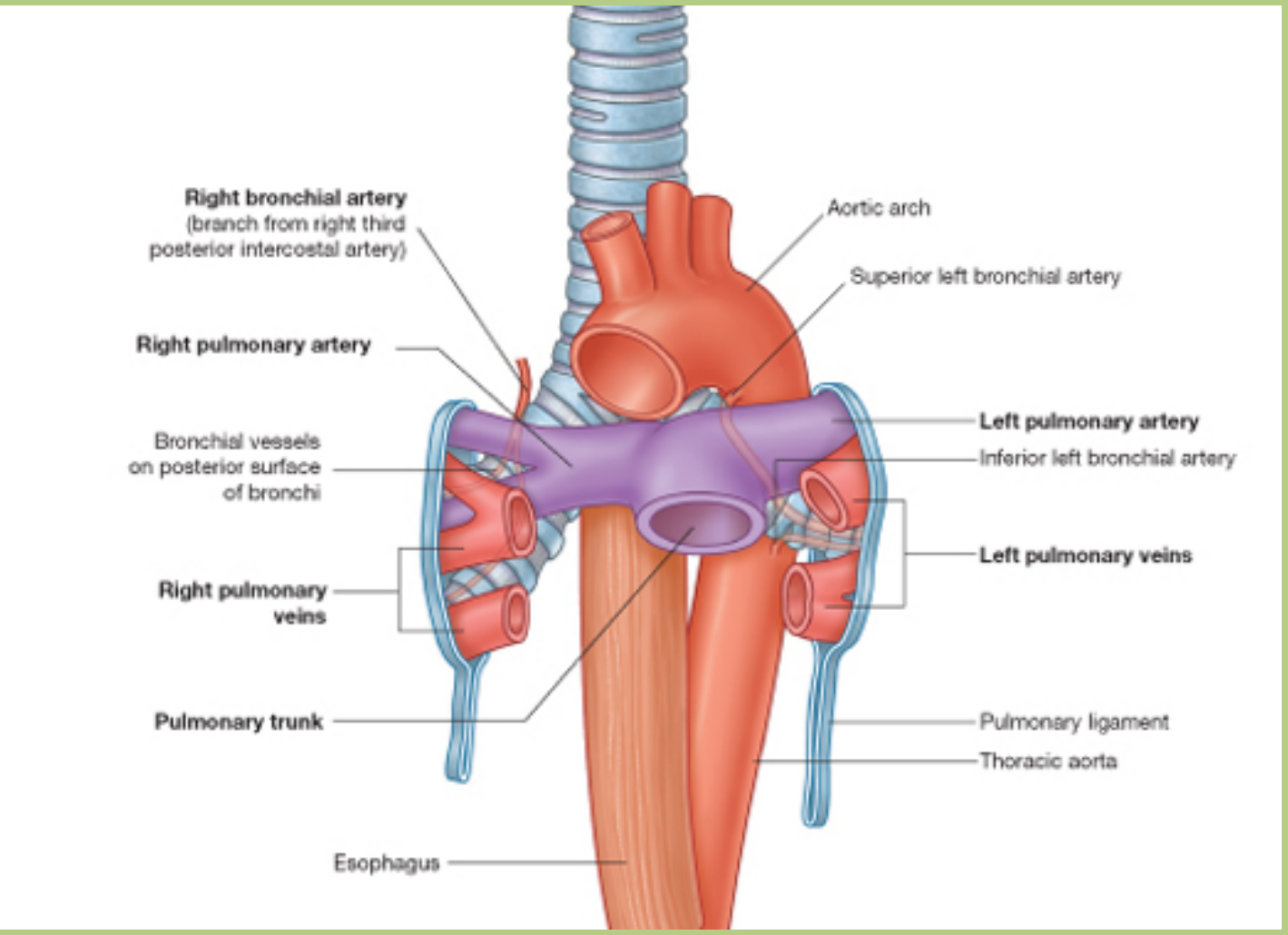
Digestive system I.: esophagus, stomach and liver

Sándor Katz M.D.,Ph.D.

Esophagus

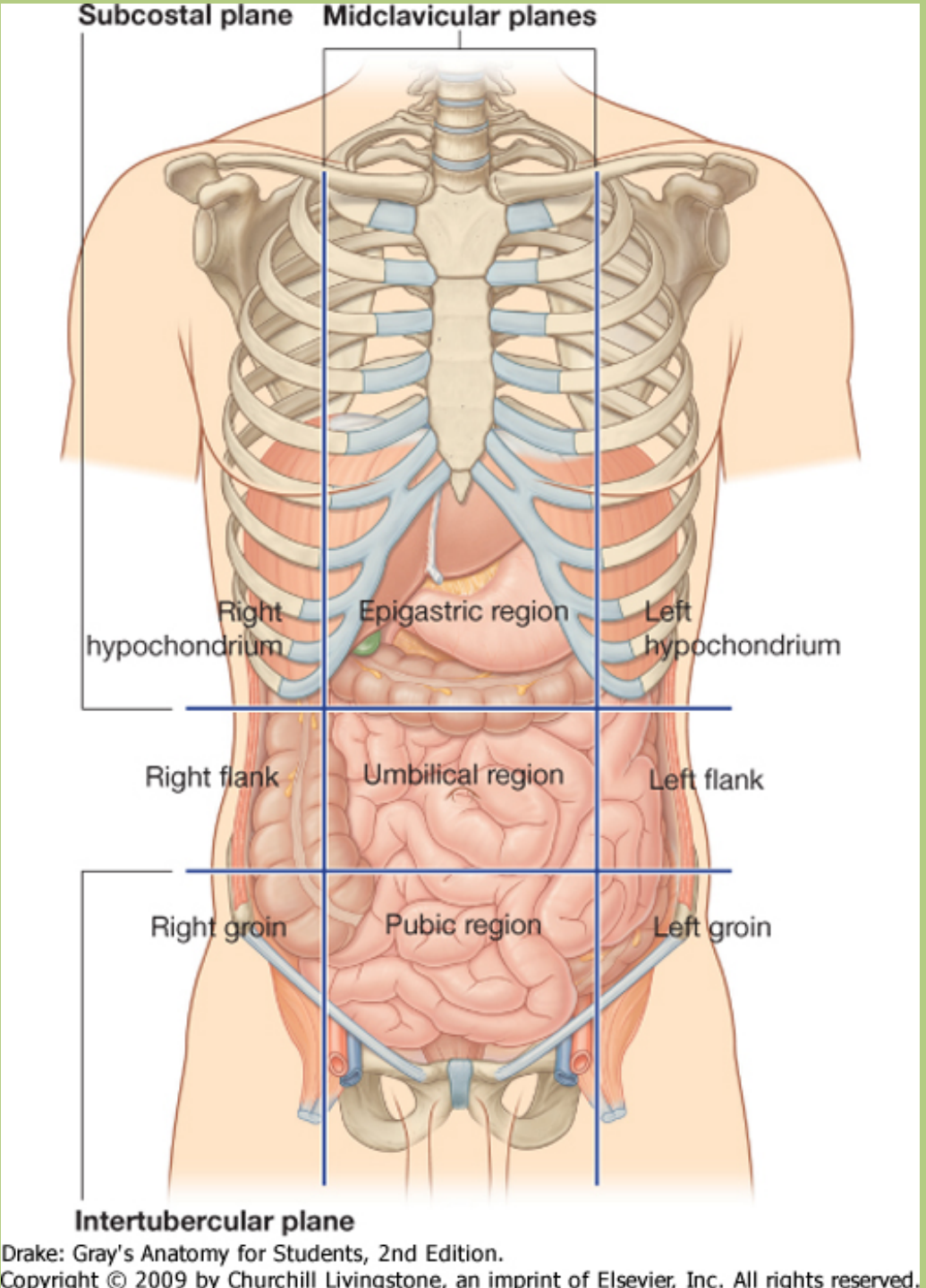


- Approximately 25 cm long muscular tube
- Location: right behind the trachea
- Lined by stratified squamous non-keratinized epithelium

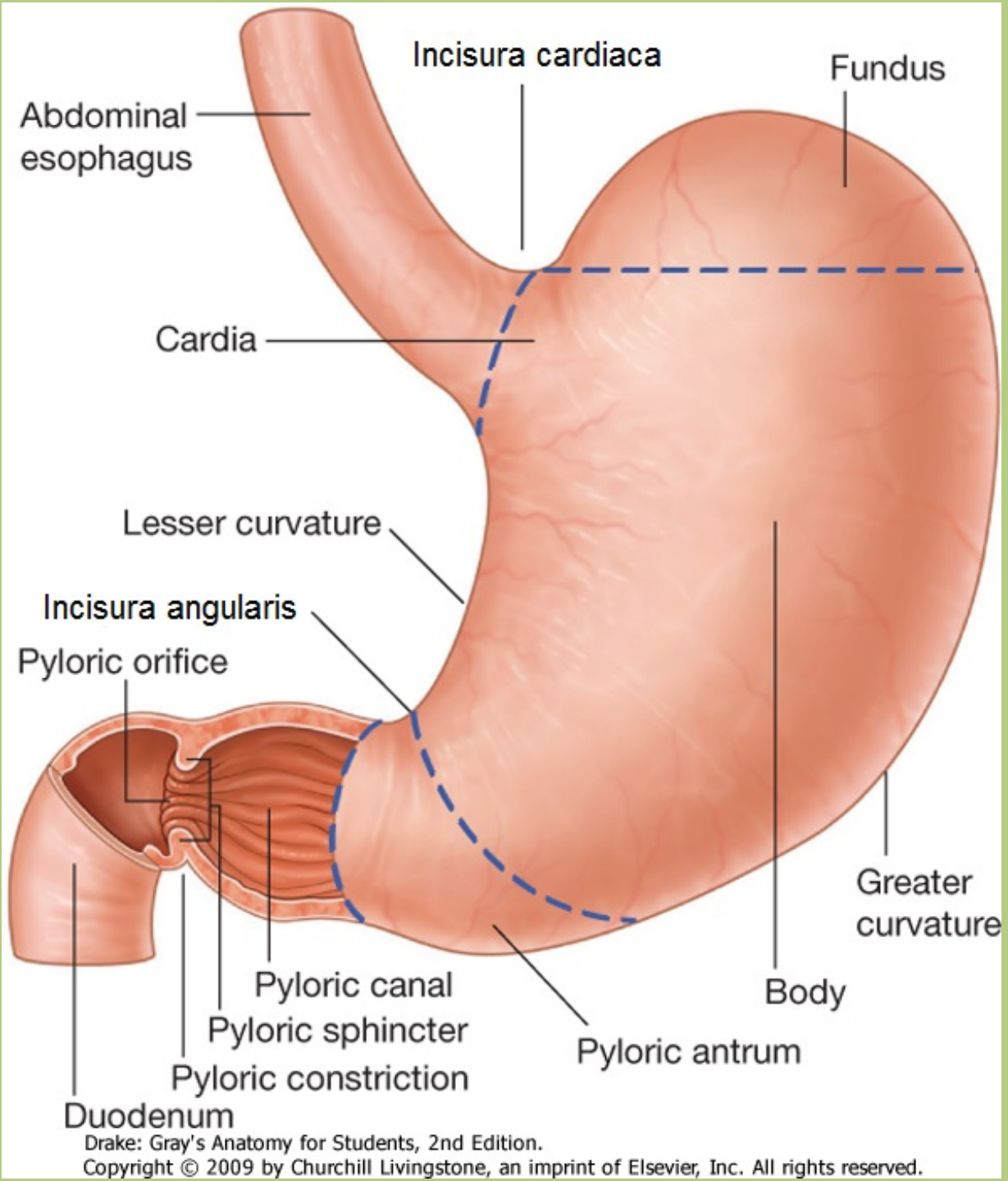
Parts:

- **cervical**
- **thoracic**
- **abdominal**

Location of the stomach



- Left hypochondrium
- Epigastrium
- (Umbilical region)



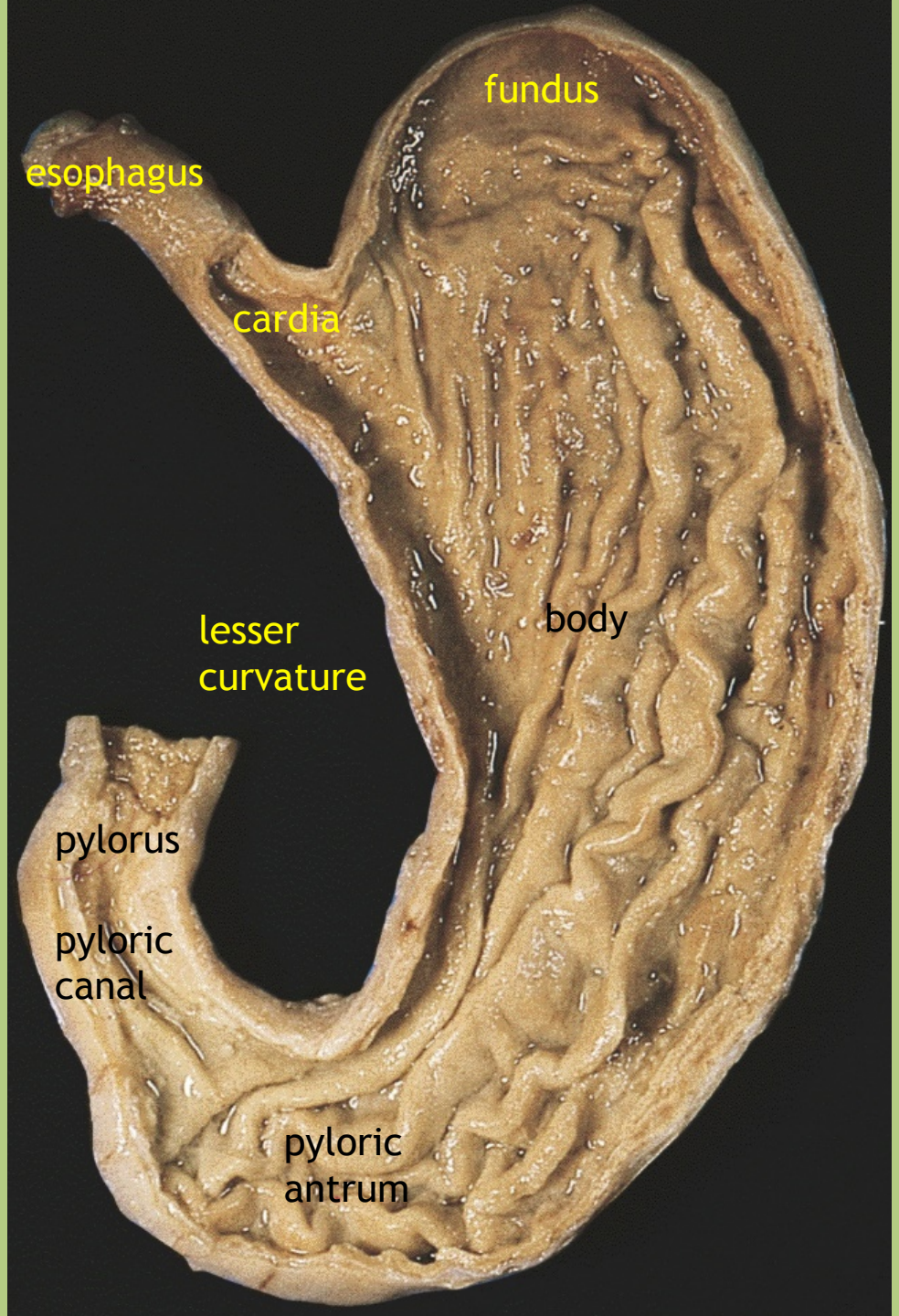
Shape and anatomical divisions of the stomach

