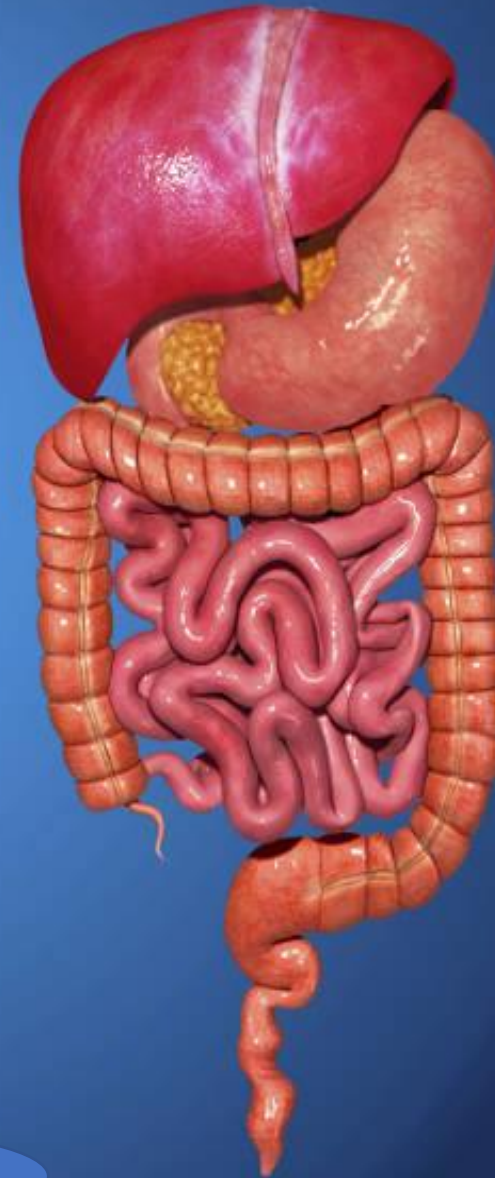
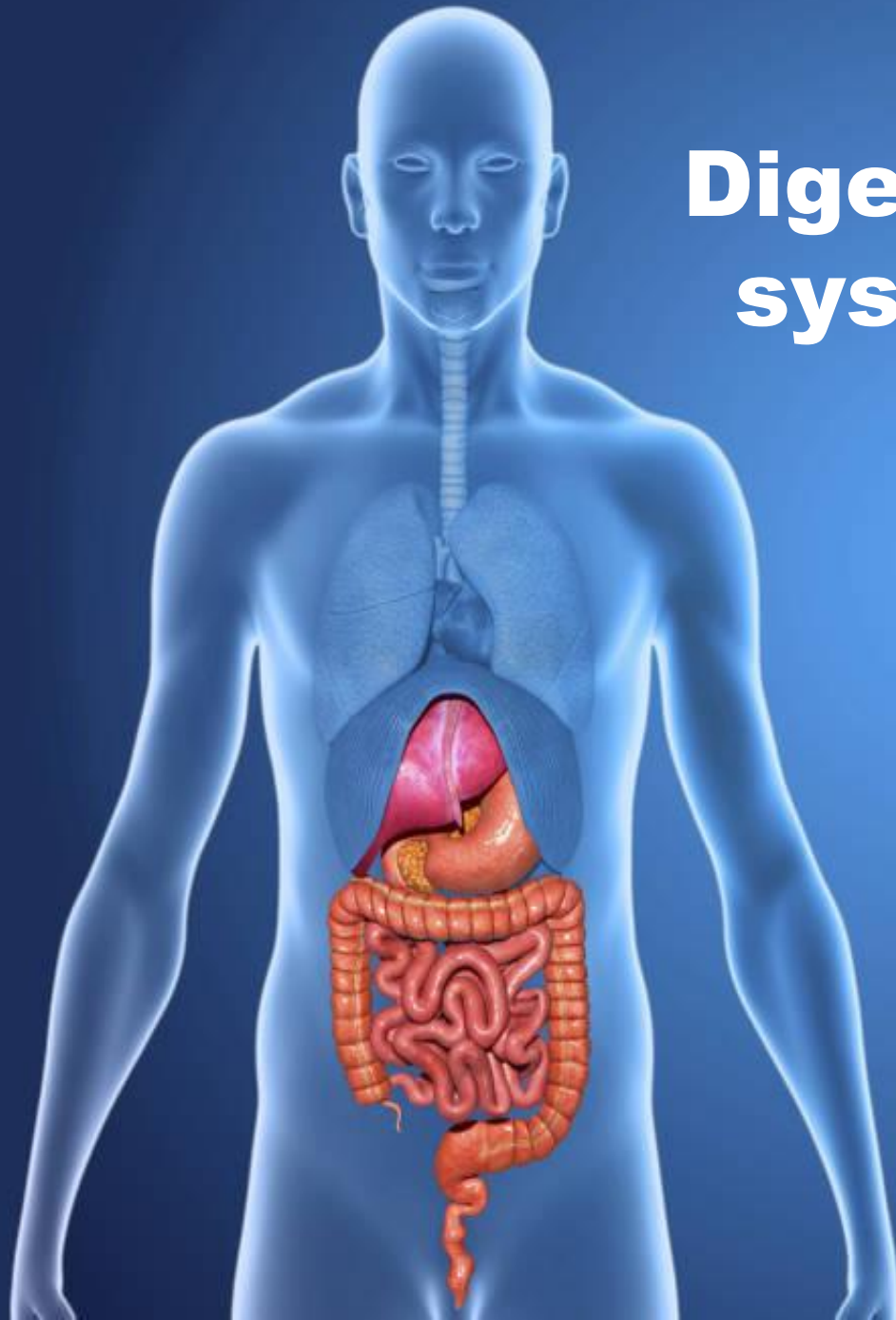


Digestive system



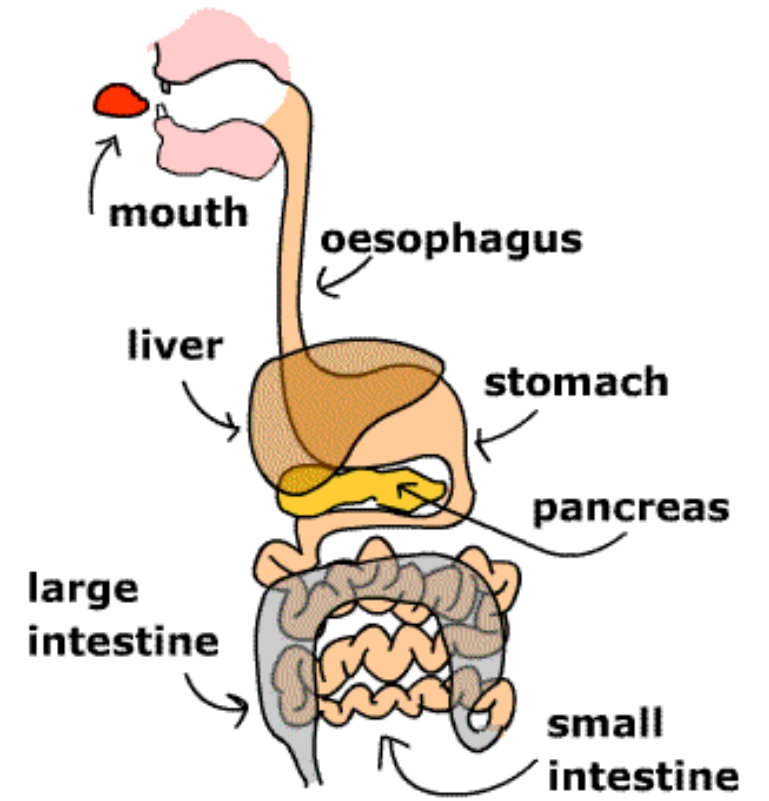
2021-2022

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Objectives

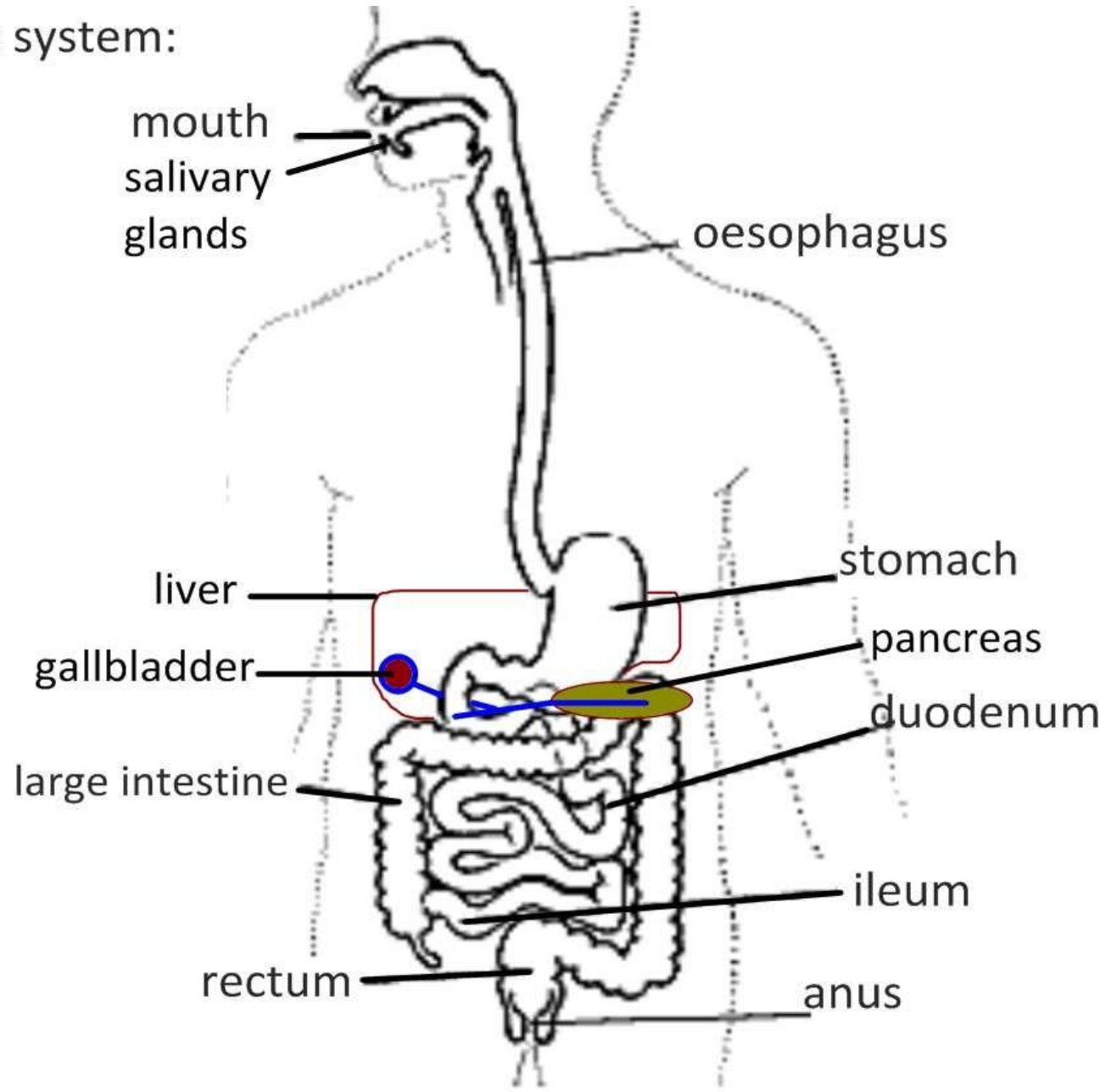
We will be able to describe and explain the following objects

