Lecture 10. Staphylococci cont.

Learning objectives

Upon completion of this lecture, student should be able to:

1. Describe the general characteristics of coagulase-negative staphylococci.
2. List and describe virulence factors of coagulase-negative staphylococci.
3. Distinguish characteristics of *S. aureus, S. epidermidis and S. saprophyticus*.

Coagulase negative staphylococci

Coagulase-negative staphylococci (CONS) are the **normal flora of the skin**.

CONS are **opportunistic bacteria**.

- They cause infections in **debilitated** or **immunocompromised** patients and in patients fitted with **urinary catheters**, **cardiac valves**, **pacemakers**, and **artificial joints**.

CONS of medical importance include:

- ***S. epidermidis***
- ***S. saprophyticus***

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	S. epidermis	*S. saprophyticus*
Virulence Factors	Exopolysaccharide "slime" or biofilm; antiphagocytic Exotoxins	Uncertain
Causes	Endocarditis in patients with prosthetic valves, intravenous catheter infections, CSF infections. Sepsis in neonates, osteomyelitis, wound infections, vascular graft infections, and mediastinitis	Urinary tract infections in sexually active, young women; infections in sites outside urinary tract are not common
Treatment	Vancomycin is the drug of choice for treatment	Can be treated with quinolones (such as norfloxacin)

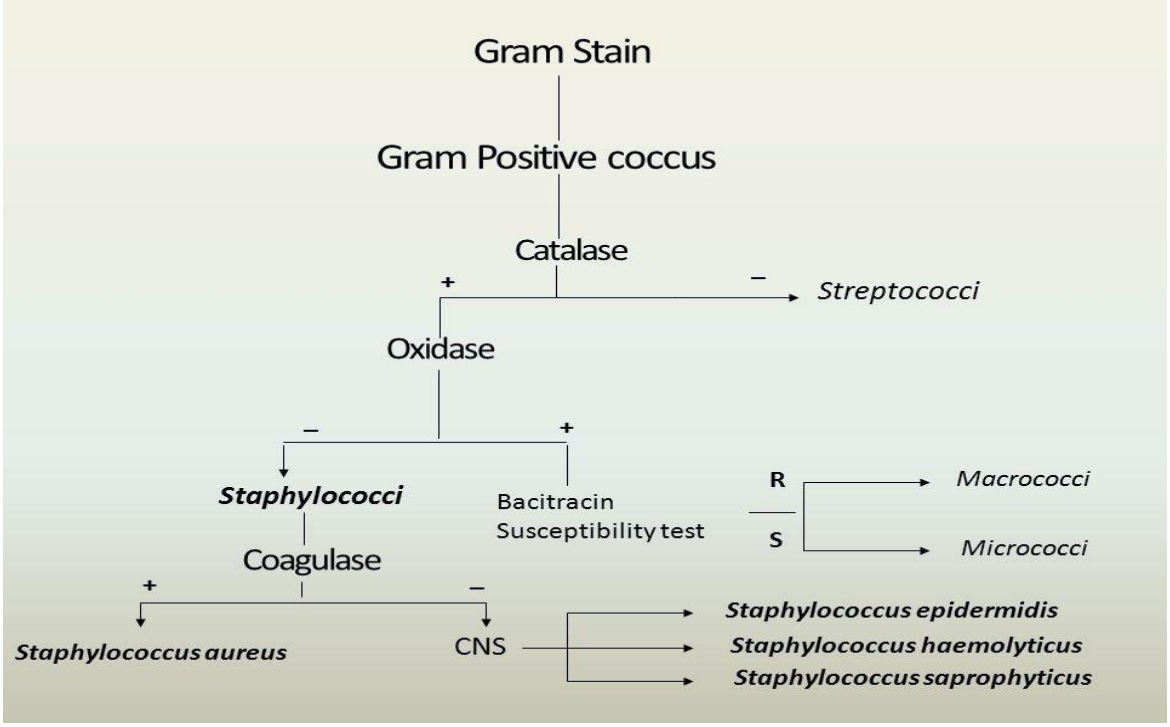
Laboratory diagnosis

Laboratory diagnosis of staphylococcal infections is based on the demonstration of staphylococci, in appropriate clinical specimens, by **microscopy** and **culture**.

Clinical specimens; pus, sputum, blood, feces and vomitus, urine, and nasal swab.

The identifying features of S. aureus

1. *S. aureus* are **Gram-positive cocci** arranged in irregular **grape-like clusters**.
2. On **nutrient agar**, *S. aureus* colonies produce characteristic **golden yellow colonies**.
3. On **blood agar**, *S. aureus* produces a **clear zone of hemolysis** (**beta-hemolysis**).
4. *S. aureus* are **coagulase positive**, **phosphatase positive**, **DNAase positive**, and **mannitol positive**.



Treatment

- **Skin** and **soft tissue infections** are treated best with local wound care with or without topical antibiotics (e.g., **neomycin**).
- **Staphylococcal abscess** are treated with **spontaneous** or **surgical drainage** of pus and **debridement of necrotic tissue**.
- **Deep-seated** and **systemic infections** are treated with **systemic antibiotics**.

Methicillin resistant *Staphylococcus aureus*

- Methicillin-resistant *S. aureus* (MRSA) denotes resistance to penicillin, as well as to all other beta-lactam antibiotics including cephalosporins and carbapenems.
- Resistance to methicillin is due to the production of a **novel PBP**, designated as **PBP 2a**.
- MRSA strains can be treated with **glycopeptide antibiotics**, such as **vancomycin** and **teicoplanin** in serious systemic infections, such as **pneumonia**, **bacteremia**, and **endocarditis**.

Epidemiology

Staphylococcal infections are found throughout the world; nearly one-third of the adult population is asymptomatic carrier of staphylococci.

Staphylococcal infections may be acquired through:

1. **Self-inoculation** from nose or other sites in patients who harbor staphylococci (**endogenous infection**)
2. **Direct contact** with infected **humans**, **carriers**, and less frequently, animals (**exogenous infection**).
    - Exogenous infection can also be acquired by close contact with infected **fomites** or inhalation of **air droplets** in heavily contaminated environment.