The Foregut Organs & Vessels

Lab 8

November 1, 2023 - Dr. Doroudi (majid.doroudi@ubc.ca)

Dissector

Objectives:

- Describe the general arrangement of the peritoneum
- Describe the arrangement of the mesenteries and omenta
- Define the relationships of the major abdominal viscera to each other
- Differentiate the relationships of the major abdominal viscera to the peritoneum, i.e. is the organ **intraperitoneal** (suspended by mesentery) or **retroperitoneal** (attached to the posterior abdominal wall)
- Define the derivatives of the foregut
- Describe the blood supply of the organs derived from foregut

Watch these dissection guide videos:

Foregut Dissection (Video)

Peritoneum Dissection (Video)

View the interactive module:

Foregut (Module)

Identify checklist structures on the interactive photo and specimens in the virtual lab:

Foregut (Atlas)

Mesentery (3D)

Foregut Organs (3D)

Liver + Biliary (3D)

Liver/Gallbladder (3D)

Cadaver dissections showing abdominal cavity with the greater omentum (left) and organs beneath (right)

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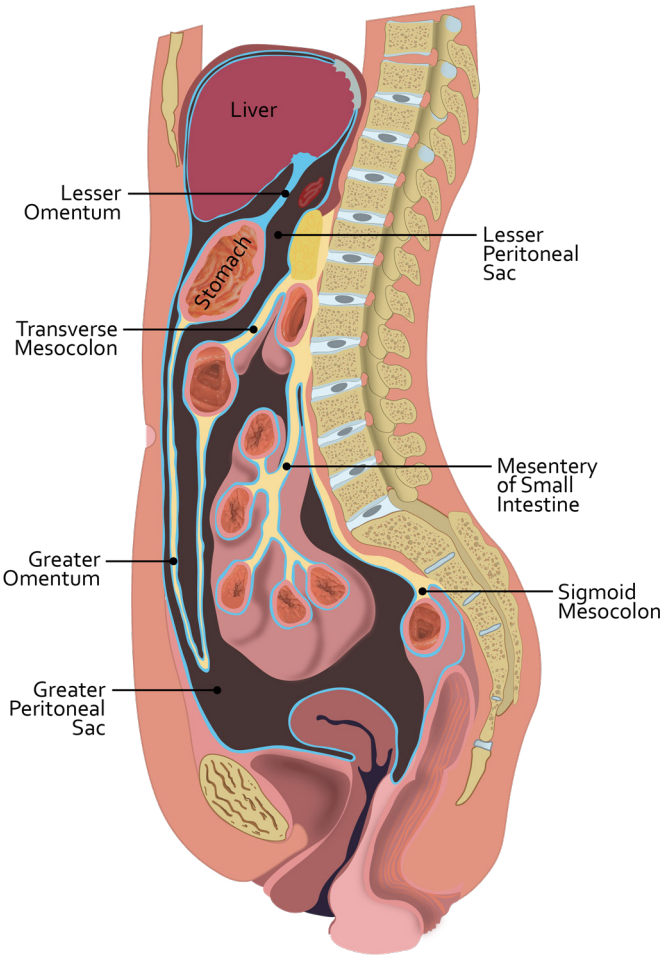
Mesentery & Ligaments:

Starting with the oesophagus, trace all components of the GI system to the rectum and identify which are **intraperitoneal** and which are **retroperitoneal**.

- ◯ Derivatives of the dorsal mesentery
  - Greater omentum *(2 layers)*
  - Mesentery of small intestine *(2 layers)*
  - Transverse mesocolon *(2 layers)*
  - Sigmoid mesocolon *(2 layers)*
  - Mesoappendix *(2 layers)*
- ◯ Derivatives of the ventral mesentery
  - Falciform ligament *(you can find the **ligamentum teres** OR **round ligament of liver** along its inferior border)*
  - Lesser omentum
    - Hepatoduodenal ligament and its contents:
      - Hepatic portal vein
      - Hepatic artery
      - Common bile duct
- ◯ Greater peritoneal sac
- ◯ Lesser peritoneal sac (omental bursa)
  - Epiploic foramen of Winslow (gastroepiploic foramen)

Note that the 4 embryological layers of the greater omentum are fused in the adult - this illustration shows the conceptual overview of how the anatomy of the greater omentum comes together.



Sagittal Section of Peritoneum (blue line)

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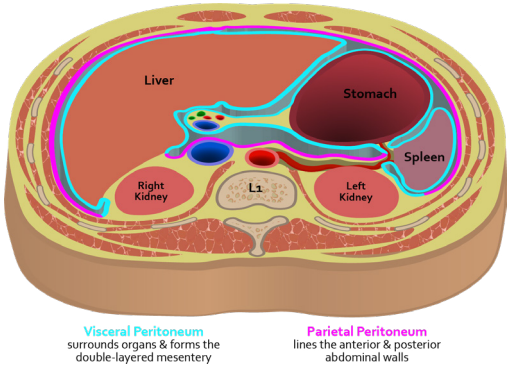

Transverse Section of Abdomen (Inferior View)

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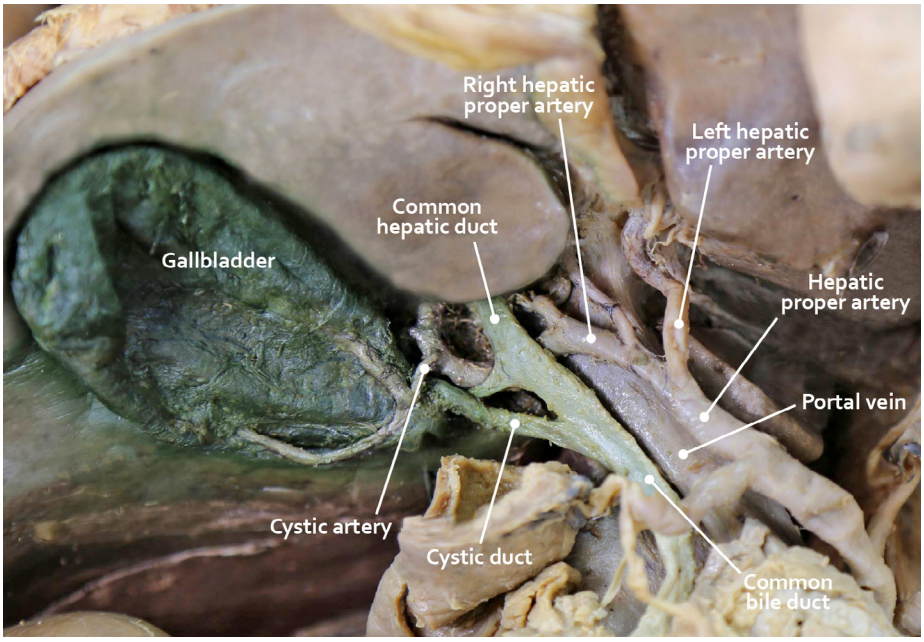

