epithelial secretion glands

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Epithelial Secretion and Glands

Function of Glandular Epithelial Cells:

Glandular epithelial cells can:

- Synthesize, store, and secrete different substances like:
  - Proteins → e.g., pancreas
  - Lipids → e.g., adrenal glands, sebaceous glands
  - Glycoproteins (carbohydrates + proteins) → e.g., salivary glands
  - All three types → e.g., mammary glands

Note: Some glands (like sweat glands) have low synthetic activity and mainly secrete substances taken from the blood.

Main Role of Epithelial Cells in Glands:

- The key role of many epithelial cells is secretion of specialized products
- Organs made mainly of these cells are called glands

Development of Glands:

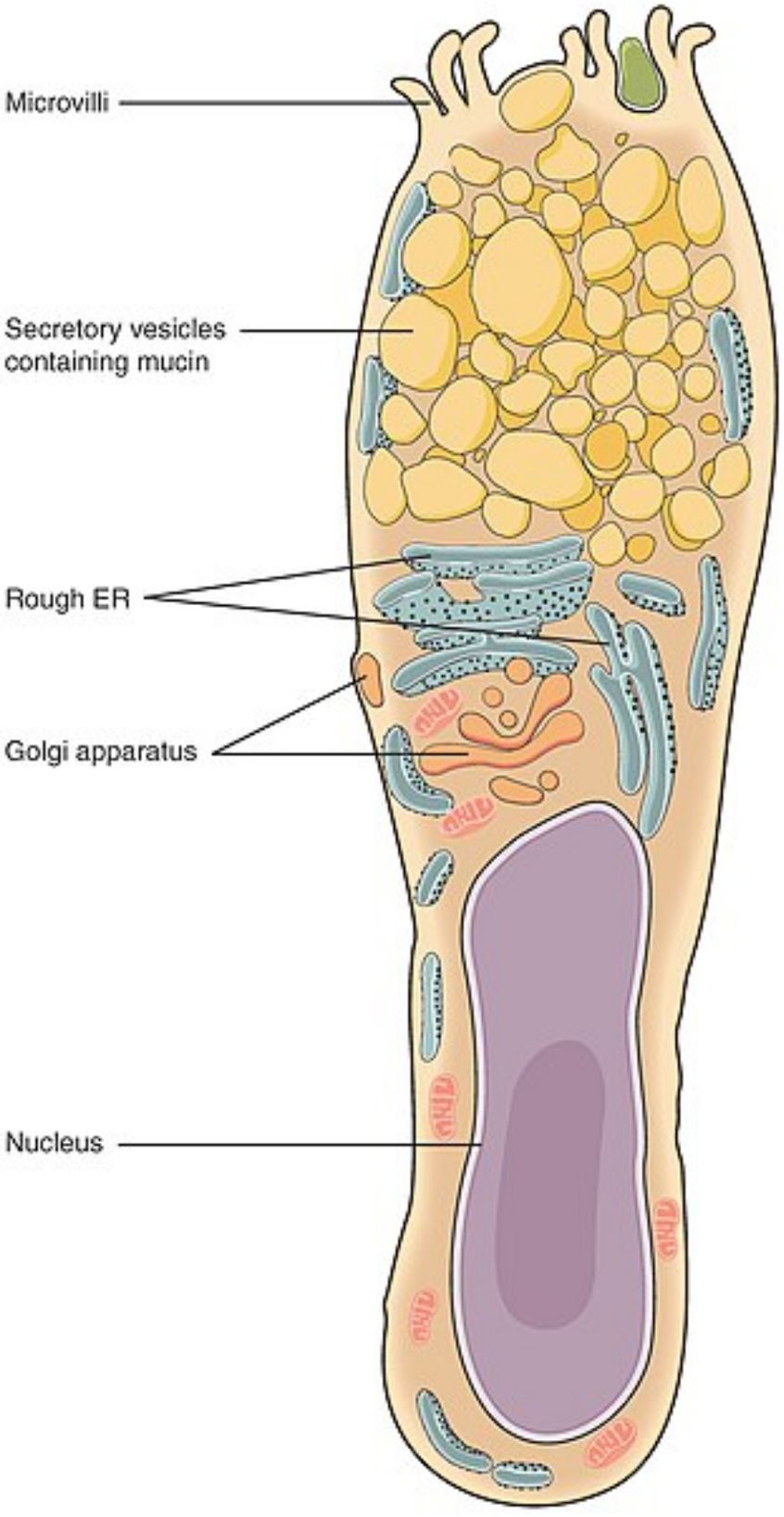
- During fetal life, glands develop from:
  - Surface epithelium
  - Through cell proliferation and invasion into underlying connective tissue
  - Followed by differentiation into specific gland types
-

