



ESIC

NURSING OFFICER

**EMPLOYEES' STATE INSURANCE
CORPORATION**

Volume – 3

HUMAN ANATOMY & PHYSIOLOGY



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HUMAN ANATOMY & PHYSIOLOGY

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* Anatomy ⇒

It is a branch of medical science which deal with the study of structure of Human's body organ.

Surgery is more important for Anatomy

* Physiology ⇒

It is branch of medical science which deal with the study of function of Human's body organ. Physicition is more important for physiology

Human Body

↓
Consist of various system

↓
Each system consist of various organ

↓
Each organ consist of various tissue

↓
Each tissue consist of cell

↓
cell

* Cell ⇒

It is the smallest unit of the Human body

⇒ Cell is defined as the functional and structural unit of body.

* TISSUE *

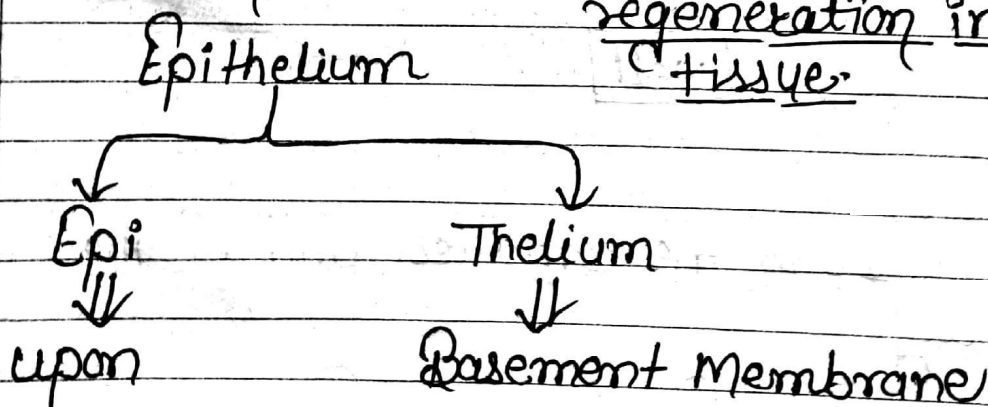
* Definition ⇒ Group of cell known as tissue.

* Histology ⇒ It is a branch of medical science which deal with the study of tissue.

* Type of tissue in Human Body ⇒ There are four type of tissue present in Human body:-

- (1) Epithelium tissue
- (2) Connective tissue
- (3) Muscular tissue
- (4) Nervous tissue

1) Epithelium Tissue (13%) ⇒ Maximum power of regeneration in epithelium tissue.



⇒ This tissue grow upon the basement membrane, usually Avascular in nature.

Teacher's Signature

⇒ This tissue is present outside of the Human body (epidermis), Inner wall of the visceral organ, Inner wall of digestive, Inner wall of Blood vessels + Heart and glands.

* Classification of Epithelium Tissue ⇒

① Depend upon the layer of cells

② Depend upon the shape of cell

(A) Simple Epithelium

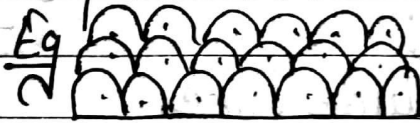
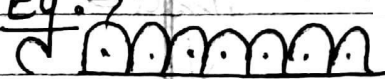
(B) Stratified epithelium

Single layer epithelium

Multiple layer epithelium

Eg: ⇒

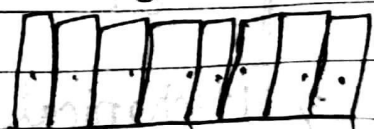
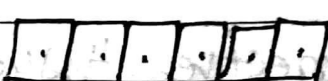
Eg: ⇒



(A) Squamous epithelium

(B) Cuboidal Epithelium

(C) Columnar Epithelium



* Functions of Epithelium tissues → This tissue responsible for →

- (1) protection (skin)
- (2) secretion (Digestive juice & Hormones)
- (3) Absorption

2) Connective Tissues →

Definition →

Connective tissue is responsible connect, separate or to provide mechanical support to Human Body

Connective tissue is classified as →

(A) Mechanical
Connective tissue



It include bone,
Cartilage



osteoblast → Bone forming cell
osteoclast → Bone destructing cell
chondroblast → Cartilage forming cell

(B) Fibrous
Connective
Tissue



(C) Vascular
Connective
Tissue



Eg → Blood &
Lymph



The vascular connective tissue contain liquid matrix. (PK as false connective tissue)

⇒ Mechanical Connective tissue is responsible

2nd Heart of Human Body → Calf Muscle

to provide mechanical support to the Human body.

