DIGESTIVE SYSTEM (III)

HISTOLOGY

Semester 2, Year 2 •

Dr . Amira Osman

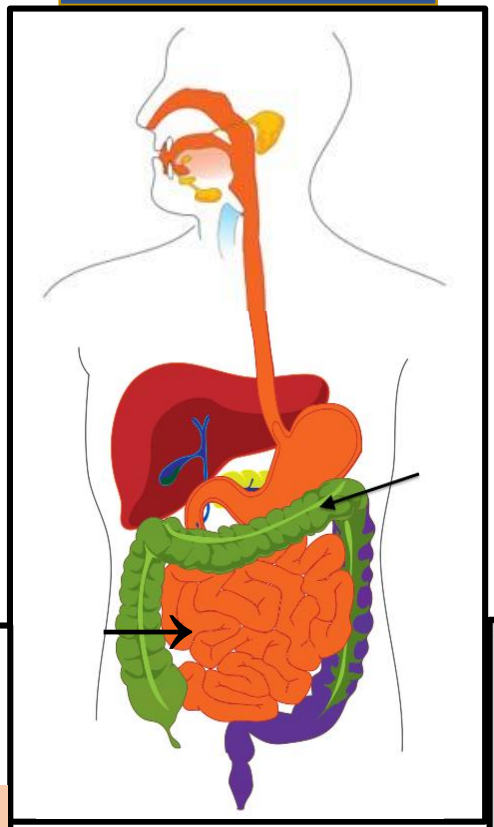
Associate professor of Human histology & Cell Biology

Learning Outcomes

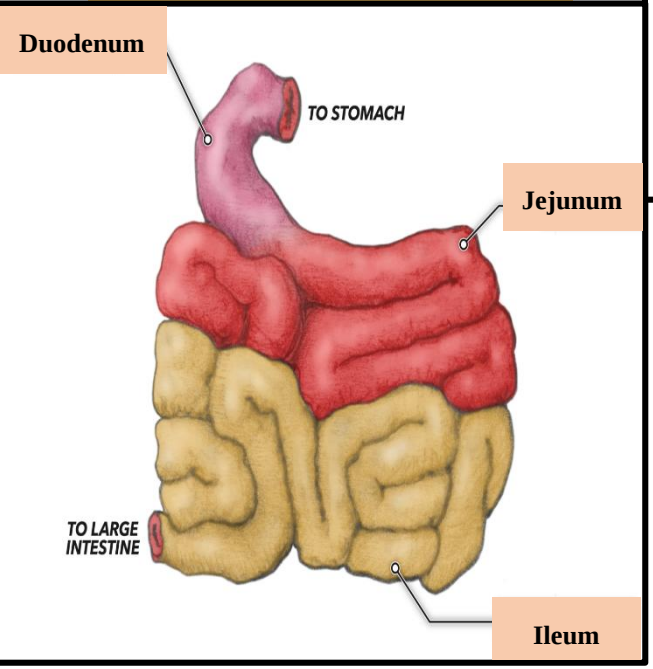
1.Identify the histological structure of small intestine

2. Identify the histological structure of large intestine

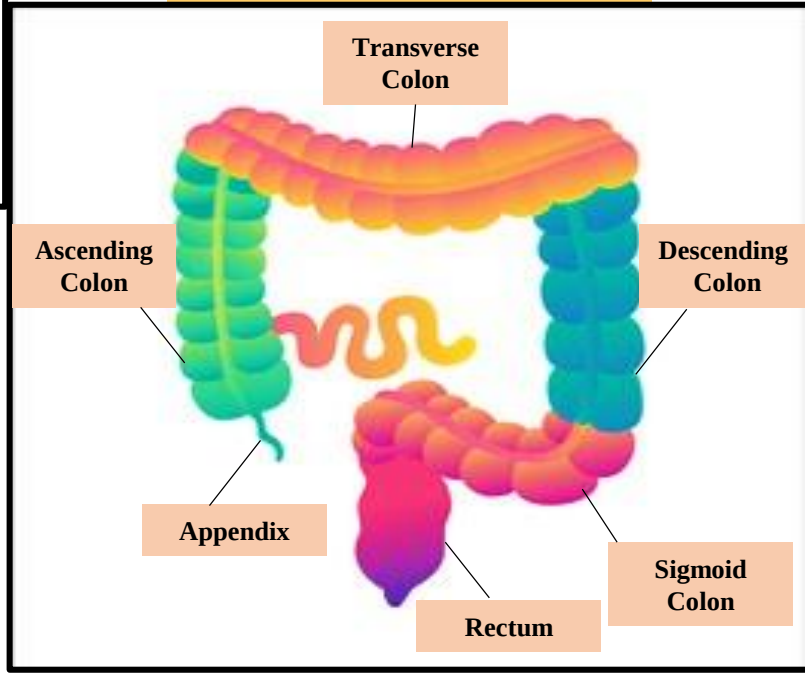
Intestine



Small Intestine

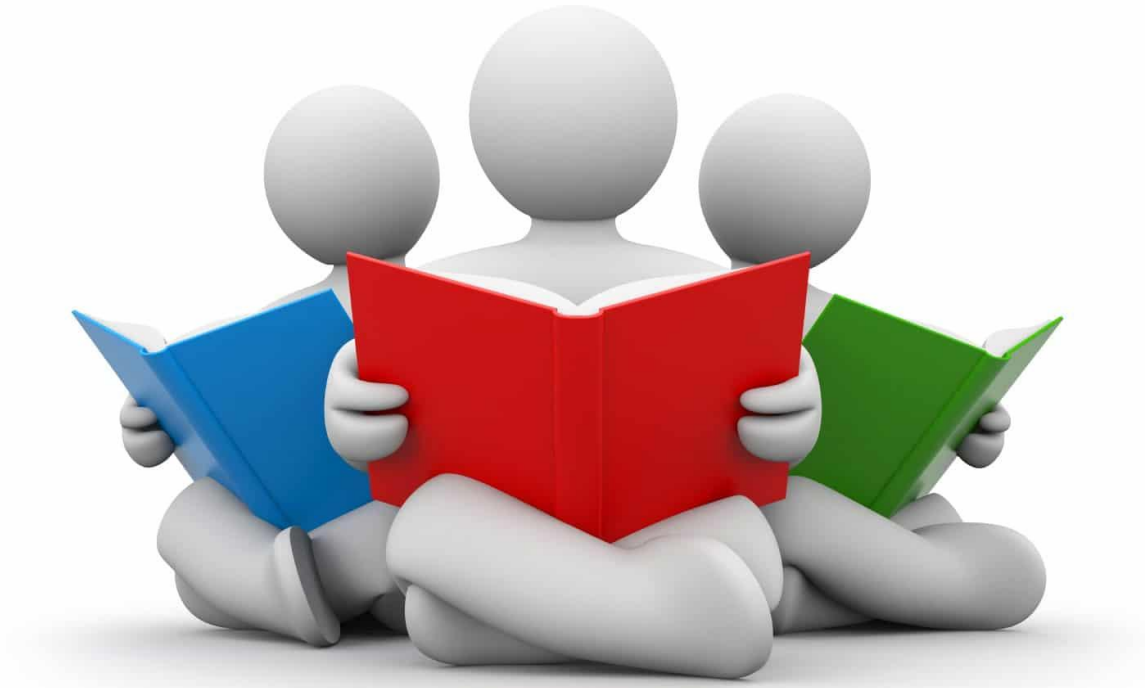


Large Intestine

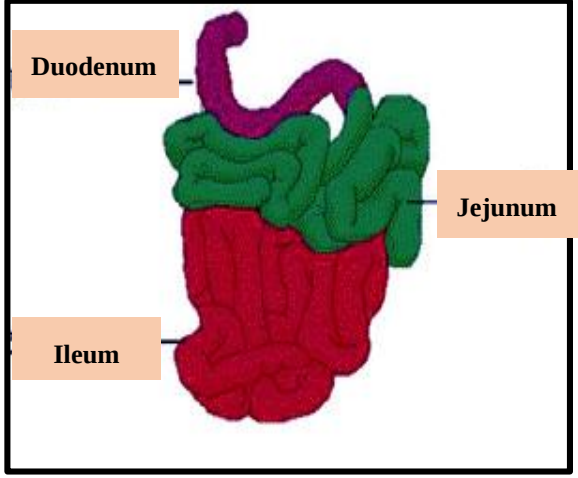


1

Identify the histological structure of small intestine



Small Intestine



It is a hollow tubular structure

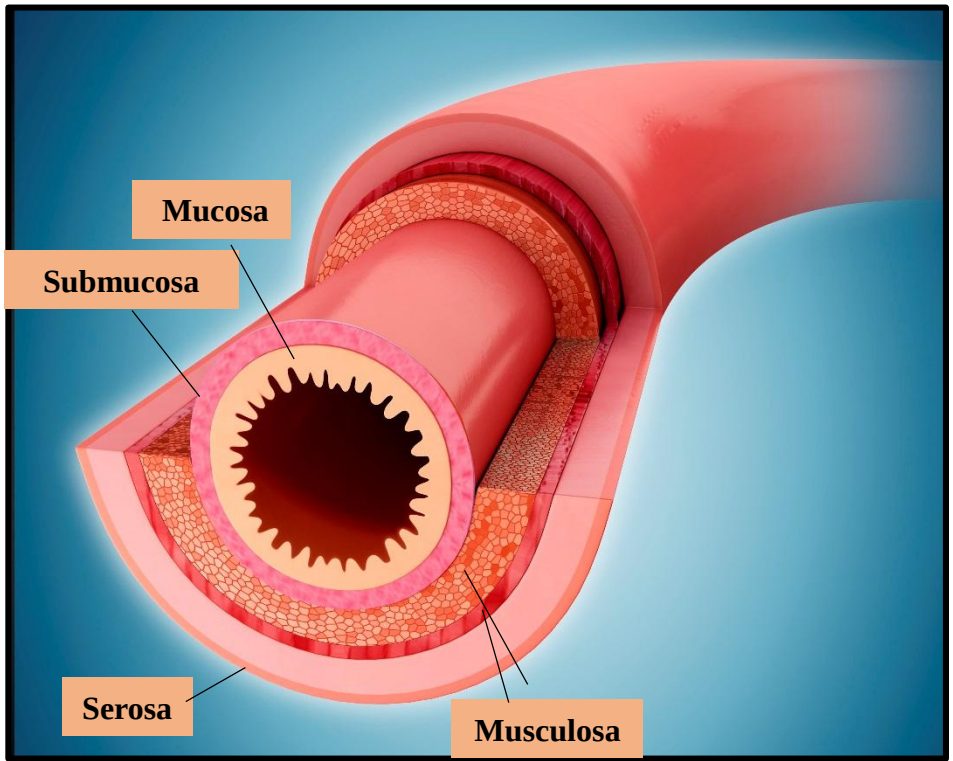
Divisions Divided into 3 parts:

1. Duodenum
2. Jejunum
3. Ileum

Histological Structure

The wall of the small intestine is formed of 4 layers:

1. Mucosa
2. Submucosa
3. Musculosa
4. Serosa



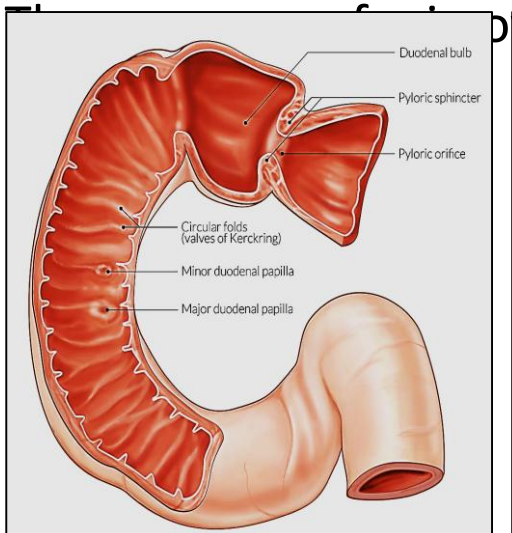
Adaption of Small intestine to its function

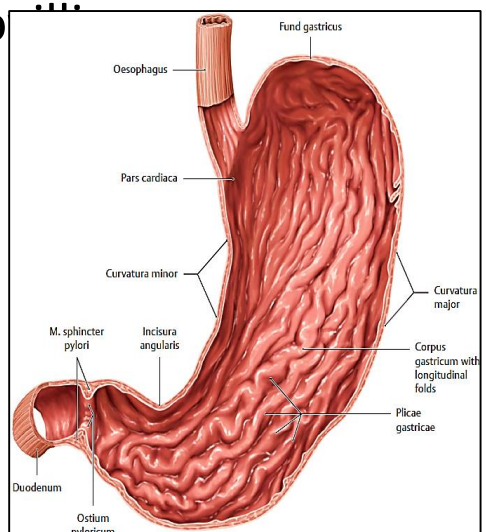
- The small intestine is the longest segment (7.5m) of the GIT which provide long contact between food & digestive enzymes

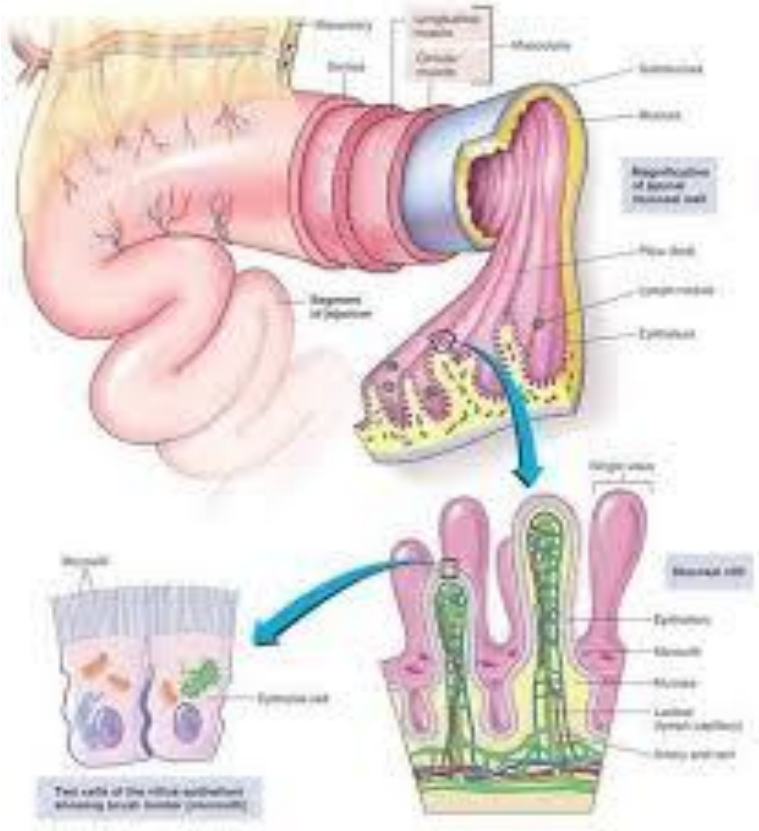
- The presence of Plicae circulares (valves of Kerckring) which is more prominent in the lower part of duodenum, jejunum because maximum absorption occurs there

