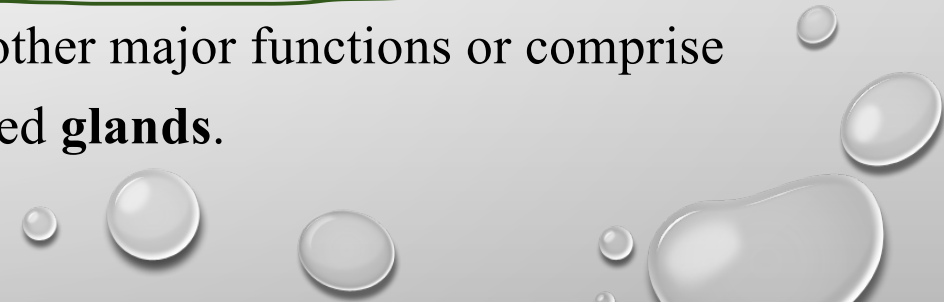




# Secretory Epithelia & Glands

Epithelial cells that function mainly to produce and secrete various macromolecules may occur in epithelia with other major functions or comprise specialized organs called **glands**.



# Secretory Epithelia & Glands

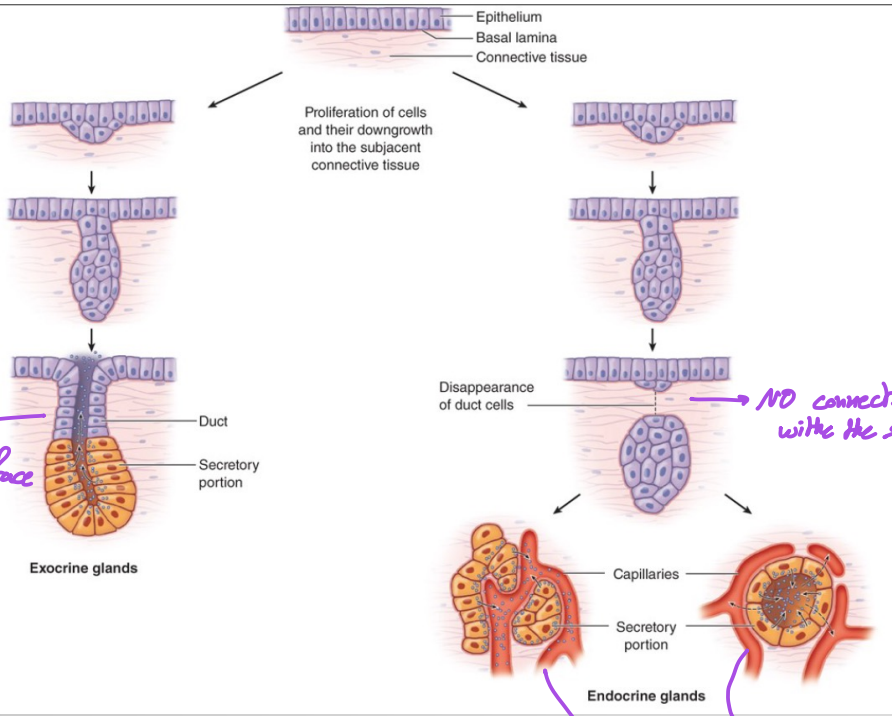
- Synthesize and release of substances; proteins, lipids, carbs, and proteins.
- Types based on the presence of duct system:
  - A. Exocrine glands (duct) *They have their ducts that transport the secretion to the target destination*  
*such as: salivary gland, lacrimal gland*
  - B. Endocrine glands (no duct) *→ Rely on blood stream and blood vessels that reach them to pick up the secretion*

Types based on number of cells:

