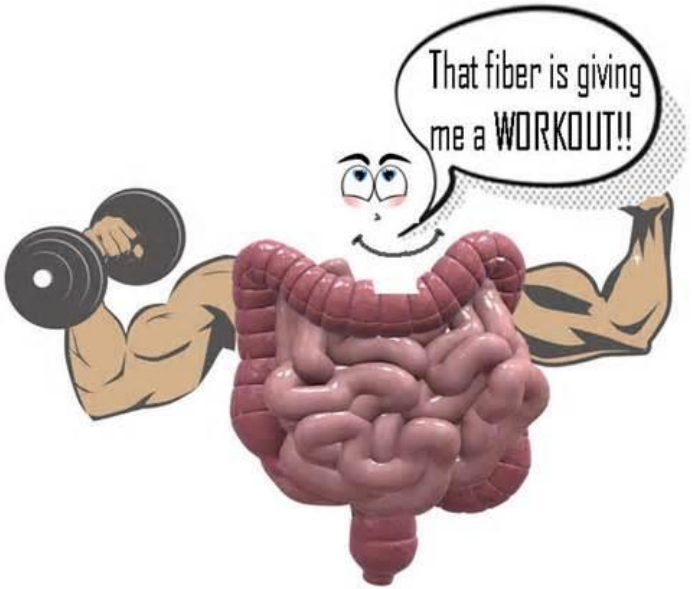
SMALL INTESTINE

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



Please be sure to **check** Histology Edits before you start, to know about any additions/changes.

