

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. They are located in the top-left, bottom-left, and bottom-right areas of the slide.

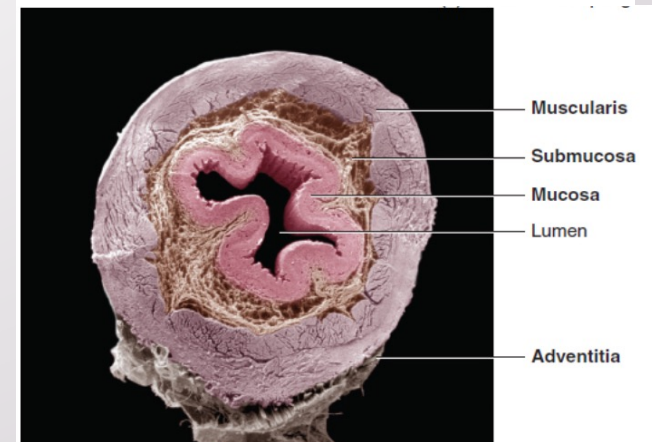
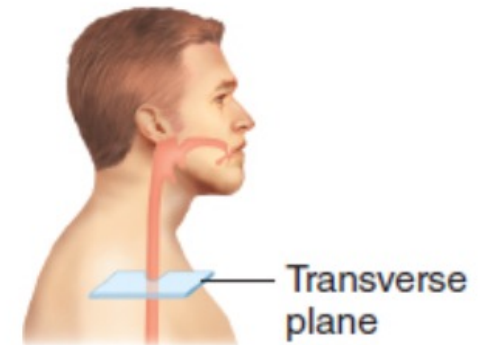
Gastrointestinal Tract (GIT)

ESOPHAGUS AND

STOMACH

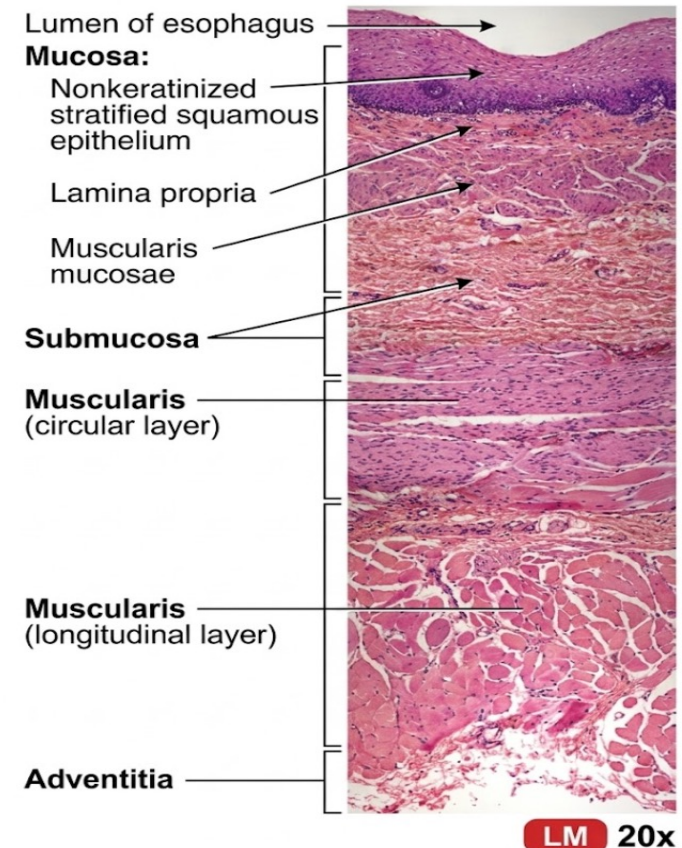
The Esophagus

- Is a collapsible muscular tube, about 25 cm long
- Lies posterior to the trachea.
- Begins at the inferior end of the laryngopharynx, passes through the inferior aspect of the neck, and enters the mediastinum anterior to the vertebral column.
- It pierces the diaphragm through an opening called the **esophageal hiatus**.



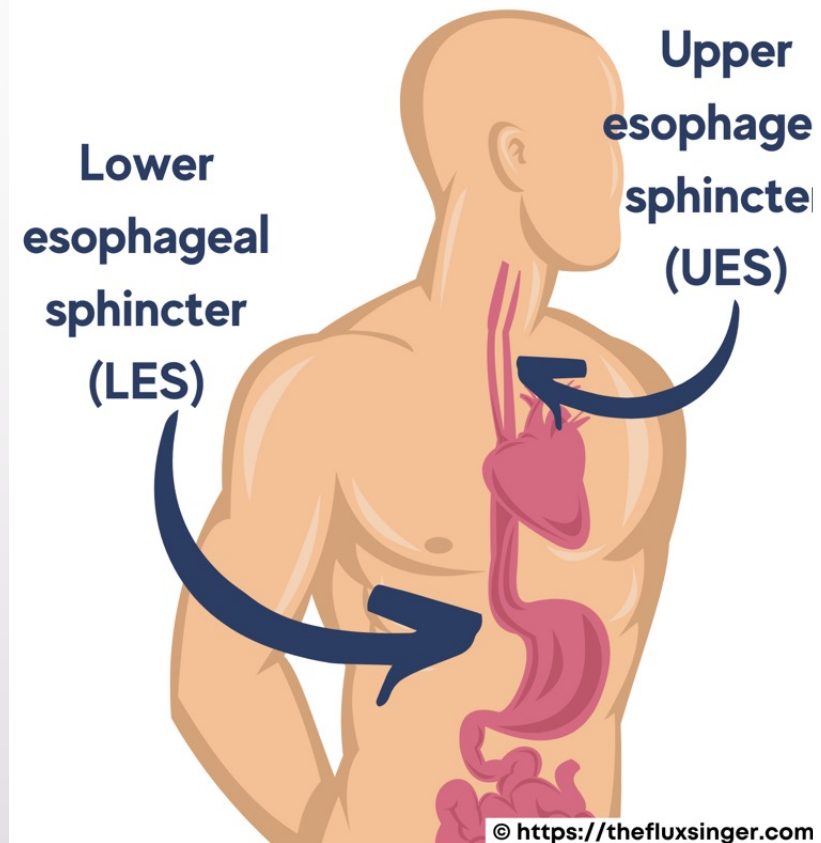
Histology Of The Esophagus

- The **mucosa** of the esophagus consists of nonkeratinized stratified squamous epithelium, lamina propria, and a muscularis mucosae.
- The submucosa contains blood vessels, and mucous glands (esophageal glands, near the stomach it contains esophageal cardiac glands).
- The muscularis of the superior third is skeletal muscle, the intermediate third is skeletal and smooth muscle, and the inferior third is smooth muscle.
- The superficial layer of the esophagus is known as the **adventitia** (attaches the esophagus to surrounding structures), the distal 1-2 cm is covered by serosa.

