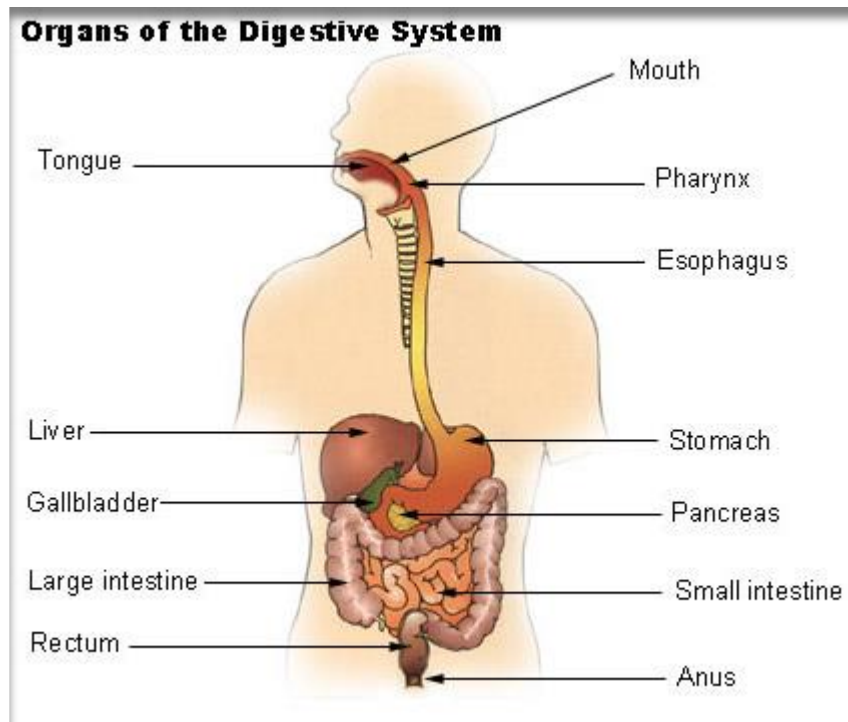


## Digestive system physiology

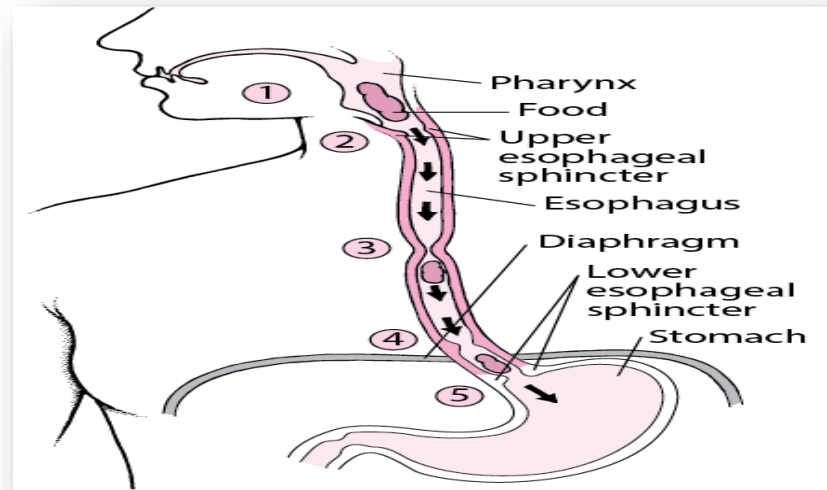
digestive system is a network of organs that help you digest and absorb nutrition from food. It includes gastrointestinal (GI) tract and biliary system.