- ✓ Function of digestive system
- ✓ The layers of gastrointestinal tract
- ✓ The GI organs
- ✓ The accessory organs



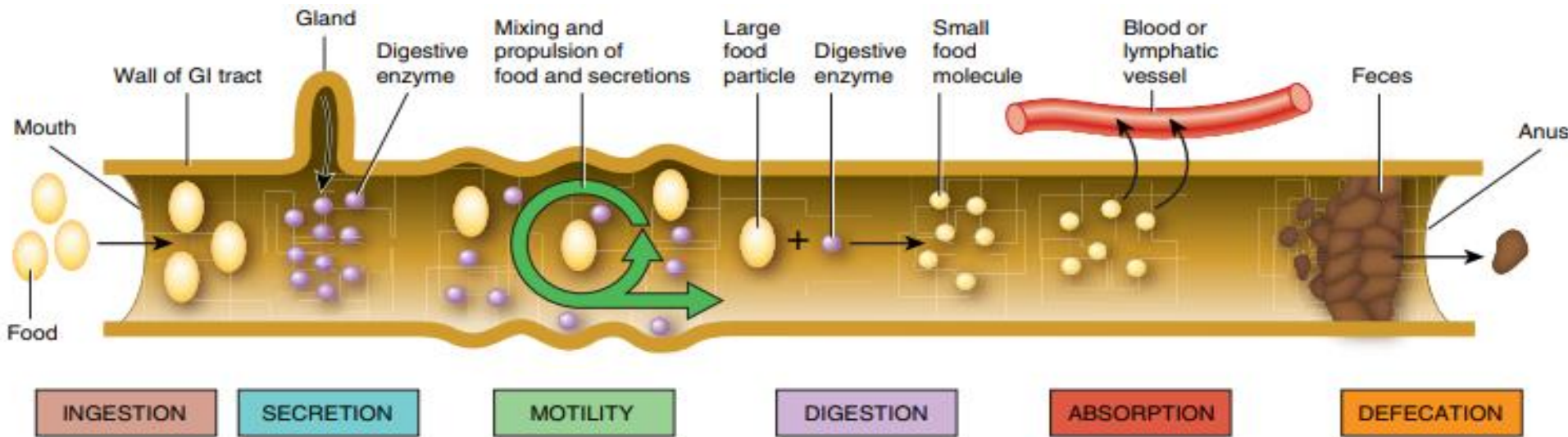
An annotated diagram of the digestive system.

The digestive system:



Function of digestive system

1. **Ingestion:** taking food into mouth.
2. **Secretion:** release of water, acid, buffers, and enzymes into lumen of GI tract.
3. **Mixing and propulsion:** churning and movement of food through GI tract.
4. **Digestion:** mechanical and chemical breakdown of food.
5. **Absorption:** passage of digested products from GI tract into blood and lymph.
6. **Defecation:** elimination of feces from GI tract.



The organs of digestive system

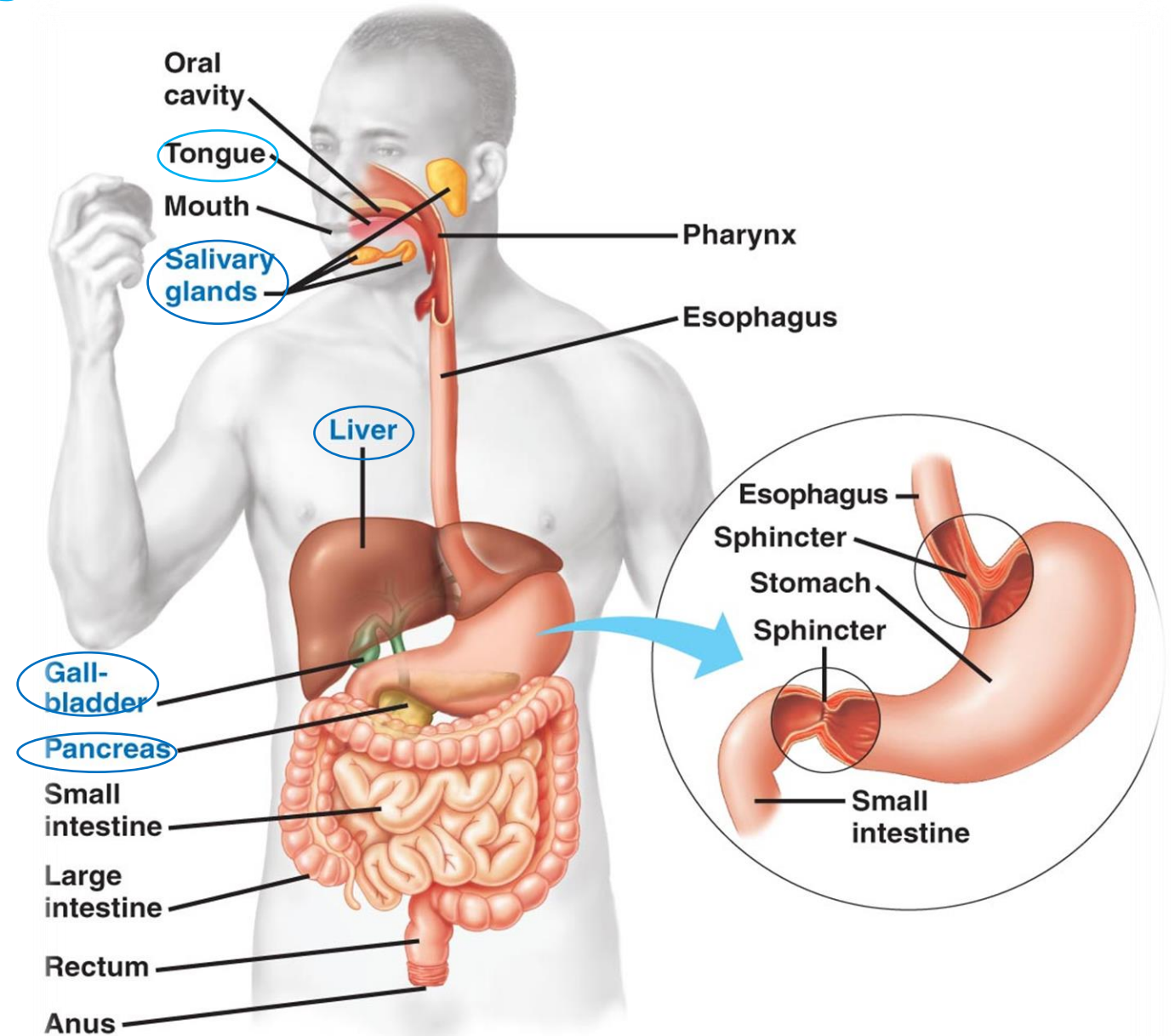
❖ **Gastrointestinal (GI) tract**, is a continuous tube that extends from the mouth to the anus through the thoracic and abdominopelvic cavities . organs include...

1. mouth,
2. pharynx,
3. esophagus,
4. stomach,
5. small intestine,
6. and large intestine

❖ **Accessory digestive** organs that participate in directly in digesting of food.

organs include...

1. teeth,
2. tongue,
3. salivary glands,
4. liver,
5. gallbladder,
6. and pancreas



Layers of the gastrointestinal tract

1. Mucosa:

The mucosa, or inner lining of the GI tract, is a mucous membrane.

It is composed of

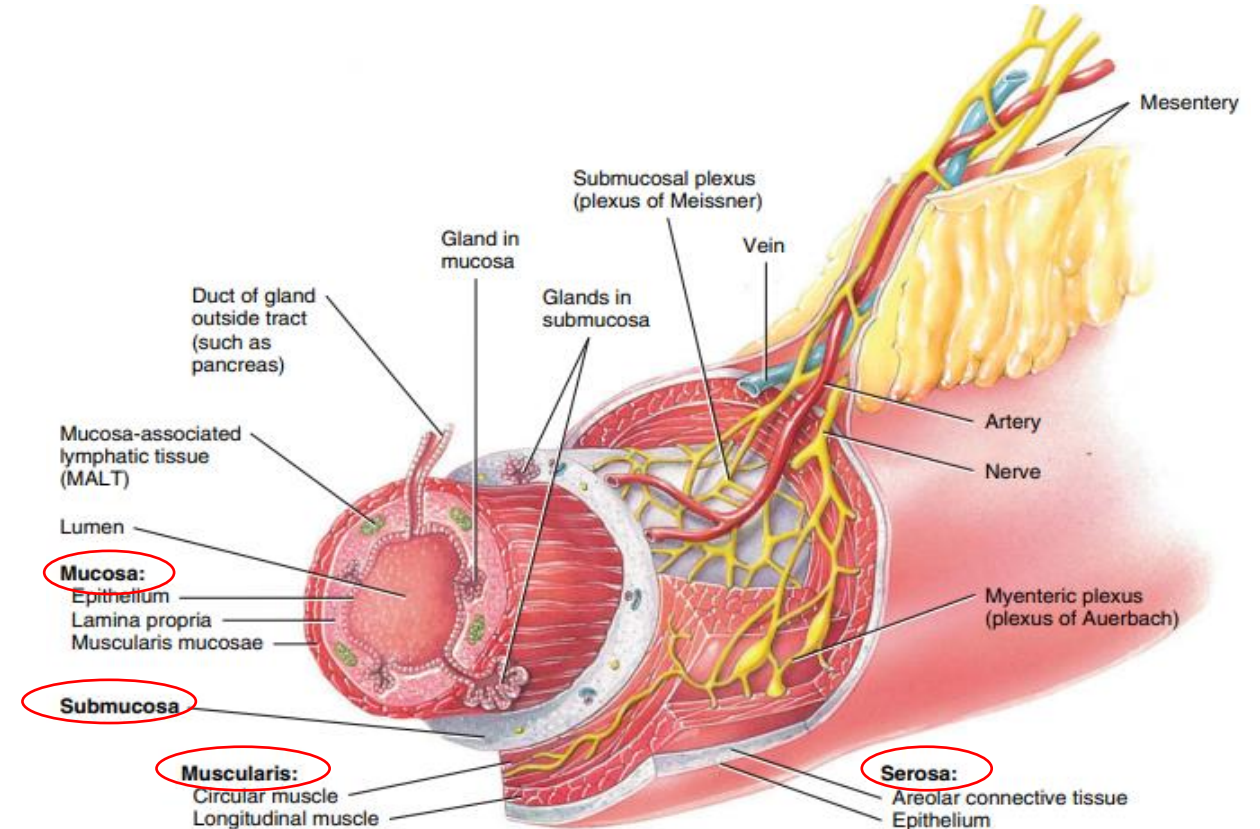
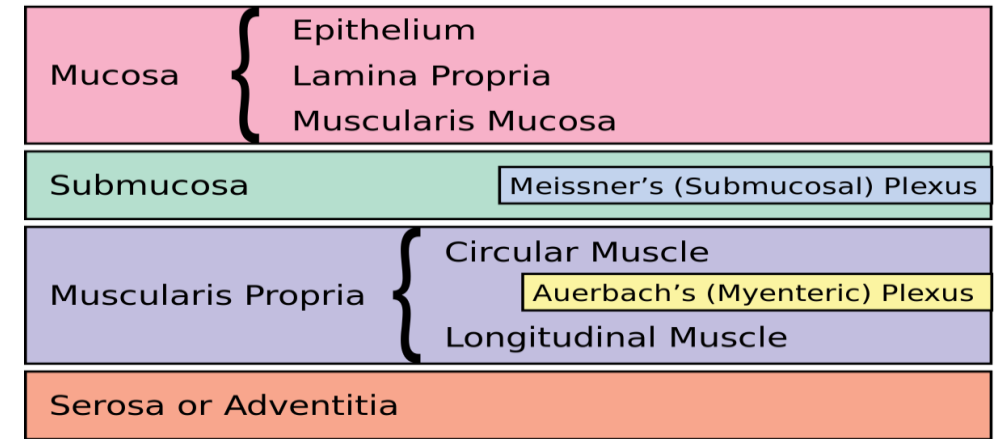
- a layer of **epithelium** in direct contact with the contents of the GI tract
- a layer of connective tissue called the **lamina propria**, and
- a thin layer of smooth muscle (**muscularis mucosae**).

