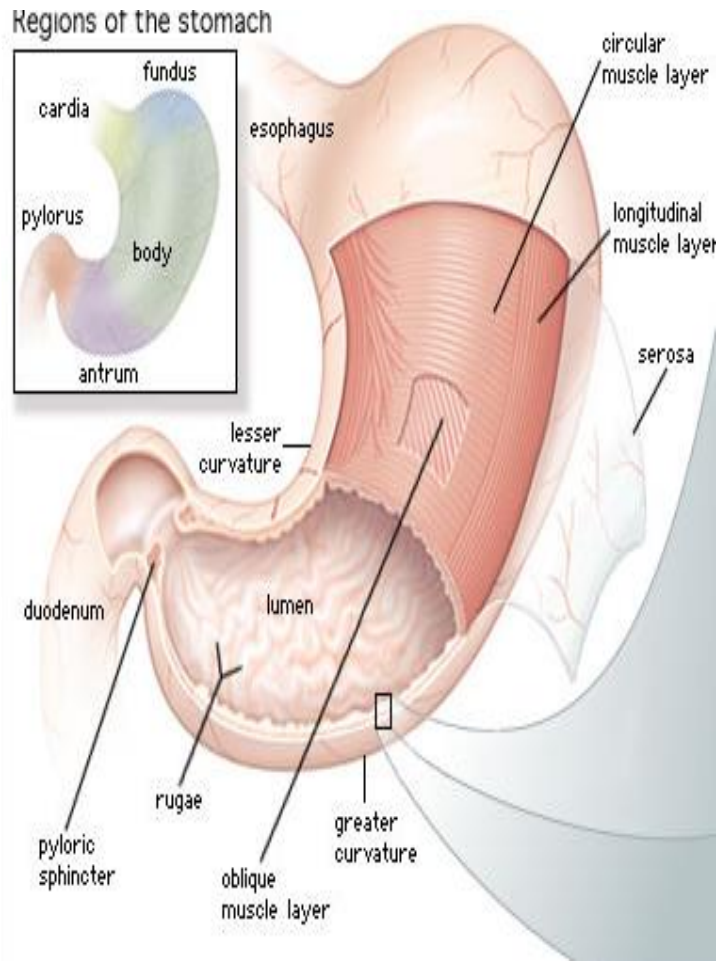
Stomach Histology

Dr.Zahid Sarfaraz Khan

A/P Anatomy Kgmc

STOMACH

- Stomach is a dilated segment of the digestive tract, that digest food and secrets hormone
- There are three histological regions:
  - Cardia
  - Fundus and body
  - Pylorus
- The fundus and body are identical in microscopic structure
- The mucosa and submucosa of the undistended stomach lie in longitudinally directed folds known as rugae
- When the stomach is filled with food, folds flatten out



MUSCULARIS EXTERNA:

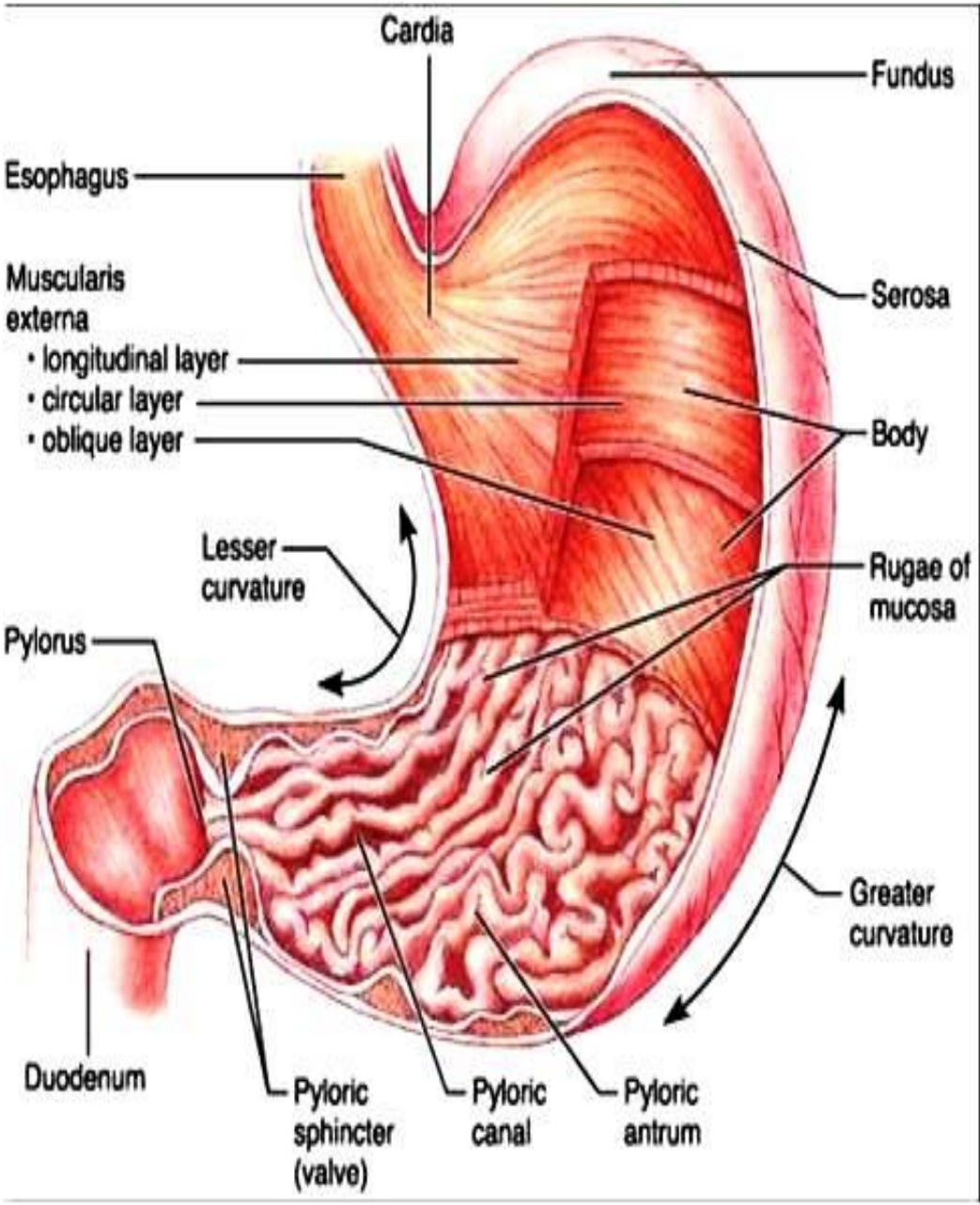
Inner: Oblique

Middle: circular

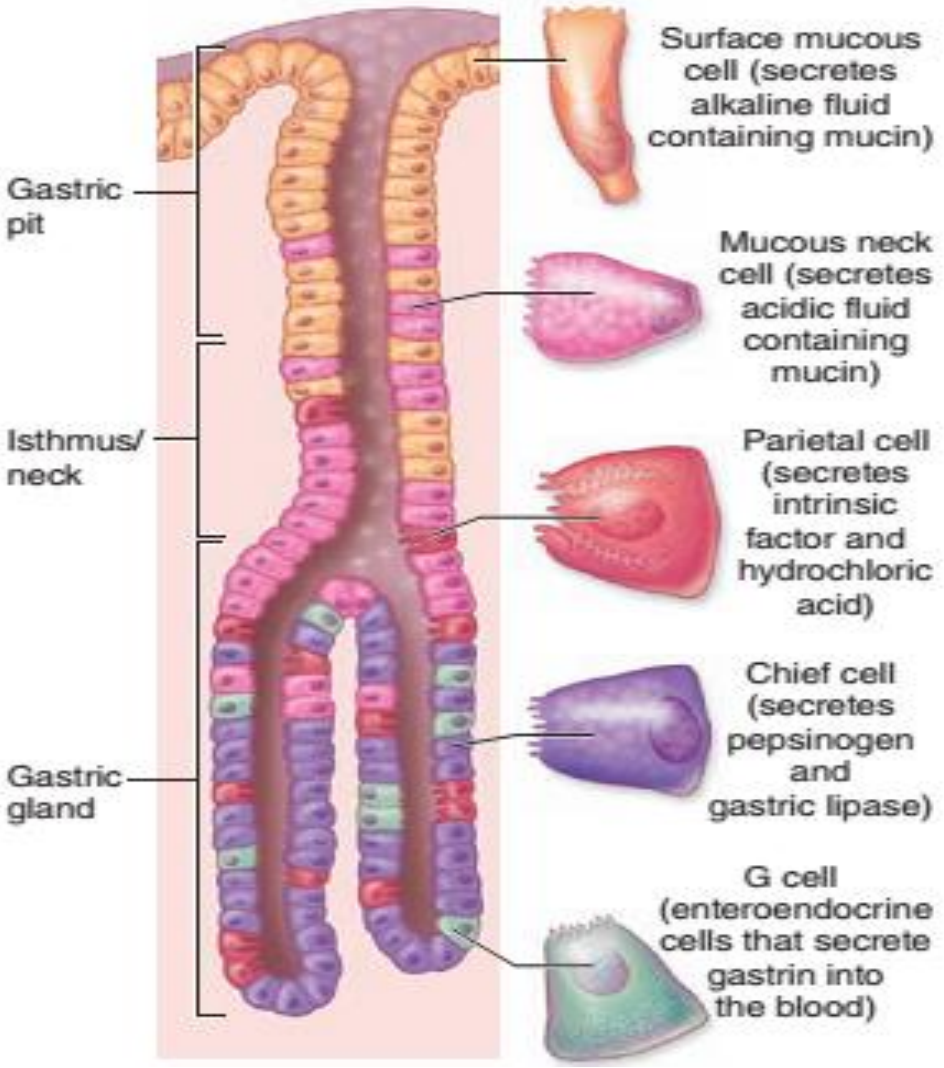
Outer: Longitudinal

SEROSA:

Outermost layers of the stomach which consists of loose connective tissue covered by mesothelium

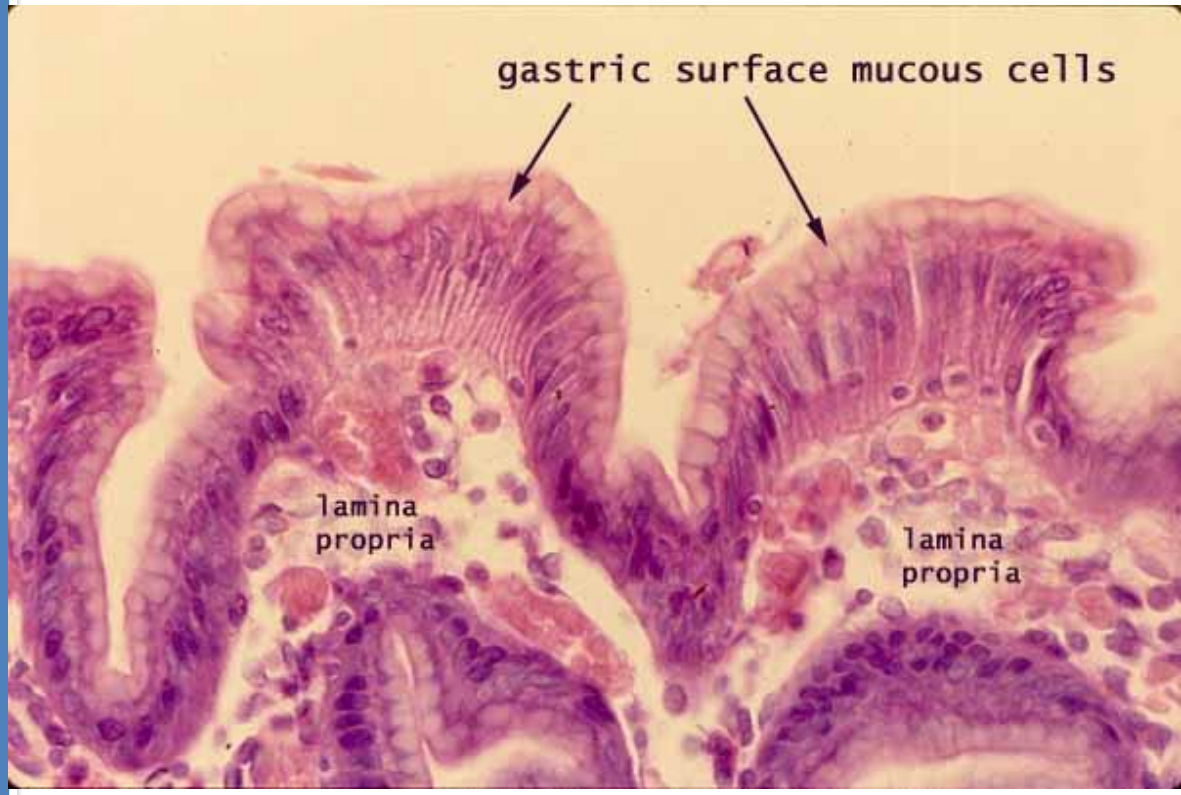


Cellular Composition of the stomach



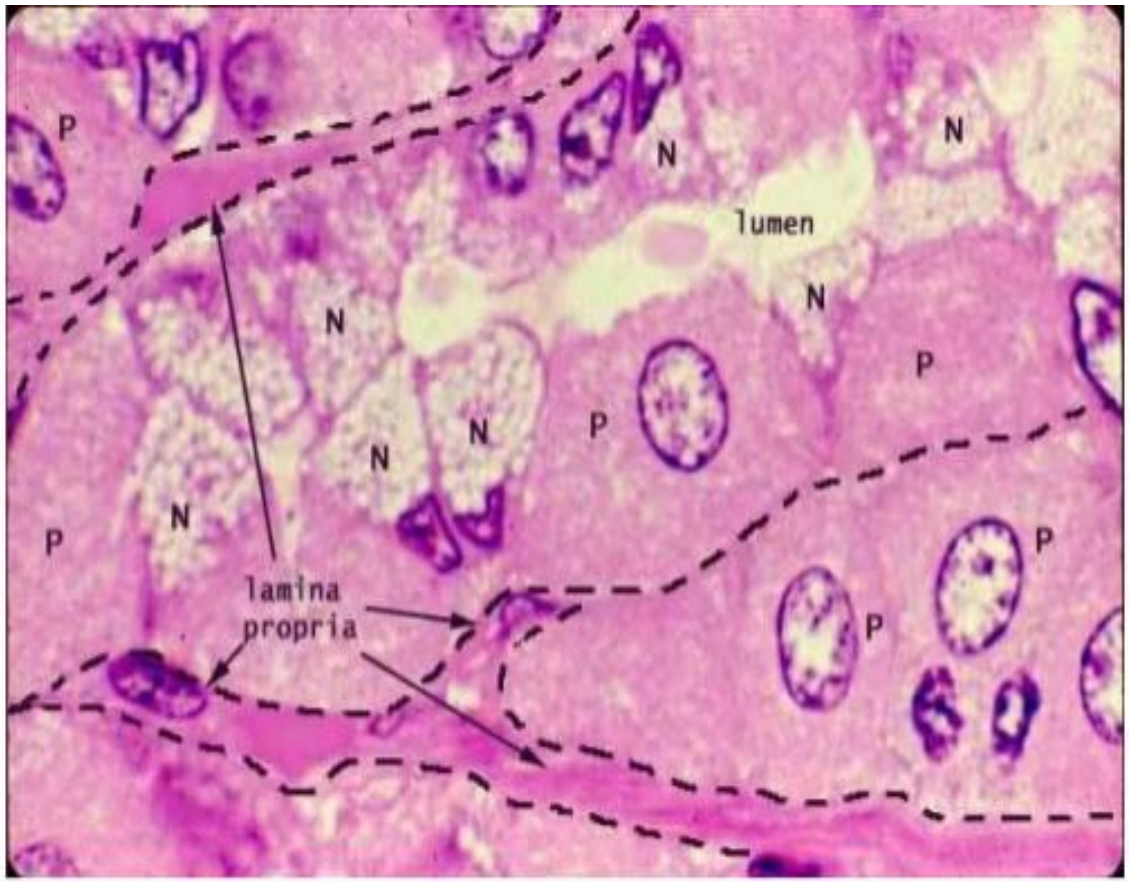
Surface mucous cells of stomach

- Cover luminal surface of stomach
- Partly cover gastric pit
- Cytoplasm contain mucigen granules
- Stain poorly
- Have short surface microvilli
- Secrete protective bicarbonate in deeper layer of surface mucous coat.



