

3<sup>rd</sup> lecture  
In  
Anatomy  
For  
1<sup>st</sup> Class  
dr.Ibtisam Khalaf

# Small Intestine

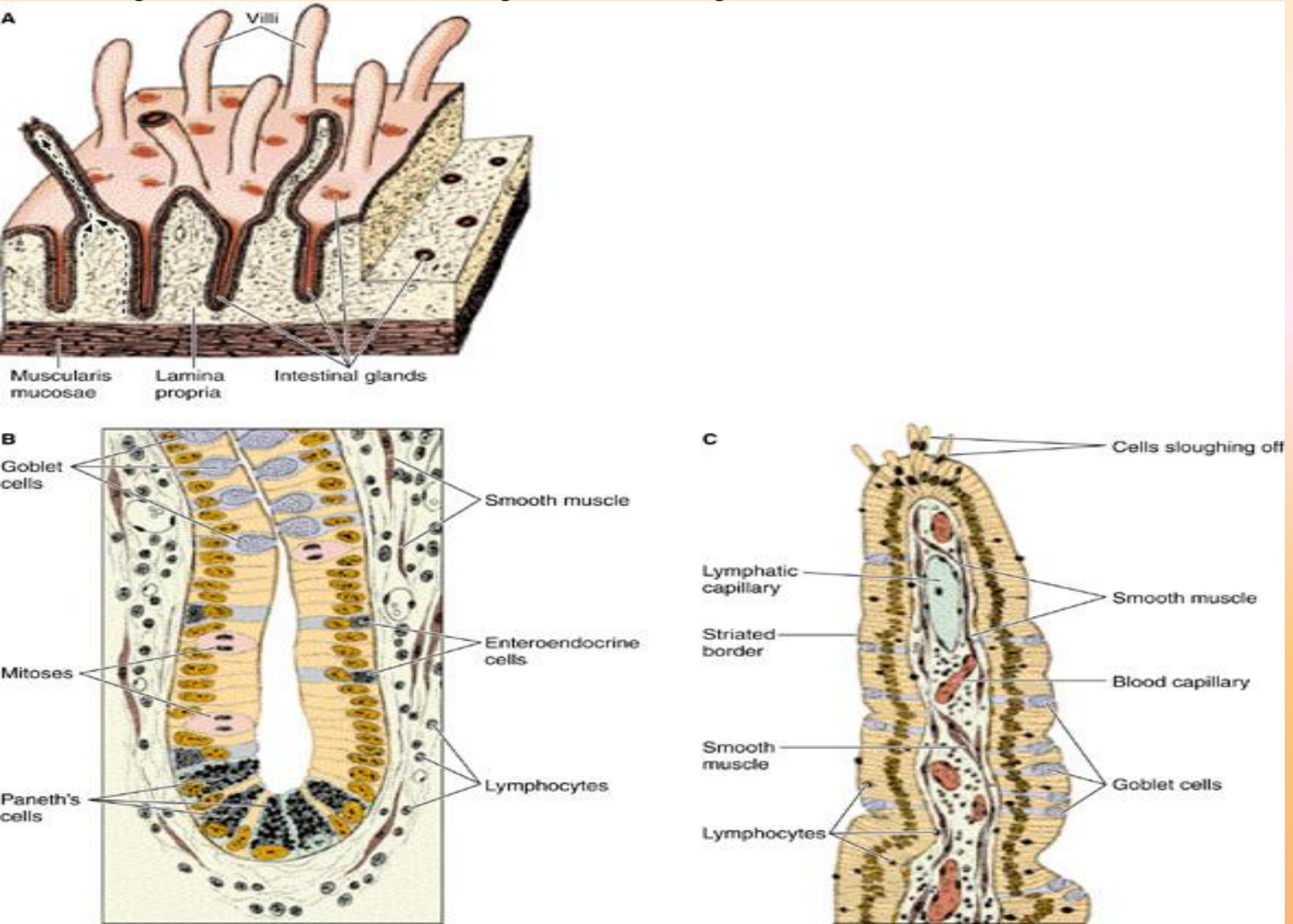
- The small intestine is the site of the terminal food digestion, nutrient absorption, and endocrine secretion.
- The small intestine consists of three segments:
  - Duodenum
  - Jejunum
  - illium