② Fibrous Connective Tissue →

It include: →

* Fibroblast

* Adipocytes

* Elastic Fiber

* Collagen Fiber

* Ligament

* Tendon

* Ligament →

⇒ It is the one type of fibrous connective tissue which join bone from bone

⇒ Strongest ligament ⇒ Anterior Cruciate Ligament

* Tendon →

It is also is type of fibrous connective tissue which join bone from muscle

⇒ Strongest tendon of Body ⇒ Achilles tendon

OR

Heal cord OR

Calcaneous tendon

↓

which joint → Heal bone to calf muscle.

Pathy \rightarrow Dysfunction
Myo \rightarrow Muscles

Q ~~Q~~ A vascular connective known as false connective tissue because it contains liquid matrix and there are no cells present.

Q A In fibrous C-T it is true because it contains solid matrix & nucleus present in cells.

3] Muscular Tissue (45% AIC to weight)
 \Rightarrow Muscular tissue consists of muscles

\Rightarrow Muscles are responsible for the contraction and movement of body parts.

* Myocytes \Rightarrow Muscle forming cells

Myogenesis \Rightarrow The process of muscle formation

Classification of Muscles

Features	Skeletal Muscle ↓	Smooth Muscle ↓	Cardiac Muscle ↓
① Location	Found in skeletal	Found in smooth organ/visceral organ	Found in Heart (Myocardium)
② Nature	Voluntary Nature	Involuntary Nature	Involuntary
③ Striation	Striated	Non-striated	Striated

* Total no. of skeletal muscle ⇒ 639

* Sarcomere ⇒ It is the functional & structural unit of skeletal muscle.

* These muscle are commonly presented in skeletal system, oral cavity, External Anal Sphincter of Anus, External Sphincter of Bladder

Q ⇒ Muscular tissue makes the maximum quantity of tissue

Teacher's Signature

4) Nervous Tissue / Nervous tissue are consist of neurons.

Q ⇒ Synapse The junction by which the neurons communicate to each other.

Functions ⇒ This tissue is responsible to send the impulses to body part for function.

* The nervous tissue cannot be divided because due to lack of centrioles, so it has minimum power of regeneration.

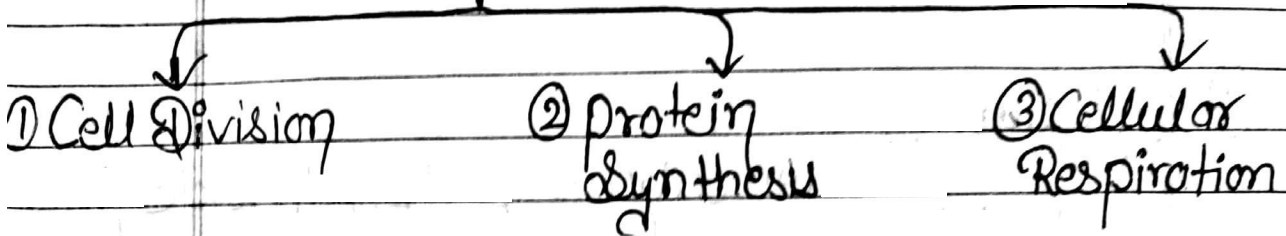
Types of Neurons ⇒

① Sensory Neuron/Afferent ⇒ They carry the impulses from body part to Brain.

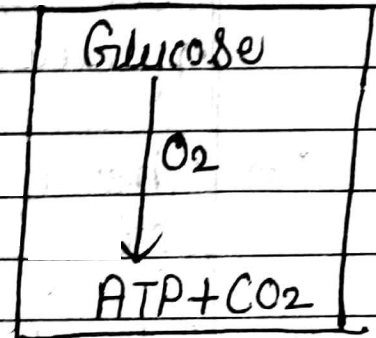
② Motor/Efferent Neuron ⇒ They carry the impulses from Brain to body (brain).

③ Mixed Neuron ⇒ Both sensory neuron and motor neuron.

* "CELL" *



⇒ Cell word is a greek word.



⇒ The discovery of cell was made by Robert Hook

⇒ The word "cell" is taken from the word "Cella" which means "small rooms."

* Depend upon the presence or absence of nucleus, the cells is classified as

(A) prokaryotic cell



Nucleus is absent

(B) Eukaryotic cell



Nucleus is present

* Terminology

① Cytoplasm \Rightarrow The liquid portion inside the cell b/w the cell membrane and nuclear membrane.

\Rightarrow The cytoplasm contain about 70% of water.

