

# Alimentary Canal (I)

## Esophagus and Stomach (Objectives)

- By the end of this lecture, the student should be able to discuss the microscopic structure in correlation with the function of the following organs:
  1. Esophagus.
  2. Stomach.

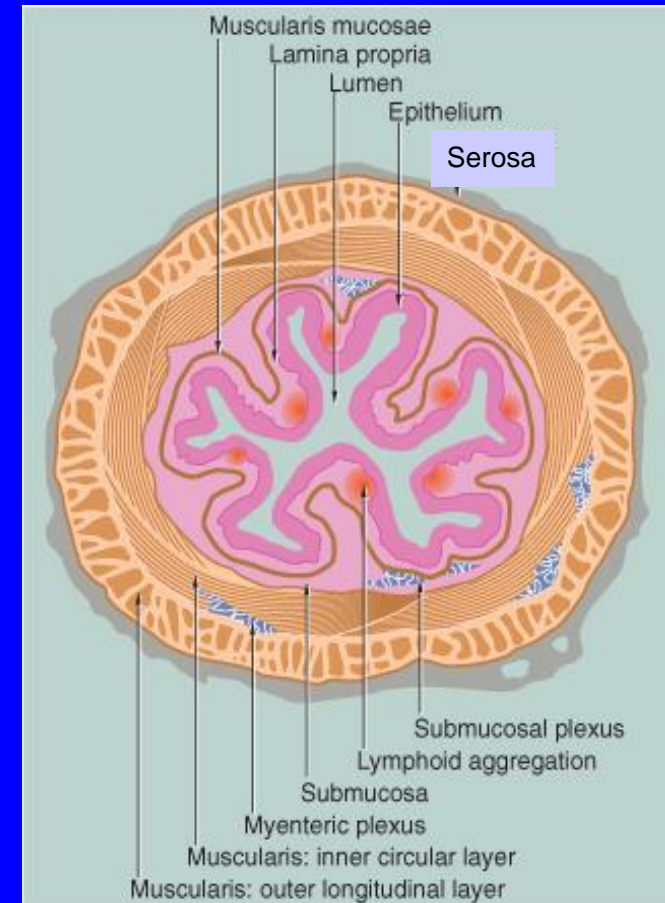
# *Alimentary Canal*

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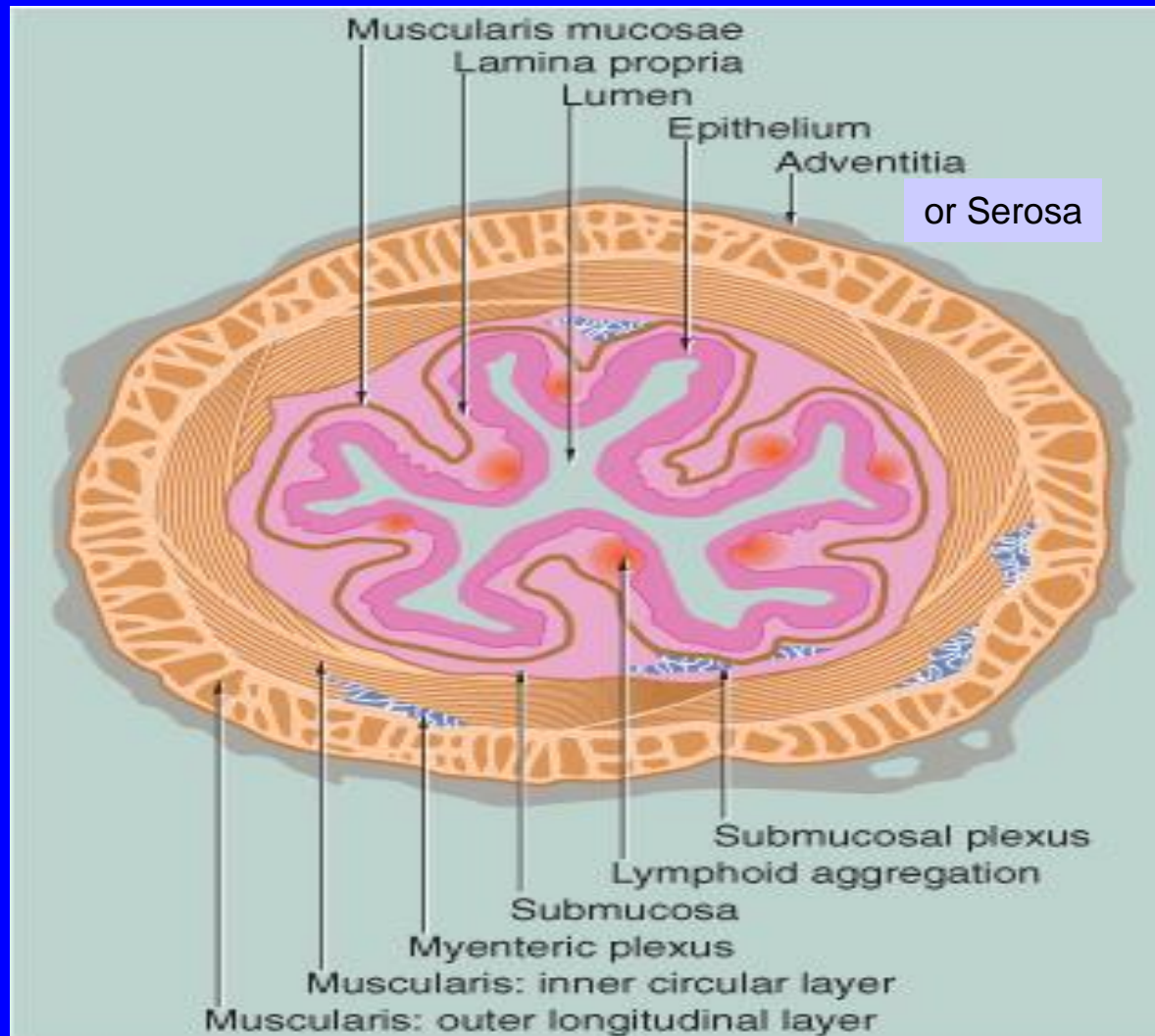
- Is the tubular portion of digestive system.
- Is subdivided into: esophagus, stomach, small intestine (duodenum, jejunum and ileum), and large intestine (cecum, colon, rectum, anal canal, and appendix).

