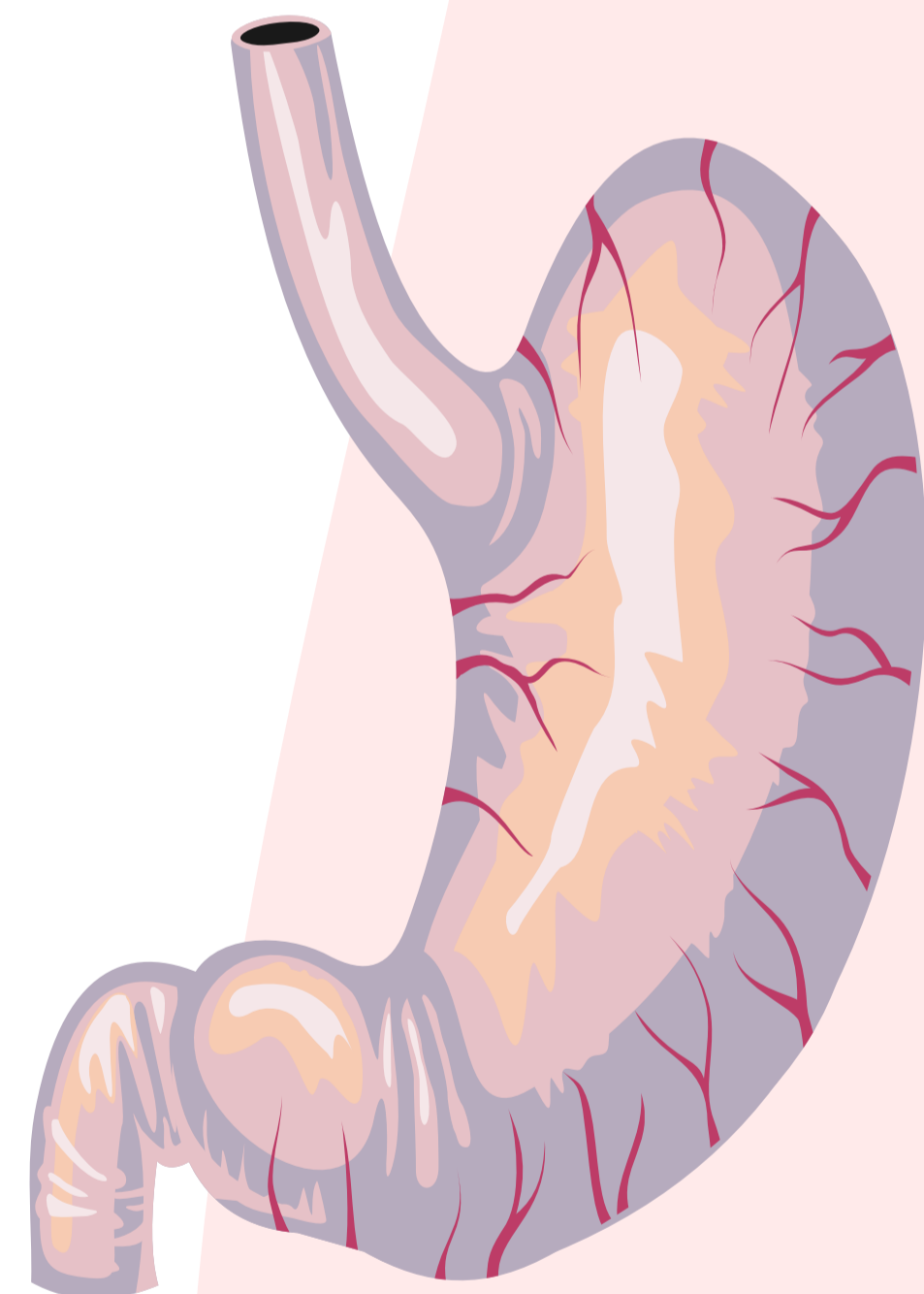
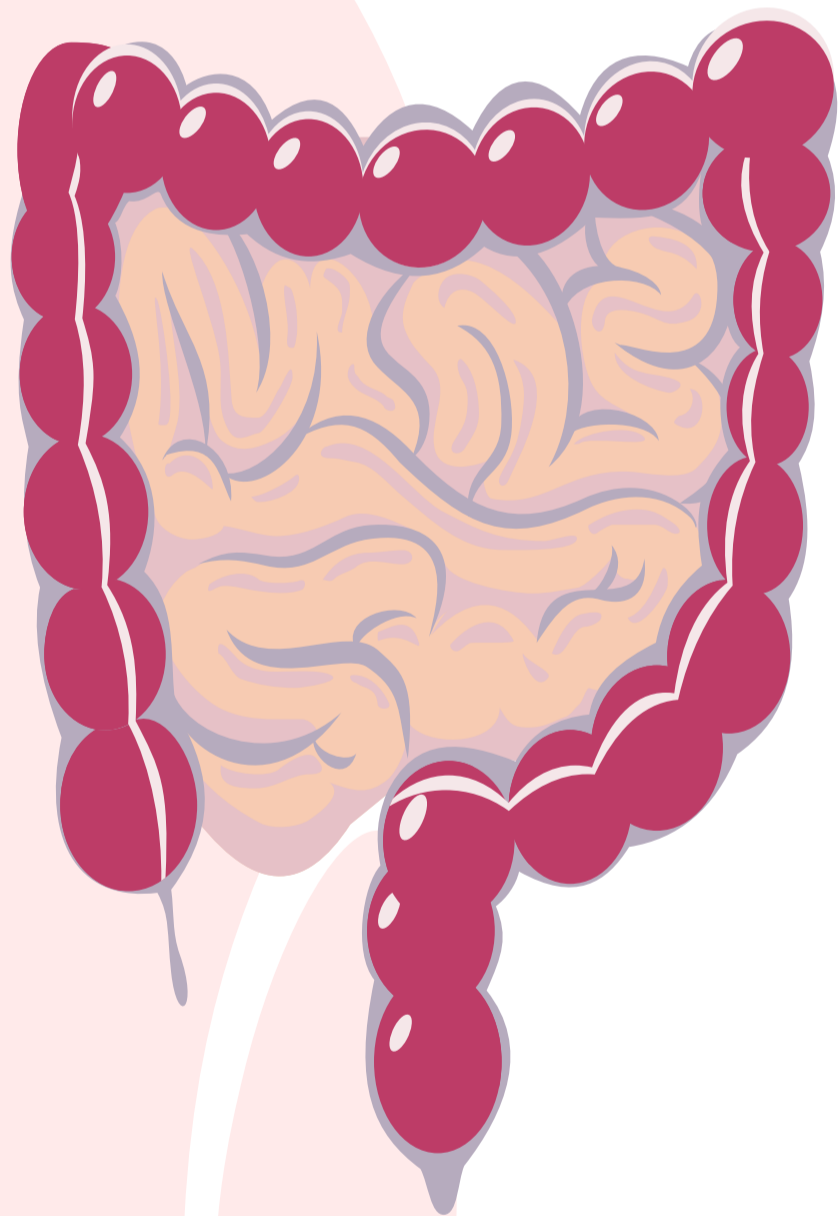


Small intestine



Color index:

- Main text
- important
- female slides
- male slides
- Dr.note
- Extra

Editing File

[Gastrointestinal & Nutrition Block | Histology]

Objectives



At the end of this lecture, you should be able to answer the following (objectives):

describe the microscopic structure of the three regions of the small intestine:

- Duodenum.
- Jejunum.
- Ileum.

