



## 4.7 – Amino Acids

### The nature of proteins

#### Primary structure

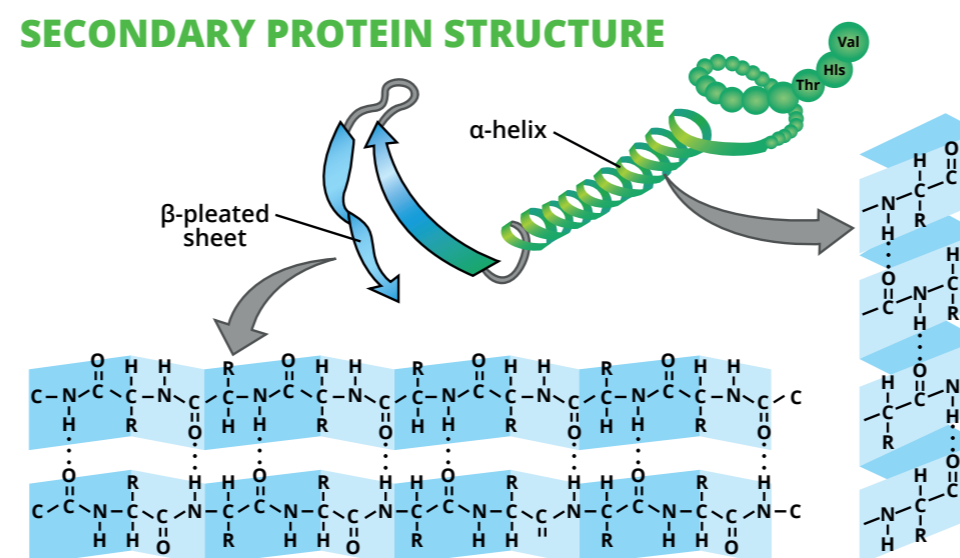
This is the sequence of amino acids in the chain. The sequence of the amino acids is very important. Even changing just one amino acid in a protein's sequence can affect the protein's overall structure and function.

#### Secondary structure

The secondary structure is concerned with how the amino acids are arranged. The two most common arrangements are an  $\alpha$ -helix and a  $\beta$ -pleated sheet.

In an  $\alpha$ -helix, the peptide is coiled into a spiral that is held in place by hydrogen bonds between the polar C=O and N-H bonds of different peptide bonds in the amino acid chain.

In a  $\beta$ -pleated sheet, the amino acids form a shape like a piece of paper stabilised by hydrogen bonds between amino acids in different polypeptide chains.



#### Tertiary structure

The tertiary structure refers to the protein as a whole and is the way in which the  $\alpha$ -coils and  $\beta$ -pleated sheets of the protein fold with respect to each other. Interactions which contribute to this structure include hydrogen bonds, disulfide ( $-S-S-$ ) bridges and salt bridges (ionic interactions between  $RCOO^-$  and  $RNH_3^+$ ).

#### Role of proteins

The functions of proteins are many. Proteins are an essential component of a healthy diet. Proteins are used in making rigid structures, e.g. collagen in cartilage and keratin in hair, nails and feathers. Enzymes are proteins; e.g. amylase is present in human saliva and it catalyses the hydrolysis of starch into sugars. Some proteins act as hormones, e.g. insulin.

About 150 enzymes have commercial uses, e.g. rennin in cheese making and protease in detergents to remove protein stains.