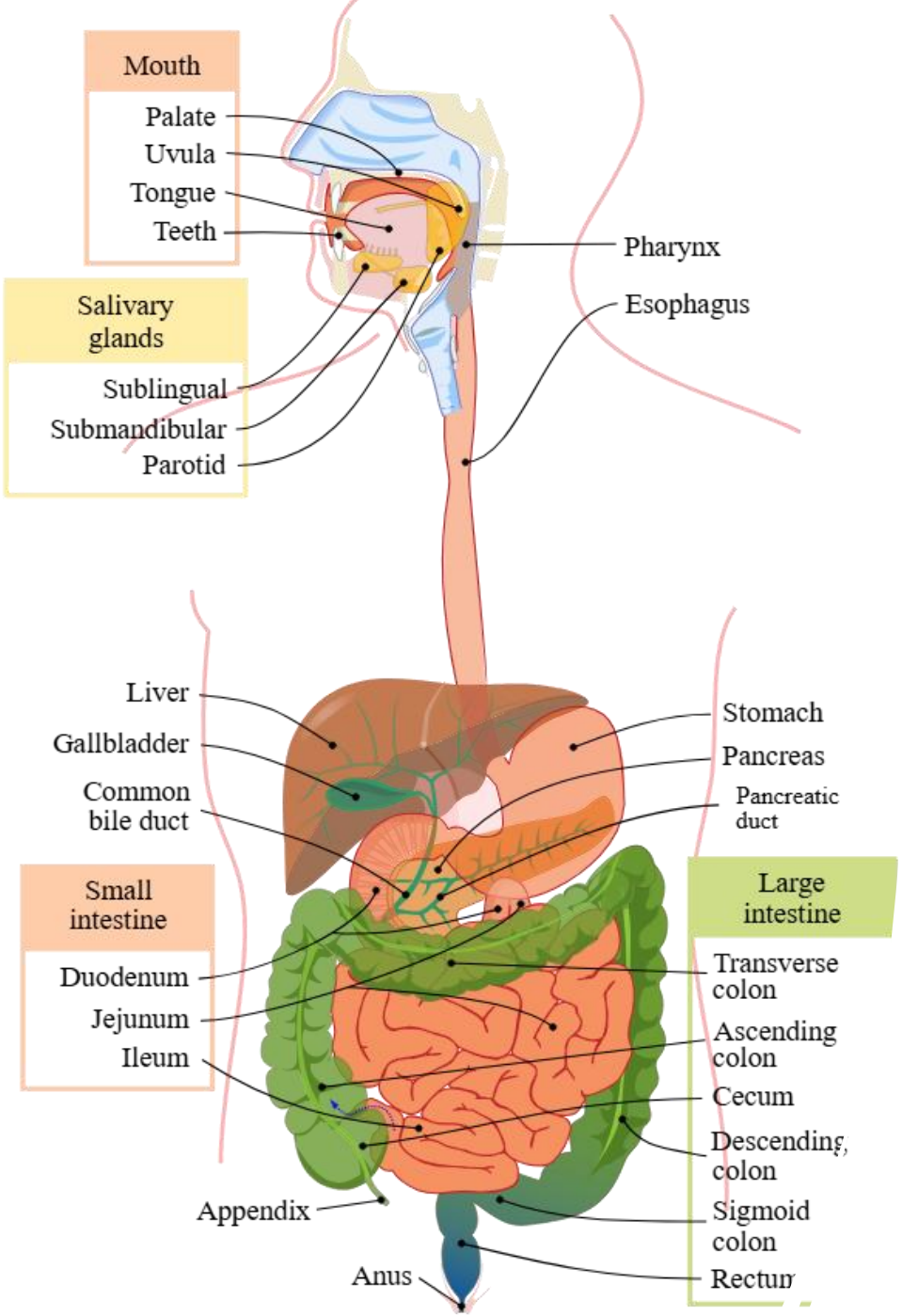
Accessory Organs & Vasculature

Lecture 3: Anatomy & Embryology

Integration of Solid Viscera and Major Abdominal Vessels



Gastrointestinal (GI) System

- Overview -

Section I