# Histology of small intestine characterized by: Villi, Plica, lieberkuhn glands

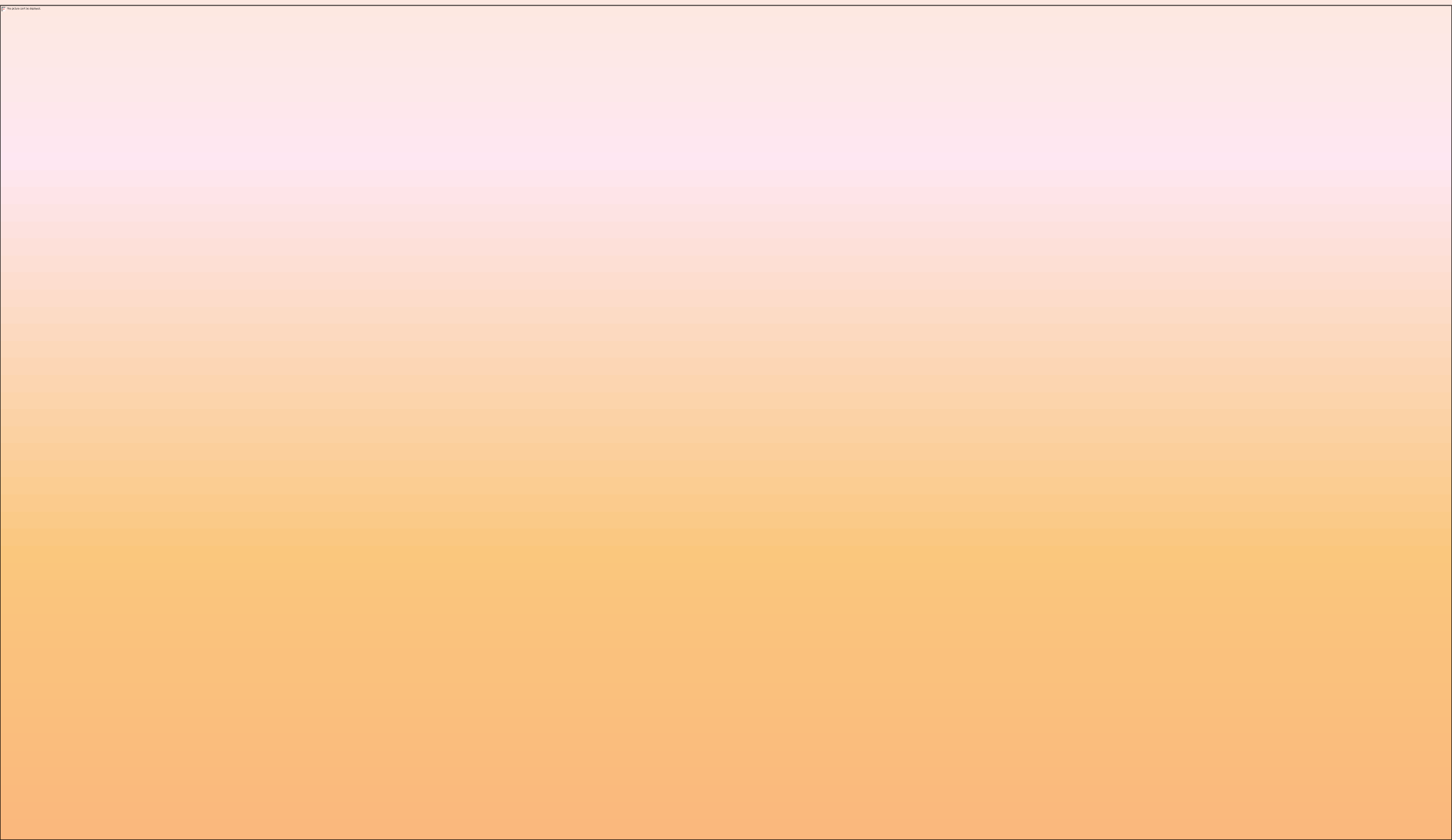
- **Lieberkuhn glands or Intestinal glands (Crypts)**
  - simple tubular glands
  - extend into lamina properia
  - empty to the base of villi
  - contain Stem cells goblet cells, absorptive cells, and Panth's cells (a protective cells secret an enzyme that digest cell wall of bacteria).
- **Villi**
  - extensions of mucosa into lumen of small intestine.
- **Plica**

The lining of the small intestine shows a series of permanent folds called plicae circulares, consisting of mucosa and submucosa.

