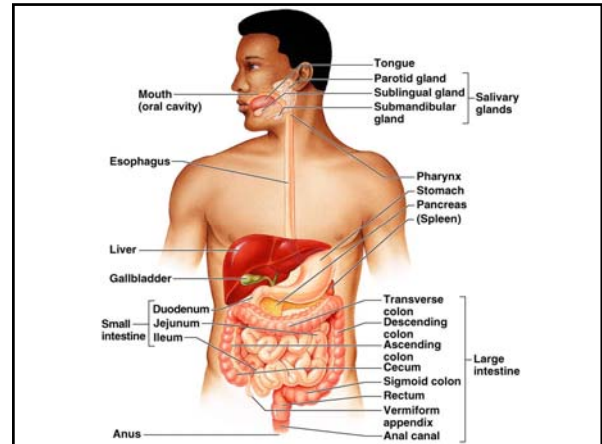


Overview of the Digestive System

- Organs are divided into two groups
 - **Alimentary canal** (The Tube)
 - Mouth, pharynx, and esophagus
 - Stomach, small intestine, large intestine and anus
 - **Accessory digestive organs**
 - Teeth and tongue
 - Gallbladder, salivary glands, liver, and pancreas

1



Digestive Processes

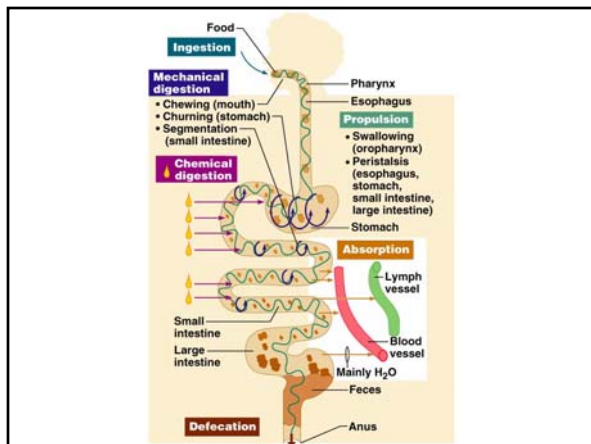
- **Ingestion** – occurs in the mouth
- **Propulsion** – movement of food
 - **Peristalsis** – major means of propulsion
- **Mechanical digestion** – prepares food for chemical digestion
 - Chewing, churning of food in stomach, segmentation
 - **Segmentation** is rhythmic local constrictions of intestine

3

Digestive Processes

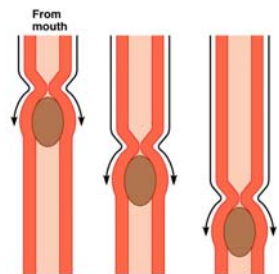
- **Chemical digestion** – complex molecules broken down to chemical components
 - Mouth
 - Stomach
 - Small intestine
- **Absorption** – water and food molecules pass through to GI lymphatics and blood vessels
- **Defecation** – elimination of indigestible substances as feces

4



Peristalsis

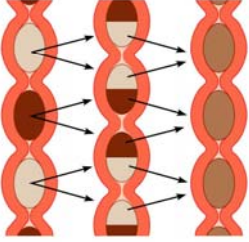
- Major means of propulsion
- Adjacent segments of the alimentary canal relax and contract



6

Segmentation

- Rhythmic local contractions of the intestine
- Mixes food with digestive juices



