Staphylococcus epidermidis

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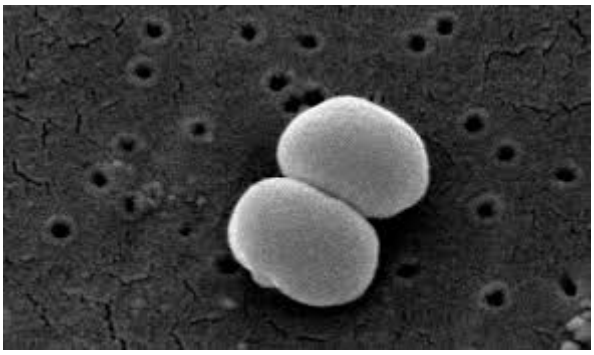


Other Names: *Micrococcus epidermidis, Albococcus epidermidis, Staphylococcus epidermidis albus*

Kingdom	Bacteria
Group	firmcuties
Subgroub	Bacilli
Size	2.76 (Mb)

Related to: Coagulase negative staphylococci (CoNS)

Microbiology:

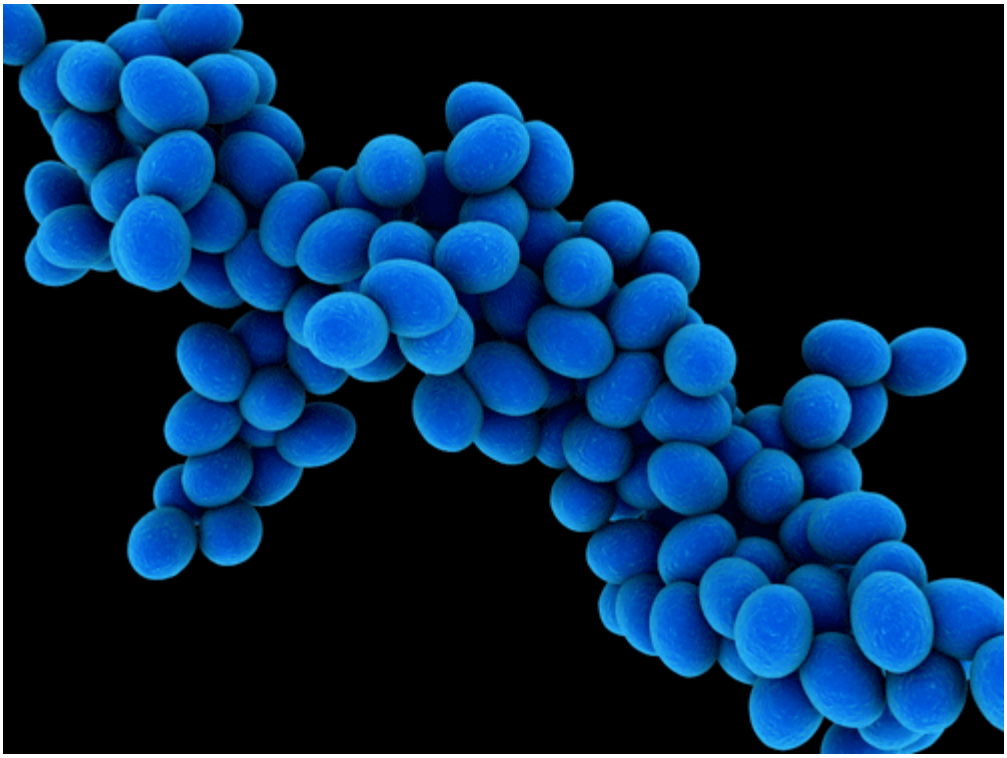
Staphylococcus epidermidis is Gram-positive coccus. The organism uses sophisticated regulatory networks to adapt its metabolism to suit varying environment condition .S. epidermidis relies on biofilm formation to protect cells from the host immune system and other anti-microbial molecules.

Habitat and transmission:

S. epidermidis is a permanent and ubiquitous coloniser of the skin and mucosa of humans. *S. epidermidis* has a probiotic balance effect on the skin microflora. It is thought that any person could

carry between 10 and 24 strains of *S. epidermidis*at any given time. Although generally seen to be a commensal organism it has become a highly significant cause of hospital-acquired infections, particularly in patients with in-dwelling devices.

