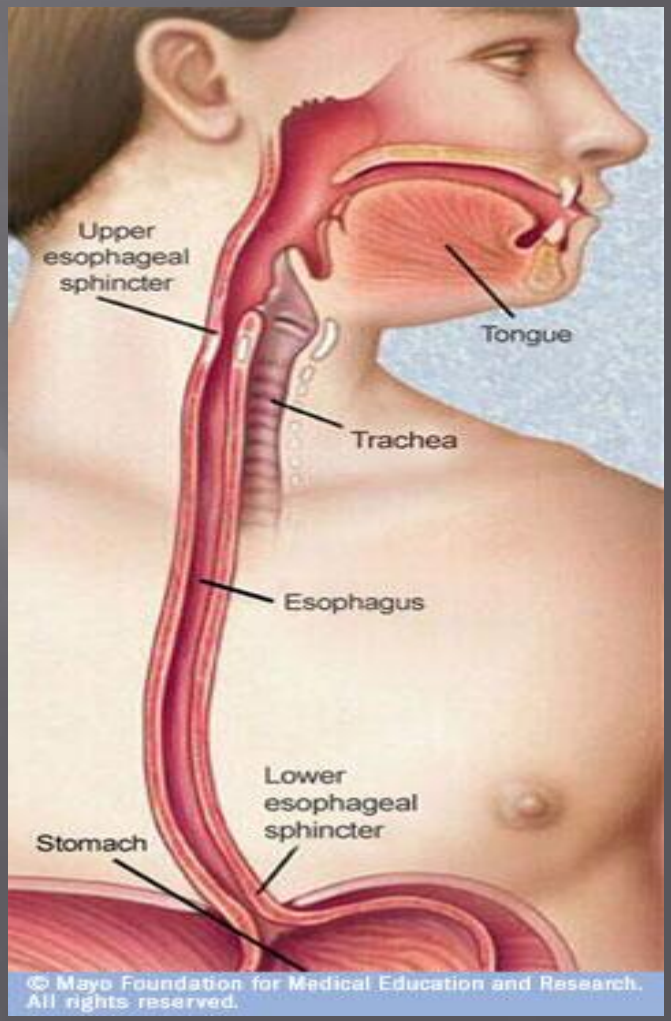
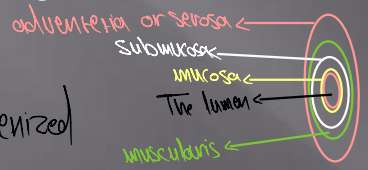
STOMACH AND ESOPHAGUS

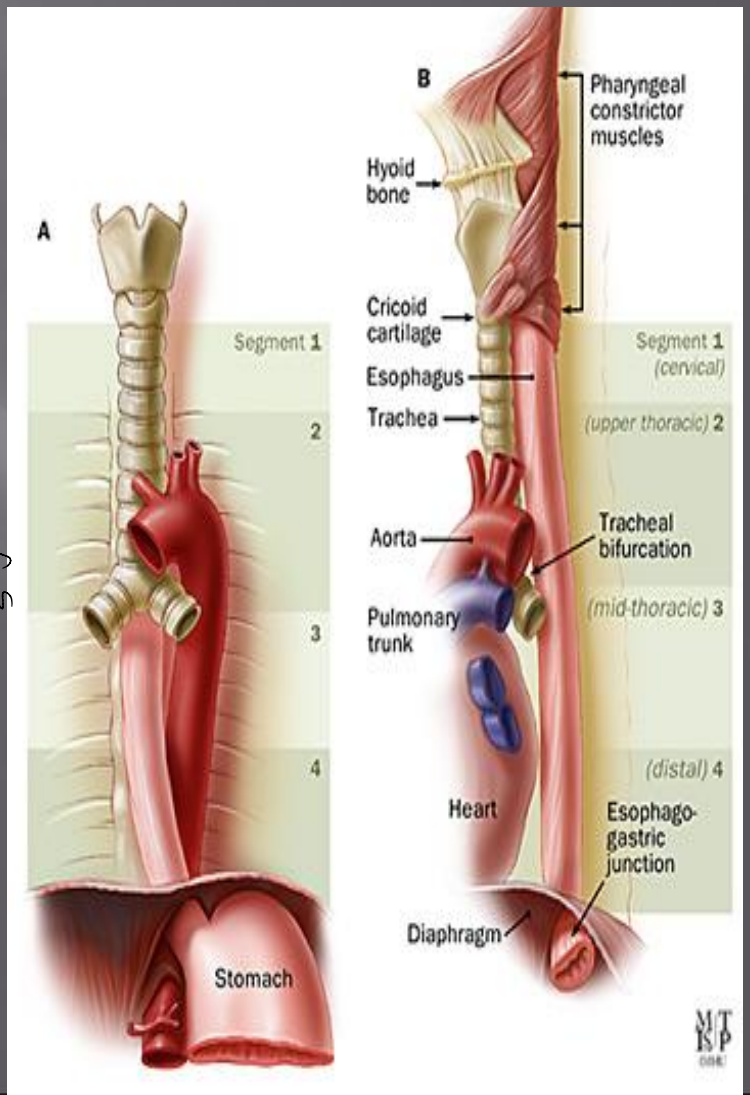
Esophagus

- The esophagus is a tubular structure (muscular, collapsible tube) about 10 in. (25 cm) long 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
- 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





- The relations of the thoracic part of the esophagus :
  - Anteriorly: The trachea and the left recurrent laryngeal nerve; the left principal bronchus, which constricts it; and the pericardium, which separates the esophagus from the left atrium
  - Posteriorly: The bodies of the thoracic vertebrae; the thoracic duct; the azygos veins; the right posterior intercostal arteries; and, at its lower end, the descending thoracic aorta
  - Right side: The mediastinal pleura and the terminal part of the azygos vein
  - Left side: The left subclavian artery, the aortic arch, the thoracic duct, and the mediastinal pleura



- 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

→esophagus has 2 vagi , one left and one right :-

- The left vagus lies anterior to the stomach and esophagus and the right vagus lies posterior to the stomach

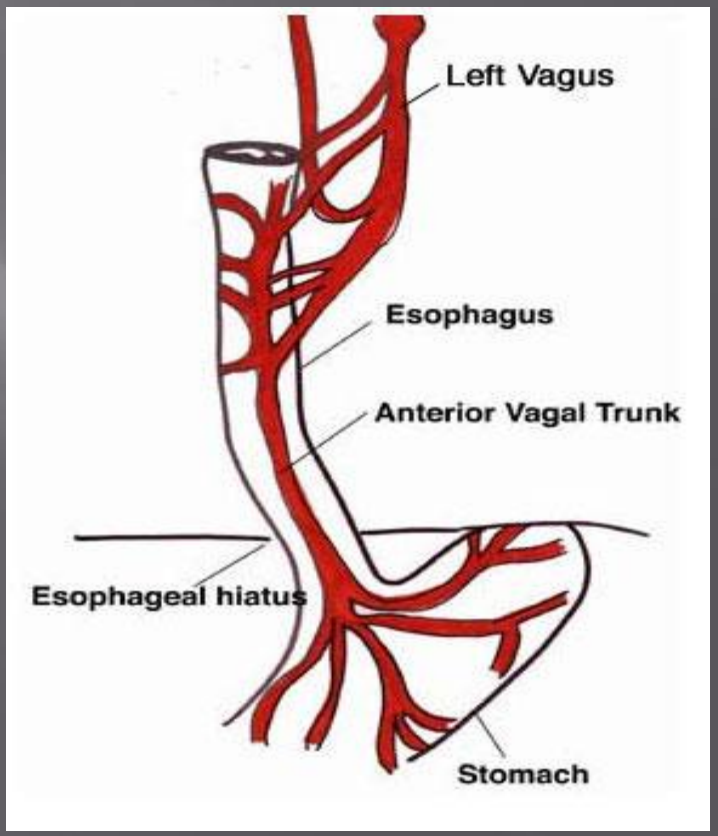
diaphragm ما يخترقوا ال ←

- 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.

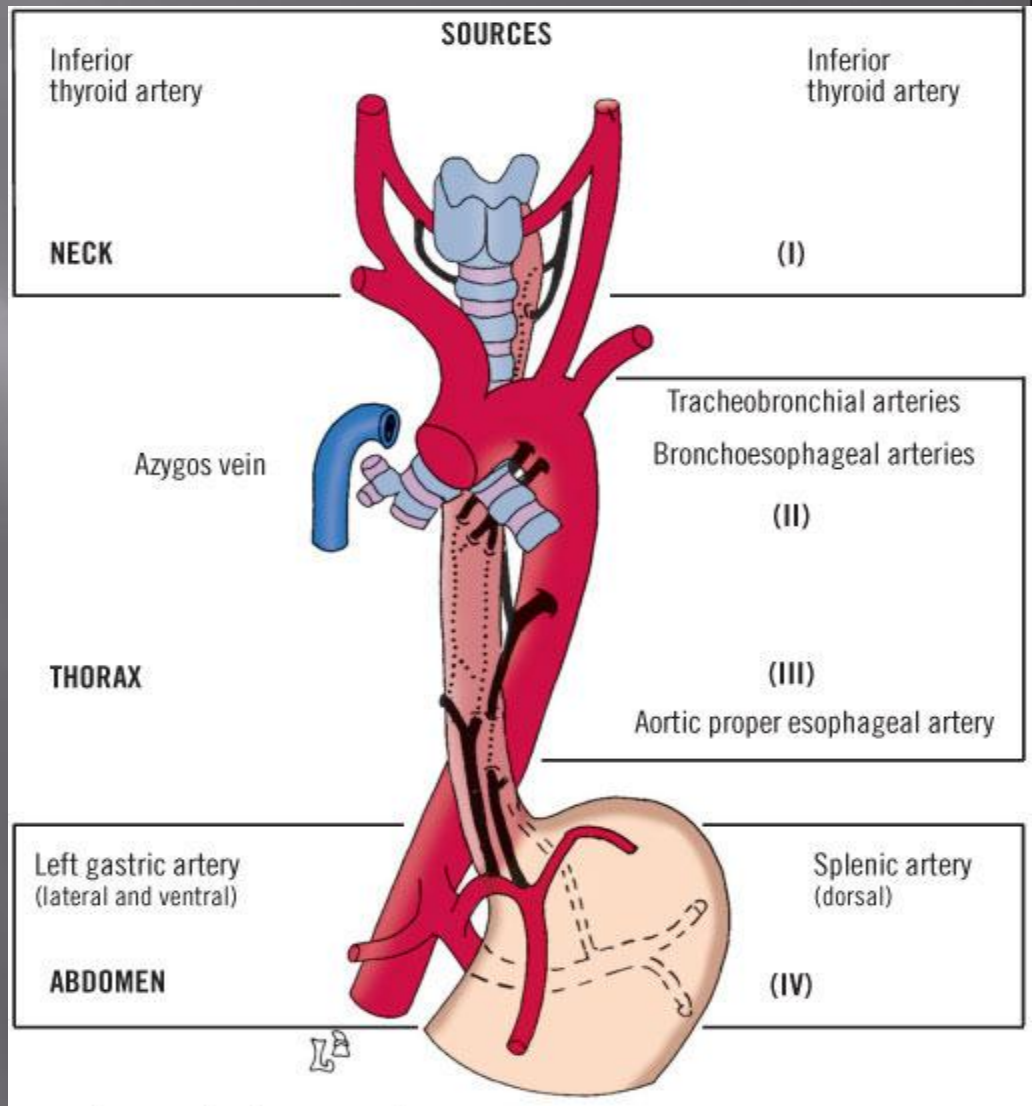
- In the abdomen, the esophagus descends for about 0.5 in. (1.3 cm) and then enters the stomach

- It is related to the left lobe of the liver anteriorly and to the left crus of the diaphragm posteriorly.



Blood Supply of the Esophagus

- The upper third of the esophagus is supplied by the inferior thyroid artery,
- the middle third by branches from the descending thoracic aorta,
- and the lower third by branches from the left gastric artery
- 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,

- and from the lower third into nodes along the left gastric blood vessels and the celiac nodes

→ esophageal plexus of nerve حواليه

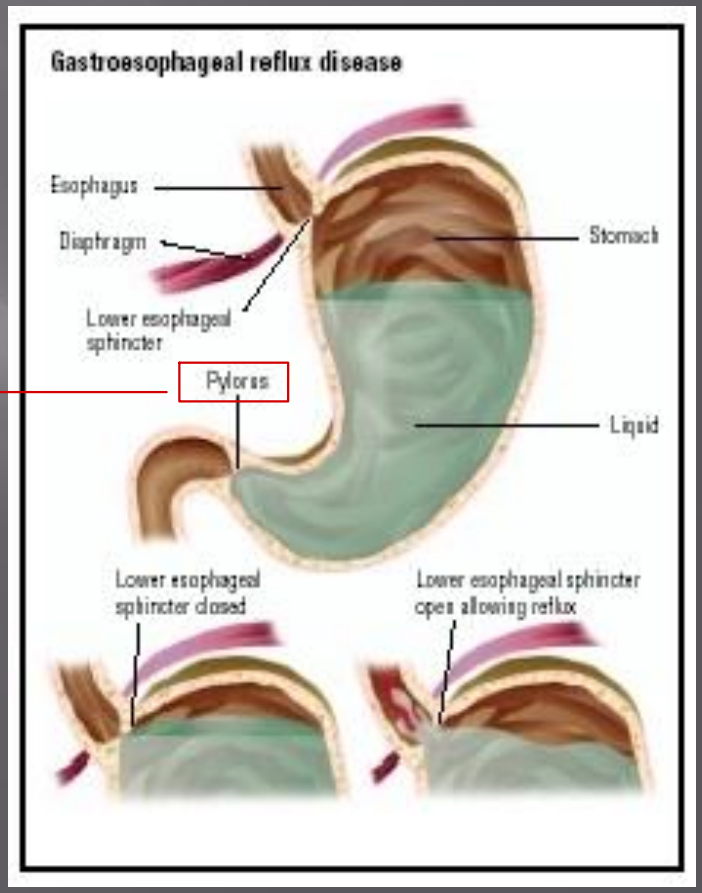
- The esophagus is supplied by parasympathetic and sympathetic efferent and afferent fibers via the vagi and sympathetic trunks

زي ما حكينا، بين 2 layers of muscle في Myenteric plexus بالإضافة ... esophageal plexus الـ ... وهو مسؤول عن الـ peristaltic movement and the secretions.

- In the lower part of its thoracic course, the esophagus is surrounded by the esophageal nerve plexus.

Gastroesophageal Sphincter

- No anatomic sphincter exists at the lower end of the esophagus
- However, the circular layer of smooth muscle in this region serves as a physiologic sphincter
- 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 vagal control, and this can be augmented by the hormone gastrin and reduced in response to secretin, cholecystokinin, and glucagon.



stomach

lodge of foreign body in the esophagus ⇒ بعض احيانا لما طفل صغير يبلع اشي ويوقف بأماكن معينة بتكون narrow

⇐ اعرف عن esophagus هاي (لا بيجي بالامتحان) ⇐

طب ايش هي هاي الاماكن ؟ ⇐

1) beginning of the esophagus

2) Cross of left main bronchus

فيها cartilage وبتجي اما esophagus

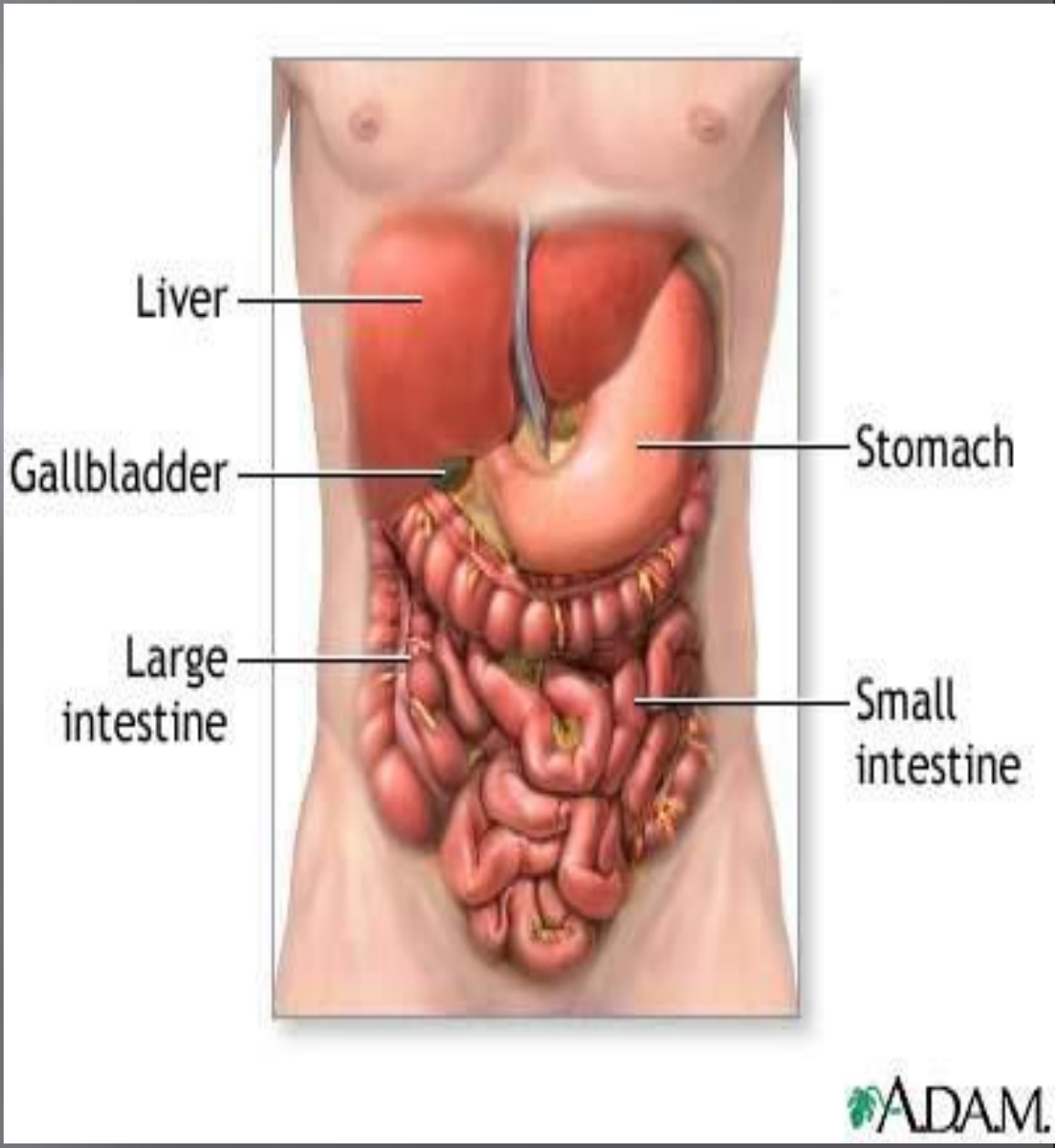
3) Arch of the aorta

4) Through the diaphragm

Stomach

↳ locate in the epigastric region.

