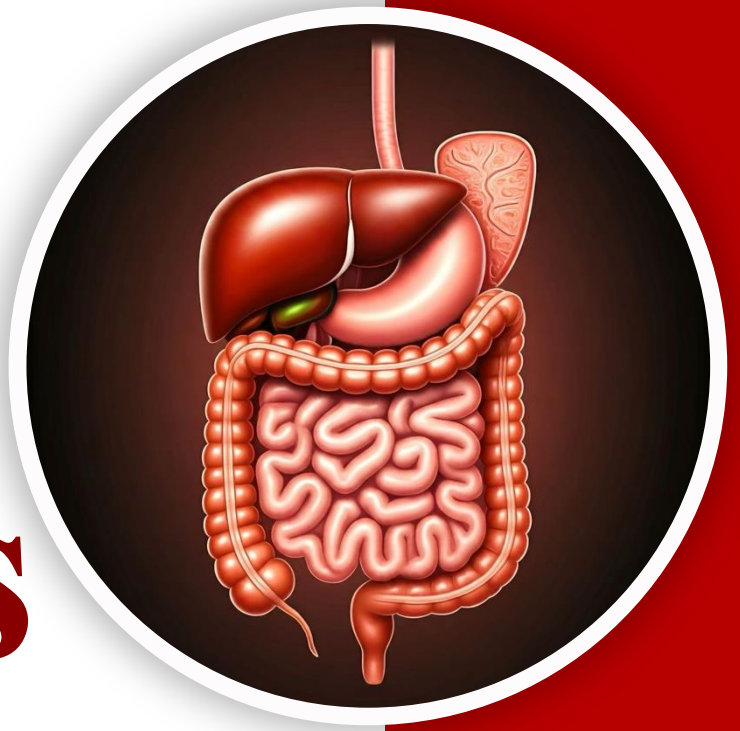
بسم الله الرحمٰن الرحيم

(وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ)

GIS Anatomy | MID 3

Stomach & Esophagus



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Color code of the Modified :

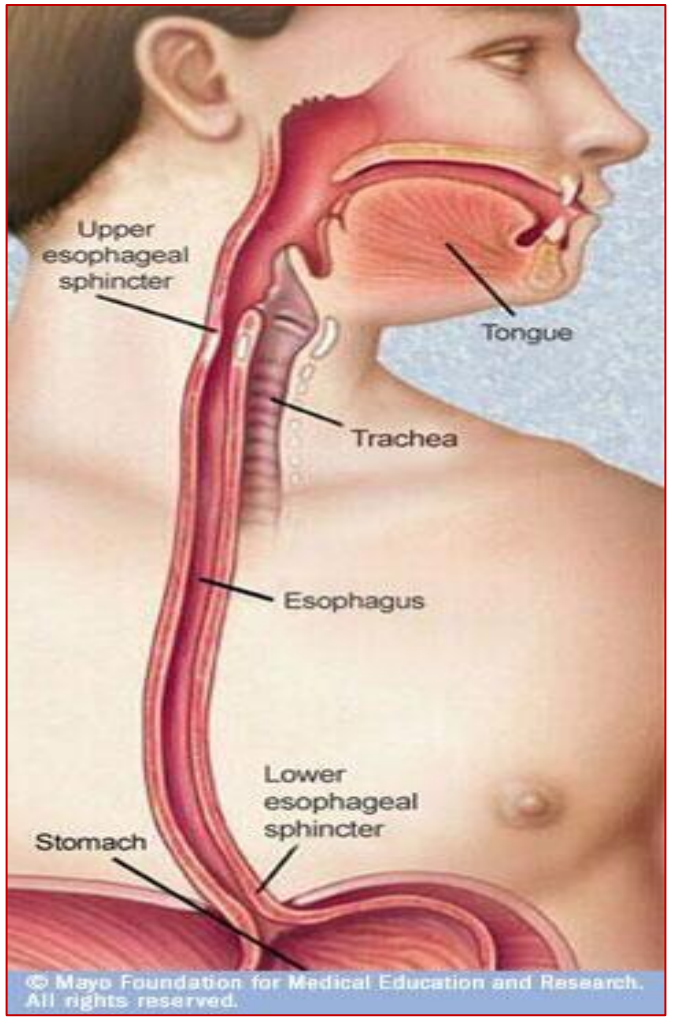
- Doctor’s word that is not in the slides.
- Doctor’s Slide that wasn’t mentioned in the lecture.
- Extra information.
- Doctor’s slide that was mentioned in the Lecture.

Stomach and esophagus

Esophagus

✓ **Consists of 4 layers : mucosa, submucosa, muscularis, adventitia.**

- The esophagus is a **tubular structure (muscular, collapsible tube) about 10 in. (25 cm) long** or from the **incisor to the cardia it is 45 cm** (this is how gastroenterologists mark the end of the esophagus and the beginning of the cardiac orifice, when they are passing tube from the oral cavity down to the cardia). Esophagus Starts from the **lower border of the cricoid cartilage (level of cervical vertebrae 6)** and ends at the cardia of the stomach. **Abdominal esophagus** or **the length of the esophagus below the diaphragm is 1.3 cm (1in to the lift of diaphragm)** that is continuous above with the laryngeal part of the pharynx opposite the sixth cervical vertebra.
- **The esophagus conducts food from the pharynx into the stomach.** Wavelike contractions of the muscular coat, called peristalsis, propel the food onward.
- It passes through the diaphragm **at the level of the 10th thoracic vertebra to join the stomach (cardia of stomach).**
- **In the neck, the esophagus lies in front of the vertebral column; laterally, it is related to the lobes of the thyroid gland; and anteriorly, it is in contact with the trachea and the recurrent laryngeal nerves.**



- **In the thorax, it passes downward and to the left through the superior and then the posterior mediastinum.**
- **At the level of the sternal angle, the aortic arch pushes the esophagus over to the midline.**

Esophagus

- The esophagus is **divided into 3 parts :**

1) **<u>Upper third :</u>** Composed of **straighted muscles, Located at the Neck.**

2) **<u>Middle third :</u>** The muscles are **Mixed (Strighted muscles + Smooth Muscles), Located at the thorax.**

3) **<u>Lower third :</u>** composed of **Smooth muscles, Below the diaphragm (1.3 cm only).**

- ✓ The Esophegus **has an opening on the diaphragm, at the level of the 10 thoracic vertebrae,** called **Esophageal orifice, 1.3 in to Thelma lift of the mid line.**

- ✓ The lining of the esophagus is **Stratified Squamous non-keratinized.**

- ✓ The wall of the esophagus is **rich with esophageal glands at the mucosa.**

- ✓ The **order** of esophageal wall layers **(from inner to outer)** : ***Epithelium → Loose areolar CT → Muscles → CT (adventitia).***

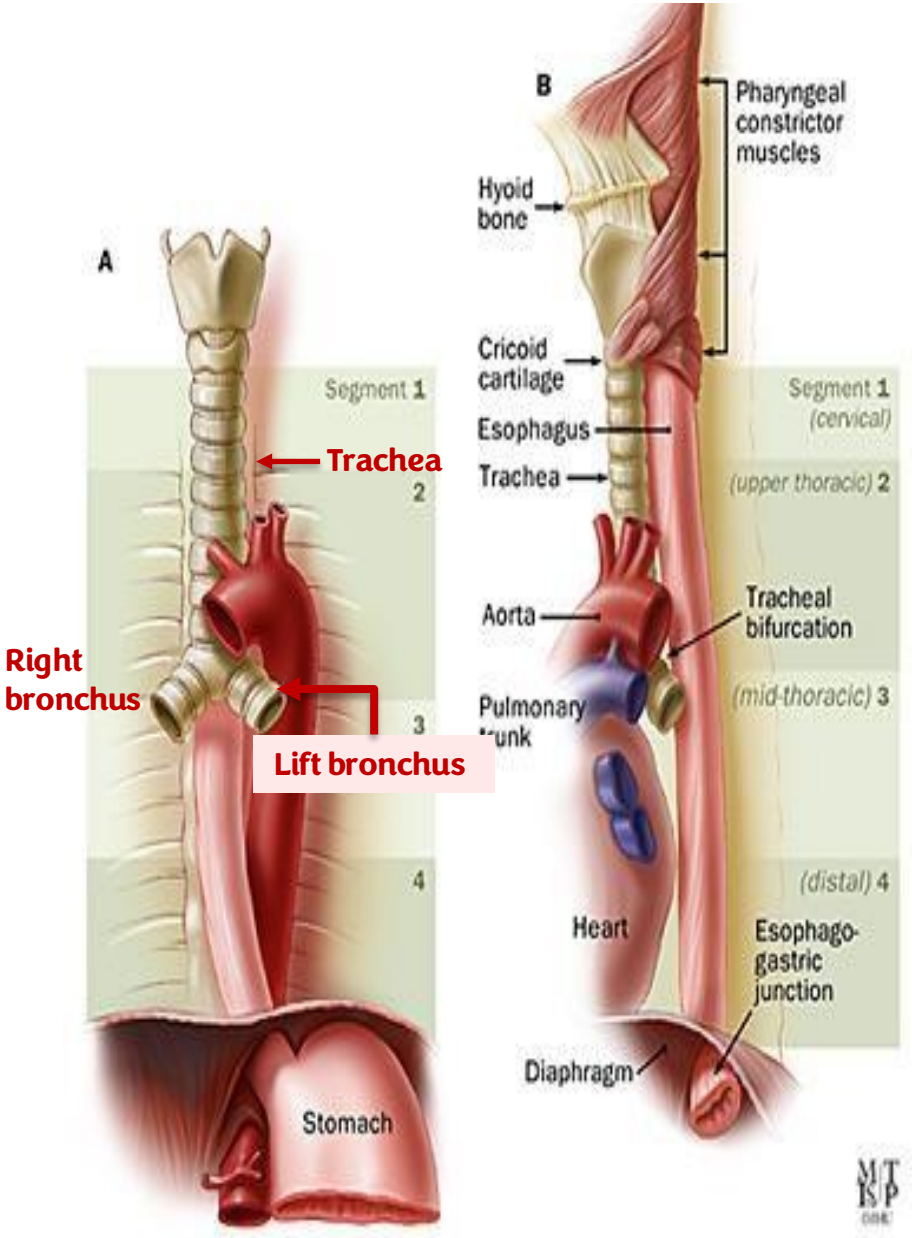
➢ The relations of the thoracic part of the esophagus :

- Anteriorly: **The trachea** and the **left recurrent laryngeal nerve** (which is a **branch** from the **vagus nerve**, **loops around the arch of aorta**, and descends **between the esophagus & trachea**) ; the left principal (main) bronchus, which constricts it; and the pericardium, which separates the esophagus from the left atrium (oblique sinus; is a space that separates the left atrium from the esophagus).

- Posteriorly: The bodies of the **thoracic vertebrae; the thoracic duct; the azygos veins** (at the **right part of the opening** of the **descending thoracic aorta,** it then **ascends upward in the thorax** to the **lift** side passing **posterior** to the esophagus (the doctor mistakenly said anterior); the right posterior intercostal arteries; and, at its lower end, the descending thoracic aorta **to pass through its opening in the diaphragmatic muscle (See the figure A).**

- Right side: The mediastinal pleura **(right) and right lung,** and the terminal part of the azygos vein.

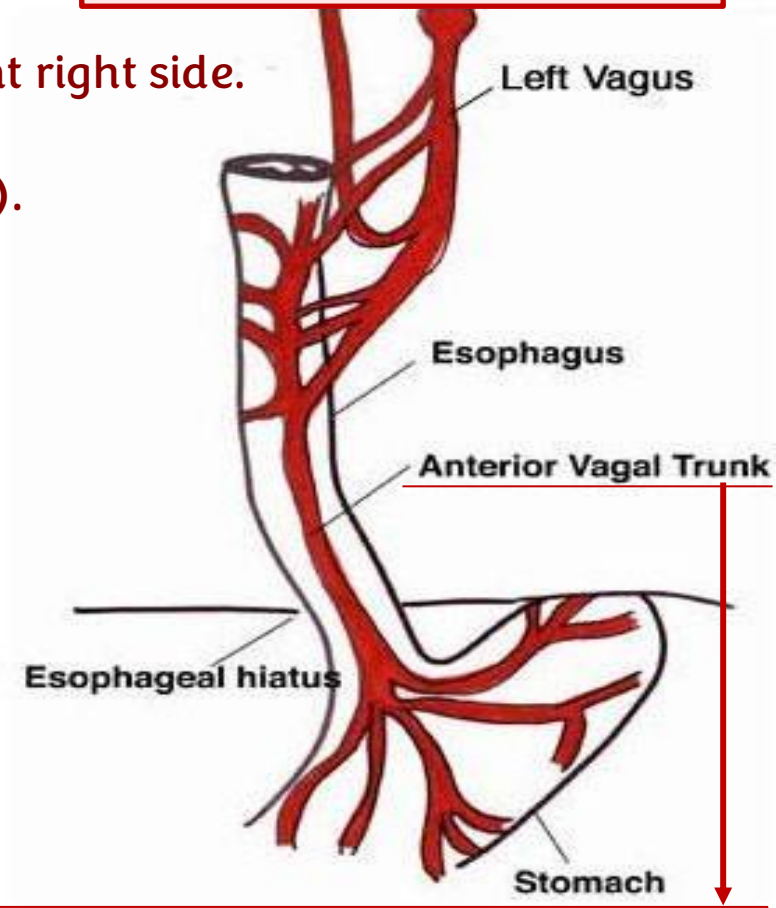
- Left side: The left subclavian artery, the aortic arch, the thoracic duct, and the mediastinal pleura **(left) and left lung.**



❑ The relations of the thoracic part of the esophagus :

- Inferiorly to the level of the roots of the lungs, the vagus nerves leave the pulmonary plexus and join with sympathetic nerves to form the esophageal plexus.
- Left vagus nerve lies at the left side of the esophagus, & right esophegus is at right side.
- **After the diaphragm,** the left vagus lies anterior to the esophagus **(anterior gastric)** and the right vagus lies posterior **to the esophagus (posterior gastric)**.
- **Sympathetic innervation** is coming **from cervical ganglia,** especially **superior cervicle ganglia.**
- At the opening in the diaphragm, the esophagus is accompanied by the two vagi, branches of the left gastric blood vessels, and lymphatic vessels
- Fibers from the right crus of the diaphragm pass around the esophagus in the form of a sling.
- In the abdomen, the esophagus descends for about 0.5 in. (1.3 cm) and then enters the stomach **and anterior & posterior vagal trunk** are surrounding the esophagus **anteriorly and posteriorly.**
- It is related to the left lobe of the liver anteriorly and to the left crus of the diaphragm posteriorly.

This is taking about nervers, don't be fooled by red color :)

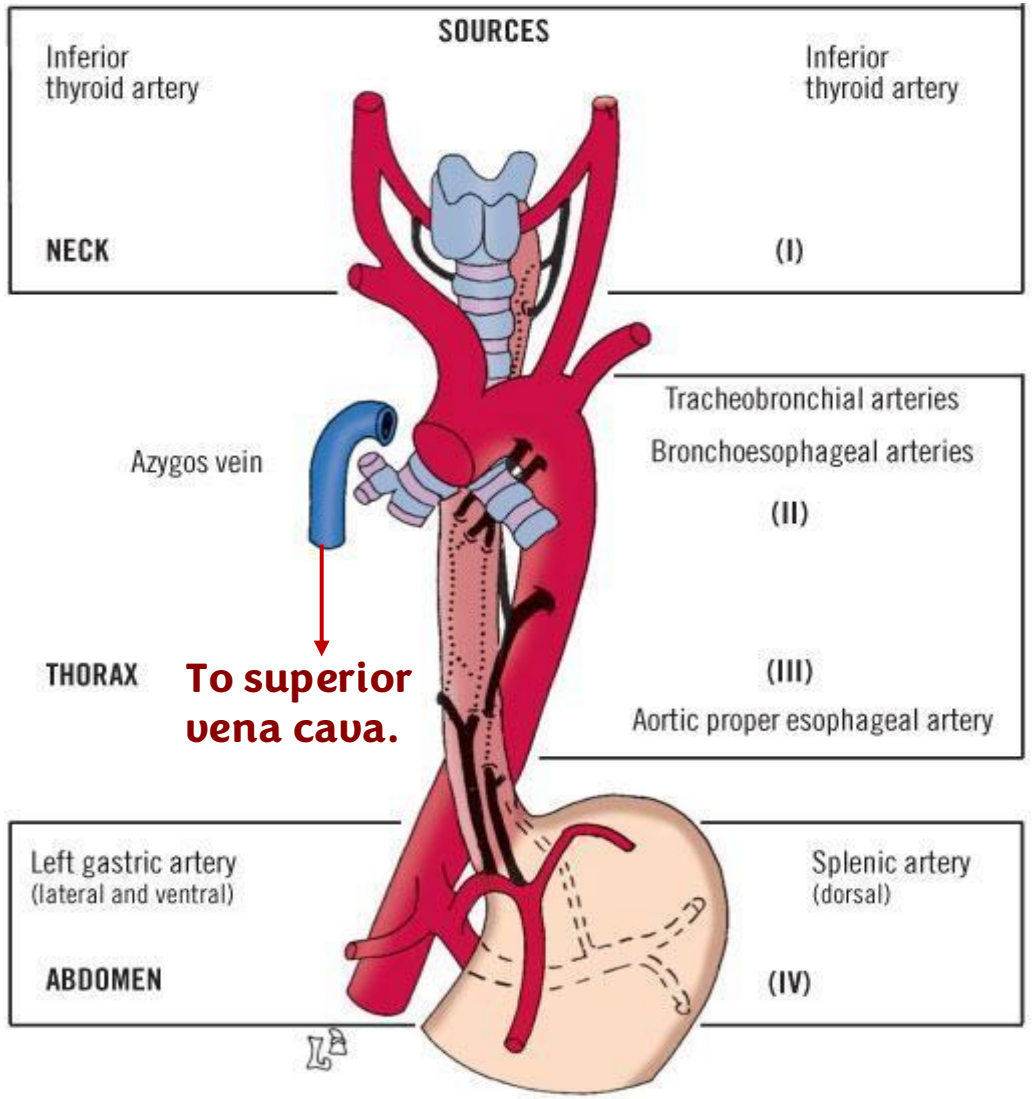


Anterior one was to the lift while posterior was to the right, they turn into posterior and anterior as they are descending

Blood Supply of the Esophagus

See the figure on the right.

- **The upper third** of the esophagus is supplied by the inferior thyroid artery,
- the middle third by branches from the **descending thoracic aorta**, tracheobronchial, bronchoesophageal and aortic proper esophageal arteries.
- and the **lower third** (follows the stomach) by branches from the left gastric artery, a branch from the celiac trunk of abdominal aorta, supplies the stomach and then the lower third of the esophagus.
- The veins from the **upper third drain into the inferior thyroid veins**, from the **middle third into the azygos veins**, and from the **lower third into the left gastric vein**, a tributary of the **portal vein.**

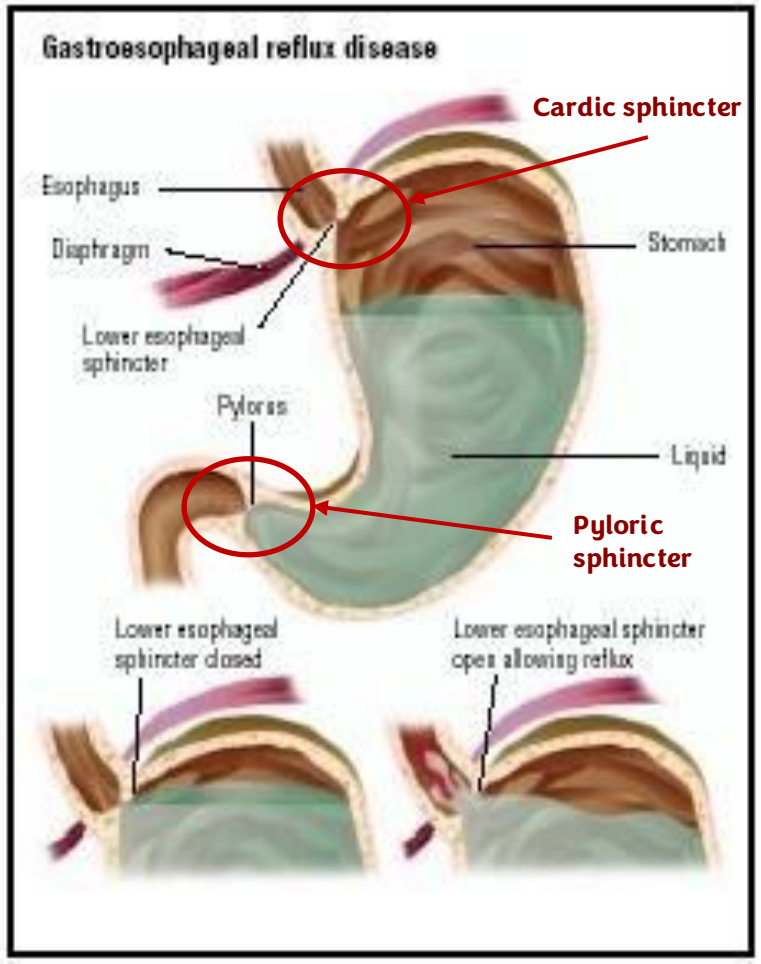


- Lymph vessels from the **upper third of the esophagus drain into the deep cervical nodes,**
- from the **middle third** into the **superior and posterior mediastinal nodes (related to lungs),**
- and from the **lower third** into nodes along the **left gastric blood vessels** and the **celiac nodes (around the origin of celiac trunk, anterior to abdominal aorta).**
- The esophagus is supplied by **parasympathetic** (secretomotor to the glands of the esophagus and motor to smooth muscles) **from the vagus nerve)** and **sympathetic** (from the **superior cervical sympathetic ganglia**) **efferent and afferent fibers via the vagi and sympathetic trunks, forming esophageal plexus around the esophagus.**
- In the lower part of its thoracic course, the **esophagus** is surrounded by the **esophageal nerve plexus.**

Gastroesophageal Sphincter

- ✓ **physiological** sphincter, **not anatomical.**
- ✓ Supplied by the **vagus** nerve.

- No anatomic sphincter exists **at the lower end of the esophagus** because there is **no thickening of circular smooth muscle to make a sphincter.**
- However, the circular layer of smooth muscle in this region serves as a **physiologic sphincter** because it functions as one, **preventing the regurgitation of gastric juice to the distal esophagus.**
- As the food descends through the esophagus, relaxation of the muscle at the lower end occurs ahead of the peristaltic wave so that the food enters the stomach.
- The tonic contraction of this sphincter prevents the stomach contents from regurgitating into the esophagus.
- The closure of the sphincter is **under <u>vagal</u> control**, and this can be augmented by the hormone gastrin and reduced in response to secretin, cholecystokinin, and glucagon.