Contents of Hepatoduodenal Ligament

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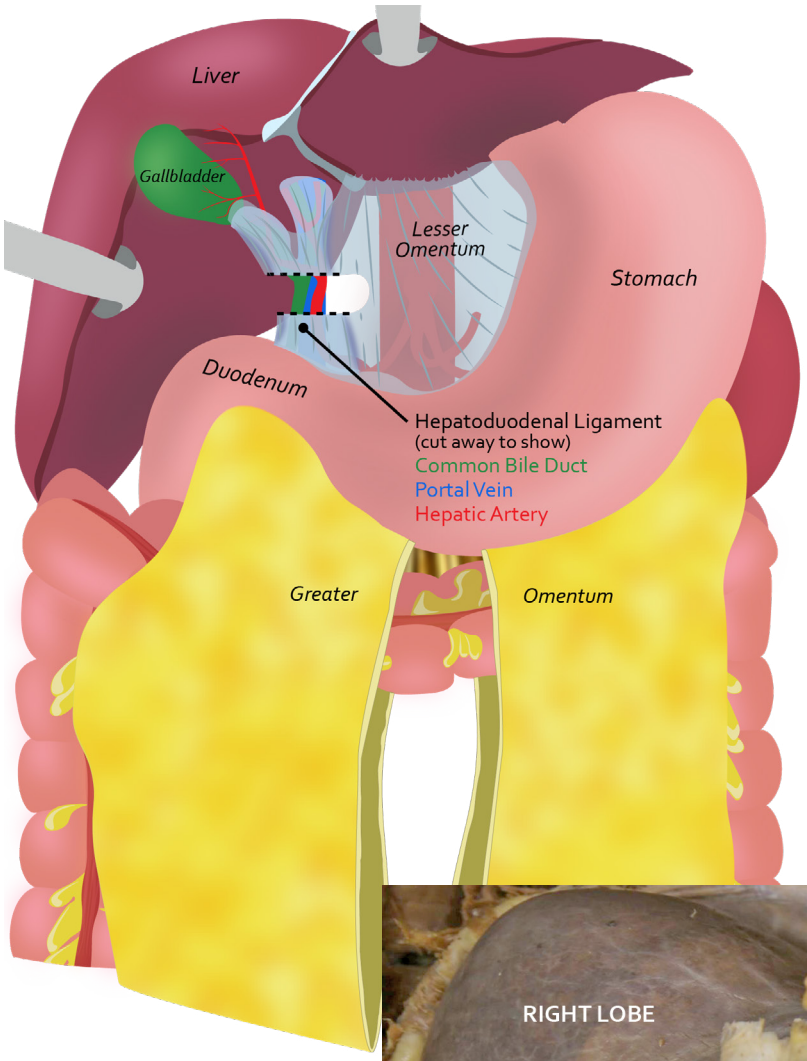

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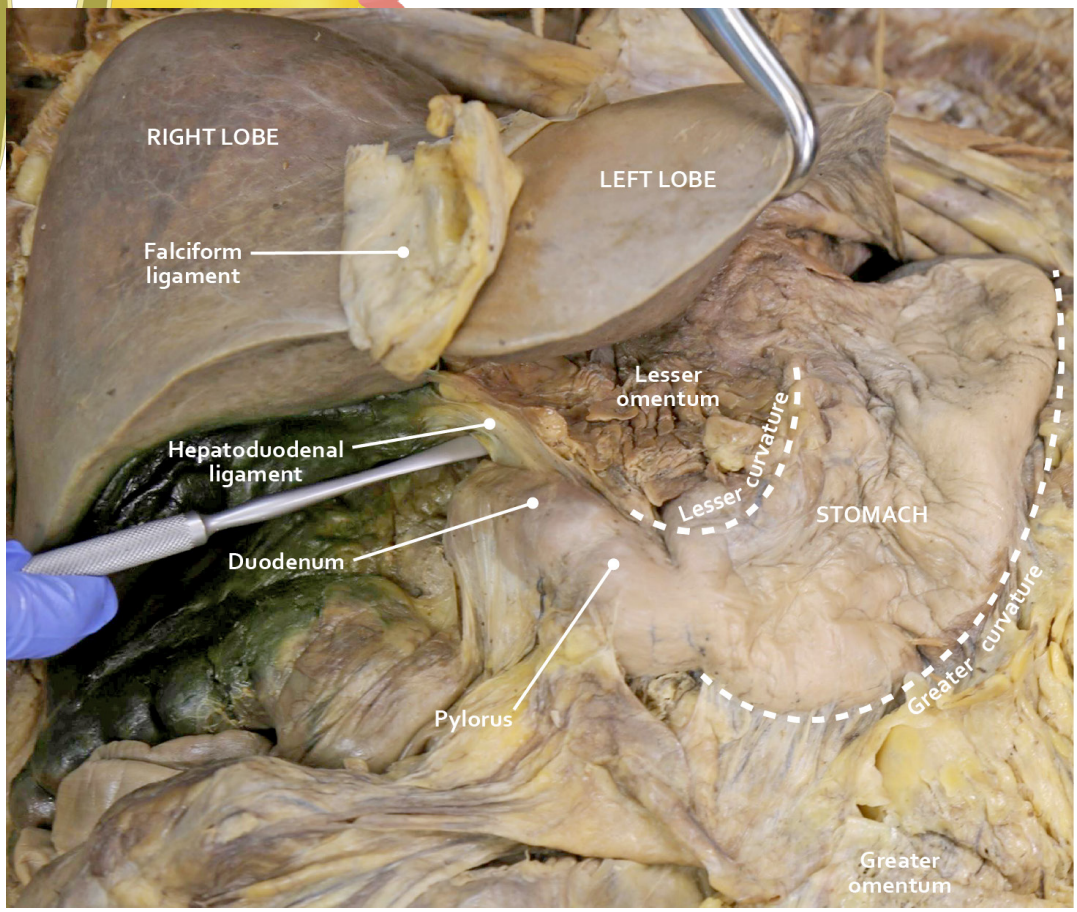
Foregut Organs