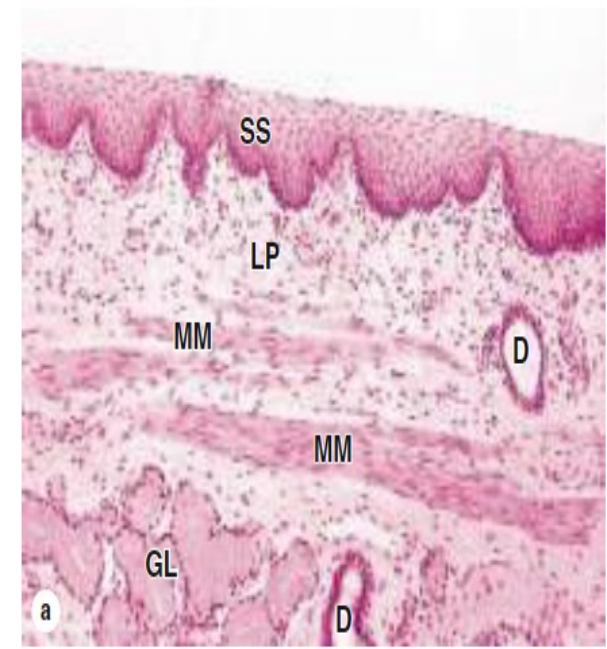
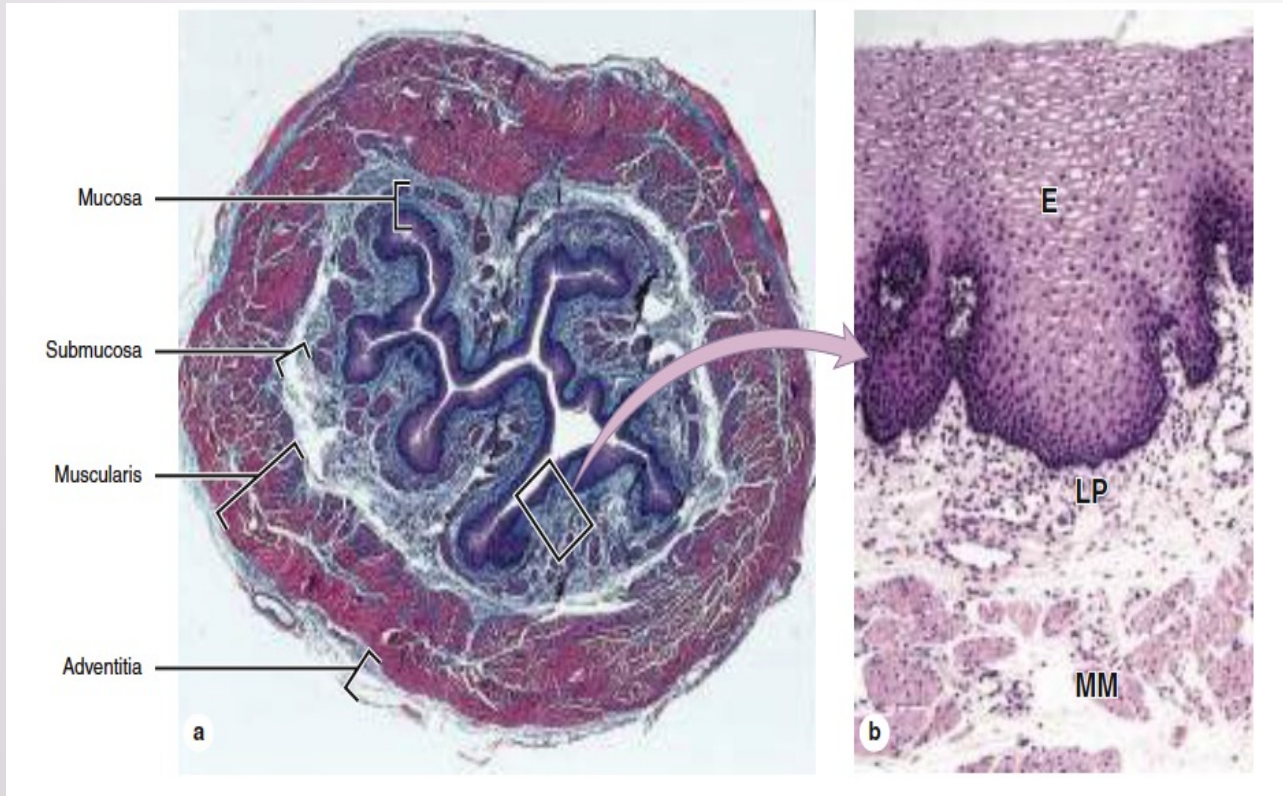


Sphincters

- At each end of the esophagus, the muscularis forms two sphincters—
 1. **Upper esophageal sphincter (UES)** (skeletal muscle): regulates the movement of food from the pharynx into the esophagus.
 2. **Lower esophageal sphincter (LES)** (smooth muscle): regulates the movement of food from the esophagus into the stomach



Esophagus

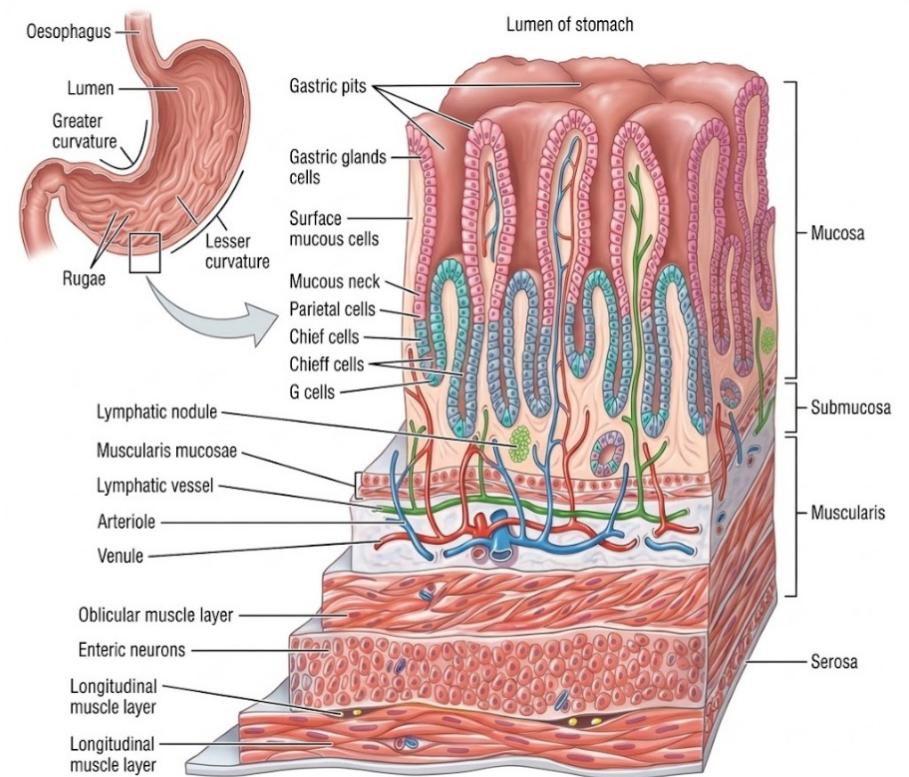


>> MEDICAL APPLICATION

The lubricating mucus produced in the esophagus offers little protection against acid that may move there from the stomach. Such movement can produce **heartburn** or **reflux esophagitis**. An incompetent inferior esophageal sphincter may result in chronic heartburn, which can lead to erosion of the esophageal mucosa or **gastroesophageal reflux disease (GERD)**. Untreated GERD can produce metaplastic changes in the stratified squamous epithelium of the esophageal mucosa, a condition called **Barrett esophagus**.