# General Architecture of L/M Structure of Alimentary Canal

- 1- Mucosa.
- 2- Submucosa.
- 3- Muscularis externa.
- 4- Adventitia OR serosa.



# General Architecture of L/M Structure of Alimentary Canal



# ESOPHAGUS

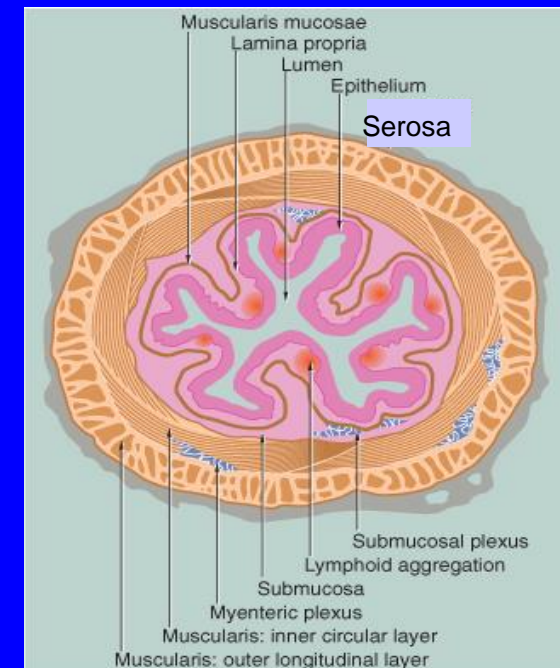


# Esophagus

## Four concentric layers:

### 1. Mucosa:

- Epithelial Lining:  
Non-Keratinized Stratified Squamous Epithelium.
- Lamina propria:  
Loose areolar C.T. with mucosal esophageal glands (secretion of mucus) in the upper and lower ends.
- Muscularis mucosae:  
Few layers of smooth muscle fibers.



# Esophagus

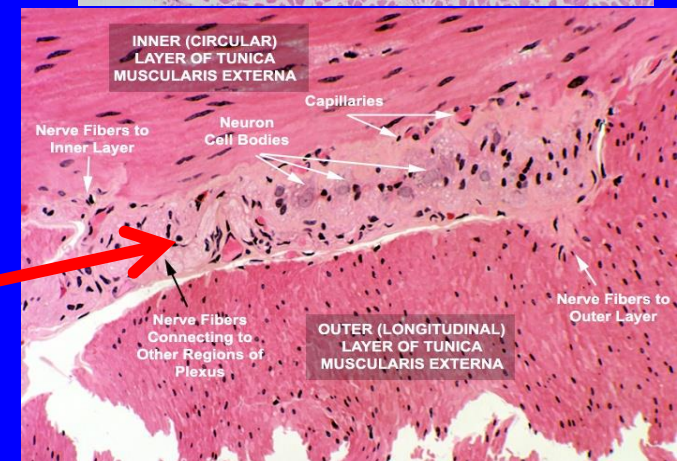
## 2. Submucosa:

- Loose areolar C.T. containing blood vessels, nerves, **submucosal esophageal glands** (secretion of mucus) &
- **Meissner's plexus** of nerve fibers and nerve cells.

## 3. Muscularis Externa:

Two muscle layers:

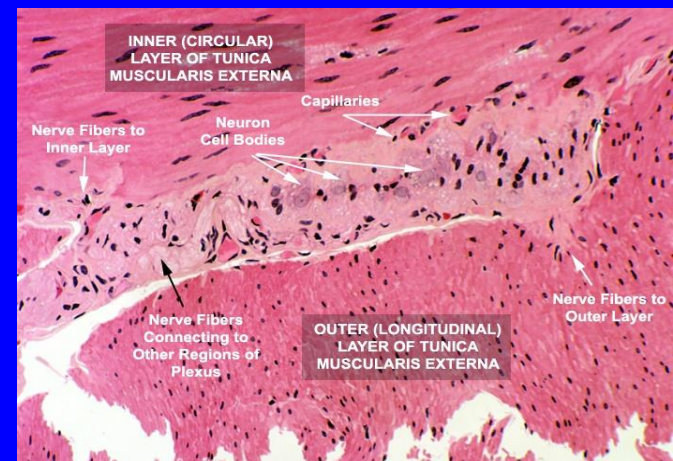
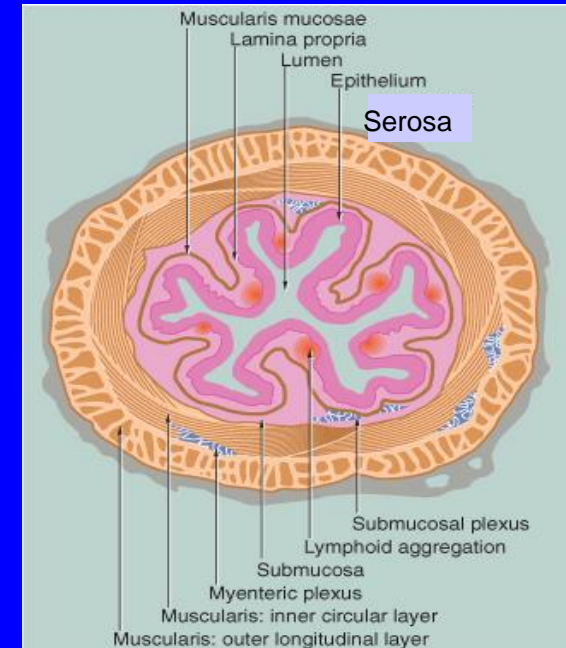
- Inner circular layer.
- Outer longitudinal layer.
- Upper 1/3: both layers are skeletal M.
- Middle 1/3: inner layer is smooth muscle  
outer layer is skeletal M.
- Lower 1/3: both layers are smooth M.
- **Auerbach's (myenteric) plexus** in  
between the 2 layers