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Foregut Organs

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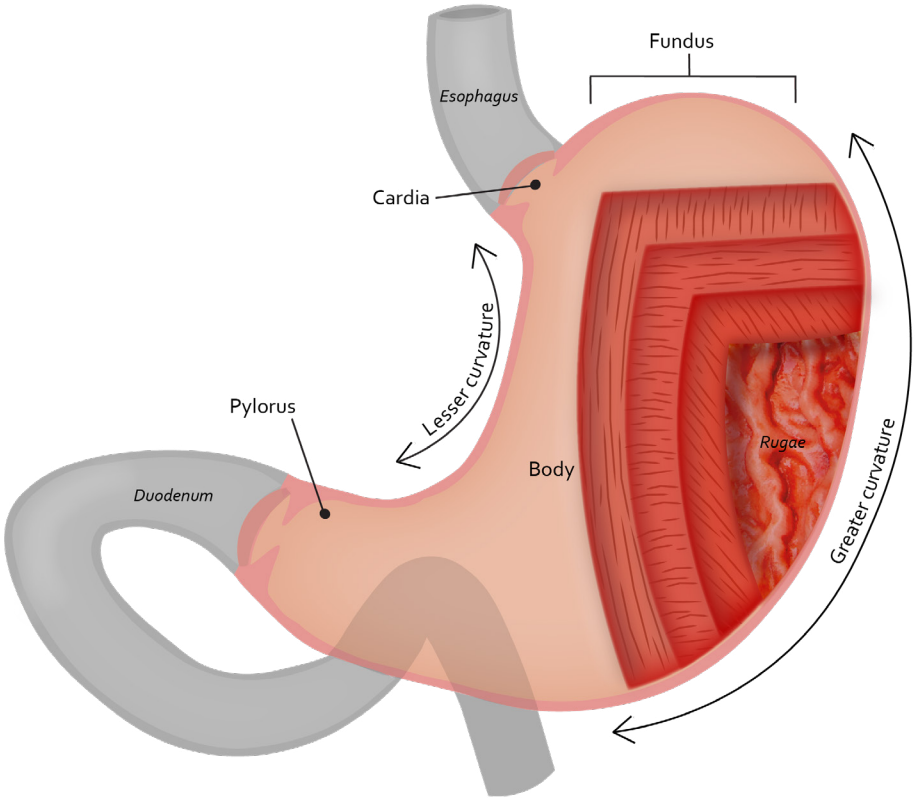

Stomach:

- Cardia
- Fundus
- Body
- Greater & lesser curvatures
- Pylorus
- Anterior & posterior surfaces

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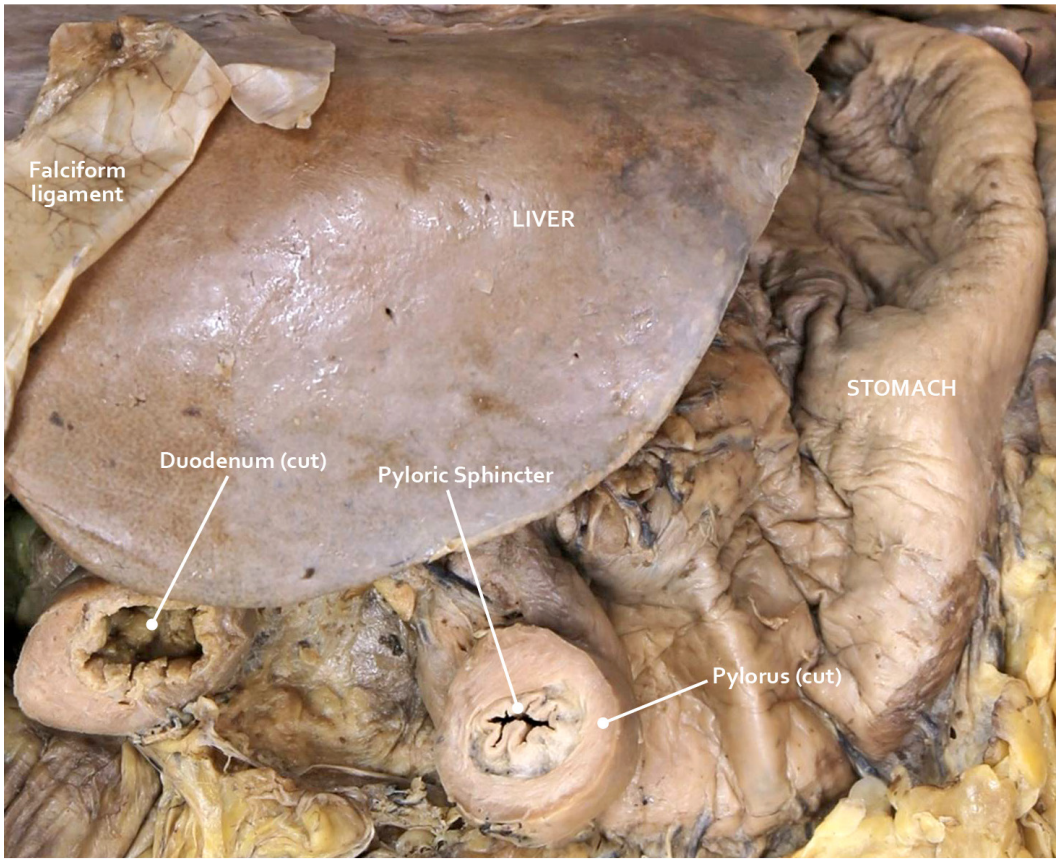
Anatomy of the Stomach



Stomach in Situ
(B. Kathleen Alsup & Glenn M. Fox, University of Michigan Medical School, BlueLink)

