



Motivational Corner:

“ A river cuts through a rock not because of its power, but its persistence.”



Objectives:

By the end of this lecture,

- The student should describe the microscopic structure of the three regions of the small intestine:

1- *Duodenum.*

2- *Jejunum.*

3- *Ileum.*

- Identify the histological structure of the 4 layers of colon.

- Identify the histological structure of the 4 layers of appendix.

4+5-

Small and Large intestine

Extra notes: Gray

Important notes: Red

Revised by

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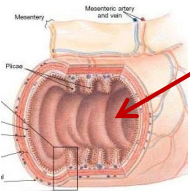


Intestine

Small Intestine

To increase surface area the mucosa has:

- Plicae circulares (circular folds). Permanent folds of the mucosa and submucosa.
- Villi.
- Intestinal crypts (crypts of Lieberkühn).
- Microvilli (Brush border).



Large Intestine

Appendix

Cecum

Colon

Rectum

Anal Canal

Ascending

Transverse

Descending

Sigmoid

Duodenum

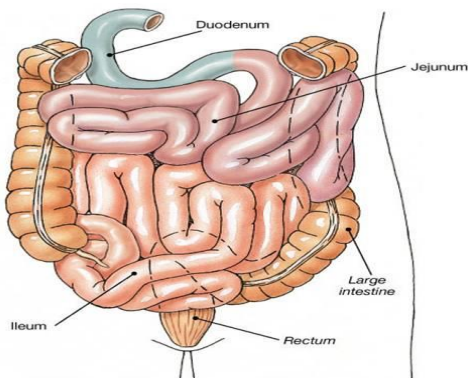
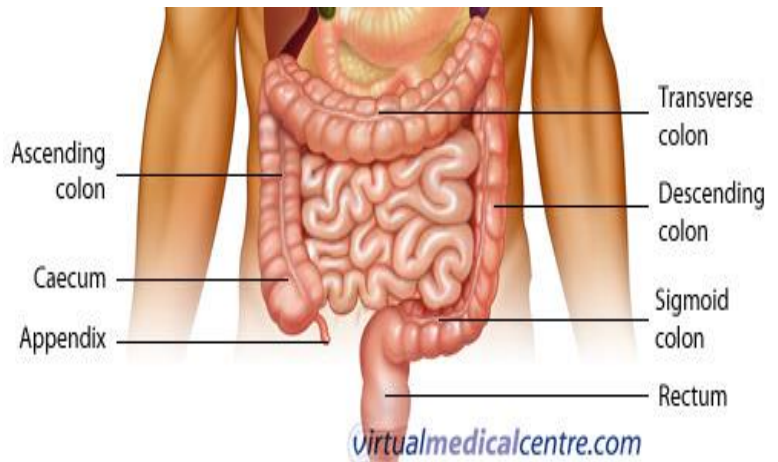
Jejunum

Ileum

Its submucosa has **Brunner's glands**. It is invested by serosa or adventitia

has neither Brunner's glands nor Peyer's patches. Jejunum is invested by serosa.

Its lamina propria, opposite the attachment of the mesentery, has lymphoid nodules (**Peyer's patches**) that extend to the submucosa. Ileum is invested by serosa.



+ Duodenum:

Mucosa

Shows *villi* and *crypts*.

Submucosa

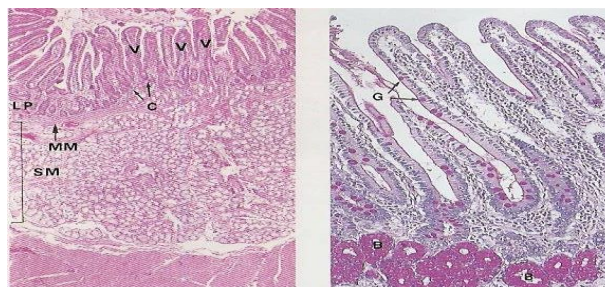
Connective tissue containing blood vessels & nerves.
Contains **Brunner's glands** (secrete mucus).

Muscularis externa

- 2 smooth muscle layers:
- (Inner circular layer, Outer longitudinal layer)

Serosa or adventitia

- Duodenum is invested by a serosa or adventitia.



Mucosa of Duodenum

Epithelium: simple columnar epithelium with **goblet cells**.

Lamina propria: Loose areolar C.T.

