

TISSUE LEVEL OF ORGANISATION

CHAPTER - 3RD

UNIT - 1ST

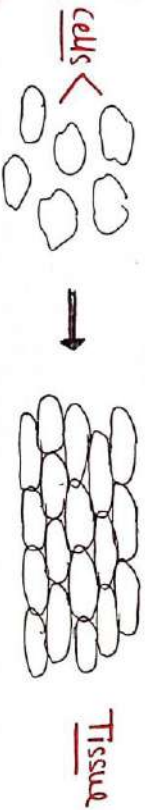
Syllabus:

classification of tissue, structure location and functions of epithelial, muscular, Nervous and connective tissue.

Tissue:

It is a group of some cells which have similar structure and functions.

- Each tissue carries out a unique functions in body.
- They are only found in multicellular organism.
- Histology → It is the branch of science that deals with the study of tissue.



Classification of Tissue

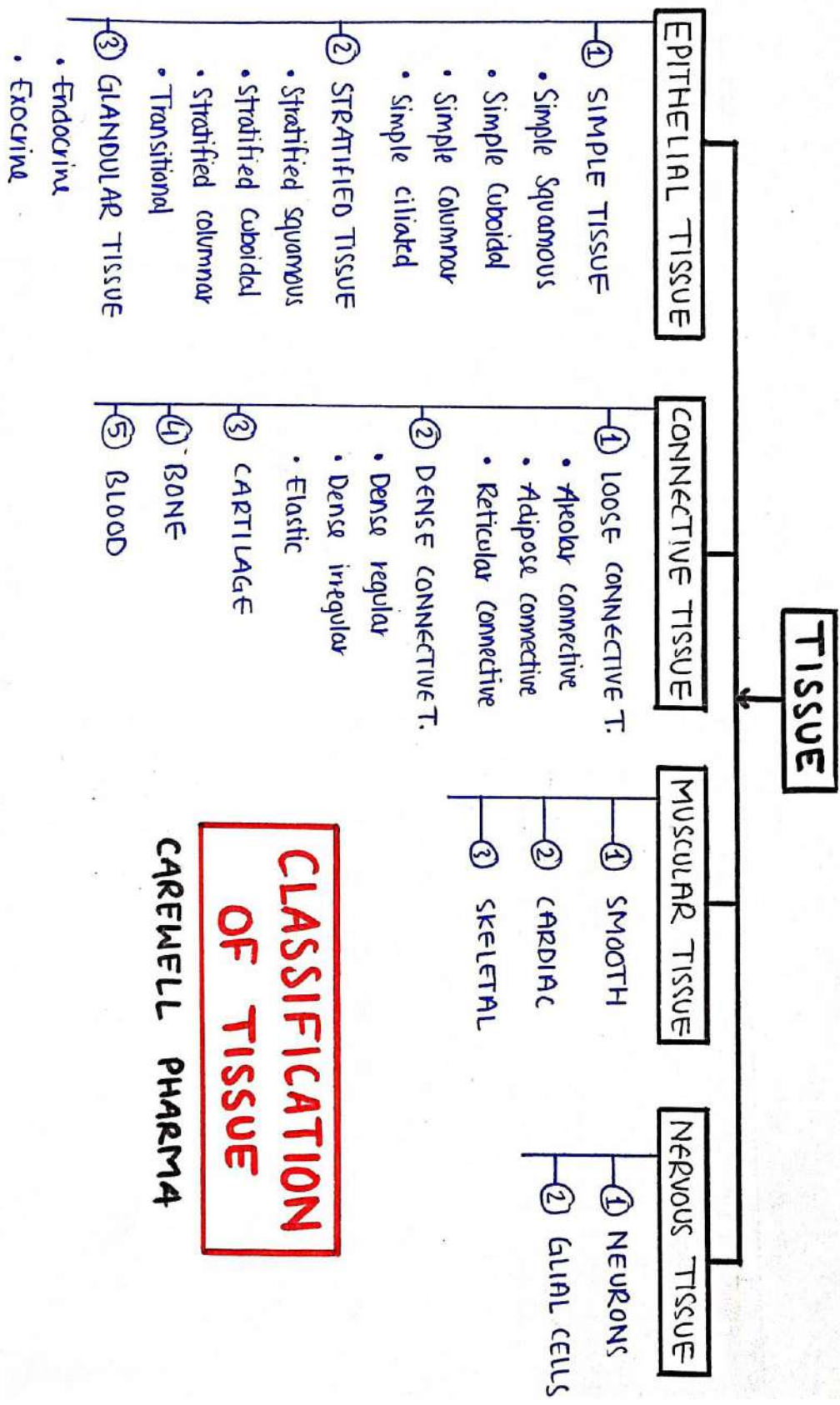
Tissues are classified into four major types based on their structure and functions.