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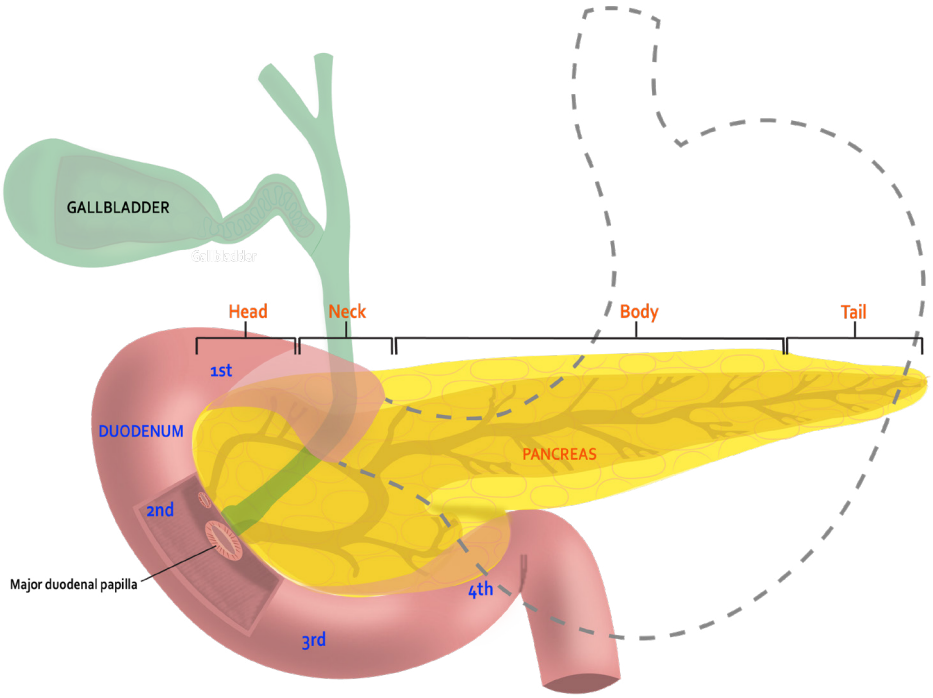
Duodenum:

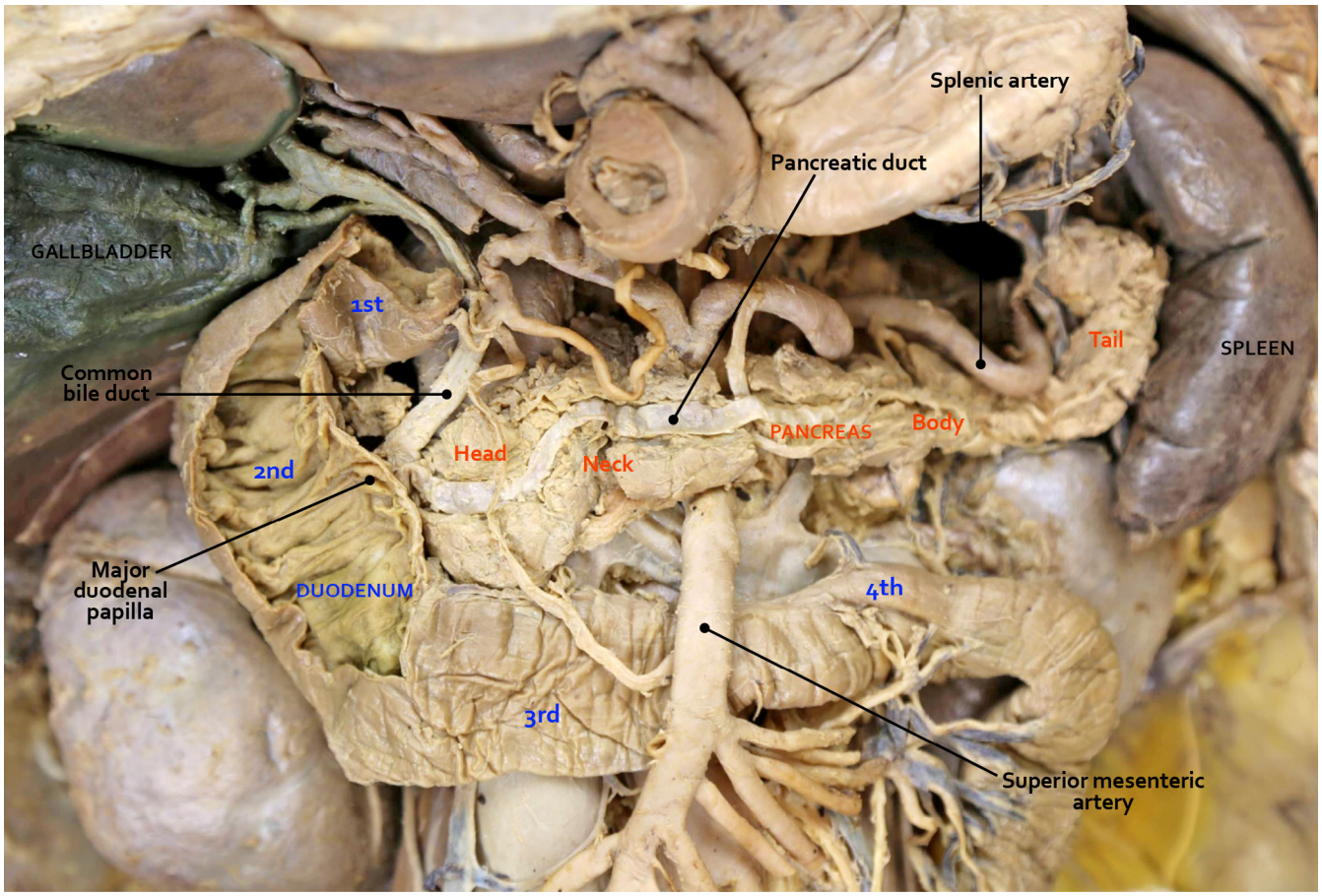
- First part
- Second part
  - Major duodenal papilla (opening of common bile duct to second part of duodenum)
- Third part
- Fourth part

Pancreas:

- Head
- Neck
- Body
- Tail

Spleen





Duodenum & Pancreas
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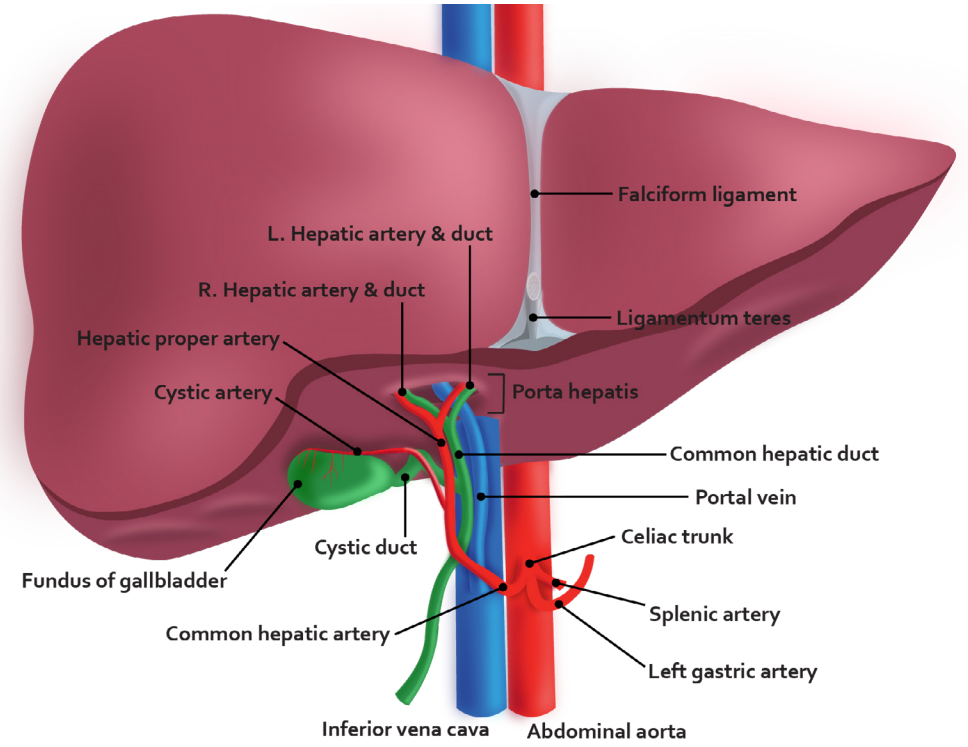
Liver:

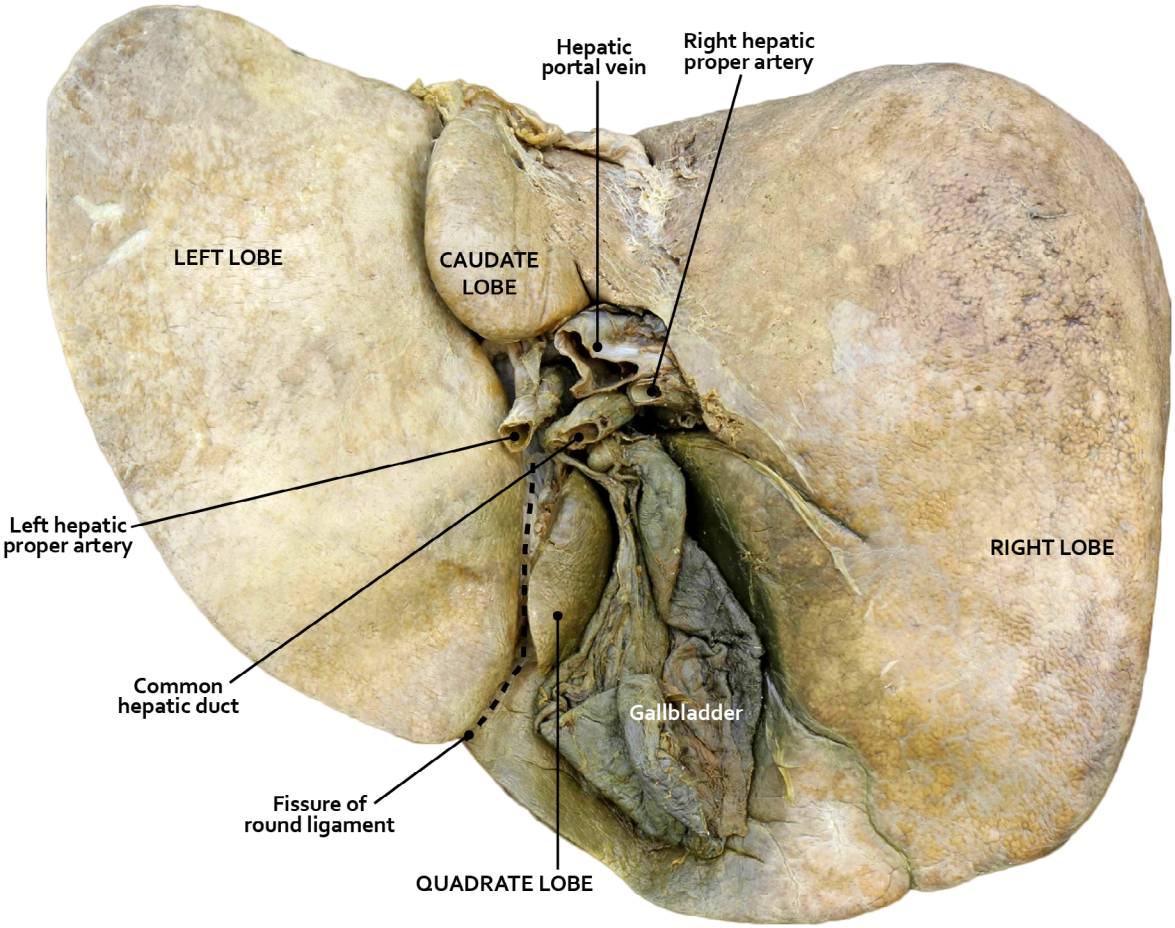
- Left lobe
- Right lobe
  - Caudate lobe
  - Quadrate lobe
  - Hepatic veins
  - Hepatic portal vein
  - Porta hepatis

Biliary Tree:

- Right & left hepatic ducts
- Common hepatic duct
- (Common) bile duct
- Gallbladder
  - Cystic duct
  - Fundus of gallbladder



Anterior View of Liver & Biliary Tree



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Postero-Inferior Liver
(B. Kathleen Alsup & Glenn M. Fox, University of Michigan Medical School, BlueLink)

