

Libyan International Medical University

Faculty of Pharmacy

Proteins

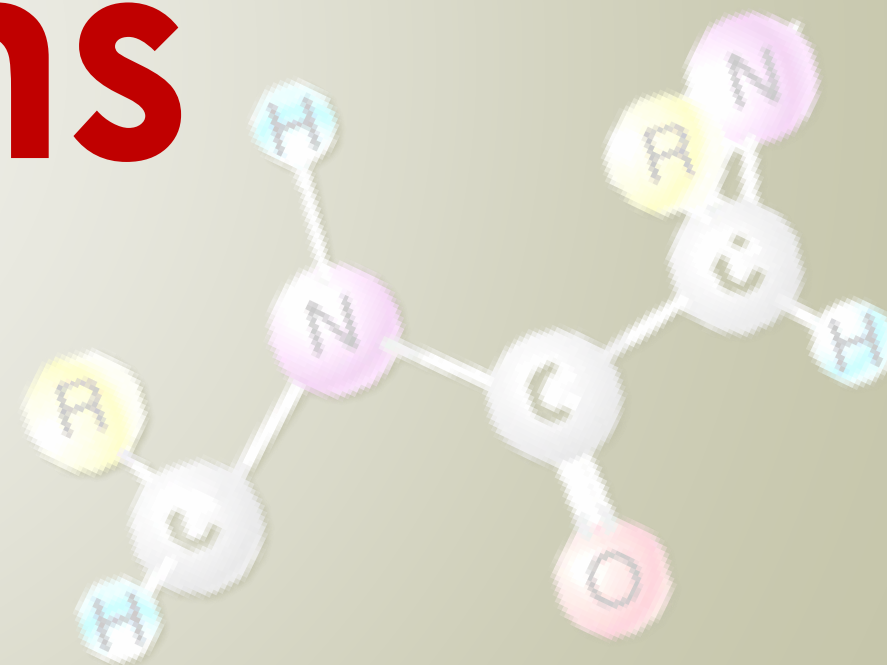
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Presented By 1ST pharmD Students :

Nuha Saleh Alkomati

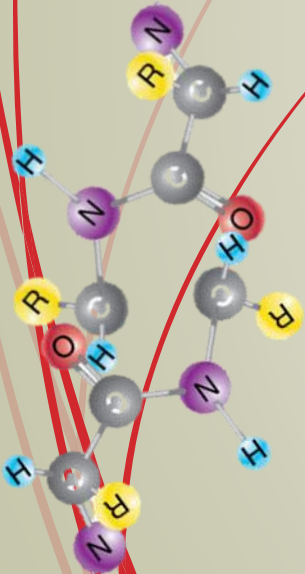
Ahlaiel Atia

Mohammed Shokry



ILOS :

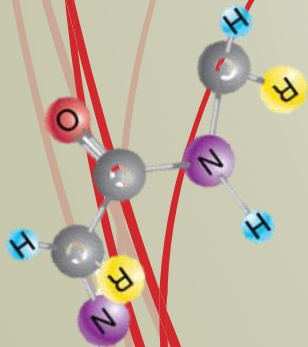
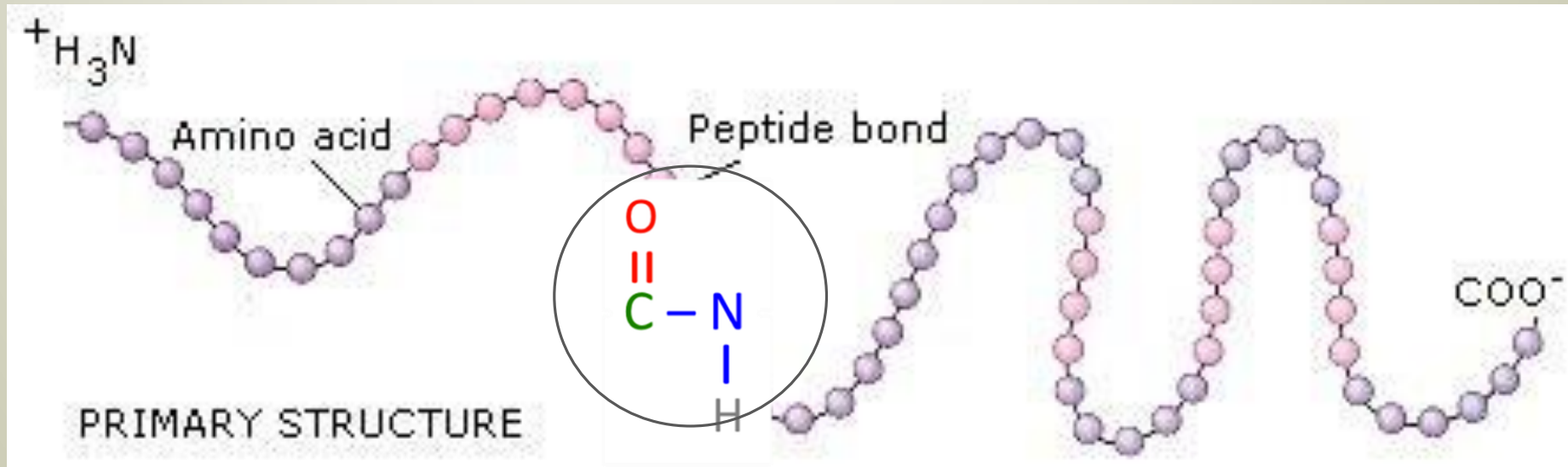
- Definition of proteins
- Importance of proteins
- Structure of proteins
- Protein denaturation



