



# Microbiology

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# Staphylococci

- **Characteristics:**

- **Morphology:** Gram-positive, non-motile, spherical cells (~1 µm), 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.
- **Catalase Test:** Staphylococci are catalase-positive, which distinguishes them from catalase-negative streptococci.

- **Structure and Physiology:**

- **Cell Wall Components:**
  - ✓ **Peptidoglycan:** 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.
  - ✓ **Teichoic Acids:** Linked to peptidoglycan, antigenic.

- **Epidemiology:**

- **Habitat:** 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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