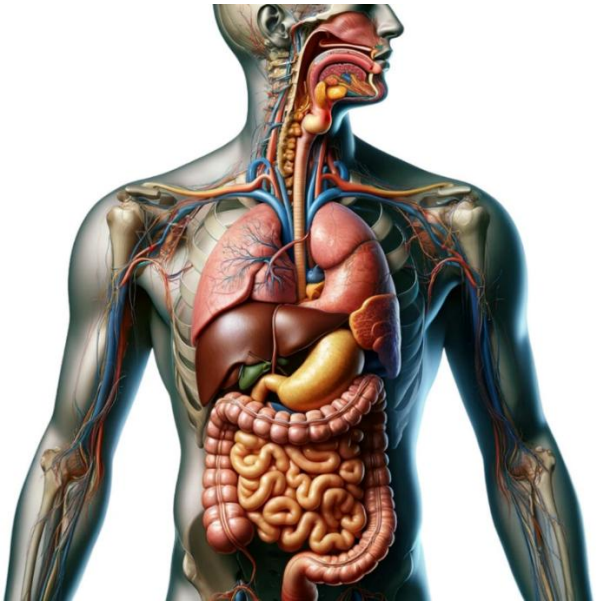
Digestive System

Introduction: Digestive System

- The digestive system is a complex group of organs and glands that processes food, breaks it down into nutrients, and eliminates waste.



Here are the realistic diagrams of the human digestive system, designed to showcase the entire pathway and major organs involved in digestion.

- It plays a crucial role in maintaining overall health and wellbeing.

Process of digestive system

- The process of digestion involves breaking down food into its basic components, absorbing nutrients, and eliminating waste.

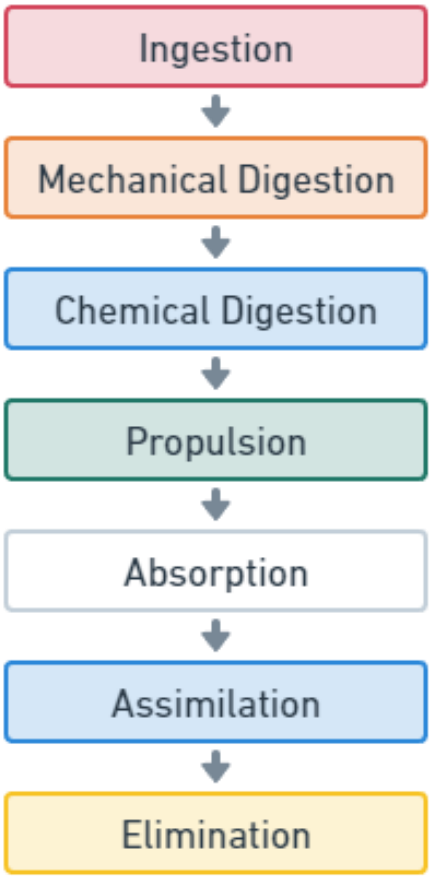
The process can be divided into several stages:

1. **Ingestion:**
   - Food is taken into the mouth and begins the process of digestion.
2. **Mechanical digestion:**
   - Food is physically broken down into smaller pieces by chewing (mastication) in the mouth.
   - This process increases the surface area of the food, making it easier for enzymes to work on it.
3. **Chemical digestion:**
   - Enzymes, acids, and other chemicals produced by the body work to break down food into simpler molecules.
   - Saliva in the mouth starts the chemical breakdown of carbohydrates, while the stomach secretes hydrochloric acid and enzymes like pepsin to break down proteins.

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4. Propulsion:

- Food moves through the digestive system via muscular contractions called peristalsis.
- These rhythmic contractions help propel the food bolus from the mouth, down the esophagus, and into the stomach.
- After churning and mixing with gastric juices in the stomach, the semi-liquid chyme is pushed into the small intestine.