Definition of proteins

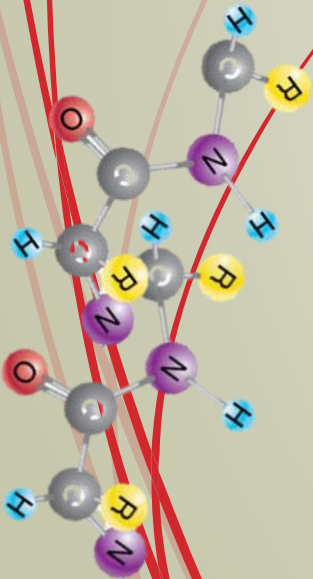
- Proteins are macromolecules, consisting of one or more long chains of amino acid residues .
- They are organic complex nitrogenous compounds of high molecular weight .

Amino acid is a type of organic acid that contains a carboxyl functional group (-COOH) and an amine functional group (-NH₂) as well as a side chain .



Types of amino acids

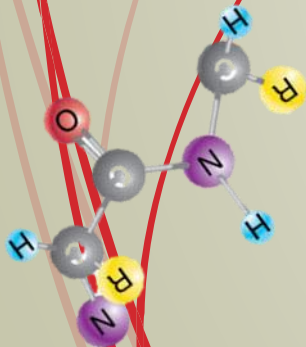
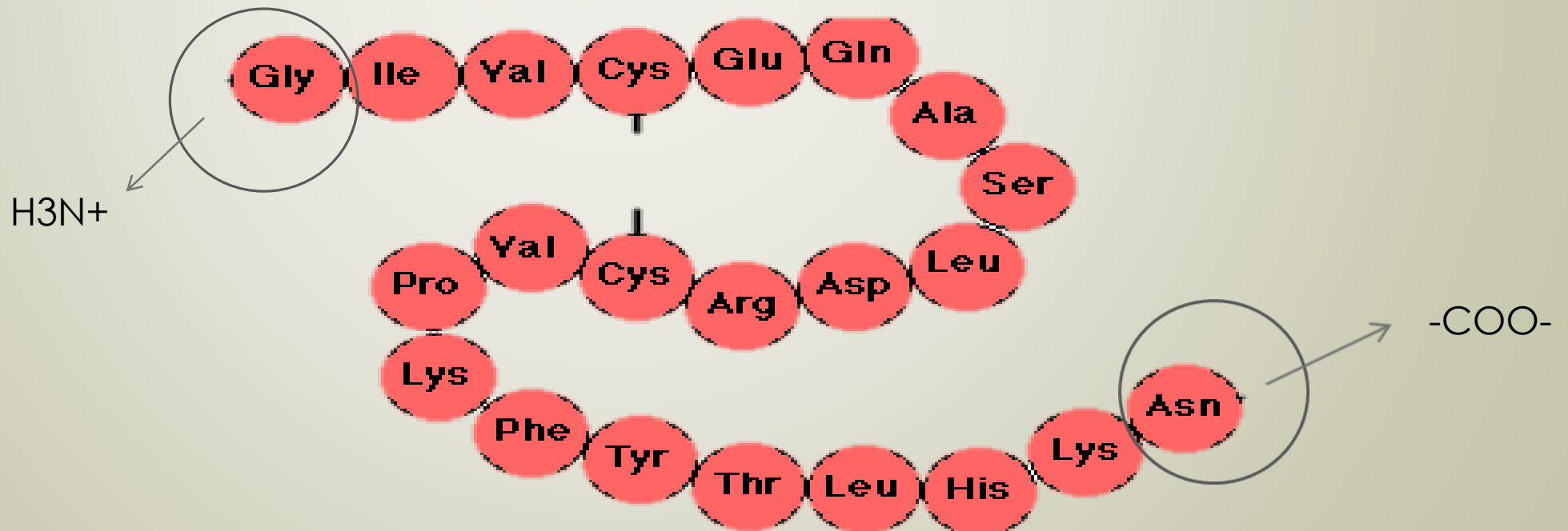
- **Essential amino acids**
- **Like** : isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.
- **Some essential amino acid**
- **Like** : Arginine and histidine
- **Non-essential amino acid**
- **Like** : Glycine, alanine, serine. Tyrosine, proline, hydroxyl proline, cysteine, aspartic acid and glutamic acid .



