Al Ameed University
College of Nursing
Subject: Nutrition and diet therapy
Stage: 3rd
Lecture: 5

Assist lect. Ehab A. Haider

Learning objectives

At the end of this lecture, the student should be able to:

1. Define concepts
2. Discuss the roles of proteins in the body.
3. Compare between complete and incomplete proteins.
4. Explaining the sources for each type of proteins

Proteins

- **Proteins** are organic compounds that contain carbon, hydrogen, oxygen, and nitrogen atoms; some proteins also contain sulfur.
- Every cell in the body contains some protein, and about three-quarters of body solids are proteins.
- **RDA for Protein**

The RDA for adults is 0.8 grams of protein per kg/body weight/ day

- **Amino acids** are basic structural units of proteins and categorized as essential or nonessential.

a. Essential amino acids

- are those that cannot be manufactured in the body and must be supplied in the diet.
- (9) essential amino acids (histidine, isoleucine, leucine, lysine, methionine, phenylalanine, tryptophan, threonine, and valine) are necessary for tissue growth and maintenance.

b. Nonessential amino acids

- are those that the body can manufacture.
- (11) Nonessential amino acids include:

1. Arginine
2. Alanine
3. Aspartic Acid
4. Cysteine
5. Glutamic Acid
6. Glycine
7. Hydroxyproline
8. Proline
9. Serine
10. Tyrosine
11. Carnitine

Function of Proteins

1. Proteins are necessary for tissue growth, repair, and wound healing.
2. Some hormones, including (thyroxin, insulin) and enzymes such as (albumin, plasma protein) are protein
3. Protein may used for energy. It supplies 4 kcal/g and provides about **15% to 20%** of total daily kcal that should come from Proteins

Function of Proteins

4. Transportation of oxygen through hemoglobin, a carrier protein that transports oxygen to the blood, and myoglobin, a protein carrier that stores oxygen in muscles.

5. Formation of some of the blood clotting factors, such as fibrogen .

6. Immunoglobulin(antibodies) are also made of protein.

Proteins may be complete or incomplete

Complete Proteins contain **all of the essential amino acids** needed for growth. plus many non-essential ones.

Sources of Complete Proteins

a. animals like meat, fish, poultry, cheese, eggs, yoghurt and milk.

b. Plants like soya and chia seeds.

Proteins may be complete or incomplete

In complete lack of one or more essential amino acids (most commonly lysine, methionine, or tryptophan)

Sources of Incomplete Proteins

- Incomplete proteins are found in the plant form.
- Vegetables, seeds, nuts, grain and legumes.

Protein Digestion

- Digestion of protein foods begins in the mouth, where the enzyme pepsin breaks protein down into smaller units.
- Most proteins are digested in the small intestine.
- The pancreas secretes the proteolytic enzymes trypsin, chymotrypsin, and carboxy peptidase.

Protein Digestion

- These enzymes break protein down into smaller molecules and eventually into amino acids.
- Amino acids are absorbed by active transport through the small intestine into the portal blood circulation.
- The liver uses some amino acids to synthesize specific proteins (e.g., liver cells and the plasma proteins, albumin, globulin, and fibrinogen).

Protein Metabolism

Protein metabolism includes three activities: anabolism (building tissue), catabolism (breaking down tissue), and nitrogen balance.

- **Anabolism**. All body cells synthesize proteins from amino acids. The types of proteins formed depend on the characteristics of the cell and are controlled by its genes.
- **Catabolism**. Because a cell can accumulate only a limited amount of protein, excess amino acids are degraded for energy or converted to fat. Protein degradation occurs primarily in the liver.

Nitrogen Balance

- Nitrogen Balance: Because nitrogen is the element that distinguishes protein from lipids and carbohydrates, nitrogen balance reflects the status of protein nutrition in the body.

- **Nitrogen balance** measures the degree of protein anabolism and catabolism; when a person's daily intake of nitrogen from proteins equals the daily excretion of nitrogen.

Nitrogen Balance

- If a person excretes more nitrogen than he consumes his body will break down muscle tissue to get the nitrogen it needs(Negative nitrogen state) Muscle loss occurs.
- If a person consumes more nitrogen than he excretes he will be in an anabolic muscle building - state (positive nitrogen state).

Protein-Kilocalorie Malnutrition

1. **Kwashiorkor** ,is malnutrition caused by severe protein deficiency. It generally occurs in infancy or childhood and onset is usually at the time of weaning from breast.

2. **Marasmus**, is a condition caused by inadequate kcals and protein. It is most often seen as starvation, It occurs during the first years of life.


Thank
You