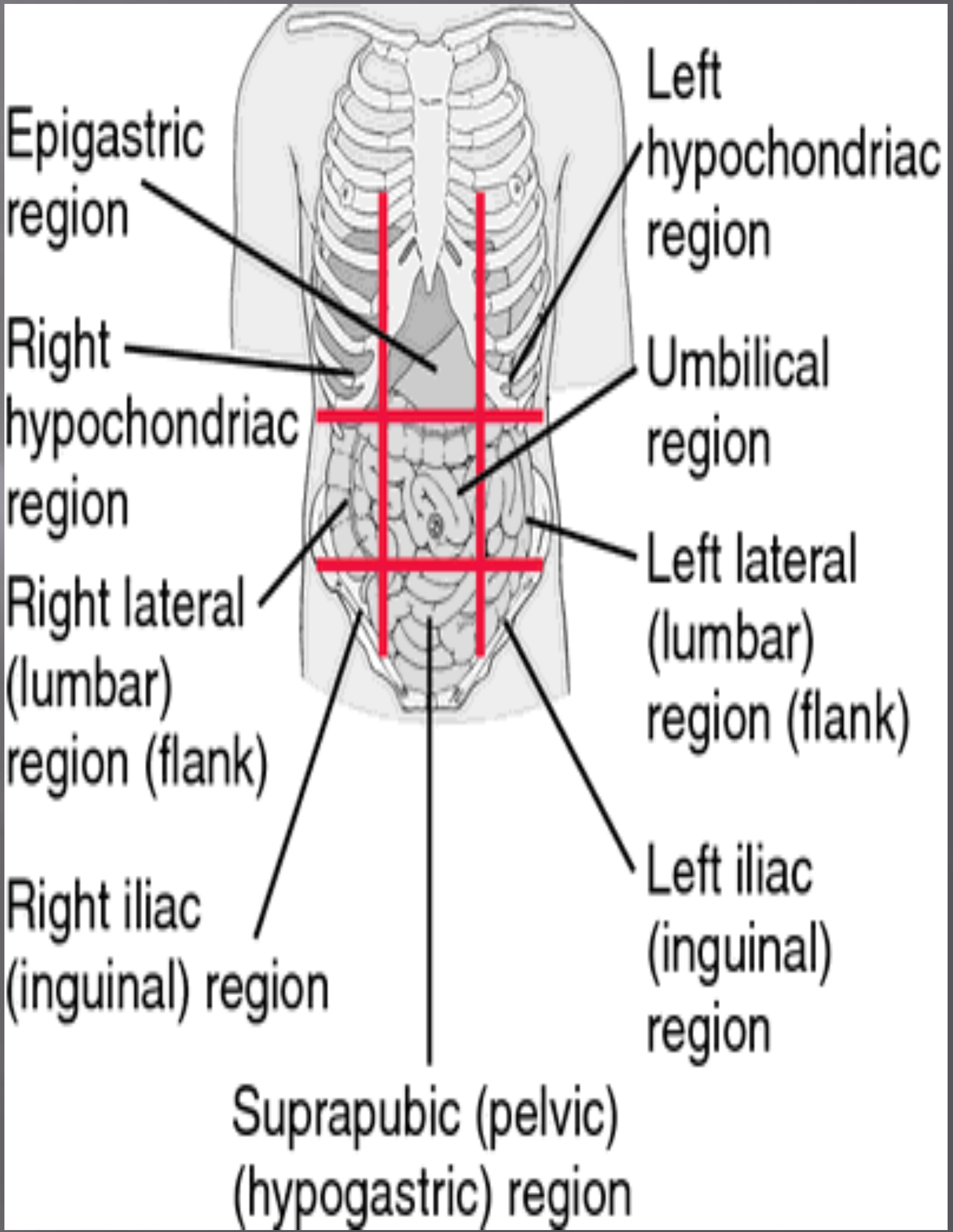
- The stomach is a dilated part of the alimentary canal
- Between the esophagus and the small intestine



Stomach site

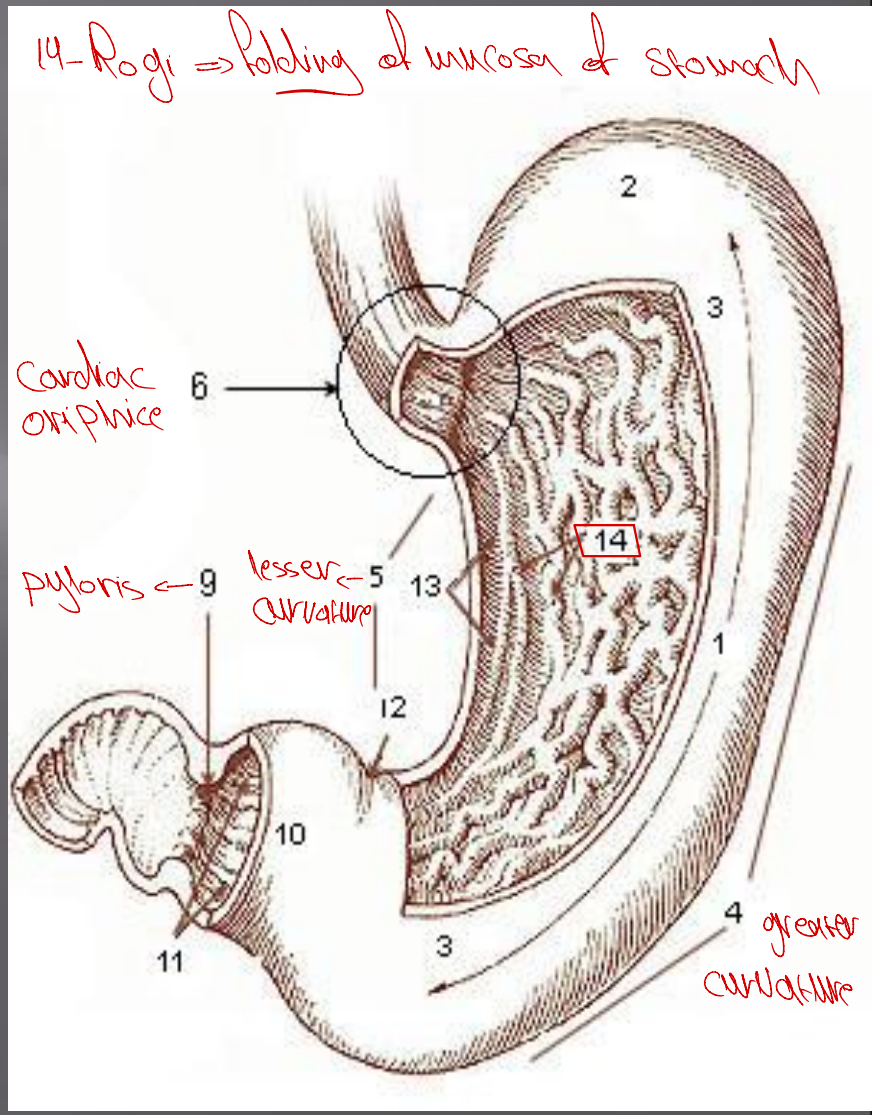
- It occupies the left upper quadrant mainly in the epigastric region

الـ حفظوا قرأ اسماء الـ Nine regions



Shape of stomach

- It is roughly J-shaped
- Steer horn in obese person
- has two openings, the cardiac and pyloric orifices
- Two curvatures, the greater and lesser curvatures
- Two surfaces, an anterior and a posterior surface



Shape of stomach…..cont

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

- The volume of its contents
- The position of the body
- The phase of respiration.

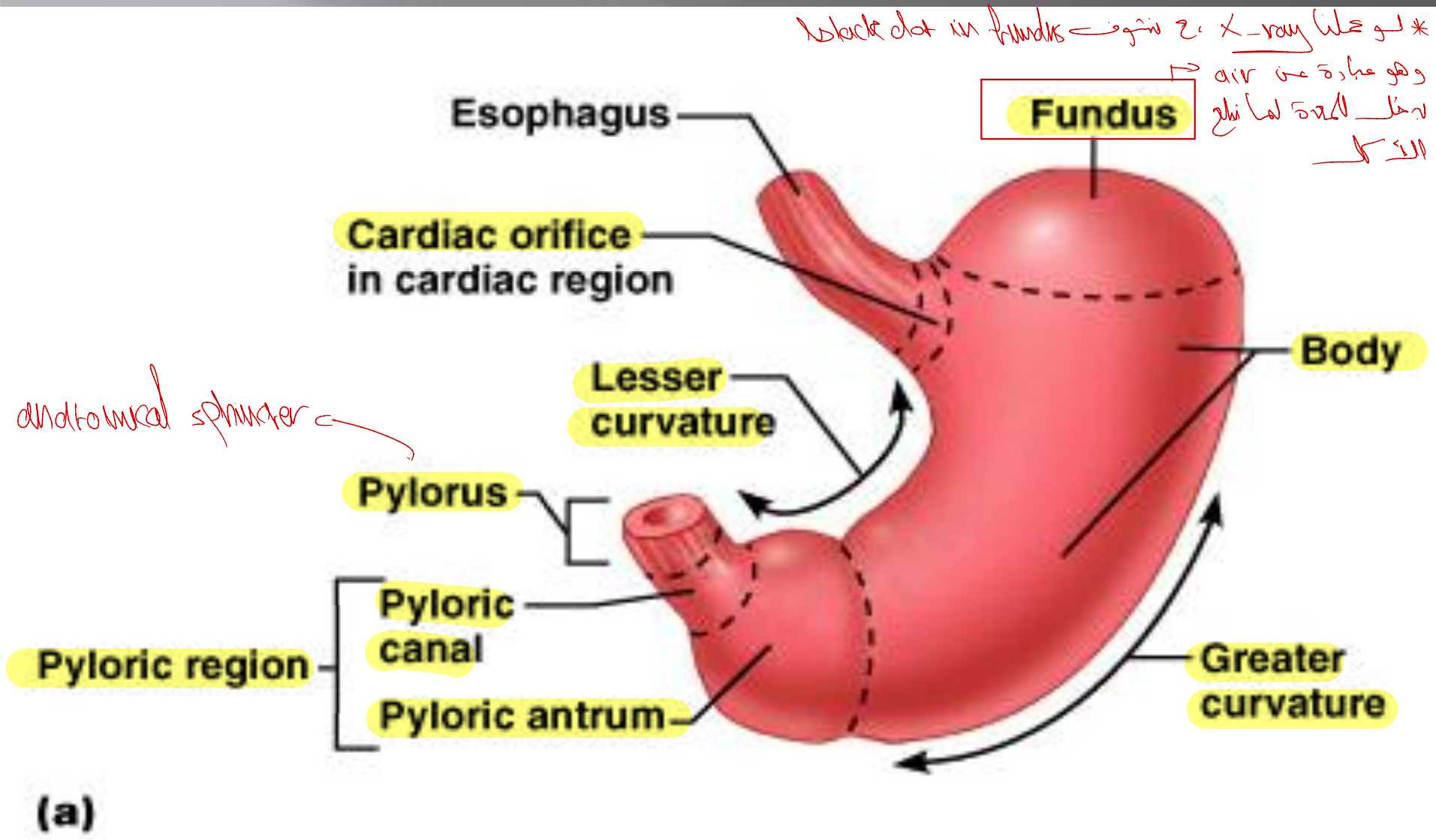
Function OF stomach

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

* About the pyloric sphincter => it close by sympathetic while the parasympathetic help in contraction of the stomach and inhibit the sphincter to open it and the evacuation of chyme take place.

Parts Stomach

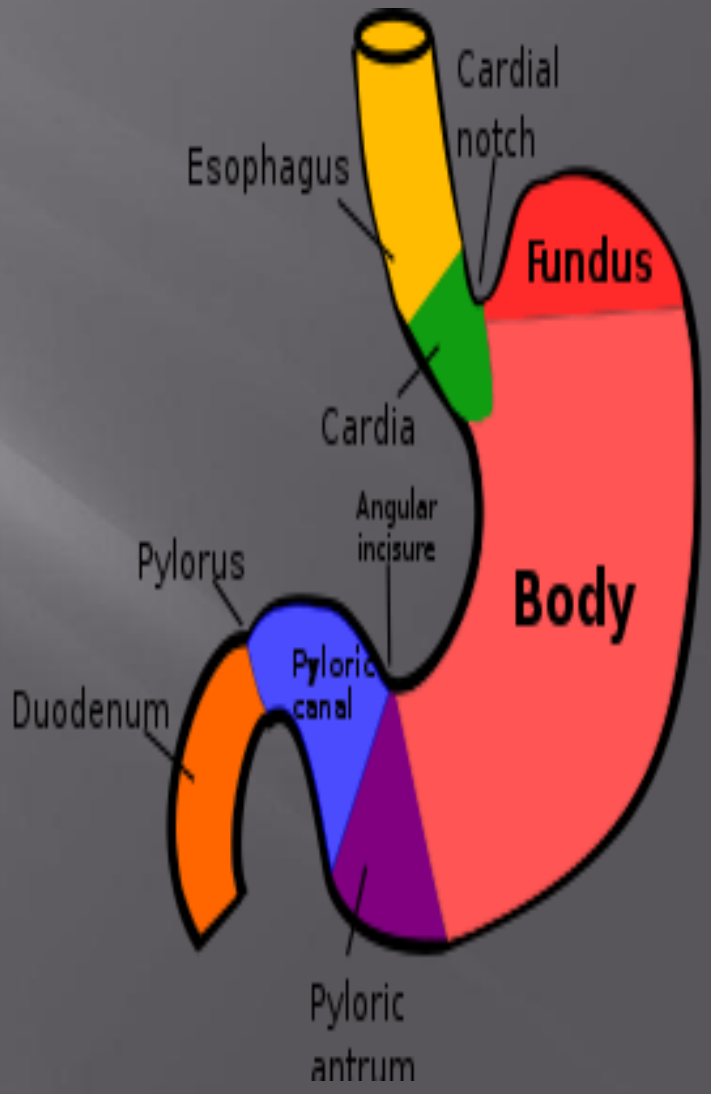


Parts of stomach

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.



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)

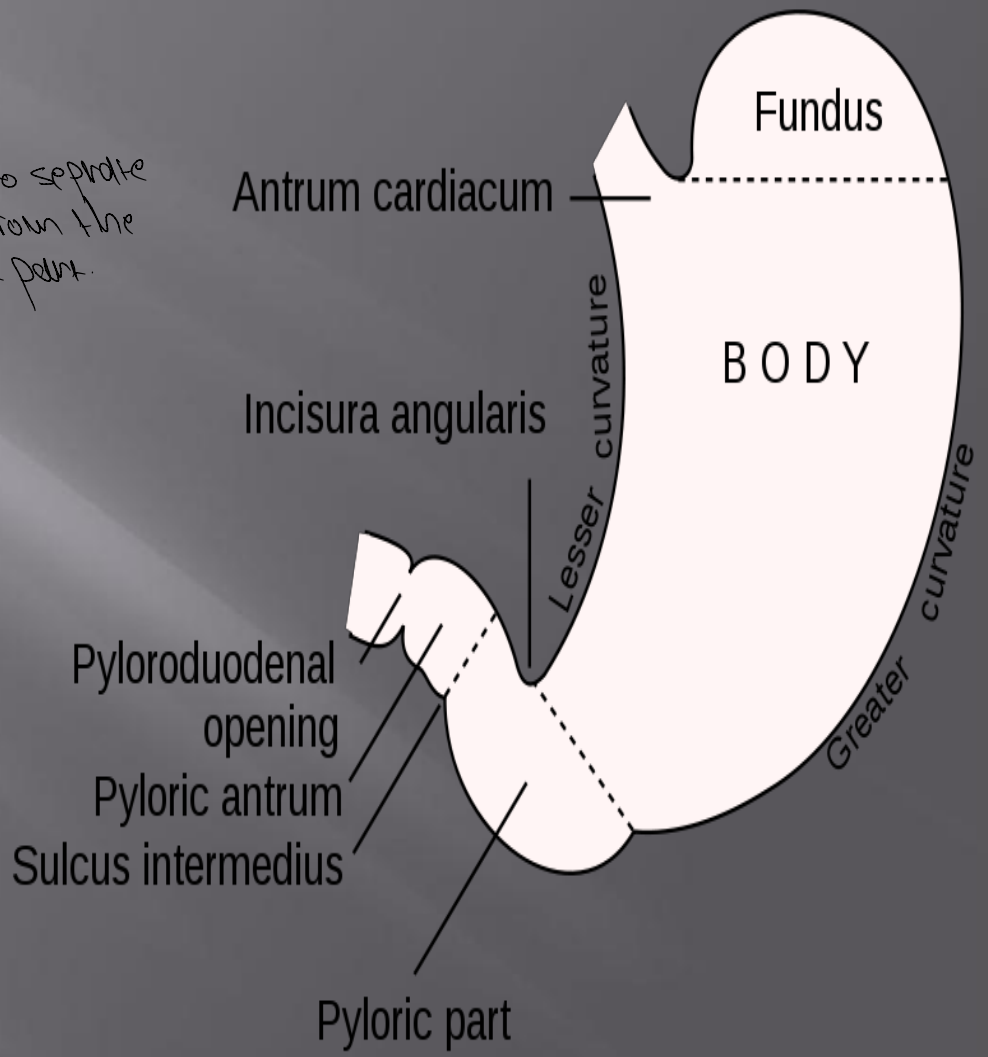
land mark to separate the body from the pyloric part.