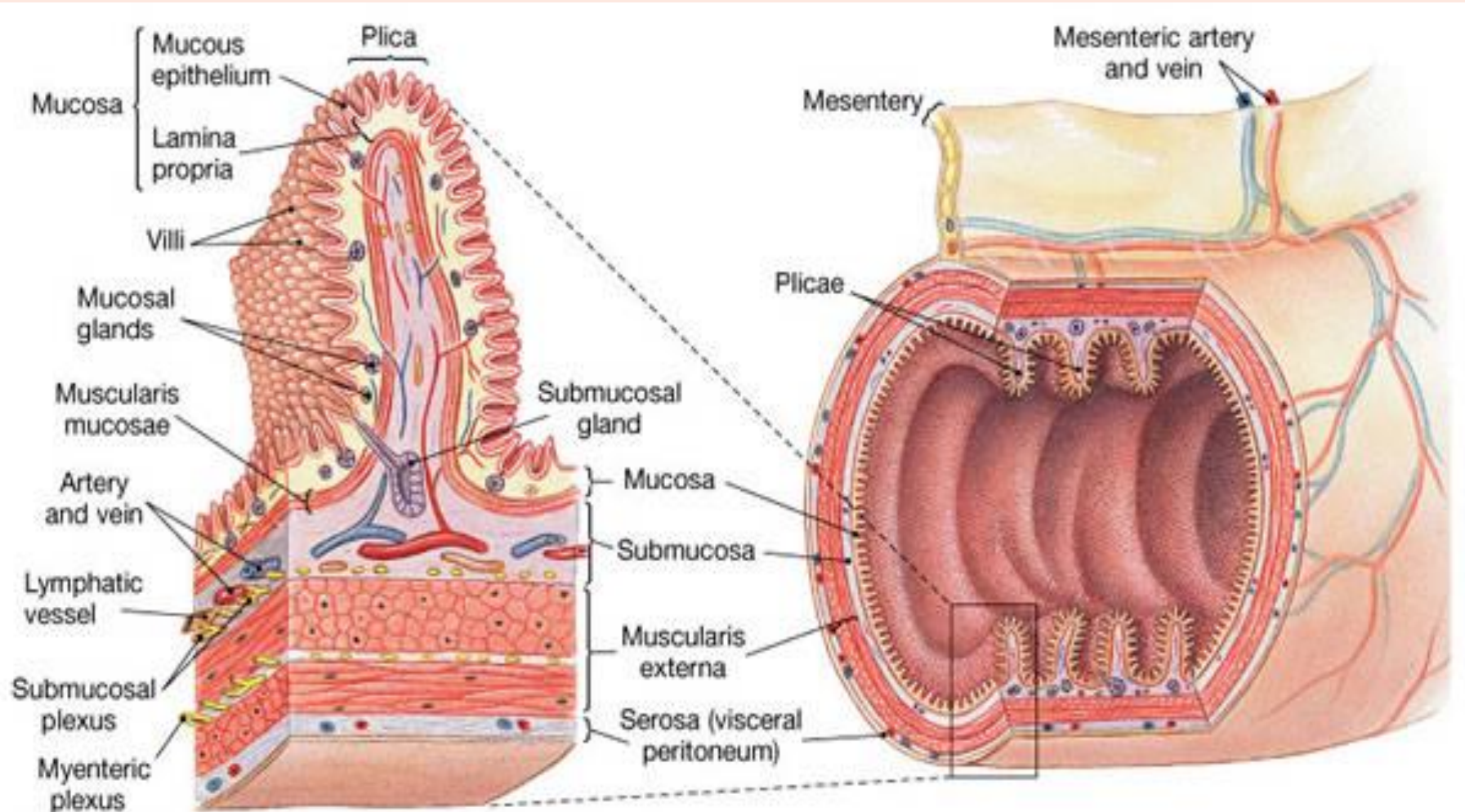
Figure 15—27. Schematic diagrams illustrating the structure of the small intestine.



**Photomicrograph of the small intestine. Note the villi, intestinal glands, submucosa, muscle layers, and serosa. PT stain. Low magnification.**



# Photomicrograph of the small intestine.





# Histology of the small Intestine

- The lining of the small intestine shows a series of permanent folds called plicae circulares, consisting of mucosa and submucosa.
- Plicae well developed in the jejunum, but do not constitute a significant feature of the duodenum and ileum.
- Intestinal villi are mucosa projecting into the lumen of the small intestine.
- Between the villi are small openings of simple tubular glands called intestinal glands(glands of lieberkuhn).

# •Therefore the small intestine is modified for dramatically increased surface area.

- The Doudenum has **Brunner's glands** (submucosal doudenal glands secrete neutral alkaline mucus). Their secretions protect doudenum from erosion by acid entering from stomach.
- The jejunum has many long leaf like villi (plicae circularis). And intermediate number of goblet cells (produce mucus).
- The ileum has numerous goblet cells and Peyer's patches (aggregation of lymphocytes).



- **Innervation of intestinal glands:**

- **Sympathatic** stimulation leads to decrease intestinal secretions
- **Parasympathatic** stimulation leads to increase intestinal secretions.

# Vessels of the small intestine

- The blood vessels that nourish the intestine and remove absorbed products of digestion penetrate the muscularis and form a large plexus in the submucosa. Therefore each villus receives one or more branches that form a capillary network just below its epithelium
- Lacteals (capillary lymphatic vessel of villus).
  - Important for the absorption of lipids because blood circulation does not easily accept the lipoproteins produced by the tall columnar during this process.

