O Microbiology 1 2025-2024

Dr.Saja Ebdah



Staphylococci

• Characteristics:

- Morphology: Gram-positive, non-motile, spherical cells ($\sim 1 \mu m$), arranged in grape-like clusters.
- Notable Species: Staphylococcus aureus, Staphylococcus epidermidis, Staphylococcus lugdunensis, and Staphylococcus saprophyticus.
 - ✓ *S. aureus* is coagulase-positive, while coagulase-negative staphylococci (CoNS) are part of the normal human microbiota.
- <u>Catalase Test</u>: Staphylococci are catalase-positive, which distinguishes them from catalase-negative streptococci.

• Structure and Physiology:

- Cell Wall Components:
 - <u>Peptidoglycan</u>: Activates immune response, chemoattractant for leukocytes, endotoxin-like activity, and activates complement.
 - MSCRAMMs: Microbial surface proteins (e.g., Protein A, clumping factor) aiding in host cell adhesion and virulence.
 - ✓ <u>Teichoic Acids</u>: Linked to peptidoglycan, antigenic.

• Epidemiology:

- > <u>Habitat</u>: Normal microbiota of skin, respiratory, and gastrointestinal tracts.
- Nasal Carriage: S. aureus is carried by 20-50% of people, with higher rates in hospital patients and healthcare workers.
- MRSA: Emerged in hospitals in the 1980s, now also found in community and livestock, affecting immunocompromised groups, elderly, and hospitalized patients.

Clinical Manifestations

1. Localized Infections:

- ✓ Impetigo: Pus-filled vesicles on erythematous bases.
- ✓ Folliculitis: Infection in hair follicles.
- ✓ Furuncles (Boils): Painful, pus-filled nodules.
- ✓ Carbuncles: Clusters of boils with systemic symptoms (fever, bacteremia).

2. Toxin-Mediated Diseases:

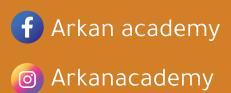
- Food Poisoning: Caused by ingestion of heat-stable enterotoxins, leading to nausea, vomiting, and diarrhea.
- ✓ Scalded Skin Syndrome: Skin desquamation in infants without organism presence in blisters.
- Toxic Shock Syndrome: Multisystem reaction with fever, hypotension, rash; requires rapid treatment.

3. Coagulase-Negative Staphylococcus (CoNS) Infections:

- Device-Related Infections: Prosthetic devices, catheters, and shunts are common sites, especially *S. epidermidis*, due to biofilm formation.
- Endocarditis: Particularly in artificial valves.
- Urinary Tract Infections: S. saprophyticus causes infections in young, sexually active women; other CoNS in catheterized patients.



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