3- Pyloric region

divided into:

a- Pyloric antrum:

- This extends from the incisura angularis to the pylorus

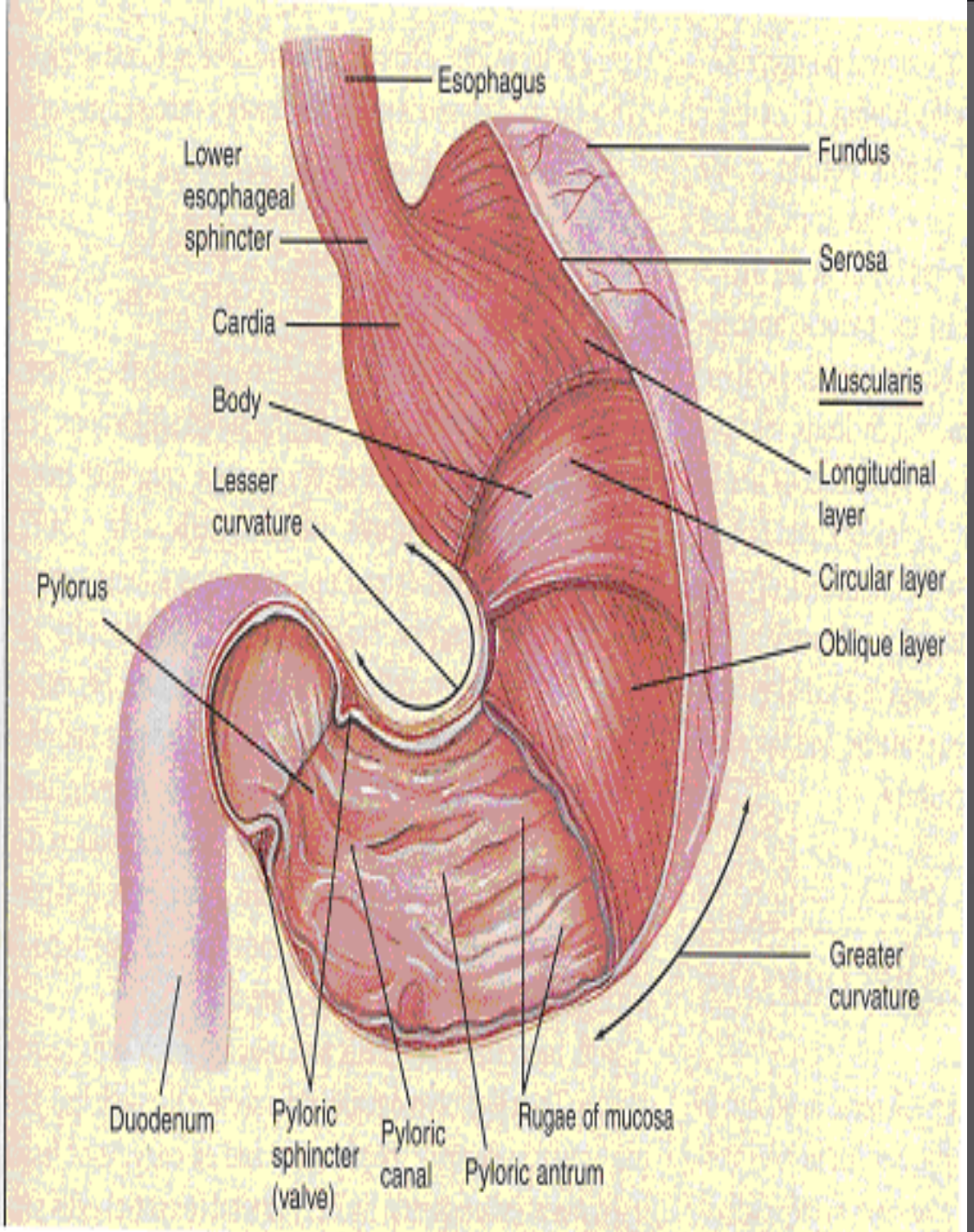


B- Pylorus:

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

* البواب الجزء الأخير من المعدة

Pyloric sphincter is an anatomical sphincter because of the thickening of the inner circular smooth muscle.



Orifices of the stomach

- *Cardiac orifice*
- pyloric orifice

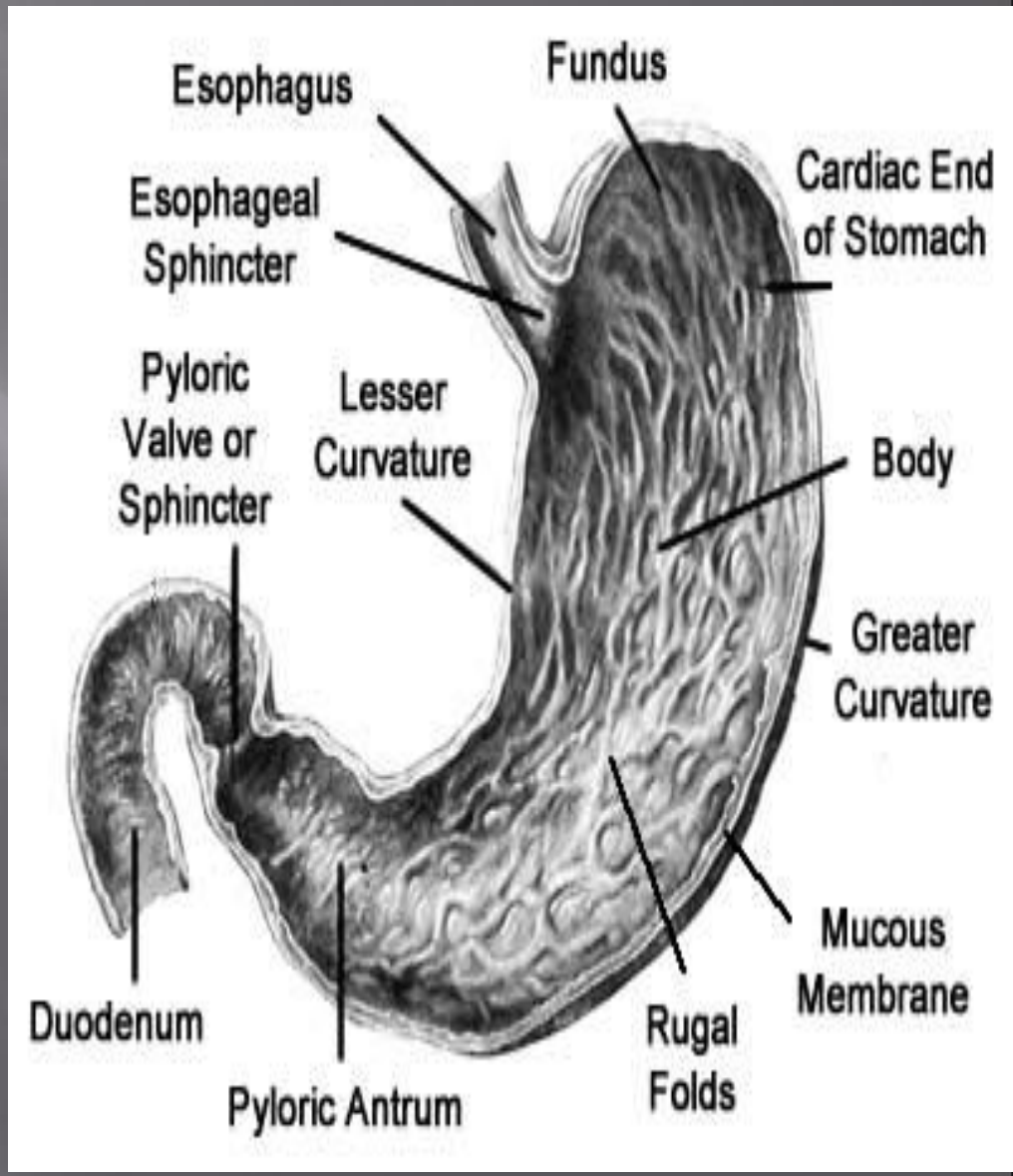
Cardiac orifice

⇒ has surface anatomy

-The cardiac orifice is where the esophagus enters the stomach

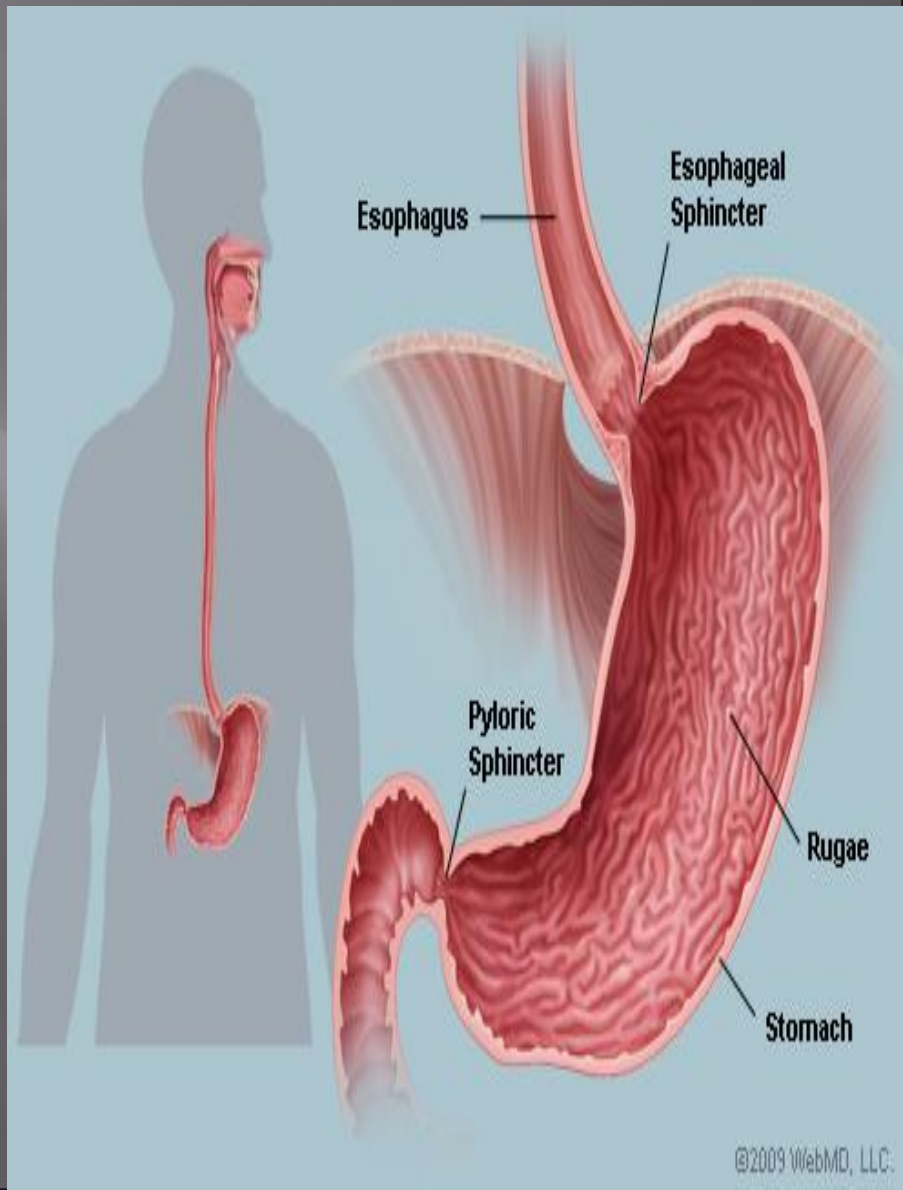
-No anatomic sphincter can be demonstrated here

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



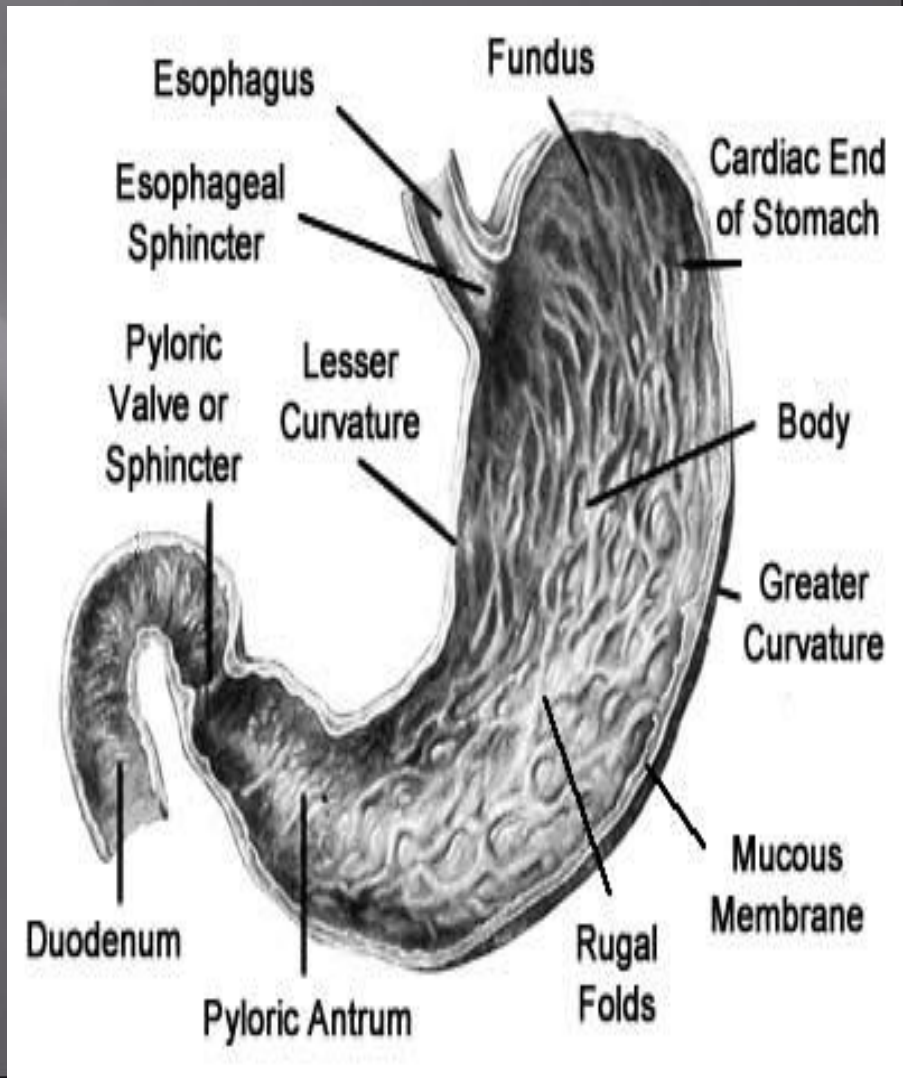
The site of Cardiac orifice

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

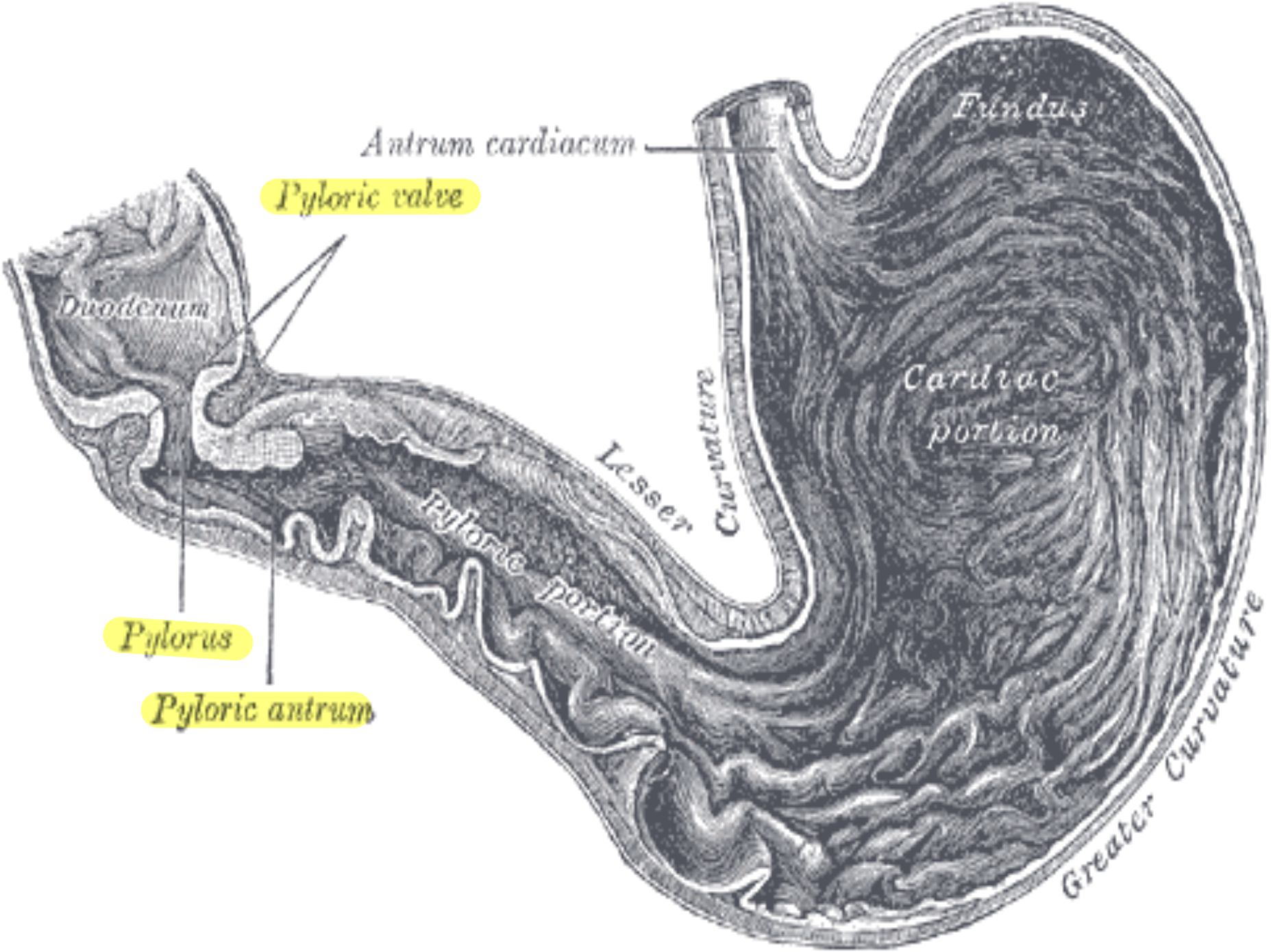


pyloric orifice

- Present at end of the pyloric canal
- On the level of L1
- 1" 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).



