

Lec10

Digestive System

Digestive System Function

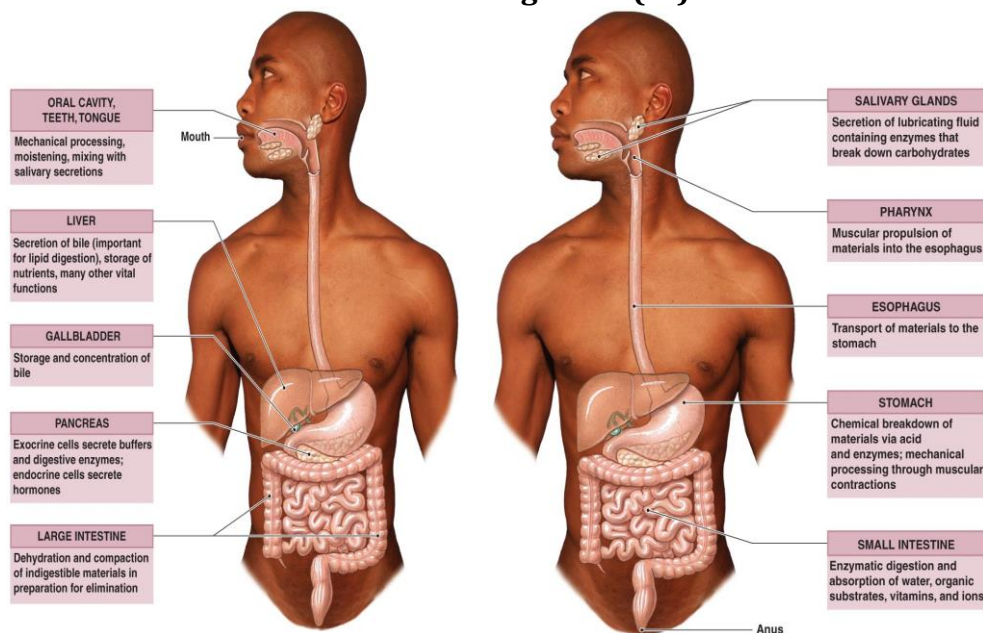
- Acquires nutrients from environment
- Anabolism

Uses raw materials to synthesize essential compounds

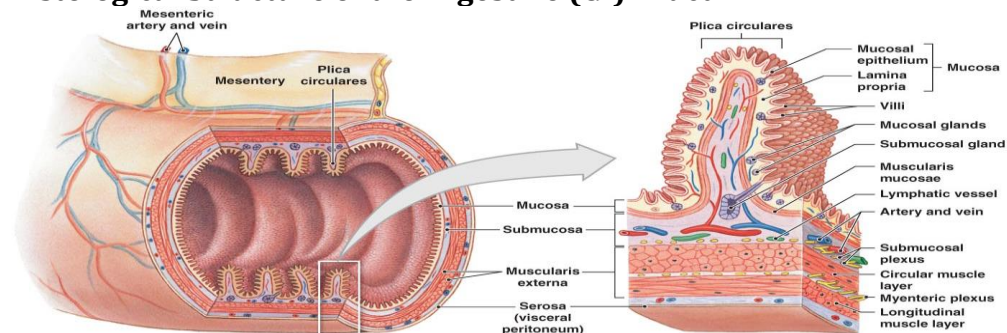
- Catabolism

Decomposes substances to provide energy cells need to function

Digestive (GI) Tract



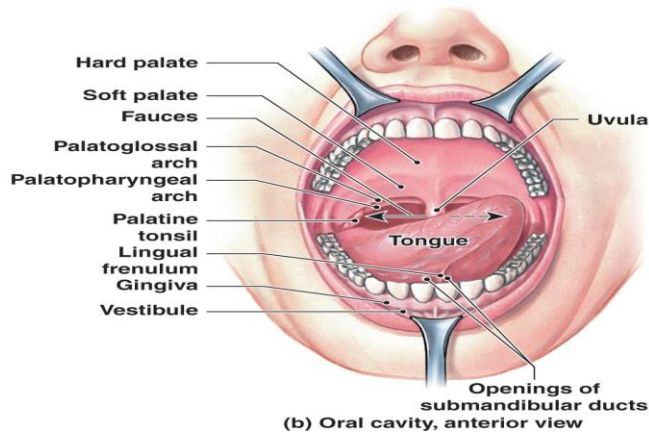
Histological Structure of the Digestive (GI) Tract



Functions of Oral Cavity

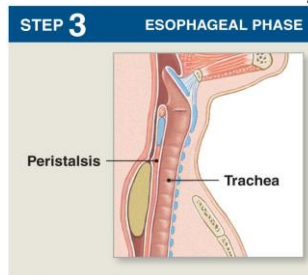
- Sensory analysis
- Of material before swallowing

- Mechanical processing
Through actions of teeth, tongue, and palatal surfaces
- Lubrication
Mixing with mucus and salivary gland secretions
- Limited digestion
Of carbohydrates and lipids