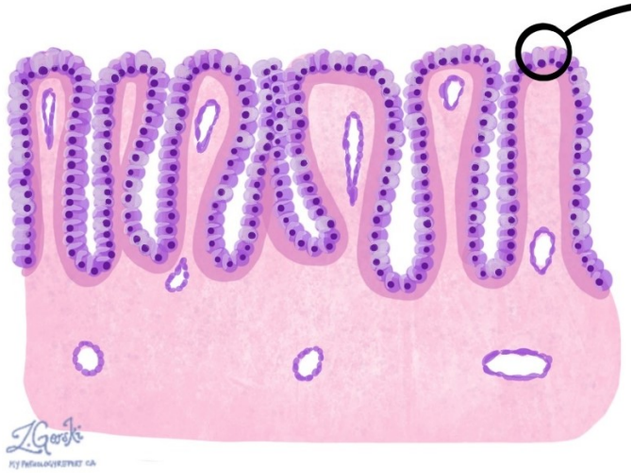
Classification of Glands:

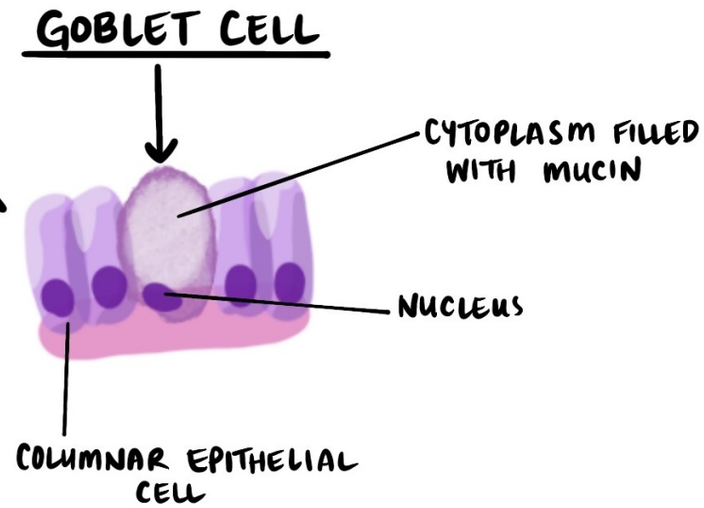
Based on where the secretion is released:

Example	Secretion Site	Type of Gland
Sweat glands, salivary glands	Into a **duct** or onto a **surface**	**Exocrine**
Thyroid, adrenal, pituitary glands	Directly into the **bloodstream**	**Endocrine**

