Pathogenic Microorganisms

3rd Class Module

Lecture

Pathogenic Mechanism of *Staphylococcus aureus*

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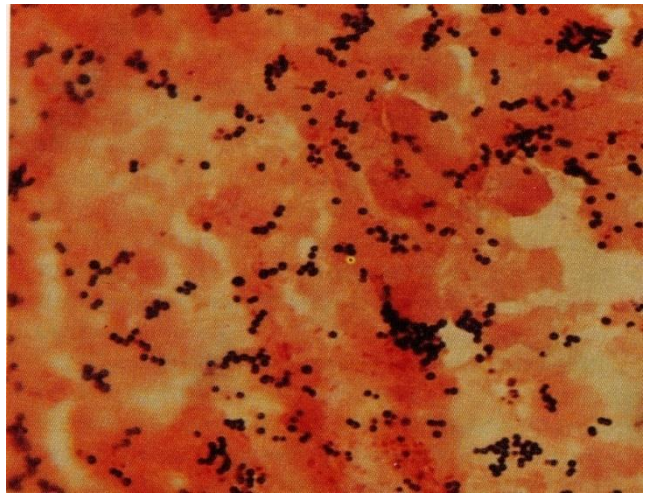
Staphylococcus: General Characteristics



- Gram-positive spherical cells (0.5-1.5 mm) in singles, pairs, and clusters
- Appear as “bunches of grapes”
- Non motile
- Non–spore-forming
- Nonencapsulated
- Catalase-producing
- Oxidase: negative
- Glucose fermenters
- Primarily aerobic, some facultatively anaerobic

Classification

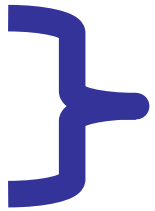
- Based on pigment production:
  - *S.aureus* :-golden-yellow pigmented colonies
  - *S.albus* :- white colonies
  - *S.citrus* :-lemon yellow colonies

S. albus , S. aureus , S. citrus on Nutrient Agar

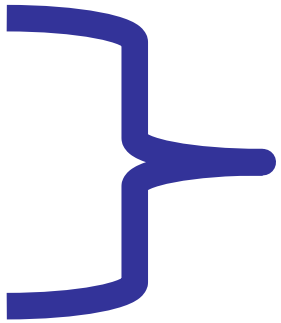
- Based on pathogenecity:
  - Pathogenic:- includes only one i.e., *S.aureus*
  - Non-pathogenic:- includes *S.epidermidis, S.saprophyticus, S.albus, S. citrus, S.hominis,etc*.
- Based on coagulase production:
  - Coagulase positive: *S. aureus*
  - Coagulase negative: *S. epidermidis, S. saprophyticus*

Coagulase Positive Staphylococci

- ***S. aureus***
- *S. intermedius*
- *S. hyicus*
- *S. delphini*
- *S. schleiferi*