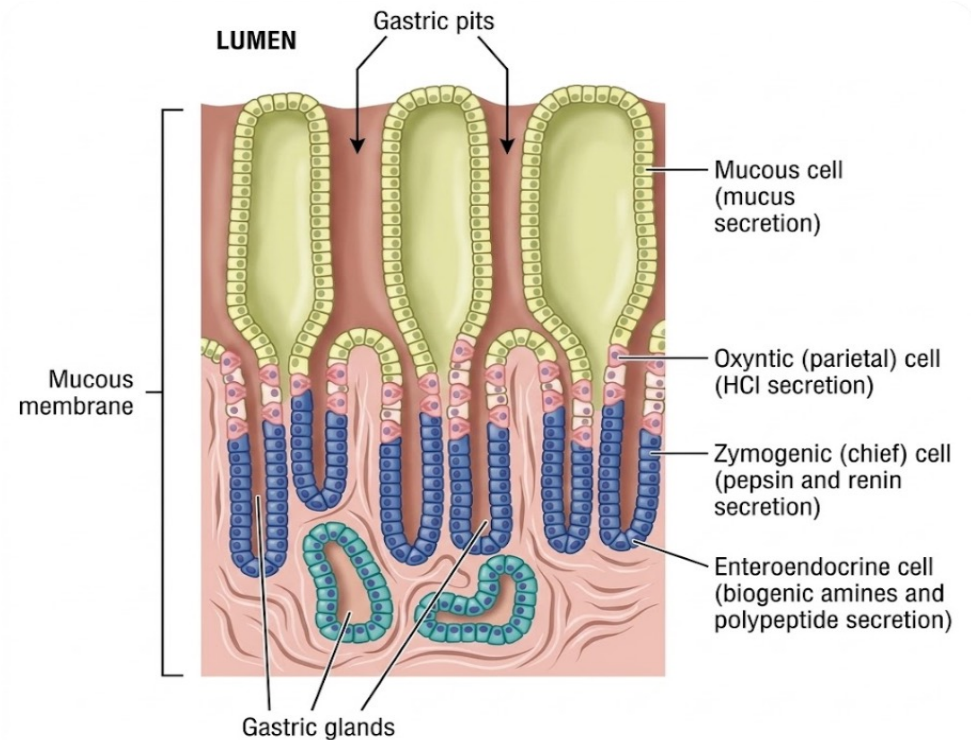
Histology Of The Stomach

- Mucosa: epithelium + lamina propria + muscularis mucosae
- Epithelium: simple columnar cells--- **surface mucous cells.**
- **Gastric glands:** extension of epithelial cells down into the lamina propria and form columns of secretory cells.
- **Gastric pits:** bottom of narrow channels where several gastric glands open into then into the lumen of stomach.
- In the fundus and body the gastric glands themselves fill most of the mucosa



Mucosa

- The mucosal surface of the stomach is a simple columnar epithelium that invaginates deeply into the lamina propria. The invaginations form millions of gastric pits, each with an opening to the stomach lumen.
- The gastric pits lead to long, branched, tubular glands that extend through the full thickness of the lamina propria.



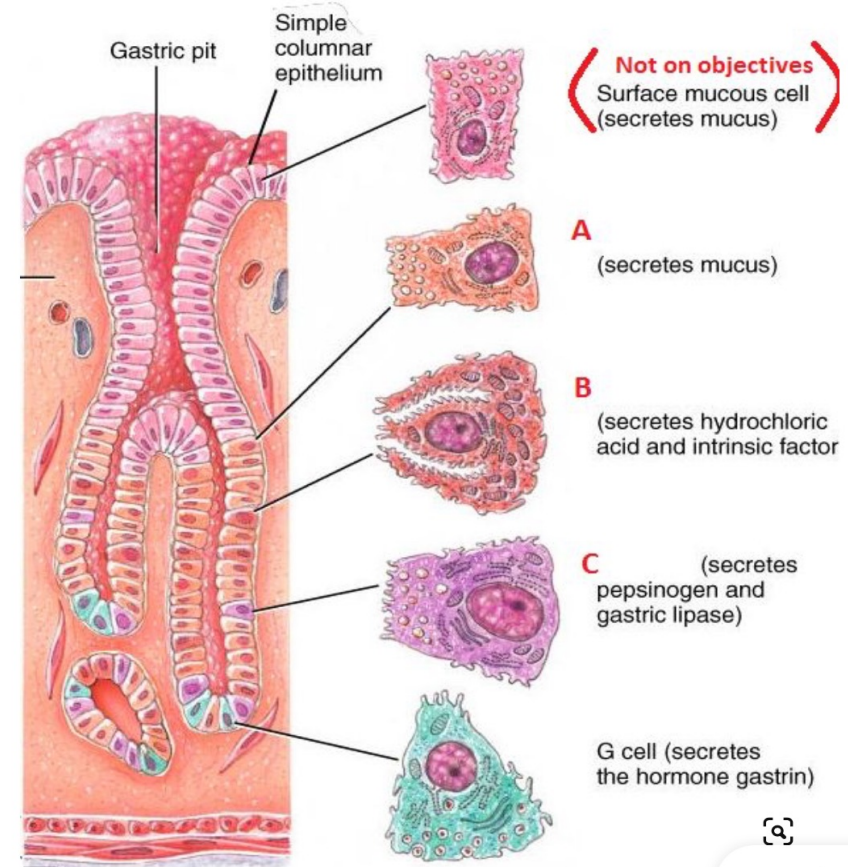
- The surface mucous cells that line the lumen and gastric pits secrete a thick, adherent, and highly viscous mucous layer that is rich in bicarbonate ions and protects the mucosa from both abrasive effects of intraluminal food and stomach acid.

Histology Of The Stomach

Surface mucous cells are the cells directly line the stomach surface. They secrete an **alkaline** fluid containing mucin.