Extra explanations : grey

جامعة الملك سعود
King Saud University

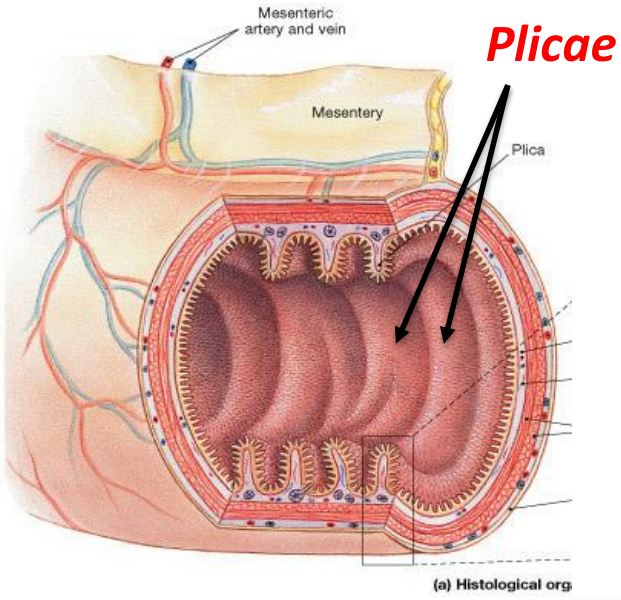
MED 434

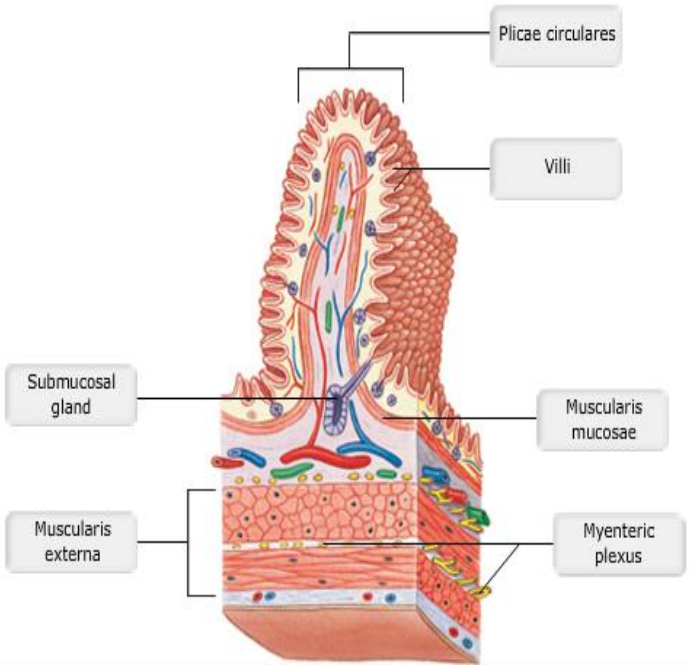
HISTOLOGY 434

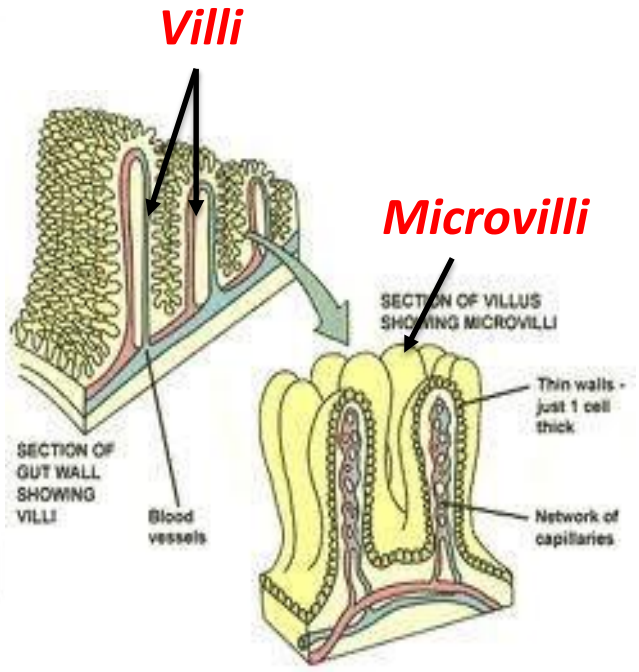
SMALL INTESTINE (complete digestion and absorbtion)

To increase surface area the mucosa has:

1. ***Plicae circulares*** تكون بالعرض مو بالطول على عكس المعدة, Also don't disappear like stomach
2. ***Villi.***
3. ***Intestinal crypts*** (crypts of Lieberkühn).
4. ***Microvilli*** (Brush border). Simple columnar absorbitive cell , increase surface area for 300 times .







INTESTINAL VILLI

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

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

Lymphocytes.

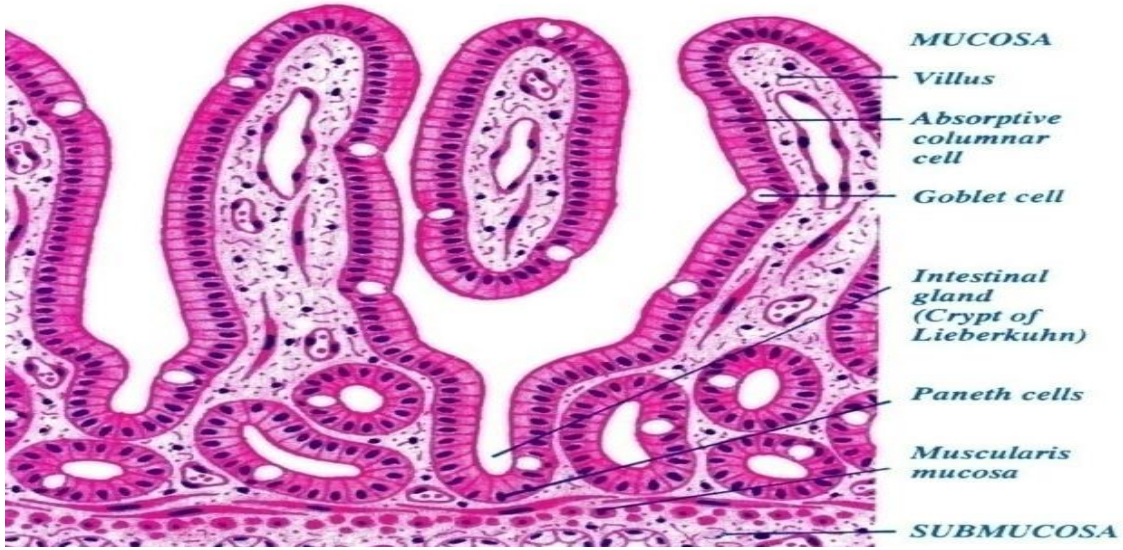
Fibroblasts.

Smooth muscle cells.

Capillary loops. (For absorption).

Lacteal (blindly ending lymphatic channels).