Human pathogens

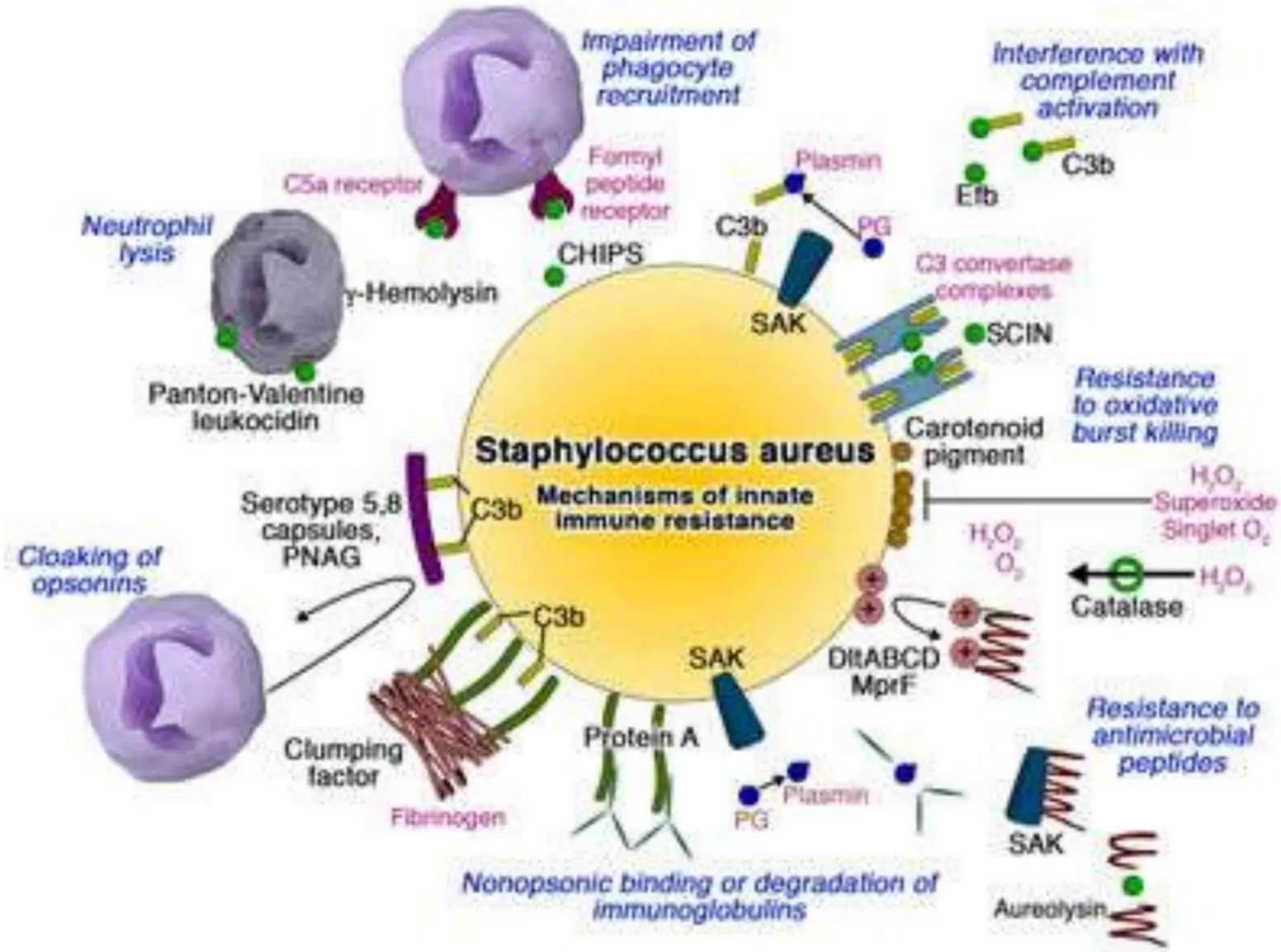


Animal-associated species

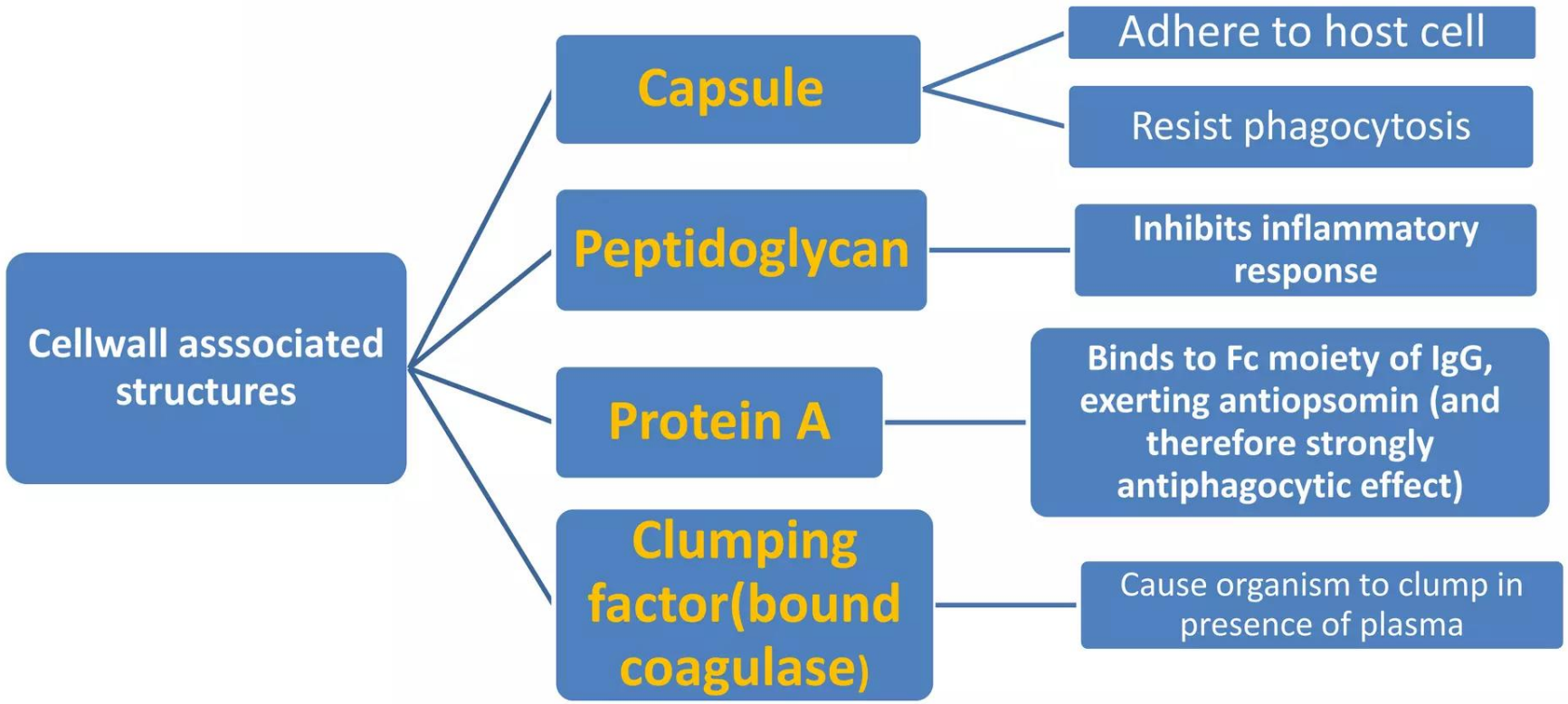
Virulence Factors

Cellwall associated structures	Extracellular toxins	Coagulase
• Peptidoglycan • Capsule • proteinA • Clumping factor (bound coagulase)	• Haemolysin • Leukocidin • Enterotoxin • TSST • Exfoliatin toxin	• staphylokinase • DNAase • Phosphatase • lipase • Phospholipase • hyaluronidase • serokinase • protease

