



مقدم من فريق أفق الطبي



lysozymes

important structural characteristic
 → cleave the peptidoglycan backbone by breaking its glycosyl bond.

innate immunity: natural resistance of the host to microbial infection

lysozyme-treated bacteria → "swell + rupture"

→ energy of water into the cells (+) high internal osmotic pressure

protoplasts: spherical forms → lysozyme-treated cells are in a solution with the same osmotic pressure.

lysozyme → cytoplasmic membrane

cytoplasmic membrane → composed of a phospholipid bilayer

active transport of molecules into the cell

secretion of enzymes and toxins

①

②

synthesis of precursors of the cell wall

③

④

energy generation → oxidative phosphorylation

lipopolysaccharide → "endotoxin"

outer membrane of the cell wall of gram negative bacteria

→ fever + shock

→ integral part of the cell wall

→ exotoxin

[LPS] → ① phospholipid → toxic effect

② polysaccharide "five sugars" → ketodeoxyglucuronate to lipid A

③ outer polysaccharide → 25 repeating units of three to five sugars

outer polymer → "important epitope of antigen" → gram negative bacteria → "clinical significance"

all the prokaryotic organisms
 not eukaryotic organisms
 (no nucleus)

no histone
 no nuclear membrane
 no nucleolus
 no mitotic spindle

nucleoid → area of the cytoplasm in which DNA is located

"DNA cloud"

210⁶ bp
 no supercoils
 intronless
 single circular molecule

glycerol phosphate
 ribitol phosphate

polymers

teichoic acid → fibers located in the outer layer of the gram positive cell wall

glycerol teichoic acid

inner cytoplasmic membrane → lipoteichoic acid

cell wall → muramic acid of the peptidoglycan

induce inflammation
 septic shock "sepsis" → gram positive bacteria

teichoic acid → staphylococci to mucosal cells

Gram stain → separates most bacteria into two groups

Gram positive stain red
Gram negative stain blue

1. crystal violet
2. iodine complex
3. crystal violet
4. decolorizer
5. counterstain (safranin)

6 steps

Gram positive → purple
Gram negative → pink/red
Colorless → Gram negative

Plasmids → extra chromosomal + double-stranded + circular DNA
+ replicating independently of the bacterial chromosome

Transmissible plasmids → conjugation

molecular weight
→ 40-100 million

contains the transfer genes enzymes
sex pilus

few (1-3) copies per cell

Non-transmissible plasmids → transfer genes enzymes

small
molecular weight [3-20 million]

usually in 10-100 copies per cell

- Functions:
1. Antibiotic resistance
 2. exotoxins
 3. pili
 4. resistance to ultraviolet light
 5. resistance to heavy metals

other plasmid-encoded products

Bacteriocins → toxic proteins produced by certain bacteria

1. degradation of bacterial cell membranes
2. pores in the membrane
3. degradation of bacterial DNA by DNAase

Exi Colicins made by E. coli + pyocins made by Pseudomonas → degradative enzymes

Bacteriocins → treating infections caused by antibiotic-resistant bacteria

2. nitrogen fixation enzymes in Rhizobium

3. Tumors caused by Agrobacterium in plant

4. antibiotics produced by streptomyces

Transposons → jumping genes
pieces of DNA
DNA of plasmid/bacteria
within between

glycocalyx → polysaccharide coating → **biofilms** → covers surfaces + allows the bacteria to adhere firmly to various structures.

glycocalyx → staphylococcus epidermidis + viridans streptococci → endocarditis

Bacterial spores

highly resistant structures are formed

in response to adverse condition

two genera of medically

genus bacillus agent of anthrax + genus clostridium

important gram + rods

tetanus botulism

One sporulation → outgrowth

thick keratinlike coat → remarkable resistance of the spore

medical important → chemicals + radiation

"resistance" → dipicolinic acid

sterilization cannot be achieved by boiling

Ca⁺⁺ chelator found only in spores

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✓ Done

structure of bacterial cells