Anatomy of the Digestive System: Organs of the Alimentary Canal

CHAPTER 14
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1. Alimentary Canal or Gastrointestinal Tract (GI) - digests and absorbs food
   - coiled hollow tube with 2 openings
   - mouth, pharynx, esophagus, stomach, small intestine, large intestine

2. Accessory Organs - assist in breakdown of molecules
   - teeth, tongue, salivary glands, pancreas, liver, gall bladder

Organs of the Alimentary Canal

1. Mouth or oral cavity
   - lips (labia) - protect oral cavity opening
   - cheeks - forms lateral walls
   - hard palate - forms anterior roof
   - soft palate - forms posterior roof
   - uvula - fleshy fingerlike projection; closes nasal cavity when swallowing
   - vestibule - area between lips & cheeks and teeth & gums
   - Frenulum – membrane that attaches tongue to floor of mouth

- oral cavity proper: the area contained by the teeth
- tongue: muscle occupying the floor of the mouth

The posterior end of the oral cavity are paired masses of lymphatic tissue (tonsils)
- palatine tonsils
- lingual tonsils

Food is mixed with saliva in the mouth and breakdown starts here
Chewing = mastication
2. Pharynx: common throat

Subdivisions:
- oropharynx - posterior to oral cavity
- nasopharynx - part of respiratory passageway
- laryngopharynx - continues to esophagus; larynx - voice box

Walls are made up of two alternating muscular layers allowing for peristalsis (propulsion of food)

3. Esophagus: gullet

Runs from pharynx through the diaphragm to the stomach
- 25 cm long
- smooth muscle
- propels food to stomach through peristalsis

4. Tissue Layers of the Alimentary Canal

From esophagus to large intestine the walls contain the same 4 layers (tunics):
1. Mucosa (innermost): epithelium, CT, thin muscle layer
2. Submucosa: soft CT, has BV, nerves and lymph
3. Muscularis externa: muscle (circular/longitudinal)
4. Serosa: layer of serous producing cells (visceral peritoneum). Held to parietal peritoneum by the mesentary

4. Innervation of the Alimentary Wall

- Submucosal nerve plexus
- Myenteric nerve plexus
- Subserous nerve plexus
- These help regulate the mobility and secretory activity of GI organs

4. Stomach

A. Structure
- Cardiac – surrounds junction between esophagus & stomach
- Fundus – lateral to cardiac region
- Body – midportion; lined with folded walls called rugae that disappear when stomach is full
- Pylorus – terminal portion
B. Valves or sphincters
- Cardioesophageal (cardiac) – leads food into stomach
- Pyloric – leads partial digested food (chyme) from body into small intestine
- Curvatures:
  - Greater – outer (lateral) curve
  - Lesser – inner (medial) curve

C. Mechanical Digestion
3 muscle layers
  - segmentation of food
    - 1st – longitudinal
    - 2nd – circular
    - 3rd – oblique

D. Chemical digestion
Walls lined with gastric pits that lead to the gastric gland which contains 3 types of cells
1. Mucus neck cells – secrete alkaline sticky mucus to protect stomach walls
2. Parietal cells – produces HCl which activates enzyme production
3. Chief cells – produce protein digestive enzymes called pepsinogen (inactive form of pepsin)

Sequence of events in chemical digestion:
1. food enters stomach
2. Parietal cells secrete HCl which lowers pH
3. low pH triggers chief cells to produce pepsinogen
4. pepsinogen converted to its active form of pepsin
5. Small intestine

A. Structure
- Extends from the pyloric sphincter to the ileocecal valve
- 2 m long
- Mesentary – web like membrane that coils small intestine & holds it intact

3 subdivisions:
- Duodenum – curves around the pancreas; receives chyme from stomach, enzymes from pancreas & bile from liver
- Jejunum – middle portion; bulk of digestion & absorption
- Ileum – terminal portion

B. Chemical Digestion in sm. intestine
1. pyloric sphincter controls amount of food entering from stomach
2. pancreas produces enzymes that are secreted to small intestines through pancreatic duct
3. Bile formed in liver is secreted through bile duct
4. Pancreatic & bile ducts join to form hepatopancreatic ampulla
5. together enzymes, bile and bicarbonate (neutralize acids) enter duodenum through duodenal papilla

C. Absorption in the sm. intestine
- Nearly all absorption occurs here
- Peyer’s Patches – collection of lymphatic tissue that increases toward end of small intestine that prevents absorption of bacteria

Surface area increased by 3 structures:
- Circular folds (plicae circularis)
- deep folds of inner walls
Villi – fingerlike projections that contain bv & lymphatic duct called the lacteal
Microvilli – “brush border”; projections of the cell membrane that give a fuzzy appearance

6. Large Intestine
- Extends from ileocecal valve to anus
- Absorption of water & elimination of waste
- No villi
- Lined with goblet cells that produce mucus for lubrication
- Outer walls puckered with haustra which aids in contraction

- Cecum – 1st portion; ileocecal valve that allows indigestible material from sm. intestine
- Appendix – sac extending from cecum

- Ascending colon – travels up right side of abdominal cavity; turns at the hepatic flexure
- Transverse colon – travels across the abdomen; turns at the splenic flexure

- Descending colon – travels down left side of abdomen
- Sigmoid colon – S shaped
- Rectum – storage chamber
- Anal sphincter – external & internal; voluntary & involuntary muscles; opens during defecation