

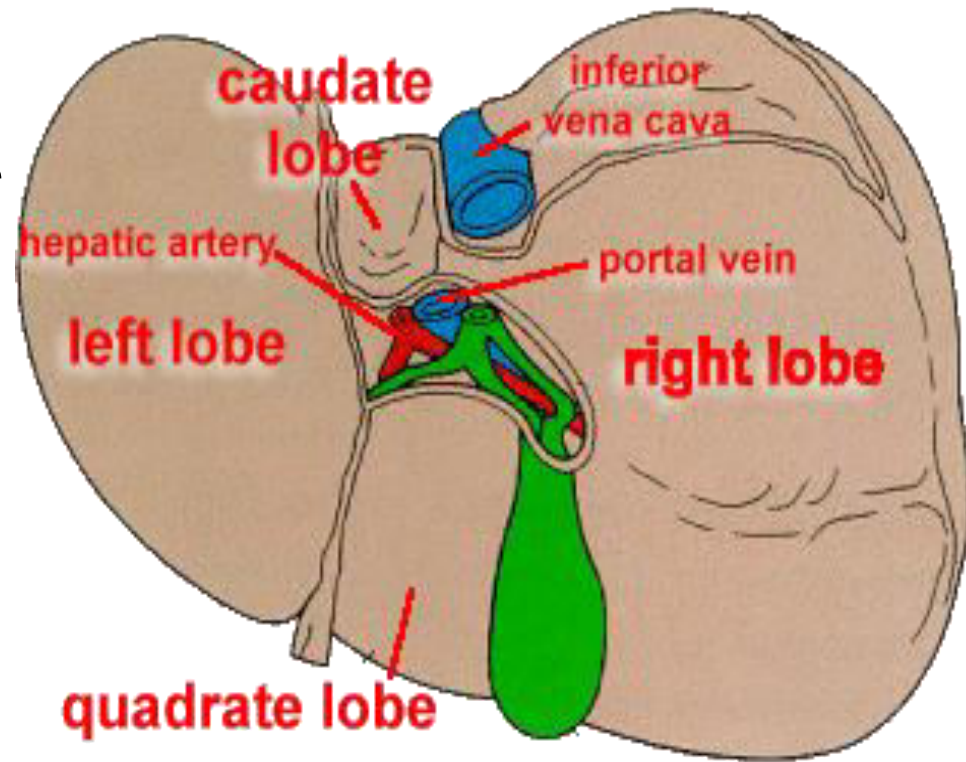
# DIGESTIVE SYSTEM (2)

