UNIT – I
INTRODUCTION OF HUMAN BODY

Presented By

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DEFINITION

Anatomy (Ana – up, tomy – process of cutting)

Anatomy is branch of science which deals with the study of structures of different organs of human body.

Physiology (Physio – nature, logy – study)

Physiology is branch of science which deals with the study of functions of different organs of human body.

SCOPE OF ANATOMY

- Developmental – Study of the complete development of human egg.
- Cell biology – Study of cellular structure and function.
- Histology - Study of microscopic structure of tissue.
- Gross anatomy - Study of structure that can be without microscope.
- Systemic anatomy - Study of specific system of the body eg. nervous system, respiratory system, urinary system.

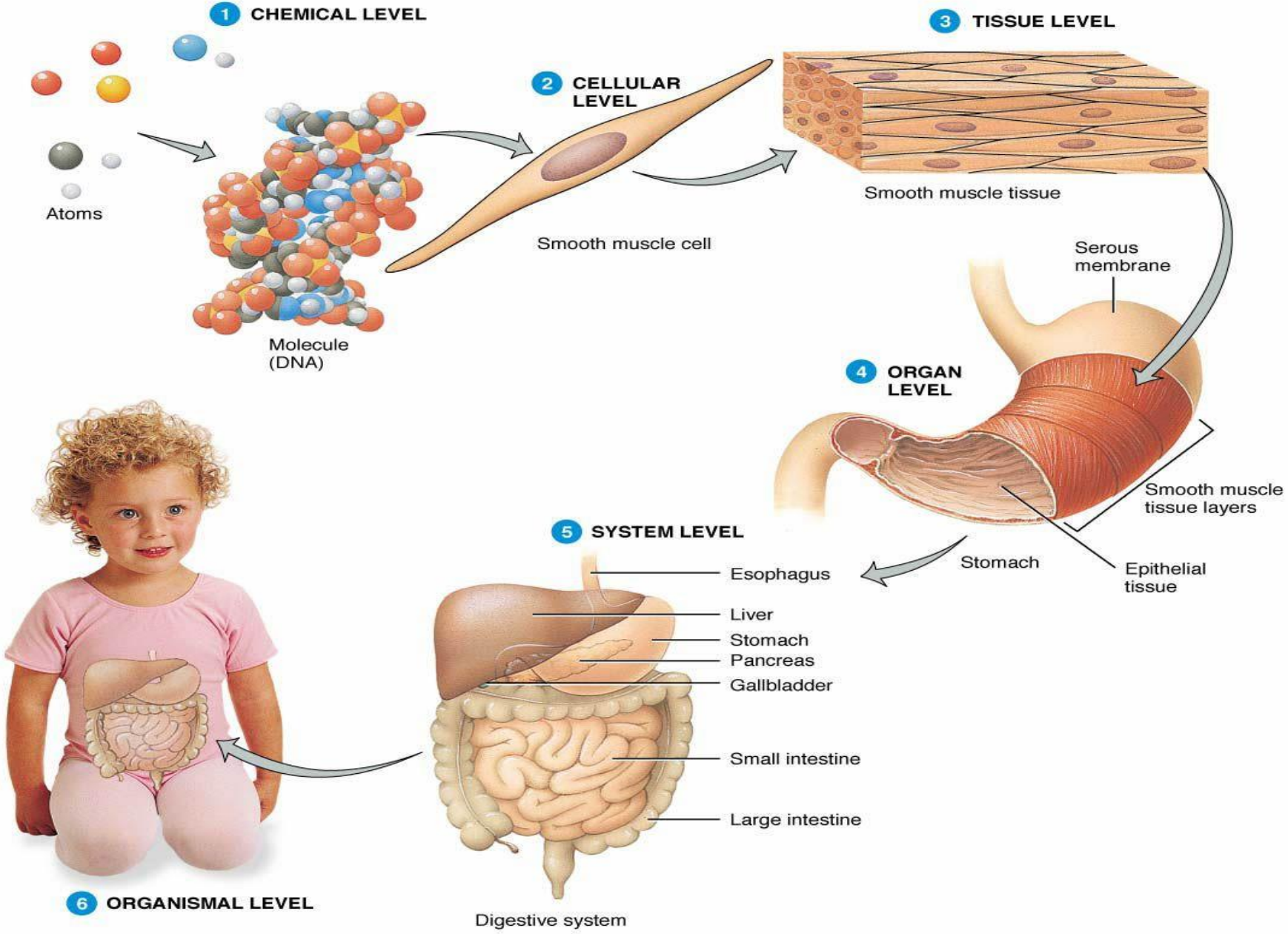
- Regional anatomy - Study of regional of the body.
- Radiographic anatomy - Study of structure can be seen with x-ray.
- Pathology anatomy - Study of structural changes associated with the disease.
- Surface anatomy - Study of anatomical landmark
- Embryology - Study of first 8 week of developmental after fertilization.

SCOPE OF PHYSIOLOGY

- Cardiovascular physiology – Study of function of the heart and blood vessels.
- Endocrinology – Study of hormones and how they control the body function.
- Immunology – Study of how the body defend against disease causing agent.
- Respiration physiology – Study of function of the air passages and lungs.
- Renal Physiology – Study of function of kidney.

Level of Structural Organization and Body System

- Chemical Level
- Cellular Level
- Tissue Level
- Organ Level
- Organ System Level
- Organization Level


1 CHEMICAL LEVEL
Atoms
Molecule (DNA)
2 CELLULAR LEVEL
Smooth muscle cell
3 TISSUE LEVEL
Smooth muscle tissue
Serous membrane
4 ORGAN LEVEL
Smooth muscle tissue layers
Epithelial tissue
Stomach
5 SYSTEM LEVEL
Esophagus
Liver
Stomach
Pancreas
Gallbladder
Small intestine
Large intestine
Digestive system
6 ORGANISMAL LEVEL

1. CHEMICAL LEVEL

- It is the simplest level within the structural hierarchy.
- The chemical level includes the tiniest building blocks of Particle, atoms, molecules, like water.
- Molecules combine to form organelles, the internal organs of a cell.
- Certain atoms, such as carbon (C), hydrogen (H), oxygen (O), nitrogen (N), and sulfur (S), are essential for maintaining life.

2. CELLULAR LEVEL

- The cellular level is made up of the smallest unit of living body.

- Molecules combine to form cells, the basic structural and functional units of an organism.

3. TISSUE LEVEL

- Tissues are groups of cells and the materials surrounding them that work to perform a similar function, similar to the way words are put together to form sentences.

- There are four basic types of tissue in your body: epithelial tissue, connective tissue, muscular tissue, and nervous tissue.

4. Organ Level

- Different types of tissues are joined together to form an organ.
- Organs are structures that are composed of two or more different types of tissues, they have specific functions.
- Examples of organs are the stomach, skin, bones, heart, liver, lungs and brain.

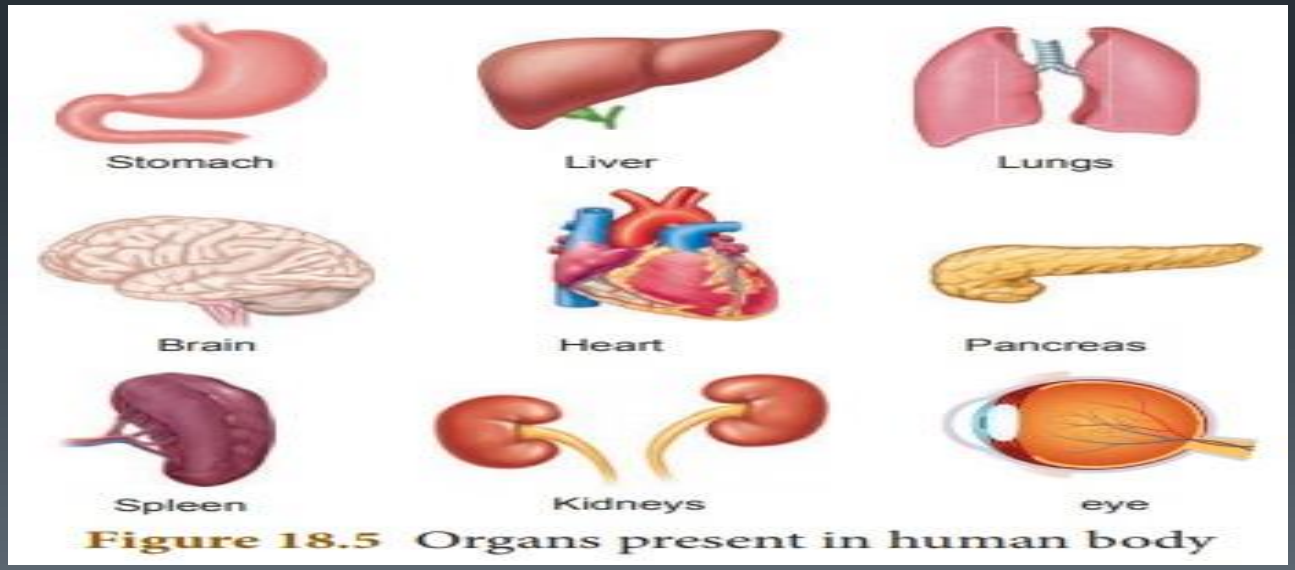
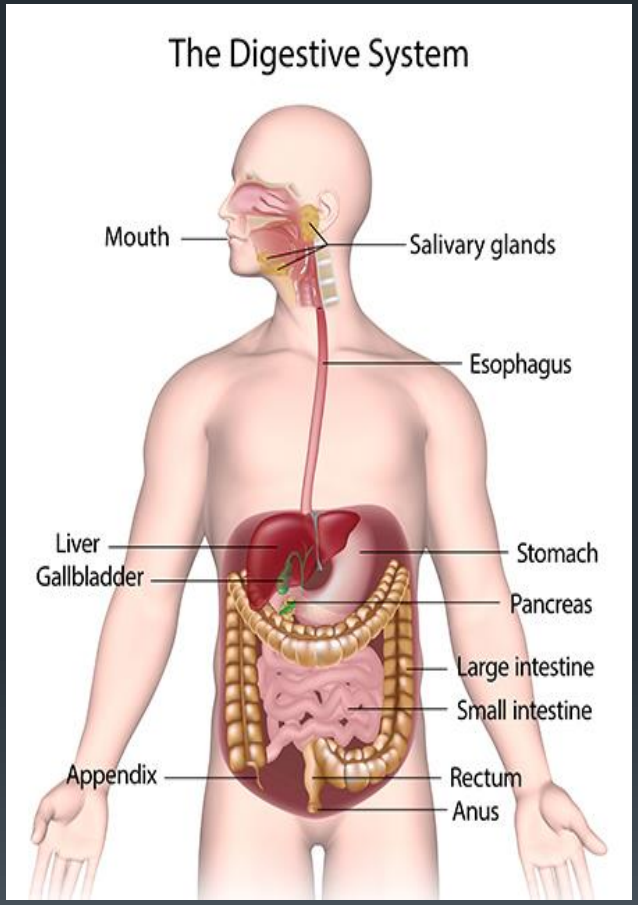


Figure 18.5 Organs present in human body

5. Organ System Level

- A system consists of related organs with a common function.

- Example of the digestive system, organ include the mouth, salivary glands, throat, esophagus, stomach, small intestine, large intestine, liver, gallbladder, and pancreas.

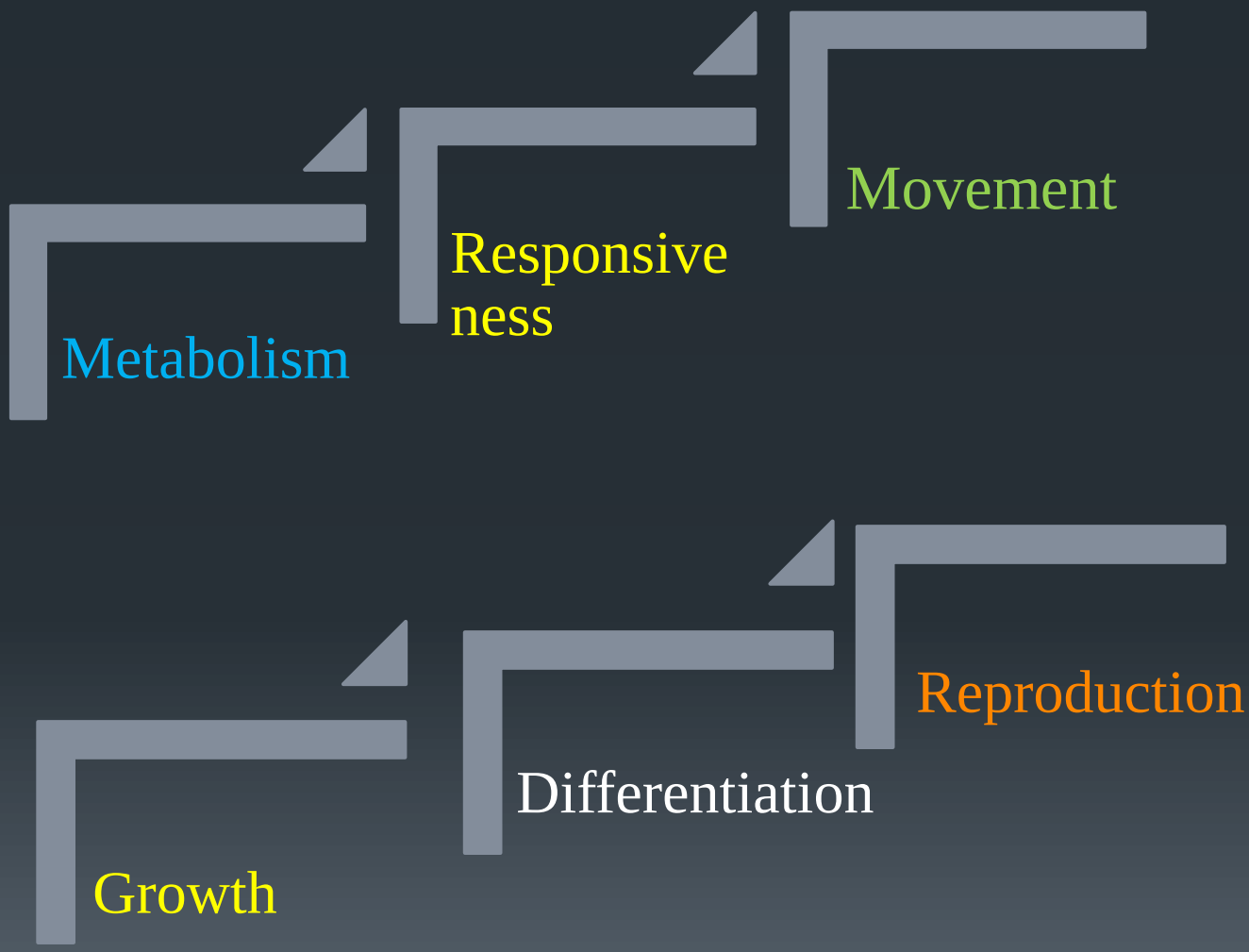


6. Organism Level

- An organism, any individual, like human body. All the parts of the human body functioning together constitute the total organism.

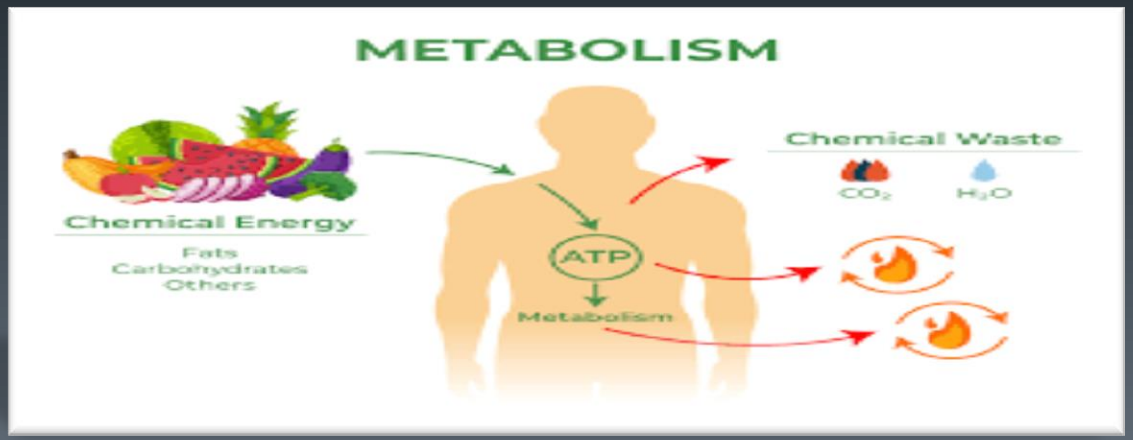
- The organism level is the highest level of organization. It is the sum total of all structural levels working together.

BASIC LIFE PROCESSES



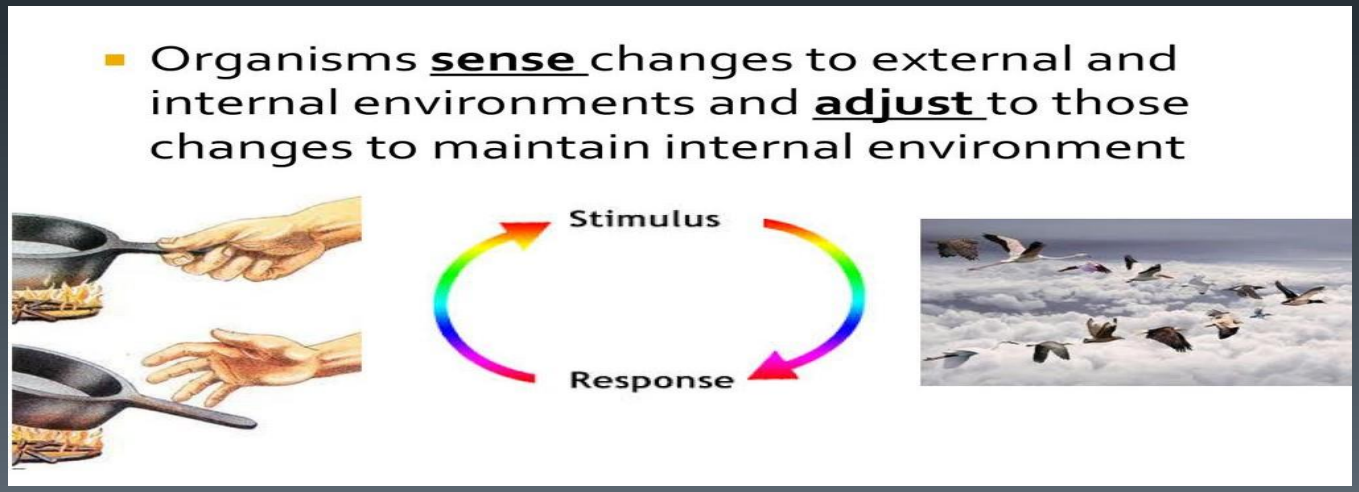
METABOLISM

- It is sum of all the chemical processes that occur in the body.
- Two phases of metabolism, namely catabolism and anabolism.
- Catabolism is the breakdown of complex chemical substances into simpler components.
- Anabolism is the building up of complex chemical substances from smaller, simpler components.
- Metabolism is regulated by hormones secreted from (glands) the endocrine system.



RESPONSIVENESS

- It is body's ability to detect and respond to changes.
- Example, a decrease in body temperature represents a change in the internal environment (within the body), and infected, certain white blood cells move from the blood into the affected tissue to help clean up and repair the area.
- Responsiveness is an extremely important necessary life function.



MOVEMENT

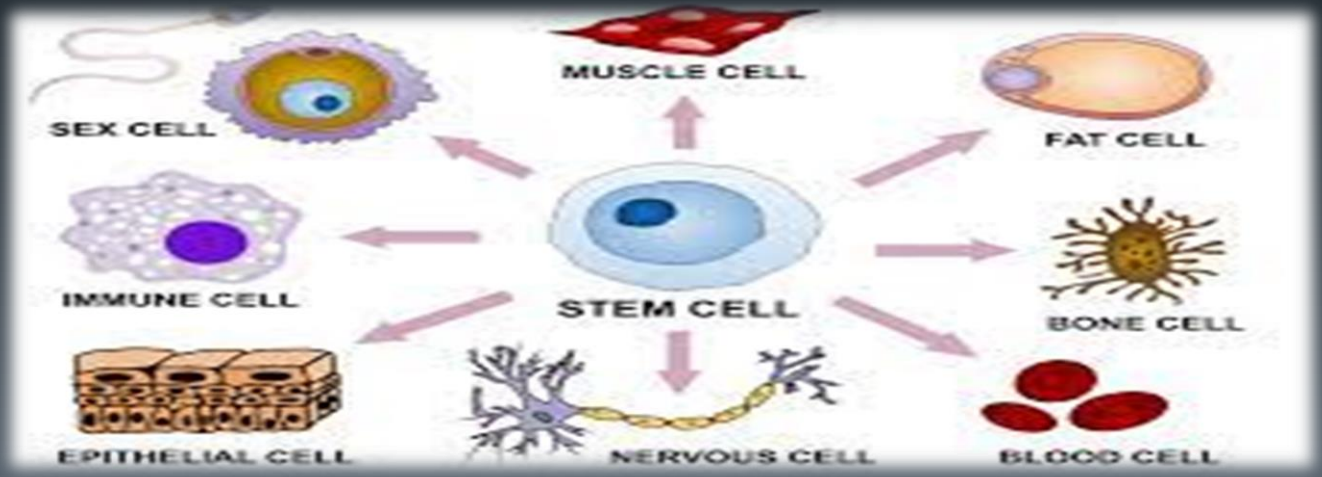
- It includes motion of the whole body, individual organ. Single cells, and even tiny structures inside cells.
- For example, the coordinated action of leg muscles moves your whole body from one place to another when you walk or run.
- Inside the cell, various parts move from one position to another to carry out their functions.

GROWTH

- It is an increase in body size that results from an increase in the size of existing cell, an increases in the number of cell, or both.
- The scientific term for growth “constructive activities must occur at a faster rate than destructive ones”.

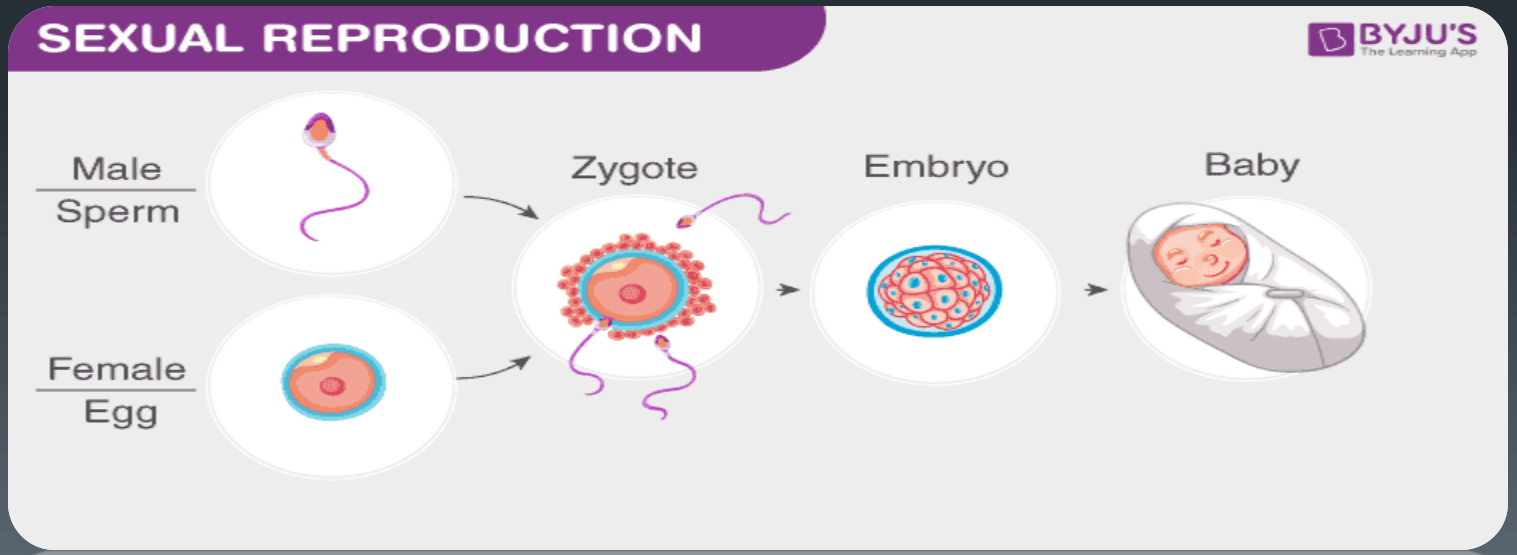
DIFFERENTIATION

- It is the development of cell from an unspecialized to a specialized state. Each type of cell in the body has a specialized structure and function that differs from that of its precursor cells.
- For example, red blood cells and several types of white blood cells all arise from the same unspecialized precursor cells in red bone marrow.
- Also through differentiation, a fertilized egg develops into an embryo, and then into foetus, an infant, a child, and finally an adult.



REPRODUCTION

- It refers either to the formation of new cells for tissue growth, repair, or replacement, or to the production of a new individual.
- In humans, the former process occurs continuously throughout life, which continues from one generation to the next through the latter process, the fertilization of an ovum by a sperm cell.



HOMEOSTASIS

- It is condition of equilibrium (balance) in the body's internal environment due to the constant interaction of the body's many regulatory processes.
- The tendency of an organism or cell to regulate its internal environment and maintain equilibrium, usually by a system of feedback controls, so as to stabilize health and functioning.
- Generally, the body is in homeostasis when its needs are met and its functioning properly.
- Every organ in the body contributes to homeostasis. A complex set of chemical, thermal, and neural factors interact in complex ways, both helping and hindering the body while it works to maintain homeostasis.