7

The Mouth (Oral Cavity) & Teeth

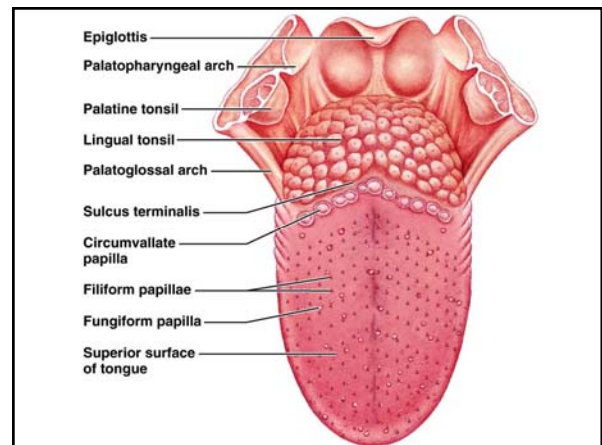
- Histology of oral cavity
 - Stratified squamous epithelium
- Upper part of the oral cavity – Palate
 - Hard Palate – Anterior 2/3 (bony)
 - Soft Palate – Posterior 1/3 (skeletal muscle)
- Lie in the gum-covered margins of the mandible and maxilla.
- Used for mastication (chewing)
 - Breaks down food into smaller fragments

8

The Tongue

- Interlacing fascicles of skeletal muscle
- Grips food and repositions it
- **Lingual frenulum**
 - Secures tongue to floor of mouth
- **Tongue papillae**
 - Filiform papillae – no taste buds - Grippers
 - Fungiform papillae – mushroom shaped and contain taste buds
 - Circumvallate papillae – contain taste buds and found on the posterior aspect of the tongue

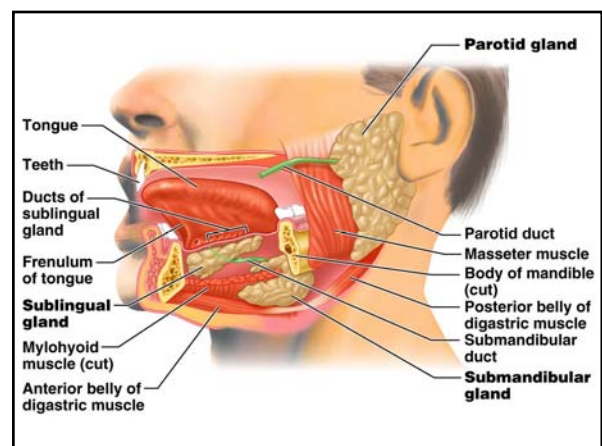
9



The Salivary Glands

- Secrete enzymes that aid in digestion
 - Carbohydrate digestion begins in the mouth
- 3 pairs of salivary glands
 - **Parotid glands**
 - Lies anterior to the ears (par=near, otid=ear)
 - **Submandibular glands**
 - Lies along medial surface of mandible
 - **Sublingual glands**
 - Lies in floor of oral cavity

11



The Pharynx (Throat)

- **Oropharynx and laryngopharynx**
 - Connects nasal cavity & mouth to larynx & esophagus
 - Passages for both air and food
 - Lined with **stratified squamous epithelium**
 - External muscle layer
 - Constricts to squeeze food into the esophagus

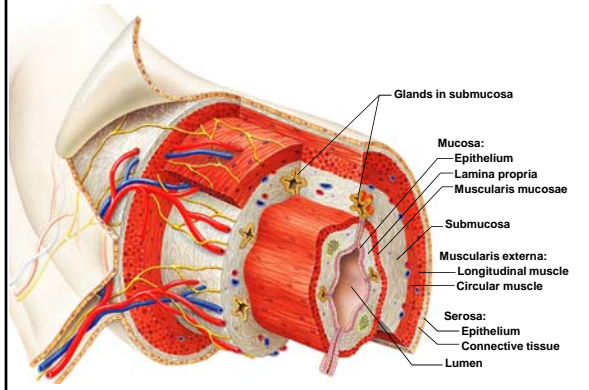
13

Histology of the Alimentary Canal Wall

- Same four layers (tonics) from esophagus to anus
 - 1) The **mucosa** – innermost layer
 - Epithelium + connective tissue + thin layer of smooth muscle
 - 2) The **submucosa** – external to the mucosa
 - Blood & lymphatic vessels, nerve fibers & Connective tissue
 - 3) The **muscularis externa** – external to the submucosa
 - Two layers (responsible for peristalsis)
 - Circular muscularis – inner layer
 - Longitudinal muscularis – outer layer
 - 4) The **serosa** – the outermost layer
 - Visceral peritoneum + areolar connective tissue