Different Structures of proteins

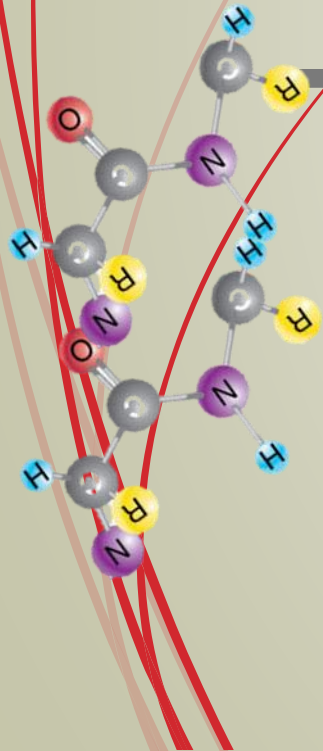
► Primary Structure :

- The primary structure of protein refers to the sequence of amino acids present in the polypeptide chain. Amino acids are covalently linked by peptide bonds.
- Structure of a protein starts from the amino-terminal(N) end and ends in the carboxyl-terminal(C) end.

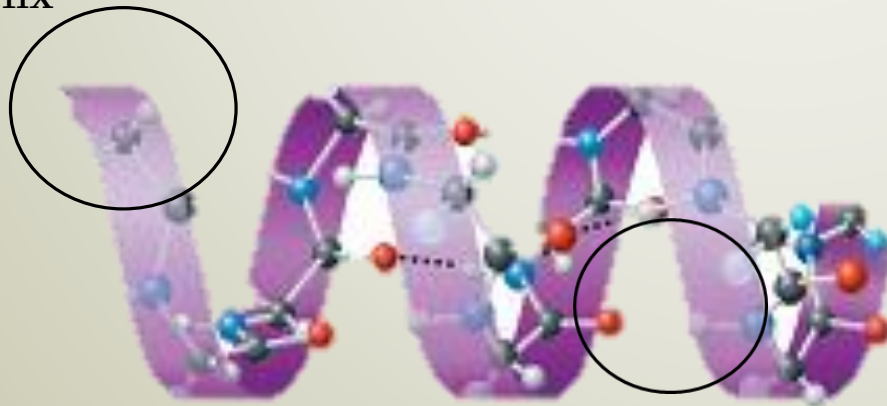


► Secondary structure :

- Localized arrangement of adjacent amino acids formed as the polypeptide chain folds
- Linus Pauling proposed some essential features of peptide units and polypeptide backbone.
- They are: The amide group is rigid and planar as a result of resonance. So rotation about C-N bond is not feasible.
- Rotation can take place only about N- Ca and Ca-C bonds

