Family : staphylococaceae

Genus : Staphylococcus

The most important pathogenic spp. are

1. Staphylococcus aureus or pyogenes : Infected human & many animal spp.
2. S. capitis , S. haemolyticus infected human
3. S. intermedius infected dog & cat .
4. S. hyicus infected pig

Non pathogenic spp. are :

1. S. epidermidis 2. S. saprophytes 3. S. equorum 4. S. gallinarum

 **Morphology & Staining :**

 The staphylococci are Gram positive cocci that tend to be arranged in irregular cluster of grapes formation . Some time found in paris or single . In old culture tend to Gram negative stain .



**Distribution in nature :**

 These organisms occure commonly on the skin , anterior nares , saliva , intestine, faeces of human & animals as well as in water, soil & air . S. aureus most important human pathogen, although its frequently a part of the normal microflora its can cause diseases such as mastitis in cattle& ewe, tonsillitis in dogs, septicemia in poultry, wound infection , toxic shock syndrome, toxiemia & sudden death.

**Cultural characterstic :**

 The staphylococci are aerobic & facultative an aerobes, catalase + for differentiate it from strept. Spp. , They don’t form spore or capsule ,non motile , its tipical mesophiles , grow at an optimum temperature of 37 oc

**Virulance factores of S. aureus :**

1. Capsular polysaccharides, peptidoglycan ,teichoic acids & protein A

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1. Coagulase enzymes . causing the coagulation of blood plasma (coagulase +) & other strains don’t produce this enzyme & are non pathogenic ( coagulase test \_ ) . 
2. Toxins which associated with abscess formation .
3. Staphyloxanthin is a pigment responsible for S. aureus characteristic golden colour that acts as a virulence factor .

**Staph Identification on agar media :**

1. **Nutrient agar :** growth is good & relatively large colonies . grow at 37oc , they are circular, convex, glistening with an entire edge, The colour may vary from white to yellow



 Staph. aureus staph. epidermides

1. **Blood agar :** strains produce hemolysine are cause ( alpha, Beta, Gamma) hemolytic colonies. The strains are surrounded by zones of hemolysis, colonies are circular,smooth,opaque, yellow colony in color of S. aureus while S. epidermidis white in color.



 

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1. Mannnitol salt agar : this media selective & differentials for selection of S. aureus & S. epidermides

S. aureus will ferment mannitol in presence of Nacl 7% , In this media phenol red is indicater . so it fermentation of mannitol will change the PH into acid & this will give a bright yellow color.

But S. epidermides didn’t ferment mannitol & use peptone in the medium which give (NH3) ammonia & the PH will be alkaline the colony appear bright pink color .

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1. Staph 110 media : Is a typical for isolation pathogen staph . which contain gelatin,mannitol,5-10% Nacl. This media is selective because they don’t have indicater so pigmented colonys which are highly selective for Nacl will liquefied gelatin & ferment mannitol & give orange colony .

**Biochemical test** : Good growth in nutrient broth & give turbidity . both catalase & urease are + , nitrates are reduced to nitrites + ,acid without gas is produced by most strains in glucose, lactose,maltose,sucrose & mannitol fermented, methyl red & gelatinase are + , voges- proskaur reaction are variable, Indol &oxidase \_ & H2S are not produce.

 

**Haemolysis** : the staphylococcal haemolysins (alpha,beta,gamma) can be produced singly or combination or nat at all. S. aureus & S. intermedius are haemolytic & produce both alpha & beta lysine & exhibit double haemolysis .

* Alpha lysine is responsible of **narrow zone** of partial haemolysis.
* Beta lysine is responsible of **clear** **zone** of complete haemolysis around the colony.



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 **Biochemical Reaction :**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Spp.** | **Coagulase test** | **Hemolysis**  | **urease** | **Mannitol agar (fermented)** | **Maltose fermented** |
| **1.S. aureus**  |  **+**  | **Alpha& beta** |  **+** |  **+** |  **+** |
| **2.S.intermedius** |  **+** | **Alpha& beta** |  **+** |  **+** |  **+ , -** |
| **3.S.epidermidis** |  **-** | **-**  |  **+** |  **-** |  **+** |
| **4.S.saprophytes** |  **-** | **-** |  **+** |  **+** |  **+** |

Characterstic of S. aureus Characterstic of S.epidermidis

|  |  |
| --- | --- |
| 1.pathogenic | 1.saprophyte or non pathogen |
| 2.golden-yellow colony on blood agar | 2.white colony |
| 3.beta- haemolysis  | 3.non haemolysis |
| 4.mannitol ferment | 4.non ferment |
| 5.coagulase + | 5. coagulase - |
| 6.gelatinase + | 6.gelatinase - |

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 post graduate lecture

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