TISSUE

- ① Epithelial tissue - Provides covering and protection to the body.
- ② Connective tissue - Provides structural framework to the body.
- ③ Muscular tissue - Provides movement to body.
- ④ Nervous tissue - responsible for coordination and communication.

functions:

- All tissue together performs the functions to support the body system.
- Tissue provides shape to the body and help body to store energy.
- Tissue helps in the formation of various organs. (eg) Heart, Kidney, lungs etc..



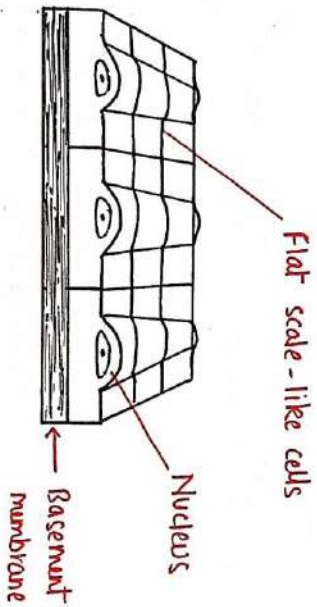
**CLASSIFICATION
OF TISSUE**

CAREWELL PHARMA

1. EPITHELIAL TISSUES

Also known as 'Vascular tissue' or 'Epithelium'.

- These are those tissue which are made up of closely packed cells and form continuous sheet.
- They contain minimal extracellular space but they are arranged on basement membrane which is made up by thin sheet of connective tissue.
- They mainly form outer covering of skin/body and internal organs like kidney, lungs, glands etc.



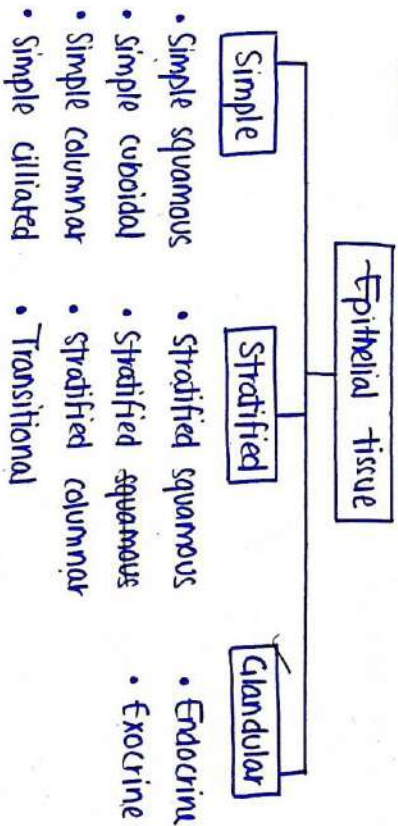
• fig. Simple Squamous Epithelial tissue

• FUNCTIONS :-

- They provide covering to our body and various internal organs.
- They provide protection to our body from mechanical injury, harmful chemicals, loss of water.
- They helps in secretion of various hormones and chemicals through glands.
- They helps in absorption of nutrients from food.
- They also helps in excretion of waste products.

• CLASSIFICATION :-

They are classified on the basis of their structure :



①. SIMPLE EPITHELIAL TISSUE

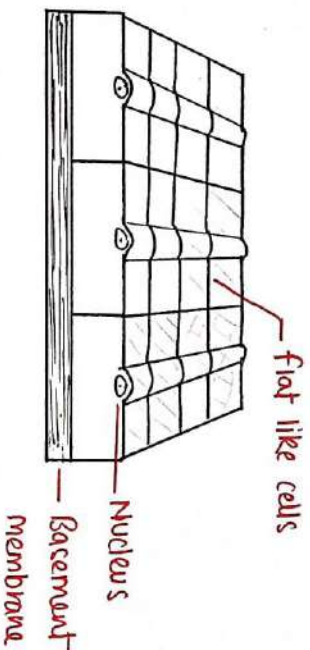
These are those tissue which are made up with single layer of cells.

i) Simple Squamous epithelium

It is made up of only a single layer of flat, scale like cells.

the nucleus of each cell is oval / spherical.