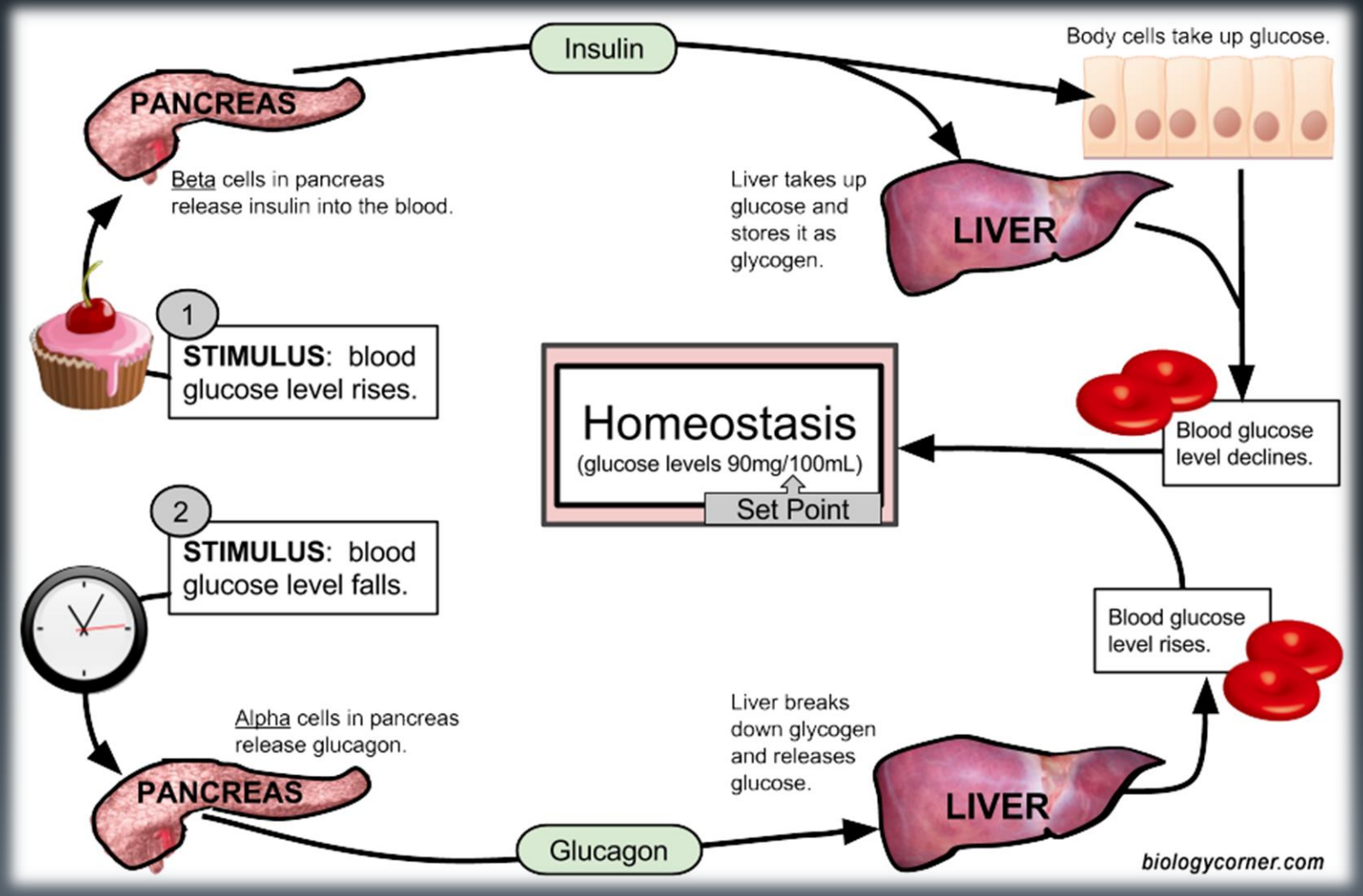
HOMEOSTASIS CONTROL

- Homeostasis is maintained by the body's responses to adverse stimuli, ensuring maintenance of an optimal physiological environment.

- Homeostasis control mechanisms have at least three components: receptor, integrating center, and effector.

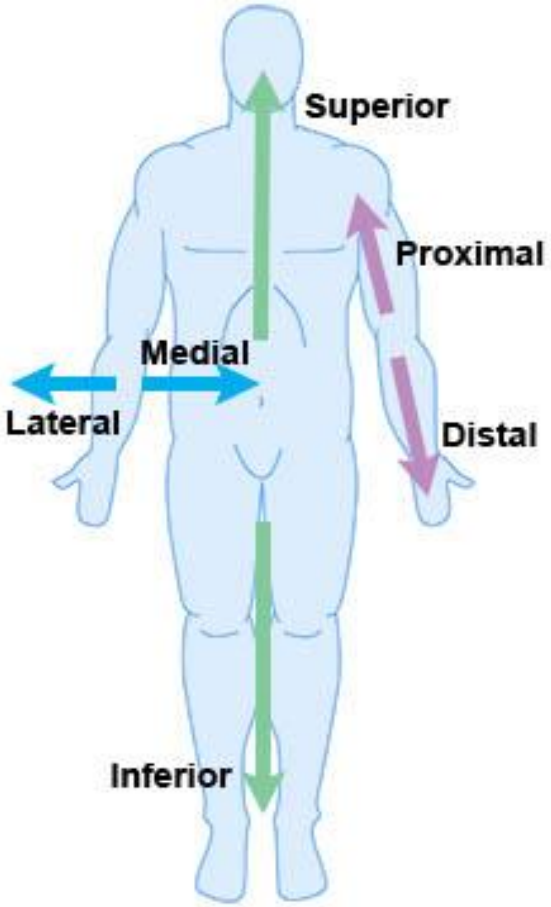
- The receptor senses environmental stimuli, sending the information to the integrating center. An example is peripheral chemoreceptors, which detect changes in blood PH.

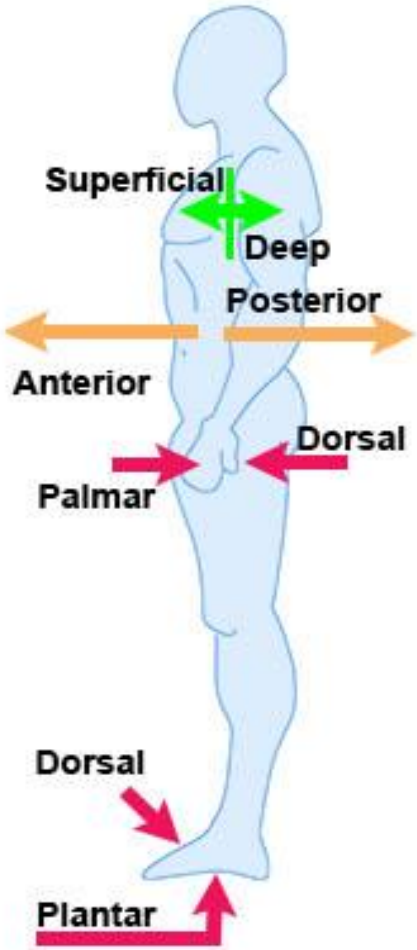
- The integrating center or control center receives information from the sensors and initiates the response to maintain homeostasis.
- The most important example is the hypothalamus, a region of the brain that controls everything from body temperature to heart rate, blood pressure, satiety (fullness), and circadian rhythms (sleep and wake cycles).
- An effector is any organ or tissue that receives information from the integrating center and acts to bring about the changes needed to maintain homeostasis. Example is the kidney, which retains water if blood pressure is too law.


Insulin
Body cells take up glucose.
PANCREAS
Beta cells in pancreas release insulin into the blood.
Liver takes up glucose and stores it as glycogen.
LIVER
1
STIMULUS: blood glucose level rises.
Homeostasis
(glucose levels 90mg/100mL)
Set Point
Blood glucose level declines.
2
STIMULUS: blood glucose level falls.
Blood glucose level rises.
Alpha cells in pancreas release glucagon.
Liver breaks down glycogen and releases glucose.
PANCREAS
LIVER
Glucagon
biologycorner.com

Basic Anatomical Terminology

Term	Definition
Superior (Cranial)	Toward the head
Inferior (Caudal)	Toward the bottom (tail)
Anterior (Ventral)	Toward the front
Posterior (Dorsal)	Toward the back
Medial	Toward the midline of the body
Lateral	Toward the side of the body
Internal (Deep)	Away from the surface of body
Distal	Away from the main mass of the body
Proximal	Toward the main mass of body


Superior
Proximal
Medial
Lateral
Distal
Inferior


Superficial
Deep
Posterior
Anterior
Dorsal
Palmar
Dorsal
Plantar


MAYO
CLINIC
THANK YOU

UNIT – I

CELLULAR LEVEL OF ORGANIZATION

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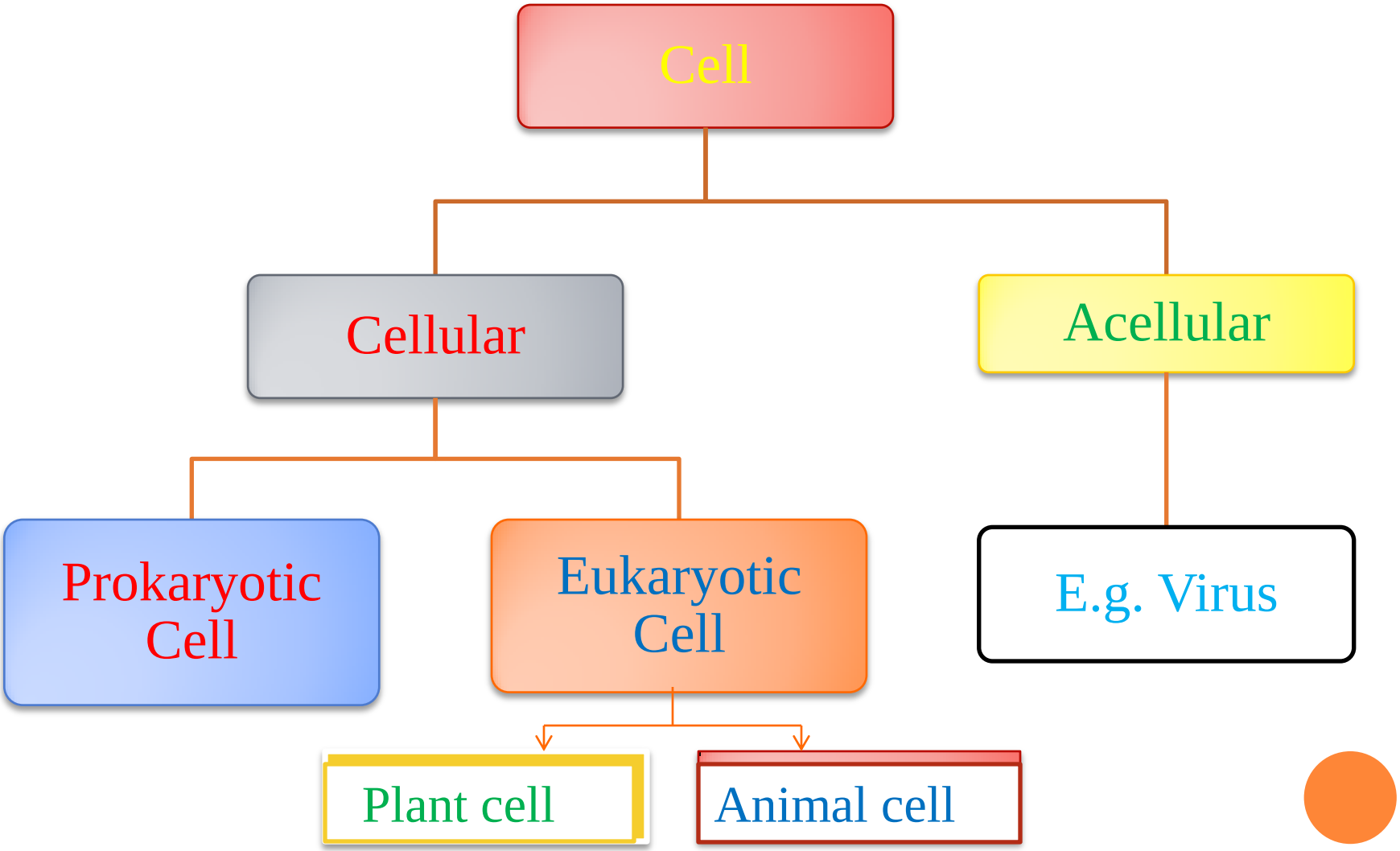
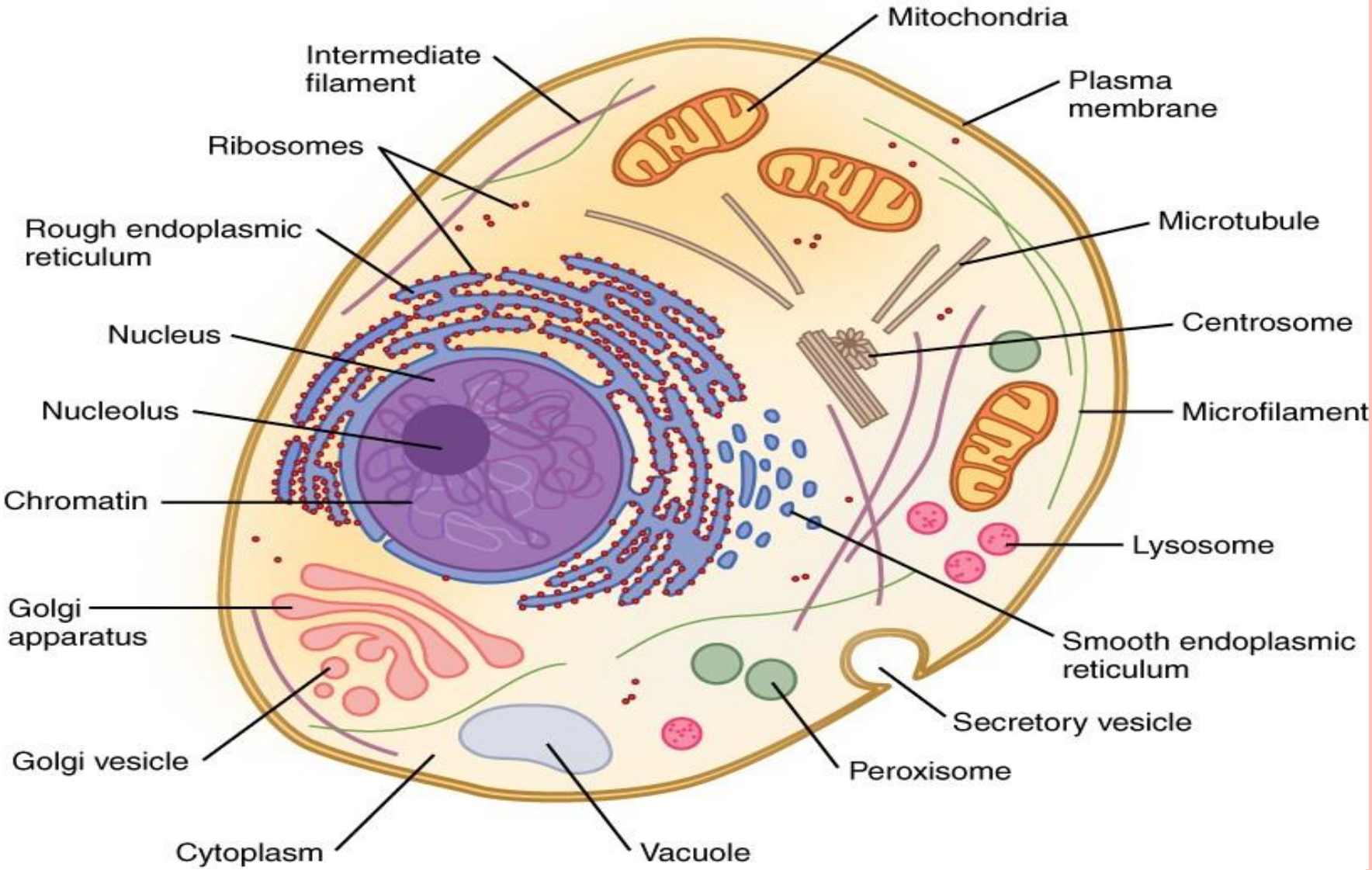
INTRODUCTION

- Cell is the basic, living, structural and functional unit of human body/life.
- There are about 200 different types of cell in our body.
- All cell produced by the process of cell division.
- Cell biology is the study of cellular structure and function.
- Cytology is the branch of science that deals with the microscopic study of cell, their origin, structure and function.

Types of cell



Structure of cell



Part of cell

Cell / Plasma membrane

Sub-Cellular Organelles

Cytoplasm

Ribosomes

Endoplasmic reticulum (smooth & rough)

Golgi complex/apparatus

Mitochondria

Lysosomes

Nucleus

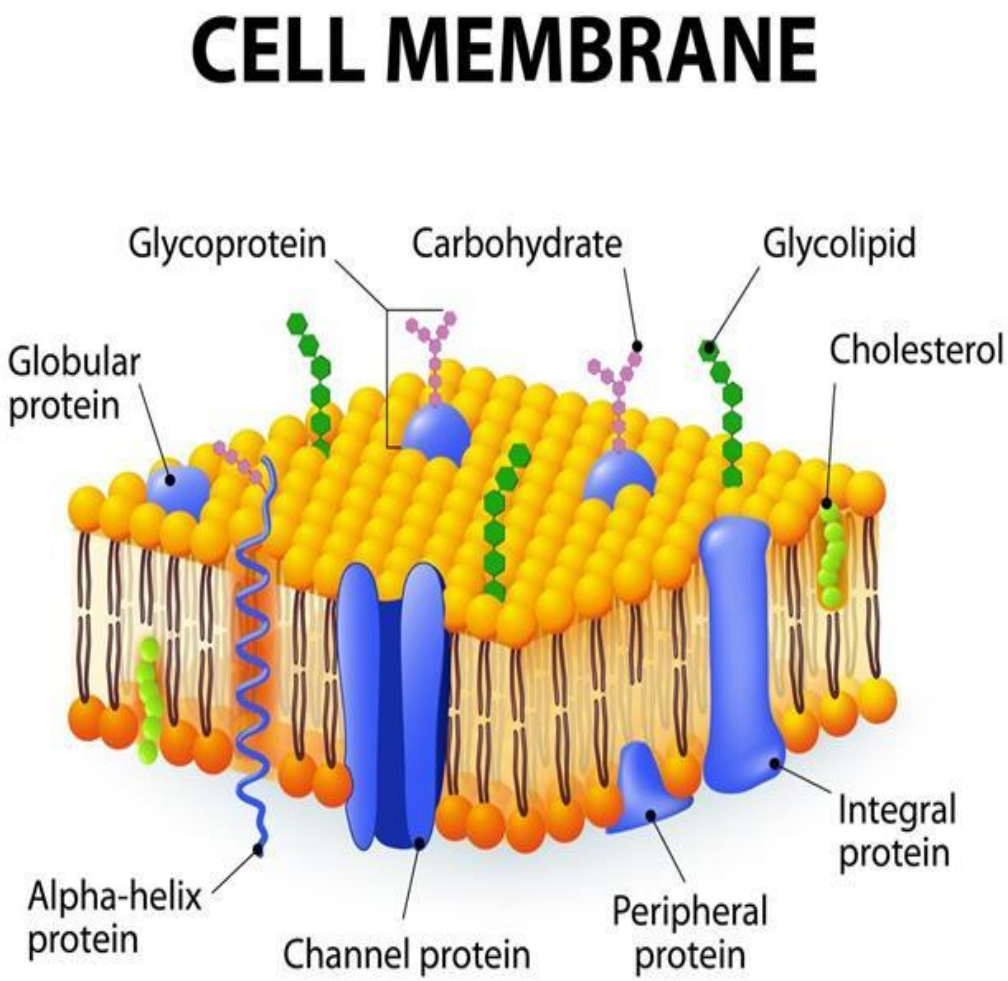
Nucleolus

Plasma membrane

- The thin barrier that separates the internal components of the cell from the extracellular materials and external environment is the plasma membrane
- The plasma membrane regulates the passage of substances into and out of the cell.
- The membrane is composed of proteins and lipids (phospholipids).
- The phospholipid molecules have head which is electrically charged and hydrophilic in nature.
- A tail which has no charge and hydrophobic in nature.

Function

- Protection
- Barrier
- Shape of the cell
- Cell junction
- Cell movement
- Selective permeability
- Impulse transmission



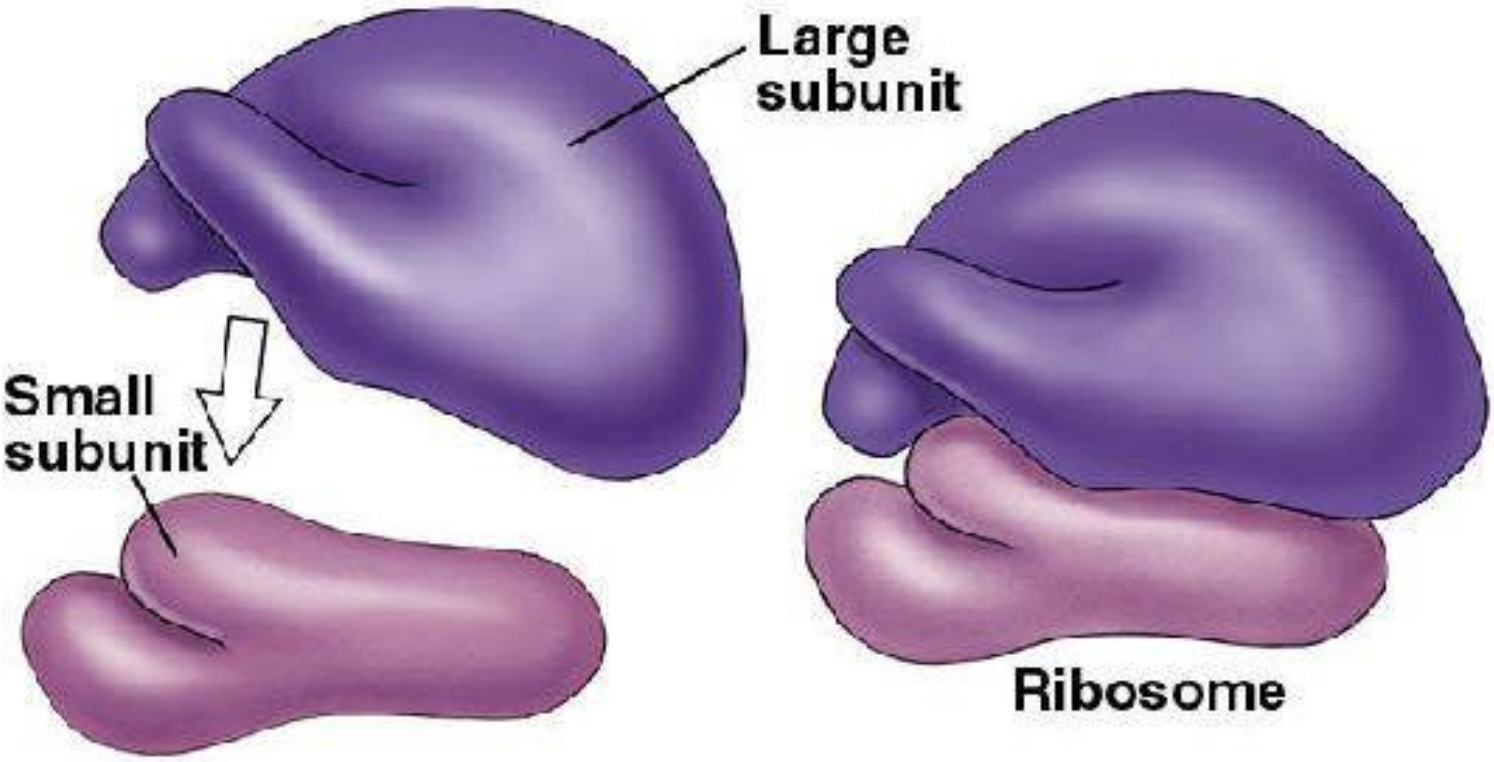
Cytoplasm

- The cytoplasm has two components
- Cytosol
- It is the fluid portion of cytoplasm that contains water (75-90%), ion, amino acids, proteins, lipids, ATP (adenosine triphosphate) and waste products.

Ribosomes

- These are tiny granules composed of RNA and protein.
- They synthesize protein from amino acid using RNA.
- When this is present in free units in the cytoplasm, the ribosomes make proteins for use within the cell.
- Ribosomes are also found on the outer surface of the nuclear envelope and rough endoplasmic where they manufacture proteins for export from the cell.