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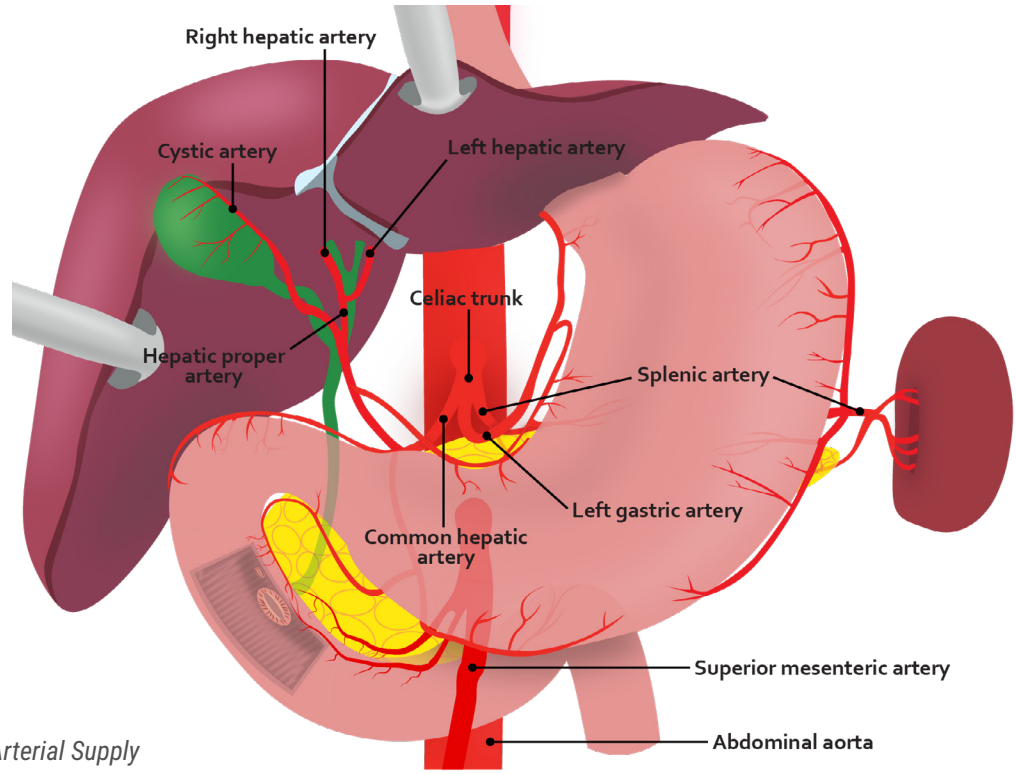
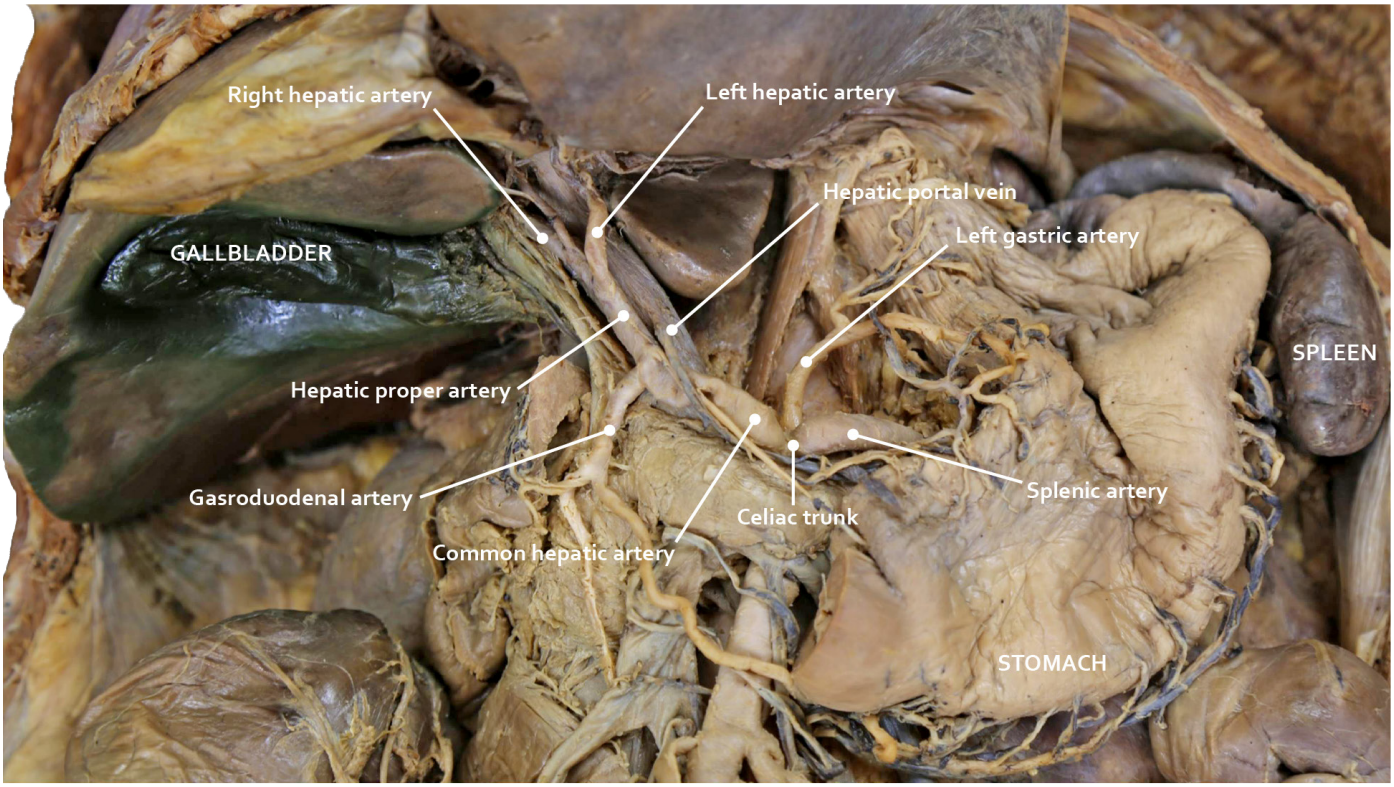
Arteries:

- Abdominal aorta
- Celiac trunk (3 branches):
  - Left gastric
  - Common hepatic
    - Hepatic proper
      - Left & right hepatic
  - Splenic



Foregut Arterial Supply



Foregut Vasculature

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Foregut Innervation:

- Celiac ganglion on either side of the celiac artery (trunk)
- **Sympathetic** nervous system: **T5-T12** (greater & lesser splanchnic nerves)
- **Parasympathetic** nervous system: **vagus nerve**

- Distribution of postganglionic (sympathetic) or preganglionic (parasympathetic) nerve fibers is via arteries
- **Sympathetics:** inhibitory to gut muscles
- **Parasympathetics:** motor to gut muscles; in stomach = acid secretion

Questions for the Foregut Lab:

1) Name the ligament which is derived from the ventral mesentery and attaches the liver to the anterior abdominal wall.

