Endothelium& Mesothelium

Endothelium lines all blood and lymph channels and mesothelium is the lining of the serous body cavities (pericardial, pleural, and peritoneal).structurally both are simple squamous epithelia but differ in their origin and potentialities, being capable of many functions not shown by ordinary simple squamous epithelium. These cells are actively phagocytic and can form fibroblasts

Specializations of the cell surface in epithelia:-

Cilia and flagella are motile processes protruding from cell surfaces.

Cilia: are eyelash or hair-like processes, they are very numerous in epithelial cells of the upper respiratory tract. There are about 250 or more cilia on the surface of a ciliated cell, arranged in regular rows.

All cilia are about 0.2 µm in diameter and vary in length from about 5-10 µm.

A flagellum is a whip-like process similar in structure to a cilium but is longer 15-30 µm in length, and usually there are only one or two associated with each cell.

Microvilli: are small slender finger- like projection of the apical cell surface consisting of tube like invagination of the plasma membrane of the apical surface containing a core of cytoplasm.

In many epithelia they are numerous and of regular dimensions and form a brush or striated border visible by light microscopy, they have cores of actin filaments that generally function to increase epithelial cells' apical surface area for absorption.

Glandular epithelia:

Glandular epithelial tissues are those formed by cells specialized in producing a fluid secretion that differs in composition from blood or intercellular fluid.

This process is usually accompanied by the intracellular synthesis of macromolecules. These compounds are generally stored in the cells in small membrane-bound vesicles called secretory granules.

The chemical nature of these macromolecules is variable.

Glandular epithelial cells may synthesize, store, and secrete proteins (e.g. pancreas), lipids (e.g. adrenal and sebaceous glands), or complexes of carbohydrates and proteins (e.g. salivary glands).

In the mammary glands, all three substances; proteins, lipids, and carbohydrates are secreted. All gland cells produce and expel to an extracellular compartment products that are not used by the cell itself but are of importance to other parts of the organism.

Types of Glandular Epithelia:

The epithelia that form the glands of the body can be classified according to various criteria ; e.g**. unicellular glands** consist of isolated glandular cells and **multicellular glands** are composed of clusters of cells.

An example of a **unicellular gland is the goblet cell** of the lining of the small intestine or the respiratory tract. However, most glands are multicellular.

Glands always derive from epithelial covering membranes by means of cell proliferation and invasion of subjacent connective tissue , subsequently followed by further differentiation

Glands usually are divided into two main groups:-

Exocrine glands are glands that retain their connection with the surface epithelium from which they originated. This connection takes the form of tubular ducts lined with epithelial cells through which the glandular secretions pass to reach the surface.

Endocrine glands are glands whose connection with the surface from which they originated was obliterated during development. These gland are therefore ductless, and their secretions are picked up and transported to their site of action by the bloodstream rather than by a duct system.