Hepatobiliary & Pancreatic Systems

Anatomy and Developmental Origins

Anatomy of the Liver & Biliary Tree

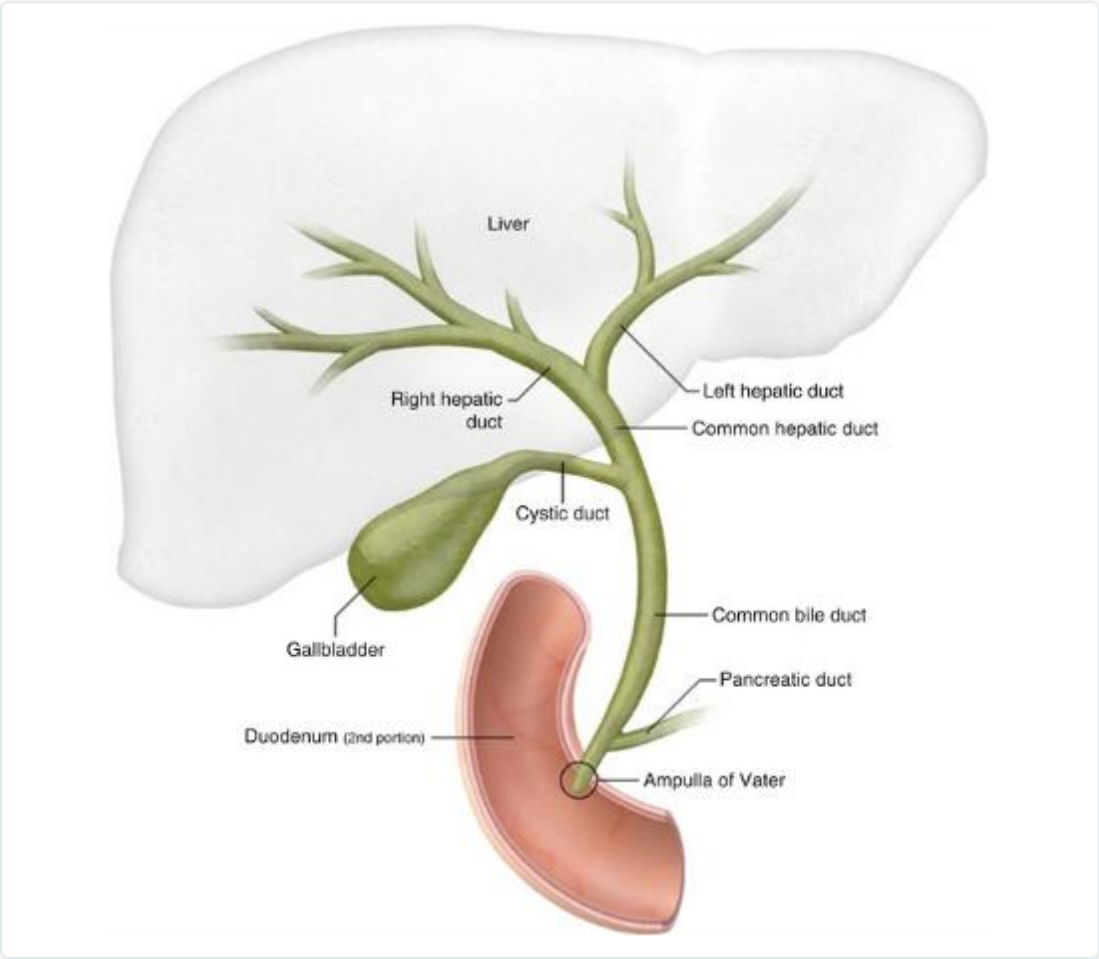
Macroscopic Structure

The largest gland in the body, occupying the right hypochondrium and epigastrium.