2. Submucosa: The submucosa consists of areolar connective tissue that binds the mucosa to the muscularis. It contains many **blood** and **lymphatic vessels** that receive absorbed food molecules also contain **submucosal plexus**, **glands** and **lymphatic tissue**

3. Muscularis: The muscularis of the mouth, pharynx, and superior and middle parts of the esophagus contains skeletal muscle that produces voluntary swallowing.

4. Serosa: are the final layers. These are made up of **loose connective tissue** and coated in mucus so as to prevent any friction damage from the intestine rubbing against other tissue

General Organization of the Gastrointestinal Tract



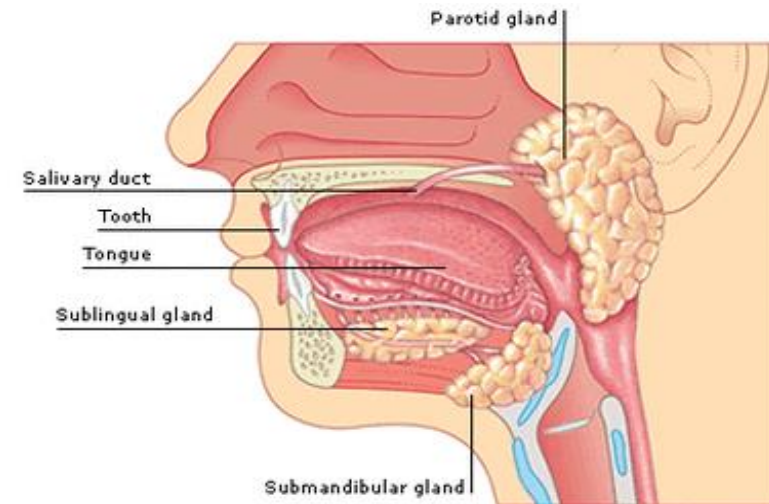
GI tract organs

1. Mouth (oral cavity)

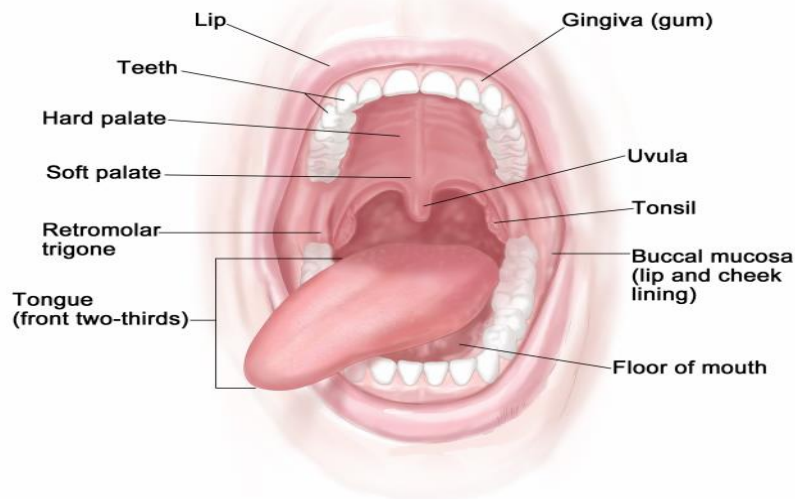
Mouth: is the first organ { starting point } of digestive system that receives food , which located along the body's midline inferior to the nose and superior to the chin, responsible for chewing to breakdown food, by the help of enzymes.

- The oral cavity is lined by a mucous membrane (the oral mucosa) consisting of a **stratified squamous epithelium nonkeratinized**
- The four types of tissues are presented in the oral cavity?
- **Parts of oral cavity**

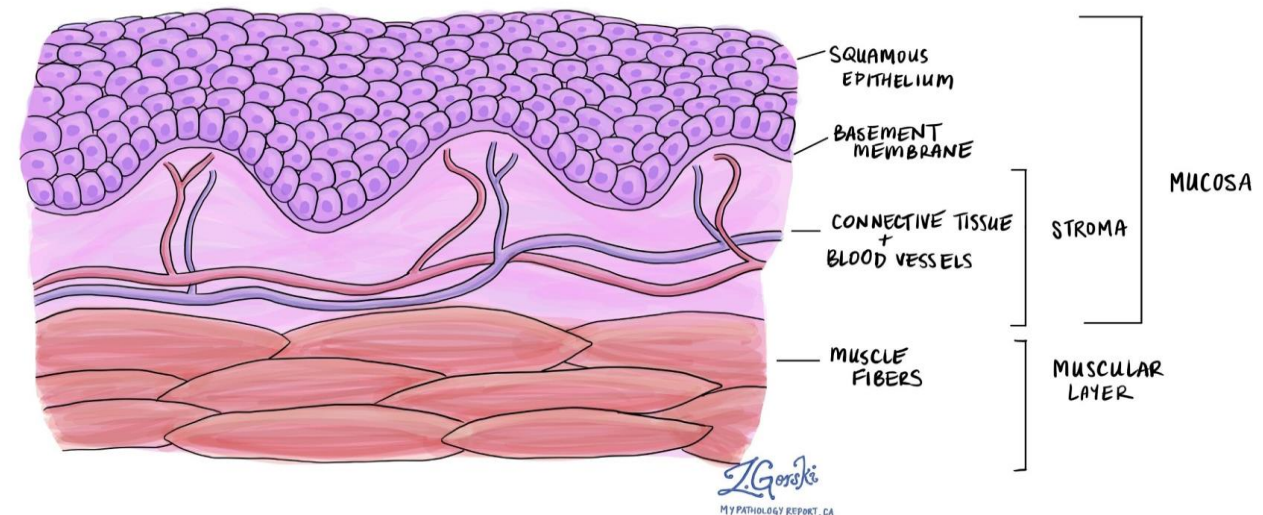
1. **Lips** : lower lip and upper lip
2. **Salivary gland** :parotid gland ,submandibular gland and sublingual gland
3. **Tongue;**
4. **Teeth** ; lower teeth and upper teeth
5. **Uvula:** is made of connective tissue, glands, and small muscle fibers



Anatomy of the Oral Cavity



THE ORAL CAVITY

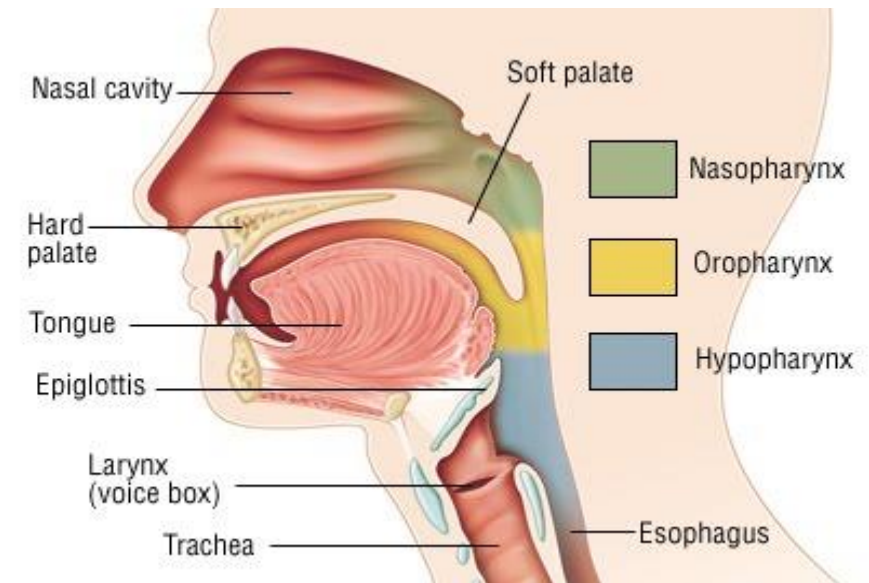
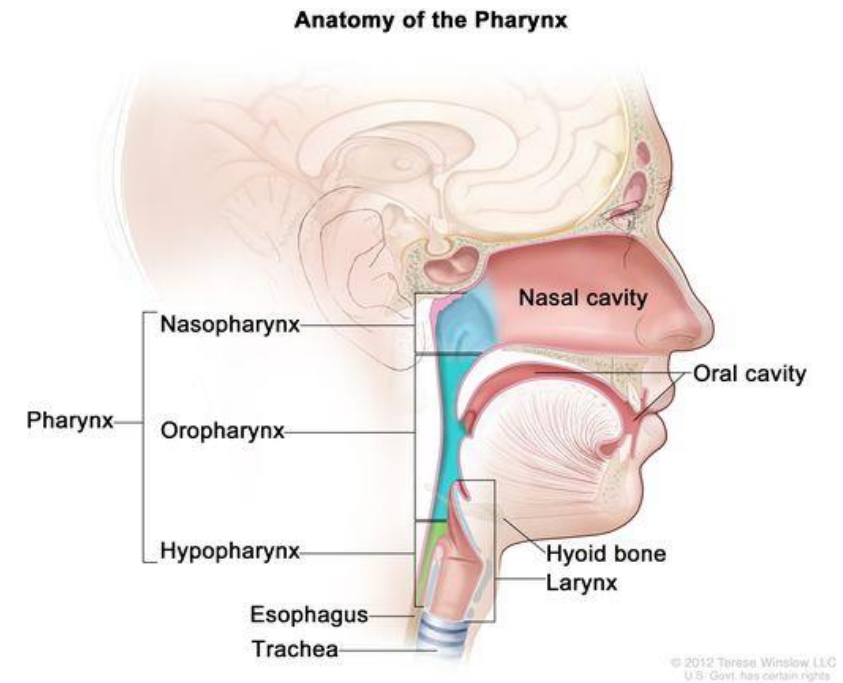