5. Absorption:

- In the small intestine, nutrients from the broken-down food are absorbed into the bloodstream through tiny, finger-like projections called villi.
- The small intestine is specialized for maximum absorption, with a large surface area due to the presence of villi and microvilli.

6. Assimilation:

- The absorbed nutrients are transported via the circulatory system to the body's cells, where they are used for growth, repair, energy production, and other essential processes.

7. Elimination:

- Indigestible food particles and waste products move into the large intestine, where water and electrolytes are reabsorbed, and the remaining waste forms feces.
- The feces are stored in the rectum until they are expelled through the anus during defecation.

- Throughout the process, the digestive system is regulated by the enteric nervous system (a complex network of neurons in the gastrointestinal tract) and the central nervous system.
- Hormones, like gastrin and secretin, are also involved in regulating the secretion of digestive juices and the movement of food through the system.

Anatomy and physiology of GIT

- The gastrointestinal (GI) tract, also known as the digestive tract, is a continuous tube that runs from the mouth to the anus.
- It is responsible for breaking down food, absorbing nutrients, and eliminating waste.

Layers of the GI Tract (from innermost to outermost)

1. Mucosa:

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- The innermost layer responsible for secretion, absorption, and protection.
- It has three sub-layers: epithelium, lamina propria, and muscularis mucosae.

2. Submucosa:

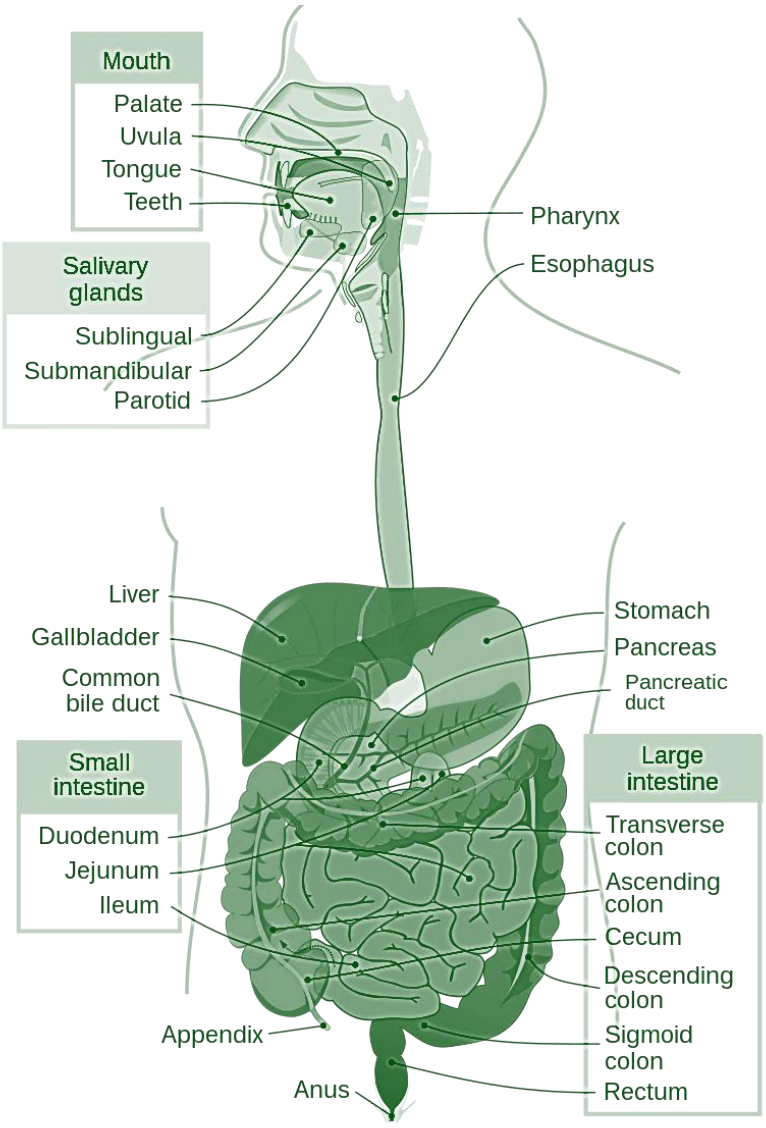
- A layer of connective tissue that contains blood vessels, lymphatic vessels, nerves, and glands.

