Bacterial structure

- Intracytoplasmic structure
- Cell wall
- Structures outside the cell wall

Intracytoplasmic structure

Nucleoid

➢Single, circular, double stranded DNA
➢ 1 mm in length
➢ supercoiled
➢ carry genetic information for growth & survival

Essential

Ribosomes

➢ bacterial chromosome is 70s (suvedberg unit)
(Big subunit 50s and small subunit 30s)
—> target of antibiotics

Essential

Inclusion granules

➢store of nutrients (glycogen, starch & phosphate)
➢for corynebacterium diphtheria—> Volutin granules(Metachromatic granules) ,that stores phosphate in large amounts

Cell membrane

➢Thin, fragile & located just inside the cell wall
➢ composed of phospholipid bilayer+Protein (No sterols)
➢ **Functions:-**
1- selective transport Passive&& Active
2- Mesosomes
*Make ATP through respiration enzymes
Resembles mitochondria
* promote cell division (by separating DNA & formation of septal mesosome)
3- biosynthesis of cell wall
4- Excretion of extracellular enzymes (Penicillinase && hydrolytic enzymes)
5-chemotactic system

Plasmid

➢ extra chromosomal double stranded DNA
➢ replicate autonomously(. Independent of bacterial chromosome)
➢ toxin production and drug resistance

Not Essential

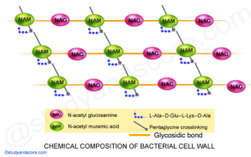
Cell wall

Definition

➢ surrounds the cell membrane
➢ rigid
➢ outermost layer (some bacteria have capsules as outer layer)

Composition

Peptidoglycan
- Glycans (NAM—NAG) (Glycosidic bond by Transglycosidase)
- Peptides (Peptide bond forms between NAM molecules by transpeptidase)



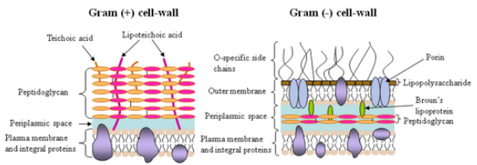
Gram stains

Gram positive

➢ 50% peptidoglycan [porous]
➢ Teichoic acid (cell membrane)
Lipoteichoic acid (cell wall)
➢ highly immunogenic {Tumor Necrosis Factor-Alpha (TNF-α) && Interleukin-1 (IL-1)}

Gram negative

➢ **5% peptidoglycan**
[2 sheets of NAG&NAM]
➢Bilayer phospholipids
[outer membrane consists of Lipopolysaccharides (Lipid A "endotoxin" ++polysaccharides "somatic O antigens"
➢**Porins (hydrophilic protein)**
➢ **periplasmic space:-**
Space between cytoplasmic&outer membrane
[peptidoglycan layer & gel-like protein]

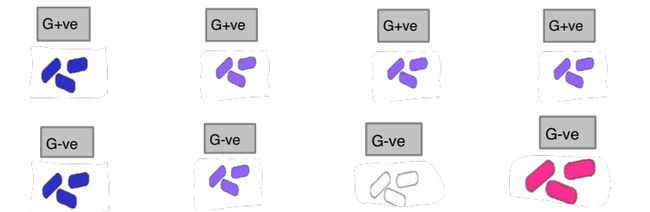


Functions of cell wall

- Maintenance of the shape(rigid) (Mycoplasma's cell wall is polymorphic "deficient of cell wall"
- Protection (osmosis sensitive)
- Target site for antibiotics(penicillin &cephaloporines)
- Has a role in cell division
- Responsible for staining

Cell wall dificient

- Naturally → Mycoplasma
- Induced [cell wall inhibitors&Lysozyme]
  - Completely ~ protoplast (+ve) ~ spheroplast (-ve)
  - Partially ~ L-form bacteria

Staining

- Crystal violet (Primary stain)
- Iodine (For fixation)
- Acetone (Alcohol)
- Counter stain (Safranin)