1. Exocrine glands
a. Unicellular glands: are composed of a single cell (e.g., goblet cells in tracheal epithelium).


Microvilli
Secretory vesicles containing mucin
Rough ER
Golgi apparatus
Nucleus




GOBLET CELL
CYTOPLASM FILLED WITH MUCIN
NUCLEUS
COLUMNAR EPITHELIAL CELL

b. Multicellular glands

(1) Multicellular glands are classified according to **duct branching** as

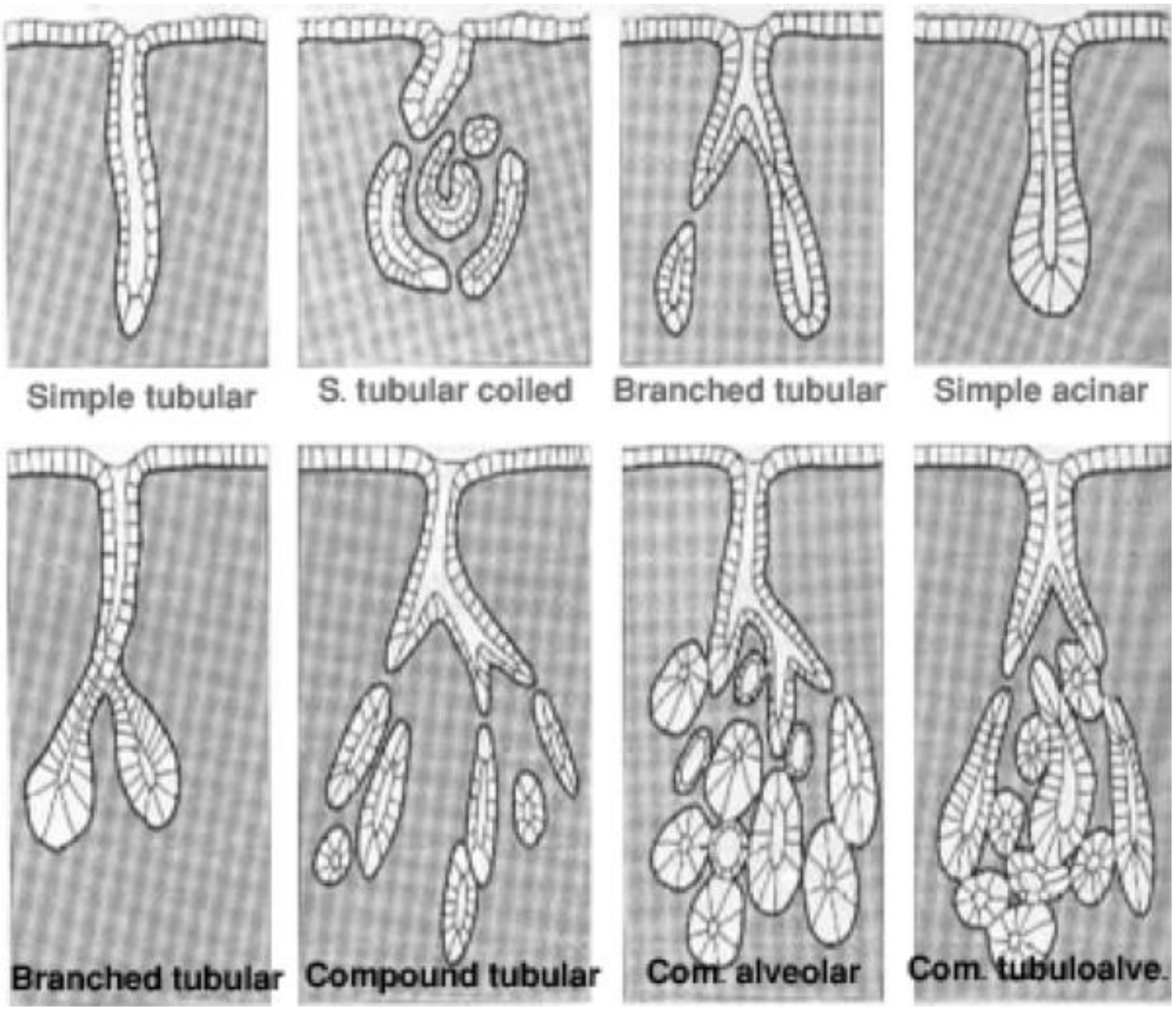
(a) **simple glands** (duct does not branch) or **compound glands** (duct branches).

(b) They are further classified according to the shape of the secretory **unit** as :