Ribosome

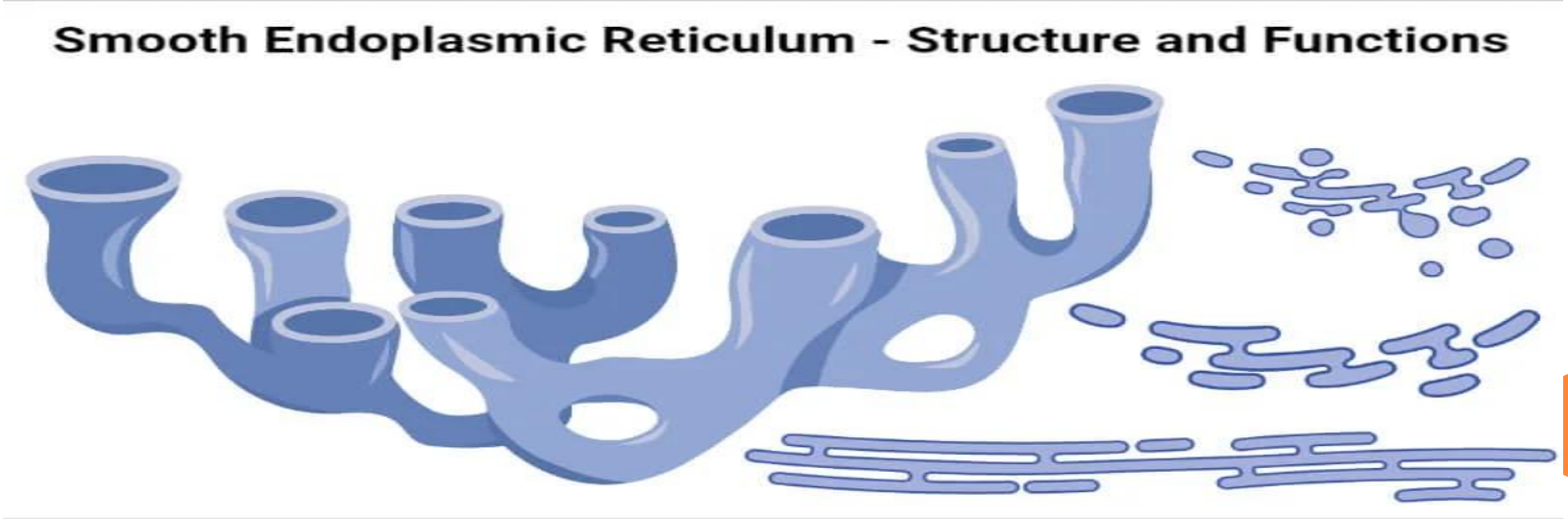


Endoplasmic reticulum

- It is the series of interconnecting membranous canals in the cytoplasm.
- There are 2 types of endoplasmic reticulum

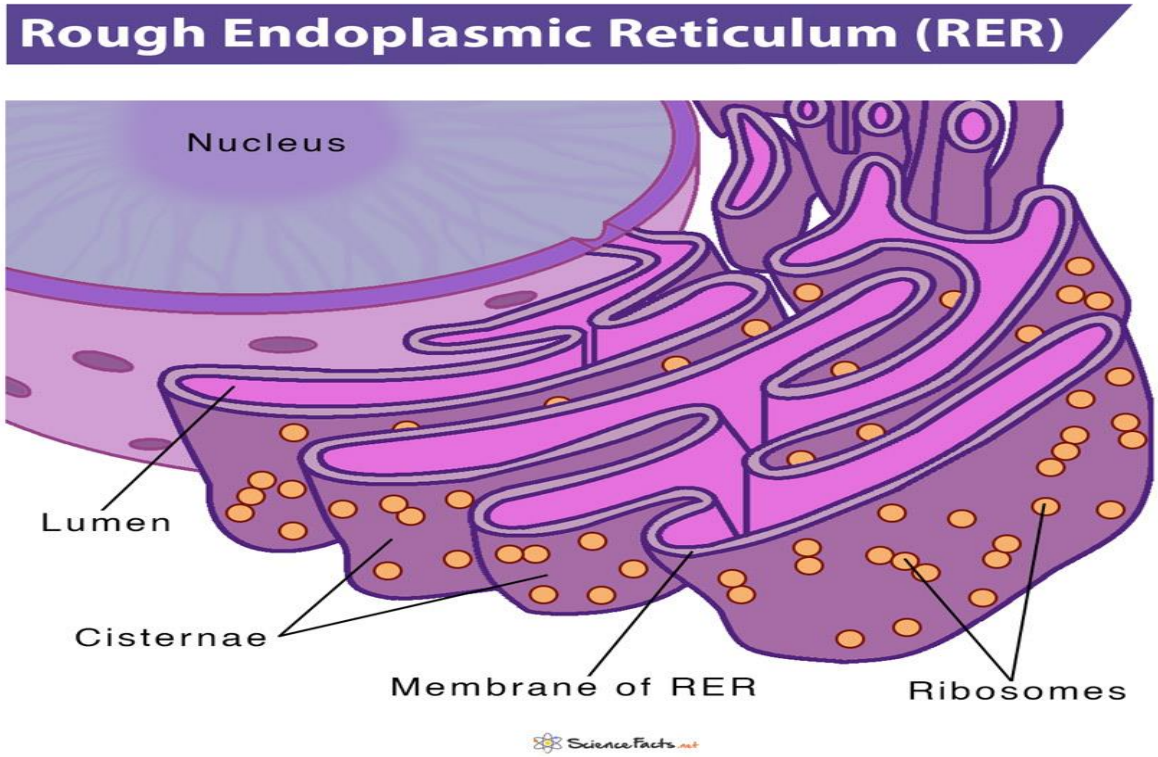
Smooth endoplasmic reticulum

- Here is lack of ribosomes



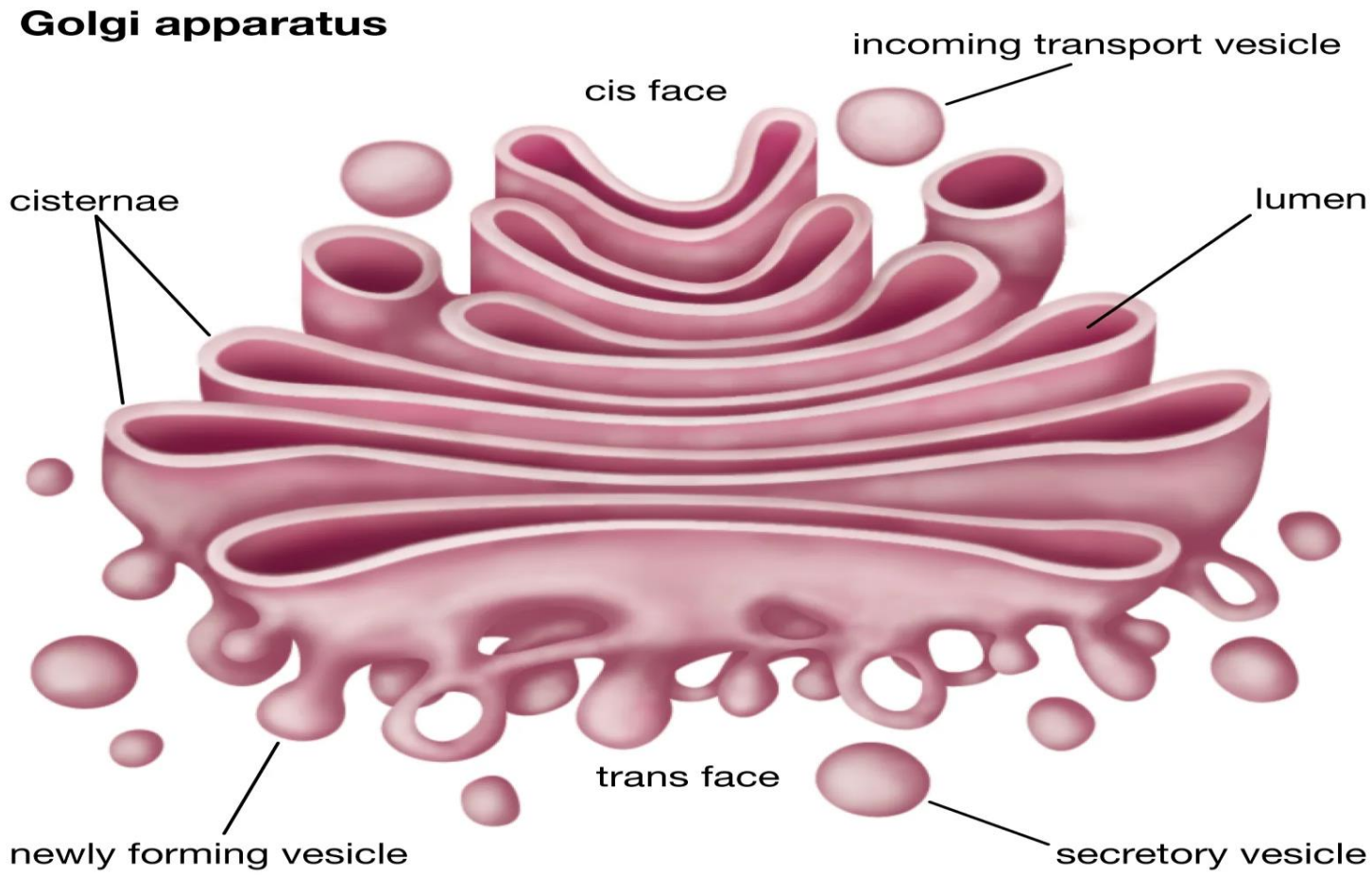
Rough endoplasmic reticulum

This is studded with ribosomes that synthesize proteins.



Golgi apparatus

- It consist of stack of closely folded flattened membranous sac.
- It present in all cells but is larger in those cells that synthesize and export proteins.
- The protein move from ER to golgi apparatus where they are packaged into membrane bound vesical called secretory granules.
- The vesicles are stored and when needed more to plasma membrane, through which the proteins are exported.


Golgi apparatus
incoming transport vesicle
cis face
cisternae
lumen
trans face
newly forming vesicle
secretory vesicle
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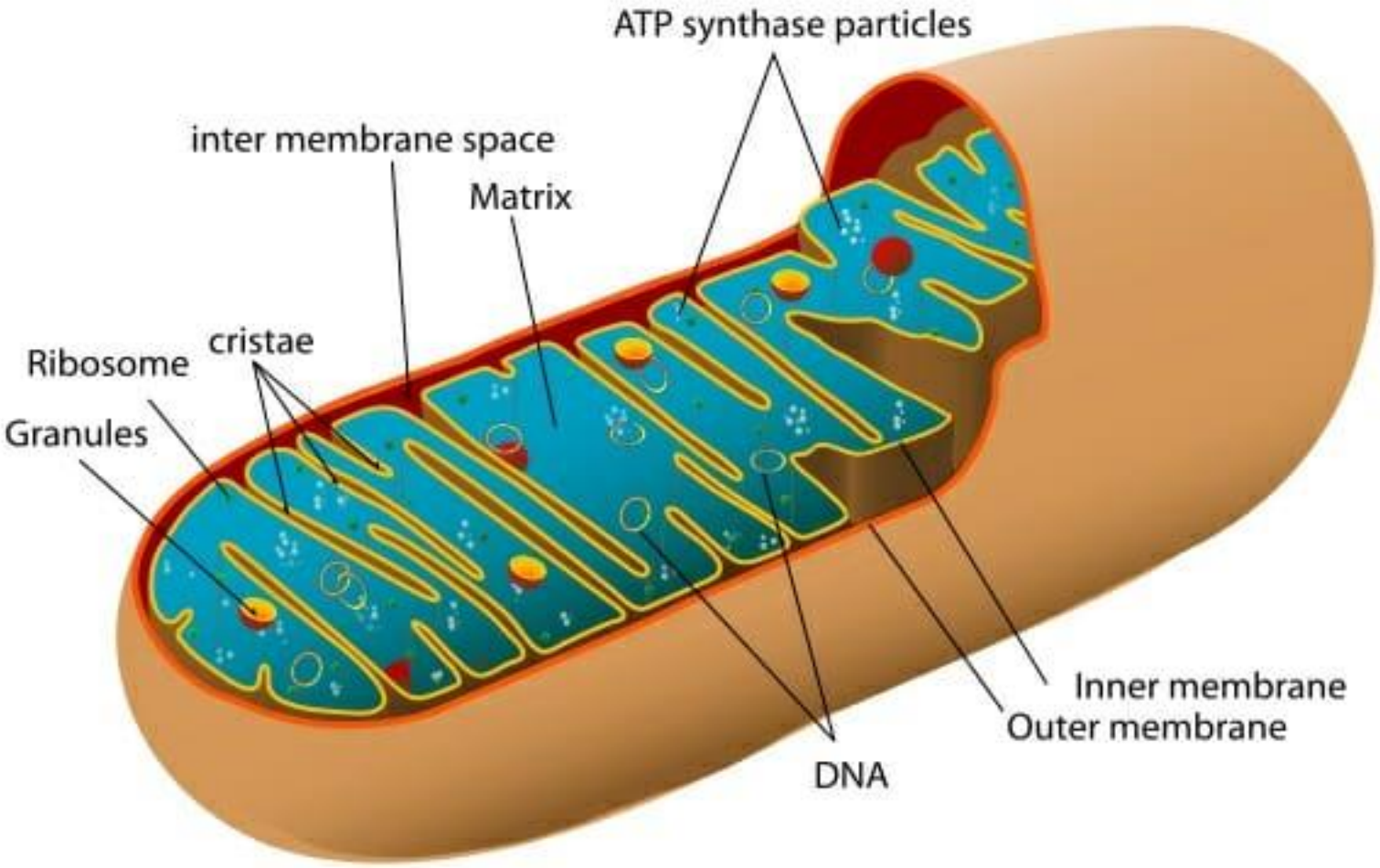
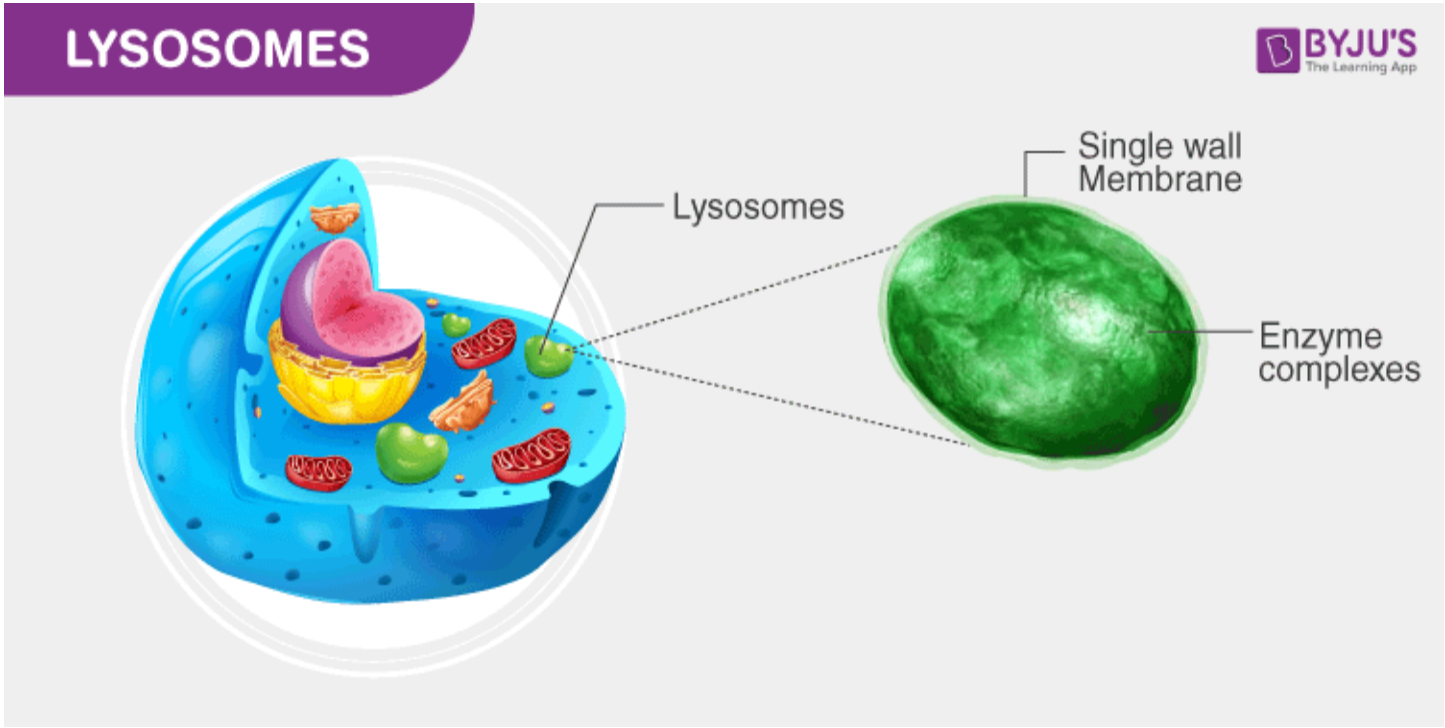
Mitochondria

- This is also called power house of cell.
- They are involved in the aerobic respiration, the process by which chemical energy is made available in the cell.
- This energy is in the form of ATM which release energy when the cell break it down.
- Synthesis of ATP is most efficient in the final stage of aerobic respiration, a process requiring oxygen.


ATP synthase particles
inter membrane space
Matrix
cristae
Ribosome
Granules
Inner membrane
Outer membrane
DNA

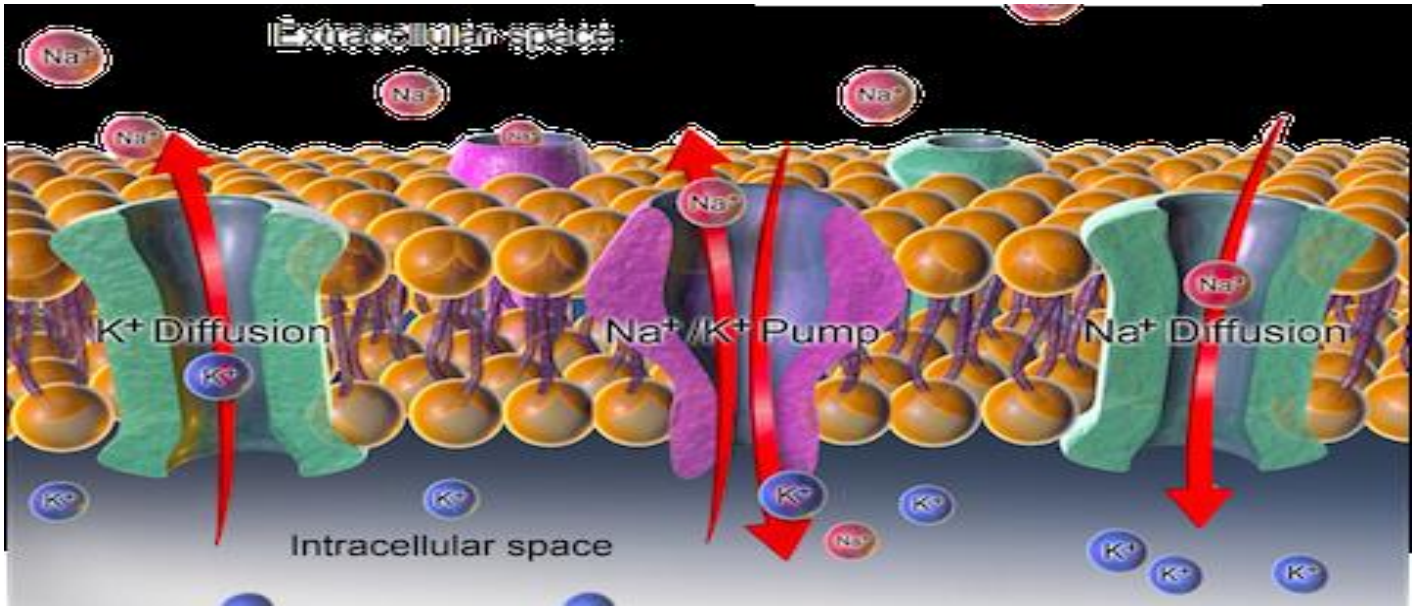
LYSOSOMES

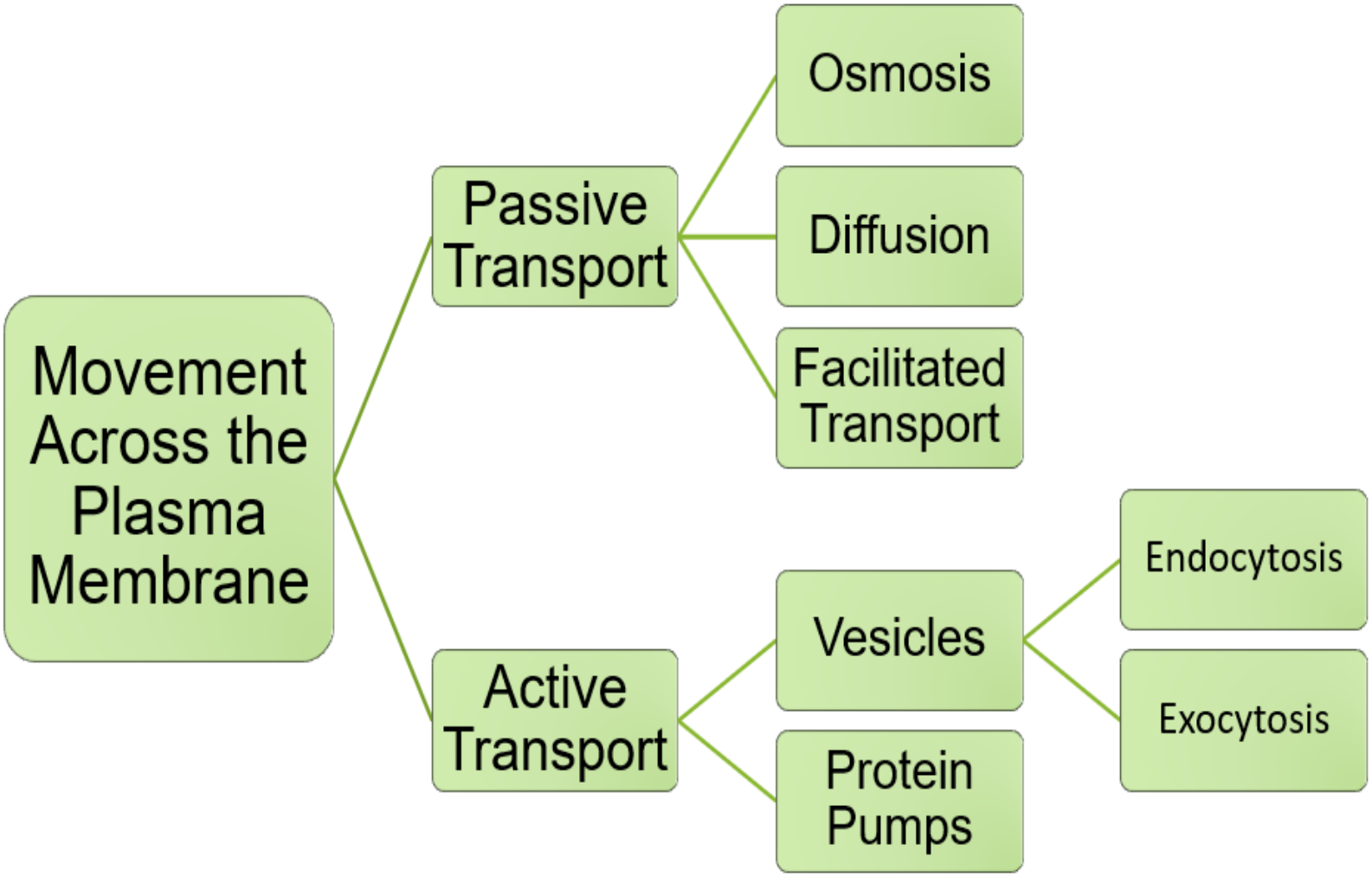
- Lysosome → Hydrolytic enzyme release Remove → problematic cell and destroyed cell



Transport across cell membrane

- Transport across the plasma membrane occurs unaided in simple diffusion i.e. molecules of gases such as carbon dioxide and oxygen as well as small molecules like ethanol, enter the cell by crossing the cell membrane without the assistant of any permease.



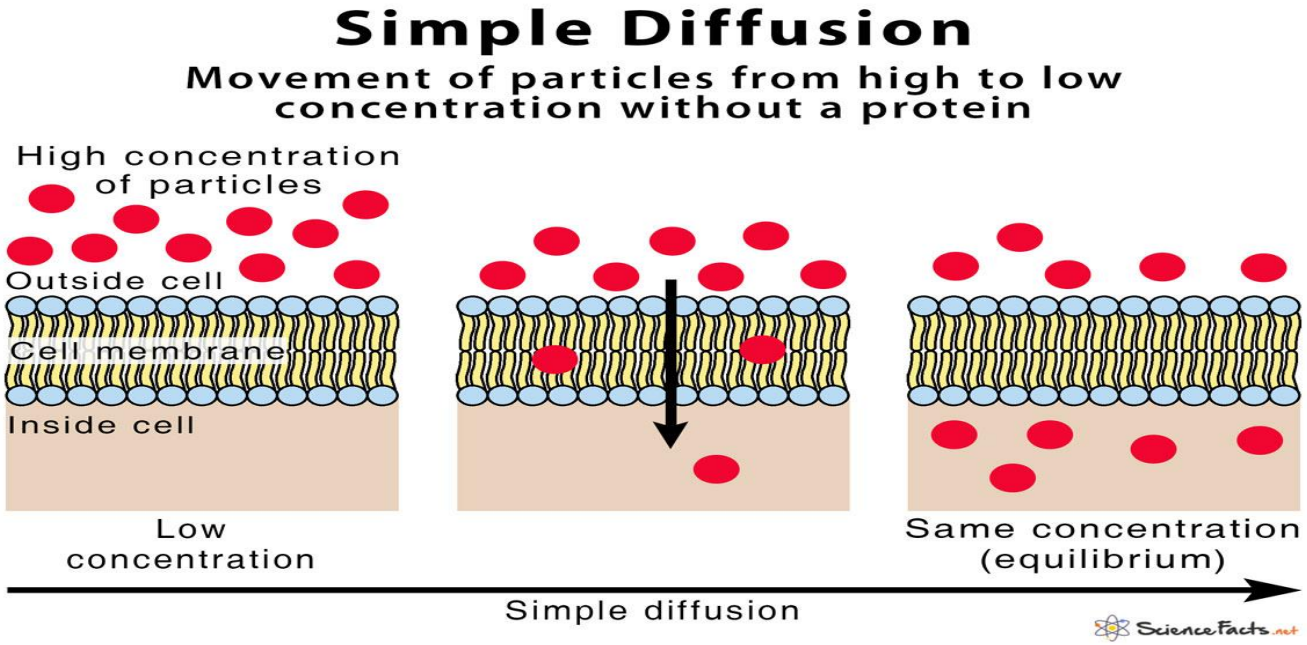

Movement Across the Plasma Membrane
Passive Transport
Osmosis
Diffusion
Facilitated Transport
Active Transport
Vesicles
Endocytosis
Exocytosis
Protein Pumps

Passive transport

1. Simple diffusion

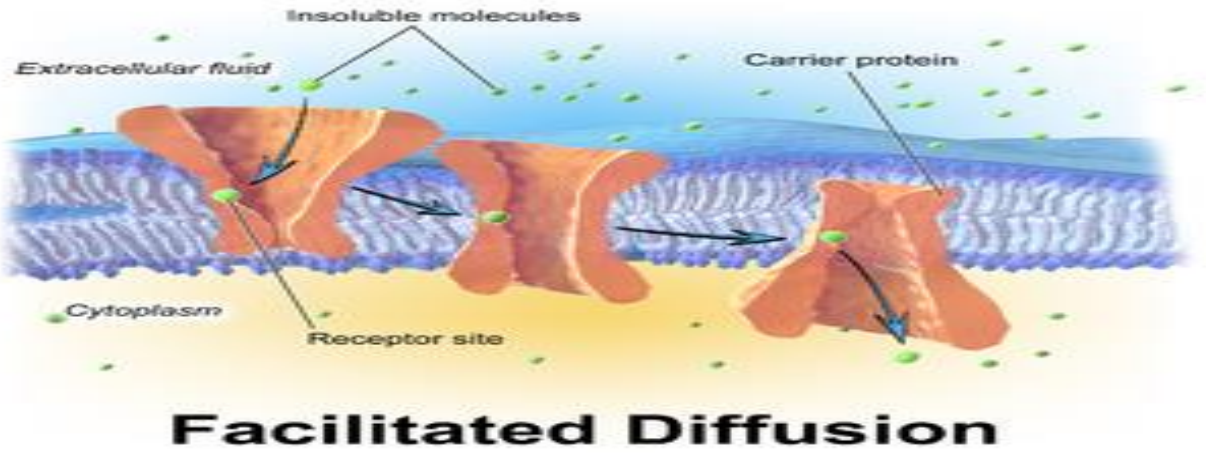
Diffusion is the movement of substance from region of higher concentration to lower concentration.

Diffusion occurs in liquids and gases because their particles move randomly from one place to another.