Exocrine gland cells that secrete their products into the stomach lumen: mucous neck cells, chief cells, parietal cells, and enteroendocrine cells:

1. mucous neck cells secrete mucus (**acidic** fluid).
2. Parietal (oxyntic) cells produce HCL and intrinsic factor (needed for absorption of vitamin b₁₂). Among mucous neck cells. Rounded or pyramidal. **Intensely eosinophilic (+++ mitochondria)**. its secretion is stimulated by parasympathetic innervation and by **gastrin**.



Histology Of The Stomach

3. The chief (zymogenic) cells secrete pepsinogen and gastric lipase (protein and lipid digestion). Predominate the lower part of the gland. Protein-secreting cell---abundant RER and apical granules (inactive pepsinogens).

4. Enteroendocrine cells are scattered cells with endocrine and paracrine function. located mainly in the pyloric antrum and secretes the hormone **gastrin**---**G cells**.

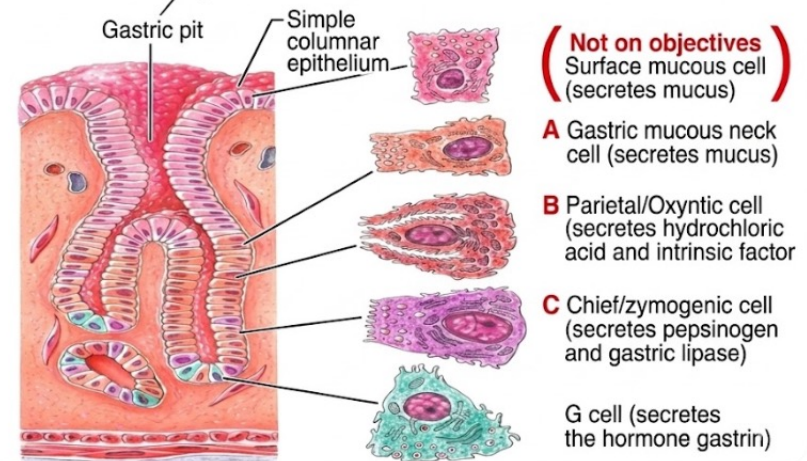
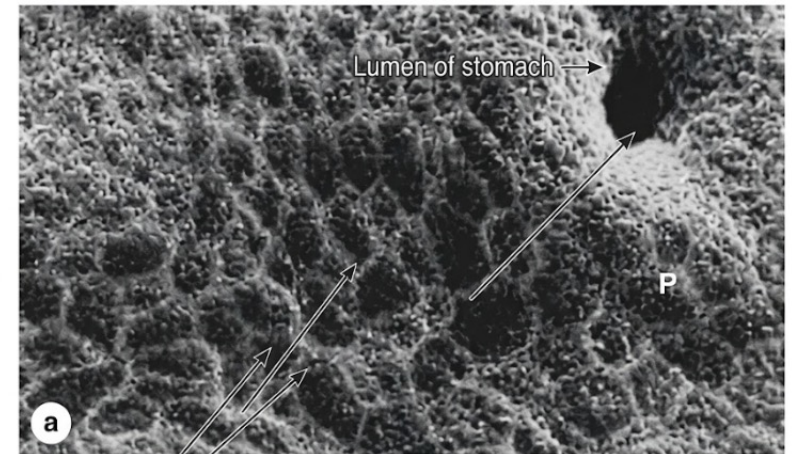
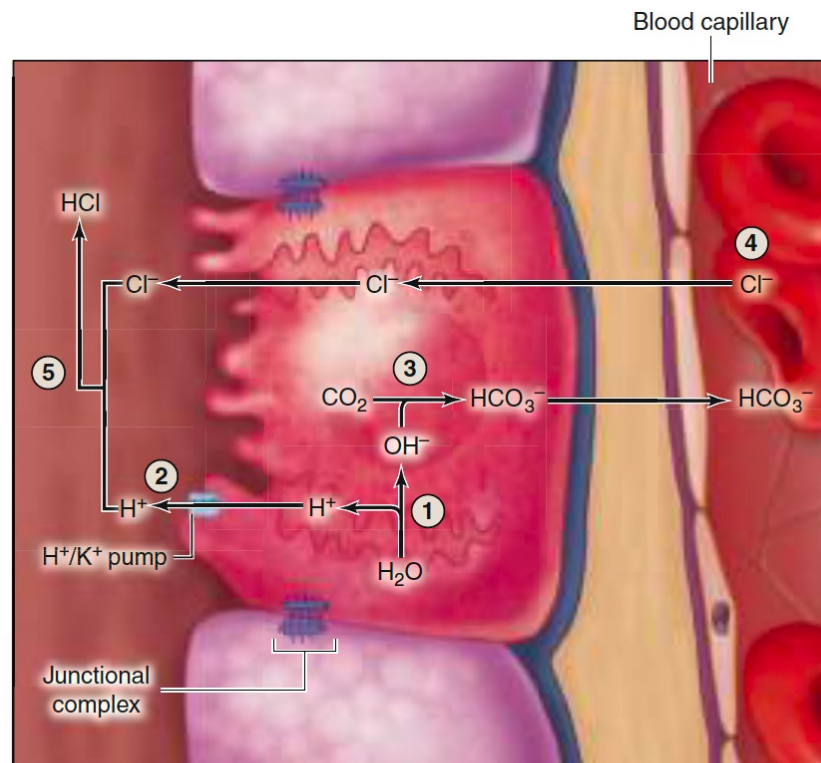


TABLE 15-1

Principal enteroendocrine cells in the gastrointestinal tract.

Cell Type	Major Location	Hormone Produced	Major Action	
			Promotes	Inhibits
D cells	Pylorus, duodenum, and pancreatic islets	Somatostatin		Secretion from other DNES cells nearby
EC cells	Stomach, small and large intestines	Serotonin and substance P	Increased gut motility	
G cells	Pylorus	Gastrin	Gastric acid secretion	
I cells	Small intestine	Cholecystokinin (CCK)	Pancreatic enzyme secretion, gallbladder contraction	Gastric acid secretion
K cells	Duodenum and jejunum	Gastric inhibitory polypeptide (GIP)		Gastric acid secretion
L cells	Ileum and colon	Glucagon-like peptide (GLP-1)	Insulin secretion	Gastric acid secretion Sense of hunger
L cells	Ileum and colon	Peptide YY	H ₂ O and electrolyte absorption in large intestine	Gastric acid secretion
Mo cells	Small intestine	Motilin	Increased gut motility	
N cells	Ileum	Neurotensin		Gastric acid secretion
S cells	Small intestine	Secretin	Pancreatic and biliary bicarbonate and water secretion	Gastric acid secretion Stomach emptying