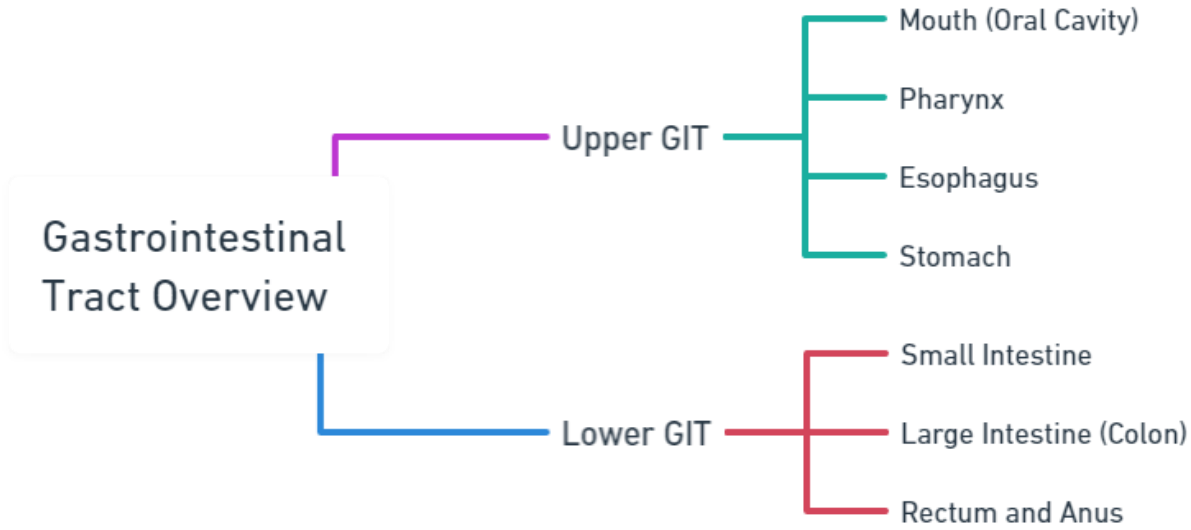
3. Muscularis externa:

- A layer of smooth muscle that propels food through the GIT. It has an inner circular layer, an outer longitudinal layer, and an additional oblique layer in the stomach.

4. Serosa/Adventitia:

- The outermost layer, composed of connective tissue and mesothelium (serosa) or connective tissue (adventitia) that anchors the GIT to surrounding structures.





Upper GI Tract

1. Mouth (Oral Cavity):

- Begins the digestive process.

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- Structures include the lips, cheeks, palate, tongue, teeth, and salivary glands.
- Salivary glands (parotid, submandibular, and sublingual) produce saliva that moistens food and begins the digestion of carbohydrates with the enzyme amylase.

2. Pharynx:

- A muscular tube that connects the mouth to the esophagus.
- Plays a role in swallowing, directing food from the mouth to the esophagus, and preventing food from entering the trachea (windpipe) through the epiglottis.

3. Esophagus:

- A muscular tube about 10 inches long, running from the pharynx to the stomach.
- Transports food to the stomach via peristaltic movements.
- The lower esophageal sphincter (LES) controls the passage of food into the stomach and prevents the backflow of gastric contents.

4. Stomach:

- A J-shaped muscular organ that stores, mixes, and digests food.
- Divided into four regions: cardia, fundus, body (corpus), and pylorus.
- The stomach lining contains gastric glands that secrete gastric juice, including hydrochloric acid and digestive enzymes like pepsin.

