



HISTOLOGY

Lecture 1: Alimentary Canal (1) (Esophagus & Stomach)

Done by:

Ethar Alqarni

Reviewed by:

Ibrahim Alfuraih



Color Guide:

- Black: Slides.
- Red: Important.
- Green: Doctor's notes.
- Blue: Explanation.

GIT Block – 432 Histology Team





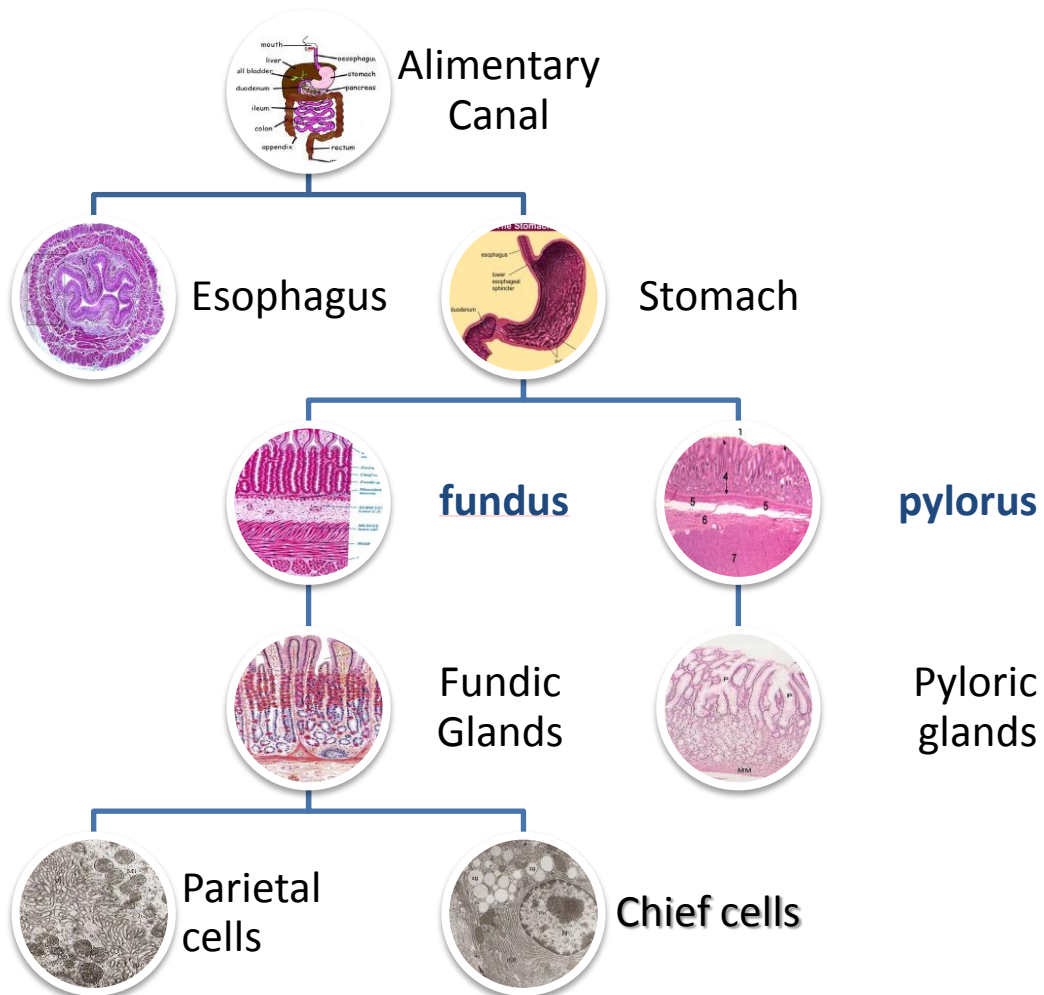
Objectives

At the end of this lecture, you should describe the microscopic structure and the function of:

1. Esophagus.
2. Stomach.



Mind Map



Digestive system:

Oral cavity, pharynx, esophagus, stomach, small intestine, large intestine, anus.