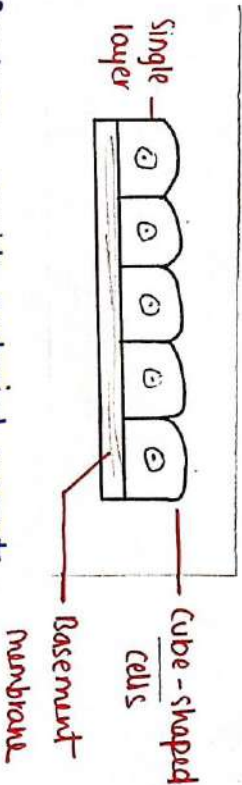
- Location - heart, blood vessels, lymphatic vessels, airsacs of lungs, lining of kidney.
- functions - Blood filtration in kidney, Diffusion of O_2 to blood vessels, exchange of gases [O_2/CO_2], secreting substances.



ii) Simple Cuboidal Epithelium

It is made up of a single layer of cube shape cells, that rest on a basement membrane

- Location - Surface of ovary, kidney tubules, thyroid glands, duct of many glands



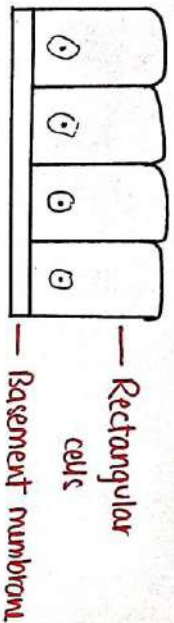
- functions - provide mechanical support, secretion and excretion.

iii) Simple columnar Epithelium

It is made up of single layer of rectangular cells arranged on basement membrane. It contain goblet cells, cilia and microvilli.

- Location - lining of stomach, intestine, uterus, uterine tubes and some part of respiratory tract.

SIMPLE COLUMNAR

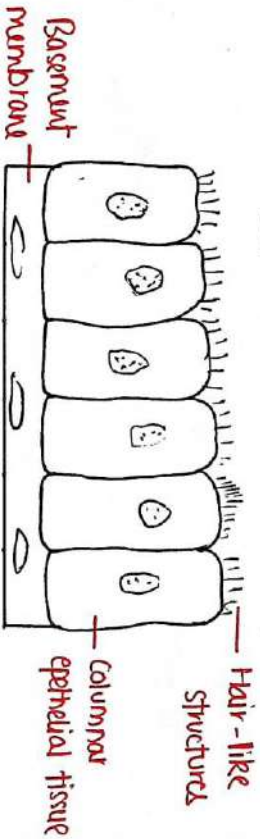


- functions - secretion and absorption
excretion and protection

iv) Simple Ciliated epithelium

Also known as pseudostratified columnar epithelium. It is made up of only a single layer and have irregularly shaped columnar cells.

- location - few portion of upper respiratory tract, ventricles of the brain, spinal cord.



- functions - protection and secretion, moves mucus and other substances by ciliary action.

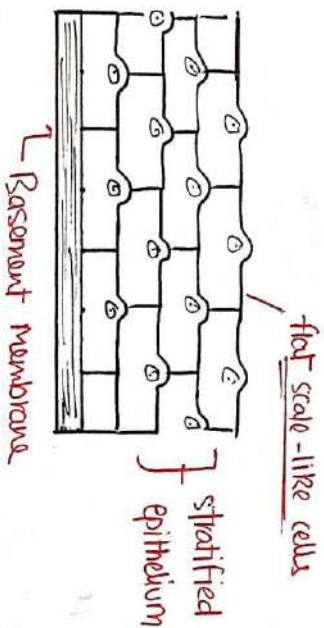
② STRATIFIED EPITHELIAL TISSUE

These are those tissue in which cells are arranged in multiple layers. i.e. one over another.

i) Stratified Squamous epithelium

It is made up of multiple layers of flattened squamous cells.

- location - skin, oesophagus, pharynx, lining of mouth, tongue, vagina



- It is of two types :

Keratinised - contain keratin fibres, provides ^{waterproof} protective qualities to the skin.