HCL production



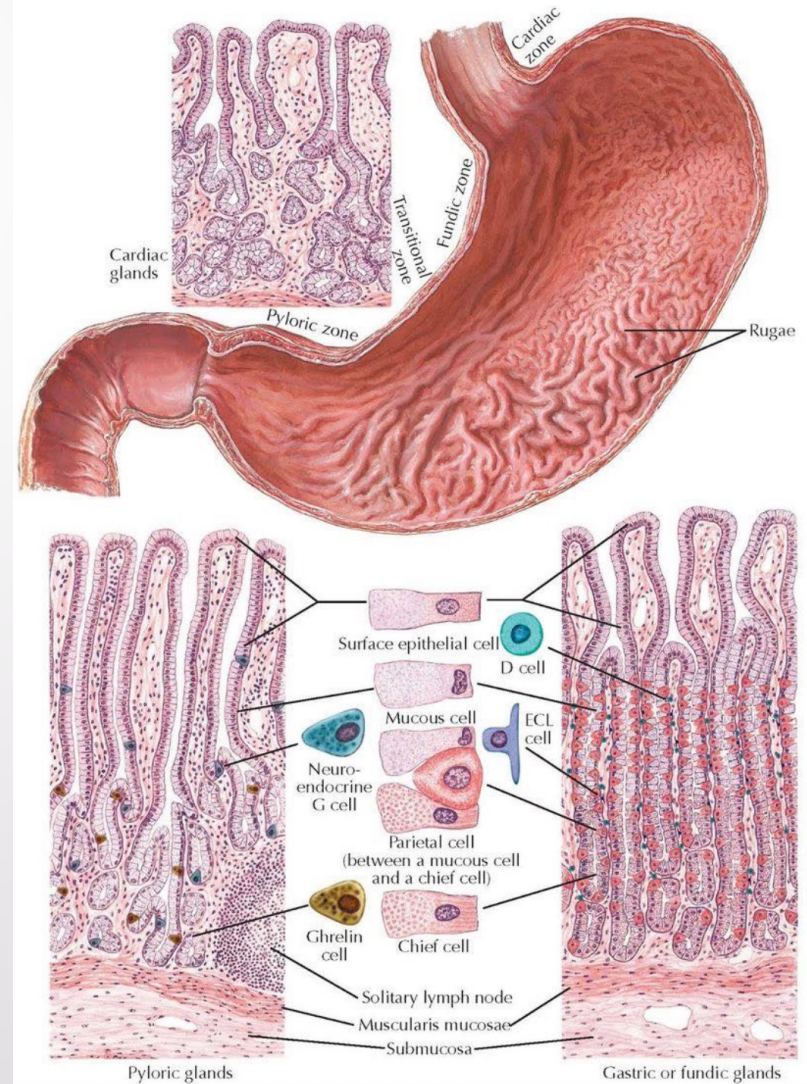
- ① Water (H_2O) within the parietal cell is split into a hydrogen ion (H^+) and hydroxide ion (OH^-).
- ② H^+ is pumped into the lumen of the gastric gland by an H^+/K^+ pump.
- ③ OH^- bonds with carbon dioxide (CO_2) to form bicarbonate ion (HCO_3^-).
- ④ An exchange occurs as HCO_3^- is transported out of the parietal cell (HCO_3^- then enters the blood), while chloride ion (Cl^-) is transported into the parietal cell; Cl^- then enters the lumen of the gastric gland.
- ⑤ Within the lumen of the gastric gland, Cl^- combines with H^+ to form hydrochloric acid (HCl).

READ ONLY

Histology Of The Stomach

- In the cardia and pylorus regions of the stomach, the mucosa also contains tubular glands, with long pits, branching into coiled secretory portions, called cardiac glands and pyloric glands. These glands **lack** both parietal and chief cells, primarily secreting abundant mucus.

Plate 4-4



Gastric Gland Type	Zone	Anatomical Context & Role	Core Cell Population (Exocrine)	Primary Function(s)
Cardiac Glands	Cardiac Zone	Located at the gastroesophageal junction. Forms a transitional zone between esophageal and gastric tissue.	Mostly Mucous cells (high volume secretion to protect esophagus). Few parietal/chief cells.	Secretes alkaline mucus to protect the distal esophagus from acidic reflux and lubricate the cardia.
Gastric or Fundic Glands	Fundic Zone (Body & Fundus)	The primary secretory region of the stomach. Contains the most cell diversity. Glands are simple, branching, with deep pits.	Abundant Parietal cells (HCl) and Chief cells (Pepsinogen). Rich in Mucous cells (both surface and neck).	Primary Acidification: HCl secretion creates pH 1-2. Protein digestion via pepsin. Vit B12 absorption (Intrinsic Factor from parietal cells).
Pyloric Glands	Pyloric Zone (Antrum & Pylorus)	Forming the transitional zone leading to the duodenum. Glands are deeply branched, coiled, and contained in the Pyloric pits.	Predominantly Mucous cells and Pyloric mucous neck cells . Some Chief cells are present, but parietal cells are rare.	Primary Hormone Regulation: Secretes Gastrin to stimulate acid production and motility. Secretes Ghrelin to stimulate appetite. Provides heavy mucus protection near the duodenum.

Histology Of The Stomach

- The submucosa is composed of connective tissue: Large blood and lymph vessels and many lymphoid cells, macrophages, and mast cells
- The muscularis has three layers of smooth muscle (outer longitudinal, a middle circular, and an inner oblique). At the pylorus the middle layer is thickened to form the pyloric sphincter
- The serosa is composed of simple squamous epithelium (mesothelium) and areolar connective tissue;