Lodge of the foreign bodies in the esophagus

✓ Children can sometimes **swallow objects naively**, which in turn might **lodge in the GI tract. Four potential sites**, that **have constriction**, at which foreign body **might got stuck in:**

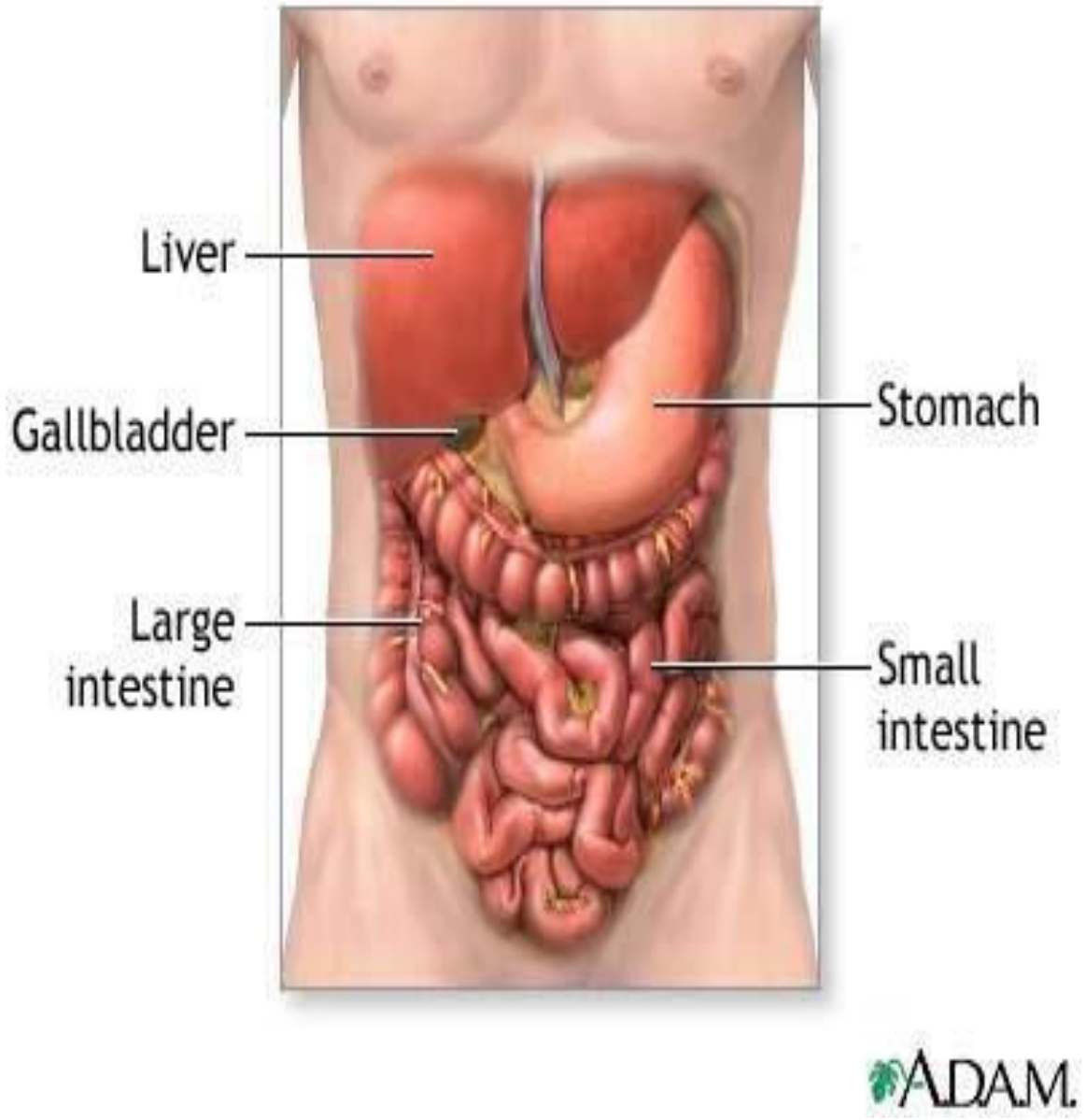
1. The beginning of the esophagus, because **the pharynx is wider than the esophagus, which makes constriction on the esophegus.**
2. Through **the opening in diaphragmatic muscle** (since it is muscle, when it is contracted, it is going top cause constriction of the esophagus**).**
3. At the **left** main **bronchus** which **crosses the esophagus anterior to it** (when the lift bronchus crosses beside the esophagus and **since it is made of cartilage, it is going to form a pressure on the esophegus**).
4. **The arch of the aorta.**

stomach

Stomach

- The stomach is a dilated part of the alimentary canal

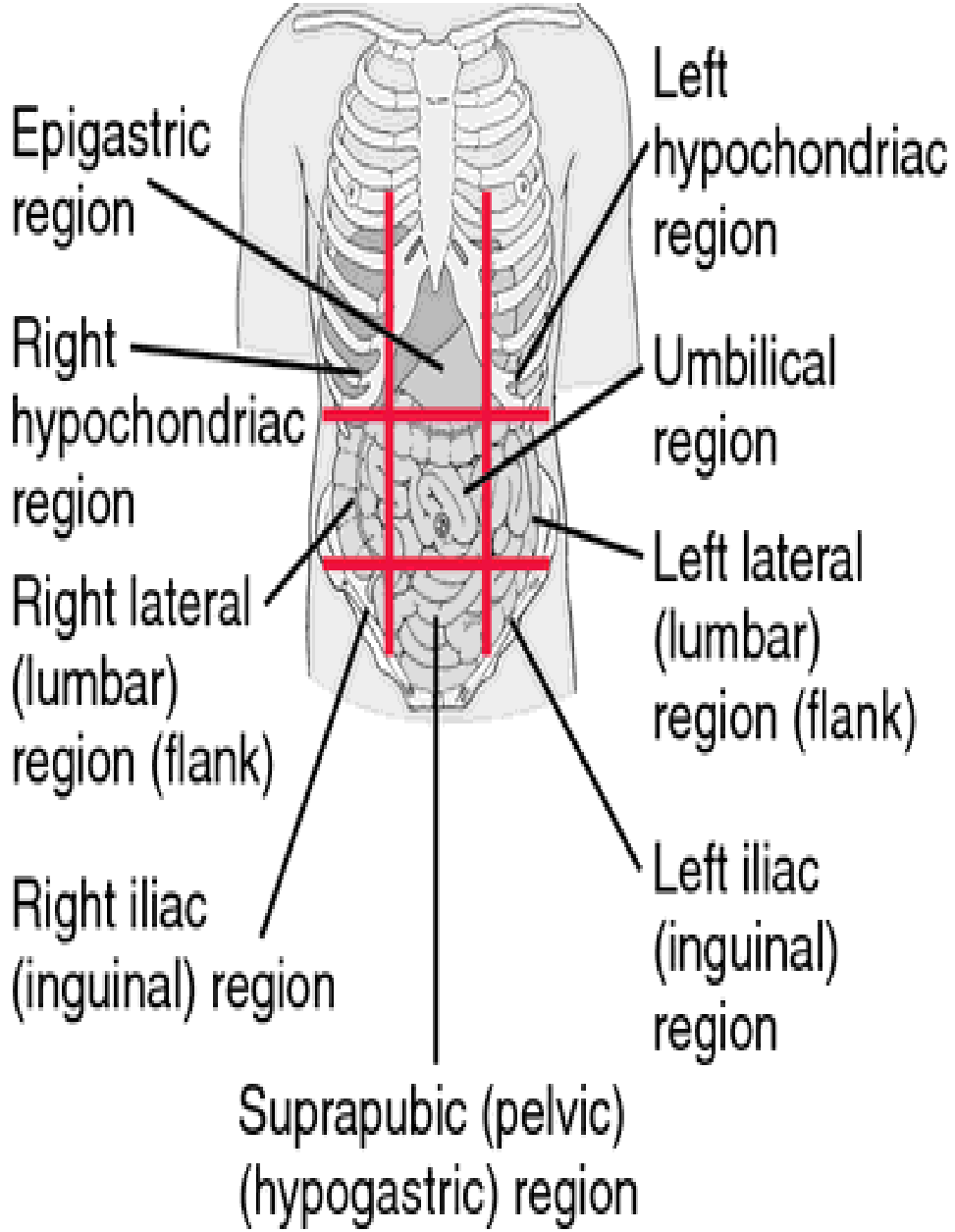
- Between the esophagus and the small intestine **(duodenum).**



Stomach site

- It occupies the left upper quadrant mainly in the epigastric region.

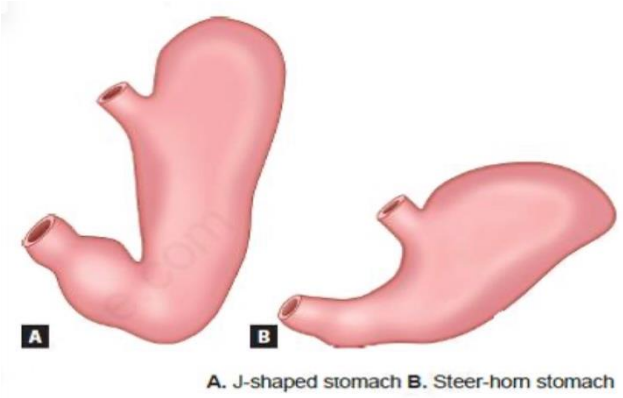
- Mainly in the **epigastric region of the abdominal wall and extends upwards into the left hypochondriac region.**



Shape of stomach

The stomach shape can be either :

- It is **roughly J-shaped**
- **Steer horn in obese person**

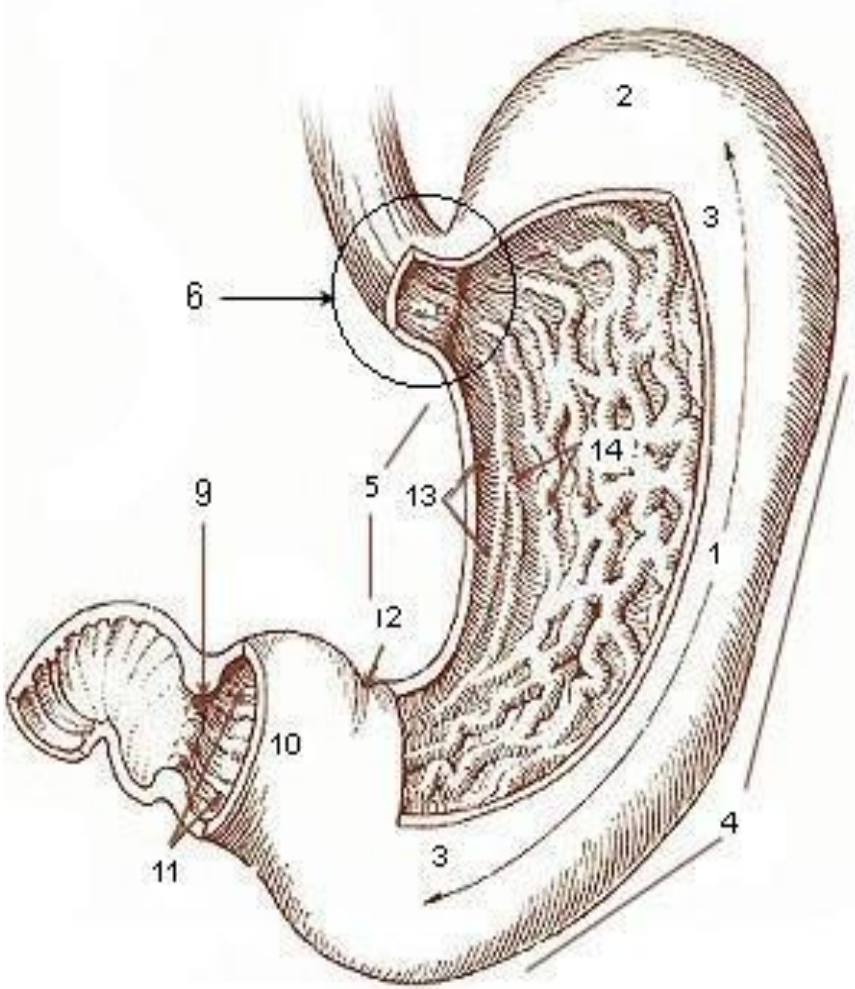


A. J-shaped stomach B. Steer-horn stomach

- Has two openings, the **cardiac (physiological only)** and **pyloric (physiological and anatomical; the latter is attributed to the circular smooth muscle thickening in that region) orifices**

- **Two curvatures, the greater (on right side) and lesser (on lift side) curvatures.**

- Two surfaces, an **anterior and a posterior surface.**



- **We have 3 types of muscles at the stomach :**

1) **Longitudinal (superficial), especially at the area close to lesser curvature, to allow fluids to pass rapidly th the stomach to duodenum.**
2) **Circular (deep).**
3) **Oblique (deeper).**

Shape of stomach…..cont

- Its shape undergoes considerable variation in the same person and depends on :

1) **The volume of its contents.**
2) **The position of the body.**
3) **The phase of respiration.**

Function OF stomach

- Has three main functions :

- It stores food (in the adult it has a capacity of about **1500 mL**).

- It mixes the **food with gastric secretions** to form a **semifluid chyme**, **stays in the stomach 2 – 4 hours, then gradual evacuation of the chyme takes place, pyloric sphincter opens, some chyme passes to the duodenum, sphincter closes and then opens …etc. (open → empty → close → repeat), until complete evacuation is done after 4 hours.**

- It controls the rate of delivery of the chyme to the small intestine so that efficient digestion and absorption can take place.

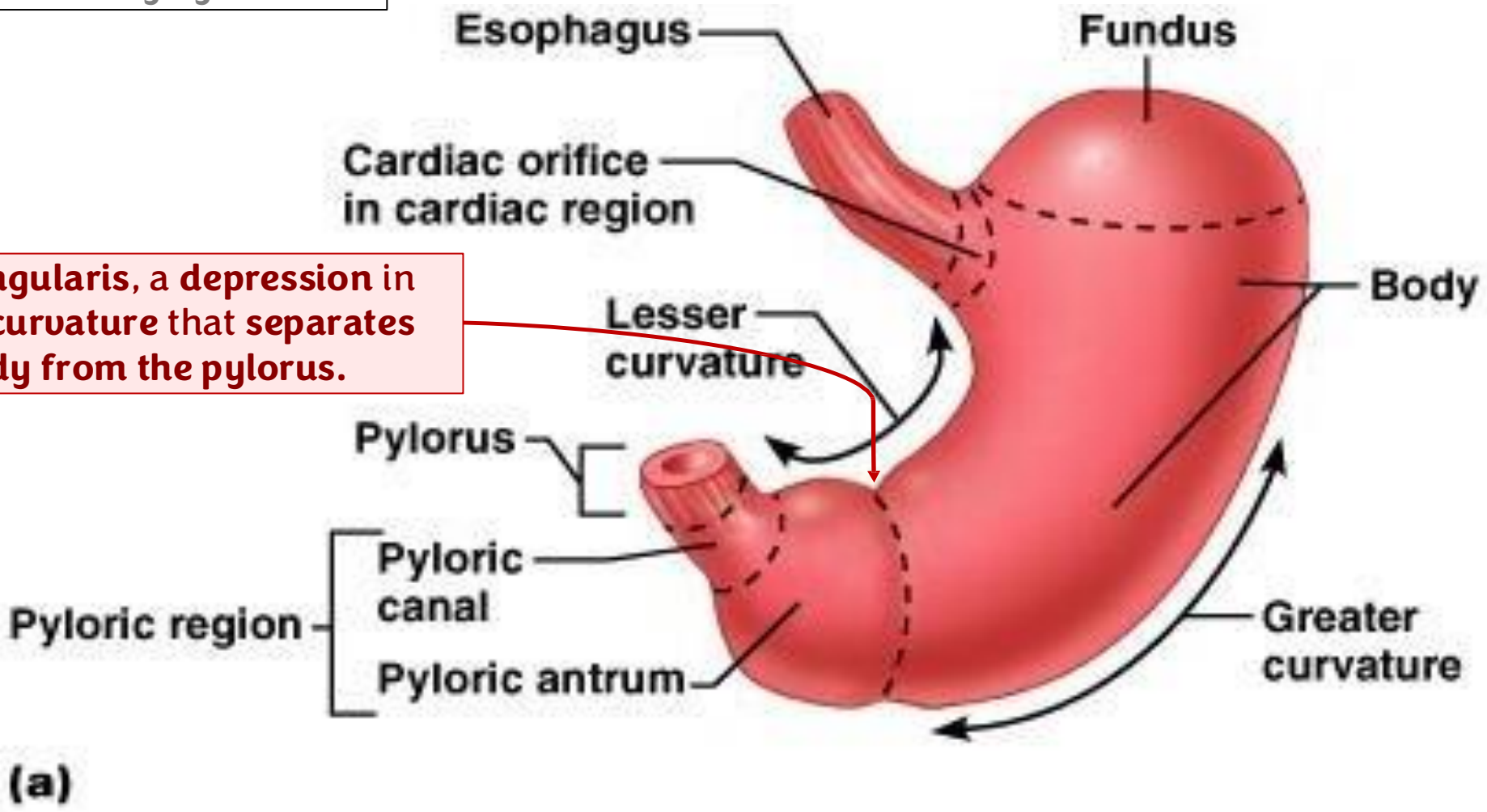
Parts Stomach

Parts of the stomach :

1) **fundus.**
2) **Body.**
3) **Pylorus.**

Take your time to examine this figure thoroughly.

Incisura angularis, a **depression** in the **lesser curvature** that **separates the body from the pylorus.**

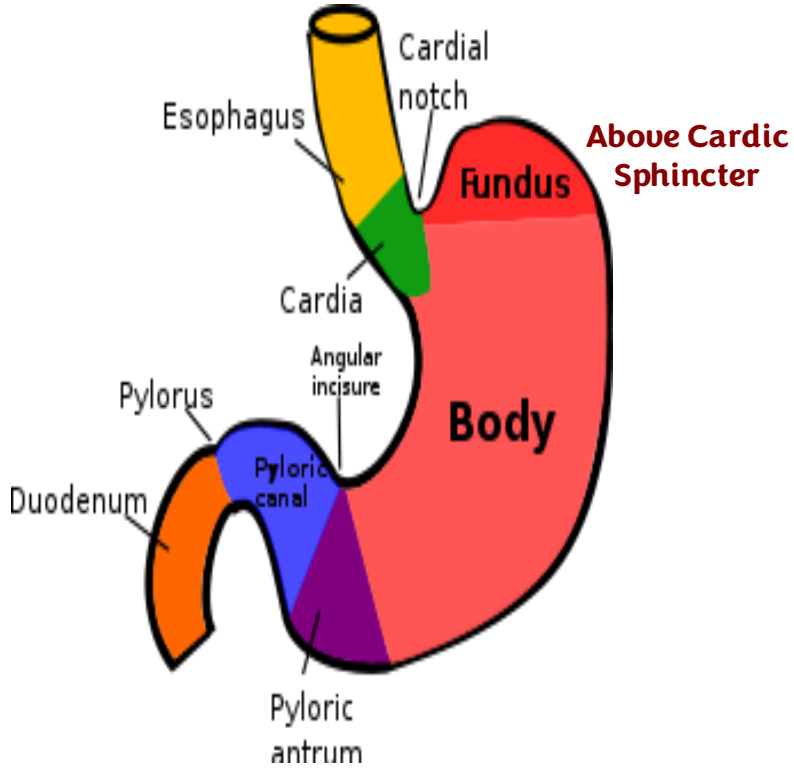


Parts of stomach

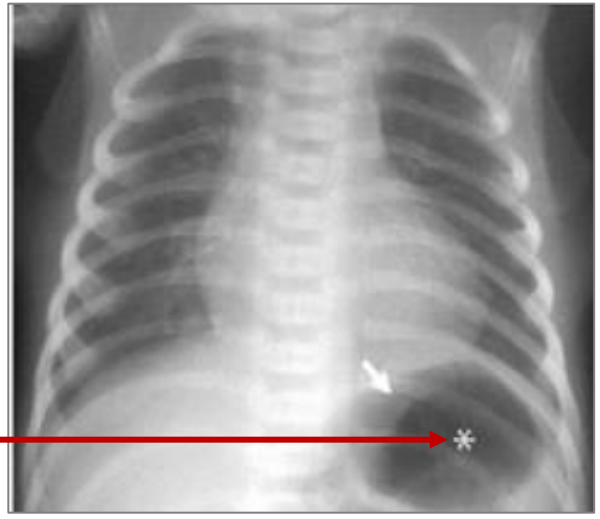
The stomach is divided into the following parts :

1 **Fundus:**

- **Dome-shaped**
- Projects **upward and to the left of the cardiac orifice.**
- It is usually **full of gas.**



✓ Normally, **cricopharyngeal** muscle contracts to prevent passage of air to the GI tract, nonetheless some **air might enter with food to be collected and trapped in the fundus of the stomach**. When we do X-Ray, it appears as **dark spot** due to the **gas entrapment**.



