Medically Important Gram Positive Bacteria: Non-Spore Forming

**Staphylococcus**

- *Staphylococcus* is a class of Gram-positive, coccii bacteria of the Staphylococcaceae family
  - These can then be divided up into ~40 species
  - They are usually found in grape-like clusters

- Most species of *Staphylococcus* are harmless and reside normally on the skin and mucous membranes of humans and other organisms, some more virulent strains include:
  - **S. aureus**
    - This is one of the more virulent strains of the genus
    - It can cause a variety of conditions depending on the site of infection
    - 15-35% of people actually harbour *S. aureus* on their skin
    - The species is spread by direct contact and can often be found in the nose and on the skin
  - **S. epidermidis**
    - This species is part of the normal skin and, less commonly, mucosal flora of humans
    - It can however become pathogenic during times of immunocompromising
    - The species can reside off the body on plastic containers etc. such as IV lines and catheters
      - This makes infection of *S. epidermidis* become associated with artificial implants and prosthetics

- *Staphylococcus* is a non-motile genus of bacteria due to their lack of flagellum or pilus for movement
  - The genus is also part of a family of facultative anaerobes
    - This means that the bacteria utilise oxygen to produce ATP, however, it can switch to anaerobic respiration when oxygen is absent
  - *Staphylococcus* are opportunistic pathogens, meaning they infect a host when their immune system is compromised. An example of this is during AIDS

- The structure of this particular genus of bacteria is interesting as it can be quite dangerous with its products:
  - *Staphylococcus* have the ability to synthesise the enzyme catalase. This will catalyse the breakdown of hydrogen peroxide to oxygen and water
    - This is useful to scientists as it allows the differentiation between *Streptococcus*, a genus of bacteria that does not produce H₂O₂
  - The bacteria are also salt tolerant and so are able to live comfortably on human skin
  - They can tolerate intense radiation and heat and so can be quite hard to destroy

- Pathogenicity of a microorganism results from 3 features:
  - The production of enzymes
  - An ability or structure that enables the organism to evade phagocytosis
    - *Staphylococcus* does this by producing coagulase. This allows the bacteria to hide in blood clots
    - It can also hide from them by producing slime layers which enable them to remain unseen
  - The production of toxins

- *Staphylococcus* can cause a number of diseases such as:
  - Food poisoning by the ingestion of enterotoxin-containing food
  - Scalded skin syndrome
  - Impetigo
  - Toxic shock syndrome
    - Caused by the TSS toxin which is absorbed into the blood

- A separate table shows the diagnosis, treatment and prevention of this bacteria