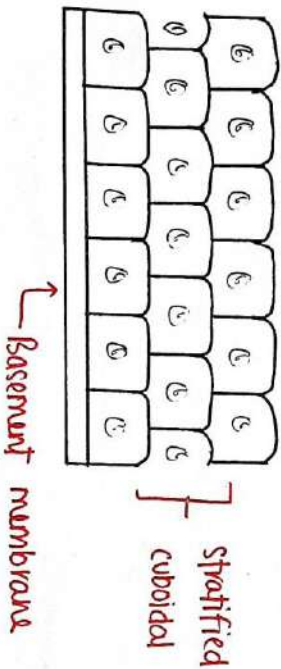
Non-keratinised - it remain moist, such as vagina, mouth and oesophagus.

ii) Stratified cuboidal epithelium

It is made up of two or more layers of cube shaped cells.

- Location - sweat gland, salivary glands and mammary glands.

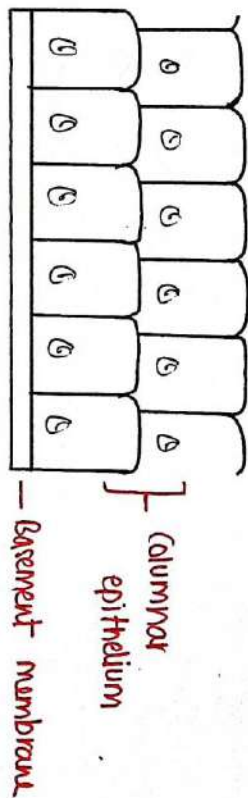
- functions - Protection, secretion of saliva, sweat, and milk.



iii) Stratified columnar epithelium

It is made up of multiple layer of rectangular shaped cells.

- Location - Urethra, oesophageal gland, mucus membrane, lining of eyelids



- functions - Protection and secretion.

iv) Transitional epithelium

It is presented at the sites which are subjected to changes in stress and tension.

- location - urinary bladders, their lining.

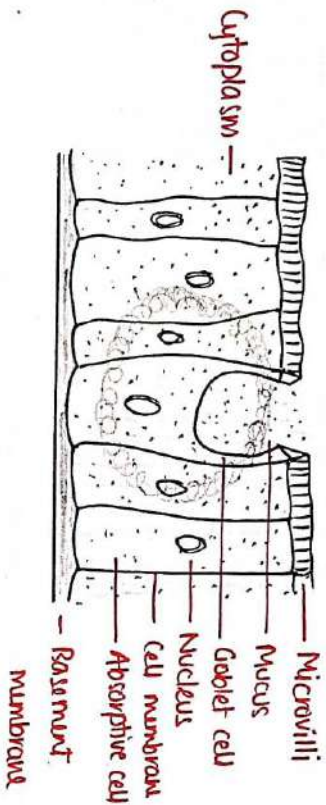


- functions - provide contraction.
(eg) Walls of urinary bladders.

③. GLANDULAR EPITHELIUM

These are those tissue which are used for their secretion action, in which they excrete various hormones and chemicals.

- They secrete into ducts, surface of the body, or directly into the blood.



i) Endocrine glands

These are those tissue that discharge their secretory products (mostly hormones) directly into the blood via ductless glands.

eg) Pituitary gland, thyroid and adrenal glands.

ii) Exocrine glands

These are those glands / tissue that discharge their secretory products (enzymes, sweat) into ducts, which further reach into its target sites (organs).

eg) secretion of saliva from salivary glands into mouth via salivary duct.

2. CONNECTIVE TISSUE

These are those tissue which connects or bind different organs or different parts of an organs.

- It is the most diverse and widespread tissue in the human body, found in almost every organ of the body.
- It is arises from the mesoderm layer of embryonic [stem cell tissue].

Connective tissue is composed of large amount of extracellular matrix (ECM), limited number of cells, fluids and number of fibres.