- Cardia
- Fundus
- Body
- Pyloric antrum
- Pylorus

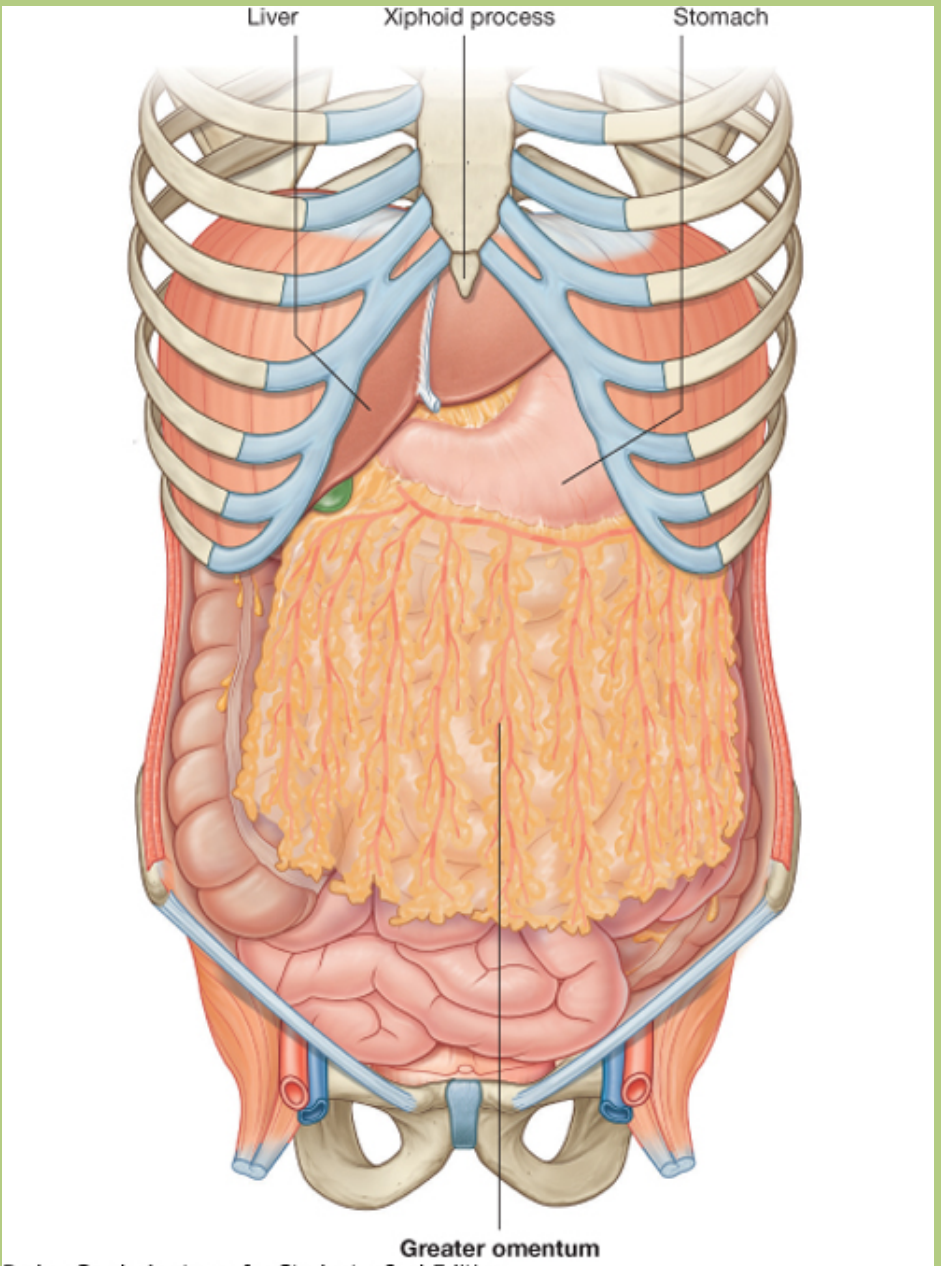
Interior of the stomach

Prominent gastric mucosal folds (rugal folds) increase the surface area. They are directed longitudinally toward the pylorus.

Average capacity of stomach:
in newborns: 15 ml
during puberty: 1000 ml
in adults: 1500ml

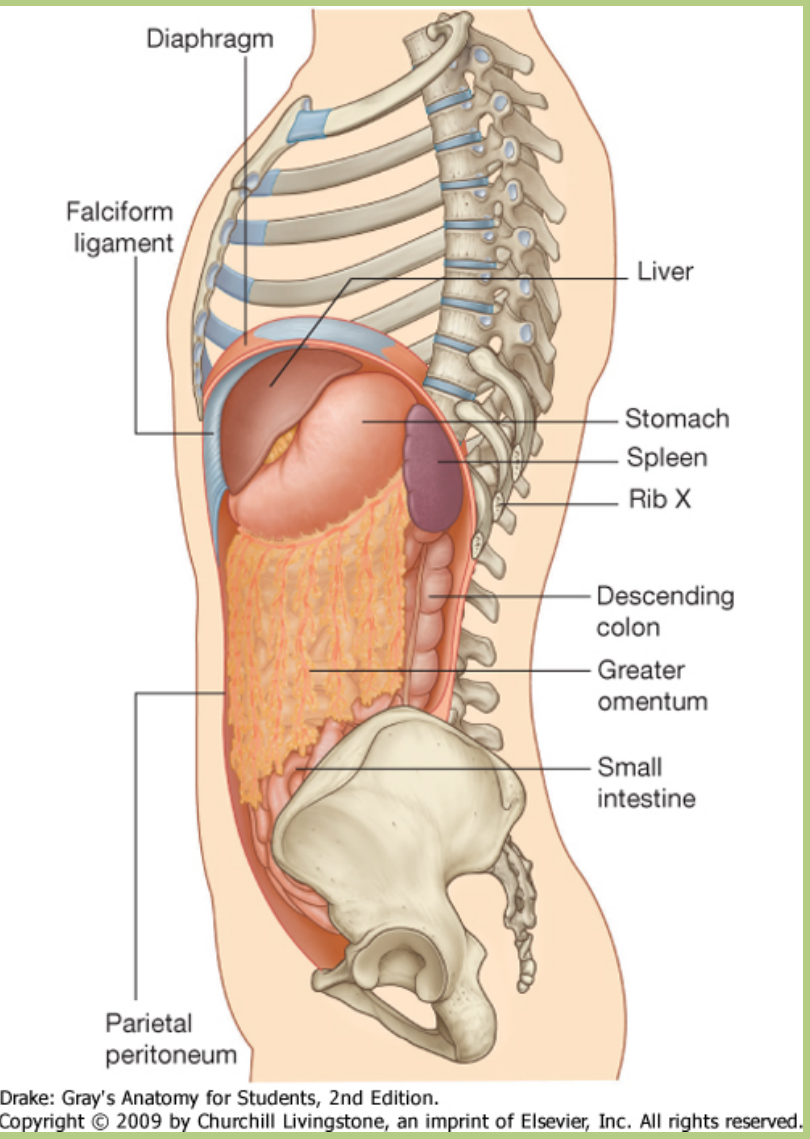

fundus
esophagus
cardia
lesser curvature
body
greater curvature
pylorus
pyloric canal
pyloric antrum

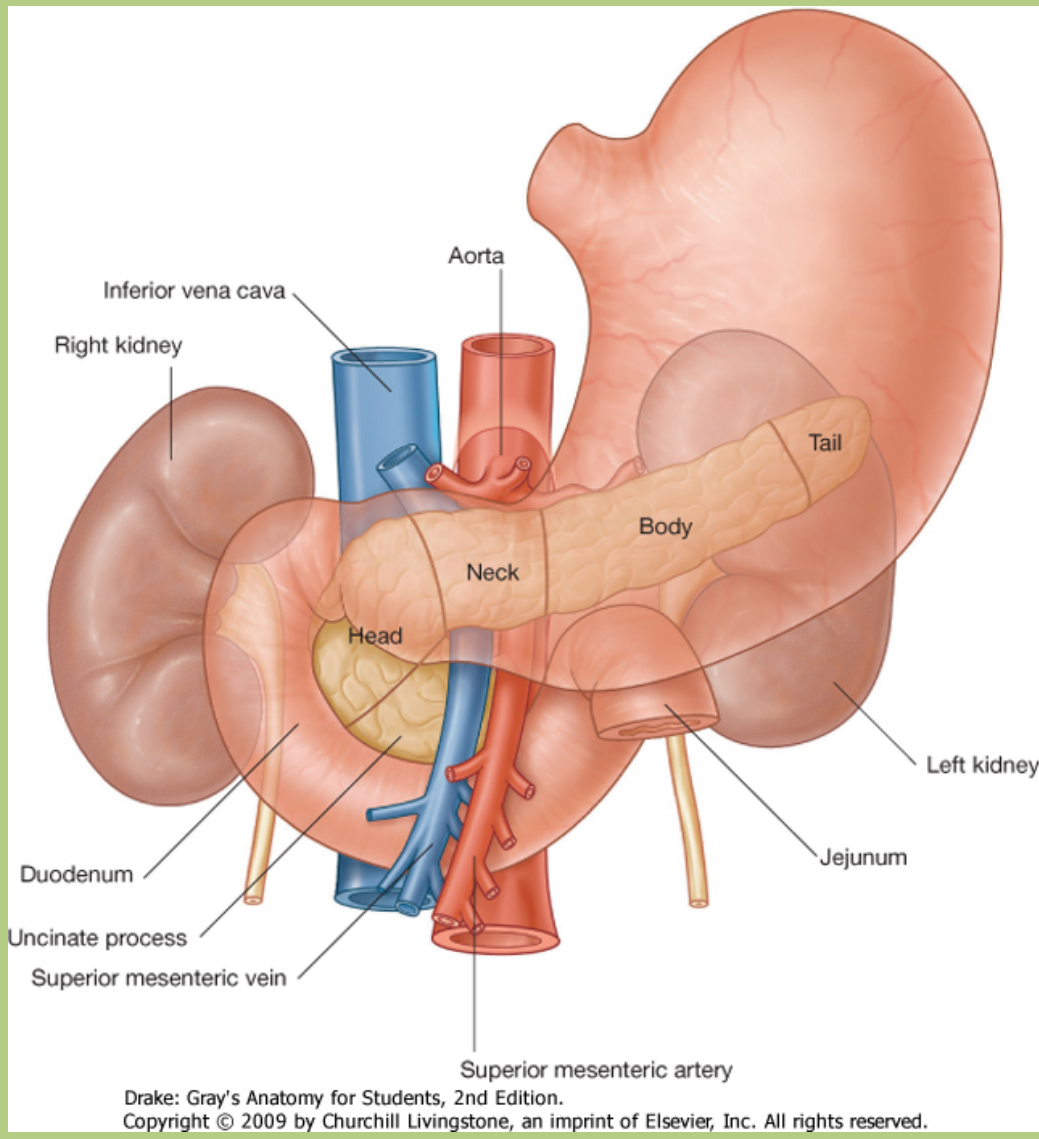
Contact areas of adjacent organs – anterior stomach wall



- Phrenic surface
- Hepatic surface
- Epigastric surface (facies libera)

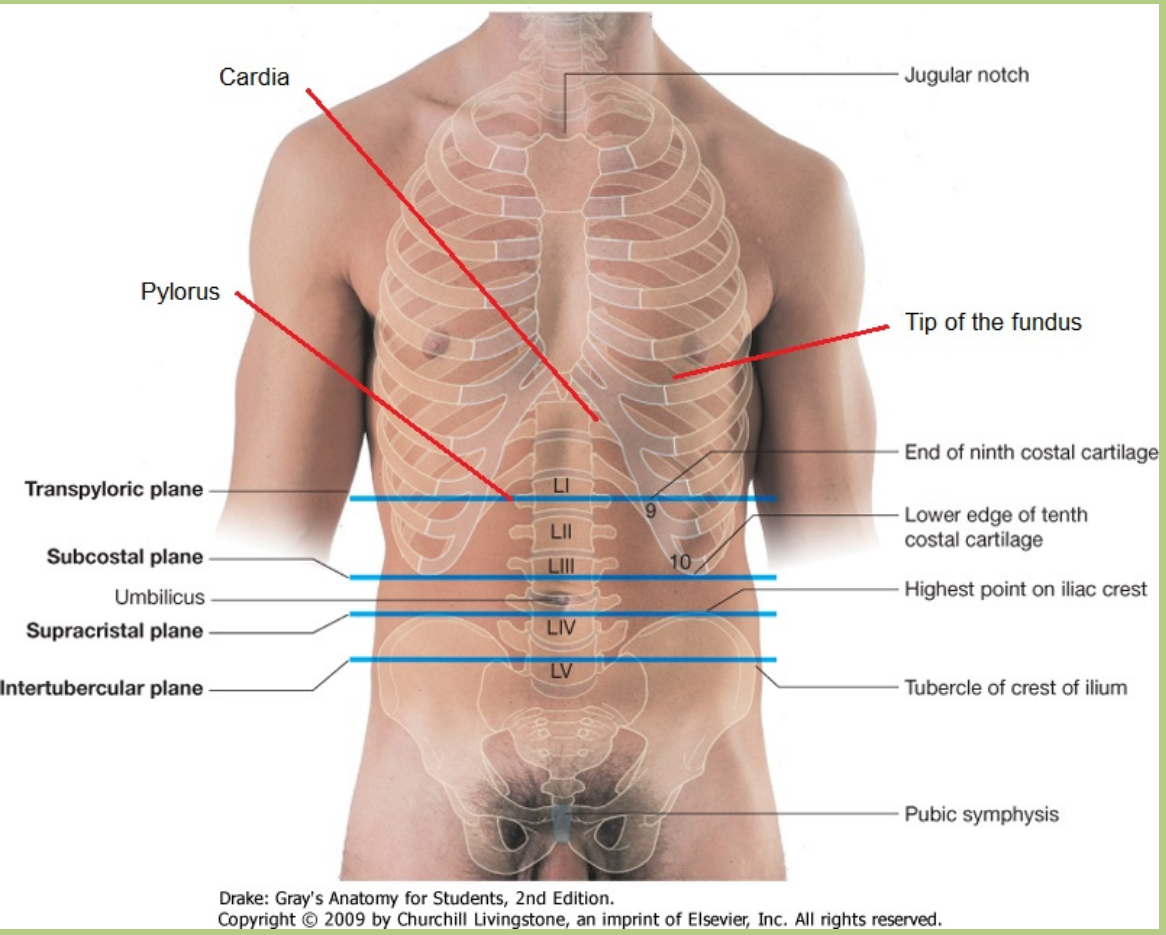
Contact areas of adjacent organs – posterior stomach wall





- Splenic, Colomesocolic, Pancreatic, Renal, Suprarenal surfaces

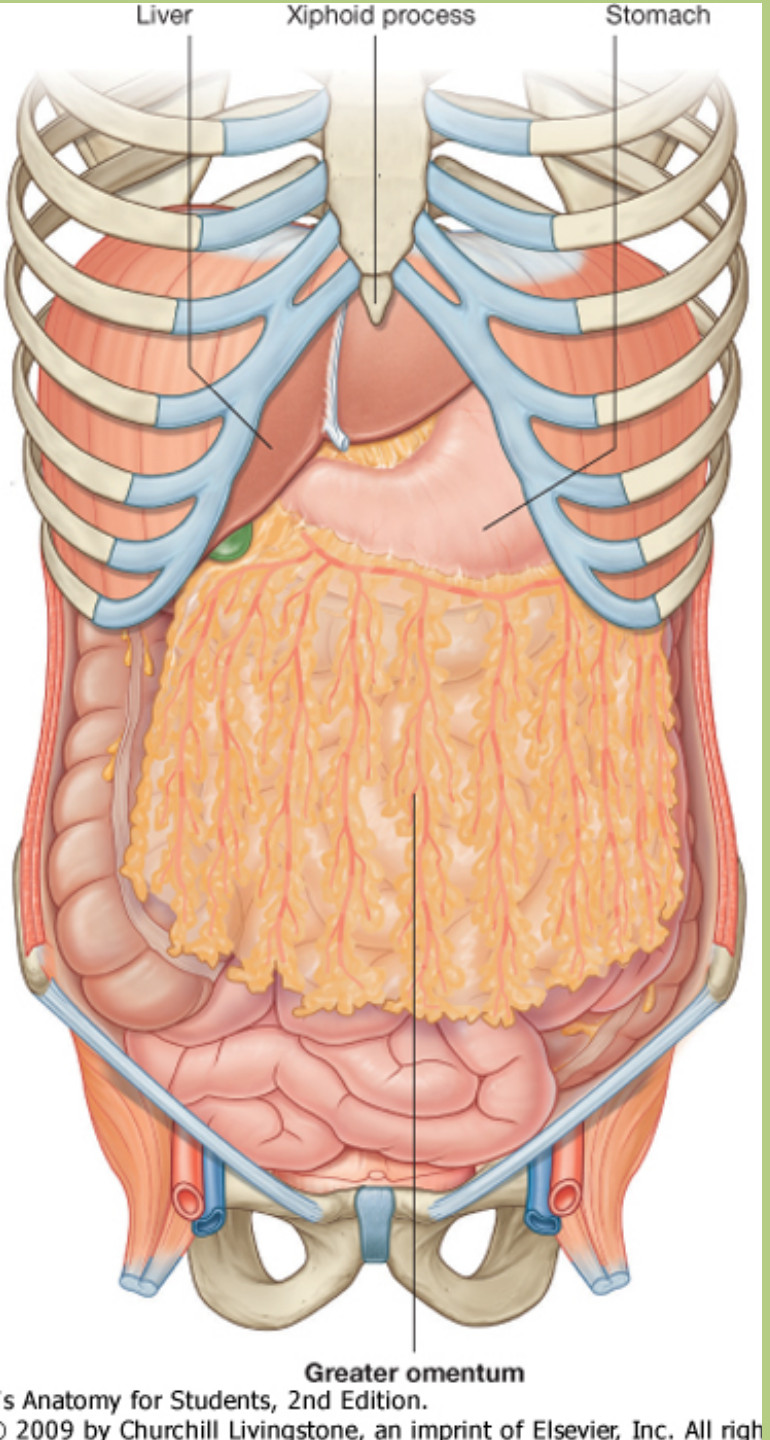
Topography of the stomach



Cardia: 2 cm to the left from the midline behind the 7th costal cartilage at the level of left edge of T11 vertebra.