Mucous neck cells

- Located just below gastric pit.
- Columnar in shape
- but Less columnar than the surface mucous cells lining the gastric pits
- Contain mucinogen granules in apical cytoplasm(Vacuolated foamy)
- While nuclei are situated basally.
- Produces soluble mucus
- But their mucus secretion is less alkaline (Acidic Mucus) than that of the surface Epithelial mucous cells.



Parietal cell of stomach

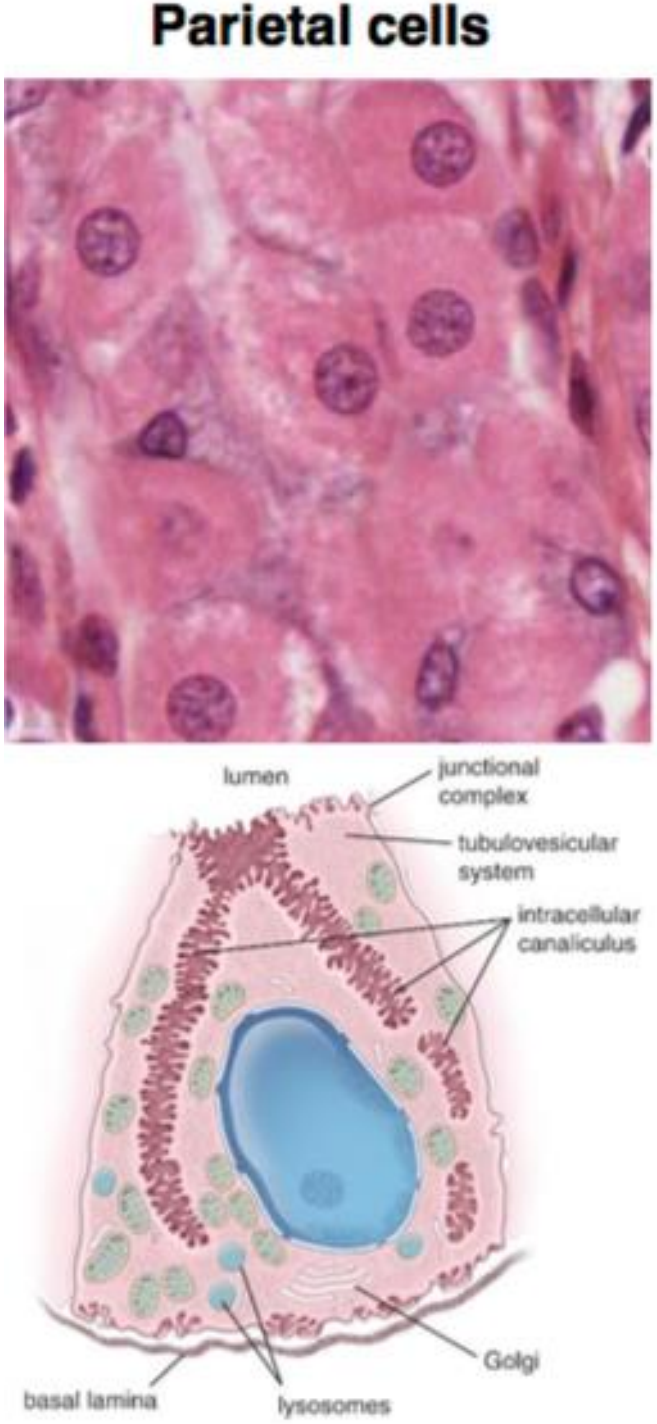
They are large, ovoid or polyhedral cells with a large central nucleus.

- More numerous in the upper half of the gland than in the lower half

- ❑Eosinophilic cytoplasm
- ❑Fried egg like appearance.
- ❑Plasma membrane form deep branching canaculi

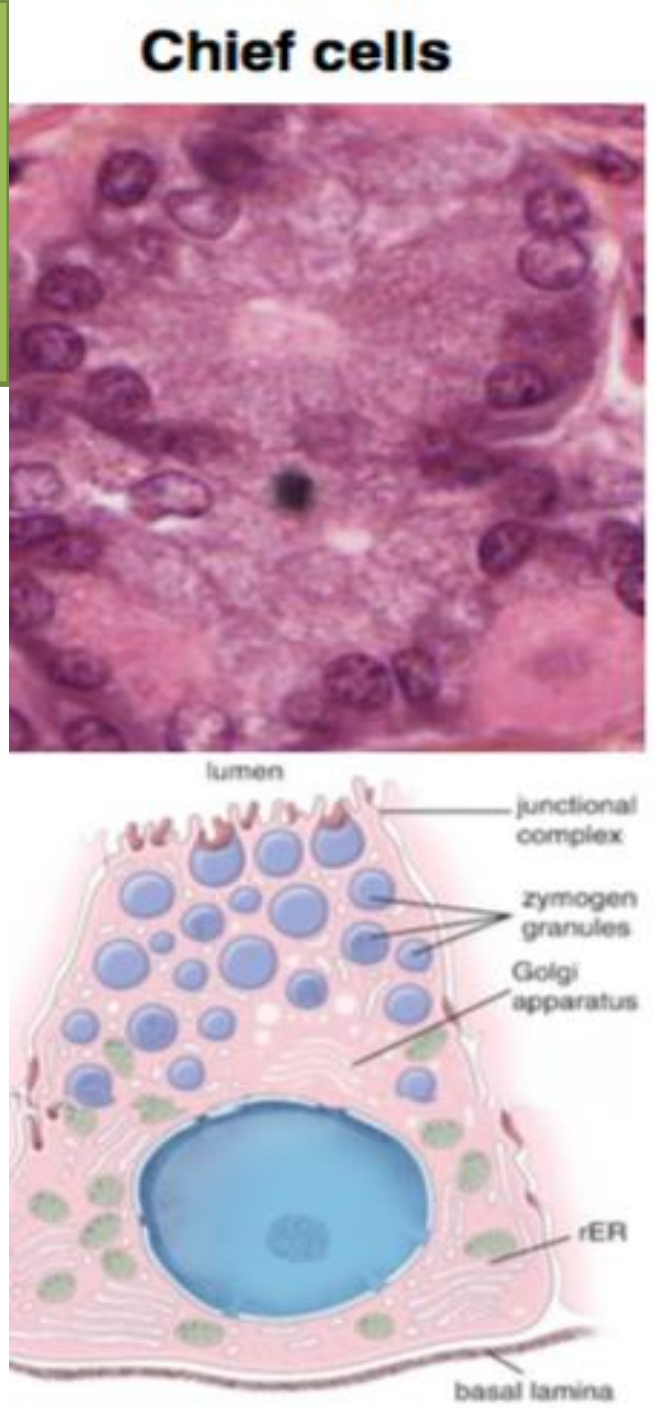
- Secretes HCL and intrinsic factor.

❖ Intrinsic factor combines with vitamin B12 to form a complex necessary for erythrocytes formation.