Alimentary canal:

Is the tubular portion of digestive system and subdivided into:

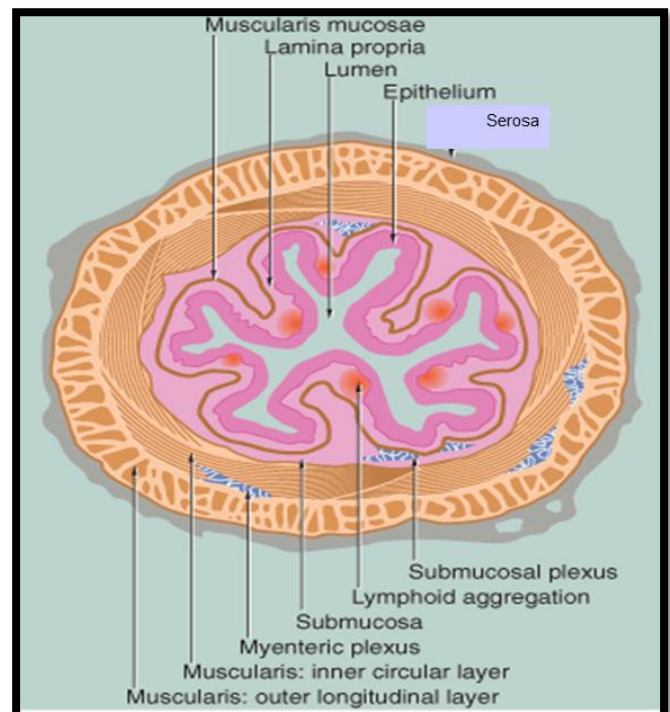
1. Esophagus.
2. Stomach.
3. Small intestine (duodenum, jejunum, and ileum).
4. Large intestine (cecum, colon, rectum, anal canal, and appendix).

We will talk about these 2 in this lecture ^^

General Architecture of L\M structure of Alimentary Canal:

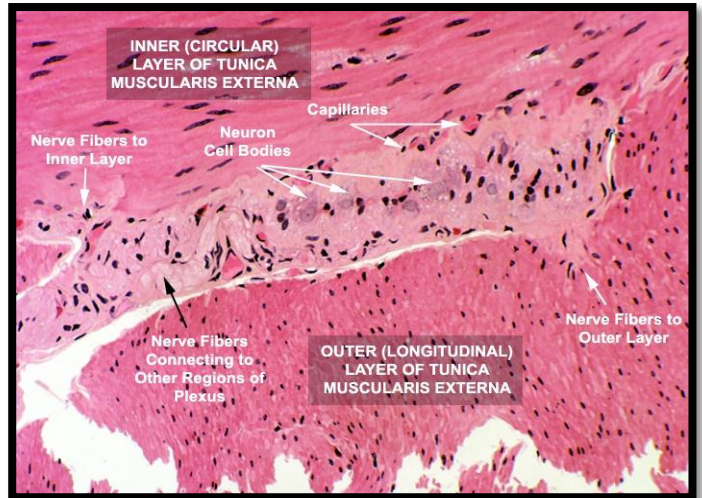
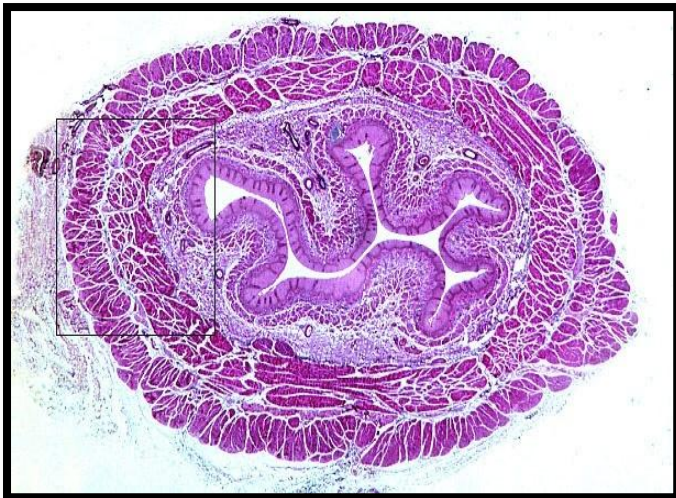
(There are 4 layers from inside to outside):

- 1- Mucosa (it is folded to allow distension in presence of food).
- 2- Submucosa.
- 3- Muscularis externa.
- 4- Adventitia OR serosa.



Transverse (cross) section of esophagus

Esophagus



To make it easy: Remember the general architecture of alimentary canal.