Tip of the fundus: at the level of 5th intercostal space near to the mid-inguinal line.

Pylorus: 2-3 cm to the right from the midline at the level of L1 vertebra.

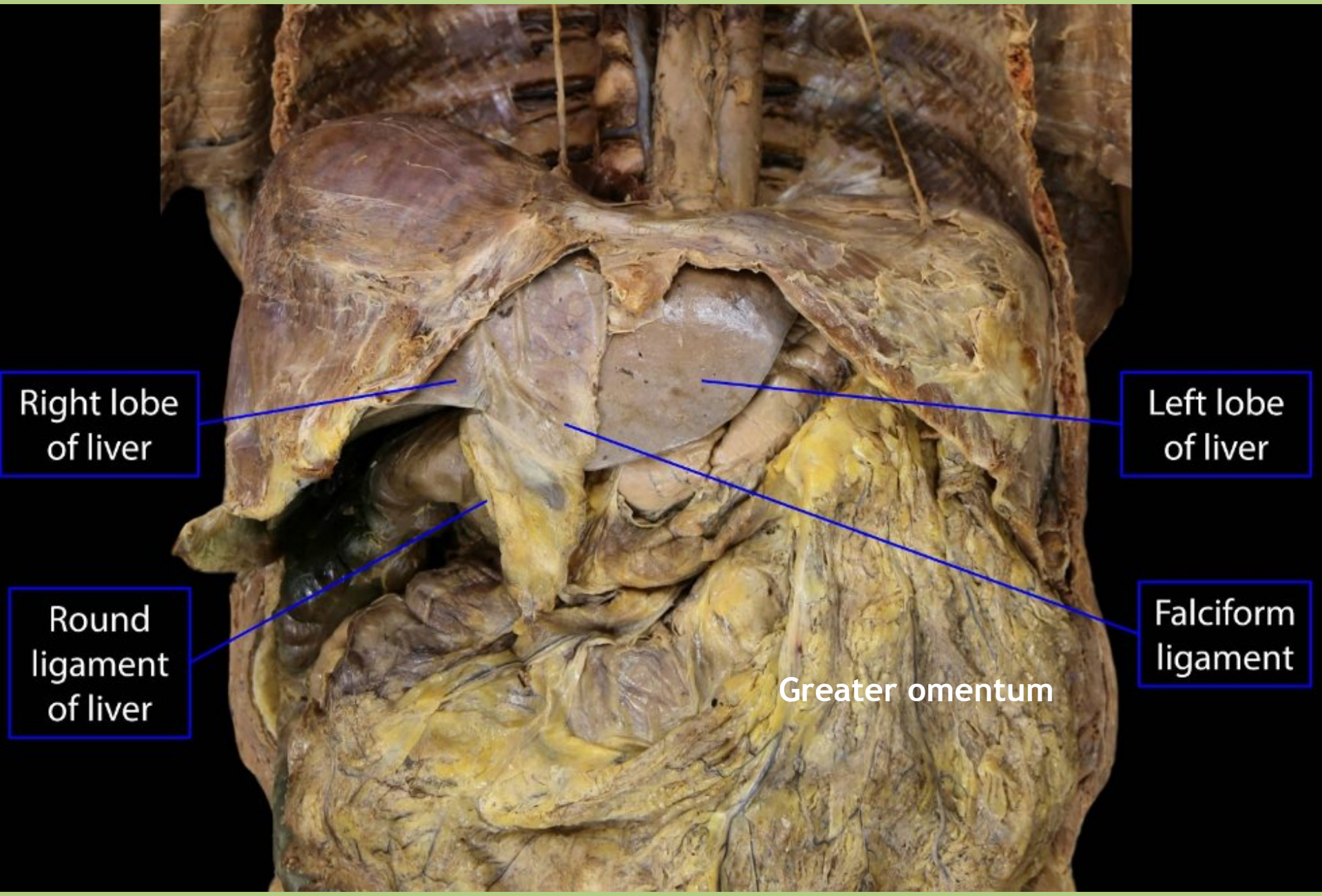


's Anatomy for Students, 2nd Edition.

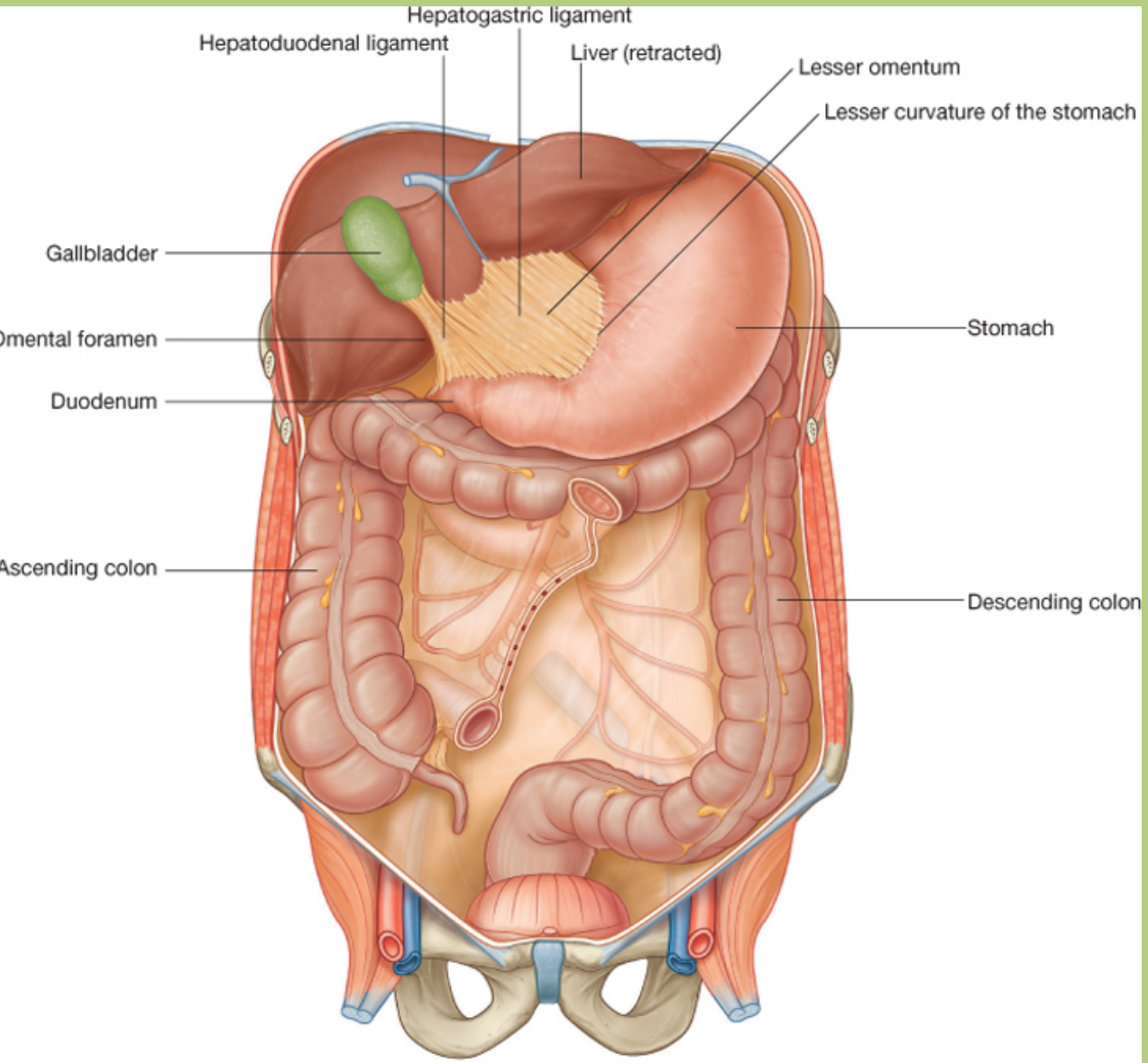
Peritoneal relationships

Stomach is **intraperitoneal** organ.

Greater omentum: from the greater curvature.


Right lobe of liver
Left lobe of liver
Round ligament of liver
Falciform ligament
Greater omentum

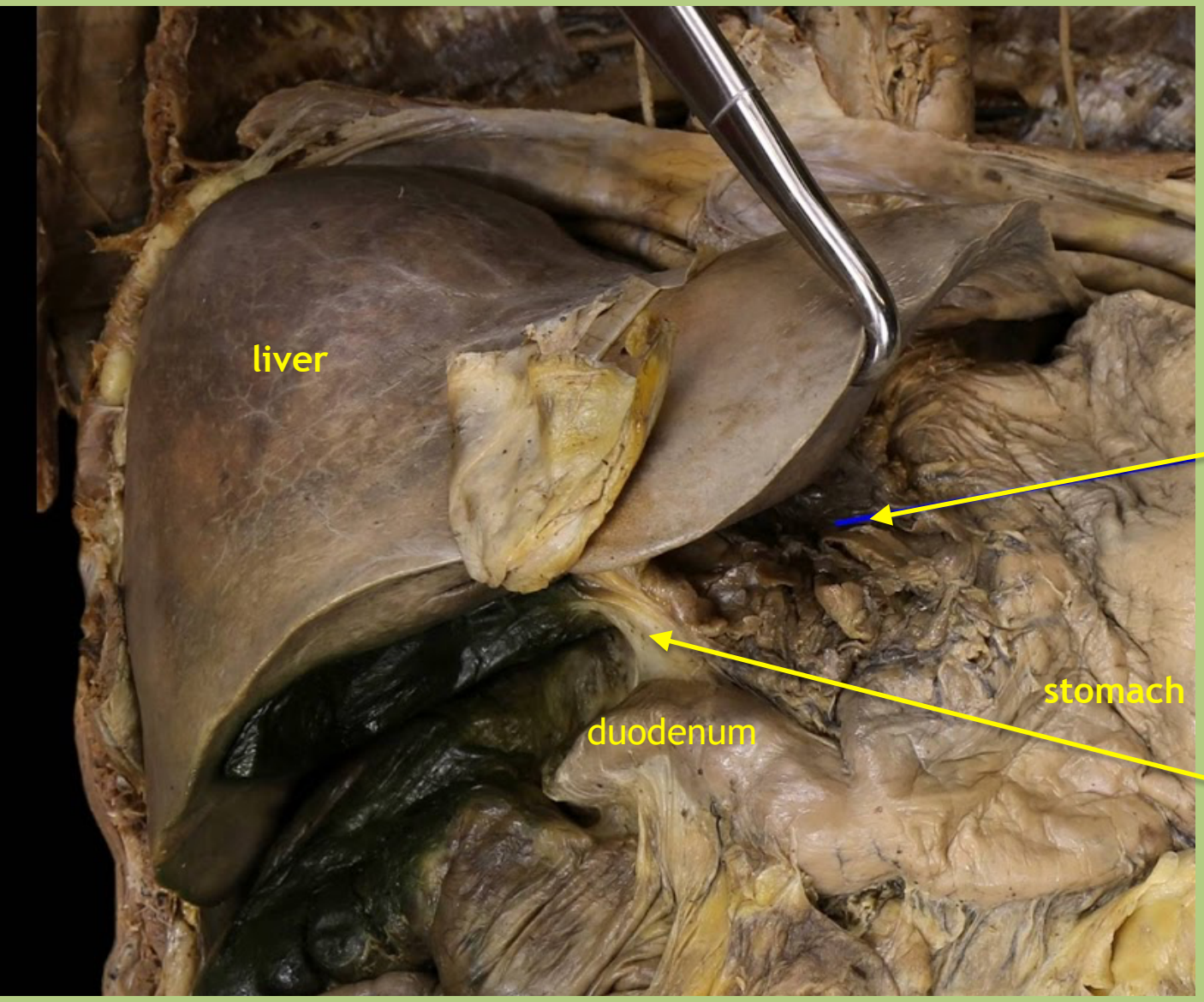
Peritoneal relationships



Hepatogastric ligament: between the lesser curvature and liver

Lesser omentum: hepatogastric ligament + hepatoduodenal ligament.

