

# Therapeutic nutrition

## Lecture - 2 -



# Learning objectives

At the end of this lecture student would be able to :

- 1-Determine protein constituents & its recommended allowances .
- 2-Classify amino-acids & proteins .
- 3-Identify essential amino-acids .
- 4-Illustrate functions of proteins .
- 5-Discuss malnutrition disorders .
- 6-Outline measures & factors affecting protein requirement .
- 7-Identify the chemical amino-acid score of certain nutrients .

# Proteins



**\*Proteins are essential constituents of cells.**

**\*They are complex organic nitrogenous compounds. They are composed of carbon, hydrogen, oxygen, nitrogen and sulfur in varying amounts. Some proteins also contain phosphorous and iron and occasionally other elements.**

Proteins are large, complex molecules that play many critical roles in the body. They do most of the work in cells and are required for the structure, function, and regulation of the body's tissues and organs.

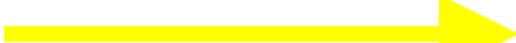
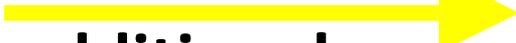
**\*Its building unit is amino-acid. Some 24 amino-acids are stated to be needed by the human body, of which 9 are called essential because the body cannot synthesize them.**

# The Two General Categories of Protein

**Fibrous proteins** are found only in animals. They usually serve as structural entities — for example, connective tissue, tendons, and muscle fiber. They are normally insoluble in water.

**Globular proteins** usually do not serve a structural function — they act as transporters, like hemoglobin, and are often enzymes. They are usually water-soluble

✦ Recommended allowances of proteins is around (15%) of energy needed by the body. [ 1 gm  4 Calories].

-  **Adult**  **1gm/Kg**
-  **Children**  **3.5gm/Kg**
-  **Adolescent**  **1.5gm/Kg**
-  **Pregnancy need additional**  **20gm daily**
-  **Lactating women need additional 40gm daily**

## Types of protein

of protein foods three types We sometimes hear that there are

### Complete proteins

These foods contain all the essential amino acids. They mostly occur in animal foods, such as meat, dairy, and eggs

### Incomplete proteins

These foods contain at least one essential amino acid, so there is a lack of balance in the proteins. Plant foods, such as peas, beans, and grains mostly contain incomplete protein

### Complementary proteins

These refer to two or more foods containing incomplete proteins that people can combine to supply complete protein.

Examples include rice and beans or bread with peanut butter

**Human body can convert many unnecessary amino-acids to amino-acids that are needed .**

**There are **nine amino-acids** necessary for any adult person. Thus diet must contain them .**

## ✦ **1- Essential amino-acids for adults are:-**

**1. Lucine .**

**2. Isolucine .**

**3. Lysine .**

**4. Methionine .**

**5. Phenylalanine .**

**6. Threonine .**

**7. Tryptophan .**

**8. Valine .**

**9. Histidine**

**Additional essential amino-acids for a growing child is Arginine, and for premature babies are Cystine and Tyrosine.**

**✦2- Some essential amino-acids have important biological functions e.g. formation of niacin from tryptophan, the action of Methionine as a donor of methyl groups for the synthesis of choline, folates and nucleic acids.**

**✦Proteins in different foods can be graded on the basis of whether they contain the essential amino-acids in a satisfactory proportion to meet the human body needs or not .**

There is evidence that cystine and tyrosine are essential for premature babies .

New tissues cannot be formed unless all the essential amino acids (EAA) are present in the diet . When one or more of the EAA are lacking , the protein is said to be ( *biologically incomplete* )

The quality of dietary protein is closely related to its pattern of amino acids.

# *Animal proteins*

- 1- superior to vegetable proteins
- 2- biologically complete
- 3- example milk , egg

# Sources

**1. Animal source proteins:** usually contain all the essential amino-acids in a suitable proportion.

Thus it considered a first class proteins.

[Meat, Fish, Milk & its derivatives, and Eggs]



**2. Vegetable source proteins:** the amount of proteins in plant cells is small in general . However, its amount is variable according to type of plant .

[Potatoes , Beans, Peas, Nuts, Bran]



● Beans and peas contain highest protein among seeds.

● Potatoes contain good amount of proteins.

# **Functions of proteins**

- 1.Body building.**
- 2.Repair and maintenance of body tissues.**
- 3.Maintenance of osmotic pressure.**
- 4.Synthesis of certain substances e.g. antibodies, plasma proteins, hemoglobin, enzymes, hormones and coagulation factors.**
- 5.Supply of energy when the calorie intake is inadequate.**
- 6- Proteins are connected with immune mechanism of the body . The cell – mediated immune response and the bactericidal activity of leucocytes have been found to be lowered in sever forms of protein energy mal nutrition**

# Supplementary function of proteins

From a variety of food sources , animal and vegetable .Cereal portions are deficient in lysine and threonine ; and pulse proteins in methionine . These are known as ( **Limiting amino acids** ) . When two or more of vegetarian foods are eaten together their proteins supplement one another and provide a protein comparable to animal protein in respect of EAA. So at a low cost , can mix diets of cereals , pulses and vegetables . This is known **as supplementary action of proteins**

**Thank you**