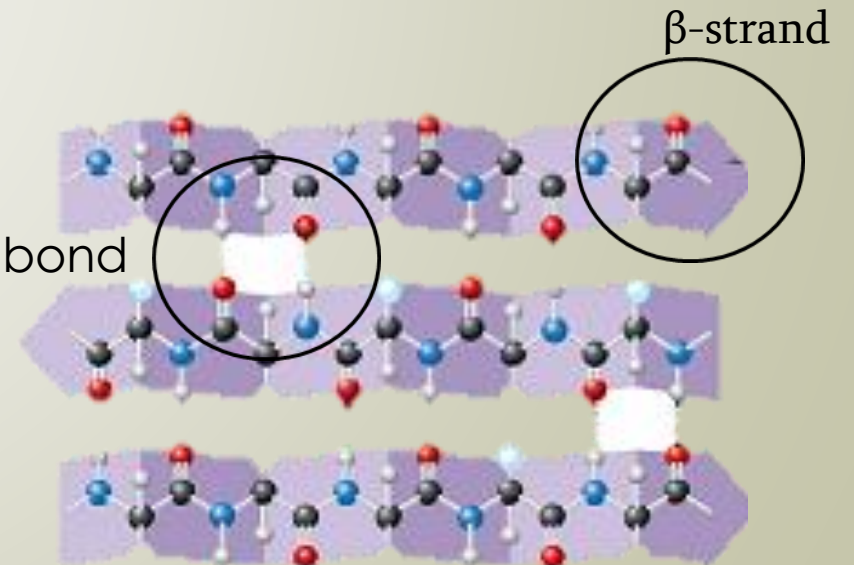


α -helix



Hydrogen bond

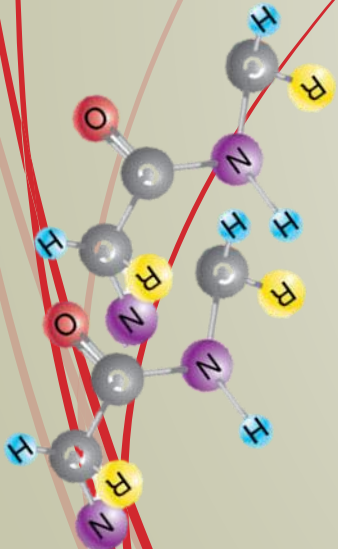
Hydrogen bond



β -strand

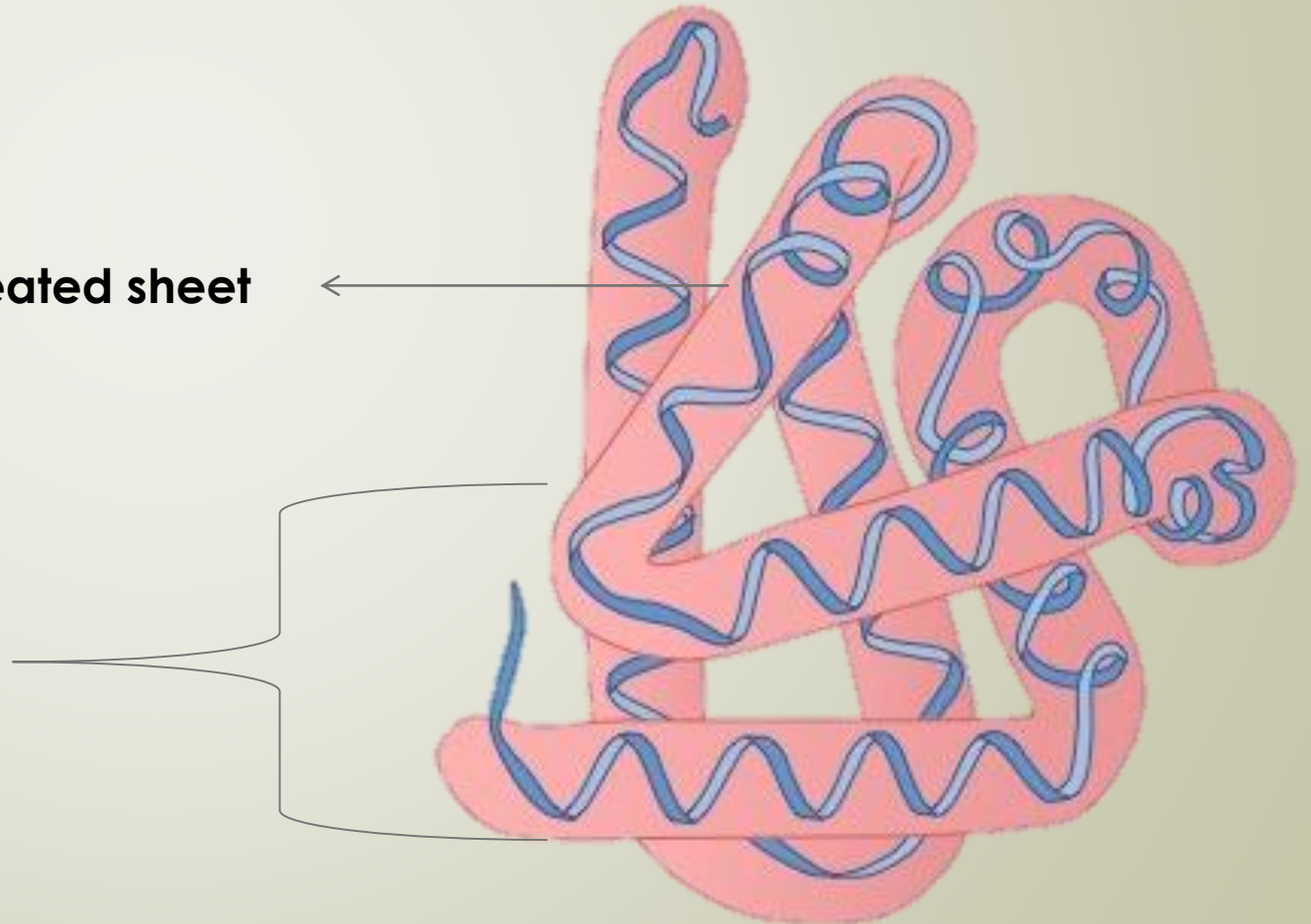
► Tertiary structure :