# Esophagus

## 4. Serosa or Adventitia:

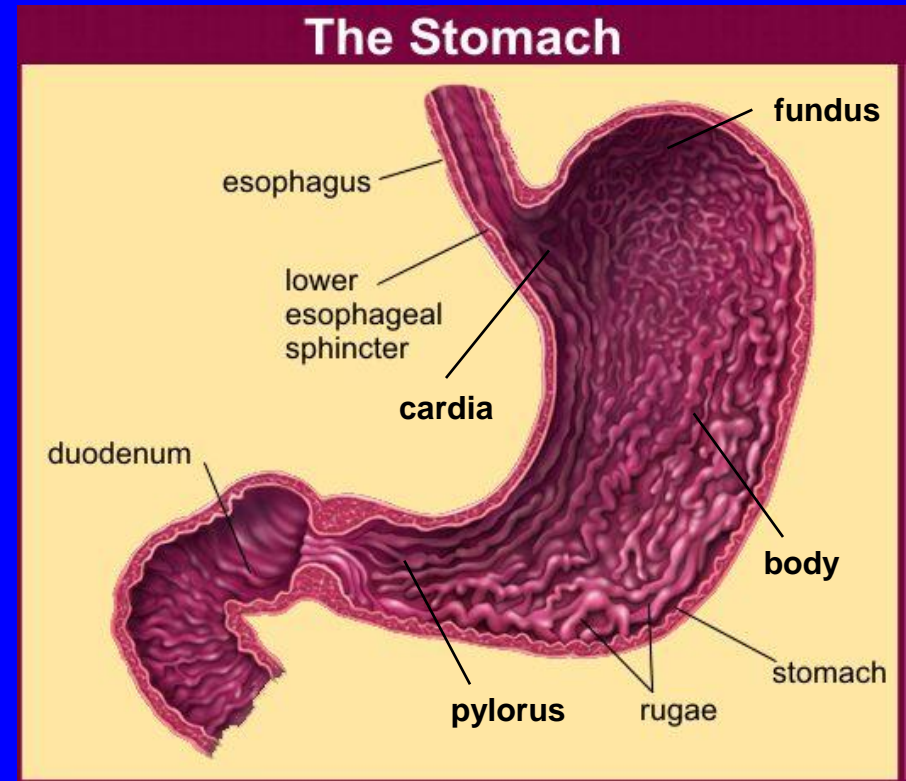
- Adventitia: is loose areolar C.T. not covered by mesothelium.
- Serosa: is loose areolar C.T. covered by mesothelium (simple squamous epithelium) in the abdominal part of the esophagus.





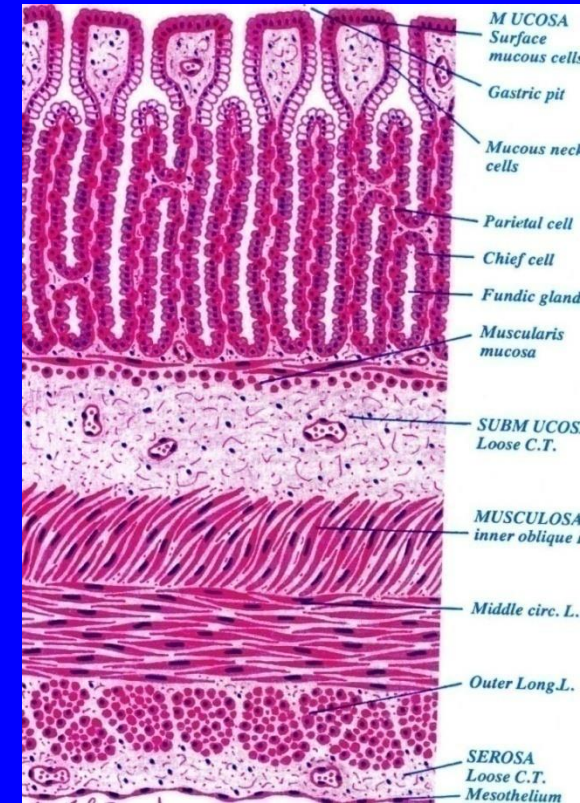
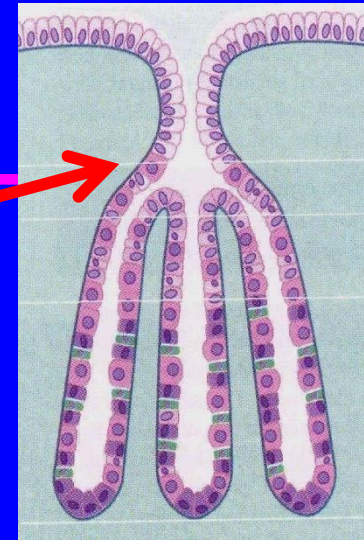
# STOMACH

