Staphylococcus aureus Disease

Staphylococcus aureus is a gram-positive cocci that literally means “golden grape cluster berry” due to its clustered appearance on gram stain. It is frequently found as normal flora on the skin and nasal passages but can cause a wide range of illnesses from minor skin infections to life-threatening diseases like pneumonia, osteomyelitis, and endocarditis. Staph aureus can cause a variety of skin infections including pimples, impetigo, furuncles, cellulitis, and abscesses. It can also cause severe pneumonia. Individuals are particularly susceptible to pneumonia caused by Staph aureus following viral influenza. This bacteria can also cause disease mediated by toxins. Some strains produce the exotoxin TSST-1, which causes toxic shock syndrome. This toxin acts as a super antigen which simultaneously binds MHC II and T cell receptors causing polyclonal T cell activation. Some strains produce an enterotoxin causing food poisoning. Staph aureus food poisoning presents as a rapid onset of symptoms due to ingestion of preformed toxins. Some produce exfoliative toxin, which are proteases that cleave desmoglein-1, which can cause detachment of the granulosum and spinosum layers in the epidermis. Staph aureus can also cause a life threatening acute bacterial endocarditis and osteomyelitis.



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Skin Infections
Skin-suit with Infectious-bacteria
Staph aureus can cause a variety of skin infections including pimples, impetigo, furuncles, cellulitis, and abscesses.

Impetigo
Emperor-tiger
This acute, highly contagious infection of the superficial layers of the epidermis is primarily caused by Staphylococcus aureus (or Streptococcus pyogenes). Patients typically display red sores around the nose and mouth with yellow-brown crusting.

Abscesses
Abscess-guy
Staph aureus is a common pathogen isolated in skin abscesses.

Exfoliative Toxin
Exfoliating-skin with Toxic-green-glow
Some strains produce exfoliative toxin, which are proteases that cleave desmoglein-1.This can cause detachment of the granulosum layer in the epidermis. The stratum spinosum and stratum basale skin layers are protected by desmoglein-3 attachments that the toxin proteases are unable to cleave.

Scalded Skin Syndrome
Scalded skin
Scalded skin syndrome is a syndrome caused by exfoliative toxin released by Staph aureus. This toxin causes detachment within the epidermal skin layer, causing widespread formation of fluid filled blisters that easily rupture on the skin. This syndrome is commonly seen in newborns or children.

Toxic Shock Syndrome (TSST 1)
Toxic-green Shocked Tampon
Some strains produce the exotoxin TSST 1, which causes toxic shock syndrome. Individuals with toxic shock syndrome commonly present with high fever, low blood pressure, and confusion and can rapidly progress to stupor and coma. There is often a characteristic rash that resembles a sunburn early in the course of illness. Toxic shock syndrome is commonly associated with tampon use in menstruating females, especially when the tampon is left in the vaginal canal for too long.

Binds to MHC II and T Cell Receptor
MHC-complex with (2) Tutu and Tennis-balls
The toxin TSST 1 acts as a super antigen, which simultaneously binds MHC II and T cell receptors, causing polyclonal T cell activation.

Food Poisoning
Food Poison-bottle
Some strains produce an enterotoxin causing food poisoning. Staph aureus food poisoning presents as a rapid onset of symptoms due to ingestion of preformed toxins.

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Acute Bacterial Endocarditis

Bacteria-guy with In-donut-heart-cards

Staphylococcus is the most common cause of acute bacterial endocarditis. The bacterium can enter the bloodstream from skin in patients who inject illicit drugs or have an intravenous catheter. Patients become ill very quickly and the bacterium can rapidly destroy an infected heart valve, causing murmurs and heart failure.

Pneumonia

Nude-Mona

Staph aureus can cause severe pneumonia. Individuals are particularly susceptible to pneumonia caused by Staph aureus following viral influenza.

Osteomyelitis

Skeleton-in-flames

Osteomyelitis is an infection of the bone or bone marrow. Staphylococcus aureus is the most common causative agent of osteomyelitis in previously healthy individuals.

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