- We have oblique and longitudinal Rugae ⇒ at the side of lesser curvature the Rugae is longitudinal and because of it the fluids can pass from the stomach to duodenum

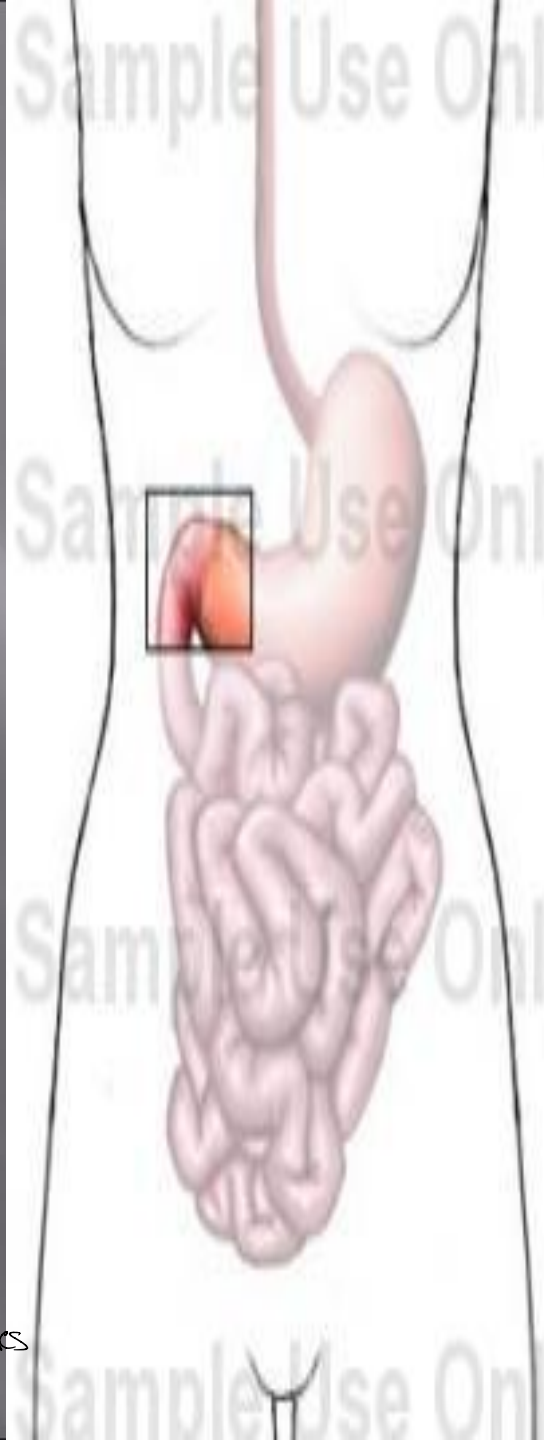

Antrum cardiacum
Fundus
Pyloric valve
Duodenum
Cardiac portion
Lesser Curvature
Pyloric portion
Pylorus
Pyloric antrum
Greater Curvature

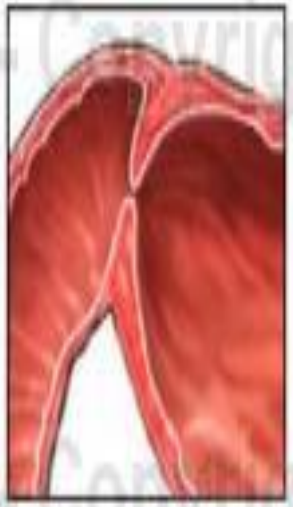
Pyloric opening…cont

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

- The sphincter receives motor fibers from the sympathetic system and parasympathetic inhibitory fibers from the vagus nerve

- Sympathetic ⇒ Contraction of sphincter
- parasympathetic ⇒ Contraction of smooth muscles of the body of the stomach.





Pyloric sphincter

Pyloric sphincter after pyloroplasty

Pyloric orifices……cont

Function of pyloric opening control by:

1- Hormonal influences from stomach & duodenum

2- Nerve fibers

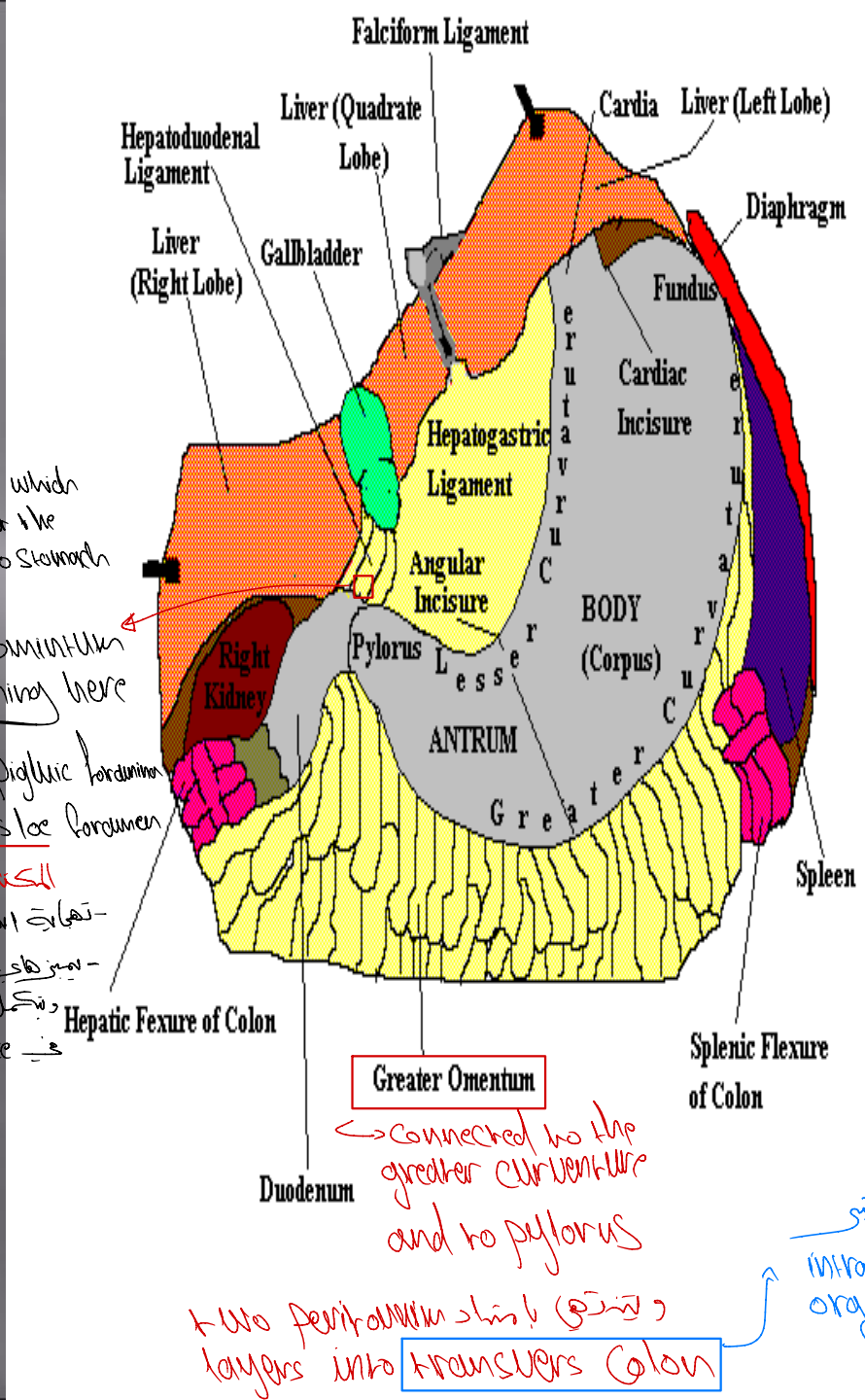
Filling stomach → Myenteric fibers → relaxation of sphincter

Curvatures of stomach

- lesser
- greater

1- The lesser curvature

- Forms the right border of the stomach
- Extends from the cardiac orifice to the pylorus



→ Ascending and descending colons are Retroperetonial organs

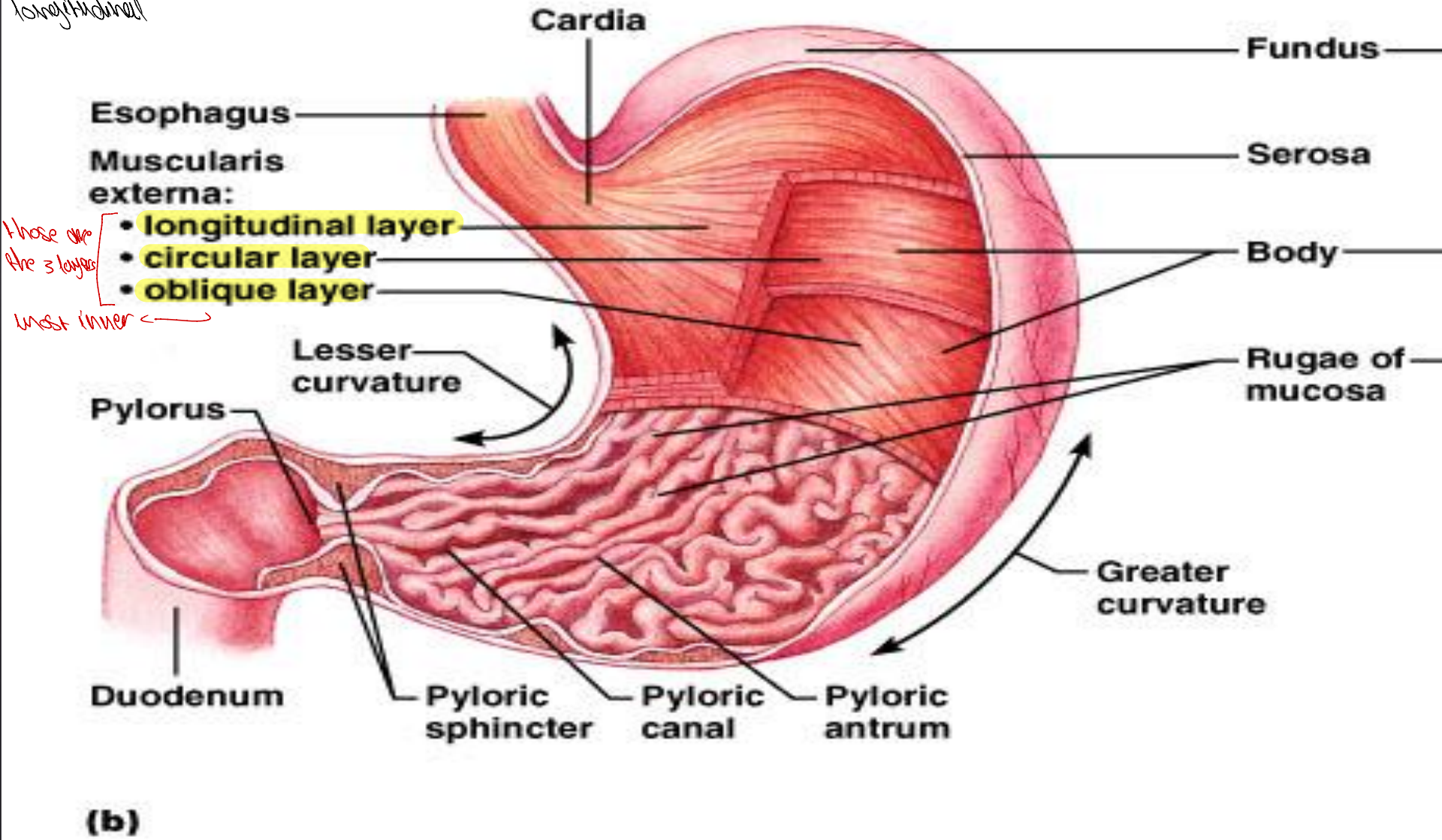
2- The greater curvature

- 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

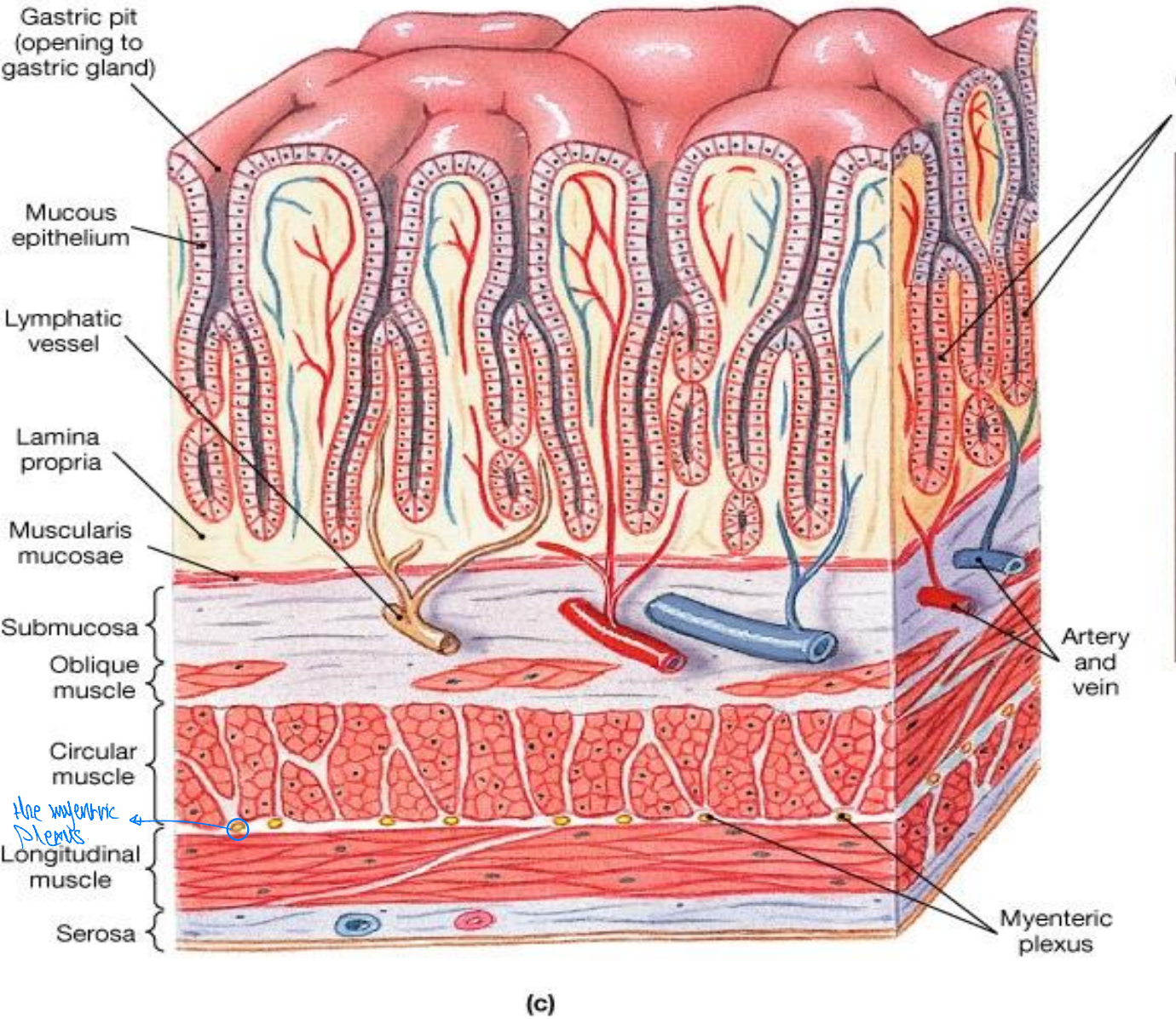
* The only organ that contain 3 layers of smooth muscles in the GIT is the stomach. The rest organs have 2 layers which are inner circular and outer longitudinal

→ the lining epithelium is simple columnar without goblet cells.

Histology of the Stomach



The Stomach – Microscopic Anatomy



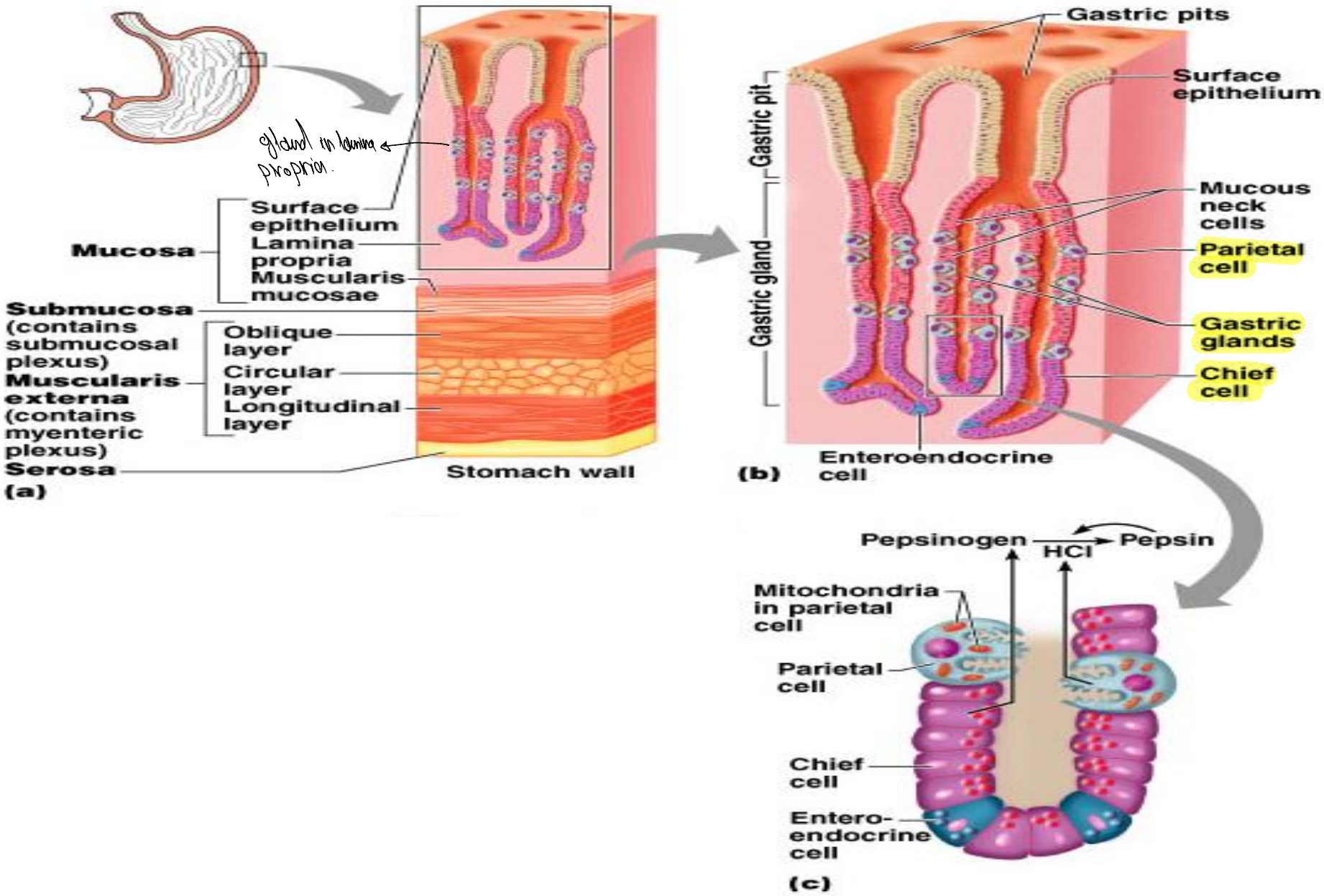
(c)

(d)

