



आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश
IFTM University, Moradabad, Uttar Pradesh
NAAC ACCREDITED

E-Content

IFTM University, Moradabad

BIOCHEMISTRY AND CLINICAL PATHOLOGY

Lecture – I
by Dr. Munesh Mani

Pharmacy Academy
IFTM University
Moradabad



Introduction to biochemistry.

Brief chemistry and role of proteins, polypeptides and amino acids, classification, Qualitative tests, Biological value, Deficiency diseases.

Introduction:-

- ▶ Biochemistry, sometimes called biological chemistry, is the study of chemical processes within and relating to living organisms.
- ▶ Biochemical processes give rise to the complexity of life.
- ▶ biochemistry deals with the structures, functions, and interactions of biological macromolecules, such as proteins, nucleic acids, carbohydrates, and lipids, which provide the structure of cells and perform many of the functions associated with life.
- ▶ The chemistry of the cell also depends on the reactions of smaller molecules and ions.

Proteins:-

- ▶ Proteins- are large biomolecules, or macromolecules, consisting of one or more long chains of amino acid residues.
- ▶ Proteins perform a vast array of functions within organisms, including catalysing metabolic reactions, DNA replication, responding to stimuli, providing structure to cells, and organisms, and transporting molecules from one location to another.
- ▶ Proteins differ from one another primarily in their sequence of amino acids, which is dictated by the nucleotide sequence of their genes, and which usually results in protein folding into a specific 3D structure that determines its activity

Proteins:-

- ▶ A linear chain of amino acid residues is called a polypeptide.
- ▶ A protein contains at least one long polypeptide. Short polypeptides, containing less than 20–30 residues, are rarely considered to be proteins and are commonly called peptides, or sometimes oligopeptides.
- ▶ The individual amino acid residues are bonded together by peptide bonds and adjacent amino acid residues.
- ▶ The sequence of amino acid residues in a protein is defined by the sequence of a gene, which is encoded in the genetic code.
- ▶ Some proteins have non-peptide groups attached, which can be called prosthetic groups or cofactors. Proteins can also work together to achieve a particular function, and they often associate to form stable protein complexes.

Proteins:-

- ▶ biological macromolecules such as polysaccharides and nucleic acids, proteins are essential parts of organisms and participate in virtually every process within cells.
- ▶ Many proteins are enzymes that catalyse biochemical reactions and are vital to metabolism.
- ▶ Proteins also have structural or mechanical functions, such as actin and myosin in muscle and the proteins in the cytoskeleton, which form a system of scaffolding that maintains cell shape.
- ▶ Other proteins are important in cell signaling, immune responses, cell adhesion, and the cell cycle.
- ▶ In animals, proteins are needed in the diet to provide the essential amino acids that cannot be synthesized. Digestion breaks the proteins down for use in the metabolism

Proteins:-

- ▶ Once formed, proteins only exist for a certain period and are then degraded and recycled by the cell's machinery through the process of protein turnover.
- ▶ A protein's lifespan is measured in terms of its half-life and covers a wide range.
- ▶ They can exist for minutes or years with an average lifespan of 1–2 days in mammalian cells.
- ▶ Abnormal or misfolded proteins are degraded more rapidly either due to being targeted for destruction or due to being unstable.

Peptides :-

- ▶ Peptides - are short chains of between two and fifty amino acids, linked by peptide bonds.
- ▶ Chains of fewer than ten or fifteen amino acids are called oligopeptides, and include dipeptides, tripeptides, and tetrapeptides.

Peptides :-

- ▶ A polypeptide- is a longer, continuous, unbranched peptide chain of up to approximately fifty amino acids.
- ▶ peptides fall under the broad chemical classes of biological polymers and oligomers, alongside nucleic acids, oligosaccharides, polysaccharides.
- ▶ A polypeptide that contains more than approximately fifty amino acids is known as a protein.
- ▶ Proteins consist of one or more polypeptides arranged in a biologically functional way, often bound to ligands such as coenzymes and cofactors, or to another protein or other macromolecule such as DNA or RNA.

References

- ▶ K.K.Pillai, J.S. Qadry, text book of Biochemistry and Clinical Pathology, CBS Publishers & Distributors, 2008