Microbiology

Lecture No: slide 5

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Sheet ☐ Slide ■

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Gram-Positive Cocci

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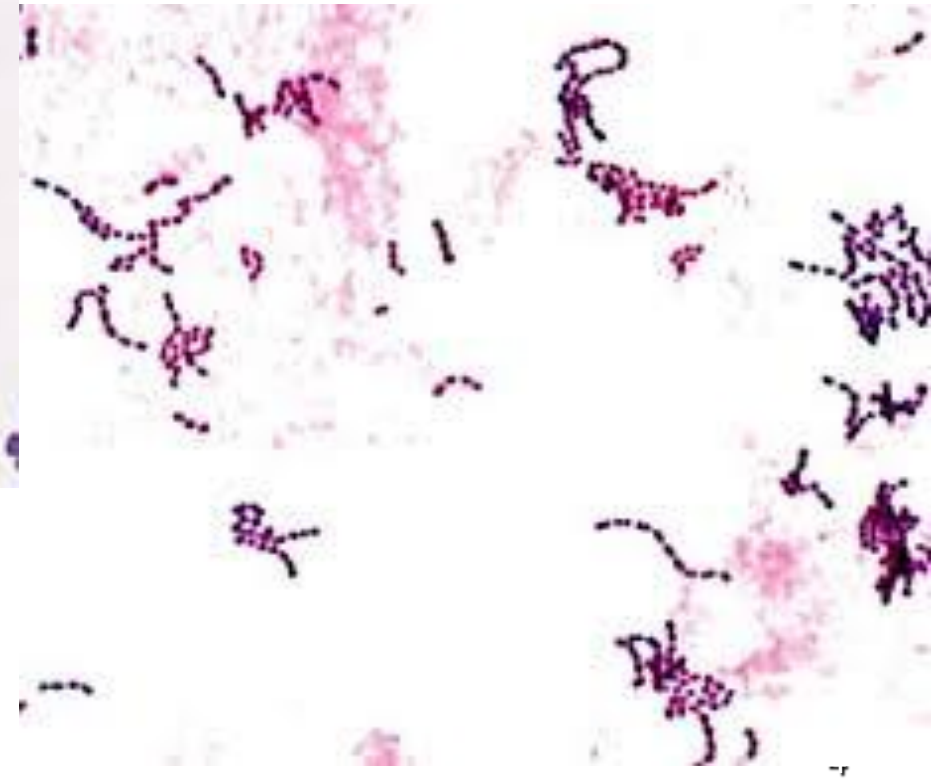
Gram-psitive cocci

- **Micrococcaceae** family.. Facultative Anaerobic Gram-positive cocci .. includes the following Genera/Groups:
- Staphylococcus.. Arranged in irregular clusters of cocci .. Catalase +ve
- The Two Common ***Staphylococcus*** species: *S. aureus* & *S. epidermidis* are common in skin, nose, oral cavity. other body sites.. Opportunistic Pathogens.
- Streptococci.. Arranged in diplococci or chain of cocci.. Catalase –ve.. Many important group & species
- Enterococci.. Arranged in diplococci & short chain.. Catalase -ve

Stapylococci-Streptococci



Pathogenicity of *S. aureus*

- More invasive & opportunistic pathogenic than all other *Staph. Species*.. Contains capsule
- Cell wall antigenic structure polysaccharides
- Protein A: antiphagocytic
- Various enterotoxins.. Common Food poisoning
- α toxin causes septic shock.
- Toxic shock syndrome toxin-1: causes toxic shock & death.
- Coagulase & Clumping factor +ve.. Both converted prothrombin into fibrin & fibrinogen .. Deposit fibrin during infection..
- **Hyaluronidase:** Spreading factor during tissue infection
- Leukocidin.. destroy WBCs.. formation of pus and acne
- A common cause of skin abscess ..wounds, sepsis/ bacteremia, sinusitis, conjunctivitis, pneumonia, meningitis, osteomyelitis & any body sites.