There are 4 concentric layers:

Mucosa

Or body of lumen, mucus membrane

- **Epithelial Lining:** Non-Keratinized Str. Squamous Epith.
- **Lamina propria:** C.T + lymphoid nodules + Blood vessels.
- **Muscularis mucosae:** Few layers of smooth muscle fibers.

Submucosa

- Connective tissue containing blood vessels, nerves, glands* & **Meissner's plexus**** (Or submucosal plexus) of nerve fibers and nerve cells.

Muscularis Externa

- Usually 2 smooth muscle layers:
1- Inner **circular** layer. 2- Outer **longitudinal** layer.
- **Auerbach's (myenteric) plexus**** in between the 2 layers.

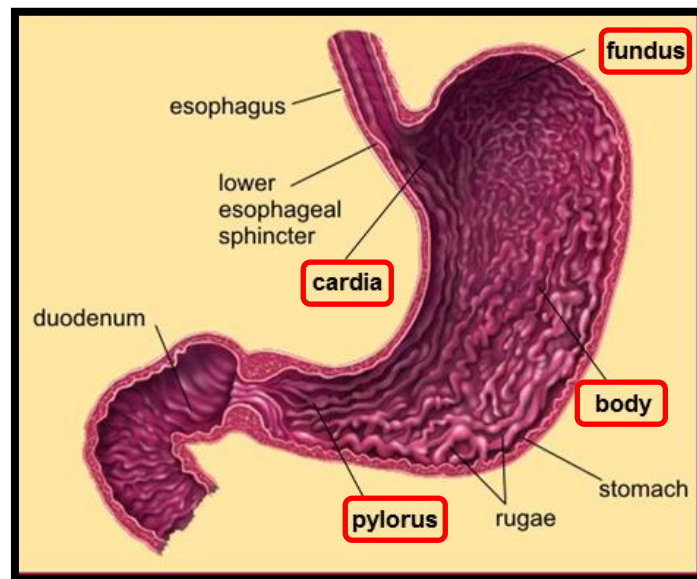
Serosa OR adventitia

- **Serosa:** is C.T. covered by **mesothelium** (simple squamous epithelium) in the **abdominal part** of the esophagus.
- or **adventitia** if there is **no** mesothelium (**C.T only**) & this covers **cervical & thoracic parts** of esophagus.

Important notes:

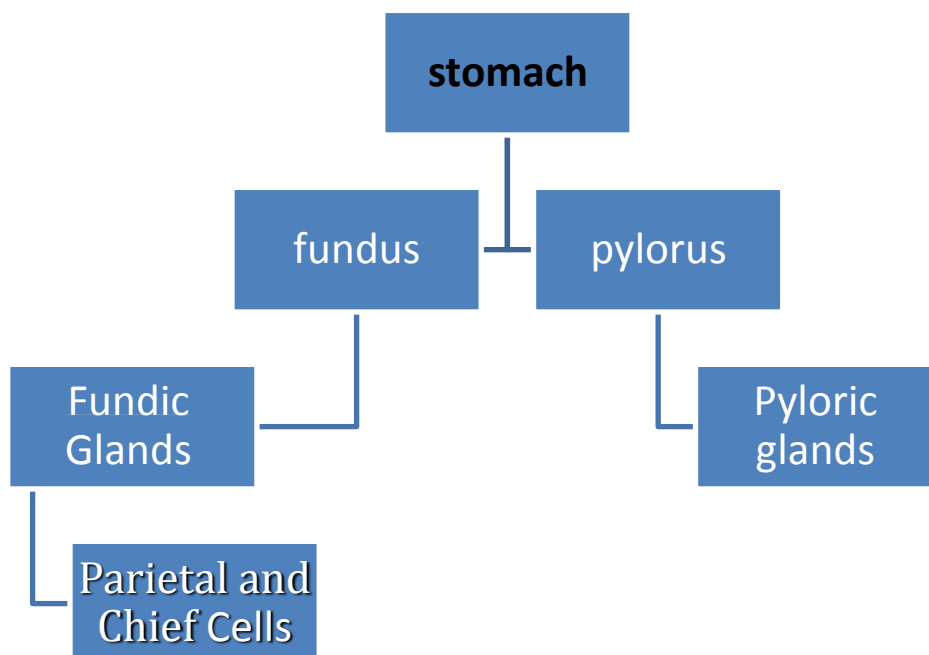
- * The only 2 organs of **Alimentary Canal** which have glands in its submucosa are: **esophagus** and **duodenum ONLY**.
- **ALL** alimentary canal has **Meissner's plexus & Auerbach's plexus** in their walls (we will not mention them later in this lecture).
- ** **Meissner's plexus** → supply muscularis mucosae /// **Auerbach's plexus** → supply muscularis externa.

