

Protein

You must be able to:

- Demonstrate knowledge and understanding of the functions and main sources of protein
- Demonstrate knowledge and understanding of the biological value of proteins
- Demonstrate knowledge and understanding of the effects of protein deficiency and excess

What is Protein?



- Protein is a **macronutrient** which is essential for growth, repair and maintenance in the body.
- Protein is made up of long chains of simpler units called **amino acids**.
- There are 20 different amino acids found in both animal and plant sources.
- Eight of these amino acids need to be provided by the diet and are called **indispensable amino acids (IAA)** or **essential amino acids (EAA)**.
- Children require additional amino acids, which are needed to support rapid growth at this stage.

Functions of Protein in the Body

- **Growth**, especially in children who require the additional two essential amino acids.
- **Repair** of body tissue after accidents, surgery or illness.
- **Maintenance** – making new body cells.
- As a macronutrient, protein is needed in large quantities.
- Any protein consumed that is surplus to the body's requirements cannot be stored and will be used as a source of energy.



Sources of Protein

Animal sources	Plant sources
<ul style="list-style-type: none"> • Meat • Fish • Poultry • Milk • Eggs • Cheese • Insects 	<ul style="list-style-type: none"> • Soya • Nuts • Seeds • Pulses, e.g. beans, lentils • Mycoprotein (Quorn™) • TVP (texturised vegetable protein) 

Biological Value of Proteins

- The biological value of a protein is the amount of indispensable amino acids it contains.
- Proteins from animal sources contain a good supply of all the indispensable amino acids required by the body and are therefore of **high biological value (HBV)**, e.g. meat, fish and eggs.
- Proteins from plant sources are of **low biological value (LBV)**, as they are missing some of the indispensable amino acids. The exception is soya, which is a plant protein of high biological value.

Protein Complementation

- Proteins of LBV can be combined if eaten together to provide all the indispensable amino acids. This is known as **protein complementation**.
- The amino acids in one protein complement the limitations of the other, e.g. beans on toast, lentil soup and bread, hummus and pitta bread.
- This is important for vegans, vegetarians and for those wanting to eat more plant protein for health and budgetary reasons.

Excess and Deficiency

- The consumption of **excess** protein (more protein than the body needs) will result in that protein being used for energy or converted into fat. Weight gain and obesity can result.
- Protein **deficiencies** are rare in western countries, but kwashiorkor, a severe form of malnutrition caused by a deficiency of protein, does occur in developing countries.

Protein Needs of Different Individuals

- Babies and children have an increased need for protein due to a prolonged period of growth.
- Adolescents require a good supply of protein to facilitate a rapid growth spurt.
- Pregnant women need an increased supply of protein to support the growing baby.
- Nursing mothers need an increased supply of protein for lactation (milk production).

Quick Test

1. What are the functions of protein in the body?
2. What are the simple units of protein called?
3. Give three examples of foods which are of high biological value.
4. Why do children require more protein in their diet?
5. Give an example of protein complementation.

Revise

Key Point

Proteins lacking one or more of the essential amino acids are known as low biological value (LBV) proteins.

Proteins containing all the essential amino acids are known as high biological value (HBV) proteins.

Key Point

Combining two or more low biological value proteins into one meal to provide all the indispensable amino acids is known as **protein complementation**.

Key Words

- Amino acids
- Indispensable amino acids
- High biological value proteins (HBV)
- Low biological value proteins (LBV)
- Protein complementation