Dr. Wafaa Shunnaq

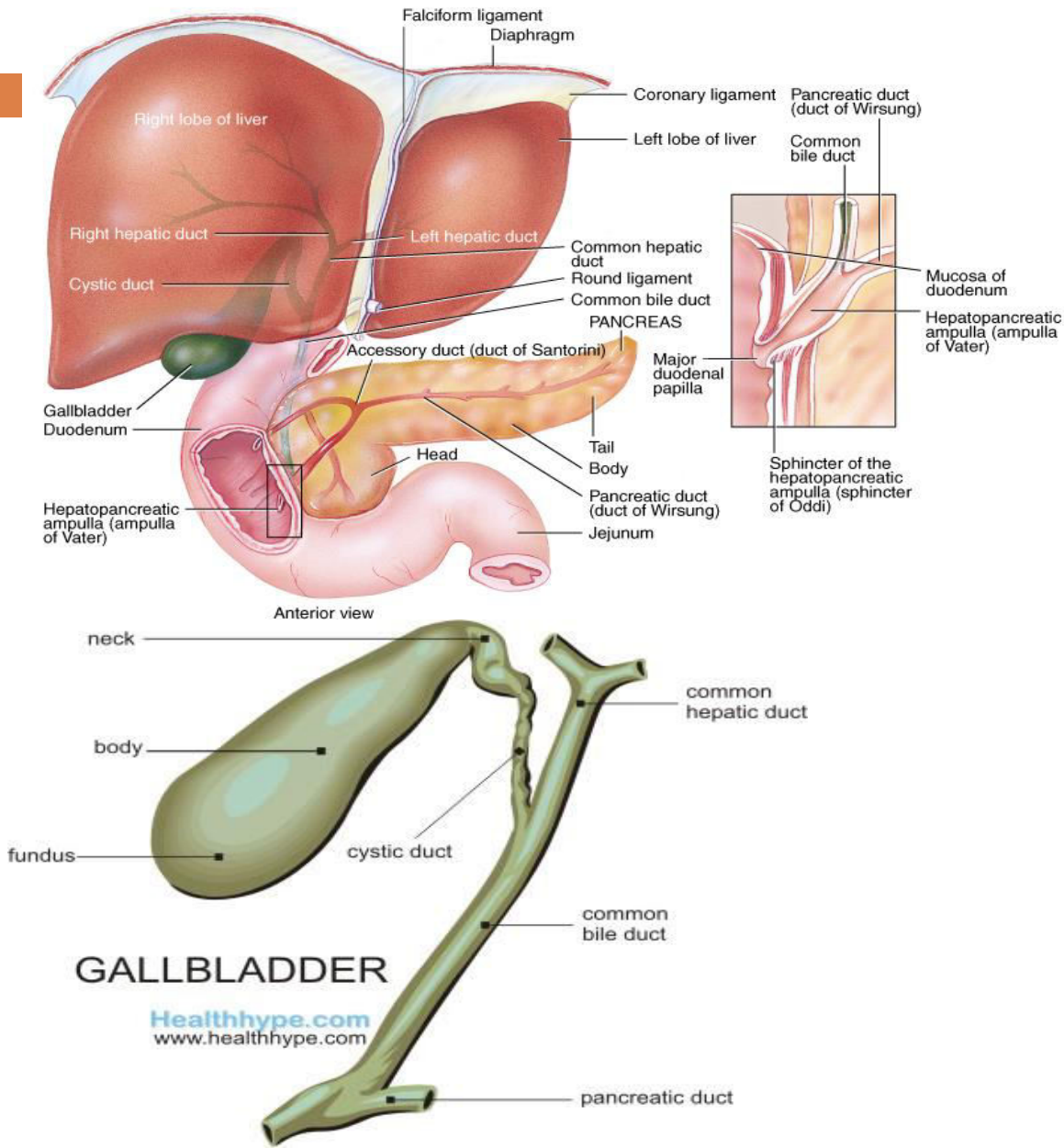
# LIVER AND GALLBLADDER

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- The *liver* is the heaviest gland in the body and the second largest organ in the body after the skin.
- The *liver* is divided into **left** and **right** lobes, separated by the falciform ligament. Associated with the right lobe are the **caudate** and **quadrate** lobes.
- The *gallbladder* is a sac located in a depression on the posterior surface of the liver.



# Anatomy of the Liver and Gallbladder



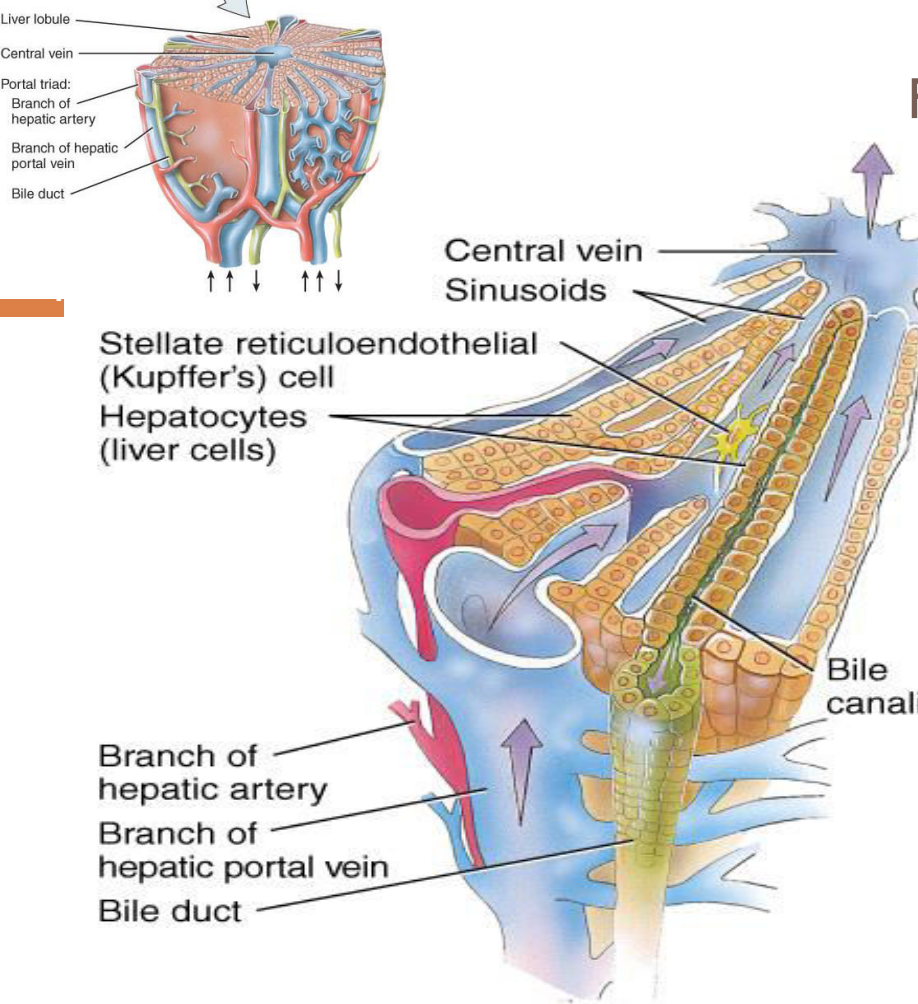
## □ Liver

- ▣ below diaphragm
- ▣ right lobe larger
- ▣ gallbladder on right lobe
- ▣ size causes right kidney to be lower than left