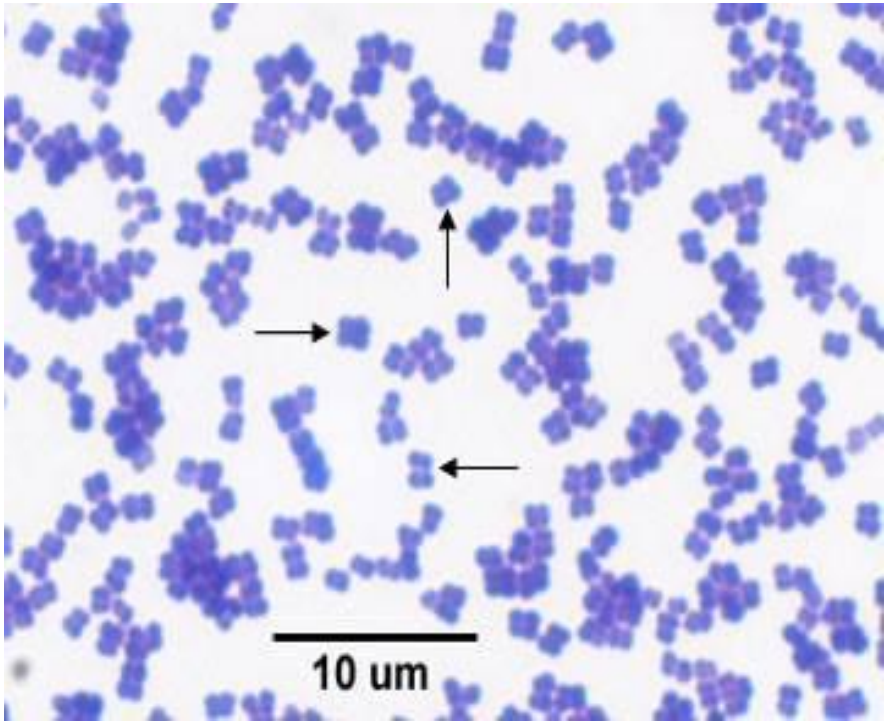
S. epidermidis

- Less pathogenic, part body normal flora, Skin , Nose Coagulase-ve.. Rarely opportunistic pathogen.,Common Bacteremia in immuno-deficient patients.. Skin abscess, Biofilm on human implants devices
- Diagnosis: Collect specimens ..Culture & identification of isolates by gram-stain, catalase & coagulase test, susceptibility test.
- Most *S. aureus* strains.. Less *S. epidermidis* are resistant to all B-lactams.. Increase rate of isolation Methicillin/Oxacillin-resistant *S. aureus* (MRSA).. All still susceptible to Vancomycin

Micrococcus species:

Common on skin ..similar in biological characters to Coagulase –ve ***S. epidermidis***

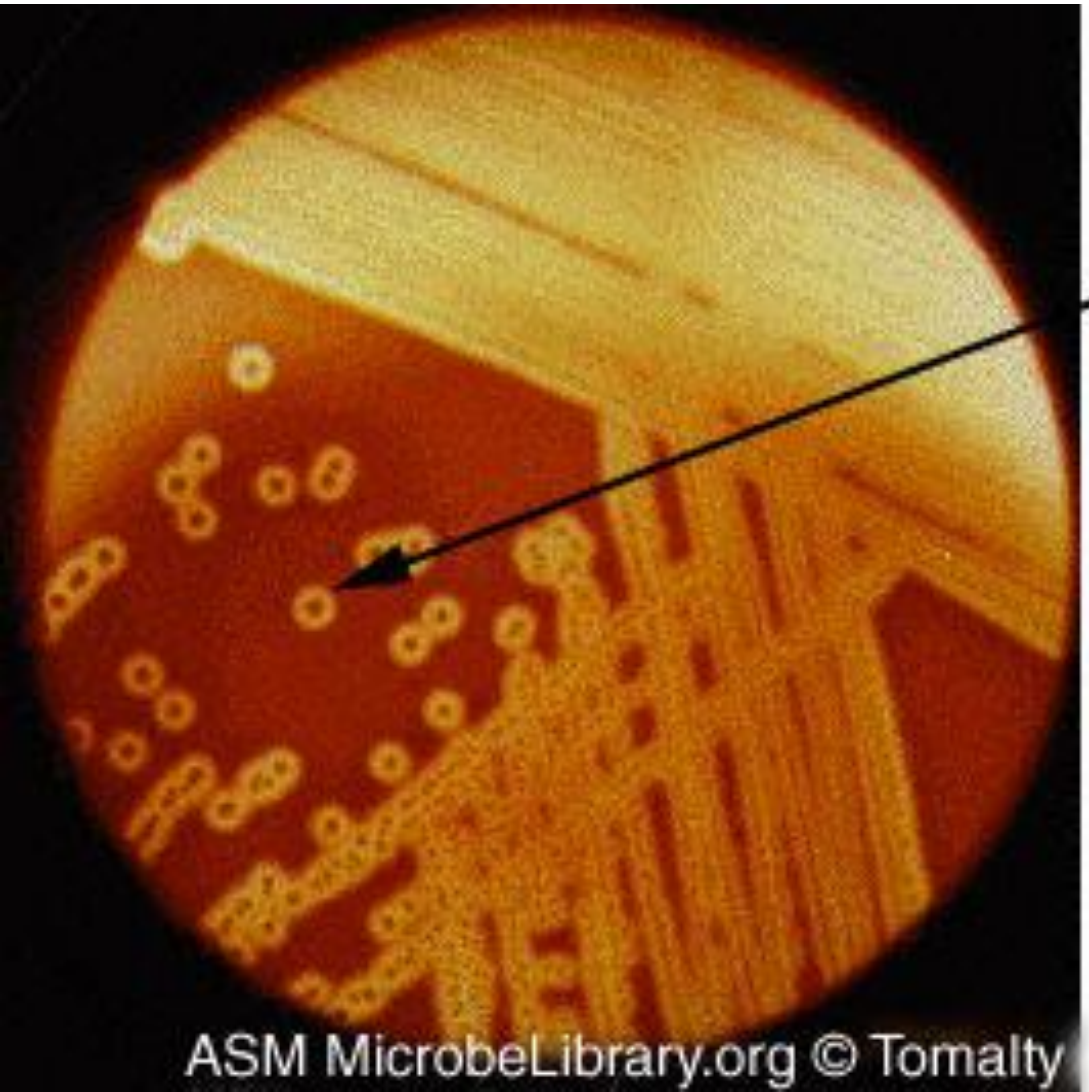
Opportunistic pathogen in immuno-compromised patients.. Mostly susceptible to β-Lactam drugs.