- Is three-Dimensional conformation .
- The function of protein depends on its tertiary structure .



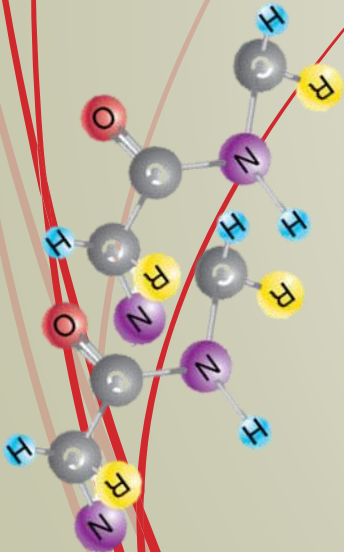
Alpha helix

Pleated sheet

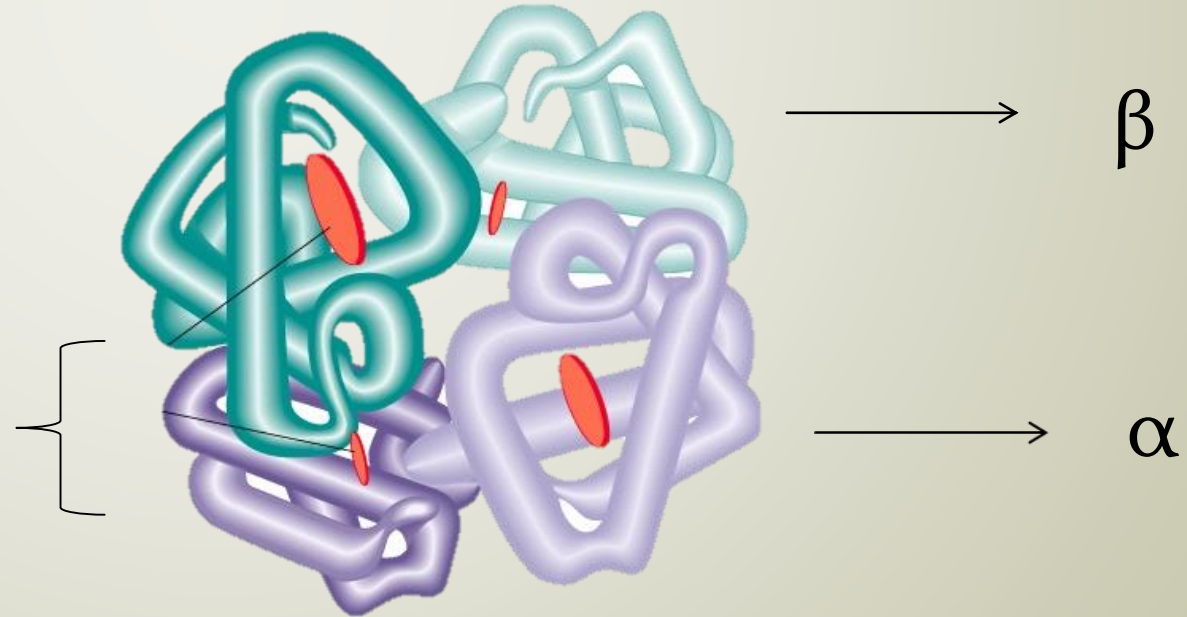


► Quaternary structure :

- The biological function of some molecules is determined by multiple polypeptide chains multimeric proteins.
- Arrangement of polypeptide sub unit is called quaternary structure.
- Sub units are held together by non Quaternary covalent interactions. Eg: globin.