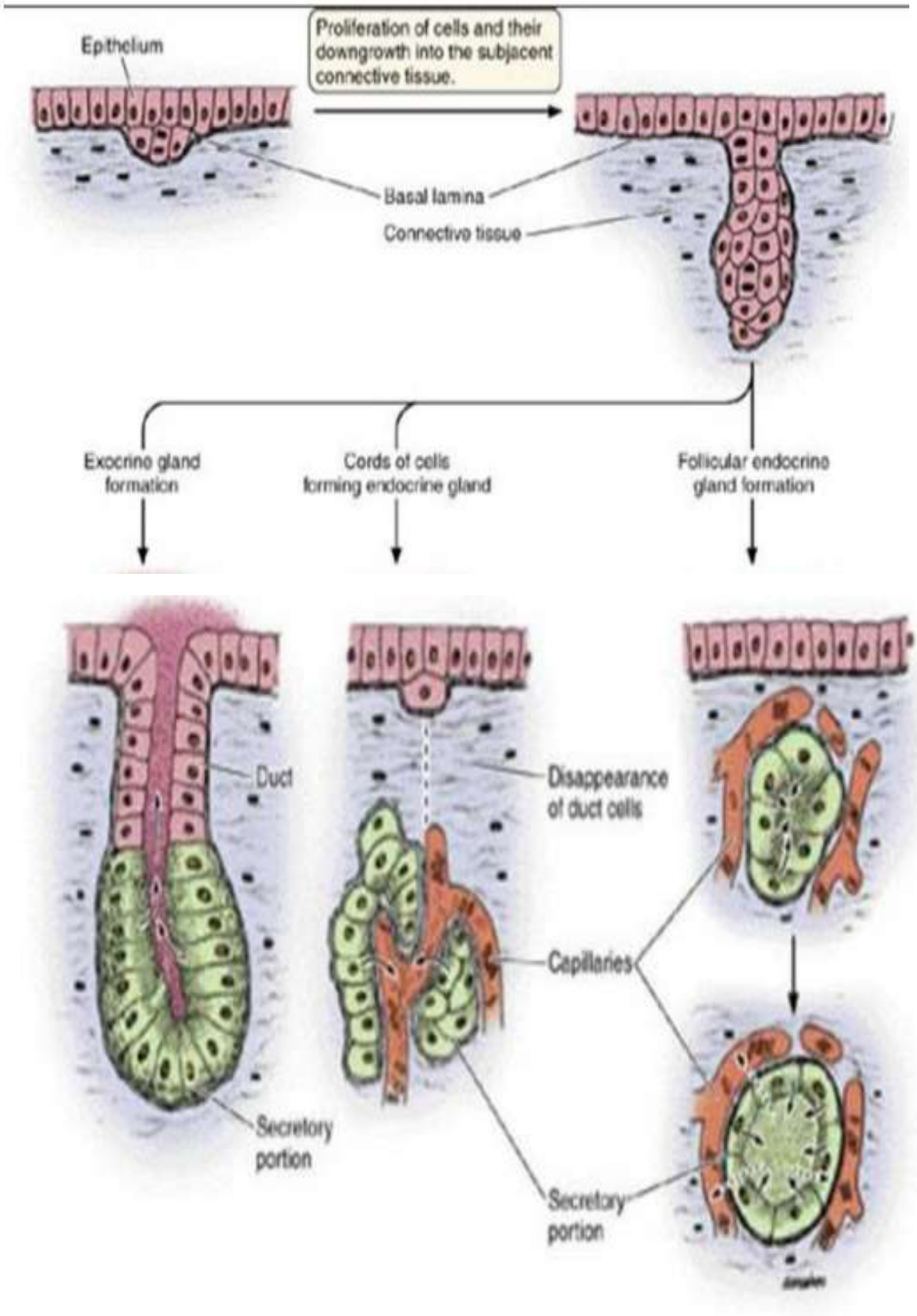

Figure 1-11: Formation of glands form covering epithelium.

According to the way the secretory products leave the cell, glands may be classified as **Merocrine or Holocrine.**

In **Merocrine glands** (e.g. in pancreas), the secretory granules leave the cell with no loss of cellular material.

In **holocrine glands** (e.g. sebaceous glands), the product of secretion is shed with the whole cell-a process that involves destruction of the secretion-filled cells.

In an intermediate type-the **apocrine gland**-the secretory product is discharged together with parts of the apical cytoplasm. This type of secretion is observed in certain sweat glands.

Multicellular glands are not merely collections of cells but complete organs with a definite and orderly architecture. They usually have a surrounding capsule of connective tissue and septa that divide the gland into lobules. These lobules then subdivide, and in this way the connective tissue separates and binds together the glandular components. Blood vessels and nerves also penetrate and subdivide in the gland.

The product of such glands is a mixture of digestive enzymes and watery mucus.

