The Gram Positive Cocci

Staphylococcus

Staphylococcus Genus Characteristics

Staphylococcus species are normal flora widespread over the body surface. They are also important pathogens. Some of the most common diseases caused by staphylococcus species include impetigo, toxic shock syndrome, bacteremia, endocarditis, folliculitis furuncle (boils), and osteomyelitis (bone abscesses).

The clinically significant species are generally separator into coagulase-positive staphs (S.aureus) and coagulase-negative staphs (S.epidermidis, S.haemlyticus and S.saprophyticus).

- Gram positive cocci (signal , in pair, or irregular grape – like clusters).

- 0.5-1.5 µm in diameter.

- Non motile

- Non spore-forming

- Facultative anaerobes

- Catalase positive (usually)

	Staphylococcus aureus	Staphylococcus epidermidis	Staphylococcus haemolyticus	Staphylococcus saprophyticus
Macromorphology	Creamy / Tan Medium	Creamy / Tan pinpoint	White small	Creamy / Tan Wavy margin
Oxygen Requirement	Facultative Anaerobe	Facultative Anaerobe	Facultative Anaerobe	Facultative Anaerobe
Motility	Non-motile	Non-motile	Non-motile	Non-motile
Catalase	Positive	Positive	Positive	Positive
Tellurite Glycine Agar	Black colonies	Gray colonies minimal growth	Gray colonies minimal growth	Gray colonies
Oxidase	Negative	Negative	Negative	Negative
Coagulase	Positive	Negative	Negative	Negative
Mannitol Salt Agar	Colorless Colonies yellow media	Colorless / pink Colonies pink media	Colorless / pink Colonies pink media	Colorless Colonies yellow Media
Novobiocin	Susceptible	Susceptible	Susceptible	Resistant
Hemolysis	Alphaprime or Betahemolysis	Alpha orAlpha-primehemolysis	Alphaprime or Betahemolysis	Alphahemolysis

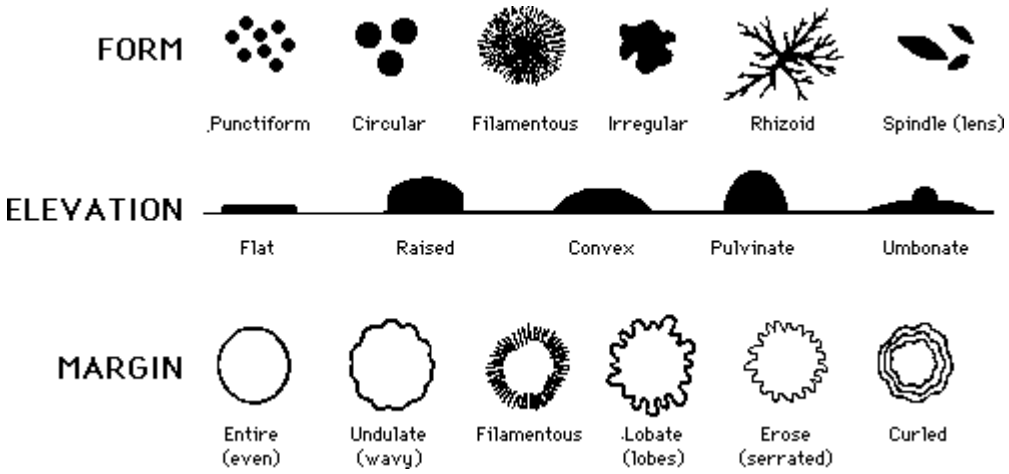
Macro-morphology of bacterial colonies

Bacterial species rarely exist by themselves, They usually live in a community with other bacteria. The samples a clinical lab receives contain amix of organism including the normal flora inhabiting the collection site and hopefully the pathogenic organism causing the disease.

The first step in isolating the bacteria is to streak for individual colonies.

Next, amicrobiologest with examine the visible appearance, or macromorphology, of the isolated colonies in order to try and recognize different species. Some bacterial colonies are visually very different .

Microbiologists use a standard set of terms when describing the macro-morphology of bacterial colonies . They are listed and illustrated below.



- Size : pinpoint, small, medium, large .
- Color : non-pigmented, white, creamy, tan .
- Texture : moist, mucoid, dry .
- Optical quality : opaque, translucent, dull, shiny .
- Hemolysis : beta, alpha, alphaprime, gamma .

Betahemolysis : is indicated by a clear colorless zone surrounding the colonies . There has been total lysis of the red blood cells .

Alphahemolysis : is indicated by a small zone of greenish to brownish discoloration of the media, This is caused by the reduction of hemoglobin to methemoglobin and it's subsequent diffusion into the surrounding medium .

Alphaprimehemolysis : is indicated by azone of complete hemolysis surrounded by azone of partial hemolysis a pink halo. This pattern can be easier to see if you scrape off the colony .

Gammahemolysis : is indicated by no change in the media .

Media of choice

1- **Blood Agar and nutrient Agar** : Considered media for primary isolation .
2- **Tellurite Glycine Agar (TGA)** : Isolation and differentiation of coagulase –positive staphylococci . Coagulase –positive staphylococci produce black colonies within 24 hours at 37°C.
3- **Mannitol Salt Agar (MSA)** : Selective and differentiation staphylococcus aureus (+) from other staphylococcus species. The yellowing of the red / pink media indicates appositive result .