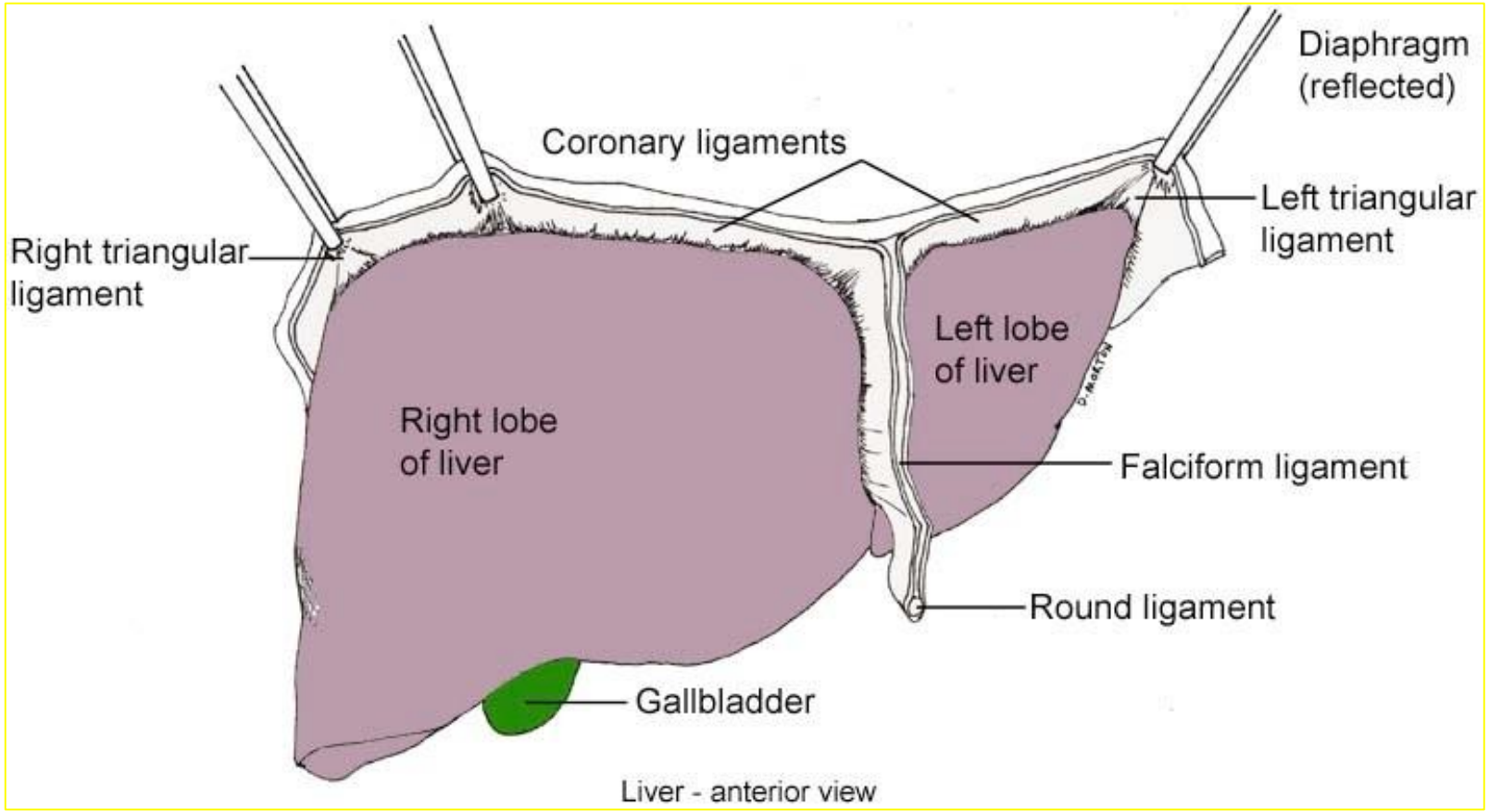
Lobes: Right and Left (separated by falciform ligament), Caudate and Quadrate (functional right/left divisions).

Porta Hepatis: Transverse fissure transmitting the Portal Vein, Hepatic Artery, and Hepatic Duct.

