

Digestive System (part 1)

What Is Digestion?

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Digestion is the complex process of turning the food you eat into **nutrients**, which the body uses for energy, growth and cell repair needed to survive. The digestion process also involves creating waste to be eliminated.

The digestive tract (or gastrointestinal tract) is a long twisting tube that starts at the **mouth** and ends at the **anus**. It is made up of a series of muscles that coordinate the movement of food and other cells that produce enzymes and hormones to aid in the breakdown of food. Along the way are three other organs that are needed for digestion: the **liver**, **gallbladder**, and the **pancreas**.

Functions of the Digestive System

- ♣ ingestion – the oral cavity allows food to enter the digestive tract and have mastication (chewing) occurs , and the resulting food bolus is swallowed .

- ♣ Digestion:

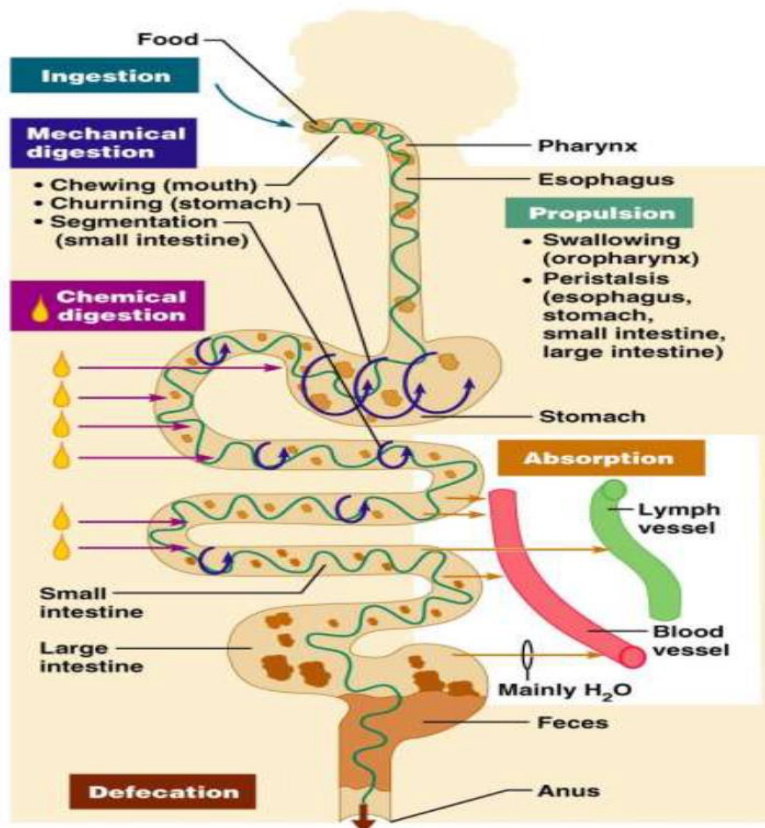
- ♣ Mechanical digestion – muscular movement of the digestive tract (mainly in the oral cavity and stomach) physically break down food into smaller particles .

- ♣ chemical digestion – hydrolysis reactions aided by enzymes (mainly in the stomach and small intestine) chemically break down food particles into nutrient molecules , small enough to be absorbed . .

Secretion – enzymes and digestive fluids secreted by the digestive tract and its accessory organs facilitate chemical digestion .

- ♣ Absorption – passage of the end – products (nutrients) of chemical digestion from the digestive tract into blood or lymph for distribution to tissue cells .

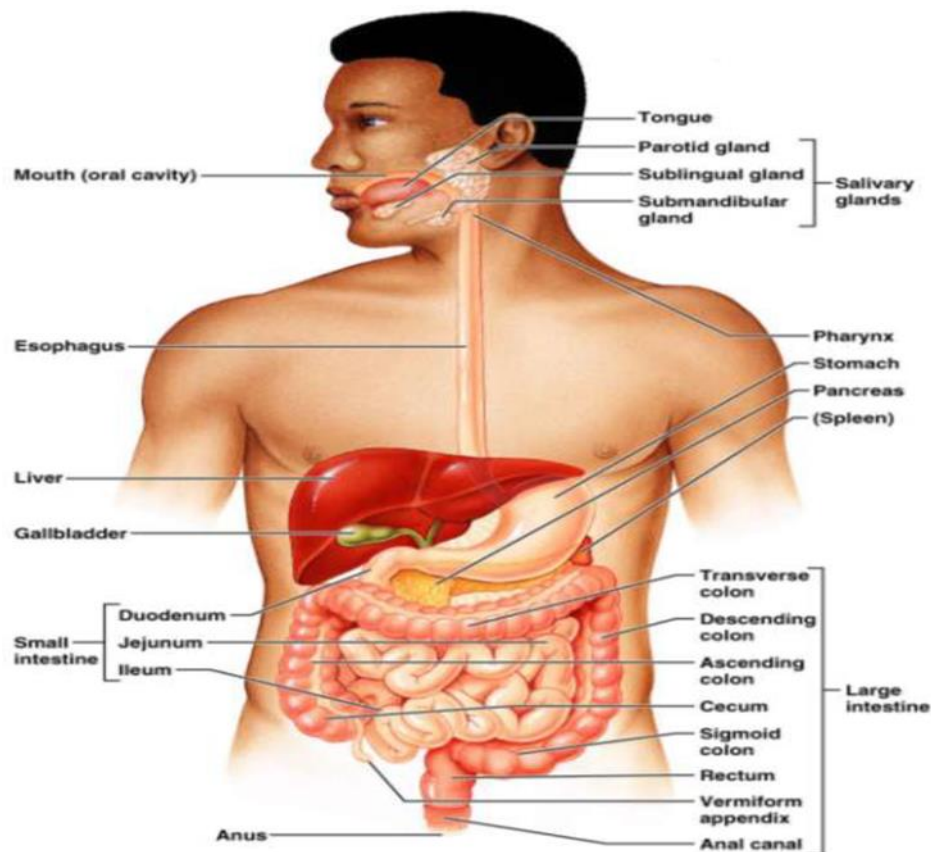
- ♣ Elimination – undigested material will be released through the rectum and anus by defecation .