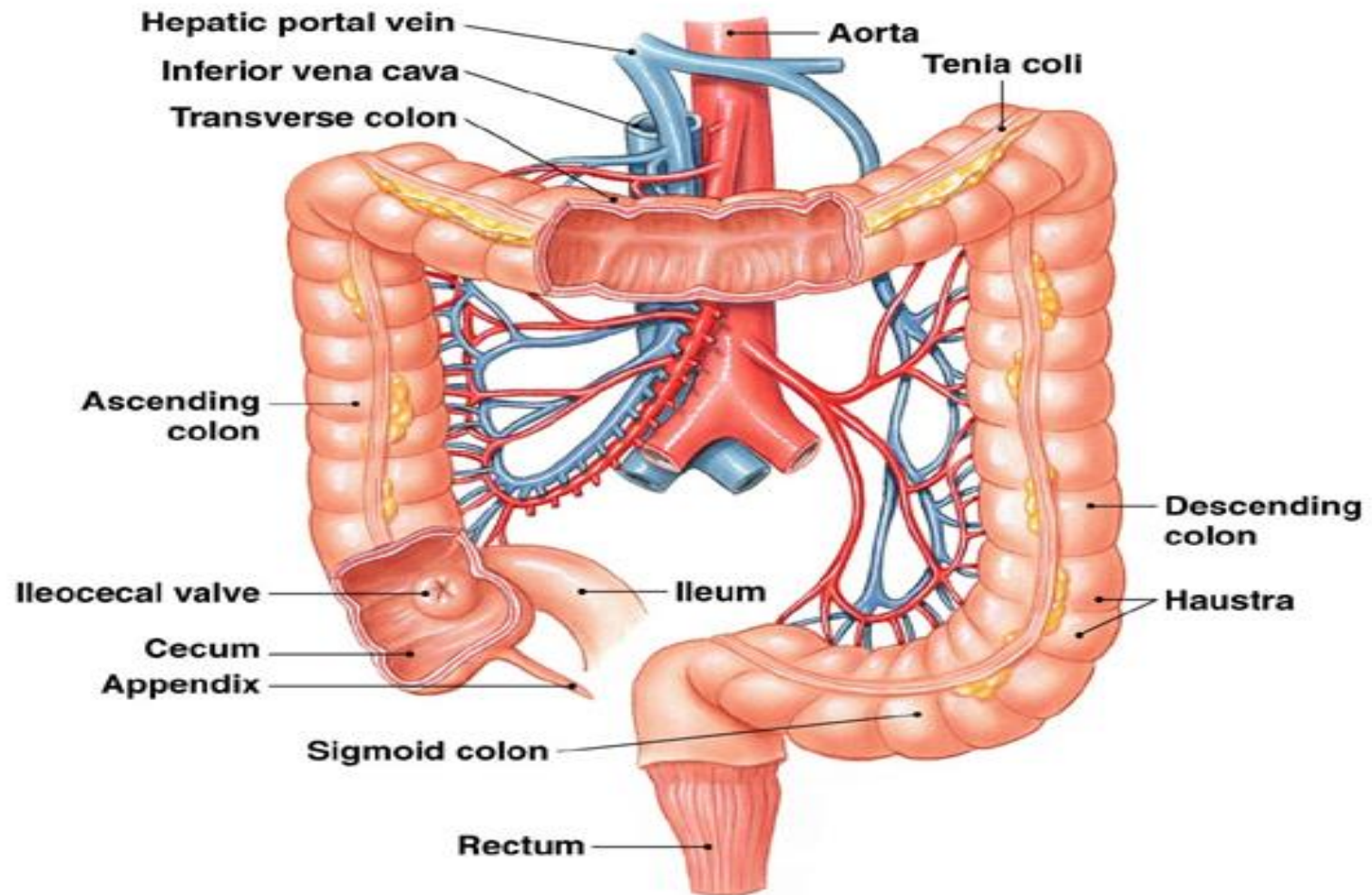
- In the duodenum there is a major duodenal papilla in which the bile and pancreatic secretions enter the intestine through Ampulla of Vater.
- **Bile secretion** leads to *emulsify the fats*. Emulsification of fats is important for *fat digestion by lipase enzyme which is produced by pancreas*.
- **Pancreas** secretes **amylase enzyme** (for carbohydrate digestion), **lipase enzyme** ( for fat digestion) and **proteolytic enzymes** (for protein digestion).

# Large Intestine

- An organ that the microbial digestion, liquid absorption, and transportation of undigested food to the rectum occurs.
- The junction between the end of ileum and beginning of large intestine is guarded by **ileocaecal sphincter**.
- Large intestine is much wider than small intestine.
- The wall of large intestine shows a series of sacculations (also called haustrations).