- The presence of villi

- [illegible]







Mucosa | **Submucosa** | **Musculosa** | **Serosa**

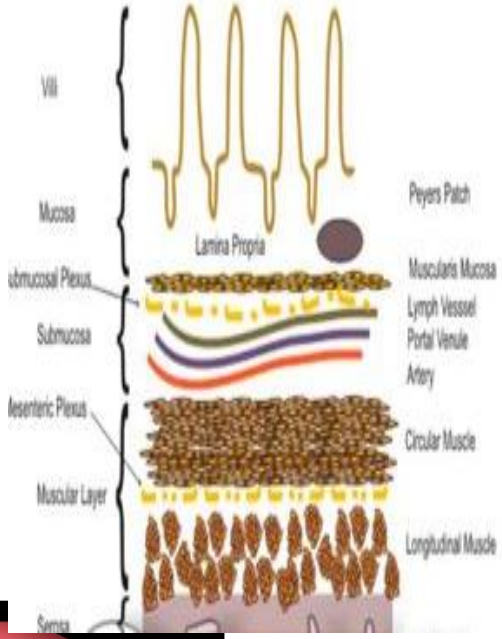
Epith. | **Corium** | **Muscularis Mucosa**

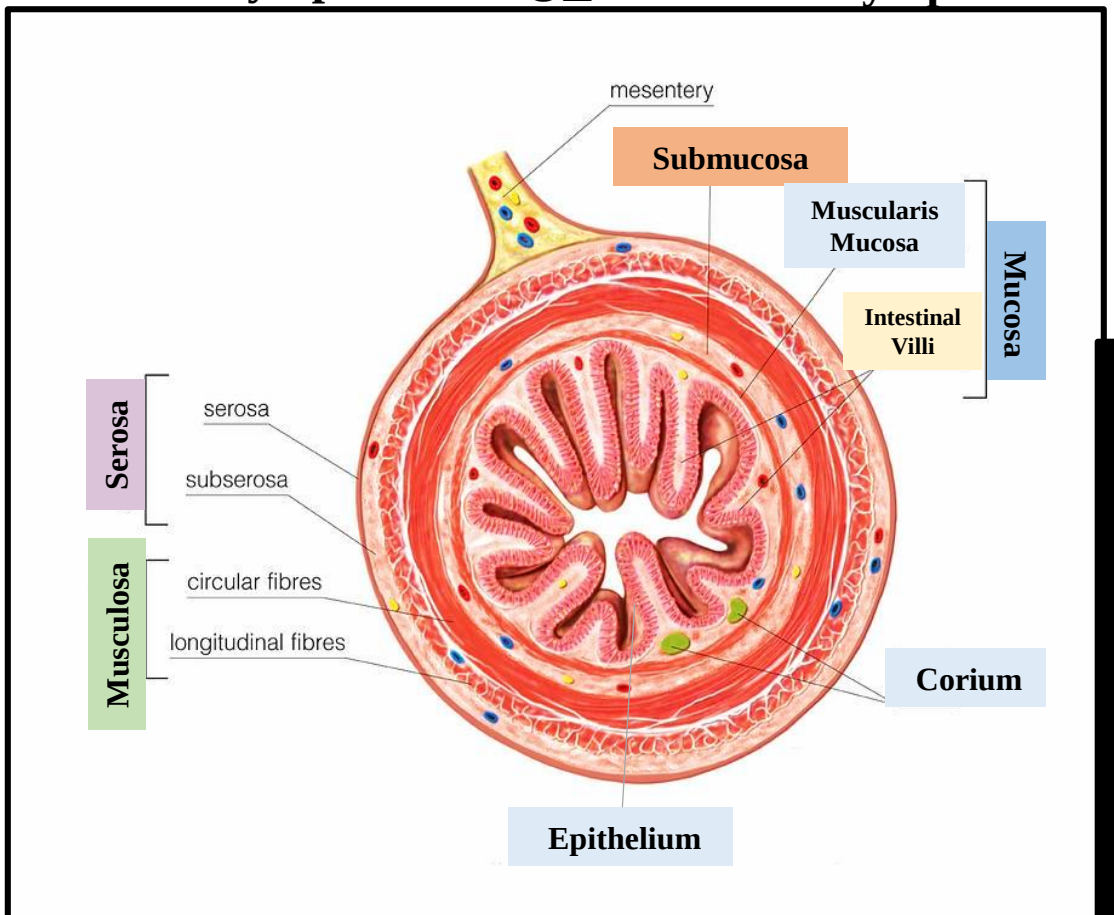
C.T.
BV, N., Lymph.

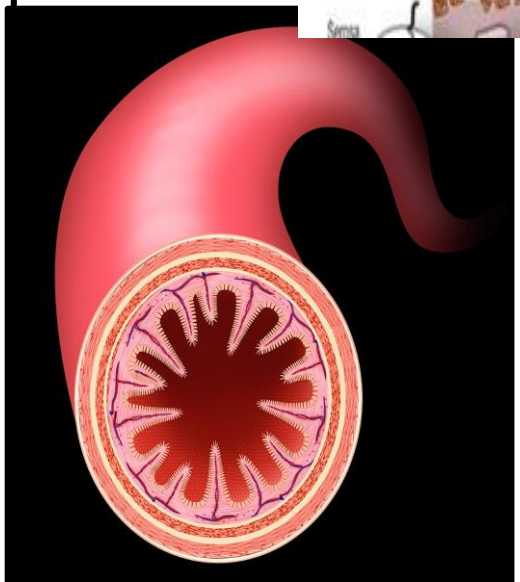
Smooth muscles
IC
OL

C.T.
BV, N., Lymph.

Smooth muscles
IC
OL







1. Mucosa

Formed of

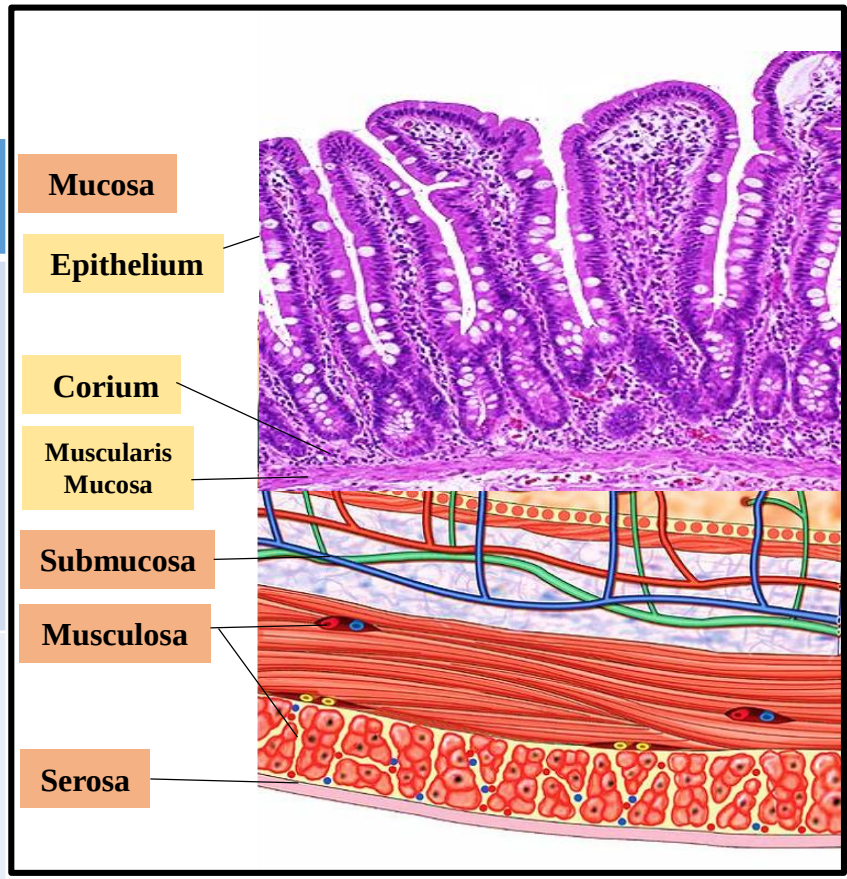
A. Epithelium

Simple columnar absorptive epithelium:

-Covers intestinal villi

-Lines intestinal crypts

	Intestinal Villi	Intestinal Crypts (or crypts of Lieberkühn)
Def.	**Finger-like projections** extending from the wall into the lumen of the intestine	**Simple tubular glands** extending from the base of the intestinal villi to the muscularis mucosa
Lining Cells	1-Simple columnar absorbing cells (90%) 2-Goblet cells (9.5%) 3-Enteroendocrine cells (0.5%)	1- 2- 3- 4-Paneth cells 5-Stem cells 6-M cells



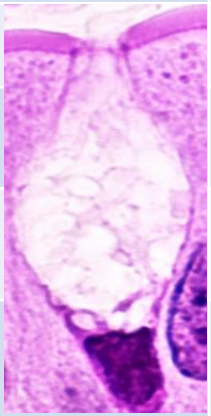
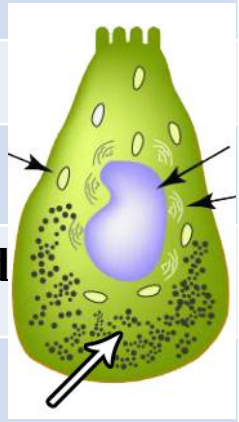
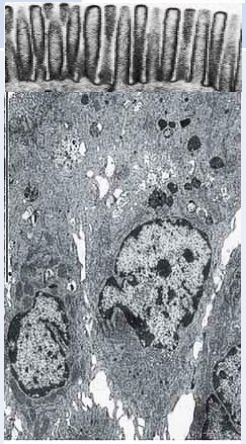
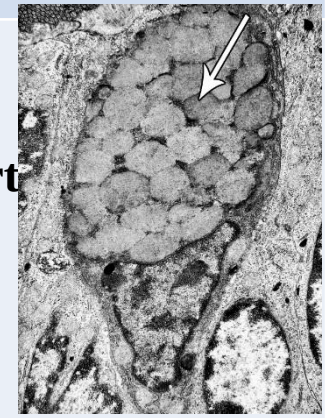
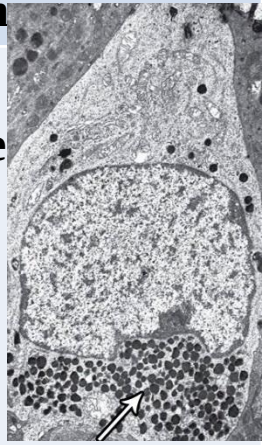
B. Corium

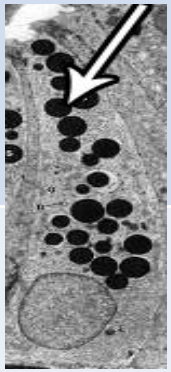
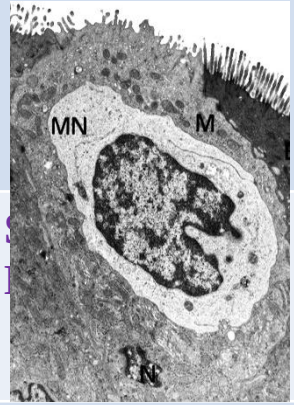
A layer of **connective tissue** containing **blood vessels**, **nerves** and **lymphatics**

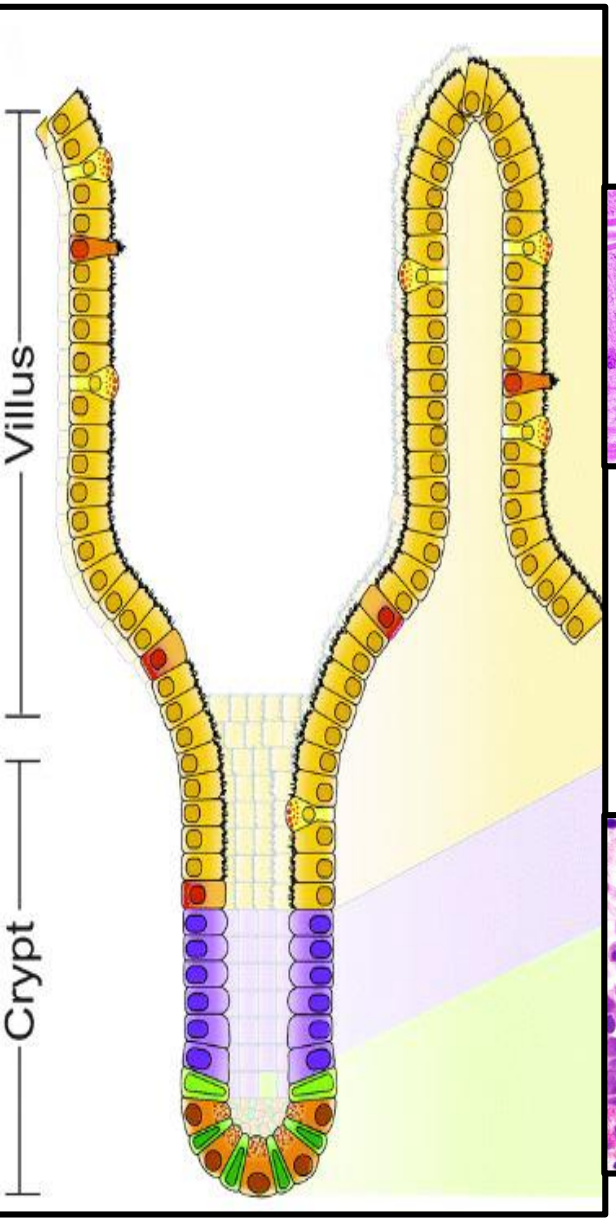
C. Muscularis Mucosa

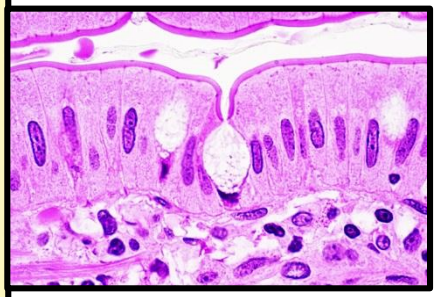
2 thin layers of smooth muscle fibres: -Inner circular -Outer longitudinal

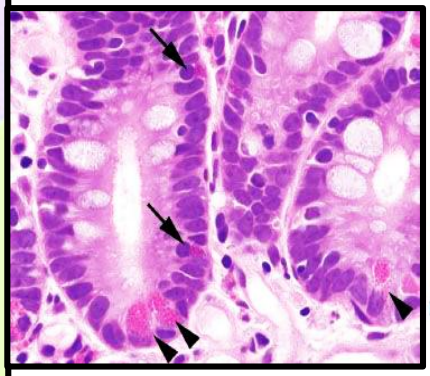
Cells lining the intestinal villi:

	Simple Columnar Absorbing Cells (Enterocytes)	Goblet Cells	Enteroendocrine Cells
Site	Villi & upper part of crypts	Villi & upper part of crypts, toward ilium	Villi & lower part of crypts
L/M			
Shape	Columnar	Goblet-like	Columnar
Nucleus	Basal & oval	Basal & flat	Basal & rounded
Cytoplasm	Basophilic	Vacuolated	Basal granules with silver stain
E/M	 Microvilli -Brush border	Granules -Mucin -Apical part 	Granules -Electron-dense -Basal part 
Function	Absorption of useful substances	Secretion of mucus to lubricate the passage of intestinal contents,	Secretion of some hormones and substances as somatostatin H. and

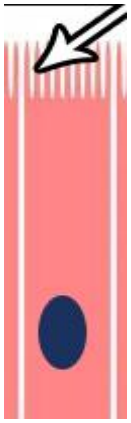
	Paneth Cells	Stem Cells	M Cells
Site	Base of Crypts	Crypts	Crypts
L/M			
Shape	Columnar 	Columnar 	Dome-shaped With basal cavity Deep pocket occupied by lymphocytes and macrophage 
Nucl.	Basal & rounded	Basal & oval	
Cyt.	Basal basophilia Apical acidophilia 	basophilic	
E/M	Granules -Electron-dense -Apical part	-rER -Ribosomes	
Funct.	Secretion of lysozyme enzyme (anti-bacterial)	Differentiate into other cell types of intestinal epithelial cells	Transport intraluminal antigen to lymphocytes and macrophages in the corium





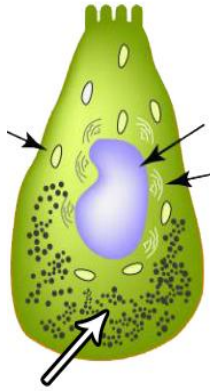


Simple Columnar Cells

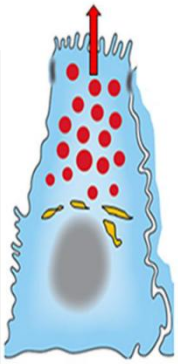


Goblet Cells

Enteroendocrine Cells



Paneth Cells



Stem Cells

M Cells

2. Submucosa

-A layer of connective tissue containing blood vessels, nerves and lymphatics.