Simple exocrine glands

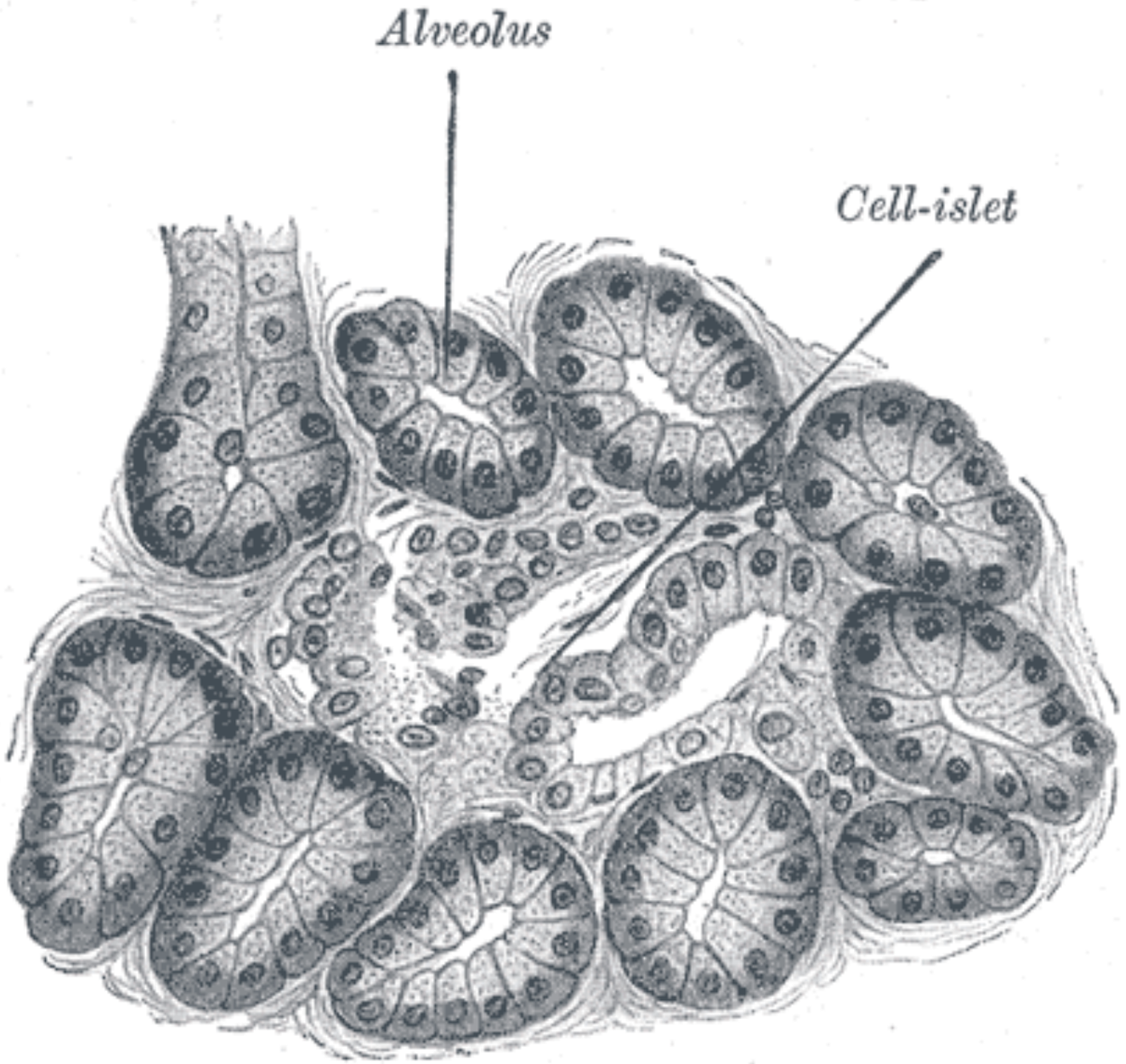
(1) Simple tubular glands have no ducts. The secretory cells are arranged in straight tubules. This type of gland can be found in small and large intestines

(2) Simple branched tubular glands do not have ducts, and their
secretory cells are split into two or more tubules. This type of gland can
be found in the stomach.

