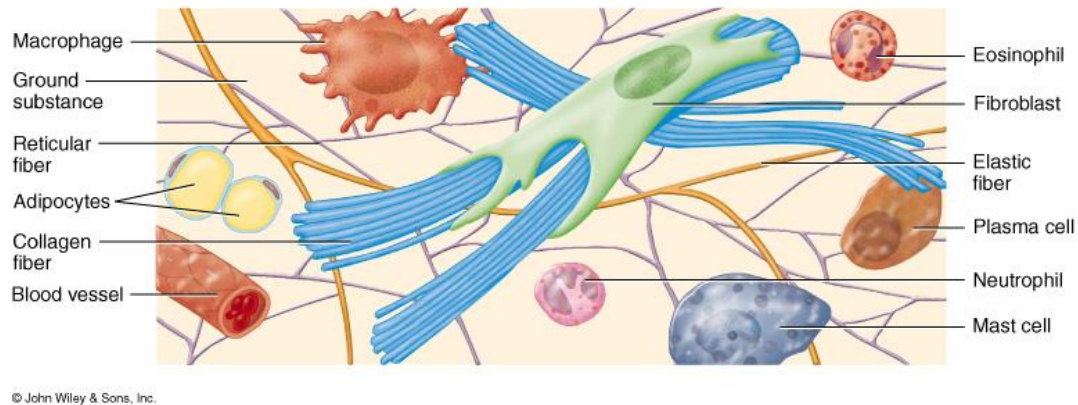


## Lecture N0 – 1



## Tissues

A **tissue** is composed of similarly specialized cells that perform a common function in the body. The tissues of the human body can be categorized into four major types:

1-epithelial tissue, which covers body surfaces and lines body cavities.

2- connective tissue, which binds and supports body parts.

3- muscular tissue, which moves body parts.

4- nervous tissue, which receives stimuli and conducts impulses from one body part to another.

### Types of Tissues

#### 1- Epithelial tissue

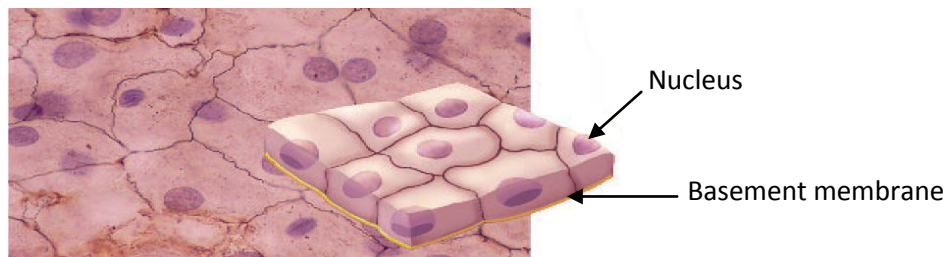
Also called epithelium, consists of tightly packed cells that form a continuous layer or sheet lining the entire body surface and most of the body's inner cavities. On the external surface, it protects the body from injury, drying out, and possible **pathogen** (virus and bacterium) invasion.

On internal surfaces, epithelial tissue may be specialized for other functions in addition to protection. For example, epithelial tissue secretes mucus along the digestive tract and sweeps up impurities from the lungs by means of cilia. It efficiently absorbs molecules from kidney tubules and from the intestine because of minute cellular extensions called **microvilli**.

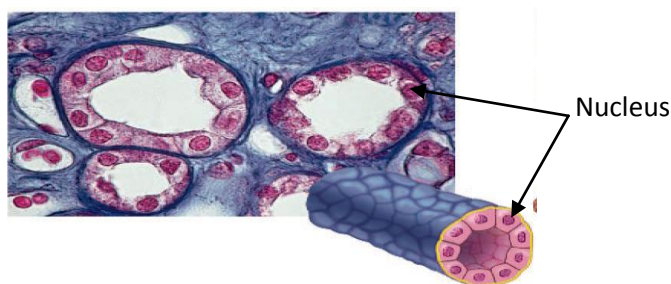


There are various types of epithelial tissue

A- **Simple squamous epithelium** is composed of flattened cells and is found lining the lungs and blood vessels.

