**Gram-positive bacteria** are [bacteria](https://en.wikipedia.org/wiki/Bacteria) that give a positive result in the [Gram stain](https://en.wikipedia.org/wiki/Gram_stain) test. Gram-positive bacteria take up the [crystal violet](https://en.wikipedia.org/wiki/Crystal_violet) stain used in the test, and then appear to be purple-coloured when seen through a microscope. This is because the thick [peptidoglycan](https://en.wikipedia.org/wiki/Peptidoglycan) layer in the bacterial [cell wall](https://en.wikipedia.org/wiki/Cell_wall) retains the [stain](https://en.wikipedia.org/wiki/Stain_(biology)) after it is washed away from the rest of the sample, in the decolorization stage of the test.

Staphylococci and streptococci constitute the main groups of medically important gram-positive cocci. The most virulent of the genus, Staphylococcus aureus, is one of the most common causes of

* Bacterial infections,
* Food poisoning
* Toxic shock syndrome.

Staphylococcus epidermidis is an important cause of prosthetic implant infections.

Staphylococcus saprophyticus causes urinary tract infections, especially cystitis in women

**GENERAL FEATURES**

Staphylococci generally stain darkly gram positive. They are round rather than oval and tend to occur in bunches like grapes. Growth of staphylococci requires supplementation with various amino acids and other growth factors, they are routinely cultured on enriched media containing nutrient broth and/or blood Staphylococci are hardy, being resistant to heat and drying, and thus can persist for long periods on fomites, which can then serve as sources of infection

***Staphylococcus aureus***

Generally, significant host compromise is required for S. aureus infection, such as a break in the skin or insertion of a foreign body (for example,wounds, surgical infections, or central venous catheters). an obstructed hair follicle (folliculitis),Disease may be: 1) largely or wholly the result of actual invasive infection .2) A result of toxins in the absence of invasive infection (“pure” toxinoses) . or 3) a combination of invasive infection and intoxication

**Epidemiology**

S. aureus is frequently carried by healthy individuals on the skin and mucous membranes. Carriers serve as a source of infection to themselves and others;

**Pathogenesis**

S. aureus expresses many potential virulence factors

**c. Fibronectin-binding protein:** promote binding to mucosal cells and tissue matrices.

**d. Clumping factor A**: or **ClfA**, is a [virulence factor](https://en.wikipedia.org/wiki/Virulence_factor) from  (*S. aureus*) that binds to It is responsible for the clumping of [blood plasma](https://en.wikipedia.org/wiki/Blood_plasma) observed when adding *S. aureus* to human plasma.

**2. Cytolytic exotoxins:** α, β, γ, and δ Toxins attack mammalian cell

**3. Panton-Valentine leukocidin:** This pore-forming toxin lyses PMNs. Production of this toxin makes strains more virulent.

**4. Superantigen exotoxins:** These toxins have an affinity for the Tcell receptor–major histocompatibility complex Class II antigen complex. This major T-cell activation can cause toxic shock syndrome, primarily by release into the circulation of inordinately large amounts of T-cell cytokines, such as interleukin-2 (IL-2), interferon-γ (IFN-γ), and tumor necrosis factor-α (TNF-α).

**1. Localized skin infections:**

The most common S. aureus infections are small, superficial abscessesinvolving hair follicles (folliculitis) or sweat or sebaceous glands ). For example, the common sty (external hordeolum) Subcutaneous abscesses called furuncles (boils)

Carbuncles are larger, deeper, multiloculated skin infections Impetigo is usually a localized, superficial, spreading crusty skin lesion generally seen in children.

**2. Deep, localized infections:**

S.aureus is the most common cause of acute and chronic infection of bone marrow. S. aureus is also the most common cause of acute infection of joint space in children (septic joint).

**3. Acute endocarditis**:

**4. Septicemia**.

**5. Pneumonia.**

**6. Nosocomial infections:** S. aureus is one of the most common causes of hospital-associated infections, often of wounds or bacteremia associated with catheters

**Lab diagnosis:**

Gram stain

Colonial Morphology on agar.

Catalase test

Coagulase test

mannitol-positive.

**Treatment**

Serious S. aureus infections require aggressive treatment, including incision and drainage of localized lesions, as well as systemic antibiotics. Doctor may perform tests to identify what type of staph bacteria is behind the infection, and to help choose the antibiotic that will work best. Antibiotics commonly prescribed to treat staph infections include certain cephalosporins, nafcillin or related antibiotics, sulfa drugs or vancomycin.

**Prevention**

There is no effective vaccine against S. aureus. Infection control procedures, such as barrier precautions and disinfection of hands and fomites, are important in the control of nosocomial S. aureus epidemics

**COAGULASE-NEGATIVE STAPHYLOCOCCI**

**A. *Staphylococcus epidermidis***

is present in large numbers as part of the normal flora of the skin . Despite its low virulence, it is a common cause of infection of implants such as heart valves and catheters. Acquired drug resistance by S. epidermidis is even more frequent than by S. aureus. Vancomycin sensitivity remains the rule, S. epidermidis produces an extracellular polysaccharide material called polysaccharide intercellular adhesin (sometimes called “slime”), that facilitates adherence to bioprosthetic material surfaces, such as intravenous catheters, and acts as a barrier to antimicrobial agents.

**B. *Staphylococcus saprophyticus***

This organism is a frequent cause of cystitis in women, It tends to be sensitive to most antibiotics, even penicillin G. S. saprophyticus can be distinguished from S. epidermidis and most other coagulase-negative staphylococci by its natural resistance to novobiocin