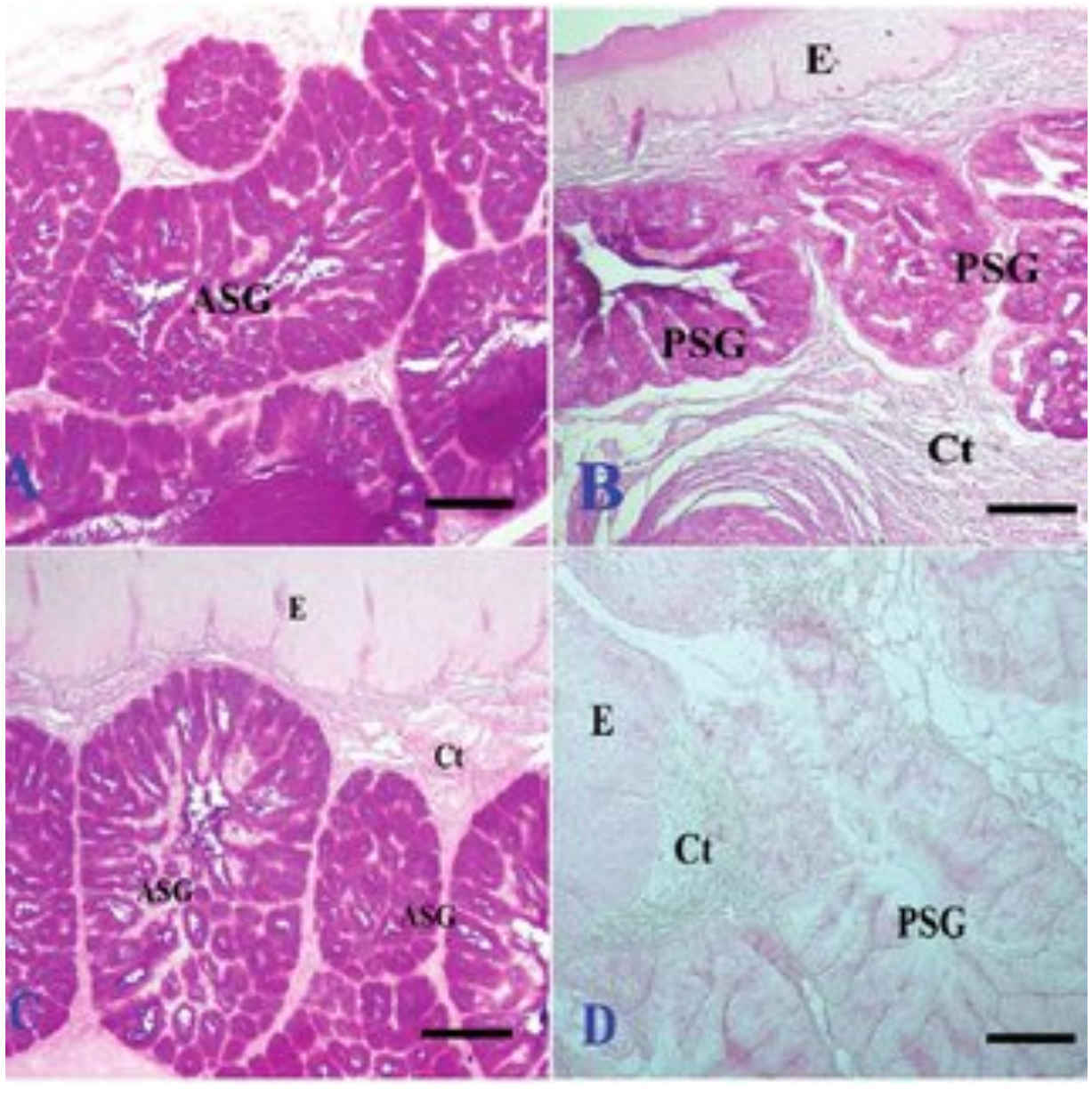


(3) Simple coiled tubular glands have a long duct, and secretory cells
are formed by coiled tubules. Sweat glands are examples of this type of
gland

(4) Simple acinar glands have a short, unbranched duct; the secretory cells are arranged in acini form. The mucus-secreting glands in the submucosa of the penile urethra are examples of this type of gland.



(5) Simple branched acinar glands have a short, unbranched duct, and
their secretory cells are formed into branched acini. The sebaceous glands
of the skin belong to this type

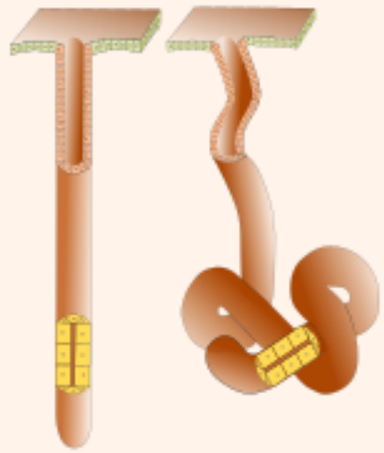
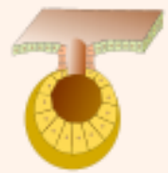
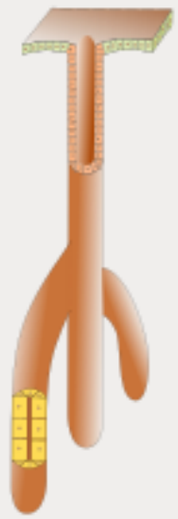
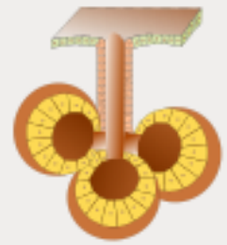
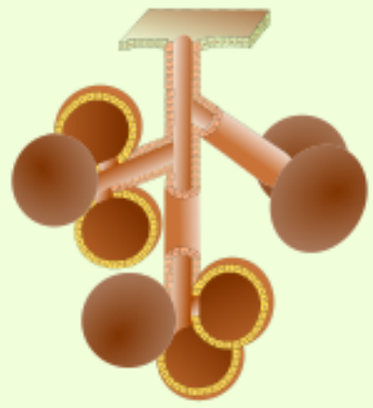
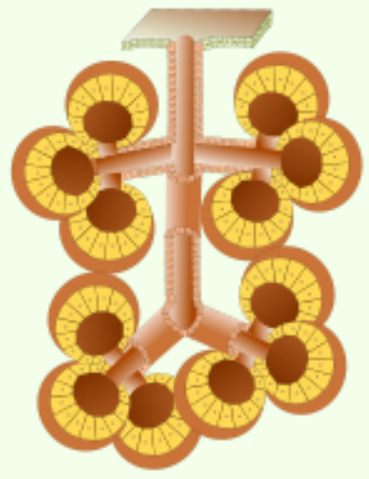


compound exocrine glands

(1) Compound tubular glands have branched ducts. Their secretory cells are formed into branched tubules as can be found in the Brunner glands of the duodenum.