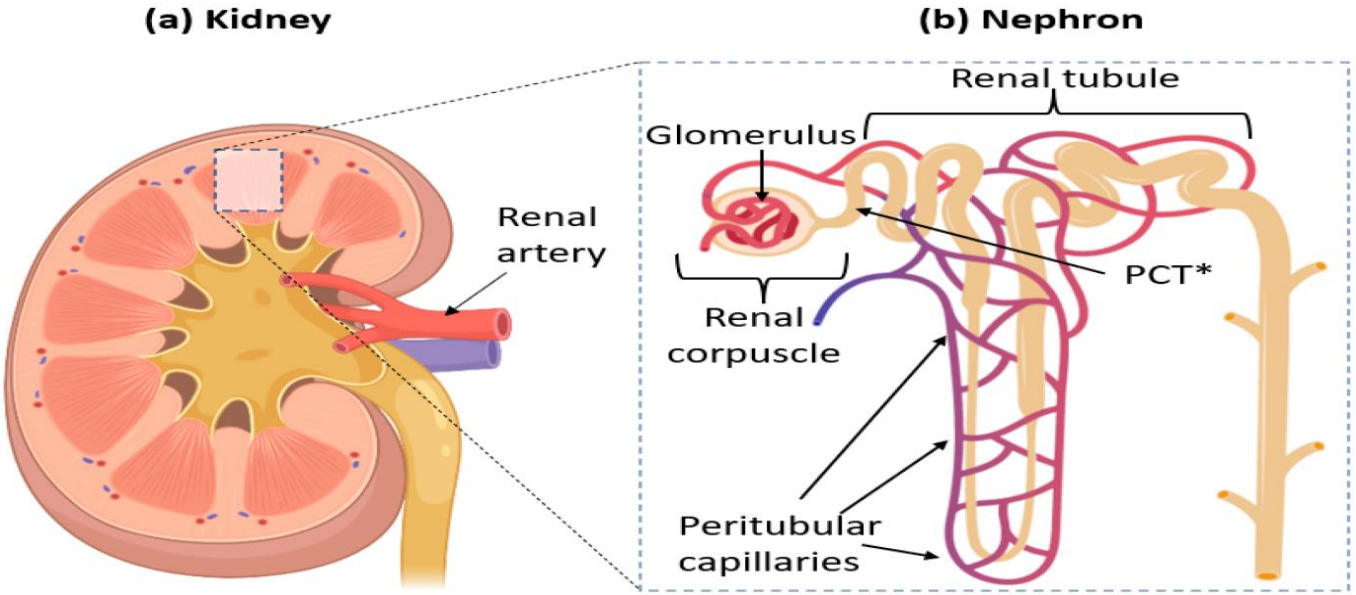
2. Facilitated diffusion

- Facilitated diffusion is the passive transportation of ions or molecules across the cell membrane through specific trans-membrane integral proteins.
- Glucose transporter, ion channels and aquaporins are some example of facilitated diffusion.
- The cell membrane is permeable only to few molecules that are smaller in size and non-polar.



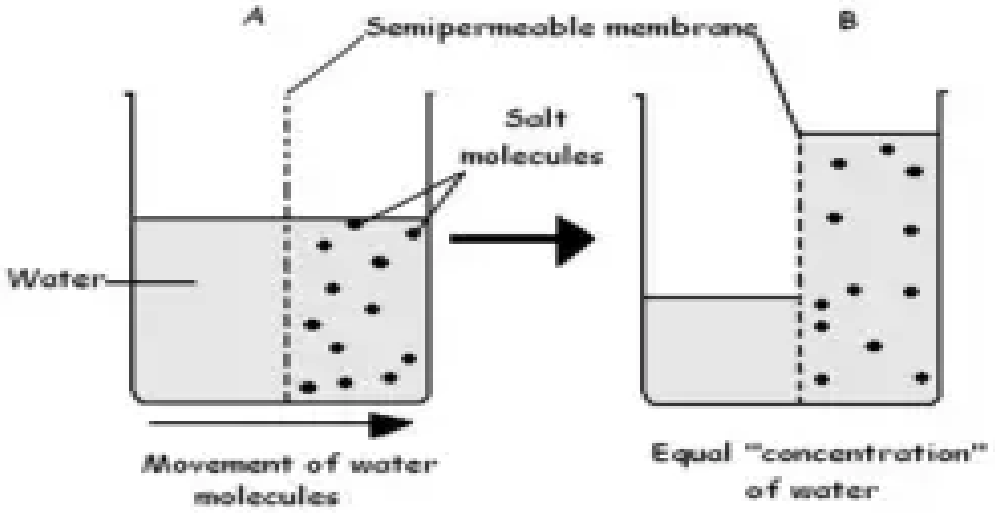
3. FILTRATION

- Filtration is the process of separation solids from liquids and gases the selective absorption of nutrients in the body.
- This process does not require and energy and takes place along concentration gradient.
- E.g. Kidney are a biological filter the blood as filtered by the glomerulus and necessary molecules are reabsorbed.



4. OSMOSIS

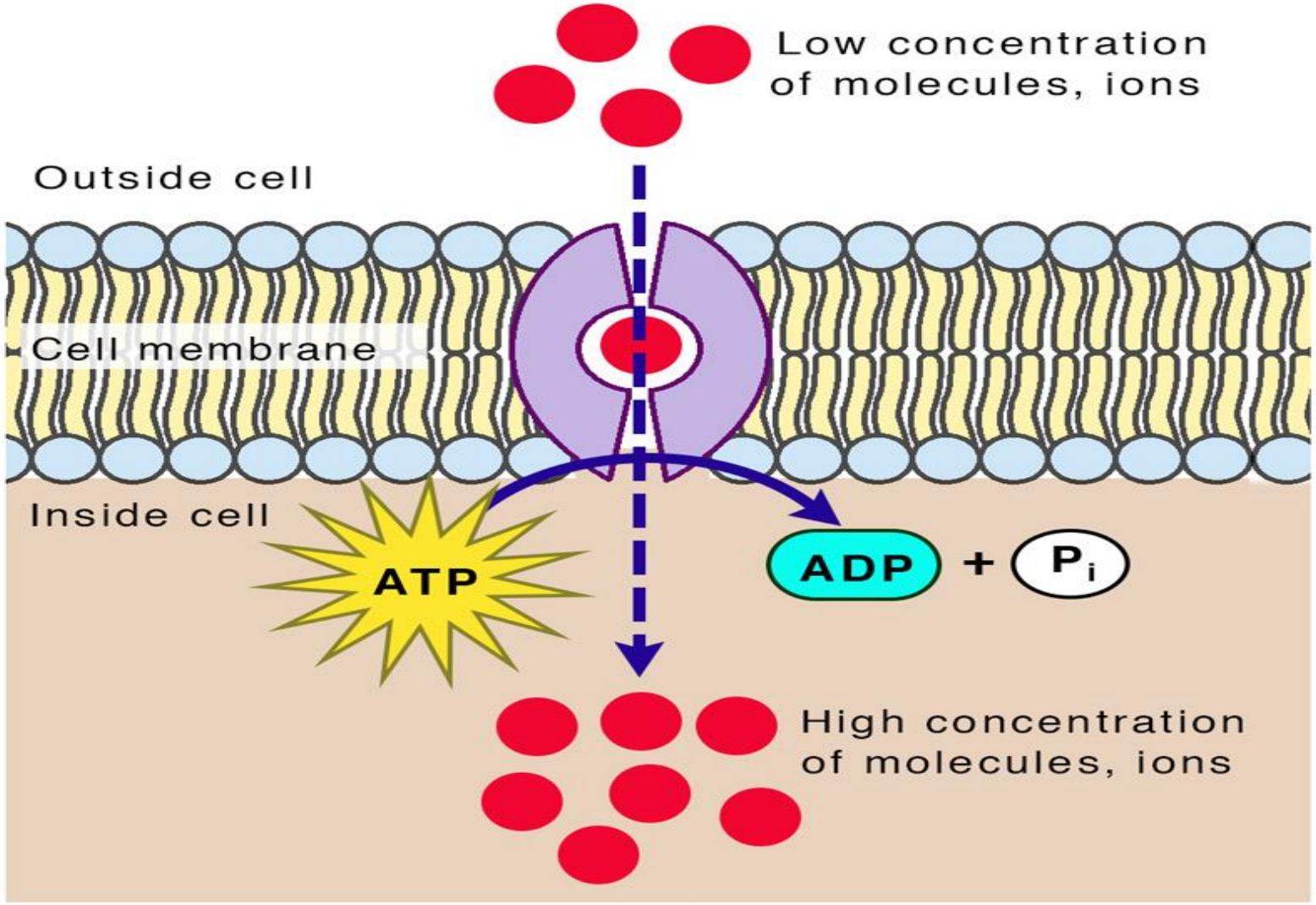
- In the process of osmosis, water and other molecule pass through a selectively permeable membrane in order to balance the concentration of order substances.
- Osmosis is affected by the concentration gradient and temperature the greater the concentration gradient the faster the rate of osmosis.



Active transport

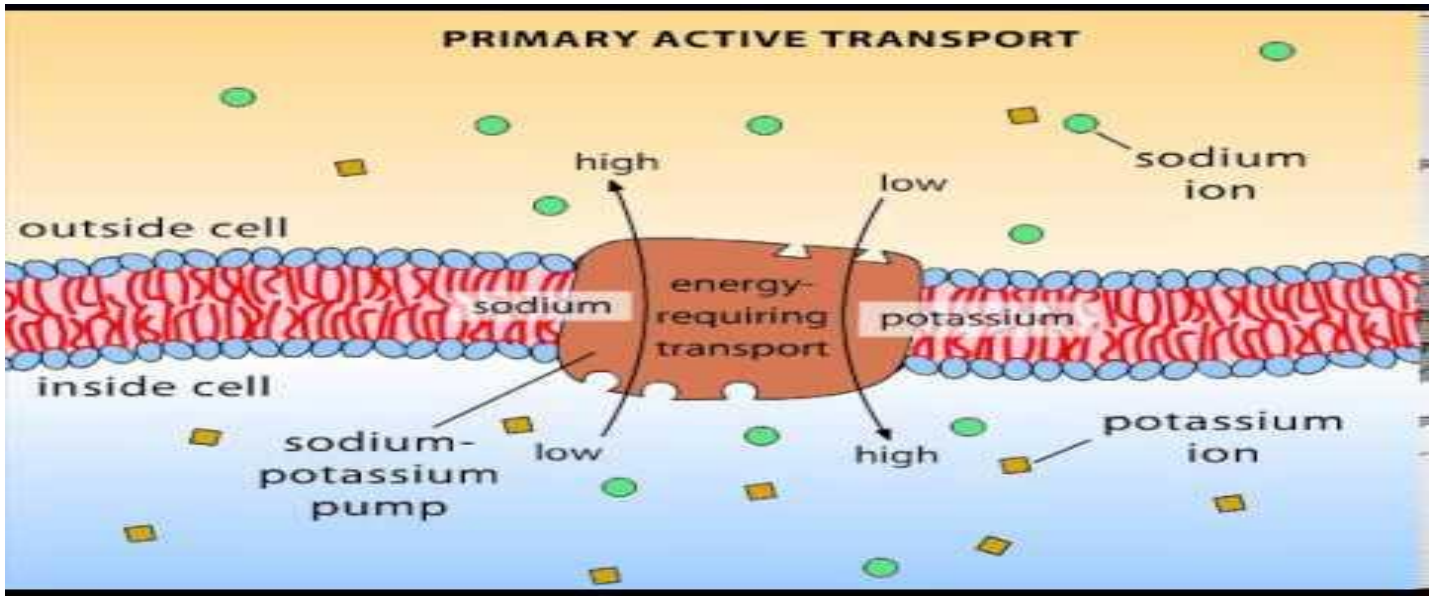
- It is biological process of movement of the molecules against the concentration gradient thus.
- It requires chemical energy to transport the components from an area of lower concentration to area of higher concentration.
- It is of two types
  1. Primary active transport
  2. Secondary active transport

Active Transport



Primary active transport

- In primary active transport the energy is utilized by the breakdown of ATP
- It requires carrier protein
- 40% of the whole ATP uses in primary active trasport
- E.g. Sodium-potassium pump



Secondary active transport

- In secondary active transport energy is used from electrochemical gradient that is generate by active transport.

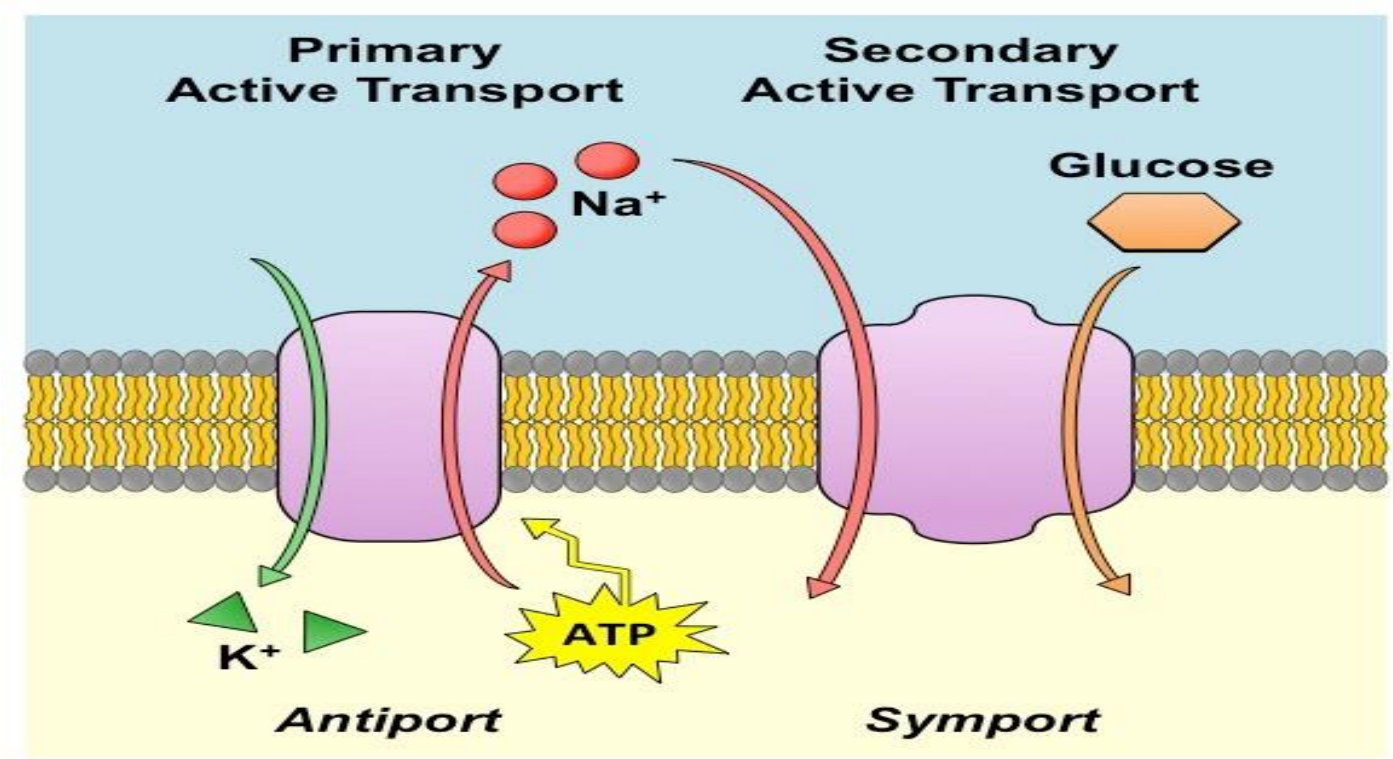
- They are of two types
  1. Symporter
  2. Antiporter

Symporter

- A symporter is an active transport protein that transport two different molecules across the cell membrane in the direction.

Antiporter

- An antiporter is an active transport protein that transport two different molecules in opposite directions.



Cell Division

- Cell division is a process by which a parent cell divides into two daughter cells.
- It is also known as Cell Reproduction or Cell Multiplication.
- The cell division takes place approximately in every 24 hours.
- There are basically two types of cell division

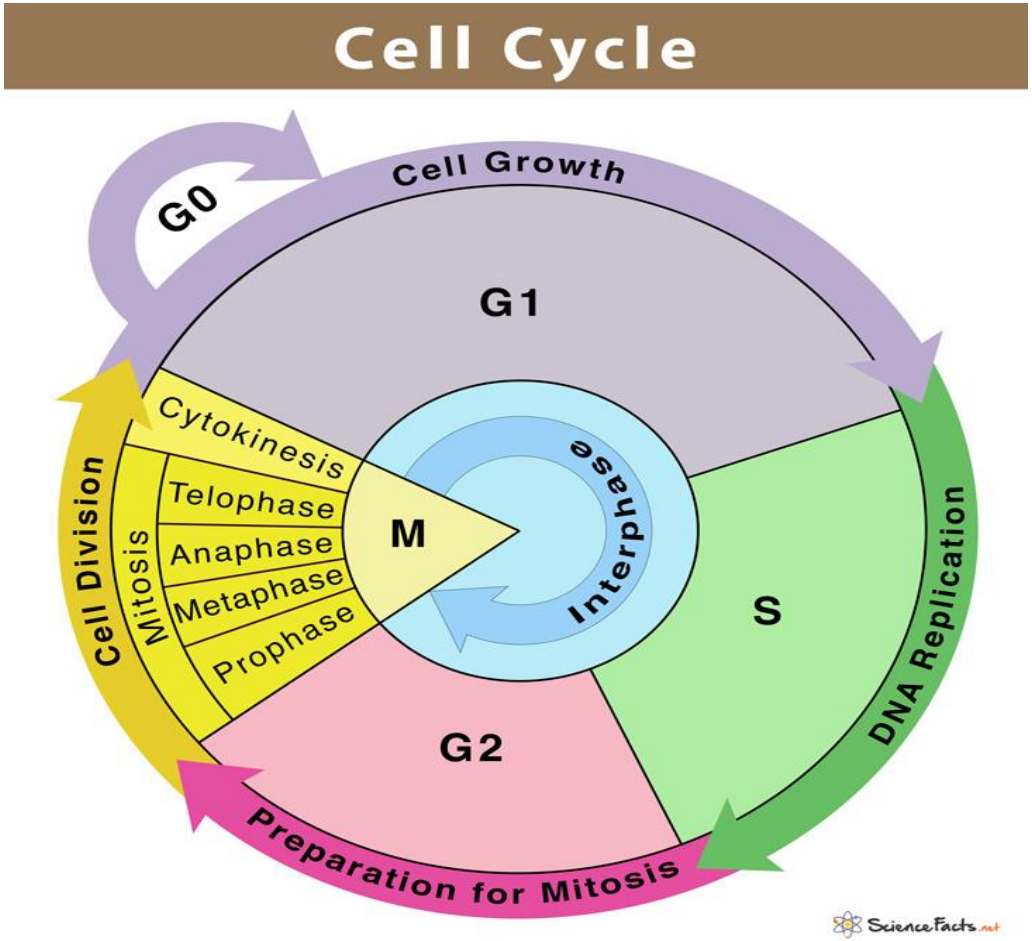
  1. Somatic cell division/ Mitosis
  2. Reproduction cell division/ Meiosis

Need of cell division

- For growth of organism
- To replace old, dead and injured cell
- For gamete formation

Phases of cell division/cell cycle

- A cell cycle or cell division involves two basic phases
  - Interphase
  - Mitosis
  - Meiosis



Interphase

- It is the largest phases of cell division and takes almost 23 hours means 95% time of the cell division.
- It is basically the preparation phase of cell division
- It consist of three phases:
- G1 Phase
- S Phase
- G2 Phase

G1 PHASE

- It is simply known as first growth phase
- In this phase cell is metabolically very active and replicate most of its cell organelles except DNA.
- G1 phase last for 8-10 hours

S PHASE

- It is known as synthesis phase
- It is the interval between G1 and G2 Phase
- During this phase cell makes an entire copy/replicate its DNA and centrosomes.
- S phase lasts about for 8 hours

G2 PHASE

- It is termed as second growth phase
- During this phase cell growth continues, enzymes and other proteins are synthesized.
- G2 phase lasts for 4-6 hours

Mitosis/ somatic cell division

- Somatic cell division or mitosis the type of cell division where the daughter cell produced are exactly similar to parent cell having same number of chromosomes as the parent cell
- Mitosis occurs in the whole body cells except germ cell and neuron cells.
- It is also known as equational division

Prophase

In early prophase, the chromatin fibre condensed and form chromosomes in which two sister chromatids attached together at centromere.

The centrosomes that replicates in the S-phase move towards opposite poles of the cell and started to form mitotic spindle or spindle fibre

METAPHASE

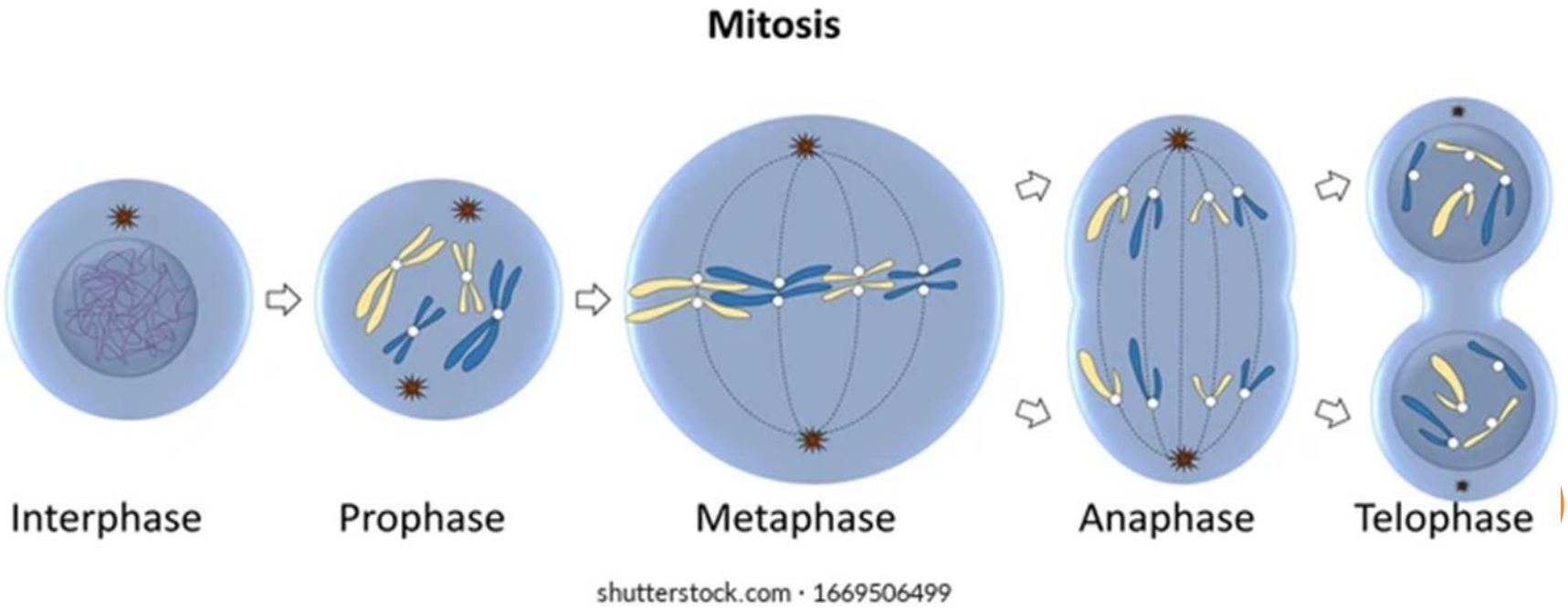
- During metaphase nuclear envelope is completely disintegrated
- The spindle fibre of centrosome align the centromere of the sister chromatids at the centre of the cell.

ANAPHASE

- In anaphase, the centromere splits and thus the two sister chromatids gets separated and move towards apposite pole of the cell.
- Once separate the chromatids again termed as chromosomes.

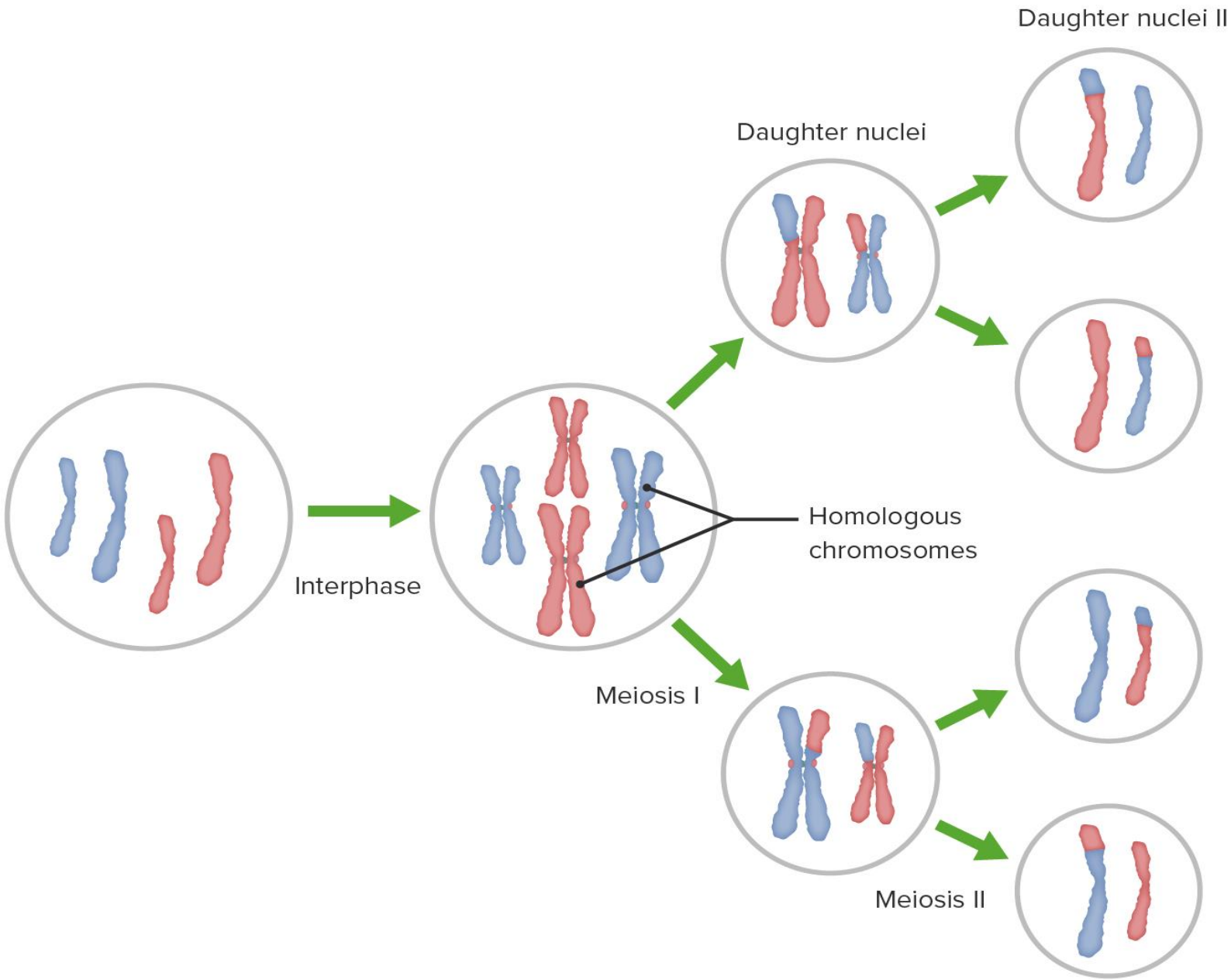
Telophase

- In this phase, the daughter chromosomes reach the opposite poles and spindle fibre gets disappear.
- Chromosomes again started converting into chromatin fibres.