It divided into:

1. Cecum and appendix
2. Colon: ascending, transverse, descending, sigmoid
3. Rectum for storage of waste products.
4. Anus



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Fig. 21-31

largeintestines

CLOSE X



Ascending  
colon

Appendix

Rectum

Transverse colon

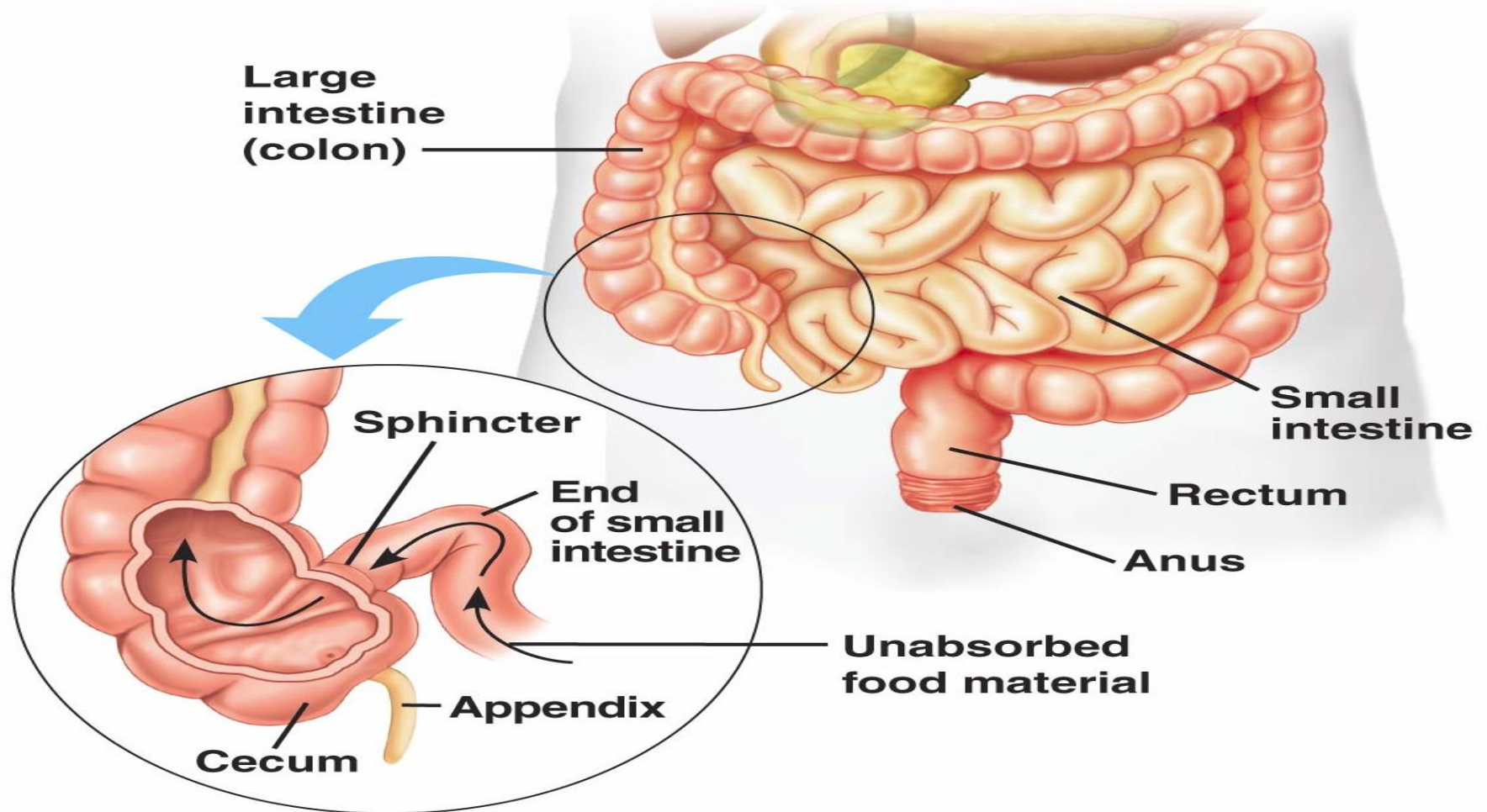
Descending  
colon

Sigmoid  
colon

ADAM.

CLOSE X

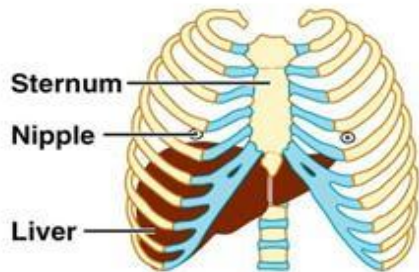






# liver

- It is the largest internal organ in the body.
- The nutrient absorbed in the digestive tract are processed (detoxification and metabolism) and stored in the liver for use by other parts of the body. Thus liver is an interface between digestive system and blood.
- All materials absorbed via intestine reach the liver through the portal vein except the complex lipids which transport mainly by lymph vessel
- It consists of four lobes (1. left lobe 2. right lobe 3. Quadrate lobe 4. Caudate lobe)



(c)

Lesser omentum  
(in fissure)

Left lobe of liver

Porta hepatis  
containing hepatic  
artery (left) and  
hepatic portal vein  
(right)

Quadrate lobe  
of liver

Ligamentum teres



Bare area

Caudate  
lobe of  
liver

Sulcus for  
inferior  
vena cava

Hepatic  
vein (cut)

Bile duct  
(cut)