② Cytosol \Rightarrow The liquid portion of cytoplasm is known as cytosol.

③ Nucleoplasm \Rightarrow The liquid portion b/w the nuclear membrane and nucleus.

④ Protoplasma \Rightarrow

protoplasm = cytoplasm + nucleoplasm

⑤ Cytology \Rightarrow It is branch of medical science which deal with the study of cell.

* The cell has studied under 3 Headings:->

- (1) Cell membrane
- (2) Cytoplasm
- (3) Nucleus

(1) CELL-MEMBRANE :->

→

The cell membrane is the most outer part of the cell, which is responsible :->

* To provide the shape of the cell, also responsible for the protection of organelles

Composition of cell membrane :->

The cell-membrane consist of :->

- (1) protein → Glycoprotein (55%)
- (2) Lipid → Phospholipid (45%)
- (3) CHO → 5%

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Q The nature of cell membrane is selective permeable or semipermeable.

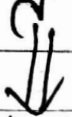
(2) CYTOPLASM :-> (70% water)

Cytoplasm contain cell organelles
These are :->

- (A) Endoplasmic Reticulum (ER)

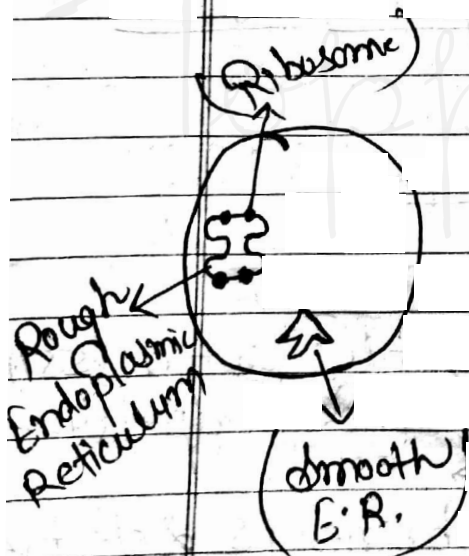
ER (Endoplasmic Reticulum)

(A) Rough E.R.

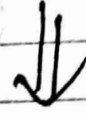


⇒ Ribosomal granules present on its surface

Function → Protein Synthesis



(B) Smooth E.R.



* Ribosomal granules absent on its surface

* Function →
① Formation of lipid Steroids & Cholesterol

② It is responsible for the detoxification of toxic substance

(Non toxic → Toxic)
③ The Smooth E.R. which are present in skeletal muscle are also known as ~~also~~ Sarcoplasmic Reticulum, & also responsible for the storage of Ca.

⑧ Golgi Apparatus →

Also known as "post-office" of the cell. Because transportation of protein.

⇒ It is responsible for the processing, packaging + transport of protein from one part to other part of cell.

⇒ Golgi apparatus is situated near the nucleus

(C) Lysosome ⇒

⇒ Lysosomes are the defensive structure of the cell

⇒ It contains the enzymes [Lysosome/Hydrolytic Enzyme]

⇒ Lysosome or Hydrolytic enzymes are responsible for the destruction of Bacteria, virus or foreign organism.

⇒ When the lysosomes are deprived from oxygen. They rupture, and lysosomes come out, lysosomes destroy the cell organelles, so, the lysosomes are also known as suicidal bag of the cell.

Q Lysosomes are also known as Garbage system of cell.

(D) Mitochondria ⇒

⇒ Mitochondria is the also known as "power House of the cell" because it is responsible for maximum

ATP production. By the process of oxydative-phosphorylation.

① ⇒ Mitochondria also contain non-genetic DNA.

(E) Centrioes (Centrosome) ⇒

⇒ These are cylindrical structure present inside the cytoplasm near the nucleus.

⇒ These are responsible for the movement of chromosome during the cell division.

② All above organs are membrane bounding Organelles.

(F) Ribosome ⇒

⇒ Ribosome are the membrane less structure.

⇒ It is formed by :-

- (1) Protein
- (2) RNA

⇒ Ribosomes has two types :-

a) Bounded Ribosome → on Rough E.R.

b) Free Ribosome → Inside the Cytoplasm.

- ⇒ These are responsible for protein synthesis
- ⇒ Ribosome are also known as "Engine of cell" because initial of protein synthesis
- ⇒ Ribosome are also known as "protein factory of cell".

(G) Microtubules & Microfilaments ⇒

⇒ These are the membrane less structure

⇒ They are Responsible to provide the mechanical support

⇒ These structure also known as "Cytoskeleton of the cell".

Central-vacuoles ⇒



Membrane bound organelles.

Responsible → Storage function