Table of contents:

Characteristic of the small intestine mucosa

Regional differences of Small intestine

Duodenum Layers

EE (DNES) Cells

**This lecture was presented by:
Dr. Aly Mohamed Prof. Raesa Abdultawab**

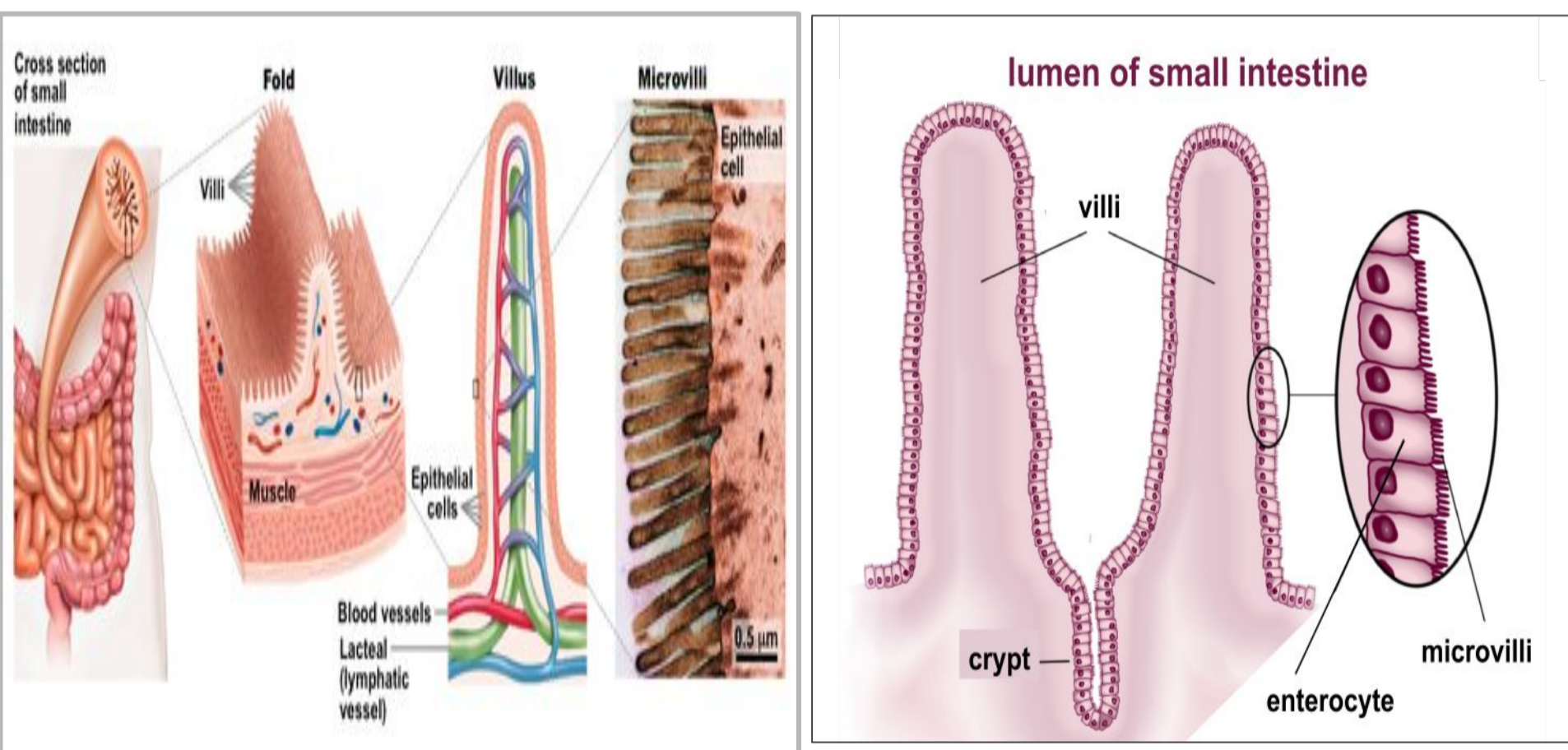
Small intestine

To increase surface area, the mucosa has:

• Villi

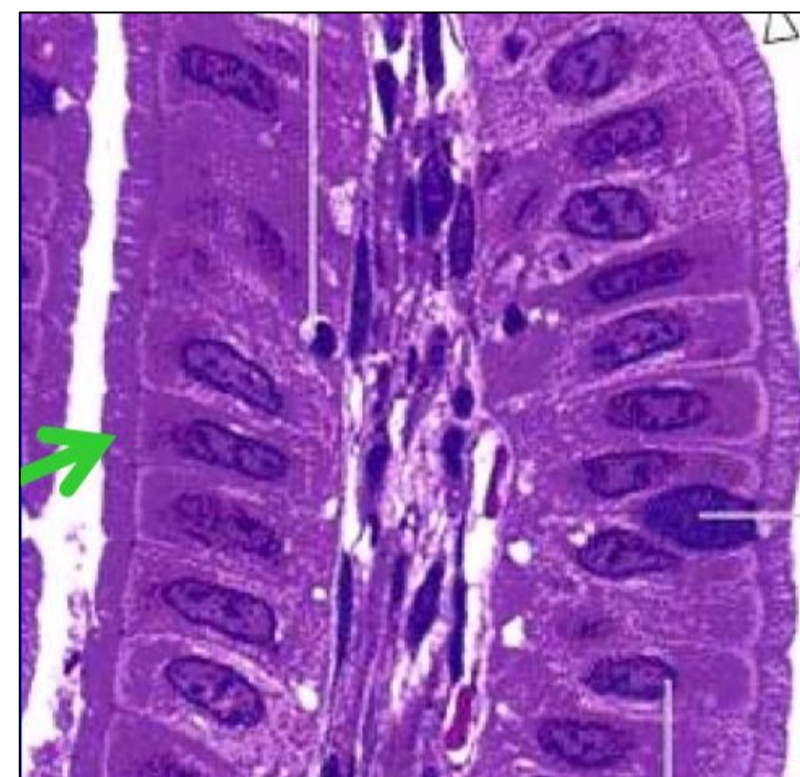
like roots, Villi is **ONLY** found in small intestines (**NOT** stomach or colon) 📁