Muscularis mucosae: 2 layers of smooth muscle cells

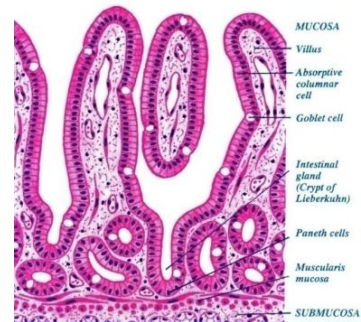


■ **INTESTINAL VILLI**

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

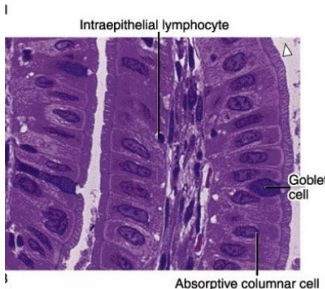
1- Central core of loose areolar CT

- **Containing:**
 - Lymphocytes
 - Plasma cells
 - Fibroblasts
 - **Smooth muscle cells**
 - Capillary loops
 - **Lacteal** (blindly ending lymphatic channels)



2- Villus-covering epithelium

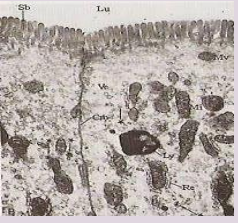
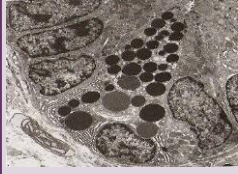
Cells covering villi:

Surface columnar absorptive cells	Goblet cells	Enteroendocrine (EE) cells (DNES cells).
<p>They have brush border (microvilli). They are covered with thick glycocalx that has digestive enzymes. They have Junction complex (tight, adhering and desmosome junctions).</p>	<p>Increase toward the ileum.</p>  <p>The image shows a cross-section of intestinal villi. Labels include 'Intraepithelial lymphocyte' pointing to a cell within the epithelium, 'Goblet cell' pointing to a cell with a large clear space, and 'Absorptive columnar cell' pointing to a tall cell with a brush border.</p>	<ul style="list-style-type: none"> ○ EC cells: secrete endorphin and serotonin. ○ S cells: secrete secretin. ○ D cells: secrete somatostatin. ○ A cells: secrete glucagon. ○ Mo cells: secrete motilin. ○ CCK-PZ cells: secrete cholecystikinin (pancreozymin)



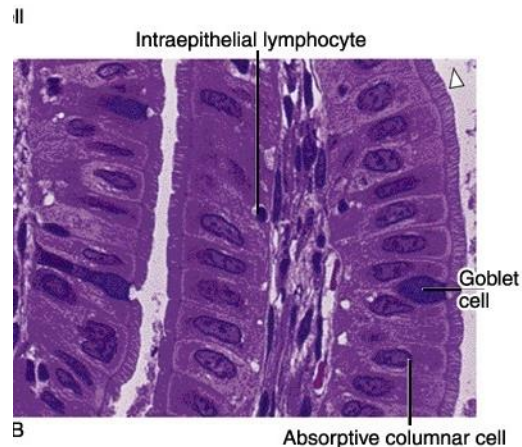
Intestinal Glands

- Simple tubular glands that open between villi.
- Composed of 5 cell types:

Columnar absorptive cells	Goblet Cells	Enteroendocrine (EE) (DNES) cells	Paneth cells	Stem cells
	Secrete Mucus	Secrete Hormone	Secrete Lysozymes (antibacterial) Are found in the base of the crypts 	Are regenerative cells & are found in the base of the crypts

M Cells (Microfold cells)

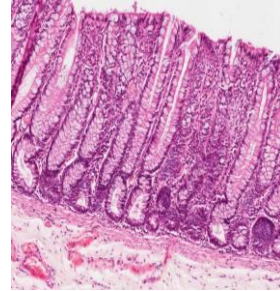
They are mainly found within the intestinal epithelium overlying lymphatic nodules of lamina propria. Each is a dome-shaped cell (or specialized squamous cell) with a basal concavity that contains intraepithelial lymphocytes and macrophages. They phagocytose and transport antigens present in the intestinal lumen to the underlying lymphoid tissue cells to initiate the immune response to these antigens leading to the **secretion of IgA**.



+ Colon

Mucosa:

- Shows **only crypts (NO villi)**
- 1- Epithelium:** simple columnar epithelium with **numerous goblet cells**.
- 2- Lamina propria:** Connective tissue containing numerous **crypts**. Cells of the crypts are the same as in small intestine but **NO Paneth cells**. **Lymphatic nodules (solitary):** frequent.
- 3- Muscularis mucosae:** 2 layers of smooth muscle.