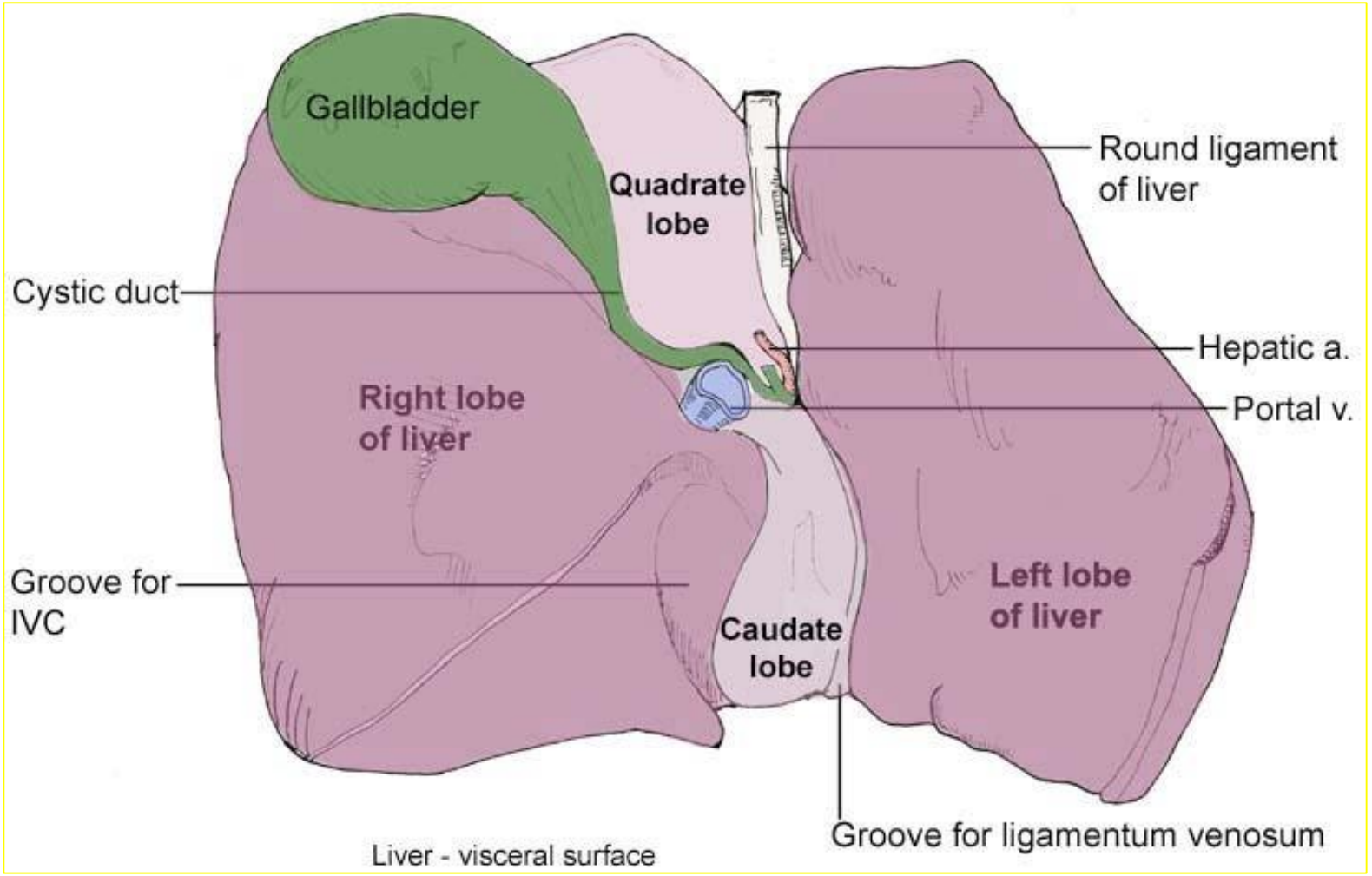
Gallbladder: Stores and concentrates bile; cystic duct joins common hepatic duct to form the *Common Bile Duct*.



