



PROTEINS AND AMINO ACIDS IN MEDICAL BIOCHEMISTRY

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Abstract

Proteins and amino acids are essential biochemical compounds that play a vital role in the structure and function of living organisms. Proteins are involved in enzymatic reactions, immune defense, transportation of substances, and cellular regulation. Amino acids serve as the building blocks of proteins and participate in numerous metabolic processes. This article discusses the chemical structure, classification, biological importance, and medical significance of proteins and amino acids in human health and disease.

Keywords: proteins, amino acids, medical biochemistry, metabolism, enzymes, nutrition, human health.

Introduction

Medical biochemistry studies the chemical processes occurring in the human body. Among the most important biomolecules are proteins and amino acids, which are necessary for normal growth, tissue repair, and physiological regulation. Proteins constitute a major part of cells and tissues, while amino acids are essential components required for protein synthesis.

Understanding the biochemical properties of proteins and amino acids is important in modern medicine because many diseases are associated with abnormalities in protein metabolism.

Structure and Classification of Amino Acids

Amino acids are organic compounds containing both amino ($-\text{NH}_2$) and carboxyl ($-\text{COOH}$) functional groups. There are twenty standard amino acids involved in protein synthesis. They are classified into:



- Essential amino acids
- Non-essential amino acids
- Polar and non-polar amino acids
- Acidic and basic amino acids

Essential amino acids cannot be synthesized by the human body and must be obtained from food sources such as meat, eggs, milk, fish, and legumes.

Proteins and Their Biological Functions

Proteins are macromolecules formed by peptide bonds between amino acids.

They possess complex structural organization including:

1. Primary structure
2. Secondary structure
3. Tertiary structure
4. Quaternary structure

Proteins perform numerous biological functions:

- Enzymatic catalysis
- Hormonal regulation
- Immune protection
- Oxygen transport
- Muscle contraction
- Cell signaling

Hemoglobin, insulin, collagen, and antibodies are examples of medically important proteins.

Medical Importance of Proteins and Amino Acids

Protein deficiency can lead to serious health disorders such as kwashiorkor, muscle wasting, immune dysfunction, and delayed wound healing. Abnormal amino acid metabolism may result in inherited diseases including phenylketonuria and maple syrup urine disease.



In clinical medicine, serum protein analysis is used for diagnosing liver diseases, kidney disorders, malnutrition, and inflammatory conditions. Amino acid supplementation is also applied in nutritional therapy and postoperative recovery.

Conclusion

Proteins and amino acids are fundamental components of life and play critical roles in human physiology and medicine. Their biochemical properties are essential for understanding metabolic processes, disease mechanisms, and therapeutic approaches. Continuous research in medical biochemistry contributes to improved diagnostic and treatment methods related to protein metabolism disorders.

References

1. Nelson D.L., Cox M.M. Lehninger Principles of Biochemistry. W.H. Freeman, 2021.
2. Murray R.K. Harper's Illustrated Biochemistry. McGraw-Hill Education, 2022.
3. Voet D., Voet J.G. Biochemistry. Wiley, 2019.
4. Berg J.M., Tymoczko J.L., Stryer L. Biochemistry. W.H. Freeman, 2019.
5. Rodwell V.W. Harper's Biochemistry Review. McGraw-Hill, 2020.