Submucosa:

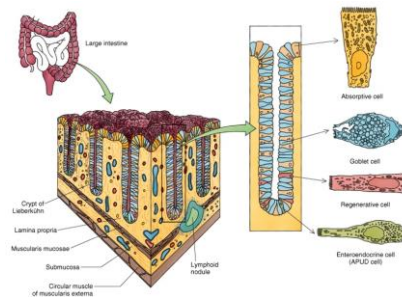
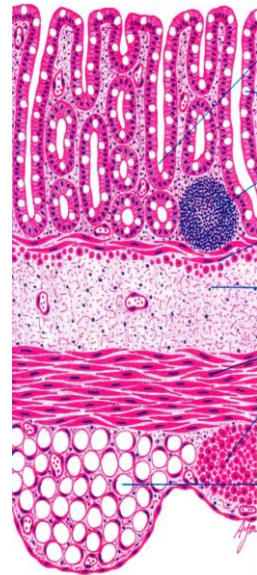
- NO glands.**
- Meissner's nerve plexus.

Muscularis Externa:

- Inner circular & outer longitudinal smooth muscle layers.
- The longitudinal layer is not continuous but in the form of 3 longitudinal ribbons or bands (**teniae coli**).
- Auerbach's nerve plexus.

Serosa:

- C.T. covered by mesothelium.
- Has fat-filled pouches (pendulous masses) called **appendices epiploicae**.



Cells lining the crypts:

1. Surface columnar absorptive cells.

2. Goblet cells.

3. Enteroendocrine cells.

4. Stem cells.

5. M-cells.

Vermiform Appendix



Similar to the colon, but with much smaller diameter, shallow crypts, more lymphoid nodules (aggregated lymphoid nodules, all around, in lamina propria and extending into Submucosa, Few goblet cells and more EE(DNES) cells

Cells lining the crypts are:

1. Surface columnar absorptive cells.
2. Goblet cells.
3. Enteroendocrine cells.
4. Stem cells.
5. M-cells.

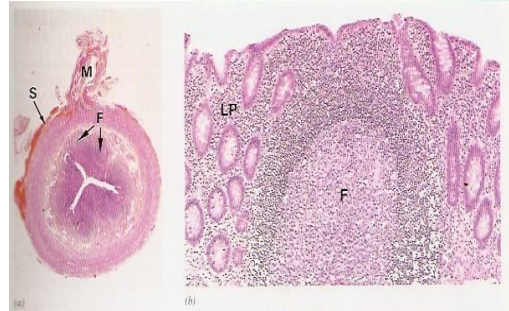
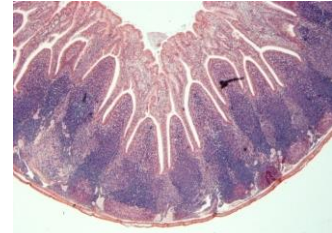
Muscularis mucosae:

Not continuous.

Muscularis externa:

No teniae coli.

It is invested by **serosa**.



1 B
2 A
3 D
4 C
5 A
6 B
7 D
8 C
9 B

MCQs

1. Which One of these structures is not involved in increasing surface area of the mucosa?
A. Plicae circulares.
B. Lymphoid nodules.
C. Villi.
D. Microvilli.
2. Which one of these layers is does not participate in mucosa of duodenum?
A. Serosa.
B. Epithelium.
C. Lamina propria.
D. Muscularis mucosae.
3. Only part that contain submucosal glands in the GIT?
A. Esophagus.
B. Stomach.
C. Duodenum.
D. A and C.
4. One of these glands is present in the crypts and the villi?
A. Paneth cells.
B. Stem cells.
C. Goblet cells.
D. Brunner's gland.
5. Where can we find the Brunner's gland?
A. Submucosa of duodenum
B. Jejunum .
C. Ileum .
D. Mucosa of esophagus.

6. Which one of these structures is not involved in increasing surface area of the mucosa ?
a. Plicae circulares
b. Lymphoid nodules
c. Villi
d. Microvilli
7. Which one of these layers contains fat-filled pouches called appendices epiploicae?
a. Mucosa
b. Submucosa
c. Muscularis externa
d. Serosa
8. Which one of these layers contains a longitudinal layer that is not continuous but in the form of 3 ribbons (Teniae Coli)?
a. Mucosa
b. Submucosa
c. Muscularis externa
d. Serosa
9. Which one of the following is not a cell that lines the crypts of the colon?
a. M cell
b. G cell
c. Goblet cell
d. Stem cell

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Thanks you for checking
our work, Good luck.
-Team histology.



HISTOLOGY
— 435 —



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