Gram Positive Bacteria

- Important structural features in Gram positive bacteria include:
 - Capsule formation, e.g. *Streptococcus pneumoniae*
 - Spore formation, e.g. *Bacillus* spp

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- A capsule is a layer of material often seen on the surface of cells when using Gram staining
 - It is a well organised, dense structure, usually consisting of polysaccharides
 - It helps bacterium evade the immune system by acting as a protectant against phagocytosis
 - It may also defend the bacteria from desiccation
 - It unusually doesn't show up on a Gram stain and is instead a clear film around the bacteria
 - The image on the right is *Klebsiella pneumoniae*, a bacterium under a Gram stain. You can see the clear capsule around it:



- Some Gram positive bacteria such as *Clostridium* can develop a special resistant structure an endospore
 - The spores are formed as the bacteria divides. One side then engulfs the other thus having 2 layers
 - These spores are highly resistant to heat, UV radiation, chemical disinfectments and desiccation
 - Some bacteria with this can survive in boiling a let for an hour
 - Spores are impermeable to most stains and stand of the spore during standing is used to dentify the species of bacteria
 - Bacillus cereus is an example of a coore former as see below during a spore stain:



• Below is a table showing some Gram positive bacteria and their associated diseases:

Microbe	Disease
Staphylococcus aureus	MRSA & MSSA
Streptococcus pyogenes	Sore Throat & Scarlet Fever
Streptococcus pneumoniae	Pneumonia
Bacillus cereus	Food Poisoning
Clostridium botulinum	Severe Food Poisoning