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Nursing Officer Recruitment Common Eligibility Test

ALL INDIA INSTITUTE OF MEDICAL SCIENCE

Volume – III

Microbiology, Nutrition, Midwifery & Gynecology

SIERRA INNOVATIONS

CONTENT

MICROBIOLOGY	
1. **Bacteria**	1–6
2. **Sterilization**	7–12
3. **Immunity**	13–15
4. **National Immunization Schedule**	16–17
5. **Stoning Procedure**	18–20
NUTRITON	
6. **Introduction**	21–22
7. **Carbohydrates**	23–26
8. **Proteins**	27–32
9. **Lipids**	33–34
10. **Fatty Acids**	35–38
11. **Vitamins**	39–61
12. **Minerals**	62
13. **Midwifery**	63–125
14. **Gynaecology**	126–165

Microbiology

Father of Bacteriology → Robert Koch.

↓

He also discovered → Tuberculosis Bacteria & Vibro cholerae

It also gave Koch phenomenon that was an expression of Hypersenitey reaction of tuberculosis Bacteria.

He Suggested a criteria before Blaming to Organism for disease this criteria was K/as Koch postulate

Bacteria ⇒ They are prokaryotes, Unicellular
⇒ They have both DNA & RNA
⇒ They don't posess Chlorophills
⇒ They are capable to posess normal life process like growth, metabolism and Reproduction

* Bacteria was classified under third kindom K/as protista (By Hackel)

(1) prokaryotes.
(2) Eukaryotes

Difference

	features	prokeryotes	Eukaryotes
(A)	Nucleus		
(1)	Nuclear Membrane	Absent	present
(2)	Miotic Devision	Absent	present
(3)	DNA	Circular	Liner
(4)	Histone	Absent	present
(5)	cytoplasm	Absent	present
(6)	Cytoplasmic Streaming	Absent	present
(7)	Mitochondria	Absent	present
(8)	Lysosomes	Absent	present
(9)	Golgi apparatus	Absent	present
(10)	Endoplasmic Reticulum	Absent	present
(11)	Centrials	Absent	present
(12)	Ribosomes	present	present
(B)	Chemical Composition		
(1)	Sterol	Absent	present
(2)	Muramic Acid	present	Absent
(C)	Miscellanious		
(1)	Flagilla	Absent	Present
(2)	pilli	present	Absent

Classification of Bacteria

on the basis of Morphology

(1) Cocci

* Spherical Shape
  * Cluster arrangement (like bunch of grapes) eg - Staphylococci
  * Chain Arrangement eg - Streptococci
  * pair Arrangement Eg - Diplococci
  * Tetared Arrangement
  * Sarcina - group of eight

(2) Bacili

* Rod cylindrical Shape
  * cocco Bacili → Same in length and width eg - Brucella
  * Chinese Letter arrangement eg - Corynebacterium
  * Coma Shape → eg - Vibrocholera
  * Actinomycetes → Resembles as radiating Sun rays
  * Spirocheats → Spiro means Spiral Cheats means Hair like

* Mycoplasma

They don't have Stable Structure
they don't have rigid cell wall
they are Flexible.

Bacterial Anatomy

Bacteria is unicellular, it is made up of following structure

(1) Capsule →

It is gelatinous secreation of Bacteria that make a protecting covering of Bacteria

It is not necessary that every bacteria has Capsule many of bacteria are non-capsulated

Usually the capsulated Bacteria are non-motile.

(2) Cell-wall ⇒ It is porous elastic membrane that is Highly permeable to the Solute

Thickness ⇒ 10-20 MM

(a) Functions ⇒

(1) provides shape to bacteria
(2) provides rigidity to bacteria
(3) provides Support to bacteria
(4) Helps in division in bacteria
(5) Helps in adhesion to the Complement

(3) Cytoplasmic membrane ⇒ It is thin elastic

membrane that is semipermeable. It lies just beneath the cell wall

It separate the cytoplasm to cell wall.

Chemically it made up phospholipids & proteins.

Functions → (1) Active & passive transportation
(2) Synthesis of cell wall
(3) Provide mechinical strength to bacteria
(4) Helpful in DNA replication

(4) Cytoplasm →
It is suspension of organic and inorganic solutes in a watery solution..

It has following structure
⇓

Ribosomes → These are granules distributed in whole cytoplasm
⇓
Responsible for → protein synthesis.
Mesosomes → Multi laminated vacules found in the cytoplasm

polysomes → These are group/ Bundle of ribosomes joined together by strand DNA.

Nucles → It is coiled and filamentous structure of DNA. It has no nuclear Membrane

(5) Flagella ⇒ They are thick long filamentous appendages arises from cytoplasmic membrane.

There are 2 parts of flagella
(1) Basal Body
(2) A Hook

Flagella is active in only motile Bacteria
It is non-function in non-Motile

Function → They are organ of Motality.

Arrangement of Flagella

(1) Monotrichaete → One flagella at one end
(2) Apitrichaete → One flagella at both end
(3) Lophotrichaete → A tuft of Flagella one side of Bacteria

pilli (fimbri) ⇒ Thin hair like appendages projected from cell wall

Function → (1) Organ Adhesion
(2) Haemagglutination

Steralization (Disinfection)

It is a process by which an instrument is freed from micro-organism (Both pathogenic and non pathogenic)

Disinfection → It is process of destruction of micro-organism which capable to rise infection.