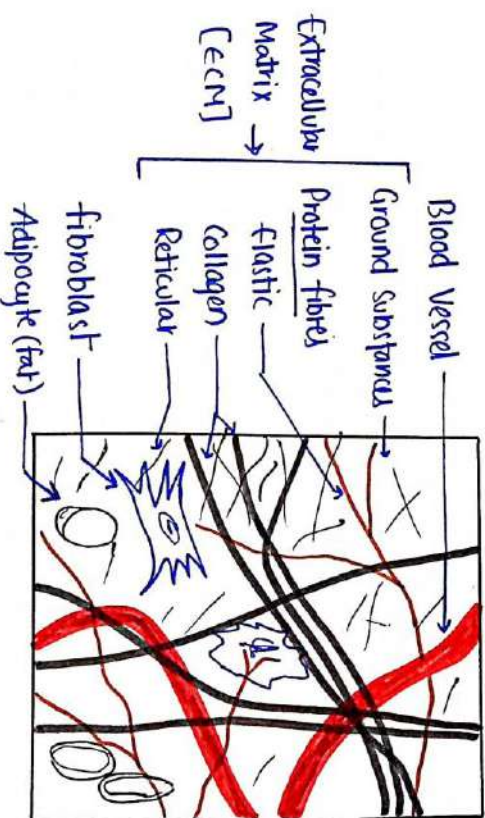
- These all collectively known as ground substances.

- They comprises of cells i.e. plasma cells, wbc, mast cells, adipocytes (fat cells), macrophages, fibroblast mesilly

- Contain fibres:

- Collagenous fibres are tough and strong ^{strength}
- Elastic fibres are elastic and extensible in nature ^{Branches... elasticity}
- Reticular fibres are delicate / fragile in nature, provide support.

- Connective tissue present in the form of soft, gel-like to firm, flexible and hard type.

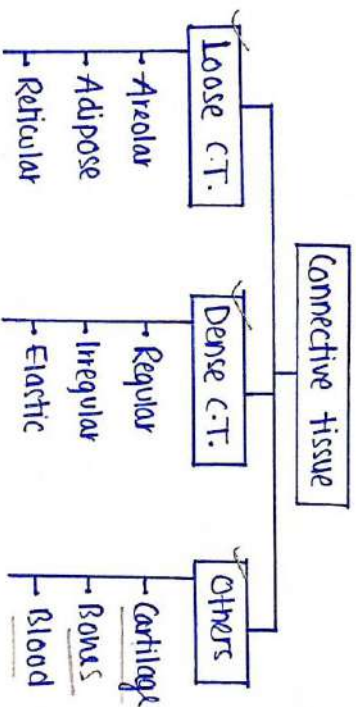


• Diagram of Connective Tissue

• FUNCTIONS :

- It connects different tissue of body.
eg muscles are connected with bones by tendons.
- It supports various tissue, organs and structures of the body.
- Blood helps in transportation of O_2 and nutrients, and also provide defence system for body.
- It work as structural framework of body.

• TYPES OF CONNECTIVE TISSUE :



① Loose connective tissue :-

These are those tissue in which cells are loosely arranged with fibres or ground substances in matrix.

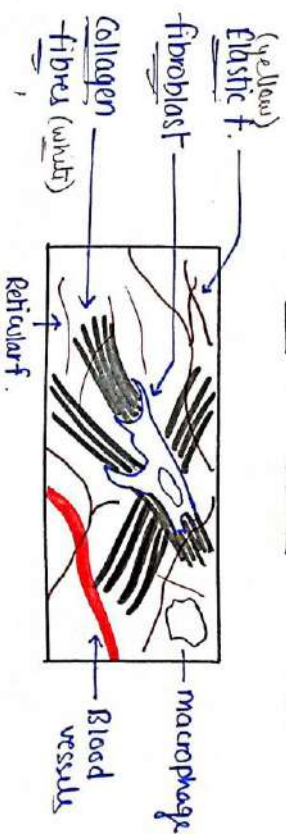
It is well vascularized and provides blood supply to nearby epithelial tissue.

It is one of the most widely distributed tissue which connects several body structure by acting as elastic glue which allow movement.

• Areolar Connective Tissue : → strength, connectivity

It connects the skin to the underlying structure. It works same as loose connective.

