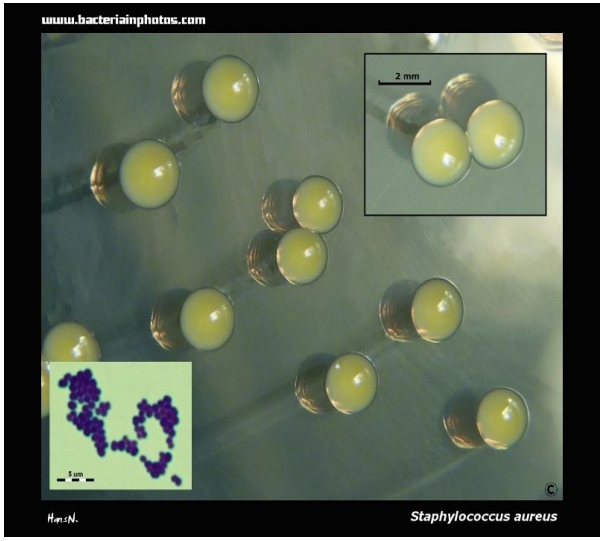
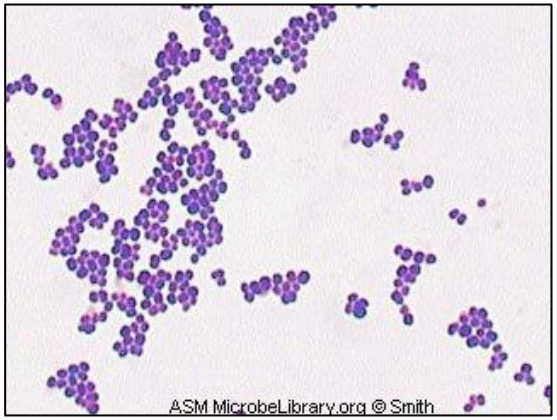
Medical Bacteriology- Lecture 5

