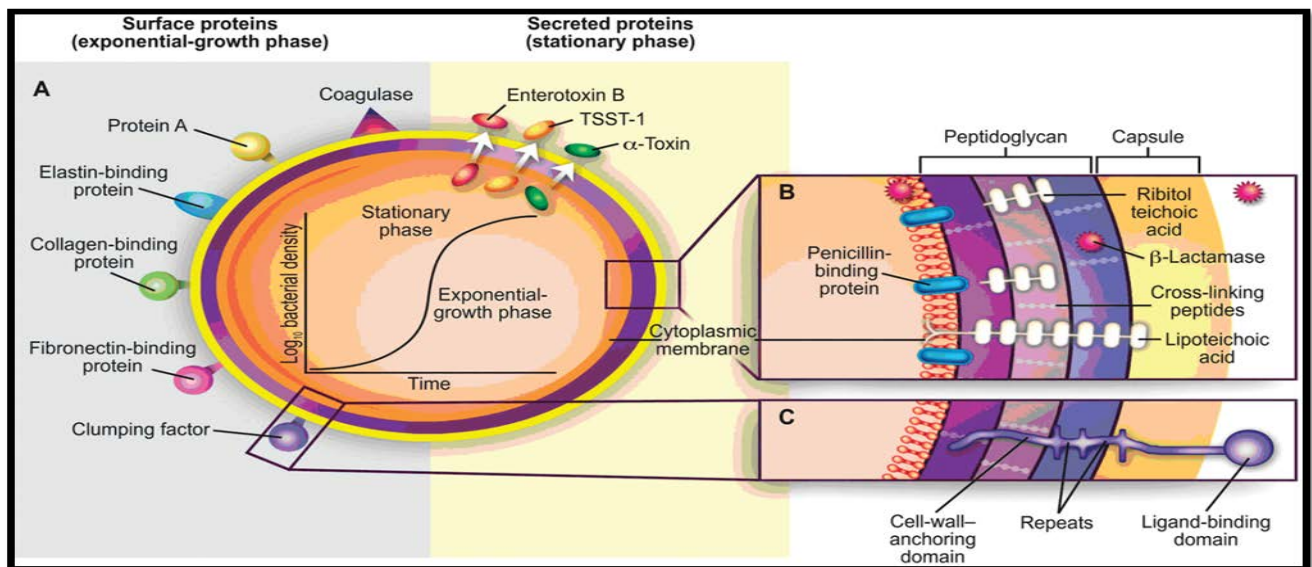


Role of biofilm formation in antibiotic resistance of clinical *Staphylococcus aureus*

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S. aureus is a gram-positive coccus occurring singly or in irregular clusters. The bacteria produce a carotenoid pigment resulting in golden-colored colonies, giving rise to the species epithet aureus (meaning golden). They are chemoorganotrophs with both respiratory and fermentative metabolism.

The broad range of infections caused by *S. aureus* is related to a number of virulence factors (Figure below) that allow it to adhere to surface, invade or avoid the immune system, and cause harmful toxic effects to the host.



Staphylococcus aureus is both a commensal and an extremely versatile pathogen in humans, causing three basic syndromes: (i) superficial lesions such as skin abscesses and wound infections; (ii) deep-seated and systemic infections such as osteomyelitis, endocarditis, pneumonia, and bacteremia; and (iii) toxic syndromes such as toxic shock syndrome (TSS) and staphylococcal scarlet fever

(both due to toxic shock syndrome toxin 1 [TSST-1] and staphylococcal enterotoxins [SEs]), staphylococcal scalded-skin syndrome (SSSS; due to exfoliatins), and staphylococcal food poisoning (due to SEs).

Antimicrobial resistance is one of the greatest threats to human health worldwide. It dramatically reduces the probability of effectively treating infections and increases the morbidity and mortality associated with common bacterial diseases.

Biofilms, matrix-enclosed microbial accretions that adhere to biological or non-biological surfaces, represent a significant and incompletely understood mode of growth for bacteria. Microorganisms attach to surfaces, start multiplying, and develop biofilms.

Microorganisms growing in a biofilm are highly resistant to antimicrobial agents by one or more mechanisms. The biofilms protect the cells not only from host immune response but also from antimicrobial agents. Therefore, once biofilm-associated *S. aureus* infections occur, they are difficult to be treated by conventional procedures.