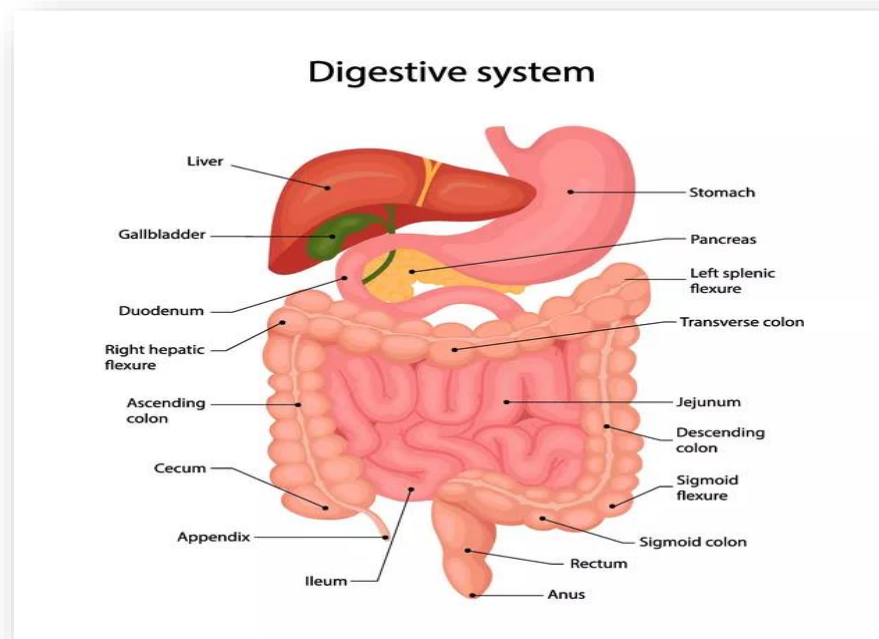
**1- gastrointestinal (GI) tract** : is a series of hollow organs that are all connected to each other, leading from mouth to anus

- ❖ **Mouth** : first digestion process begins in mouth . teeth grind the food and mix it with saliva produced by salivary gland that aid in digestion of starch and swallowing .

- ❖ **Esophagus** : is a tubular, elongated organ of the digestive system which connects the pharynx to the stomach.



- ❖ **Stomach** :  
The stomach is a J-shaped organ that digests food. It produces enzymes (substances that create chemical reactions) and acids (digestive juices). This mix of enzymes and digestive juices breaks down food so it can pass to small intestine.  
The stomach is the main site for protein digestion and uses powerful enzymes, known as pepsins, as well as hydrochloric acid , to digest foods like meats, milk, and cheese. By the time food is ready to leave the stomach, it has been turned into a thick liquid called **chyme**.



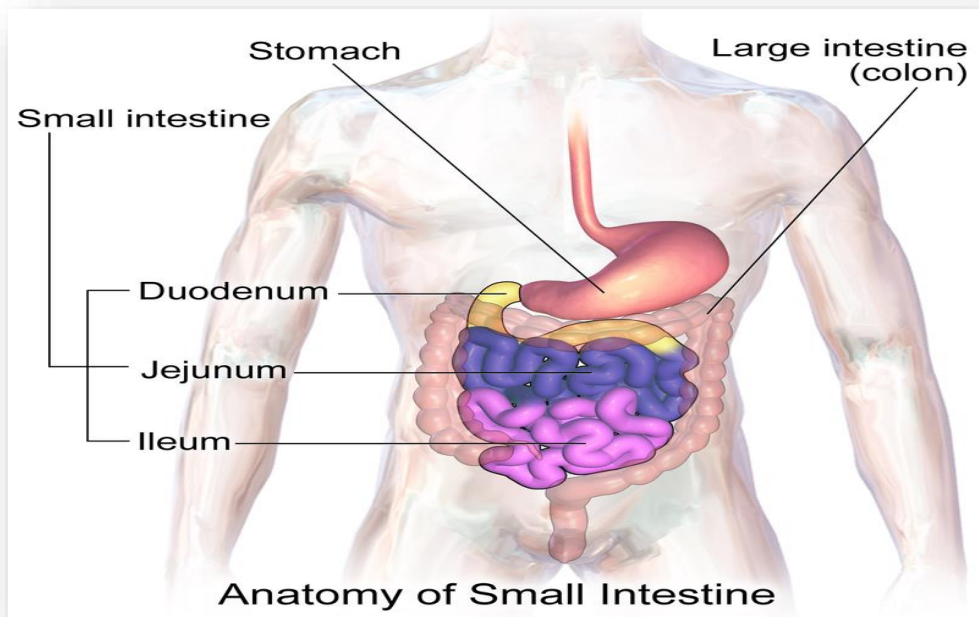
❖ **Small Intestine** is where many nutrients (like protein, carbohydrates, and fats) get absorbed into the bloodstream. It has three parts:

**duodenum** . first part is where enzymes from the pancreas and bile from the liver are added to the chyme.

**jejunum** . This coiled middle part further digests the chyme and absorbs nutrients.

**ileum** . The final section that leads into the large intestine absorbs nutrients, vitamin B12, and bile acids.

Millions of microscopic, finger-like projections called **villi** line the inside of the small intestine. The villi make lots of surface area for nutrients to get absorbed into the blood.



### ❖ The Large Intestine

The last part of the digestive tract, the large intestine, is a muscular tube . complete any nutrient absorption and process the waste into feces.