## □ Gallbladder

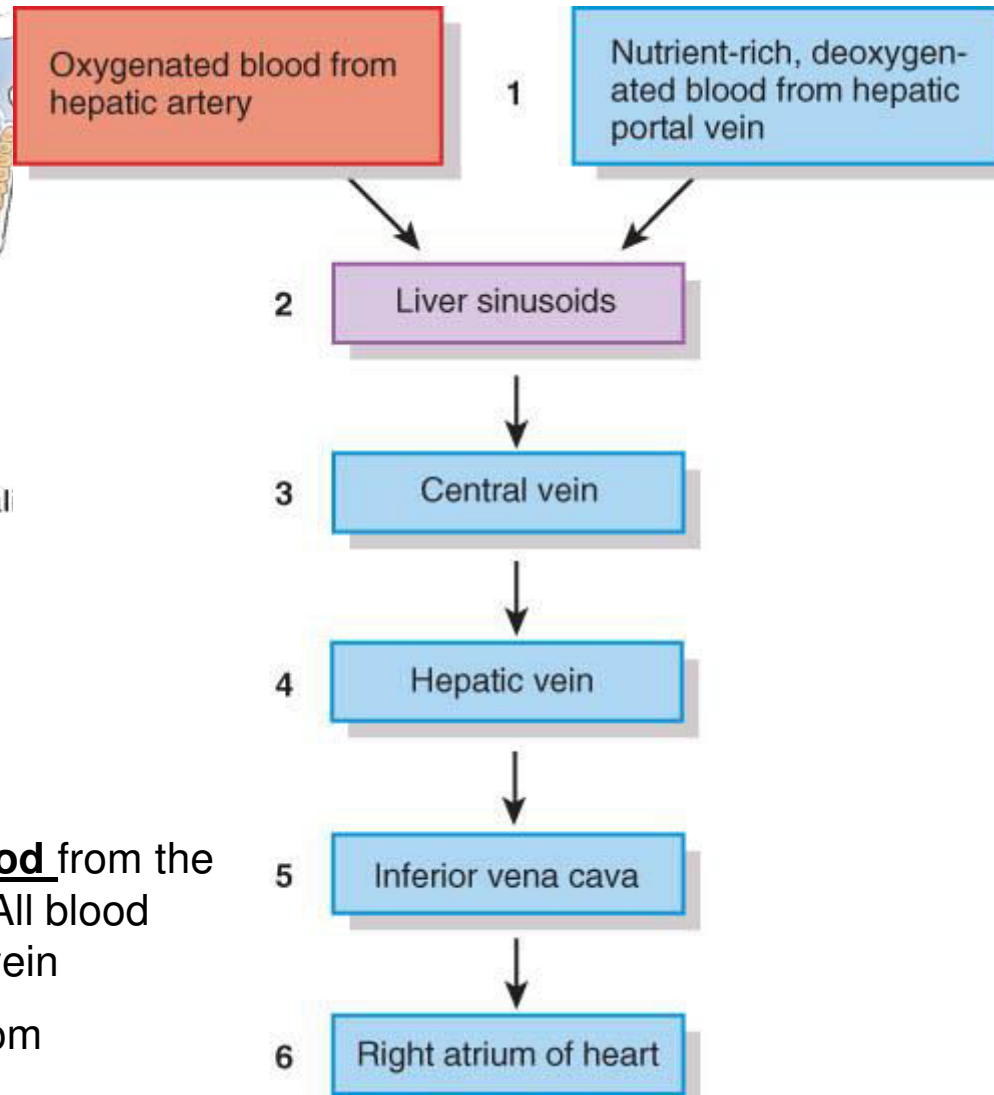
- ▣ fundus, body & neck

# Flow of Fluids Within the Liver



The liver receives **a double supply of blood** from the hepatic artery and the hepatic portal vein. All blood eventually leaves the liver via the hepatic vein

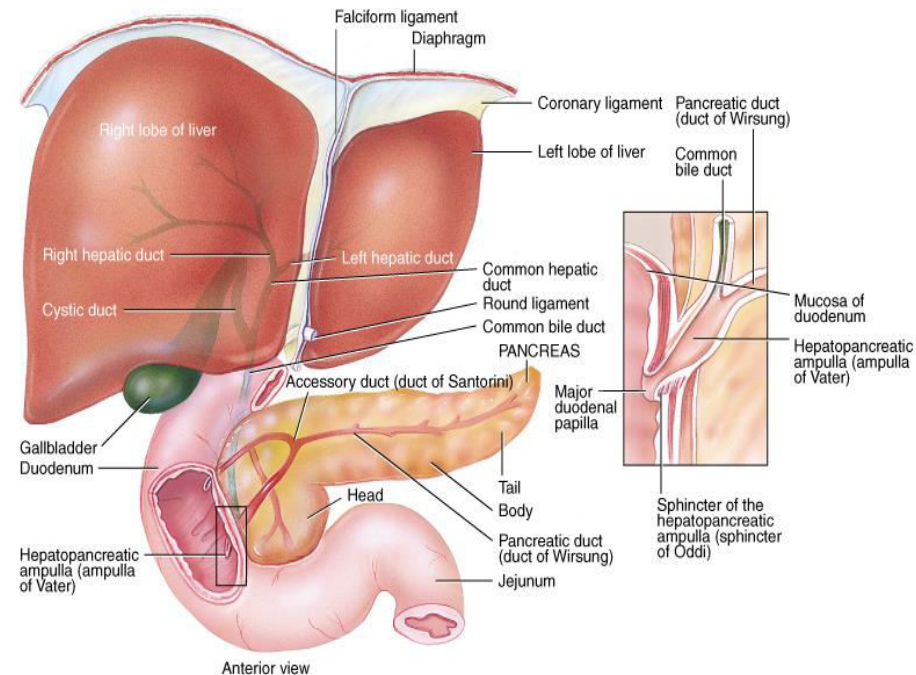
1. **Hepatic portal vein:** nutrient rich blood from stomach, spleen & intestines
2. **Hepatic artery:** branch from the aorta