Meiosis/ reproduction cell division

- Reproduction cell division or meiosis is the type of cell division where the daughter cells receive only half chromosome of parentral cell
- Meiosis occurs in germ cells/ sex cells/ reproductive cells found in male (sperm) and female (ovum)
- Fertilization of sperm and ovum
- Then a new born / organism is formed


Daughter nuclei II
Daughter nuclei
Homologous chromosomes
Interphase
Meiosis I
Meiosis II

Cell junctions

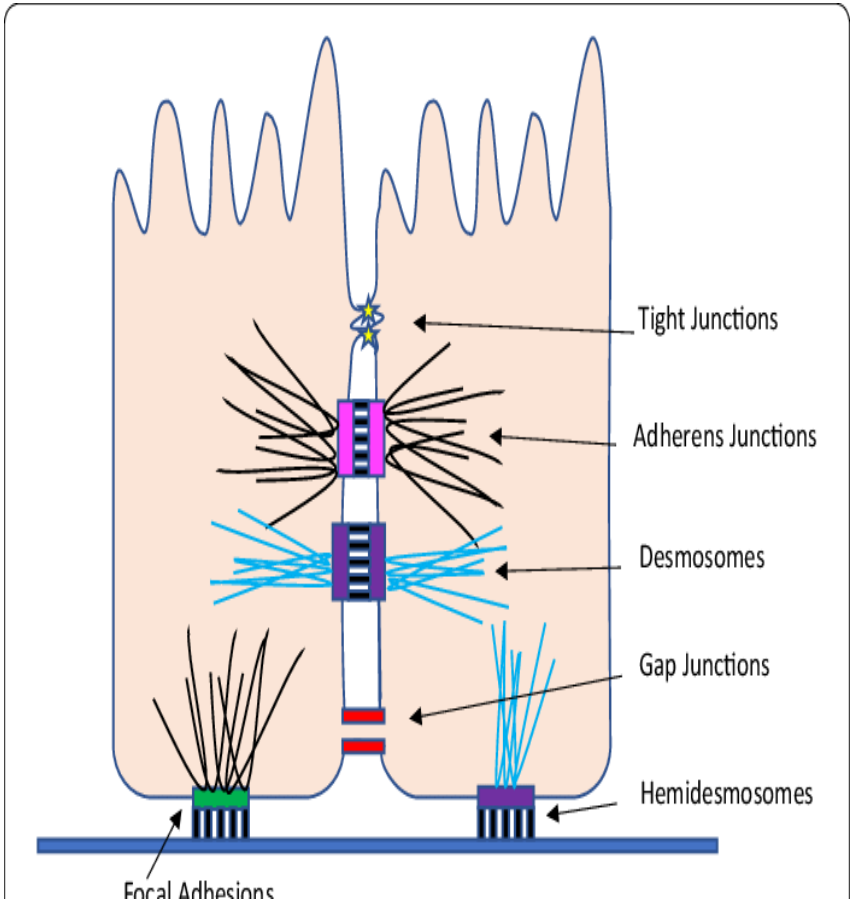
- Cell junction is simply the connection two plasma membrane or two cells.
- It can be seen between two cell and basement membrane.
- It consist of multi-protein complexes that provides contact two neigh bouring cells.

Function of cell junctions

- Helps in attachment of cells
- Helps in transfer of ions/ substances
- To prevent the movement of unwanted substances
- Help in cell communication

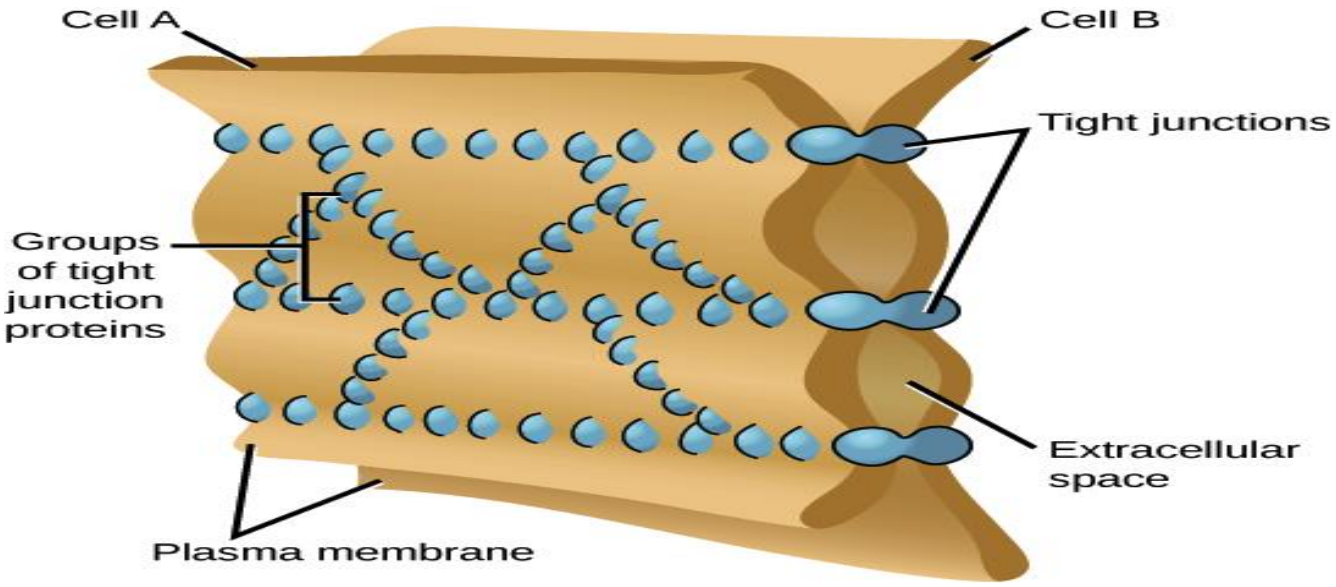
Types of cell junctions

- There are five different types of cell junctions
- Tight junctions
- Gap junctions
- Desmosomes
- Hemi-desmosomes
- Adherens junctions



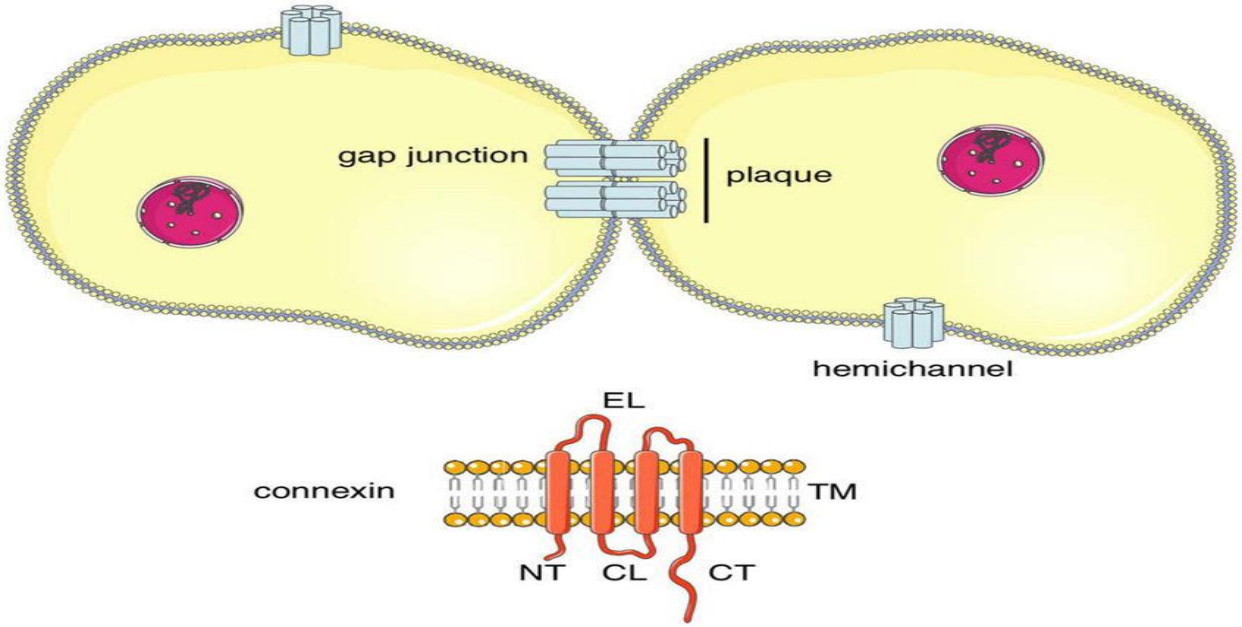
Tight junction

- Tight junction act as a barrier that prevents the movement of unwanted ions/ substances across cells.
- The cells of epithelial tissues that found in stomach, intestine and urinary bladder contain many tight junctions that prevents the leaking of components into blood.



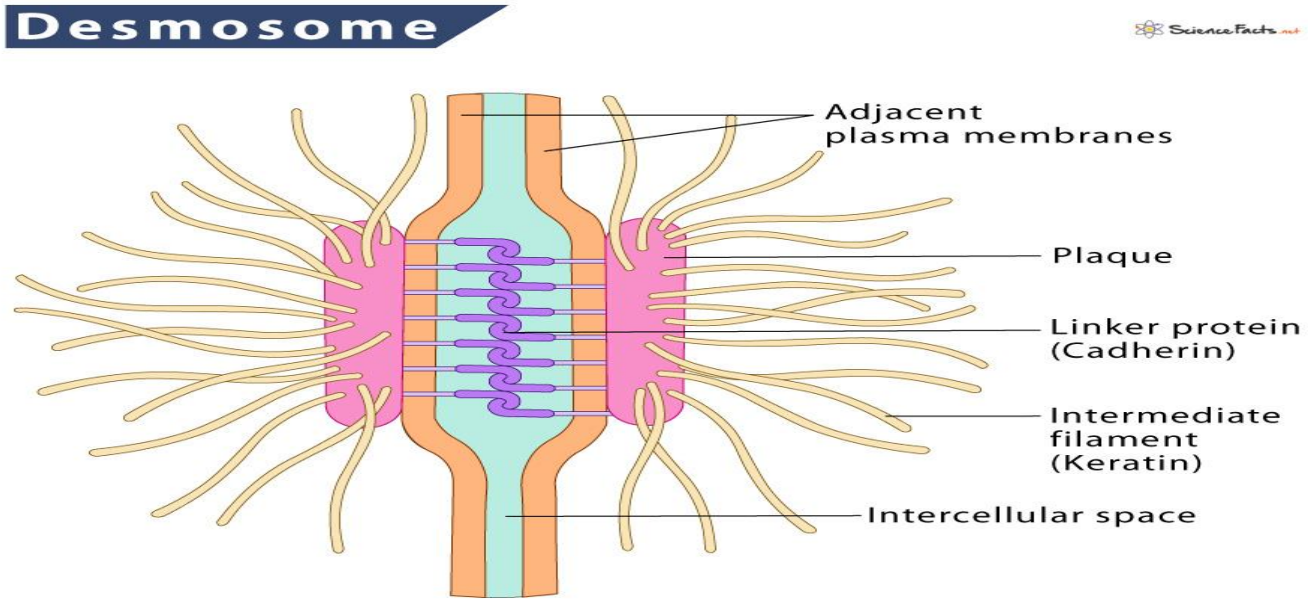
Gap junction

- Gap junction are specialized intracellular connection between cells which helps in the transfer of required ions/ substances between two or more cells.
- A gap junction allows the communication of cells with one another.



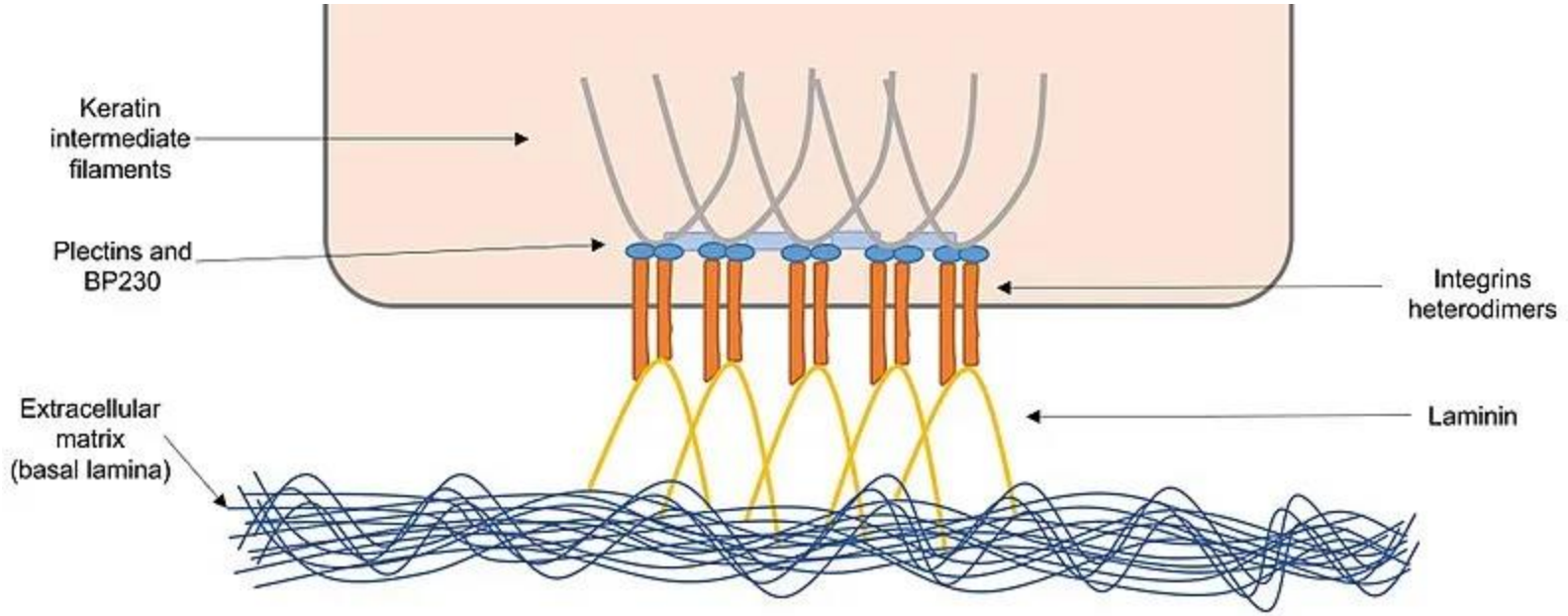
Desmosomes

- These junctions keeps the neigh bouring cells together.
- They contains plaque and intermediate filament (mode of keratin)
- The glycoprotein helps in attachment of cells.



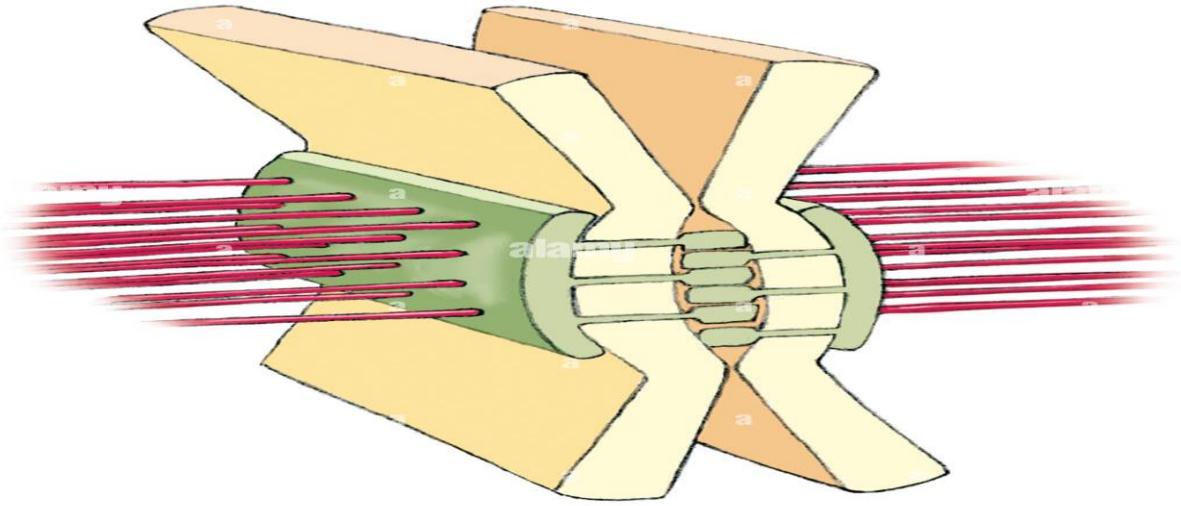
Hemi-desmosomes

- Hemi-desmosomes resemble like desmosomes but they do not attach with adjacent cells, they are basically attached with the basement membrane.



Adherens junctions

- These are also called belt desmosomes
- Adherens junction contain plaque (a dense layer of protein)
- The glycoprotein present in adherens junction helps to join the cells.



Cell communication

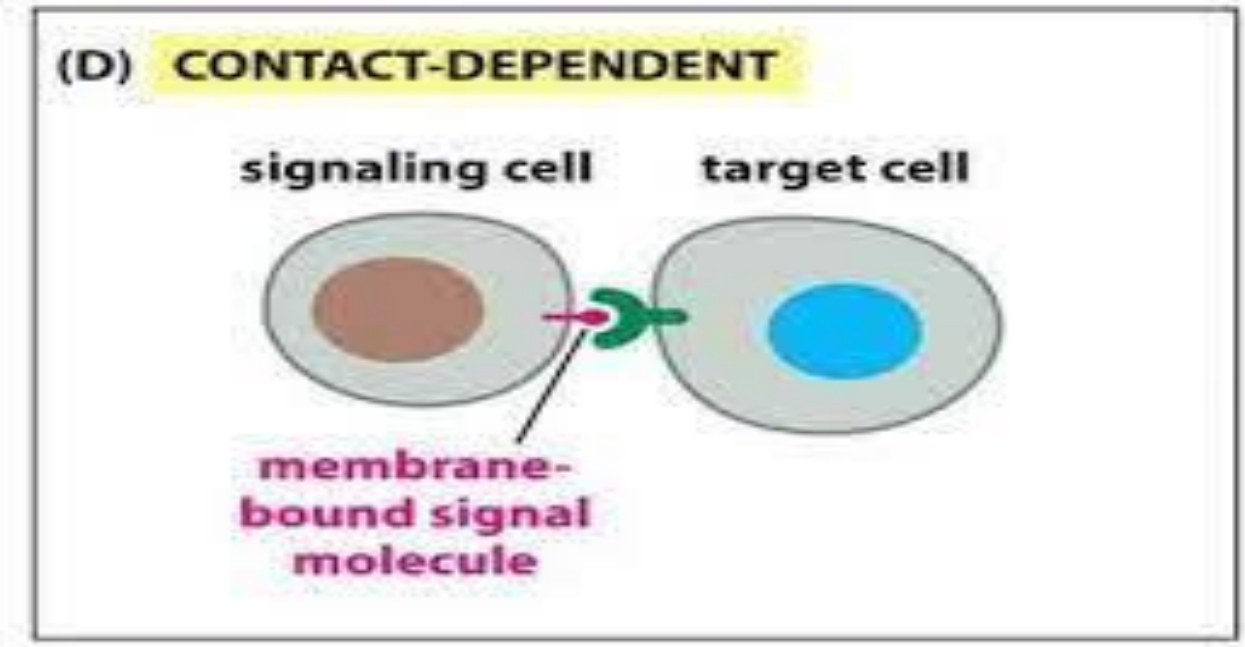
- Cell communication is also known as cell signalling
- It is the ability of cell to receive and send signals from and to another cell.
- Cell communication is important for growth and development of cell its is also important to maintain homeostasis.
- Communication between cells requires
- Ligand : the signalling molecule
- Receptors : the site where receptor binds

Types of cell signalling

- Contact dependent
- Paracrine
- Endocrine
- Synaptic

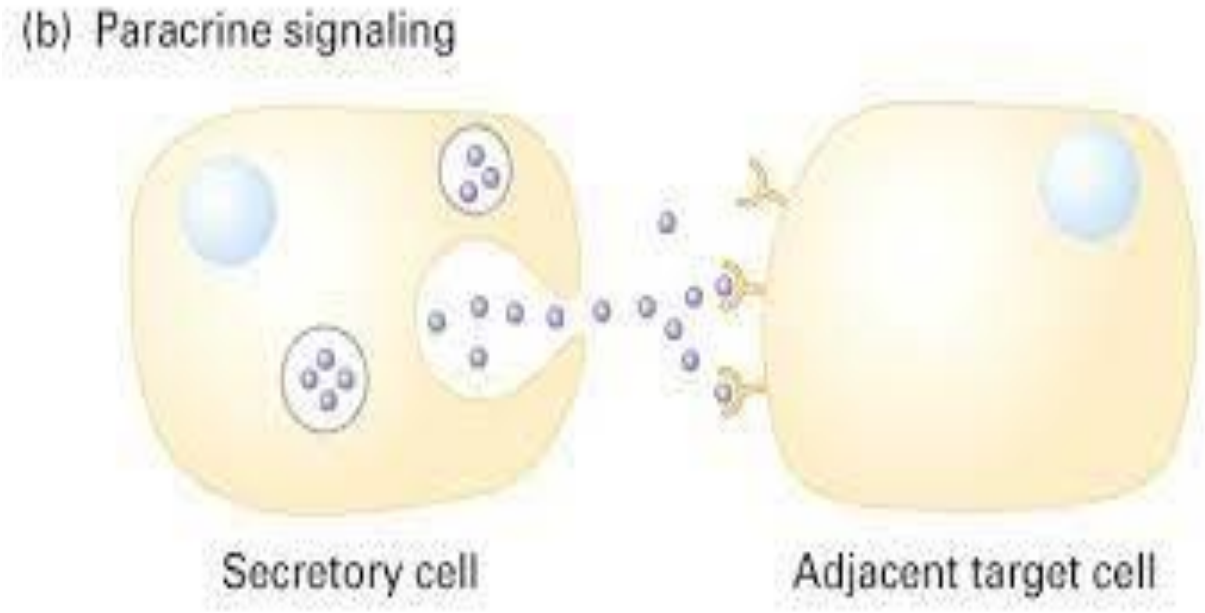
Contact dependent

- Contact dependent occur by transferring signal molecules across gap junction neigh bouring cells.
- Both side molecule transfer
- A cell targets a cell connected by gap junction.



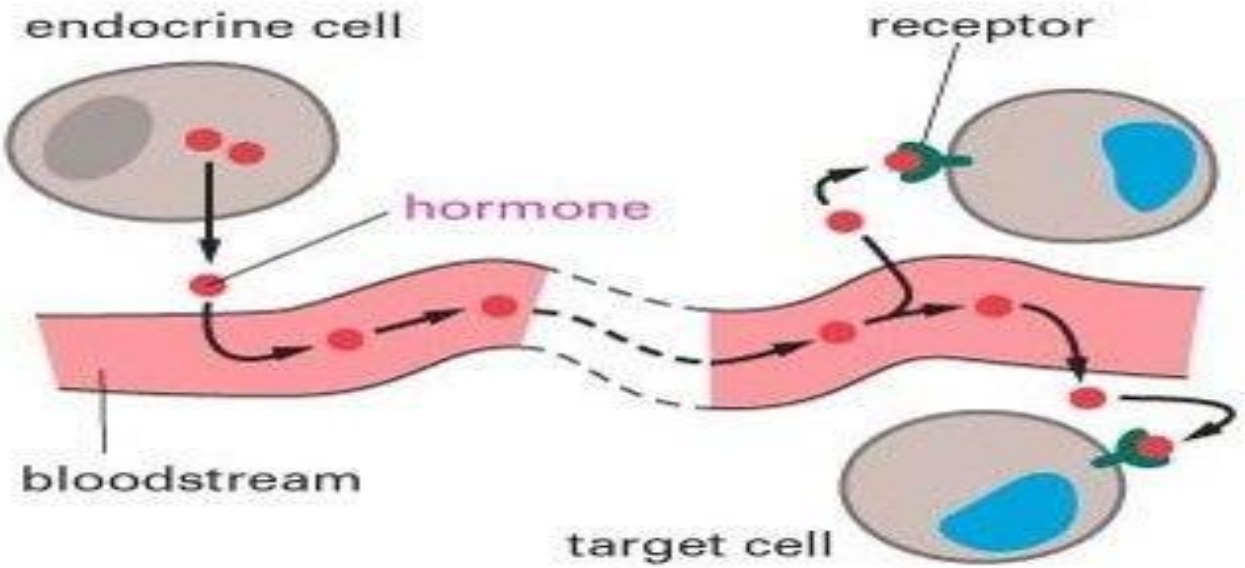
Paracrine signalling

- Paracrine signalling is a form of cell signalling in which target cell is very close to signalling cell but not directly attached.
- It plays an important role in growth and development.