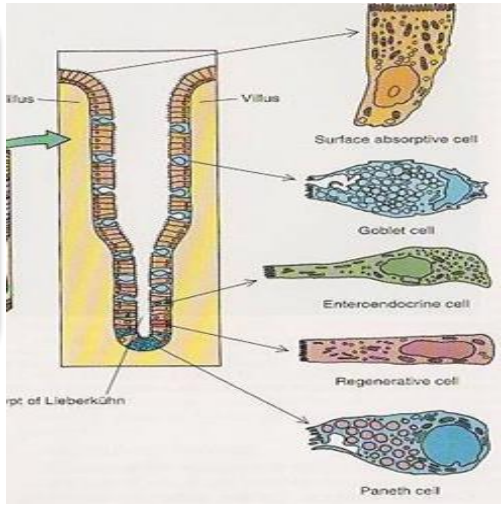
2.Villus-covering epithelium.



CELLS COVERING THE VILLI

CELLS COVERING THE VILLI

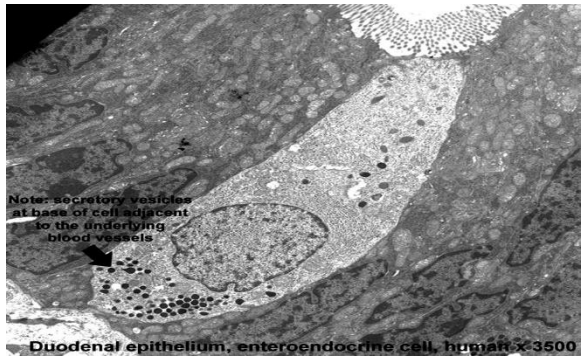
1.Surface columnar absorptive cells:
They have brush border (microvilli).
They are covered with *thick glycocalx*
that has digestive enzymes.
2.Goblet cells: IncThey have Junction complex. (tight, adhering and desmosome junctions).
rease toward the ileum. To secrete mucus for protection.
3.Enteroendocrine (EE) cells: (DNES cells). diffuse neuroendocrine system.