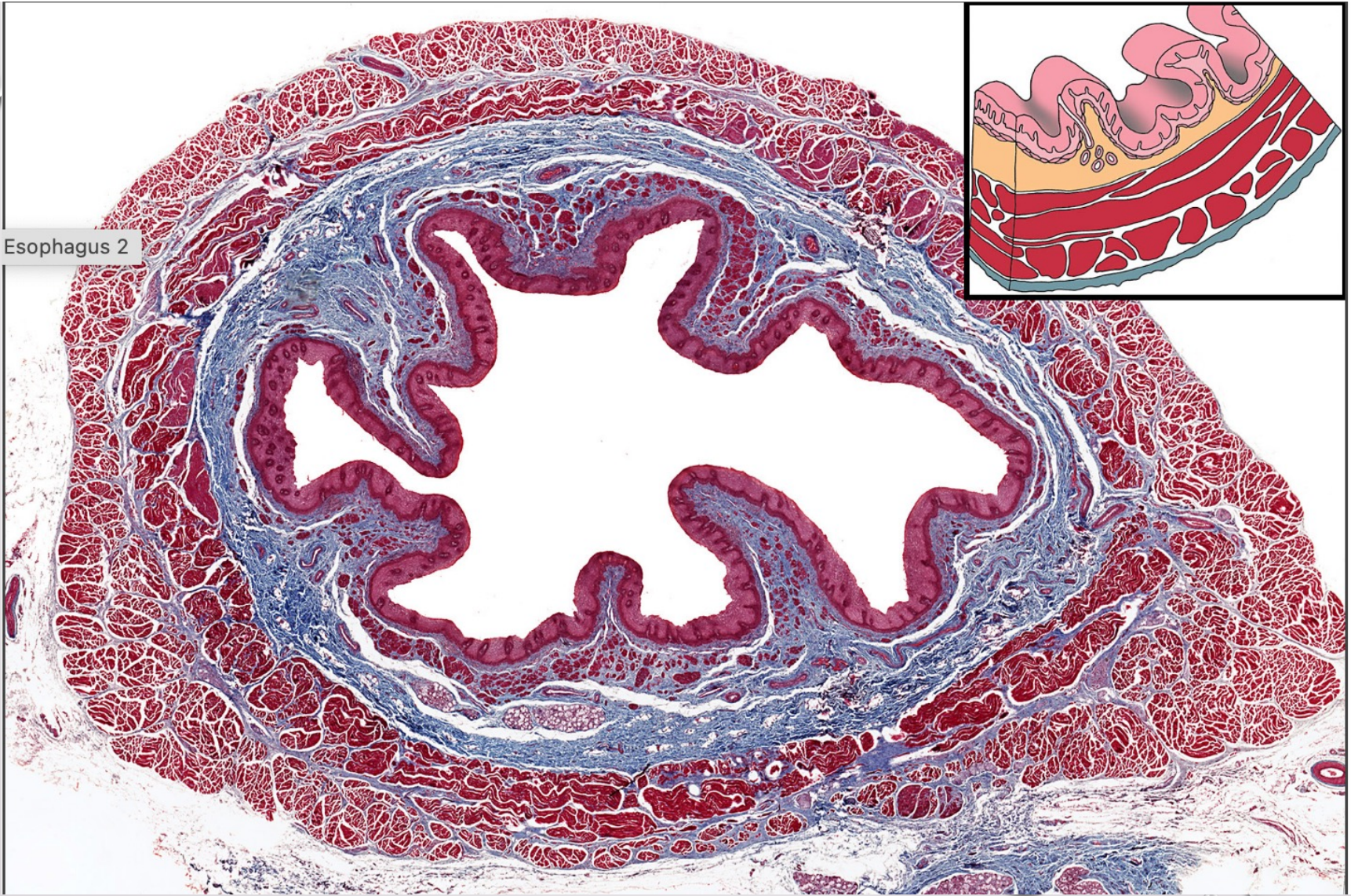
>> MEDICAL APPLICATION

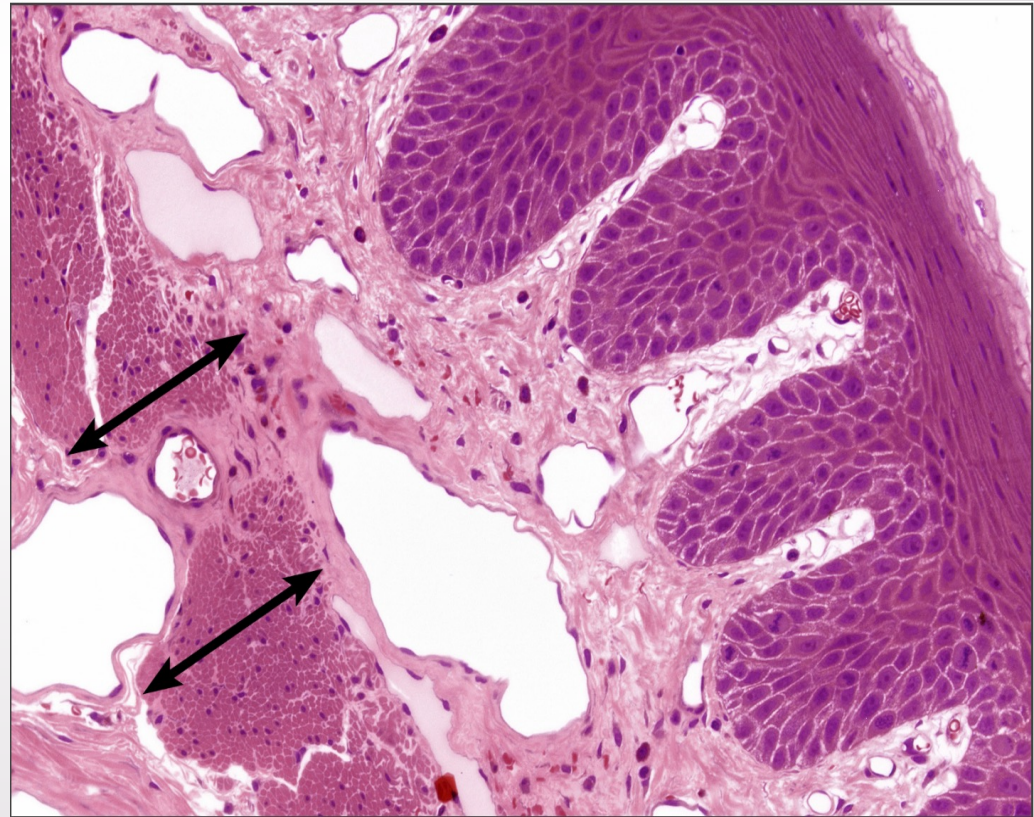
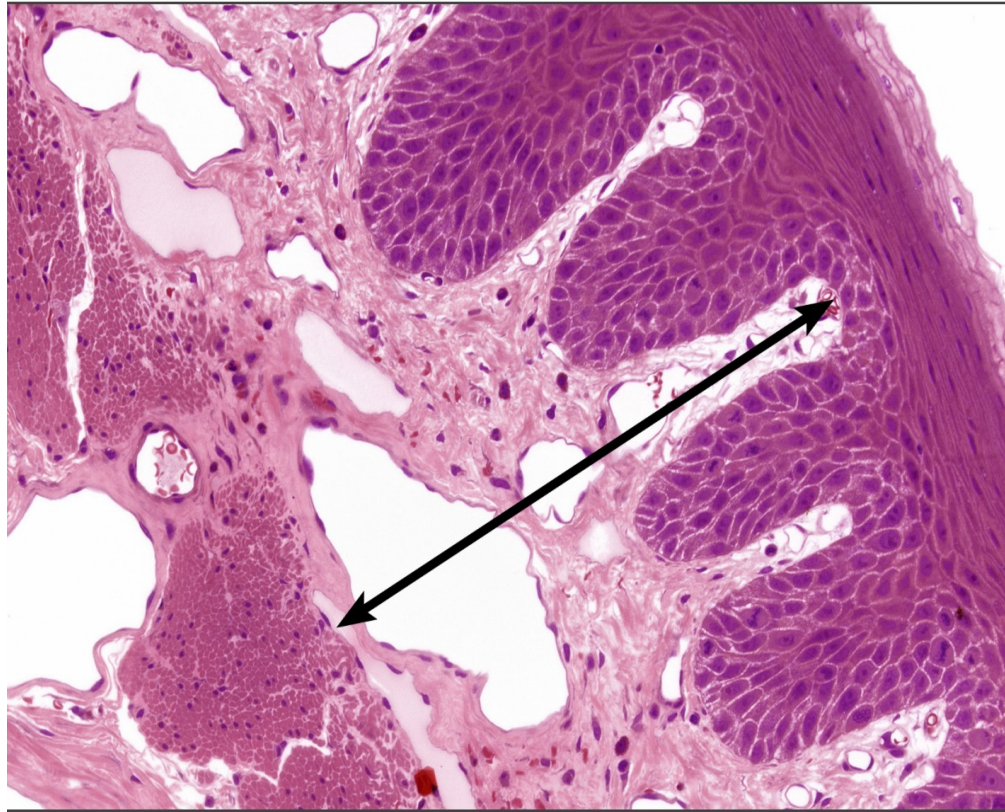
For various reasons, including autoimmunity, parietal cells may be damaged to the extent that insufficient quantities of intrinsic factor are secreted and **vitamin B₁₂** is not absorbed adequately. This vitamin is a cofactor required for DNA synthesis; low levels of vitamin B₁₂ can reduce proliferation of erythroblasts, producing **pernicious anemia**.