- A. Unicellular *such as: Goblet cell*
- B. Multicellular *most of glands*

# Glands' Formation

\* Glands grow from epithelial tissue down toward connective tissue



there's connection with the surface

NO connection with the surface

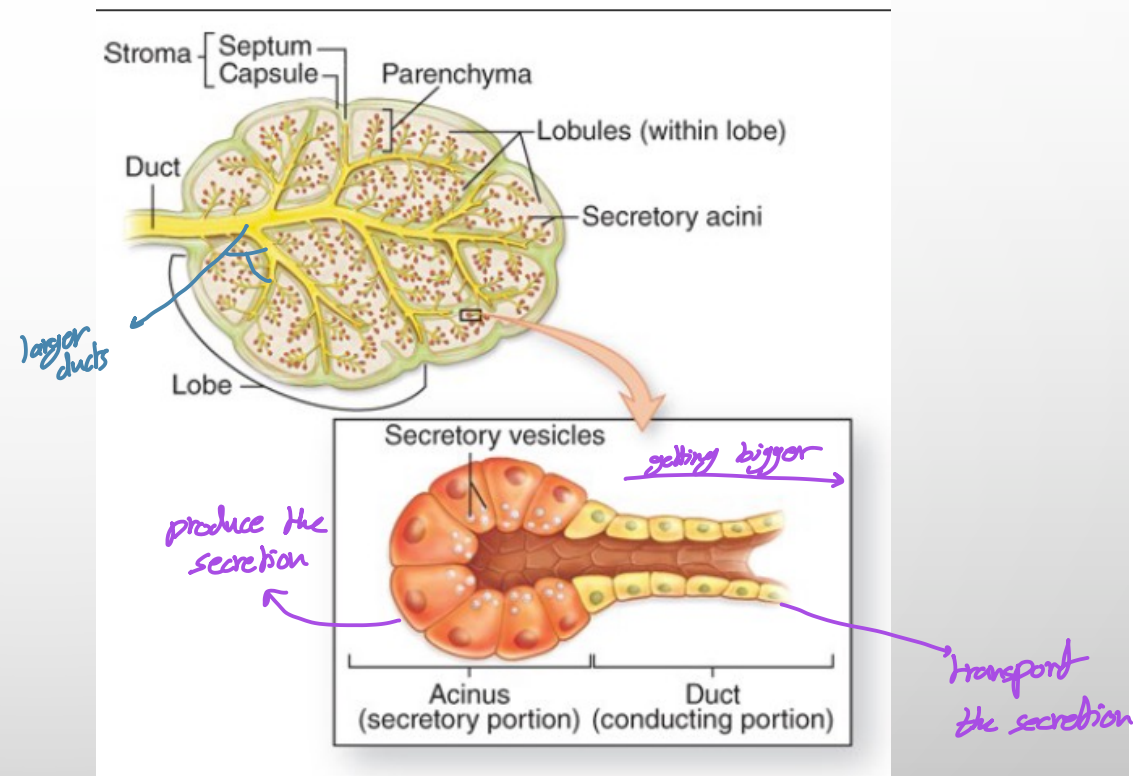
depends on vessels

- Develop from covering epithelia in the fetus by *(multiplying) تكاثر* cell proliferation and growth into the underlying connective tissue, followed by further differentiation. → *become something new, different than Epi. cells*
- Retains its connection with the surface=exocrine.
- Loses its connection with the surface=endocrine; capillaries surround them to deliver their product (hormones).

# Gland Structure

- Glands are organized into secretory part and ducts.
- Parenchyma: secretory part.
- Stroma connective tissue element that surround and support parenchyma.
- Glands are usually surrounded by capsules.
- Capsules sends septa to divided the gland into smaller compartments; lobes and lobules within it.

→ capsule بکون کامل محیط نيه ملا يعطيه larger ducts بکون septum بس ملا يعطيه parenchyma او بکون secretory part



# Classification Of Exocrine Glands

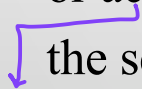


- Simple glands: glands with unbranched duct.
- Compound glands: the ducts have two or more branches.
- The secretory portions can be tubular or acinar (different in the nature of the secretory material).