Chief, peptic or zymogenic cells

- Located at base of the gland
- Basally located nuclei
- Strongly basophilic granular cytoplasm
- Pepsin secreting cells

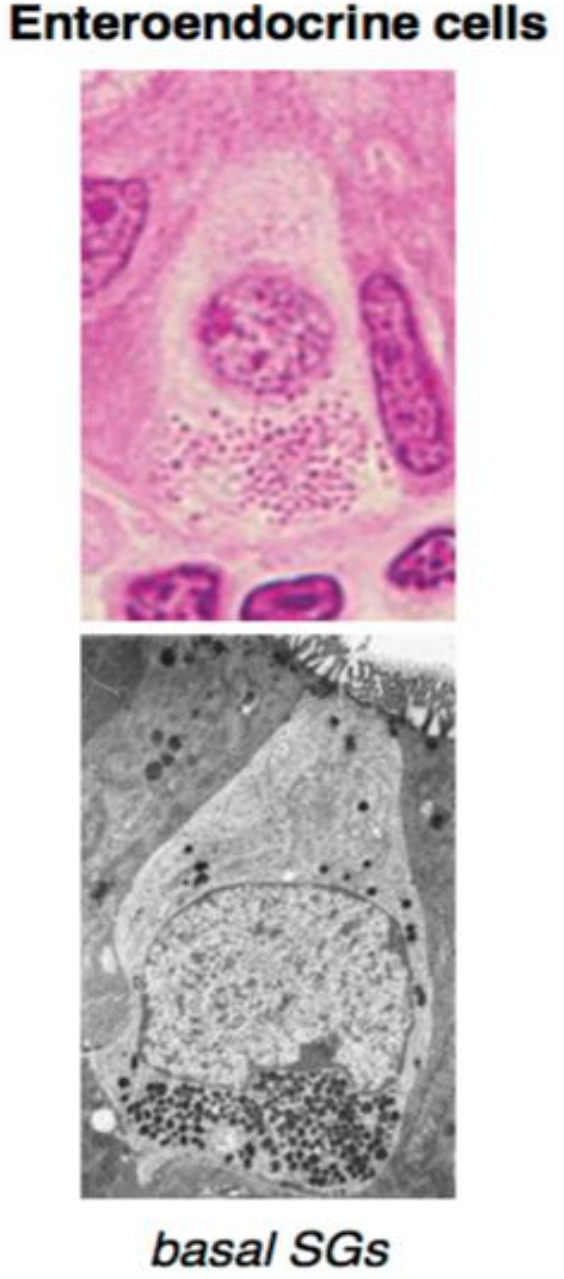


Neuroendocrined OR DNES Diffused Neuroendocrine system

- Also found in based of the gastric gland

Secrete:-

- Serotonin
- Peptide hormone gastrin called G cell.
- Somatostatin



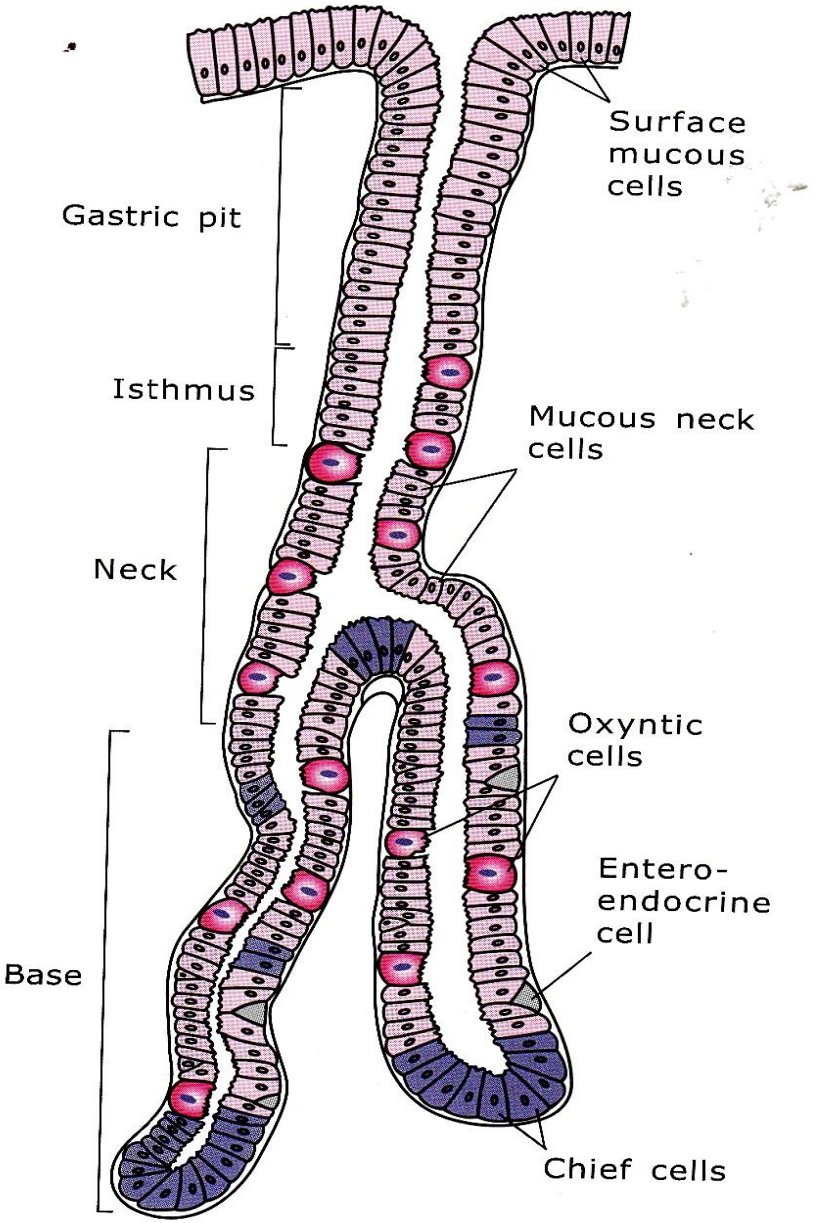
Regerative Stem Cells

- Relatively thin and columnar
- Few in no. and interspersed among neck of fundic gland.
- Rich supply of ribosome
- BUT Less orgenelles
- Nuclei basally located
- Have little heterochromatine and display a large nucleous
- These cells have regenerative ability and replace all those cell where need occur.

FIGURE **15–20** Ultrastructure of parietal, chief, and enteroendocrine cells.

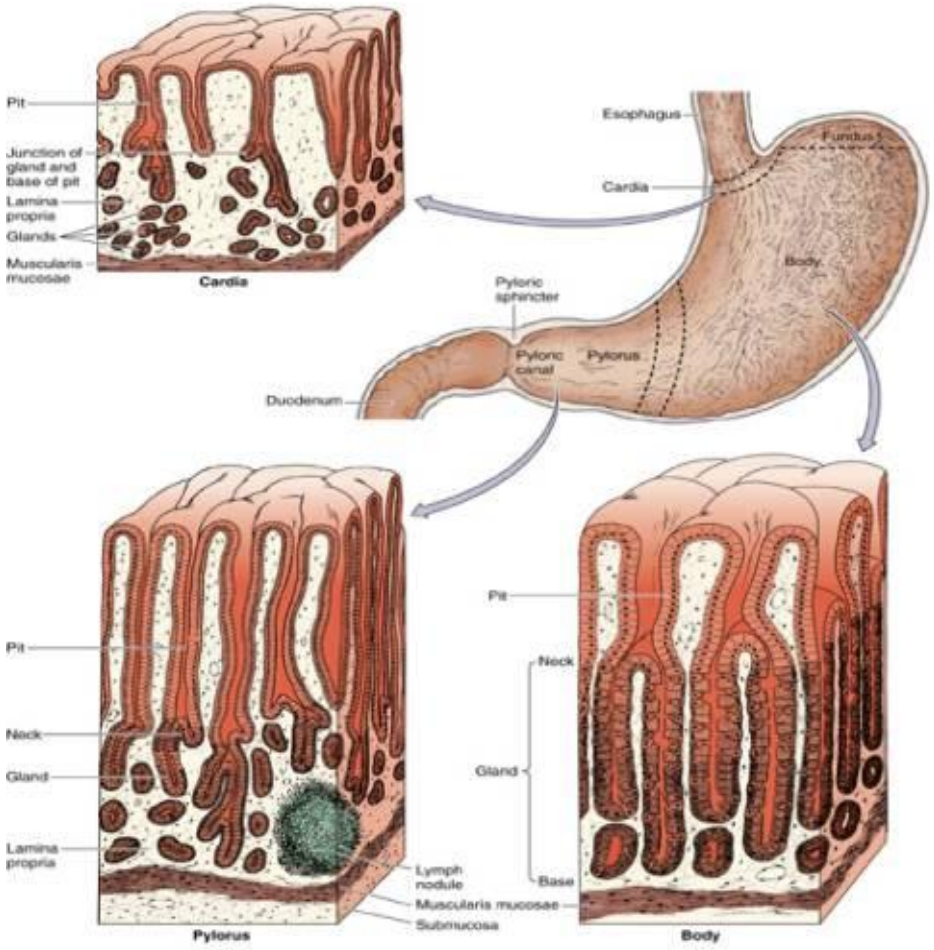
TEM of a transversely sectioned gastric gland shows the ultrastructure of three major cell types. Parietal cells (**P**) contain abundant mitochondria and intracellular canaliculi (**IC**). Also shown are chief cells (**C**), which have extensive rough ER and apical secretory granules near the lumen (**L**). An enteroendocrine cell (**E**) shows dense basal secretory granules and is a closed-type enteroendocrine cell; that is, it has no contact with the gland's lumen and secretes product in an endocrine/paracrine manner. X1200.