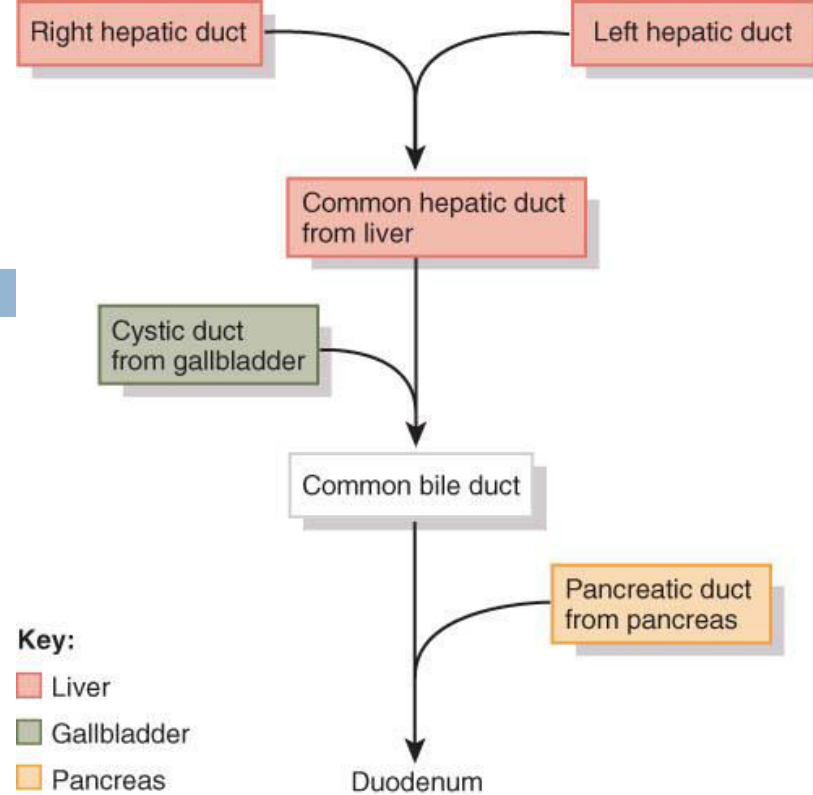
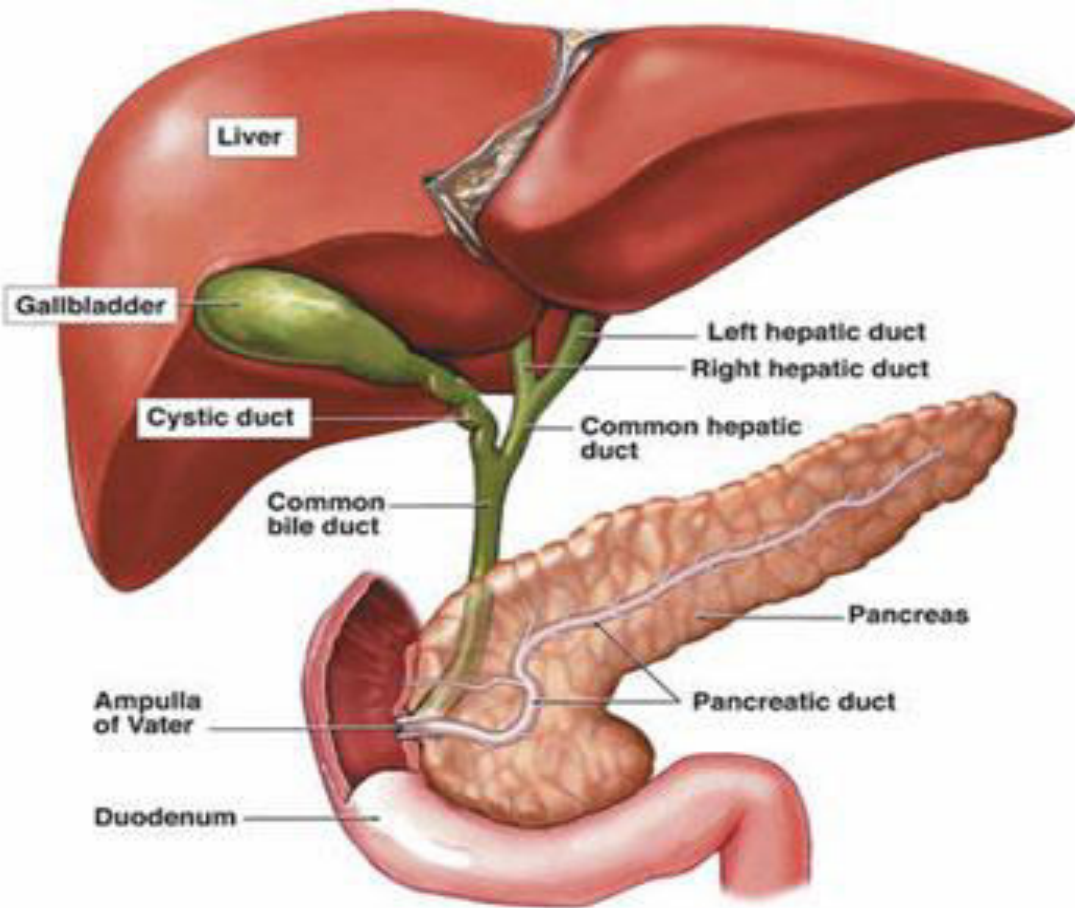
# Bile - Overview

5

- Hepatic cells (hepatocytes) produce *bile* that is transported by a duct system to the **gallbladder for concentration and temporary storage.**
- Bile is partially an excretory product (containing components of worn-out red blood cells) and partially a digestive secretion.
- Bile's contribution to digestion is the emulsification of triglycerides.
- The liver also functions in carbohydrate, lipid, and protein metabolism; removal of drugs and hormones from the blood; excretion of bilirubin; synthesis of bile salts; storage of vitamins and minerals; phagocytosis; and activation of vitamin D.