-In the proximal part of the duodenum Bruner's glands (mucous secreting glands)

-In the antimesenteric border of the ileum Peyer's patches

3. Musculosa

2 layers of smooth muscle fibres:

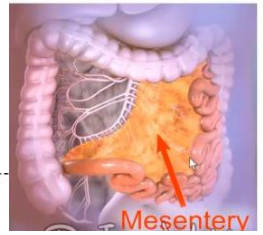
-Inner circular SMF

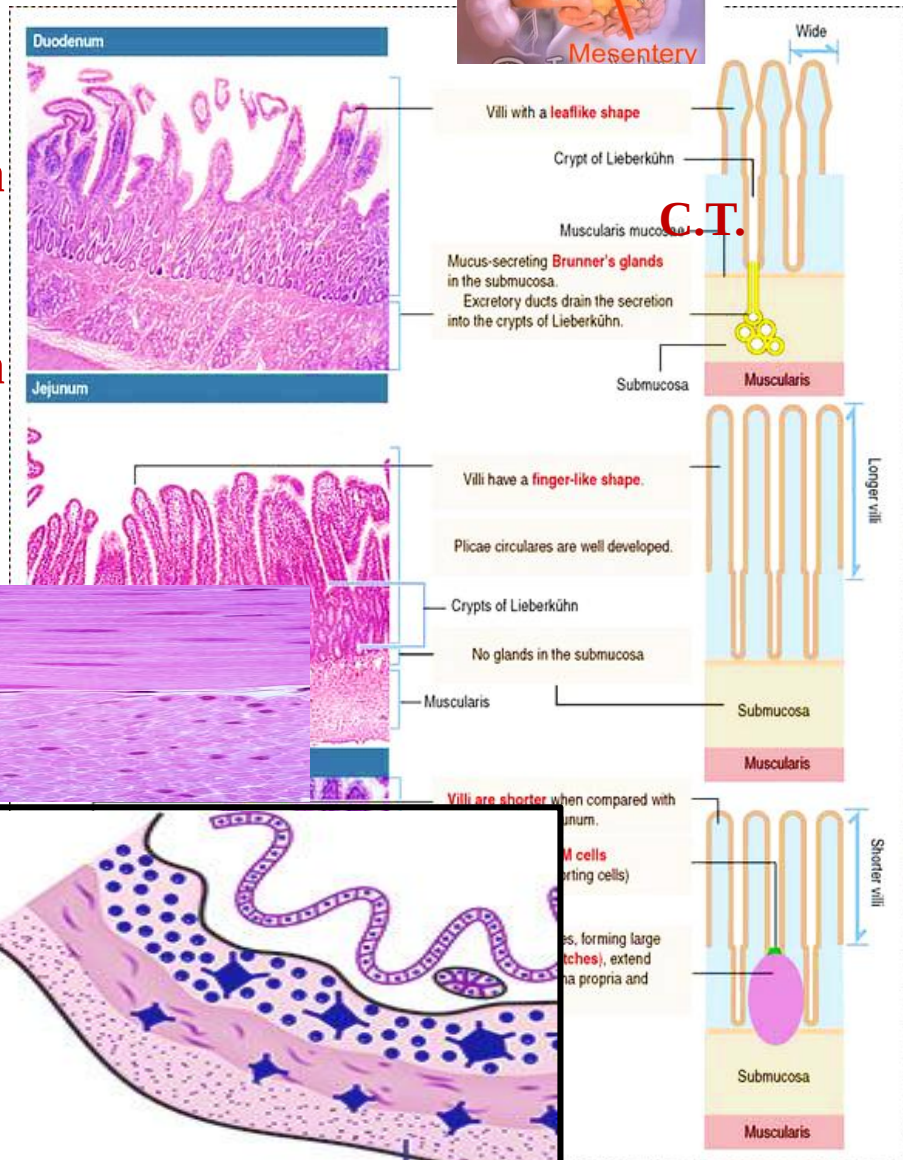
-Outer longitudinal SMF

4. Serosa

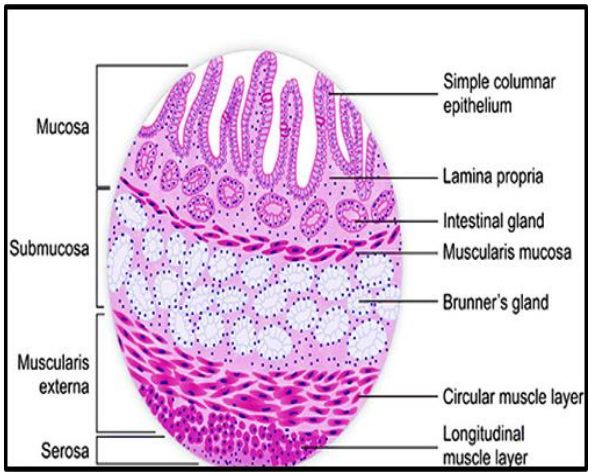
-A layer of connective tissue:

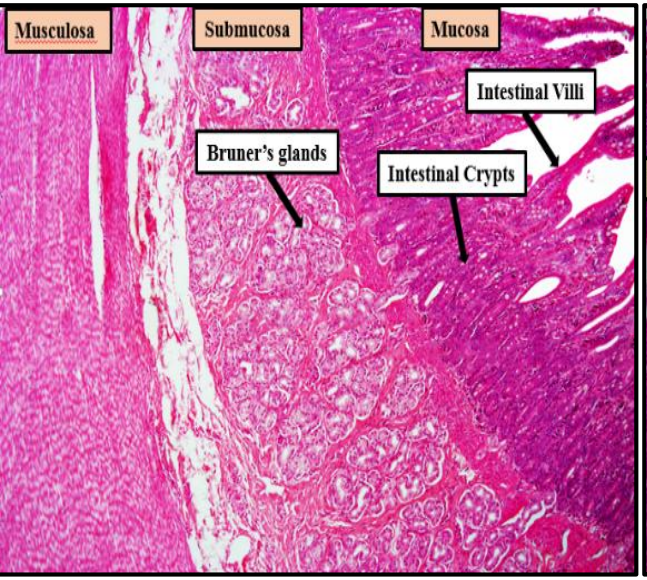
Covered with simple squamou mesothelial cells





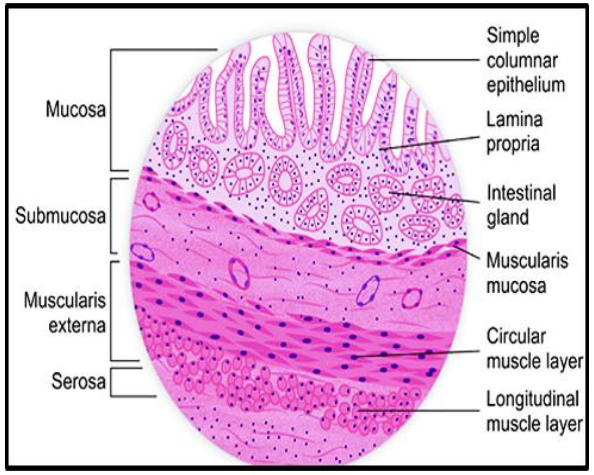
Duodenum

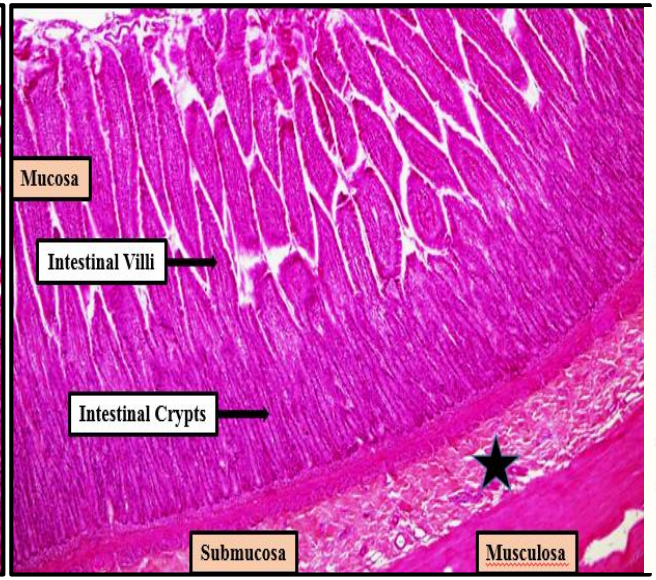




Broad villi

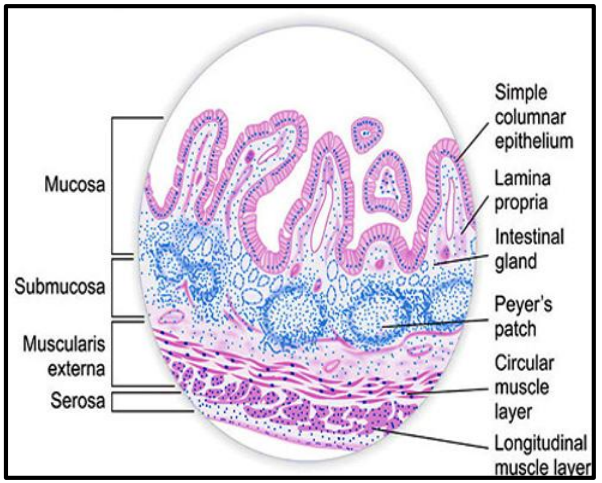
Jejunum

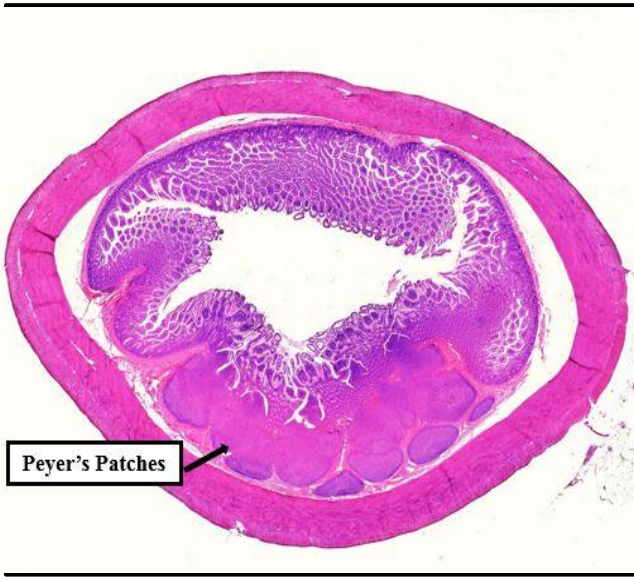




long villi

Ileum



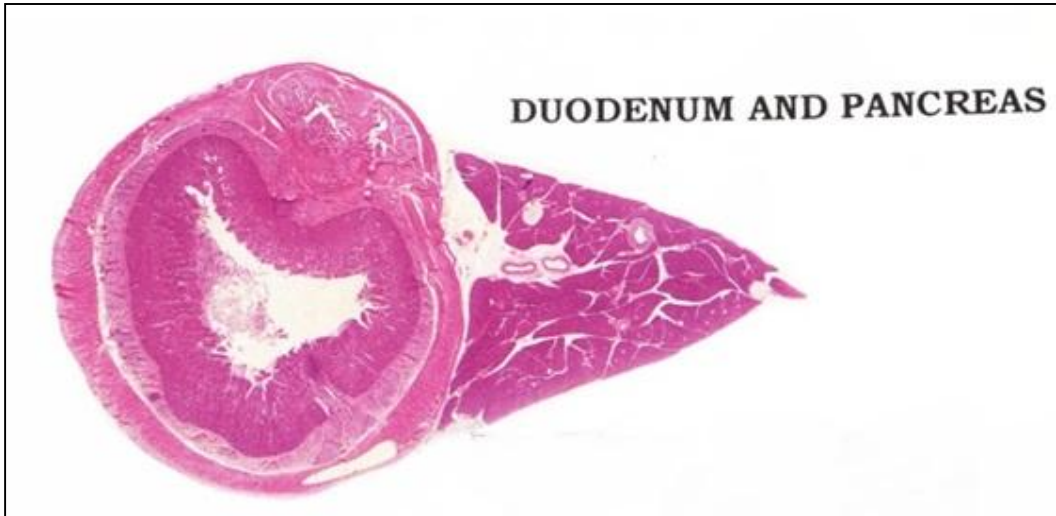


short villi

Duodenum

V: Villi
G: Brunner's Glands

Compound Slide:

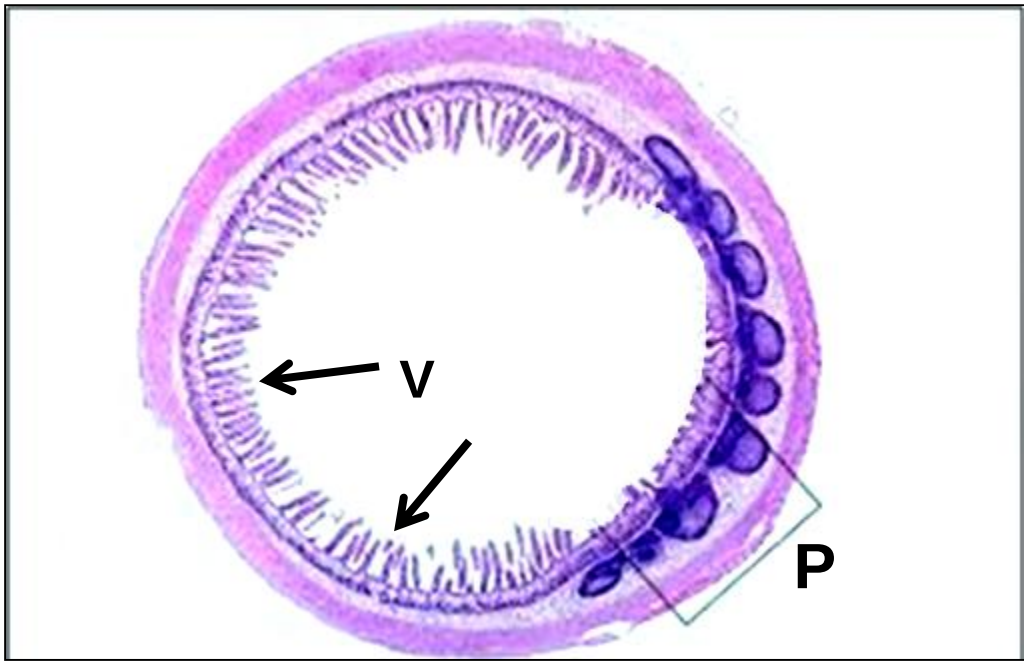


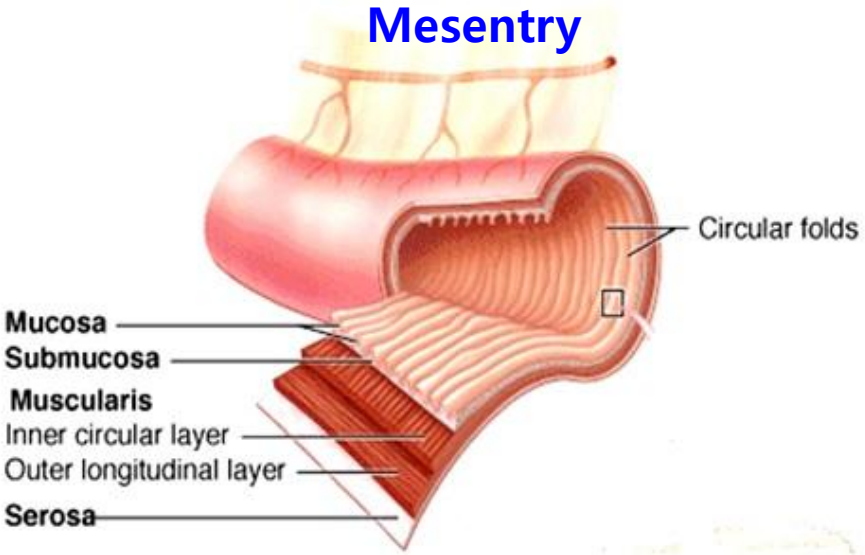
Ileum

V:villi

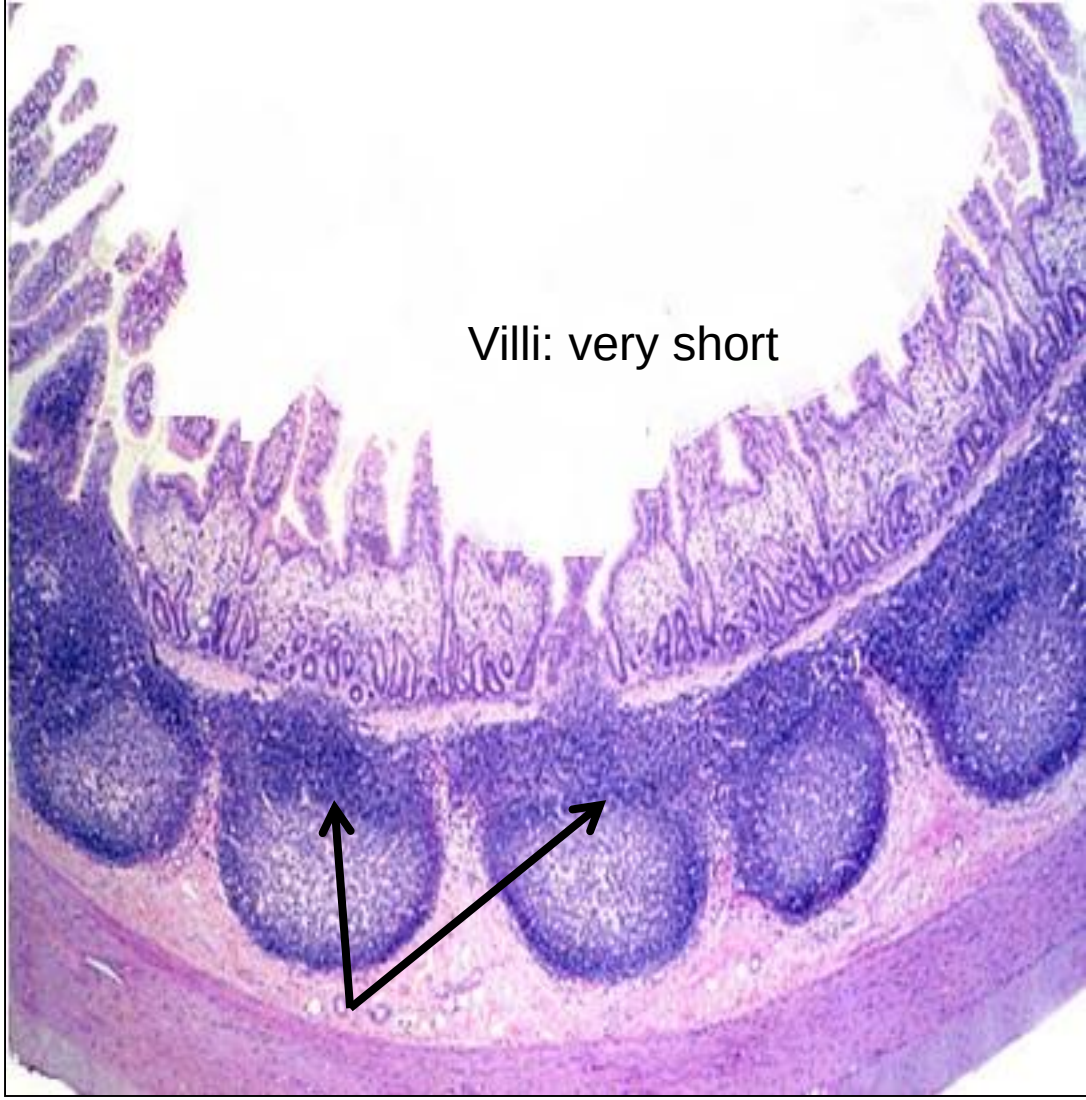
P:Peyer's patches.

Present ONLY at the anti-mesenteric border.



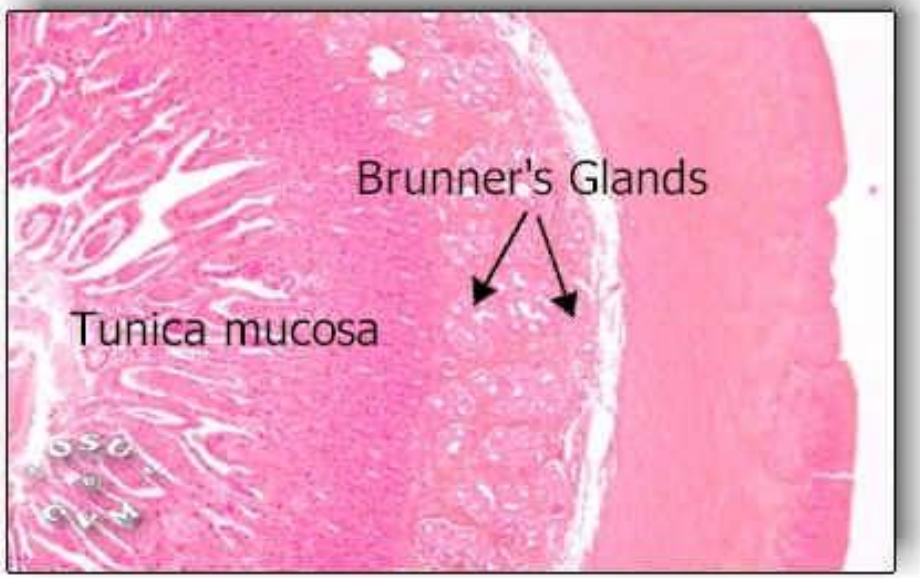


Peyer's Patches

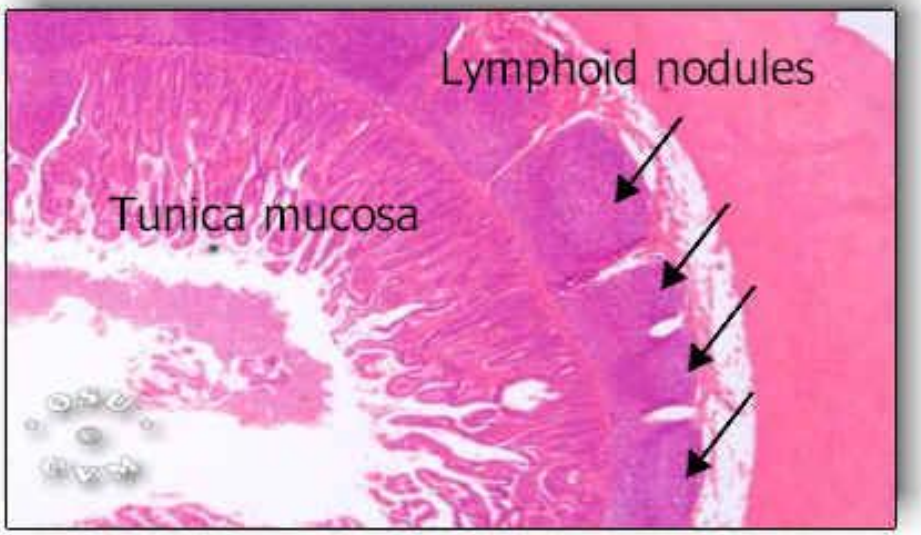


The **villi** over Peyers´ patches are ***short or absent***.

Duodenum



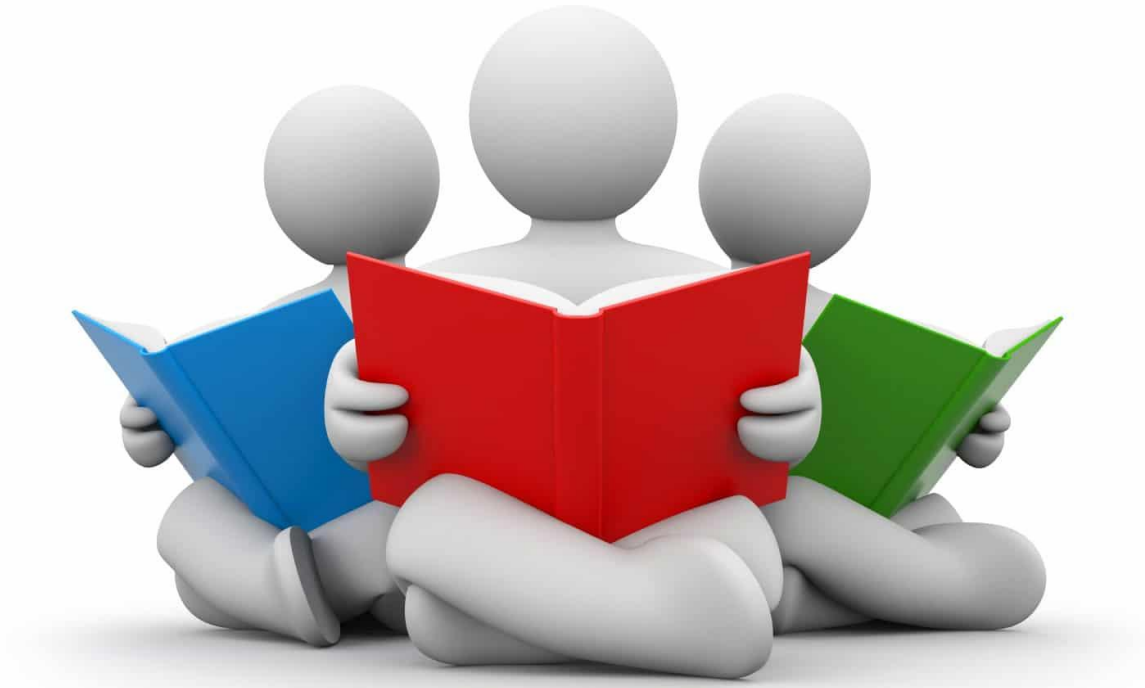
Ileum



Jejunum

2

Identify the histological structure of large intestine



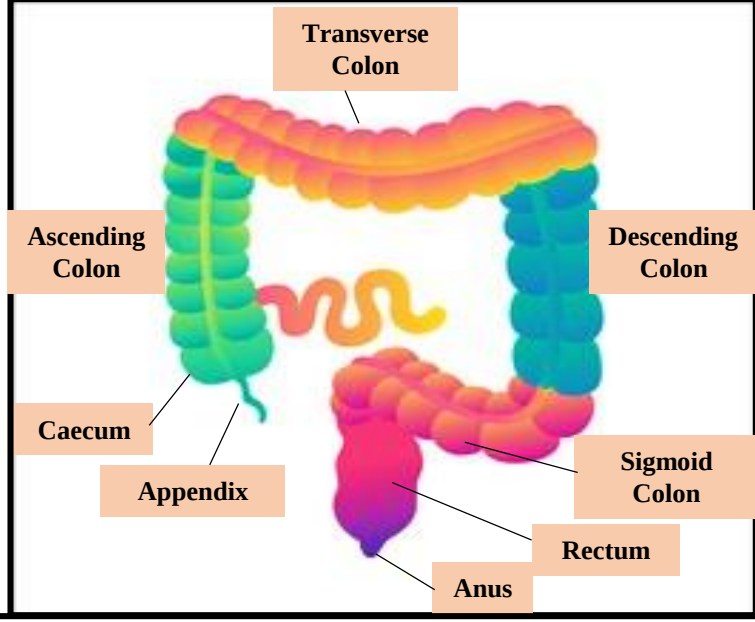
Large Intestine

It is the widest part of the digestive canal

Divisions

Divided into:

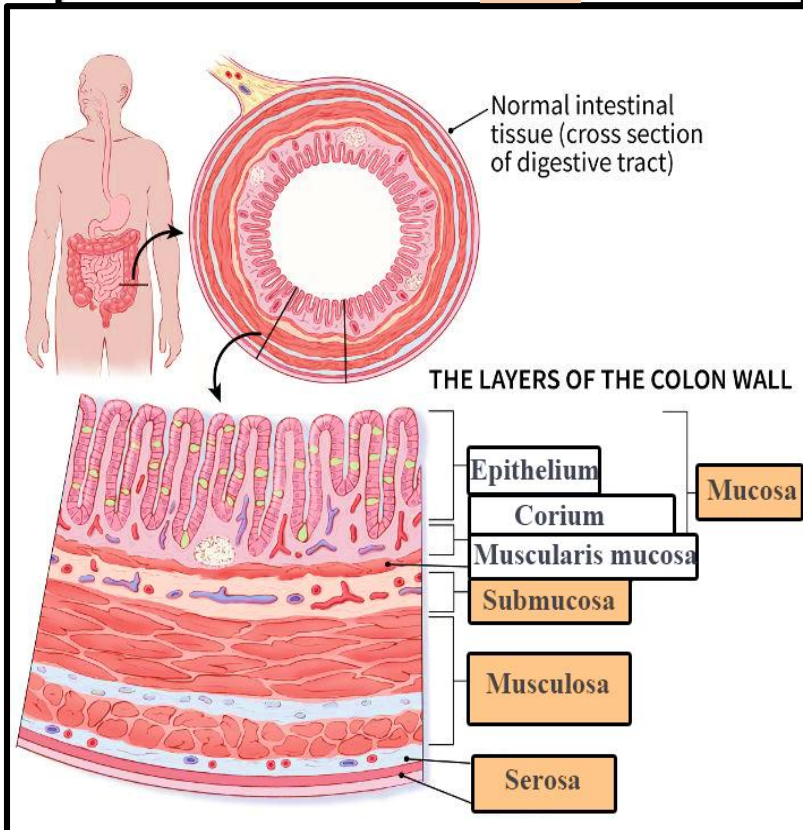
1. Caecum
2. Appendix
3. Ascending colon
4. Transverse colon
5. Descending colon
6. Sigmoid colon
7. Rectum
8. Anal canal



Histological Structure

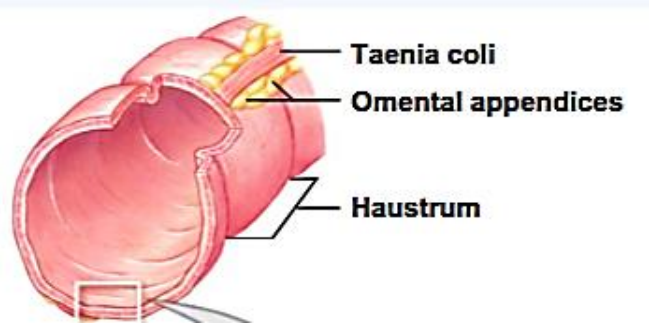
The wall of the large intestine is formed of 4 layers:

1. Mucosa
2. Submucosa
3. Musculosa
4. Serosa



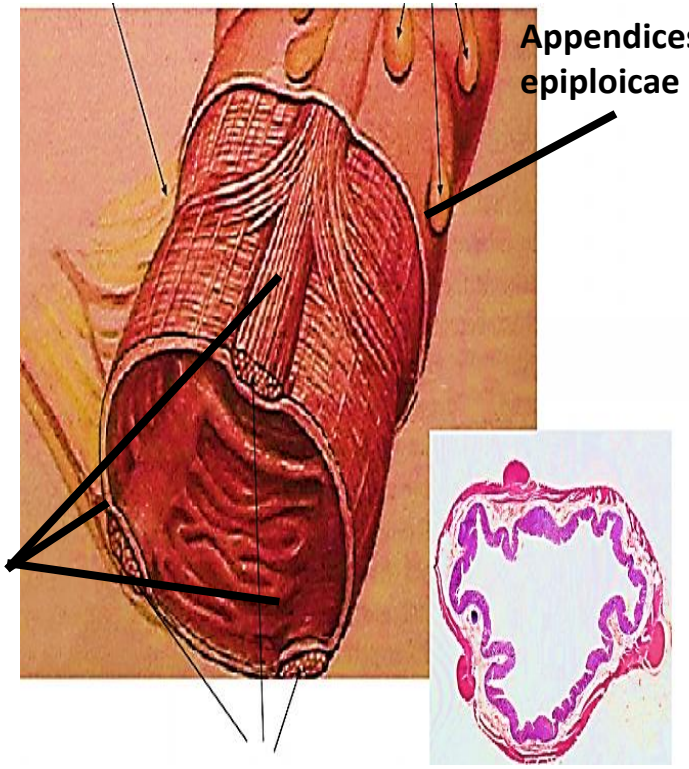
Taenia coli

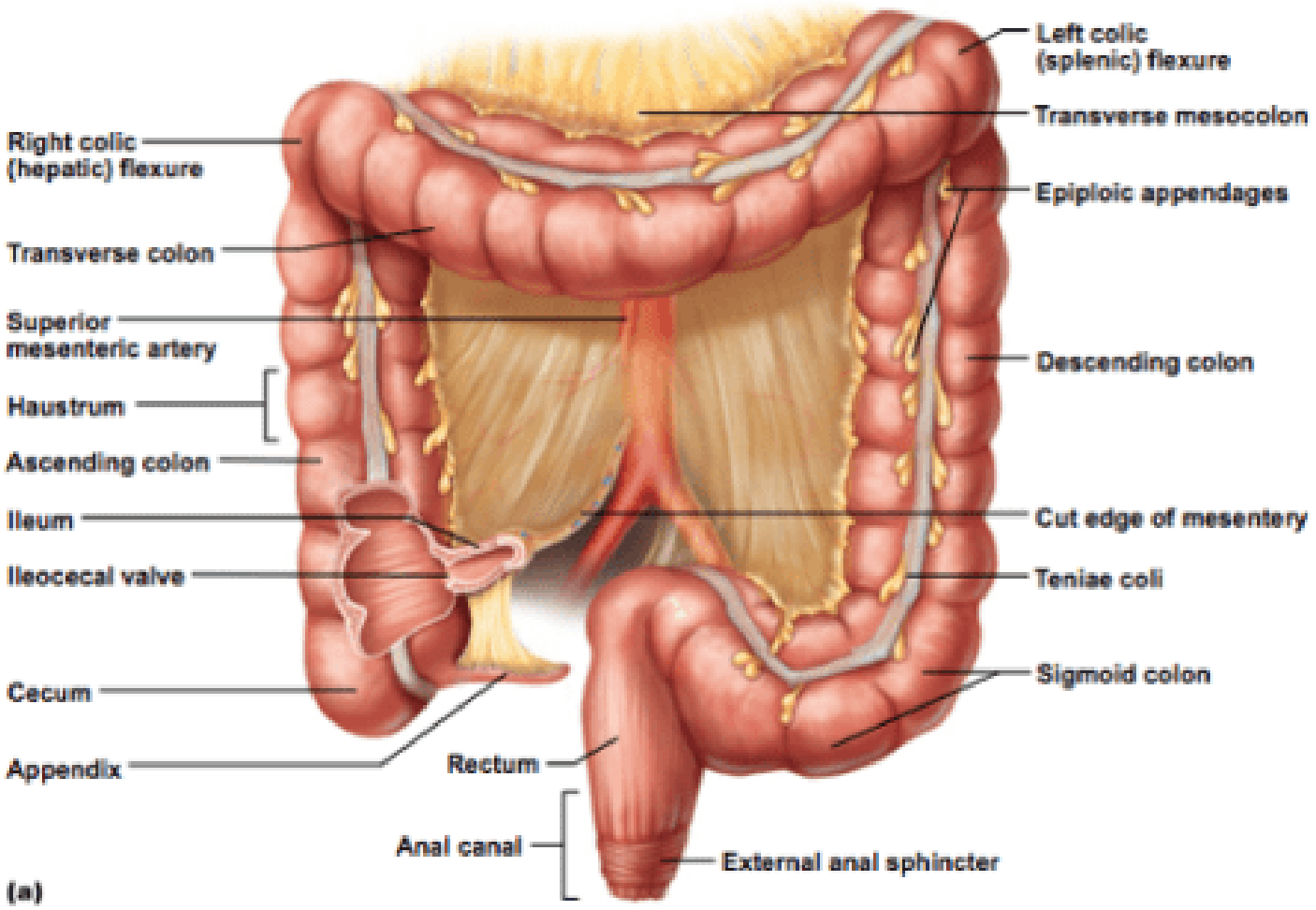
- **The musculosa** of the large intestine 2 layers (IC & OL).
- **IC** is continuous but the **OL** breaks up into 3 longitudinal bands to forms the taenia coli
- Responsible for haustra (segmentation) of colon. Haustra helps to push contents of colon through with peristalsis



appendices Epiploicae

The serosa: shows small pouches of peritoneum contains fat




Left colic (splenic) flexure
Transverse mesocolon
Right colic (hepatic) flexure
Epiploic appendages
Transverse colon
Superior mesenteric artery
Descending colon
Haustrum
Ascending colon
Ileum
Cut edge of mesentery
Ileocecal valve
Teniae coli
Sigmoid colon
Cecum
Appendix
Rectum
Anal canal
External anal sphincter
(a)

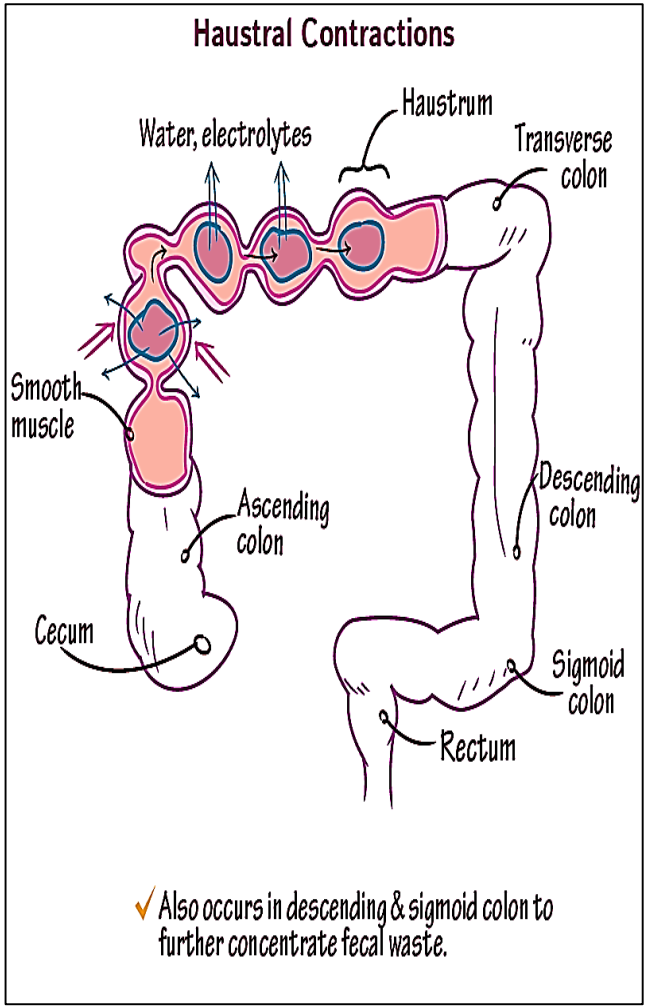
Importance of taenia coli

There are 2 types of ms. contractions in the large intestine Haustral & peristaltic contractions

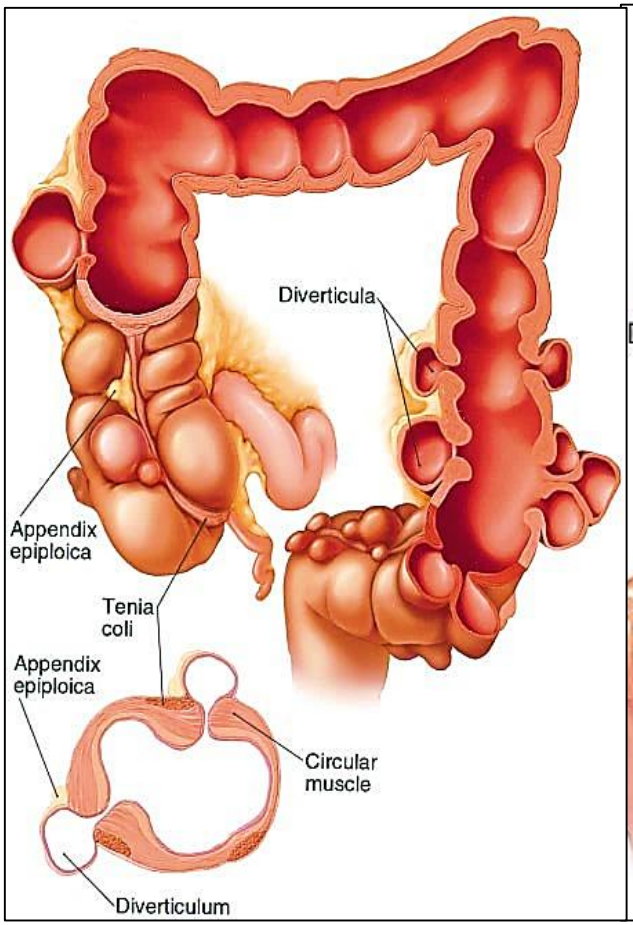
Haustral movement : OL ms localized slow movement. The distension of one haustrum initiate contraction T Coli which pushes the waste product to the next Haustrum → slow to allow time for water absorption

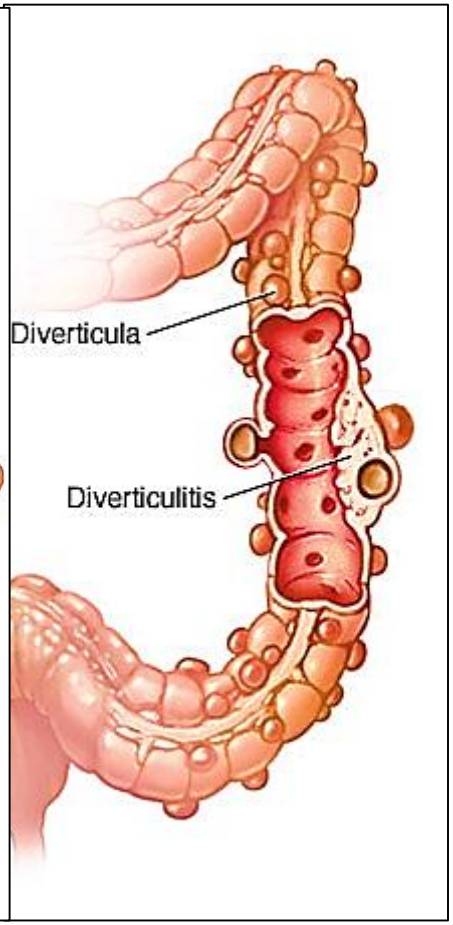
Peristaltic movement involve both IC & OL ms → distal mass movement of colonic content from part to another