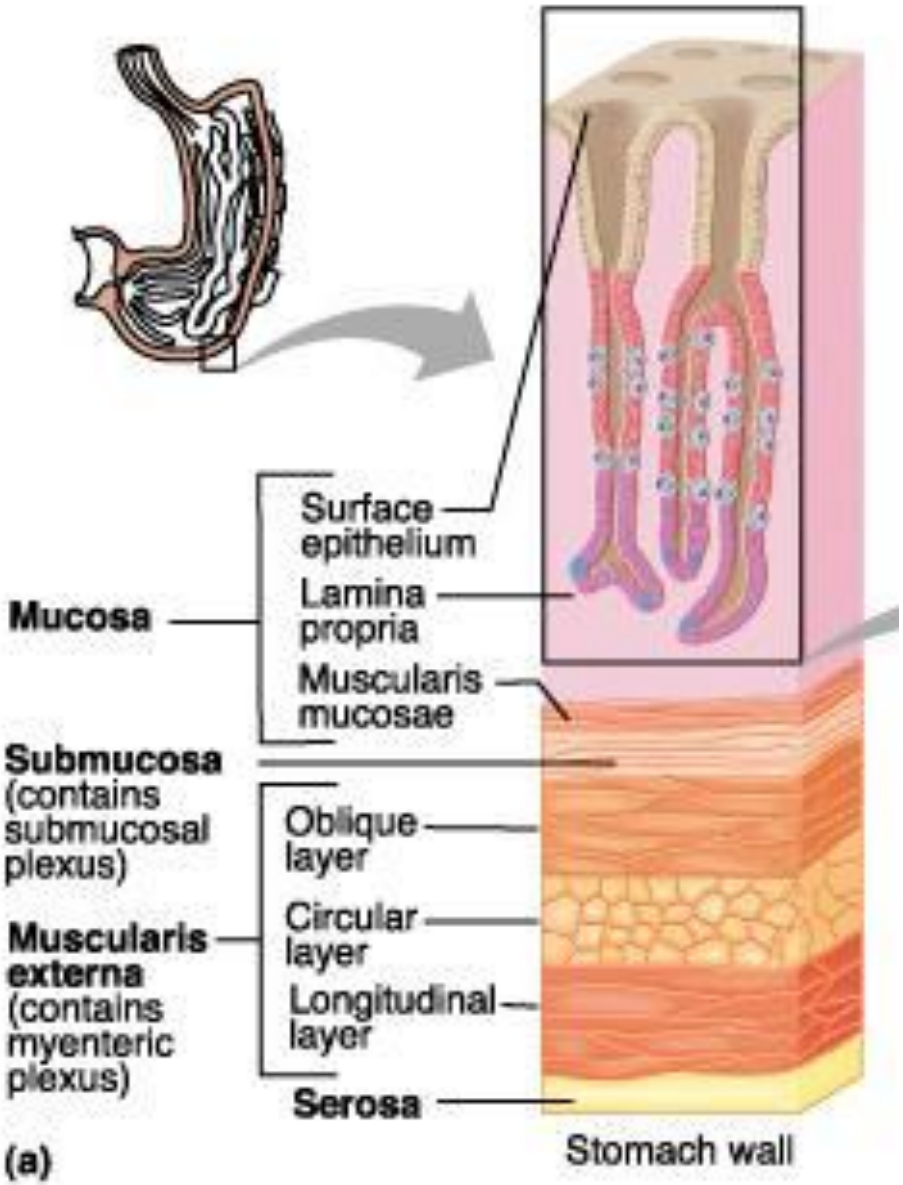
Types of cells:



Stomach

- Stomach is divided into three histological regions on the basis of nature of glands:
  - ➢ Cardiac region
  - ➢ Fundic region (fundus & body)
  - ➢ Pyloric region




Surface epithelium
Lamina propria
Mucosa
Muscularis mucosae
Submucosa (contains submucosal plexus)
Oblique layer
Circular layer
Muscularis externa (contains myenteric plexus)
Longitudinal layer
Serosa
(a)
Stomach wall

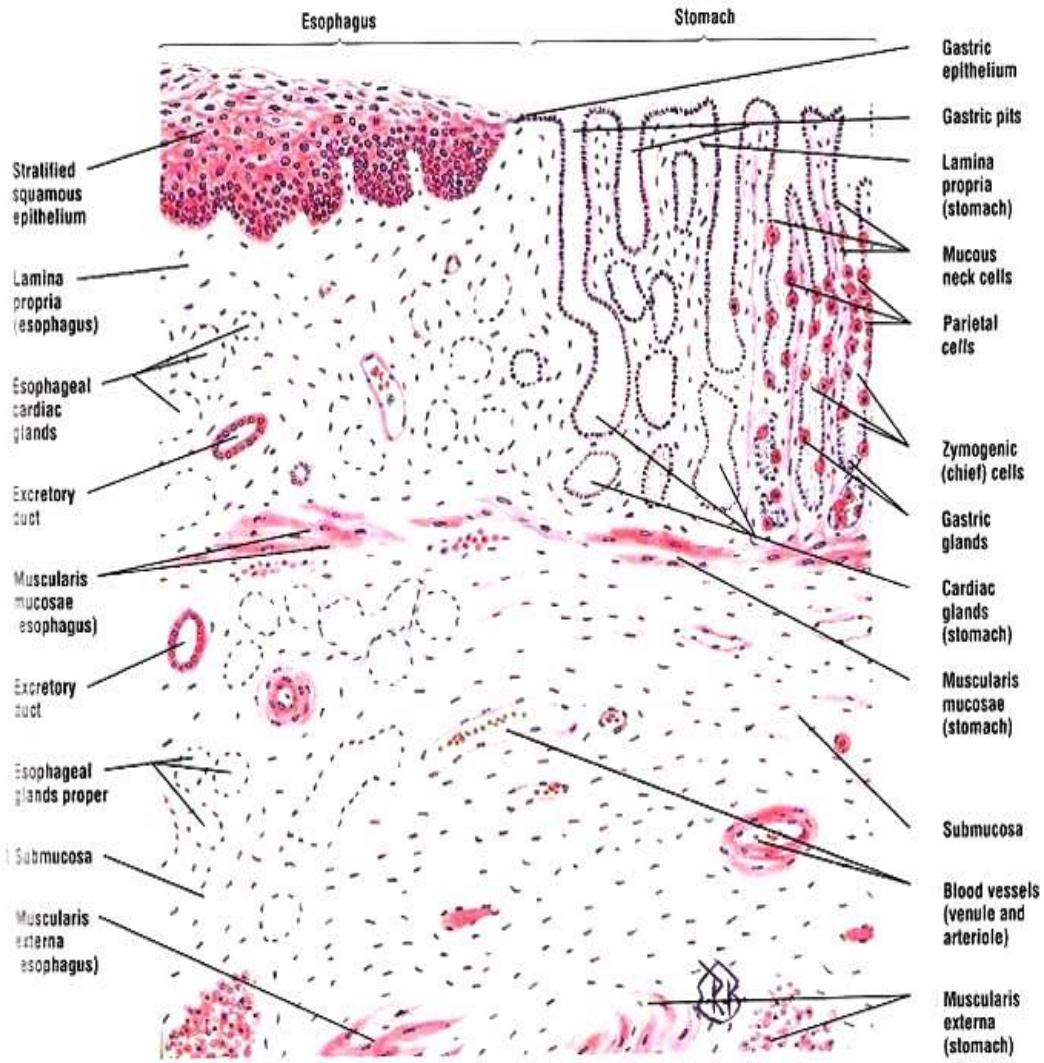
Cardiac region of the stomach

Mucosa:

- Epithelial lining at the cardio-oesophageal junction changes from stratified sq. to simple columnar epithelium
- Presence of Mucous surface cells and cardiac glands and gastric pit.