*Elongated*



*Sac like (Rounded)*

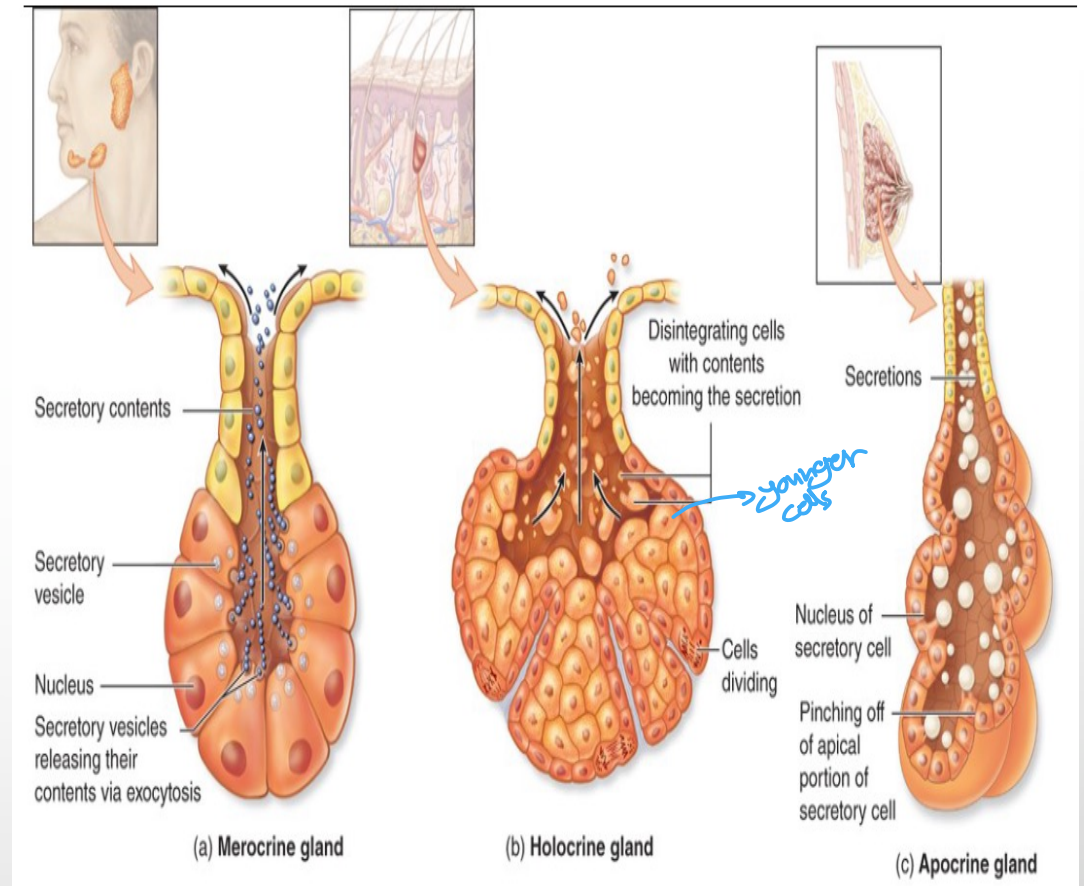


SIMPLE Glands (Ducts Do Not Branch)					
Class	Simple Tubular	Branched Tubular	Coiled Tubular	Acinar (or Alveolar)	Branched Acinar
Features	Elongated secretory portion; duct usually short or absent	Several long secretory parts joining to drain into 1 duct	Secretory portion is very long and coiled	Rounded, saclike secretory portion	Multiple saclike secretory parts entering the same duct
Examples	Mucous glands of colon; intestinal glands or crypts (of Lieberkühn)	Glands in the uterus and stomach	Sweat glands	Small mucous glands along the urethra	Sebaceous glands of the skin
COMPOUND Glands (Ducts from Several Secretory Units Converge Into Larger Ducts)					
Class	Tubular		Acinar (Alveolar)		Tubuloacinar
Features	Several elongated coiled secretory units and their ducts converge to form larger ducts		Several saclike secretory units with small ducts converge at a larger duct		Ducts of both tubular and acinar secretory units converge at larger ducts
Examples	Submucosal mucous glands (of Brunner) in the duodenum		Exocrine pancreas		Salivary glands



# Types Of Secretion

- **Merocrine** (salivary): most common method of protein or glycoprotein secretion---exocytosis from membrane-bound vesicles or secretory granules.
- **Apocrine** (mammary): product accumulates at the cells' apical ends, portions of which are then extruded to release the product together with small amounts of cytoplasm and cell membrane *→ Apical portion*



- **Holocrine** (sebaceous): cells accumulate product continuously as they enlarge and undergo terminal differentiation, culminating in complete cell disruption which releases the product and cell debris into the gland's lumen.