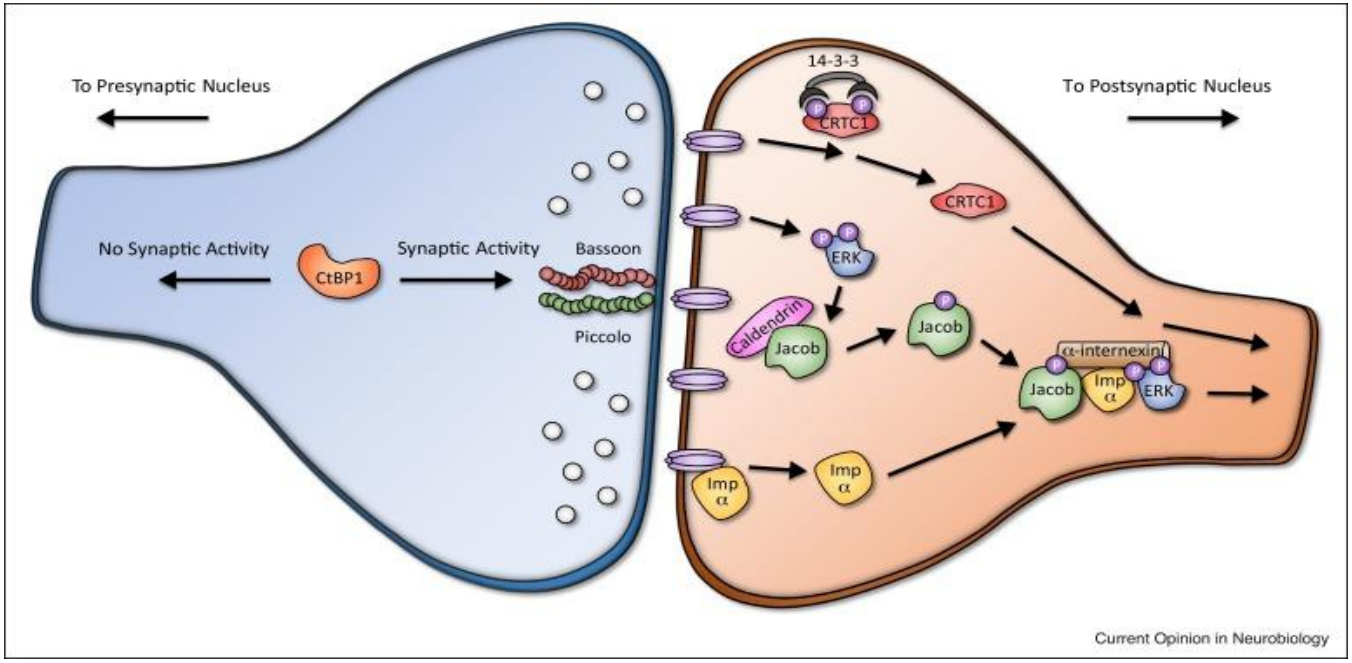
Endocrine signalling

- When the target cell is too for form signalling cell, then cell releases its signals (ligands) into the bloodstream and act on target cells and this type of signalling, called endocrine signaling.
- In endocrine signals are in the form of hormons

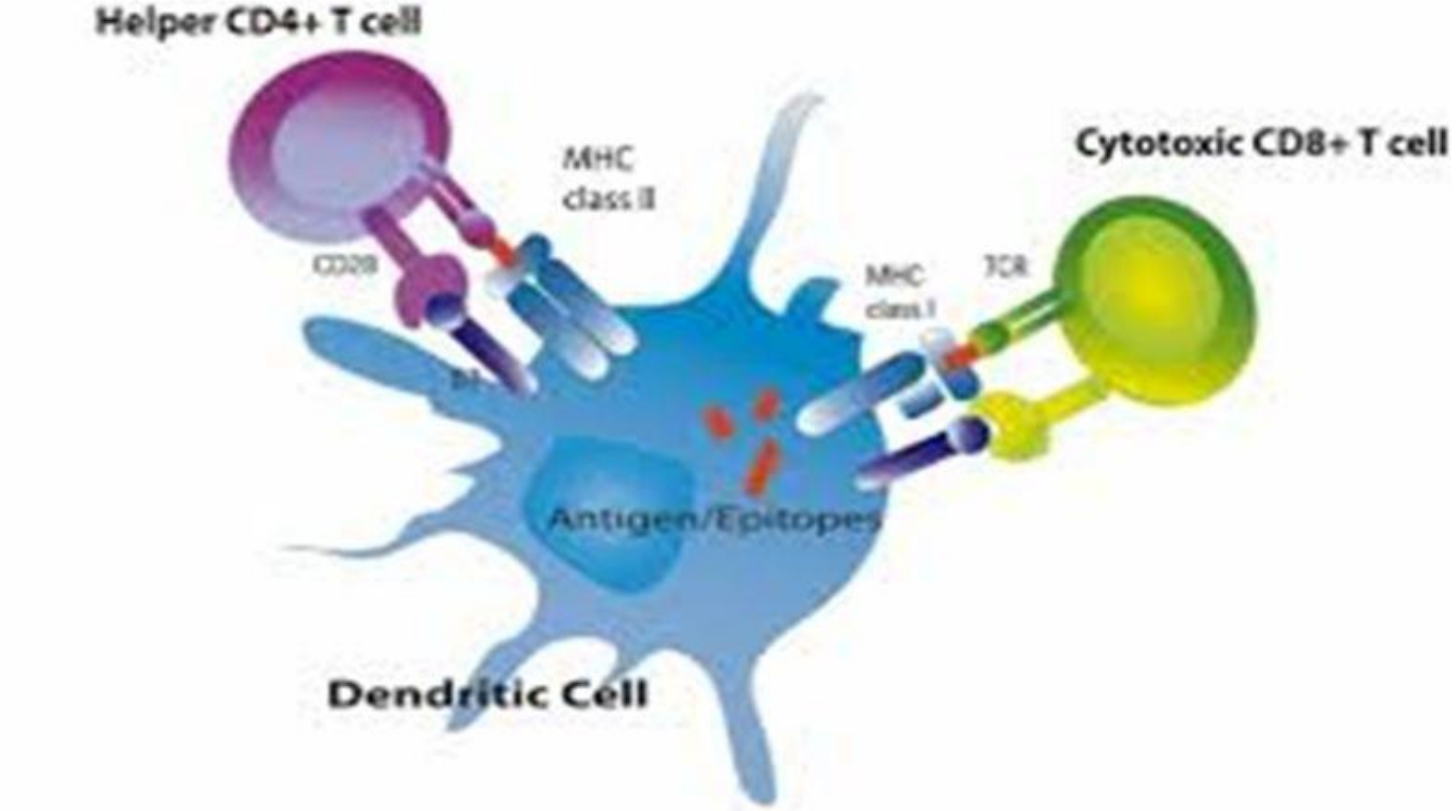


Synaptic

- Synaptic is do not travel to circulatory system like hormons.
- Fibre like nerve cell release neurotransmitters.



Thank you


Helper CD4+ T cell
MHC
class II
Cytotoxic CD8+ T cell
CD28
MHC
class I
TCR
Antigen/Epitopes
Dendritic Cell

Unit – I

Tissue Level of Organization

Presented By

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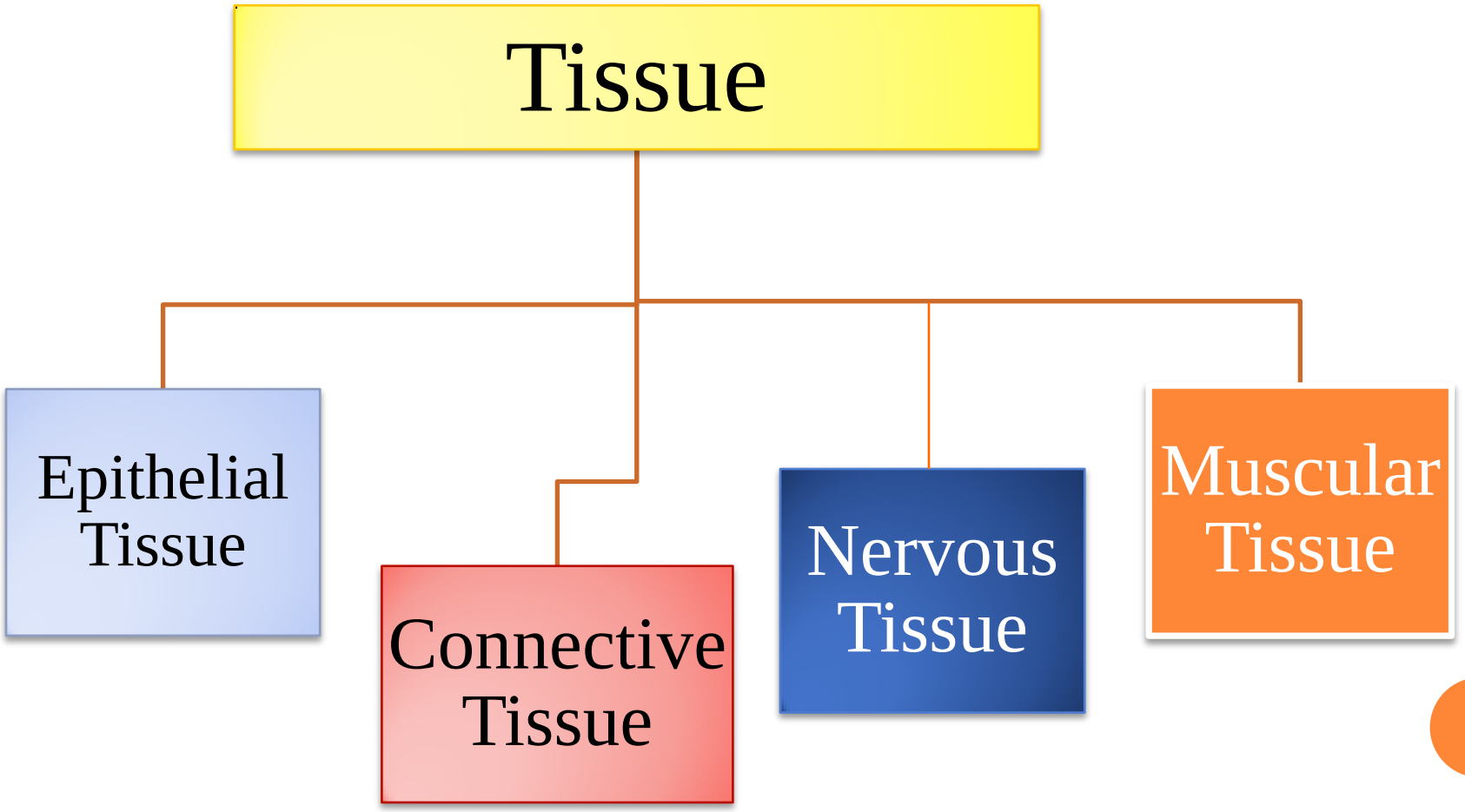
Assistant Professor

Jijamata College of Pharmacy, Nandurbar.

Definition

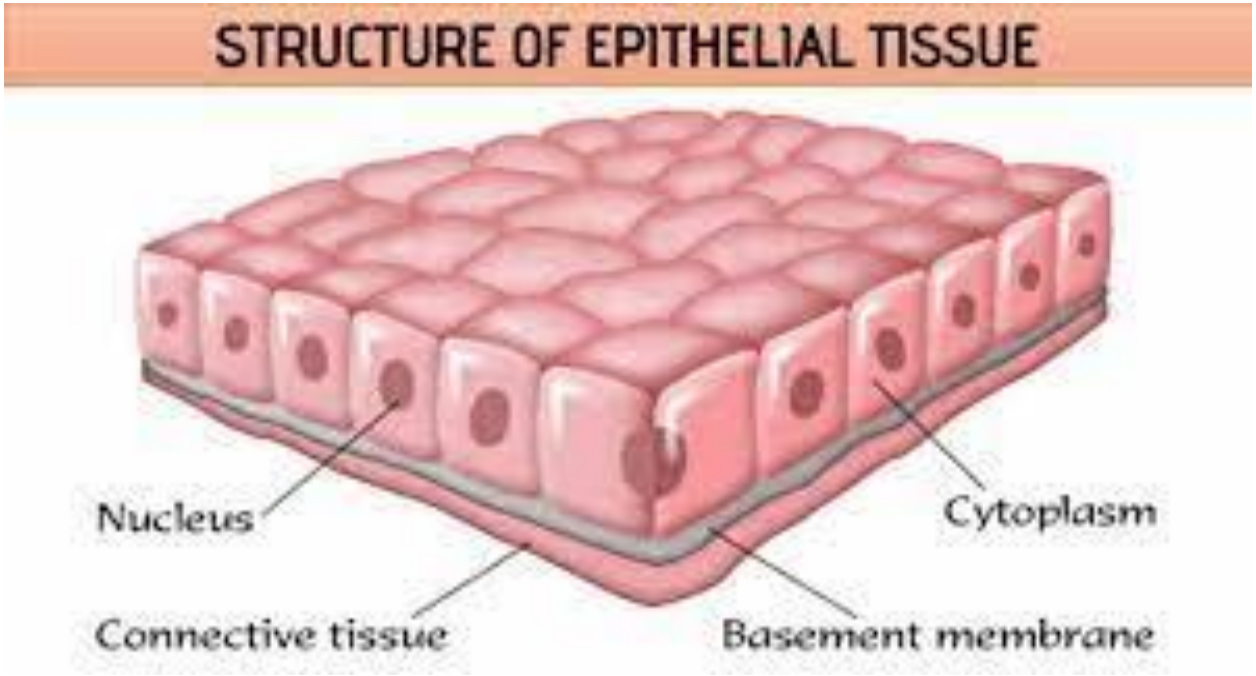
- Tissue are the group of similar cell and perform a similar function and interconnect by the non-living intracellular material or matrix.
- Study of tissue is called histology
- Father of histology is marcello malpighi.

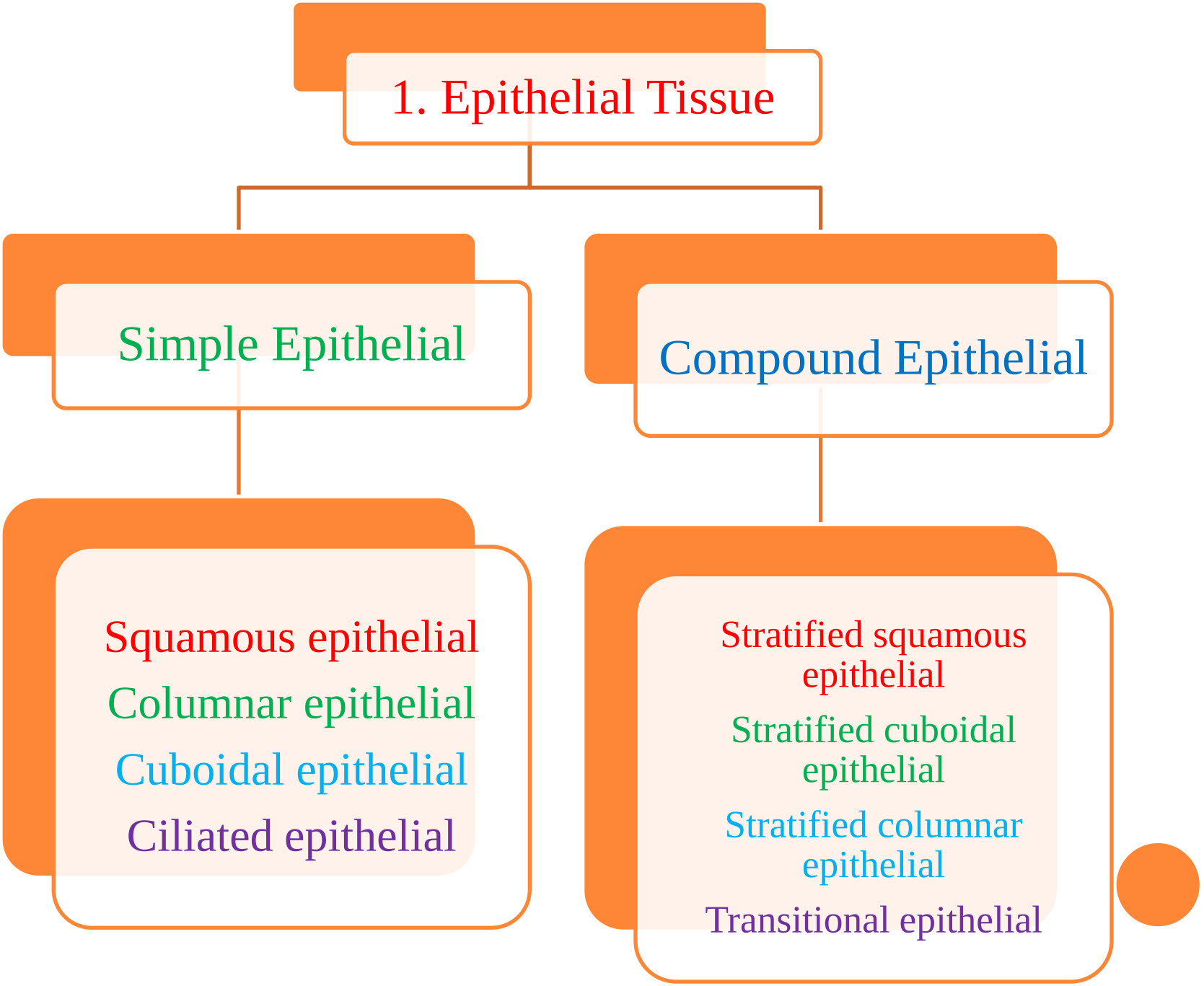
Classification



1. Epithelial tissue

- Epithelial tissue is present on the basal membrane and lower the basal membrane connective tissue are present due to involvement of the junction cell communicate with each other.




1. Epithelial Tissue
Simple Epithelial
Compound Epithelial
Squamous epithelial
Columnar epithelial
Cuboidal epithelial
Ciliated epithelial
Stratified squamous epithelial
Stratified cuboidal epithelial
Stratified columnar epithelial
Transitional epithelial

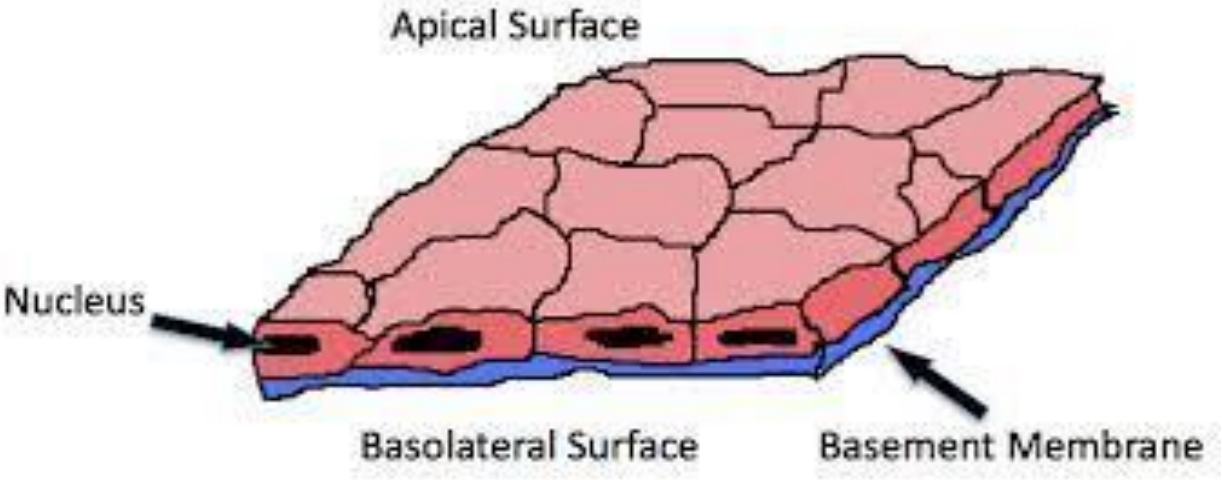
A. Simple Epithelial Tissue

- The Simple epithelium a single layer of cell

i) Squamous epithelium

Location – It line heart, blood vessels, lymphatic vessels, air sacs of lungs and glomerular of kidneys.

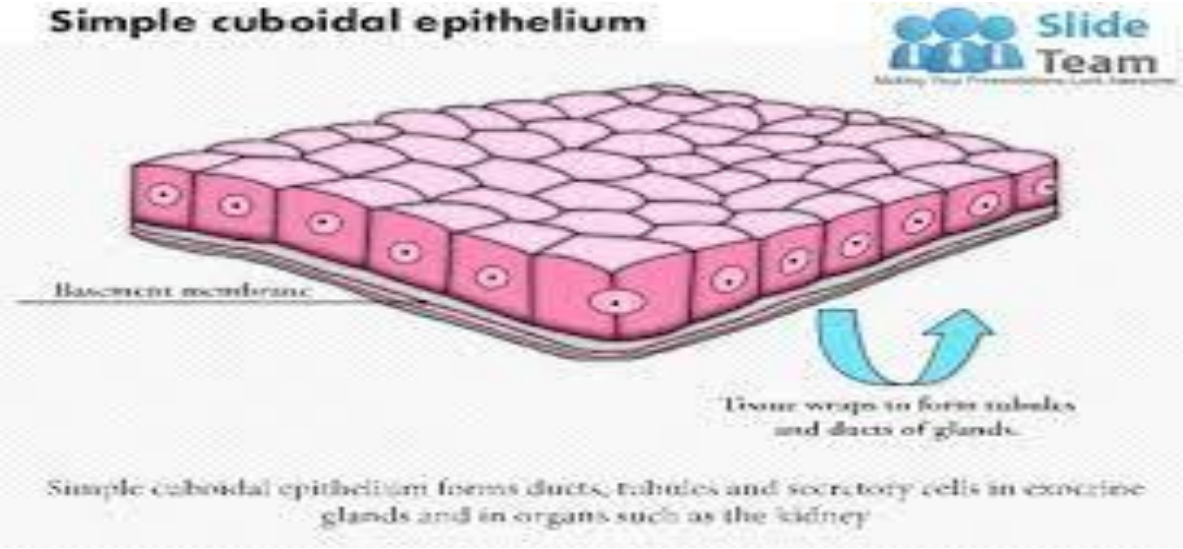
Functions – It performs the function of filtration (such as blood filtration in the kidneys).



ii) Cuboidal epithelium

Location – It lines the kidney tubules, pancreas and covering of ovaries.

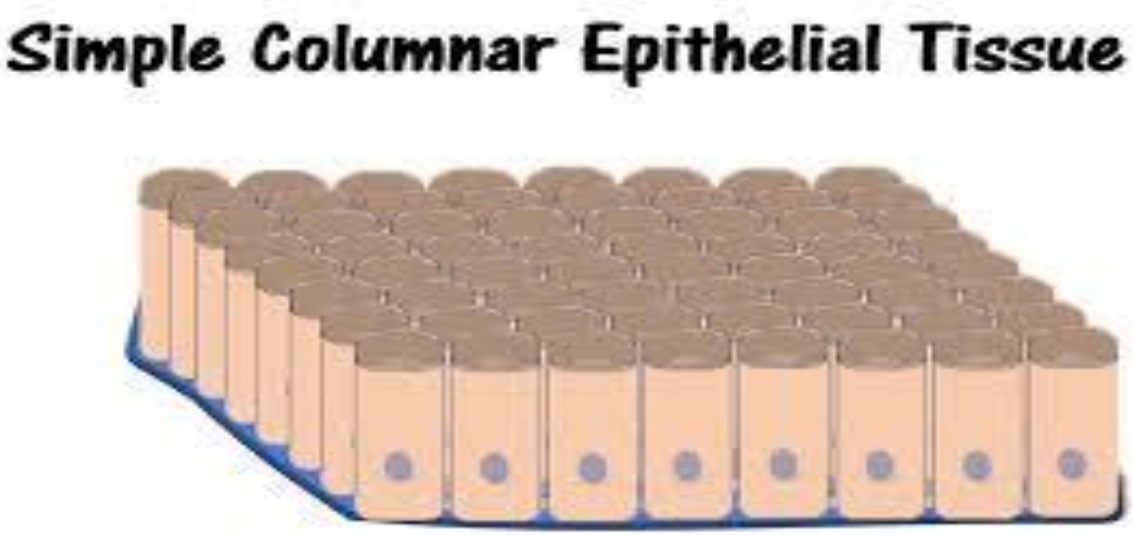
Function – It performs the function of protection to the tissues, secretion and absorption of filtered substances.



iii) Columnar Epithelium

Location - They are found in the nasal passage, eye, digestive system, ears and buccal cavity.

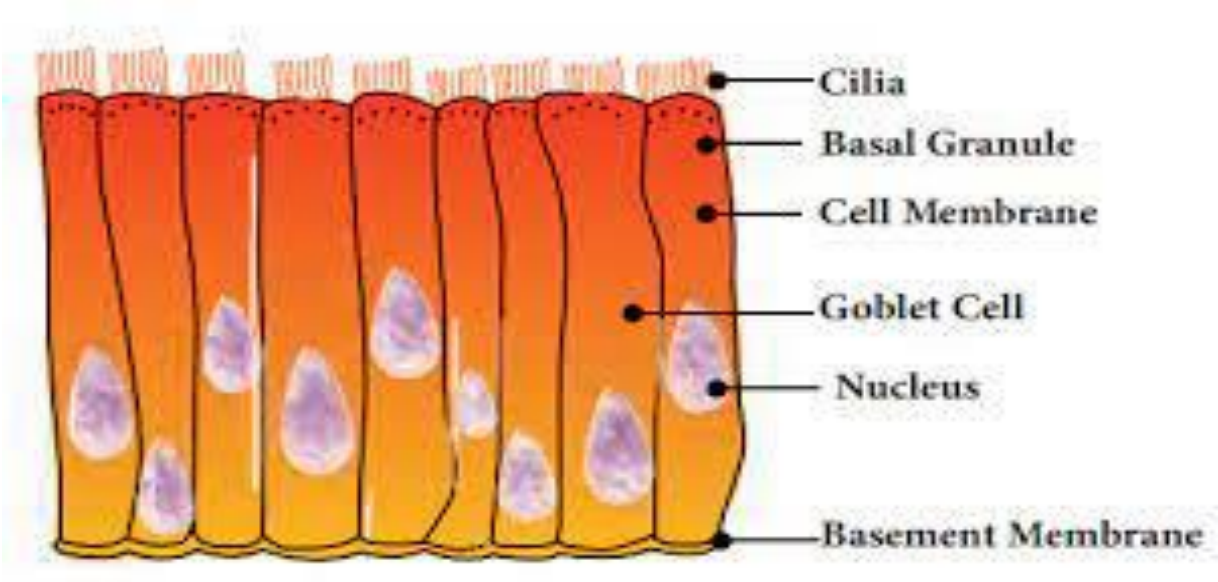
Function – It performs the function of protection, secretion, absorption and small intestine.



iv) Ciliated Epithelium

Location – It lines the upper respiratory tracts, uterine tubes, uterus, and spinal cord.

Function – Preventing infection, The cilia move the mucous.



