Ministry of Higher education and Scientific Research

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LECTURE (3)

((AMINO ACIDS, PEPTIDES AND))

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Amino acids, peptides and

introduction

Amino acids, peptides, and polypeptides are fundamental elements in biochemistry and molecular biology. They play a crucial role in building proteins, which are essential for the functions of living cells. This theoretical scientific lecture discusses the basic concepts related to these compounds, their chemical composition, and their interaction mechanisms.

Amino Acids

Definition and composition

Amino acids are the basic structural units of proteins. They are molecules that contain an amino group (-NH2) and a carboxyl group (-COOH) attached to a central carbon atom, in addition to a side chain (R) that determines the

Classification

:Amino acids are classified into several categories:

- **-Essential amino acids: The body cannot produce them, such as leucine, .lysine, and phenylalanine**
- **-Non-essential amino acids: The body can synthesize them, such as .alanine, aspartate, and glycine**
- **-.Polar and nonpolar amino acids: based on side chain properties**
- **-Acidic and basic amino acids: according to the nature of their functional groups**

Chemical properties classification

-.It has the ability to form hydrogen bonds •

-.They react via peptide bonds to form peptides and proteins •

-.It can be ionized in acidic and basic media •

Peptides .

Definition and composition

Peptides are short chains of amino acids linked by peptide bonds. It is formed when the carboxyl group of one amino acid combines with the amino group of another amino acid through a dehydration reaction.

Types of peptides

-.Dipeptides: They consist of two amino acids •

-.Tripeptides: They consist of three amino acids •

-.Oligopeptides: ranging from 4-10 amino acids •

-Polypeptides: They exceed 10 amino acids, and may form proteins when • folded in a specific way.

Biological functions of peptides

.They act as hormones such as oxytocin and insulin •

.Participates in cellular signaling processes •

.Possess antimicrobial properties in some cases •

3- Polypeptides-

Definition and composition

Polypeptides are long chains of amino acids exceeding 50 units, and form the .basis of proteins when organized into specific three-dimensional structures

Folding and 3D composition

:Proteins consisting of polypeptides pass through several structural levels

-.Primary Structure: The linear arrangement of amino acids •

-Secondary Structure: It includes the alpha helix (α-helix) and the folded • beta sheet (β-sheet), which is formed due to hydrogen bonds

- • Tertiary Structure: The three-dimensional arrangement resulting from .interactions between the side chains of amino acids

-Quaternary Structure: When several polypeptide chains combine to form a • functional protein

Biological functions of polypeptides

-.It is involved in the formation of enzymes and carrier proteins •

-.Play a role in immune reactions •

-..It contributes to the transport of substances within cells •

The relationship between amino acids, peptides, and polypeptides-

Amino acids are the building blocks that are linked by peptide bonds to form peptides, which when increased in number form polypeptides, which may be arranged in specific ways to form biologically active proteins. These reactions are controlled by genetic factors and specialized enzymes

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THANK YOU & GOOD LUCK