# Pathway of Bile Secretion



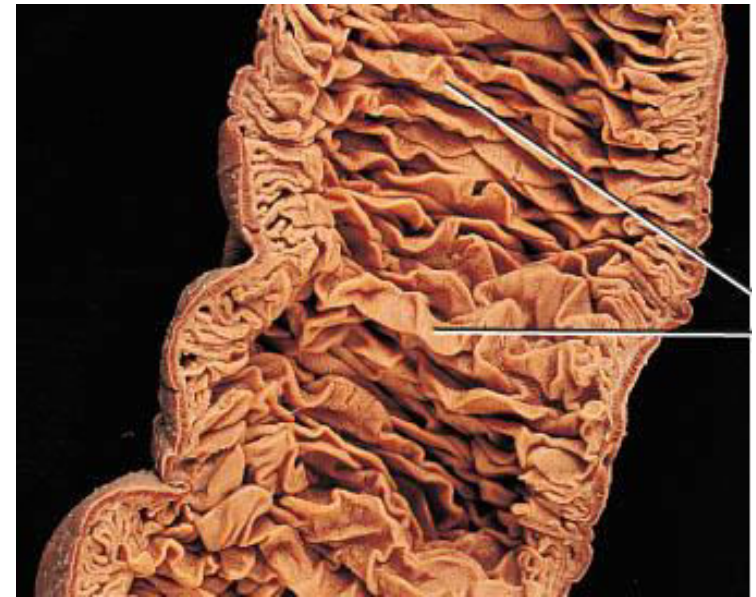
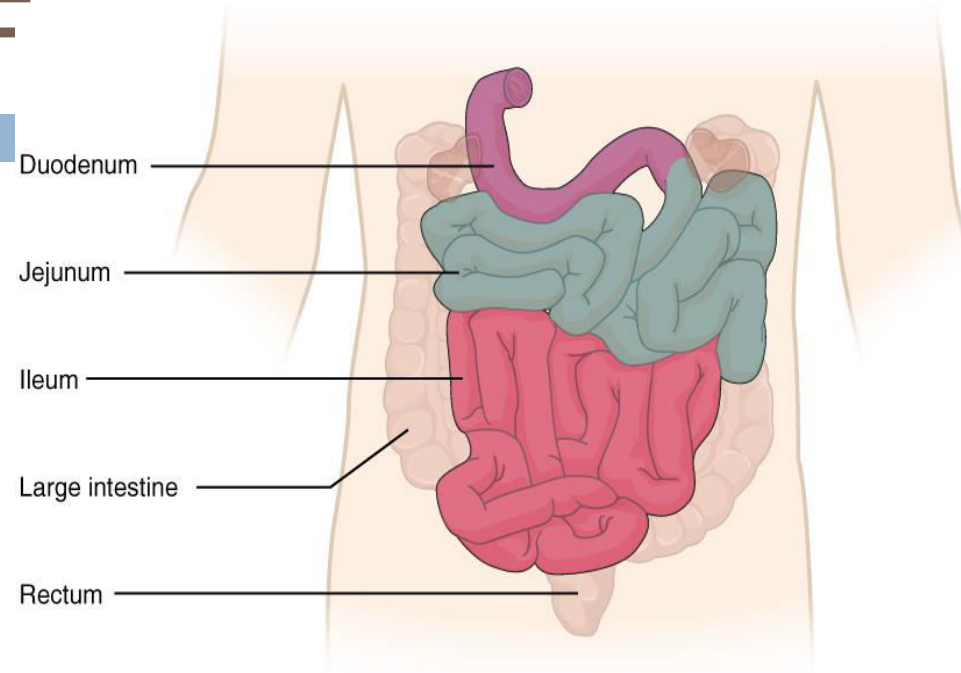
(c) Ducts carrying bile from liver and gallbladder and pancreatic juice from pancreas to the duodenum

- **Right & left Hepatic ducts** connect to form **common hepatic duct from liver**
- **Cystic duct from gallbladder & common hepatic duct from liver** join to form **common bile duct**
- **Common bile duct & pancreatic duct** join to form **Ampulla of vater** which open into duodenum