2. Pharynx

- **pharynx**, commonly called the throat, is a muscular, funnel-shaped passageway inside the body. The oral pharynx is lined by a **stratified squamous epithelial non-keratinizing**. It connects the mouth and nose to the esophagus and larynx
 - The pharynx is in the middle of the neck. It starts at the bottom of the skull and is about 4.5 inches long
1. Carries air to the respiratory system.
 2. Delivers food and liquid to the digestive system.
 3. Pushes food into the esophagus so it's not breathed in.
 4. Equalizes pressure in the ears and drains fluid from the ears.

▪ Parts of pharynx

1. **Nasopharynx**
2. **Oropharynx**
3. **Hypopharynx (laryngopharynx)**



3. Esophagus

- **The esophagus** is a muscular tube-shaped organ of around 25 centimeters in length that connects the pharynx to the stomach . Also its lining with **stratified squamous epithelium nonkeratinized**
- The organ extends from approximately the 6th cervical vertebra to the 11th thoracic vertebra
- The esophageal functions are to transport food from the mouth to the stomach and to prevent reflux of gastric contents
- and can be divided grossly into 3 parts:

- Muscular tube from pharynx to stomach
 - Upper 1/3—skeletal muscle
 - Lower 2/3—smooth muscle
- Upper esophageal sphincter
 - Skeletal muscle
 - Between pharynx and esophagus
- Lower esophageal sphincter
 - Smooth muscle
 - Between esophagus and stomach

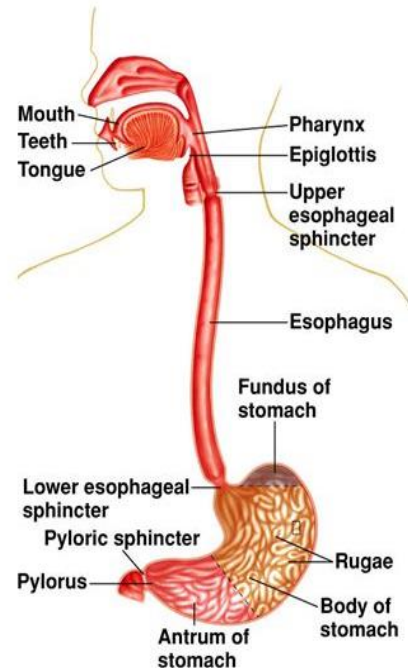
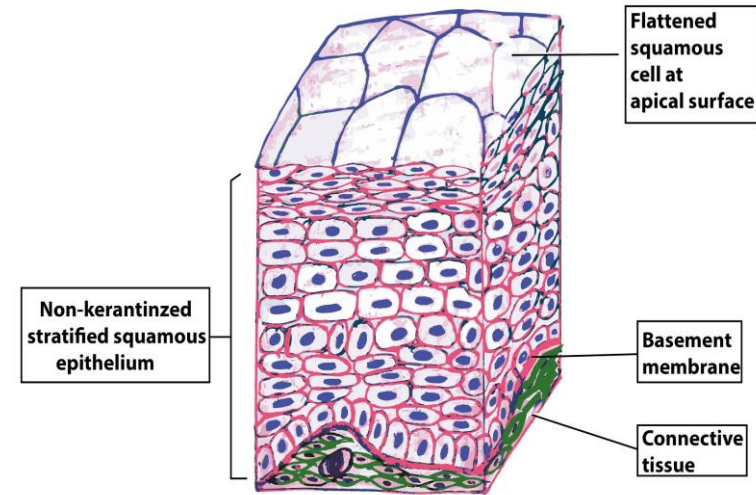
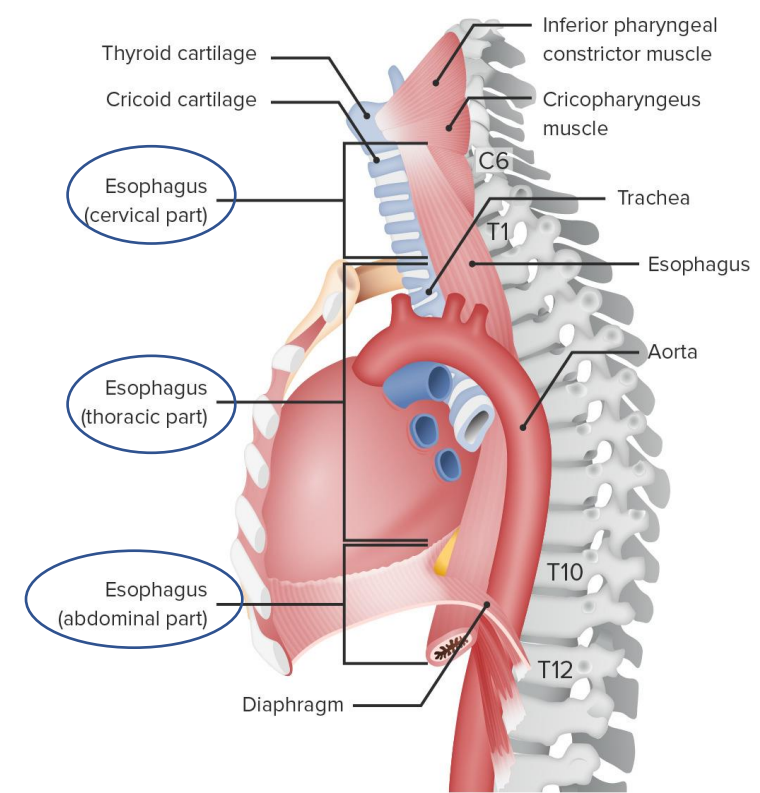


Figure 20.4 (4 of 2)



4. stomach

➤ **stomach** is a muscular, J-shaped organ in the upper part of the abdomen in between **esophagus** and the **duodenum** (the first part of the small intestine).

➤ Functions

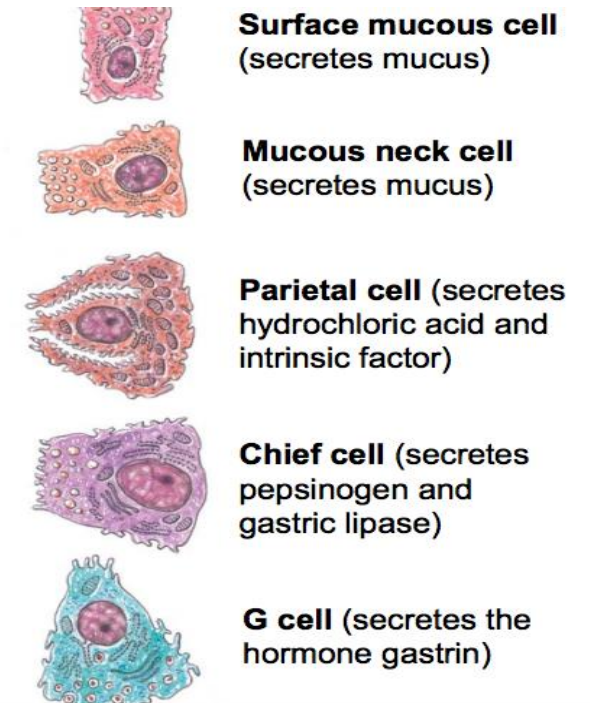
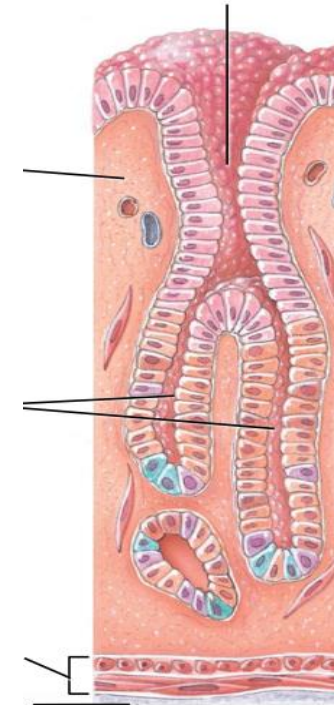
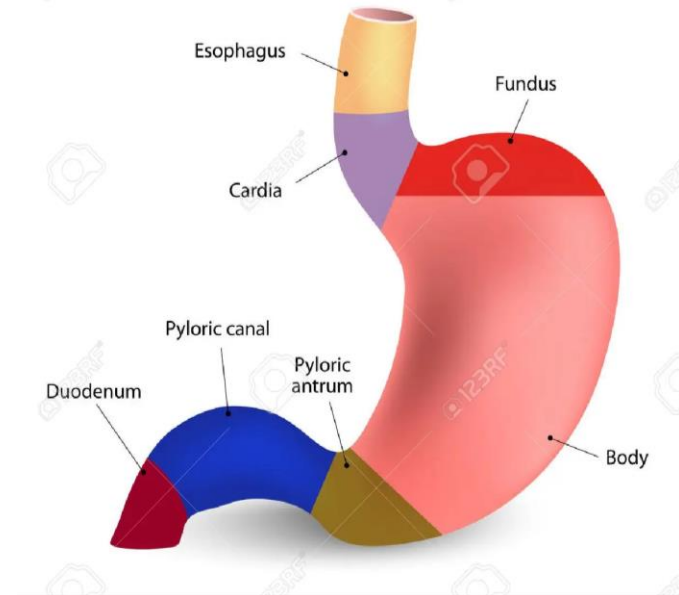
1. **Mixes** saliva, food, and gastric juice to form chyme.
2. **Serves as reservoir** for food before release into small intestine.
3. **Secretes gastric juice**, which contains **HCl** (kills bacteria and denatures proteins), **pepsin** (begins the digestion of proteins), **intrinsic** factor (aids absorption of vitamin B12), and **gastric lipase** (aids digestion of triglycerides).
4. **Secretes gastrin** into blood.

