

What is histology?

Histology is the science of microscopic anatomy of cells and tissues, in Greek language Histo= tissue and logos = study and it's tightly bounded to molecular biology, physiology, immunology and other basic sciences.

Tissue: A group of cells similar in structure, function and origin. In tissue cells may be dissimilar in structure and functions but they are always similar in origin.

Classification of tissues: despite the variations in the body the tissues are classified into four basic types:

1. **Epithelium (epithelial tissue)** covers body surfaces, line body cavities, and forms glands.
2. **Connective tissue** underlies or supports the other three basic tissues, both structurally and functionally.
3. **Muscle tissue** is made up of contractile cells and is responsible for movement.
4. **Nerve tissue** receives, transmits, and integrates information from outside and inside the body to control the activities of the body.

❖ Epithelium

General Characterizes of epithelial tissues:

1. Cells are closed to each other and tend to form junctions
2. Little or non-intracellular material between intracellular space.
3. Cell shape and number of layers correlate with the function of the epithelium.
4. Form the boundary between external environment and body tissues.
5. Cell showed polarity
6. Does not contain blood vesicle (vascularity).
7. Mitotically active.
8. Rest on basement membrane (basal lamina).
9. Regeneration: because epithelial tissue is continually damage or lost.
10. Free surface: epithelial tissue always has apical surface or a free adage.

Method of Classification epithelial tissue

- 1- Can be classified according to number of layer to two types:
 - A. Simple epithelium: composed of one layer
 - B. Stratified epithelium: more than one cell layer thick
- 2- The tissue can be classified according to the shape of cells (squamous, cuboidal, columnar and transitional).

Simple epithelium

- 1. Simple squamous epithelial tissues:** Cells are much wider than tall, and Nucleus is highly flattened. Location in the lining of blood vessels and alveoli of the lungs.
- 2. Simple cuboidal epithelial tissues:** Cells are of equal height and width. Nucleus is spherical its function are secretion and absorbs also line the walls of ducts and tubules. Found in kidney tubules, ducts of gland and ovary surface.
- 3. Simple columnar epithelial tissue:** Cells are much taller than they are wide. Nucleus is oval shaped. Also may be containing **goblet cell** for mucus secretion. There is two type of this tissue either **ciliated** or **non-ciliated**. The first one found in uterus and oviducts, while the other found in stomach. This tissue found in intestine characterized by **microvilli** in free surface called **striated border**.
- 4. Pseudostratified columnar epithelial tissue:** Cells are of various heights, all cells rest on the basement membrane, but only the tallest cells reach the free surface. Variation in the location of nuclei gives the appearance of a stratified epithelium. Also its may be **ciliated** found in trachea or **non- ciliated Pseudostratified columnar epithelial tissue** found large ducts of salivary gland.

Stratified epithelium

- 1. Stratified squamous epithelial tissues:** can be "keratinized" (rich in keratin intermediate filaments) found mainly in the epidermis of skin or "nonkeratinized" lines wet cavities (eg, mouth, esophagus, and vagina).
- 2. Stratified columnar epithelial tissues:** are rare; it is present in the human body only in small areas, such as the salivary glands and the part of urethra.
- 3. Stratified cuboidal epithelium** is restricted to large excretory ducts of sweat and salivary glands.

4. Transitional epithelium or urothelium, which lines the urinary system like bladder, and the upper part of the urethra, is characterized by a superficial layer of dome-like cells that are neither squamous nor columnar. These cells, sometimes called umbrella cells, are essentially protective against the hypertonic and potentially cytotoxic effects of urine.

Glands: are formed by cells specialized to secrete. The molecules to be secreted are generally stored in the cells in small membrane-bound vesicles called **secretory granules**.

Classification of glands

- **According to the number of cells:**

1-unicellular glands: such as **goblet cell** in the lining of the small intestine or respiratory tract

2-multicellular glands: are composed of clusters of cells.