# SMALL INTESTINE

7

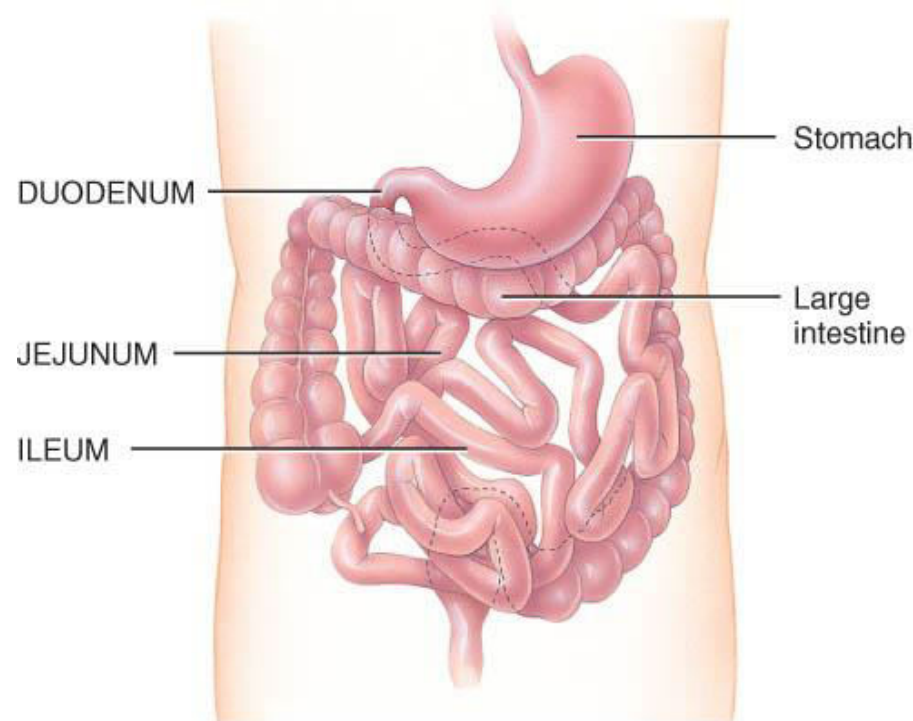
- The major events of **digestion** and **absorption** occur in the small intestine.
- The small intestine extends from the pyloric sphincter to the ileocecal sphincter.
- The small intestine is divided into the **duodenum**, **jejunum**, and **ileum**.
- Projections called **circular folds, or plicae circularies**: are permanent ridges in the mucosa that enhance absorption by increasing surface area and causing chyme to spiral as it passes through the small intestine .



# Anatomy of the Small Intestine

8

- 20 feet long----1 inch in diameter
- Large surface area for majority of absorption
- 3 parts
  - ▣ duodenum---10 inches
  - ▣ jejunum---8 feet
  - ▣ ileum---12 feet
    - ends at ileocecal valve



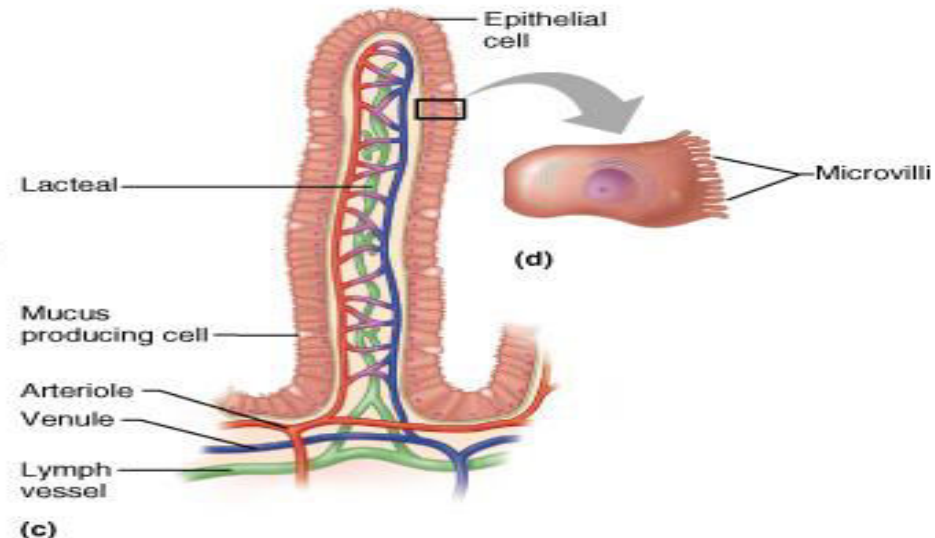
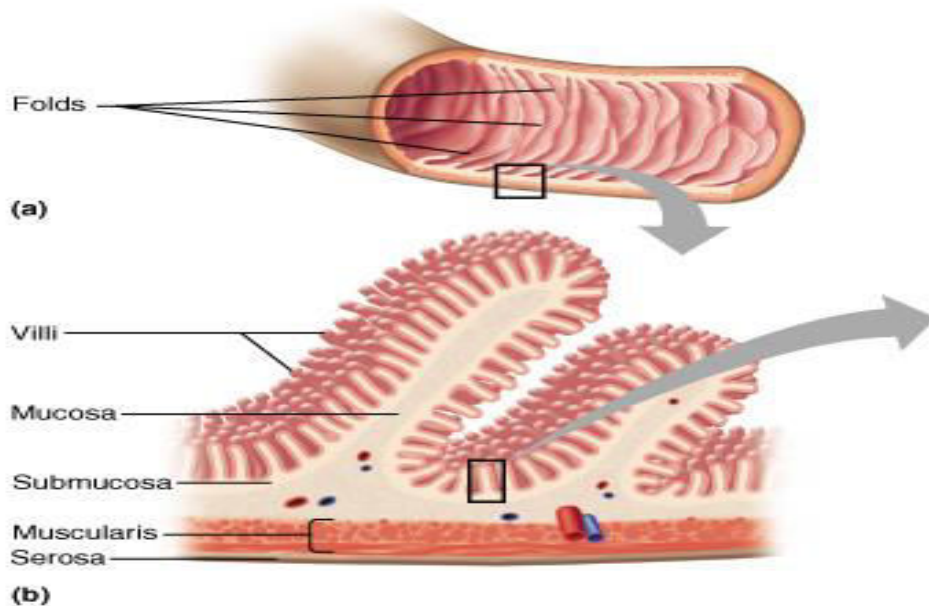
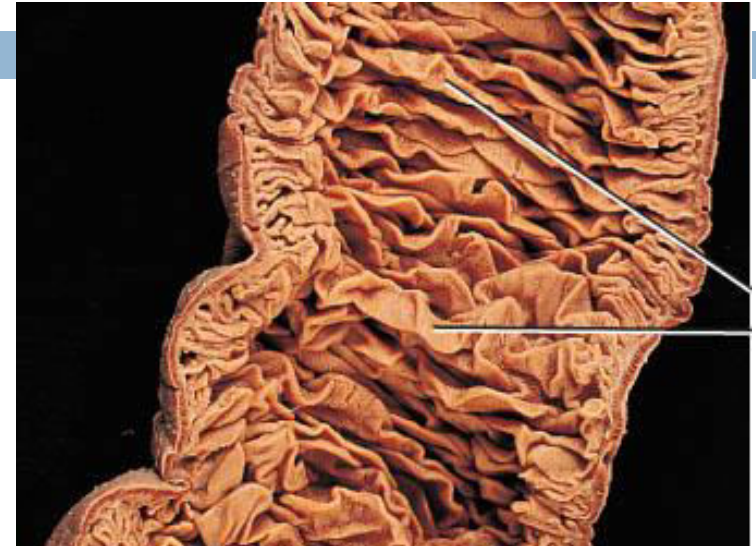
(a) Anterior view of external anatomy