2- Body:

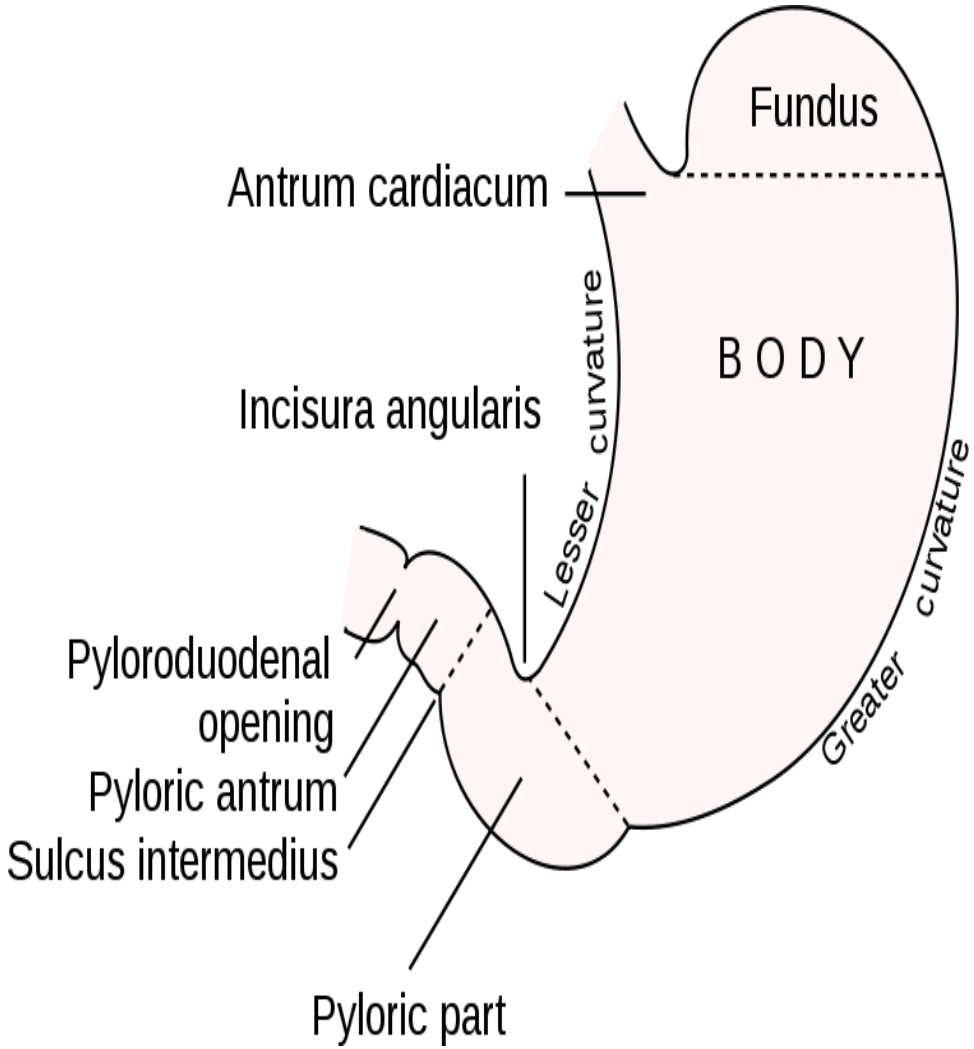
-Extends from the level of the cardiac orifice to the level of the incisura angularis (a constant notch in the lower part of the lesser curvature)

3- Pyloric region Contains **3 regions; antrum, canal, sphincter.**

divided into:

a- Pyloric antrum:

- This extends from the incisura angularis to the pylorus



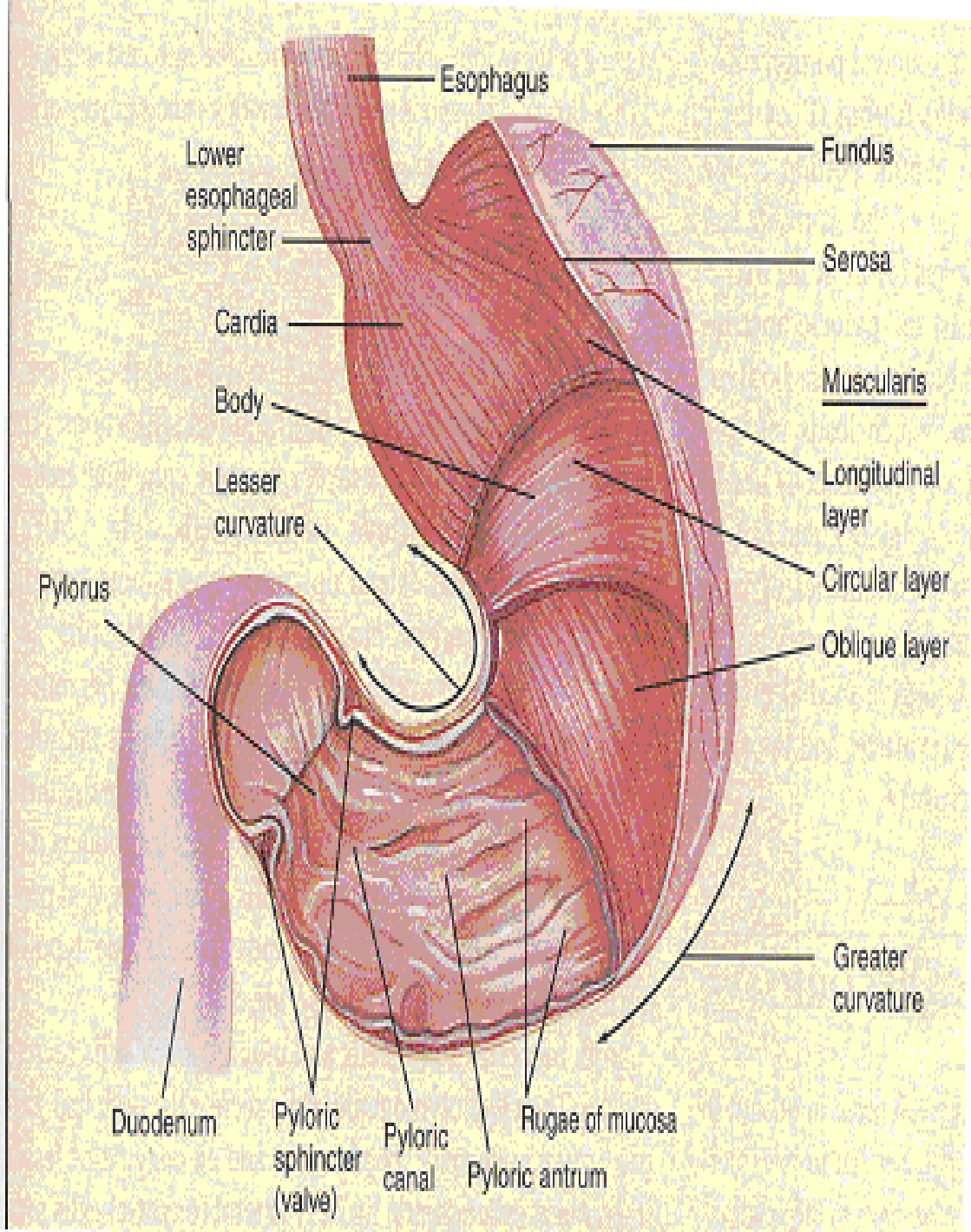
B- Pylorus canal:

c. Pylorus:

- The most tubular part of the stomach.
- The thick muscular wall is called the pyloric sphincter.

- **Duodenal cap is the first part of the duodenum attached to the pylorus and is the most site to have peptic ulcer.**

- **The pyloric sphincter** has a **surface anatomy**, it is **1 in to the right of the mid line.**
- **Also, The *Trans Pyloric Line* pass through pyloric sphincter.**



Orifices of the stomach

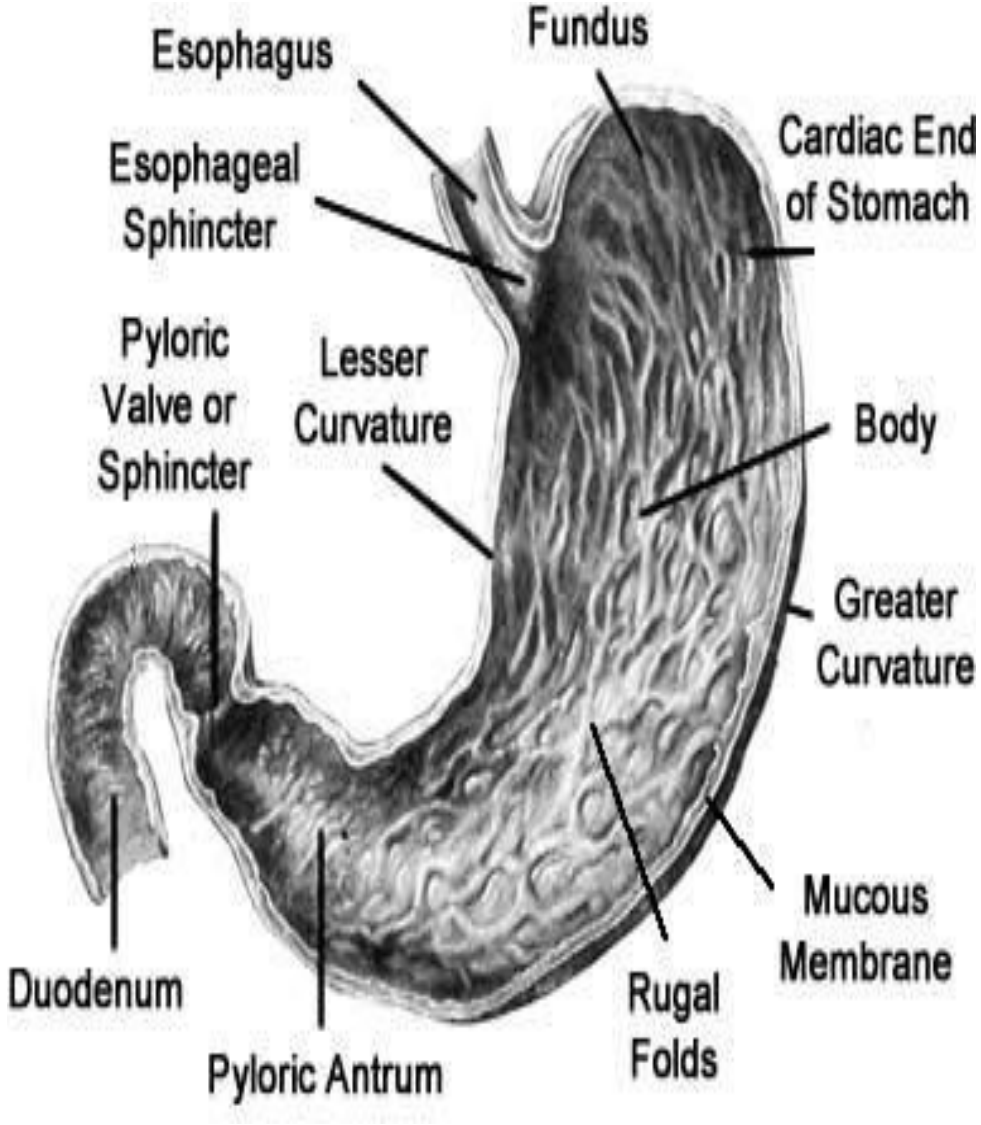
- *Cardiac orifice*
- pyloric orifice

Cardiac orifice

-The cardiac orifice is where the esophagus enters the stomach.

-No anatomic sphincter can ben demonstrated here.

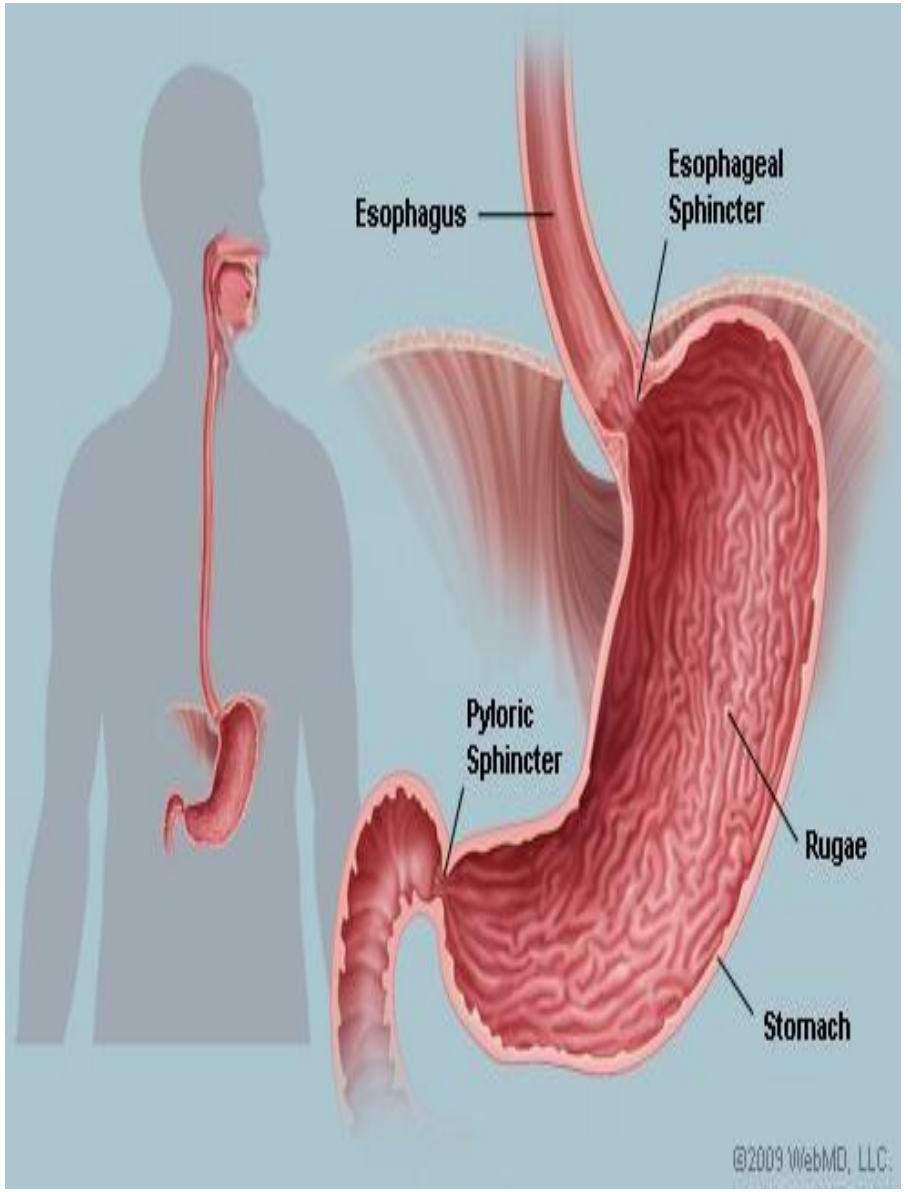
- A physiological sphincter→ physiological mechanism exists that prevents regurgitation of stomach contents into the esophagus.



The site of Cardiac orifice

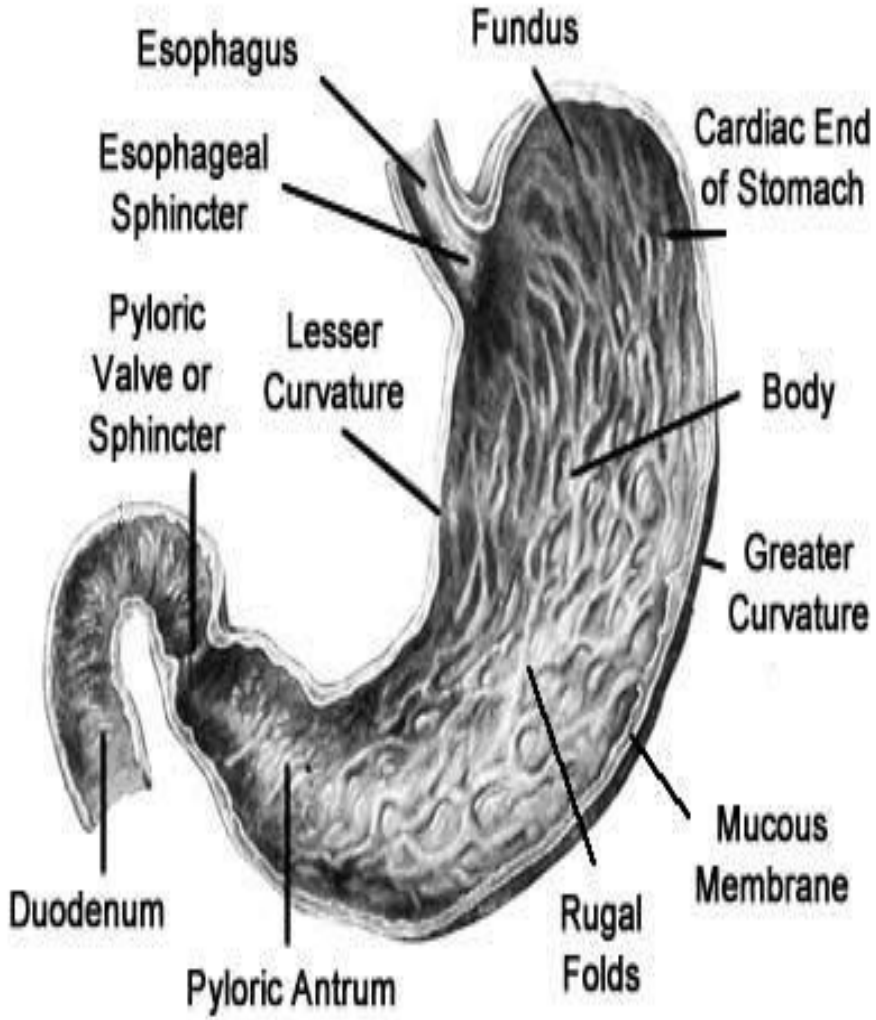
Surface anatomy of the cardiac orifice:

- 7th left costal cartilage.
- 1 inch to left of midline.
- 45 cm from incisors in the oral cavity.
- 10 cm from anterior abdominal wall.



pyloric orifice

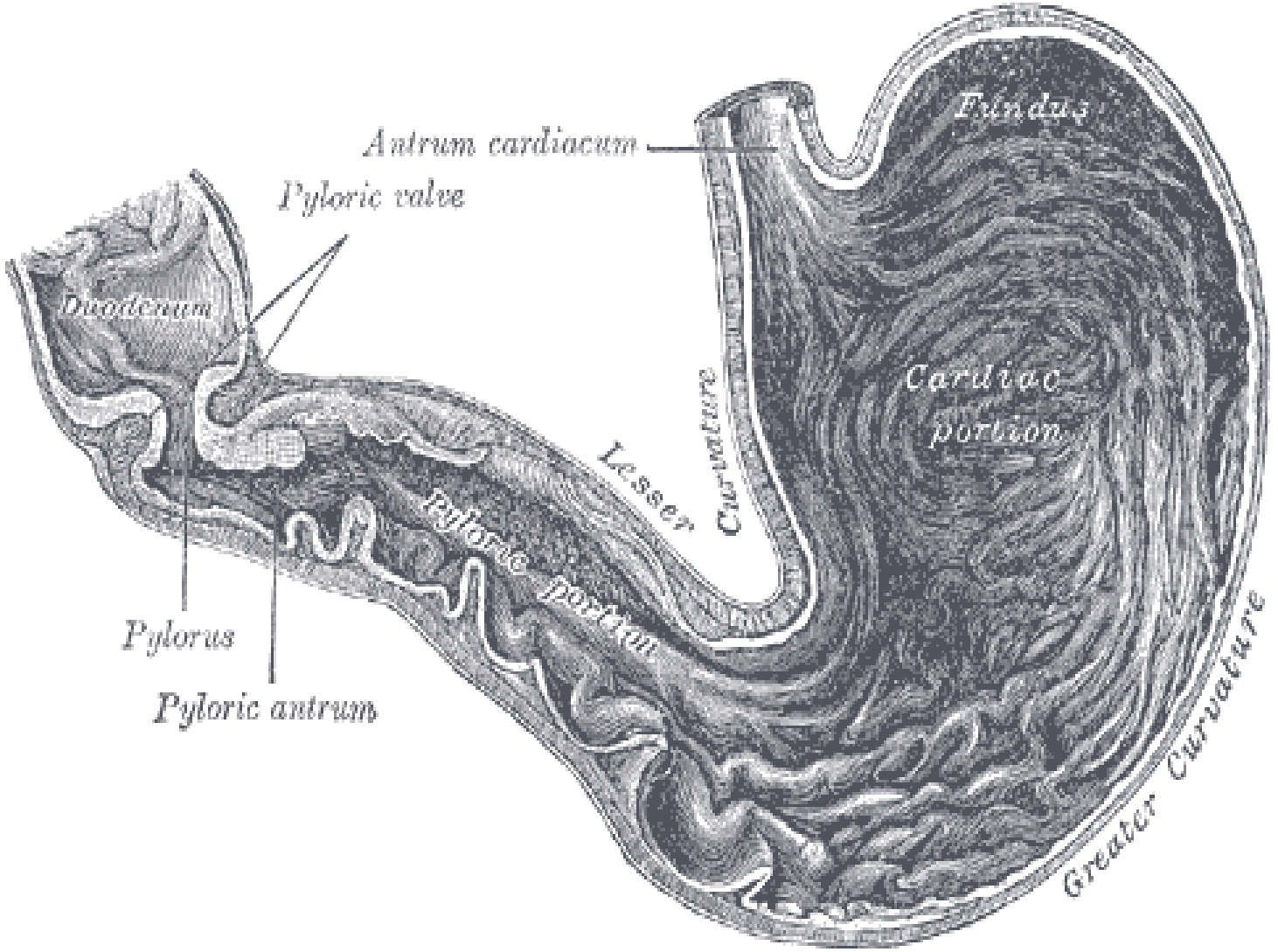
- Present at end of the pyloric canal
- On the level of L1
- **1 inch to the Rt. of the midline.**
- The circular muscle coat of the stomach is much thicker here and forms the anatomic and physiologic pyloric sphincter
- Its position can be recognized by a **slight constriction on the surface of the stomach (The pylorus lies on the transpyloric plane).**
- The **sympathetic** and **vagus nerves** have opposite effects on the **pyloric sphincter**: the **sympathetic nerve stimulates contraction**, while the **vagus nerve promotes relaxation.**
- There is a vein crossing the pyloric sphincter, called **vein of Mayo**, a landmark for surgeons.



Clinical corrolation-congenital anomalies.

- ✓ In some cases , **hypertrophy** (**enlargement**) of this muscle can occur in newborns, known as **pyloric hypertrophy**. When this hypertrophy happens, the muscle **obstructs the passage of food from the stomach to the small intestine,** leading to **projectile vomiting after feeding.**

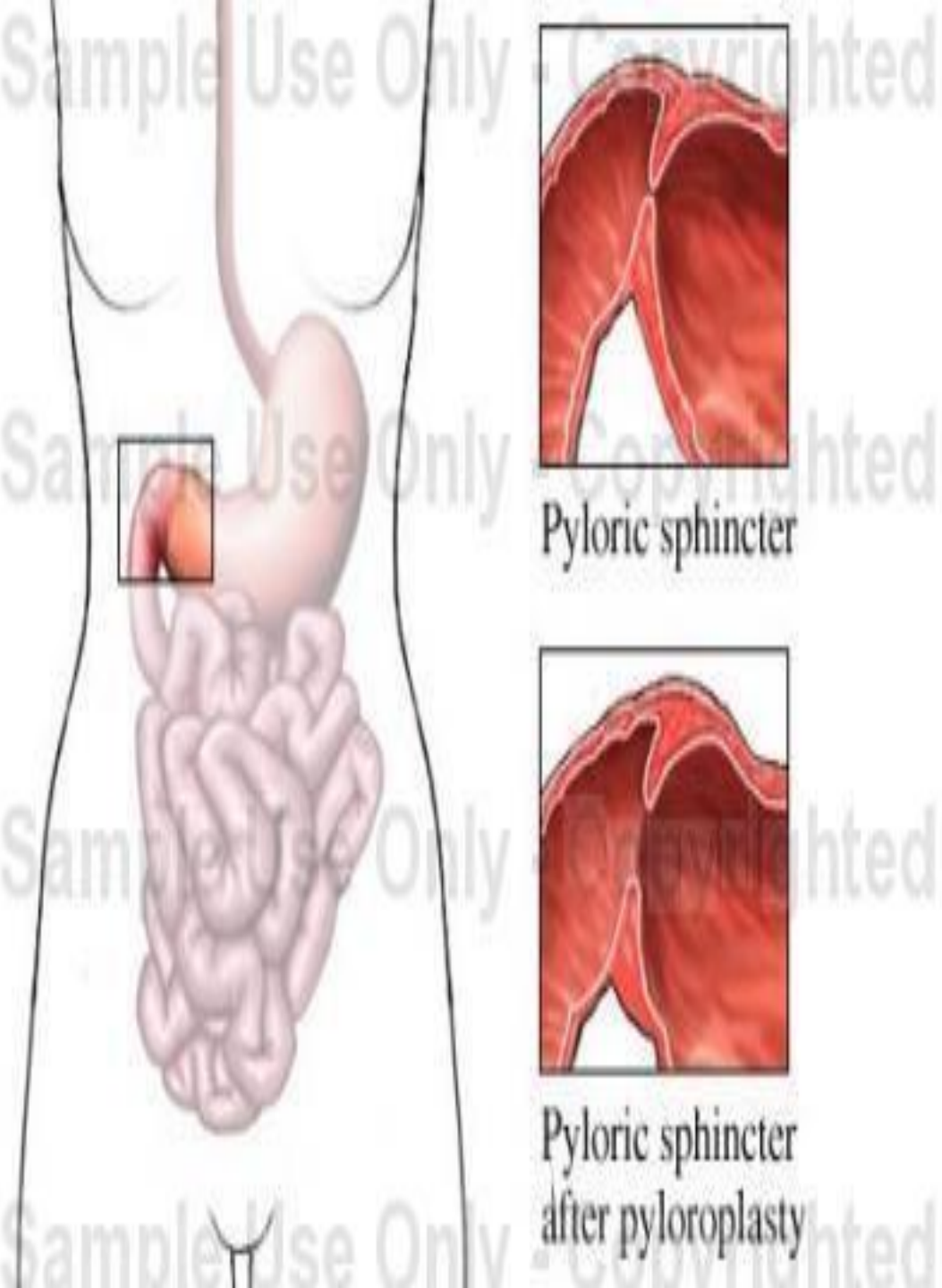
- ✓ The treatment for this condition is usually surgical to relief this sphincter.