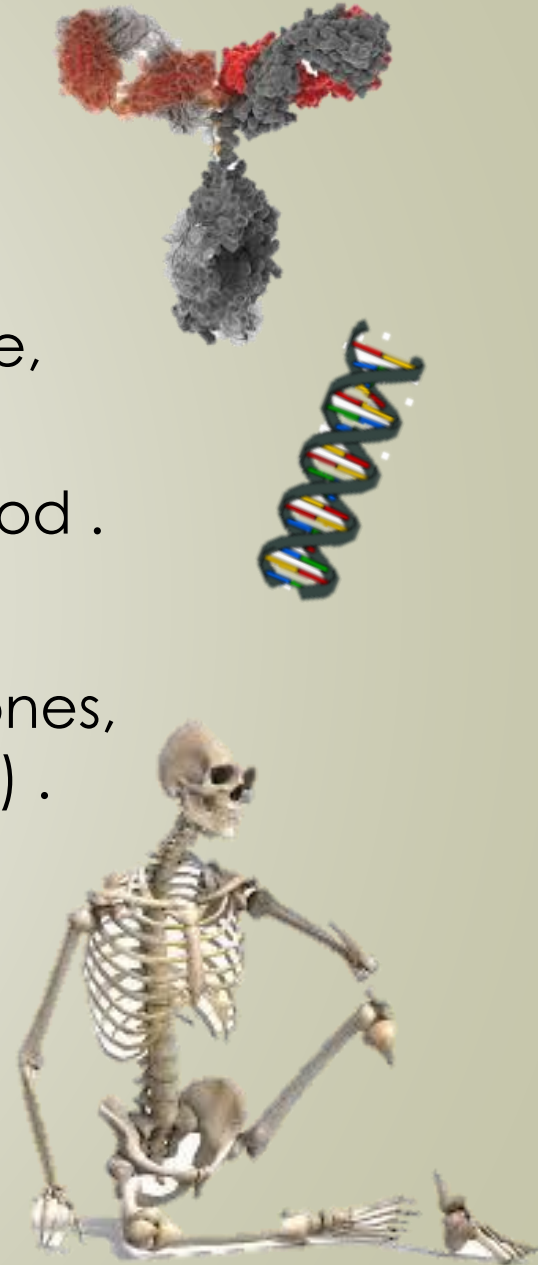
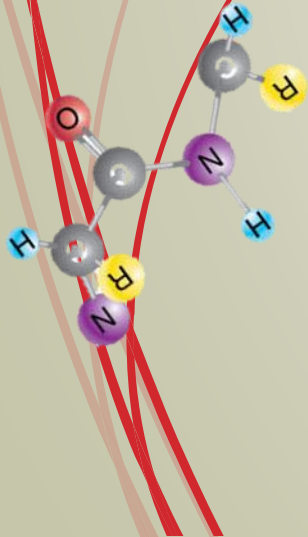


Heme group



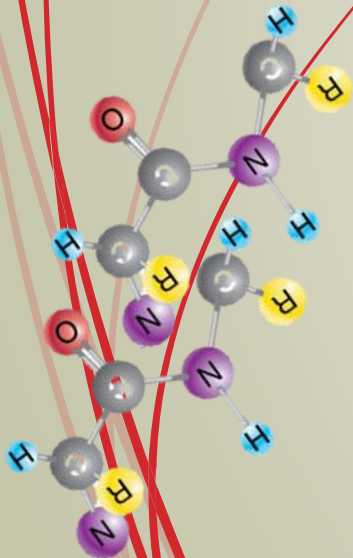
Importance of proteins

- Formation of enzymes and protein hormones.
- Formation of supporting structures in the body as bone, cartilage, skin, nails, hair and muscles
- They enter in the formation of buffer system of the blood .
- They enter in the formation of hemoglobin .
- They included in plasma proteins, which carry hormones, minerals and lipids (in the form of lipoprotein complex) .
- They are involved in the formation of antibodies(immunoglobulins) .