# surface area of the small intestine

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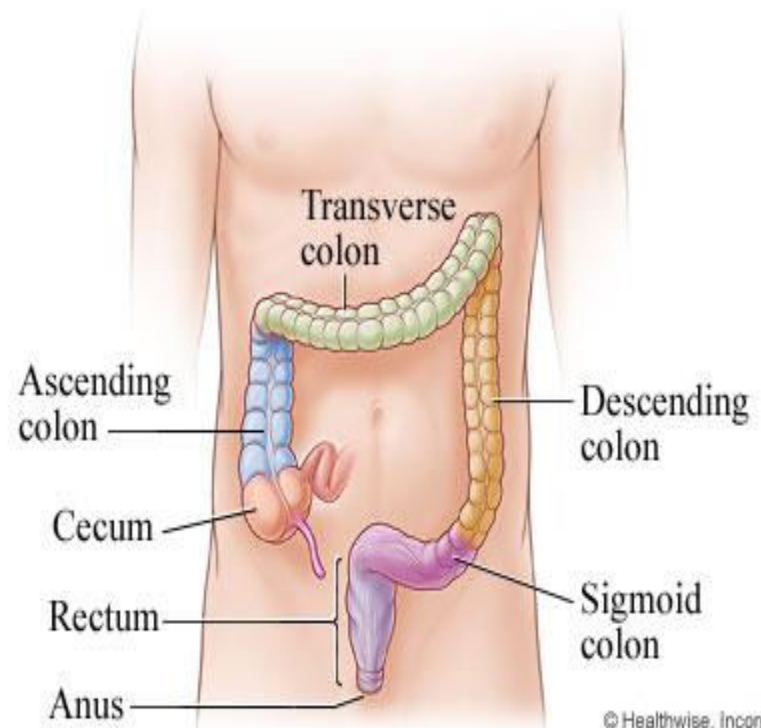
- **plica circularis**
  - ▣ permanent 1/2 inch tall folds
  - ▣ not found in lower ileum
- **villi**
  - ▣ 1 Millimeter tall
- **microvilli**
  - ▣ cell surface feature known as brush



# LARGE INTESTINE

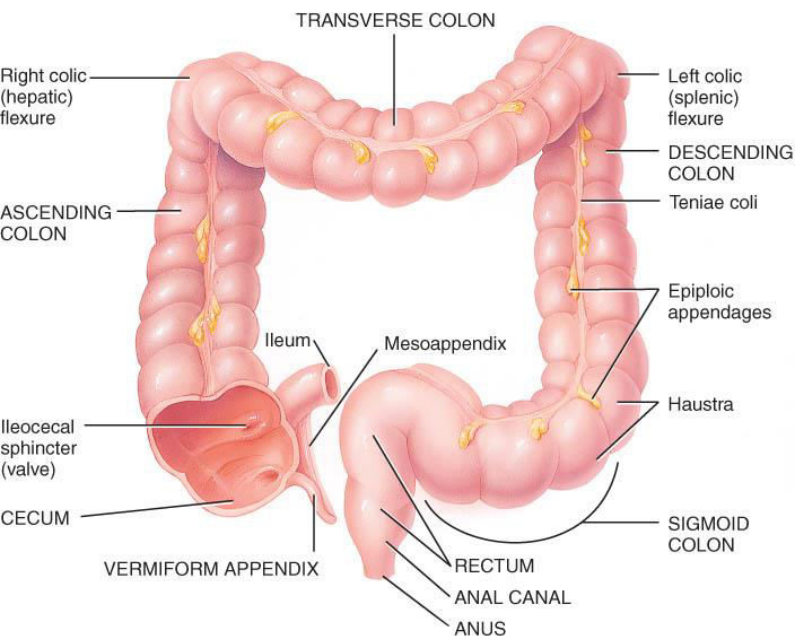
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- The *large intestine (colon)* extends from the ileocecal sphincter to the anus.
- Its subdivisions include the:
  1. *Cecum*
  2. *Colon: ascending, transverse and sigmoid*
  3. *rectum*
  4. *anal canal*
- Hanging inferior to the cecum is the *appendix.* (contains large amounts of lymphatic tissue)