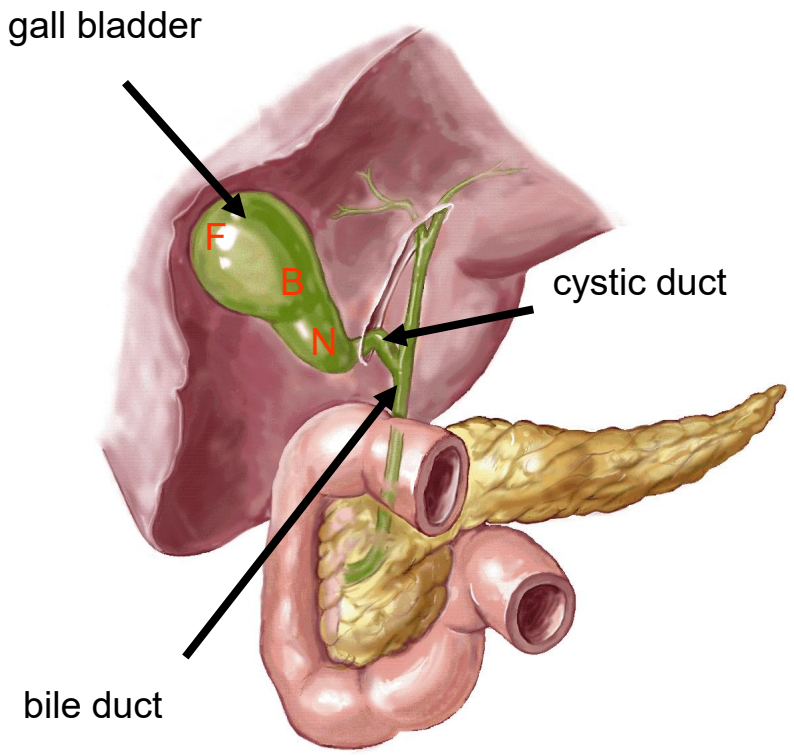
Anterior View of the Liver



Inferior View of the Liver

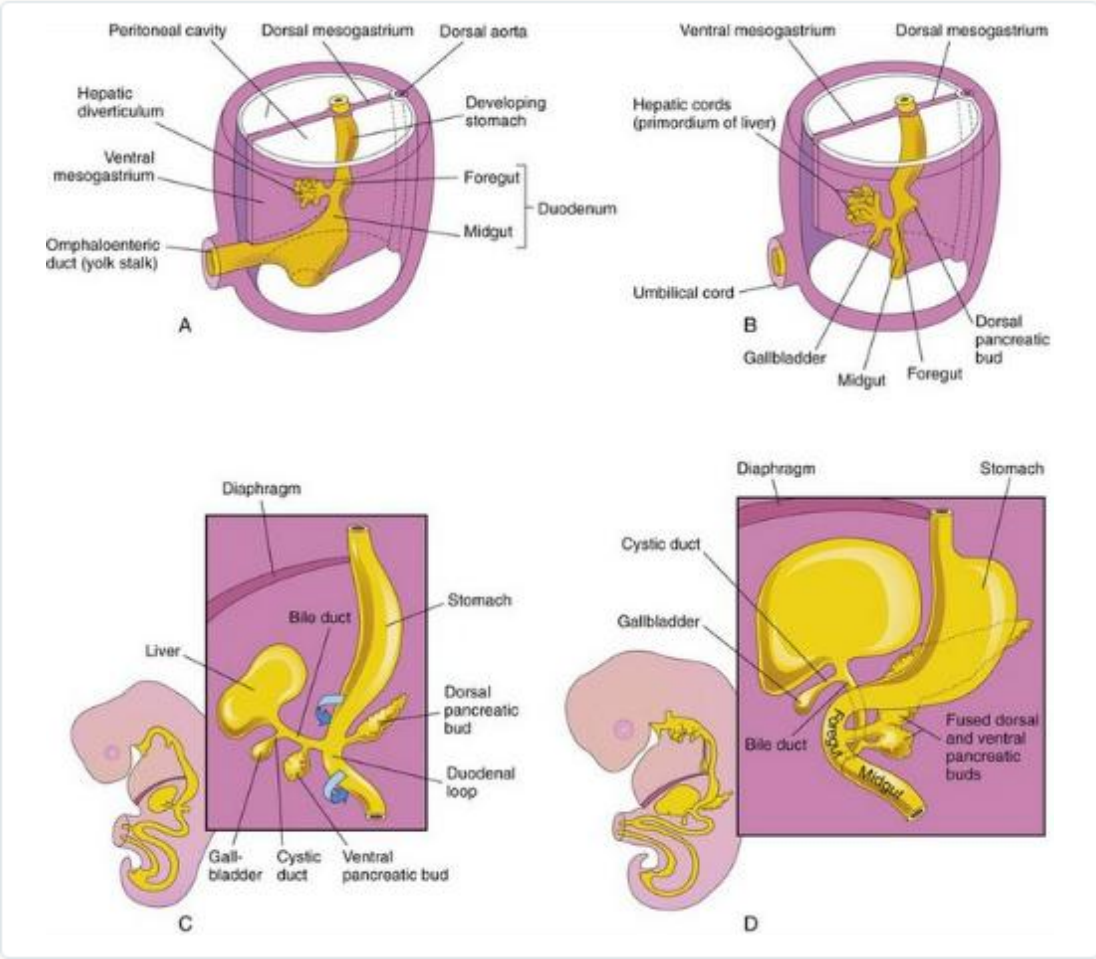


Gall bladder



- F = fundus hangs below liver
- B = body contacts visceral surface of liver
- N = neck joins cystic duct
- Covered in visceral peritoneum
- Store and concentrate bile – folds and microvilli
- Fat in duodenum – releases cholcystokinin cause GB to contract
- Smooth muscle distal end bile duct and ampulla relax = bile into duodenum to emulsify fat

Embryology of the Glandular Buds



Foregut Diverticula

Derived from the endodermal lining of the distal foregut in the 4th week.

Hepatic Diverticulum: Grows into the ventral mesogastrium; forms liver parenchyma and biliary tree.

Pancreatic Buds:

- *Dorsal Bud:* Forms most of the pancreas (head, body, tail).
- *Ventral Bud:* Forms part of the head and uncinate process.