Stomach

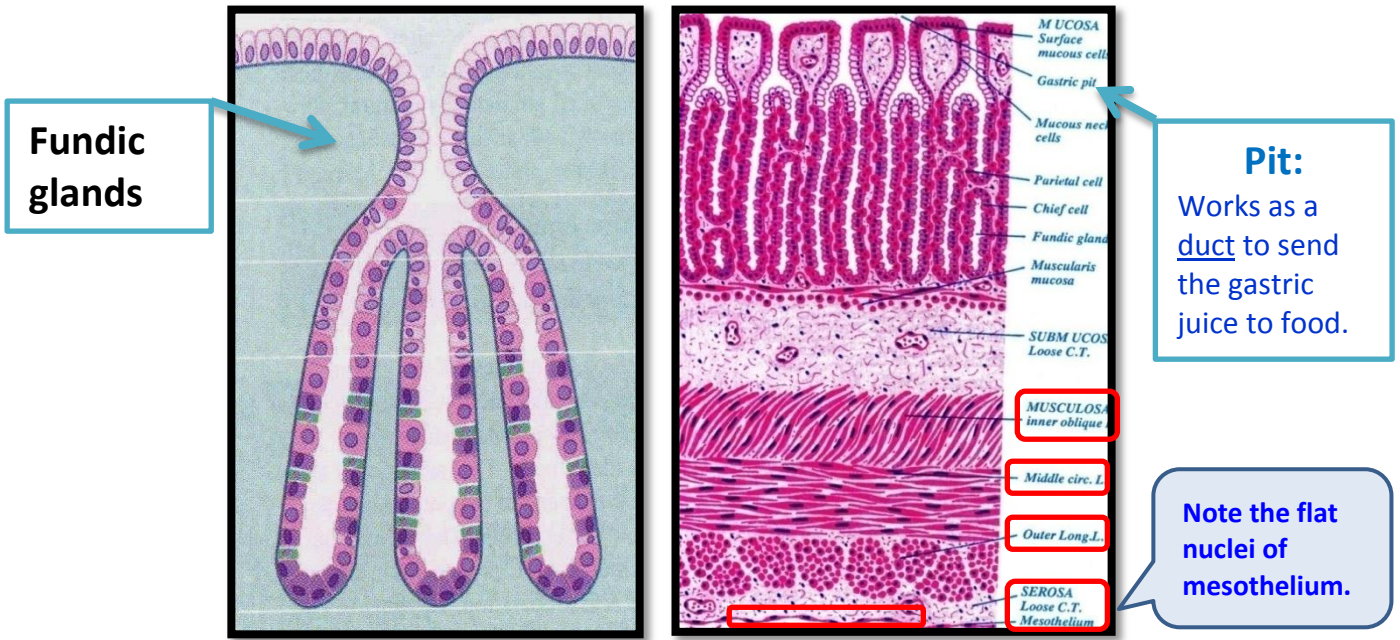


- It has 4 regions: cardia, fundus, body, and pylorus.
(In microscopic point of view Fundus is identical to Body of stomach)
- Mucosa has (longitudinal) folds, known as rugae that disappear in the distended (full) stomach.

We will study the fundus & pylorus regions ONLY.



Fundus of Stomach:

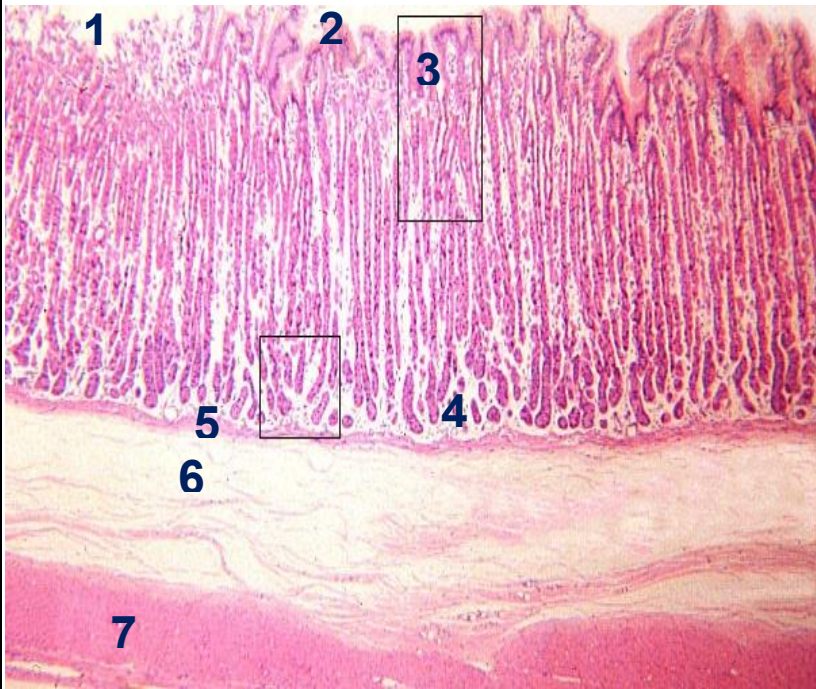


- We can distinguish serosa from adventitia by seeing the flat nuclei of mesothelium in serosa.

To make it easy: Remember the general architecture of alimentary canal.

- Mucosa**
 - Surface Epithelium: simple columnar mucus-secreting cells.
 - Fundic glands (due to modification in mucosa).
 - Lamina propria: invaded by numerous fundic glands.
 - Muscularis mucosae.
- Submucosa**
 - Connective tissue containing blood vessels & nerves.
 - NO glands.
- Muscularis Externa**
 - 3 smooth muscle layers:
 - 1- Inner oblique.
 - 2- Middle circular.
 - 3- Outer longitudinal.
 - Auerbach's (myenteric) plexus in between the circular and longitudinal.
- Serosa**
 - C.T. covered by mesothelium (because stomach is in abdominal cavity that covered by peritoneum).

Fundic Glands:



Fundic glands have:

- **Short** pits (**one fourth** of mucosa).
- Simple or branched tubular glands.
- Are rich in **parietal & chief cells**.

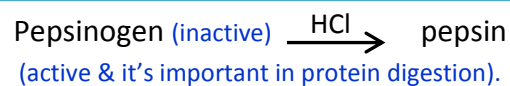
- 1- Lumen.
- 2- Surface epithelium.
- 3- Pit.
- 4- Lamina propria (space b/w the glands).
- 5- Muscularis mucosae.
- 6- Submucosa.
- 7- Part of muscularis externa.

Composed of 5 cell types:

1. Parietal (oxyntic = **acidophilic**) cells: They secrete:

- **HCl** (this explains the acidic environment of stomach).
- **Gastric intrinsic factor** that helps absorption of vitamin B₁₂.