Pyloric opening…cont

-The pyloric sphincter controls the outflow of gastric contents into the duodenum.

- The sphincter receives **motor** fibers from the sympathetic system (contraction) and **inhibitory** fibers from the **vagus nerve (relaxation).**



Pyloric orifices.....cont

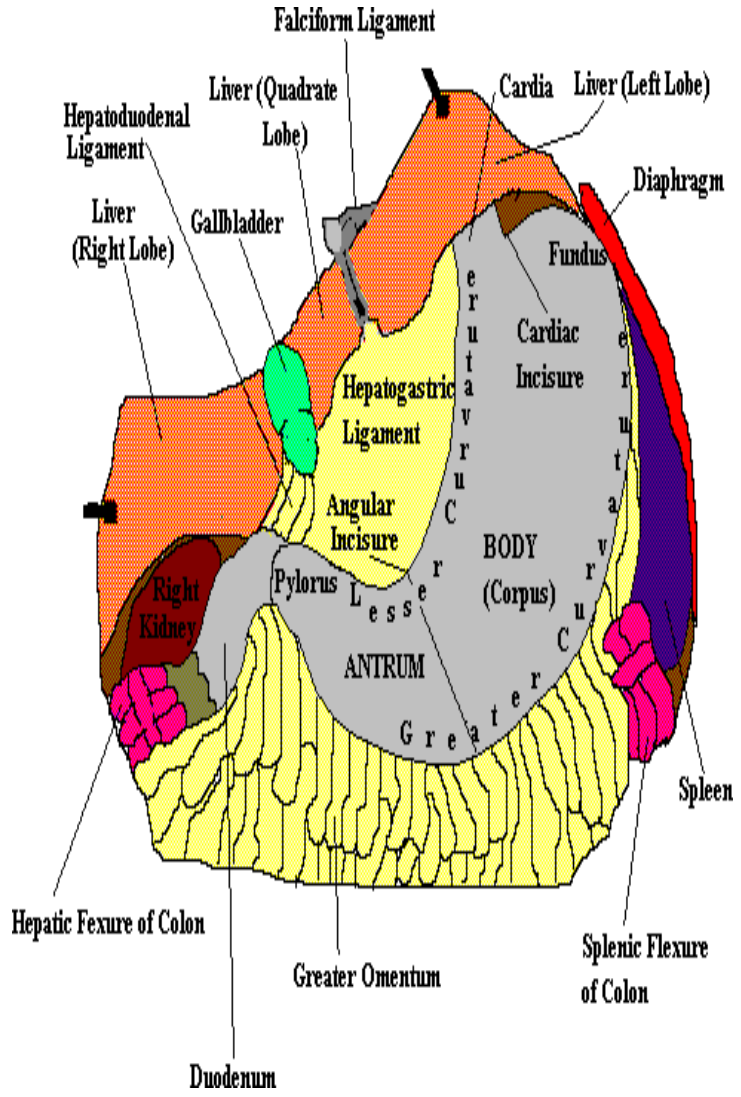
- Function of pyloric opening control by:

1) Hormonal influences from stomach C duodenum.
2) Nerve fibers.

- Filling stomach → Myenteric fibers → relaxation of sphincter.

Curvatures of stomach

- 1- The lesser curvature
- Forms the right border of the stomach
- Extends from the cardiac orifice to the pylorus
- **There are 2 layers of peritonium that are attached to the lesser curvature of stomach.**

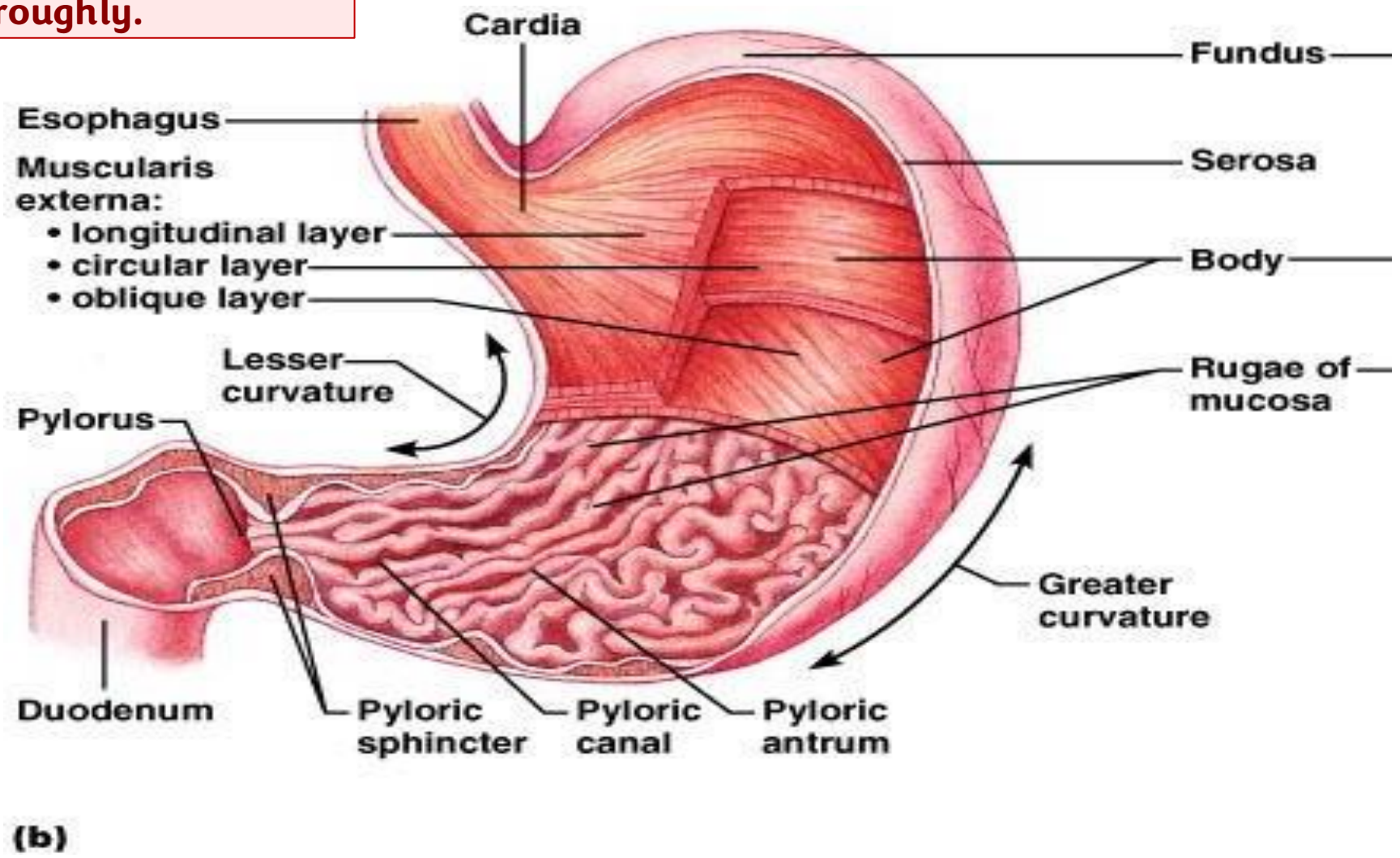


2- The greater curvature

- Much longer than the lesser curvature
- Extends from the left of the cardiac orifice, over the dome of the fundus, and along the left border of the stomach to the pylorus

Histology of the Stomach

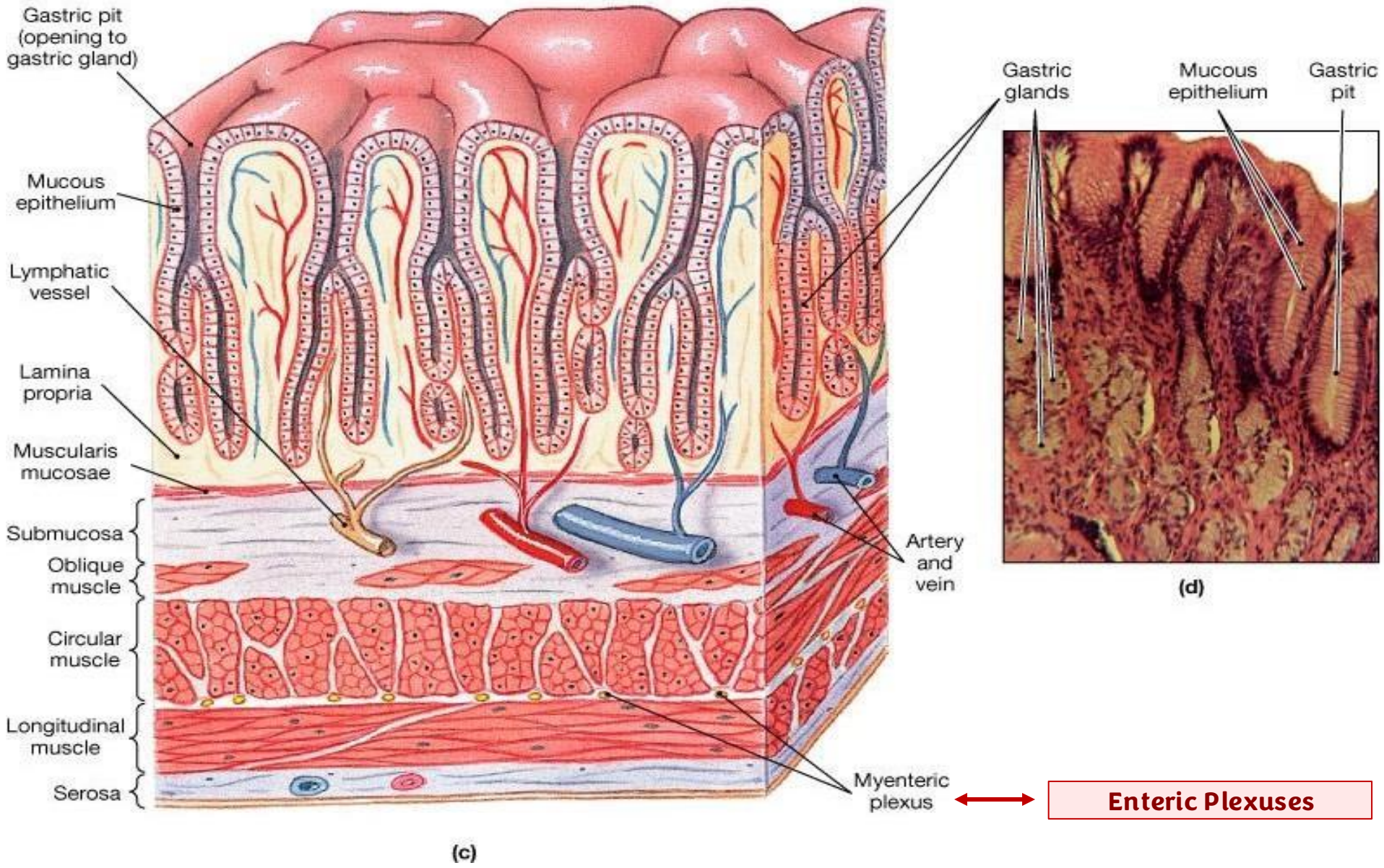
Take your time to examine this figure thoroughly.



GENERAL HISTOLOGY OF THE STOMACH

- ✓ The stomach has 4 layers: **mucosa**, **submucosa**, **mascularis**, **serosa** (**mesothelium**; **simple squamous epithelium**) as the stomach is completely covered with **peritoneum**.
- ✓ Mucosa consists of 3 layers: simple columnar **lining epithelium (1)** without goblet cells, **lamina propria (2)** filled with gastric glands open into the bases of **gastric pits** that in turn open into the gastric lumen, and thin layer of smooth muscle; **mascularis mucosae (3)**.
- ✓ The lining epithelium of the luminal surface, gastric pits and glands is **simple columnar** devoid of **goblet cells**.
- ✓ Mucosal foldings of the stomach lining are called **Rugae**, oriented either longitudinally with the lesser curvature, transversely or obliquely. This explains the rapid and swift passage of fluids through the stomach passing through the longitudinal folds with the lesser curvature.
- ✓ **Lamina propria** of the mucosa, and **submucosa** are rich in blood and lymphatic vessels.
- ✓ **Mascularis layer** contains **3 sublayers**, **oblique (innermost), circular and longitudinal (outermost),** unlike other regions of the **GI tube which mostly contain circular and longitudinal layers only** and **devoid of the oblique fibers. Myenteric plexus (Enteric Plexus) lies between the two longitudinal and circular surface.**
- ✓ At the **pyloric sphincter**, oblique layer is absent, thickening of the inner circular smooth muscle layer with the longitudinal layer constitute this sphincter.

The Stomach – Microscopic Anatomy

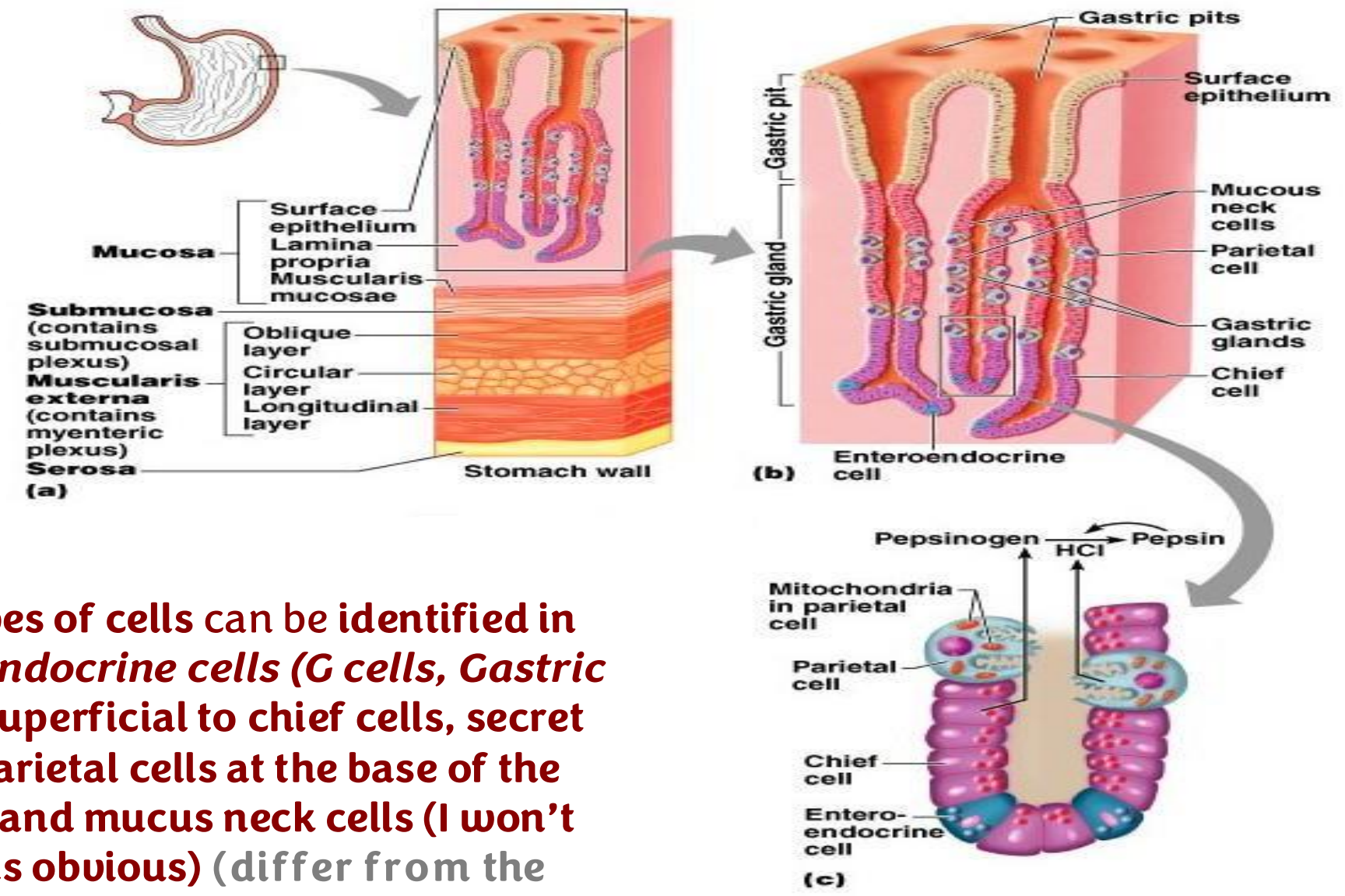


Enteric Plexuses

Mucous membrane

- The mucous membrane of the stomach is thick and vascular and is thrown into numerous folds, or **rugae** mainly longitudinal in direction
- The folds flatten out when the stomach is distended.

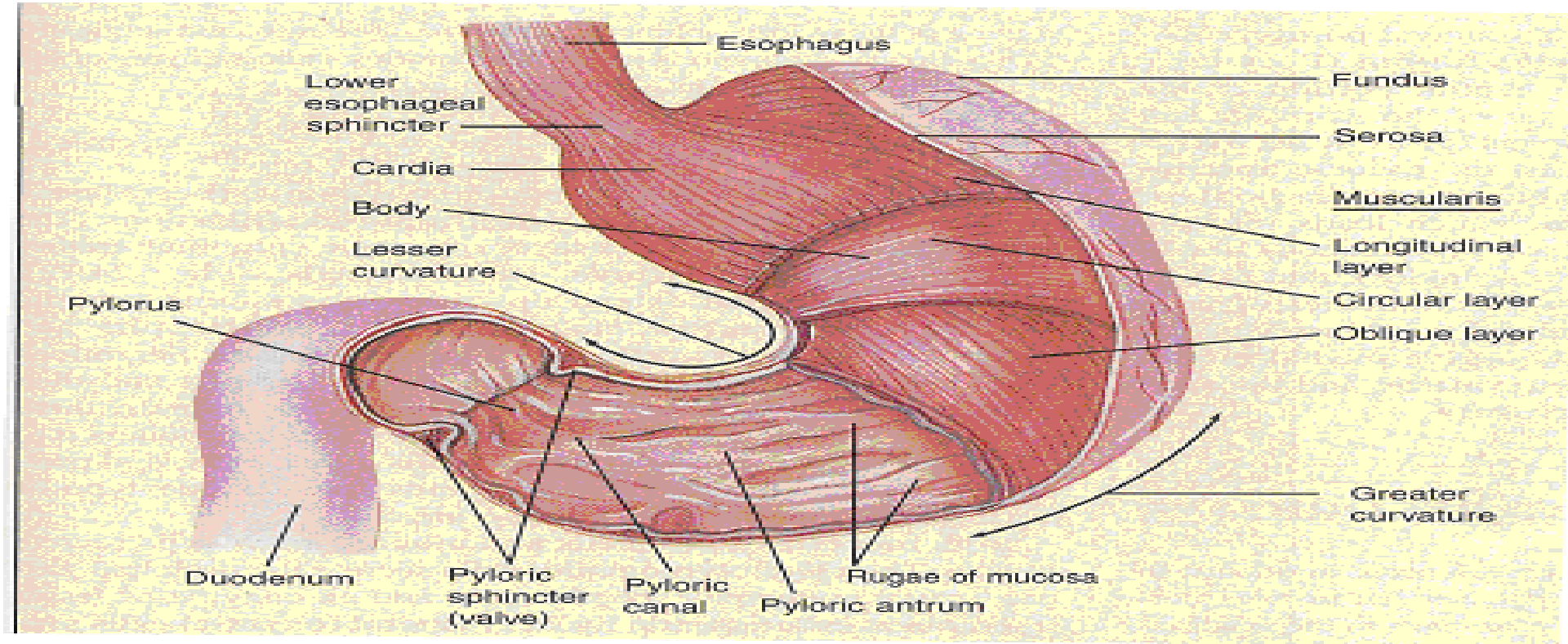
Stomach – Microscopic Anatomy



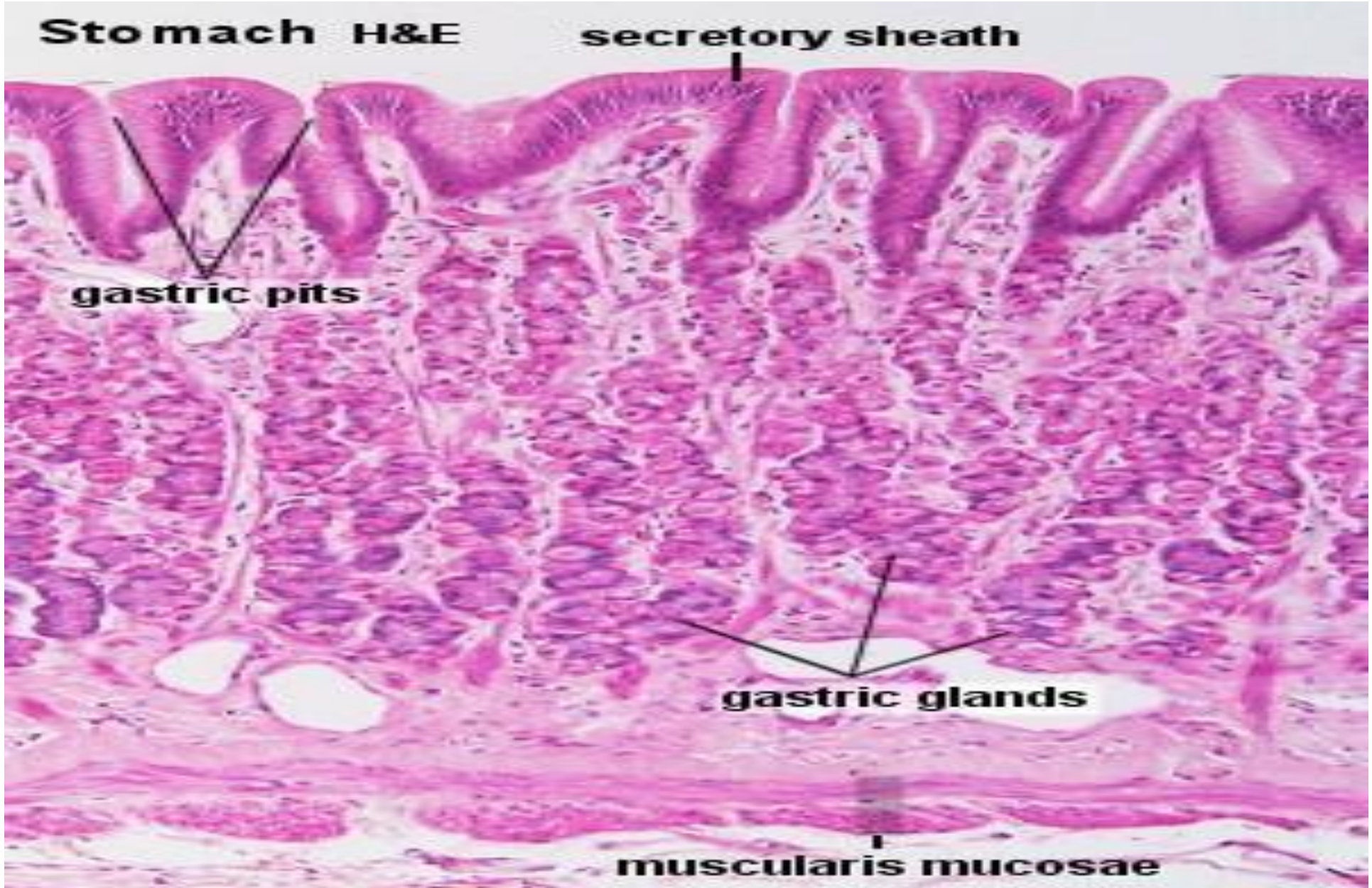
- ✓ There are **four different types of cells** can be **identified in the gastric glands: *enteroendocrine cells (G cells, Gastric secretion)*, *parietal cells* (superficial to chief cells, secret HCL), *chief cells* (deep to parietal cells at the base of the gland, secret pepsinogen), and mucus neck cells (I won't write what it does cause it is obvious)** (differ from the mucous cells lining the luminal surface and the gastric pits).