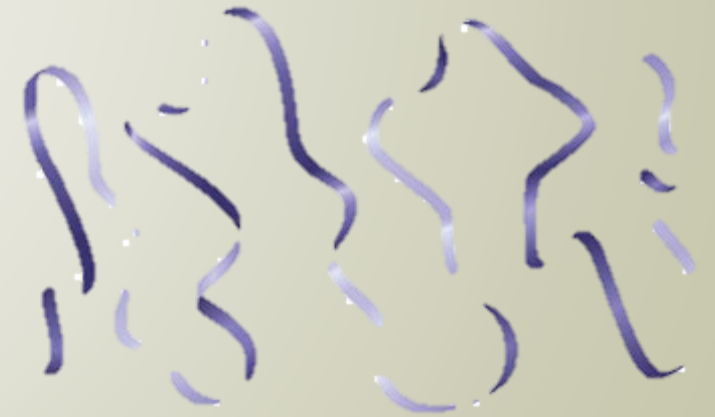


Protein denaturation

- It is the change in native state (physical, chemical and biological properties) of protein .
- Denaturation of proteins involves the disruption and possible destruction of both the secondary and tertiary structures .



Normal protein



Denaturation protein

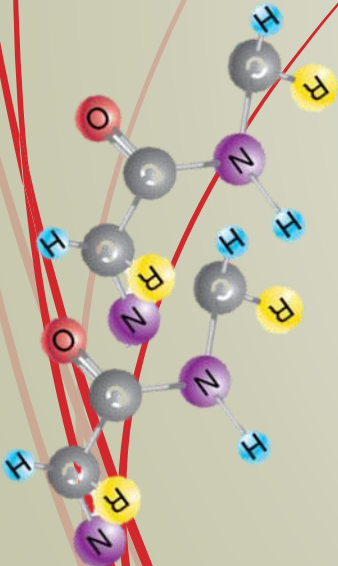


Question ??

Choose the **ONE** correct answer

A peptide bond :

- A. has a partial double-bond character .
- B. is ionized at physiologic pH .
- C. is cleaved by agents that denature proteins, such as organic solvents and high concentrations of urea .
- D. is stable to heating in strong acids .
- E. occurs most commonly in the cis configuration .

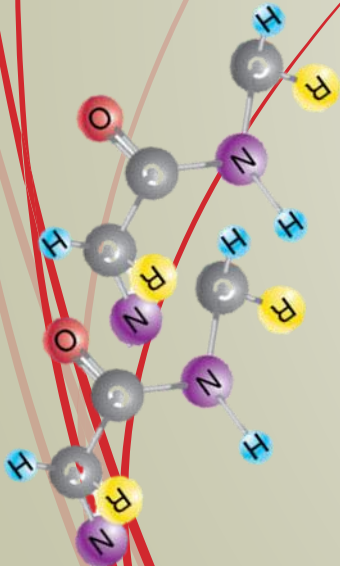


Question ??

Choose the ONE correct answer

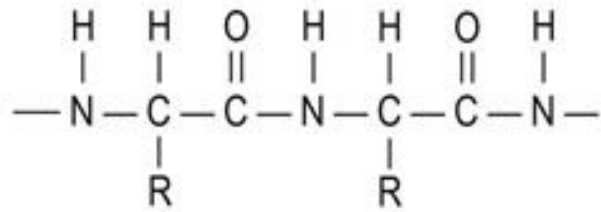
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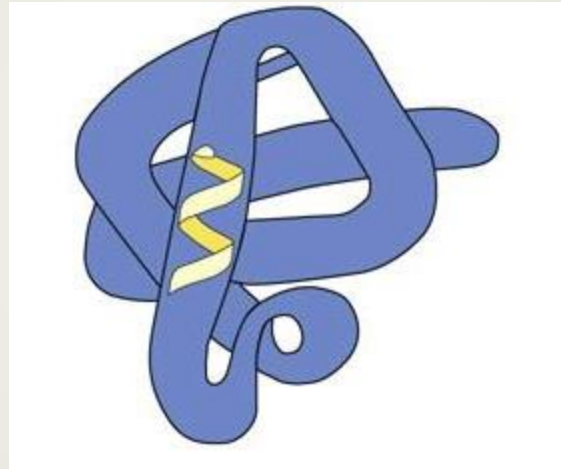


Which ONE is the secondary structure ?