Mucous membrane

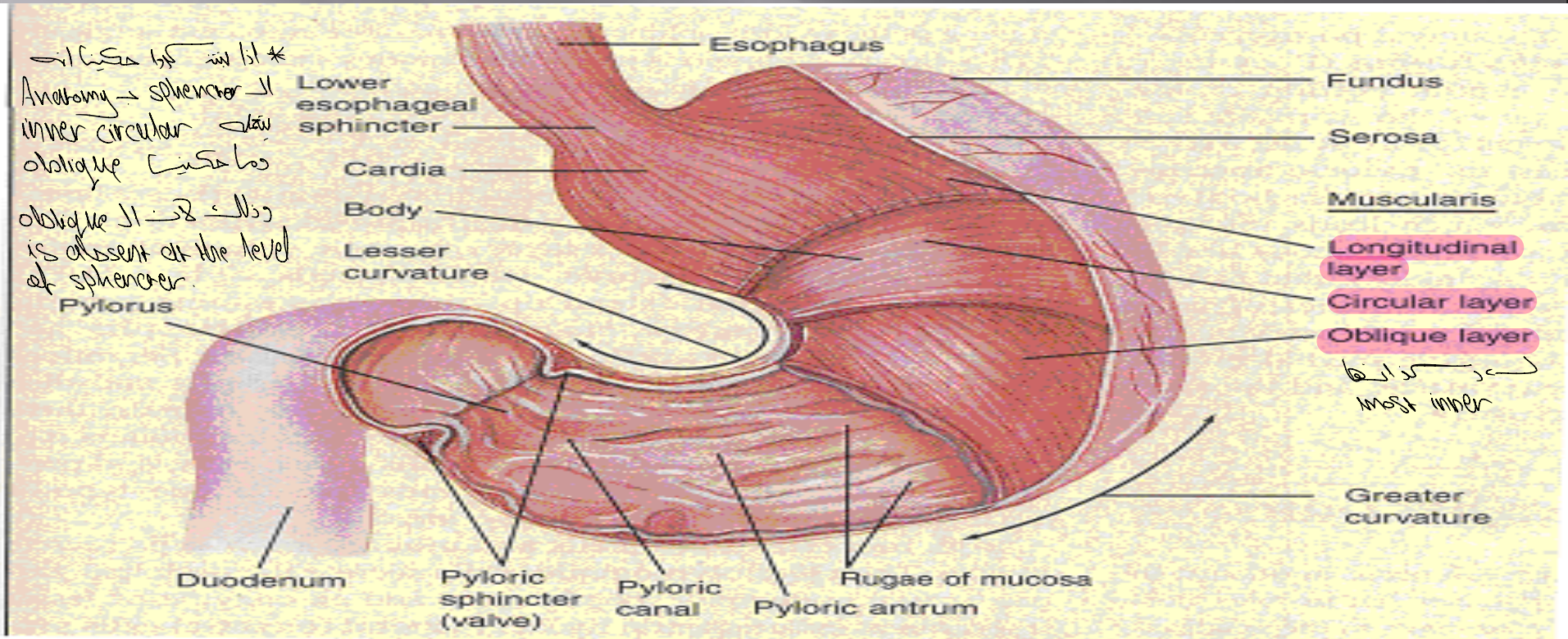
- The mucous membrane of the stomach is thick and vascular and is thrown into numerous folds, or rugae mainly longitudinal in direction
- The folds flatten out when the stomach is distended.

Stomach – Microscopic Anatomy



muscular wall of stomach

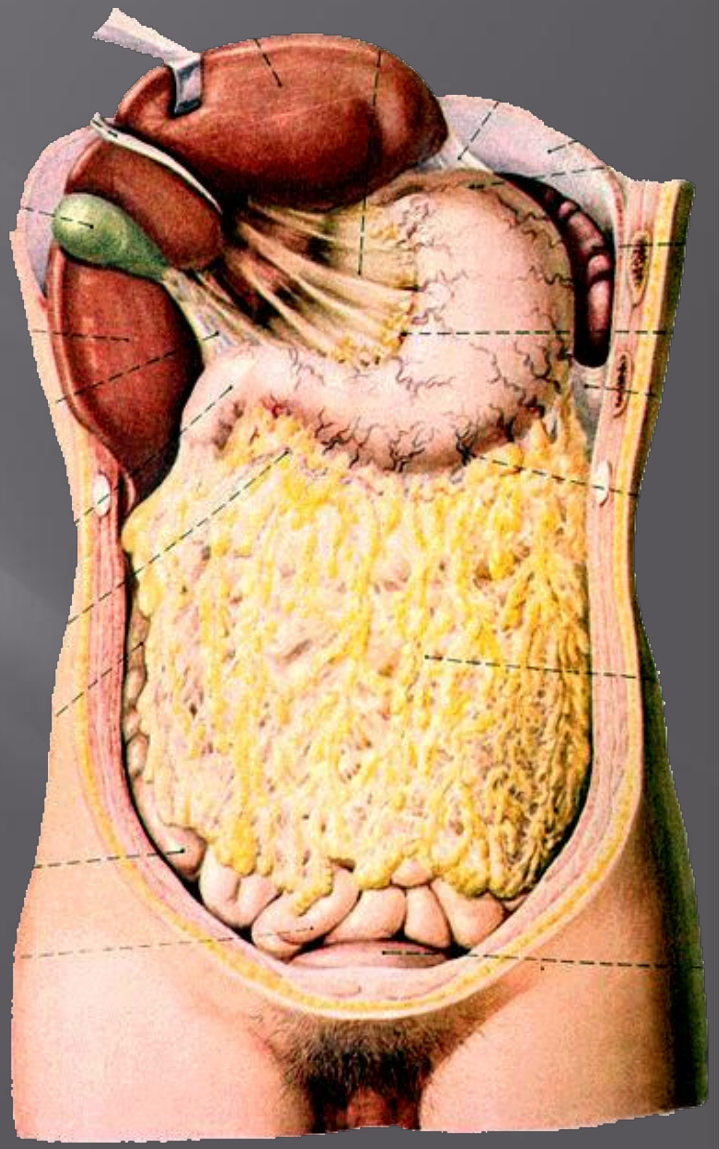
- The muscular wall of the stomach contains longitudinal fibers (outer surface), circular fibers(inner surface), and oblique fibers



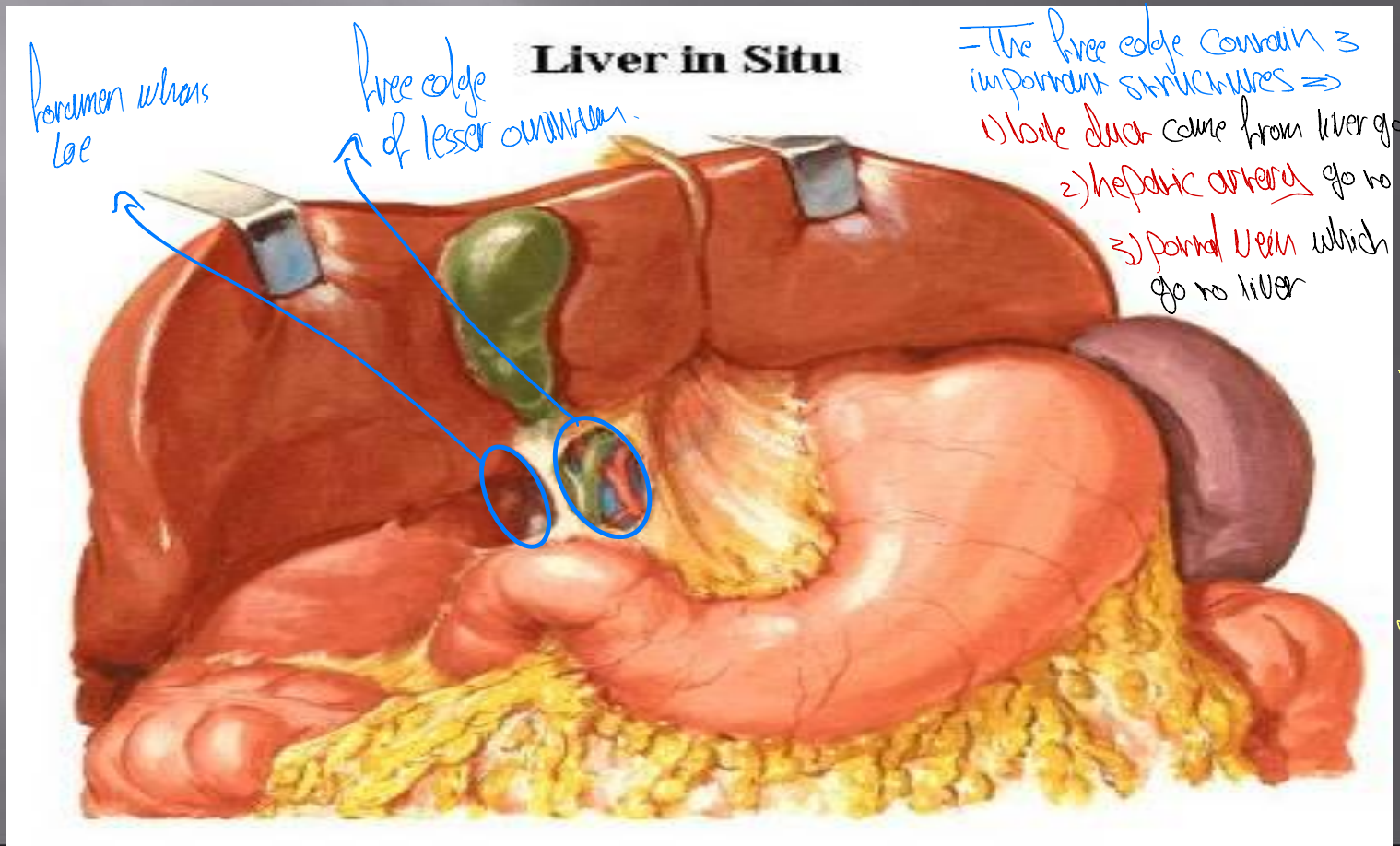
Stomach – Microscopic Anatomy

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.

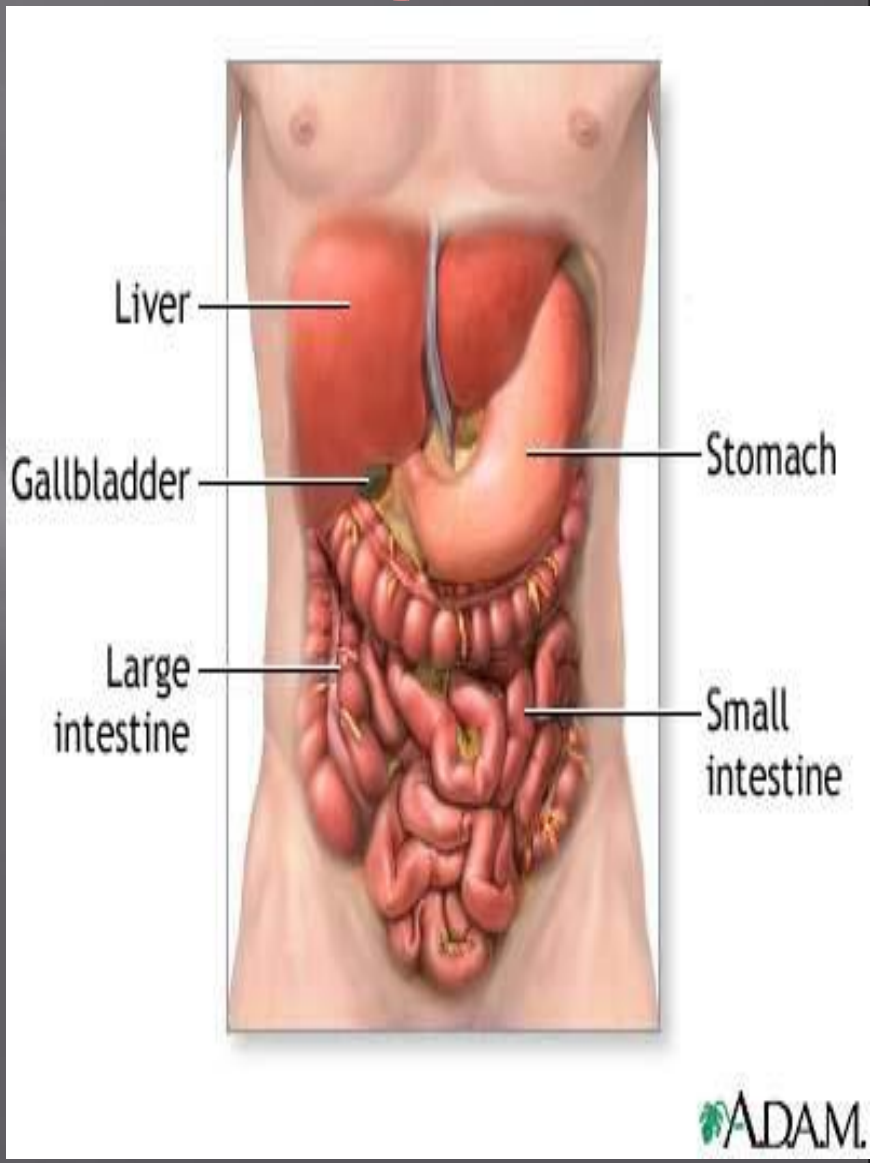


Relations of stomach

→ has two surfaces

Anterior- superior

- The anterior abdominal wall
- the left costal margin
- the left pleura and lung
- the diaphragm
- the left lobe of the liver



Relations of stomach…cont

Posteriorly = stomach bed

-The lesser sac

-the Lt. crus of diaphragm

- the spleen (most lateral organ from stomach)

- the left suprarenal gland

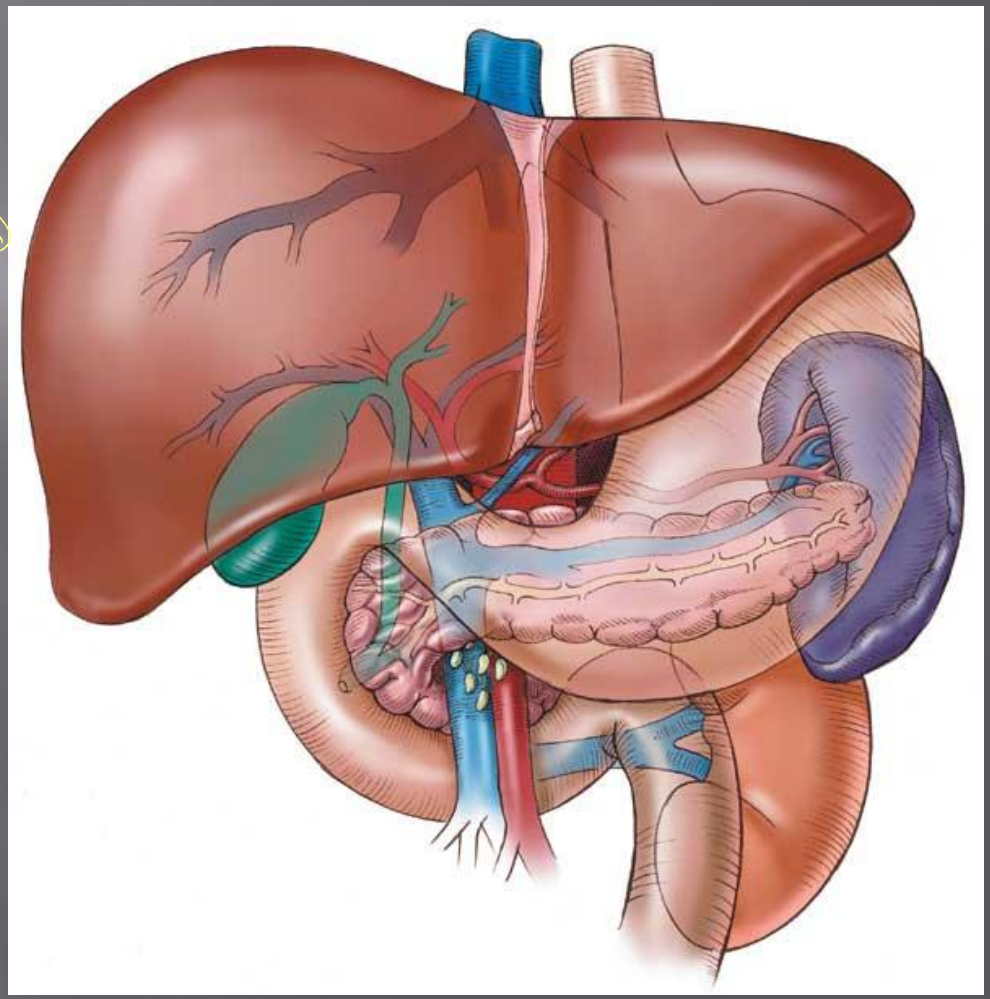
-the upper part of the left kidney

- the splenic artery

- the body of pancreas

- the transverse mesocolon

- the transverse colon



STOMACH - BLOOD SUPPLY & VENOUS DRAINAGE

origin for all arteries here!!