Muscular Wall Of Stomach

- The muscular wall of the stomach contains longitudinal fibers (outer surface), circular fibers(inner surface), and oblique fibers **which is absent at the lower part of the stomach as becoming closer to the pylorus.**

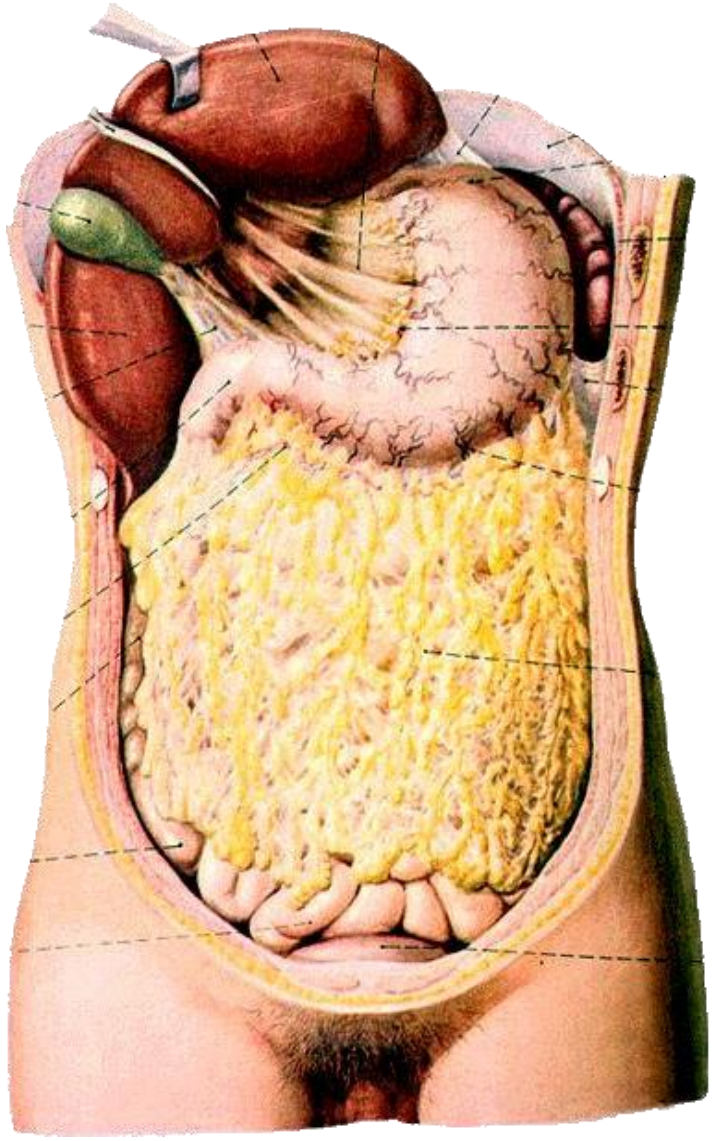


Stomach – Microscopic Anatomy

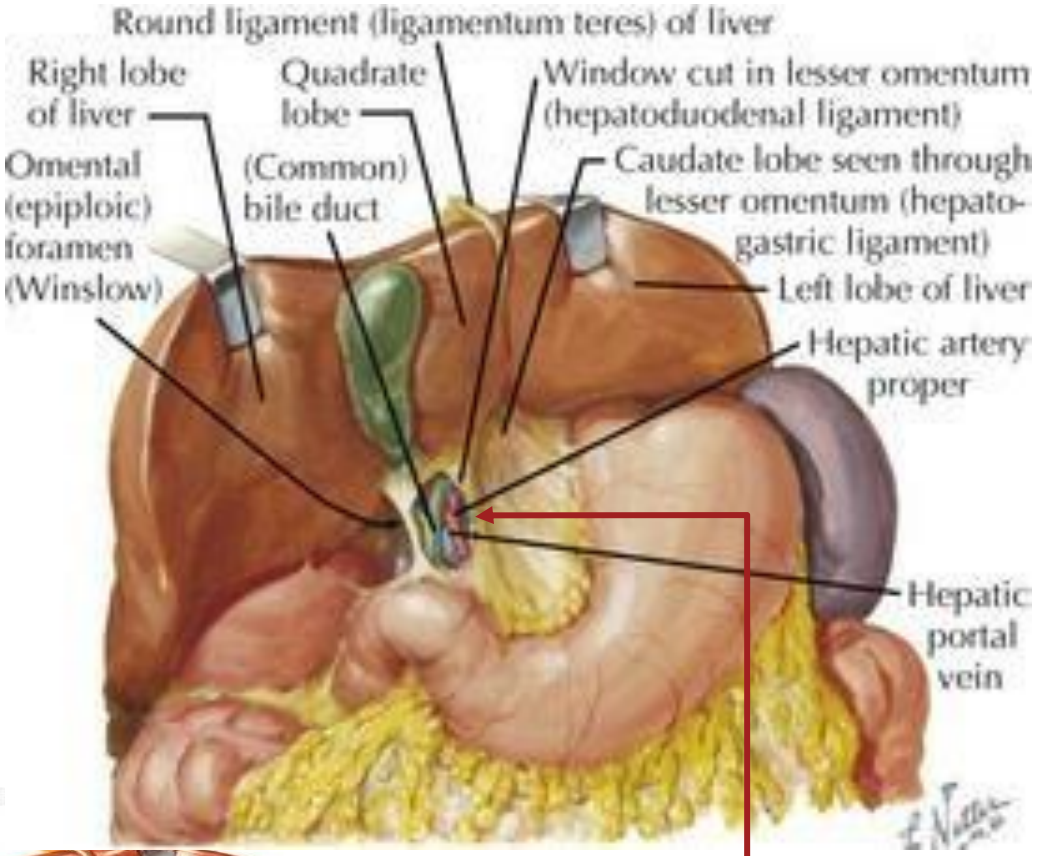


Peritoneum of stomach

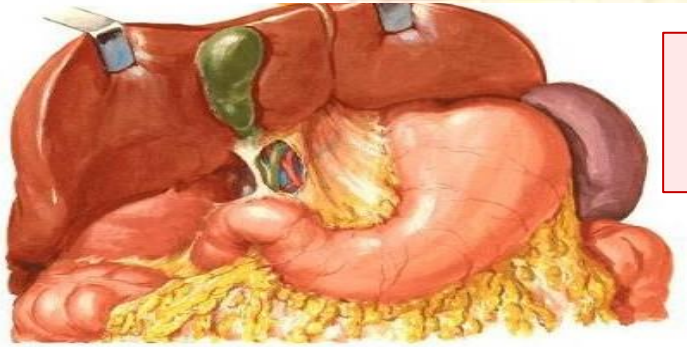
- The peritoneum (visceral peritoneum) completely surrounds the stomach.
- It leaves the lesser curvature as the lesser omentum
- It leaves the greater curvature as the gastrosplenic ligament and the greater omentum
- The gastrosplenic ligament extends from the upper part of the greater curvature to the spleen, and the greater omentum extends from the lower part of the greater curvature to the transverse colon.



- The lesser curvature is suspended from the liver by the lesser omentum
- **Gastrophrenic ligament** between the **fundus and the diaphragm.**



- ✓ The **lesser omentum** is divided into two parts: the ***hepatogastric ligament*** (connecting the liver to the stomach) and the ***hepatoduodenal ligament*** (connecting the liver to the duodenum).
- ✓ ***Omental foramen (epiploic or foramen of winslow)*** is located behind the free edge of the the **lesser omentum** (useful for surgeries regarding structures behind the stomach) It communicates **with the lesser sac behind the stomach.**
- ✓ Free edge of the **lesser omentum contains common bile duct, hepatic artery** and **portal vein.**



Blocking the blood supply here will cause bleeding to stop.

LESSER AND GREATER OMENTUMS

- ✓ **Two layers of the peritoneum arise from the lesser curvature**, forming **the lesser omentum**. The lesser omentum **connects the stomach to the liver**. Between these two layers, **there are fat, blood vessels, nerves, and lymph nodes.**

- ✓ **Two layers of the peritoneum arise from the greater curvature**, forming the **greater omentum**. Like the lesser omentum, the greater omentum **contains fat, blood vessels, nerves, and lymphatic vessels.** It **descends from the greater curvature of the stomach, then ascends, and attaching eventually to the transverse colon**. The greater omentum **originates from the greater curvature** and **ends at the transverse colon, surrounding it,** therefore the transverse colon is an **intraperitoneal organ just like the stomach**, meaning it is **entirely enclosed by the peritoneum**, while the ascending and descending colon are retroperitoneal organs, meaning they lie behind the peritoneum (anterior to them).

GREATER OMENTUMS

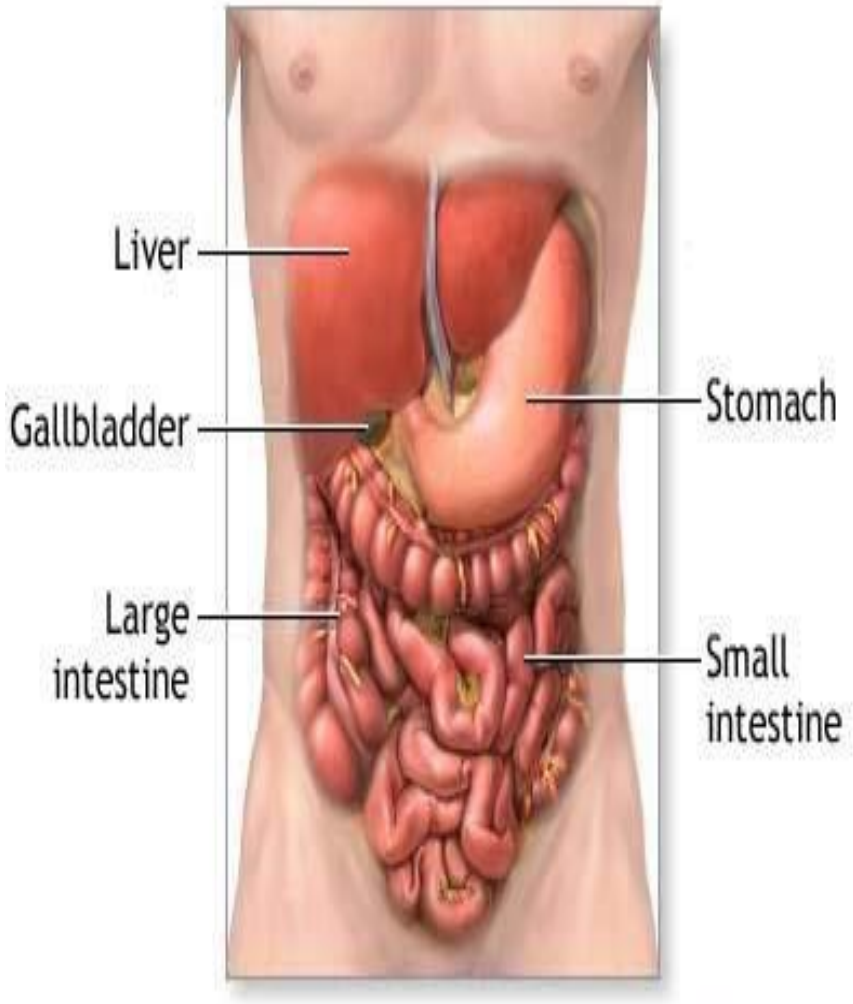
- ✓ The greater omentum is colloquially referred to as the '**policeman of the abdomen'.** This **large, fatty layer** contains numerous **blood vessels, adipose tissue, lymph nodes, lymphatic vessels, and nerves.**

- ✓ Its primary function in response to infection is to **localize the pathology.** If inflammation occurs within the abdominal cavity, **the greater omentum migrates and surrounds the affected organ,** such as an inflamed appendix, **effectively walling off the infection to prevent widespread dissemination (spread)** and facilitating a localized inflammatory response.

Relations of stomach

Anterior- superior

- The anterior abdominal wall, **at the epigastric region.**
- the left costal margin (cartilage); when it extends to the left hypochondriac region.
- **the left pleura and lung**
- **Part of** the diaphragm which separates the stomach from the lung and the pleura.
- **the left lobe of the liver** which can extends to cover the anterior wall of the stomach.



Relations of stomach...cont

Posteriorly = stomach bed

-The lesser sac

-the Lt. crus of diaphragm

- the spleen located along the **lateral edge of the stomach**, both **anteriorly and posteriorly.**

- the left suprarenal gland

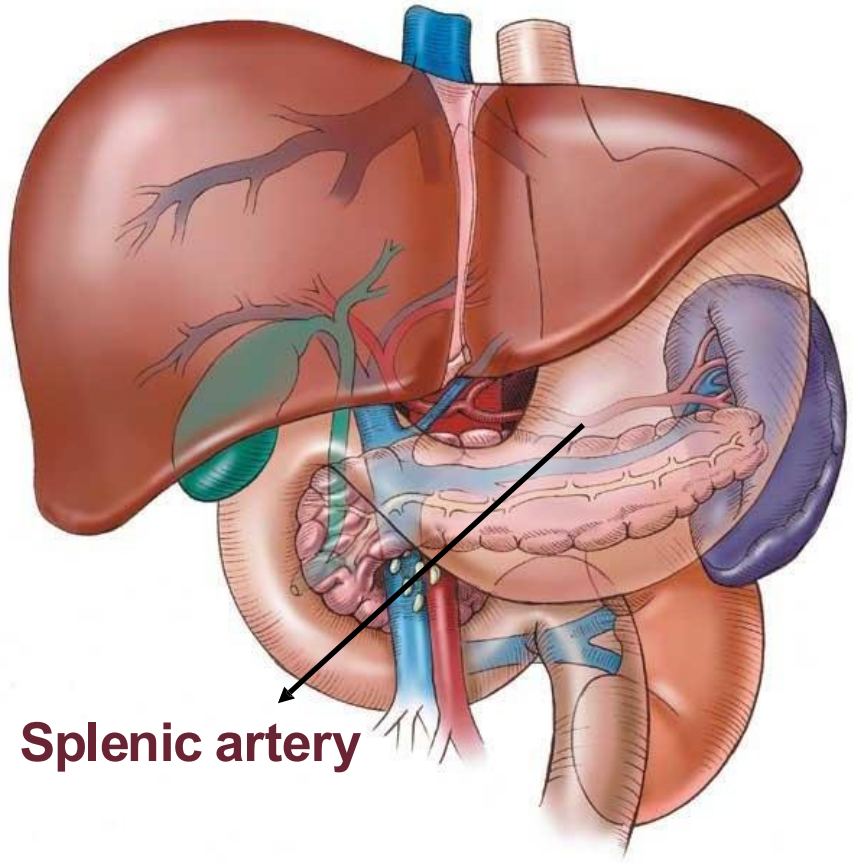
-the upper part of the left kidney

★the splenic artery located **on the upper border of the pancreas**, while the **splenic vein** is located **behind the pancreas.** The latter is not a part of the stomach bed.

- the body of pancreas.

- the transverse mesocolon.

- the transverse colon.



✓The peritoneum forms the **greater sac and the lesser sac. The greater sac is located anterior to the stomach, while the lesser sac is posterior to the stomach.** when the **stomach is full, it distends backwards as a result of expansion.** Therefore, it is essential to have a space behind it to accommodate this backward movement.

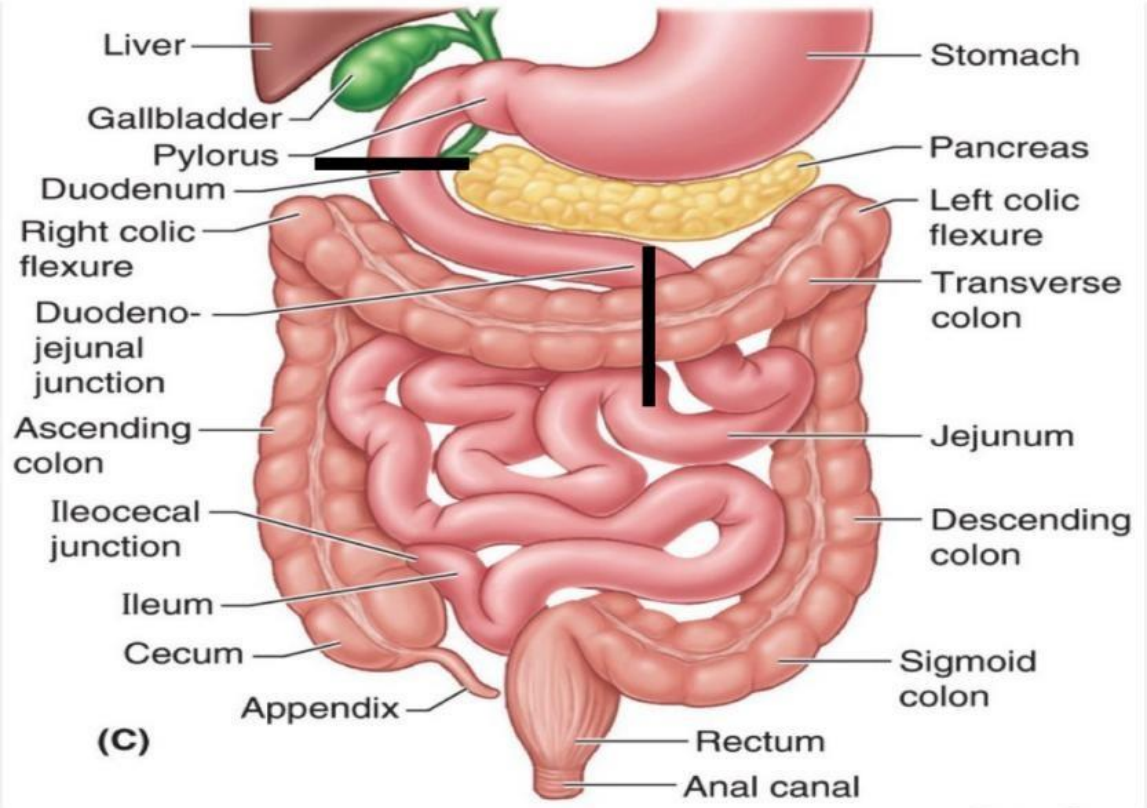
BLOOD SUBPPLY OF THE GI TRACT

- ✓ **Emberyologically**, the **foregut** gives rise to the **lower esophagus, the stomach, and the upper half of the duodenum**, with **its blood supply from the celiac trunk.**

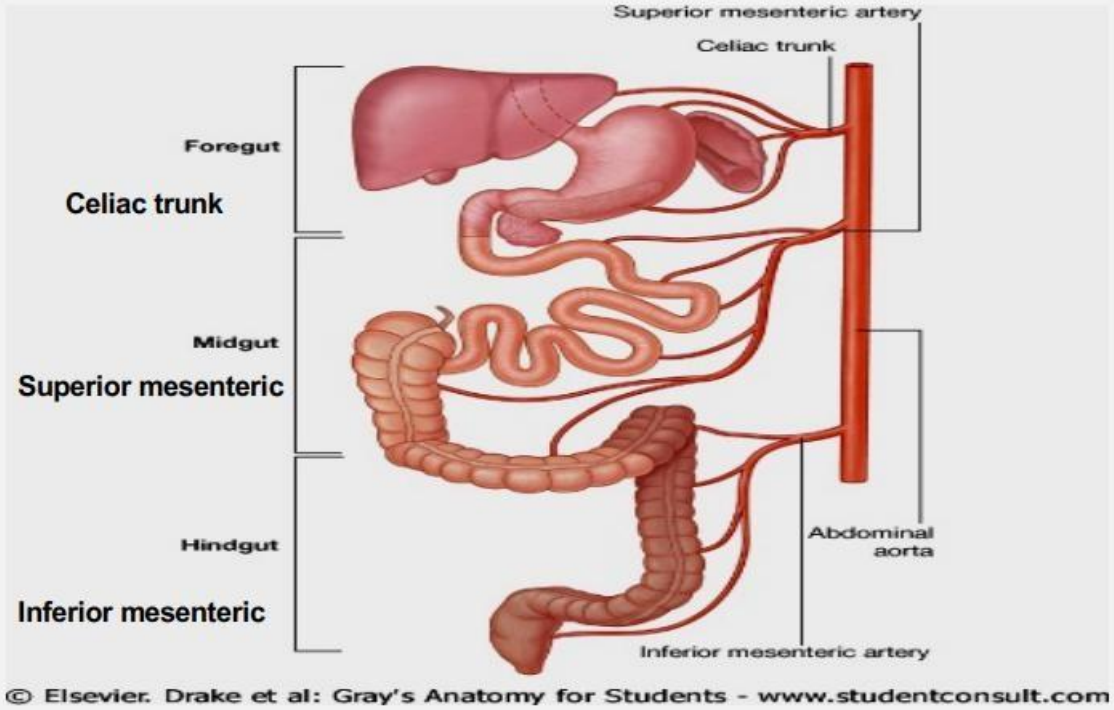
- ✓ The **midgut** gives rise from the **lower half of the duodenum**, the **small intestine,** and continues to the **lateral third of the transverse colon**, with its blood supply from the **superior mesenteric artery.**

- ✓ The **hindgut** gives rise to **the lateral third of the transverse colon**, the **descending colon**, the **rectum**, and the **upper part of the anal canal** (while lower half is by inferior rectus artery), with its blood supply from **the inferior mesenteric artery.**

One thing I want to emphasize on is that midgut terminates at the proximal/right two thirds of the transverse colon, not lateral third, and then hindgut starts from the distal one third of the transverse colon, yet better stick to what Dr says.

