



# Digestive system

جامعة ساوة

كلية العلوم

قسم علوم الأدلة الجنائية

المرحلة الثانية

رقم المحاضرة 4

اسم المحاضر م.م سالي باسم طالب

# Alimentary Chanel General Characteristics:

The alimentary channels a muscular tube about 5 m (20 ft) in length that extends from the esophagus to the anus.

Digestion involves both mechanical and chemical processes:

Mechanical digestion is the breaking down of food into smaller pieces to increase its surface area for digestive juices. Chemical digestion is the breakdown of food molecules into small, absorbable ones through hydrolysis, and digestive enzymes speed up this process in the digestive tract.

## 1-Mouth

The mouth, or oral cavity, is involved in the intake of food, mechanically breaking it into small pieces, mixing it with saliva to begin chemical digestion, and swallowing it. The cheeks, palate, and tongue surround the mouth.

# Both mechanical and chemical digestion happen in the mouth.

- Mechanical digestion: Food is mix with saliva, breaking it into smaller pieces to increase surface area for enzyme action.
- Chemical digestion: The enzyme salivary amylase breaks down starch and glycogen into maltose (a disaccharide). This process continues briefly in the stomach until the enzyme is stopped by stomach acid. The enzyme lingual lipase, made by the tongue, starts acting mainly in the stomach to digest fats.

## **Salivary glands**

The salivary glands make and release saliva into the mouth during chewing. Saliva is mostly water (99.5%), which helps dissolve food, clean the mouth, and is necessary for taste.

Mucus in saliva helps stick food pieces together for easy swallowing. It also has enzymes:

- Salivary amylase starts the digestion of carbohydrates.
- Lysozyme helps kill bacteria.

## **2- Pharynx**

The passage that connects the nose and mouth to the esophagus. It is part of both the digestive and respiratory systems.

## **3-Esophagus**

Its digestive role is to move food from the mouth to the esophagus during swallowing  
The stomach is a J-shaped organ located below the diaphragm on the left upper side of the abdomen. Its main functions are to store food for a period right now, mix food with gastric juice, and start protein digestion.

### **Structure of the Stomach**

The stomach has four main parts:

1. Cardia – the small area where food enters from the esophagus.
2. Fundus – the upper curved part that stores food temporarily.
3. Body – the largest central part where mixing and digestion mainly occur.
4. Pyloric part – the lower narrow section that connects to the small intestine.

At the end of the stomach is the pyloric sphincter, a circular muscle that controls the passage of food into the duodenum (first part of the small intestine).

# Gastric juice

The fluid made by the gastric glands in the stomach. It contains several important substances that help with digestion:

- Mucous cells – secrete mucus that coats and protects the stomach lining from strong acid and enzymes.
- Chief cells – produce pepsinogen (the inactive form of the enzyme pepsin), gastric lipase (for fat digestion), and rennin (important in milk digestion in infants).
- Parietal cells – release hydrochloric acid (HCl), which activates pepsinogen and kills bacteria, and produce the inherent factor, which is needed to absorb vitamin B<sub>12</sub> in the small intestine.

When food mixes with gastric juice in the stomach, chemical digestion turns it into a semiliquid called chyme.

# Digestion and Absorption

Food entering the stomach is mixed with acidic gastric juice (pH 2), which contains HCl and the enzyme pepsin. Pepsin is secreted in an inactive form and becomes active in the acidic environment, breaking proteins into peptides.

Only small amounts of water, minerals, drugs, and alcohol are absorbed in the stomach.

Most digestion and absorption occur in the small intestine, where pancreatic and liver secretions enter the duodenum to complete the digestive process.

## **Accessory of the Digestive System**

### **Liver**

The liver is the largest gland in the body and has many vital functions. It produces bile to help digest fats and makes important proteins and heparin. It controls blood sugar, helps in fat and protein metabolism, and stores nutrients like glycogen, vitamins, and iron. The liver also detoxifies many drugs and toxic chemicals and removes old blood cells and bacteria from the blood.

# Pancreas

The pancreas is a small gland located behind the stomach and connected to the duodenum by a duct. It has two main functions:

1- Secreting pancreatic juice enzymes that helps digest food 2- releasing hormones into the blood. The pancreatic juice travels through ducts that join to form the pancreatic duct leading to the small intestine.

Pancreatic juice contains enzymes that digest all main food types in the small intestine.

- Pancreatic amylase breaks starch and glycogen into maltose.
- Pancreatic lipase breaks fats into fatty acids for absorption.
- Trypsin breaks proteins into peptides.

## **Bile**

It contains water, bile salts, pigments (like bilirubin), cholesterol, and minerals.

Bilirubin is a waste from red blood cell breakdown; too much of it causes jaundice, turning the skin and eyes yellow.

Only bile salts help in digestion—breaking large fat droplets into small. Bile salts also help the absorption of fatty acids, cholesterol, and-soluble vitamins in the small intestine.

# 5-Small intestine

- The small intestine is a long, tube (about 4 m long) where most digestion and nutrient
- absorption take place. It starts at the pyloric sphincter and ends at the large intestine.
- 1. Duodenum – the first short part that receives chyme from the stomach.
- 2. Jejunum – the middle part where much absorption occurs.
- 3. Ileum – the longest part that continues absorption.
- Its inner lining has many villi (tiny finger) that increase surface area for absorption.
- Each villus has blood capillaries to absorb nutrients.
- The intestinal glands secrete intestinal juice, a slightly alkaline fluid with water and
- mucus. This juice provides the right environment for bile salts and pancreatic enzymes
- to act and helps activate trypsin for protein digestion.

# Digestion and Absorption

In the small intestine, **chyme** mixes with bile, pancreatic juice, and intestinal juice.

Here, enzymes from the pancreas and intestinal lining continue the digestion of carbohydrates, fats, and proteins until they are ready for absorption.

The large intestine connects to the small intestine at the ileal orifice, which opens to let chyme enter. It is wider (about 6.5 cm)

It has four parts:

1. Cecum
2. Colon (the main and longest part).
3. Rectum (stores feces).
4. Anal canal – leads to the outside of the body.

The appendix extends from the cecum; it has no digestive role but helps in immune defense.

# Function

The large intestine absorbs water, some minerals, and vitamins from the remaining chyme. It does not secrete digestive enzymes, but intestinal bacteria break down undigested food, producing B vitamins, vitamin K, and gas. The mucosa secretes mucus to the lining. As the contents move through the colon, water is absorbed and feces are formed, containing bacteria, mucus, water, and undigested food.