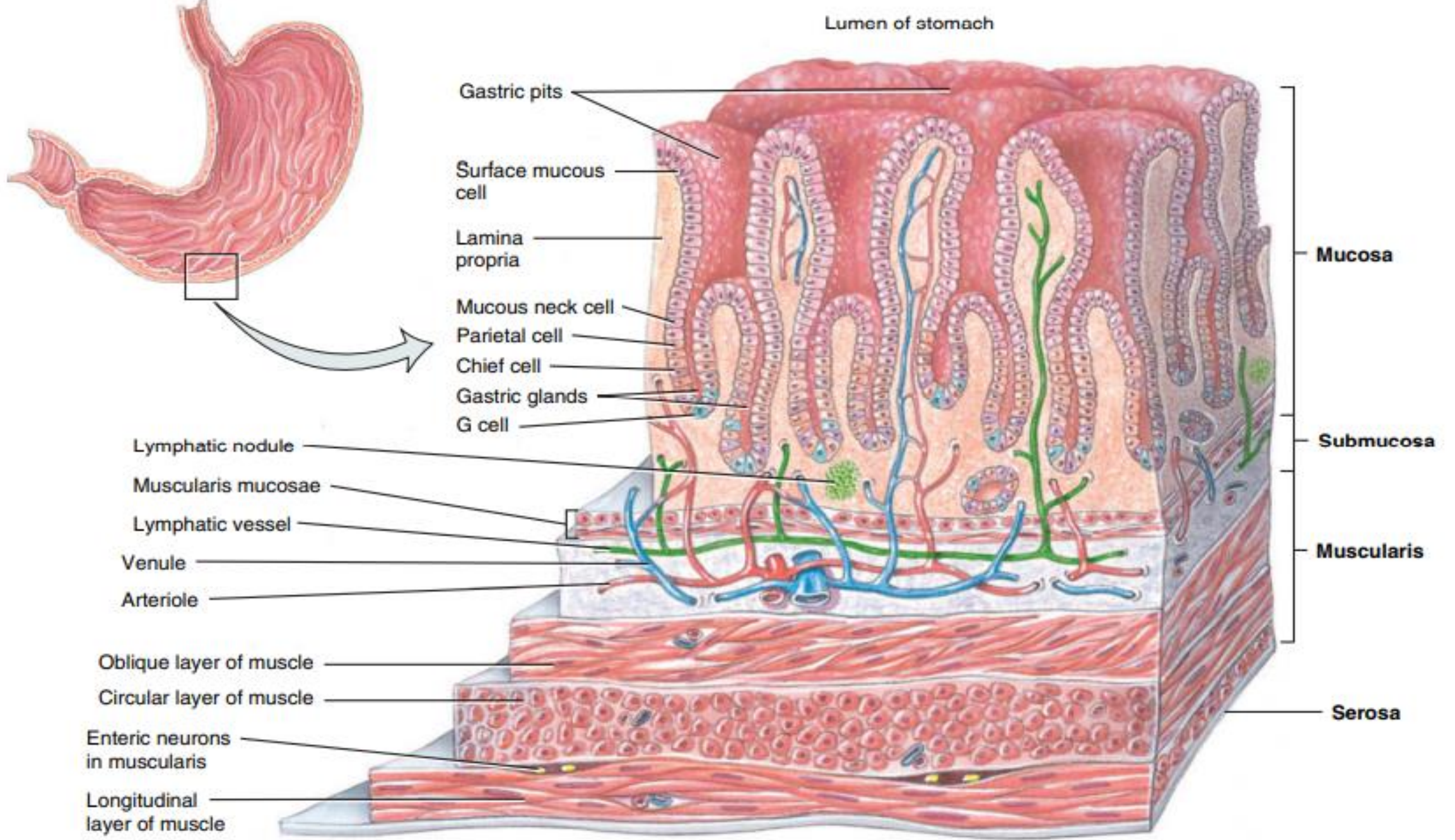
➤ The regions of the stomach

1. Fundus
2. Cardia
3. Body
4. Pyloric canal
5. pyloric antrum

➤ layers of muscle

1. Oblique layer
2. circular layer
3. longitudinal





(a) Three-dimensional view of layers of stomach

5. Small intestine

➤ **small intestine**, a long, narrow, folded or coiled tube extending from the stomach to the large intestine; it is the region where most digestion and absorption of food takes place

➤ Functions

1. Segmentations mix chyme with digestive juices and bring food into contact with mucosa for absorption; peristalsis propels chyme through small intestine.
2. **Completes digestion** of carbohydrates, proteins, and lipids; begins and completes digestion of nucleic acids.
3. **Absorbs** about 90% of nutrients and water that pass through digestive system.

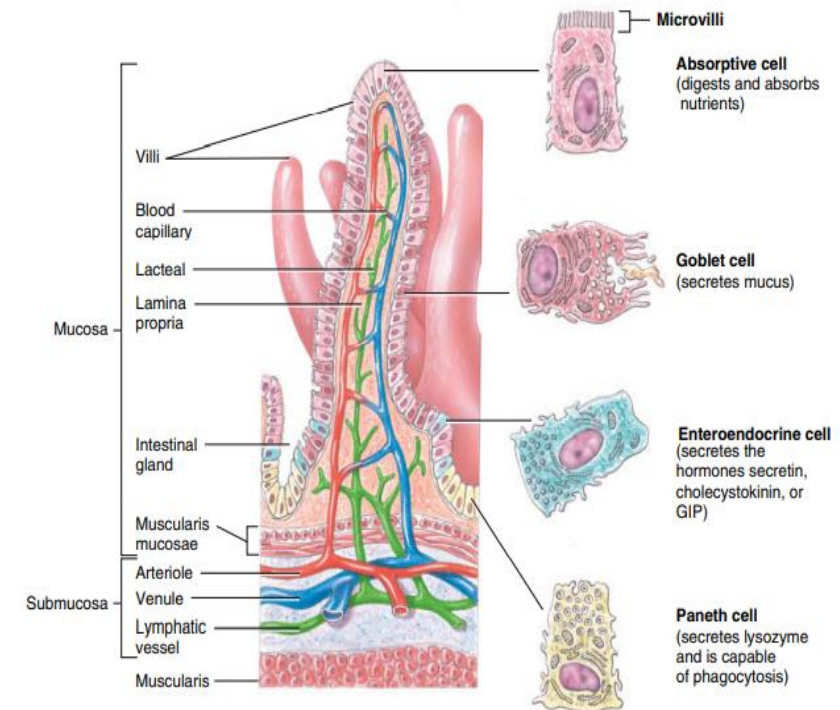
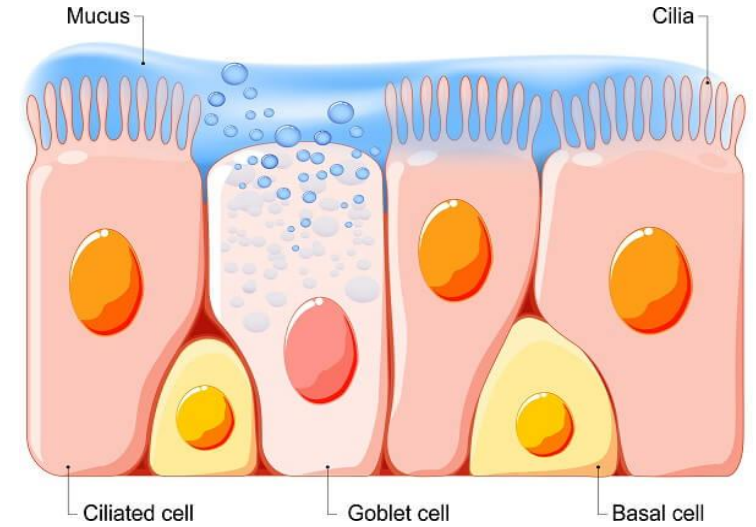
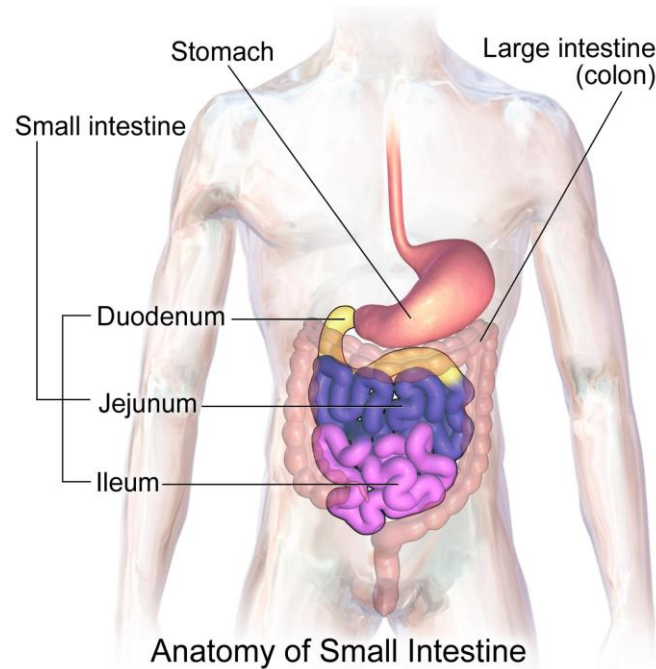
➤ The small intestine is lined by **simple columnar epithelium**,