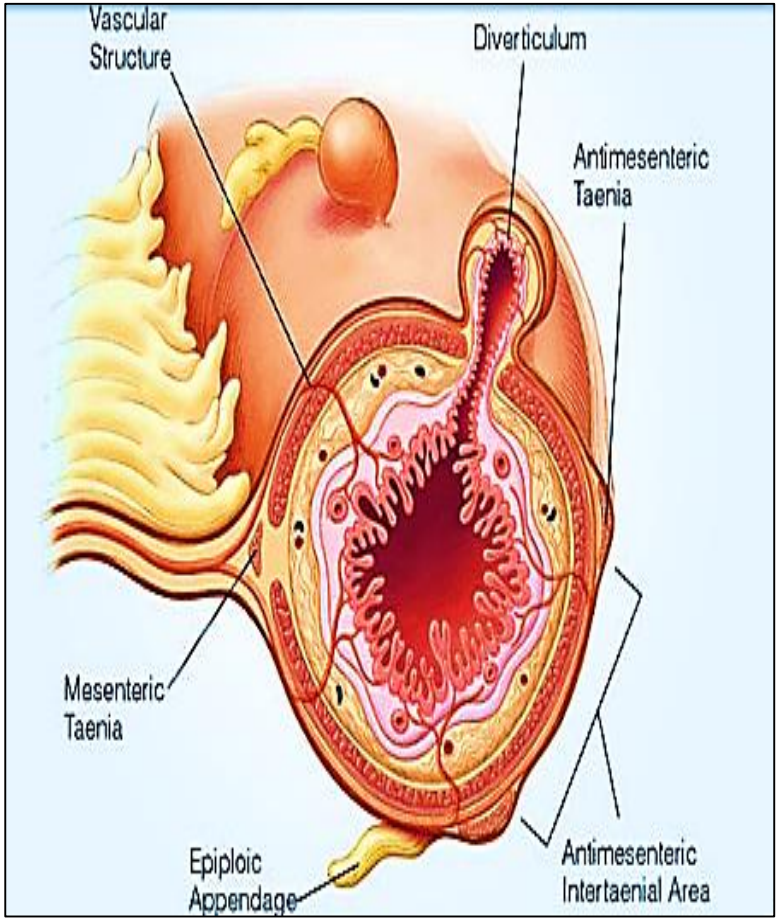
(once/day)



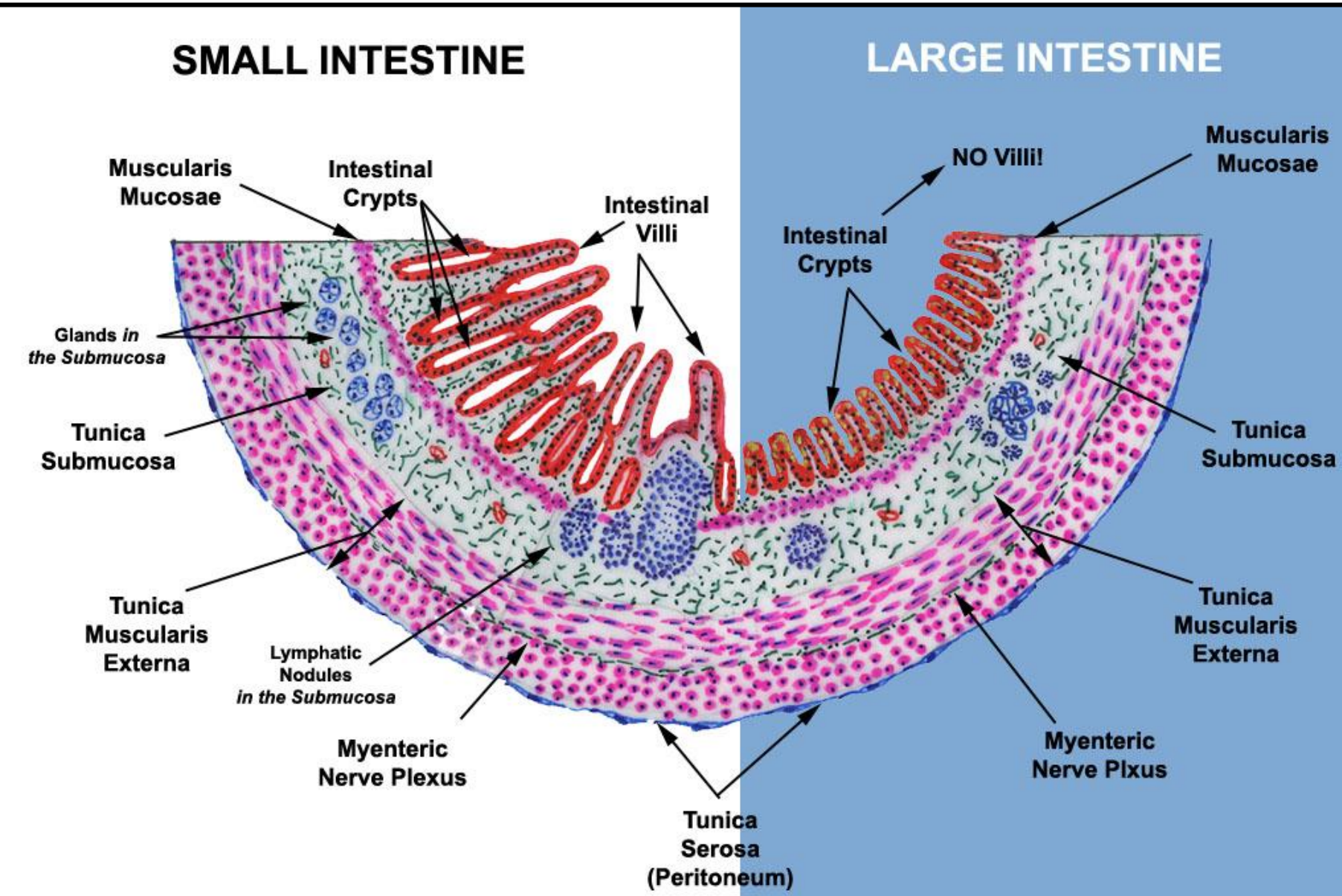
Diverticulosis

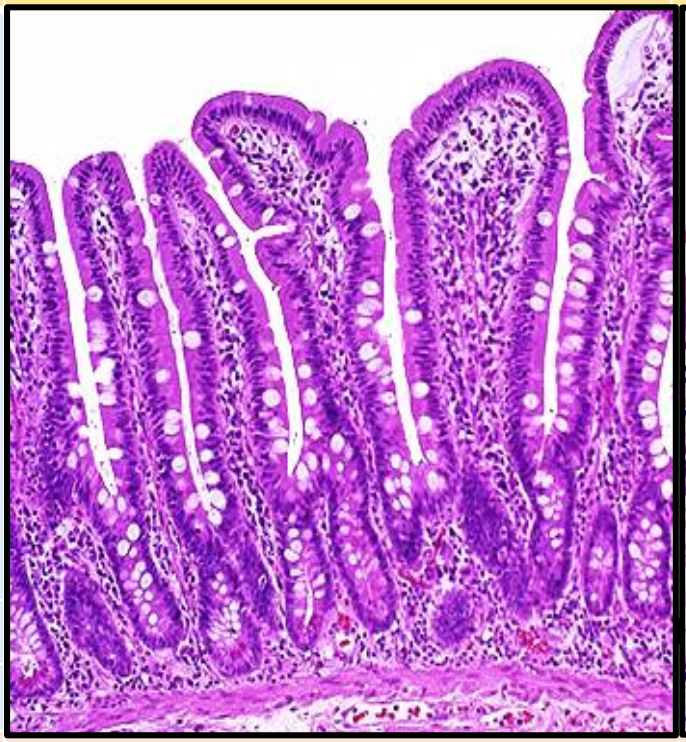
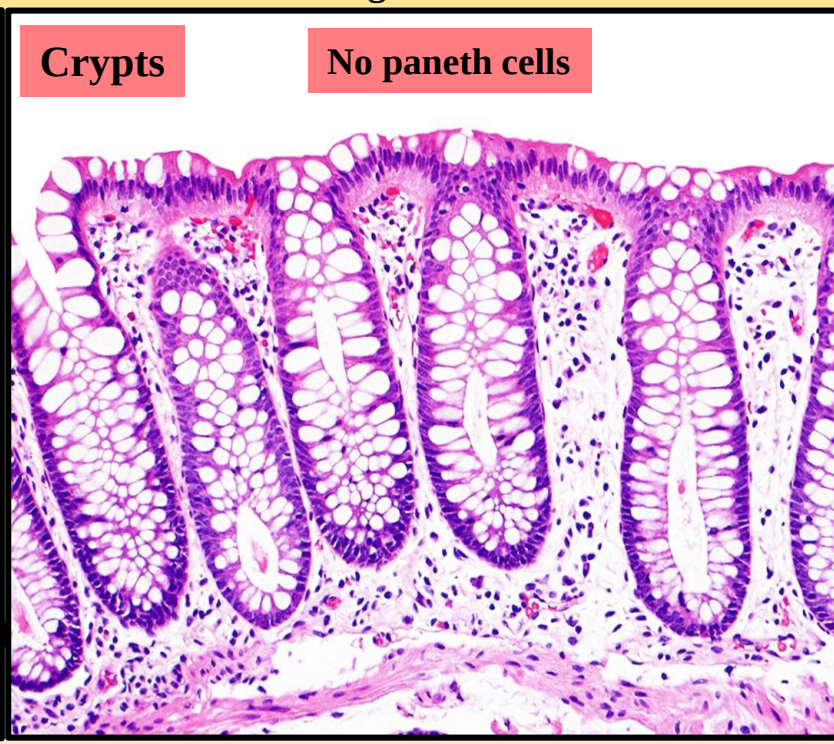


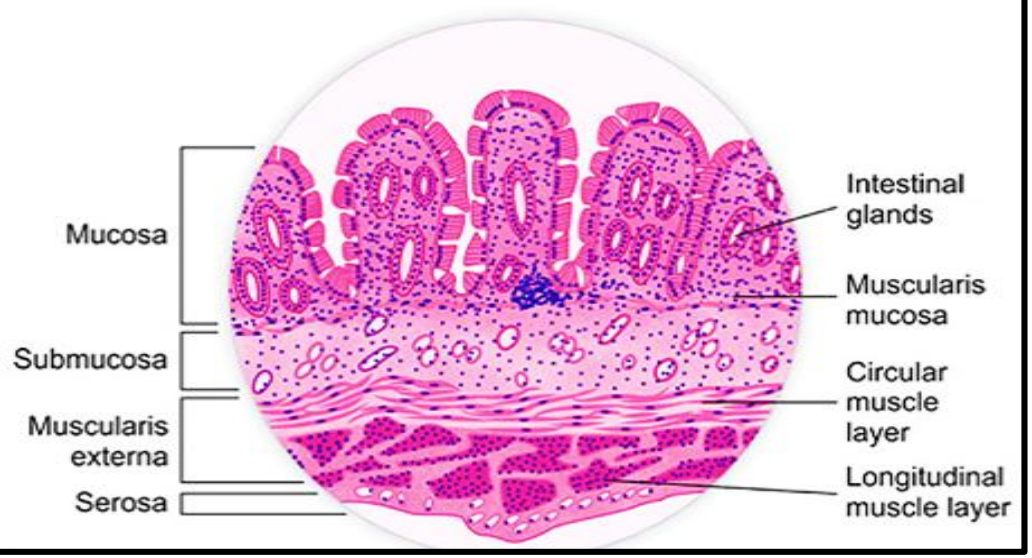




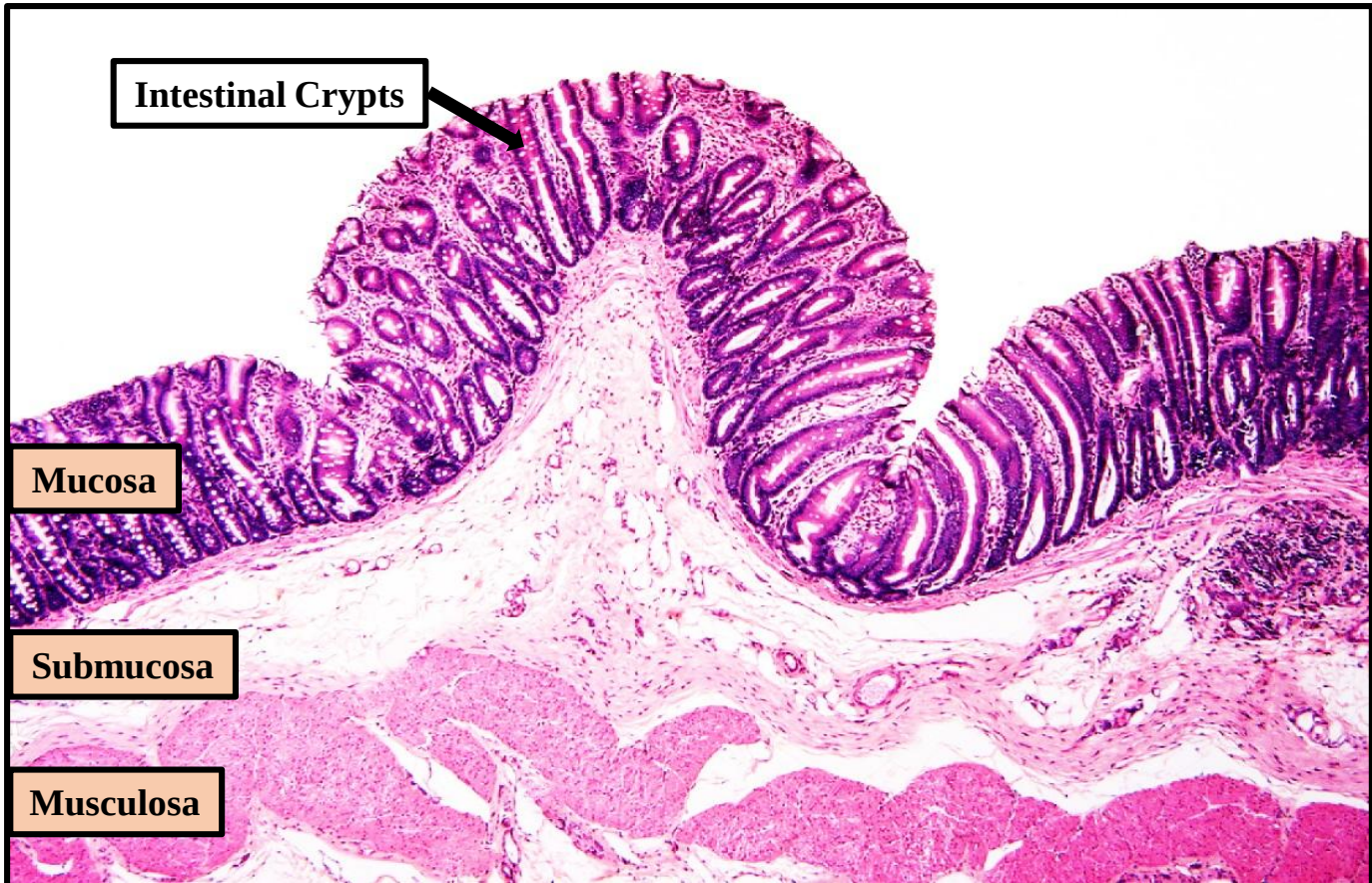
Diverticulosis is caused by small outward bulges in the large intestine (diverticula) wall in areas lack Taenia coli which can be blocked with food residue . If any of the diverticula become infected, this leads to symptoms of diverticulitis. The exact reason why diverticula develop is not known, but they are associated with not eating enough fiber

