

Nutrition for Nurses

Nutrition and Human Welfare

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Proteins

Proteins :

Proteins are the essential constituents of plant and animal cells. There is no known life without them. In animals, the muscular tissue of the body is composed of protein. Protein is needed in nutrition for the growth and repair of the human body. The word protein is derived from the Greek word meaning "stand first".

Proteins are nitrogenous substances. They contain carbon, hydrogen, oxygen and nitrogen. Some proteins have sulphur and phosphorus in addition to the above main elements. Plants, yeasts and bacteria are capable of making proteins from the materials present in the soil, air and water; in the same way as plants build up carbohydrates and derive energy from them. Animals do not possess this faculty and, therefore, depend upon the plants for their protein. Man derives his proteins either from the plants or the animals which have built their proteins from plants.

All life processes depend on the presence of appropriate proteins in the tissues and blood. Shortage of plasma proteins will lead to oedema of limbs; of liver proteins to cirrhosis of liver and primary carcinoma of liver, and of muscle proteins to decreased tonus.

Proteins are made up of the building blocks, "amino acids". There are 22 amino acids known in foods. All the proteins in foods are made up of different combinations, permutations and arrangements of the 22 amino acids. Ten of these amino acids are capable of maintaining life and growth in animals and man. They are called

"essential or indispensable amino acids". Some maintain life but do not permit growth while a few others neither maintain life nor promote growth. These are called "Non-essential or dispensable amino acids".

Classification of Proteins :

There are several ways of classifying proteins. They are given below.

1. Proteins are divided into animal or vegetable groups. The animal proteins are obtained from meat of all kinds, poultry, fish, milk, milk products and eggs. Vegetable proteins are obtained from vegetables of all types, seeds, nuts, yeasts and cereals.

2. Proteins are also grouped as: First Class, Second Class or Third Class proteins. The first class proteins maintain life and promote growth. They are found in most of the animal foods and also in some nuts and pulses. The second class proteins maintain life but do not promote growth. Some proteins in the vegetable kingdom belong to this group. The third class proteins neither maintain life nor promote growth. The zein in maize and gelatin are typical examples of this group.

3. Proteins are also classified as complete, partially complete and incomplete proteins. All the foods giving first class proteins give complete proteins. All the second class proteins are partially complete and the third class ones incomplete.

The complete proteins have adequate quantities of each of these amino acids essential for life and growth. A small quantity of such a protein will go a long

way towards supporting life, repairing tissues and promoting growth. Examples of complete proteins are :

Casein, lact-albumin, and lactoglobulin in milk.

Ova vitellin in egg yolk, and albumin and globulin in meat egg and fish.

The above proteins possess a high biological value. Biological value means the percentage of absorbable proteins from the digested proteins in the intestinal tract. Although all the complete proteins are from animal sources, not all animal proteins are complete—for example, gelatin, an animal protein is an incomplete one.

The partially incomplete proteins are either devoid of one or other of the essential amino acids needed for growth or they may not have them in adequate quantities. They may support life. Gliodin of wheat is a good example for this group of proteins. The incomplete proteins are those which as sole dietary protein are incapable of supporting either growth or life. However, such proteins do not exist individually in foods. Most foods have mixtures of different proteins and may supply the essential amino acids.

Why then do we use proteins of low biological value and the incomplete ones in our diets? Because they are usually taken along with other proteins, as part of a mixture of foods. What is lacking in an individual protein is thus supplied by another individual protein containing the missing components. Plant foods give most of the proteins in human diets all over the world. Animal products are more expensive than vegetable food supply. The cereals supply the largest amount of proteins in the world. Although they are inferior in quality, when supplemented with milk, the milk proteins enhance the value of cereal proteins. This method of mixing foods of animal and vegetable origins is economical and beneficial. It must be remembered that the greater the needs for growth (as in childhood) the greater will be the requirement for the proteins of

high biological value. Infants, growing children, pregnant and nursing women, convalescents and certain disease conditions all need high class proteins.

Proteins are necessary for growth and for repair at all ages to meet the normal wear and tear. They are needed for wound healing and regeneration of blood. They are important in the production of anti bodies against pathogenic bacteria. Proteins take part in many essential processes in the body. The proteins of the muscles are responsible for their contractions. Enzymes depend on proteins for their activities. Hormones are elaborated by making use of proteins. Proteins maintain the osmotic pressure of blood. They have a high "specific dynamic action", which means they produce more warmth than either fats or carbohydrates, in that more energy is needed for their digestion.

Proteins also supply fuel—but they are costly items for being used as fuel.

Foods providing proteins in the diet

Animal Foods	Grams per ounce
Eggs (fowl, duck)	3.8
Fish	5.7—6.4
Liver (sheep)	5.4
Mutton	5.3
Fowl	7.2
Milk—Cow's	0.9
Milk—Buffaloe's	1.2
Vegetable Foods	
Rice	1.8—2.0
Wheat	3.4
Bengal gram	4.9
Black gram	11.7
Field beans	7.0
Green gram	7.1
Red gram dhal	6.3
Soya Bean	12.3
Almonds	5.9
Cashew nuts	6.0
Coconut	1.4
Gingelly seeds	5.2
Ground nuts	7.6
Wood apple	2.1
Yeast (dry)	11.2

(To be contd.)