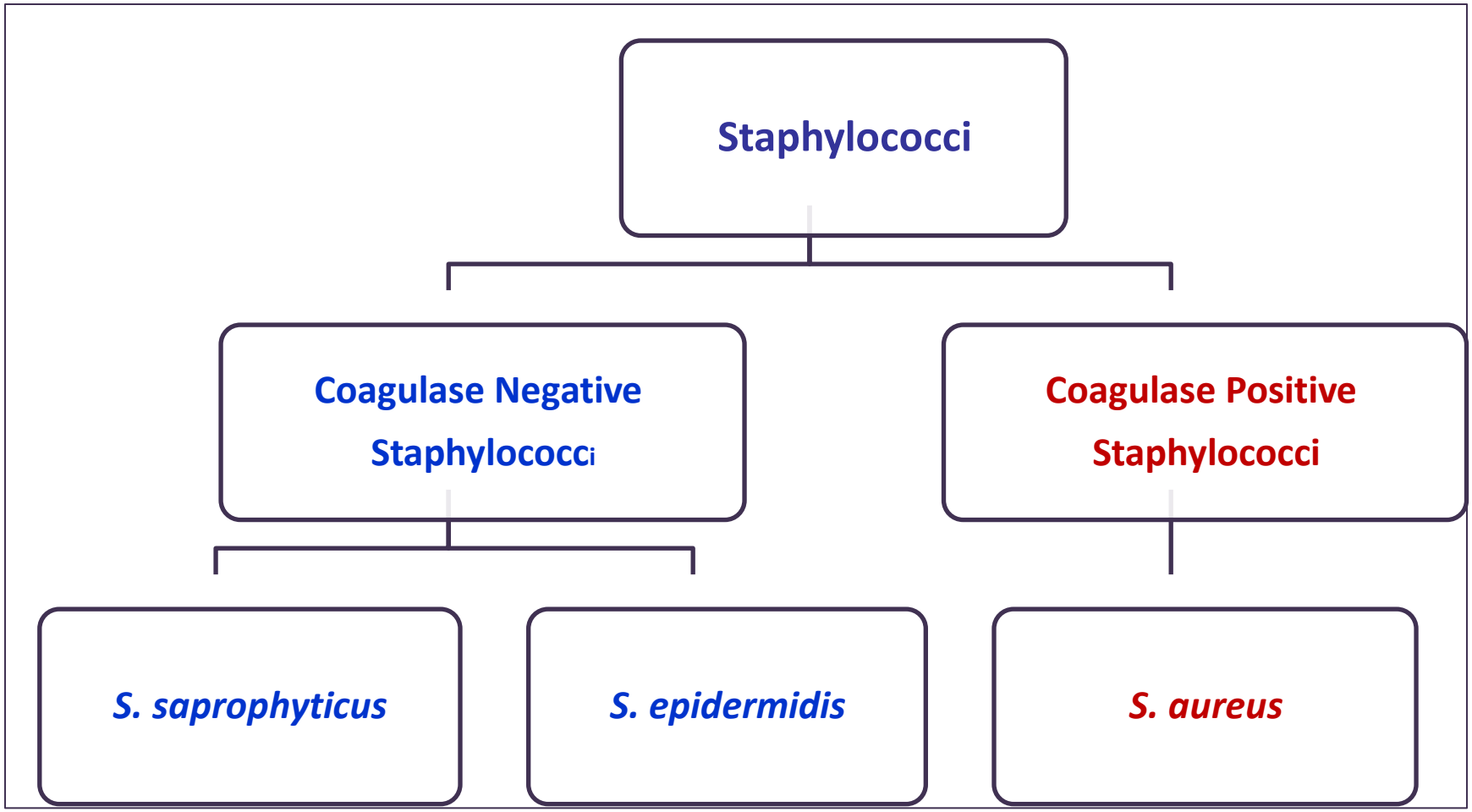
Staphylococci





Manal M. Alkhluaifi

Staphylococci



Important Phenotypic Characteristics of Staphylococci

- **Gram-positive**
- **Cocci, grape- like clusters**
- **Catalase-positive.**
- Grow at **15 % NaCl** concentrations.
- Facultative anaerobes (respiration or fermentation)
- fermentation of glucose produces mainly lactic acid.
- Optimum temperature at 37°C
- Non Fastidious

Staphylococci

- **Medically Important Staphylococci Species:**

- **Coagulase Positive Staphylococci (CoPS)**

S. aureus

- normal flora of nares
- **potential pathogen**
- **Causes nosocomial infections**

Staphylococci

- **Medically Important Staphylococci Species:**

- **Coagulase Positive Staphylococci:**

S. epidermidis and *S. saprophyticus*

- normal flora of human skin and mucous membranes
- **Causes nosocomial infections**
- Less virulence
- Major virulence factor of ***S. epidermidis*** is **Biofilm** (adherence)
- ***S. saprophyticus*** is a leading cause of **cystitis in young women.**