Submucosa:

Consists of Meissner's plexus and blood vessels

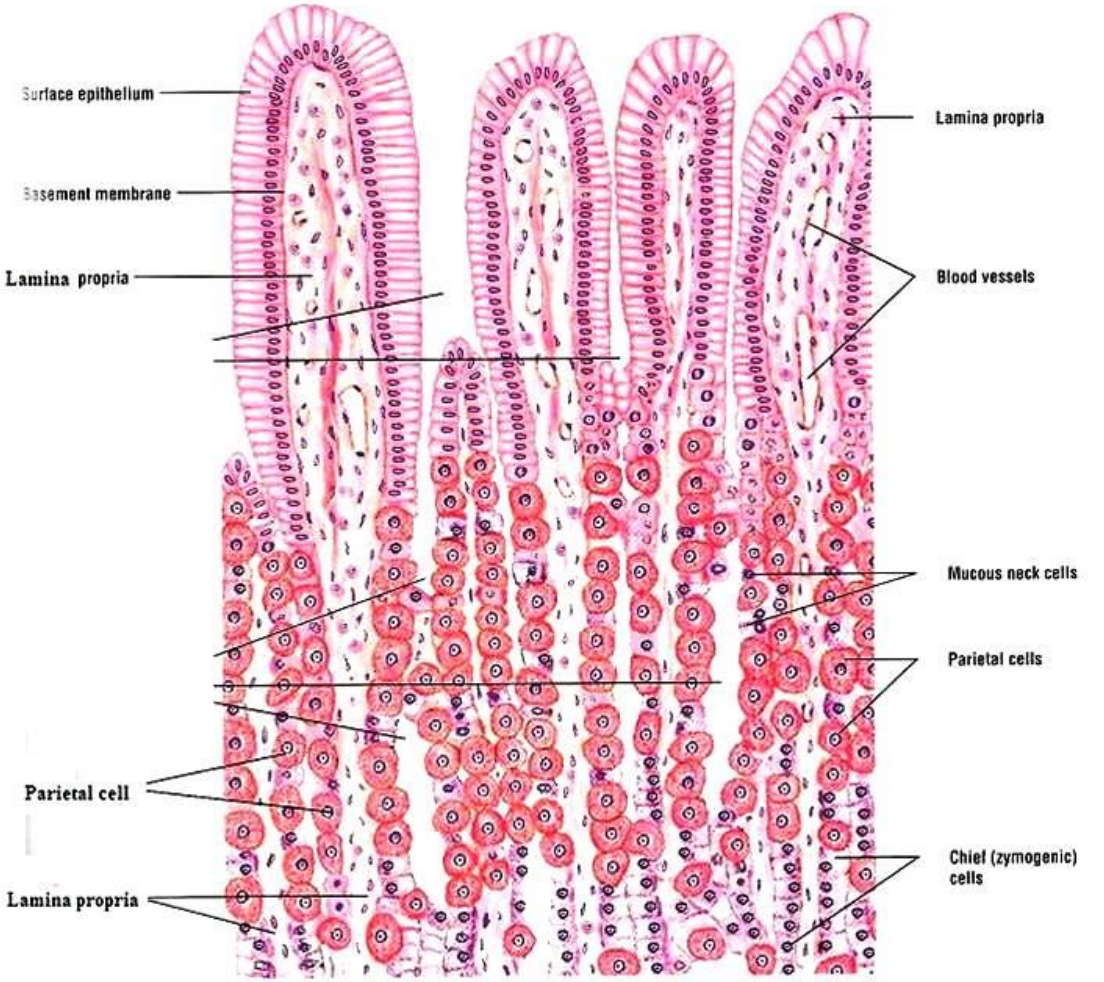


Esophageal-stomach junction. Stain: hematoxylin and eosin. Low magnification.

Stomach - fundus

- **Mucosa:**

- ***Lining Epithelium*** – Simple columnar epithelium that invaginates to various extents into the lamina propria, forming **gastric pits.**
- These cells are involved in mucus secretion. The mucus protects the epithelial lining from damage due to the presence of acid in the stomach.
- HCL
- PEPSINOGEN