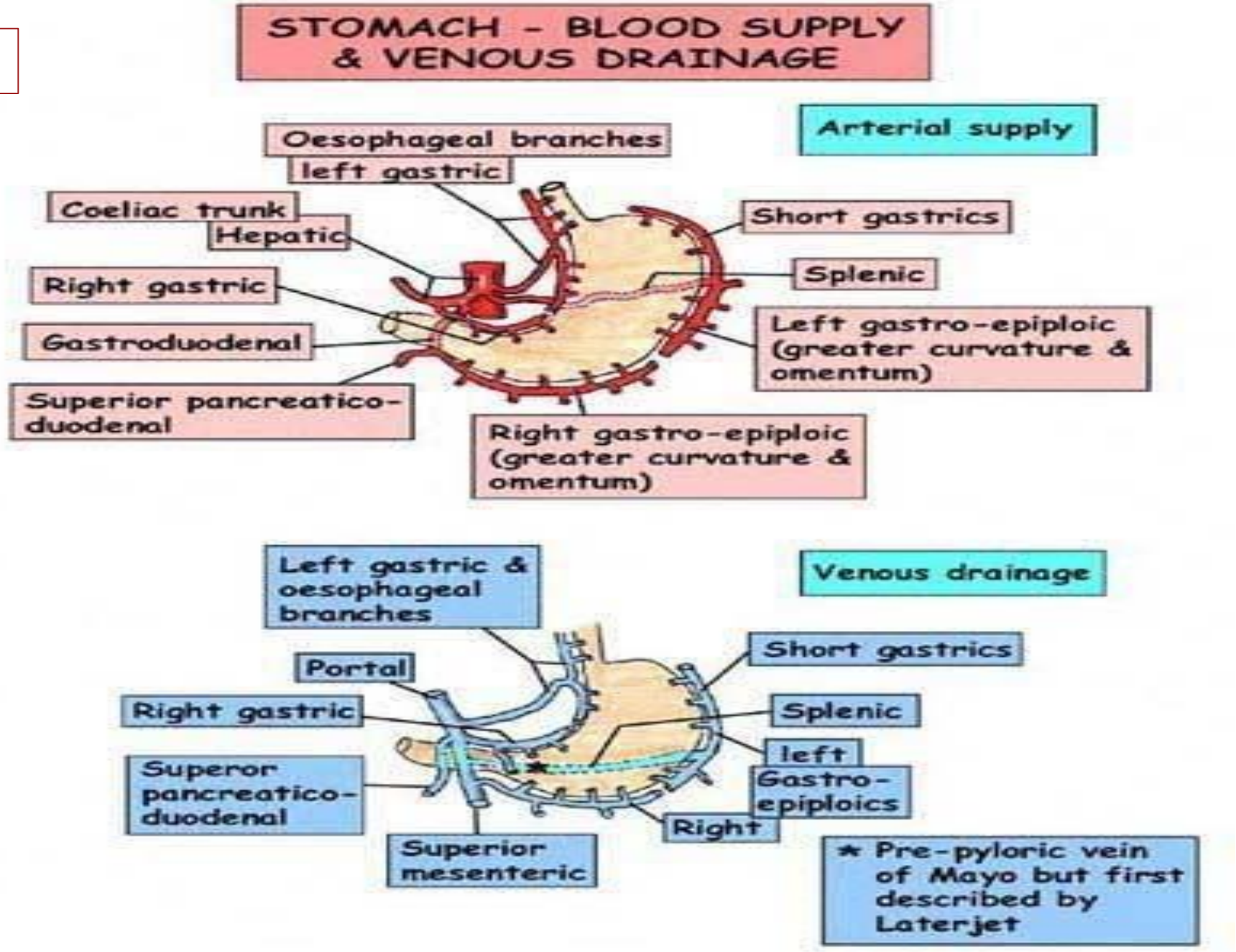


Blood supply of the gut



These figures are not present in doctor's slides; they are actually taken from Dr. Ahmed Salman's slides from the introductory course in our first year, just to help you comprehend these basic concepts.

Important figure



ARTERIAL BLOOD SUPPLY OF THE STOMACH

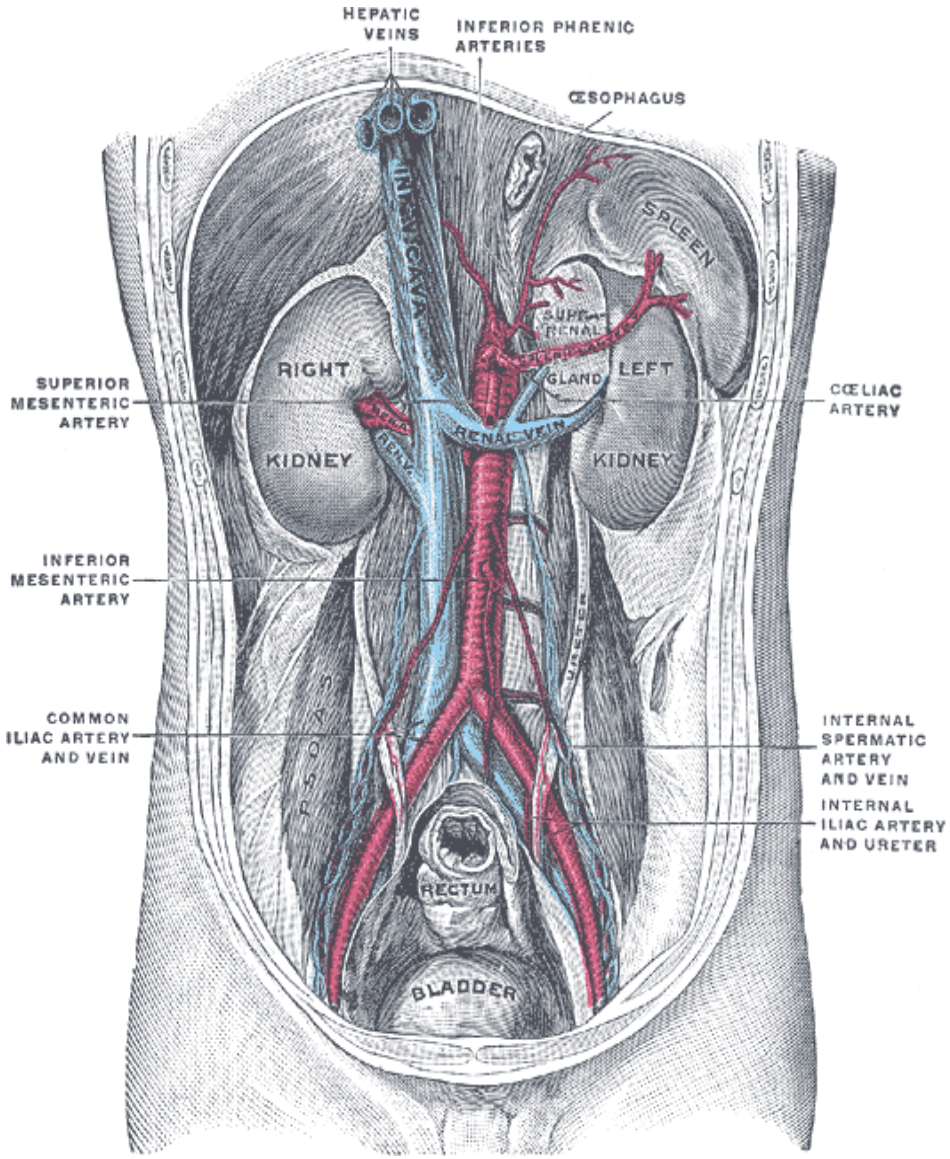
- ✓ The ***celiac trunk*** is the main arterial supply to the stomach. It gives off three primary branches: the ***left gastric artery***, the ***splenic artery***, and the ***hepatic artery***.
- ✓ Each of these branches contributes to the vascular supply of different stomach regions. The ***left gastric artery*** directly supplies the lesser curvature and lesser omentum and sends ***esophageal branches to sypply lower third of esophagus*** . From the ***hepatic artery***, the ***right gastric artery*** arises and also runs along the lesser curvature and lesser omentum.
- ✓ The ***gastroduodenal artery***, another branch of the ***hepatic artery***, gives off the ***superior pancreaticoduodenal artery*** and ***right gastroepiploic artery***, the latter supplies the greater curvature and greater omentum. While the ***left gastroepiploic artery*** arising from the ***splenic artery***, which also runs along the greater curvature and greater omentum.
- ✓ The ***splenic artery*** as well gives ***short gastric arteries***, which supply the fundus of the stomach.
- ✓ ***superior pancreaticoduodenal artery*** arises from the ***gastroduodenal artery,*** primarily supplies the pancreas and duodenum.

VENOUS BLOOD SUPPLY OF THE STOMACH

- ✓ The venous drainage of the stomach generally follows the reverse path of the arteries.
- ✓ The ***left gastric vein*** drains blood from the oesophagus and the lesser curvature of the stomach, and it empties directly into the ***portal vein***.
- ✓ The ***right gastric vein*** also drains the lesser curvature and joins the ***portal vein*** as well.
- ✓ The ***right gastroepiploic vein*** (which accompanies the right gastroepiploic artery) drains into the ***superior mesenteric vein***.
- ✓ The ***left gastroepiploic vein*** and the ***short gastric veins***, both of which drain the greater curvature and the fundus respectively, empty into the ***splenic vein***.
- ✓ The ***splenic vein*** and the ***superior mesenteric vein*** come together to form the ***portal vein***, which ultimately carries the blood to the liver.

Blood supply….cont

- The arteries are derived from the branches of the **celiac artery.**
- The celiac trunk arise from the front of the abdominal aorta and its located at the level of T12 to L1 above the pancreas.
- Its 1 cm long.



Blood supply for stomach……cont

Relations of celiac artery

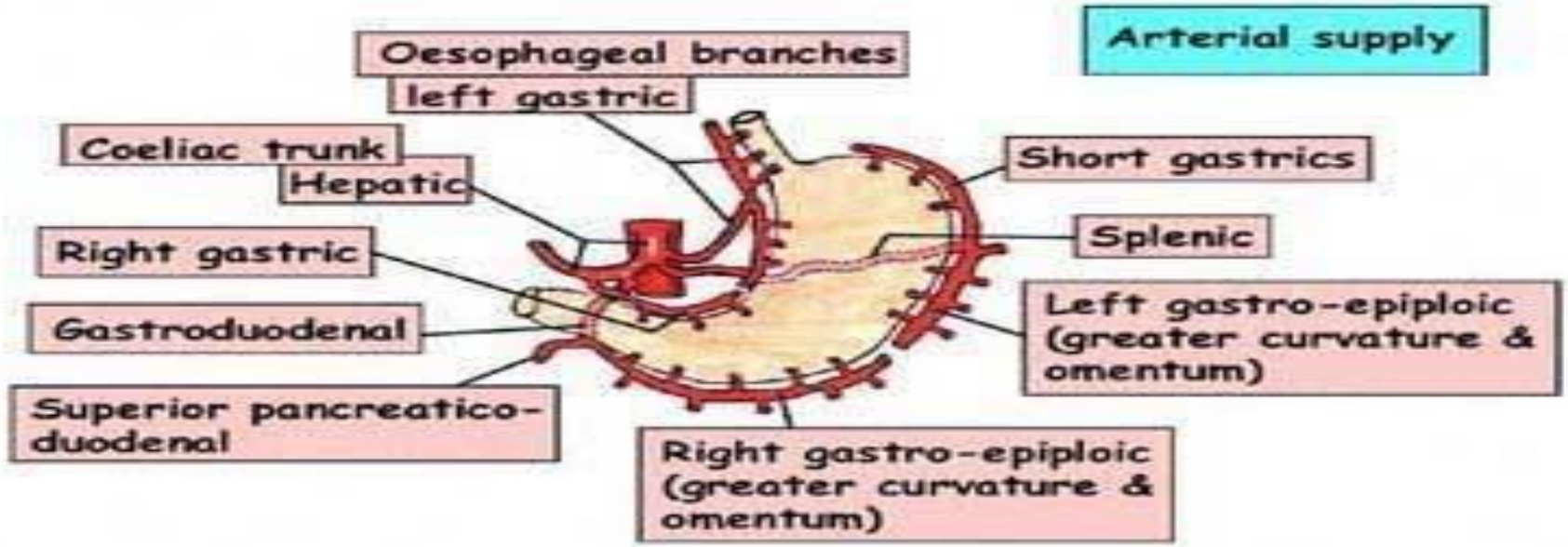
Above pancreas.

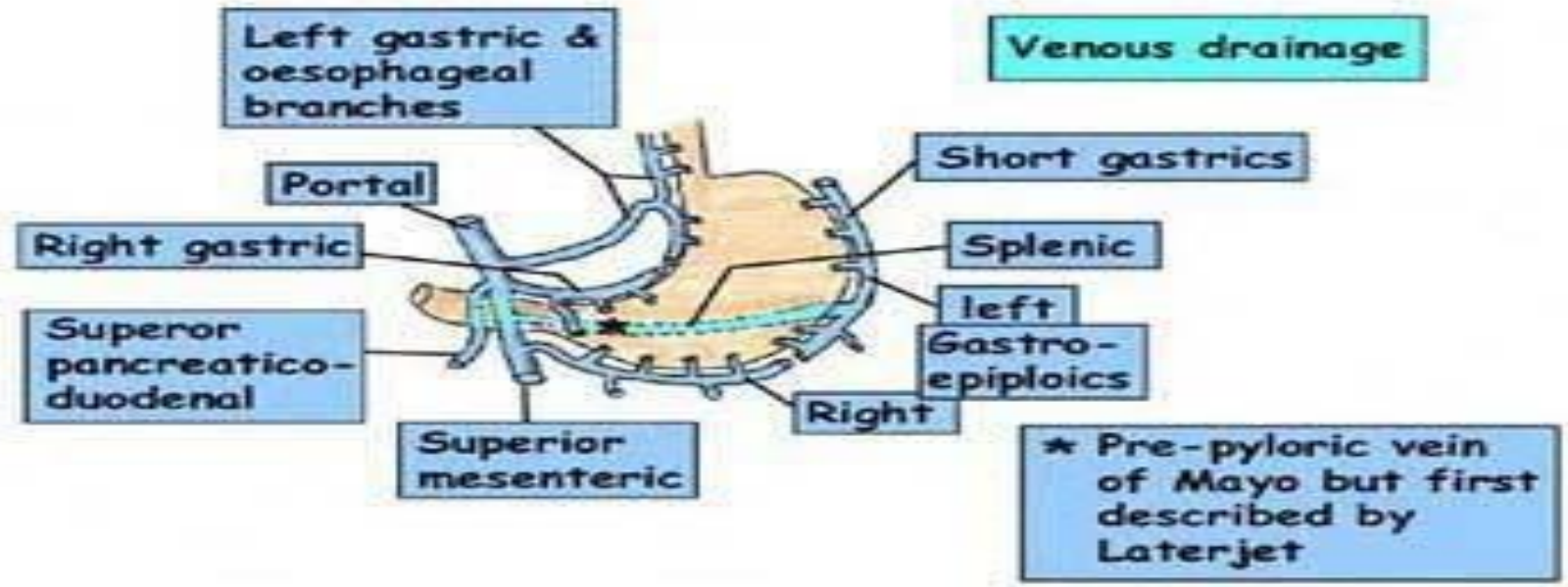
- On each side : **celiac ganglia+ lympatic nodes.**
- Crus of diaphragm and lumbar Nerves.
- **Its Branches for foregut.**

Main distribution

- Lt.gastric.a → Stomach.
- Splenic.a → Spleen.
- Hepatic.a → Liver.

STOMACH - BLOOD SUPPLY & VENOUS DRAINAGE

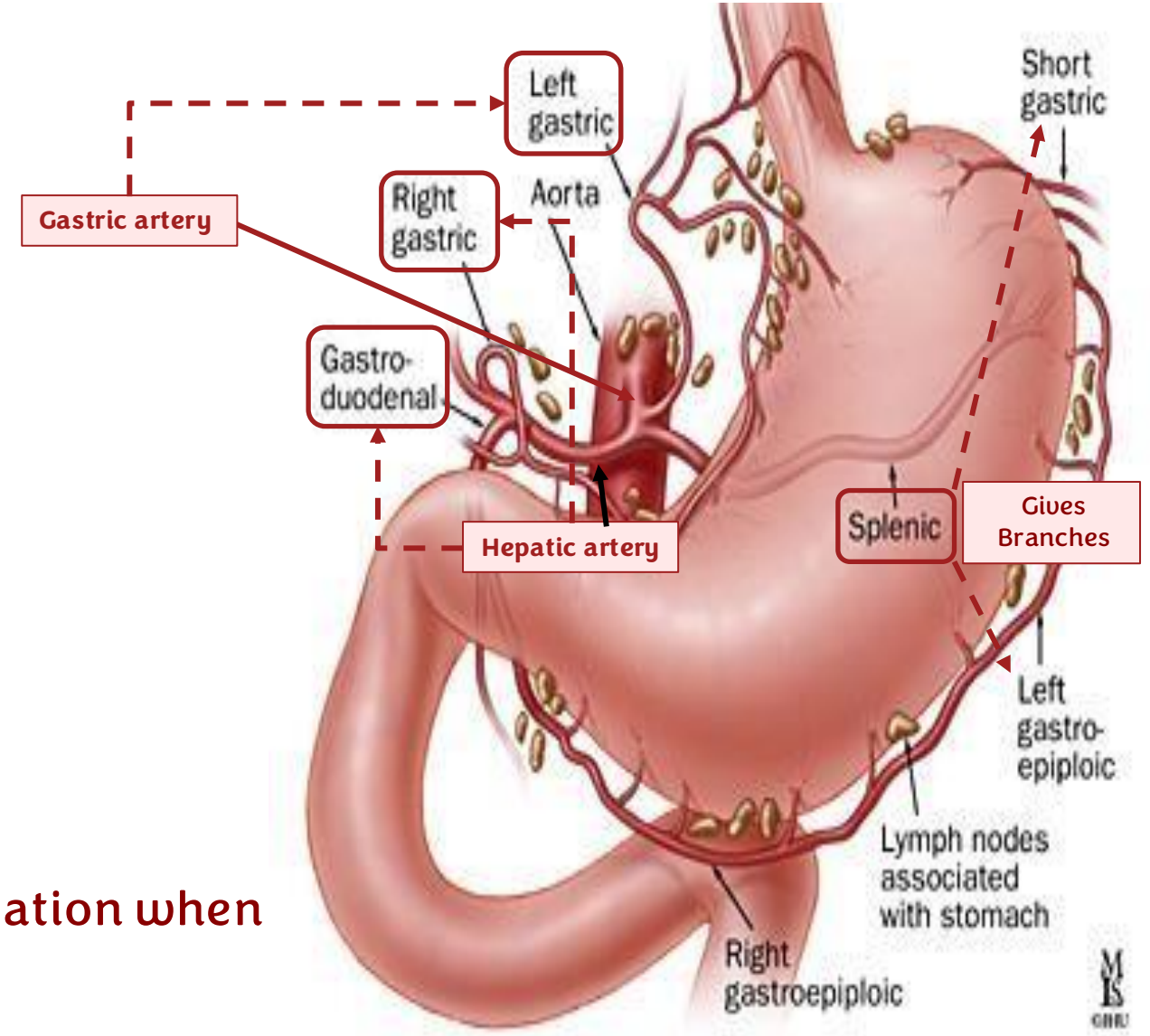




Blood supply for stomach……cont

1- The left gastric artery

- Arises from **the celiac artery.**
- It passes upward and to **the left to reach the esophagus.**
- Then descends along the lesser curvature of the stomach.
- **It supplies the** lower third of the esophagus and the upper right part of the stomach



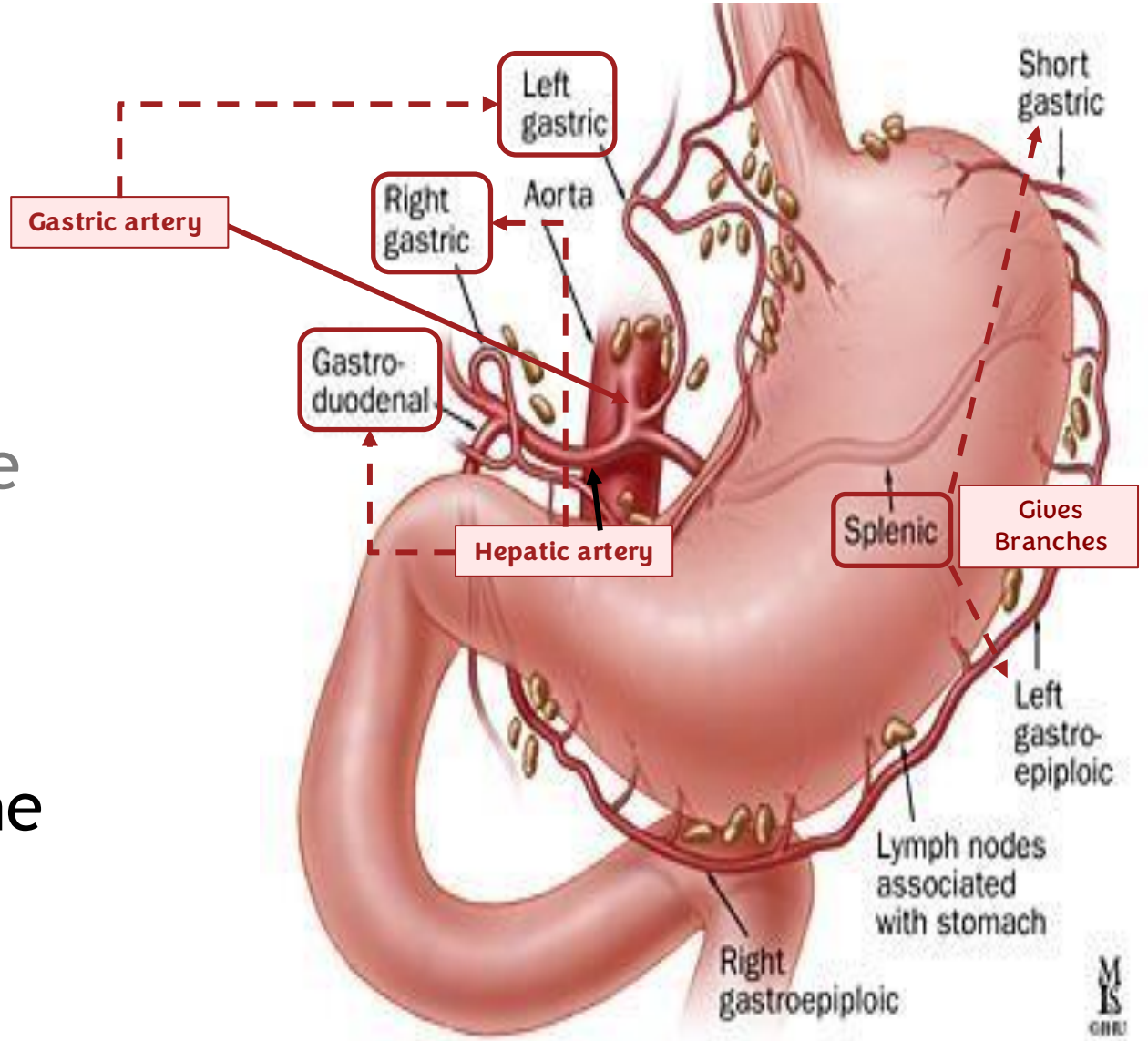
- ✓ The **splenic artery** is tortuous to allow elongation when stomach distends, preventing rapture.
- ✓ **Facial** (importand for facial expression) **, uterine (important in pregnancy amd uterus become bigger) & are also tortuous.**

The continuous arrow is showing structure while non-continuous ones are showing branches

Blood supply…..cont

2- The right gastric artery

- arises from the hepatic artery at the upper border of the pylorus
- runs to the left along the lesser curvature.
- It supplies the lower right part of the stomach.

