BACTERIAL CELL WALL STRUCTURES

PEPTIDOGLYCANS:

PRESENT IN GRAM+VE AND GRAM –VE BACTERIA

CONFERENCE SHAPE AND PROVIDE MECHANICAL PROTECTION

MADE UP OF GLYCAN BACKBONE OF N-ACETYL MURAMIC ACID AND N-ACETYL GLUCOSAMINE. LINKED BY BETA 1-4 BONDS. THIS CAN BE CLEAVED BY AN ANTIBACTERIAL SUBSTANCE LYSOZYME.

PEPTIDE CHAINS ARE HIGHLY CROSS-LINKED WITH BRIDGES IN G+VE (STAPHYLOCOCCUS) OR PARTIALLY CROSS-LINKED WITH SIMILAR BRIDGES IN G –VE BACTERIA (E.Coli). CROSS LINKS ARE TETRA-PEPTIDES, THESE ARE THE TARGETS OF B-LACTAM ANTIBIOTICS.

See diagrams:

Structure of Gram +ve and Gram-ve bacteria
Diagrammatic representation of peptidoglycan structures

(Source: Salton and Kim)
MAJOR CLASSES OF CHEMICAL COMPONENTS IN BACTERIA:

GRAM POSITIVE CELL WALLS:

PEPTIDOGLYCAN PRESENT IN ALL SPECIES
POLYSACCHARIDE
TEICHOIC ACID
  Ribitol
  Glycerol
TEICHURONIC ACID
PEPTIDOGLYCOLIPIDS
  found in Mycobacteria/Corynebacterium
GLYCOLIPIDS (WAXES)

GRAM –VE ENVELOPES:
  • LIPOPOLYSACCHARIDE (LPS) PRESENT ALL SPECIES
  • LIPOPROTEIN
  • PORINS (MAJOR OUTER MEMBRANE PROTEINS)
  • PHOSPHOLIPIDS/PROTEINS
  • PEPTIDOGLYCAN

THESE CHEMICAL STRUCTURES ON BACTERIA ARE NOT PRESENT IN THE HOST AND THEY CAN NOT BE ALTERED BY MUTATION OR ELIMINATION.

HENCE THEY CAN BE RECOGNIZED BY THE IMMUNE SYSTEM OF THE HOST AND THEY ARE CALLED PAMP:

PATHOGEN ASSOCIATED MOLECULAR PATTERNS