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Diploma in Pharmacy 2nd Year
Biochemistry & Clinical Pathology
Important Questions
Chapter 3 : Proteins

Chapter 3
Proteins
IMPORTANT Questions

Q1. What are Proteins ? Classify Proteins with suitable example

Ans.

Proteins

- → Proteins are naturally occurring polymers made up of amino acids.
- → Almost everything that occurs in the cells involves one or more Proteins.
- → Proteins provide structure, cellular reaction and carried out the tasks.
- → 20 amino acids are found in protein and they are called standard amino acid. These amino acids contain the carboxyl group and the amino group attached to α carbon.

Classification of proteins

Based on composition and Solubility

- **Simple Proteins :** Simple protein contain only amino acid reduce and other intimately bound material.
  - Ex : Albumins, globulins, glutelin etc.
- **Conjugated Proteins :** Conjugated proteins contain in addition to polypeptide chain others substance or groups which impart characteristics properties.
  - Ex : Nucleoproteins, Glycoproteins, Haemoglobin, Phosphoproteins etc.
- **Derived Proteins :** Derived protein are derived from partial to complete hydrolysis from the simple or conjugated proteins by the action of acids, alkalis or enzymes.
  - Ex : Peptones, peptides, proteoses etc.

Q2. Write the role of Protein.

Ans.

Role of Protein

- Protein performs difference role in the living system.
- Proteins which catalyse by your chemical reactions are called enzymes.
- Proteins are responsible for transportation of metabolites fructose, Glucose or Gases (like Oxygen, Carbon dioxide) are called transport proteins.
- Protein which are responsible for to protect from infection and other toxic substances are called antibiotics or defense proteins
- Proteins which are required to give strength to cells or tissue are called structural proteins.
- Proteins which are required to carry out mechanical work are called muscle proteins.

Q3. What are Amino Acids ? Classify Amino Acids with suitable example

Ans.

AMINO ACIDS

- → Amino acids are building blocks of protein.
- → Amino acids are compound that contain and amino group and carboxyl group and the amino group attached to alpha carbon.
- → The key elements of an amino acid are Carbon (C) Hydrogen (H) Oxygen (O) and nitrogen (N).
- → There are there are 20 amino acids at present in our body in which 9 Essential and 2 Non-essential amino acids

Classification of amino acids

On the basis of chemical nature

- **Neutral amino acids :** The amino acids have equal amount of amino and carboxylic group are called neutral amino acids , examples : Glycine, alanine.
- **Acidic amino acids :** The amino acids have negative R group or chain are called acidic amino acids , examples : aspartic acid , glutamic acids.
- **Basic amino acids :** The amino acids have positive R group or chain are called basic amino acids , examples : arginine, lysine
- **Sulphur containing amino acids :** methionine, cystine.
- **Aromatic amino acids :** The amino acids have aromatic ring are called aromatic amino acids . example phenylalanine.

On the basis of Nutritional requirement

- **Essential Amino Acids :** The amino acids are not synthesised in the body and are obtained from dietary sources are called Essential Amino Acids .(VIPHALLMTT)
  - **Example :** Valine, Isoleucine, Phenylalanine, Histidine, Arginine
- **Non Essential Amino acids :** The amino acids are synthesised in the body and are Non Essential Amino acids.
  - **Example :** Glycine, Tyrosine, Proline, Cysteine

Q4. Write the structure of protein ?

Ans.

Structure of proteins (four levels of organization of protein structure)

1. **Primary protein :** It is the simple/basic/polypeptide chain like proteineous structure formed by the joining of amino acid by the help of covalent or peptide bond. Its biological activity mainly depends on the, types of amino acids. Many of genetic disorders are occurs due to changes in the primary protein structure.
2. **Secondary protein :** Secondary structure forms by the interaction between the polypeptide chain of primary protein amino group and carboxyl group. It mainly presents two structural forms-
    - α secondary protein (Helix Form).
    - β secondary protein (Sheet/Plate form).
3. **Tertiary protein :** Tertiary protein form by the further chemical modification between the secondary protein. It is stabilized due to presence of the H-bond, electrostatic forces, disulphides bonds, and Vander walls forces.
4. **Quaternary protein :** The quaternary structure of a protein is the association of seve

Q5. What are the Qualitative test for Protein and Amino Acids.

Ans.

Qualitative test of protein and amino acids

- **Ninhydrin test :** Amino acids and proteins a give Blue to violet colour with Ninhydrains solution.
- **Biuret test :** When biuret is treated with dilute copper sulphate in alkaline medium a purple colour is obtained.
- **Millon's test :** When proteins are treated with Millon's reagent a white precipitate is formed.
- .**Xanthoproteic test :** Nitration of aromatic amino acids of protein give yellow colour concentrated nitric acid is used for Nitration.
- **Hydrolysis Test :** Proteins on hydrolysis gives free amino acids Hydrolysis can be carried out by acids like HCL, H_2SO_4, etc. Or Alkalis like – NaOH, KOH etc.

Q6. Give Biological role of Protein and Amino Acids.

Ans.

Biological role of Proteins and amino acids

- Proteins give amino acids on hydrolysis during digestion and amino acids are the building blocks required for a cell to synthesis for proteins.
- Proteins are the structural component of protoplasm cell and tissues
- Enzymes and few hormones are Proteins in nature antibiotics, haemoglobin are also Proteins.
- Protein is one of the important components of diet it is required to maintain growth and healthy functioning of the body.
- In the cell, cell membrane is also made up by the protein, protein play the role in the transporting the cellular and outer material through the active or passive transport.
- In our body some amount of protein stored, for the starvation, critical condition for energy.
- During the clinical condition protein also play the major role (protein excrete in urine, during blood examination)

Q7. Write about disease related to malnutrition of Protein.

Ans.

Diseases Related to Malnutrition(deficiency) of proteins

1) **kwashiorkor :** This disease occurs due to severe deficiency of dietary proteins .The affected person have abnormally thin or week body parts , but have swollen ankles , feet and belly due to fluid retention in them.

Symptoms

- Loss of weight.
- Growth and weigh gain stop.
- Ankles , feet and belly swell.
- Immune system is damage , and get infection easily.
- The natural colour of skin and hair changes to a rust color.

Treatment

- Kwashiorkor can be treated by increasing the proteins in diet .

2) **Marasmus :** This disease occurs due to severe deficiency of all macronurients (proteins , carbohydrates , fats). Children are mostly suffer from this disease.

Symptoms

- Loss of weight.
- Growth and weigh gain stop.
- The natural colour of skin and hair changes to a rust color .
- Chronic diarrhea.
- Respiratory infection.

Treatment

- Marasmus can be treated by increasing the proteins , carbohydrates , fats and other essential nutrients in diet .

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