extra



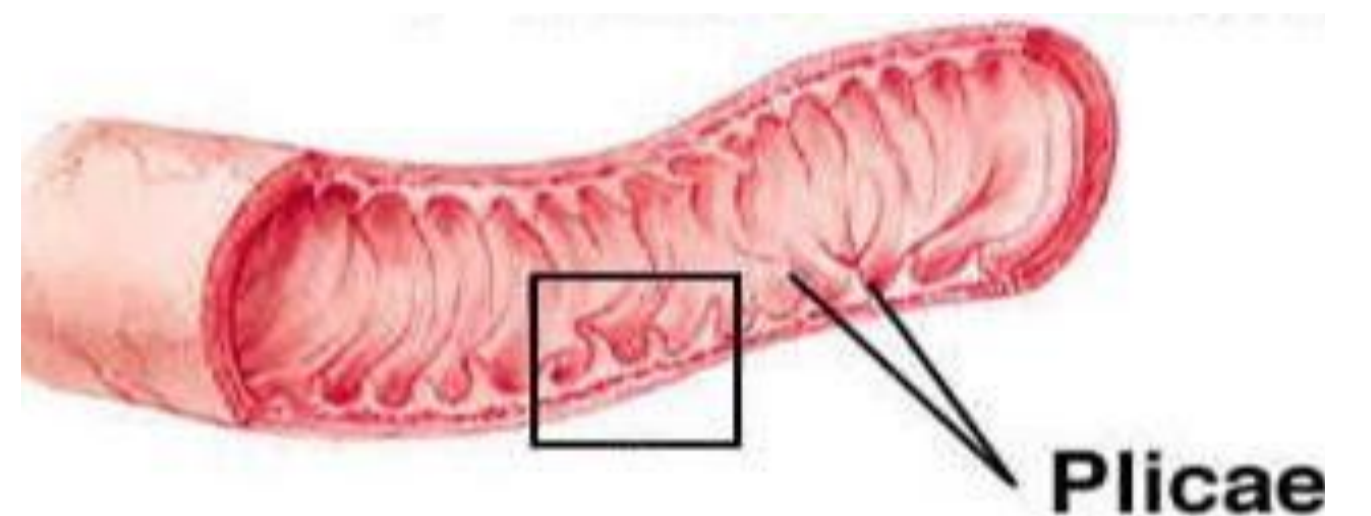
• Microvilli (Brush border)

mini villi present only in the small intestine and the proximal tubules of the kidney



• Plicae circulares (circular folds): Permanent folds of the mucosa and submucosa.

(Stomach has rugae to increase the capacity for storage while small intestine has folds to increase the surface area for absorption, it is a fixed structure).