(2) Compound acinar glands have branched ducts, and the secretory units are branched acini. The pancreas and mammary glands are examples of this type of gland.

(3) Compound tubuloacinar glands have branched ducts, and the secretory units are formed by both an acinar component and a tubular

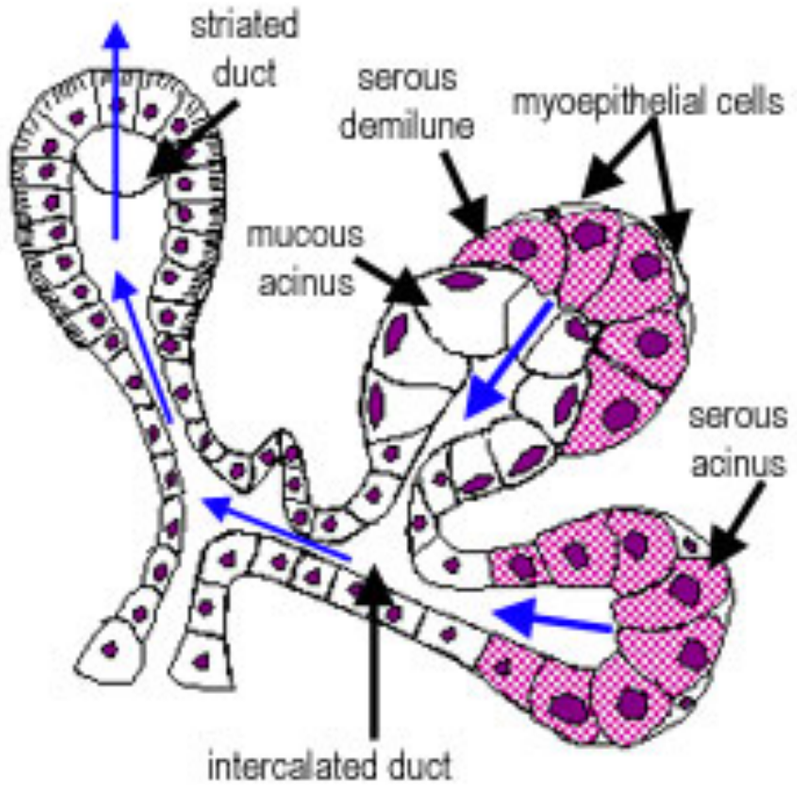
	Tubular	Alveolar	Acinar
Simple types			
Branched			
Compound			

The type of secretory product of exocrine glands:

A. **Serous Glands**: produce and secrete a non-viscous, watery fluid, such as sweat, milk, tears, or digestive juices. This fluid carries wastes (sweat) to the surface of the skin, nutrients (milk), to a nursing infant, or digestive enzymes from the pancreas to the lumen of the small intestine.

B. **Mucous Glands**: secrete mucins, which forms mucus when mixed with water. Found in such places as the roof of the oral cavity and the surface of the tongue.

C. **Mixed Glands (seromucous**): such as the salivary glands inferior to the oral cavity, contains both serous and mucous cells, and produce a mixture of the two types of secretions.



