Introduction to medical microbiology

الله بعينكم لو نظرة سريعة سهل ان شاء الله

Medical microbiology deals with microbes that are harmful to man.

Uses of Beneficial bacteria:

1) Food industry
2) Industrial applications
3) Sewage treatment
4) Recycling vital elements in the environment of elements

Harmful bacteria:

1) food spoilage
2) diseases

Portal of entry:

- Respiratory
- Alimentary
- Genital tract
- Skin

features	Prokaryotic	Eukaryotic
Nucleus	NO	yes
Size	0.05 – 10 μm	10 - 100 μm
Nuclear mem.	NO (Nucleoid)	yes (Nucleus)
Organelles mem.	Absent	present
chromosome nu.	One (circular)	Multiple (linear)
Ribosome	70S (30S - 50S)	80S (40S - 60S)
cell wall	present Except [Mycoplasma]	Absent Fungi (chitin)
cell membrane	No sterols Except [Mycoplasma]	Has sterols
Division	Binary Fission	Mitosis

#1 Antony van Leeuwenhoek

Father of microbiology

first to observe live microorganisms

#2 John Hunter

venereal diseases

Syphilis and Gonorrhea were caused by a single pathogen

#3 Edward Jenner

first vaccine
the smallpox vaccine, the world's first vaccine.

#4 John Snow

Found source of cholera outbreak in London

Founders of modern epidemiology

#5 Ignaz Semmelweis

pioneer of antiseptic procedures

"savior of mothers"

Puerperal sepsis can be prevented by apply hygienic measures

Hand washing stops infections

#6 Louis Pasteur

Fermentation of alcohol

pasteurization

Created the first Vaccines of rabies, Bacillus anthrax

#7 Robert Koch

Developed microbiological media & streak plates culture.

Germ theory

#8 Alexander Fleming

(Penicillin G)

#9 Kary Mullis

(PCR)

#10 Zur Hausen

cervix cancer caused by Papilloma viruses

So vaccine HPV is developed

Bacterial structure

Intracytoplasmic structure

1) Nucleoid

- Single chromosome
- Circular
- dsDNA
- 1mm in length
- Supercoiled
- Carry genetic information for growth & survival

Essential

2) Ribosome

- 70s

Essential

- Function of the cell membrane
- → #Selective transport (Passive)
- → #Mesosomes Respiration enzyme (Making energy) (Like Mitochondria) (1)
- (2) Cell division Separate DNA Septal mesosomes
- → #Biosynthesis of cell wall
- → #Excretion of extracellular enzymes (Hydrolytic (1) enzymes)/(Penicillinase) (2)
- → #Chemotactic system For bacteria that has flagella

3) Inclusion granules

- Store of nutrient

4) cell membrane

Essential

- Composition of cell membrane
- → Phospholipid bilayer + proteins (no sterols) except for mycoplasma

5) plasmid

- EXTRA circular chromosomal dsDNA
- → #Replicate autonomously
- → #Its genetic function is toxin production for drug resistance

Not essential

Function of cell wall

1) Maintenance of the shape (Rigid)

2) Protection (Osmosis insensitive)

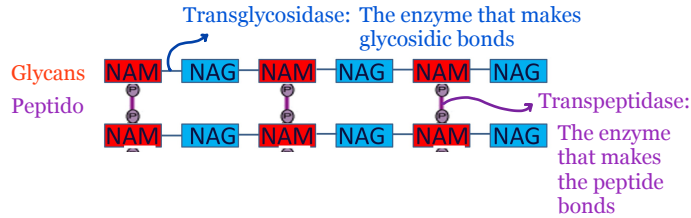
3) Target site for antibiotics

4) Role in cell division

5) Responsible for staining

Cell wall

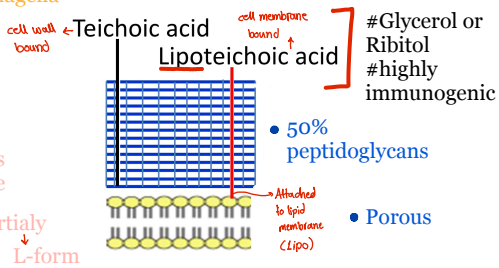
- Rigid
- due to peptidoglycans



Cell wall deficiency:

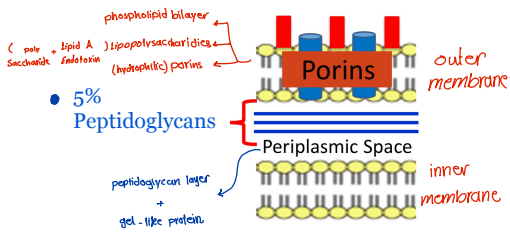
- Natural → Mycoplasma
- Induced → Cell wall inhibitors Lysozyme → Completely or partialy
  - Protoplast G+
  - Spheroplast G-
  - L-form bacteria

Gram +



- 50% peptidoglycans
- Porous

Gram -



- 5% Peptidoglycans