

## **PROTEINS**

“Proteins are complex nitrogenous compounds of very high molecular weight.”

It has been estimated that about **2000** different proteins exist in nature.

### **Amino acids**

Amino acids are the building blocks of proteins. There are **20** naturally occurring amino acids.

Different proteins are formed due to different arrangement of 20 amino acids. Each amino acid has an amine group (NH<sub>2</sub>), Carboxylic group (COOH) and Side chain (R). Hence, they may be alkaline, acidic or amphoteric in nature.

## **CLASSIFICATION OF PROTEINS**

### **1. On basis of reaction to heat**

- Coagulable protein (egg)
- Non-coagulable protein (Casein protein in milk)

### **2. On the basis of solubility**

- In water (Albumin)
- In salt (Globulin)

## **CLASSIFICATION OF AMINO ACID ON BASIS OF NUTRITION**

Nutritionally, all amino acids are broadly classified into 2 groups:

<b>Essential amino acids</b>	<b>Non essential amino acids</b>
Essential amino acids cannot be synthesized by human body and must be included in diet	Non-essential amino acids can be synthesized from other amino acids in the human body and not essential in the diet
9 amino acids are essential	11 amino acids are non essential
Examples: Histidine, isoleucine, leucine, lysine	Examples: Alanine, arginine, asparagine, aspartic acid
Sources: Animal products (meat, milk, egg and fish) and Plant foods (Cereals, legumes and leafy vegetables)	

### **Formation of proteins**

In the formation of proteins, the amino group of one amino acid reacts with the acidic group of another amino acid, liberating a molecule of water and forming the peptide link.

- Dipeptide** when only two amino acids link together through a peptide bond
- Tripeptide** when three amino acids link together through a peptide bond
- Polypeptide** when several/many amino acids link together through a peptide bond

### **Application of proteins**

Proteins are added to food for variety of reason.

- Emulsifying agent** (egg is used in mayonnaise as emulsifier)

- Foaming agent** (in ice cream and whipped toppings, food foams are produced with proteins)
- Gelling ability** (In the production of gelatin and yoghurt)
- Improve nutritional quality** (formulated milk)

### **Proteins in Human body**

1. Proteins after digestion provide 4 kcal of energy/g
  2. Proteins are needed in the body for building and maintenance of tissues
  3. In case of shortage of carbohydrates and lipids, proteins provides energy
  4. Some proteins such as enzymes, hormones and antibodies have special role in living organisms.
- Enzymes act as a biological catalyst
  - Hormones are essential to regulate different functions in body
  - Antibodies help to fight against infections
5. Children need more protein on body weight basis than adults because they are growing and building body tissues.

### **Sources of protein**

**Animal source:** Meat, egg, milk, cheese, seafood

**Plant source:** Beans, pulses, Nuts, cereals