## Merocrine

يتم تصنيع المادة المراد إفرازها ثم تنقلها vesicles أو secretory granules وتخرجها من الخلية حتى يتم إفرازها

## Apocrine

يتم تصنيع المادة المراد إفرازها وتتراكم في الجزء العلوي من الخلية ثم تخرج من الخلية ومعها جزء من cytoplasm & membrane

## Holocrine

يتم تصنيع المادة المراد إفرازها وتتراكم في الخلية ويزداد حجم تلك الخلية، إلى أن تنفصل الخلية كاملة ثم تتحطم و تخرج المادة التي بداخلها

# Nature Of Secretory Products.

- Exocrine glands secretion is categorized based on the nature of their secretory products into serous or mucous.
- **Serous** cells synthesize proteins (mostly not glycosylated; digestive enzymes)---well-developed RER and Golgi complexes and are filled apically with secretory granules in different stages of maturation---stain intensely with basophilic or acidophilic stains. *(more watery)*  
*most features of the cell*
- **Mucous** cells filled apically with secretory granules contain heavily glycosylated proteins called mucins (when released from the cell---become hydrated and form a layer of mucus)---hydrophilic mucins are usually washed from cells during routine histological preparations, causing the secretory granules to stain poorly. *(more to be thick)*



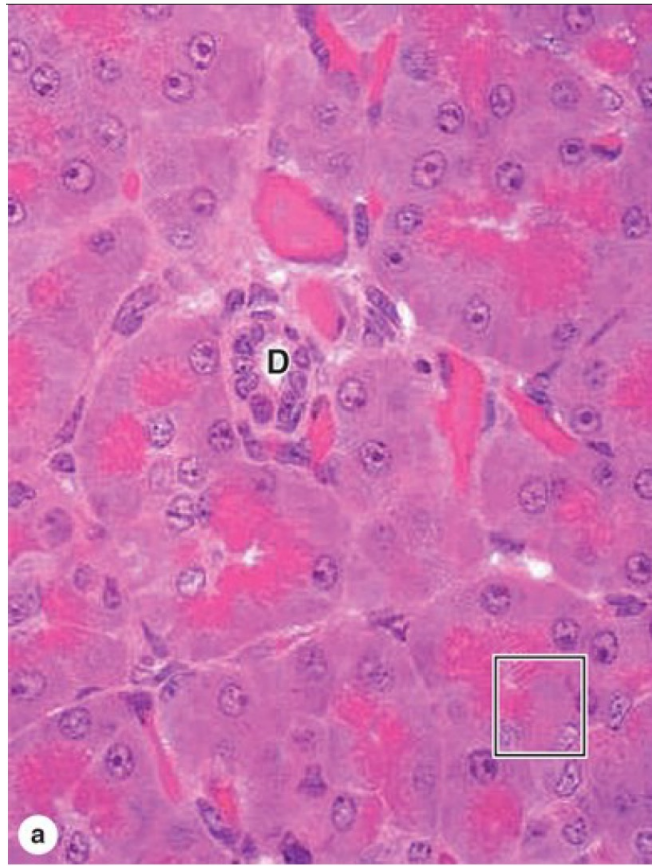
# Nature Of Secretory Products

- Some salivary glands are mixed **seromucous** glands, having both serous acini and mucous tubules
- Myoepithelial cells: contractile at the basal ends of the secretory cells. *acini (rounded)* Long processes of these cells embrace an **acinus**. *acini (rounded)* Are rich in actin and myosin filament--- strong contractions serve to propel secretory products from acini into the duct system.