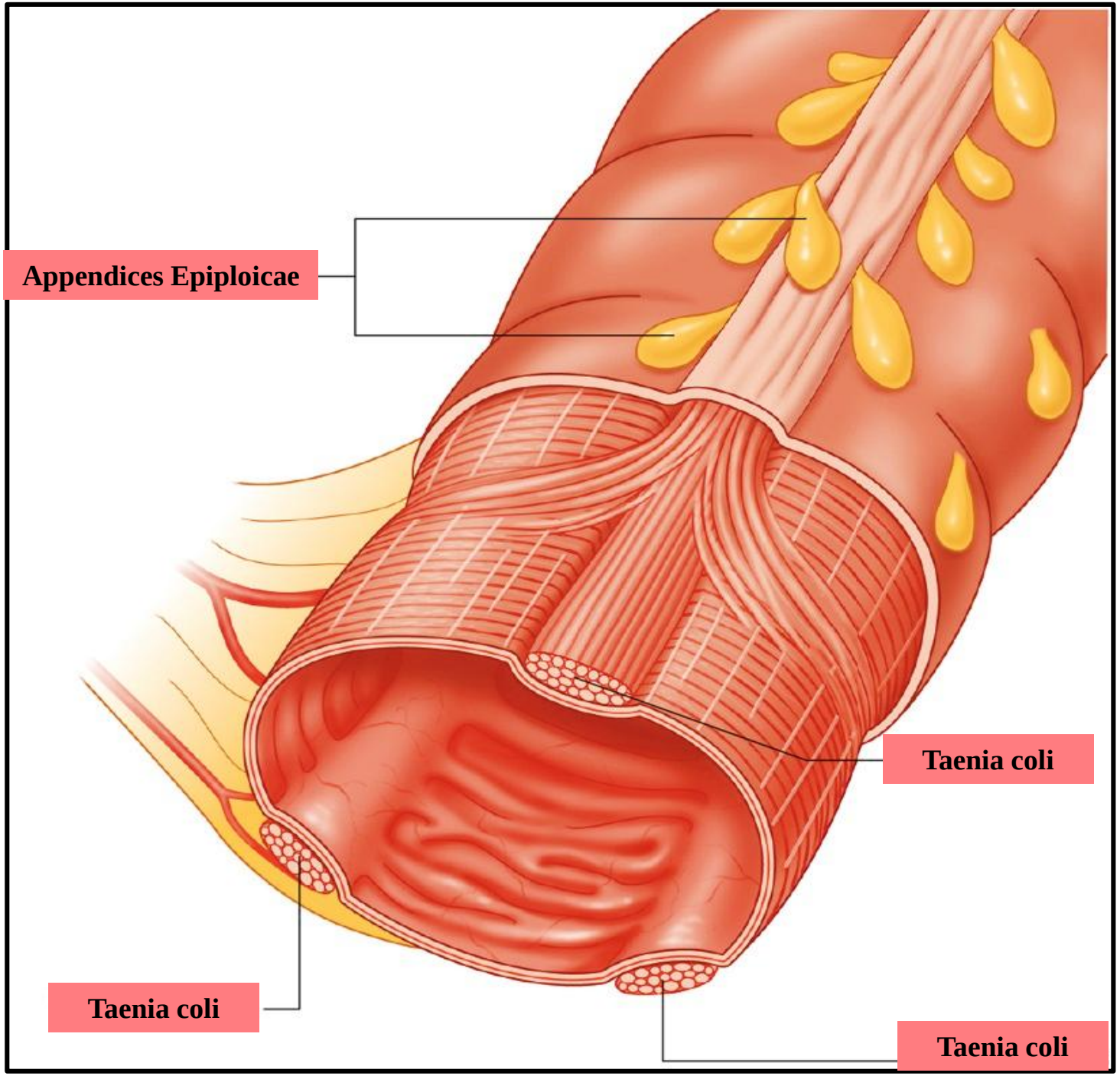

SMALL INTESTINE
LARGE INTESTINE
Muscularis Mucosae
Intestinal Crypts
Intestinal Villi
Glands in the Submucosa
Tunica Submucosa
Tunica Muscularis Externa
Lymphatic Nodules in the Submucosa
Myenteric Nerve Plexus
Tunica Serosa (Peritoneum)
NO Villi!
Intestinal Crypts
Muscularis Mucosae
Tunica Submucosa
Tunica Muscularis Externa
Myenteric Nerve Plxus

		Small Intestine	Large Intestine
Mucosa	Epith.		Crypts No paneth cells 
	Corium		
	MM		
Submucosa		Connective tissue containing blood vessels, nerves and lymphatics	
		-Duodenum: Bruner's glands -Ileum: Peyer's patches	Solitary lymph follicles
Musculosa		Smooth muscle fibres: -Inner circular -Outer longitudinal	
			Taenia coli Outer longitudinal layer: -Colon: Breaks up into 3 bands (Taenia coli) -Rectum: Continuous (No Taenia coli)
Serosa		Connective tissue covered with simple squamous mesothelial cells	
			Appendices epiploicae Masses of adipose C.T. hangs out from serosa into peritoneal cavity



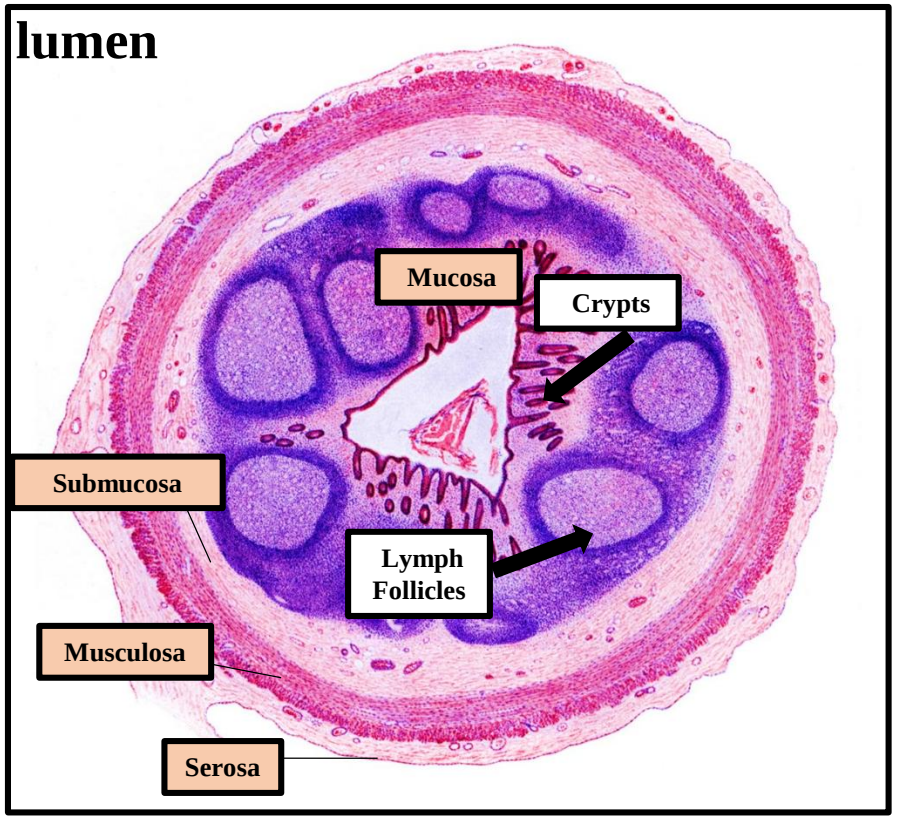
Large Intestine




Appendices Epiploicae
Taenia coli
Taenia coli
Taenia coli

Vermiform Appendix

The human appendix has the general characters of large intestine with few differences: narrow lumen



Mucosa

Epith.

Crypts: Few, narrow & short with few goblet cells

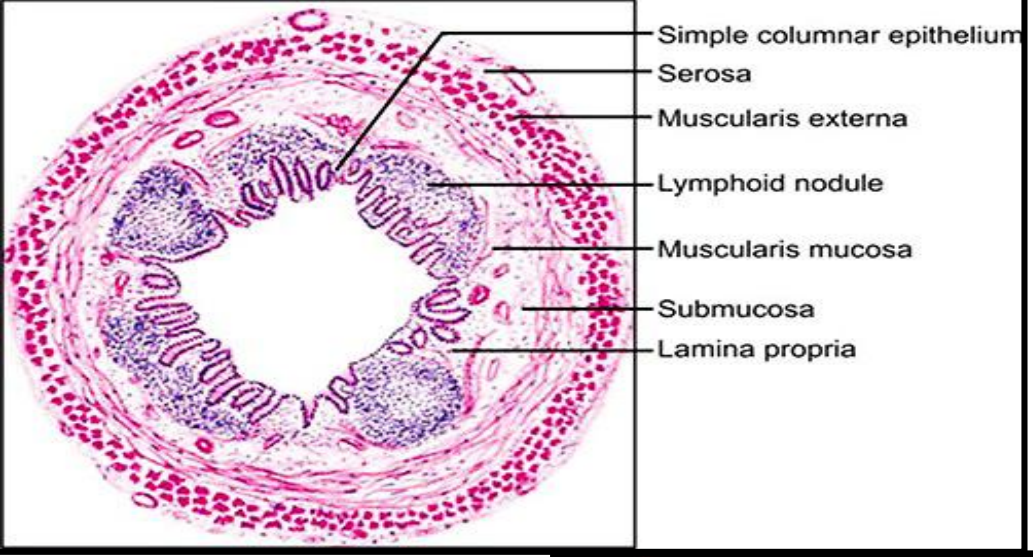
Corium

MM

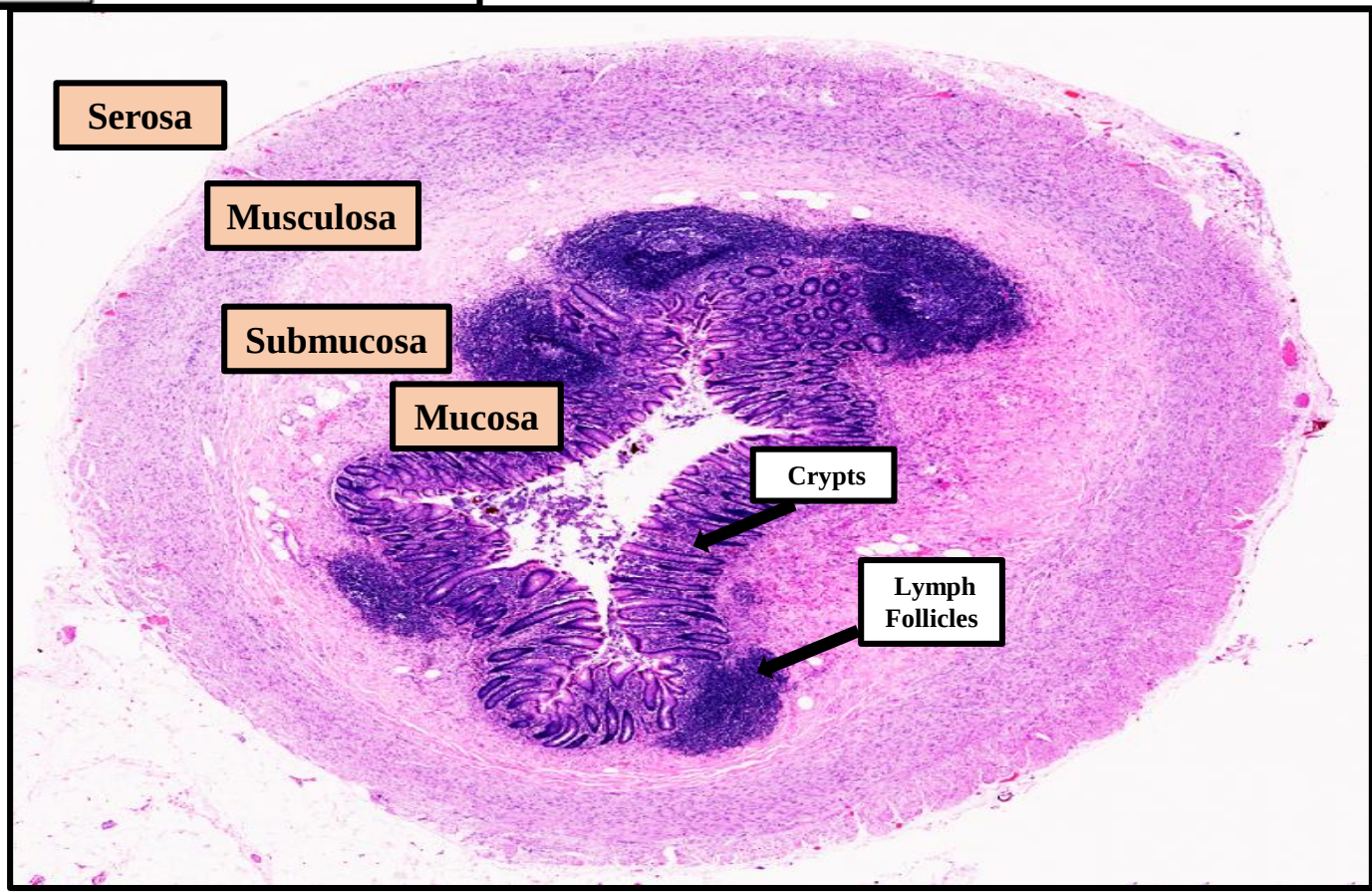
Submucosa — **Lymph follicles along the whole circumference**