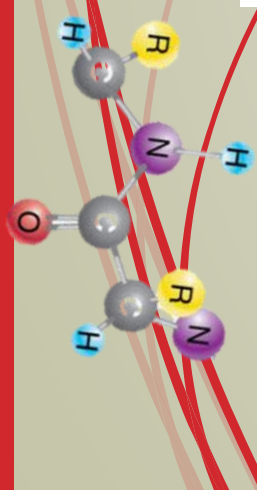
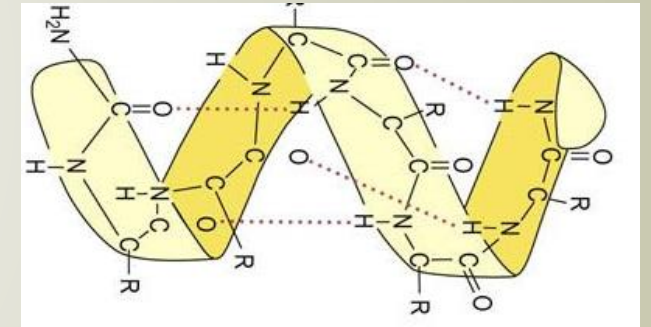
[A]



[B]

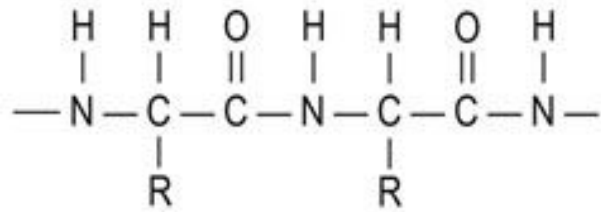


[C]

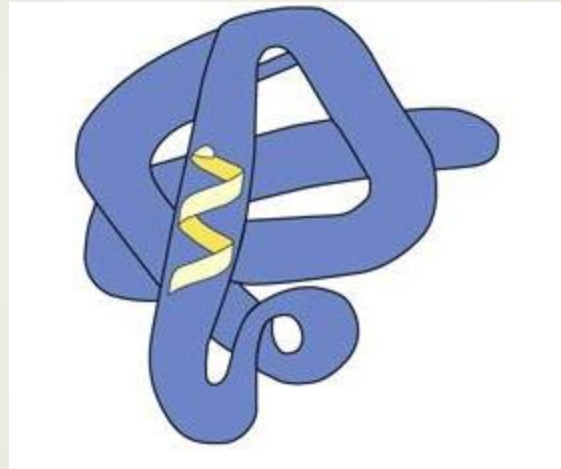


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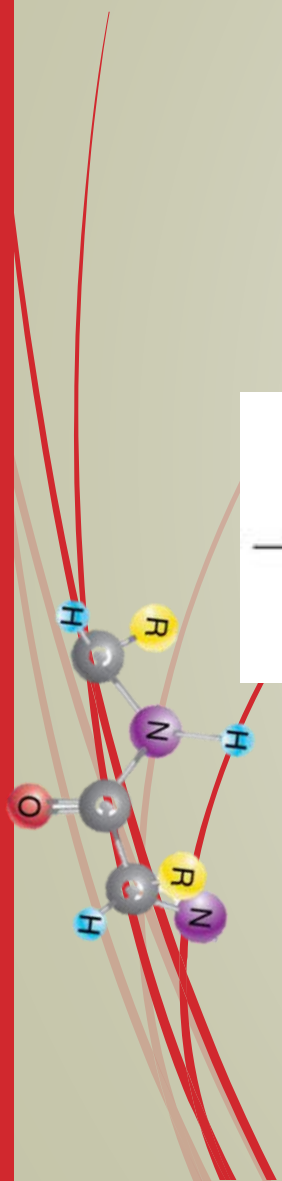
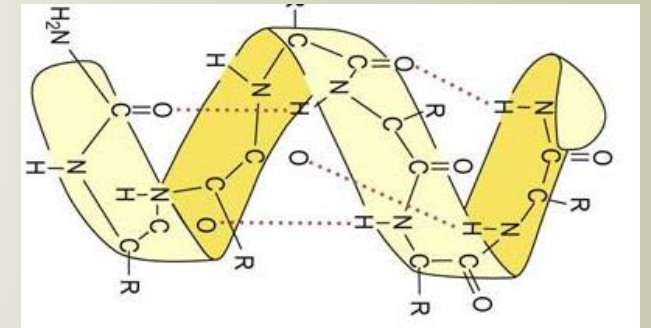
[A]



[B]



[C]



Reference

- ✓ Lippincott's Illustrated Biochemistry, R.A.HARVEY. 3rd Edition. P- 14-20. Chapter2 .
- ✓ <http://chemistry.elmhurst.edu/vchembook/568denaturation.html>
- ✓ [https://www.thoughtco.com/definition-of-amino-acid-605822 ..](https://www.thoughtco.com/definition-of-amino-acid-605822..)