2) Name the opening in the abdomen that connects the greater peritoneal sac to the lesser peritoneal sac.

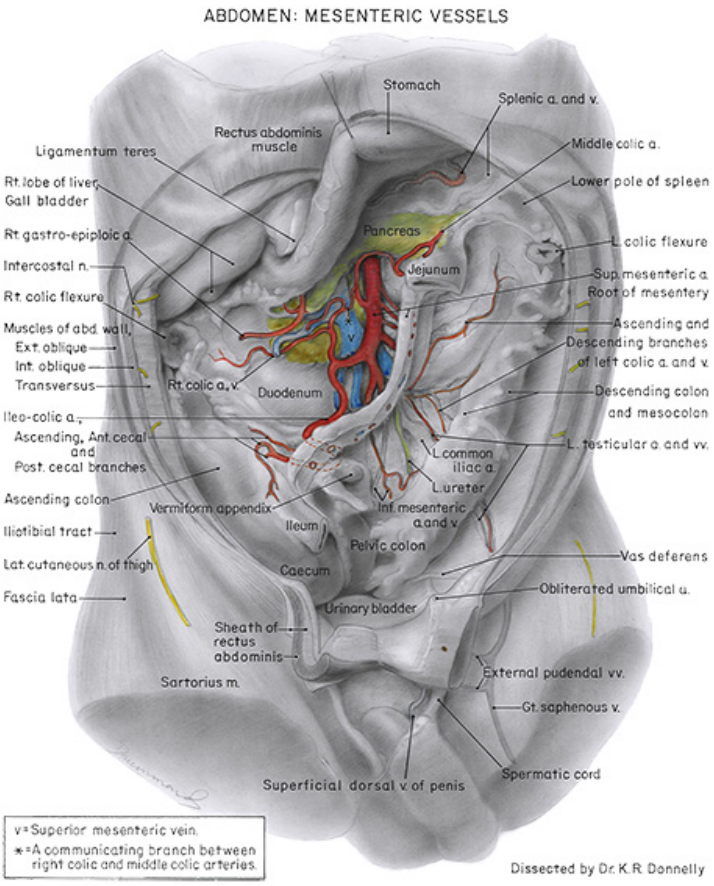
3) Name the anatomical structures that are found within the hepatoduodenal ligament.

4) The bile and pancreas digestive enzymes are drained in to which part of duodenum? What is the name of the opening in the duodenum for these secretions?

5) Which segments of spinal cord are in charge of sympathetic innervation of the organs derived from foregut?

6) Name three branches of the celiac trunk (artery).

Additional Reference Images



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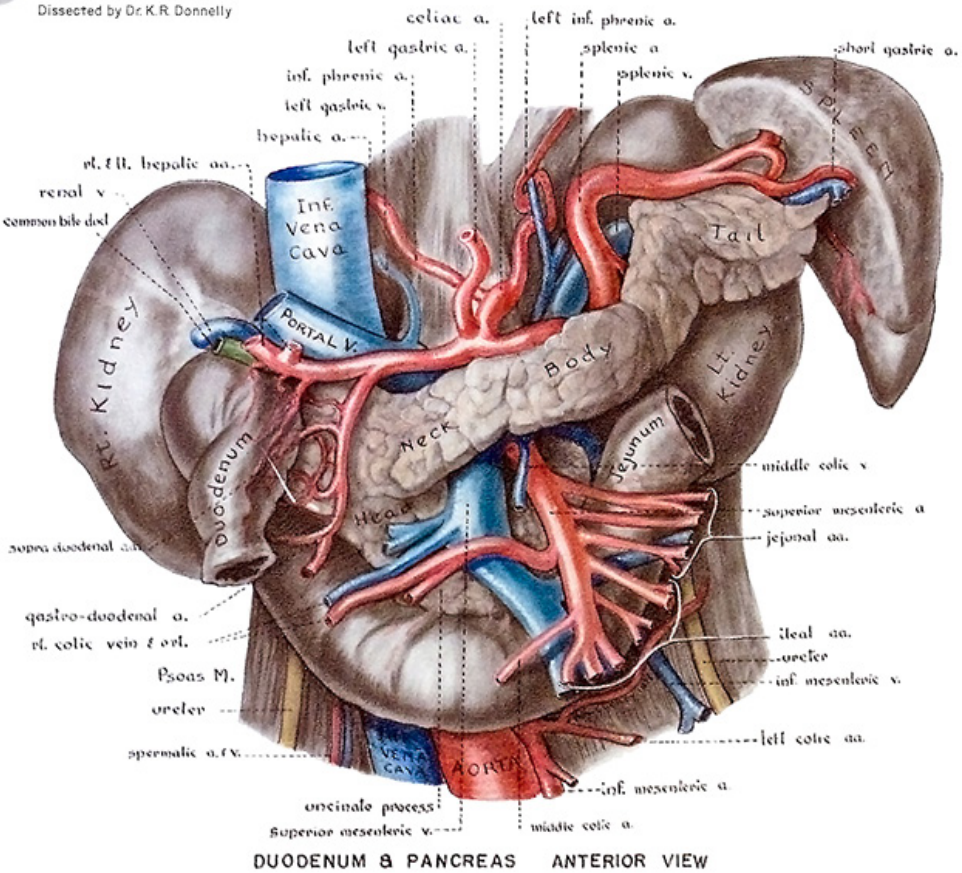