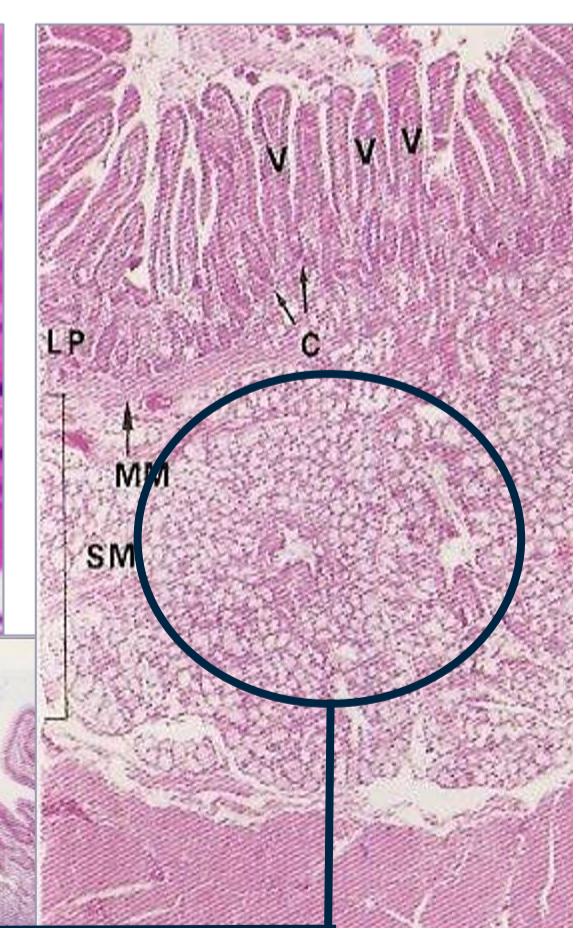
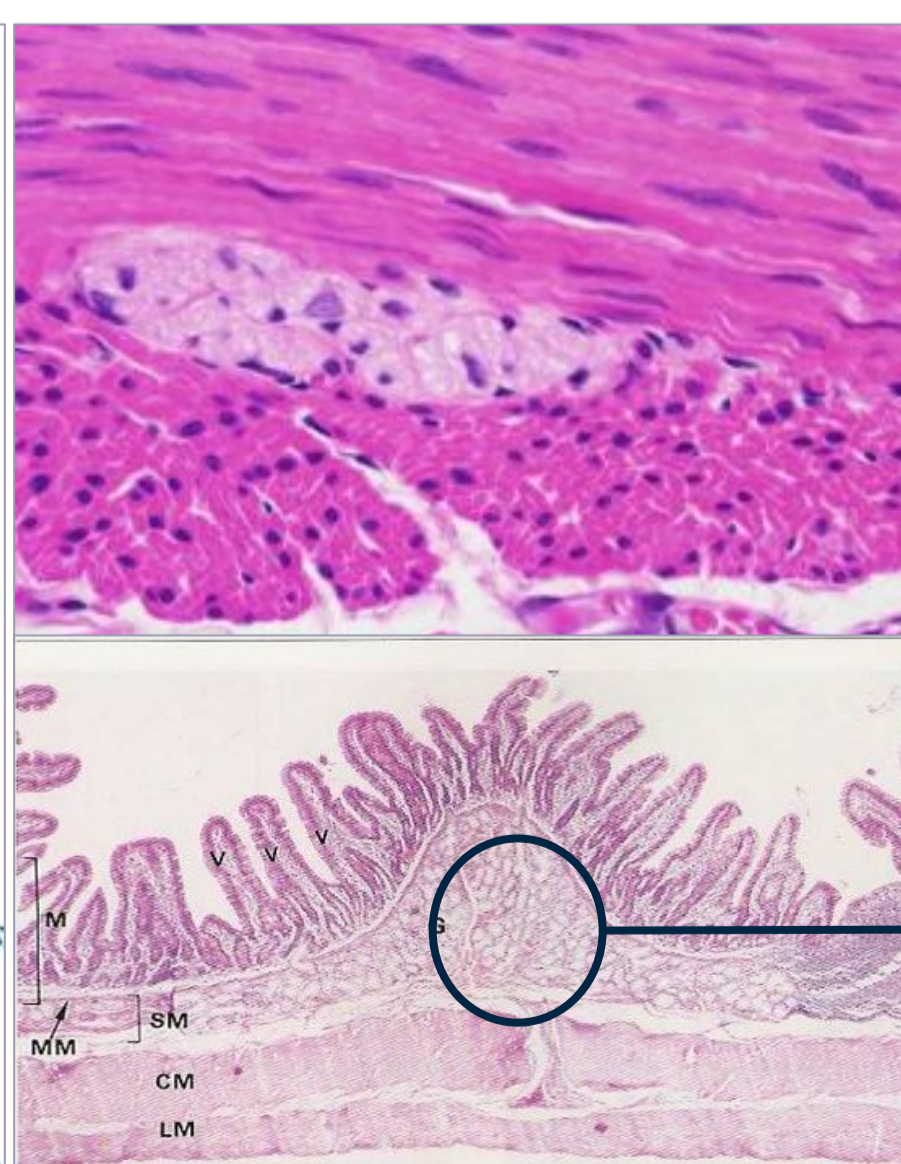
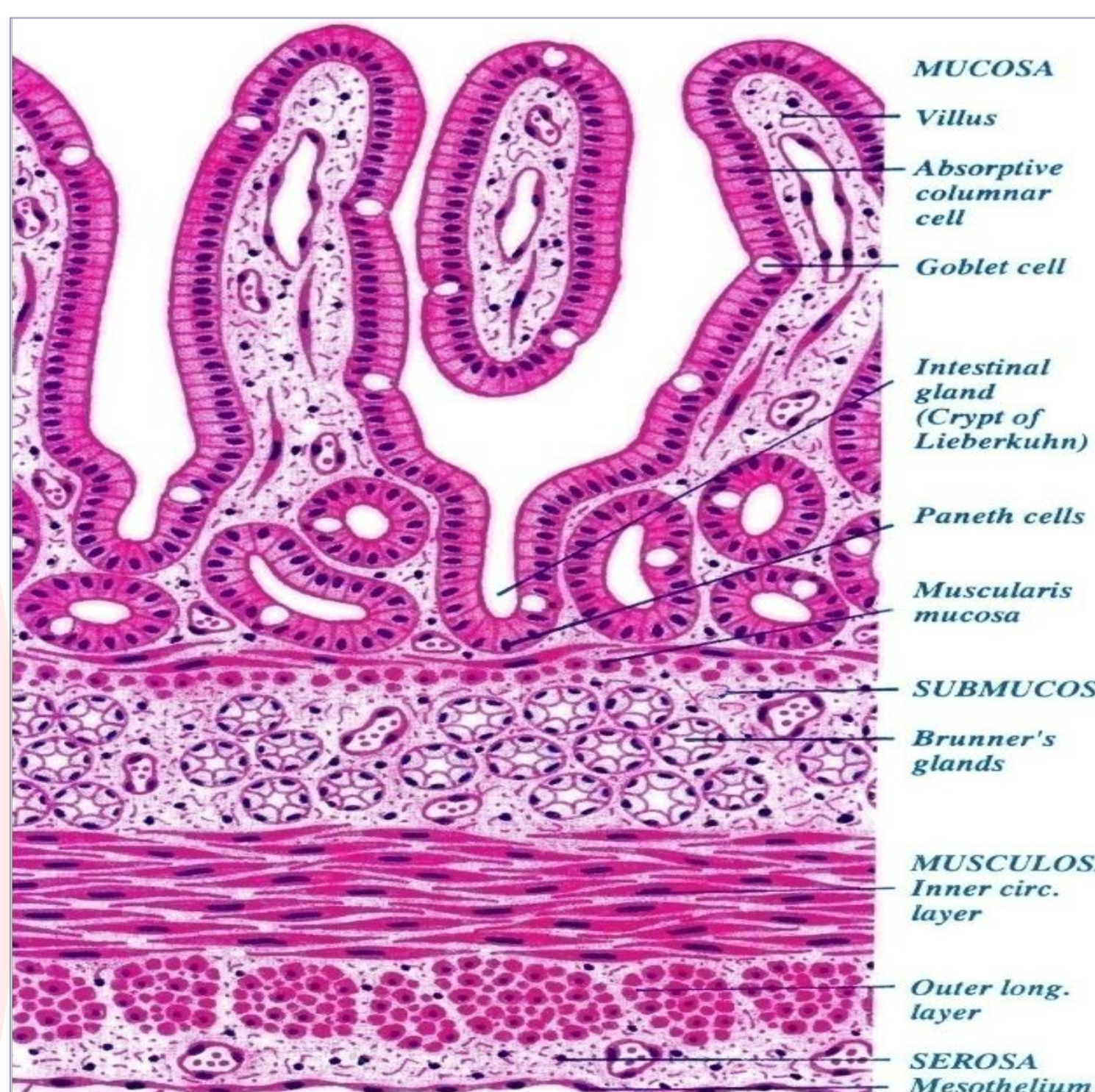
• Intestinal crypts (gland) (crypts of Lieberkühn). absorptive cells

Regional differences of Small intestine

Duodenum	Jejunum	Ileum
<ul style="list-style-type: none"> - Its submucosa has Brunner's glands. 📁 - It is invested by serosa in 1st and 3rd parts or adventitia in 2nd part. 	<ul style="list-style-type: none"> - Has neither Brunner's glands nor Peyer's patches. - It is invested by serosa. 	<ul style="list-style-type: none"> - Its lamina propria, opposite the attachment of the mesentery Has lymphoid nodules (Peyer's patches 📁 with Mucosal origin) that extend to the submucosa - Ileum is invested by serosa.
<p>Brunner's glands.</p>	<p>Jejunum H&E lumen villi with simple columnar epithelium longitudinally and transversely cut smooth muscle cells</p>	<p>Peyer's patches</p>