Musculosa — **Outer longitudinal layer is continuous (No taenia coli)**

Serosa — **No appendices epiploicae**



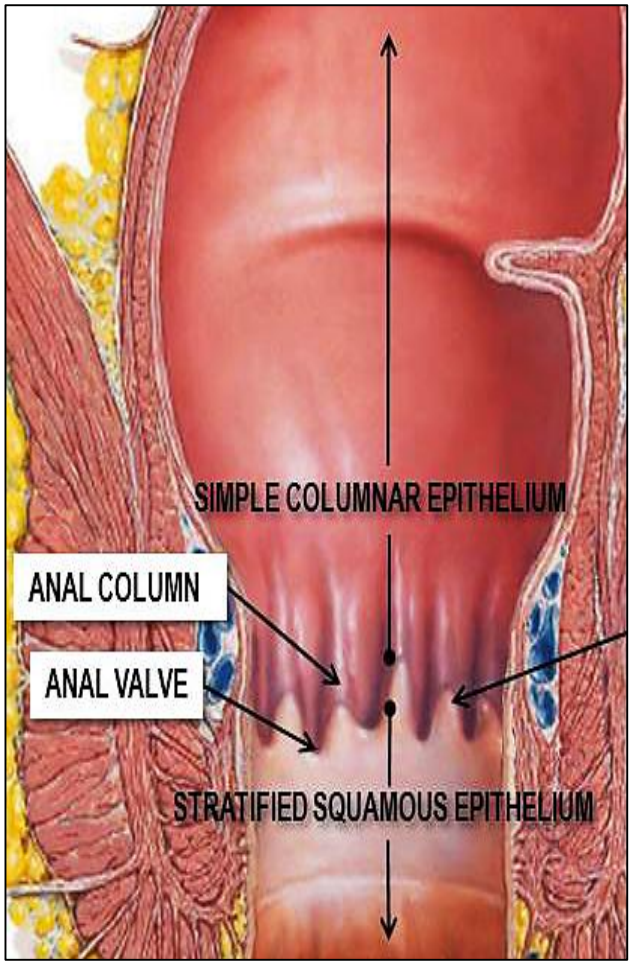
Vermiform Appendix



The anal canal

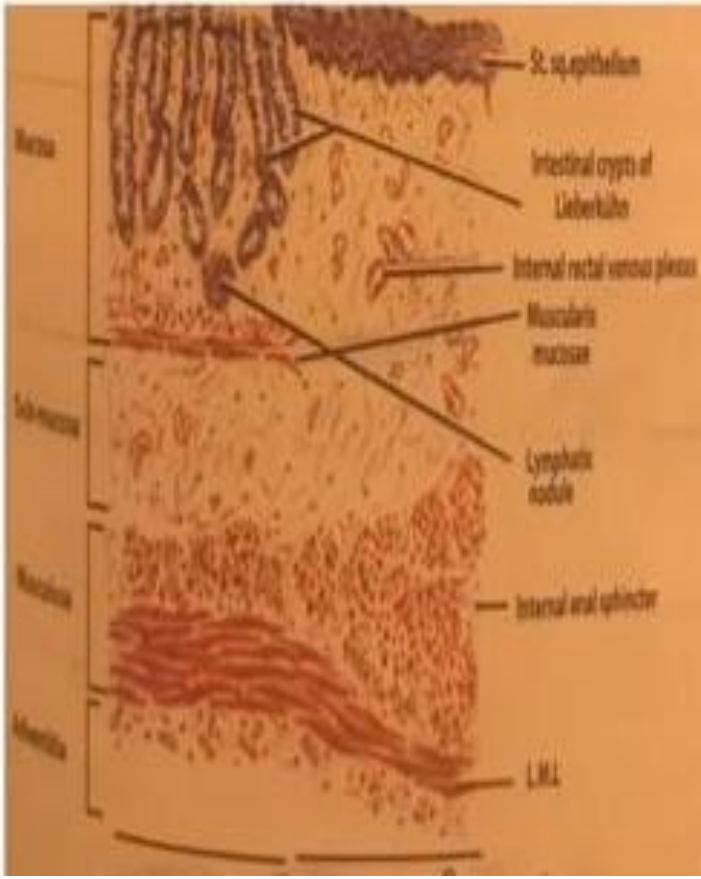
The mucosa of the anal canal shows permanent vertical folds called **columns of Morgagni**

The ends of Morgagni columns connected together with transverse mucosal folds called **anal valves which mark the pectinate line**



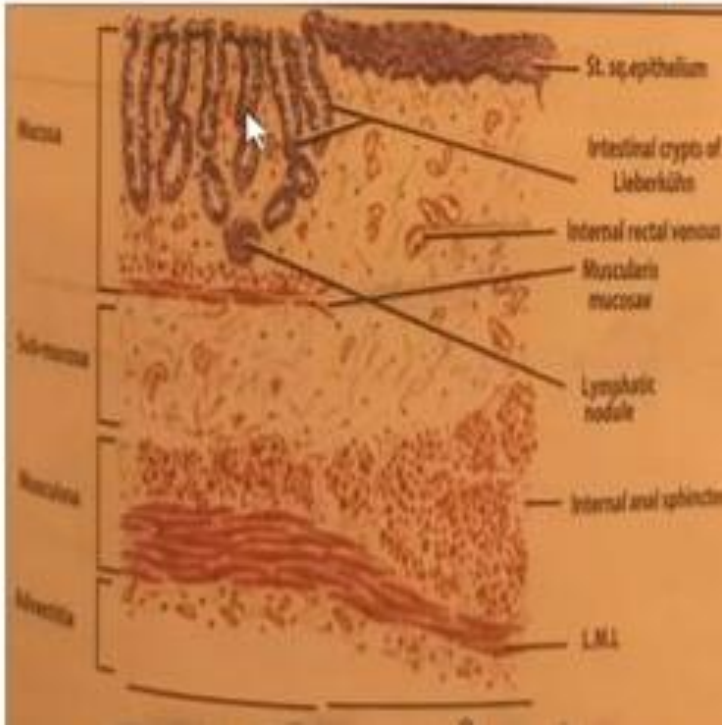
III- The recto anal junction

A- Epithelium: changes gradually from *simple columnar epithelium with goblet cells* → *stratified columnar* epithelium on the anal columns → *non keratinized stratified squamous* epithelium at the level of the anal valves → *keratinized stratified squamous* epithelium about 1cm above the anal orifice with hair follicles, sebaceous glands& the circumanal apocrine sweat glands.



III- The recto anal junction

- **Lamina propria:** the short crypts of Liberhuhn gradually disapperar.
- **Muscularis mucosae:** fades out at the level of the anal columns, and the lamina propria blends with **the submucosa** of the anal canal& *contains the internal rectal venous plexus.*

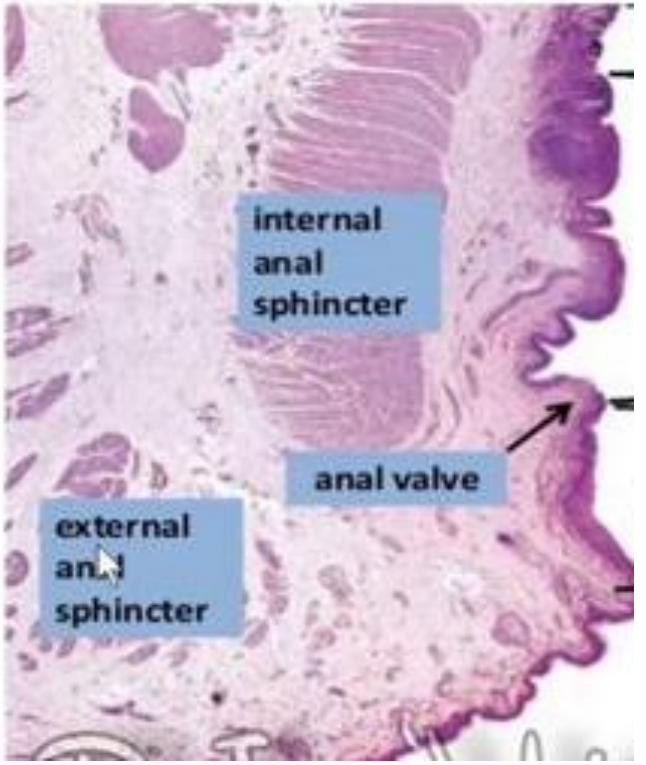


III- The recto anal junction

3- Musculosa:

- The inner circular smooth muscle layer is thickened to form *the internal anal sphincter.*
- Distal to internal anal sphincter, there is *the external anal sphincter* (circumferential bundles of skeletal muscles).
- The outer longitudinal layer: fades in between the 2 sphincters.

4- Adventitia: The adventitia of rectum is continuous with the dermis around the anal orifice which contains *the external rectal venous plexus.*

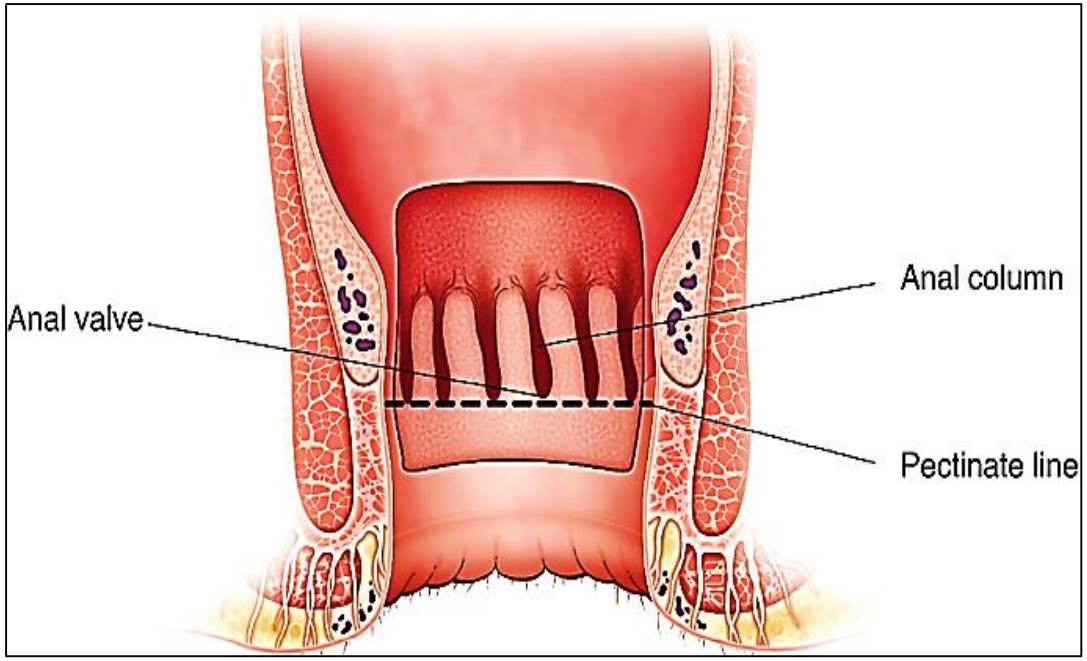


Importance of the pectinate line

The pectinate line demarcates the upper two-thirds of the anal canal from the lower one-third.

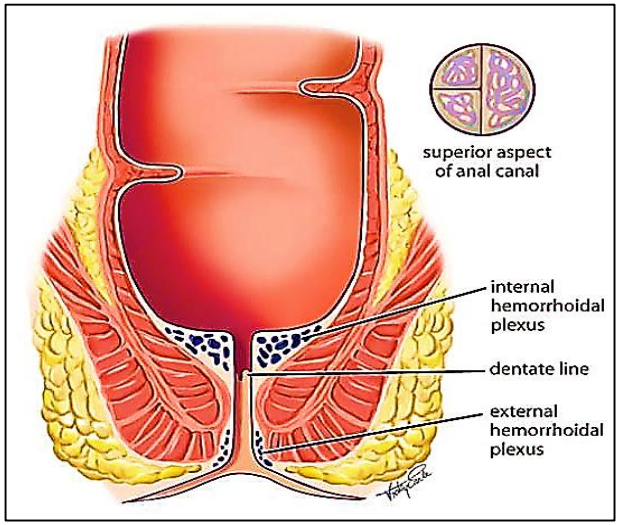
It also serves as an embryologic landmark that explains the different arterial supply, venous drainage, lymphatic drainage, and nervous supply of the segments of the anal canal

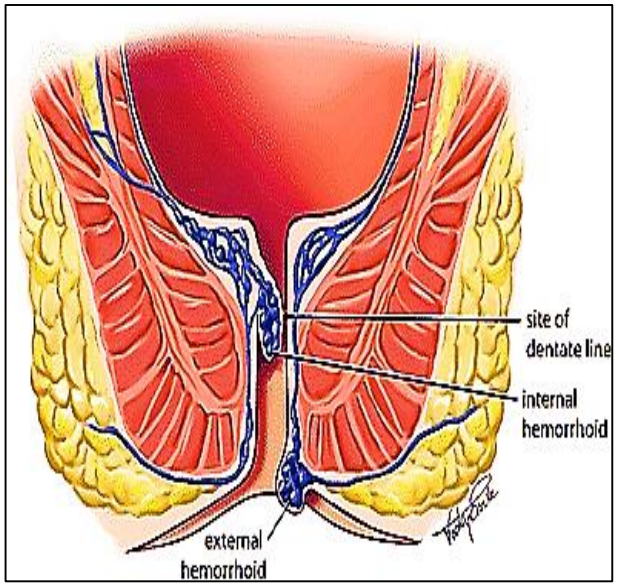
Even tumors arise in the upper 2/3 different from tumors arise in the lower 1/3



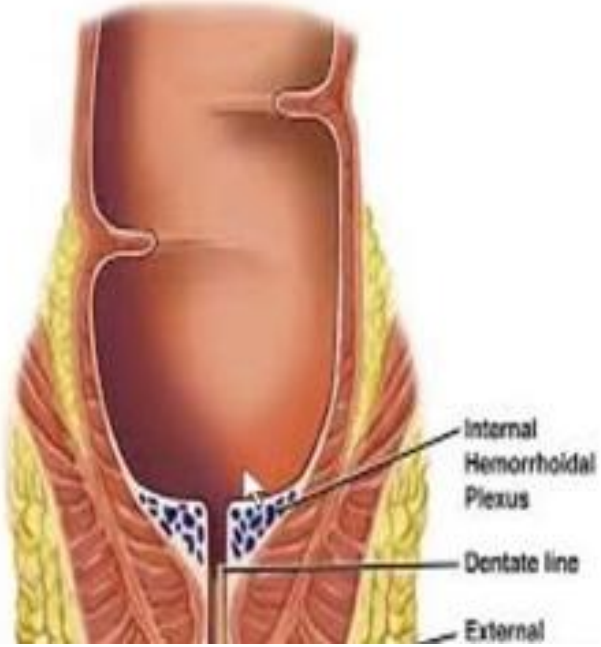
Hemorrhoids also called piles, are swollen veins of the anus and lower rectum, similar to varicose

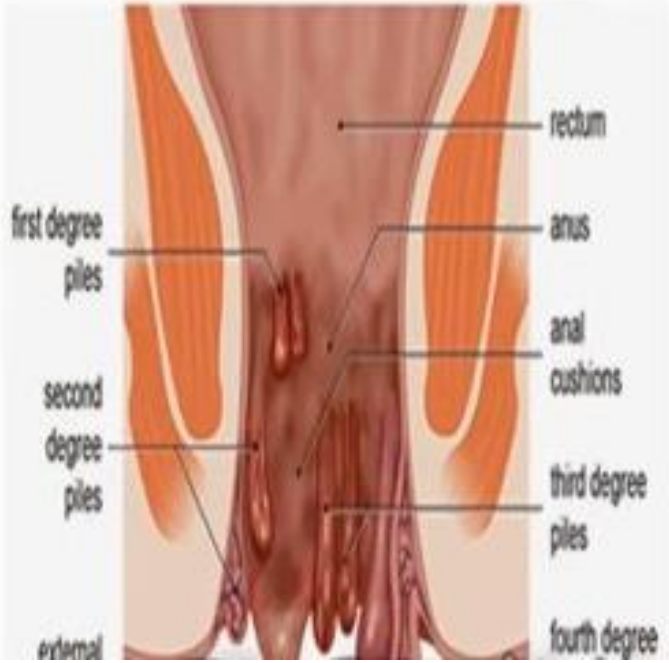
Internal hemorrhoids are usually painless, but tend to bleed. External hemorrhoids may cause pain





The venous plexuses of the recto anal junction may become dilated and congested causing piles (hemorrhoids).






thank you