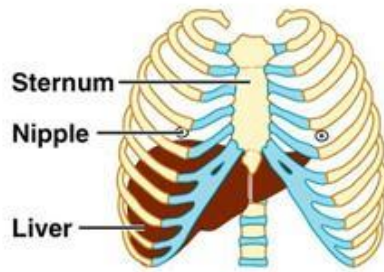
Right lobe  
of liver

Gallbladder

(b)

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Figure 23.23b, c

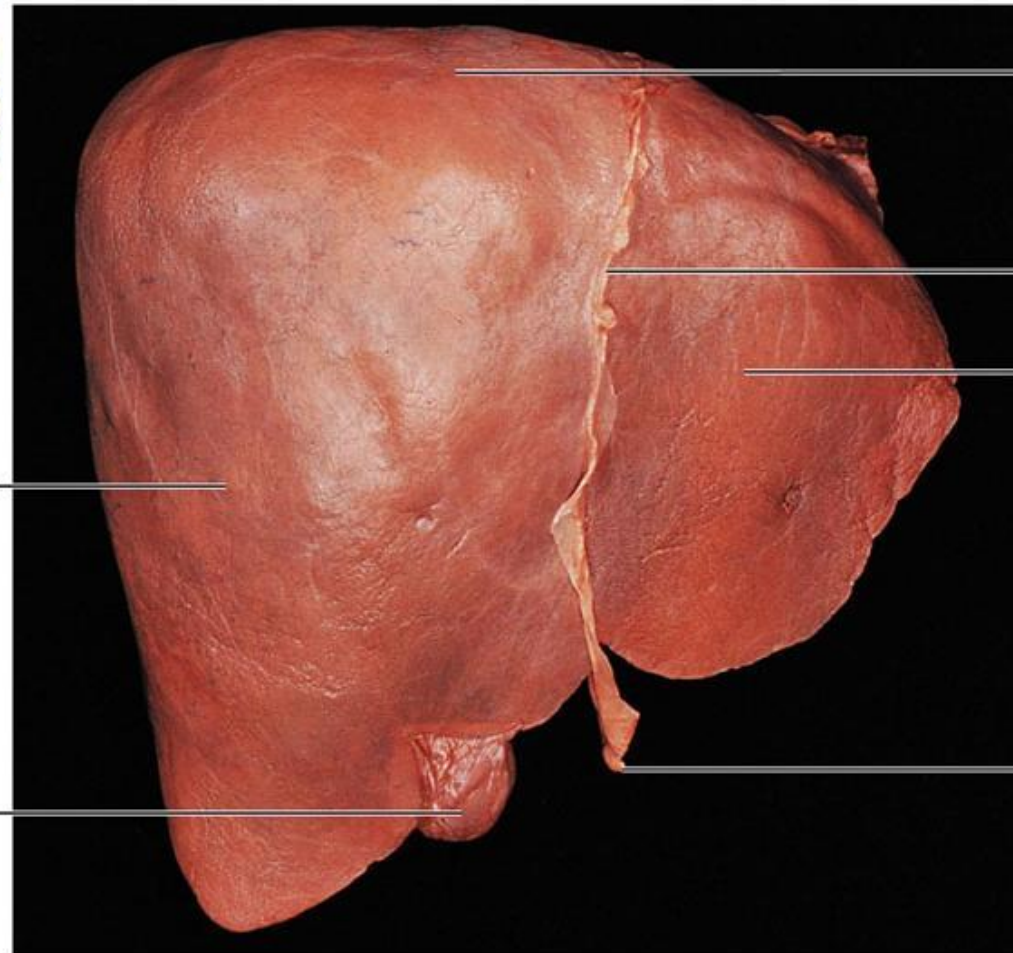


(c)

Right lobe of liver

Gallbladder

(a)



Bare area

Falciform  
ligament

Left lobe  
of liver

Round  
ligament  
(ligamentum  
teres)