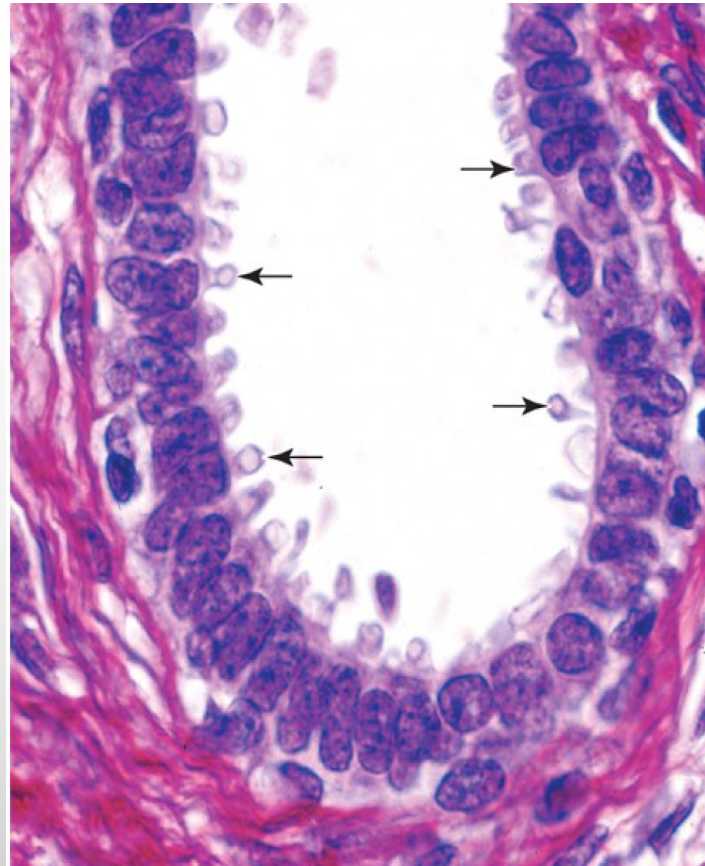
*the secretory portion (rounded)*



# Merocrine



# Apocrine



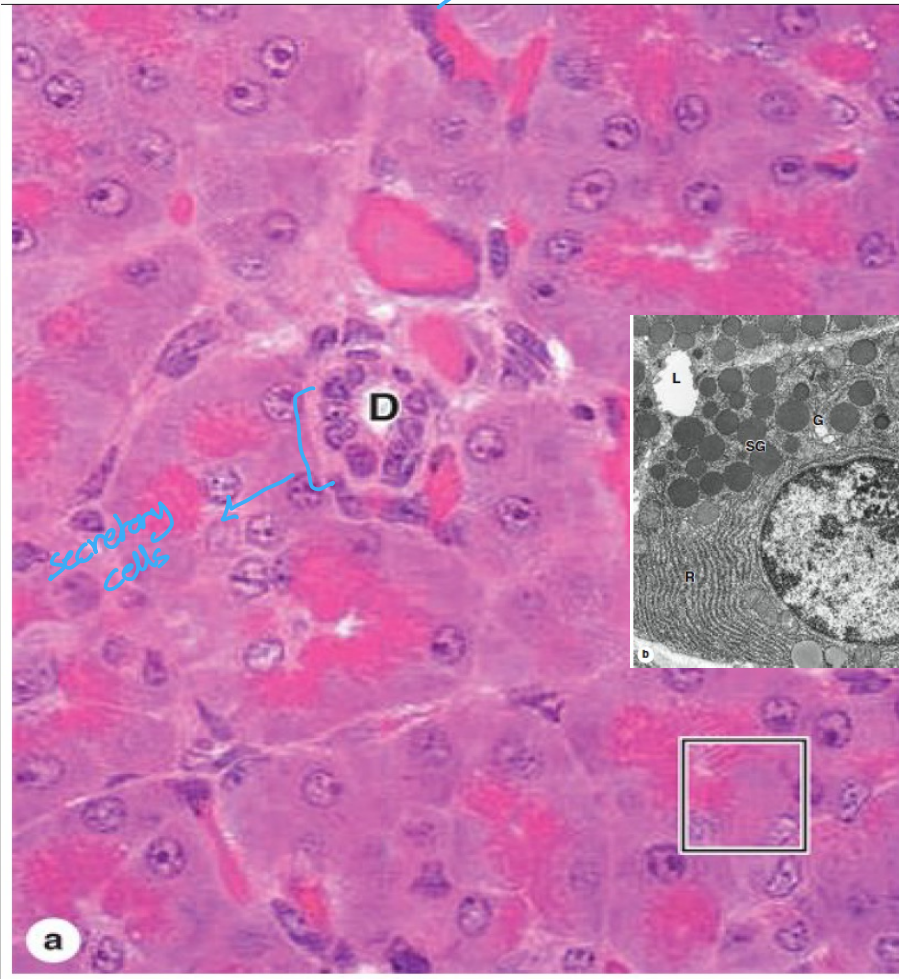
# Holocrine



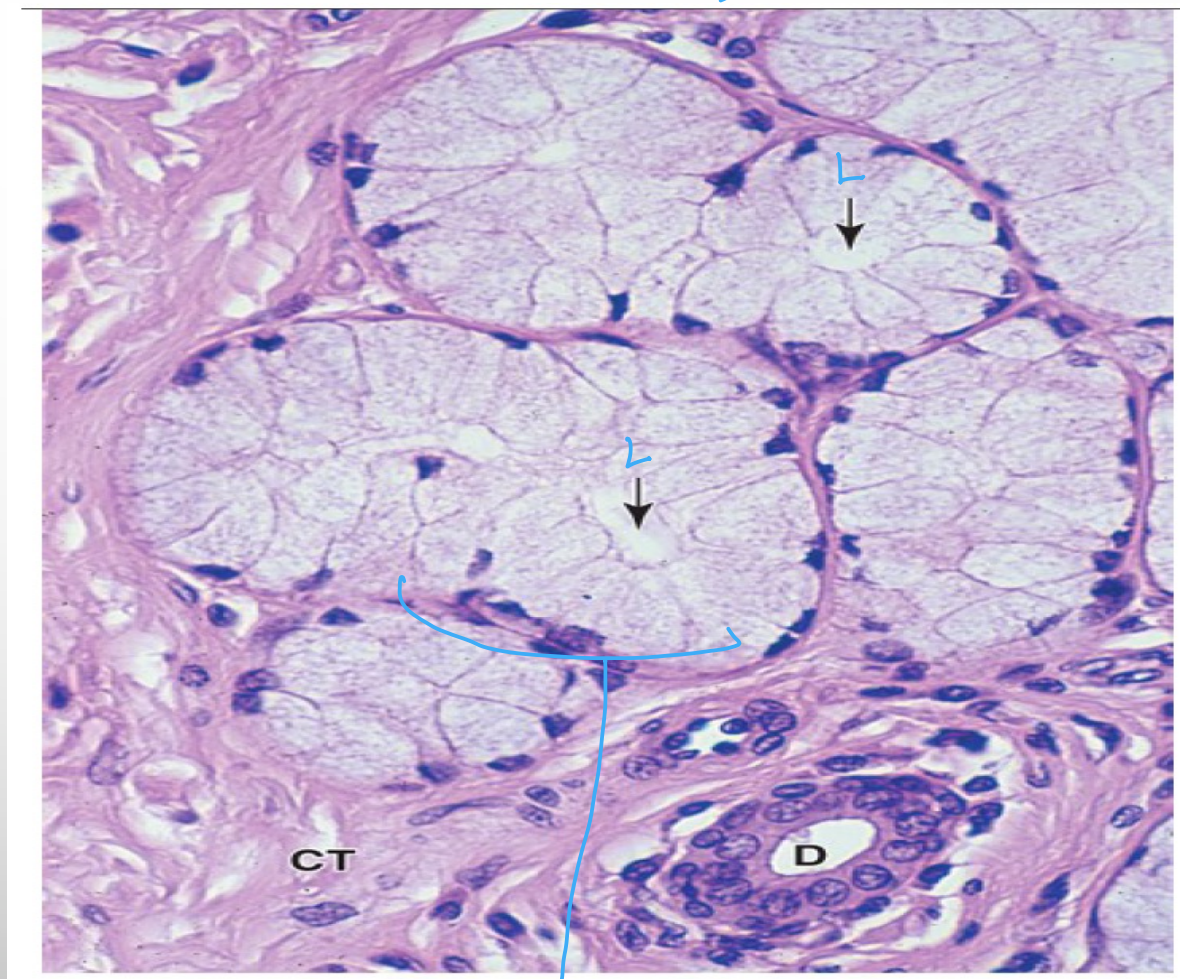


# Serous and Mucous Secretory Cells

*serous*



*mucous*

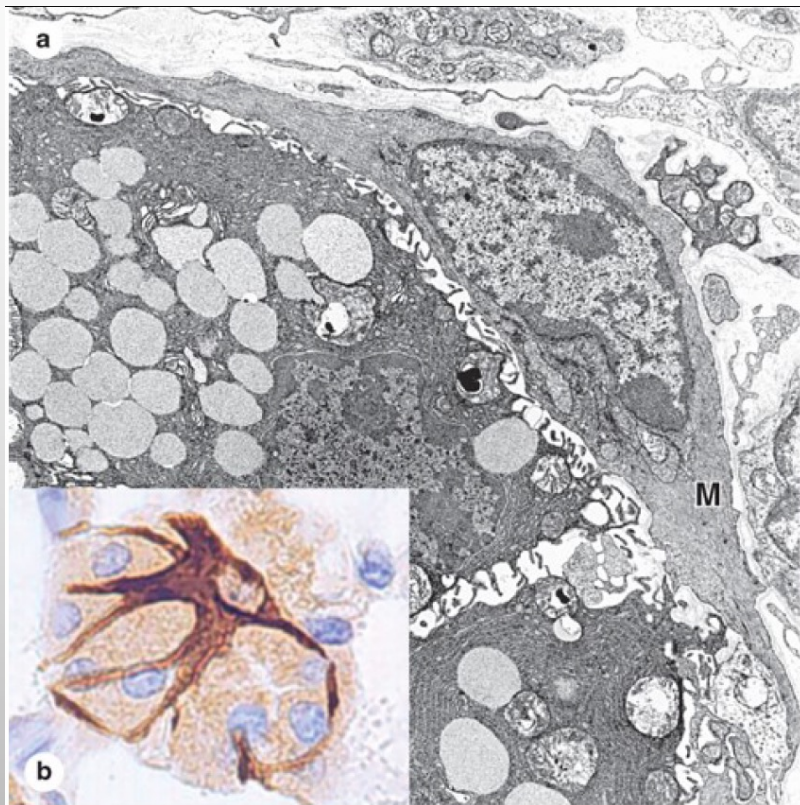


*whitish due to the hydrophilic nature of its glycosylated proteins*

