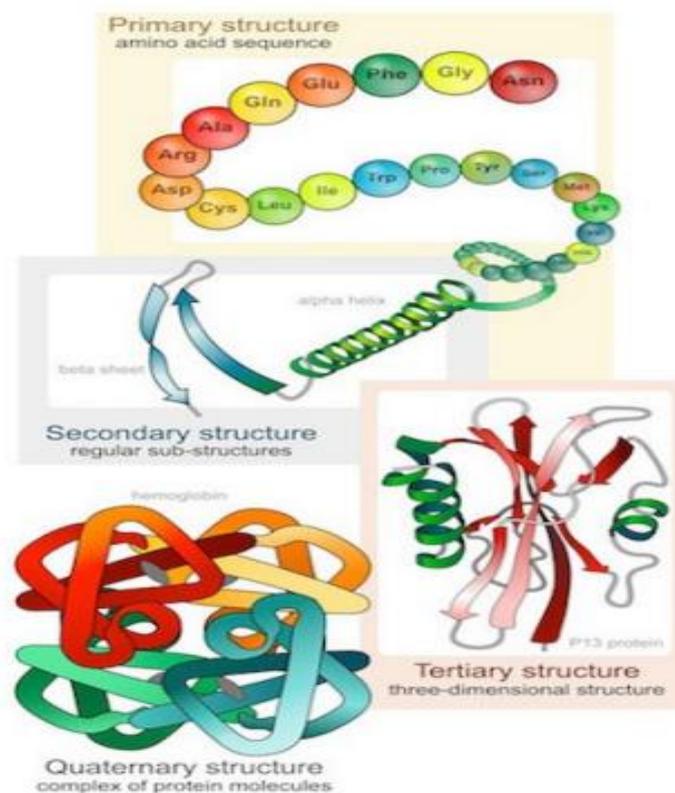


## Introduction :

- ✓ Twenty percent of the human body is made up of proteins.
- ✓ Proteins are the large, complex molecules that are critical for normal functioning of cells.
- ✓ Proteins are an essential part of all living organisms, especially as structural components of body tissues such as muscle, hair, etc., and as enzymes and antibodies
- ✓ Proteins are made up of smaller units called amino acids, which are building blocks of proteins.
- ✓ Protein is a class of nitrogenous organic compounds which have large molecules composed of one or more long chains of amino acids that consists of amino acid residues joined by peptide bonds.
- ✓ There are 20 amino acids that help form the thousands of different proteins in your body.
- ✓ A typical human cell contains 9000 different proteins; the human body contains about 100,000 different proteins.



## proteins:

- ✓ Proteins are a diverse and abundant class of biomolecules, constituting more than 50% of the dry weight of cells.
- ✓ The sequence of a protein is determined by the DNA of the gene that encodes the protein (or that encodes a portion of the protein, for multi subunit proteins).
- ✓ A change in the gene's DNA sequence may lead to a change in the amino acid sequence of the protein.
- ✓ Even changing just one amino acid in protein's sequence can affect the protein's overall structure and function.
- ✓ To understand how a protein gets its final shape or conformation, we need to understand the four levels of protein structure: primary, secondary, tertiary, and quaternary.

## Classification of proteins by Composition

According to the chemical composition of proteins, there are two types of proteins:

- 1- **Simple proteins:** are made of amino acids bound together to form a large molecule(( contain only amino acid residues)).
- 2- **Conjugated proteins:** are complex molecules containing simple proteins and non-protein components (contain other organic or inorganic components, called prosthetic groups .(–hemoproteins — heme (hemoglobin, myoglobin, cytochromes)

## Difference Between Simple Protein and Conjugated Protein

	Simple Protein	Conjugated Protein
<b>DEFINITION</b>	Simple proteins are peptide chains having amino acids but no other non-protein components	Conjugated proteins are peptide chains having both amino acids and non-protein components
<b>EFFECT</b>	Give only amino acids	Give amino acids and non-protein components
<b>EXAMPLES</b>	Albumin, glutelins, albuminoids, histone proteins, and protamines	Lipoproteins (contains a lipid residue), glycoproteins (contains a sugar residue), phosphoproteins (contains a phosphate residue), hemoproteins (contain an iron residue), etc.

### Functions of proteins:

Proteins are the agents of biological function. Virtually every cellular activity is dependent on one or more particular proteins. Thus, a convenient way to classify the enormous number of proteins is by the biological roles they fill. The various functions of proteins are as follows.

#### 1 .Enzymatic Protein:

Enzymatic proteins accelerate metabolic processes in your cells, including liver functions, stomach digestion, blood clotting and converting glycogen to glucose. An example is digestive enzymes that break down food into simpler forms that your body can easily absorb.

## **2- Regulatory Proteins :**

A number of proteins can regulate the ability of other proteins to carry out their physiological functions. A well-known example is insulin, the hormone regulating glucose metabolism.

## **3- Transport Proteins:**

These proteins function to transport specific substances from one place to another. Hemoglobin, for example, carries oxygen to body tissues from the lungs. Serum albumin carries fats in your bloodstream, while myoglobin absorbs oxygen from hemoglobin and then releases it to the muscles. Calbindin is another transport protein that facilitates the absorption of calcium from the intestinal walls.

## **4- Storage Proteins:**

Proteins whose biological function is to provide a reservoir of an essential nutrient are called storage proteins. Because proteins are amino acid polymers and because nitrogen is commonly a limiting nutrient for growth, organisms have exploited proteins as a means to provide sufficient nitrogen in times of need. For example, ovalbumin, the protein of egg white, provides the developing bird embryo with a source of nitrogen during its isolation within the egg. Casein is the most abundant protein of milk and thus the major nitrogen source for mammalian infants.