Duodenum Layers

Inner	Mucosa	<p>Shows villi and crypts</p> <p>A- Epithelium: simple columnar epithelium absorptive cell with brush border with goblet cells.</p> <p>B- Lamina propria: Loose areolar C.T.</p> <p>C- Muscularis mucosae: 2 layers of smooth muscle cells.</p>
	Submucosa	<ul style="list-style-type: none"> •Connective tissue containing blood vessels & nerves. •Contains Brunner's glands (secrete mucus) <p>I will not bring it as (brunner's glands are found in duodenum only, you have to know which layer EXACTLY)</p>
	Muscularis Externa	<p>2 smooth muscle layers:</p> <ul style="list-style-type: none"> • Inner circular layer. • Outer longitudinal layer.
Outer	Serosa / Adventitia	Duodenum is invested by a serosa or adventitia



Mucosa of Duodenum

Intestinal villi

• Each Villus is a finger-like projection of small intestinal mucosa and it is formed of:

1- Central core of loose areolar C.T. containing:

- Lymphocytes • Plasma cells. • Fibroblasts.
- Smooth muscle cells. Comes from Muscularis mucosae • Capillary loops.
- Lacteal (blindly ending lymphatic channels) the majority of fat goes through it

2- Villus-covering epithelium.

Cells Covering the Villi

MCQ
What are the cells that cover the villi?

• Surface columnar absorptive cells:

- They have brush border (microvilli).
- They are covered with thick glyocalx that has digestive enzymes.

- They have Junction complex 'more than one' (tight, adhering and desmosome junctions)

• Goblet cells: Increase toward the ileum. start to appear in duodenum and continue to increase in number till the end of git

• Enteroendocrine (EE) cells (DNES cells).

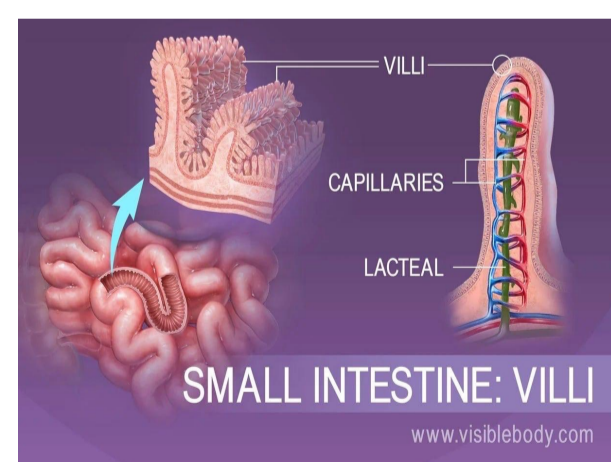
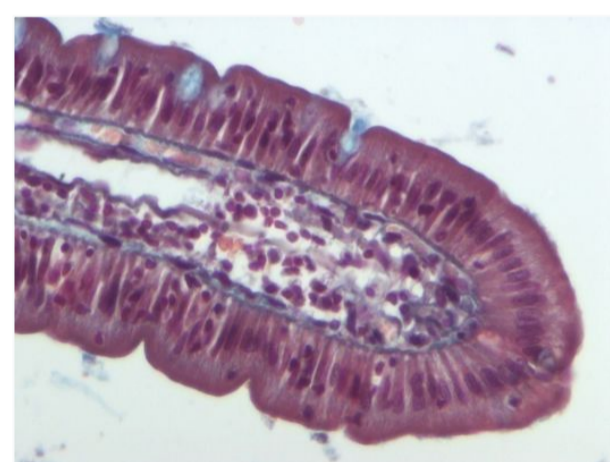
Intestinal glands (crypts)

• Simple tubular glands that open between villi.

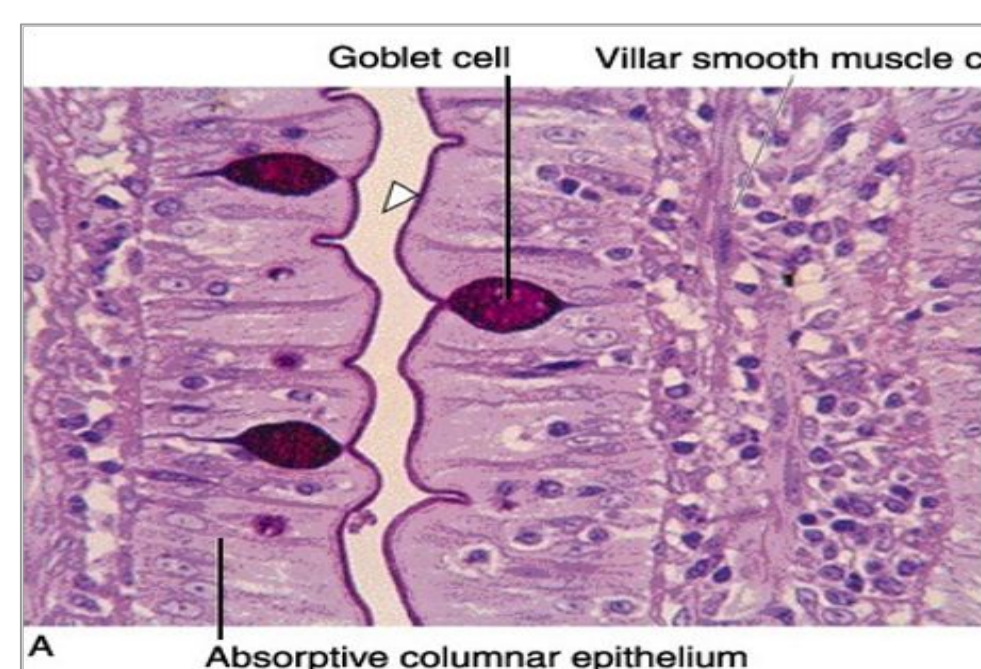
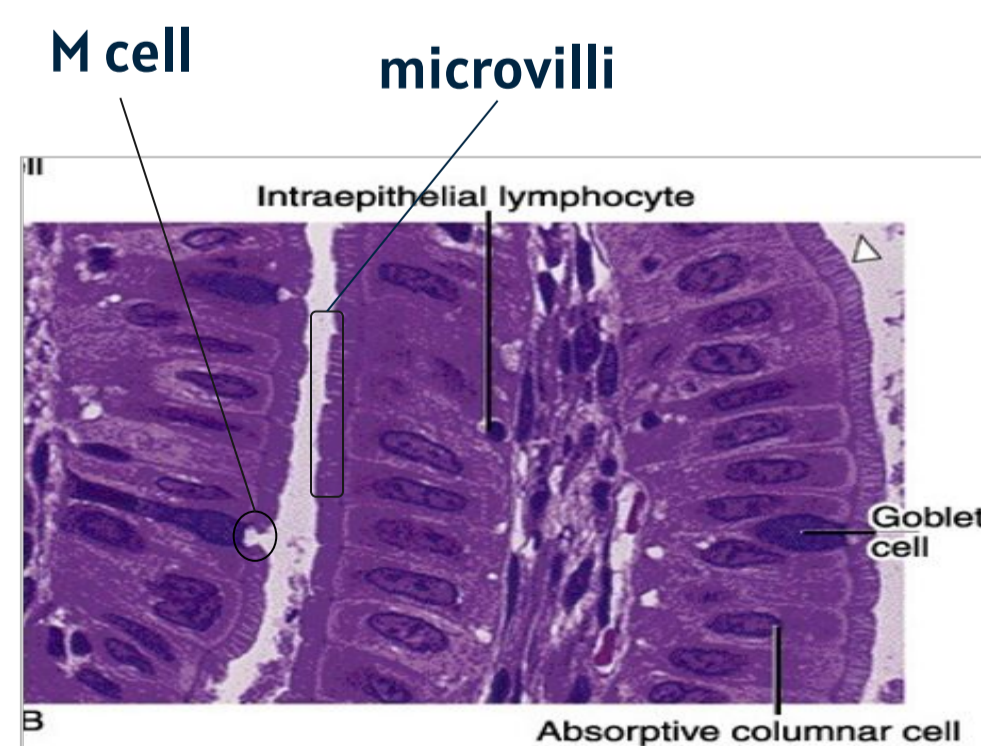
• Composed of 5 cell types:

1. Simple Columnar absorptive cells.
2. Goblet cells: secrete mucus.
3. Enteroendocrine (EE) (DNES) cells: secrete hormones.
4. Paneth cells: secrete Lysozyme (antibacterial) are found in the base of the crypts. present only in small intestine making it sterile 🎁🎁🎁
5. Stem cells: are regenerative cells. are found in the base of the crypts.

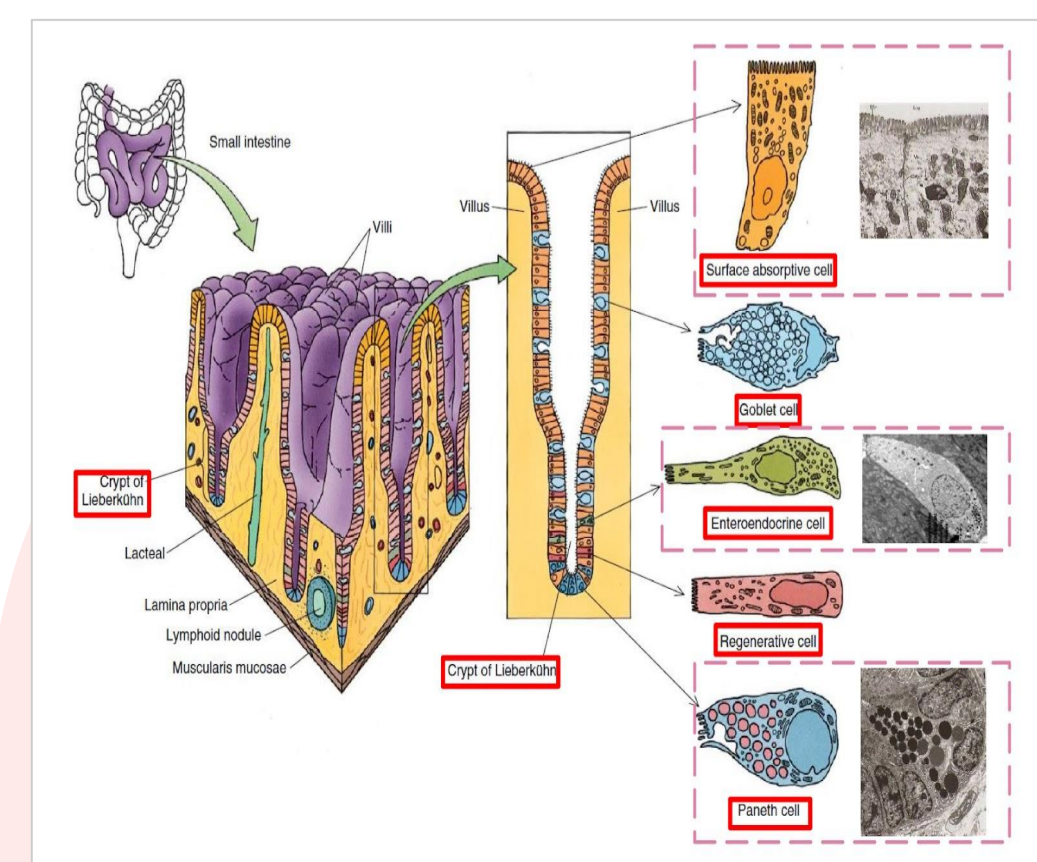
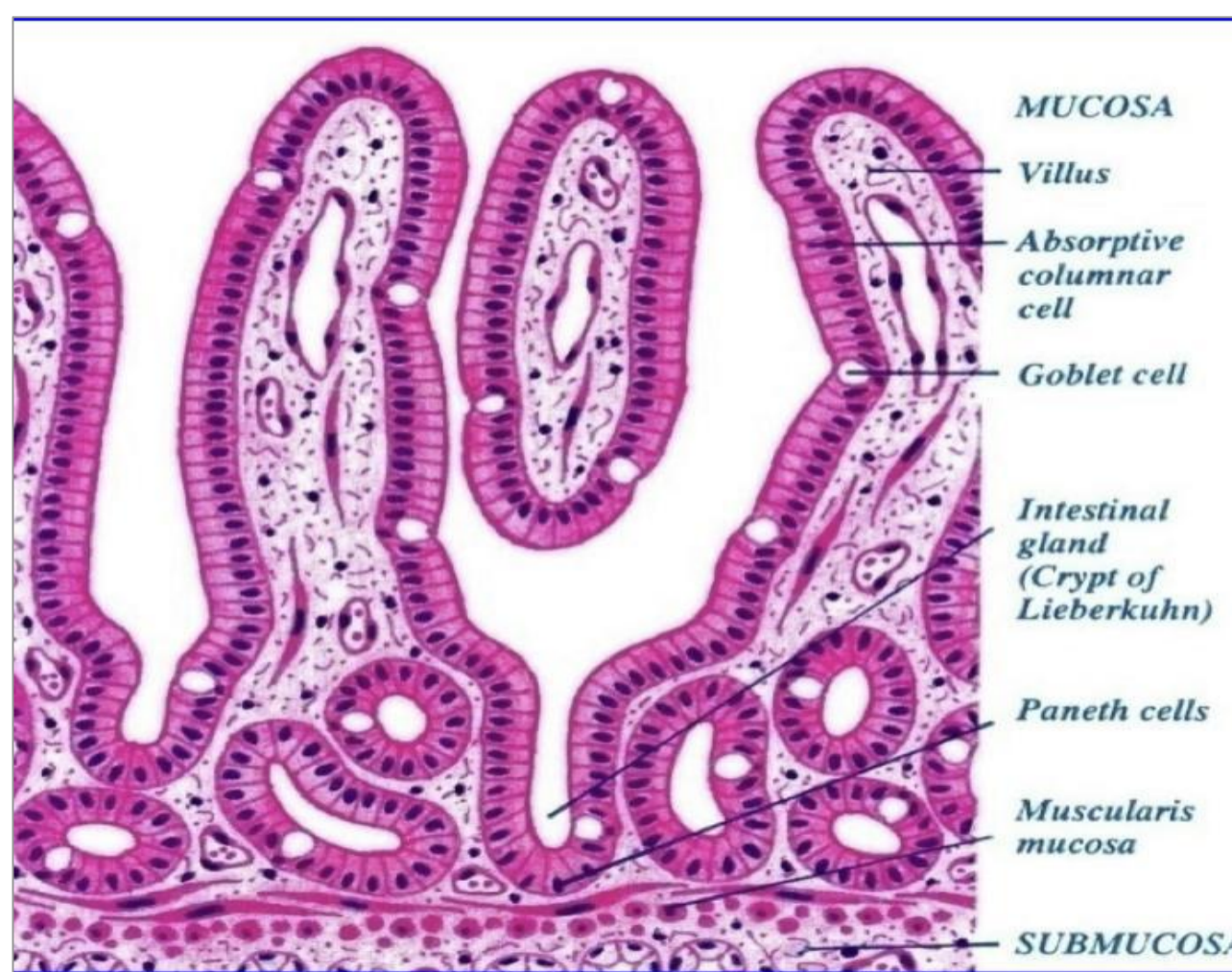
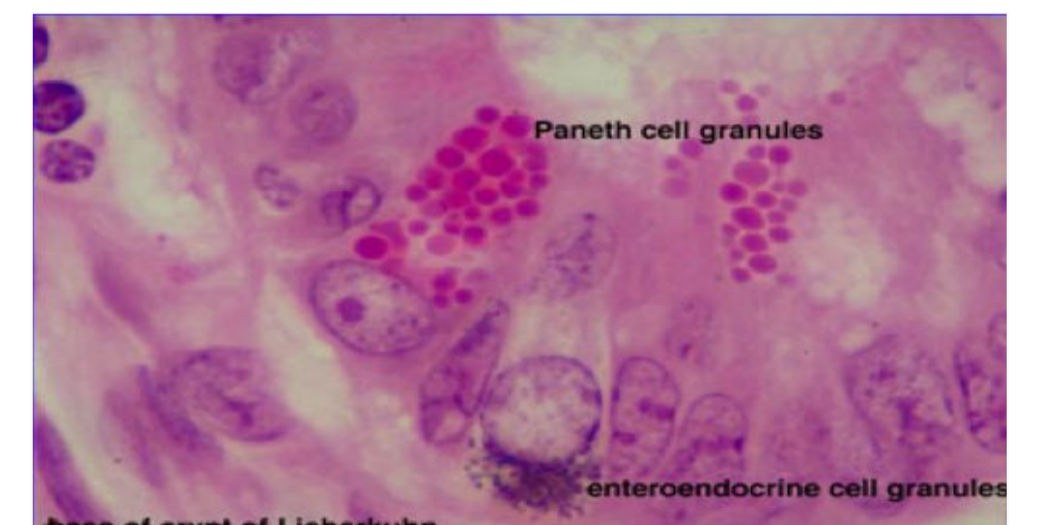
Intestinal villi



Cells covering the villi



Intestinal glands (crypts)



EE (DNES) Cells

EC cells:
• secrete endorphin and serotonin.

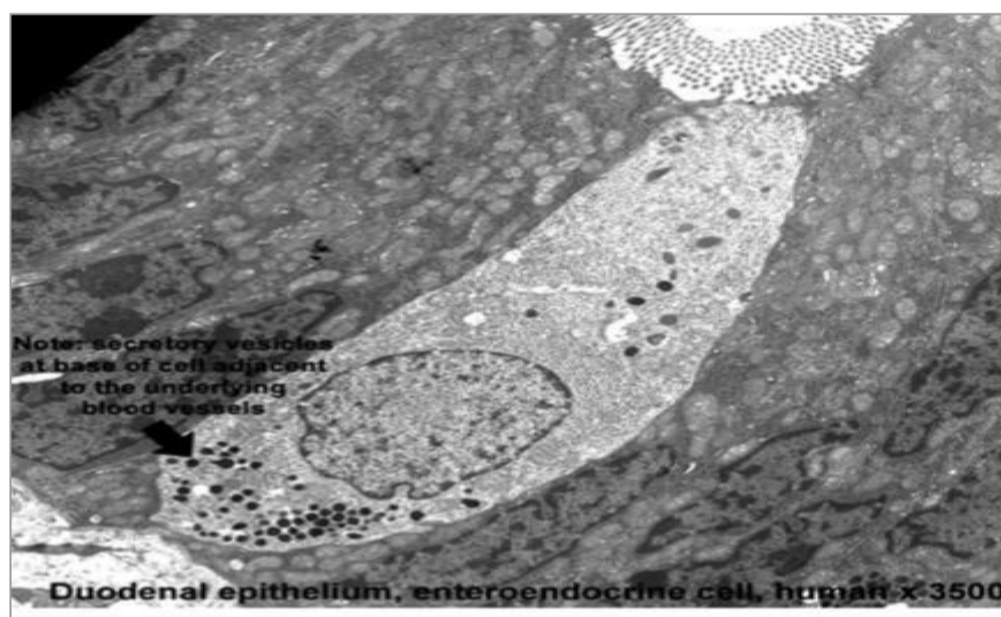
S cells:
• secrete secretin.