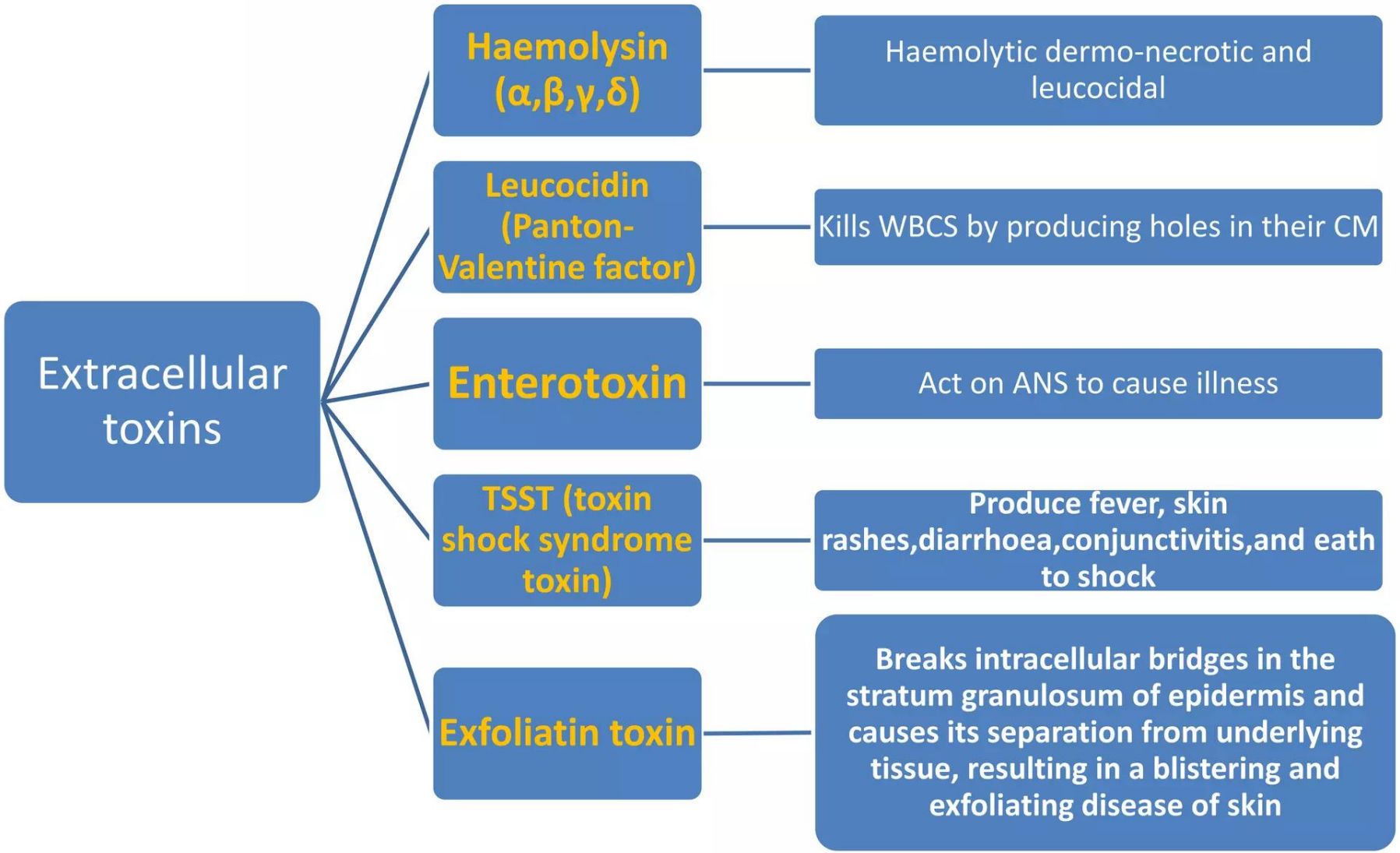
Virulence Factors



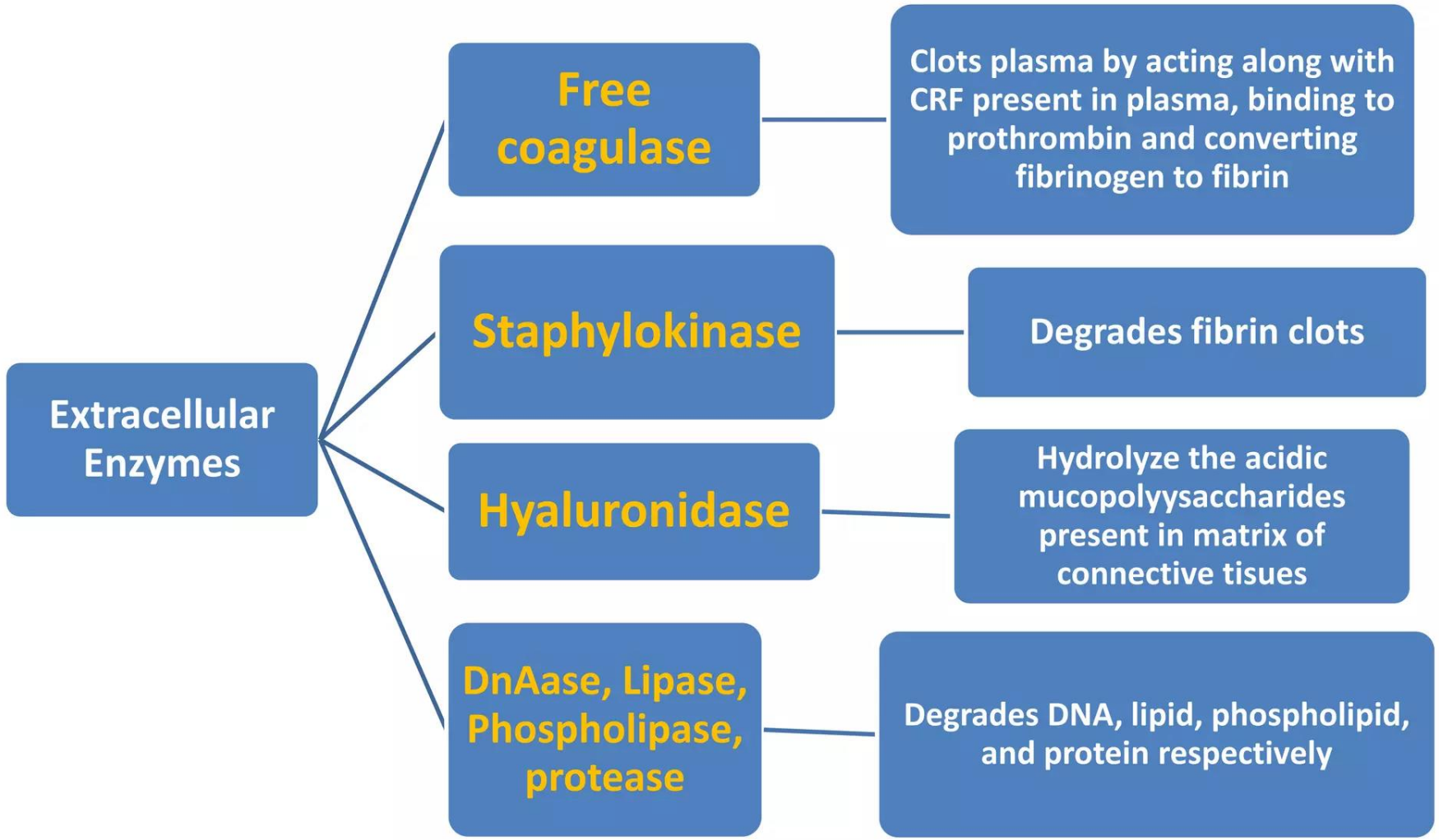
Virulence Factors(contd....)



Virulence Factors(contd....)



Virulence Factors(....contd)



Pathogenesis

- Adhere to damaged skin, mucosa or tissue surfaces
  - At these sites, they evade defence mechanisms of the host, colonize and cause tissue damage
- *S.aureus* produces disease by
  - Multiplying in tissues
  - Liberating toxins,
  - Stimulating inflammation

Clinical Syndromes

1. Cutaneous Infection

– Folliculitis (It is inflammation of the hair follicles)

– Boils/furuncles (Furuncle is deep seated infection, originating from folliculitis,(if infection extends from follicle to neighbour tissue). Causes redness, swelling, severe pain. Commonly found on the neck, armpit and groin regions.

– Carbuncle (Carbuncle: Carbuncle is an aggregation of infected furuncles).

– Impetigo (a very superficial skin infection common in children, usually produces blisters or sores on the face, neck, hands, and diaper area).

– Wound infections

2. Deep infections

– Osteomyelitis(inflammation of bone. Bacteria can get to the bone – Via bloodstream – Following an injury

– Periostitis (inflammation of periosteum)

– endocarditis (It is an inflammation of the inner layer of the heart, the endocardium)

Clinical Syndromes

3. Exfoliative diseases (scaling off tissues in layers) • Also known as ‘Staphylococcal skin scalded syndrome.

4. Toxin shock syndrome (Caused when Toxin shock syndrome toxin (TSST) liberated by *S.aureus* enters bloodstream).

5. Staphylococcal food intoxication(Poisoning • Caused when consuming food in which *S.aureus* has multiplied and formed endotoxin).

Mode Of Transmission