

Gram Positive Cocci (blue to violet cocci)

- Staphylococcus**
 - Grape-like cluster
 - Catalase (+)
 - Type
- Streptococcus**
 - Chain
 - Catalase (-)

Test

for differentiation of Staphylococcus species

① **Catalase test**

- differentiate between staphylococcus and strepto coccus.
- best mechanism: Identify organism that produce catalase enzyme (then enzyme detoxifies hydrogen peroxid by broken it to water & gas O₂)
- H₂O₂ → O₂ + H₂O + bubbles from O₂ resulting bubble from

mannitol salt agar media (M.S.A)

- selective to staphylococcus genus.
- differential media
- ↑ salt (7.5%)
- can tolerate high saline levels.
- organism from other genus may be growth (slowly)
- mechanism: contain mannitol and pH indicator phenol red
- if organism can ferment mannitol & acid byproduct & phenol red in agar → yellow
- other staph species such as epidermis not ferment mannitol & remain red

Coagulase test

staph aureus (+) & other staph species (-)

Produce Coagulase enzyme to convert soluble fibrinogen → insoluble fibrin in plasma

Clot formation within 4 hours (positive test)

- negative tubes left for 24 hours overnight → reexamine next day
- this step is essential form some strains of staph aureus like MRSA strain
- produce delayed clot rapidly lysed by type of Staphylokinase

for differentiation streptococcus species

by appearance

Streptococcus

- α-hemolytic: Green partial hemolysis
- β-hemolytic: Clear complete hemolysis
- γ-hemolytic: No hemolysis
- Enterococcus (Group D)
- other: β-facialis, β-facium

Stable - esculin test

- used to differentiate between enterococcus group D and non enterococcus species
- mechanism: based on the hydrolysis of esculin into esculetin + glucose
- esculetin → react with iron salt ferric chloride → form ferric esculetin complex & black color

*** Diphtheroids**

- gram positive
- coccobacilli
- aerobic non sporulating pleomorphic
- more uniform than Corynebacterium diphtheria
- arranged in Chinese letters
- usually commensals in skin mucous membrane
- black meta chromatic granules

Candida

- larger than bacteria
- Budding
- unicellular fungi
- shape: spherical, elliptical, cylindrical

test

- Sabouraud dextrose agar
- germ tube test
- screening test to differentiate

*** Mycobacterium**

- waxy coating on its cell surface
- cause to mycob. acid
- the coating makes the cell impervious to gram staining & so acids fast
- stains, such as:
 - Ziehl-Neelsen stain
 - Fite-Jensen stain
- made of:
 - (1) Carboxyl function (primers) → heating
 - (2) Hydrophobic acid (alcohol) → de colorizer
 - (3) Methylene blue counter stain
- In culture: brown granular colony, callus (buffs rough) or L (smooth colony)
- In culture: period = 4 weeks
- Put the media in covered tubes to avoid drying of media

Candida Spp.

- C. albicans
- C. Krusei
- C. tropicalis
- C. glabrata

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Chrom agar

- novel differential culture medium & facilitate isolation and identification of yeast species
- Form:
 - can be detached with wet test films
 - Germ tube (Candida)
 - Spherule (Staphylococcus)
 - Blue ring (Staphylococcus)
 - Pink (Candida)
 - Rough (Candida)
 - Pink (Candida)

Aspergillus niger (fungus)

- one of the most common species of aspergillus
- cause disease: black mold
- in certain fruits/vegetables such as grapes, apricots, onions, peanuts.
- common contaminate of food
- one of the most common causes of otomycosis (fungal ear infection)
- may damage the ear canal & tympanic membrane

Penicillium spp

- genus of ascomycetous fungi
- in food spoilage & drug production
- some members of the genus produce penicillin
- molecule that used as anti biotic
- Penicillium species & occasional infection in humans (penicilliosis)