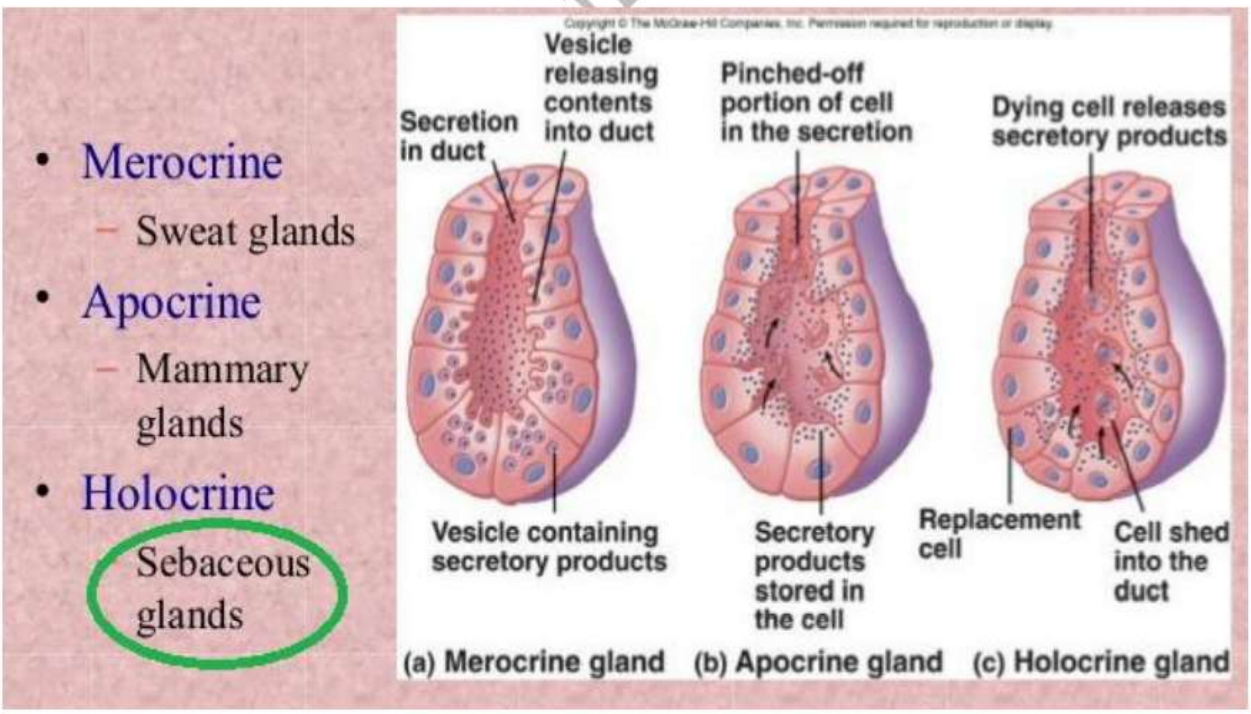

Figure 1-12: Exocrine glands and secretion types.

In addition to secretory cells, epithelia of many exocrine glands (e.g, sweat, lachrymal, salivary, and mammary glands) contain contractile myoepithelial cells at the basal ends of the secretory cells.

Endocrine glands lack myoepithelial cells and are specialized for either protein or steroid hormone synthesis. The pancreas contains both endocrine and exocrine cells. Liver cells exert both functions in the same cells, secreting bile components into a duct system and releasing other products to the bloodstream.

In some glands, the excretory ducts also participate in regulating the ionic composition of the secretory fluid.

Simple glands have only one unbranched duct.

Compound glands have ducts that branch repeatedly.

The cellular organization within the secretory portion of the gland further classifies the glands. The simple glands can be tubular , coiled tubular , branched tubular , or acinar. The compound glands can be tubular ,acinar , or tubloacinar. (Fig 1-13) illustrates these types of glands schematically.

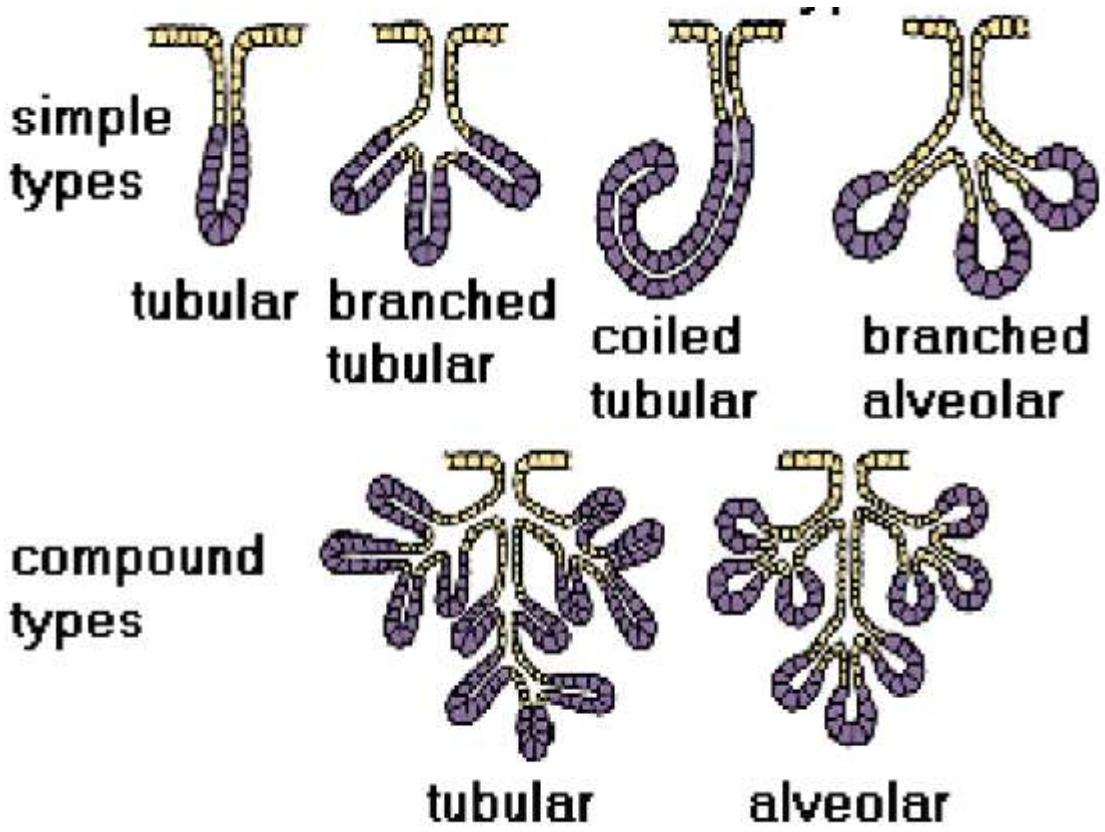

Figure 1-13: Exocrine gland types.