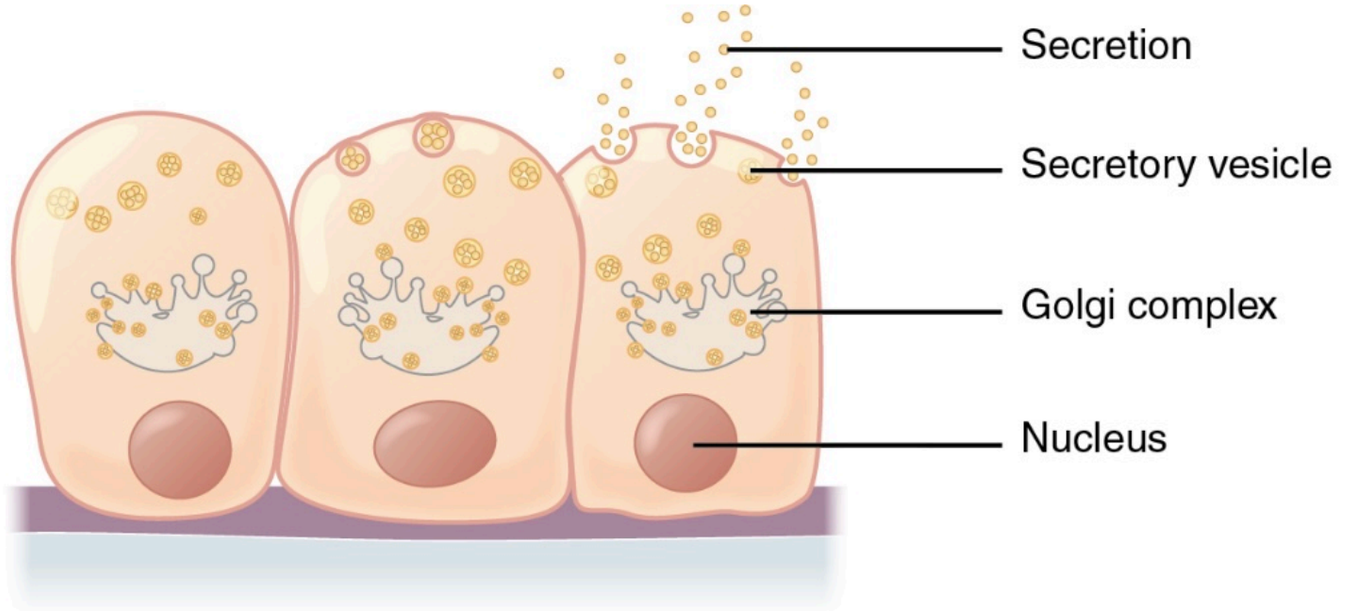
Mechanisms of secretion

(**A) Holocrine glands** : Formed from cells that accumulate a product and then the entire cell disintegrates. Thus, a holocrine secretion is a mixture of cell fragments and the product the cell synthesized prior to its destruction. • The ruptured dead cells are continuously replaced by other epithelial cells undergoing mitosis. The oil-producing glands (sebaceous glands) in the skin are an example of holocrine glands.

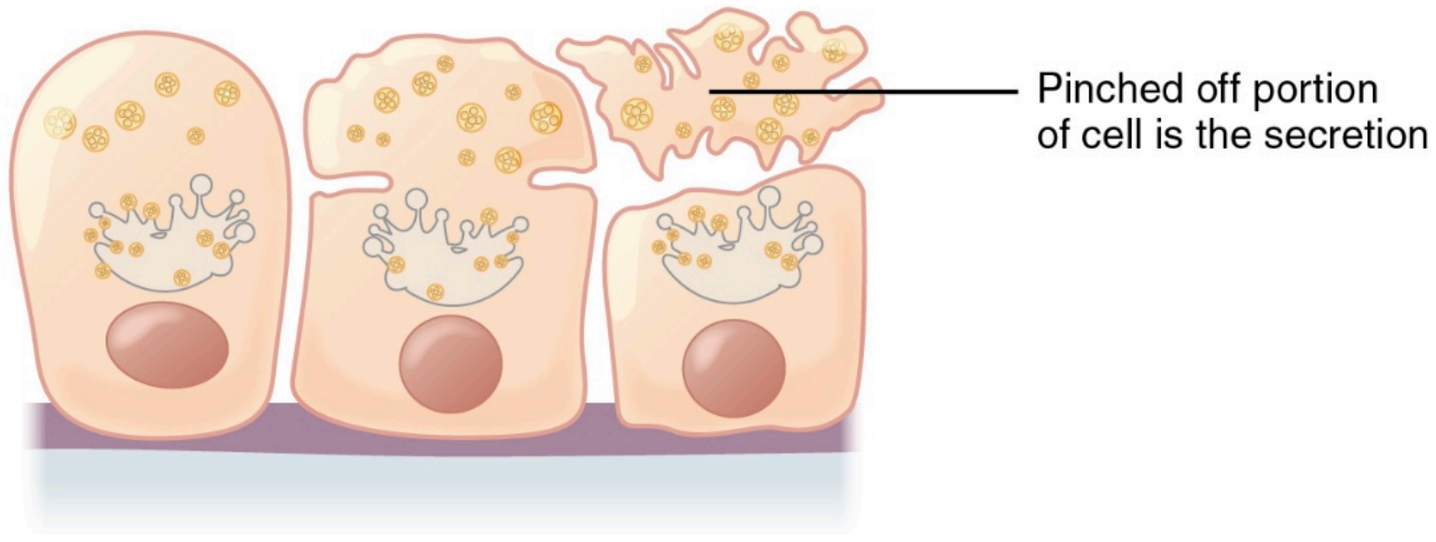
(B) Merocrine glands :the secretory cells release their contents by exocytosis. They package their secretions in structures called secretory vesicles. • The secretory vesicles travel to the apical surface of the glandular cells, and leave the cell by exocytosis with no loss of other cellular material. • Lacrimal(tear) glands, salivary glands, some sweat glands, the exocrine glands of the pancreas, goblet cell , and the gastric glands of the stomach are examples of merocrine glands.