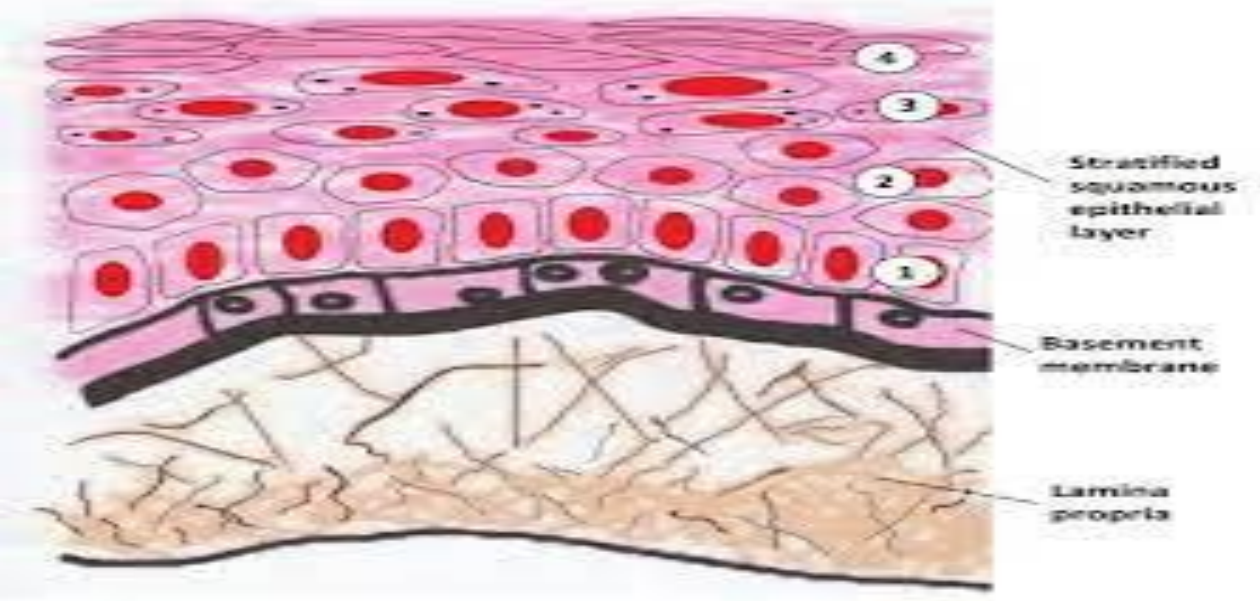
B. Compound/Stratified Epithelial

- Stratified epithelial tissue a multilayer of cell.

i) Stratified Squamous

Location – Present in keratinized cells (superficial layer of skin), non-keratinized cells(lining of mouth, oesophagus)

Function – It Protection against mechanical friction and chemical damage.



ii) Stratified Cuboidal

Location – Present in ducts of sweat gland, male urethra, and uterus.

Function – It plays an important role of protection, secretion and absorption.

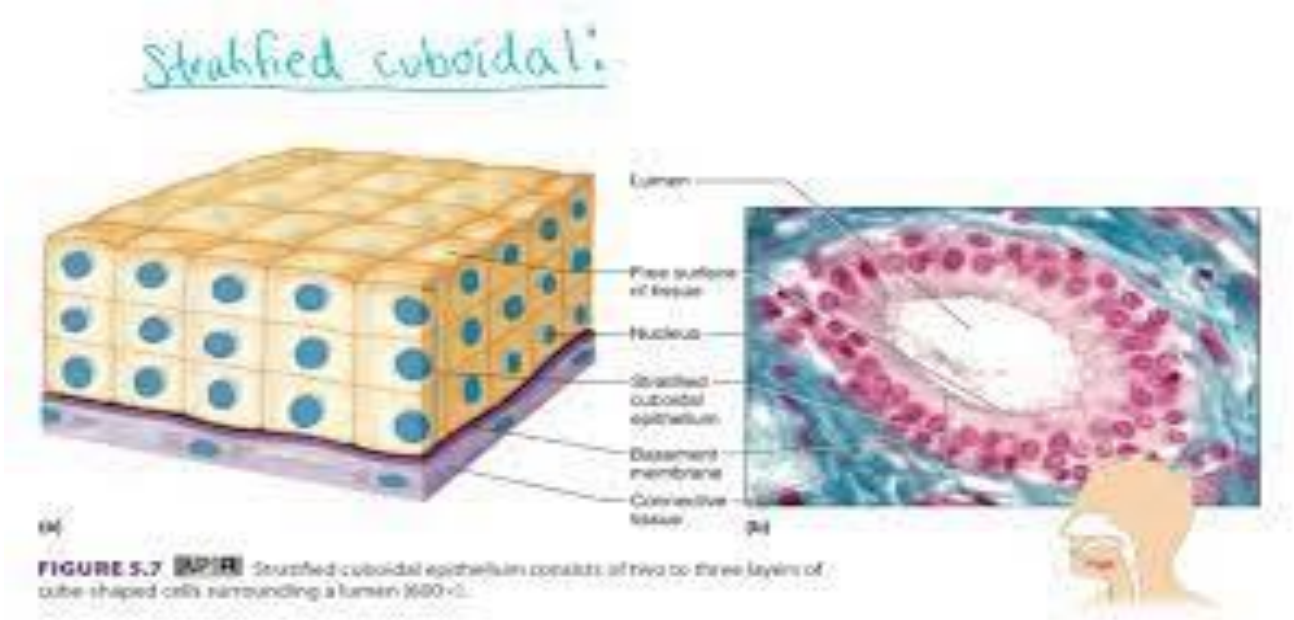


FIGURE 5.7 Stratified cuboidal epithelium consists of two to three layers of cube-shaped cells surrounding a lumen (600×).

iii) Stratified Columnar

Location – present in part of urethra, large excretory ducts of glands and conjunctiva of eye.

Function – It performs the function of protection and secretion.

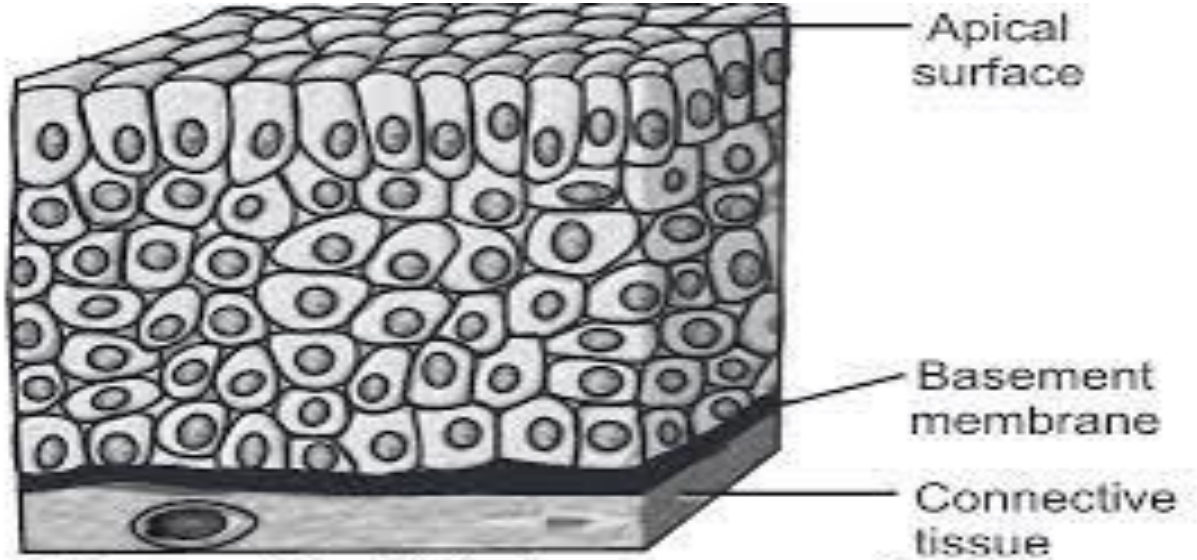


Fig. : Stratified columnar epithelium

iv) Transitional Epithelium

Location – present in uterus and urinary bladder.

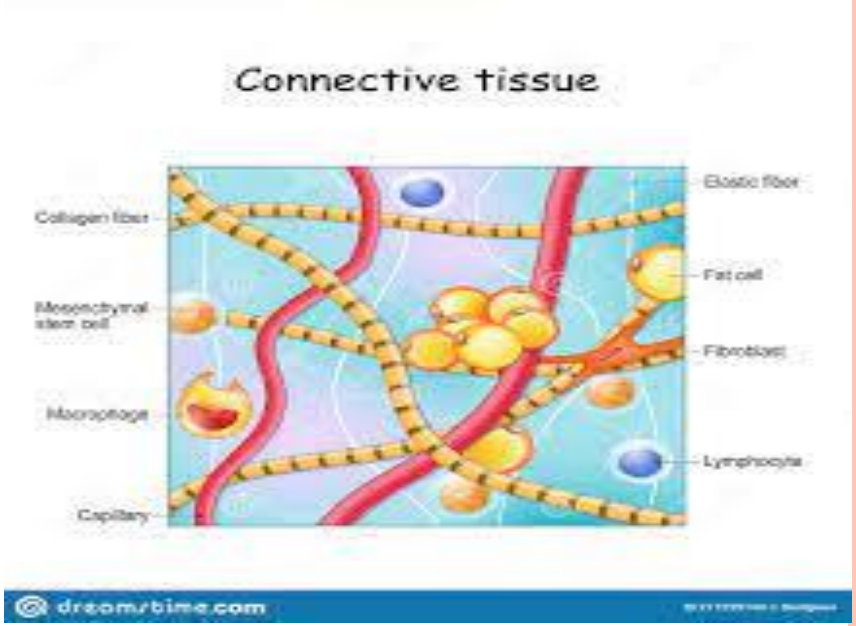
Function – It protects the underlying structure and permits distension of organs.

2. Connective Tissue

- Connective tissue are named because of their special function of linking and supporting other tissue or organ of body.

Basic function of connective tissue

- Binding and structural support
- Protection
- Transport
- Insulation and energy store



Components of connective tissue

Cell

- Fibroblasts
- Macrophages
- Leukocytes
- mast cell
- plasma cell

Fibers

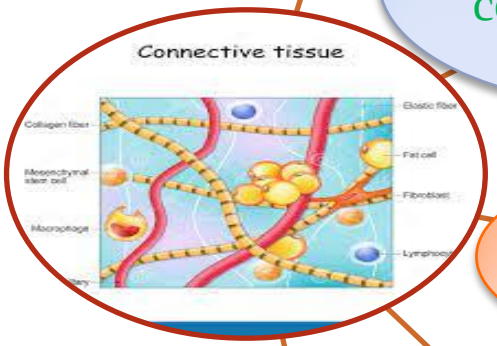
- Collagen fibers
- Elastin fibers
- Reticular fibers

Ground substance

- Glycoproteins
- Glycosoaminoglycans
- water

Classification of Connective Tissue

1. Loose connective tissue
   - i) Areolar connective
   - ii) Adipose connective
   - iii) Reticular connective
2. Dense connective tissue
   - i) Dense regular connective
   - ii)Dense irregular connective
   - iii) Elastic continue
3. Cartilage
   - i) Hyaline cartilage
   - ii) Fibrocartilage
   - iii) Elastic cartilage
4. Bone
5. Blood



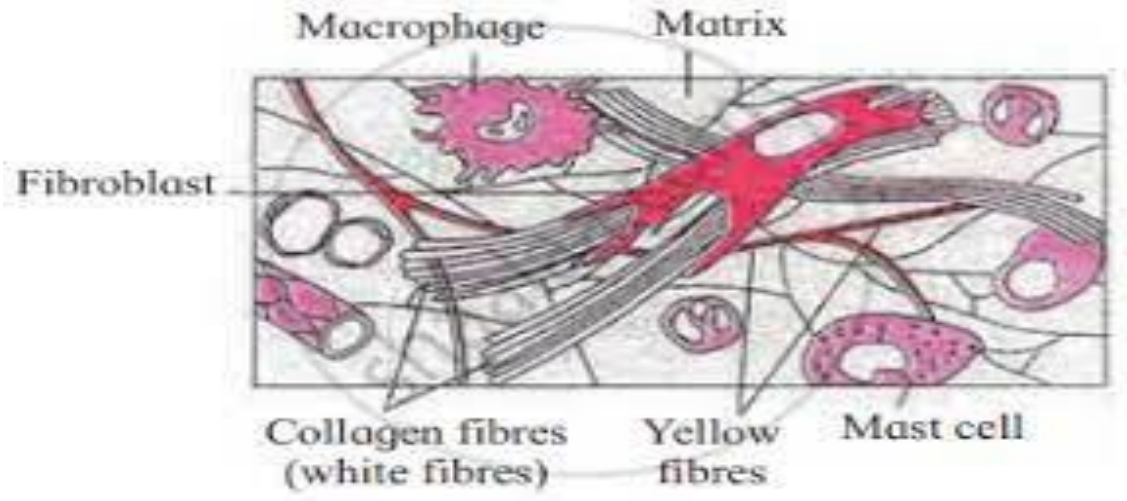
A. Loose connective tissue

- The fibers are loosely woven. It has a proportion of ground substance they are easily distorted.

i) Areolar Connective Tissue

Location – Present the skin (dermis)

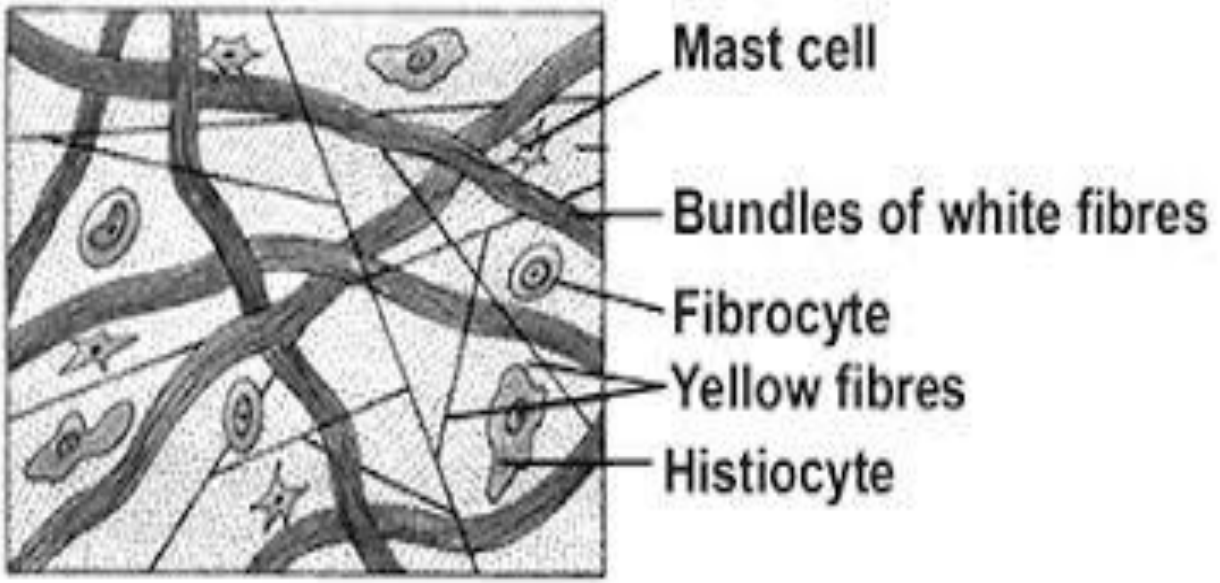
Function – Strength, elasticity and support to tissue.



ii) Adipose Connective Tissue

Location – Present is subcutaneous layer deep in skin, around heart, kidney, yellow bone marrow.

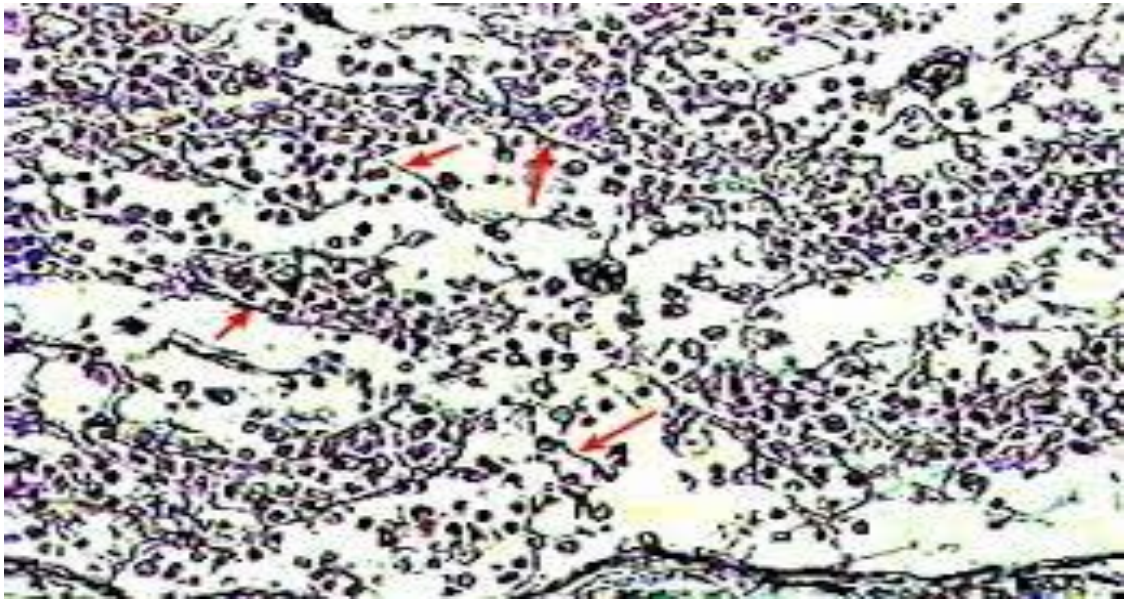
Function – Prevent heat loss, reservoir of energy, support and protect organ.



iii) Reticular connective tissue

Location – Present in supporting framework of liver, spleen, lymph node, around blood vessels and muscles.

Function – Form stroma of organ, bind smooth muscle tissue cells.



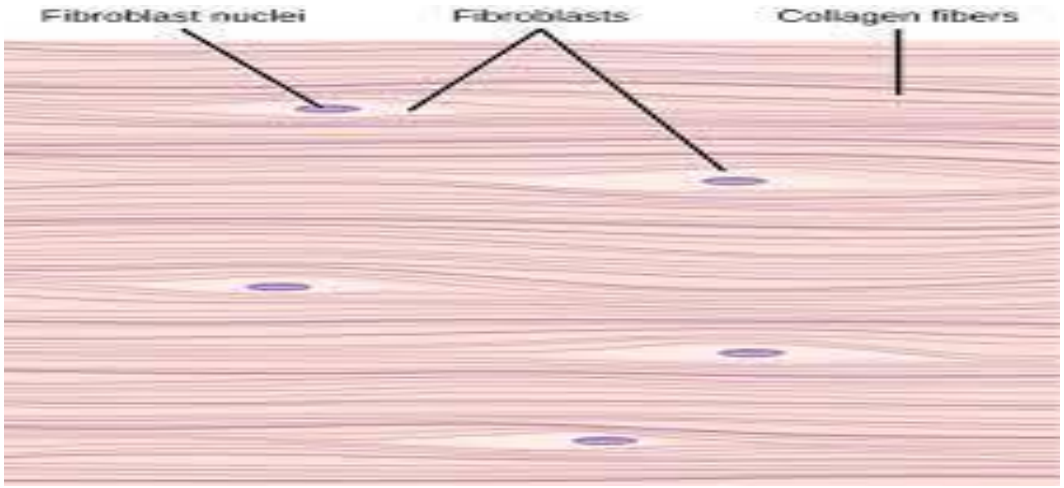
B. Dense Connective Tissue

- It is fibers are densely packed, fibers content is higher and cell content is lower as compared to loose connective tissue.

i) Dense regular connective tissue

Location – Present in tendons (attach muscle to bone), ligament (attach bone to bone).

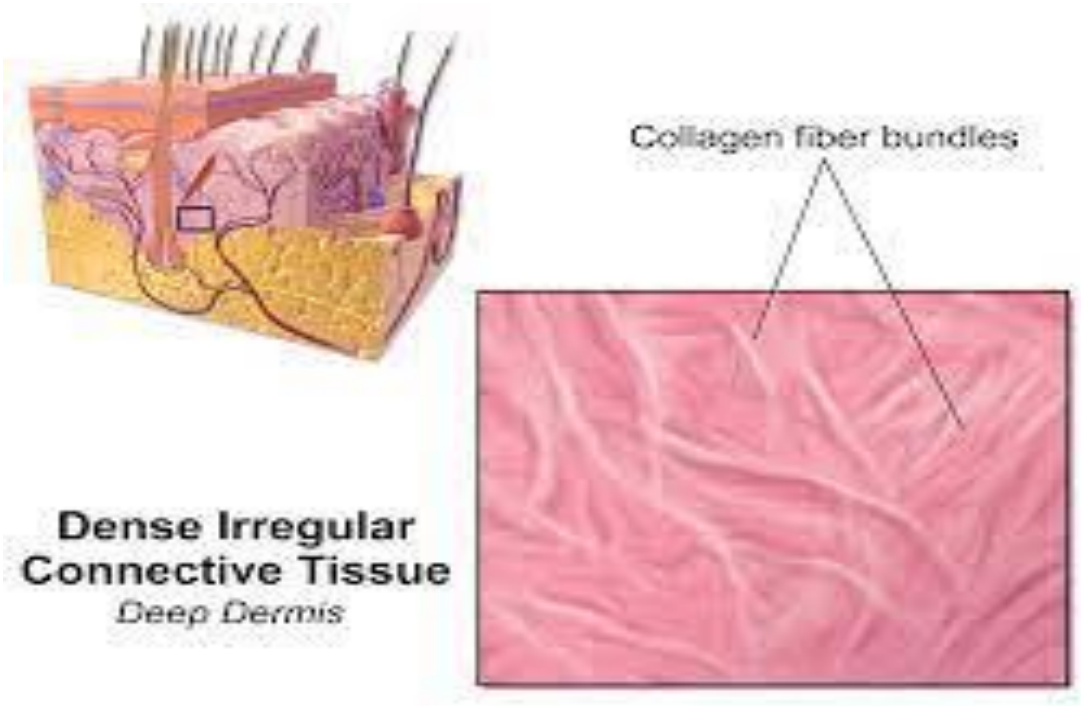
Function – Provides strong attachment to structures.



ii) Dense Irregular Connective tissue

Location – Present in dermis of skin, periosteum of bone.

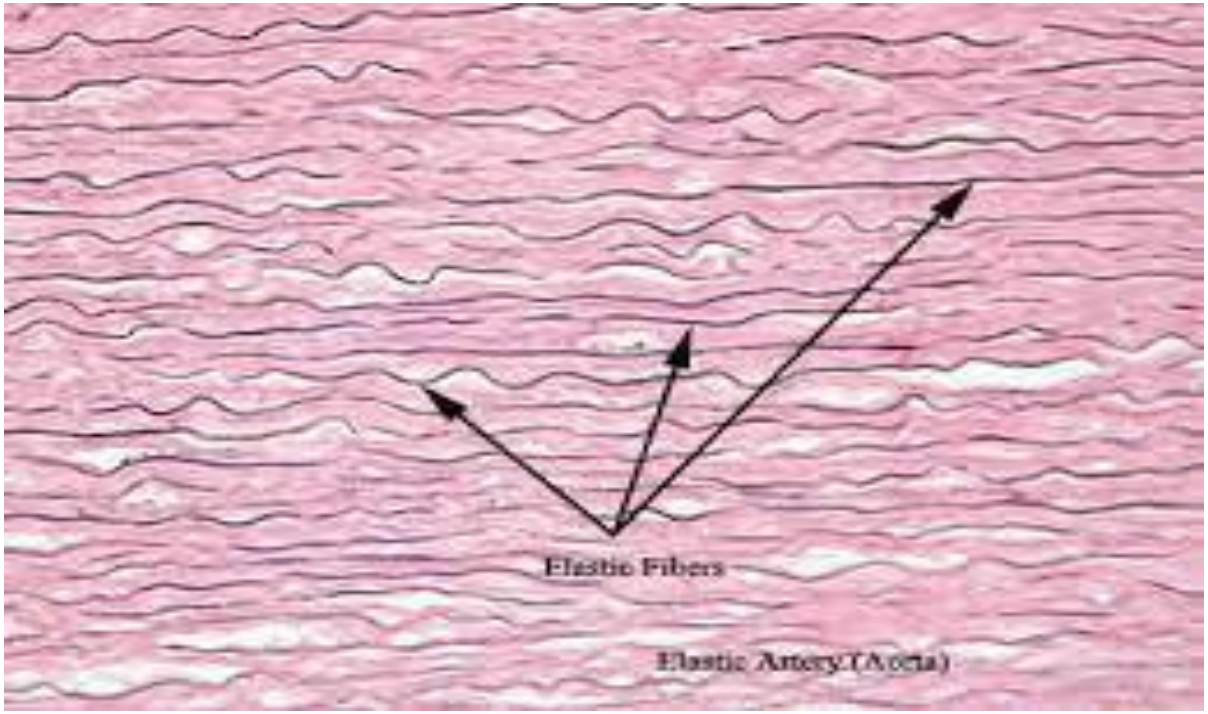
Function – Provides strength to different organ



iii) Elastic connective tissue

Location – Present in trachea, bronchial.

Function - Stretching



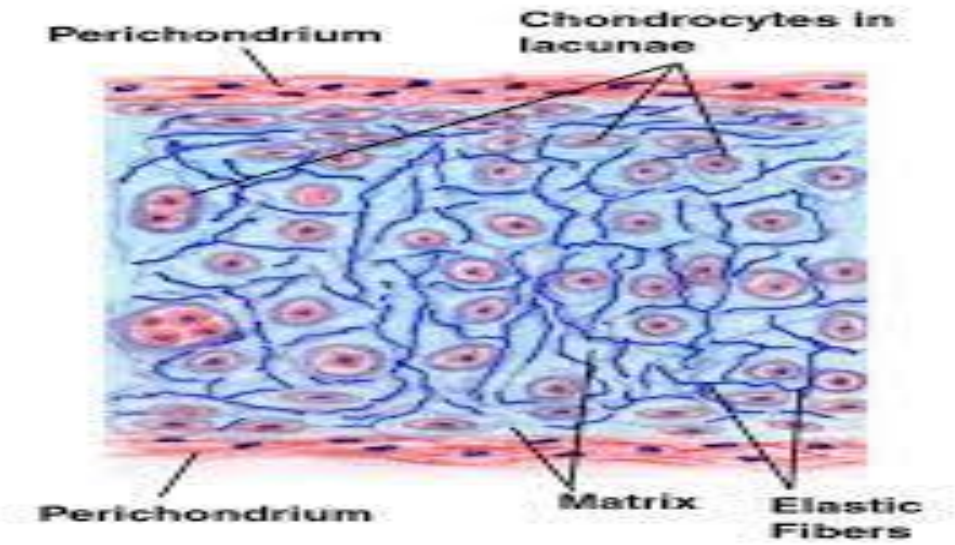
C. Cartilage

Network of closely packed collagen fibers and elastic fibers in gelatinous substance called as ground substance.

i) Hyaline cartilage

Location – Present in ends of long bones, ends of ribs, nose, la

Functio



ii) Fibrocartilage

Location – Present in inter-vertebral disc.