Lower GI Tract

1. Small Intestine:

- Approximately 20 feet long, divided into three sections: duodenum, jejunum, and ileum.
- The duodenum receives chyme from the stomach, along with bile from the liver and gallbladder, and pancreatic juices from the pancreas, which aid in digestion.
- The jejunum and ileum are mainly involved in the absorption of nutrients and water.

2. Large Intestine (Colon):

- About 5 feet long, divided into the cecum, ascending, transverse, descending, and sigmoid colon, and the rectum.
- Absorbs remaining water and electrolytes from indigestible food matter and forms solid waste (feces).
- The colon houses a large number of bacteria that play a role in the fermentation of undigested food, vitamin production, and protection against harmful bacteria.

3. Rectum and Anus:

- The rectum stores feces until they are expelled from the body.
- The anus is the final part of the GI tract, consisting of internal and external sphincters that control the expulsion of feces.

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Accessory Digestive Organs

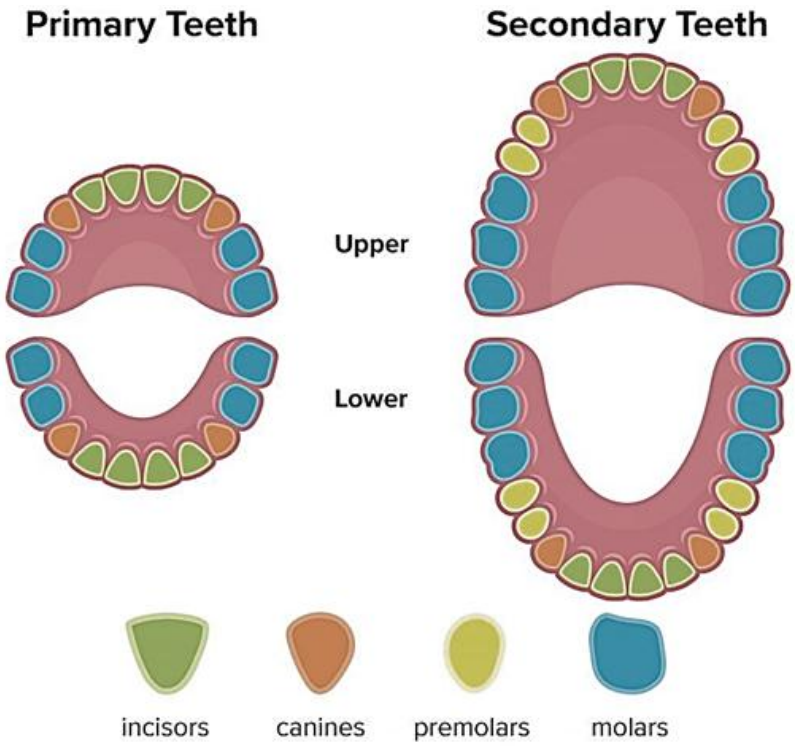
In addition to the primary GI tract, several accessory organs contribute to the digestive process:

1. **Salivary Glands:**
   - As mentioned, these include the parotid, submandibular, and sublingual glands, which secrete saliva to initiate the digestion of carbohydrates.
2. **Liver:**
   - The body's largest gland, playing a crucial role in metabolism, detoxification, and the production of bile, which helps in the digestion and absorption of fats.
3. **Gallbladder:**
   - Stores and concentrates bile from the liver, releasing it into the duodenum to aid in digestion.
4. **Pancreas:**
   - Produces pancreatic juice containing digestive enzymes and bicarbonate ions, which neutralize the acidity of chyme entering the duodenum from the stomach.

Mouth

- The oral cavity, or mouth, marks the entry point of the digestive system, equipped with specialized structures for the initial processing of food.
- Here, food encounters teeth and salivary glands, which work in concert to reduce food to a consistency suitable for digestion and absorption further down the GI tract.

Teeth:



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