Peritoneal relationships



Lesser omentum: hepatogastric ligament + hepatoduodenal ligament.

hepatogastric ligament

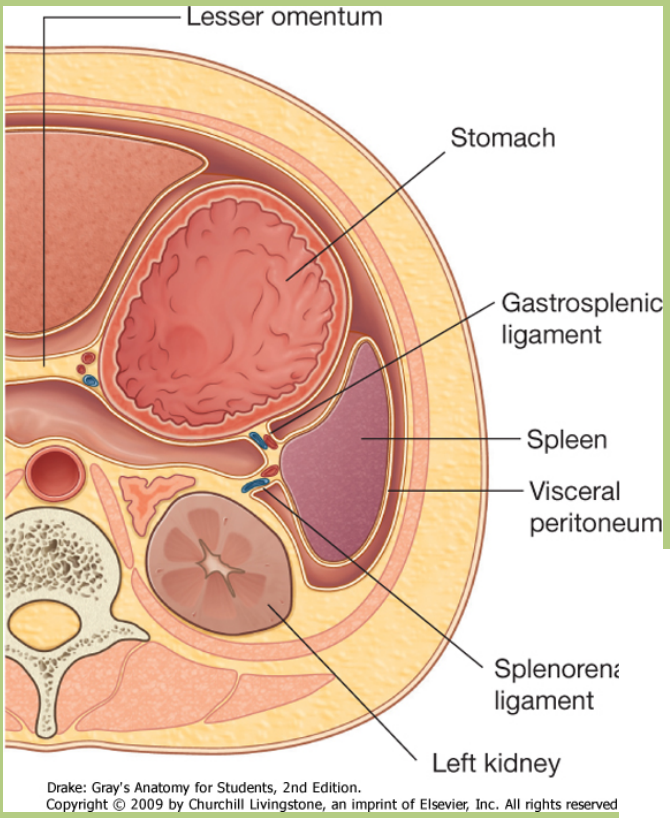
hepatoduodenal ligament
(between the first part of duodenum and liver)

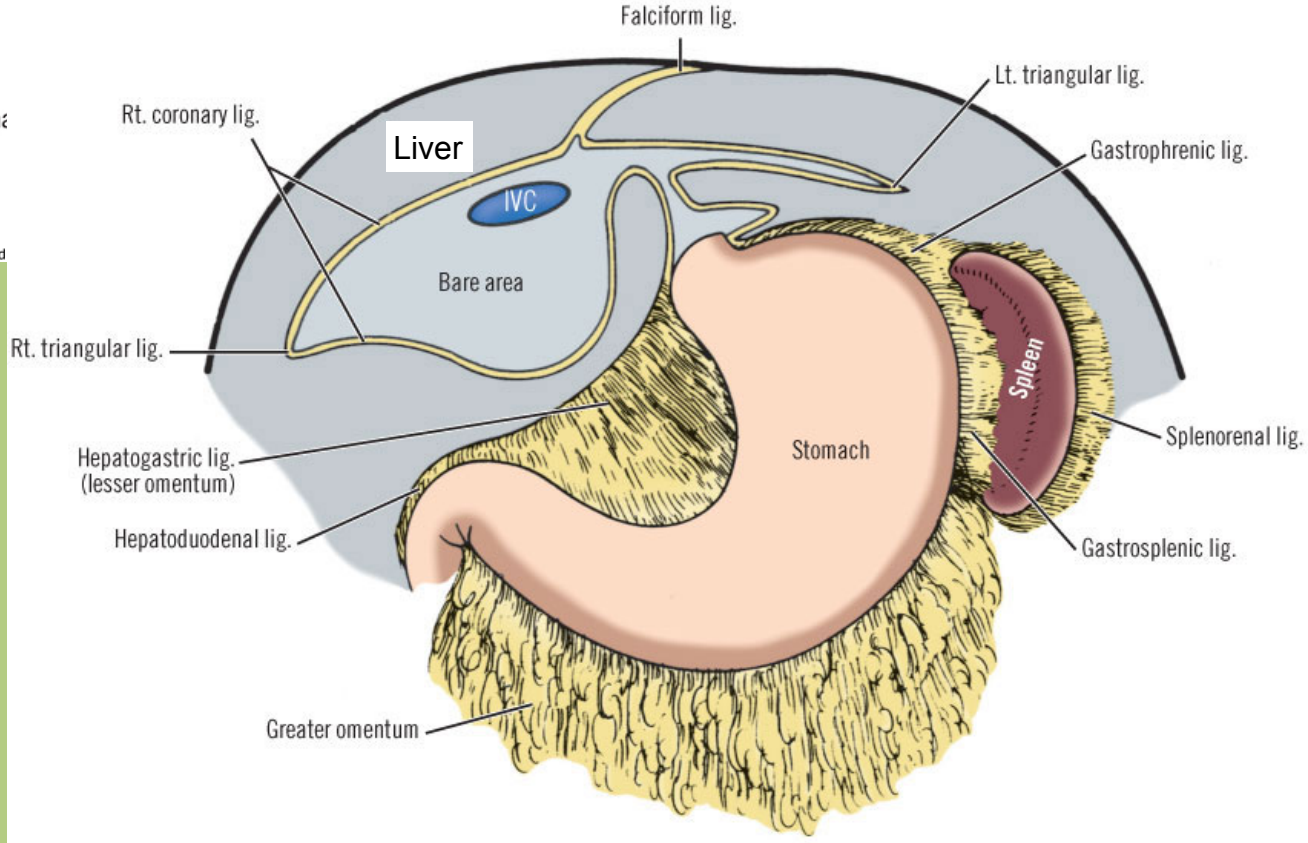
Peritoneal relationships

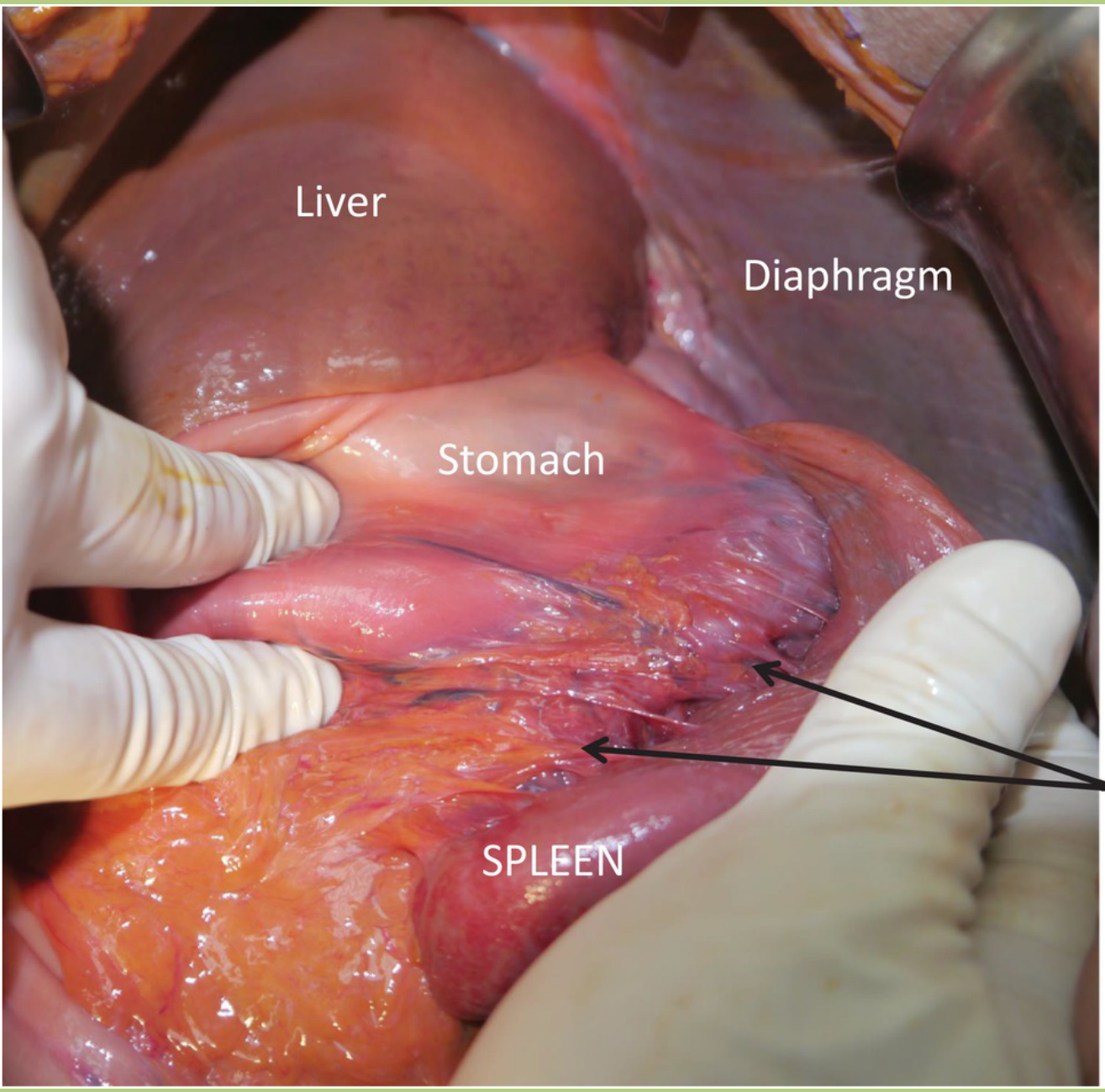
Gastrophrenic ligament: from the upper portion of greater curvature to the diaphragm

Gastrosplenic ligament: from the lateral portion of greater curvature to the spleen

Gastrocolic ligament: between the greater curvature and transverse colon





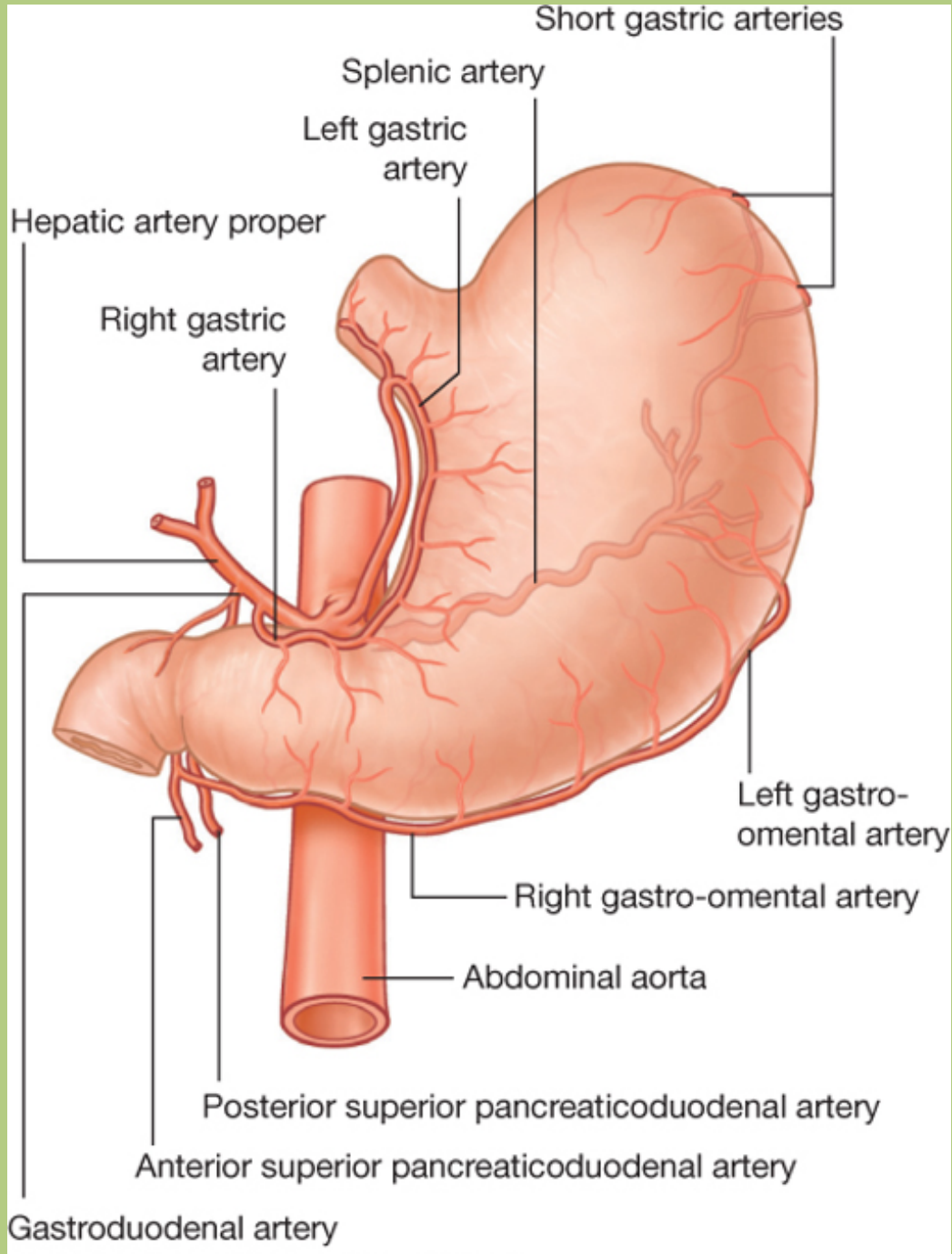

Liver
Diaphragm
Stomach
SPLEEN
Gastrosplenic ligament
with short gastric vessels

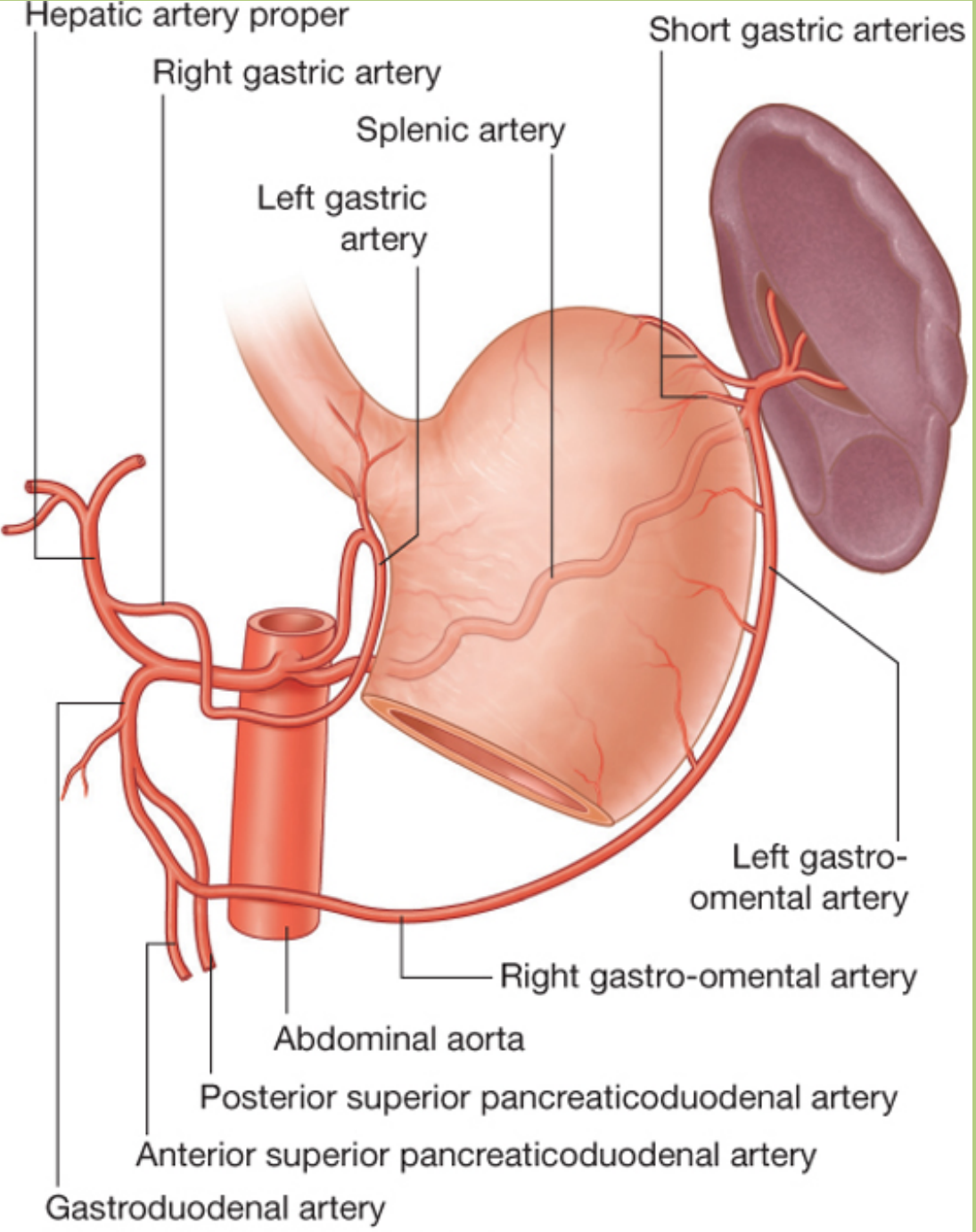
Vasculature - arteries

LESSER CURVATURE (in the hepatogastric ligament):
Left gastric artery: a direct branch of the celiac trunk.

Right gastric artery: arises from hepatic artery proper. (Its origin often varies: the most common alternative is the common hepatic.)

FUNDUS:
Short gastric arteries: they arise from the splenic artery and situate in the gastrosplenic ligament.



