Tissues

- Cell are joined together to form tissue
- **Tissue**: group of cells that perform certain function.
- Tissues consist of cells, fibers and extracellular substances, which may be liquid (blood) semisolid (cartilage) or solid (bones).
- Different tissue.....

Main kind of tissue: Table 4-1

1. Epithelial tissue.
2. Connective tissue.
3. Muscular tissue.
4. Nervous tissue.

1. Epithelial Tissues :طلائي

General characteristics:

- It forms the lining and external covering of surfaces.
- It functions in diffusion, secretion, absorption, filtration and protection.
- It has tow basic forms membranous and glandular
  All gland develop from epithelium (glandular epithelium).
- The membranous epithelia consist of sheet of tightly packed cells.
- Membranous epithelium has two types:
  1. Simple (one layer)
     -pseudo stratified
  2. Stratified (multiple layers)
- Epithelial layers rest on basement membrane (layers of glycoprotein holding the epithelium in place and fuses with underlying connective tissue).
- The free surface of the cells faces outside environment or internal body fluid.
  (Fig 4-3)

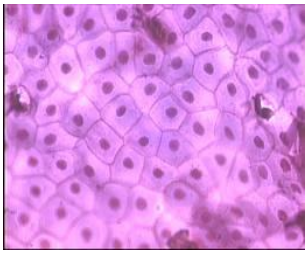
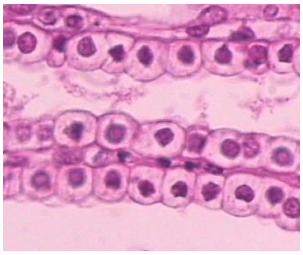
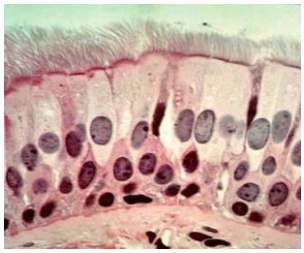
Glandular Epithelium:

- Gland is a structure that secretes and release products like mucus, enzymes, hormones, sweat, saliva,..
- **The gland may be:**
  Single cell (ex. Mucus secreting goblet in the small intestine)
  Many cell (ex salivary glands)

- **Gland also may be:**
Exocrine: release substance through ducts or tubes (salivary glands)
Endocrine: have no ducts or tubes and release hormones into bloodstream (Thyroid gland)

Simple epithelium:

- Squamous
- Cuboidal
- Columnar

Simple Squamous	Simple Cuboidal	Simple Columnar
-Single layers of very thin flattened cells.	-single layer of cub-shaped cells.	- Single layer of tall slender columns like cells. - Free surface may have microvilli. - Nuclei are usually located near the bottom of the cells.
location: 1 . Lining of blood vessels 2.lining of the alveoli of the lung.	location: 1.kidney tubules (ex: collecting duct) 2. Thyroid gland.	location: lining of the digestive tract; 1.esophagus 2.stomach 3. Intestine.
		

Pseudo stratified epithelium:

- Simple epithelium looks to be stratified because the nuclei of the cells do not line up but each cell touches the basement membrane.
Location: trachea is lined with psedostratified ciliated columnar epithelium.

Stratified epithelium:

- It has many layer of cells; the basal layer touches the basement membrane.
Location: skin, lining of nose, mouth, anal canal, vagina.

Function: usually protective.

2. Connective tissues (C. T.)

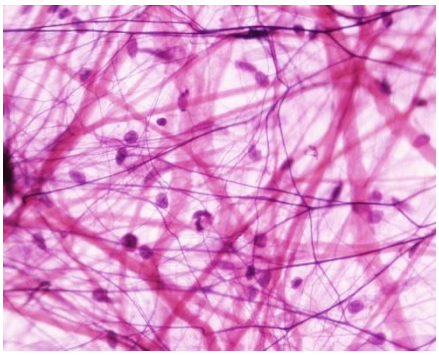
General characteristic:
- It binds the tissues and organs together, provide support and protection, fill the spaces, produce blood cells and store fats.
- It has cells and different amounts of extracellular material (matrix).
- The matrix range from hard to liquid.
- Most C.T. Have fibroblast, cells that produce fibers of different kind like:
1.white (collagenous) fibers: contain collagen, not branched, flexible and strong.
2. Yellow (elastic) fibers: contain elastin, branched not strong as collagen but more elastic.

- C.T. Has two type:
1. Connective tissue proper 2.specialized C.T.

Type of connective tissue:
• C.T. Proper (contains fibers and cells)
1-loos C.T.
2-adipose C.T.
3-dense C.T.:
*regular
*irregular
•Specialized:
1-cartilage
2-bone
3-blood

Type of connective Tissue Proper:

1. Loose Connective Tissue:



- It contains cells, white collagen and yellow elastic protein fibers and semifluid matrix.
- Its cells and fibers are loosely arranged.

Location:
under most epithelium, wall and cover of many internal organs like blood vessels, muscle cells,. Act
Function:
elasticity and diffusion.

Some cells of loose C.T.:

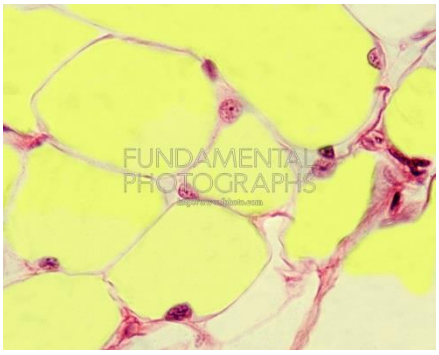
Fibroblasts:

-cells that produce fibers of the tissues.
-They form fibers needed to repair damage.

