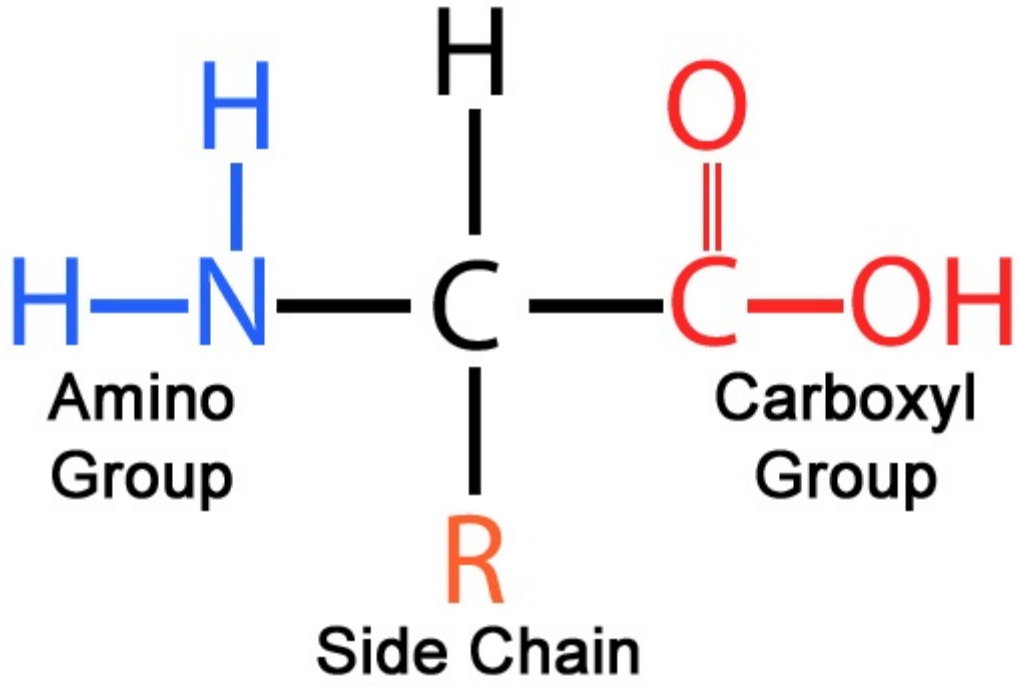
2-Proteins: Lec. 4

- The building blocks of proteins are amino acids



- There are **20** amino acids that function as building blocks of proteins.
- **Nine** of these amino acids are considered are **Essential**—they must be consumed in the diet they are:

- **(histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine).**

- **Non-essential amino acids**, meaning they can be synthesized in sufficient quantities in the body. These five are
- **(alanine, aspartic acid, asparagine, glutamic acid, and serine).**

- **Conditional amino acids:** being essential only at certain life stages or in certain disease states. They include
- **(arginine, cysteine, glutamine, glycine, proline, and tyrosine)**

- Within a protein, multiple amino acids are linked together by **peptide bonds**, thereby forming a long chain. All proteins are made up of one or more chains of amino acids (polypeptide chains).

Classification of Proteins

- **(a) Simple proteins**
- On hydrolysis they yield only the amino acids and occasional small carbohydrate compounds. **albumins, globulins, glutelins, albuminoids, histones and protamines.**

(b) A conjugated protein

- is a protein that functions in interaction with other (nonpolypeptide) Chemical groups.
- **Lipoproteins, glycoproteins, Nucleoproteins, phosphoproteins, hemoproteins, metalloproteins, phytochromes, cytochromes, and chromoproteins**

(c) Derived proteins:

- These are proteins derived from simple or conjugated proteins by physical or chemical means. denatured proteins and peptides.

Functions of proteins

- **1-Antibodies**
- **2-Contractile Proteins**
- **3-Enzymes**
- **4- Hormones**
- **5- Structural proteins**
- **6- Storage proteins**
- **7- Transport proteins**

3-Lipids:

compounds that are insoluble in water but soluble in organic solvents

Functions of Lipids:

1. Acting as structural components of cell membranes.
2. Serving as energy storage sources.
3. They also provide insulation to the body.
4. Act as primary compounds for some vitamins and hormones.
5. It is considered a source of essential fatty acids.

Types of Lipids

Simple Lipids

1. **Fats:** Esters of fatty acids with glycerol. Oils are fats in the liquid state.

2. **Waxes**: Esters of fatty acids with higher molecular weight monohydric alcohols.

Complex Lipids

1. **Phospholipids**: containing a phosphoric acid residue in addition to fatty acids and alcohol.

2. **Glycolipids:** containing a fatty acid, sphingosine, and carbohydrate.

3. **Other complex lipids**: sulfolipids and amino lipids. Lipoproteins may also be placed in this category

Derived Lipids

These include fatty acids, glycerol, steroids, other alcohols, fatty aldehydes, hydrocarbons, lipid-soluble vitamins, and hormones.

These compounds are produced by the hydrolysis of simple and complex lipids.

Fatty Acids:

Fatty acids are carboxylic acids (or organic acid), usually with long chains, either unsaturated or saturated.

Saturated fatty acids: Lack of carbon-carbon double bonds indicates that the fatty acid is saturated.

Unsaturated fatty acid: is indicated when a fatty acid has more than one double bond.