Branch from the abdominal aorta at the level of T12 or L1

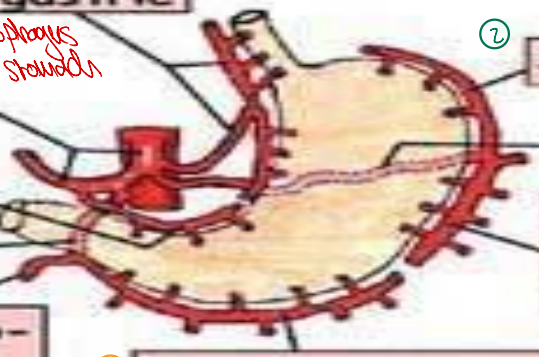
give 3 branche in green color

its branches in orange

for esophagus and stomach

Arterial supply

- Oesophageal branches
- ① left gastric
- Coeliac trunk
- Hepatic
- ① Right gastric
- ② Gastroduodenal
- Superior pancreatico-duodenal
- ② Short gastrics
- ③ Splenic
- Left gastro-epiploic (greater curvature & omentum)
- ③ Right gastro-epiploic (greater curvature & omentum)



Venous drainage

All veins drain here

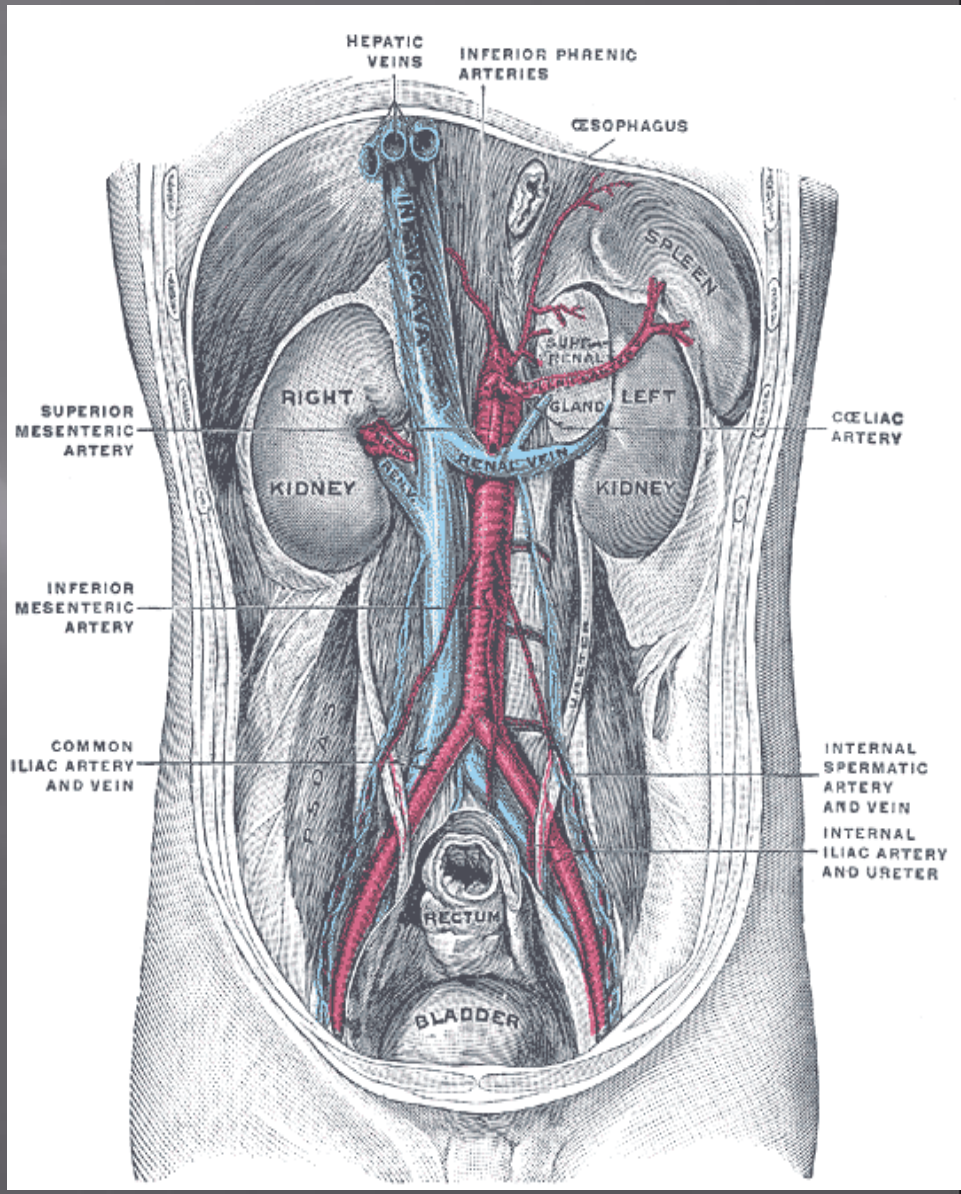
- Left gastric & oesophageal branches
- Portal
- Right gastric
- Superor pancreatico-duodenal
- Superior mesenteric
- Short gastrics
- Splenic
- left Gastro-epiploics
- Right
- ★ Pre-pyloric vein of Mayo but first described by Laterjet

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



- left and Right gastric Are on the lesser curvature

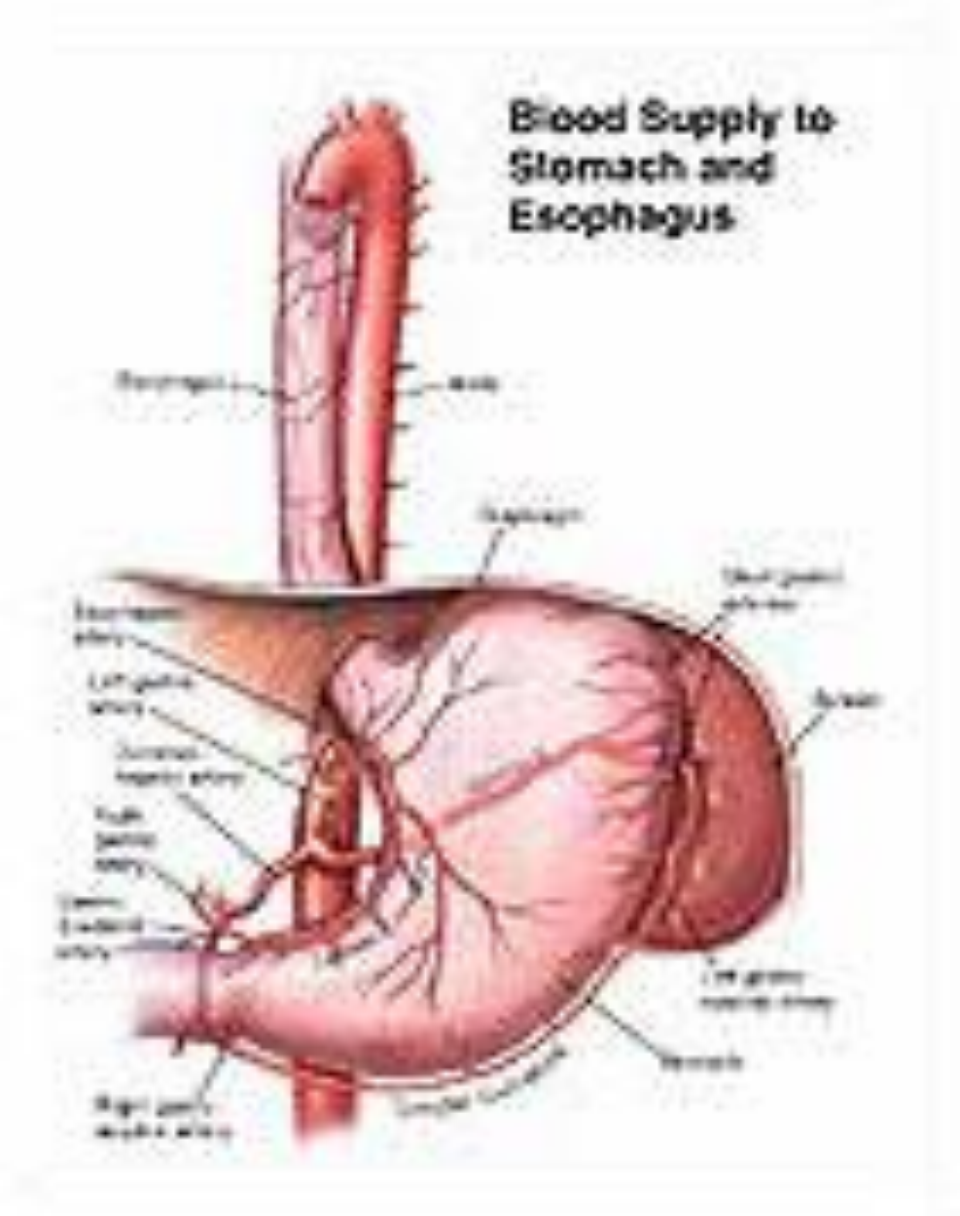
Blood supply for stomach……cont

Relations of celiac artery

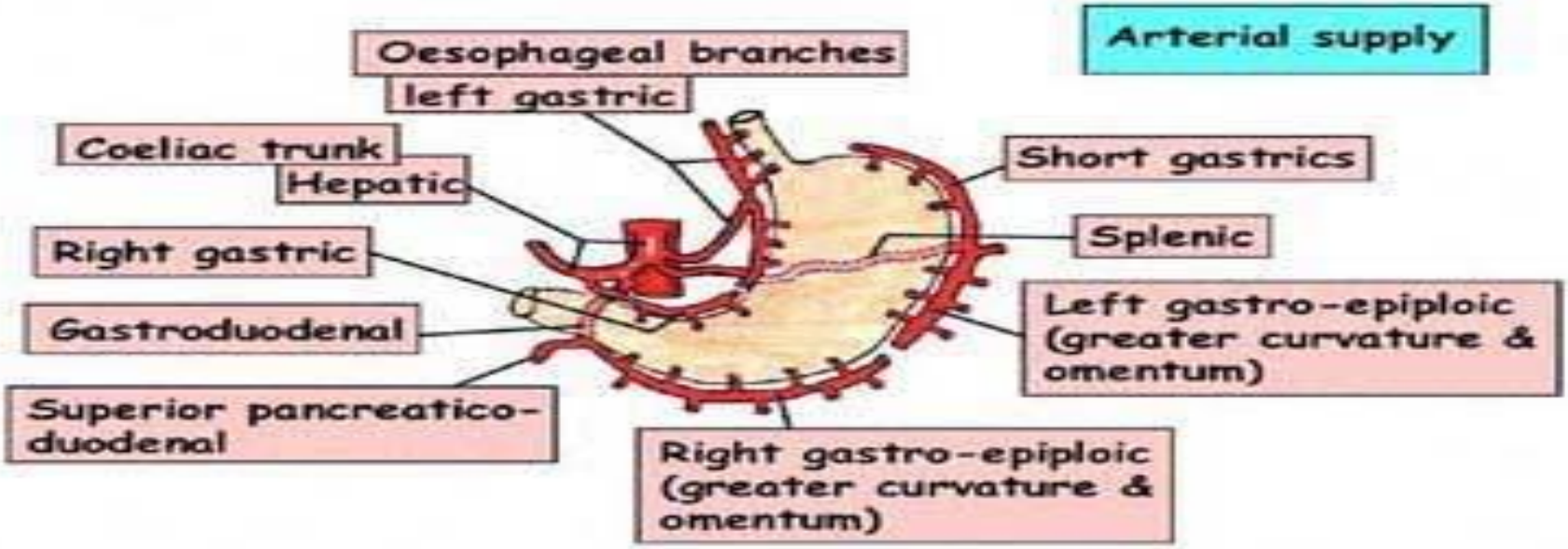
- On each side : celiac ganglia+ lympatic nodes
- Crus of diaphragm and lumbar nerves
- Its Branches for foregut

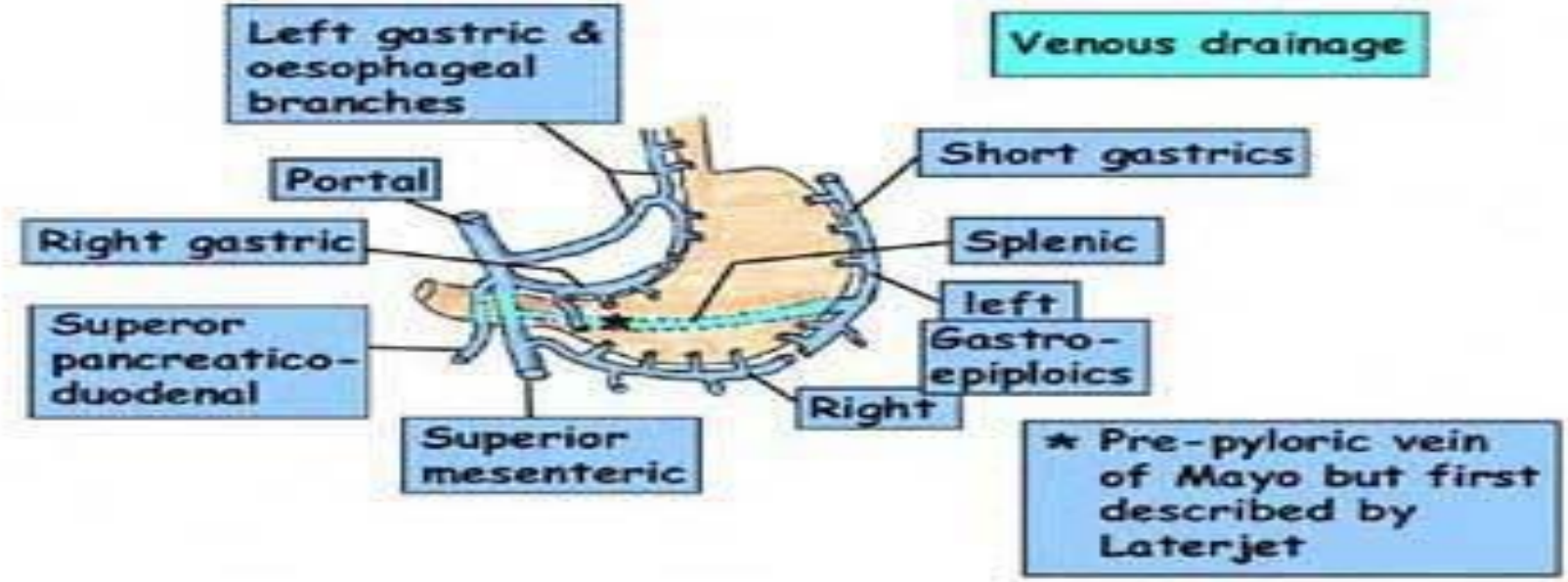
Main distribution

- Lt.gastric.a
- Splenic.a
- Hepatic.a



STOMACH - BLOOD SUPPLY & VENOUS DRAINAGE





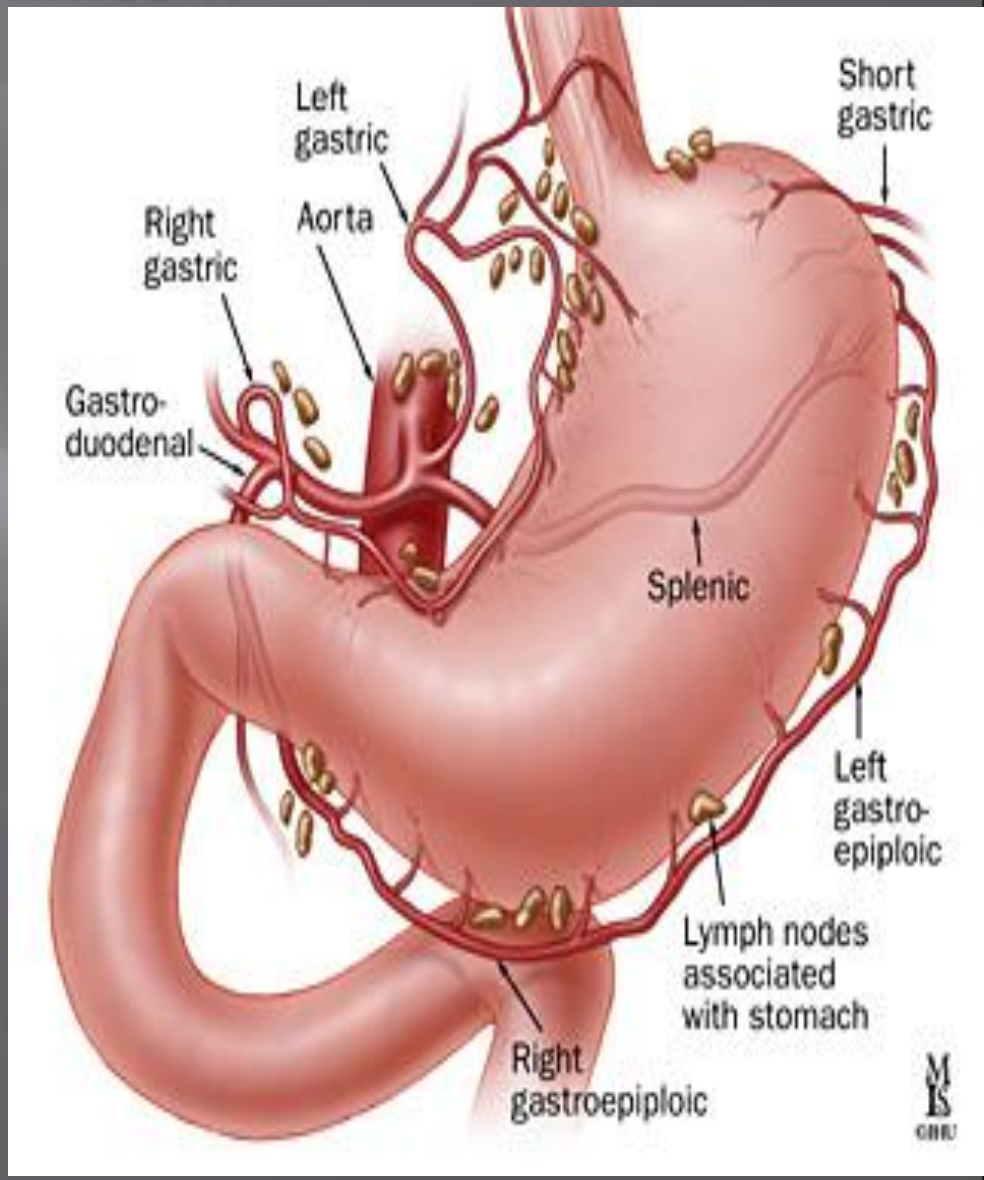
Blood supply for stomach……cont

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

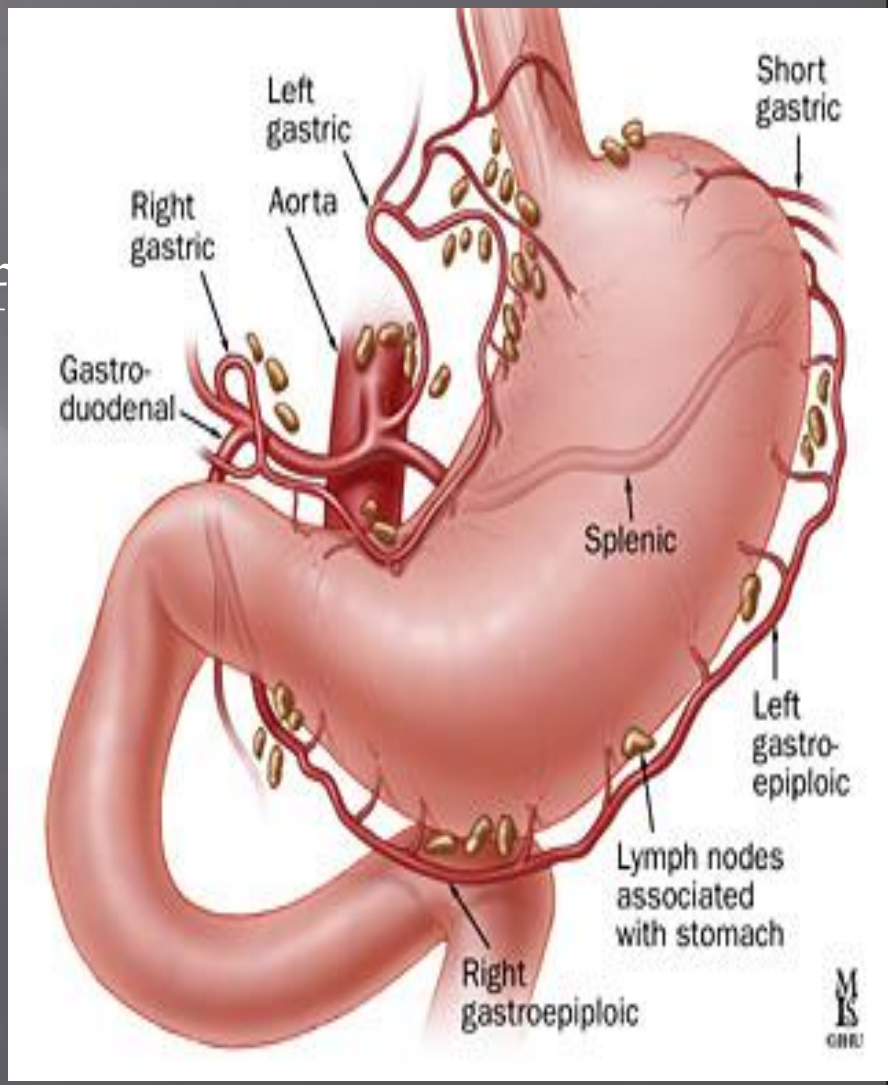
-It supplies the lower third of the esophagus and the upper right part of the stomach