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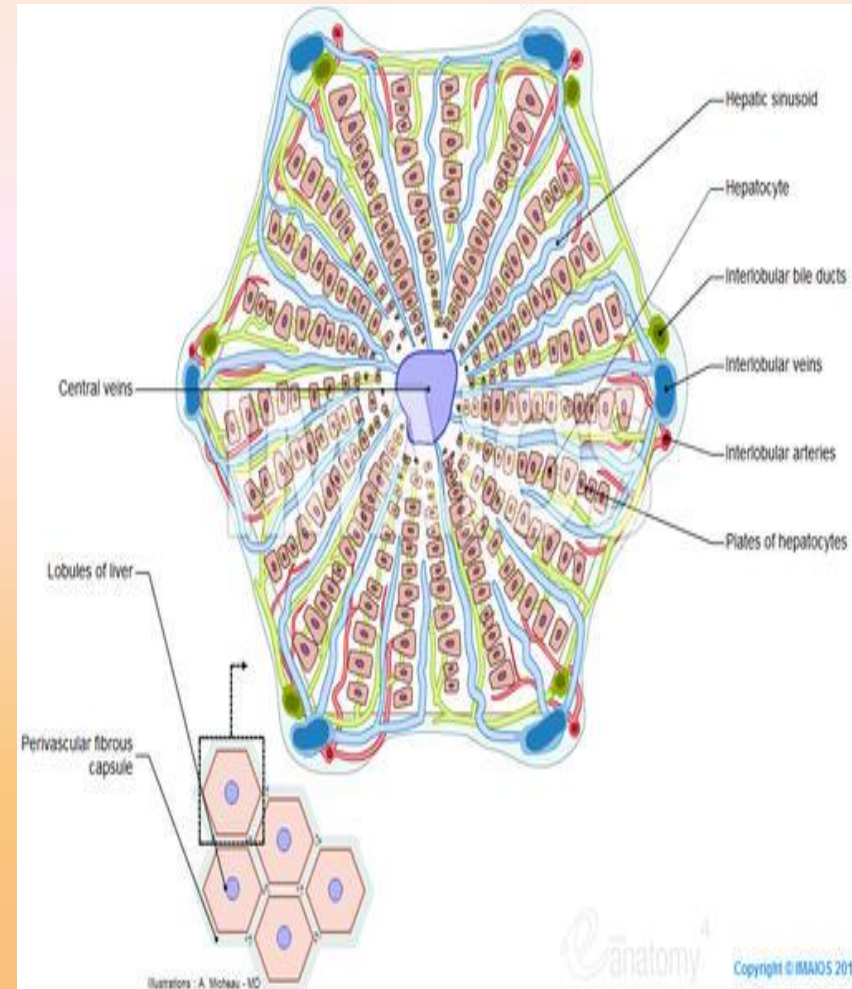
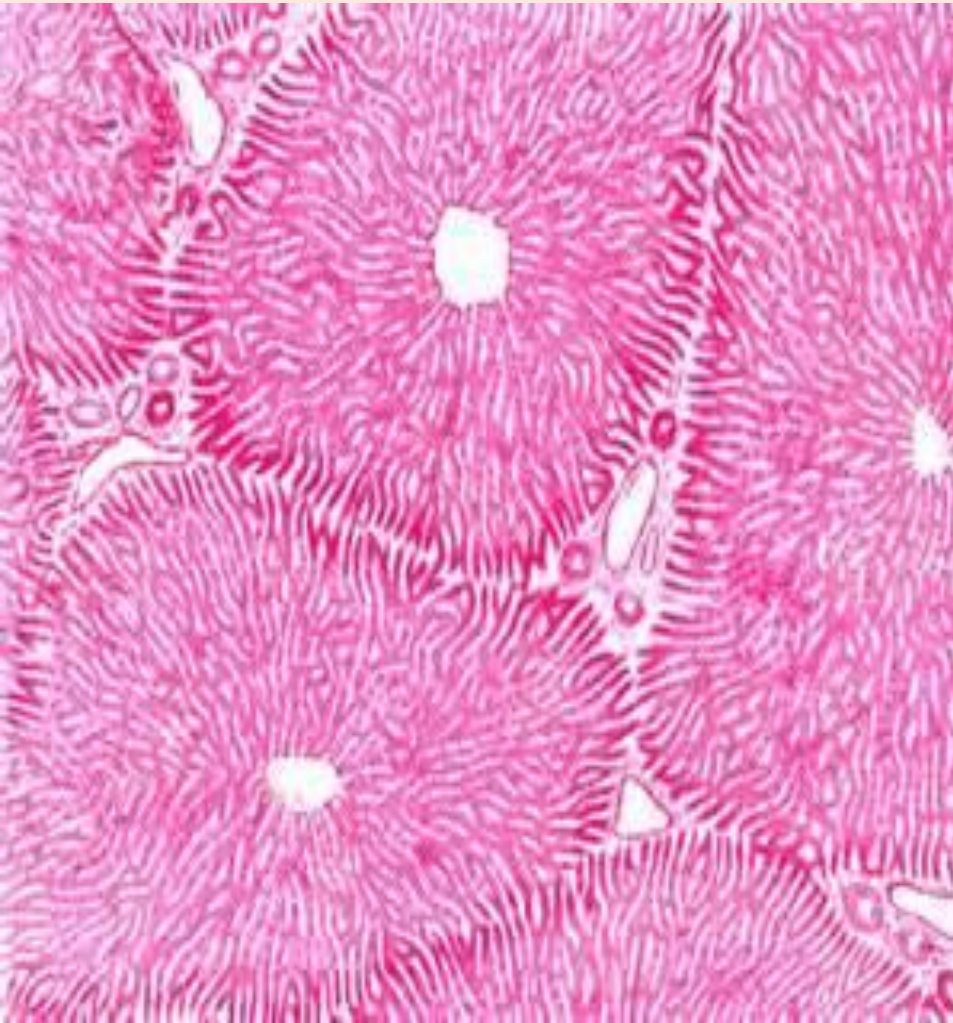
Figure 23.23a, c