• Location - found between (muscles), below the skin, blood vessels, nerves

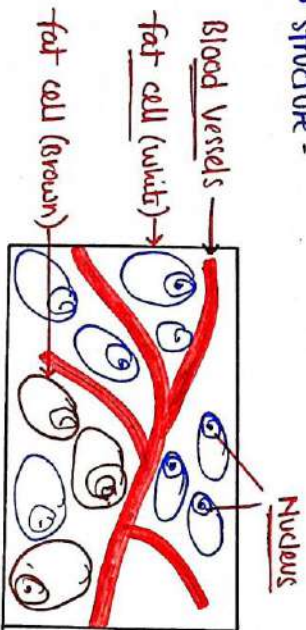


- Adipose Connective tissue:

It contain adipocytes (fat cells), which store energy (glycose) for the body.

• Location - under the skin b/w internal organs, bone marrow

- Structure -



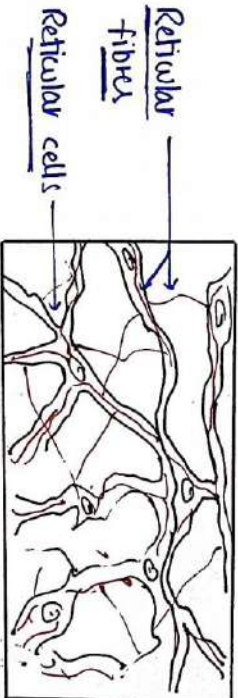
• functions - store energy in the form of fat, support and protection, Brown fat produce heat generation.

- Reticular tissue:

The term reticular means 'like a net'. The reticular network is formed by thin, branches of reticular fibres.

• Location - found in spleen, lymph nodes, and bone marrow.

• functions - provide protection and helps in the production of blood cells.



② Dense connective tissue / Dense fibrous:

These are those tissue which are densely packed and form rope like structure. They mainly contain fibrocytes, fewer fibroblast cells, and fibres in large amounts.

- Dense (Irregular) Tissue:

In this, collagen fibres are arranged in irregularly (random) -

It is arranged in the form of thick mat like strong connective tissue.

(Eg) Dermis layer of skin, outer covering of organs such as kidney, spleen etc..



• Dense regular tissue:

In this, collagen fibres are arranged in parallel, regular.

they provide strong attachment, flexibility.

(Eg) It is present in tendons (attach muscles to bone) and ligaments (attach bone to bone).

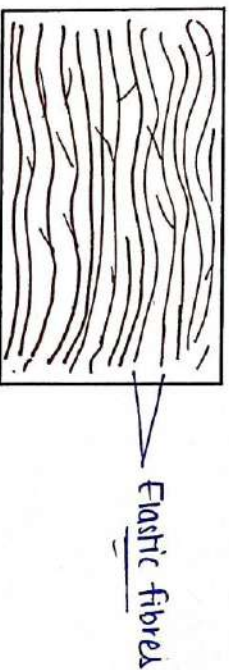


• Elastic Dense tissue:

In this, elastic fibres are arranged parallel to each other.

It provides elasticity with strength.

(eg) Trachea, Bronchi, lungs and ligaments.
Arterial walls are also made up of elastic fibrous tissue.



③ Cartilage :-

It is strong, flexible connective tissue.

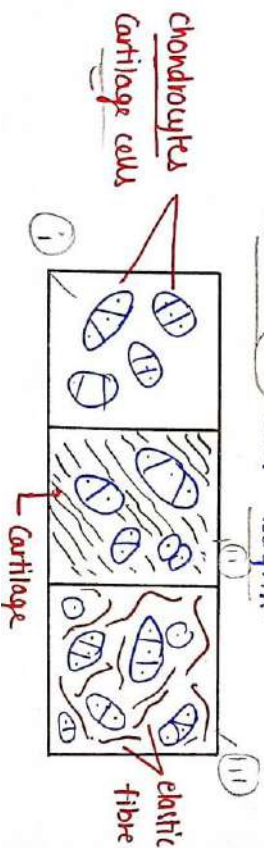
It contains only one type of cell i.e. chondrocyte which produces the fibres and the tough, rubbery ground substance of cartilage. - It protects joints and bones.

- It is present at the end of bones and helps in the formation of bones.
- It is of three types :-

i) Hyaline cartilage - It forms the covering of ends of bones and it is found in rings of trachea.

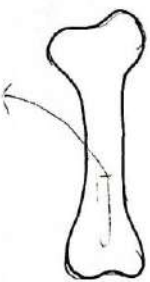
ii) Fibro cartilage tissue - The strongest and most durable tissue, it forms intervertebral discs of vertebral column. It is also present in knee joints and work as shock absorber.

iii) Elastic cartilage tissue - It contains less amount of collagen fibre and large elastic fibres, which provides flexibility. It is present in external ear and larynx.