Esophagus

- A hollow muscular tube
- About 25 cm (10 in.) long and 2 cm (0.80 in.) wide
- Conveys solid food and liquids to the stomach
- Begins posterior to cricoid cartilage
- Is innervated by fibers from the esophageal plexus

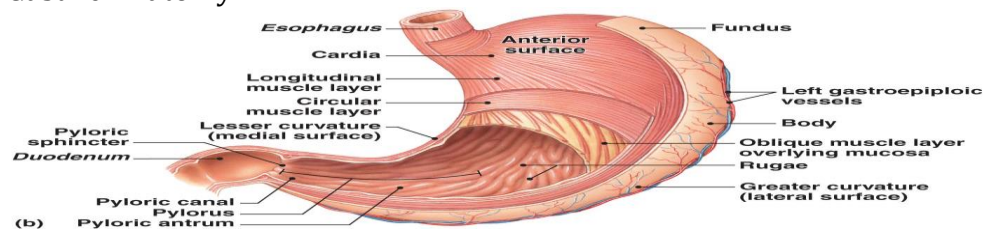


Stomach Function

- Major Functions of the Stomach
 - Storage of ingested food
 - Mechanical breakdown of ingested food
 - Disruption of chemical bonds in food material by acid and enzymes
 - Production of **intrinsic factor**, a glycoprotein required for absorption of vitamin

B₁₂ in small intestine

Gastric Anatomy

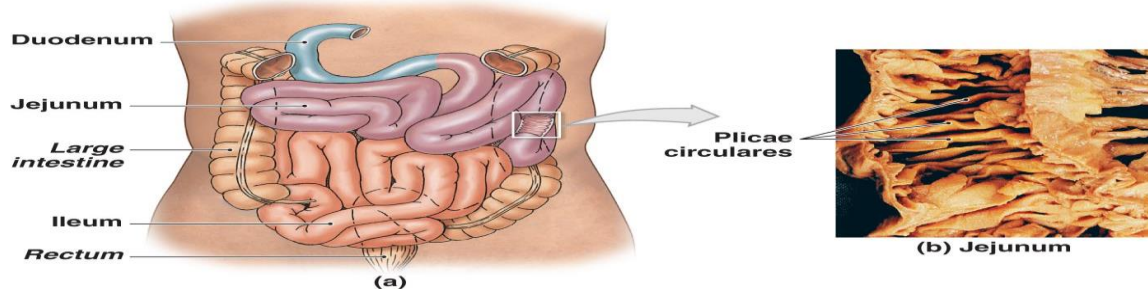


Digestion in the Stomach

- Stomach performs preliminary digestion of proteins by pepsin
Some digestion of carbohydrates (by salivary amylase)
Lipids (by lingual lipase)
- Stomach contents
Become more fluid
pH approaches 2.0
Pepsin activity increases
Protein disassembly begins
- Although digestion occurs in the stomach, nutrients are not absorbed there

Small Intestine

- 90% of absorption occurs in the small intestine



Small Intestine

- The Duodenum

The segment of small intestine closest to stomach

25 cm (10 in.) long

“Mixing bowl” that receives **chyme** from stomach and digestive secretions from pancreas and liver

Functions of the duodenum

To receive chyme from stomach

To neutralize acids before they can damage the absorptive surfaces of the small intestine

Small Intestine

- The Jejunum

Is the middle segment of small intestine

2.5 meters (8.2 ft) long

Is the location of most

Chemical digestion

Nutrient absorption

Has few plicae circulares

Small villi

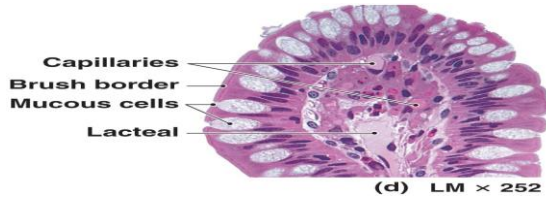
Small Intestine

- The Ileum

The final segment of small intestine

3.5 meters (11.48 ft) long

Ends at the **ileocecal valve**, a sphincter that controls flow of material from the ileum into the large intestine
Small Intestine



Small Intestine

- Intestinal Secretions

Watery intestinal juice

1.8 liters per day enter intestinal lumen

Moisten chyme

Assist in buffering acids

Keep digestive enzymes and products of digestion in solution

- Intestinal Movements

Chyme arrives in duodenum

Weak peristaltic contractions move it slowly toward jejunum

- Myenteric reflexes
- Not under CNS control
- Parasympathetic stimulation accelerates local peristalsis and segmentation

