

Tissues – Chapter 4

- A tissue is a group of cells having similar structure and function.
- Study of tissues is Histology.
- There are 4 basic types of tissues. Epithelial, Connective, Muscular and Nervous

Epithelial Tissues

- Epithelial Tissues are surface forming tissues. These can cover external or internal surfaces of body or organs. These lie on a common basement membrane.

Intercellular Junctions

- 3 important inter-cellular junctions are present between cell membranes of neighboring cells: Desmosomes, Tight Junctions and Gap Junctions.
- **Desmosomes**: small specialized areas with interlocking proteins between 2 membranes and help to hold cells of tissue together.
- **Tight Junctions** lie near the outer margin of epithelial cells and stop outflow of intercellular fluid.
- **Gap Junctions**: have regulated openings between neighboring cells and help in transfer of ions and small molecules.

Classification of Epithelial Tissues

- **Epithelia are classified** on the basis of number of layers (simple or stratified) and the shape of cells (Squamous, Cuboidal and Columnar). **Fig 4.4** depicts kinds of simple epithelium.

Transitional Epithelium

- **Transitional Epithelium** is many layered like normal stratified but its cells can stretch. When it is stretched the number of layers is less than when epithelium is tension free. It lines the lining of ureters and bladder.

Stratified Epithelium

- **Stratified Epithelium** is 2 - many layered. Most common is Squamous Stratified Epithelium. The basal layers are living and mostly columnar or Cuboidal. But the outer layers are flat and scale like, when living the epithelium is called Non-keratinized like the lining of mouth cavity and when dead due to accumulation of protein keratin the epithelium is keratinized like the epidermis of skin. **Fig 4.5**

Glands – exocrine / endocrine

- Exocrine Glands, on the basis of secretion, are of 3 kinds. Holocrine – If all the cell contents are released at same time, for example Sebaceous glands. Apocrine – Secretory vesicles accumulate in apical part of cell and released at same time, damaging the apical part of cell; for example sweat glands opening on main surface of skin. These glands have watery secretion. Merocrine – Secretory vesicles do not get stored and release contents by exocytosis causing no damage to cell; for example sweat glands opening into axilla, areola and groins. These have odorous sweat. **Fig 4.6**

Recap-1 Chapter-4

1. Epithelial cells have no blood supply = ----- and are -----placed.
2. -----epithelial tissues are 1 layered and ----- are many layered E.T
3. ----- and ----- are 2 examples of intercellular bridges in between Epithelial cells.
4. -----and -----may be the surface structures on epithelial cells.
5. -----glands secrete by vesicles (no damage to cell); -----glands lose apical part of cell; and -----glands release whole cell with vesicles
6. Epithelial cells have basal end lying on a -----membrane and -----ends.
7. Shapes of cells in simple epithelium may be -----, ----- or -----.
8. -----, -----, and -----are types of simple epithelium.
9. -----epithelium is specialized for secretion or absorption and ----- epithelium is specialized for protection against wear and tear.

10. Sweat glands are ----- and oil gland in skin are -----and breast glands are ----- in nature of secretion.
11. -----epithelium lines bladder and can change # of layers in it.
12. -----epithelium lines trachea and is 1-layered but looks 2-3 layered

Connective Tissues

- **Classification** of connective tissues is based on the nature of matrix. There are 3 main types.
Fig 4.7 Important
- **Connective Tissue Proper**: has a semisolid jelly like matrix. Cartilage has solid matrix and is avascular. Bone has solid matrix but has is vascular (has blood supply). Blood has fluid matrix called plasma. Fig 4.6 page 128 depicts the common embryonic origin, descendant cells, classes, subclasses, matrix components and functions of different connective tissues.

Loose / Dense connective tissue

Connective Tissue Proper

- **Areolar C.T.** is loose connective tissue proper. Fig 4.8. Study well and remember description, function and location given in fig 4.9.
- **Adipose C.T.** is loose connective tissue proper. It stores fats inside cells which look like rings with single gem.
- **Reticular tissue** is loose Connective tissue proper. It forms a delicate network inside most lymphatic organs like spleen.

Dense Connective Tissue

- Regular: dense C.T. are 2 types
- Tendon – rich in Collagen fibers and join muscle to bones
- Ligaments – rich in elastin fibers and join bone to bone

Supporting Connective Tissues

- **Supporting Connective Tissues** include cartilage and bone. These provide a strong framework for the body. These have a solid matrix and cells are present in spaces = lacunae. Cartilages are avascular but bones are vascular. **Table 4-3** compares bone and cartilage.

Cartilages

- **Cartilage**: Chondro = cartilage, chondrocyte = cartilage cells, perichondrium = covering of cartilage formed of cells and fibers. Cartilages are avascular = lack blood supply. Cartilage has 3 kinds. The matrix is liquid having protein, polysaccharide and water. Fig 4-10

Bone

- **Bone**: Osteo = bone, osteocyte = bone cell, osteoblast = bone forming cell , osteoclast = bone breaking cell, Periosteum = covering of bone formed of cells and fibers.
- Bone is a tough skeletal tissue matrix is formed of calcium salts with small amount of liquid around them. Collagen fibers are dominant. Osteocytes are present in lacunae arranged around central canals. The canal has blood supply in it. Fig 4-11.

Muscle Tissue

- **Muscles** are specialized tissues for contraction. Sarco = muscle, Sarcolemma = covering of muscle, muscle fiber = specialized cell formed of hundreds of Myofibrils. 3 kinds of muscle fibers, skeletal, cardiac and smooth. **Fig 4.13 Important.**

Nerve or Neural Tissue

- **Nerve or Neural Tissue**: It has 2 kinds of basic cells. 1 – Neurons 2 – Neuroglia.
- **Neurons** are cells that conduct information in the form of electrical disturbances = Nerve impulses. These cells are very long. Fig 4-14 depicts the main parts. Cell body has the nucleus. Many extensively branched appendages, Dendrites, are attached to cell body. These receive nerve impulses from other neurons. Axon is a very long appendage attached to cell body. It has branches

at end bearing synaptic terminals. Axon passes on the nerve impulse to other neurons or muscles or glands through synaptic vesicles.

Neuroglia

- **Neuroglia** are non-conducting cells. These are supporting cells and help in keeping the brain and spinal cord free of debris and germs; nourishing the neurons and play role in insulation of nerve fibers. There are 4 types of Neuroglia. **Astrocytes** are supporting and nourishing cells. **Oligodendrocytes** form neurilemma sheath around nerve fibers. **Microglia** are phagocytes and remove debris. **Ependymal cells** line central canal of spinal nerve cord.

Recap 2 Chapter 4

1. -----and-----are 2 types of fluid connective tissues.
2. -----, -----, and ----- are 3 kinds of cells found in loose C.T.
3. -----fibers are straight, long, unbranched strong but flexible.
4. -----fibers are branched and wavy and contract back after extension
5. ----- tissue is an example of connective tissue proper.
6. ----- tissue stores fats for energy.
7. ----- join bones to bones and -----join muscles to bones.
8. -----cartilage lines joints, -----forms discs b/w vertebrae.
9. Bone has -----in spaces called lacunae; bone is covered by -----.
10. -----muscle fibers are branched and have ----- discs at ends.
11. -----muscle fibers are single celled without any striations.
12. -----muscle fibers are multicellular and have distinct -----.
13. ----- are neural cells that nourish and support ----- .
14. ---membrane lines inside intestine and ---membrane lines outside it.
15. -----membranes line freely movable joints like knee and shoulder.