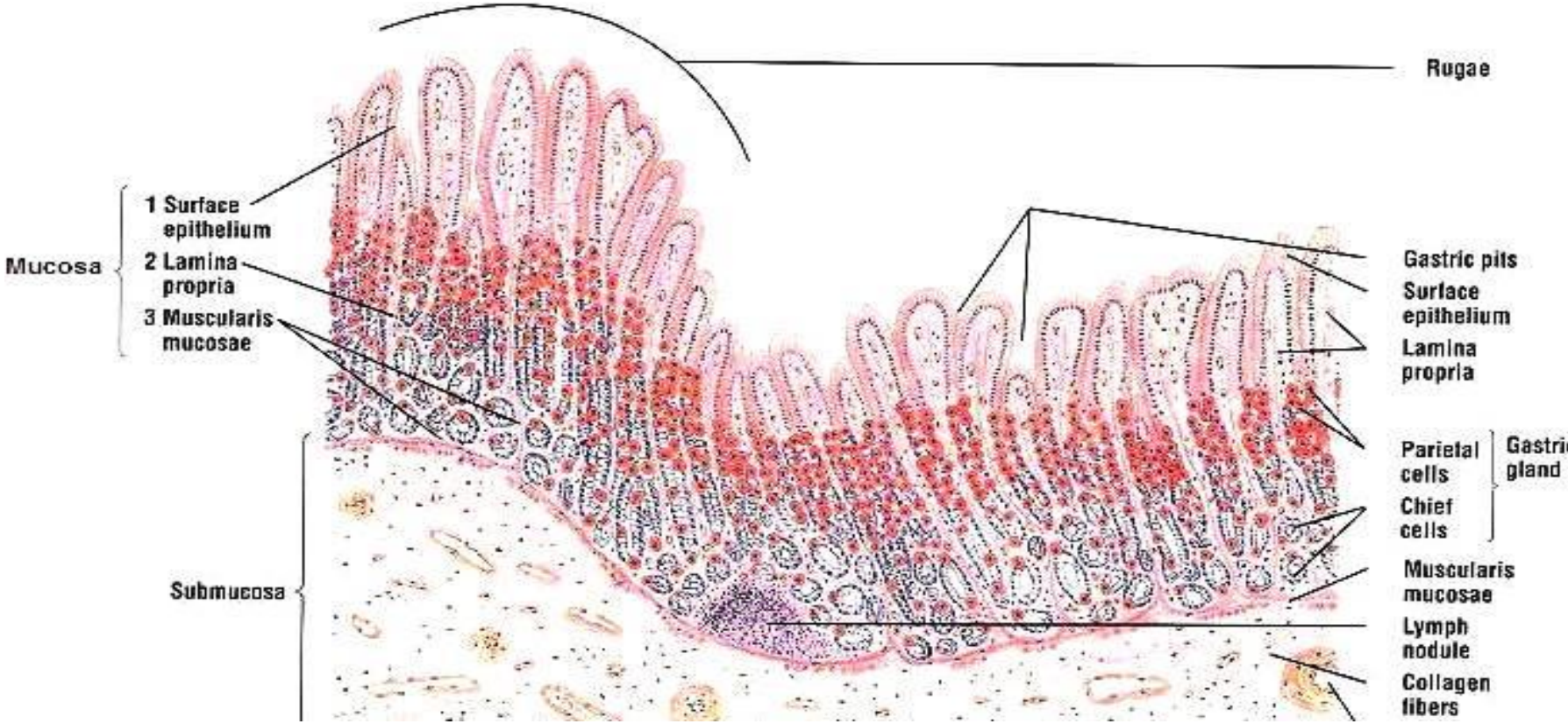


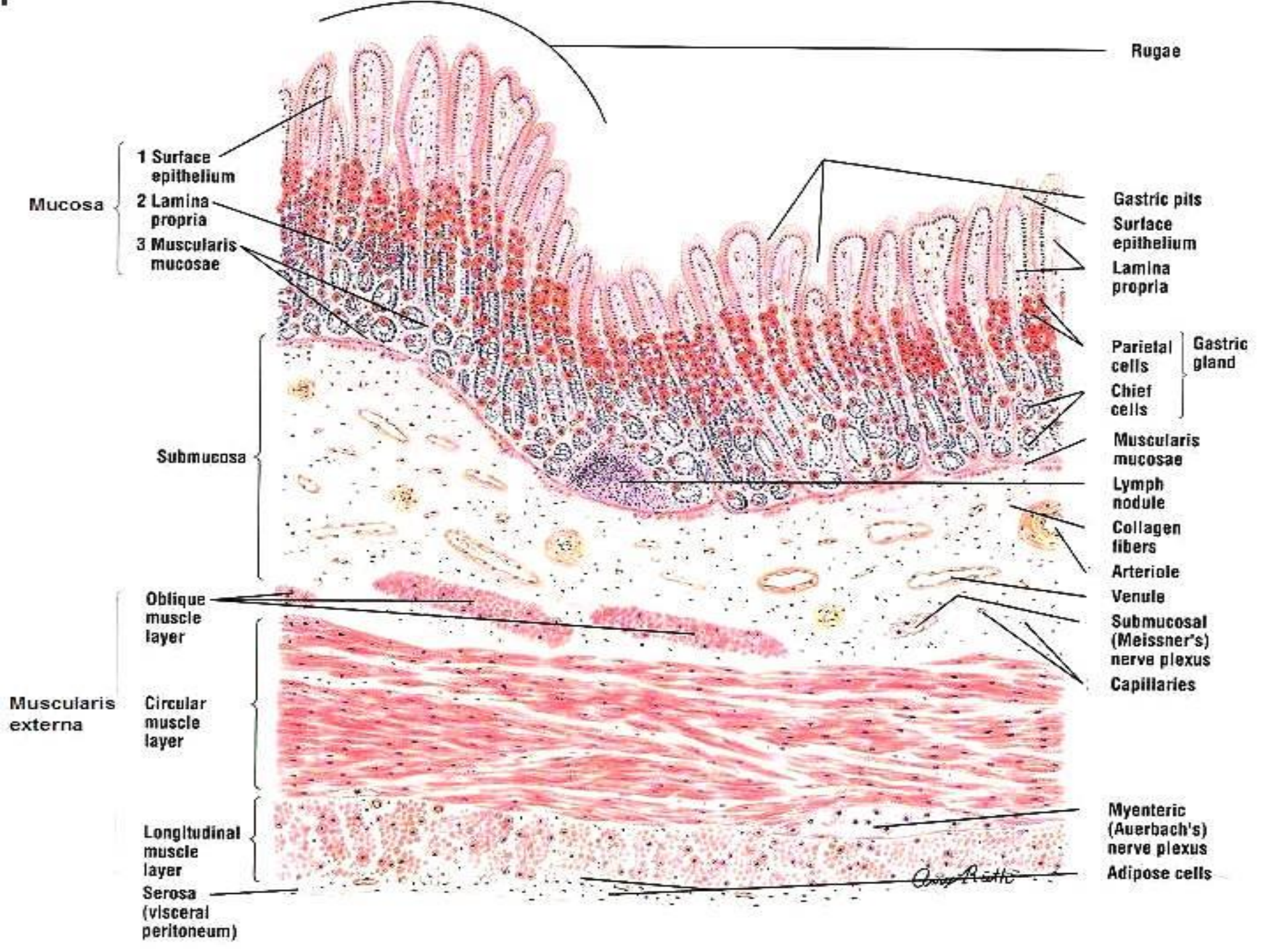
Stomach: superficial region of the gastric (fundic) mucosa. Stain: hematoxylin and eosin. High magnification.

MUSCULARIS MUCOSAE:

- It consists of two thin layer of smooth muscles.

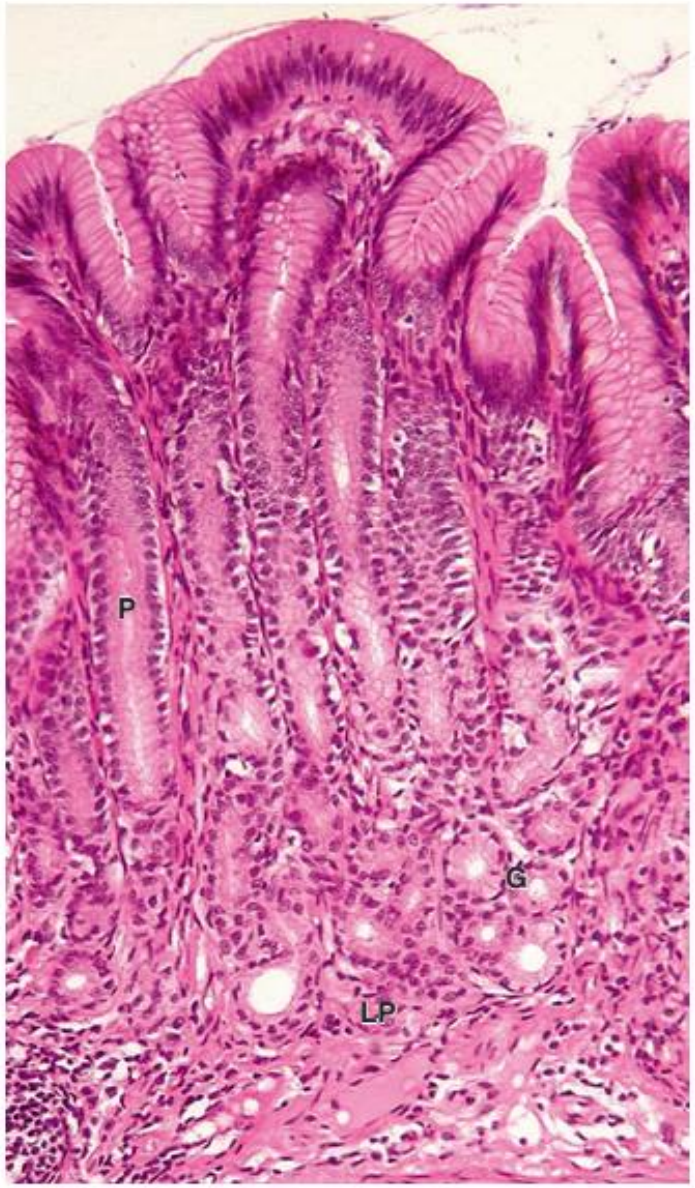
  i.e., Outer longitudinal and inner circular




Rugae
Mucosa
1 Surface epithelium
2 Lamina propria
3 Muscularis mucosae
Submucosa
Muscularis externa
Oblique muscle layer
Circular muscle layer
Longitudinal muscle layer
Serosa (visceral peritoneum)
Gastric pits
Surface epithelium
Lamina propria
Gastric gland
Parietal cells
Chief cells
Muscularis mucosae
Lymph nodule
Collagen fibers
Arteriole
Venule
Submucosal (Meissner's) nerve plexus
Capillaries
Myenteric (Auerbach's) nerve plexus
Adipose cells

PYLORIC GLANDS

The pyloric region of the stomach has deep gastric pits (**P**) leading to short, coiled pyloric glands (**G**) in the lamina propria (**LP**). Cardial glands are rather similar histologically and functionally. Cells of these glands secrete mucus and lysozyme primarily, with a few enteroendocrine G cells also present. The glands and pits are surrounded by cells of the lamina propria connective tissue containing capillaries, lymphatics and MALT. Immediately beneath the glands is the smooth muscle layer of the muscularis mucosae. X140. H&E.