2. Peptic (**chief**) cells: secrete **pepsinogen**.

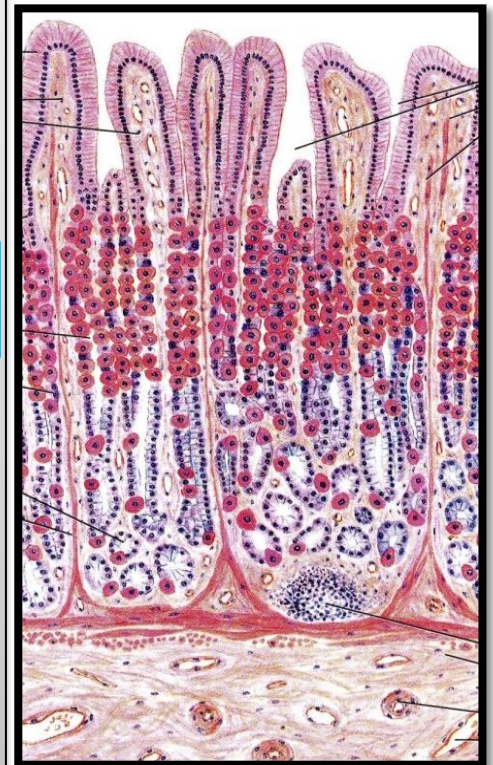


3. Mucous neck cells: secrete **mucus**.

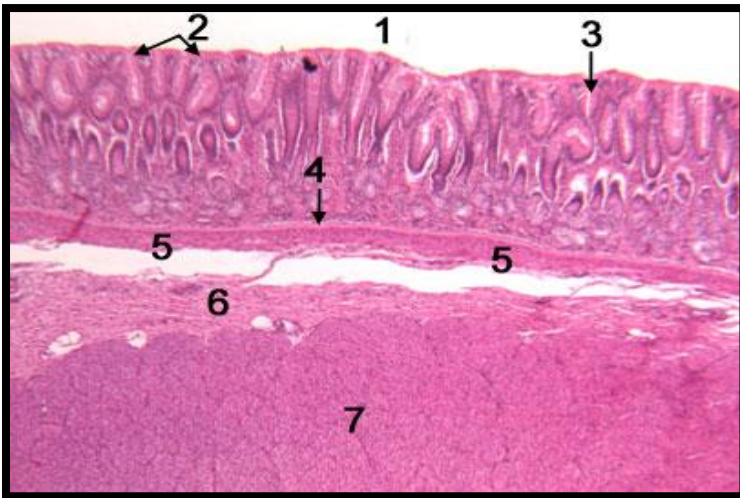
4. Enteroendocrine (DNES) cells:

secrete **hormones** (e.g. **somatostatin**). They also secrete **endorphin** and **serotonin**.

5. **Stem cells**: regenerative cells. They renew every 4 days of all types of fundic gland cells.



Pylorus of stomach:



- 1- Lumen.
- 2- Surface epithelium.
- 3- Pit.
- 4- Lamina propria (if you see spaces between glands it will be lamina propria).
- 5- Muscularis mucosae.
- 6- Submucosa.
- 7- Part of muscularis externa.

Mucosa

- **Surface Epithelium:** simple columnar mucus-secreting cells.
- **Pyloric glands (due to modification in mucosa).**

Submucosa

- Connective tissue containing blood vessels & nerves.
- **NO glands.**

Muscularis Externa

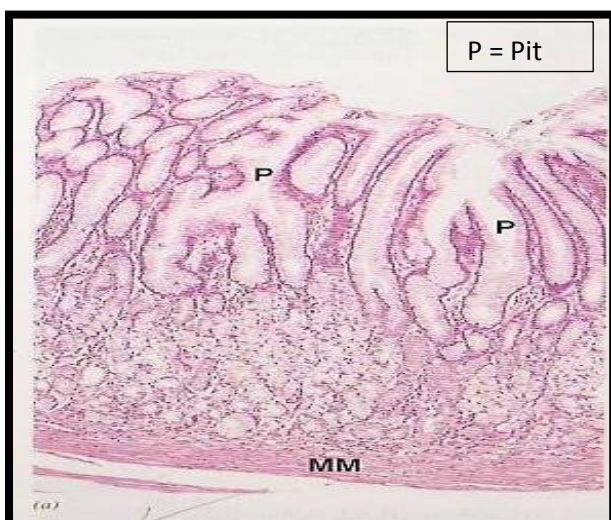
- **2 smooth muscle layers:**
- 1- Inner **circular.** 2- Outer **longitudinal.**