➤ Type of cells

1. Absorptive epithelial cell
2. Goblet cell
3. Enteroendocrine cell
4. Paneth cell

➤ The parts of small intestine

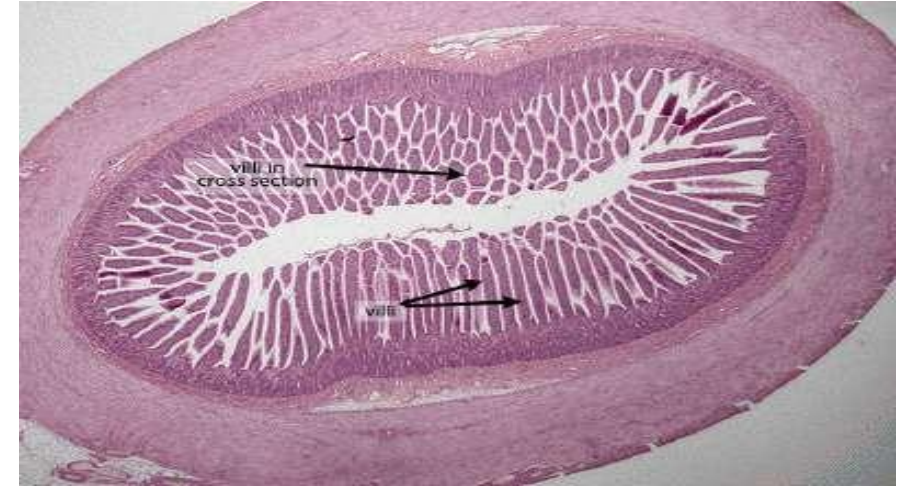
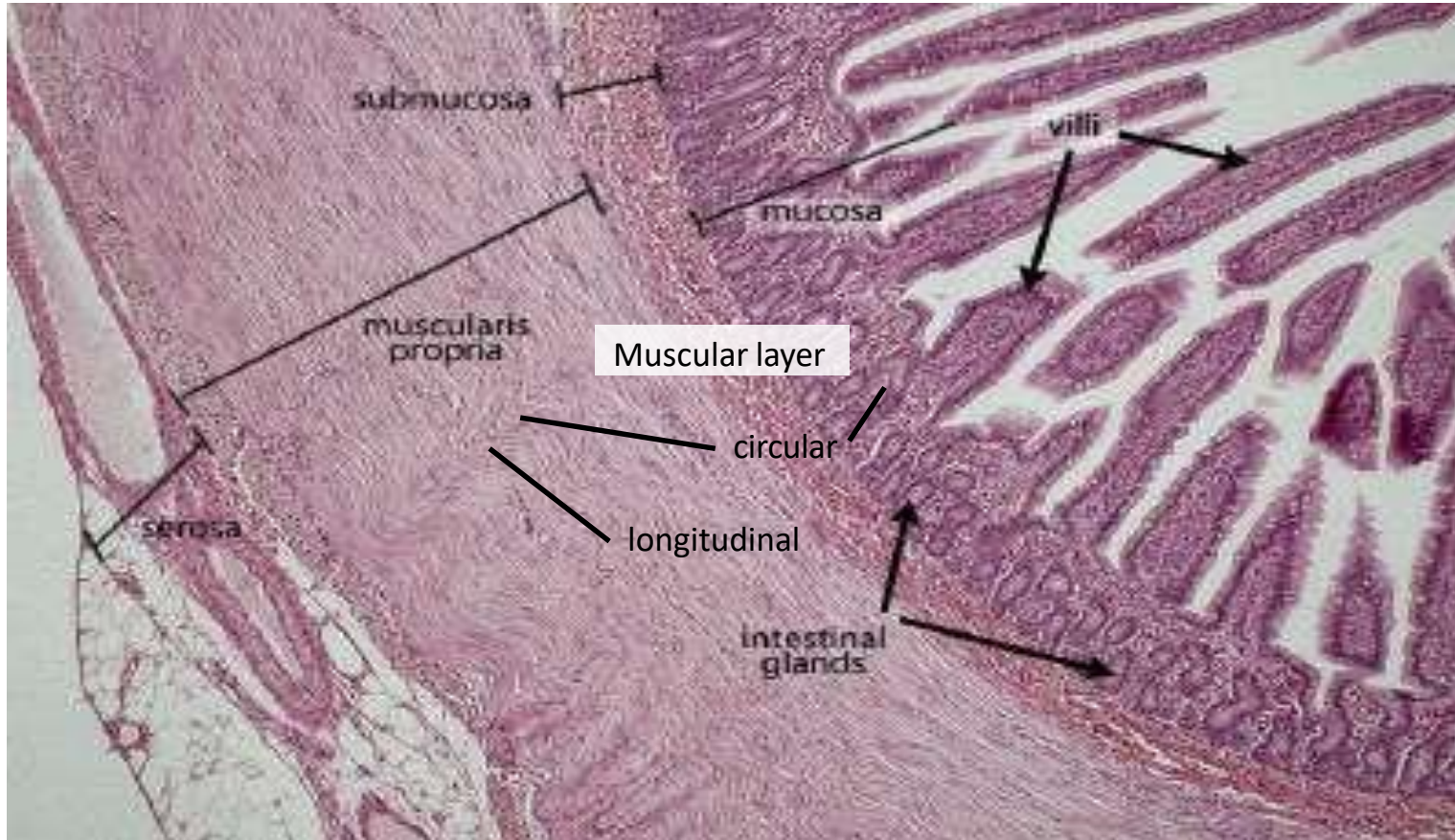
1. Duodenum
2. Jejunum
3. ileum



Identify the tissue layers in transverse sections of the small intestine viewed with a **microscope or micrograph**.

The small intestine contains four distinct tissue layers from the lumen;

1. **Mucosa** – inner lining, includes villi
2. **Submucosa** – connective tissue (between the mucosa and muscle)



3. **Muscular layer** – inner circular and outer longitudinal muscle perform peristalsis

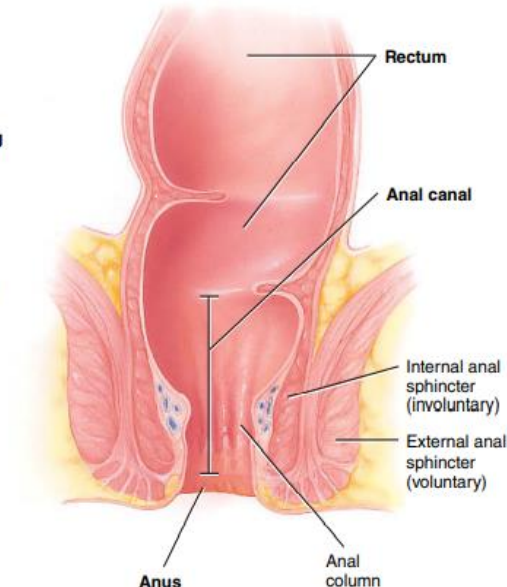
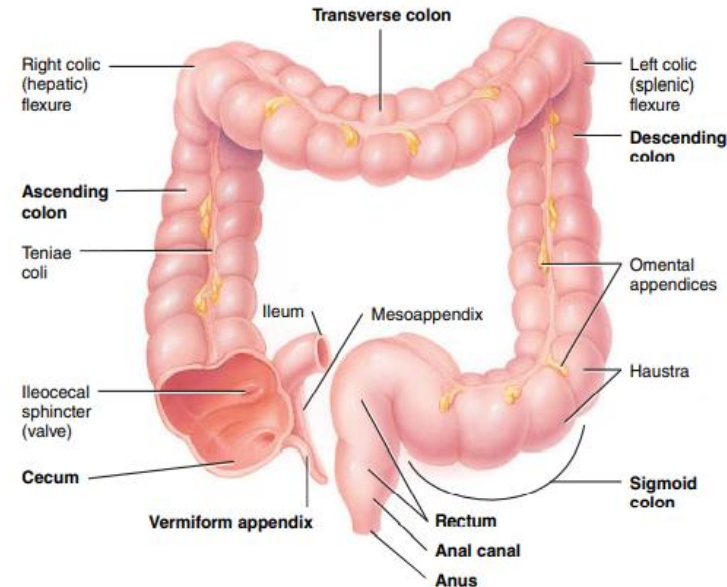
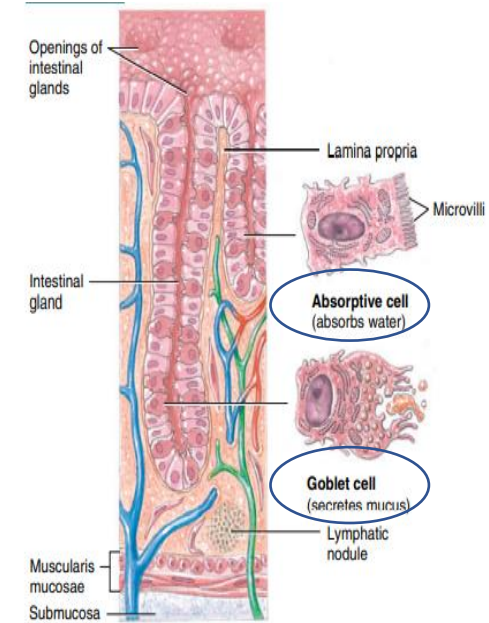
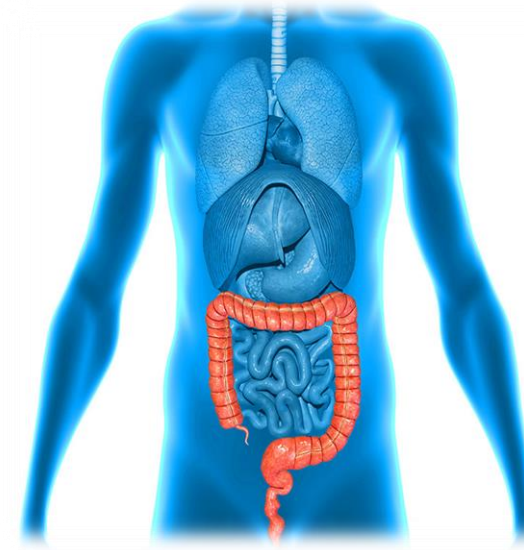
4. **Serosa** – protective outer layer
Epithelial cells consisting of a thin layer of cells

6. Large intestine

- The **large intestine**, also known as the large bowel, is the last part of the gastrointestinal tract and of the digestive system.
- **Location:** The large intestine wraps around the border of the abdominal body cavity from the right side of the body, across the top of the abdomen, and finally down the left side.
- **Function:** is to absorb water and salts from the material that has not been digested as food,
- **Type of cells :**
- ❖ LI lined by simple columnar epithelia .
- ❖ Absorptive cell (absorption)
- ❖ Goblet cell (secretion)

➤ Parts of LI

- ❖ ileum
- ❖ Appendix
- ❖ Cecum
- ❖ Colon (ascending colon ,transvers colon, descending colon)
- ❖ Rectum
- ❖ Anus



