TA9 - Primary Structure

PRIMARY STRUCTURE

Two amino acids joined together make a **dipeptide**. Three, a **tripeptide**. The condensation reaction which causes this can be repeated so that more amino acids can add together in exactly the same way, forming a long chain called a **polypeptide**. This is a process of **polymerisation**, and can be visualised as a series of small condensations, giving a larger product.

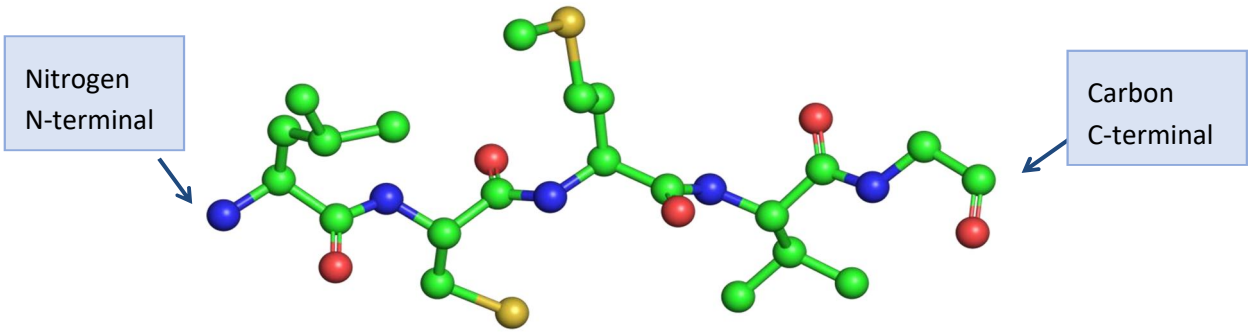
These polypeptides have a repeating unit backbone. Because each different amino acid has a different side chain, the only difference along a polypeptide chain is the series of side chains extending from it, as you can see below. They depend on the specific amino acid residues. For each protein, the order of amino acid residues is specific and different.

Primary structure: the sequence of amino acids in a polypeptide chain.

This is really important because the order of the amino acid residues determines how the protein eventually **folds** up on itself. This affects the protein's final shape and structure, and it is this which affects the protein's **function**. One single change to the amino acid sequence can completely change the ability of a protein to perform its function – that's how important it is!

For example, this could be the sequence in Protein LCMVG:
leucine – cysteine – methionine – valine – glycine
But imagine if glycine sneaked in before valine when the polypeptide was being made, then you'd have this Protein LCMGV: leucine – cysteine – methionine – glycine – valine

Even though there doesn't appear to be much of a difference, this is a different protein, and may have a very different function, as we will see later. Every organism has to be very careful that the right amino acid is in the right position when a protein is being made – this is a phenomenal task if you think about how many different amino acids there are in the body!



At the left-hand side of the protein chain, there will be an amino acid with a NH_2 group. In this example, it is leucine, and this is called the protein's **N-terminal**. At the other end of the protein chain is a C=O group, here it is glycine. This is known as the **C-terminal**.

3D representation of LCMVG. Notice that the amino acid units repeat, with R-group side chains extending from alternate sides of the polypeptide chain

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