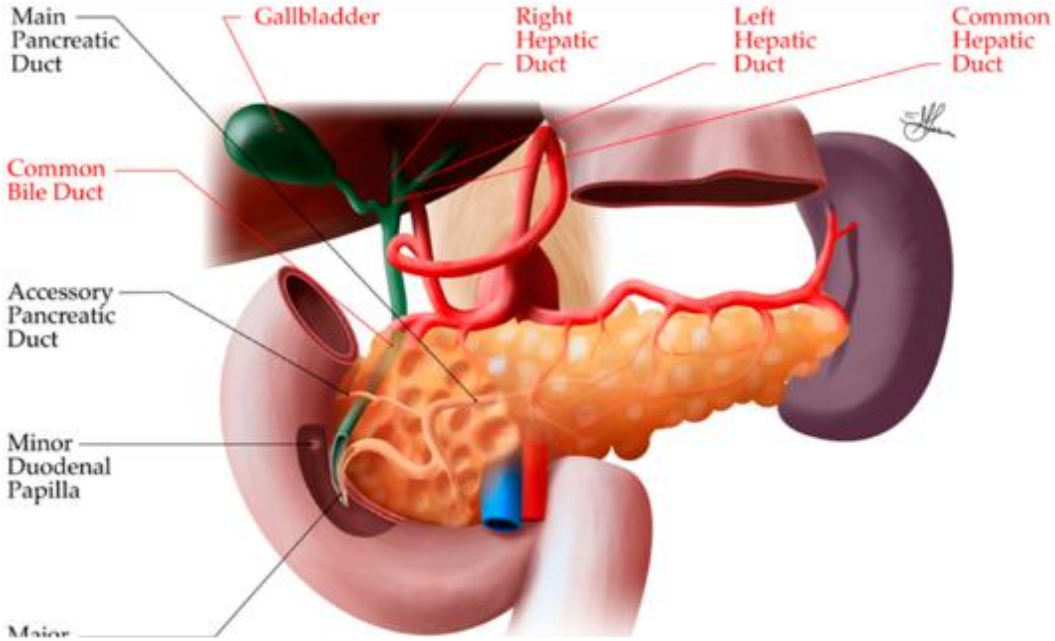
Fusion: Stomach rotation brings the ventral bud posterior to fuse with the dorsal bud.

Anatomy of the Pancreas

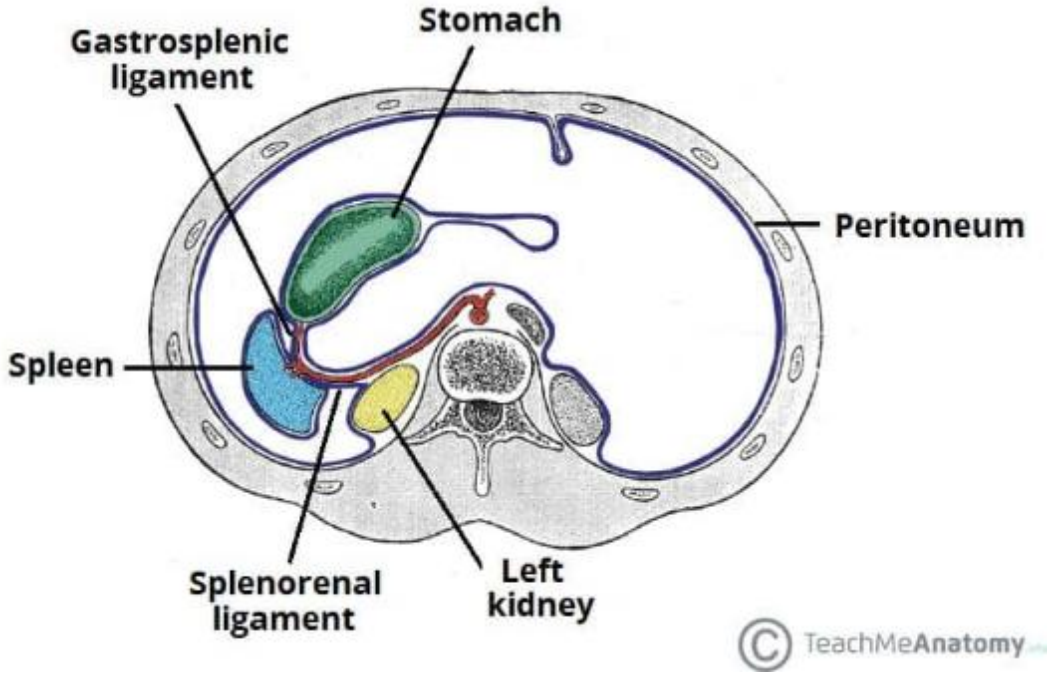
Exocrine & Endocrine Structure

A retroperitoneal organ located posterior to the stomach.