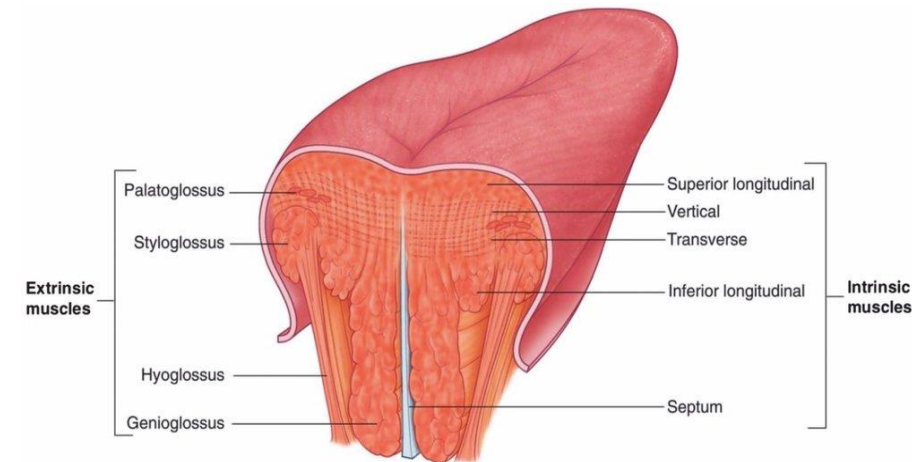
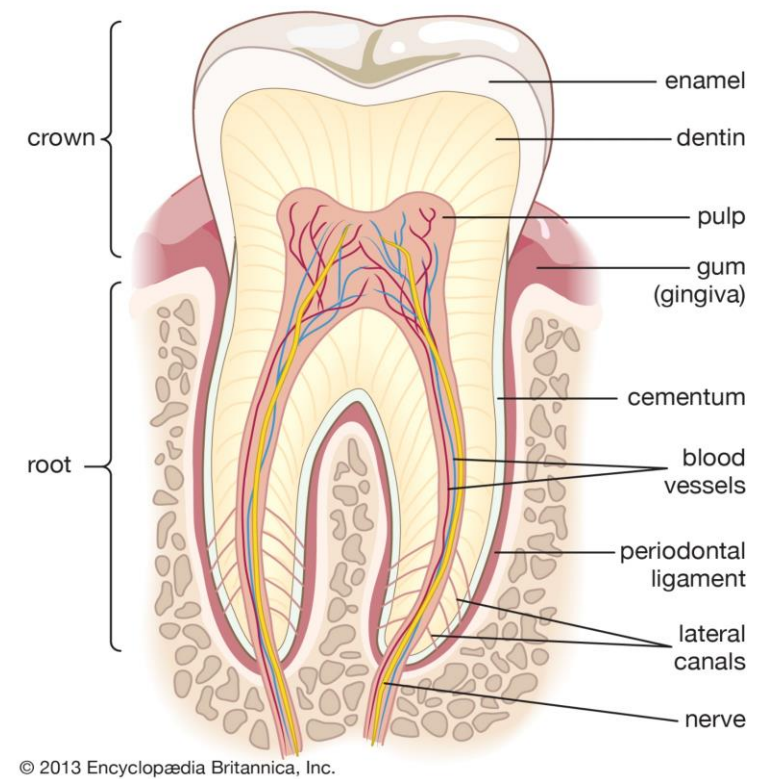
Accessory digestive organs

1. tooth

- Tooth (plural teeth) is a hard, calcified structure found in the jaws (or mouths) of many vertebrates and used to break down food
- they are located **on the jaws and in or around the mouth**
- **Type of tissues:**
- Your teeth are composed of **four** dental tissues. Three of them—**enamel, dentin and cementum**—are **hard tissues**.
- The fourth tissue—**pulp**, or the center of the tooth that contains nerves, blood vessels and connective tissue—**is a soft**, or non-calcified tissue

2. Tongue

- The tongue is a muscular projection organ in the mouth which located on the floor of the mouth
- **Function** : as a digestive organ by facilitating the movement of food during mastication and assisting swallowing.
- **Type of muscle** :
- 1. extrinsic muscles** of the tongue, which originate outside the tongue (attach to bones in the area) responsible for the tongue movement.
- 2. intrinsic muscles** of the tongue originate in and insert into connective tissue within the tongue. They alter the shape and size of the tongue for speech and swallowing.
- **Septum**: is a vertical layer of fibrous tissue separating the halves of tongue .



3. Salivary gland

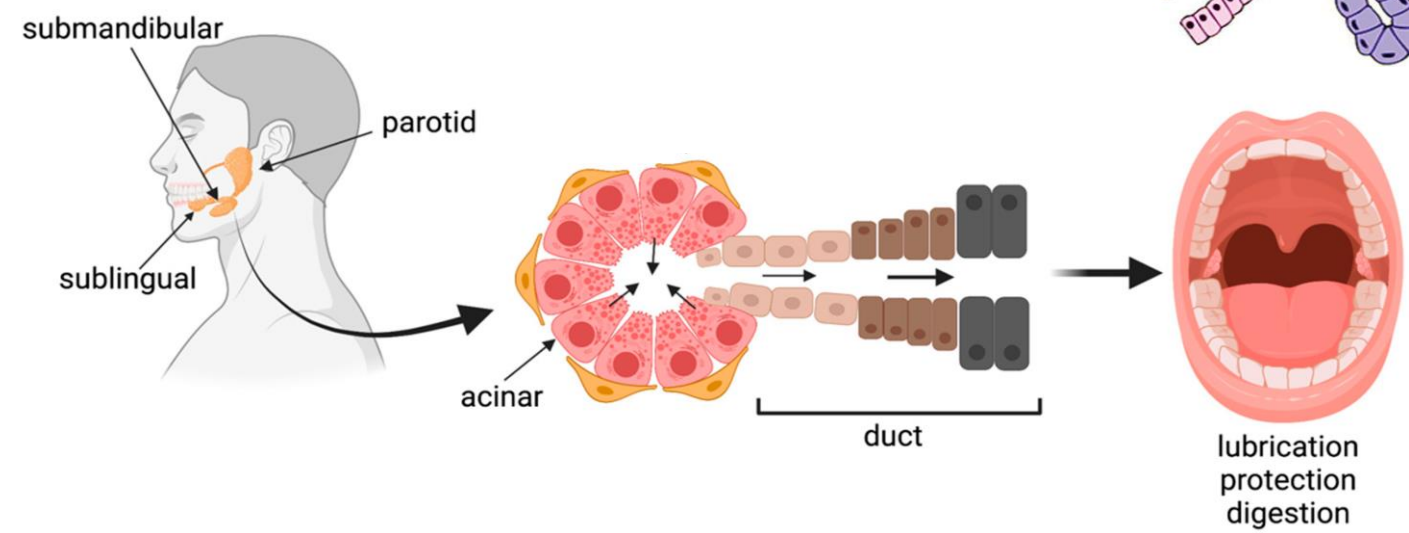
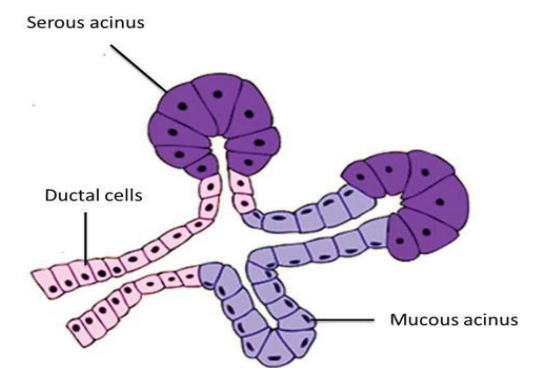
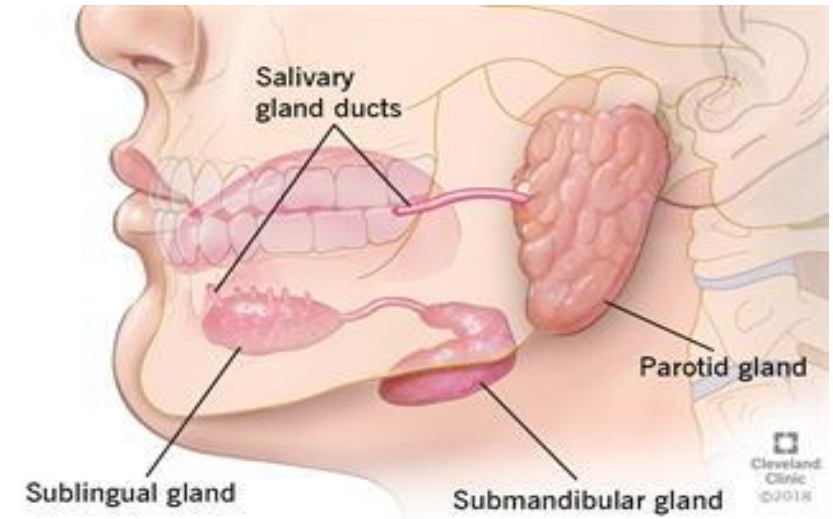
➤ Salivary glands are a group of organs, make saliva, which aids in digestion, keeps your mouth moist and supports healthy teeth.

➤ **Type of cells**

1. Serous acinus
2. Ductal cell
3. Mucous acinus

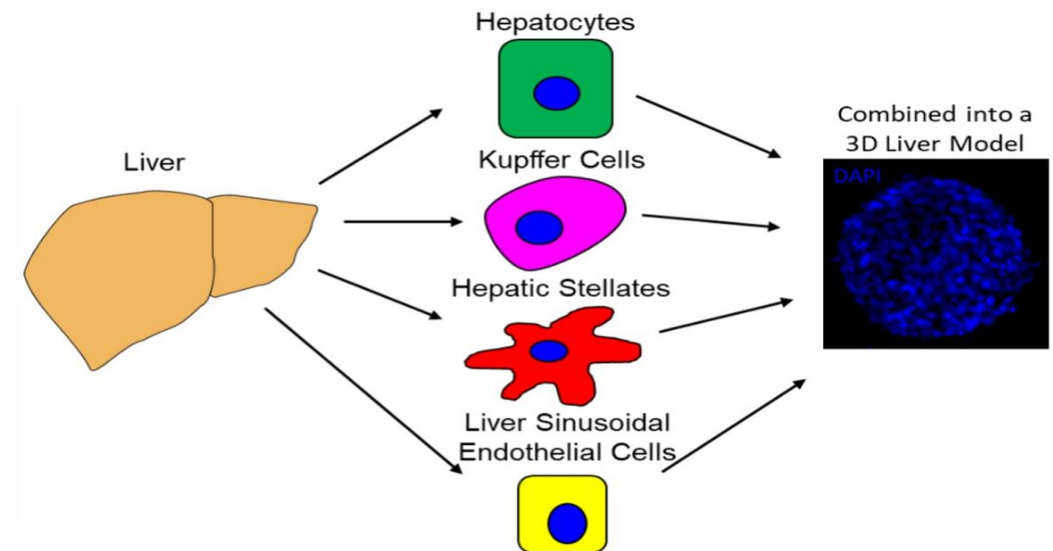
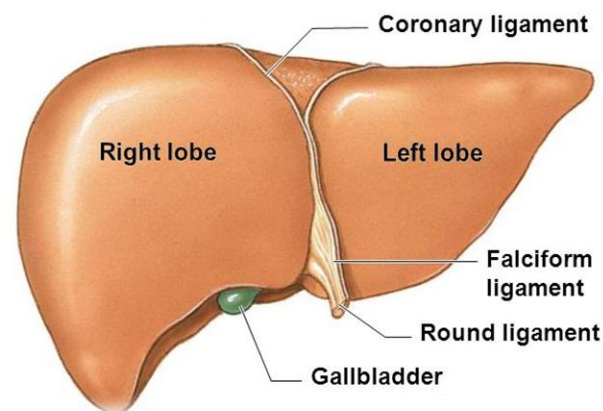
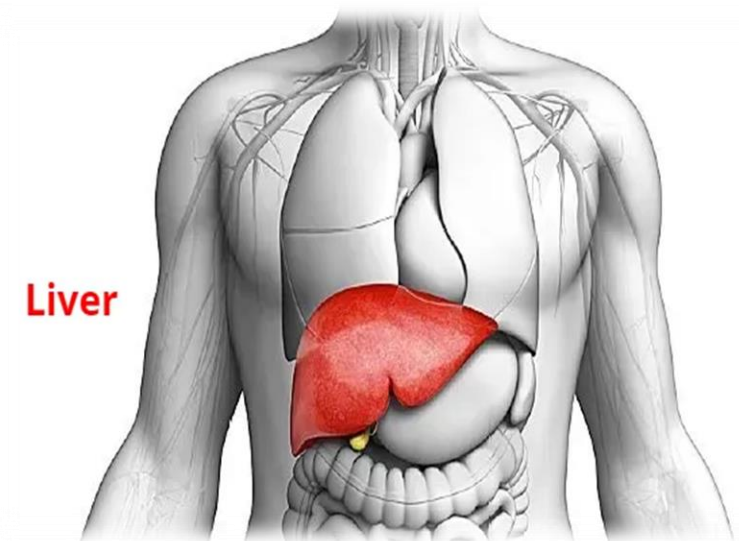
➤ **Types of salivary glands**