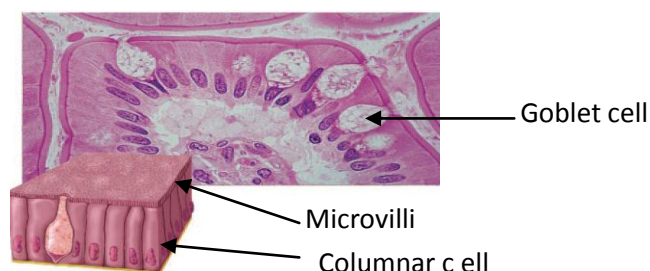


B- **Simple cuboidal epithelium** contains cube-shaped cells and is found lining the kidney tubules.



### C - Simple columnar Epithelium

has cells resembling rectangular pillars or columns, and nuclei are usually located near the bottom of each cell. This epithelium is found lining the digestive tract. Ciliated columnar epithelium is found lining the oviducts, where it propels the egg toward the uterus.



An epithelium can be simple or stratified. Simple means the tissue has a single layer of cells, and stratified means the tissue has layers of cells piled one on top of the other. The walls of the smallest blood vessels, called **capillaries**, are composed of a single layer of epithelial cells. The permeability of capillaries allows exchange of substances between the blood and tissue cells. The nose, mouth, esophagus, anal canal, and vagina are all lined by stratified squamous epithelium. As we shall see, the outer layer of skin is also stratified squamous epithelium, but the cells have been reinforced by keratin, a protein



that provides strength. **Pseudo stratified epithelium** appears to be layered; however, true layers do not exist because each cell touches the baseline. The lining of the windpipe, or trachea, is called pseudo stratified ciliated columnar epithelium. A secreted covering of mucus traps foreign particles, and the upward motion of the cilia carries the mucus to the back of the throat, where it may either be swallowed or expectorated.

Smoking can cause a change in mucus secretion and inhibit ciliary action, and the result is a chronic inflammatory condition called bronchitis.



**Basement membrane** often joins an epithelium to underlying connective tissue. We now know that the basement membrane is glycoprotein, reinforced by fibers that are supplied by connective tissue. An epithelium sometimes secretes a product, in which case it is described as glandular. A **gland** can be a single epithelial cell, as in the case of mucus-secreting goblet cells found within the columnar epithelium lining the digestive tract, or a gland can contain many cells. Glands that secrete their product into ducts are called **exocrine** glands, and those that secrete their product directly into the bloodstream are called **endocrine** glands. The pancreas is both an exocrine gland, because it secretes digestive juices into the small intestine via ducts, and an endocrine gland, because it secretes insulin into the bloodstream. Epithelial tissue is named according to the shape of the cell. These tightly packed protective cells can occur in more than one layer, and the cells lining a cavity can be ciliated and or glandular.

### ***Junctions Between Cells***

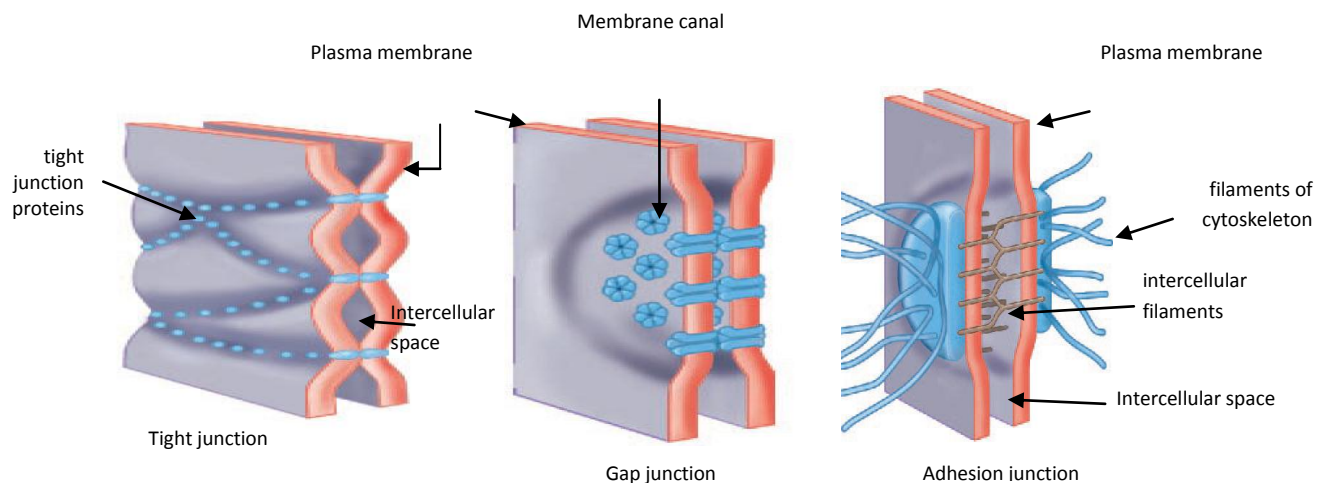
The cells of a tissue can function in a coordinated manner when the plasma membranes of adjoining cells interact. The junctions that occur between cells help cells function as a tissue.