- It has 4 regions: **cardia**, **fundus**, **body** and **pylorus**.
- Mucosa has folds, known as **rugae** that disappear in the distended stomach.



# Fundus (and Body) of Stomach

- **Mucosa:** is invaded by **fundic glands**.  
The surface epithelium of the mucosa is simple columnar mucus-secreting cells.
- **Submucosa:**
  - Connective tissue containing blood vessels, nerves, and Meissner's plexus.
  - **NO glands.**
- **Muscularis Externa:**
  - Three smooth muscle layers:
    - Inner oblique.
    - Middle circular.
    - Outer longitudinal.
  - Auerbach's (myenteric) plexus.



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

# Mucosa of Fundus of Stomach

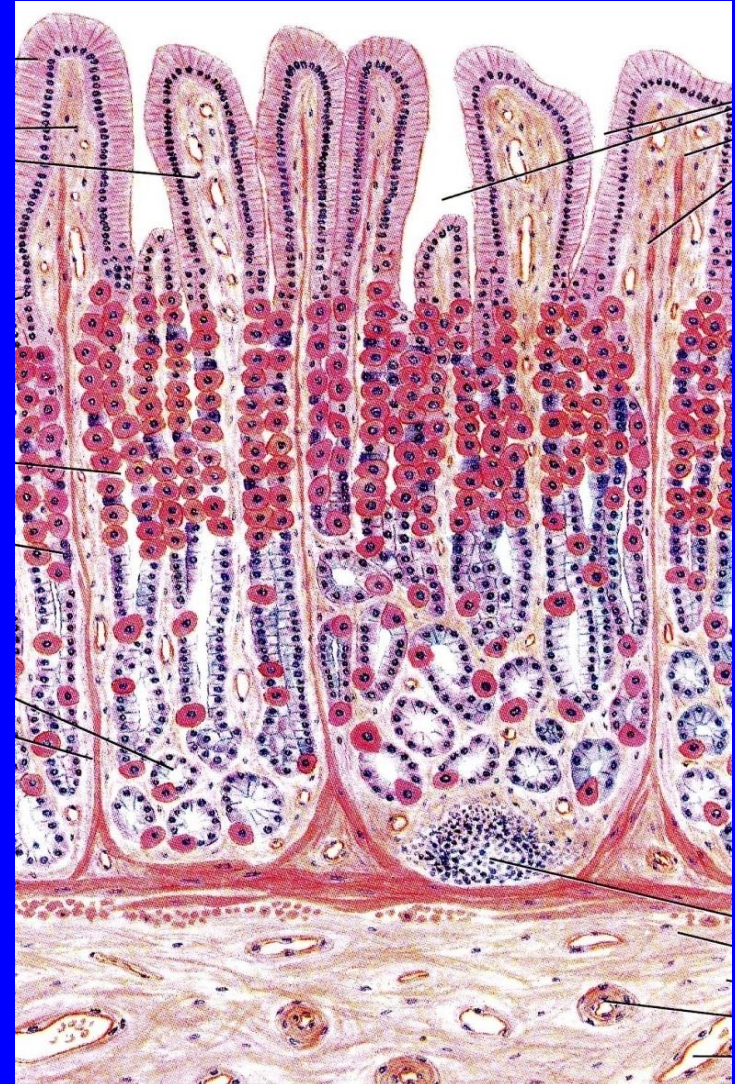
## ■ It is composed of:

### 1. Surface Columnar Epithelium:

Simple columnar epithelium: secretes mucus.

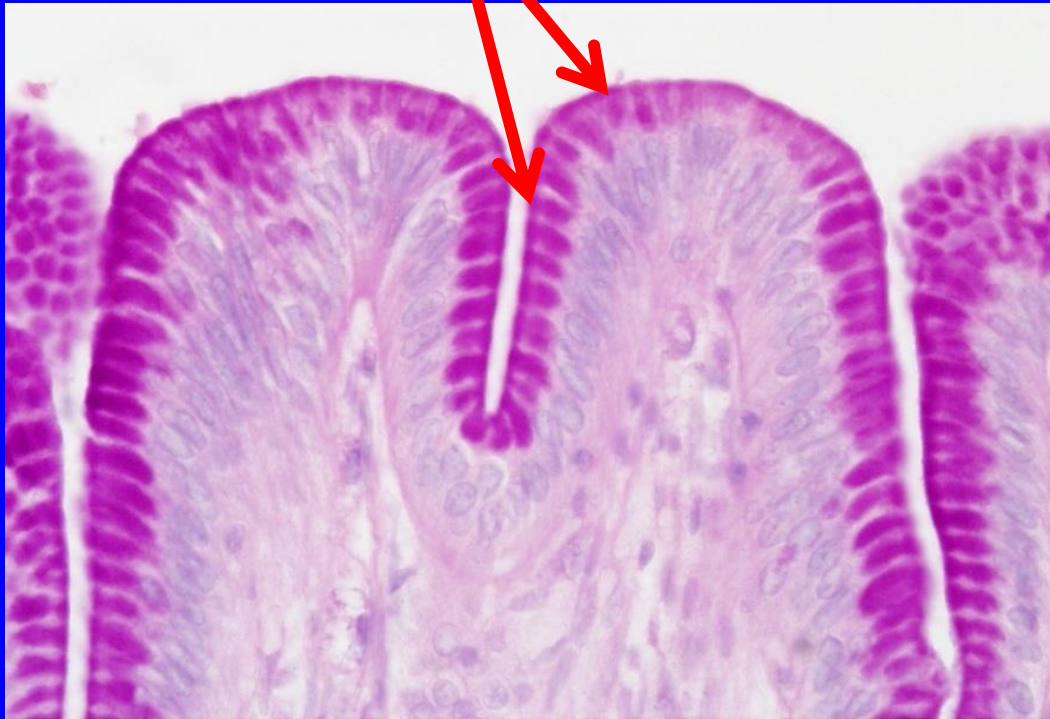
### 2. Lamina propria: C.T. invaded by numerous fundic glands with lymphoid elements.

