



Physiology

Lecture7

The Digestive System

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## Digestive system

Digestion is defined as the process by which food is broken down into simple chemical substances that can be absorbed and used as nutrients by the body.

### The Basic Stages of the Digestive Process

- Ingestion
- Digestion
- Absorption / Assimilation
- Elimination / Defecation

### Primary Digestive Organs

Primary digestive organs are the organs where actual digestion takes place,

These organs are:

- Mouth
- Pharynx
- Esophagus
- Stomach
- Small intestine
- Large intestine.

### Accessory Digestive Organs

Accessory digestive organs are the organs which help the primary digestive organs in the process of digestion.

These organs are:

- Teeth
- Tongue
- Salivary glands
- Exocrine part of pancreas
- Liver
- Gallbladder.

### Main function of digestive system

The main function of the digestive system is

- to turn the food into simple sugars, amino acids, and carbohydrates. This is fuel for the human body.
  - **The first stage of the digestive system is the mouth and teeth.**
- The teeth grid up the food.
  - Which saliva is mix with the food to break the food down.
  - The food is swallowed and wave like motion moves the food to the stomach.
- **Second stage is the stomach breaks down the food.**
- The stomach churns the food. Mixing the food with the gastric juices.
  - This is done with the gastric juices are mix in the stomach.
  - The glands in the stomach produce the juices.
  - The gastric juices break down the proteins.
  - Then the food is passed into the small intestine.
- **In the small intestine which is about 20ft long.**
- This is where the small intestine absorbs the nutrients from the food.
  - Most digestion takes place in the duodenum of the small intestine. Small finger like projections called villus that collect the nutrients. These nutrients are passed into the bloodstream.
- **The three organs that help in digesting the food.** Liver, and gallbladder.
- Liver – It produces bile , a substance that aids in digestion of fats.
- Gallbladder – It holds and releases bile into the small intestine as needed

## Function of the Pancreas

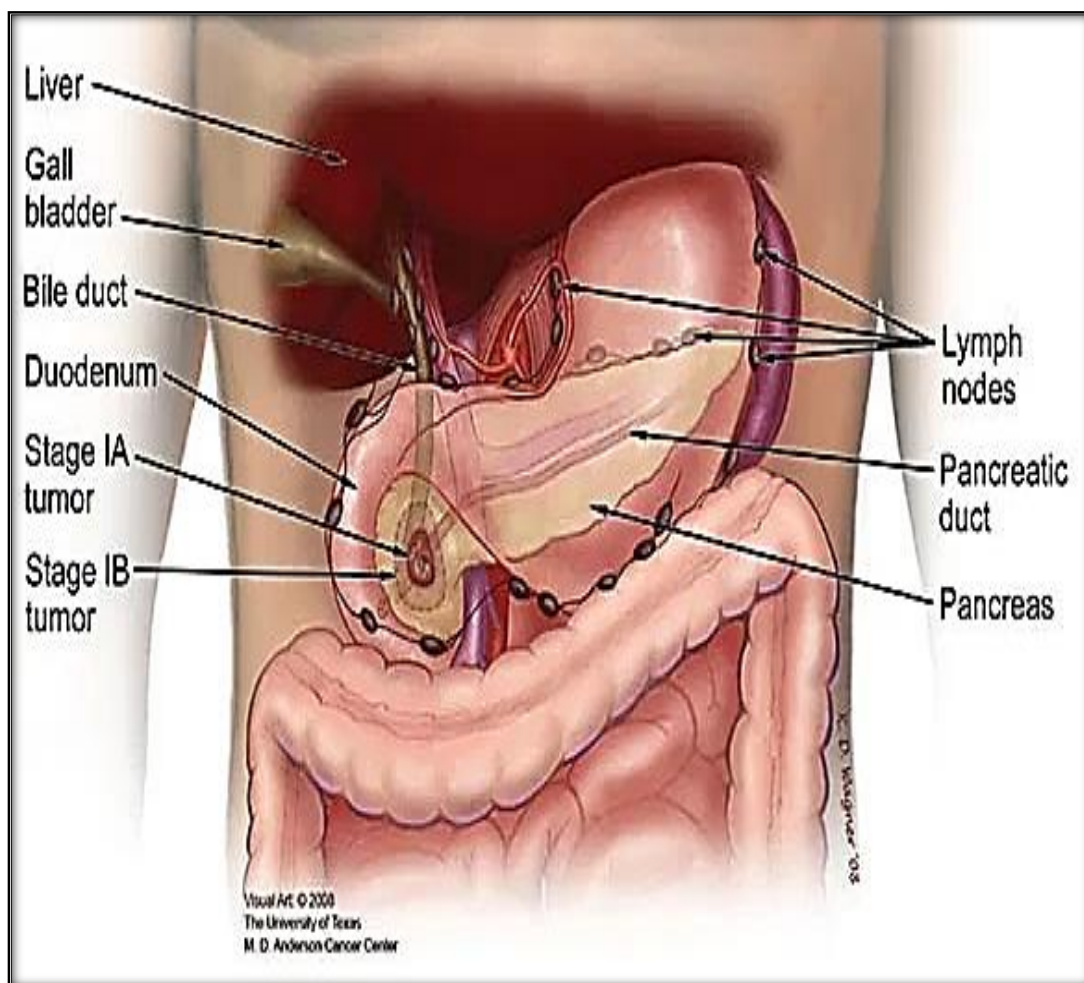
- Lies across the back of the abdomen.

The pancreas produces enzymes that are necessary to break down carbohydrates, proteins, and fats.

- Cells in the pancreas are called Islet of Langerhans, which produce two hormones (glucagon, and insulin.

These regulate sugar in the blood.

- Insulin – Is a hormone that stimulates the liver to convert glucose to glycogen.
- Glucagon – Is a hormone that stimulates the liver to convert glycogen to glucose.



## Digestion and Absorption of Protein

Once a protein source reaches your stomach, hydrochloric acid and enzymes called proteases break it down into smaller chains of amino acids. Amino acids are joined together by peptides, which are broken by proteases.

From your stomach, these smaller chains of amino acids move into your small intestine. As this happens, your pancreas releases enzymes and a bicarbonate buffer that reduces the acidity of digested food.

This reduction allows more enzymes to work on further breaking down amino acid chains into individual amino acids.

**Some common enzymes involved in this phase include:**

- trypsin
- chymotrypsin
- carboxypeptidase

### **Protein absorption**

also happens in your small intestine, which contains microvilli. These are small, finger-like structures that increase the absorptive surface area of your small intestine. This allows for maximum absorption of amino acids and other nutrients.

Once they've been absorbed, amino acids are released into your bloodstream, which takes them to cells in other parts of your body so they can start repairing tissue and building muscle.

## Digestion and Absorption of Carbohydrates

carbohydrates include starches, sugars, and fiber.

### Digestion of Carbohydrates

Dietary carbohydrates are digested to glucose, fructose and/or galactose, and absorbed into the blood in the small intestine.

The digestion and absorption of dietary carbohydrates can be influenced by many factors.

### Absorption of Carbohydrates

Absorbed carbohydrate molecules are used immediately for energy or stored in various forms in the muscles, liver or adipose tissue for future use.

## Digestion and Absorption of lipids

The digestive process has to break those large droplets of fat into smaller droplets and then enzymatically digest lipid molecules using enzymes called lipases. The mouth and stomach play a small role in this process, but most enzymatic digestion of lipids happens in the small intestine.

the products of lipid digestion are absorbed into circulation and transported around the body, which again requires some special handling since lipids are not water-soluble and do not mix with the watery blood.