**Tight junction** forms an impermeable barrier because adjacent plasma membrane proteins actually join, producing a zipper like fastening. In the intestine, the gastric juices stay out of the body, and in the kidneys, the urine stays within kidney tubules because epithelial cells are joined by tight junctions.

A **gap junction** forms when two adjacent plasma membrane channels join. This lends strength, but it also allows ions, sugars, and small molecules to pass between the two cells. Gap junctions in heart and smooth muscle ensure synchronized contraction.



In an **adhesion junction** (desmosome) , the adjacent plasma membranes do not touch but are held together by intercellular filaments firmly attached to button like thickenings. In some organs—like the heart, stomach, and bladder, where tissues get stretched—adhesion junctions hold the cells together.



## 2- Connective Tissue

**Connective tissue** binds organs together, provides support and protection, fills spaces, produces blood cells, and stores fat. As a rule, connective tissue cells are widely separated by a **matrix**, consisting of a non cellular material that varies in consistency from solid to semi fluid to fluid. The matrix may have fibers of three possible types:

- 1- white **collagen fibers** contain collagen, a protein that gives them flexibility and strength.
- 2- **Reticular fibers** are very thin collagen fibers that are highly branched and form delicate supporting networks.
- 3- Yellow **elastic fibers** contain elastin, a protein that is not as strong as collagen but is more elastic.

### *Loose Fibrous and Dense Fibrous Tissues*

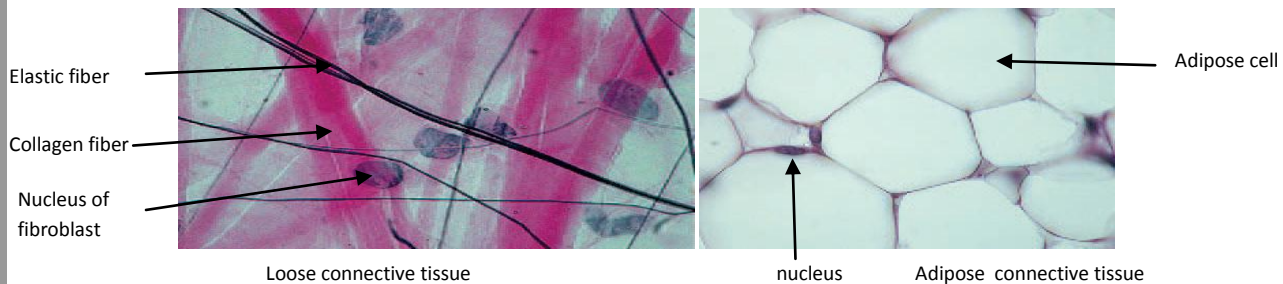
Both loose fibrous and dense fibrous connective tissues have cells called **fibroblasts** that are located some distance from one another and are separated by a jellylike matrix containing white collagen fibers and yellow elastic fibers.





### Loose fibrous connective tissue

supports epithelium and also many internal organs. Its presence in lungs, arteries, and the urinary bladder allows these organs to expand. It forms a protective covering enclosing many internal organs, such as muscles, blood vessels, and nerves .



### Dense fibrous connective tissue

contains many collagen fibers that are packed together. This type of tissue has more specific functions than does loose connective tissue. For example, dense fibrous connective tissue is found in **tendons**, which connect muscles to bones, and in **ligaments**, which connect bones to other bones at joints.

### *Adipose Tissue and Reticular Connective Tissue*

In **adipose tissue** the fibroblasts enlarge and store fat. The body uses this stored fat for energy, insulation, and organ protection. Adipose tissue is found beneath the skin, around the kidneys, and on the surface of the heart.

Reticular connective tissue forms the supporting meshwork of lymphoid tissue present in lymph nodes, the spleen, the thymus, and the bone marrow. All types of blood cells are produced in red bone marrow, but a certain type of lymphocyte (T lymphocyte) completes its development in the thymus , The lymph nodes store lymphocytes.