### 3. Muscularis mucosae: 2 layers of smooth muscle fibers.



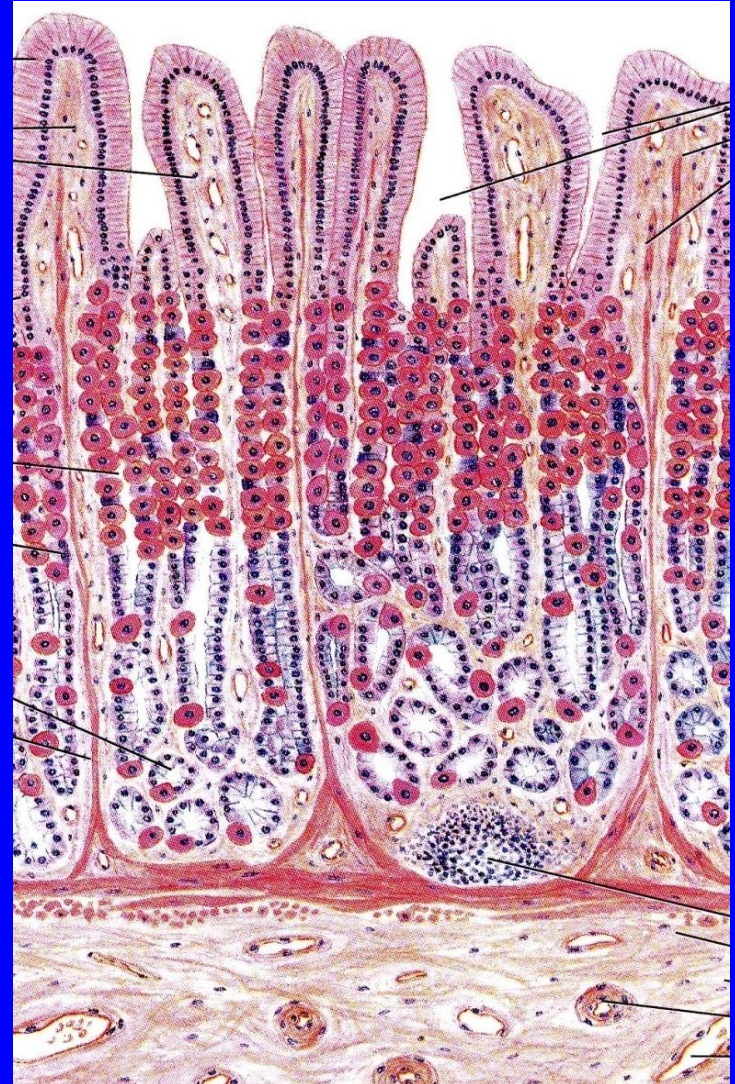
# Mucosa of Fundus of Stomach

Surface Columnar Epithelium



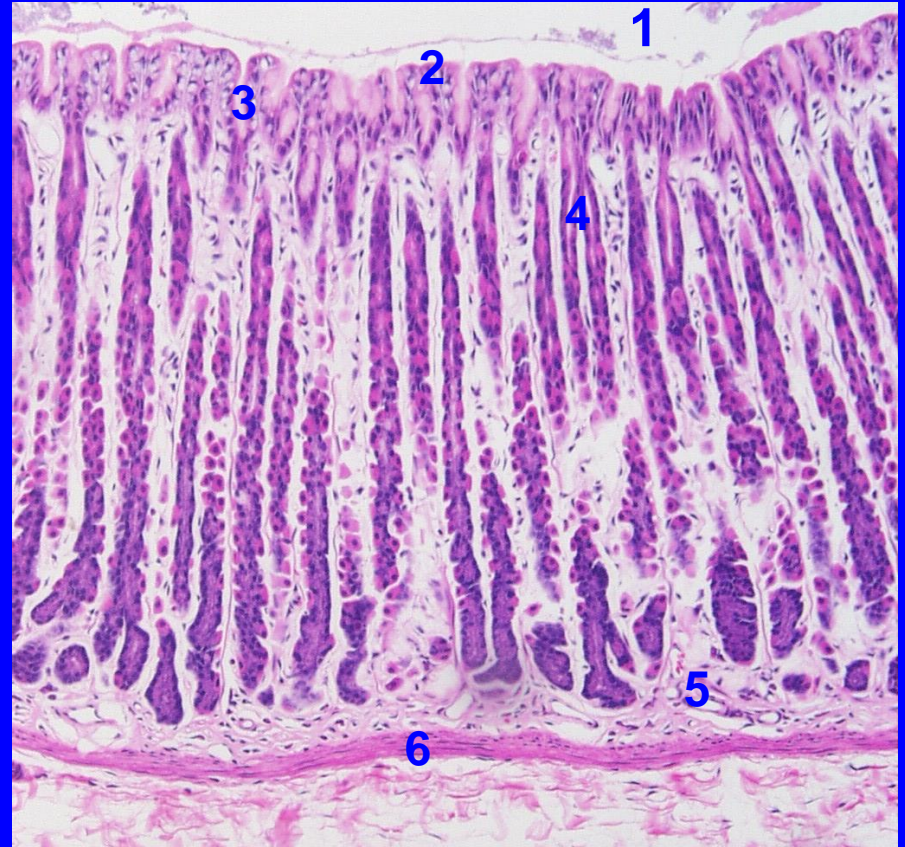
# Fundic Glands

- **Fundic glands have:**
  - Short pits: one fourth of mucosa.
  - Simple branched tubular glands.
  - Are rich in parietal & chief cells.



# Mucosa of Fundus of Stomach

1. Lumen.
2. Surface columnar epithelium.
3. Pits of fundic glands.
4. Fundic glands.
5. Lamina propria.
6. Muscularis mucosae.



# Fundic Glands

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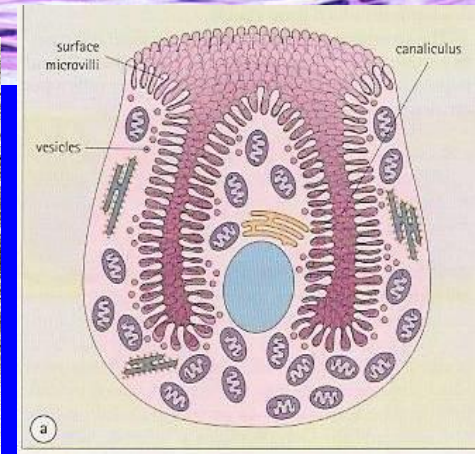
