

Medical Microbiology :

Studying microorganism associated with human disease → 1) Activity 2) influence

note :

Some of them can be beneficial and some can be harmful

Benefits :

- 1) food → fermentation
- 2) industrial → Bacteria used for genetic engineering
- 3) Sewage treatment → recycling water
- 4) recycle vital elements in the environment of elements

harm :

- 1) food spoilage
- 2) Diseases

portal of entry :

- 1) respiratory → inhalation
- 2) Alimentary (GIT) → ingestion
- 3) Genital tract → sexual contact
- 4) Skin → abrasions, bites
- 5) congenital infections (vertical transmission)
- 6) other → Conjunctiva, blood transfusion, injection and organ transplant

note :

Microorganisms that cause disease are said to be pathogenic

Short history

1) Antony van Leeuwenhoek

- father of Microbiology
- Microscopist
- first to observe live microorganism in water mud and saliva

2) John Hunter

- Surgeon
- was the leading authority on venereal disease
- believed that syphilis and Gonorrhea were caused by a single pathogen

3) Edward Jenner

- physician and scientist
- pioneered in concept of vaccines
- created the smallpox vaccine (first vaccine)

4) John Snow

- physician
- located source of cholera outbreak in London
- established the disease borne
- one of founders of epidemiology

5) Ignaz Semmelweis

- physician and scientist
- known as early pioneer of antiseptic procedures
- savior of mothers
- discovered puerperal sepsis can be prevented if the attending nurses apply hygienic measures
- hand washing stops infections

6) Louis Pasteur

- biologist, microbiologist and chemist
- Discovered principle of fermentation of alcohol by microorganism
- invent technique of treating milk and wine to stop contamination, a process called pasteurization
- Create first vaccines of rabies, Bacillus anthrax

Germ theory with Louis :

- 1) discover the reason behind wine and dairy products become sour and it was bacteria.
- 2) stirred scientists to think if bacteria could make the wine "sick" then they could cause human illness

Notes :

- 1) his attempts to prove theory were unsuccessful
- 2) but Robert Koch provided the proof by cultivating anthrax bacteria apart from any other type

7) Robert Koch

- Developed microbiological media and streak plates for pure culture.

Germ theory

- Micro. must be present in every case of disease
- organism must be grown in pure culture from diseased host.
- inoculation of above into host must be same disease
- organism must be recovered from experimentally infected host

8) Alexander Fleming

- physician and microbiologist
- his best known discovery is the first broadly effective antibiotic (penicillin) from the mould *penicillium rubens*.

9) Kary Mullis

- biochemist
- invent polymerase chain reaction (PCR) technique

10) Zur Hausen

- virologist
- done research on cancer of the cervix
- discovered the role of papilloma viruses
- research made it possible development of a vaccine HPV.

Notes

HPV stand for Human papilloma vaccine

Classes of organism that can cause disease

1) viruses

2) bacteria

3) fungi, has 2 varieties

a) yeasts are unicellular organism

b) Mold are large multicellular //

4) parasites, 2 classes

a) Protozoa → unicellular, vary in size

v. small → intracellular infection

large → extracellular infection

b) Helminthes (metazoa) → multicellular, reach several meters in lengths.

Classification of Microorganisms:

A) Eukaryotic

B) Prokaryotic

C) viruses

Characteristic	prokaryotic	Eukaryotic
Nucleus	NO	yes
Size	quite small	relatively large
nuclear membrane	No (Nucleoid)	yes (nucleus)
Membrane-bound organelles	Absent	Present
chromosome Number	one (circular)	Multiple (linear)
cell wall	present except Myoplasma	Absent except fungi (chitin)
cell membrane	No Sterols except in myoplasma	has Sterols
Division	Binary fission	mitosis

Viruses 8

- 1) Acellular
- 2) infection agent (one of smallest ones)
- 3) No cell structure
- 4) has DNA or RNA
- 5) obligate intracellular
- 6) Directed host cell for replication

Viroids 8

- 1) ssRNA, circular without protein coat
- 2) infect plants
- 3) Smaller than virus

prion 8

- 1) protein without nucleic acid (infectious)
- 2) misfolded protein (α helix to β -sheets)
- 3) aggregates in CNS \rightarrow spongification in brain
- 4) cause Creutzfeldt-Jakob disease (CJD)
seen in human.
- 5) Mad cow disease, Bovine Spongiform encephalopathy (BSE or Mad cow disease seen in cattle.

Note 8

Size of Microorganisms

prion < viroids < virus < Bacteria < fungi