- **According to the Structures of glands :**

1-simple glands: which composed from unbranched ducts

a) **simple Tubular gland**

b) **simple acinar gland**

2-compound glands: which composed from branched ducts

a. **compound Tubular gland**

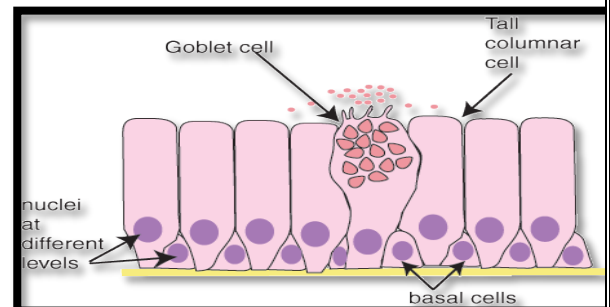
b. **compound acinar gland**

c. **compound tubuloacinar glands**

- **According to mode of secretion** which divided into two types:

1- Exocrine glands retain their connection with the surface epithelium, the connection taking the form of tubular ducts lined with epithelial cells through which the secretions pass to the surface.

2-endocrine glands have lost their connection to the surface from which they originated during development. These glands are therefore ductless and their secretions are picked up

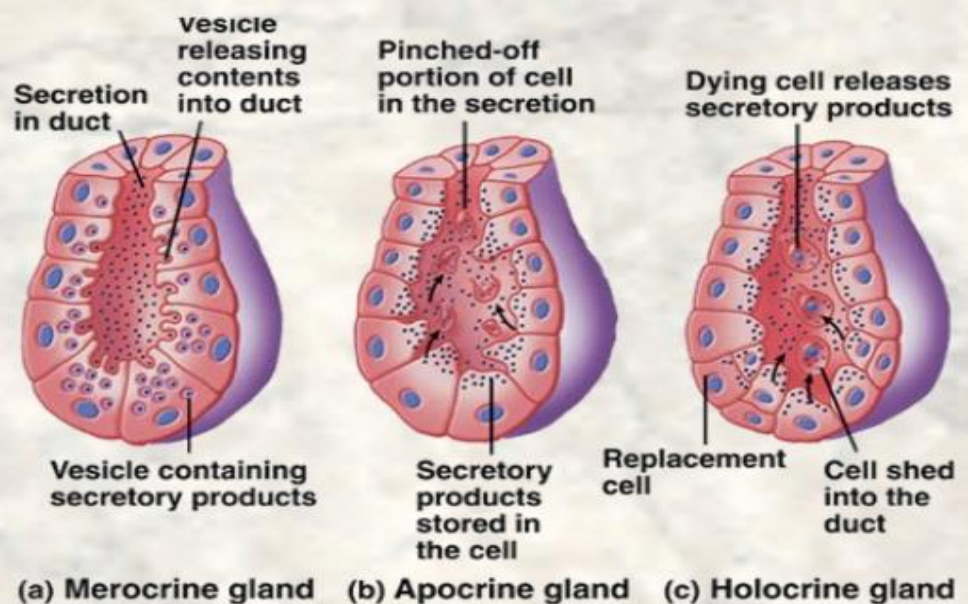


and transported to their sites of action by the bloodstream rather than by a duct system. Multicellular glands, whether exocrine or endocrine, also have connective tissue in a surrounding capsule and in septa that divide the gland into lobules.

- **According to the type of secretion** :it contain three type
 1. **Merocrine secretion** releases products, usually containing proteins, by means of exocytosis at the apical end of the secretory cells. Most exocrine glands are merocrine. Is seen in sweat glands.
 2. **Holocrine secretion** is produced by the disintegration of the secretory cells themselves as they complete their terminal differentiation, which involves becoming filled with product. Is seen in Sebaceous glands
- **Apocrine secretion** involves loss of membrane-enclosed apical cytoplasm, surrounded by a thin layer of cytoplasm within an envelope of plasma membrane is seen in mammary glands.