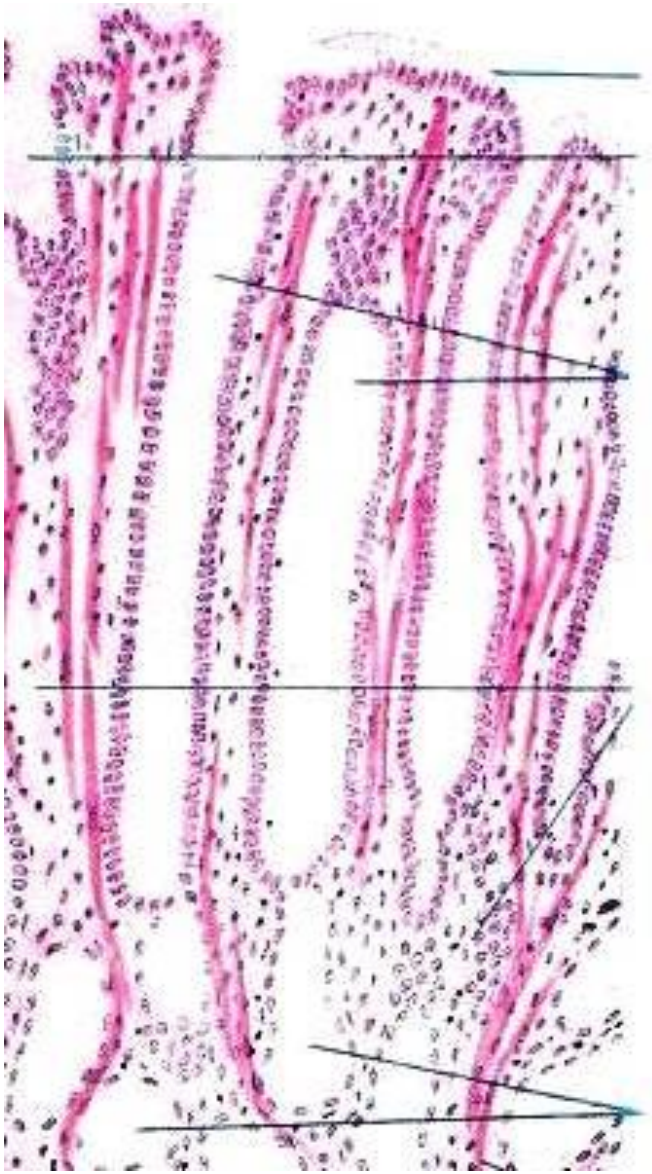
STOMACH - PYLORUS

- **MUCOSA:**

- Epithelium: Simple columnar as in fundic part
- Pyloric glands occupy the lamina propria
- **Gastric pits are deeper**
- **Glands are short,tortuous and branched**
- Produce mucus contain lysoenzyme and

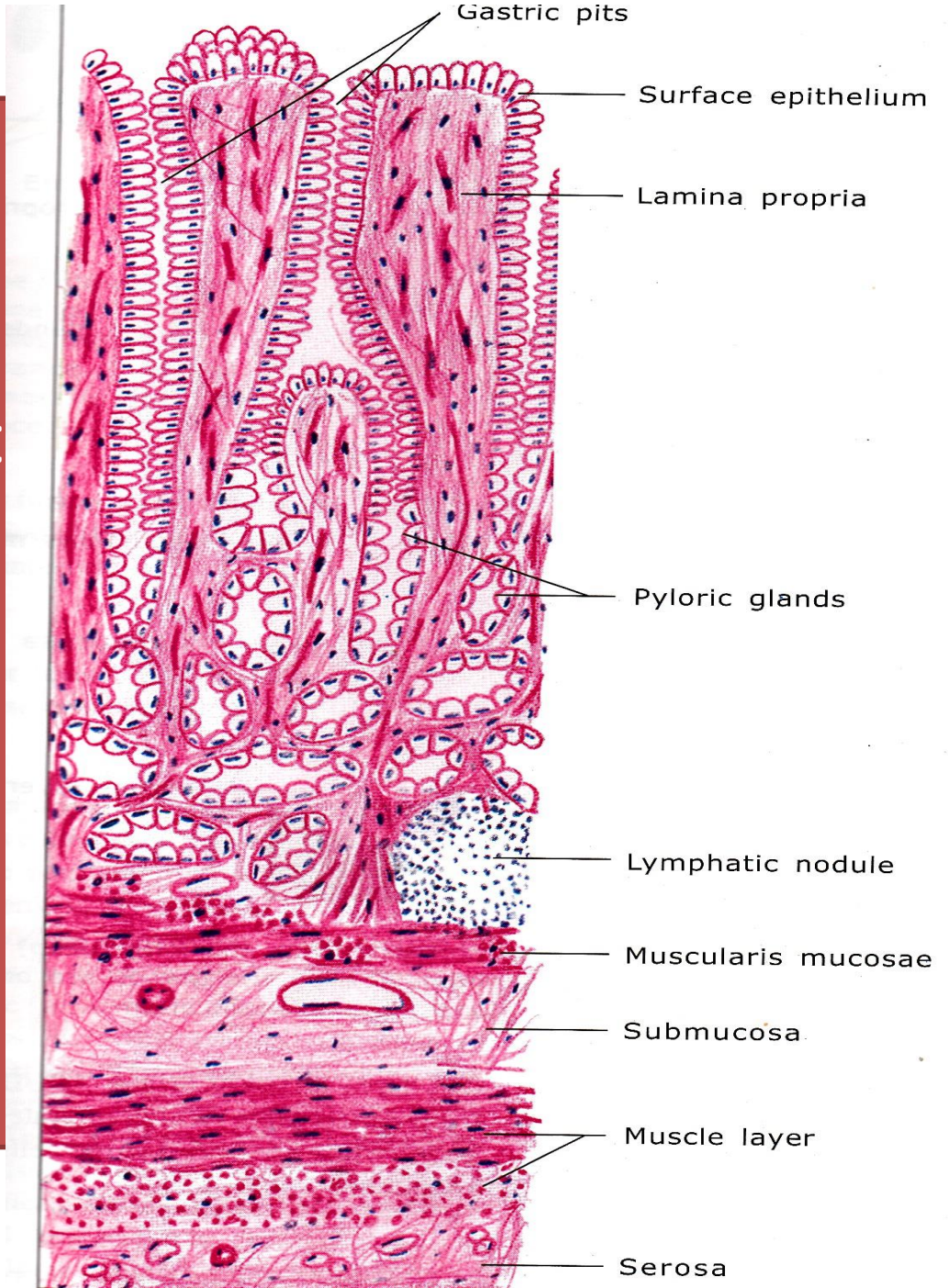
  Gastrin G cells

Presence of amino acid + distention of stomach stimulate G cell to release gastrin---parietal cell --- release acid secretion.



Pyloris have

Muscularis mucosa and Submucosa are similar to fundic part



- **MUSCULARIS EXTERNA**:

Inner: Oblique

Middle: circular

Outer: Longitudinal

Similar to Fundic part, but the circular fibres are much thickened to form **pyloric sphincter**

Difference between cardia, fundus & body, and pylorus

CARDIA	FUNDUS & BODY	PYLORUS
Contain **cardiac gland**	Contain **gastric gland**	Contain **pyloric gland**
Gastric pit less deeper than pyloric gland	**Gastric pit less deeper** than pyloric gland	**Gastric pit more deeper** than gastric or cardiac gland
Parietal cells absent or very few	**Parietal cells more**	**Parietal cells few**

23

MEDICAL APPLICATION

- For various reasons
- Including autoimmunity, parietal cells may be damaged to the extent that insufficient quantities of intrinsic factor are secreted and vitamin B12 is not absorbed adequately.
- low levels of vitamin B12 can reduce proliferation of erythroblasts, producing pernicious anemia

Gastric and duodenal ulcers

- Are painful erosive lesions of the mucosa.
- That may extend to deeper layers.
- Such ulcers can occur anywhere between the lower esophagus and the jejunum, and

Their causes include:-

A- Bacterial infections with Helicobacter pylori,

B- Effects of nonsteroidal anti-inflammatory drugs,

C- Overproduction of HCl or pepsin,

D- Lowered production or secretion of mucus or bicarbonate.

ATROPIC GASTRITIS

- Both parietal cell and chief cells are became decrease.
- Little gastric juice, no acid or pepsin activity.
- Intrinsic factor produce by parietal cell decrease.

MEDICAL APPLICATION

- Tumors called carcinoids, which arise from enteroendocrine
- EC cells, are responsible for the clinical symptoms caused by overproduction of serotonin.
- Serotonin increases gut motility.

Thank you