Genome structure

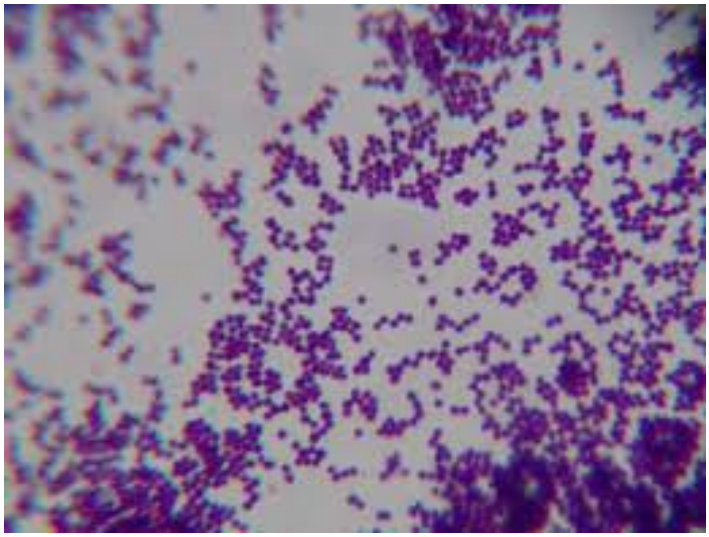


Random shotgun method was used to completely sequence the ~2.6-Mb genome S. epidermidis RP62a at The Institute for Genomic Research (TIGR) (7). RP62A's chromosome length is 2,616,530bp, contains 32.10% of G+C content, 6 rRNA operons and plasmid with 28,080bp and 32% G+C content (11). Two plasmids vSe1 and vSe2 were identified in the strains RP62a and ATCC 12228 and have phrophage integrase genes. The plasmid vSe1 have genes for cadmium resistance whereas a second strain-specific sortase and two LPXTG surface attachment proteins is .(encoded by vSe2 of ATCC 12228 (7

S. epidermidis RP62A genome was compared to ATCC 12228 genome to analyze and discover the evolution of the virulence and resistance of

them. The nonsyntenic parts of the genome islands are where the differences of resistance and pathogenicity are located. Staphylococci and low-GC-content gram-positive bacteria assisted in changing their virulence and resistance. The cap operon which is the top virulence .(factor in Bacillus anthracis is also found in S. epidermidis (7

Cell structure and metabolism



When compared to other bacteria such as micrococcus, *S. epidermidis*' cell wall is much stronger. The addition of lysostaphin can differentiate *S. epidermidis* from micrococcus. Micrococcus is more likely to lyse whereas the cell wall of *S. epidermidis* contains chemical properties of the peptidoglycan that prevent it from lysis. There are endopeptidases that cut the glycl-glycine bonds in the penta or hexpeptide crossbridge of the peptidoglycan of *S. epidermidis*. The strains that contain serine in the interpeptide bridges are more resistant to lysis

The cell wall of Staphylococci contain teichoic acids which are connected to the peptidoglycan by covalent bonds. The teichoic acids are composed of either glycerol or ribitol which are connected by phosphodiester bonds. They are water soluble polymers made up of 30-50% of the dry components of the cell. *S. aureus* and *S. epidermidis* can be distinguished by having ribitol or glycerol. *S.*

epidermidis has glycerol teichoic acid glucosyl residues while *S. aureus* has N-acetylglucosamine ribitol teichoic acid

S. epidermidis is capable of growing using glucose anaerobically but cannot create coagulase or ferment mannitol. Most strains of *S. epidermidis* make acetoin, phosphatase and reduce nitrate. With oxygen, all strains can produce acid when exposed to glucose, fructose, maltose, sucrose, and glycerol and 70%-90% with galactose, mannose, and lactose. Acid cannot be formed from mannitol, trehalose, rhamnose, xylose, or arabinose .

Ecology

The natural environment of *S. epidermidis* is the human body and usually originates from disease. Since the bacteria usually lives on the skin and nares of all human beings and is a nosocomial pathogen, it is imporant to be able to identify the specific strains. *S. epidermidis* is the most common staphylococcus on the human skin. In addition, *S. epidermidis* also covers 90%-100% staphylococci from the nares when *S. aureus* is not present

Pathogenicity

S. epidermidis causes biofilms to grow on plastic devices placed within the body.This occurs most commonly on intravenous catheters and on medical prosthesesInfection can also occur in dialysis patients or anyone with an implanted plastic device that may have been contaminated. Another disease it causes is endocarditis. This occurs most often in patients with defective heart valves. In some other cases, sepsis can occur in hospital patients

Treatment

Antibiotics are largely ineffective in clearing biofilms. The most common treatment for these infections is to remove or replace the infected implant, though in all cases, prevention is ideal. The drug of choice is often vancomycin, to which rifampin or aminoglycoside can be added. Hand washing has been shown to reduce the spread of infection