# HISTOLOGY OF THE LIVER

- Liver mainly consists from a large number of lobules (hexagonal lobule)
- three adjacent lobules form an area called portal area (this area contains blood vessels, bile duct and lymph vessel).
- In the center of each lobule there is central vein.
- Hepatocytes arrange as a cord or plate from central vein to the periphery of lobules.
- Sinusiods carry blood from portal vein and hepatic artery (in the portal area) to the central vein.
- Kupffer's cells



# Histological Structure of Liver



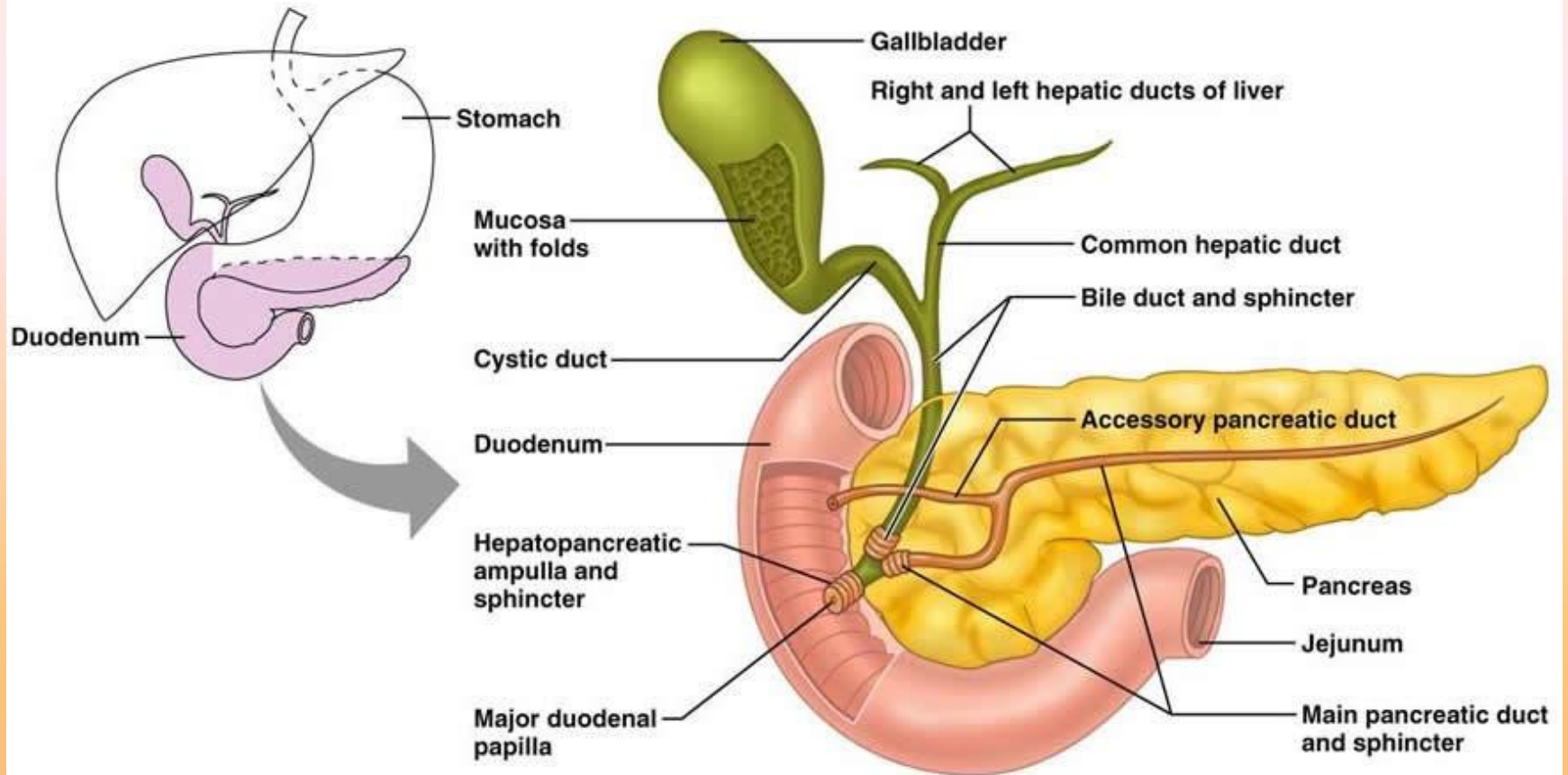
# Pancreas

- It is an exocrine and endocrine gland.
- Exocrine secretion are amylase, lipase, and proteolytic enzymes.
- Anatomically pancreas consist from:
  1. Head
  2. Body
  3. Tail

- Secretion of pancreas carry by main pancreatic duct.
- The main pancreatic duct units with common bile duct to form ampulla of vater



# Pancreas



Pancreatic secretion is controlled by:

1. **Hormones** mainly secretin and cholecystokinin are produced by *enteroendocrine cells of duodenal mucosa*.
2. **Parasympathatic stimulation**