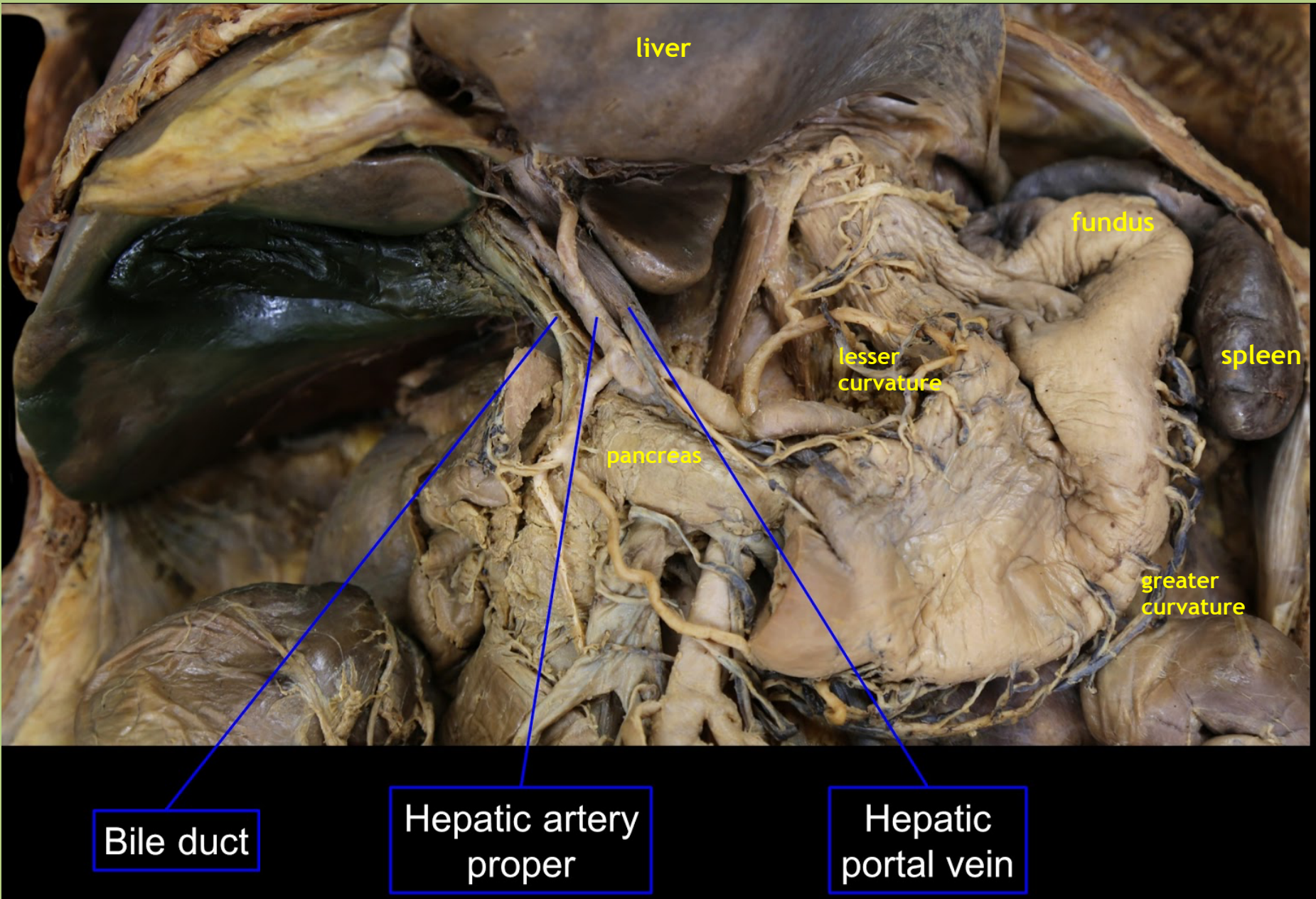


Vasculature - arteries

GREATER CURVATURE (in the greater omentum):

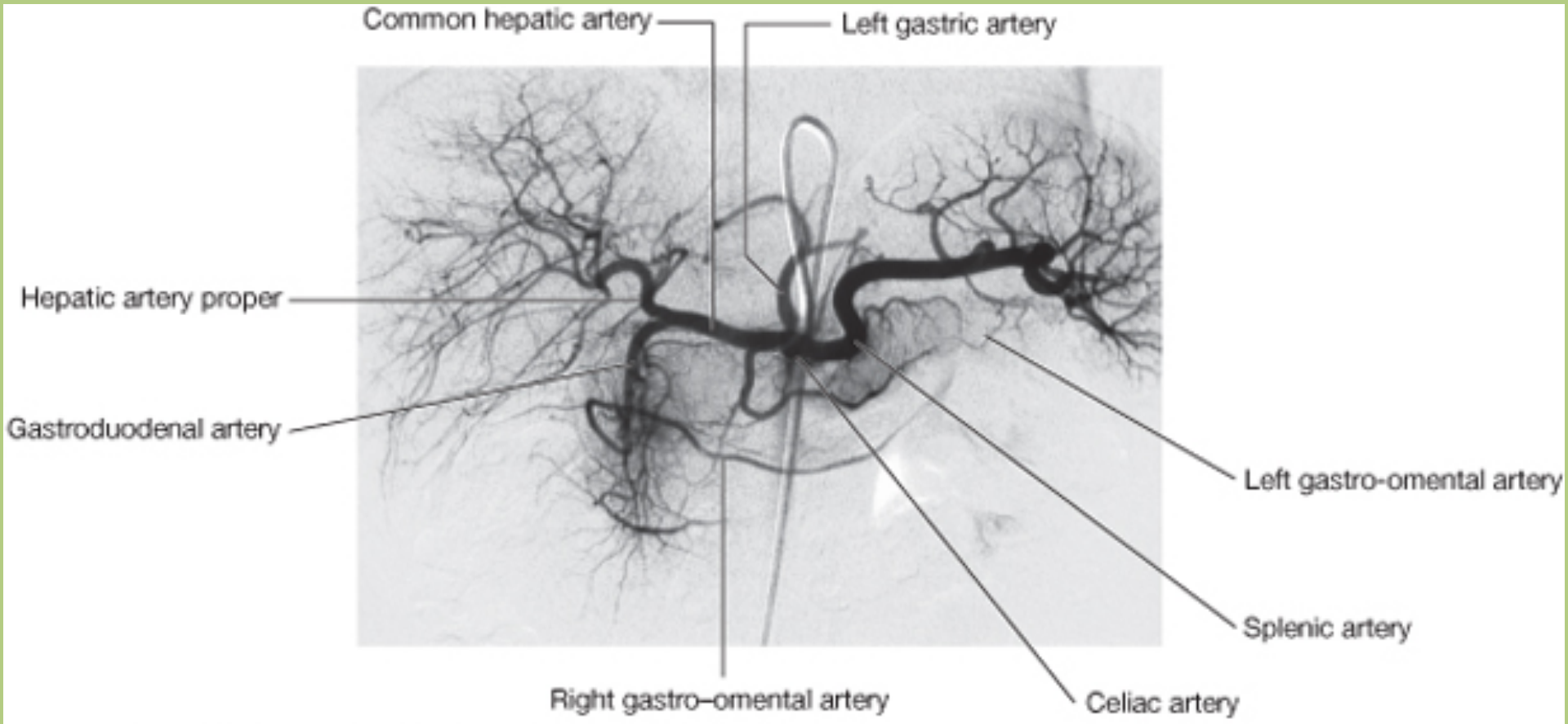
Left gastroepiploic (gastro-omental) artery: branch of the splenic artery.

Right gastroepiploic (gastro-omental) artery: originates from the gastroduodenal artery.

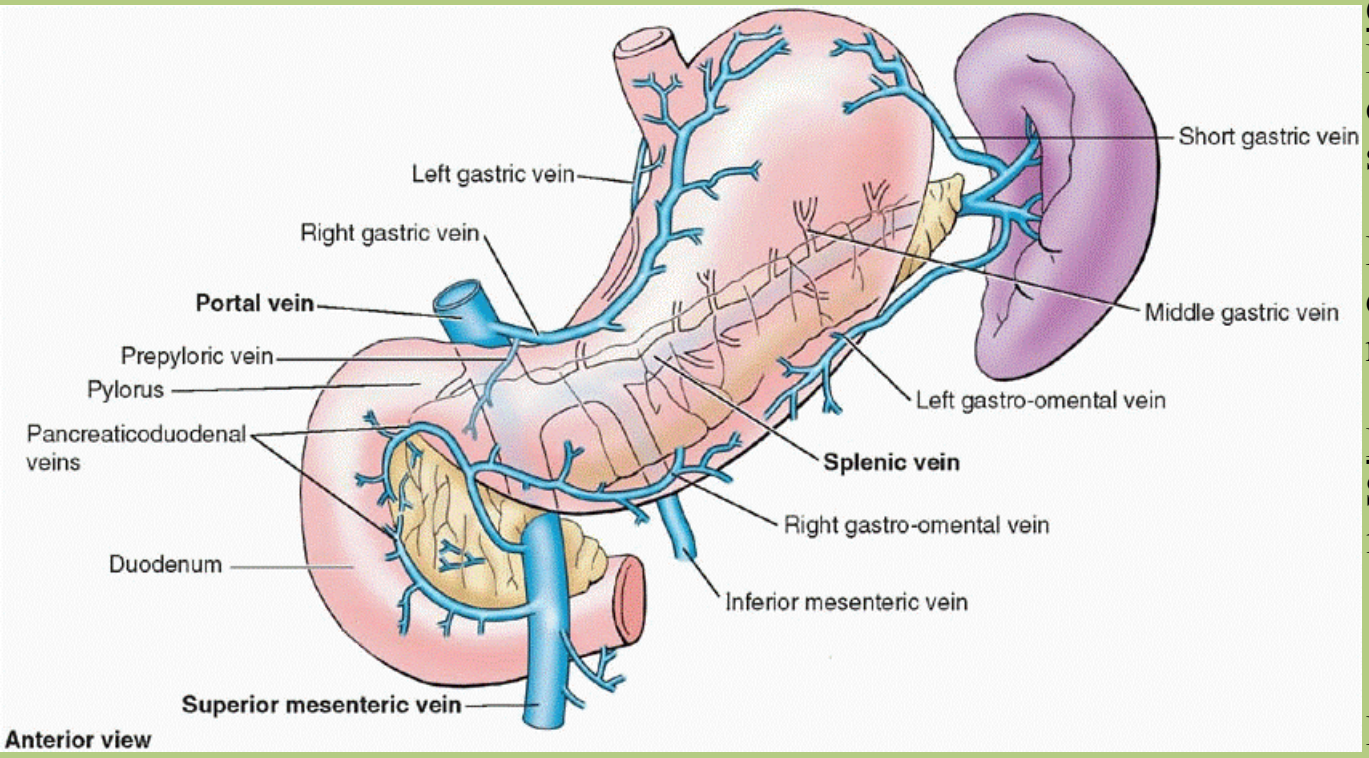


Hepatoduodenal lig. contents, anterior

BlueLink



Vasculature - veins



LESSER CURVATURE:

Left gastric and right gastric veins: drain into the hepatic portal vein.

GREATER CURVATURE:

Left gastroepiploic (gastro-omental) vein: drains into the splenic vein.

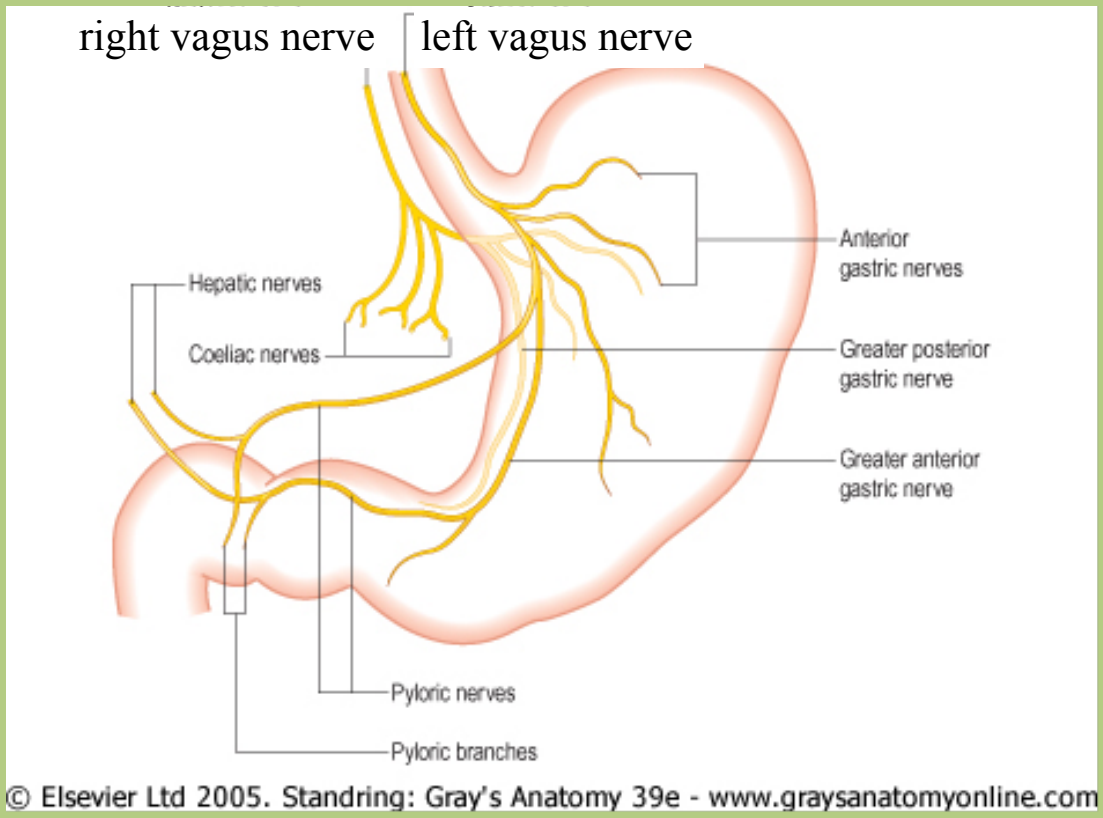
Right gastroepiploic vein: drains into the superior mesenteric vein.

FUNDUS:

Short gastric veins: drains into the splenic vein.

Prepyloric vein: ascends over the pylorus to the right gastric vein. (Surgeons use it for identifying the pylorus.)