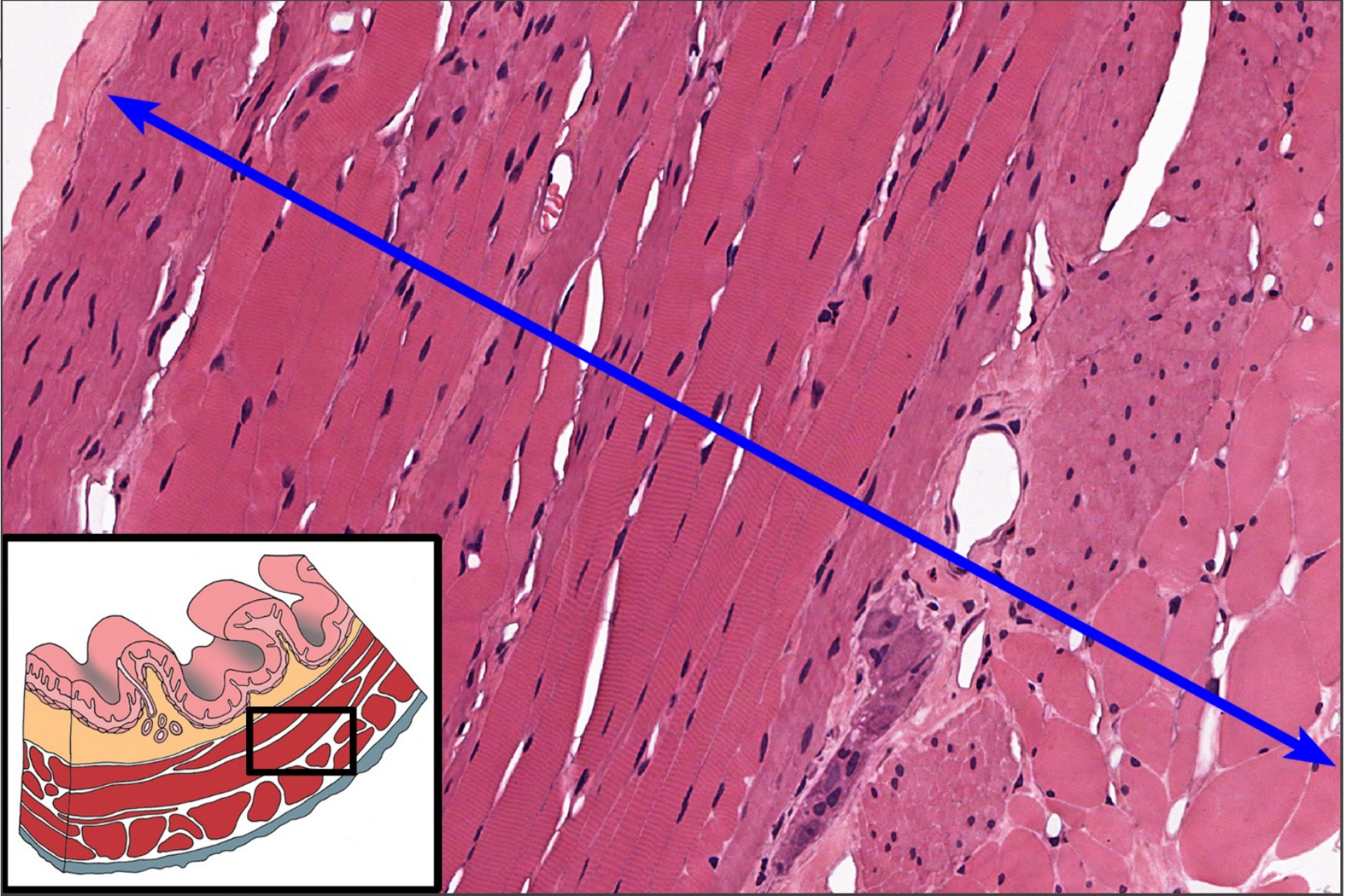
>> MEDICAL APPLICATION

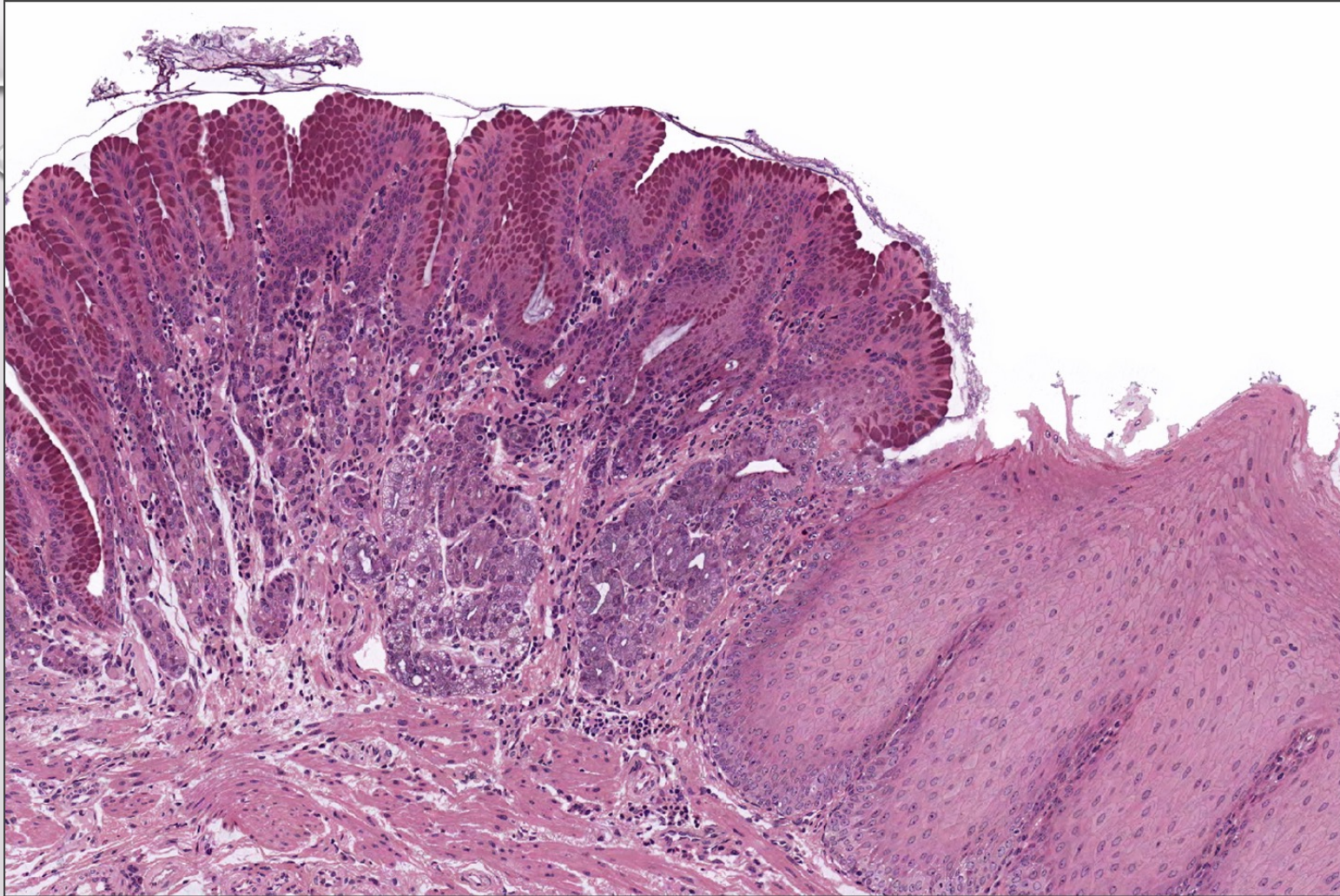
Gastric and duodenal ulcers are painful erosive lesions of the mucosa that may extend to deeper layers. Such ulcers can occur anywhere between the lower esophagus and the jejunum, and their causes include bacterial