The media used to cultivate the Streptococci are:

1- Blood Agar: It is the most important media for cultivated these bacteria, because it shows different types of haemolysis. The colonies are circular in shape 1 µm in diameter, white to grayish in color.

5

CAMP Test

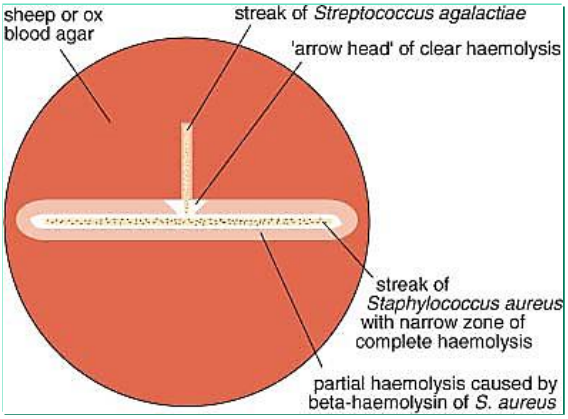
- Principle:

  Group B streptococci produce extracellular protein (CAMP factor)

  CAMP act synergistically with staphylococcus β-lysin to cause lysis of RBCs

- Procedure:
  - Single streak of *Streptococcus* to be tested and a *Staphylococcus aureus* are made vertical to each other with 3-5 mm distance was left between two streaks.
  - After incubation, a positive result appear as an **Arrow head shaped zone of complete hemolysis.**
  - *S. agalactiae* is CAMP test positive while non group B streptococci are negative

6



CAMP test. *Streptococcus agalactiae* elaborates a factor which completely lyses the red cells already damaged by the β-haemolysin of *Staphylococcus aureus*, producing a characteristic clear '**Arrow head**' zone of complete haemolysis.

7

2- Edwards medium: It is selective media for Streptococci. This medium contains esculain (sugar) and crystals violate which inhibiting other contaminates bacteria.

3- MacConkey Agar: used for cultivating of Enterococci which tolerate the bile salts on this medium and appear as small pin – head colonies .

4- Brain heart infusion Agar: Use to cultivate of Streptococci. In this medium the characteristic chains arrangement seen more obviously in microscopic examination.

8

Biochemical tests

- Aerobic or facultative anaerobes, fastidious.
- Streptococci are catalase and oxidase negative (Staphylococci are catalase positive).
- The type of the haemolysis which produced by Streptococcal species can be variable and important characteristic in the recognized.

α, β, γ hemolysis produced by different Streptococci

Diseases

Identification of *S. pneumonia* and *viridans streptococci*

- The alpha-hemolytic streptococci, or viridans (**Green**) group (e.g. *S. mutans, S. salivarius*), are normal inhabitants of the mouth causes dental caries and inhabitant of nasopharynx, and respiratory tract causing Pneumonia.
- Alpha-hemolytic streptococci may be isolated by blood culture in cases of bacterial endocarditis and meningitis.
- **Specimens include: Sputum, blood, throat swab, ear swab, CSF.**

Diagnosis

Diagnostic procedures

1. Streptococci are highly susceptible to desiccation and specimens should be cultured immediately.

2. Pus or exudate collected on swabs should be placed in a transport medium if specimens cannot be processed immediately.

3. Chains of Gram-positive cocci may be demonstrable in smears from specimens.

4. Specimens should be cultured on blood agar, selective blood agar and MacConkey agar. Plates are incubated aerobically at 37°C for 24 to 48 hours.

5. Identification criteria for isolates:
   – Small, translucent colonies, some of which may be mucoid
   – Type of haemolysis on blood agar
   – Chains of Gram-positive cocci
   – No growth on MacConkey agar with the exception of *Enterococcus* species – Negative catalase test.

6. Lancefield grouping (carbohydrate antigens).

7. Biochemical test profile.

8. Detection of antigens is possible using latex agglutination or enzyme-linked immunosorbent assay (ELISA) technologies.

9. Polymerase chain reaction (PCR) is a sensitive technique using the can be used.


Thanks