Importance of Protein

Protein is crucial to good health. The name comes from the Greek word *proteos*, meaning "primary" or "first place." Proteins are made up of amino acids that join together to form long chains. There are 20 amino acids that help form the thousands of different proteins in your body. Proteins do most of their work in the cell and perform various functions. The Important functions of protein in our body are:

1. Growth and Maintenance:

Our body needs protein for growth and maintenance of tissues. Our body's protein needs are dependent upon your health and activity level.

a. Under normal circumstances, our body breaks down the same amount of protein that it uses to build and repair tissues.
b. Other times, it breaks down more protein than it can create other compounds, thus helping our body's needs.
c. This happens in periods of illness, during pregnancy and while breastfeeding.
d. People recovering from an injury or surgery, older adults and athletes require more protein as well .

2. Biochemical Reactions

a. Enzymes are proteins that aid the thousands of biochemical reactions that take place within and outside of your cells.
b. The structure of enzymes allows them to combine with other molecules inside the cell called substrates, which catalyze reactions that are essential to your metabolism.
c. Enzymes may also function outside the cell, such as digestive enzymes like lactase and sucrase, which help digest sugar.
d. Some enzymes require other molecules, such as vitamins or minerals, for a reaction to take place.
e. Bodily functions that depend on enzymes include: Digestion, Energy production, Blood clotting and Muscle contraction.
f. Lack or improper function of these enzymes can result in disease.

3. Acts as a Messenger

a. Some proteins are hormones, which are chemical messengers that aid communication between your cells, tissues and organs.
b. They're made and secreted by endocrine tissues or glands and then transported in your blood to their target tissues or organs where they bind to protein receptors on the cell surface.
c. Hormones can be grouped into three main categories:
   - **Protein and peptides:** These are made from chains of amino acids, ranging from a few to several hundred.
   - **Steroids:** These are made from the fat cholesterol. The sex hormones, testosterone and oestrogen, are steroid-based.

- **Amines:** These are made from the individual amino acids tryptophan or tyrosine, which help make hormones related to sleep and metabolism.

d. Protein and polypeptides make up most of our body's hormones. Some examples include:

- **Insulin:** Signals the uptake of glucose or sugar into the cell.
- **Glucagon:** Signals the breakdown of stored glucose in the liver.
- **hGH (human growth hormone):** Stimulates the growth of various tissues, including bone.
- **ADH (antidiuretic hormone):** Signals the kidneys to reabsorb water.
- **ACTH (adrenocorticotropic hormone):** Stimulates the release of cortisol, a key factor in metabolism.

4. Structural Proteins:

a. Some proteins are fibrous and provide cells and tissues with stiffness, strength, elasticity and rigidity.
b. These proteins include keratin, collagen and elastin, which help form t he connective framework of certain structures in your body.
c. Keratin is a structural protein that is found in your skin, hair and nails.
d. Collagen is the most abundant protein in your body and is the structural protein of your bones, tendons, ligaments and skin.
e. Elastin is several hundred times more flexible than collagen. Its high elasticity allows many tissues in your body to return to their original shape after stretching or contracting, such as your uterus, lungs and arteries.

5. Maintains Proper pH

Protein plays a vital role in regulating the concentrations of acids and bases in your blood and other bodily fluids. The balance between acids and bases is measured using the pH scale. It ranges from 0 to 14, with 0 being the most acidic, 7 neutral and 14 the most alkaline. Examples of the pH value of common substances include:

- pH 2: Stomach acid
- pH 4: Tomato juice
- pH 5: Black coffee
- pH 7.4: Human blood
- pH 10: Milk of magnesia
- pH 12**:** Soapy water

a. Proteins act as a buffer system, helping our body maintain proper pH values of the blood and other bodily fluids.
b. A variety of buffering systems allows your bodily fluids to maintain normal pH ranges.
c. A constant pH is necessary, as even a slight change in pH can be harmful or potentially deadly (19Trusted Source, 20Trusted Source).
d. One way your body regulates pH is with proteins. An example is hemoglobin, a protein that makes up red blood cells.

e. Haemoglobin binds small amounts of acid, helping to maintain the normal pH value of your blood.
f. The other buffer systems in your body include phosphate and bicarbonate.

