

# Protein

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- Protein is the building material for the structure of the body. It is broken down into Amino Acids, and AA are the basis for synthesis of the body: bone and muscle, skin and brain, AA are used to make nucleic acids, which form the genetic code as well as the molecules which store energy within the body. At a very basic level, protein is what we are made of. Although protein provides (4) Calories of energy per gram, the body uses it for energy only if CHO and fat is insufficient. On the average (58%) of the total dietary protein become available when needed to be burned for energy.
- There are (20) in total of amino acids, ten of which the body can not synthesize in adequate amounts, these are called Essential Amino Acids [EAAs], it must be supplied by the diet and is therefore a dietary essential. Amino acids which can be made in the body and do not need to be in the diet are none essential.

# The Quality of Protein

- Protein is found in many foods from both animals and plants, such as: meat, fish, eggs, milk and cheese are widely known to be good sources.
- Legumes, beans, peanuts, peas are the best plant sources.
- Proteins vary greatly in their make-up of amino acids. The ideal protein has an amino acid pattern which exactly matches the body needs. Egg albumin is generally thought to be a good reference protein. One can grade a protein according to how closely it conforms to the composition of the reference protein.
- The nutritional quality of protein (biological value) of egg is considered to be (100), whereas that of white flour is approximately 50. In general the value for animal proteins (80-100), cereal proteins (50-70), legumes give intermediate value.
- A common way of designating the quality of protein in foods is whether they are complete or incomplete in terms of the amounts of essential amino acids that they contain.

# Complete Protein Foods

## Incomplete protein foods

- **Complete Protein Foods**
- Foods called so are those which contain all the EAAs in sufficient quantity and ratio to meet the body's needs. These proteins are of animal origin.
- **Incomplete protein foods:**
- Are those foods deficient in one or more of the EAAs. These proteins are mostly of plant origin.
- In a mixed diet, animal and plant proteins, complete one another; I.e. cereal protein are not especially high quality but if they are combined with protein found in milk, the deficiencies in the cereal protein are made up in the milk proteins. Cereal with milk a much better protein source than cereal alone.
- Even a mixture of plant proteins alone may provide an adequate balanced ratio of amino acids if planned carefully I.e. rice=legumes.

# Protein requirements

- It is clear that protein is an essential nutrient, but how much and what kind do we want and need actually?

# Factors Influencing Protein Requirement

## 1. Tissue Growth:

- The primary purpose of protein in the diet is to supply AA in the quantity and quality necessary for growth and maintenance of tissue. So any period of growth increases the need for protein. Growth related factors include **age, body size, and general physical state**.
- Also special periods of rapid growth such as the growth of the **fetus** and maternal tissue during **pregnancy** need more protein.

## 2. Illness or Disease;

- Any illness or disease will usually increase the requirement for protein. Diseases accompanied by **fever** usually increase the need for protein, because of the **increase in basal metabolic rate** and the general **breaking down** of tissue rebuilding. **Post surgical** states require protein for **wound healing**. Extensive tissue destruction as occur with **burns** requires considerable increase in protein intake for healing process.
- In general **RDA** is 0.75 grams per kilogram body weight per day, which is **45-60 gram/day** for adult. Fuel factor is 4 Cal. Quality protein should provide [15-29] of the total calories of a healthy person's well balanced diet.

# Protein Malnutrition

- Protein malnutrition is demonstrated by **loss of energy, weakness, muscle wasting, edema, fatty liver, skin rashes, poor healing, and low immune response.**
- There are low levels of a number of plasma proteins. It predisposes to **infection**, and the death rate from infections in children with protein malnutrition is 30-40%. **Pure protein malnutrition** is known as *Kwashiorkor*, while **pure energy deficiency** is *Marasmus*. Deficiency in **both** is the most common and is usually called Protein-energy malnutrition (or) *PEM*. The persons most often affected with PEM are young **children under 5 years of age** because of their demand for growth, while a disease associated primarily with protein deficiency commonly occurs in children between the ages of 1 and 4 years old. These children are usually in good health while they are breast feed, but they become ill soon after they have been **weaned**. It is common in many developing countries and is a consequence of feeding a child **diet** adequate in **calories but deficient in protein.**

The image features two large, vibrant yellow roses in full bloom, positioned diagonally across the frame. They are set against a dark teal background. The roses have many layers of petals, with some showing a slight gradient from yellow to white. Green leaves are visible around the base of the roses. The text 'Thank you very much' is written in a stylized, reddish-brown font with a slight shadow effect, centered over the roses.

Thank you

very much