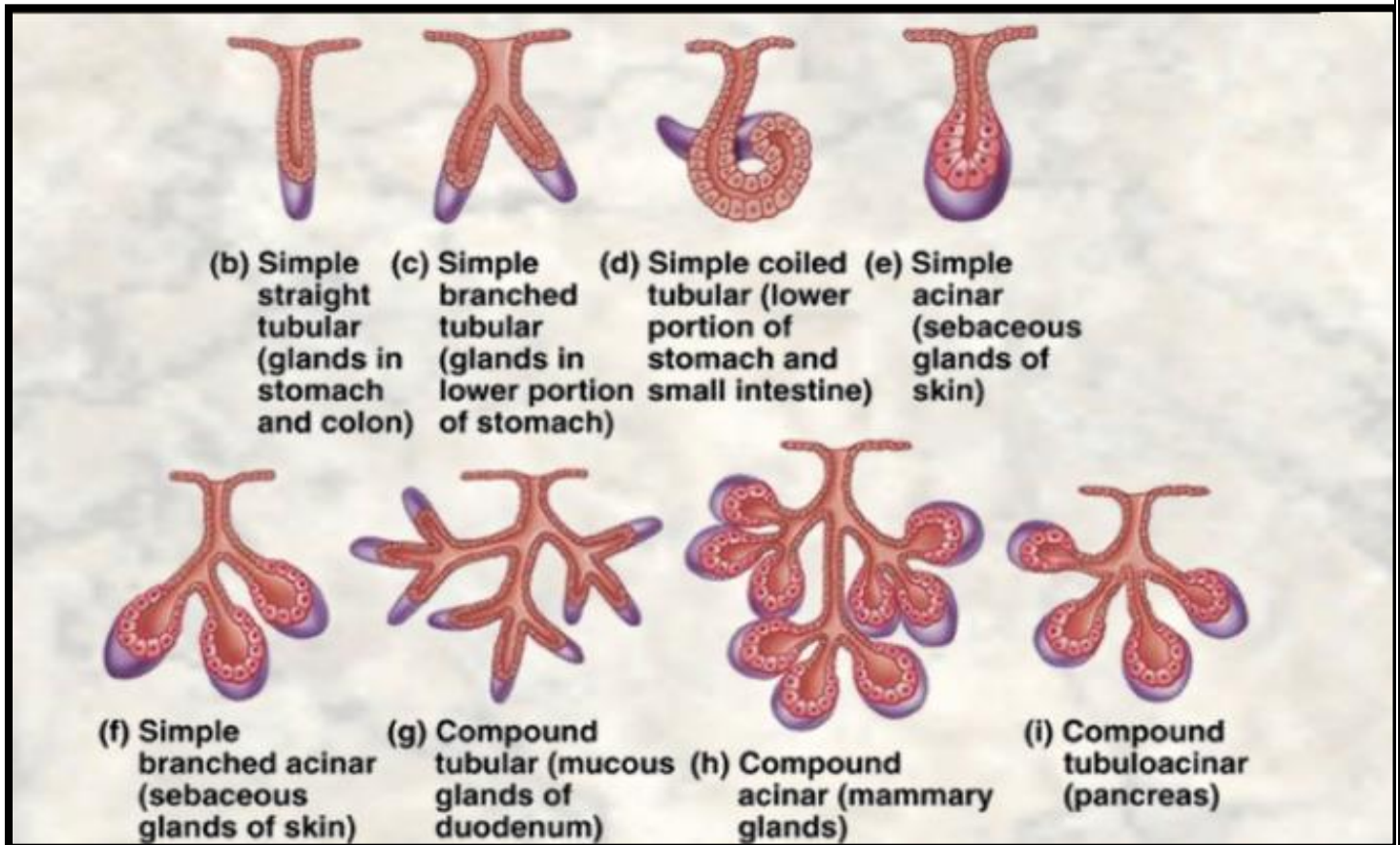
Exocrine Glands & Secretion Types

- **Merocrine**
 - Sweat glands
- **Apocrine**
 - Mammary glands
- **Holocrine**
 - Sebaceous glands



- **According to the substance of secretion**
 1. **Serous gland:** the gland that secreted liquid substance contain enzymes such as parotid glands

2. **Mucous gland** the gland that secreted mucous substance such as palatine glands
3. **Mixed (sero-mucous glands)** the gland that secreted mixed from mucous and serous substance such as submandibular glands and submaxillary glands.



Function of epithelium tissues

1. Protection: like keratin and mucous
2. Absorption like microvilli in intestine
3. Secretion like hormone and enzyme
4. Sensory reception like test bund
5. Surface transport like cilia
6. Proliferation such as epithelial tissue in seminiferous tubules