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Organization of The Digestive System

- ♣ Organs of the digestive system are divided into 2 main group : the gastrointestinal tract (GI tract) and accessory structures .
- ♣ GI tract is a continuous tube extending through the ventral cavity from the mouth to the anus – it consists of the mouth , oral cavity , pharynx , esophagus , stomach , small intestine , large intestine , rectum , and anus
- ♣ Accessory structures include the teeth, tongue (in oral cavity) , salivary glands , liver , gallbladder , and pancreas .



The digestive tract consist of 4 layers:

1- Mucosa: Composition

- Covering epithelium
- Loose connective tissue called lamina propria
- Smooth muscle layer muscularis mucosae, with inner circular and outer longitudinal layers

2- Submucosa

- Dense irregular connective tissue layer with blood vessels, nerves, and lymphatic vessels.
- Contains submucosal nerve plexus that controls muscularis mucosae

3- Muscularis Externa

- Thick, smooth muscle layer inferior to submucosa
- Normally contains an inner circular and an outer longitudinal smooth muscle layers

4- Serosa or adventitia

SEROSA

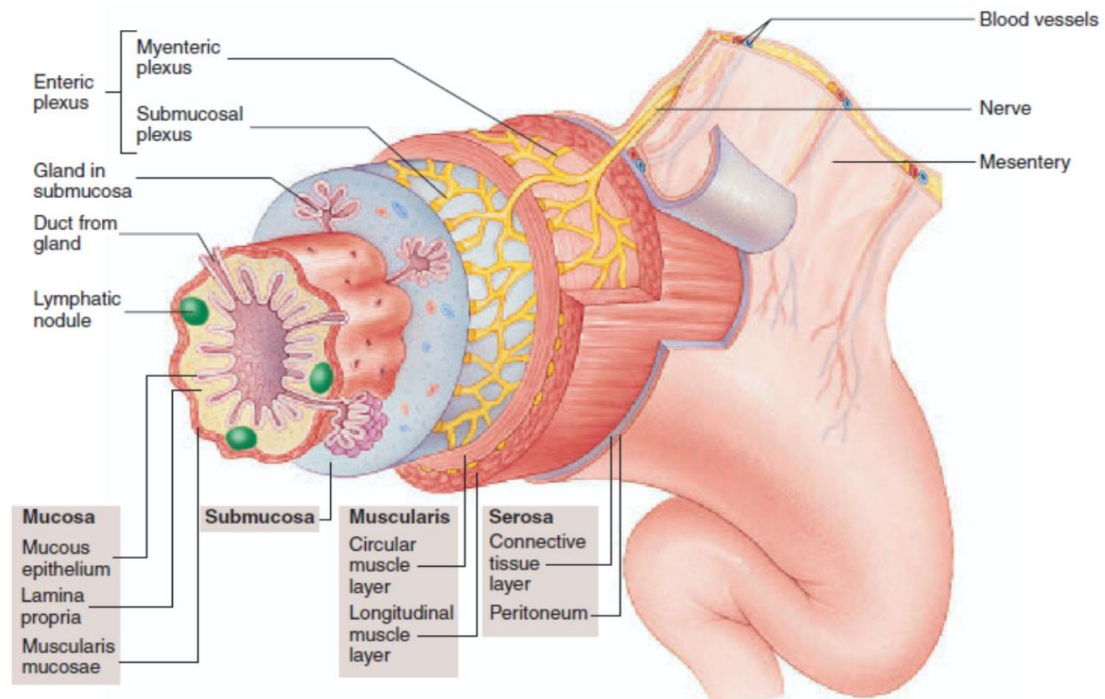
Thin layer of connective tissue, mesothelium, that covers the visceral organs

Covers abdominal esophagus, stomach, small intestine, and anterior wall of colon.