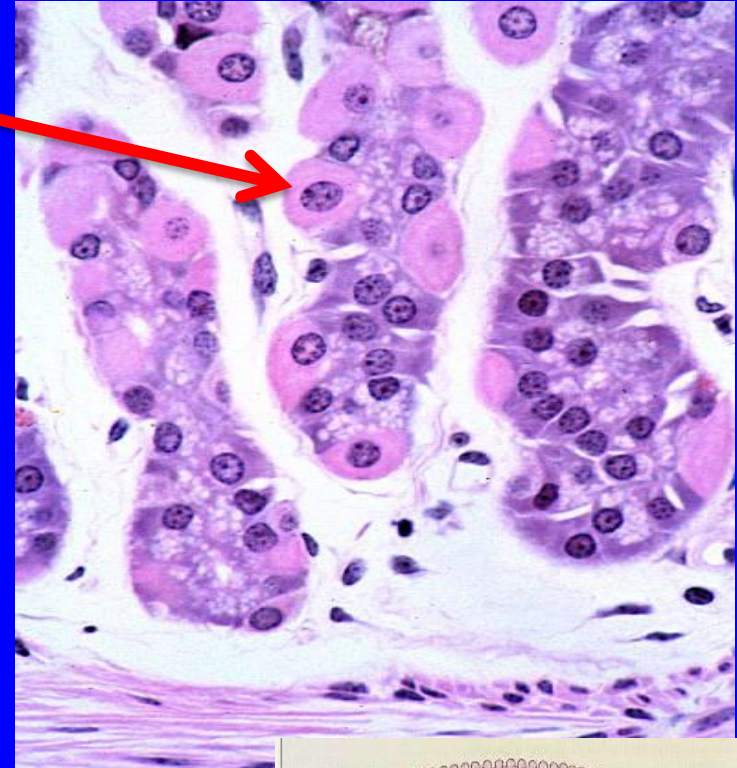
Composed of 5 cell types:

1. **Parietal (oxyntic) cells.**
2. **Peptic (chief) cells.**
3. **Mucous neck cells.**
4. **Enteroendocrine (EE, DNES) cells.**
5. **Stem cells.**

# Fundic Glands

## 1. Parietal (oxyntic) cells:

- Shape: pyramidal or polygonal.
- Nucleus: central, round.
- Cytoplasm:
  - deeply **acidophilic**, rich in SER and mitochondria (40% of the cell volume).
  - C-shaped intracellular canaliculus.
- Secrete **HCl** and **gastric intrinsic factor** that helps absorption of vitamin B<sub>12</sub>.
- Parietal - why?
- Oxyntic - why?