EE (DNES) cells all of them columnar cells

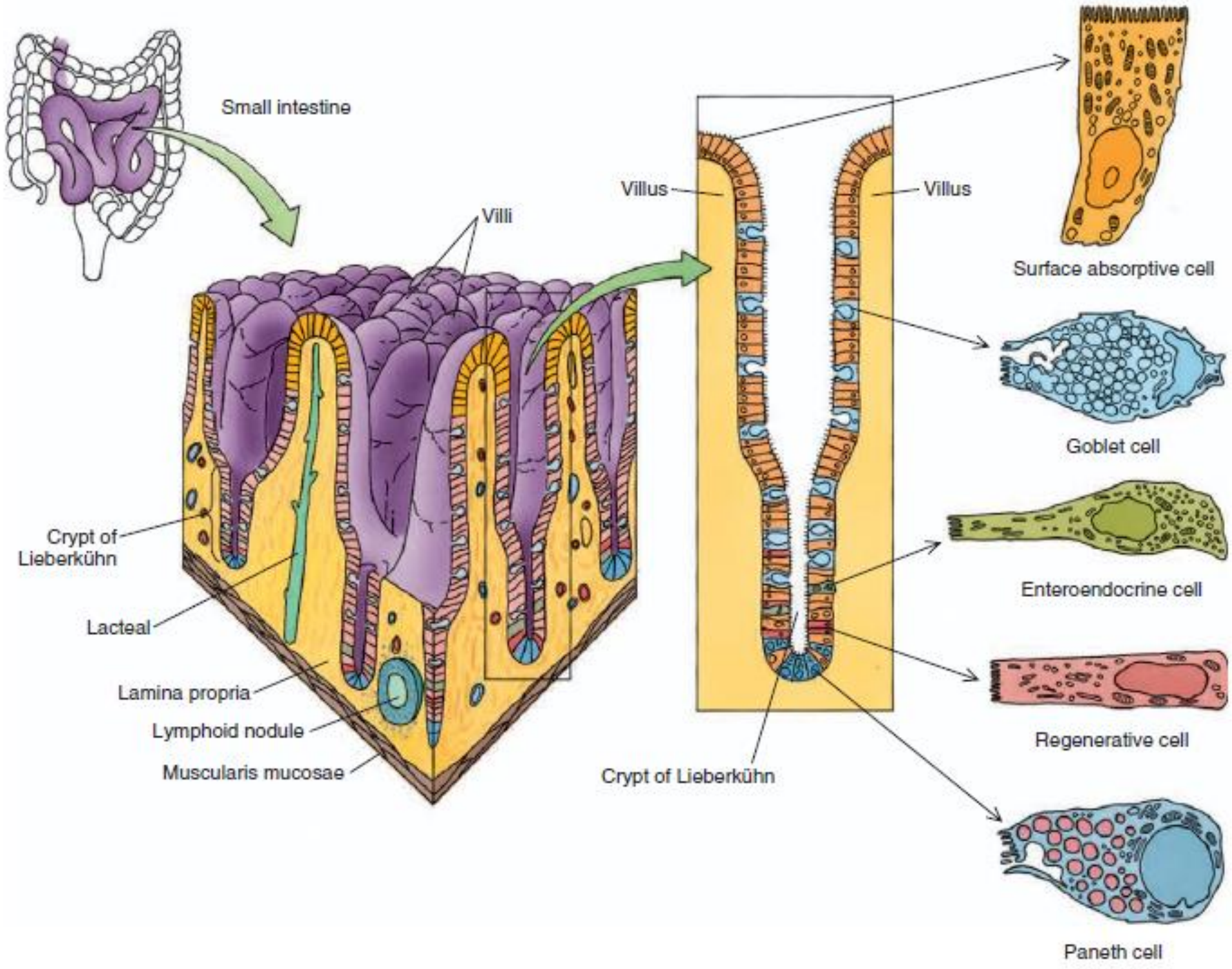
EE cells: secrete Hormones

- **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 cholecystokinin (pancreozymin)**



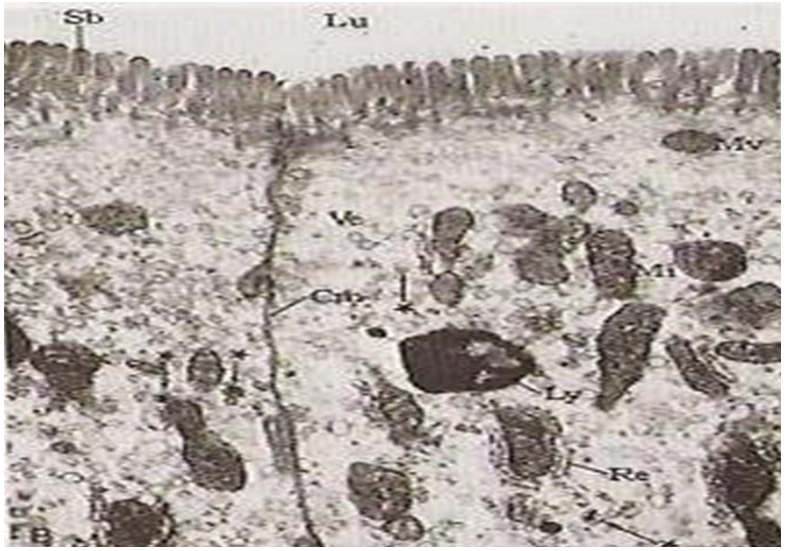
M CELLS (MICROFOLD CELLS)

They are mainly found *within the intestinal epithelium* overlying lymphatic nodules of lamina propria.
Each is a dome-shaped cell 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.* So this cell recognize the toxicity food not allergy food .


Small intestine
Villi
Crypt of Lieberkühn
Lacteal
Lamina propria
Lymphoid nodule
Muscularis mucosae
Villus
Villus
Crypt of Lieberkühn
Surface absorptive cell
Goblet cell
Enteroendocrine cell
Regenerative cell
Paneth cell

INTESTINAL GLANDS (CRYPTS)

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



1.Columnar absorptive cells.

2.Goblet cells: secrete *mucus.*

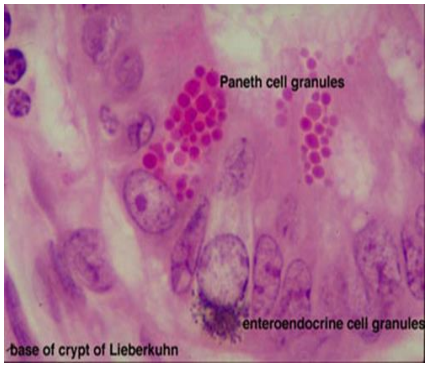
3.Enteroendocrine (EE) (DNES) cells: secrete *hormones*.

.

4.Paneth cells: secrete *Lysozyme* (antibacterial).

are found in the base of the crypts.

So the lumen of small intestine is sterile due to HCl from Stomach and presence of Paneth .



5.Stem cells: are *regenerative* cells.

are found in the base of the crypts.

DUODENUM

Notes:
• All the parts of the small intestine except for what is stated otherwise (regional differences)

1.Mucosa:

Shows villi and crypts.
A-Epithelium: ***simple columnar epithelium with goblet cells.***
B-Lamina propria: C.T.
C-Muscularis mucosae: 2 layers of smooth muscle cells.