ADVENTITIA

Thick layer of connective tissue, doesn't have mesothelium layer .

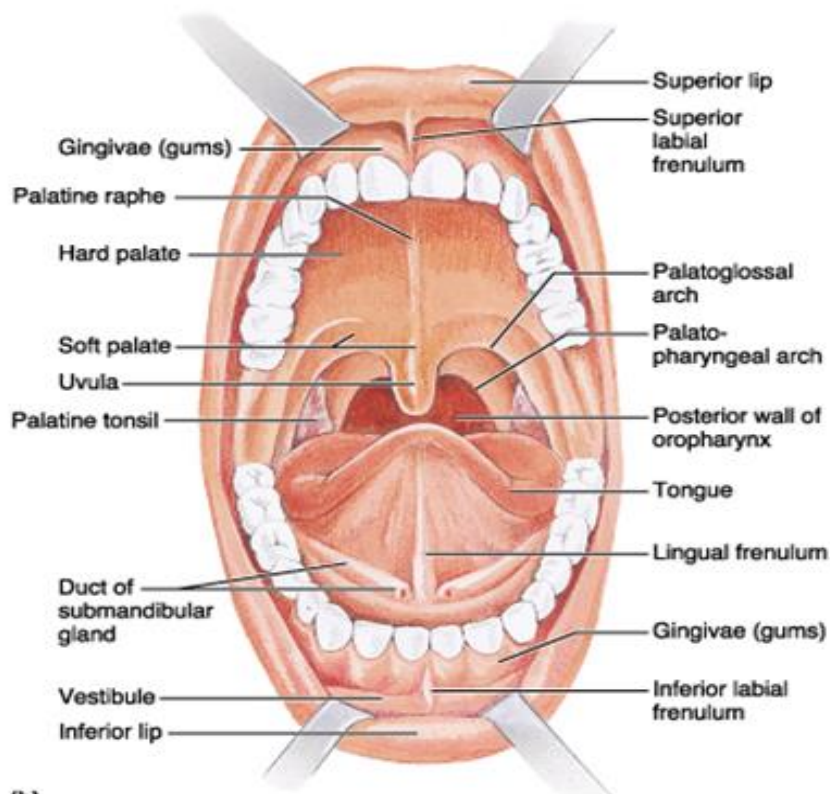
Covers thoracic part of esophagus and posterior wall of ascending and descending colon .



Mouth & Oral Cavity

♣ Food enters the GI tract by ingestion . Food is broken down by mechanical digestion , using mastication (Teeth mechanically break down food into small pieces by tear, grind and mash) .

One chemical digestive process occur where amylase enzyme in saliva breaks down polysaccharide into disaccharides . The tongue , made of skeletal muscle, manipulates the food during mastication . it also contains taste buds to detect taste sensations(intrinsic) . Food particles are mixed with saliva during mastication , resulting in a moist lump called bolus for easier passage into pharynx , epiglottis is a flap-like structure at the back of the throat that closes over the trachea preventing food from entering it. It is located in the Pharynx.



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Esophagus

- Approximately 20 cm long.
 - Functions include: Secrete **mucus**
 - Moves food from the throat to the stomach using muscle movement called **peristalsis**
 - If acid from the stomach gets in here that's **heartburn**.
- **Esophagus :**
 - Soft tube that extends from pharynx to stomach, posterior to the trachea
 - Penetrates diaphragm and enters stomach
 - Lumen lined by nonkeratinized stratified squamous epithelium
 - In the upper third, muscularis externa contains skeletal muscle
 - In the middle, both smooth and skeletal muscle found in muscularis externa
 - In lower third, muscularis externa contains smooth muscle

Mucous esophageal glands are present in both the lamina propria and submucosa for lubrication

Stomach

- J-shaped muscular bag that stores the food you eat, breaks it down into tiny pieces.
- Mixes food with **Digestive Juices** that contain enzymes to break down **Proteins and Lipids**.
- **Acid (HCl)** in the stomach Kills Bacteria.
- Food found in the stomach is called Chyme.
- lined by mucus-secreting simple columnar epithelium for protection.
- Consists of cardia, fundus, body, and pyloric regions
- Gastric glands produce gastric juices rich in hydrochloric acid and protein-digesting enzymes

Gastric Glands and Cells

1- Mucous Neck Cells

□ secrete an alkaline mucus to protect the stomach lining from acidic gastric juice

2- Chief Cells

□ secrete the inactive enzyme called **pepsinogen**.

3- Parietal Cells

□ secrete hydrochloric acid (HCl) which helps convert pepsinogen into pepsin and kills microbes in food

4- G Cells

secrete several hormones and substances like gastrin, histamine, somatostatin, endorphins