infections with *Helicobacter pylori*, effects of nonsteroidal anti-inflammatory drugs, overproduction of HCl or pepsin, and lowered production or secretion of mucus or bicarbonate.

Esophagus 2





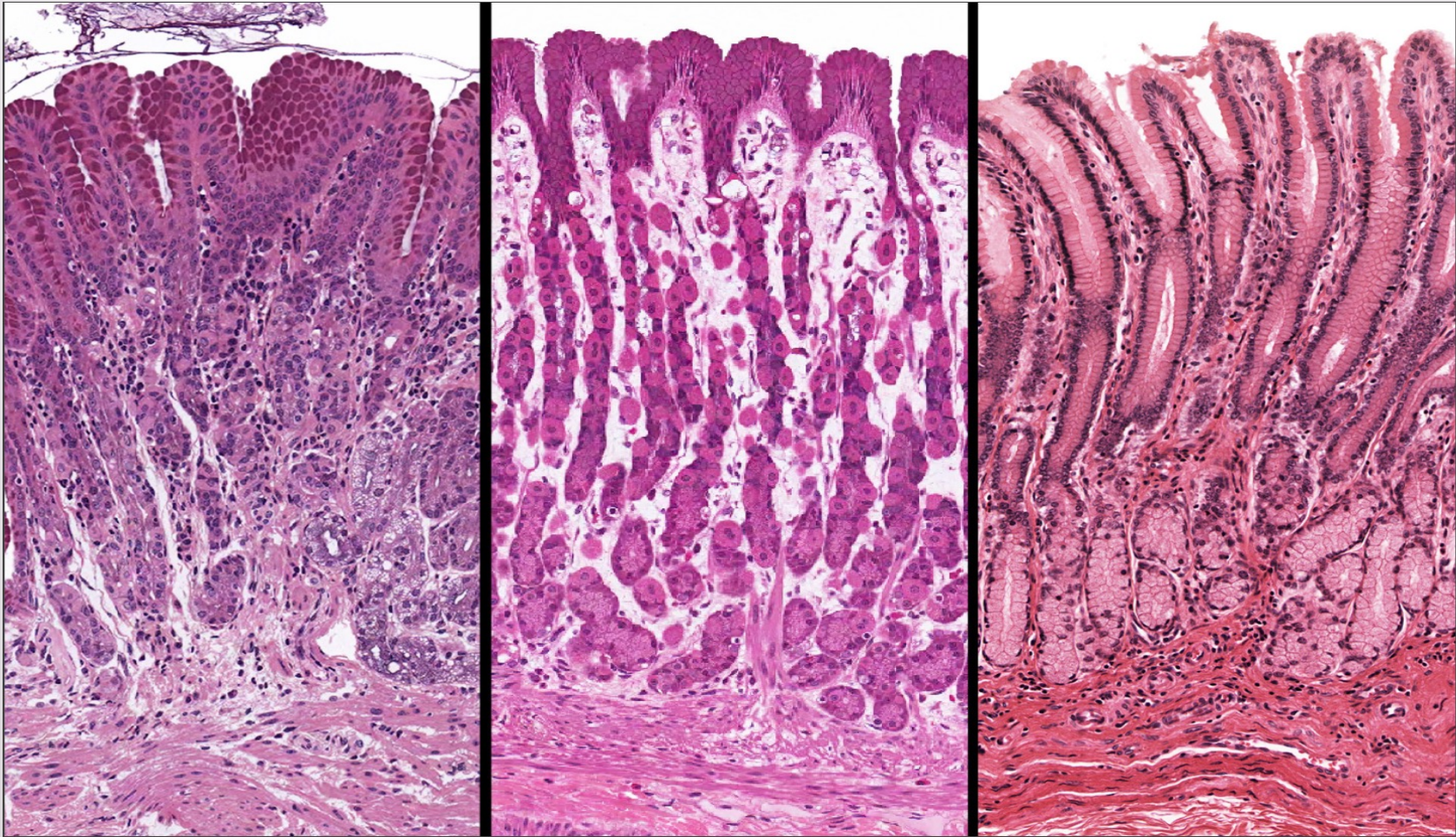




CARDIAC

BODY/FUNDUS

PYLORIC



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