Innervation of the stomach



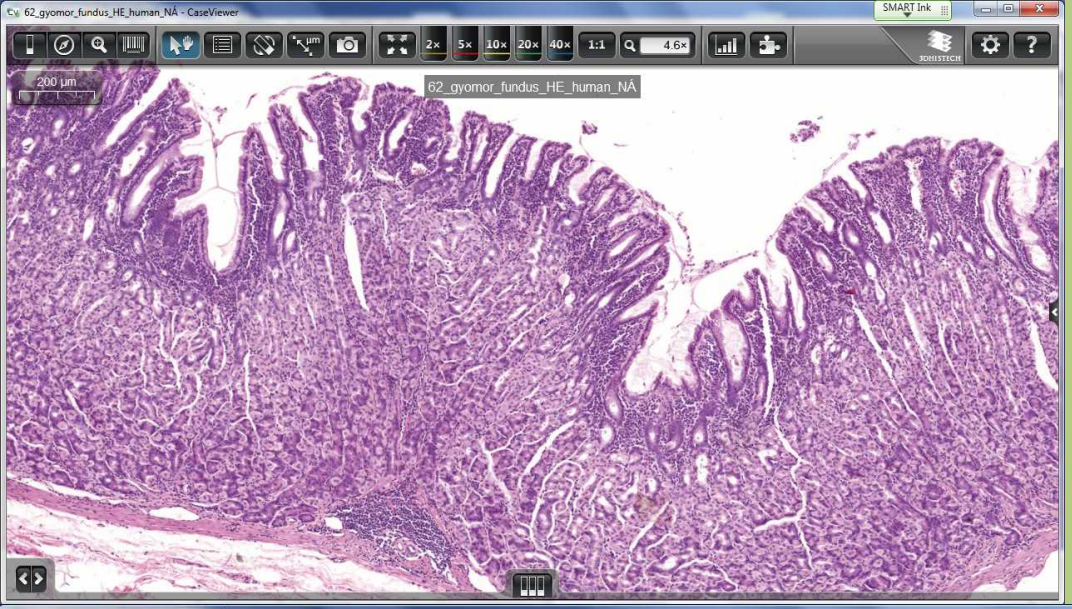
Parasympathetic innervation:
left vagus nerve – anterior side
right vagus nerve - posterior side

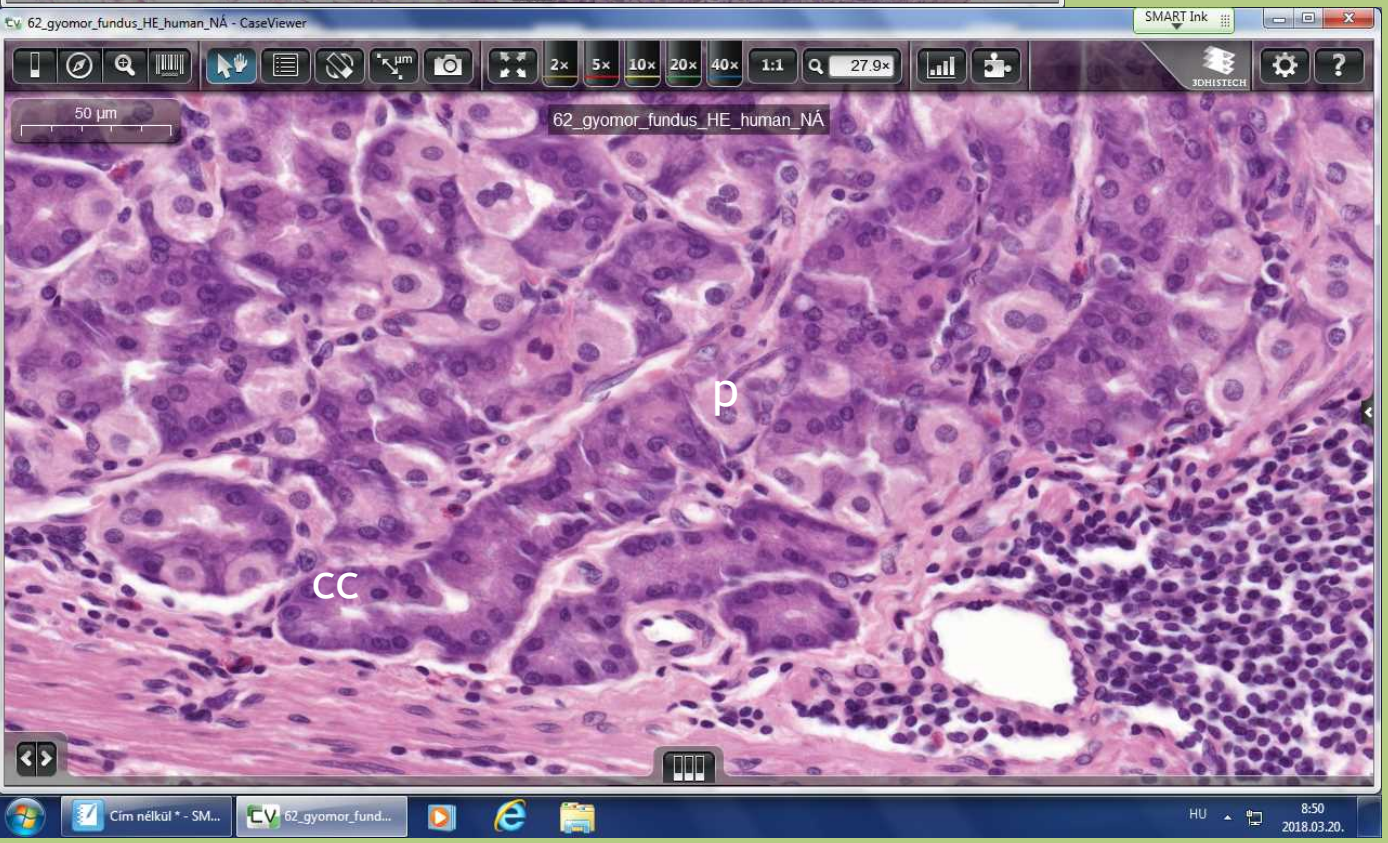
The parasympathetic gastric supply is secretomotor to the gastric mucosa and motor to the gastric musculature. It is responsible for coordinated relaxation of the pyloric sphincter during gastric emptying.

Sympathetic innervation: from T6-9 ganglia via the ***greater splanchnic nerve via celiac plexus***.

The gastric sympathetic nerves are vasoconstrictor to the gastric vasculature and inhibitory to gastric musculature. The sympathetic supply to the pylorus is motor, and brings about pyloric constriction.

Histology of the stomach



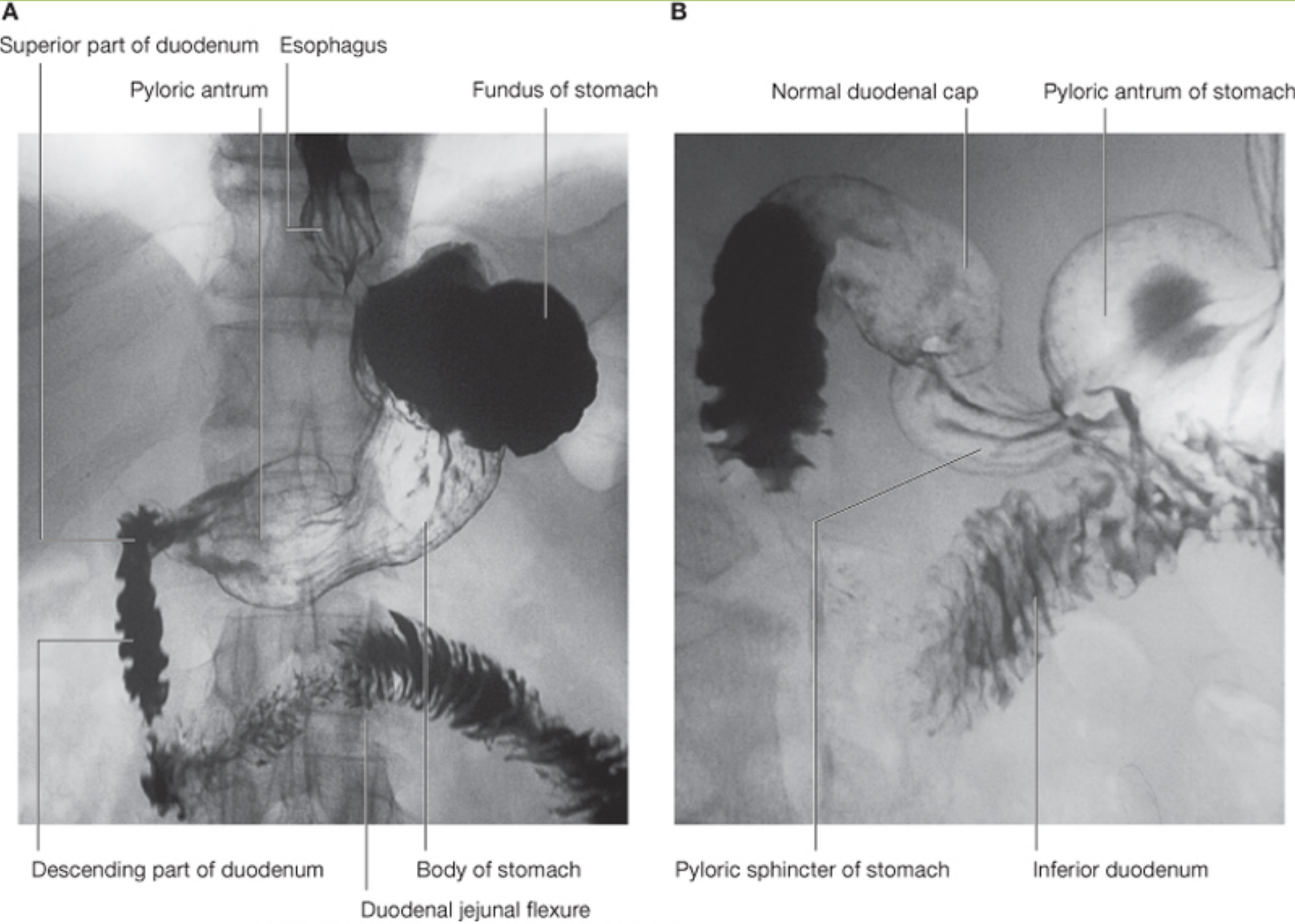


Gastric glands:

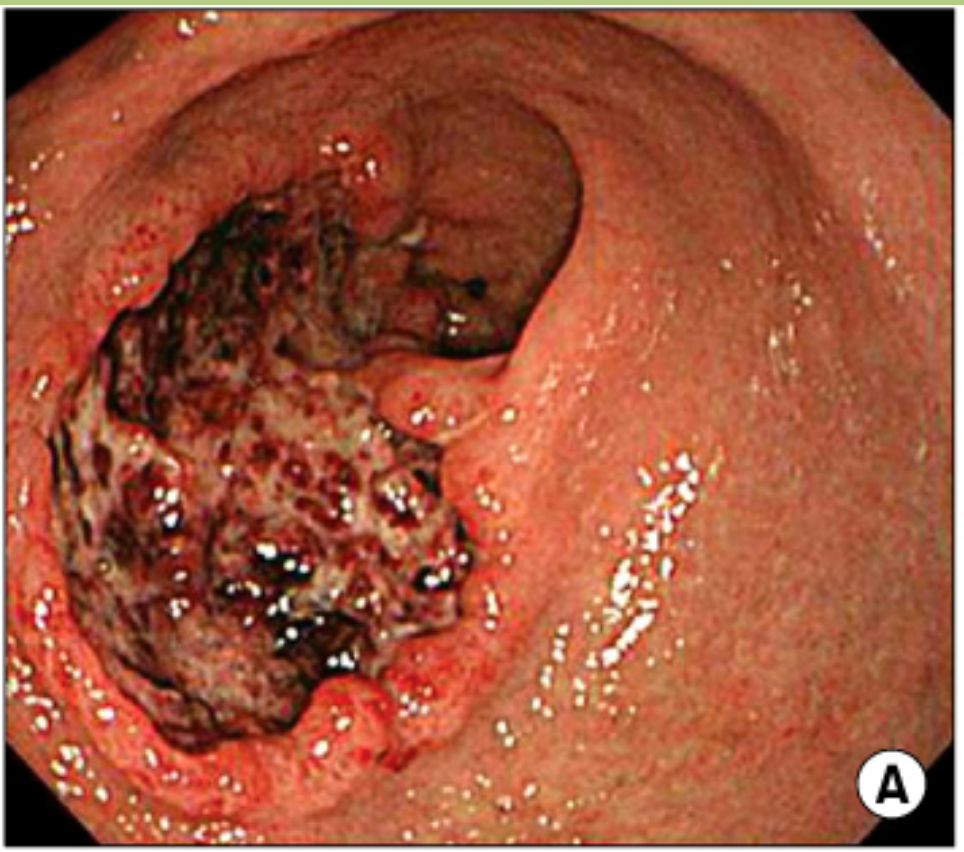
Chief cells (cc): pepsinogen
Parietal cells (p): HCL, intrinsic factor (essential for the absorption of Vitamin B_{12})
Mucus secreting neck cells
Enteroendocrine cells
Undifferentiating cells

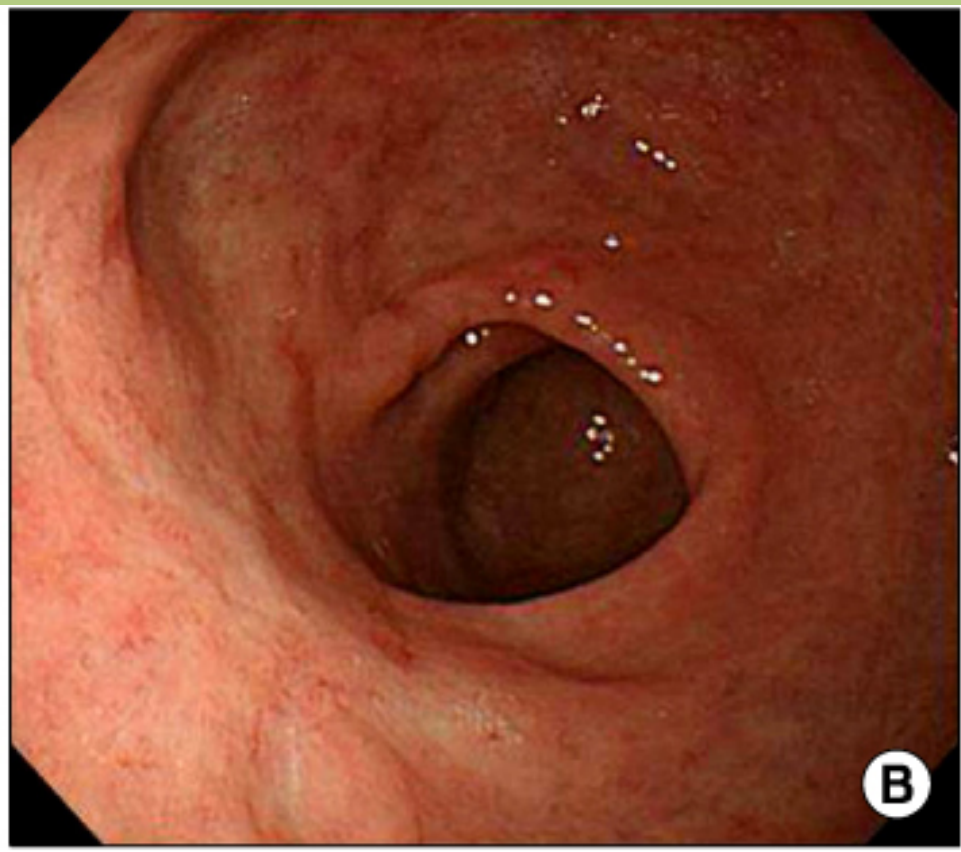
Functions

- Pepsinogen production
- Mucous secretion – gastric mucosa barrier
- HCL and intrinsic factor production
- Gastrin, somatostatin secretion
- Motor function: peristalsis
- Absorption: some drugs (aspirin), ethanol, caffeine