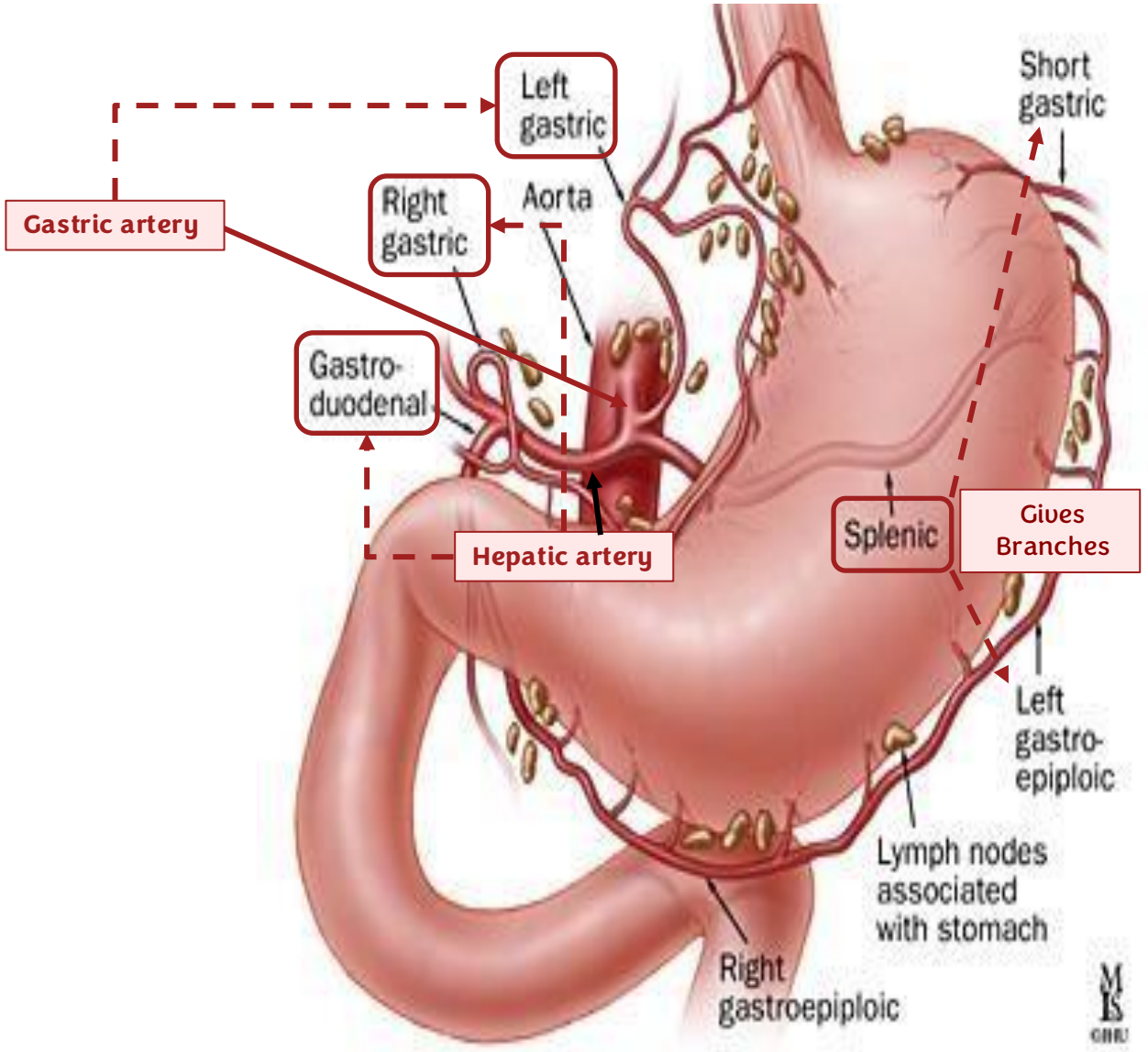


The continuous arrow is showing structure while non-continuous ones are showing branches

Blood supply….cont

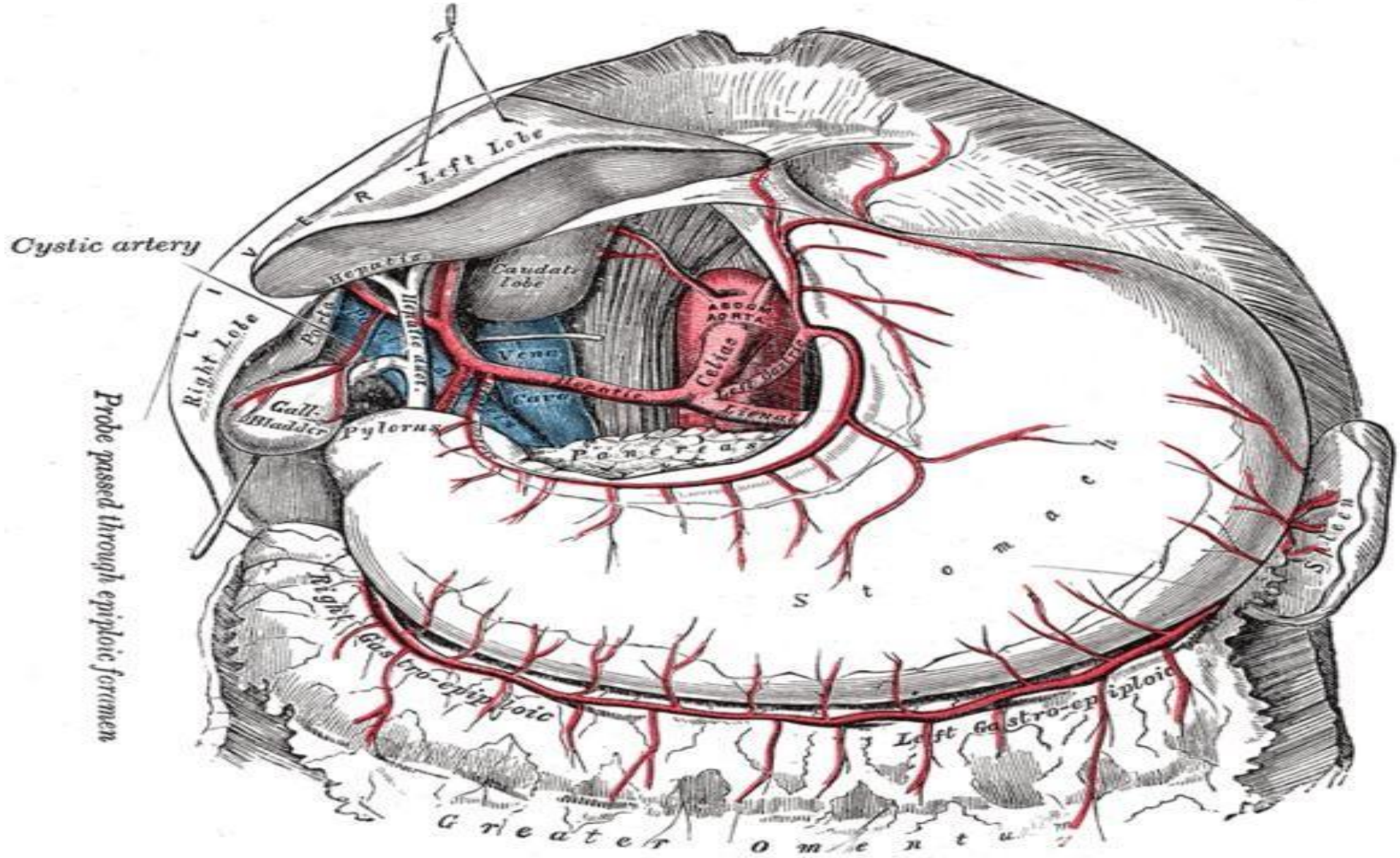
3- The short gastric arteries

- Arise from the splenic artery (5-7 arteries)
- Arises from splenic artery in the gastrosplenic ligament
- pass upward in the gastrosplenic to supply the fundus



The continuous arrow is showing structure while non-continuous ones are showing branches

Blood supply of stomach



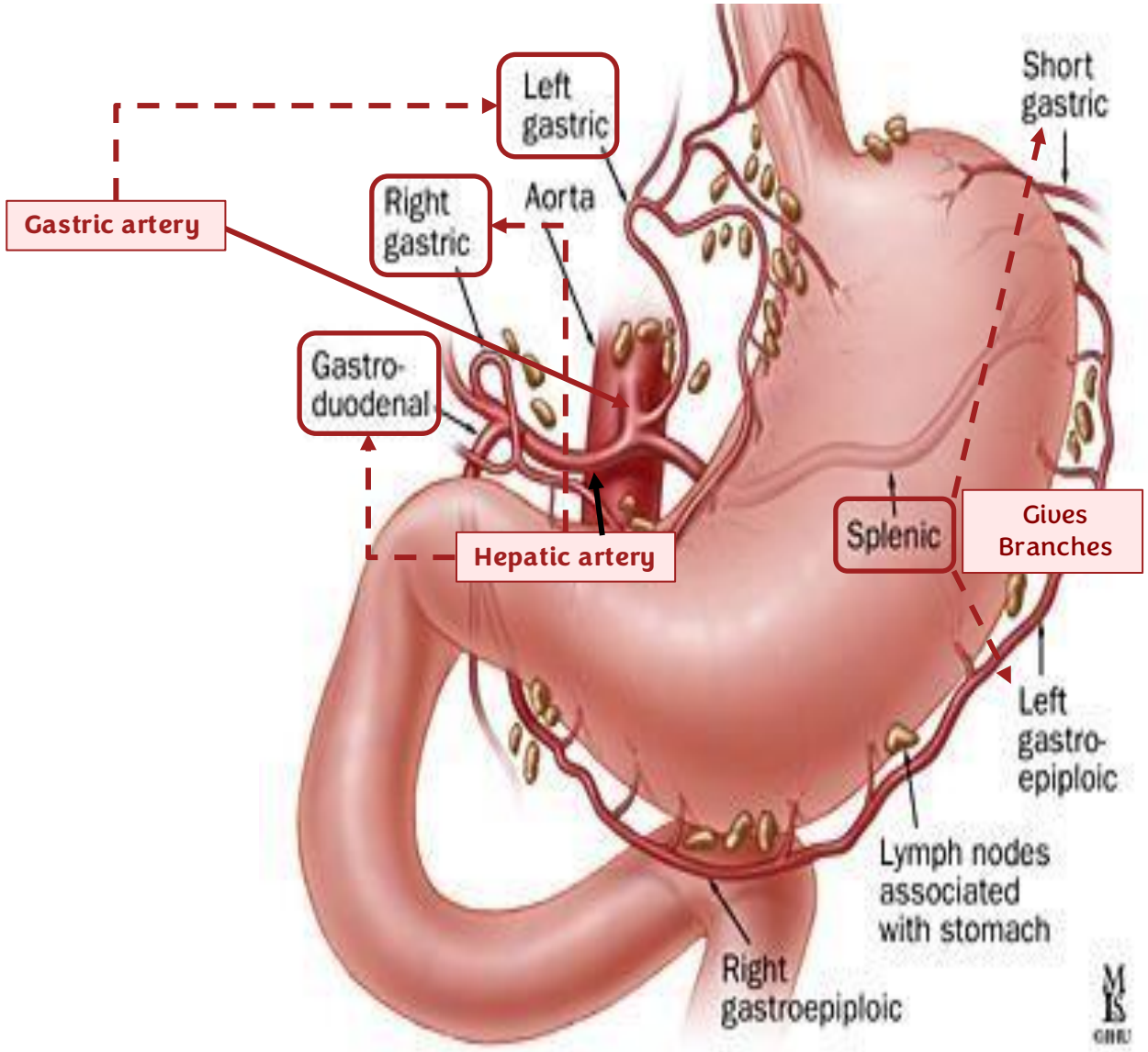
Blood supply…..cont

4- The left gastroepiploic artery

- - Arises from the splenic artery before the hilum of the spleen.
- Passes forward in the gastrosplenic (ligament)
- Supply the stomach along the upper part of the greater curvature in the greater omentum

5- The right gastroepiploic artery.

- arises from the **gastroduodenal branch of the hepatic artery**
- It passes to the left and supplies the stomach along the lower part of the greater curvature in the greater omentum.



The continuous arrow is showing structure while non-continuous ones are showing branches

Venous drainage

We call them Tubutaries, They are opposite to the blood supply

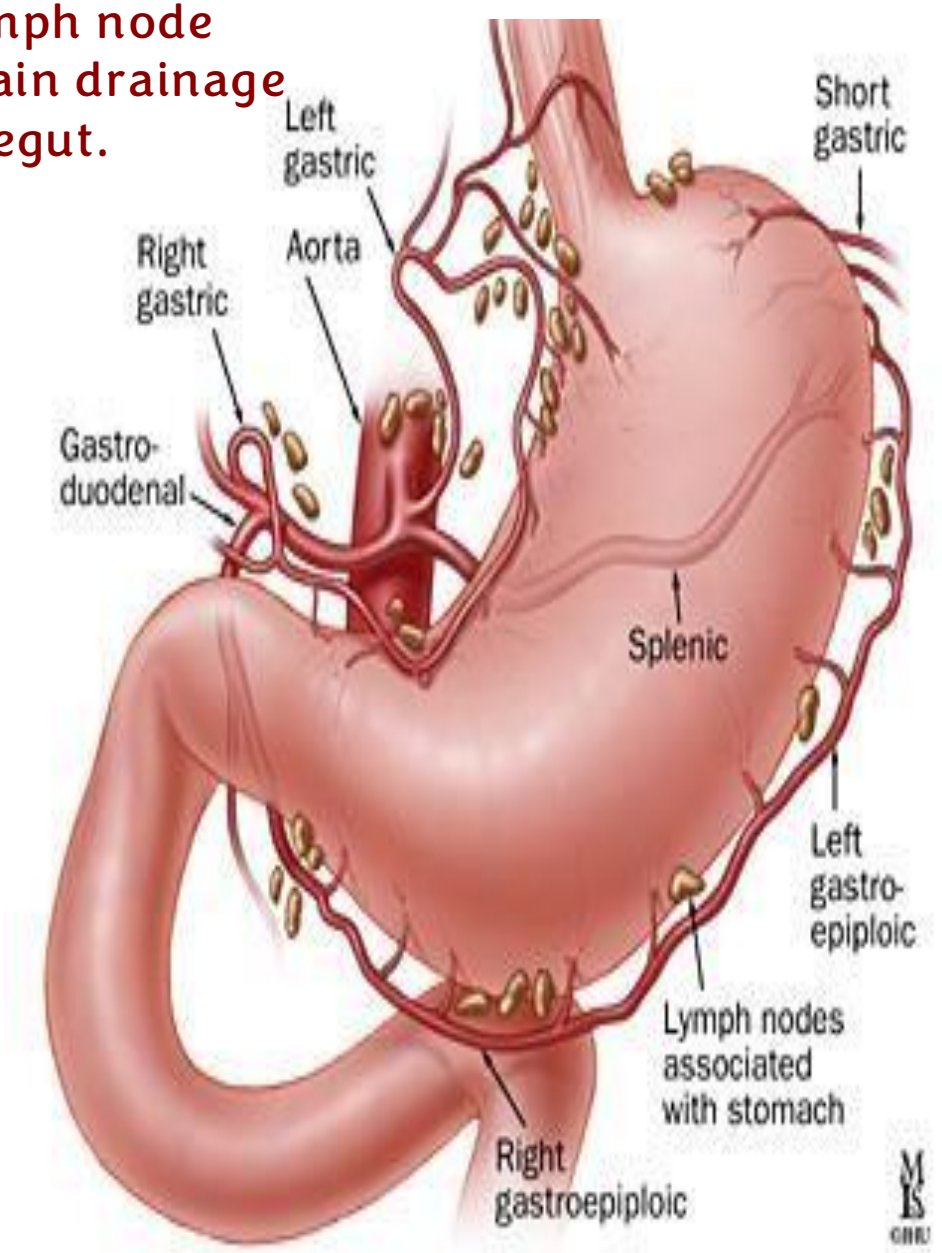
- The veins drain into **the portal circulation.**
- The **left and right gastric veins** drain directly into the portal vein
- The short gastric veins and the left gastroepiploic veins join the splenic vein
- The right gastroepiploic vein joins the superior mesenteric vein (which meet the splenic vein behind the neck of pancreas to form the portal vein → **collecting all absorptive for the liver to function).**

Lymphatic drainage

★ Celiac Lymph node are the main drainage of the foregut.

- Follow the arteries of stomach
- **The left and right gastric nodes**
- **The left and right gastroepiploic nodes**
- The short gastric nodes

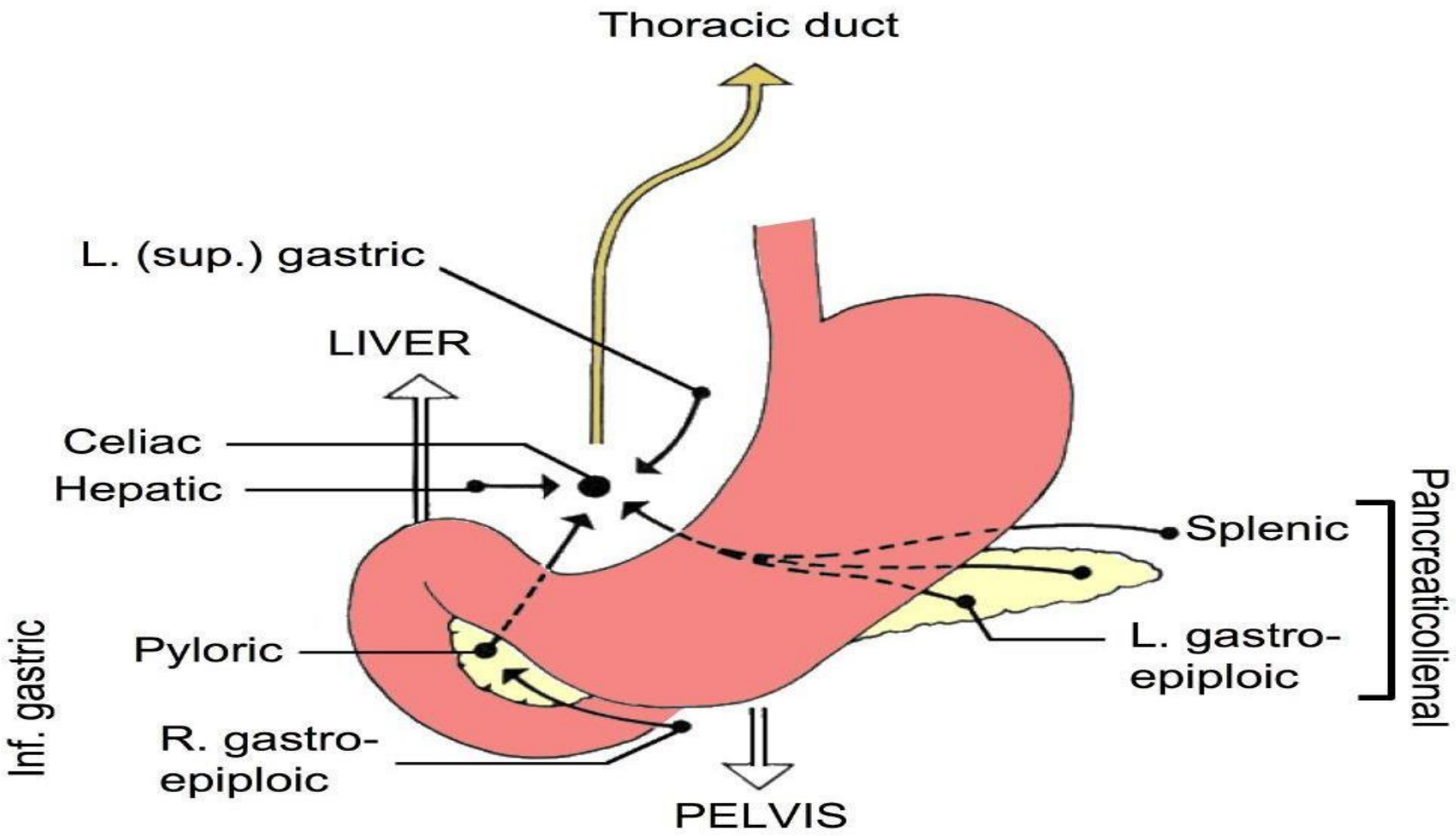
★**All lymph from the stomach eventually passes to the celiac nodes located around the root of the celiac artery on the posterior abdominal wall.**



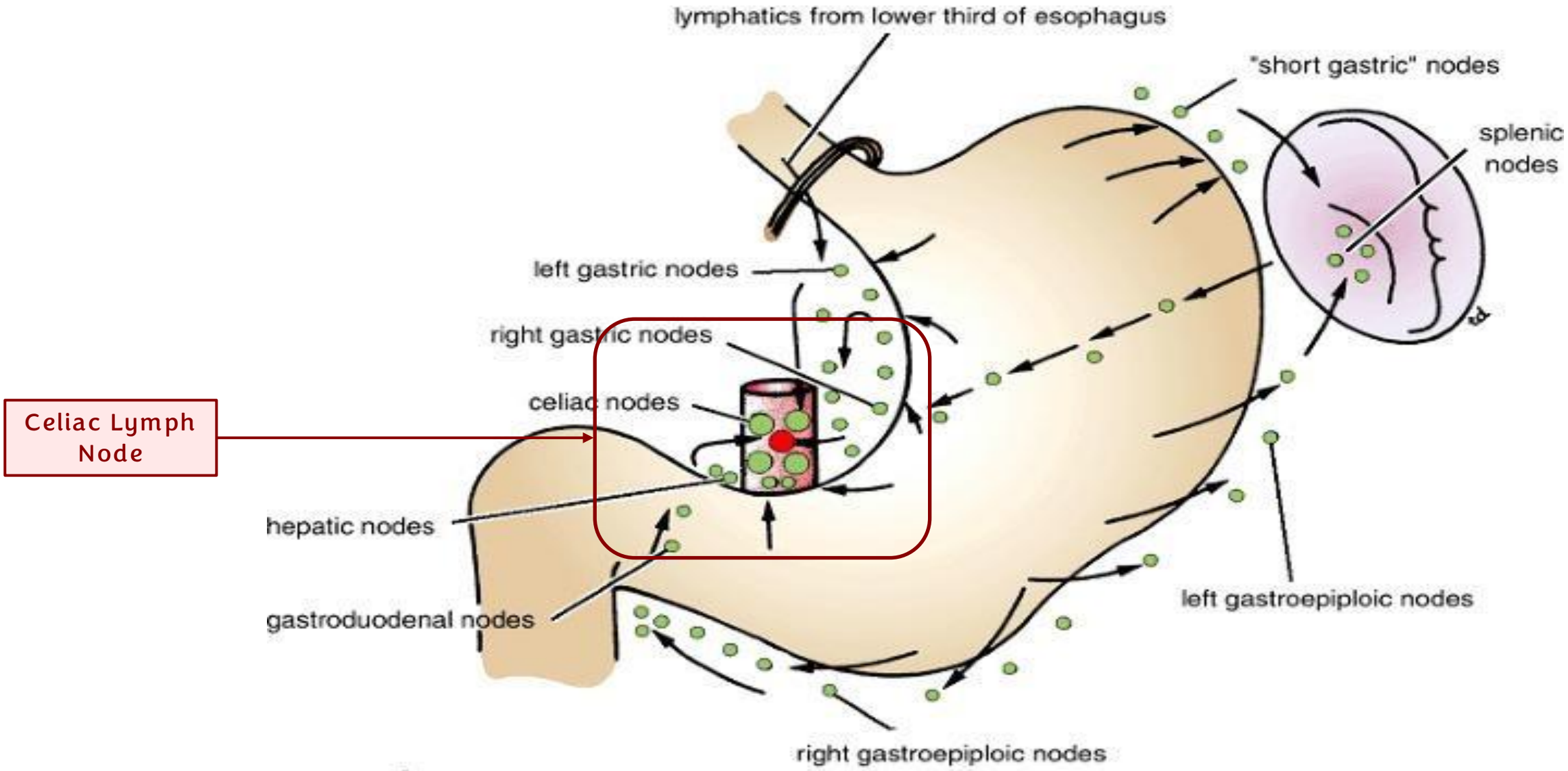
✓ All the lymphatic drainage from the organs supplied by the coeliac trunk—including the **stomach, spleen, and duodenum**—first drains into the **celiac lymph nodes**, which are located around the **coeliac trunk**.

