Lecture title: Non-Standard Amino Acids

Lecturer Affiliation: *Department of Physiology, Biochemistry, and Pharmacology*
College of Veterinary Medicine, University of Mosul, Mosul, Iraq

Summary

In addition to the 20 common standard amino acids, other amino acids are found in protein in smaller quantities and called Non standard amino acids or rare amino acids.

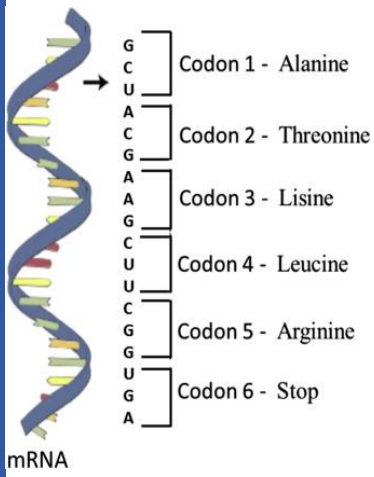
Non-Standard Amino Acids (the rare amino acids):

Definition:

Non-standard amino acids are amino acids derivatives that are considered to be chemically modified after post-translational modification.

Non- standard amino acids properties :

1- This type of amino acid is known to be found in various living organisms but does not occur in all proteins.
2- They are not found in the genetic code of any organism.
3- This type of amino acid can get created naturally and artificially in the laboratory



Function of non-standard amino acids:

1- As food additives (As flavoring agent)
2- phosphorylation, in which a phosphate molecule is added to the hydroxyl portion of the R groups of serine, threonine, and tyrosine. Phosphorylation serves a crucial role in the regulation of protein function and cell signaling.
3- Used therapeutically for pharmaceutical purposes. For example, treatments with single amino acids are part of the medical approach to control certain disease states. Examples include: example : L-di hydroxyl phenylalanine (L-dopa) for Parkinson disease; citrulline, and ornithine to treat liver diseases.

Non-standard amino acids examples:

1- 4-hydroxy proline and 5-hydroxy lysine both are found in collagen, a fibrous protein of connective tissues.
2- γ-carboxy glutamate, found in the blood clotting protein prothrombin.
3- Certain muscle proteins contain methylated amino acids, like 6-N-Methyl lysine is a constituent of myosin (a contractile protein of muscle).

Derivative of amino acids :

Define:

Amino acid derivatives are compounds that have been derived from an amino acid by either replacing or removing the amino group, carboxyl group, side group, or any group which is attached to the central atom.

Examples:

1- L-orinthine and L-citrulline, both are metabolic intermediates in the biosynthesis of arginine and in the urea cycle.
2- Thyroxine and triiodothyronine, two of several hormones derived from the amino acid tyrosine, are found in thyroid tissue. Their principal function is to stimulate metabolism in other cells and tissues.
3- Gamma γ –Aminobutyric acid (GABA) that have biological function Transmit signal in the nerves