Function – Protect bony structure

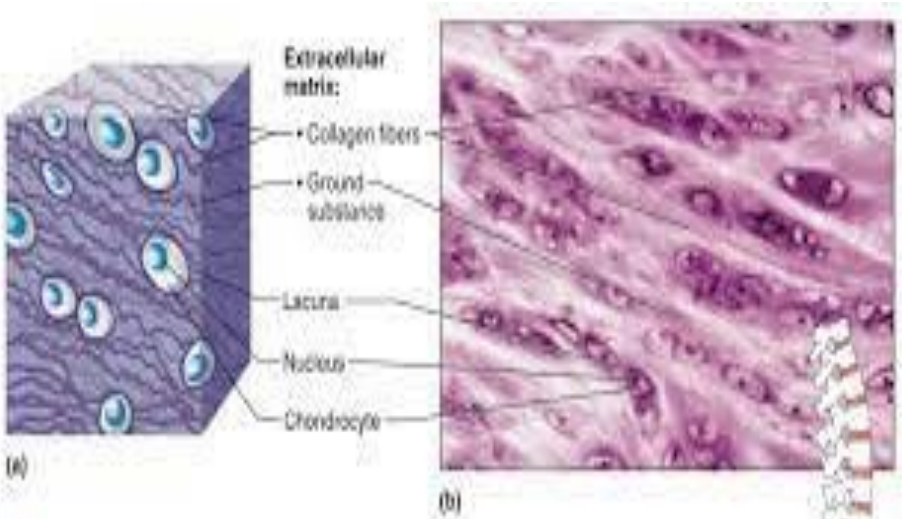
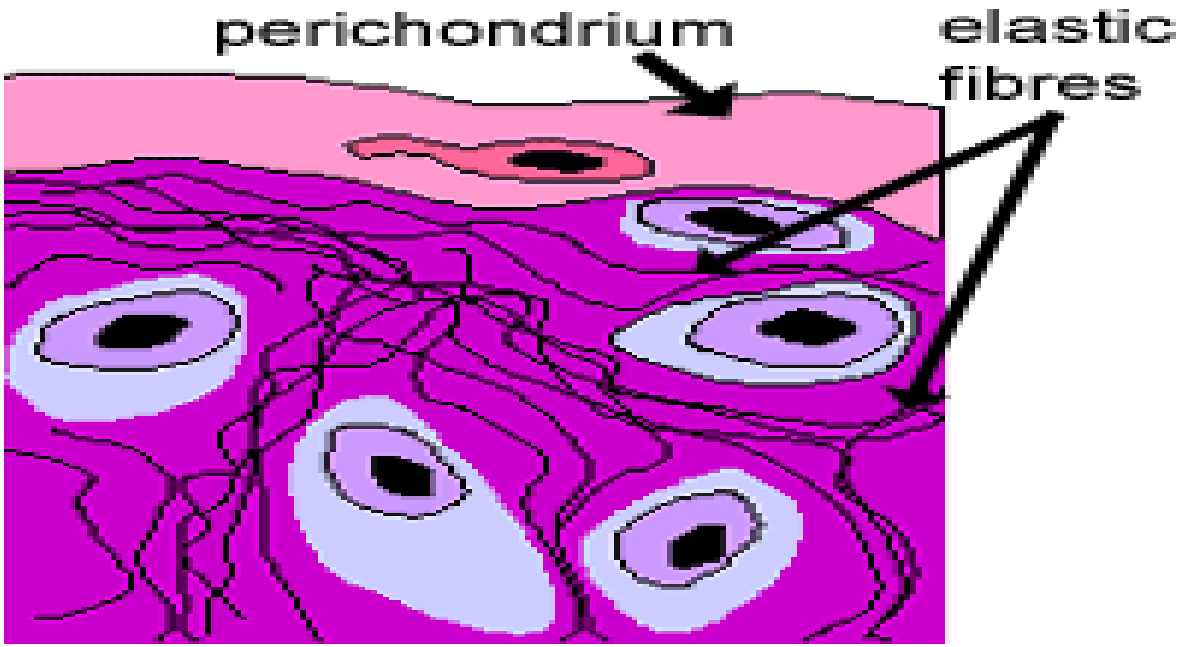


FIGURE 5.19 Fibrocartilage contains many large collagen fibers in its extracellular matrix (100×).

iii) Elastic cartilage

Location – Present in pinna of ear and top of larynx.

Function – Strength and elasticity.



D. Bone

- Bone is the hardest connective tissue.
- Compose of 25% water, 30% organic material and 45% inorganic salts.
- Present in compact and spongy bone tissue.

Function of Bone

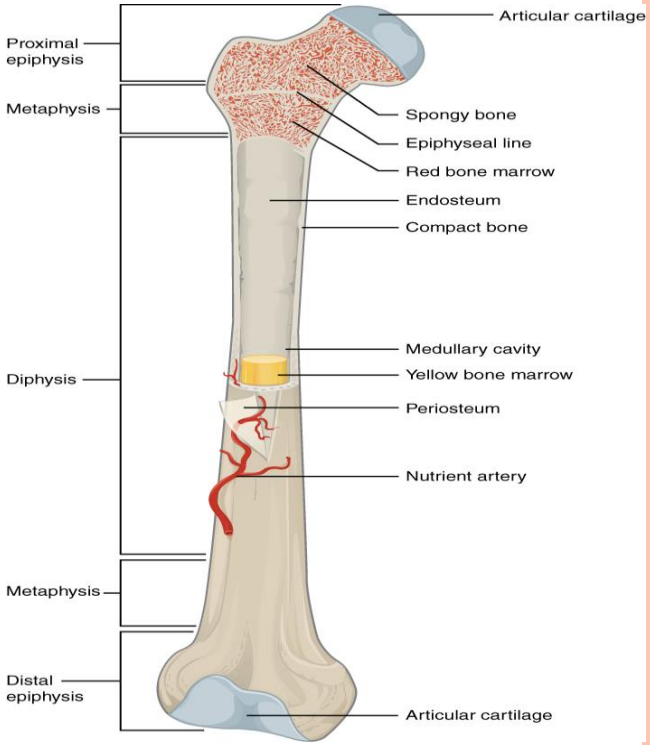
Supporting frame work for body

Protection

Locomotion of body

Store in calcium salt

Support and maintain shape



E. Blood

- Blood is the fluid connective tissue.
- Composed of 55% plasma and 45% of cell.
- Present in blood vessels (arteries, arterioles, capillaries, venules and veins.

- **Blood cell are three types**

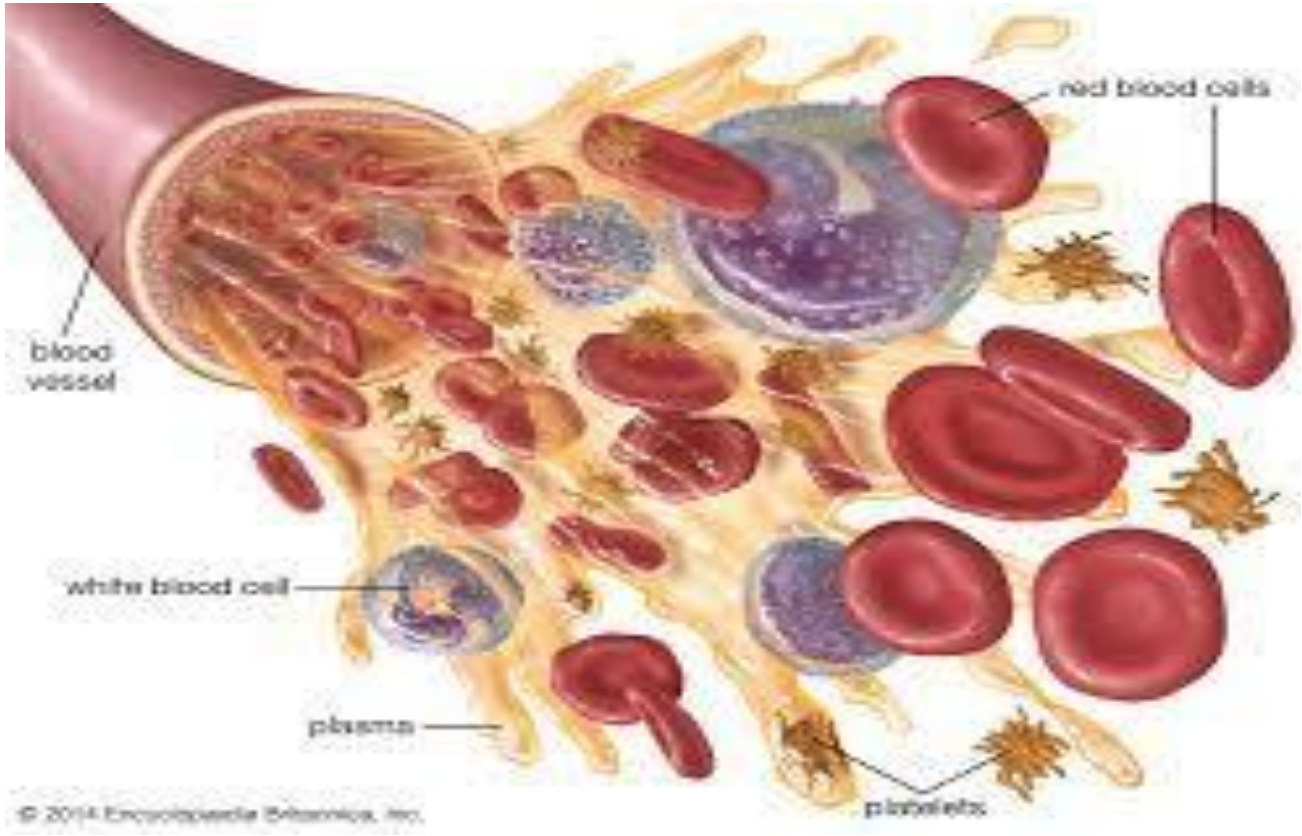
1. Erythrocyte (RBC) : Cell transport oxygen to body cell and remove carbon dioxide.

2. Leucocyte (WBC) : Involved in phagocytosis, immunity and allergic reaction.

3. Thrombocyte (Platelets) : Process of blood clotting

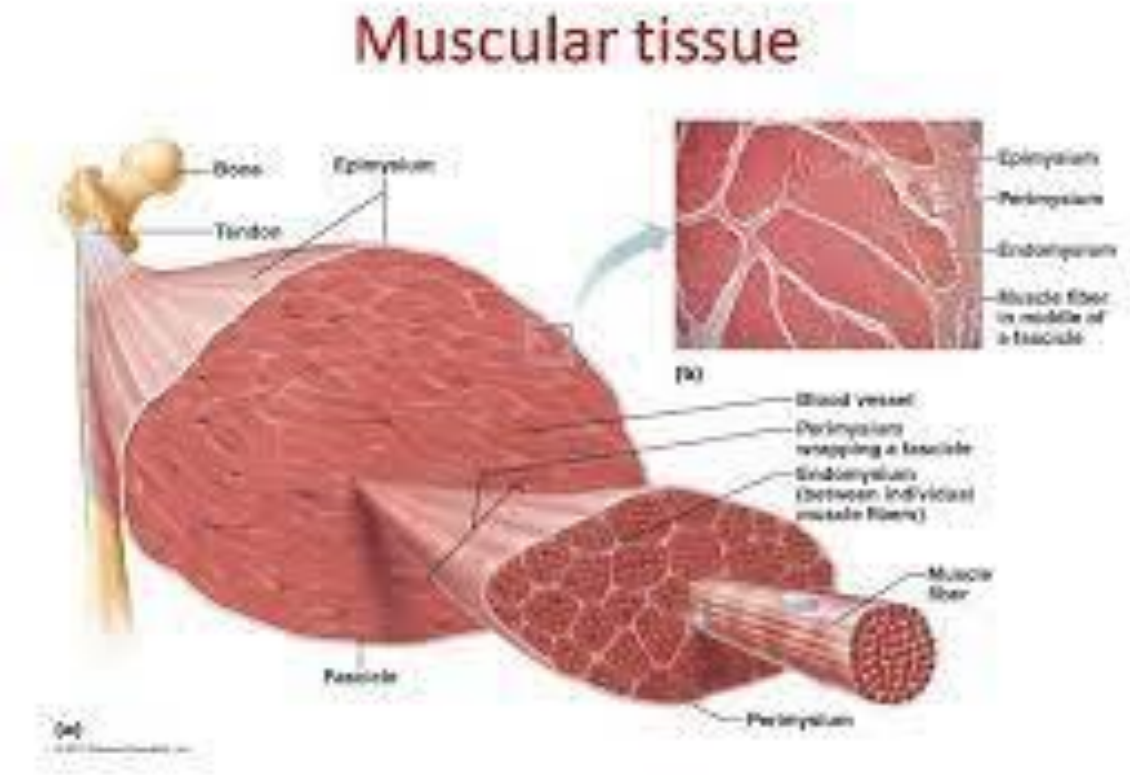
Function

- Transportation (oxygen to body, remove carbon dioxide)

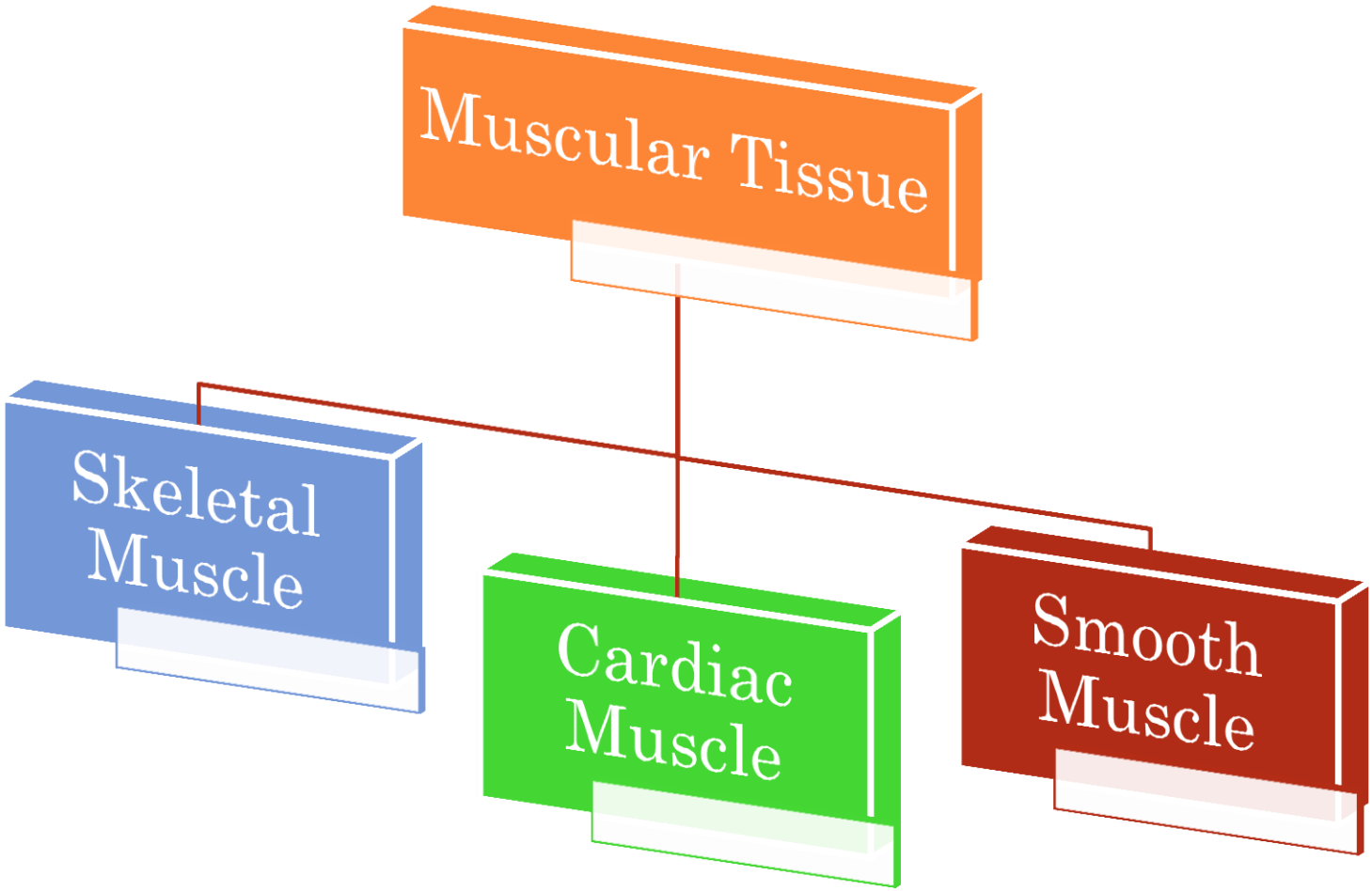


3. Muscular tissue

- Muscular tissue consist of elongated cell called as muscular fibers that can use ATP to generate force.



Classification

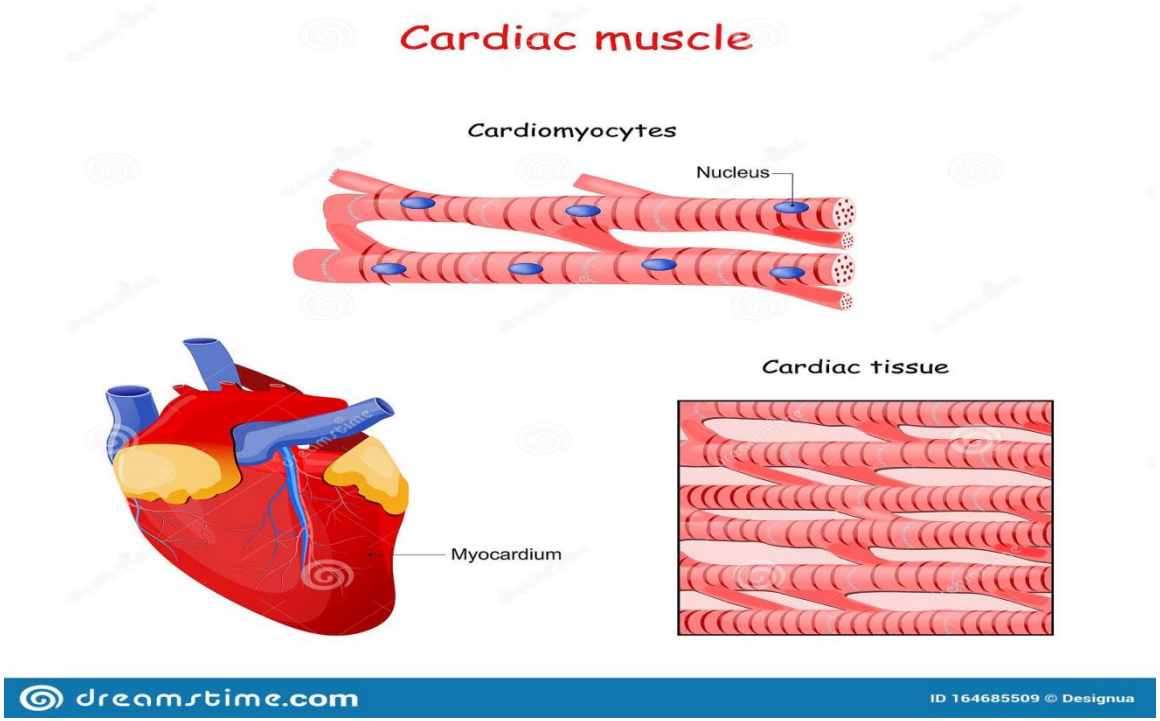


I. SKELETAL MUSCLE TISSUE

- Location – Present in attached to bone by tendons.
- Function – Help to motion, posture, and protection

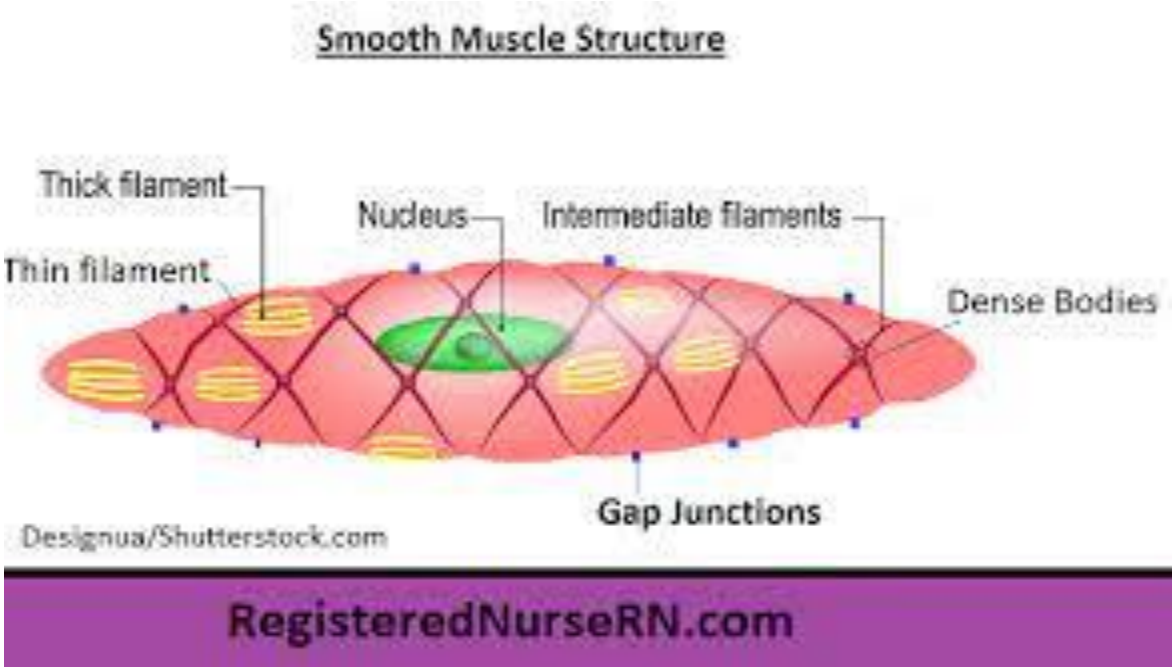
II. Cardiac muscle tissue

- Location – Present in heart wall
- Function – Pump blood to all part of body



III. Smooth muscle tissue

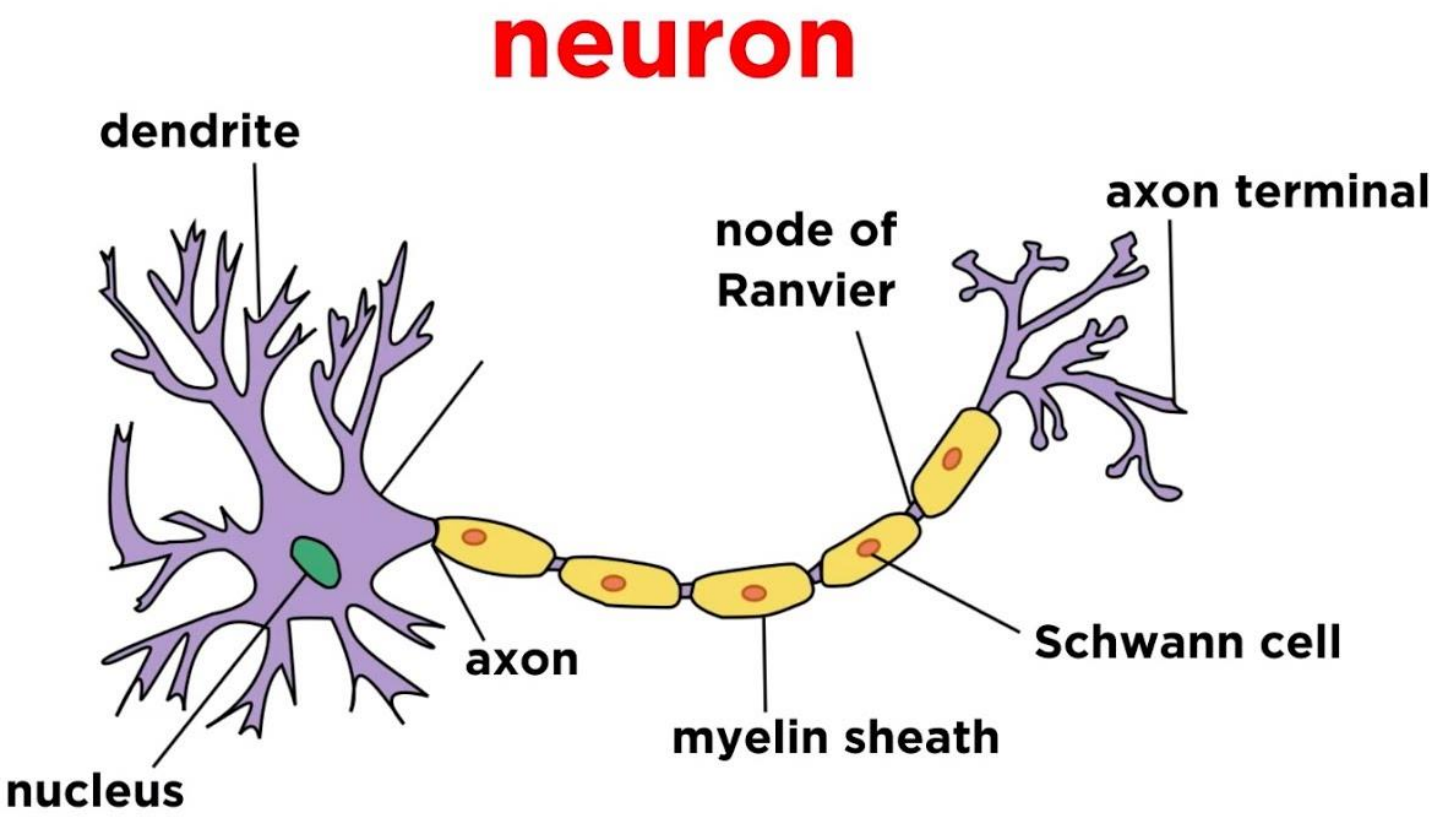
- Location – Present in wall of blood vessels, respiratory tract, uterus.
- Function – Contraction of blood vessels, Contraction of urinary bladder or gall bladder.



4. NERVOUS TISSUE

- Neurons or nerve cells are sensitive to various stimuli.
- Neurons consist of three basic part : dendrites, axons and cell body (nucleus).
- Location – Present in the nervous system
- Function – It exhibits sensitivity to types of stimuli converts stimuli in nerve impulses.

NERVOUS TISSUE




THANK YOU