## **5 -Contractile Proteins:**

These proteins are actin and myosin. Contractile proteins can cause heart complications if they produce severe contractions.. Such as actin and myosin forming the contractile systems of cells.

## 6- Structural Proteins:

Structural proteins provide strength and protection to cells and tissues such as  $\alpha$ -Keratins are insoluble fibrous proteins making up hair, horns, and fingernails. Collagen, another insoluble fibrous protein, is found in bone, connective tissue, tendons, and cartilage, where it forms inelastic fibrils of great strength.

## 7 - Defensive Protein.:

Antibodies, or immunoglobulin, are a core part of your immune system, keeping diseases at bay. Antibodies are formed in the white blood cells and attack bacteria, viruses and other harmful microorganisms, rendering them inactive.

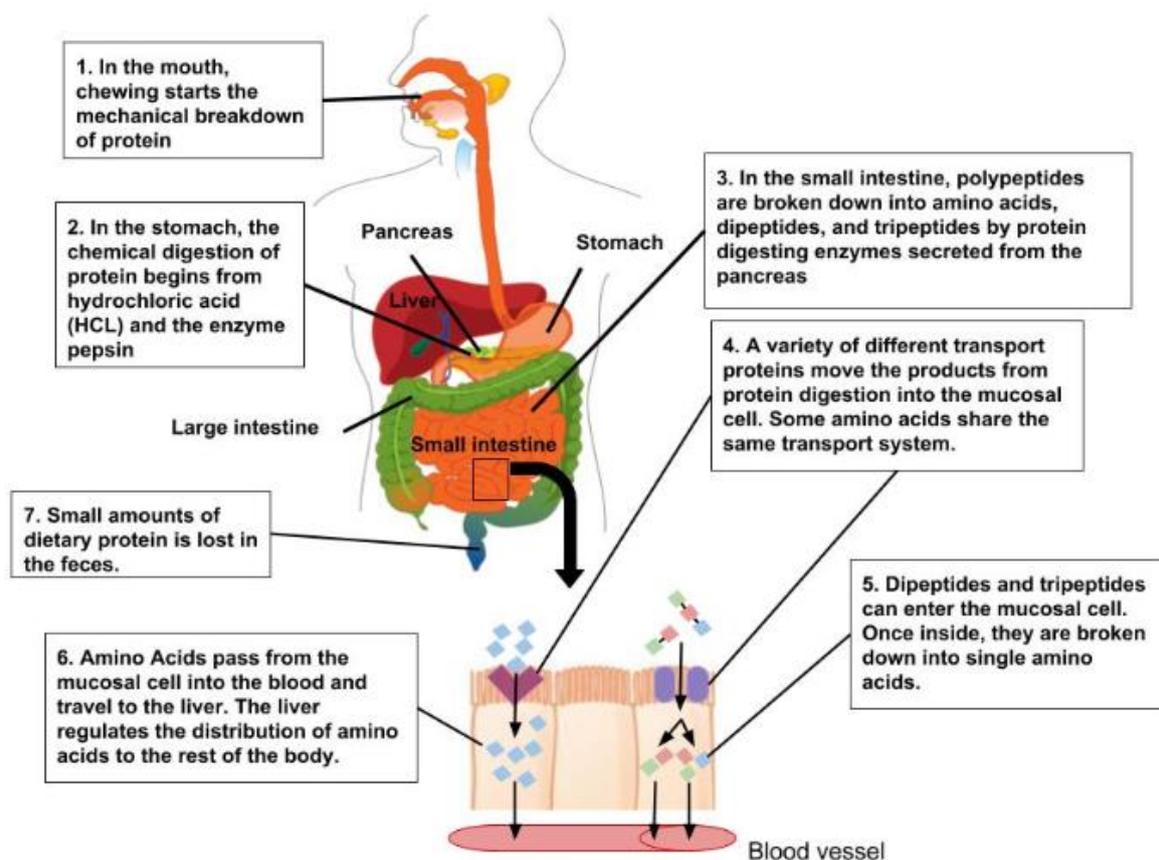
## 8- Receptor Protein:

Located on the outer part of the cells, receptor proteins control the substances that enter and leave the cells, including water and nutrients. Some receptors activate enzymes, while others stimulate endocrine glands to secrete epinephrine and insulin to regulate blood sugar levels.

## Digestion and absorption of proteins:

Several groups of enzymes catalyze the digestion of proteins. There are two main classes of proteolytic digestive enzymes (proteases),

- 1- **Endopeptidases:** hydrolyze peptide bonds between specific amino acids throughout the molecule. eg. pepsin in the gastric juice and trypsin, chymotrypsin, and elastase secreted into the small intestine by the pancreas.
- 2- **Exopeptidases** :catalyze the hydrolysis of peptide bonds, one at a time, from the ends of polypeptides.
  - a- **Carboxypeptidases:** secreted in the pancreatic juice, release amino acids from the free carboxyl terminal
  - b- **Aminopeptidases:** secreted by the intestinal mucosal cells, release amino acids from the amino terminal.



## Important functions of protein in the body:

- Growth and Maintenance. Share on Pinterest. ...
- Causes Biochemical Reactions. ...
- Acts as a Messenger. ...
- Provides Structure. ...
- Maintains Proper pH. ...
- Balances Fluids. ...
- Bolsters Immune Health. ...
- Transports and Stores Nutrients.