Streptococci-1

- **Viridans Streptococci Group**: Alpha-hemolytic/ Non-Hemolytic.. Normal respiratory flora.. Oral cavity.. opportunistic pathogen, Dental caries, Sepsis, Localized oral abscesses.. Common Endocarditis
- **Beta-hemolytic Streptococci Group**: Serogroups A, B, C, D, F, G.. Cell wall specific carbohydrates.. Respiratory flora.. 2-30 %Healthy Carries..Children
- **Group A Hemolytic Streptococci (S. pyogens)**: Most invasive & Pathogenic.. Virulence Factors.. Cell Wall antigens/ M Proteins.. Many Extracellular Enzymes.. Hemolysins, 80 Specific subtypes, Pyrogenic /Erythrogenic Toxin.. Superficial skin infection.. Scarlet fever.. Children..No Vaccine

Beta-Hemolytic Streptococcis- Susceptible for Bacitracin



S. pyogenes

Note the clear zone of beta-hemolysis surrounding the *Streptococcus* colonies when grown on blood agar.

Streptococci-2

- **Group A streptococcal** : Infections affect all ages with peak incidence at 5-15 years of age.. Acute Sore throat/ Pharyngitis, Skin infection, Sepsis, Otitis media, Sinusitis, Meningitis.
- Infection less common in Adults
- Few Healthy carriers over the years.
- Post streptococcal complications:
- A) Rheumatic Fever.. inflammatory disease affecting primarily the heart and joints after repeat infection.
- B) Glomerulonephritis.. immune complex disease affects the kidney.. Bloody urine..fatal disease
- **Group B Streptococci: (*S. agalactiae*)**

  Common in vaginal tract (5-20%).. Puerperal sepsis, Neonatal meningitis, Fatal ..Urinary Tract Infection.

Streptococci-3

- ***Streptococci pneumoniae*: G+ve Diplococcus**
- Capsule polysaccharides, 85 capsular serotypes..highly invasive, Antiphagocytic activity.. Common coloniser human nasopharynx.. Opportunistic pathogen
- Common cause of bacterial pneumonia (Community acquired), more pathogenic very young & old persons after RT viral infections
- Common cause of meningitis, Sinusitis, Otitis Media, Bacteremia, Young children, Immunocompromised persons.. up 50-90% *S. pneumonia* R-Penicillin in Jordan.. Specific vaccine for Adults & Children.. Protective 1-2-year.
- ***S. pneumoniae*** can be differentiated from V*iridans* streptococci Group.. Both alpha hemolytic using an G-Stain & Optochin test.
- **Group D/ Enterococcus:** *E. faecalis*, *E. faecium*.. Common in intestines Human-Animal.. opportunistic pathogen.. Urinary Tract Infect., Wound, Rare Sepsis, Endocarditis..

S. pneumoniae - Susceptible to Optochin in Lab test