2.Submucosa:

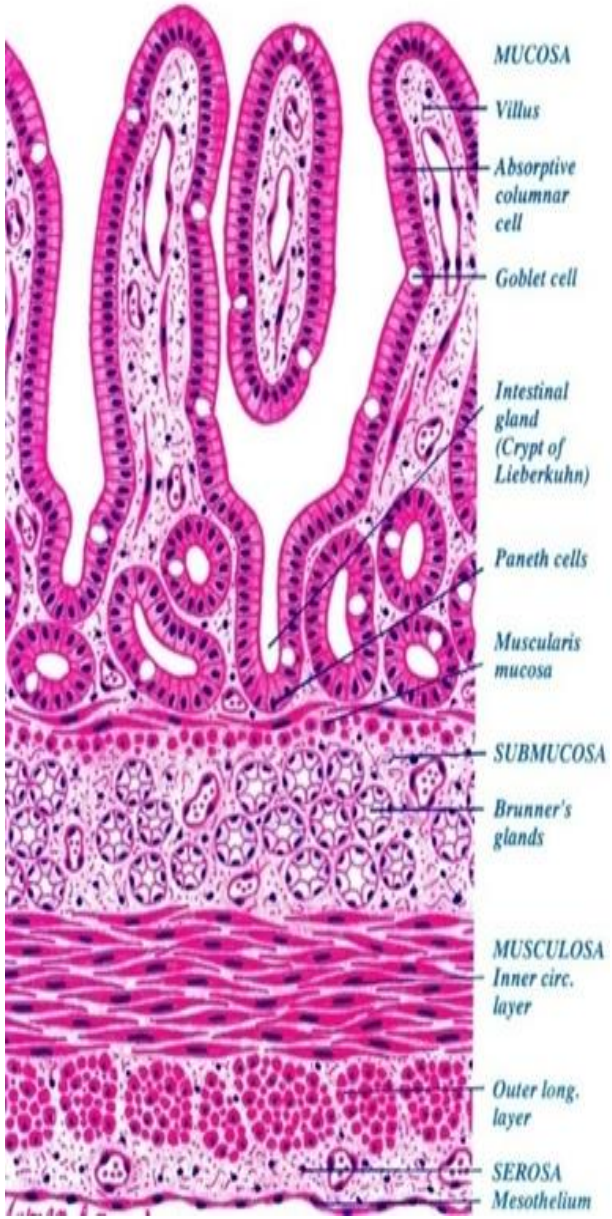
Connective tissue containing blood vessels & nerves.
Contains ***Brunner's glands*** **(secrete mucus).**to help in neutralization
.

3.Muscularis Externa:

2 smooth muscle layers:
Inner circular layer.
Outer longitudinal layer.

4.Serosa or Adventitia:

Duodenum is invested by a serosa ***or*** **adventitia.**
But the jejunum and ileum only serosa

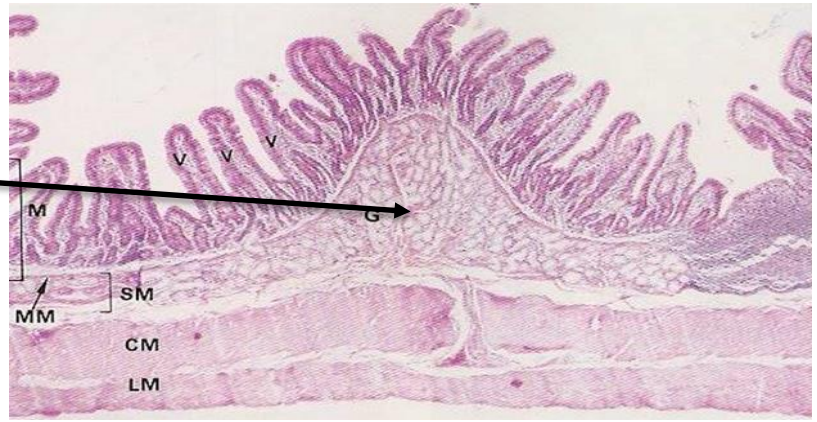


REGIONAL DIFFERENCES OF SMALL INTESTINE

Duodenum:

Its ***submucosa has Brunner's glands***.

It is invested by serosa or adventitia.