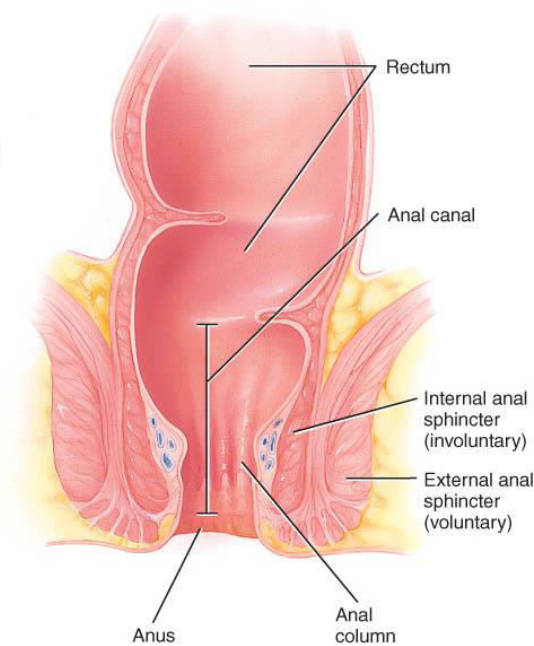


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# Anatomy of Large Intestine



(a) Anterior view of large intestine showing major regions

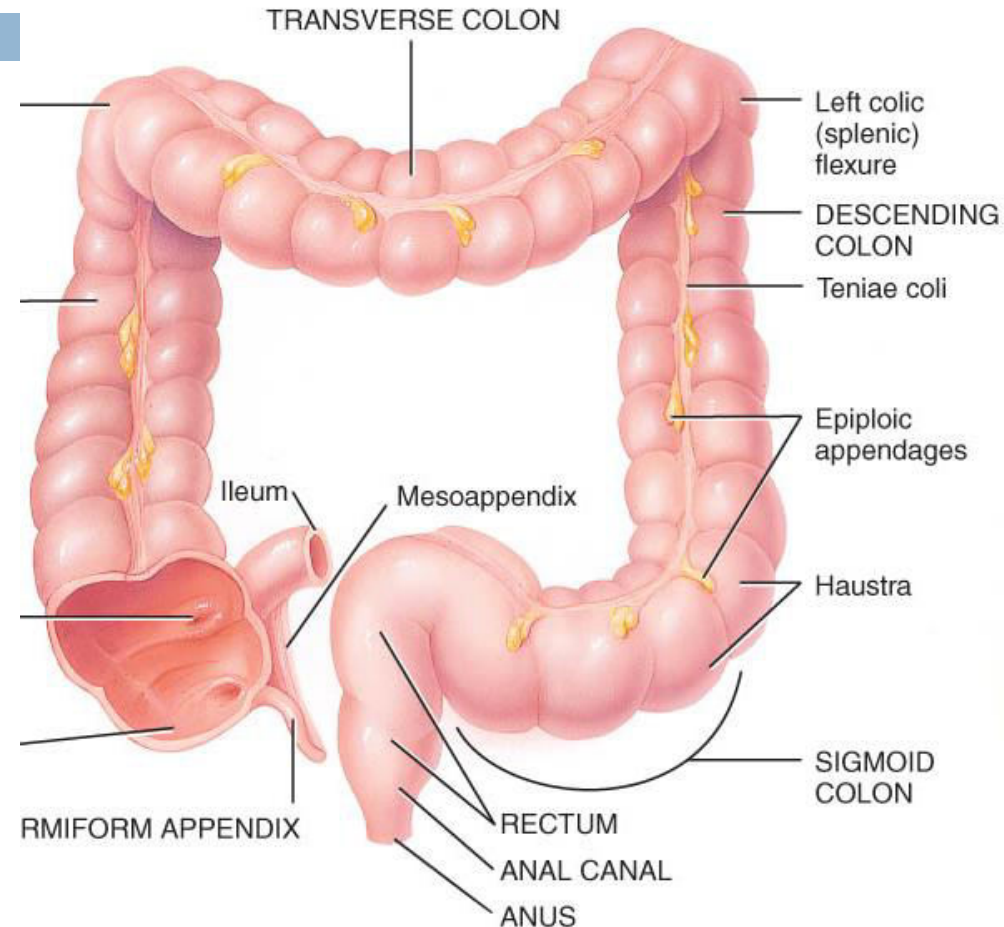


(b) Frontal section of anal canal

- ❑ 5 feet long by 2½ inches in diameter
- ❑ Ascending & descending colon are retroperitoneal
- ❑ Cecum & appendix
- ❑ Rectum = last 8 inches of GI tract anterior to the sacrum & coccyx
- ❑ Anal canal = last 1 inch of GI tract
  - ❑ internal sphincter----smooth muscle & involuntary
  - ❑ external sphincter----skeletal muscle & voluntary control

# Large Intestine

- External features of large intestine:
  - taeniae coli = bands of muscles
  - haustra (pouches) formed
  - Epiploic fat appendages



(a) Anterior view of large intestine showing major regions

# Appendicitis

13

- Inflammation of the appendix due to blockage of the lumen by chyme, foreign body, carcinoma, stenosis, or kinking
- Symptoms
  - ▣ high fever, elevated WBC count, neutrophil count above 75%
  - ▣ referred pain, anorexia, nausea and vomiting
  - ▣ pain localizes in right lower quadrant
- Infection may progress to gangrene and perforation within 24 to 36 hours