Pancreas

- Lies posterior to stomach

From duodenum toward spleen

- Is bound to posterior wall of abdominal cavity

- Is wrapped in thin, connective tissue capsule

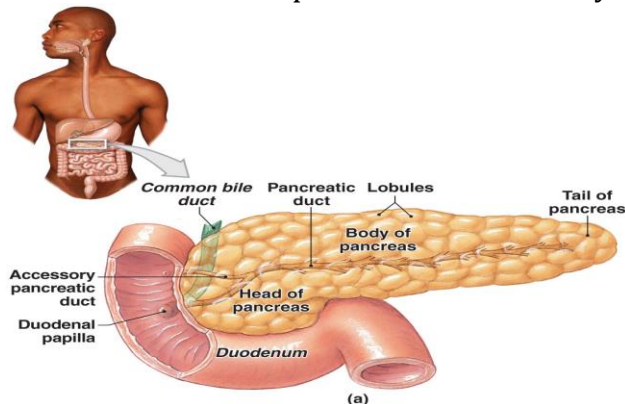
Functions of the Pancreas

1. Endocrine cells of the pancreatic islets:

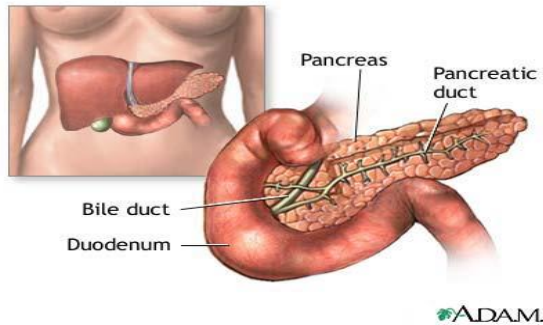
Secrete insulin and glucagon into bloodstream

2. Exocrine cells:

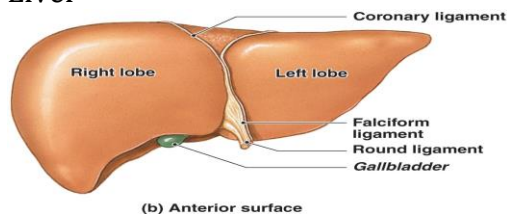
Acinar cells and epithelial cells of duct system secrete **pancreatic juice**



Pancreas



Liver



Liver

- **Hepatocytes**

Are liver cells

Adjust circulating levels of nutrients

Through selective absorption and secretion

In a liver lobule form a series of irregular plates arranged like wheel spokes

Many **Kupffer cells** (stellate reticuloendothelial cells) are located in sinusoidal

lining

As blood flows through sinusoids

Hepatocytes absorb solutes from plasma

And secrete materials such as plasma proteins

Gallbladder

- Is a pear-shaped, muscular sac
- Stores and concentrates bile prior to excretion into small intestine
- Is located in the fossa on the posterior surface of the liver's right lobe
- The Cystic Duct

Extends from gallbladder

Union with common hepatic duct forms common bile duct

Large Intestine

- Is horseshoe shaped
- Extends from end of ileum to anus
- Lies inferior to stomach and liver
- Frames the small intestine
- Also called large bowel
- Is about 1.5 meters (4.9 ft) long and 7.5 cm (3 in.) wide

Parts of Large Intestine

- The Cecum

Is an expanded pouch

Receives material arriving from the ileum

Stores materials and begins compaction

- Appendix

Also called vermiform appendix

Is a slender, hollow appendage about 9 cm (3.6 in.) long

Is dominated by lymphoid nodules (a lymphoid organ)

Parts of Large Intestine

- The Colon

Has a larger diameter and thinner wall than small intestine

The wall of the colon

Forms a series of pouches (haustra)

Haustra permit expansion and elongation of colon

Parts of Colon

- Ascending Colon

Begins at superior border of cecum

Ascends along right lateral and posterior wall of peritoneal cavity to inferior surface of the liver and bends at right colic flexure (hepatic flexure)

- Transverse Colon

Crosses abdomen from right to left; turns at left colic flexure (splenic flexure)

Is supported by transverse mesocolon

Is separated from anterior abdominal wall by greater omentum

Parts of Colon

- The Descending Colon

Proceeds inferiorly along left side to the iliac fossa (inner surface of left ilium)

Is retroperitoneal, firmly attached to abdominal wall

- The Sigmoid Colon

Is an S-shaped segment, about 15 cm (6 in.) long

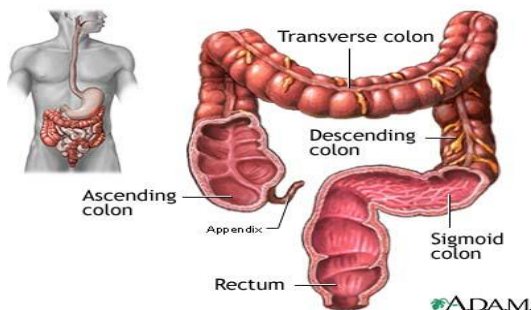
Starts at sigmoid flexure

Lies posterior to urinary bladder

Is suspended from sigmoid mesocolon

Empties into rectum

Parts of Colon



Parts of Large Intestine

- The Rectum

Forms last 15 cm (6 in.) of digestive tract

Is an expandable organ for temporary storage of feces

Movement of fecal material into rectum triggers urge to defecate

- The anal canal is the last portion of the rectum

Contains small longitudinal folds called anal columns

- Anus

Also called anal orifice

Is exit of the anal canal

Has keratinized epidermis like skin