Antiseptic → prevents growth of micro-organism

Bacteriostatic → prevents the multiplication of Bacteria

Bacteriocidal → It kills the bacteria.

* Methods of Steralization and Disinfection

(1) physical Method	(2) Chemical Method
Sunlight	Acid and Alkaline
Drying	Oxidizing Agent
Dry Heat	Halogens
Moist Heat	formaldehydes
Radiation	Soap & detergens
filteration	Phenol
	Dye
	Vapors
	Alcohol

(1) Physical Method

(A) Sun Light ⇒ Traditional method of Steralization.

It acts as a bacteriacidal Bcoz of UV rays.

⇒ Useful in Steralization of blankets, room, water of rivers etc.

(B) Drying ⇒ Also natural Method

↳ Not a reliable Method of Steralization

(C) Dry Heat ⇒

It is a method of Steralization in which articles are placed in following dry heat which cause bactericidal activity.

Types of dry Heat

Red Heat	Flamming	Incineration	Hot air oven
In this Method artices are placed in flame and allow them to become red Hot	In this Method articles are passed just over flame cout allowing them to be Red Hot Eg ⇒ Mouth of test tube, Glass Slide, cotton woods	Method of Steralization by a Higher temp. of dry Heat Eg ⇒ waste of Human Body Soiled Dressing	Articles are placed in Higher temp of dry Heat for 1 Hours that cause Steralization Meachnism

(D) Moist Heat ⇒ It is also method of Steralization. Steralization by moist heat mab be following :—

Types

(1) Below 100°c Temp.

(A) pasteurization → This method used to Steralization of milk.

Two Method

(i) Holder Method → Temp. 62°c for 30 Min

(ii) flash Method → 73°c for 15-20 Sec.

After this immediate instant cooling process is required.

(b) Vaccine Bath ⇒ Method of Sterilization of vaccies at 60°c for 1 Hours.

(2) A 100°c Temp.

(A) Tyndallization → In this process Media. Like Serum media, egg media are Sterlized.
Temp → 100°c for 30 Min 3 days

(B) Boiling → By this process non-pathogenic Bacteria may be killed but spores remain unaffected.

(3) IMP

Above 100°C Temp.

↓↓↓

Autoclave

↓↓↓

Most reliable method of steralization

Temp. → 121°C

pressure → 15 Lb/inch²

For 15-20 Min.

Eg → Surgical equipments, gowns etc.

(D) Radiation → It includes

↓↓

UV Rays → Bactericidal effect

Gamma Rays → also used for sterlization

↓↓↓

Radiating range in 2.5 mrad

Eg → Bone Graft

Skin Graft

(E) Filter Method → used for steralization

↓↓↓

Basically filter are made up of nitrocellulose membrane

Eg → Antibiotics, Liquids, paraffin

(2) Chemical Method

(i) Acid & Alkaline → They are bactericidal and some antiseptic.
eg → Boric acid

(ii) Metallic Ions → $HgCl_2$, $AgNO_3$ are Mettalic ions
↓↓
which are used for Steralization purpose.

(iii) Halogens ⇒ They are Salt forming substance
↓↓
Three types of Halogens
(1) Iodine
(2) Bromine
(3) Chlorine → water disinfection

(iv) Oxidizing ⇒
KMnO4 mostly used oxidizing agent

(v) Formaldehyde
↓↓
It is used for disinfection and steralization of woolen, Blankets, infected room & operation theater.

⇒ For 100 cubic feet area 50ml of 40% formaldehyde is used
The area should be air tightened or closely properly

(vi) Soap & Detergents ⇒ (weak Disinfectant

(vii) **Alcohol** → 70% ethyl alcohol is used for disinfection. It is more useful than 100% alcohol.

(viii) **Dye** ⇒ Gentian violet and malachite green are dyes which are used for steralization.

(ix) **Vapors** ⇒ formalin vapors are used for disinfection of infected room O.T and infected cloths of pt.

Immunity

* It is resistance that is produce against the micro-organism and its produced by the body.

Immunity

Innate

It is basic immunity or resistance that passed into one generation to another

Acquired

It is resistance or immunity that is acquired by the host.

(1) Natural / Native / Innate Immunity

Non-Specific

It is immunity or resistance that passed on one generation to another generation & it is general

Types → (1) Species
(2) Racial
(3) Individual

Specific

It is basic immunity or resistance that passed into one generation another & it is specific for particular or specific micro-organism

Eg → Immunity against M. Tuberculi.

(2) Adaptive/Acquired Immunity

↓

It is resistance or immunity that is not entertained but it is acquired or adopated by host during his life.

(It is always specific)

(1) Active Immunity

↓

obtained by individual immune system by stimulating of antigen

(2) Passive Immunity

↓

It is not produced by an individuals immune system so it is obtained as in ready form or other sources

* Active Immunity

(A) Active natural Immunity

↓

It is an immunity that is obtained following an antigen entry or clinical infection

Eg → Measles

(B) Active Artificial Immunity

↓

It is an immunity is obtained by vaccinations.

* Passive Immunity

(A) passive Natural Immunity

It is an immunity that is obtained from mother during fetal life or by Breast milk.

(B) passive Artificial Immunity

It is an immunity that is obtained by readymade Immunoglobins and antitoxins.