Macrophages:

-Cells that play a role in immune protection.
-It engulfed bacteria.
-It contain numerous lysosomes needed for intracellular digestion of foreign material.

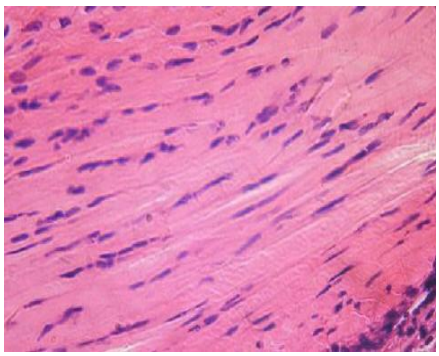
2. Adipose C.T.:



-it is modified loose tissue containing fat cells.
-cells contain huge fat globules.
- The nuclei and the cytoplasm are peripheral
-it has little matrix.

Location:
Under the skin, around the heart and kidneys.
Function:
-store fats; energy reserves
-provides insulation (عزل), padding (حشو)
Cushion(وسادة) and protects body parts.

3. Dense C.T.:



-contains densely packed fires which are produced by fibroblasts

Dense regular C.T.:

Have rows of fibroblasts, parallel bundles of collagen fibers and less ground substance

Location:

- Tendons: that attaches skeletal muscles to the bones.
-ligaments: that attach one bone to another

Function:

Strength and elasticity

Dense irregular C.T.:

- The fibers are less regularly arranged.

Location:

-dermis: of the skin
- Capsules: around some organs

Function:

Support.

(Dense C.T. Is stronger than loose C.T.)

Type of specialized Tissue:

1. Cartilage:

-It has cells called chondrocytes lie in lacunae embedded in rubbery matrix.
- It lacks blood vessels

Function:

-support, flexibility, low friction surface for joint movement.

Types of cartilage:

A. hyaline cartilage (glassy):

-the matrix has fine translucent appearance.

Location:

Ends of long bones (joints), nose, ribs, trachea, embryo's skeleton.

B. elastic cartilage:

- It has collagen and elastic fibers.
- It is rigid and flexible.

Location:

Outer ear.

C. fibrocartilage:
- It has bundles of collagen fibers.
- It withstands a lot of tension and pressure.

Location:
Intervertebral discs.

2. Bone:

- The most rigid (hard) C.T.
- It's matrix has collagen fibers and calcium salts.
- Its cells are called osteocytes lie in lacunae.
- There are two types of bones (compact and spongy)

Function:
- Movement, support, protection of internal organs,...ect.
- Red bone marrow produces blood cells.
- stores minerals.
- play a role in homeostasis by maintaining blood calcium level.

Types of Bones:

A. Compact bones:
- consist of cylindrical units called osteons (aversion system)
- In osteon, osteocytes arranged in circles around central canal which contains nerve fibers and blood vessels.
- Extension of bone cells within canaliculi connect the cells with each other.

Location:
Shafts of long bones.

B. spongy bones:
- contain irregular network of calcified plates.
- It is lighter than compact bones.
- appears spongy but actually it is quite strong.

Location:
End of long bones.

3. Blood:

- It is called vascular connective tissue.
- It consist of plasma (extracellular fluid, matrix) and formed elements (RBCs, WBCs, and platelets).
- All blood cells arise from the red bone marrow.

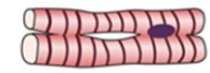
Red blood cells :(RBCs, erythrocytes)
-mature human RBCs have one nuclei (a nucleated)

Function: deliver O2 to tissues and small amount of CO2 away from them.

Lecture 3

3. Muscle Tissue:

Skeletal Muscle



Cardiac Muscle

Smooth Muscle

- It is an excitable tissue composed of contractile cell called muscle fibers.

- It is excited after arrival of nerve impulse and contracts or relaxes.
- Each muscle fiber contains protein filaments called actin and muocin.
- There are three types of muscles: - smooth -skeletal -cardiac.

A. Smooth (visceral) muscle:

-Involuntary
-no striation
- muscle cell has single nucleus, spindle shape with tpered ends.

Location: walls of the internal organs like blood vessels. Stomach, reproductive tract, bladder,..ect
Function: movement of internal organs.

B. Skeletal muscle tissues:

- Voluntary with few exceptions like muscles of upper esophagus.
- Cells have dark and light bands, which give striated (banded) appearance.
- Bundles of long cylindrical multinucleated cells.
- The nuclei are peripheral.
-attached to the bones of the skeleton.

Location: associated with the bones of the skeleton
Function: movement of the body parts (hands, legs...)

C. Cardiac muscles

- Involuntary
- striated (banded)
- cells are branched uninucleated with central nuclei.
- Cell are tightly connected to one another by intercalated discs to work as a single functional organ

Location: walls of the heart
Function: pump the blood.

4. Nerve Tissue:

- It consists of two main types of cells:

A. Neurons (nerve cells)

- Excitable cells which transmit impulses
- consists of nucleated cell body and cytoplasmic extensions (dendrites and axons).
- It has three types depending on the number of extensions: unipolar, bipolar, and multipolar.
- Dendrites receive impulses from receptors or another neuron, transmit .. (ناقص)

B. Neuroglia (glial cells)

- Make up most of the nervous tissue
- help speed the nerve impulse.

Location: nervous system (brain, spinal cord, nerves,..)
Function: respond to stimuli and transmit impulses (signals/ messages)