(C) Apocrine glands: Composed of cells that accumulates their secretory products within the apical portion of their cytoplasm. The secretion follows as this apical portion decapitates. So, their mode of secretion is a decapitation. The apical portion of the cytoplasm begins to pinch off into the lumen of the gland for the secretory product to be transported to the skin surface. Mammary glands and ceruminous glands (special types of sweat glands) are apocrine glands

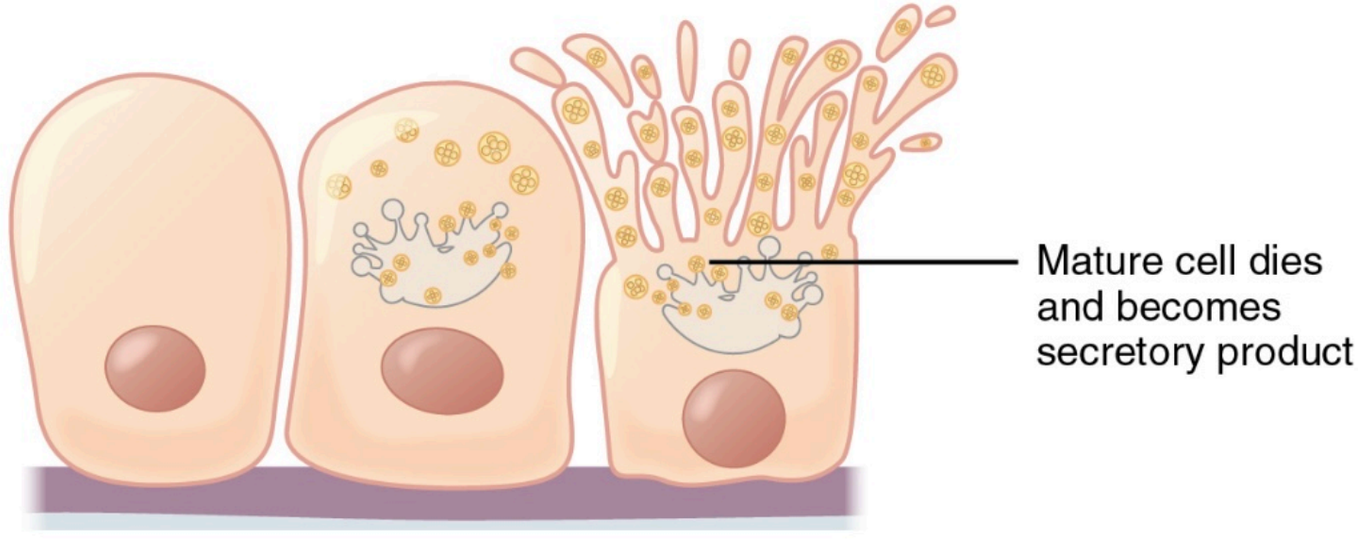
(a) Merocrine secretion



(b) Apocrine secretion



(c) Holocrine secretion



2. **Endocrine glands** may be unicellular (e.g., individual endocrine cells in gastrointestinal and respiratory epithelia) or multicellular (e.g., adrenal gland), and they lack a duct system. These glands that secrete their products through the basal lamina into the blood stream and lack a duct system. These glands often secrete hormones.

MEDICAL APPLICATION

Both benign and malignant tumors can arise from most types of epithelial cells. Malignant tumors of epithelial origin are called carcinomas (Gr. karkinos, cancer + oma, tumor). Malignant tumors derived from glandular epithelial tissue are called adenocarcinomas (Gr. adenos, gland + karkinos). Adenocarcinomas are by far the most common tumors in adults after age 45


Thank
you!