④ Bone : (osseous tissue)

It is the hard connective tissue, that contains a high concentration of salt like calcium phosphate and calcium carbonate (mineral). It also consists of collagen fibres. It is present in arms, legs, ribs etc. -



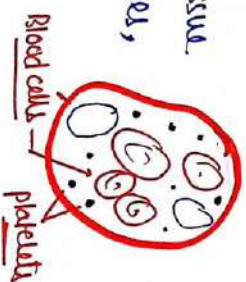
- provide protection and structural framework.

⑤ Blood :

It is liquid connective tissue which is formed in the bone marrow and other tissues.

- It is composed of 55% plasma and 45% cells.
- Blood cells are - RBCs (Red blood cells), WBCs (White blood cells), Platelets.

- Helps in connect different tissues.
- helps in transportation of gases, nutrients, drugs etc..
- Body defence system.



3. MUSCULAR TISSUE

These are those tissue which is made up from muscle fibres and helps in the movement of body.

• The main functions of this tissue is contraction and relaxation, which helps in movement.

• FUNCTIONS:

through contraction & relaxation.

- They allow movement of bones and joints.
- Helps in the production of a large amount of heat. ~~striated muscles~~
- It maintain body posture
- It forms protective layer around organs.
- It play a major role in pumping of blood by the heart, peristaltic movement of stomach, movement of food in GIT etc..
- It helps to express feeling.

• TYPES OF MUSCULAR TISSUE:

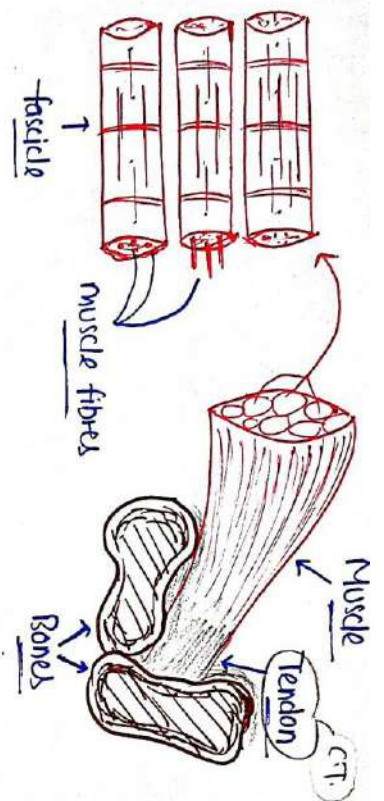
Based on the location, muscular tissue divided into three parts :-

- i) skeletal muscles
- ii) Smooth muscles
- iii) cardiac muscles

i) skeletal muscles :

These are those muscles which are attached to the bones and helps in the movement of bones and joints.

- These are cylindrical shaped, multinucleated cells having a group of muscle fibrils.
- Also known as striated as they contain strips.
- These are voluntary in nature which is controlled by somatic nervous system.
- present upon the skeletal system.
- It comprises 40% of body mass.



(ii) Smooth Muscles :

These muscles are thin and spindle shape.

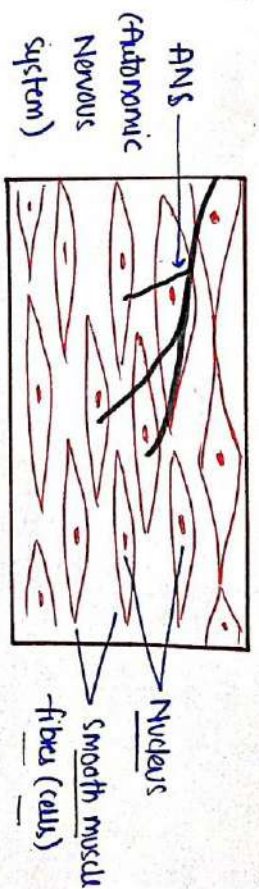
They consists of actin (thin) and myosin (thick) filaments sliding over each other and provide contraction.

Blood vessels, GI Tract, urinary stomach, bladder

• they are unstriated muscle fibres, having a single nuclei.

• Involuntary in nature and are controlled by Autonomic Nervous system.