Serosa

- C.T. covered by **mesothelium.**

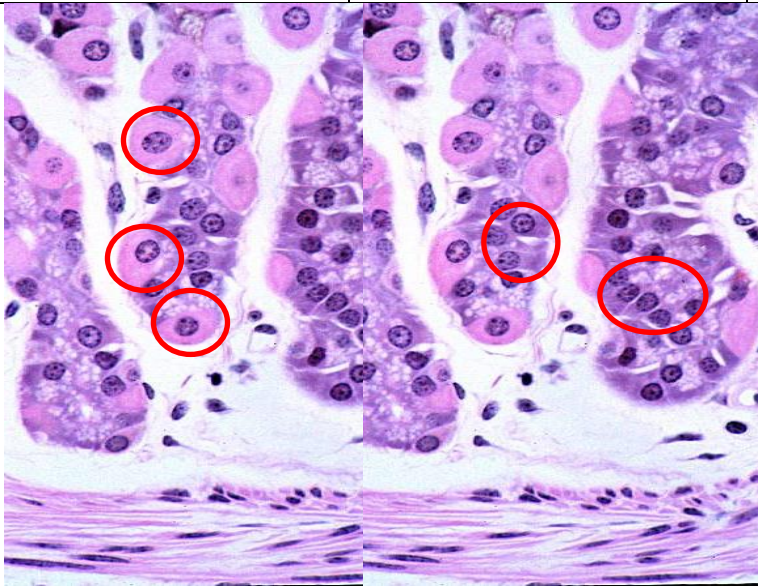
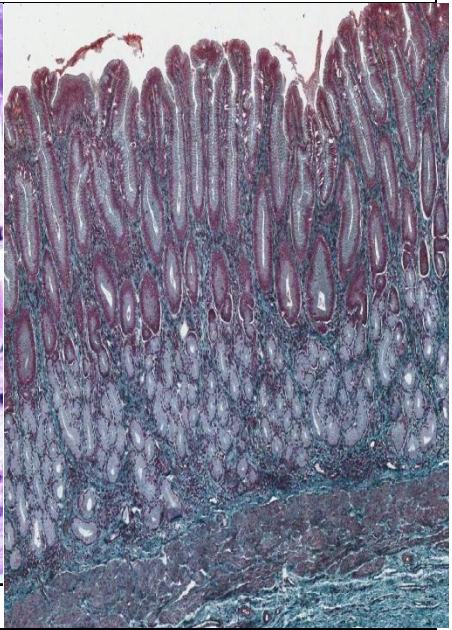
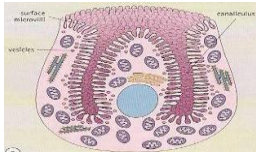
Pyloric glands:

- Its function: **alkalinization** of food (chyme) **by mucus** to enter the intestine.



- **Deep** pits (**about half** the length of mucosa).
- They are branched and convoluted > many cross sections.
- The predominant cells are **mucous neck cells** that secrete **mucus**.
- **Microscopically:** mucus neck cells look pale.

Some Microscopic Features of Gastric Cells

Stomach (fundus & pylorus)	Fundic Gland Cells		Pyloric Gland Cells
	Parietal Cells	Chief Cells	Mucus Neck Cells
L\M			
Stain	H\E		Special stain for mucus.
Appearance	Acidophilic (pink).	Basophilic (blue).	Dark cells with red nuclei.
Secretion	HCl & gastric intrinsic factor.	Pepsinogen.	Mucus.
Characteristic Feature	Presence of microvilli. 	Rich in rough endoplasmic reticulum (RER) since they secrete zymogen (which is protein in nature).	-----

- **Sources of mucus in stomach:**
 1. Surface epithelium: simple columnar **mucus-secreting** cells.
 2. **Mucus** neck cells (found in both fundic & pyloric glands).
- Mucus (which lines the stomach) protects it from self-digestion by HCl & pepsin.
- However, ↑HCl & pepsinogen secretions **OR** ↓ mucus secretion could lead to digestion of mucosa.



Summary

	Esophagus	Stomach	
Layers	-----	Fundus	Pylorus
Mucosa	Non-Keratinized Stratified Squamous Epithelium.	Surface epithelium: Simple columnar mucus-secreting cells.	
		Fundic glands.	Pyloric glands.
		Short pits (1\4 of mucosa).	Deep pits (1\2 of mucosa).
Submucosa	Glands.	NO glands.	
	Meissner's plexus.		
Muscularis externa	2 smooth muscle layer.	3 layers.	2 layers.
	Auerbach's plexus.		
Serosa OR adventitia	Serosa in the abdominal part of the esophagus. Or adventitia.	Serosa.	



Questions

1-Regarding the esophagus, in which one of the following site we can find Glands & Meissner's plexus?

A-Mucosa B-Submucosa C-Muscularis Externa D-Adventitia

2-Which one of the following Cell type of fundic glands help in absorption of Vitamin B₁₂?

A-Parietal cells B-Peptic cells C-Enteroendocrine cells D-Stem cells

3-Fundic glands are located in?

A-Mucosa B-Submucosa C-Muscularis Externa D-Serosa

4-Which one of the following Cell type of fundic glands secretes pepsinogen?

A-Oxyntic cells B-Chief cells C-DNES cells D-Stem cells

1	2	3	4
B	A	A	B



**If you have any questions or suggestions please do not
hesitate to contact us on:
432histologyteam@gmail.com**



Histology Team Leaders:

Nada Alouda

Faisal Alshuwair

Best of luck!