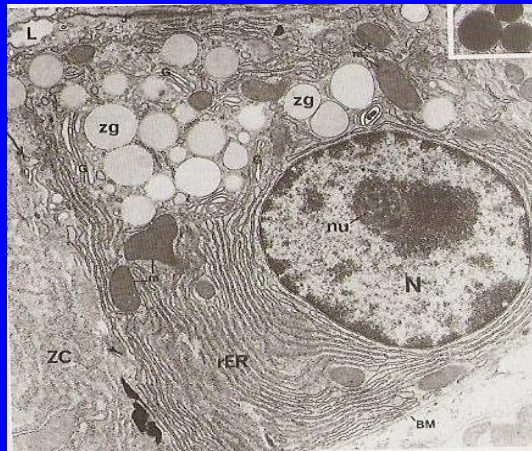
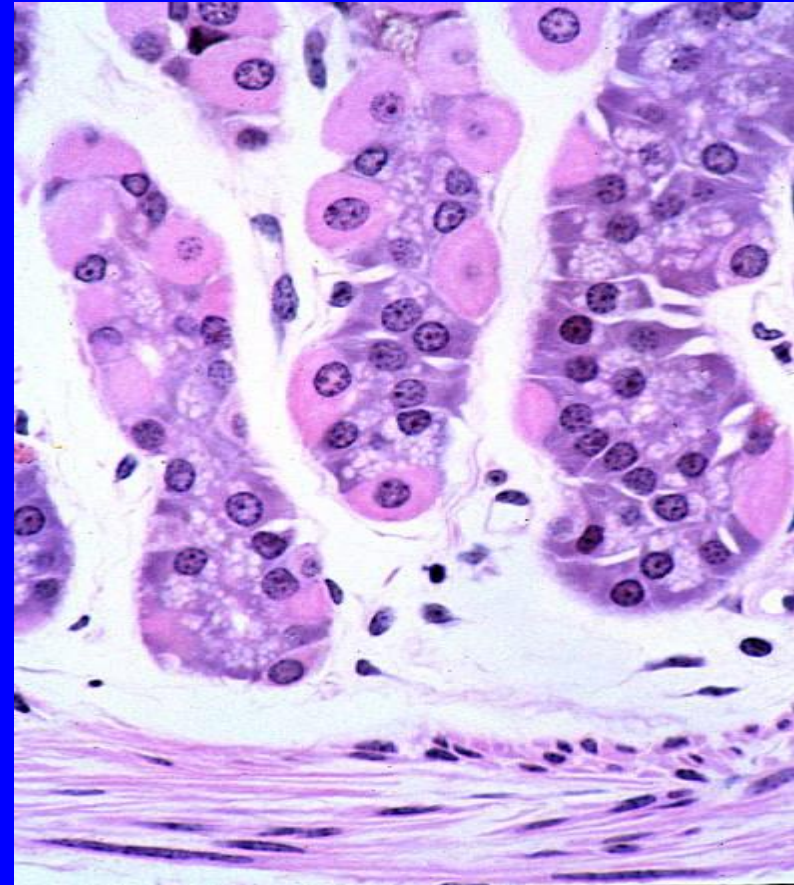




# Fundic Glands

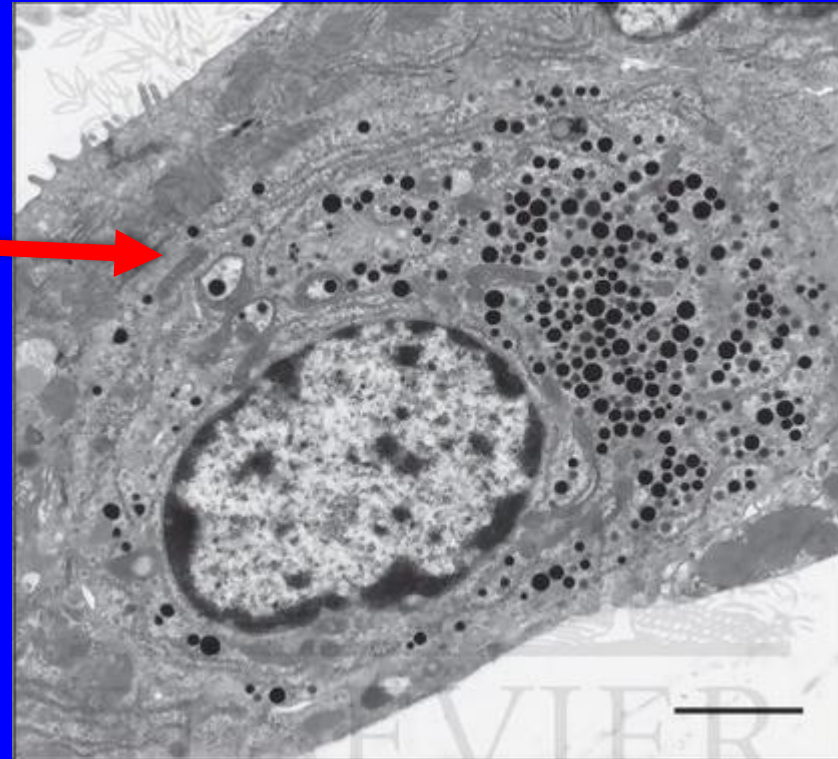
## 2. Peptic (chief) cells:

- The predominant cell type.
- Columnar cells.
- **Nucleus:** basal, round.
- **Cytoplasm:**
  - basophilic with apical secretory granules.
  - secrete **pepsinogen**.