• Location → Iris of the eyes, Blood vessels, lungs, stomach, gall bladder, Intestine.

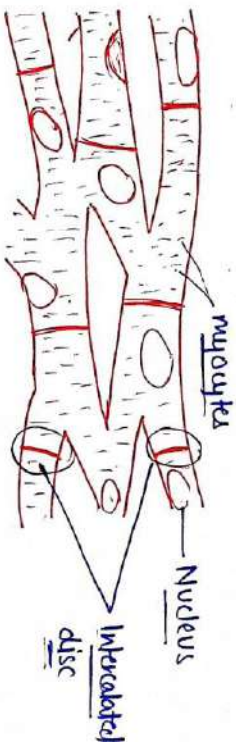


(iii) Cardiac Muscles :

These are those muscles which are found in heart

• It consist of branched striated fibres with one or two centrally located nuclei

• They have involuntary control which have automatic and rhythmic contraction of muscles.



• functions :- pump blood to all part of the body, helps in generating contraction, work as protective layer for heart.

4. NERVOUS TISSUE

These are those which are found in the brain, spinal cord and nerves and are responsible for coordinating and controlling many body activities.

- The main function of nervous tissue is to receive information from stimuli, analyze with brain/spinal cord and send response.

• FUNCTIONS:

- Responsible for coordination and communications.
- Regulate and controls body functions.
- Send and receive impulses (information).
- Stimulates muscle contraction
- play major role in emotions, memory.

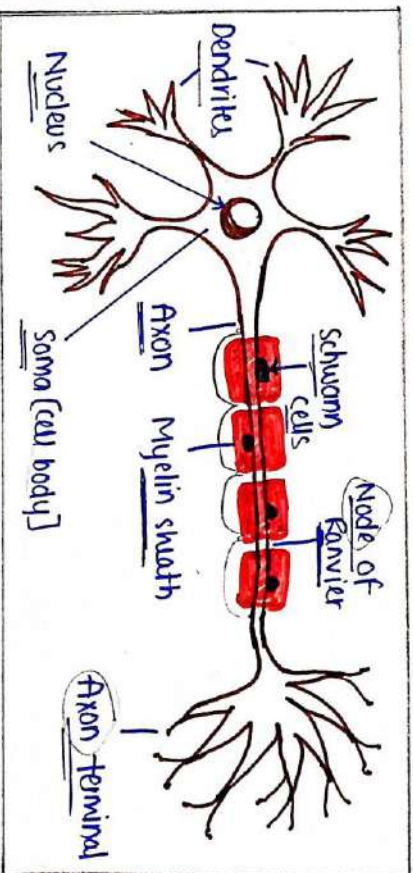
• TYPES:

It consists of two types of cells

- ① Neurons / Nerve cells
- ② Glia cells / Neuroglia cells.

① Neurons / Nerve cells:

It is the structural and functional unit of Nervous tissue. It is responsible for all the functions provided by Nervous tissue



It contain various parts :

- Cell body → main body contain nucleus + dendrites.
- Dendrites → Branches, receive signals + passd.

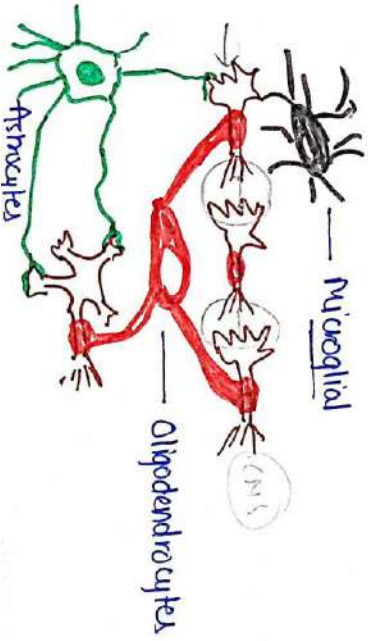
- Axon → passes signal
- Myelin sheath → jump the message / fast.
- Axon terminal → end part, transmit signal.

② Neuroglial / Glial cells:

These are supporting cells which ~~provides~~ connects, support and regulate the functioning of neurons.

It is of three types -

- Astrocytes - regulates the functions and protection
- Microglia - destroy pathogens
- Oligodendrocytes - enhance conduction speed.



_____ X _____

Unit ① completed

@carewellpharma