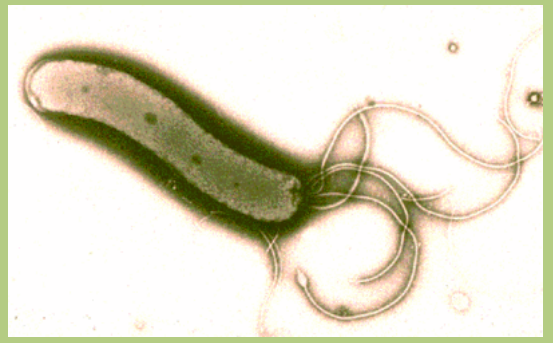


Gastric ulcer



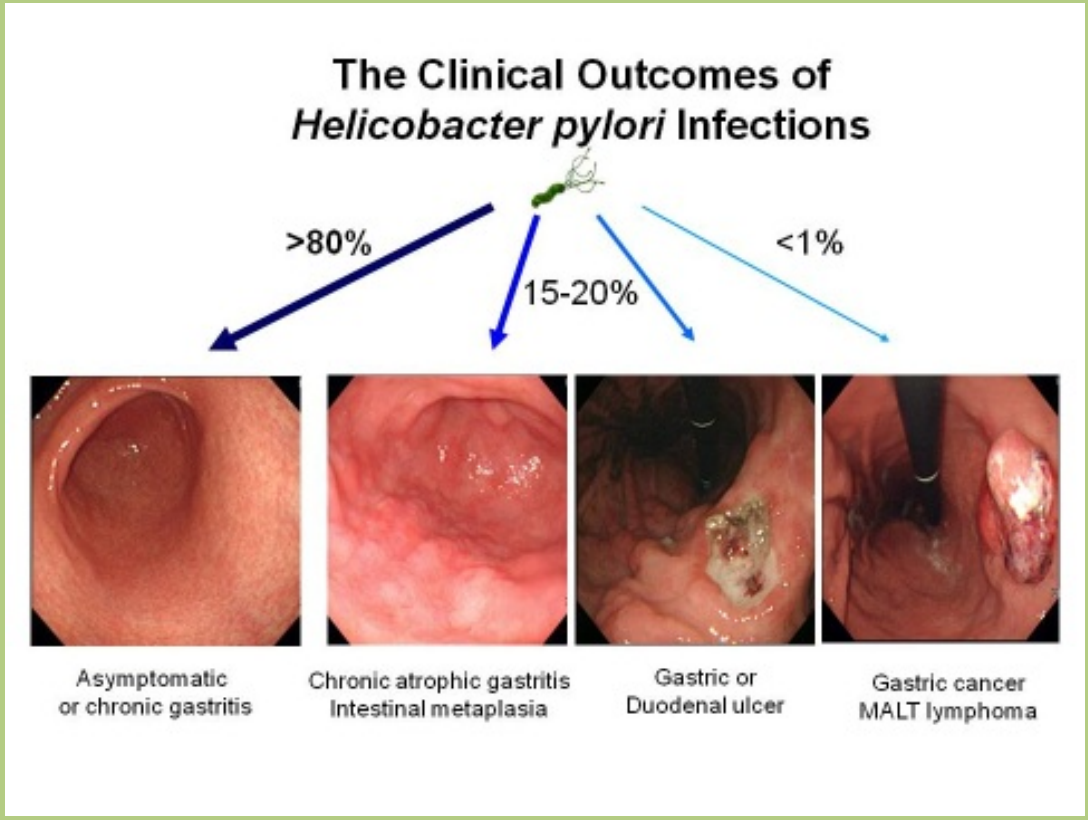


Helicobacter pylori



- Barry Marshall and Robin Warren – Nobel prize 2005

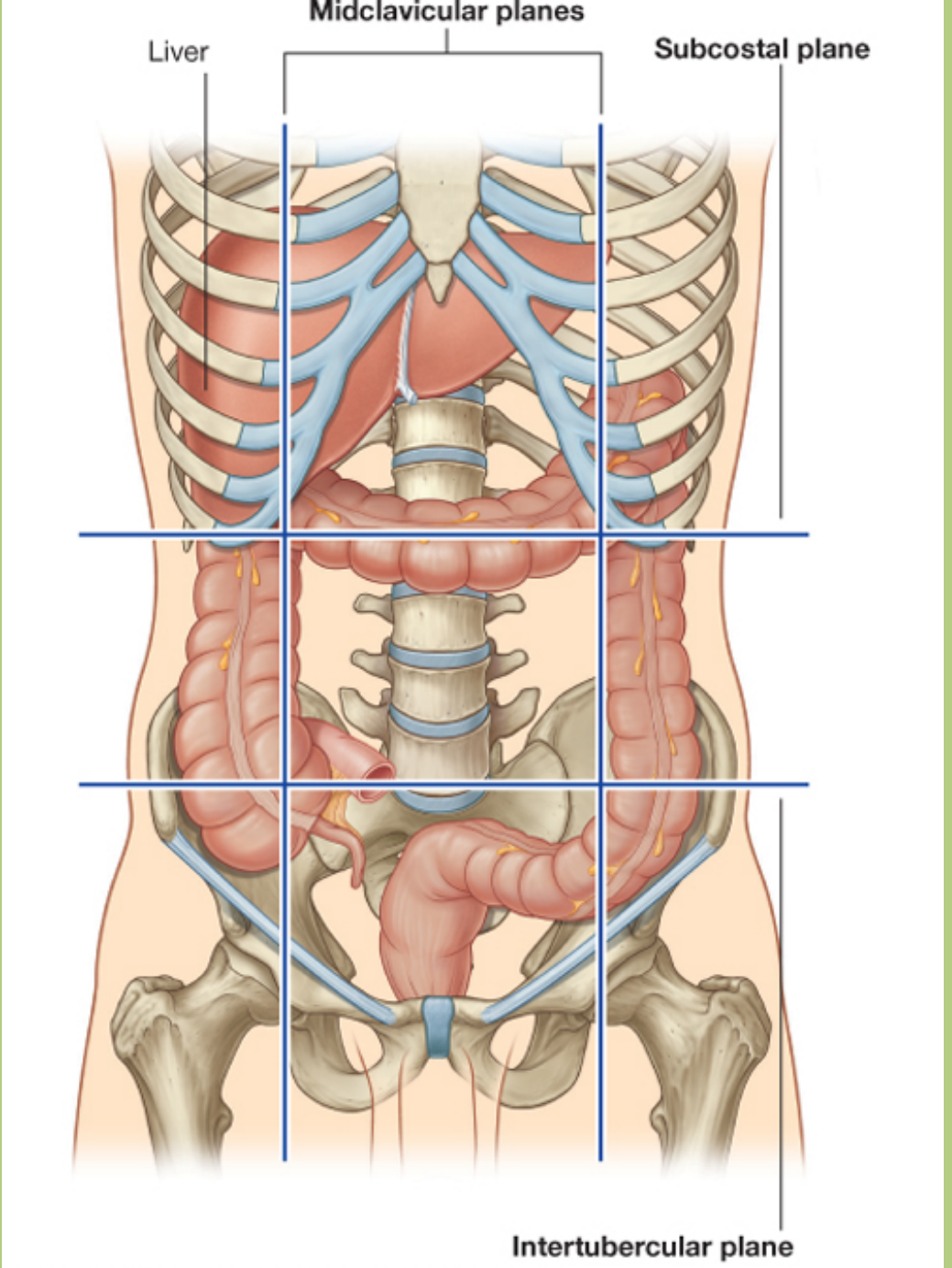
Helicobacter pylori



Gastric carcinoma:

Major risk factors: high salt intake, Helicobacter pylori infection (more than 50% of the world's population harbor H. pylori in their stomach or duodenum).

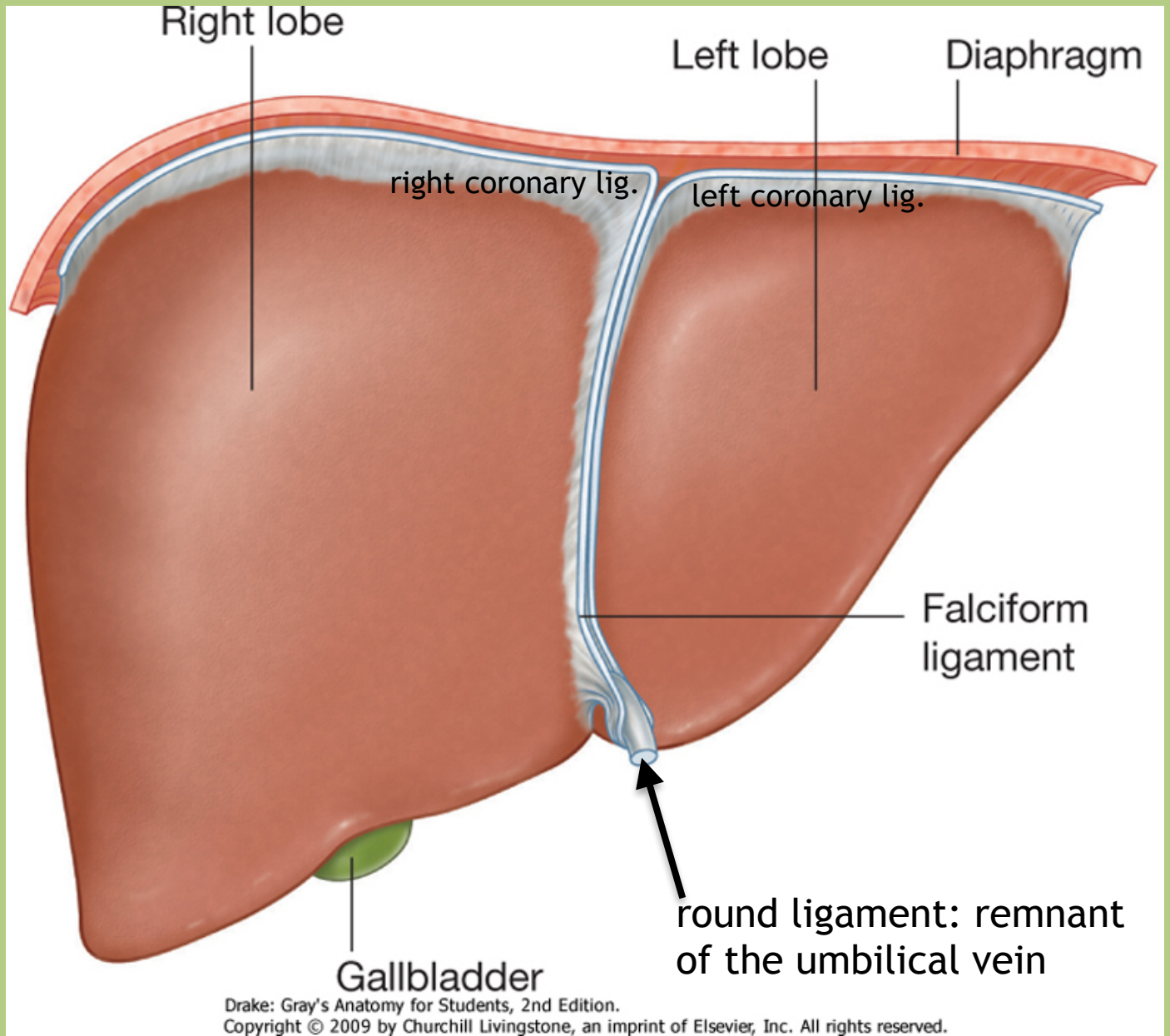
Protectives: fresh vegetables and fruits.

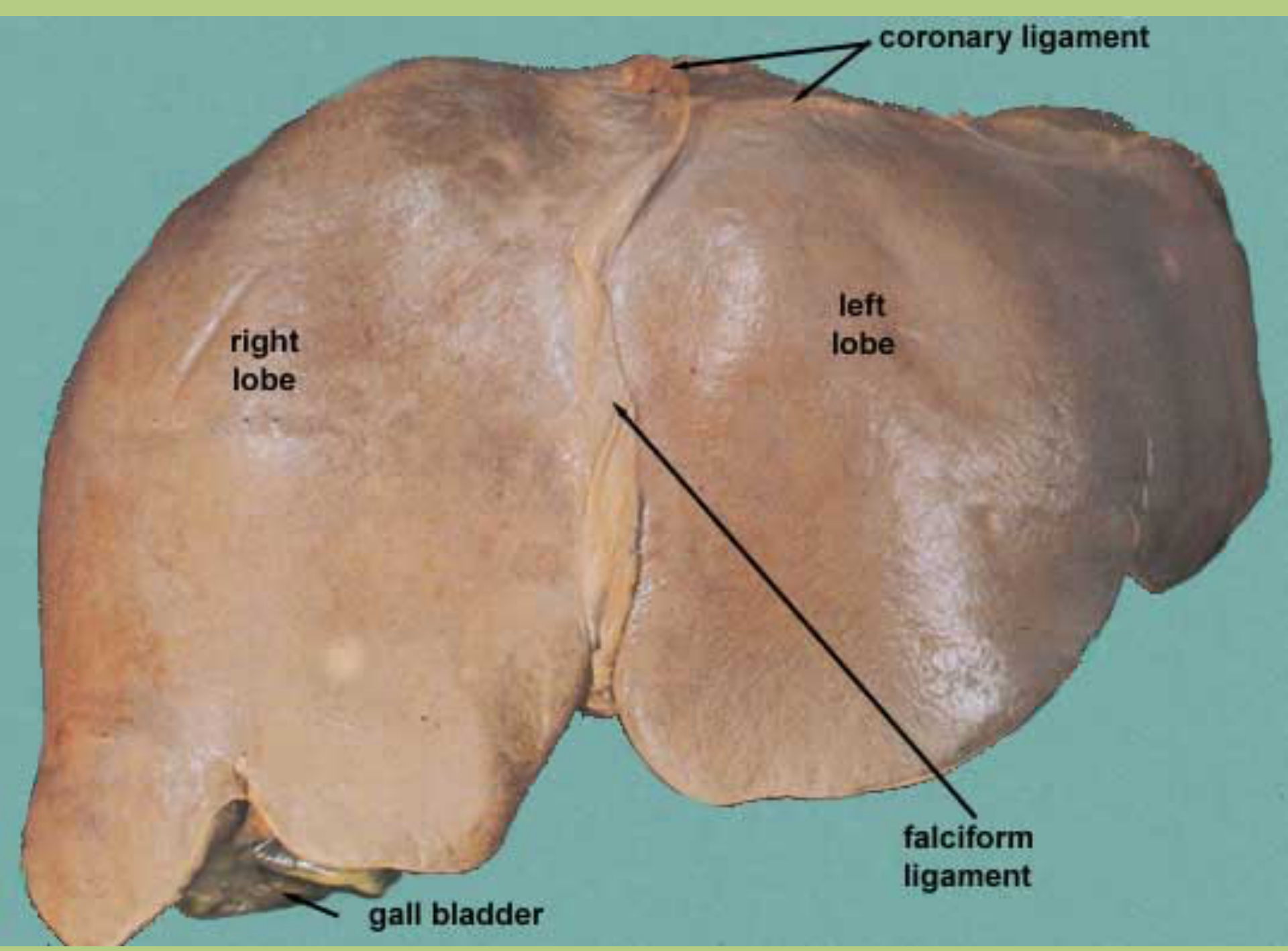


Liver - location

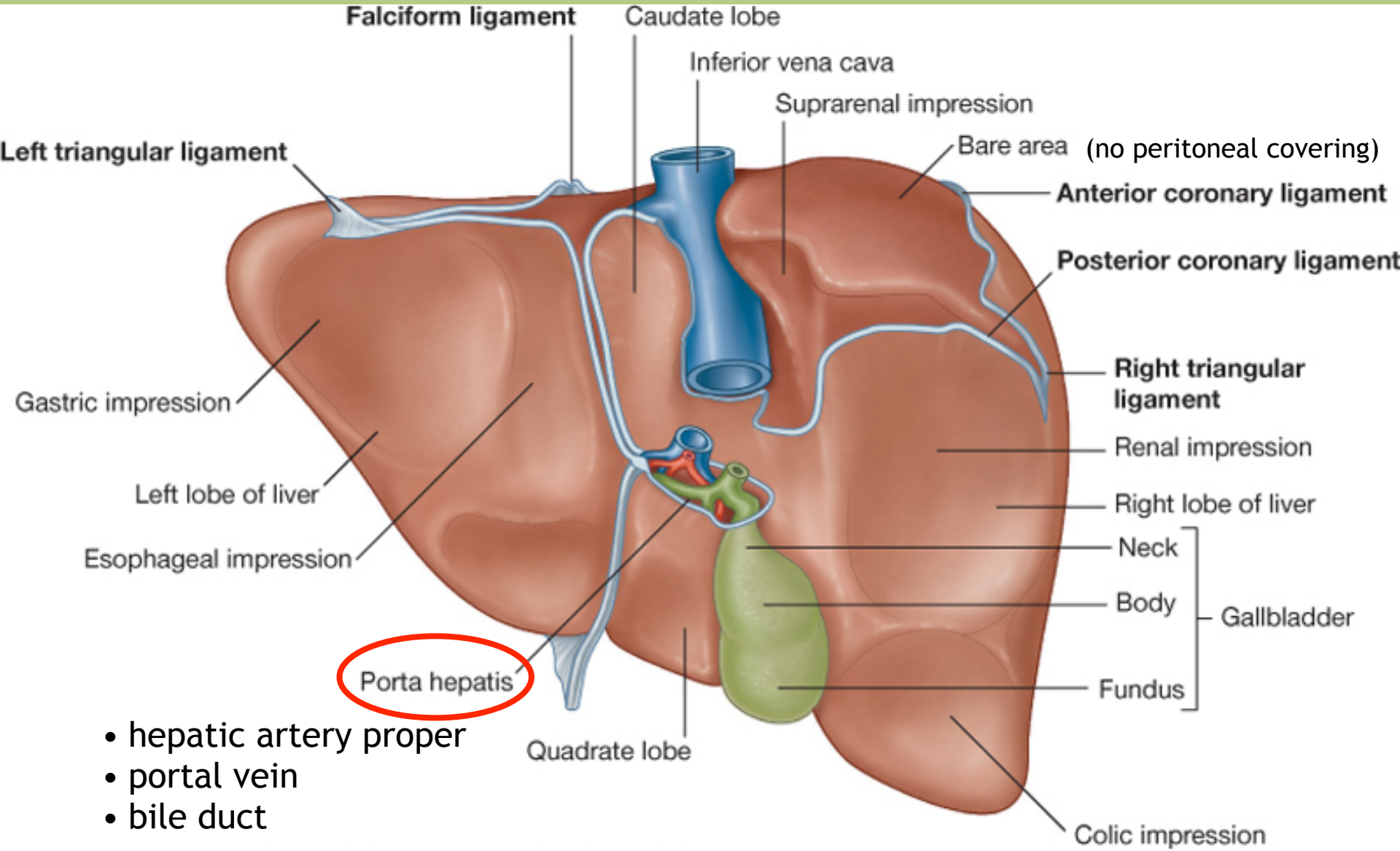
- Right hypochondrium and epigastrium
- Intraperitoneal organ (except: bare area)