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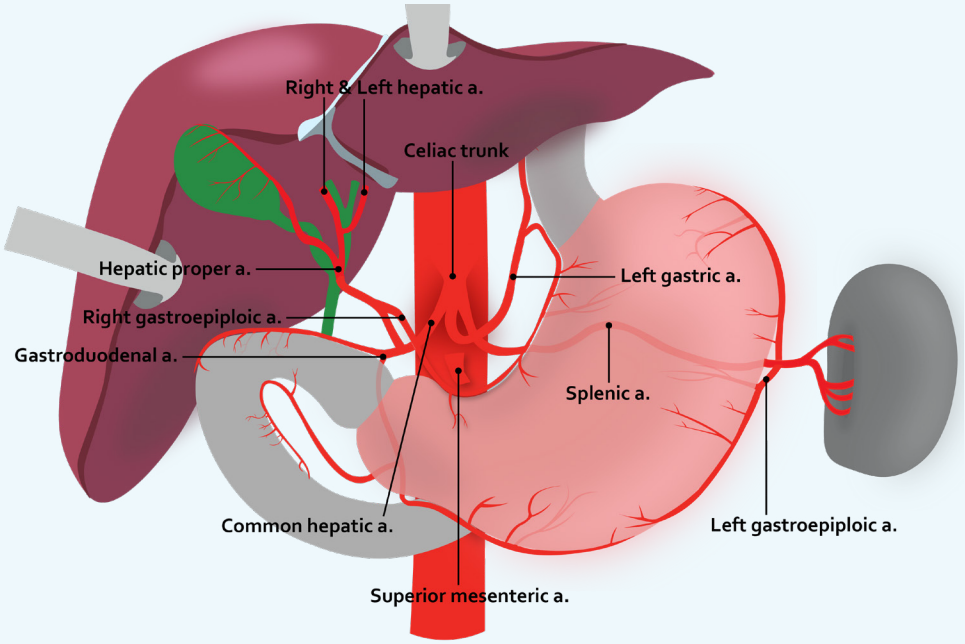
Foregut Dissection (Video)

Stomach and Duodenum

1. *Find the greater omentum and spread it out from the greater curvature of the stomach downward:*
   - You are now looking at the supracolic region (superior to the transverse colon)
2. *Place the stomach in the anatomical position and try to find its curvatures, fundus, cardia, pylorus and anterior surface.*
3. *Trace the pyloric part of the stomach to the right:*
   - If you palpate this region, you should be able to appreciate the extra thickness of this area which is due to the presence of the pyloric sphincter
4. *Following the pylorus to the right, you will be able to find the first part of duodenum.*
5. *The rest of the duodenum is retroperitoneal and you need to detach it from the posterior abdominal wall.*

Portal Triad and Celiac Artery (Trunk) Dissection

1. *Break through the lesser omentum (only the hepatogastric ligament part) and investigate the lesser sac behind the stomach.*
2. *Pass your finger one more time through the epiploic foramen and try to appreciate its boundaries:*
   - In front of your finger is the hepatoduodenal ligament and its contents (portal triad including the bile ducts, hepatic artery and portal vein)
3. *Pass a piece of white paper through the epiploic foramen (it will provide a better view of the portal triad contents).*
4. *With blunt dissection clean the hepatoduodenal ligament and find the portal triad elements:*
   - You will be able to see:
     - common bile duct on front right side
     - hepatic artery on front left side
     - portal vein as most posterior element in the triad
   - You also will see substantial amounts of nerve fibers running with the arteries. Just ignore them, but appreciate that they are coming from the celiac ganglion (foregut ganglion)



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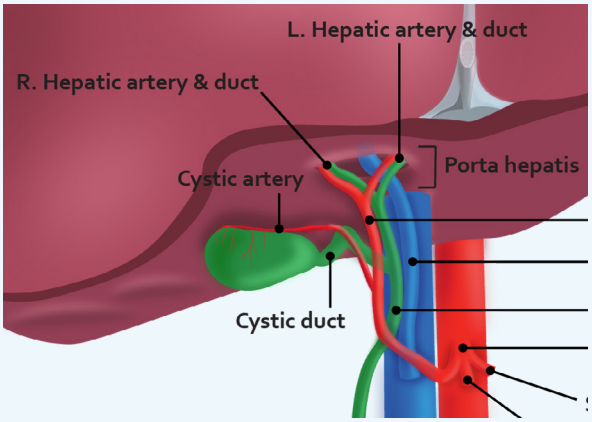
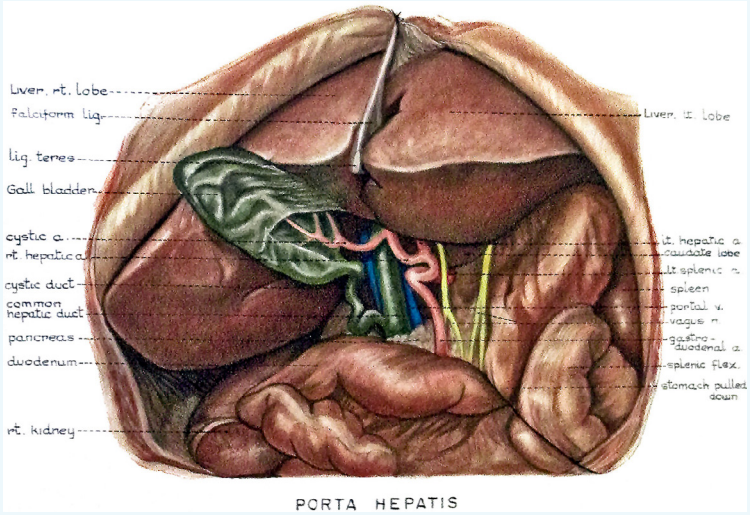
1. *Trace the hepatic artery to the left and find the common hepatic artery.*
2. *Tracing the common hepatic artery all the way to the left, you will be able to find the celiac artery (trunk).*
3. *At this point, you will be able to find the splenic artery going to the left (along the superior border of pancreas), and left gastric artery along the lesser curvature of the stomach superiorly.*
4. *Appreciate that the head of pancreas is surrounded by duodenum. From this point trace the pancreas to the left and find its tail close to the spleen.*

Liver (exploration on the prosection)



1. *Place the liver in the anatomical position. On its superior surface find the falciform ligament and round ligament of the liver (ligamentum teres hepatis):*
   - The larger right lobe is on the right side of the falciform ligament and the smaller left lobe is on its left side
2. *On its inferior (visceral) surface find the right lobe, left lobe, quadrate lobe and caudate lobe.*
3. *Also on this surface, find the porta hepatis and its contents including hepatic artery, hepatic ducts and portal vein.*
4. *Find the gallbladder and its different parts including fundus, body, cystic duct.*
5. *Find the bare area, inferior vena cava (if it has been removed with liver) on the posterior surface.*
6. *Look inside the lumen of IVC (from superior view), you should be able to see the hepatic veins draining into IVC.*



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Opening the Second Part of Duodenum

1. *If the duodenum in your cadaver is not full of contents, we suggest you to open the second part of it and find the major duodenal papilla.*
2. *Make a small incision **ONLY** on the anterior wall of the descending part (2nd part) of duodenum. Open this wall like a window (try to put the hinge of your window close to the head of the pancreas).*
3. *Clean the contents of the duodenum with paper towel and find the major duodenal papilla.*