Blood supply…..cont

2- The right gastric artery

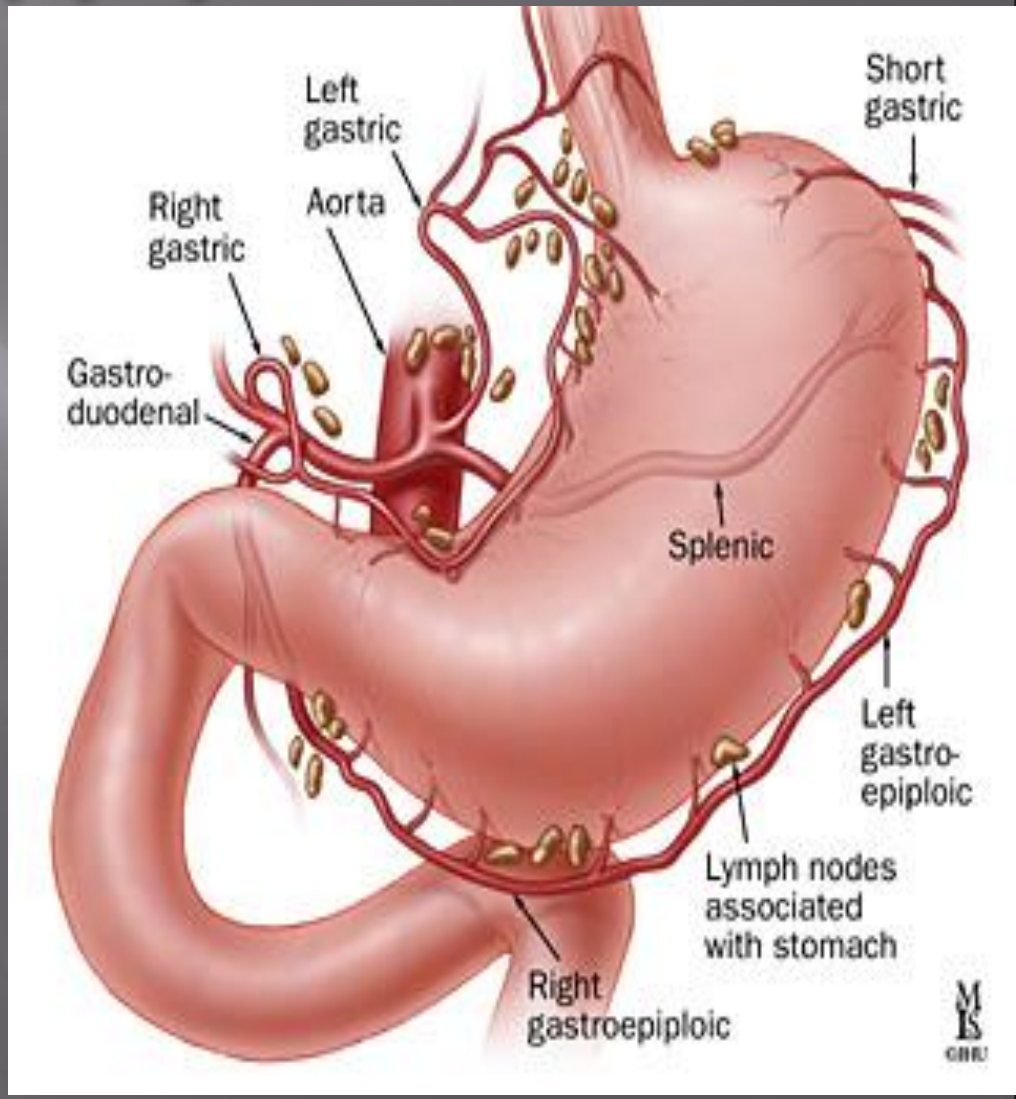
- arises from the hepatic artery at the upper border of the pylorus
- runs to the left along the lesser curvature.
- It supplies the lower right part of the stomach.



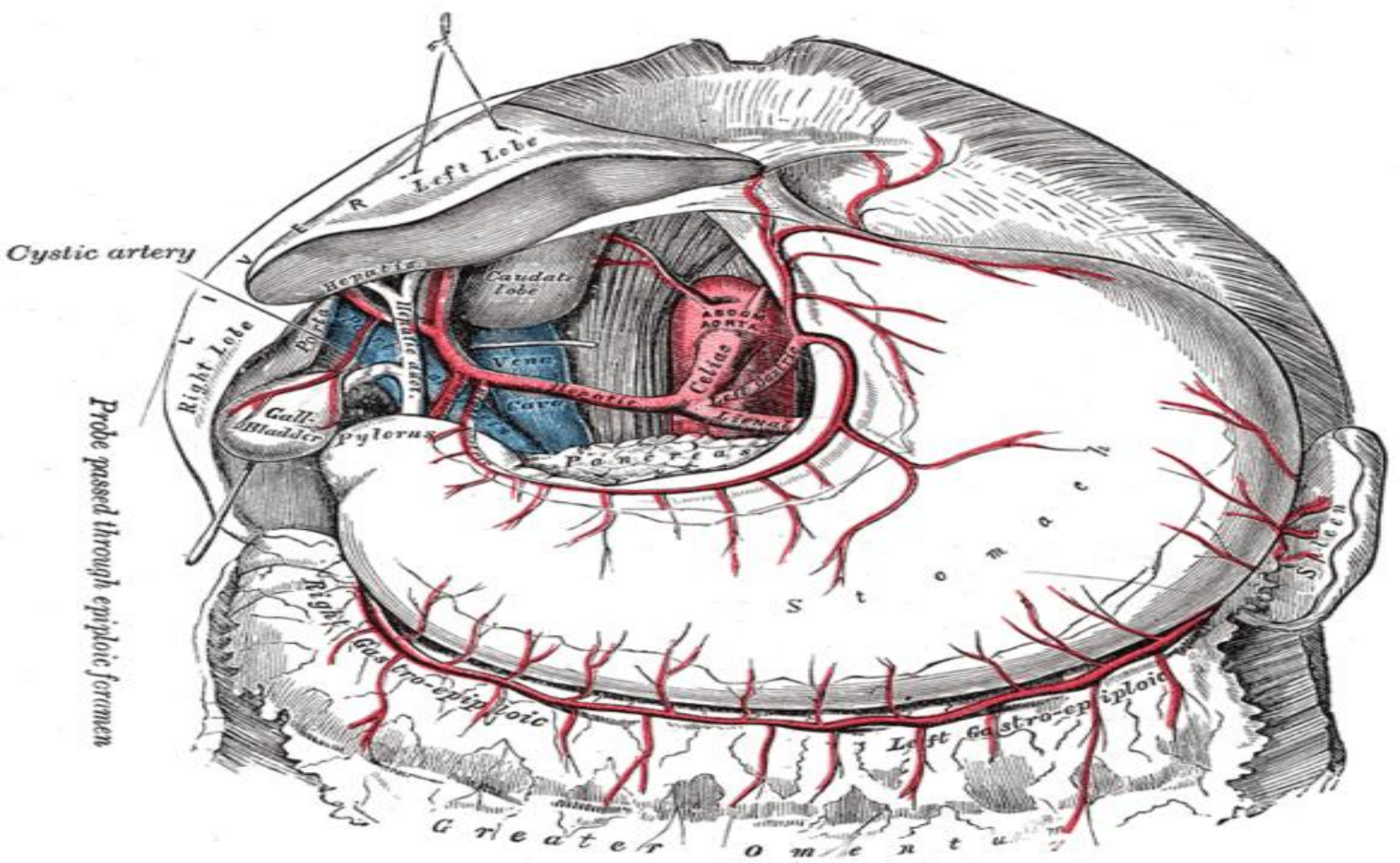
Blood supply….cont

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



Blood supply of stomach



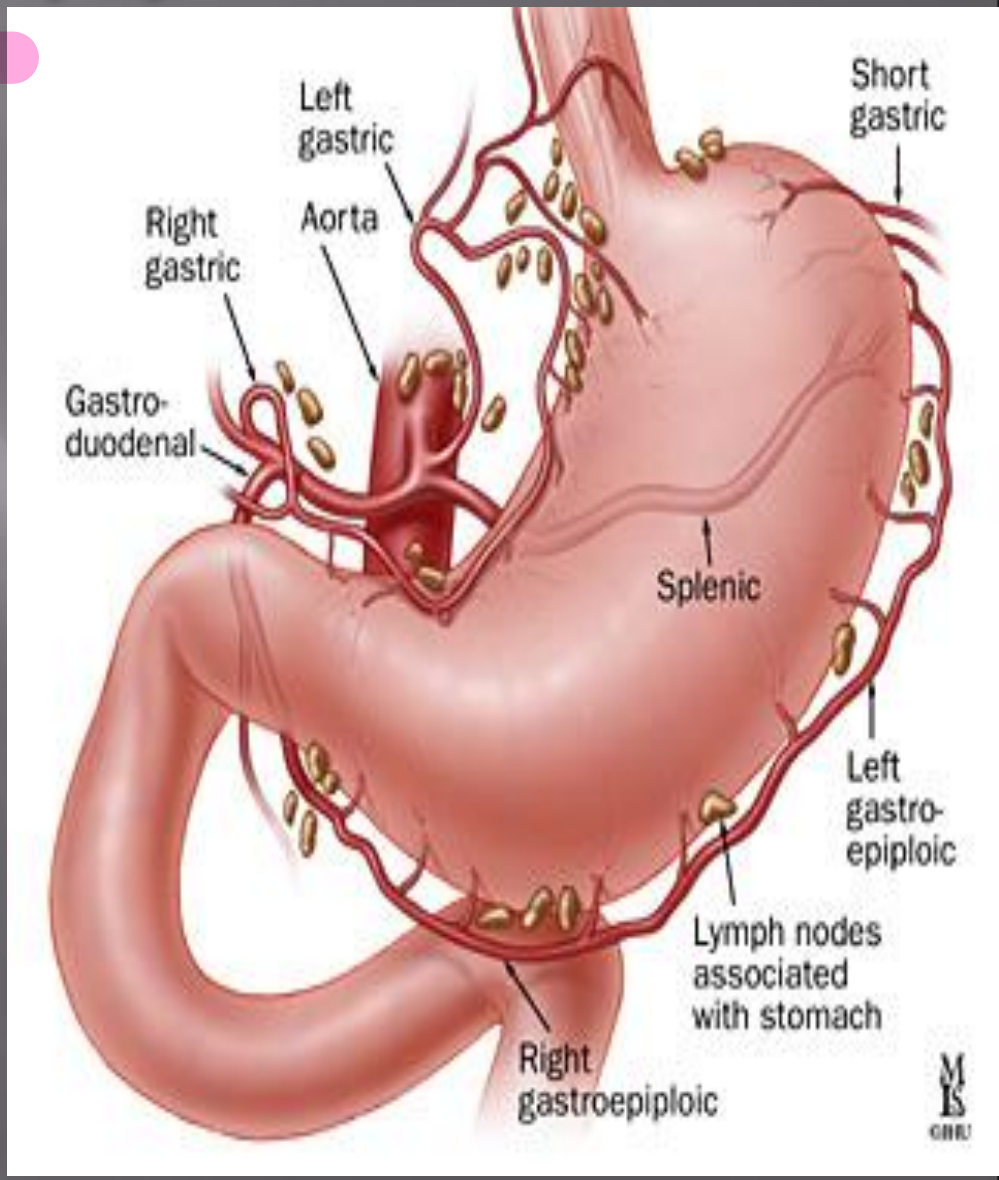
Blood supply…..cont

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.

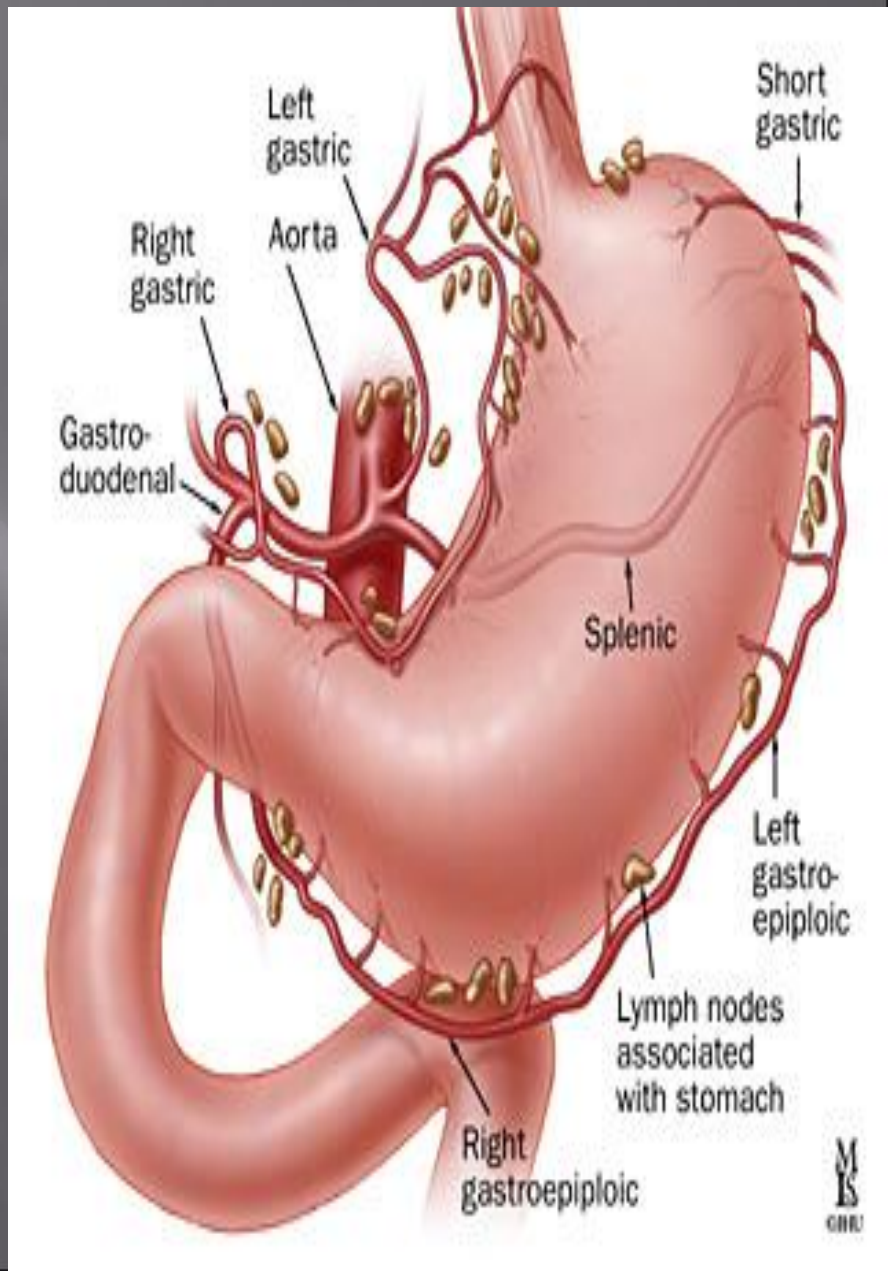


Venous drainage

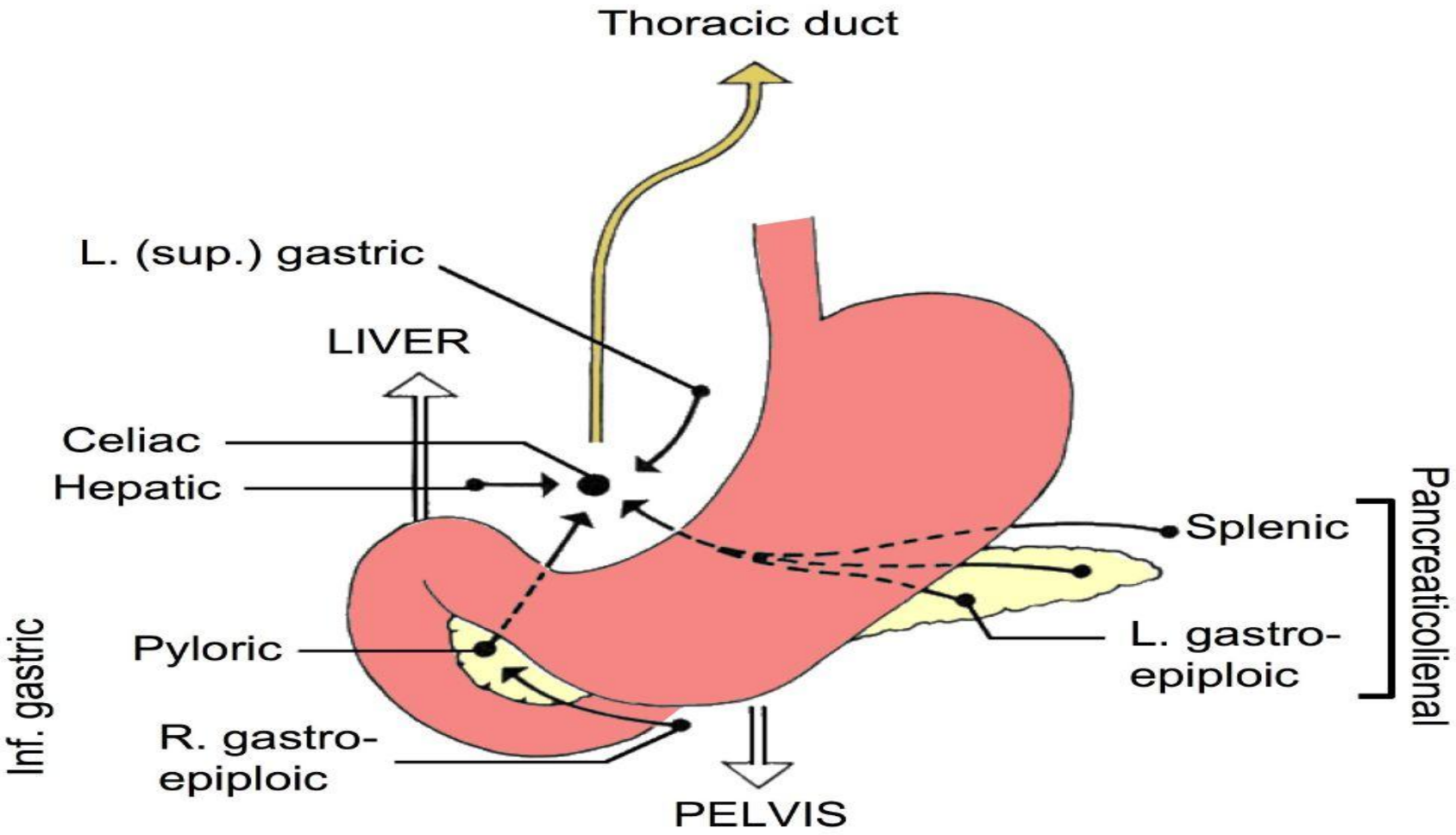
- The veins drain into the portal circulation
- The left and right gastric veins drain directly into the portal vein
- The short gastric veins and the left gastroepiploic veins join the splenic vein
- The right gastroepiploic vein joins the superior mesenteric vein(which meet the splenic vein behind the neck of pancreas to form the portal vein