Liver - costal surface

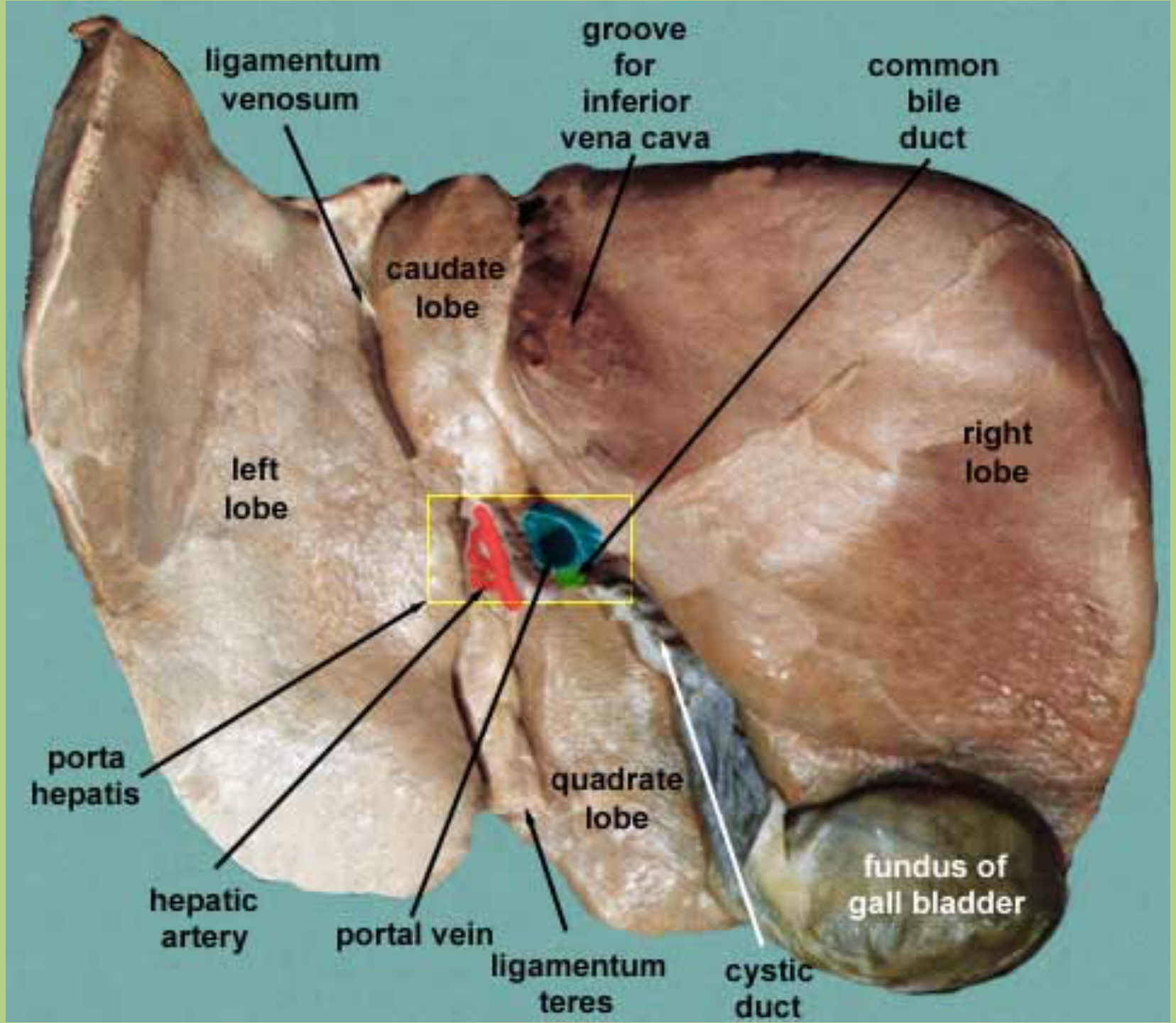



coronary ligament
right lobe
left lobe
falciform ligament
gall bladder

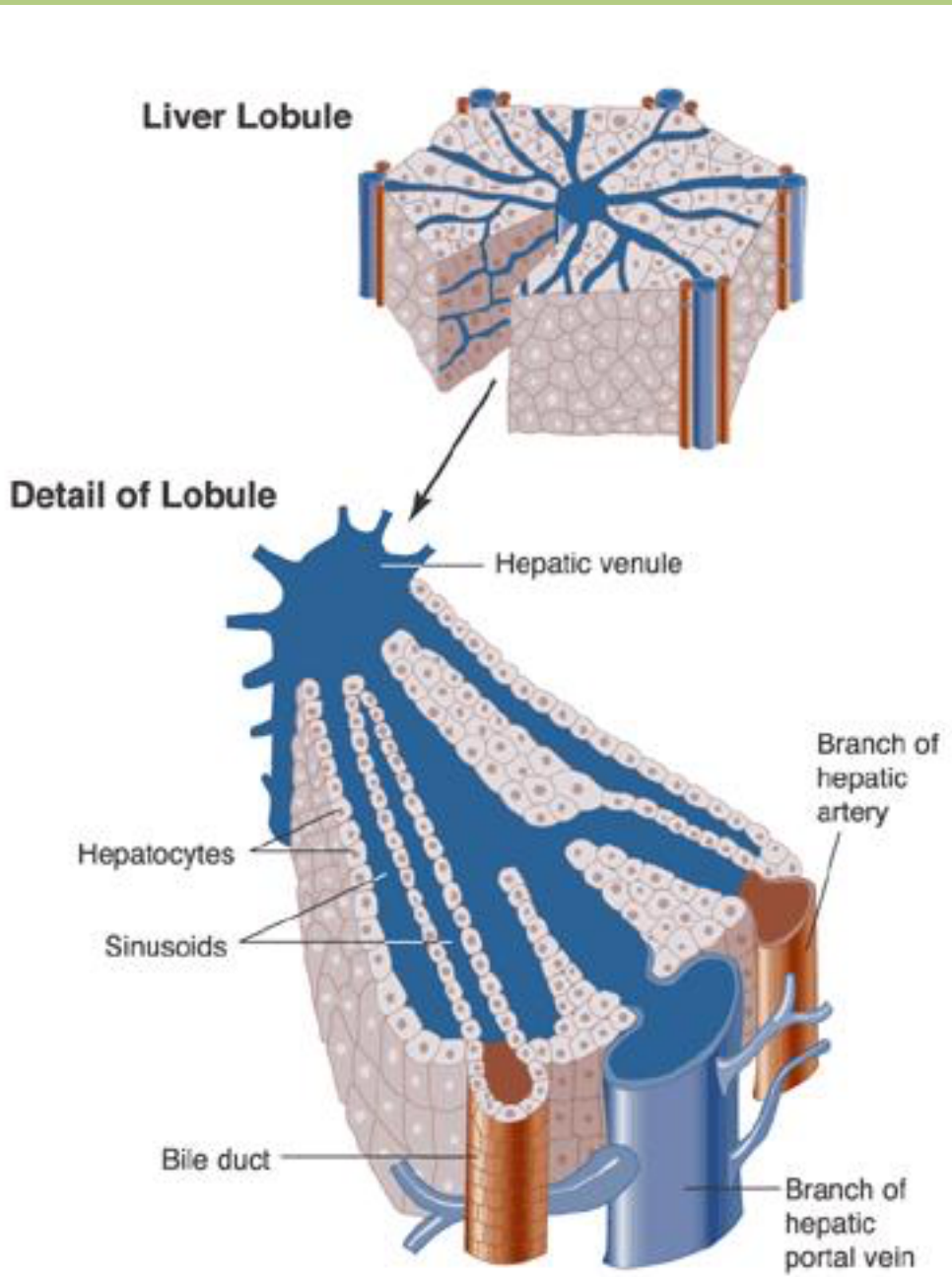
Liver - visceral surface



- hepatic artery proper
- portal vein
- bile duct


ligamentum venosum
groove for inferior vena cava
common bile duct
caudate lobe
left lobe
right lobe
porta hepatis
quadrate lobe
fundus of gall bladder
hepatic artery
portal vein
ligamentum teres
cystic duct

Liver - structural and functional unit



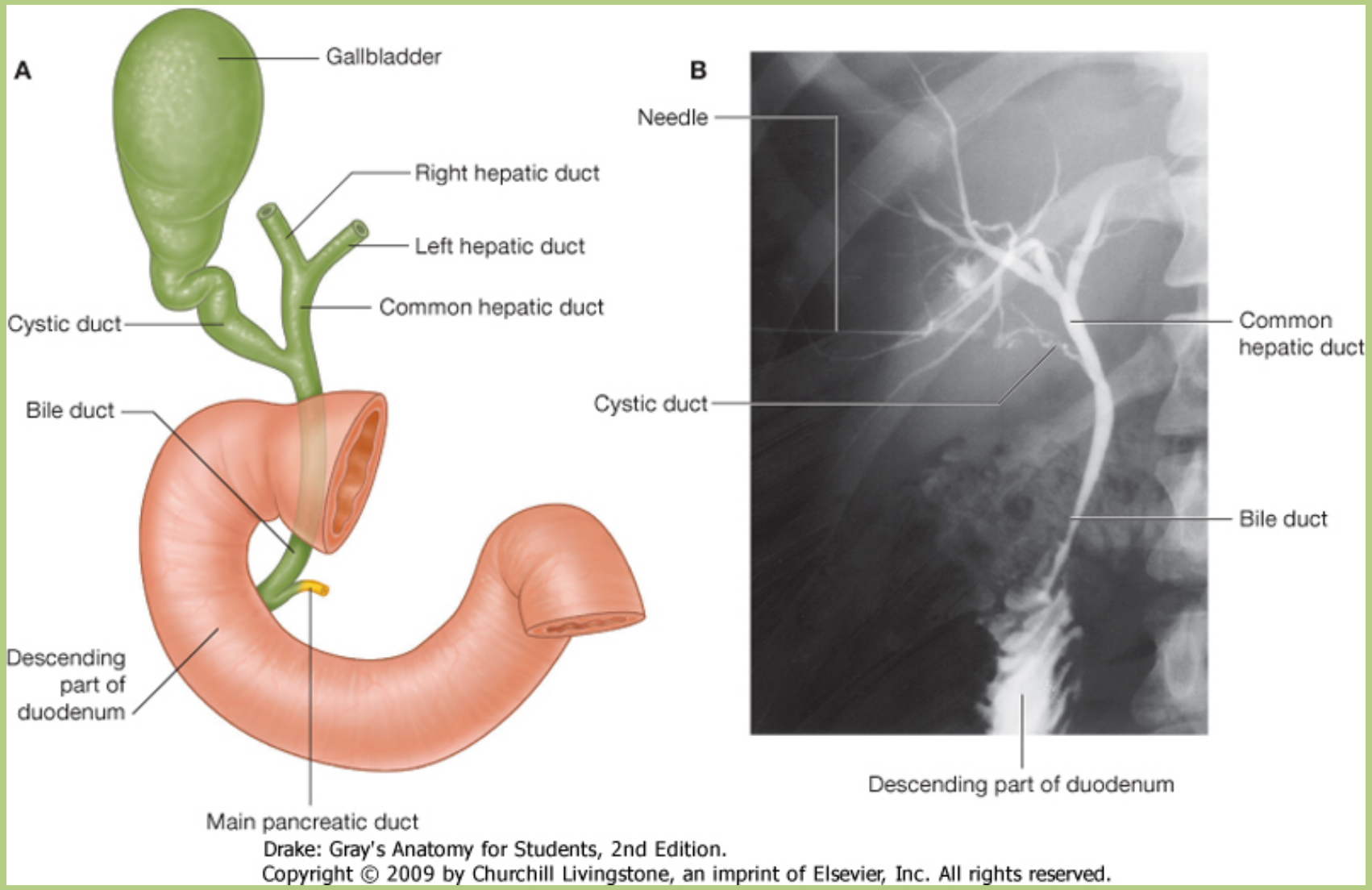
- hepatic lobule

Main functions of the liver

- **Dietary function:** 1. bile production (emulsifies lipids), 2. storage of glycogen, 3. storage of vitamins (A, D, E, K, B_{12}) 4. modifies carbohydrates, fats and proteins for utilisation

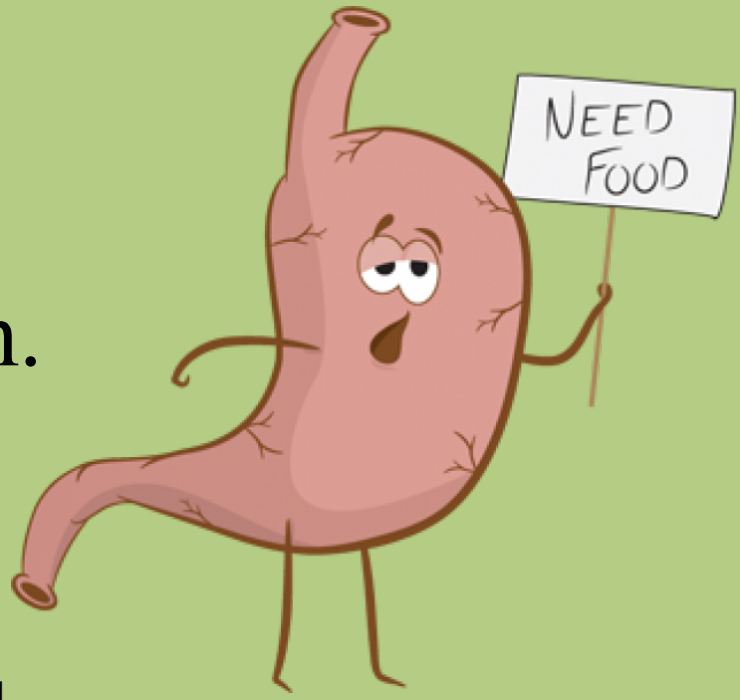
- **In fetus, forms red blood cells** (RBC)
- **Fibrinogen** and **prothrombin** synthesis
- **Elimination of old and degenerated RBCs** by Kupffer cells
- **Detoxifies nitrogenous waste** producing **urea** and **ammonia**

Gallbladder



- storage of the bile
- absorption of water from the bile

Thank you for your attention.



References: Drake: Gray's Anatomy for Students, 2nd ed.
Standring: Gray's Anatomy, 39th ed.