14

Histology of the Alimentary Canal



The Esophagus

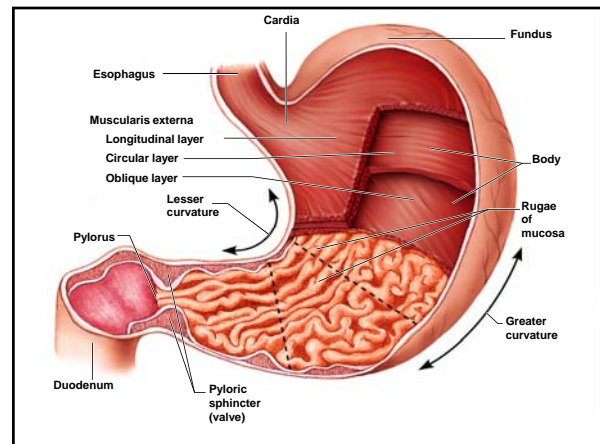
- **Muscular tube**
 - Begins as a continuation of the pharynx
 - Joins the stomach inferior to the diaphragm
 - **Cardiac sphincter** – closes lumen to prevent stomach acid from entering esophagus

16

The Stomach

- Protein digestion begins in the stomach
 - Secretion of **pepsin** begins protein digestion
 - Functions under acidic conditions (HCL)
 - Hydrochloric acid (secreted by **parietal cells**) also breaks down proteins
 - Destroys many harmful bacteria in food
- Food is in stomach for approximately 4 hours
- Muscularis has three layers
 - Circular, longitudinal & oblique layers – Churns food
 - food is churned into chyme

17



Microscopic Anatomy of the Stomach

- Gastric glands of fundus and body
 - **Mucous neck cells**
 - Secrete a special mucus
 - **Parietal (oxyntic) cells**
 - Secrete hydrochloric acid and gastric intrinsic factor
 - Intrinsic factor is needed for B-12 absorption
 - **Chief (zymogenic) cells**
 - Secrete pepsinogen – activated into pepsin when it encounters acid

19

The Small Intestine – Gross Anatomy

- Longest portion of the alimentary canal
- Site of most enzymatic digestion and absorption
- Three subdivisions
 - Duodenum
 - Jejunum
 - Ileum

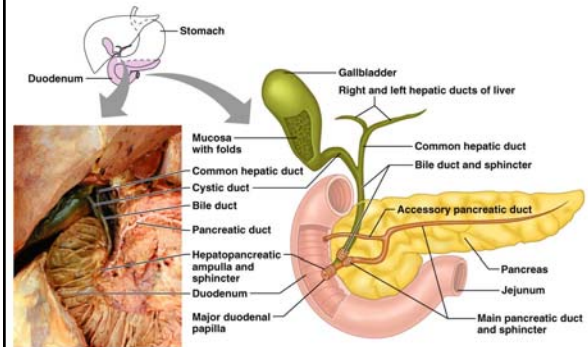
20

The Duodenum

- Receives digestive enzymes and bile
- **Main pancreatic duct and common bile duct** enter duodenum
 - Sphincters control entry of bile and pancreatic juices
 - Hepatopancreatic ampulla – entry point
- Enzyme secretion is initiated by acidic chyme
- Brunner's glands – Secrete bicarbonate-rich mucus to neutralize the acidic chyme

21

The Duodenum and Related Organs



Gastroesophageal Reflux & Peptic Ulcers

- GERD – Gastroesophageal Reflux Disease
 - Due to relaxation of the cardiac sphincter
 - Allows stomach acids to enter esophagus
 - Sx – Heartburn, belching, regurgitation
 - Medical Tx – Antacids, drugs to lower stomach acid, surgery to reconstruct sphincter

23

Gastroesophageal Reflux & Peptic Ulcers

- Peptic Ulcers
 - Affects 1 out of 8 people in the U.S.
 - Most affected age 50-70
 - 2% Occur in lower esophagus – due to GERD
 - 98% occur in stomach (33%) or duodenum (66%)
 - Duodenum 3x more likely

24