Lymphatic drainage

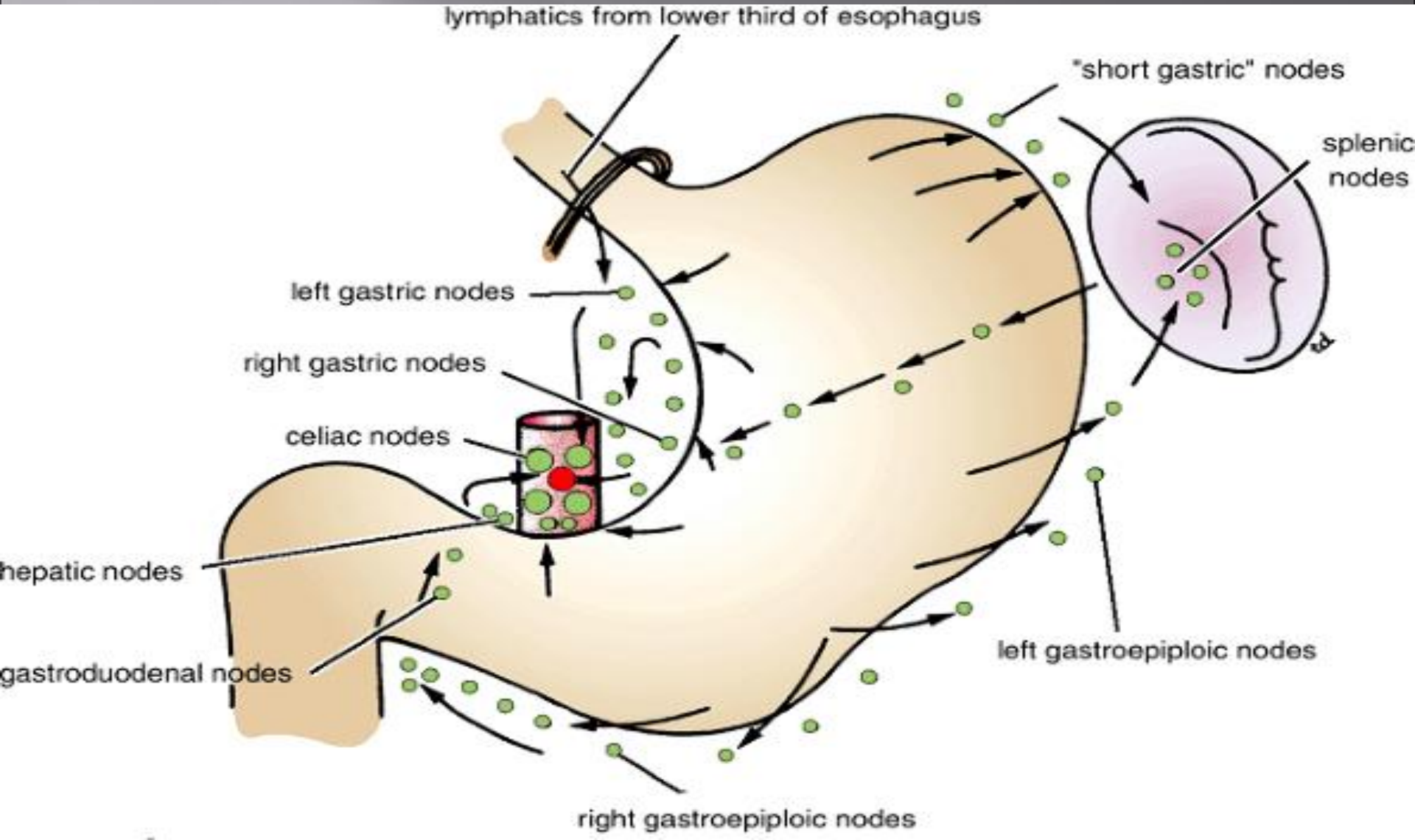
- Follow the arteries of stomach
- The left and right gastric nodes
- The left and right gastroepiploic nodes
- The short gastric nodes
- All lymph from the stomach eventually passes to the celiac nodes located around the root of the celiac artery on the posterior abdominal wall.



Lymphatic drainage

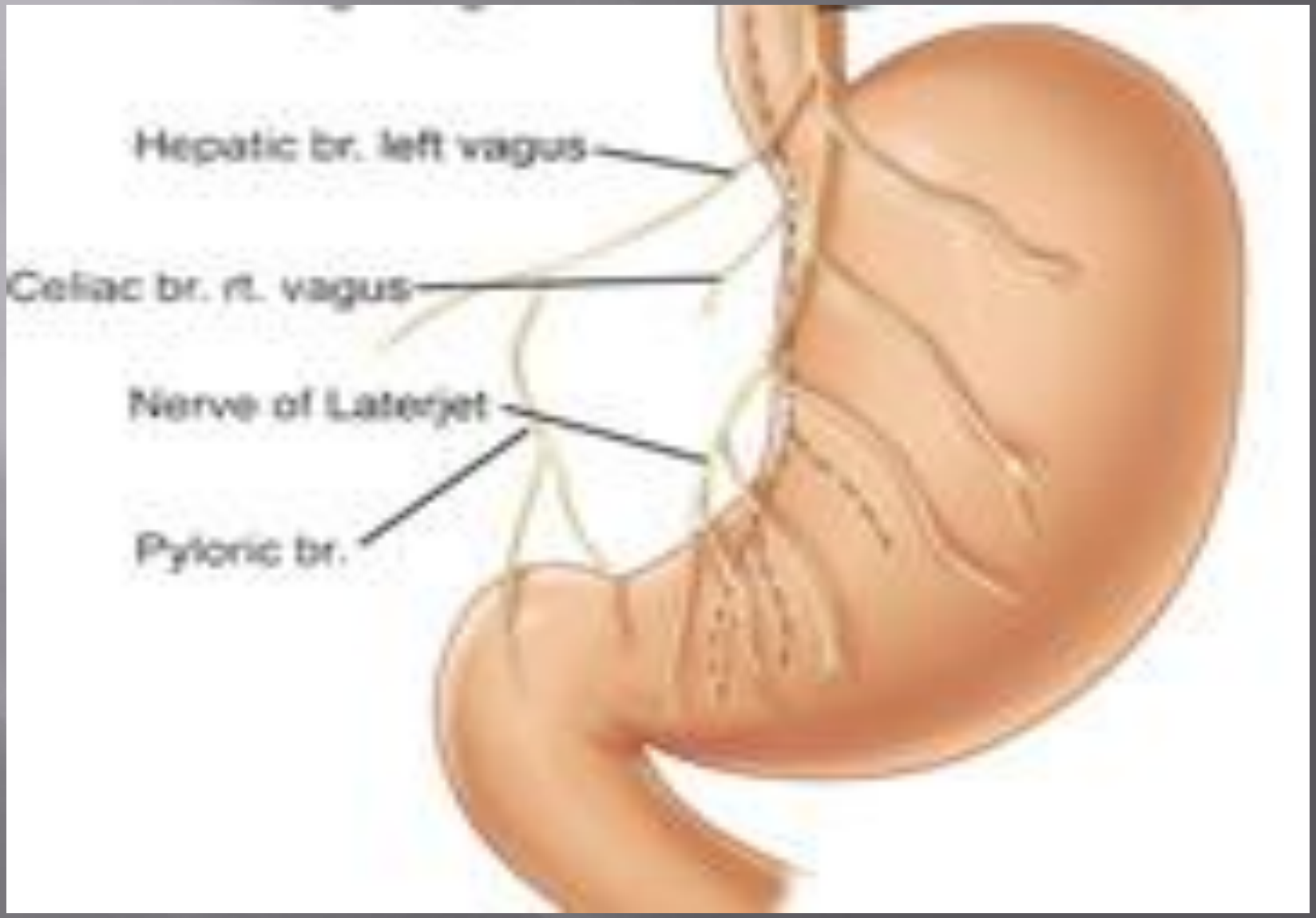


Lymphatic drainage….cont



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 of the stomach carries a proportion of **pain sensation**
- The parasympathetic vagal fibers are **secreto-motor** to the **gastric glands** and motor to the muscular wall of the stomach(peristaltic movement)
- The pyloric sphincter receives **motor fibers** from the sympathetic system and inhibitory fibers from the vagus.n.


Hepatic br. left vagus
Celiac br. rt. vagus
Nerve of Laterjet
Pyloric br.

Nerve supply of stomach…..cont

- **The anterior vagal trunk** has 3 branches

- mainly from the left vagus nerve

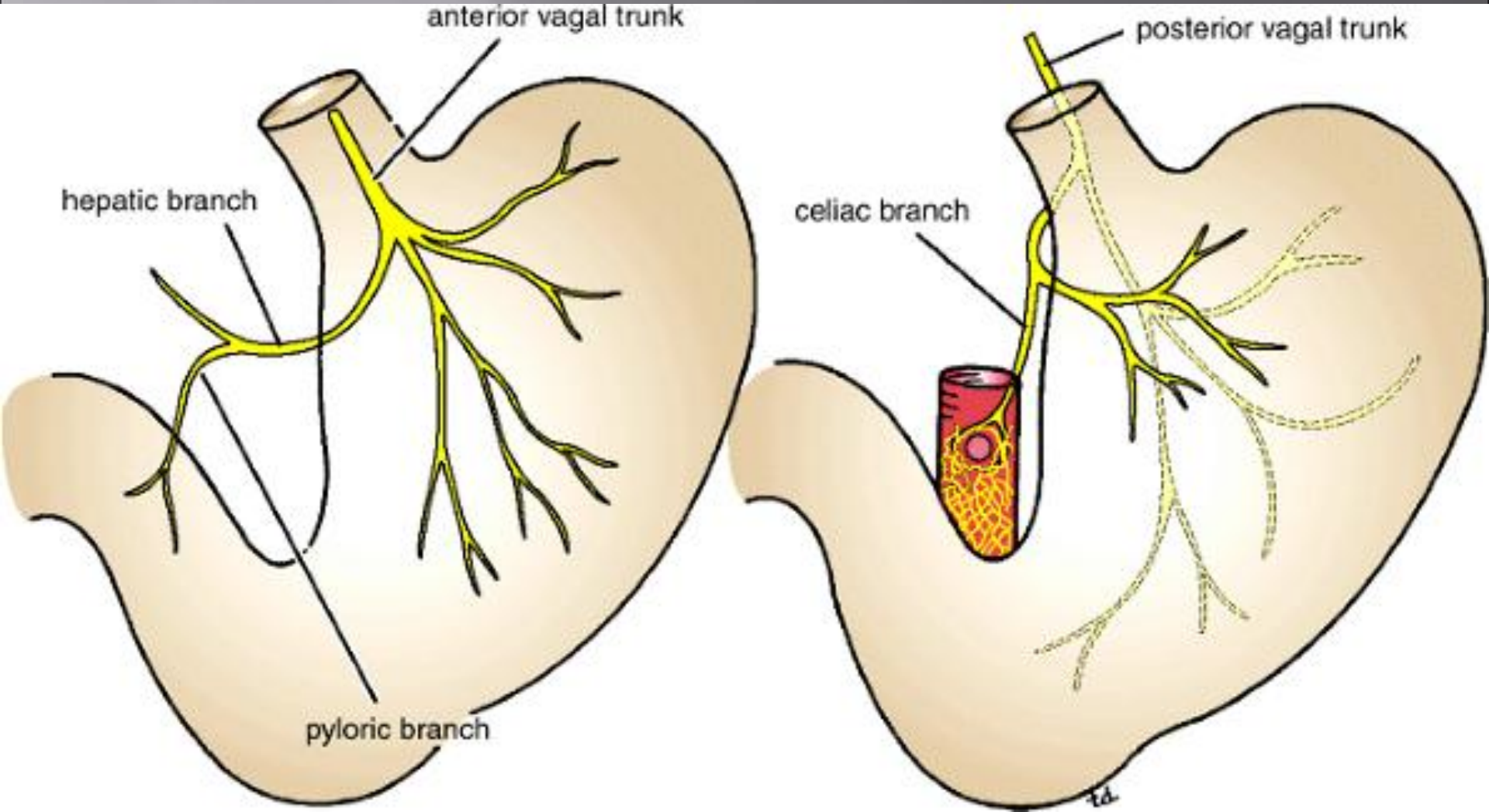
Distribution

1- The anterior surface of the stomach.

2- A large hepatic branch passes up to the liver

3- Ant. Nerve Laterjet→ pylorus

Nerve supply of stomach…..cont



Nerve supply of stomach…..cont

- **The posterior vagal trunk**

- mainly from the right vagus nerve
- **Distribution**

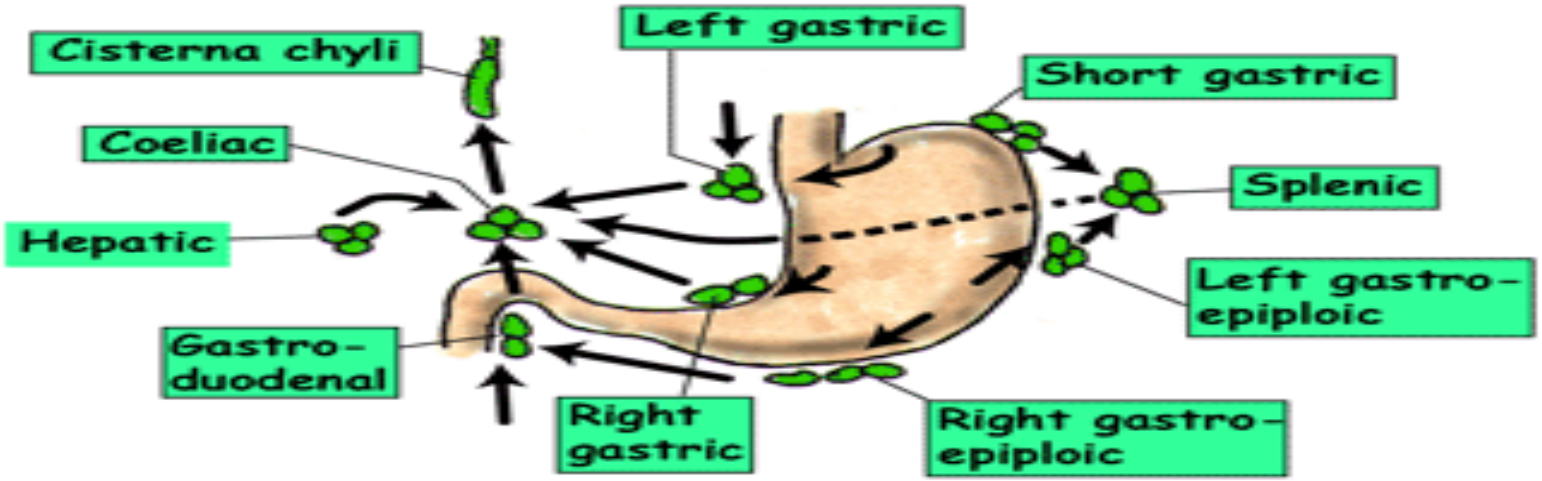
1- mainly the posterior wall of the stomach.

2- Ant. Wall of body of stomach

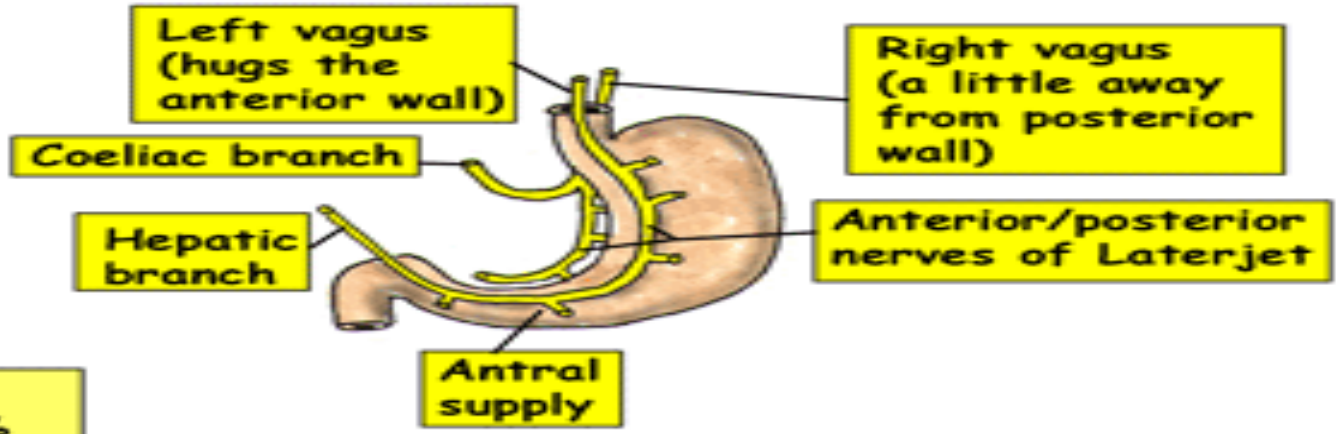
3- Celiac branch→ small intestine+ as far as to splenic flexure+ pancreas

4- post. Nerve latarjet→ pylorus

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
- Trunkal vagotomy →Sectioning the vagus nerves below the diaphragm around the esophagus.
- Highly selective vagotomy(cut all branches of the vagi except latarjet.n)
- Peptic ulcer(D.U)
- Gastroscopy
- Pyloroplasty(drainage)= gastro- jejunostomy

Causes of Ulcers in stomach

H. pylori the cause of peptic ulcer