Some organs have both endocrine and exocrine functions, and one cell type may function both ways; e.g. in the liver, where cells that secrete bile into the duct system also secrete some of their products into the bloodstream. In other organs, some cells are specialized in exocrine secretion whereas others are concerned exclusively with endocrine secretion, e.g. in pancreas, where the acinar cells secrete digestive enzymes into the intestinal lumen while the islet cells secrete insulin and glucagon into the blood.

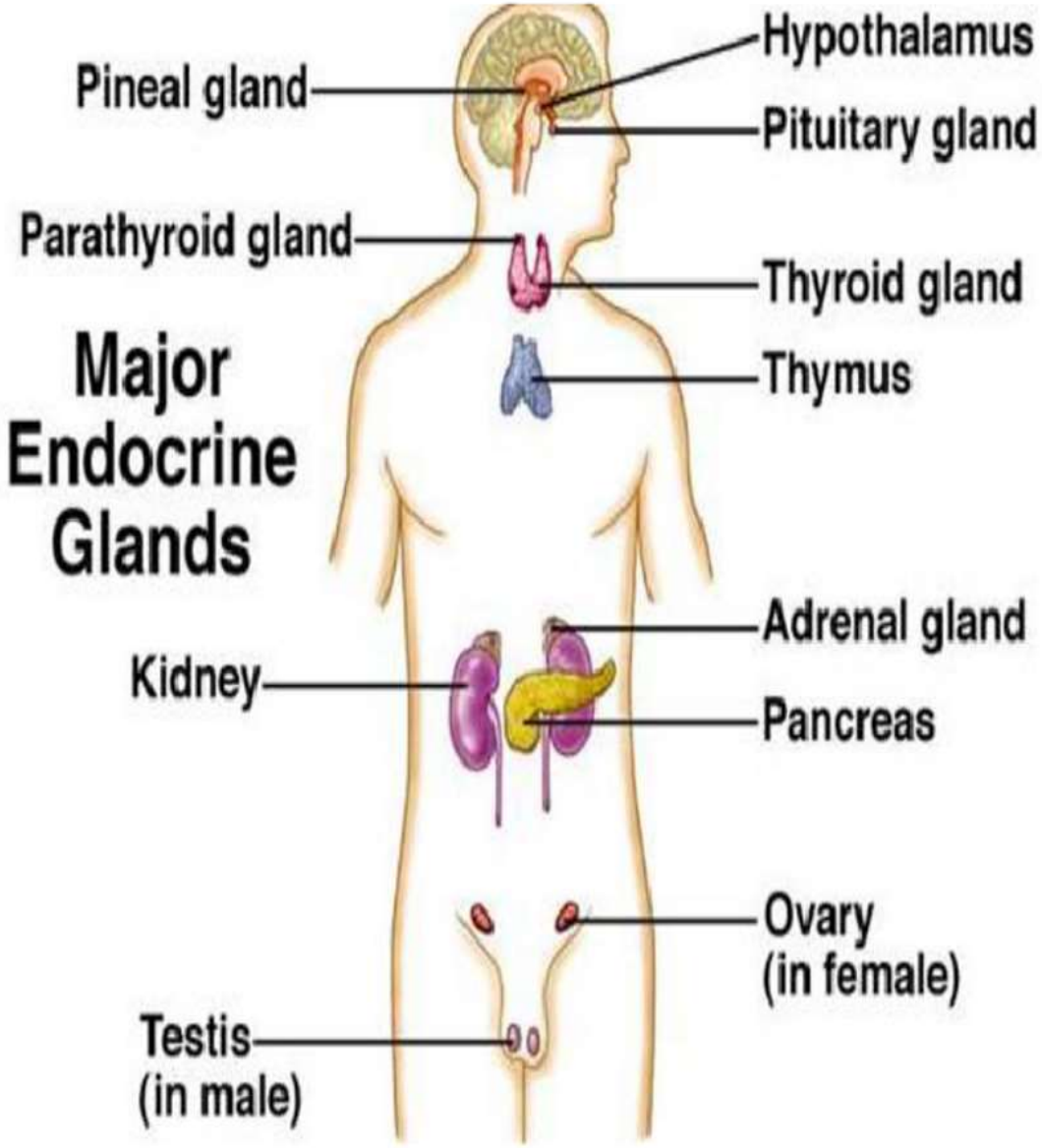

Figure 1-14: Major endocrine glands in human.