6. Balances Fluids

a. Proteins regulate body processes to maintain fluid balance.
b. Albumin and globulin are proteins in your blood that help maintain our body's fluid balance by attracting and retaining water.
c. If you don't eat enough protein, your levels of albumin and globulin eventually decrease.
d. Consequently, these proteins can no longer keep blood in your blood vessels, and the fluid is forced into the spaces between your cells.
e. As the fluid continues to build up in the spaces between your cells, swelling or edema occurs, particularly in the stomach region.
f. This is a form of severe protein malnutrition called kwashiorkor that develops when a person is consuming enough calories but does not consume enough protein.
g. Kwashiorkor is rare in developed regions of the world and occurs more often in areas of starvation.

7. Strengthen Immune Health

a. Proteins help forming immunoglobulins, or antibodies, to fight infection.
b. Antibodies are proteins in our blood that help protect your body from harmful invaders like bacteria and viruses.
c. When these foreign invaders enter our cells, our body produces antibodies that tag them for elimination.
d. Without these antibodies, bacteria and viruses would be free to multiply and overwhelm your body with the disease they cause.
e. Once our body has produced antibodies against a particular bacteria or virus, your cells never forget how to make them.
f. This allows the antibodies to respond quickly the next time a particular disease agent invades your body.
g. As a result, your body develops immunity against the diseases to which it is exposed.

8. Transports and Stores Nutrients

a. Transport proteins carry substances throughout your bloodstream — into cells, out of cells or within cells.
b. The substances transported by these proteins include nutrients like vitamins or minerals, blood sugar, cholesterol and oxygen
c. For example, haemoglobin is a protein that carries oxygen from your lungs to body tissues.
d. Glucose transporters (GLUT) move glucose to your cells, while lipoproteins transport cholesterol and other fats in your blood.
e. Protein transporters are specific, meaning they will only bind to specific substances.
f. Proteins also have storage roles. Ferritin is a storage protein that stores iron.

g. Another storage protein is casein, which is the principal protein in milk that helps babies grow.

9. Provides Energy

a. Proteins can supply your body with energy. Protein contains 4 calories per gram, the same amount of energy that carbohydrates provide. Fats supply the most energy, at 9 calories per gram.
b. Carbohydrates and fats are much better suited for providing energy, as your body maintains reserves for use as fuel. Moreover, they're metabolized more efficiently compared to protein.
c. However, the last thing your body wants to use for energy is protein since this valuable nutrient is widely used throughout your body.
d. In fact, protein supplies our body with very little of its energy needs under normal circumstances.
e. However, in a state of fasting (18–48 hours of no food intake), your body breaks down skeletal muscle so that the amino acids can supply you with energy.
f. Our body also uses amino acids from broken-down skeletal muscle if carbohydrate storage is low. This can occur after exhaustive exercise or if you don't consume enough calories in general.

10. Pigmentation and Vision

a. Melanin is the pigment responsible for the colour of the hair, skin, and iris. Melanin includes Eumelanin, the melanin of brown and black pigments and Pheomelanin, red pigment. It is made from an amino acid known as L-tyrosine. The conversion of L-tyrosine into melanin is helped by certain nutrients, notably vitamin C, vitamin B6 and copper.

b. Rhodopsin is a light-sensitive receptor protein involved in visual phototransduction. Rhodopsin is a biological pigment found in the rods of the retina and is a G-protein-coupled receptor (GPCR) and it belongs to opsins. Rhodopsin is extremely sensitive to light, and thus enables vision in low-light conditions. When rhodopsin is exposed to light, it reacts immediately and photo-bleaches. In humans, it is regenerated fully in about 30 minutes.