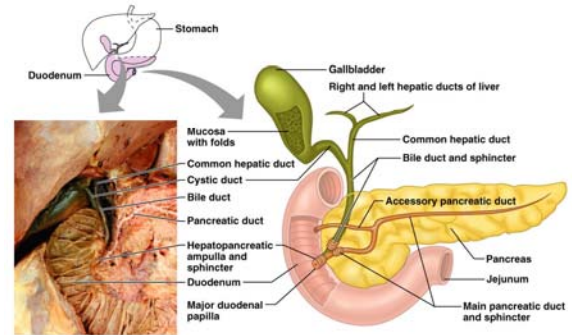


The Digestive System

PART 2

The Duodenum and Related Organs



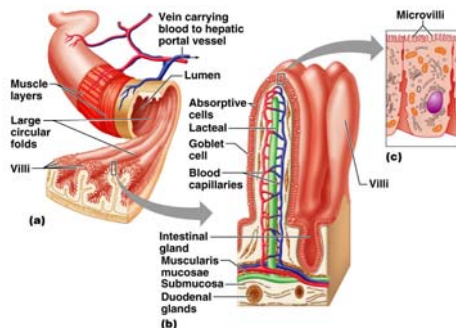
The Small Intestine – Microscopic Anatomy

- Modifications for absorption
 - **Circular folds** (plicae circulares)
 - Folds of mucosa and submucosa
 - **Villi** (found on circular folds of the mucosa)
 - Finger-like projections of the mucosa
 - Covered with simple columnar epithelium
 - **Microvilli**
 - Further increase surface area for absorption

Histology of the Intestinal Wall

- **Absorptive cells**
 - Uptake digested nutrients
- **Goblet cells**
 - Secrete mucus that lubricates chyme
- **Enteroendocrine cells**
 - Secrete hormones
- **Intestinal crypts**
 - Epithelial cells secrete intestinal juice

The Small Intestine – Structural Features



Nerve Plexuses

- **Myenteric nerve plexus**
 - Lies between circular and longitudinal muscularis
 - Controls peristalsis and segmentation
- **Submucosal nerve plexus**
 - Lies in submucosa
 - Signals glands to secrete

The Large Intestine

- Digested residue contains few nutrients
- Small amount of digestion by bacteria
- Main functions
 - Absorb water and electrolytes
- Mass peristaltic movements force feces toward the rectum

Gross Anatomy of Large Intestine

- Subdivided into
 - Cecum
 - Sac, connects to ileum
 - Vermiform appendix
 - Colon
 - Ascending, transverse, descending, sigmoid
 - Rectum
 - Anal canal

Gross Anatomy of Large Intestine

- Special features of large intestine
 - **Teniae coli**
 - Thickening of longitudinal muscularis
 - **Haustra**
 - Puckering created by teniae coli
 - **Epiploric appendages**
 - Fat-filled pouches of visceral peritoneum

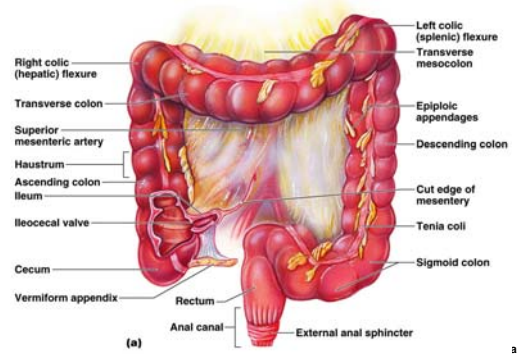
Gross Anatomy of Large Intestine

- **Cecum**
 - Blind pouch, connects to ileum
 - Beginning of large intestine
- **Vermiform appendix**
 - Contains lymphoid tissue
 - Neutralizes pathogens
- **Colon**
 - Divided into distinct segments
 - Ascending, transverse, descending, and sigmoid colon

Gross Anatomy of Large Intestine

- **Rectum**
 - Descends along the inferior half of the sacrum
- **Anal Canal**
 - The last subdivision of the large intestine
 - Lined with stratified squamous epithelium

Gross Anatomy of Large Intestine



Vessels and Nerves of the Large Intestine

- First half of large intestine
 - Arterial supply - **superior mesenteric artery**
- Distal half of large intestine
 - Arterial supply - **inferior mesenteric artery**

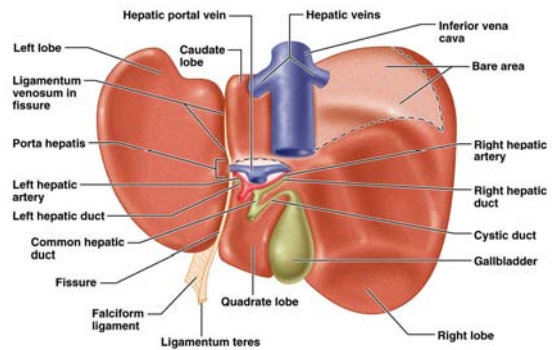
Microscopic Anatomy of Large Intestine

- Villi are absent
- Contains numerous goblet cells
- Intestinal crypts – simple tubular glands
- Lined with **simple columnar epithelial tissue**
 - Epithelium changes at anal canal
 - Becomes **stratified squamous epithelium**

The Liver

- Largest gland in the body
 - Performs over 500 functions
 - Digestive function
 - Bile *production*
 - Performs many metabolic functions

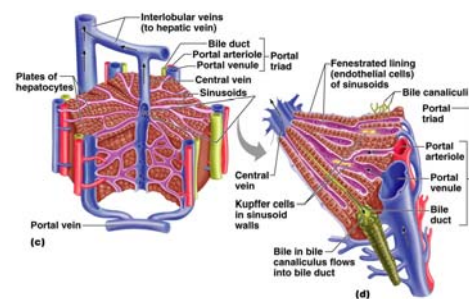
Visceral Surface of the Liver



Microscopic Anatomy of the Liver

- **Hepatocyte** – functional cells of the liver
- **Portal triad** composed of
 - Bile duct tributary
 - Branch of hepatic portal vein
 - Branch of hepatic artery
- **Kupffer cells** – destroy bacteria

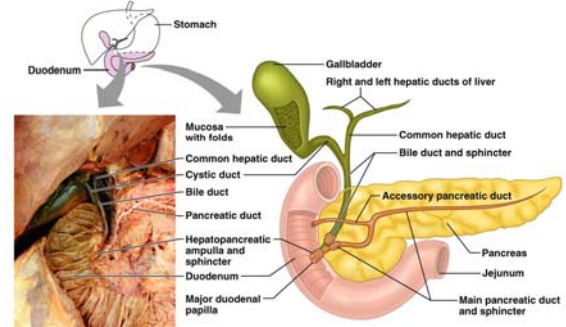
Microscopic Anatomy of Liver



The Gallbladder

- Stores and concentrates bile
- Expels bile into duodenum
 - Bile emulsifies fats
- **Cholecystokinin** – released from enteroendocrine cells in response to fatty chyme

The Gallbladder



The Pancreas

- Exocrine function
 - **Acinar cells** make, store, and secrete pancreatic enzymes
 - Enzymes are activated in the duodenum
- Endocrine function
 - Produces **insulin** and **glucagon**
 - Regulates blood sugar

The Digestive System in Later Life

- Middle age – gallstones and ulcers
- Old age – activity of digestive organs decline
 - Fewer digestive juices and enzymes produced
 - Absorption is less efficient
 - Dehydration of fecal mass leads to constipation
 - Diverticulosis and cancer of digestive organs