- **Parts:** Head (in the C-loop of duodenum), Neck, Body, and Tail (reaches the splenic hilum).
- **Duct System:**
  - *Main Pancreatic Duct (Wirsung):* Joins Bile Duct at the Hepatopancreatic Ampulla (Vater).
  - *Accessory Duct (Santorini):* Drains the upper head into the minor duodenal papilla.



The Spleen: Unique Origin



Mesenchymal Development

Unlike the GI tract, the spleen is **not** endodermal. It develops from mesenchymal cells in the *dorsal mesogastrium*.

- **Position:** Left hypochondrium, protected by ribs 9-11.
- **Ligaments:**
  - *Gastrosplenic:* Contains short gastric/left gastro-omental vessels.
  - *Splenorenal:* Contains splenic vessels and tail of the pancreas.

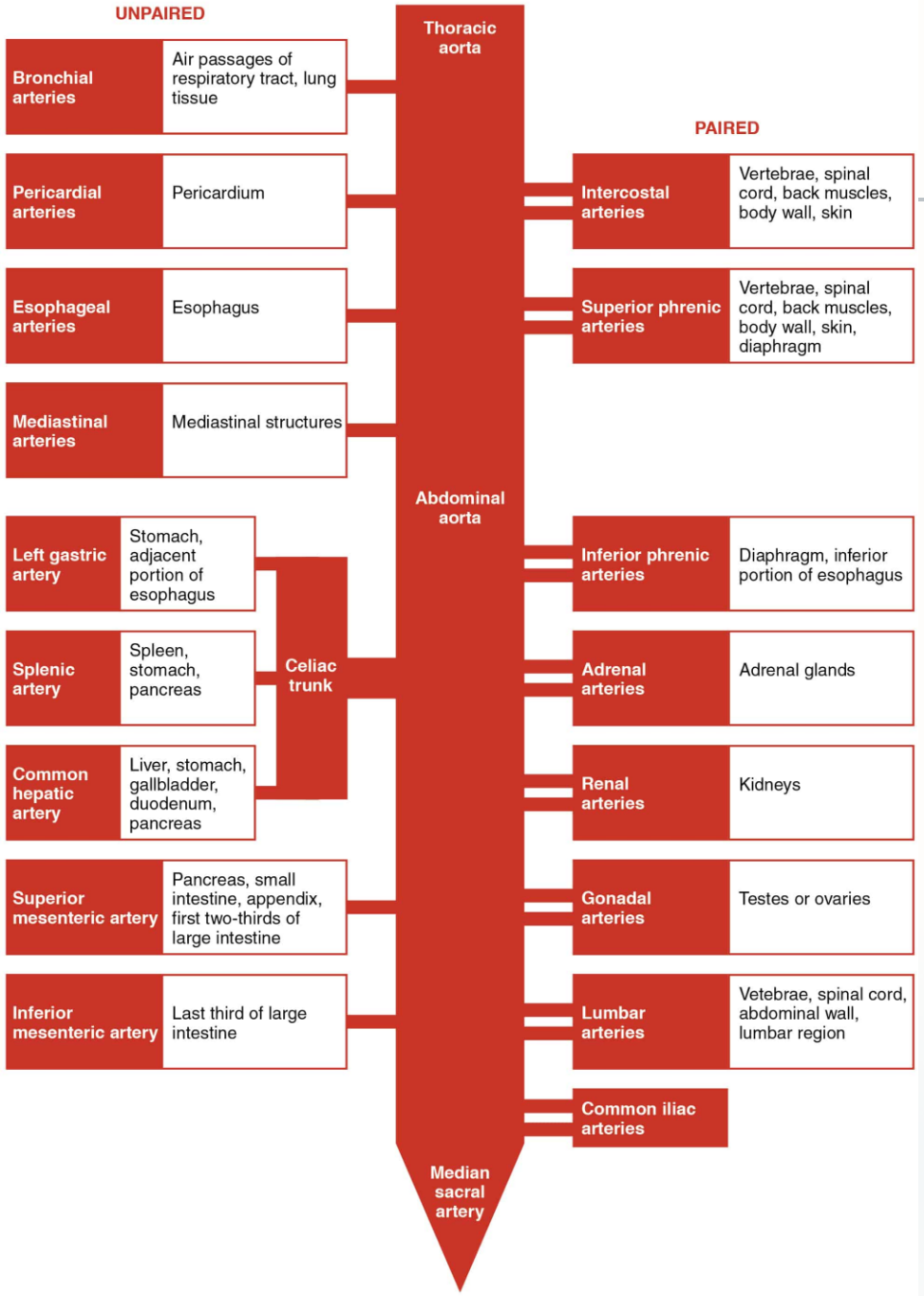
Section II

Abdominal Vasculature

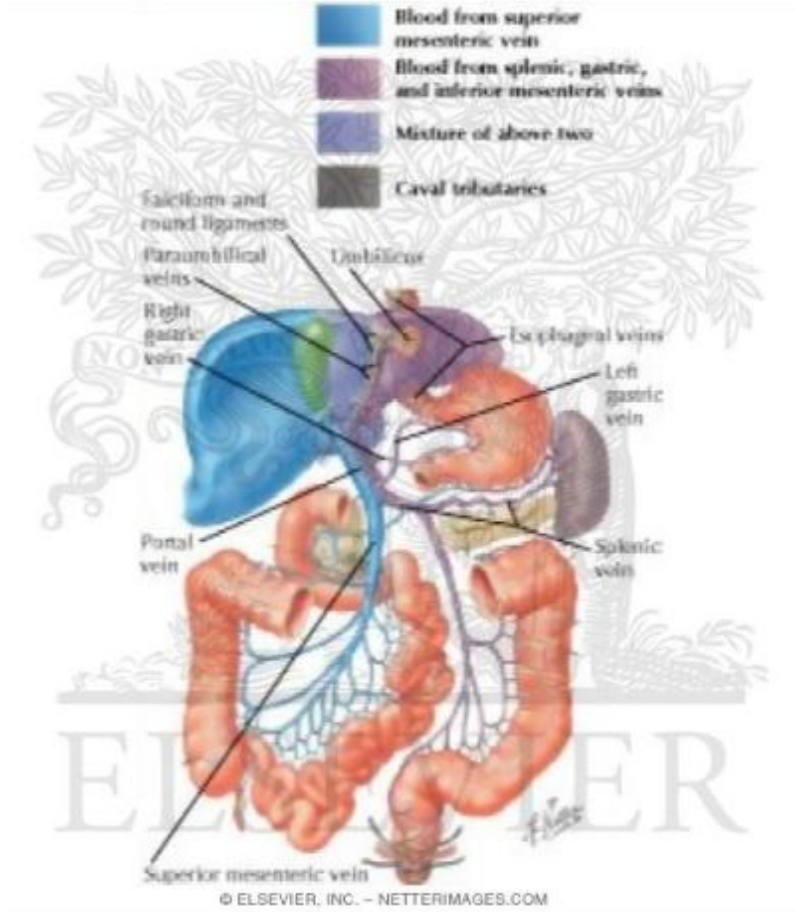
Aorta and the Portal System

The Abdominal Aorta

Type	Major Branches
Unpaired Visceral	Celiac Trunk, SMA, IMA
Paired Visceral	Renal, Gonadal, Suprarenal
Paired Parietal	Lumbar, Inferior Phrenic
Terminal	Common Iliac, Median Sacral



The Portal Venous System



Nutrient-Rich Drainage

Collects blood from the GI tract, spleen, and pancreas to deliver to the liver for processing.

- **Formation:** Formed posterior to the neck of the pancreas by the union of the *Superior Mesenteric Vein* and the *Splenic Vein*.
- **Tributaries:** Inferior Mesenteric Vein (usually joins splenic), Gastric veins, Cystic veins.

Portocaval Anastomoses

Esophageal

Left gastric (portal) vs. Azygos (caval). Leads to **Esophageal Varices**.

Umbilical

Paraumbilical (portal) vs. Epigastric (caval). Leads to **Caput Medusae**.

Rectal

Superior rectal (portal) vs. Middle/Inferior (caval). Leads to **Anorectal Varices**.

Clinical Significance: These channels enlarge in portal hypertension (cirrhosis).

Summary of Glandular Origins

Organ	Embryological Origin	Vascular Supply
Liver	Endoderm (Foregut)	Hepatic Artery / Portal Vein
Pancreas	Endoderm (Foregut Buds)	Splenic / Pancreaticoduodenal
Spleen	Mesenchyme (Dorsal Mesogastrium)	Splenic Artery