✓ From there, lymph flows into larger lymphatic vessels that drain into the **cisterna chyli**, located near the abdominal opening of the aorta and then to the **thoracic duct**.

Lymphatic drainage



Lymphatic drainage….cont



Nerve supply for stomach

- The nerve supply includes **sympathetic fibers** **derived from the celiac plexus.**

- **parasympathetic fibers** from the **right and left vagus nerves .**

- The **sympathetic innervation** **(from celiac ganglia)** of the stomach carries a proportion of **pain Sensation** **(also for pyloric sphincter).**

- The **parasympathetic vagal fibers** are **secreto-motor** to the **gastric glands** and **motor to the muscular wall of the stomach(peristaltic movement).**

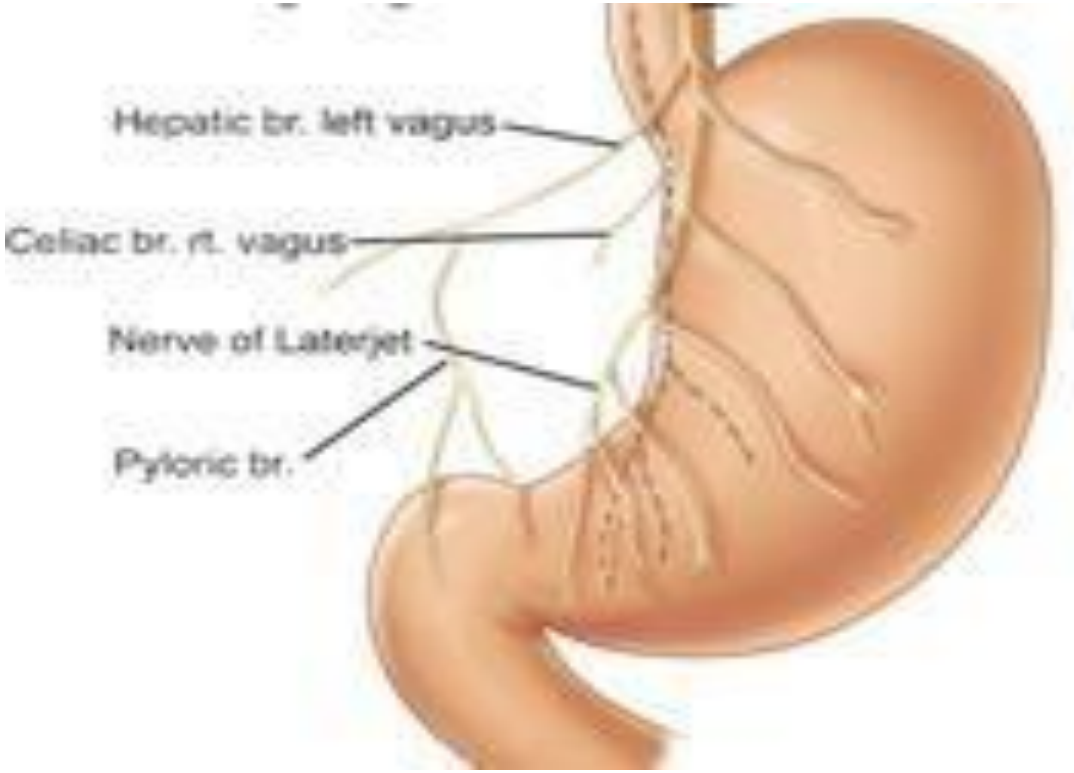
- **Also, the parasympathetic innervate the myenteric Plexus in the wall of the organ between the inner and outer circular smooth muscles**

- **Also the parasympathetic post ganglionic neuron is very short.**

- The **pyloric sphincter** receives **motor fibers** from the **sympathetic system and inhibitory fibers from the vagus nerve.**

NERVE SUPPLY FOR THE STOMACH

- ✓ The **vagus nerve** descends into the abdomen in the form of a **vagal trunk**, which wraps around the esophagus.
- ✓ As it passes through the diaphragm:The **left vagus nerve** becomes the **anterior vagal trunk**.The **right vagus nerve** becomes the **posterior vagal trunk**.
- ✓ Both the anterior and posterior vagal trunks give off branches to supply abdominal organs.



Nerve supply of stomach…..cont

- **<u>The anterior vagal trunk</u>**

- mainly from the left vagus nerve

<u>Distribution</u>

1 The **anterior surface of the stomach.**

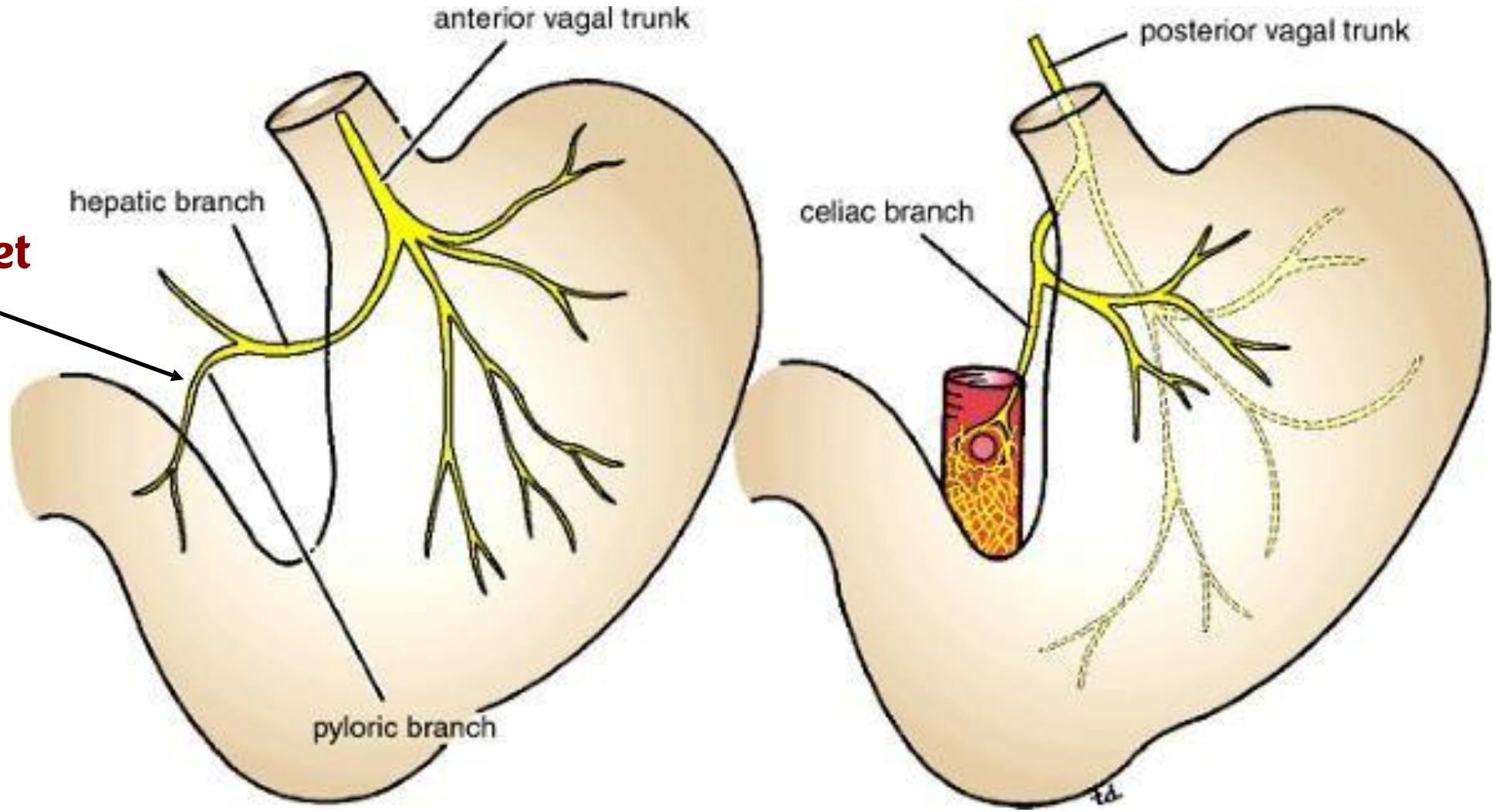
2 A large **hepatic branch passes up to the liver.**

3 **Anterior Nerve Latarjet→ pylorus.**

✓ The ***nerve of Latarjet*** is an important branch of the vagus nerve **(Branching the from anterior & posterior vagal nerves)**, and it plays a key role in **gastric evacuation**.

✓ If this nerve is cut or injured, the stomach will not be able to empty properly.

Nerve supply of stomach…..cont



Latarjet

Nerve supply of stomach…..cont

- **The posterior vagal trunk**

- mainly from the right vagus nerve

- **Distribution :**

1 **mainly the posterior wall of the stomach.**

2 **Ant. Wall of body of stomach.**

3 Celiac branch→ small intestine **+ Large Intestine until the lateral third of transverse colon +** as far as to splenic flexure+ pancreas.

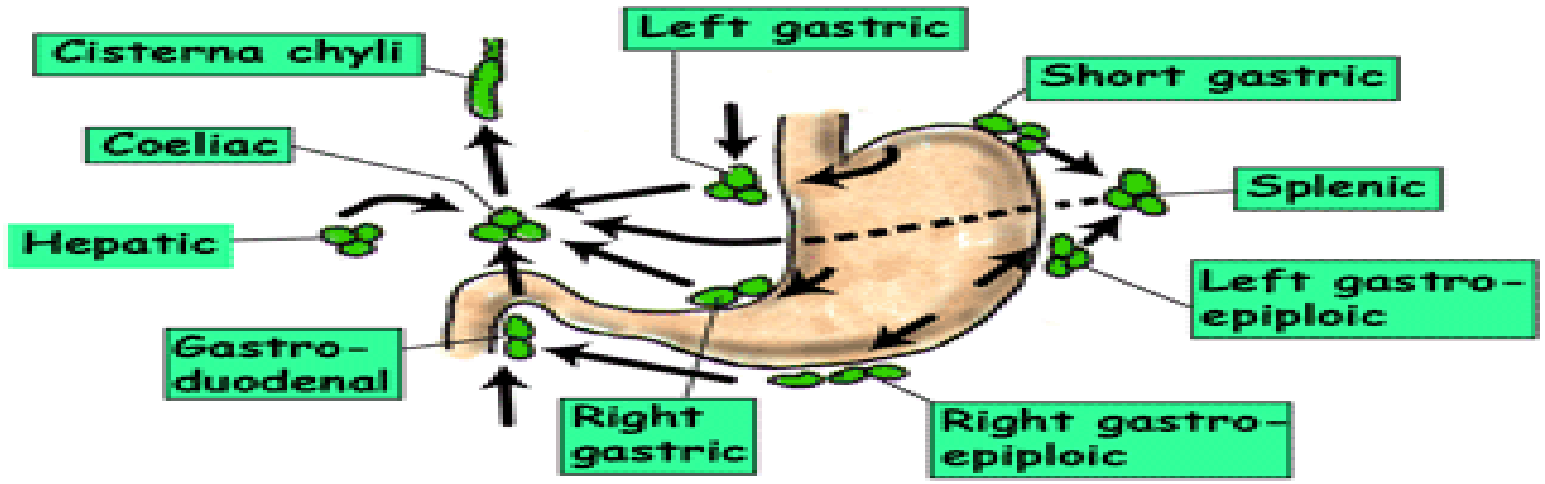
4 **posterior Nerve latarjet→ pylorus.**

NERVE SUPPLY FOR THE STOMACH

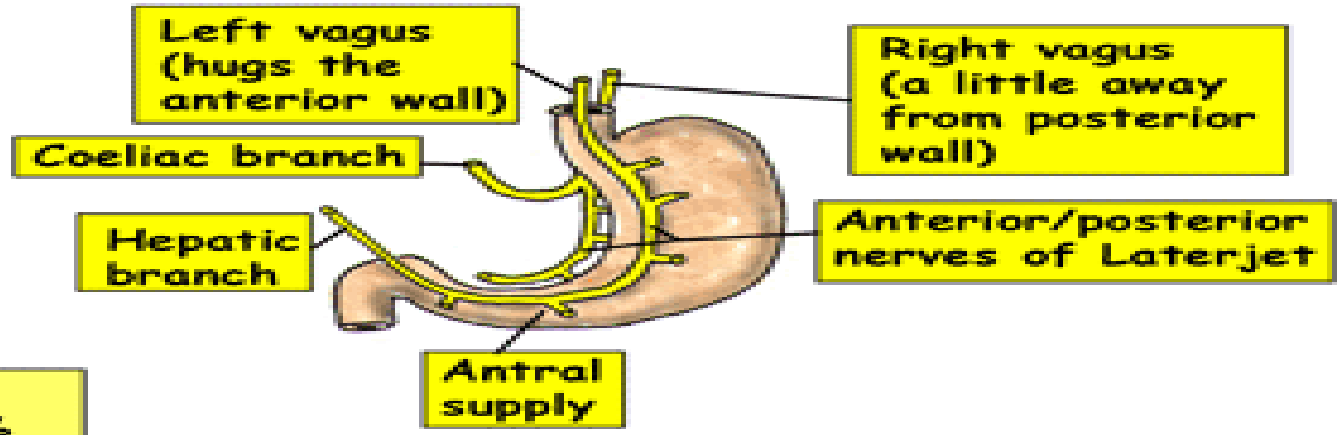
- ✓ The **posterior vagal trunk** gives the posterior surface branches, which include long branches that go to the duodenum, small intestine, jejunum, and the large intestine up to the lateral third of the transverse colon.

- ✓ After that point, parasympathetic innervation is taken over by the **S2, S3, and S4 spinal nerves (pelvic splanchnic nerve)**.These provide parasympathetic supply to the **hindgut**.

STOMACH – LYMPHATIC DRAINAGE & NERVE SUPPLY



Sympathetics Greater splanchnic nerves (T5-9) for decreasing motility, vaso-constriction, closing pylorus & sensation



Vagus nerves are 80% sensory. 20% motor for increasing motility, opening pylorus & initiating secretions

Note: Highly selective vagotomy destroys vagus to fundus & body but preserves nerve to antral pump

Clinical notes

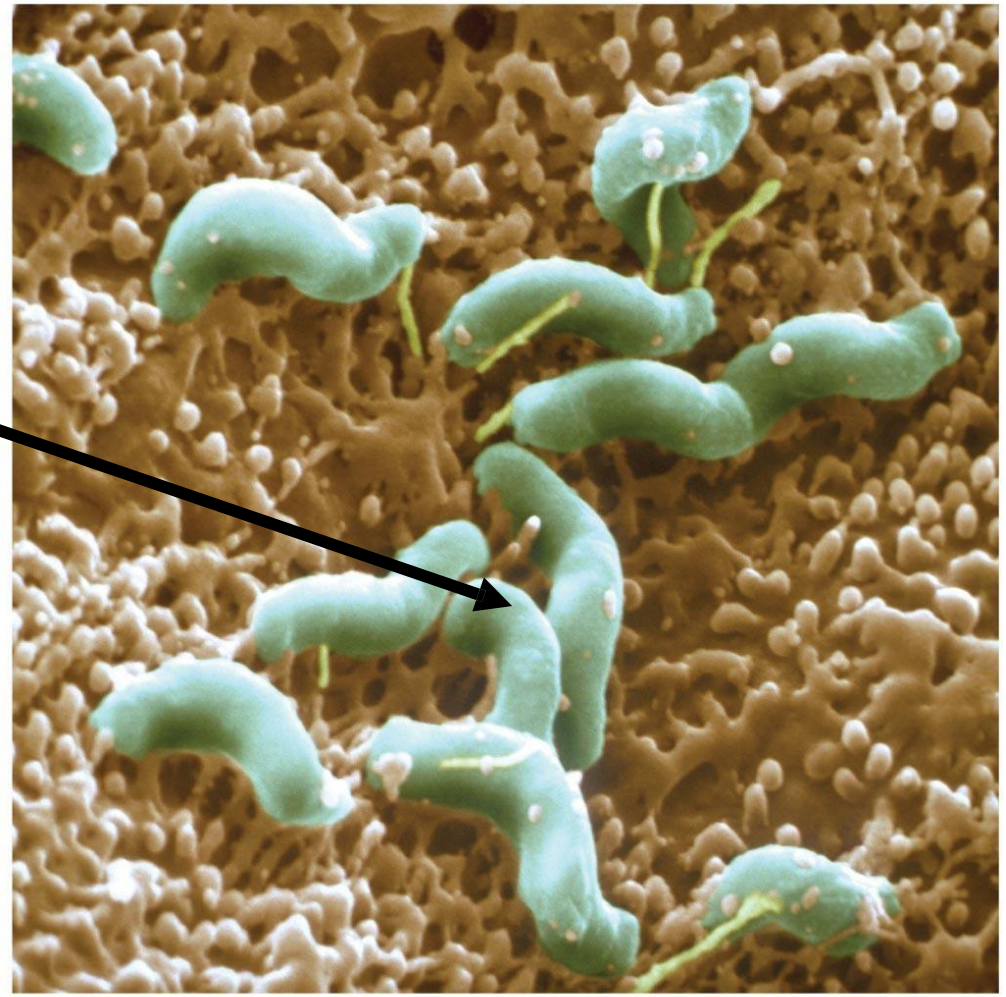
- Gastric Ulcer (Ulcer can affect the stomach (Gastric), and can be duodenal (peptic ulcer).
- Truncal vagotomy →Sectioning the vagus nerves below the diaphragm around the esophagus. This was the surgical procedure before; it has many problems and complications.
- Highly selective vagotomy (cut all branches of the vagi except latarjet nerve)
- Peptic ulcer(D.U)
- Gastroscopy is now present in every clinic.
- Pyloroplasty (drainage of the stomach)= gastro- jejunostomy

A highly selective procedure that was done in the past when the main cause of peptic ulcer was increased acidity by the chyme coming from stomach.

- ✓ **Peptic ulcers (duodenal ulcers), gastric ulcers** on the other hand are rare to occur and if it happens, it is mostly **malignant**.
- ✓ Therefore, the general rule is: **any gastric ulcer is considered malignant until proven otherwise.**
- ✓ On the contrary, in the duodenum, the rule is the opposite: **any duodenal ulcer is considered peptic ulcer until proven otherwise.**
- ✓ **Helicobacter pylori** is now recognized as the main **cause of peptic ulcers.**
- ✓ Nowadays, treatment is **devoid of any surgical intervention,** only two **antibiotics** with proton pump inhibitors are given as a regimen.

Causes of Ulcers in stomach

Helicobacter pylori



Click on The Greatest Modified Slide writer of all time to have access to the test!

Mousa Al-Neimat

رسالة من الفريق العلمي:

قَالَ ابنُ القَيِّم : ((أجمع عقلاءُ كلِّ أمَّةٍ على أنَّ النَّعيمَ لا يُدْرَكُ بالنَّعيم، وأنَّ من آثَر الراحةَ فاتتهُ الراحة، وأنَّ بحسب ركوب الأهوال واحتمال المشاقِّ تكونُ الفرحةُ والملذَّة؛ فلا فرحة لمن لا همَّ له، ولا لذَّة لمن لا صبر له، ولا نعيم لمن لا شقاء له، ولا راحة لمن لا تعب له، بل إذا تعب العبدُ قليلًا استراح طويلًا، وإذا تحمَّل مشقَّة الصَّبر ساعةً قاده لحياة الأبد، وكلُّ ما فيه أهلُ النَّعيم المقيم فهو ثمرةُ صبر ساعة، والله المستعان، ولا قوَّة إلا بالله)).

كتاب (مفاتح دار السعادة) لإبن القيِّم.

For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1	Slide 35	There are four different types of cells can be identified in the gastric glands: **enteroendocrine cells (G cells, HCL secretion), parietal cells (superficial to chief cells, secret pepsinogen), chief cells (deep to parietal cells at the base of the gland),** and mucus neck cells (I won't write what it does cause it is obvious) (differ from the mucous cells lining the luminal surface and the gastric pits).	There are **four different types of cells** can be **identified in the gastric glands: *enteroendocrine cells (G cells, Gastric* secretion), *parietal cells* (superficial to chief cells, secret HCL), *chief cells* (deep to parietal cells at the base of the gland, secret pepsinogen), and mucus neck cells (I won't write what it does cause it is obvious) (differ from the mucous cells lining the luminal surface and the gastric pits).**
	Slide 36	— —	**The last info has been added.**
	Slide 41	— —	**New Slide has been added**