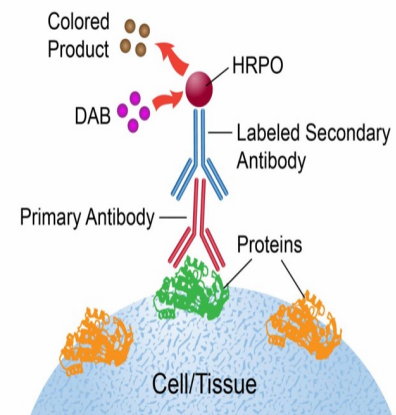


# Myoepithelial Cells

- In exocrine glands only



## Indirect Immunohistochemistry



## Immunofluorescence

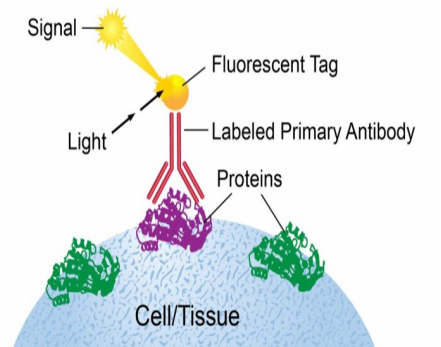


Diagram 1: Illustration of Indirect Immunohistochemistry and Immunofluorescence methods.

immunohistochemistry-02

\* we always use secondary antibody for the Amplification of signal

\* In Immunohistochemistry staining, the secondary antibody carries an enzyme whereas in Immunofluorescent it's antibody carries a fluorophore

\* enzyme will produce a different colour

\* fluorophore is excited with a proper wavelength and it will re-emit it with a longer wavelength which we catch as a signal