D (delta) cells:
• secrete somatostatin

A (alpha) cells:
secrete glucagon.
(found in liver)

Mo cells:
• secrete motilin

CCK-PZ cells:
• secrete cholecystokinin (pancreozymin)



★ M Cells (Microfold cells)

They are mainly found within the intestinal epithelium overlying lymphatic nodules of lamina propria.

- Each is a dome-shaped cell (or specialized squamous cell) with a basal concavity that contains intraepithelial lymphocytes and macrophages.
- They (macrophage) phagocytose and transport antigens present in the intestinal lumen to the underlying lymphoid tissue cells to initiate the immune response to these antigens leading to the secretion of IgA.

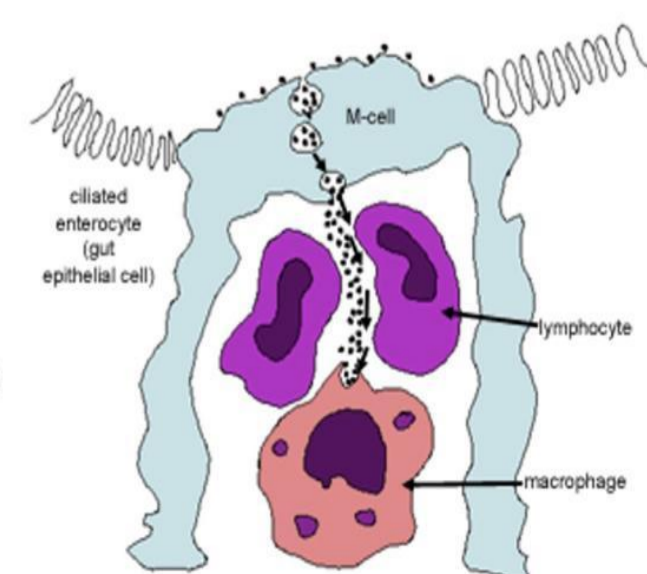
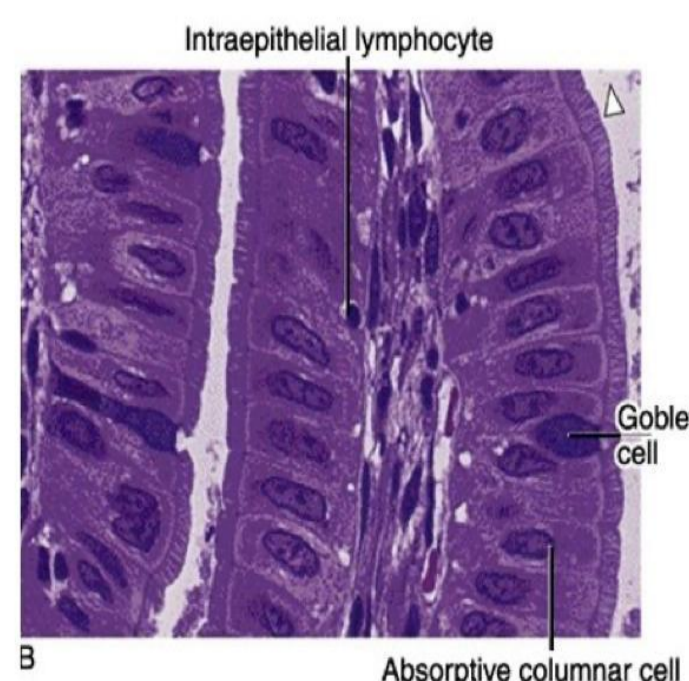
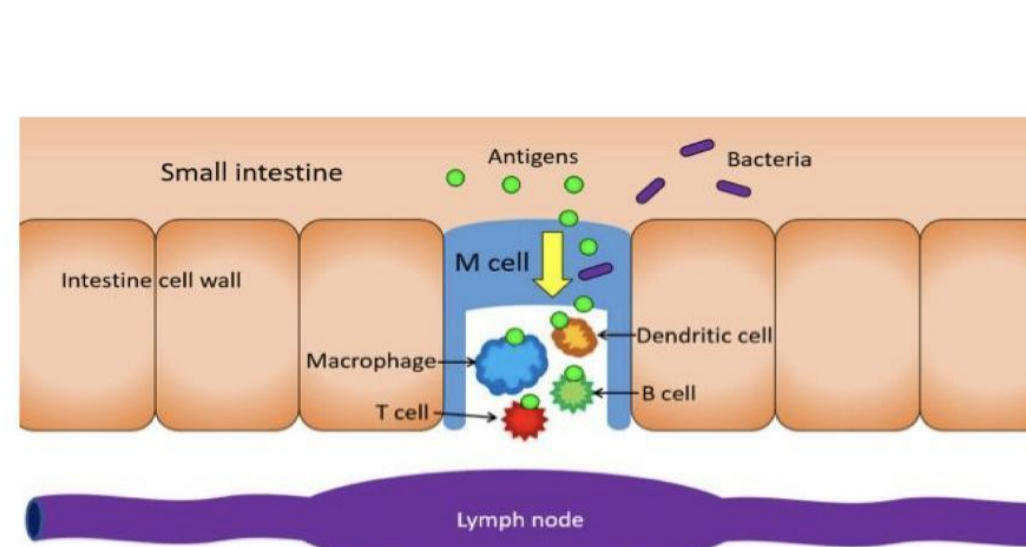
(Surface antibodies)

Small intestine lamina propria contain lymphatic nodules

"appear most in ileum because it near to the large intestine which is full of bacteria" which a collection of lymphocytes and macrophages.

The M cells was عادية خلية but due to the cells in the lymphatic nodules حفرت in the basal part of the cell near the lumen, has non microvilli and modified to present the Auto immune Cells mainly the macrophages.

"Sometimes because of its small thickness يمكن تدخل ال antigen by pinocytosis"



MCQs



01	Which one of the following is present ONLY in ileum:			
A- serosa	B- Peyer's patches	C- Brunner's glands	D- lamina propria	
02	M cells can lead to the secretion of:			
A- IgE	B- IgG	C- IgA	D- IgM	
03	Crypts of Lieberkühn are present at:			
A- stomach	B- small intestine	C- large intestine	D- esophagus	
04	Which one of the following cells covers the villi:			
A- simple columnar epithelium	B- stratified columnar epithelium	C- simple cuboidal epithelium	D- simple squamous epithelium	
05	Paneth cells are present at:			
A- Serosa	B- villi	C- Crypts	D- Submucosa	

Answer key:

1. B
2. C
3. B
4. A
5. C

This Lecture is done by:

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