Pathogenesis of *S. aureus*

- causes a variety of **suppurative** and **toxigenic infections:**

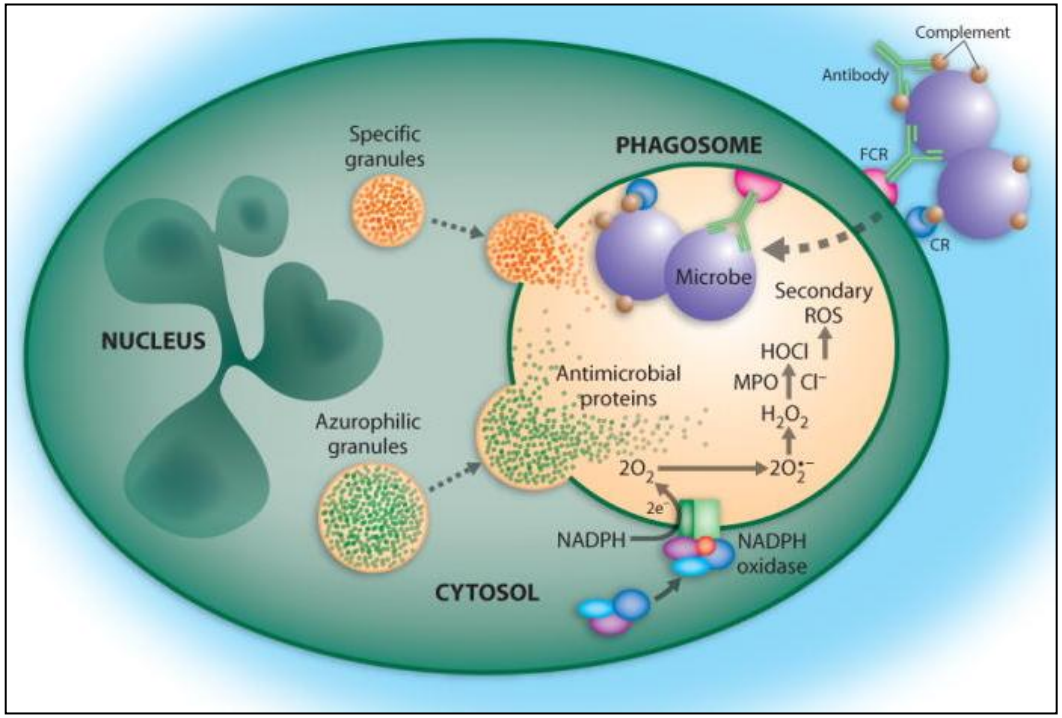
- **Superficial skin lesion** **(Boils, furuncles)**
- **Serious skin infections** (**Impetigo), (Staphylococcal scalded skin syndrome)**
- **Deep infections** (**Pneumonia Osteomyelitis, endocarditis, meningitis**
- **hospital acquired infections**
- **Toxigenic infections** **(Food Poising) , (toxic shock syndrome)**
- **Serious consequences of staphylococcal infections** **(Septicemia or Bacteremia)**

S. aureus Virulence factors

- **Surface proteins** for adherence such as; (**laminin** & **fibronectin).**
- **Invasins** (**leukocidin**, **kinases**, **hyaluronidase), Dnase**, **Lipases** .
- **Surface factors** Inhibit phagocytic engulfment (**capsule**, **Protein A**).
- **Biochemical properties** Enhance survival in phagocytes
- **(Staphyloxanthin**; antioxidant carotenoid pigment) (**Catalase production)**
- **Immunological disguises** (**Protein A**, **coagulase**)
-
- **Membrane-damaging toxins (Hemolysins**, **Leukocidin)**
- **Exotoxins** **Staphylococcal enterotoxins (SEA)**
- **Toxic shock syndrome toxin** (**TSST)**
- **Exfoliative toxins (Ets)**
- **Panton-Valentine Leukocidin (PVL).**
- **Resistance to antimicrobial agents**

Host Defense against Staphylococcal Infections

- **Phagocytosis**
- **Antibodies**



Treatment

- **MRSA** can be treated with **vancomycin** or an alternative.
- Some MRSA are **resistant to vancomycin (VRSA).** The infections treated with combination therapy using sulfa drugs and or rifampin.
- **Coagulase negative Staphylococci** are resistant to **methicillin**.
- **Vancomycin** is the most common antibiotic used to treat infections caused by CoNS-; if they not resistant.
- **Rifampin and gentamicin** may be added to prevent antibiotic resistance.

- **Vaccines**
- No vaccine available

Comparison between Coagulase Positive and Coagulase Negative Staphylococci

	S. aureus	*S. epidermidis*	*S. saprophiticus*
Hemolytic	Beta hemolytic	Non hemolytic	Non hemolytic
Mannitol Fermentation	Ferment	No ferment	No ferment
Coagulase enzyme	Produce coagulase	Not produce	Not produce
Pigment production	yellow (golden) colony	small white colony	small white colonies
DNase production	produce	none	none
Novobiocin	Sensitive	Sensitive	Resistant
Habitat	nose	skin	skin