Jejunum:

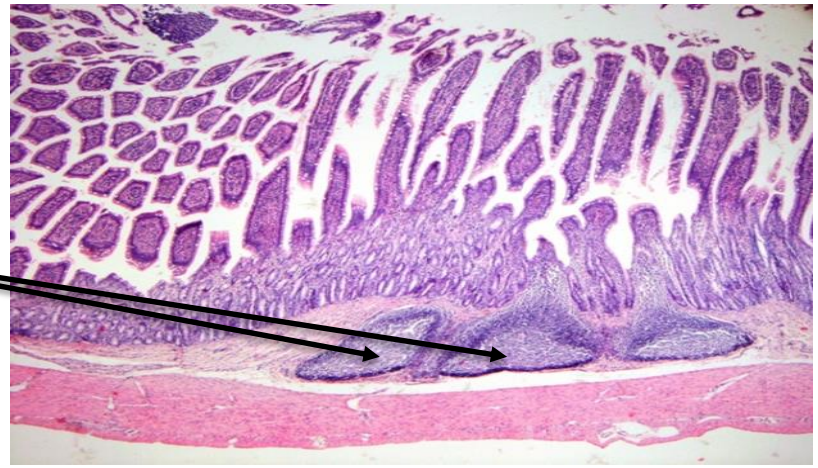
has ***neither*** Brunner's glands nor Peyer's patches.

It is invested by serosa.

Ileum:

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

It is invested by serosa.



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.

1-B 2-A 3-D

MCQs

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 of the following structures is not found in colon?
A-Mucosa.
B-Submucosa.
C-Peyer’s patches
D-Muscularies externa.

4-C 5-A 6-C

SAQs

Where does submucosa GLANDS exists in GIT?
ONLY in esophagus and duodenum

What is the type of epithelium of mucosa of duodenum?
Simple columnar epithelium with goblet cells

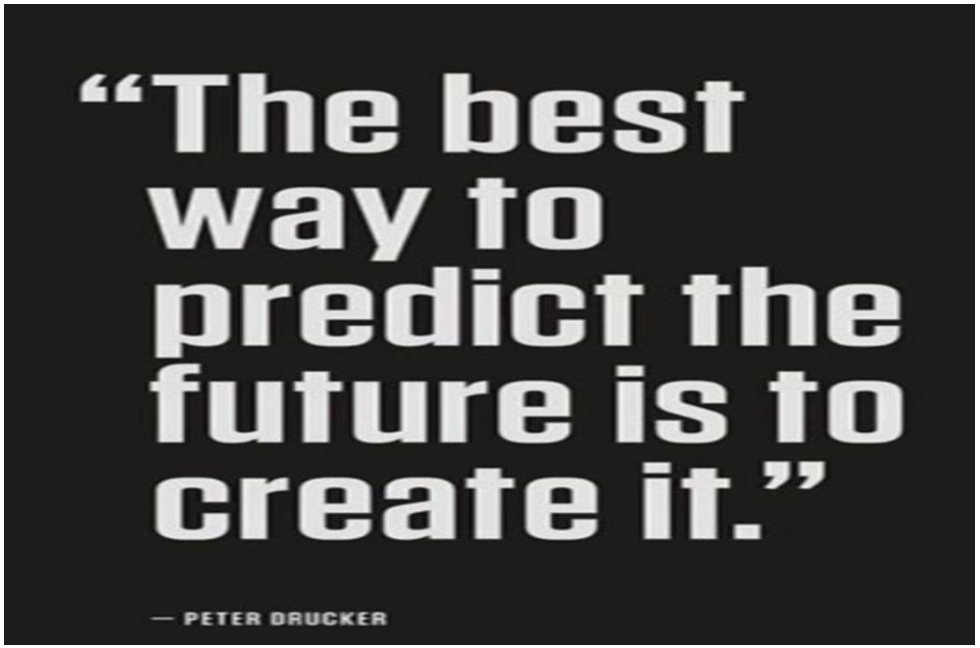
Mention two features about Paneth cells?
Exists only in duodenum
Secretes antibacterial agents (Lysozymes)

What does submucosa of duodenum contain?
Brunner's glands, and It secretes mucus

Mention a feature about jejunum?
Has neither brunner's glands nor peyer's patches

Where are Peyer's patches located?
In anti-mesentery of ileum (origin in lamina properia and extend to submucosa)

Motivation Corner



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Thank you for checking our work

For any correction, suggestion or any useful information do not hesitate to contact us: Histology434@gmail.com