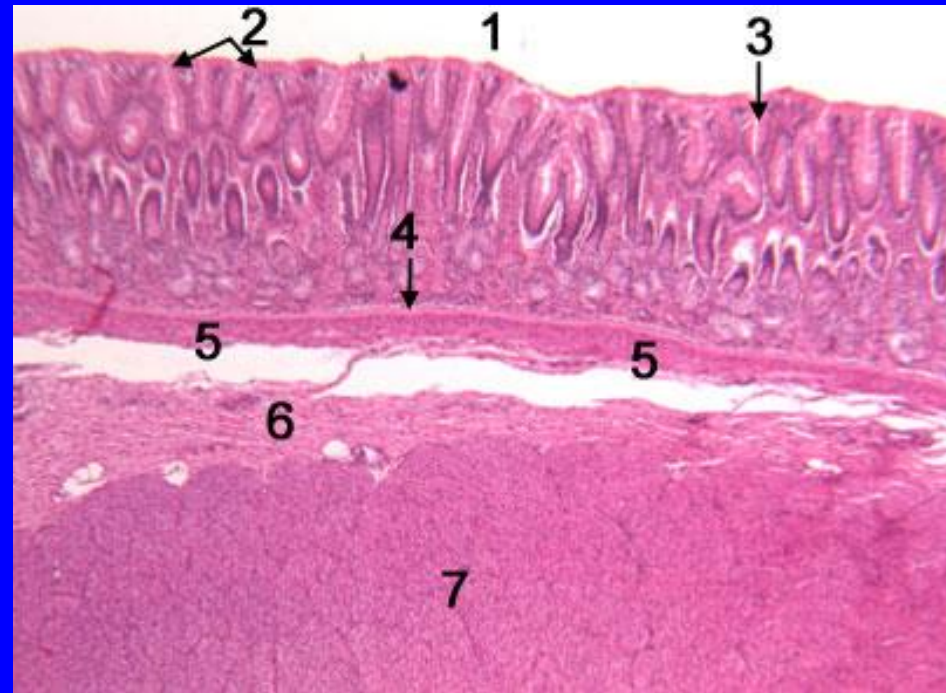
# Fundic Glands

3. **Mucous neck cells:**  
secrete **mucus**.
4. **Enteroendocrine (EE) (DNES) cells:**  
secrete **hormones** (e.g. serotonin, endorphin).
5. **Stem cells:** regenerative cells.



# Pylorus of Stomach

- **Mucosa:** is invaded by **pyloric glands**. The surface epithelium is simple columnar mucus-secreting cells.
- **Submucosa:**
  - Connective tissue containing blood vessels, nerves, and Meissner's plexus.
  - **NO glands.**
- **Muscularis Externa:**
  - Two smooth muscle layers:
    - Inner circular.
    - Outer longitudinal.
  - Auerbach's plexus.
- **Serosa:**
  - C.T. covered by mesothelium



1. Lumen
2. Surface epithelium
3. Pits of pyloric glands
4. Lamina propria
5. Muscularis mucosae
6. Submucosa
7. Muscularis externa

# Pyloric glands

- Their pits are deep --  
- about half the length of mucosa.
- They are branched and convoluted ---  
many cross sections.



# Pyloric glands

Cells of pyloric glands:

**1. Mucus neck cells (Mucus secreting cells):**

- The predominant cells.
- Secrete mucus.

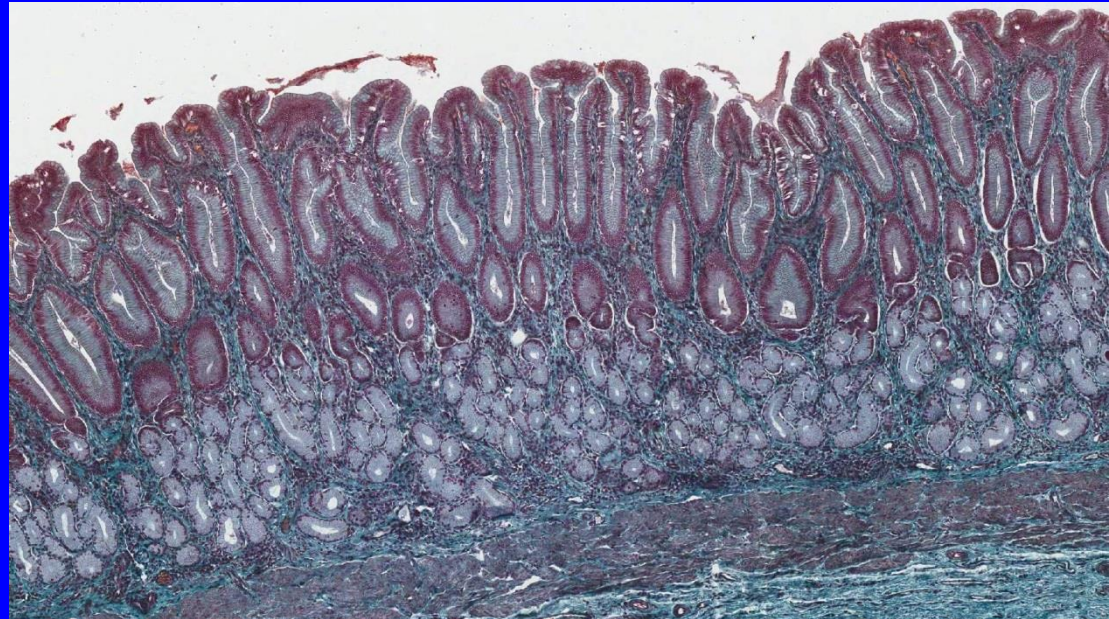
**2. EE cells:**

- EC cells
- G cells
- D cells
- A cells

**3. Stem cells.**

**4. Parietal cells: few.**

**5. No peptic cells.**



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**THANK YOU**