1. Parotid glands :glands are found in front of and just below each ear.
2. Sublingual glands :glands are under the tongue.
3. Submandibular glands : glands are below the jaw.



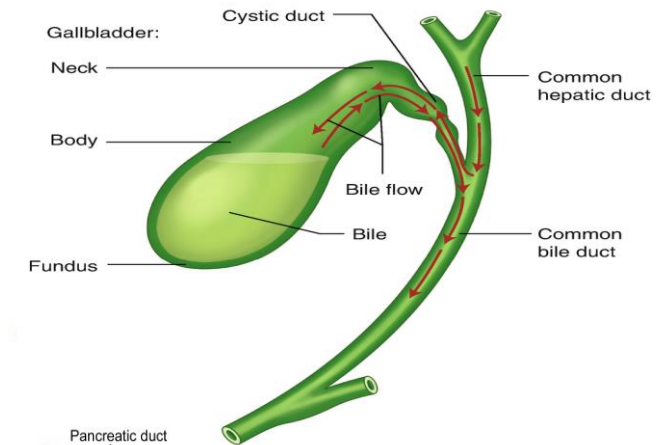
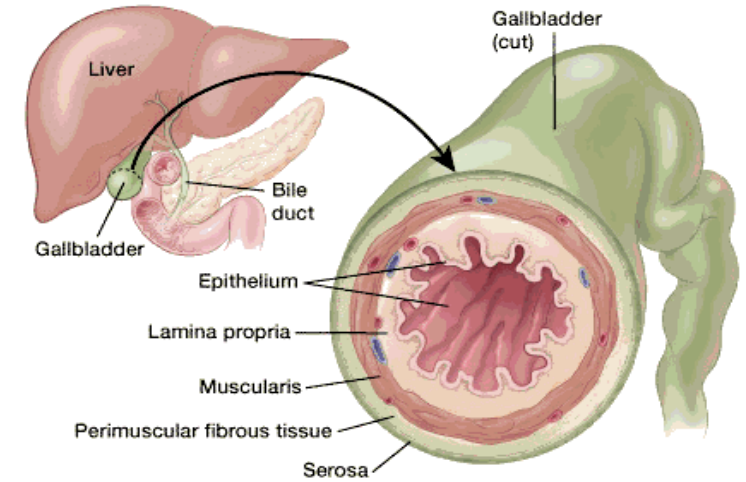
4.liver

- The human liver is an organ and gland in the human body. It's spongy, wedge-shaped, reddish-brown
- **location** : The liver is located in the upper right-hand portion of the abdominal cavity, beneath the diaphragm
- **Function** : it Makes bile, a fluid that helps the body digest (break down) food. Stores glycogen (an energy source) and vitamins to be used by the body later.
- **Type of tissue**: The liver has a thin capsule of dense connective tissue.
- **Type of cells** : Four major liver cell types—
 1. **hepatocytes** (HCs), hepatic
 2. **stellate cells** (HSCs),
 3. **Kupffer cells** (KCs),
 4. **liver sinusoidal endothelial cells** (LSECs)—



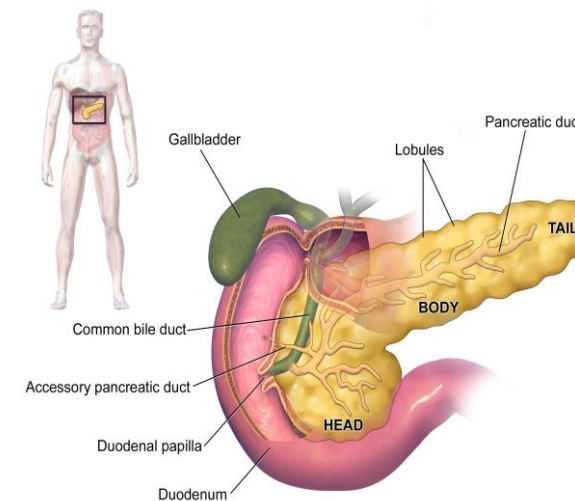
5. Gallbladder

- **gallbladder** is a small, pear-shaped organ on the right side of your abdomen, just beneath your liver.
- **Function** :The gallbladder holds a digestive fluid called bile that's released into your small intestine. And stores bile produced by the liver.
- **Type of tissue** ; lined by **simple columnar epithelia** .
- **Parts of gallbladder:**
 1. Body
 2. Neck
 3. Fundus
 4. Bile flow
 5. Common hepatic duct
 6. Common bile duct
 7. cystic duct

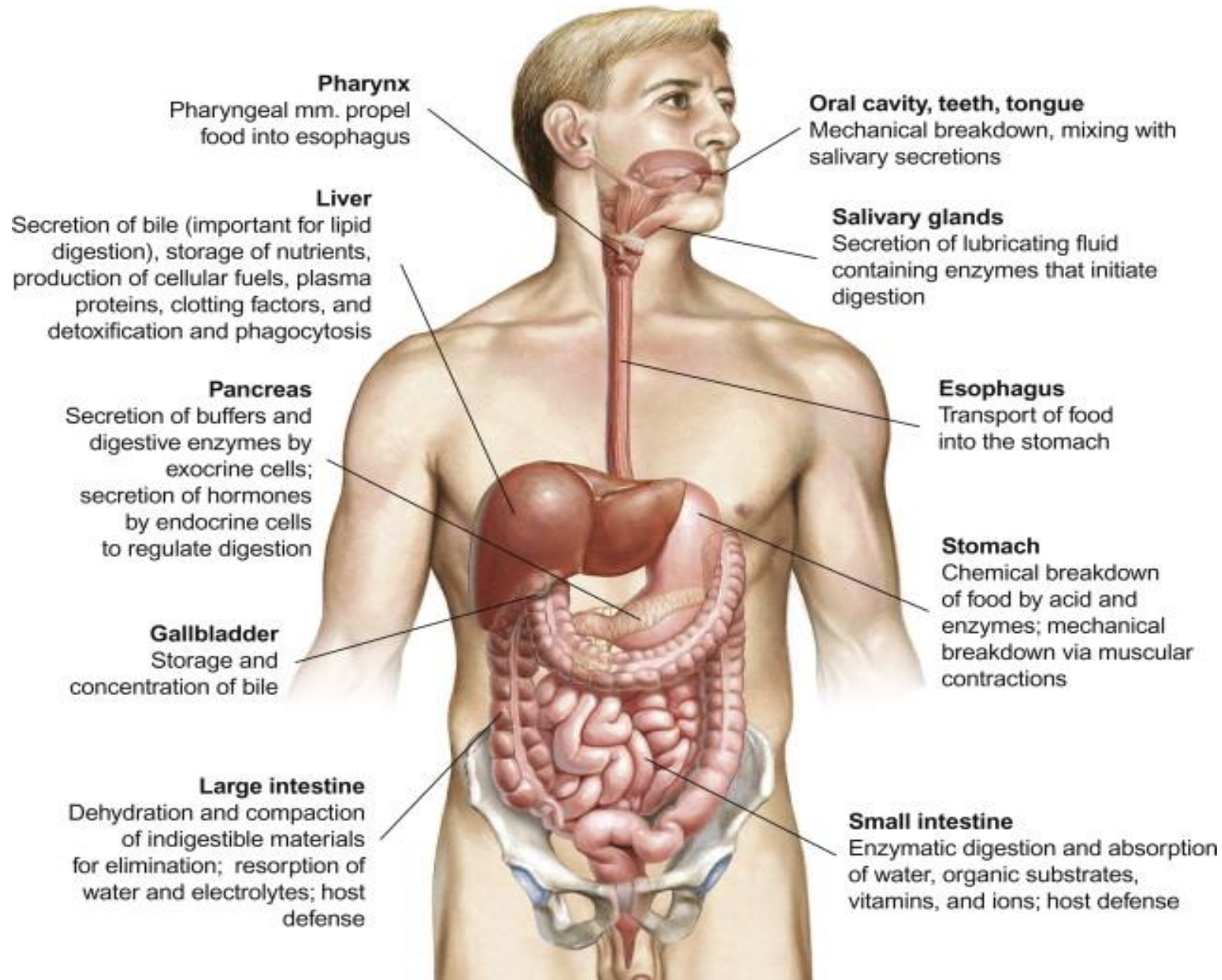


6. Pancreas

- A glandular organ located in the abdomen. It makes pancreatic juices, which contain enzymes that aid in digestion, and it produces several hormones, include insulin.
- **Type of tissue** : Almost all of the pancreas (95%) consists of exocrine tissue that produces pancreatic enzymes for digestion.
- **Type of cell:**
 1. **Alpha cells** (A cells) secrete the hormone glucagon.
 2. **Beta cells** (B cells) produce insulin and are the most abundant of the islet cells.
 3. **Delta cells** (D cells) secrete the hormone somatostatin,



Summary of digestive system



Q&A

- What Is digestive system?
- Mention the main function of Digestive system...?
- What are the layers of GI tract...?
- Write the main organs of GI tract..?
- What are the main accessory organs in digestive system?
- enumerate salivary glans?
- the main cells in liver?
- where is the location of Gallbladder?
- enumerate parts of pancreas?



References

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digestive system