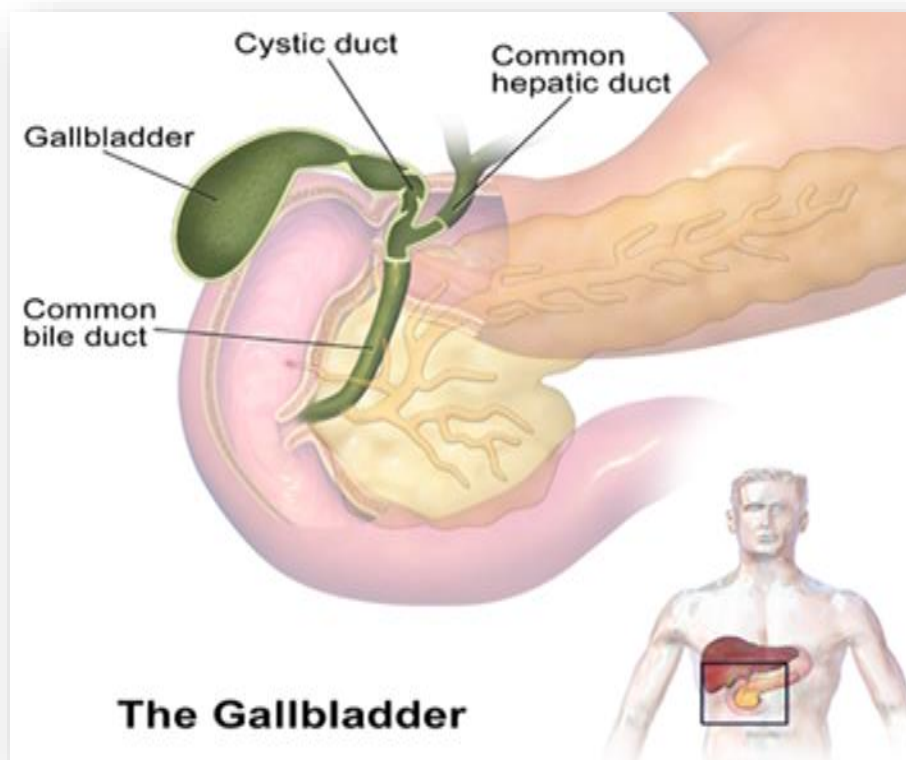
**2 - Biliary system** : biliary system is a network of three organs that deliver bile and enzymes through GI tract

**A) Pancreas:** is one of the largest glands in the human body. pancreas makes enzymes that help digest proteins, fats ,and carbs. and it secretes a hormone called insulin. Insulin helps to regulate the amount of sugar in the blood.

**B) Liver :** is the largest solid organ in the body have several function as .

- **Albumin Production:** Albumin is a protein that keeps fluids in the bloodstream from leaking into surrounding tissue. It also carries hormones, vitamins, and enzymes through the body.
- **Bile Production:** Bile is a fluid that is critical to the digestion and absorption of fats in the small intestine.
- **Filters Blood:** All the blood leaving the stomach and intestines passes through the liver, which removes toxins, byproducts, and other harmful substances.
- **Stores Vitamins and Minerals:** The liver stores significant amounts of vitamins A, D, E, K, and B12, as well as iron and copper.
- **Processes Glucose:** The liver removes excess glucose (sugar) from the bloodstream and stores it as glycogen. As needed, it can convert glycogen back into glucose

**c) Gallbladder** : also known as the cholecyst, is a small hollow organ where stores and concentrates bile from the liver, and then releases it into the duodenum in the small intestine to help absorb and digest fats.



## **Practical**

**Digestive enzyme:** molecules that break down large food biomolecules into smaller building blocks for better absorption by breaking the chemical bonds between them.

Type of digestive enzyme

### **1- Amylase**

Amylase is important for digesting carbohydrates. It breaks down starches into sugars. Amylase is secreted by both the salivary glands and the pancreas.

### **2- Maltase**

The small intestine releases maltase, which is responsible for breaking down maltose (malt sugar) into glucose (simple sugar). The body uses glucose for energy.

### **3- Lipase**

Lipase is responsible for the breakdown of fats into fatty acids and glycerol (simple sugar alcohol). It's produced in small amounts by your mouth and stomach, and in larger amounts by your pancreas.

### **4-Proteases**

Also called peptidases, proteolytic enzymes, or proteinases, these digestive enzymes break down proteins into amino acids.