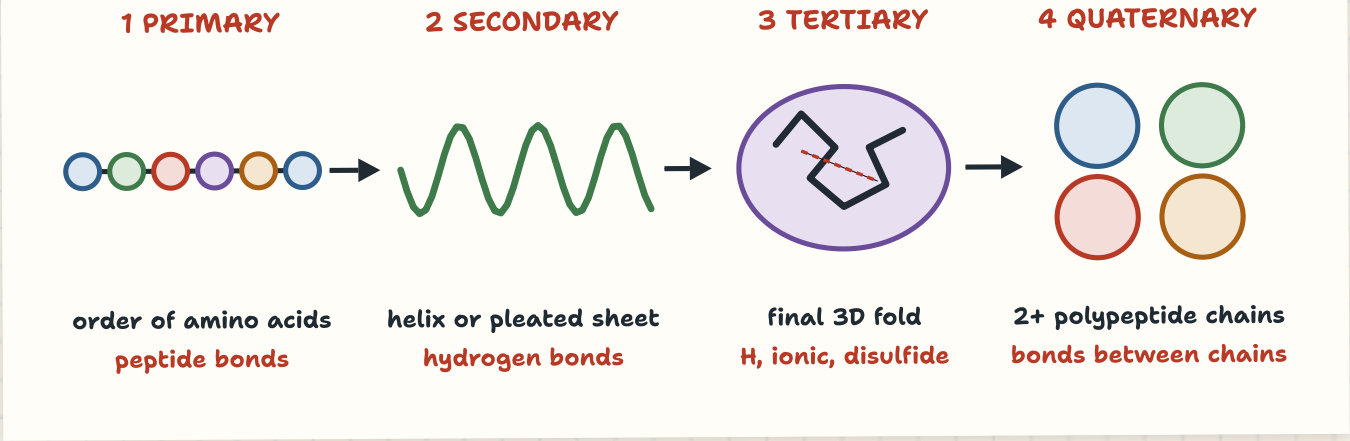
Protein Structure: Primary to Quaternary

Four levels of protein structure, from amino acid sequence to several chains.



Key terms

primary structure	the sequence of amino acids in a polypeptide chain.
secondary structure	parts of the chain twisting into an alpha helix or beta pleated sheet, held by hydrogen bonds.
tertiary structure	the whole polypeptide folded into its final three-dimensional shape; R groups bond with each other.
quaternary structure	more than one polypeptide chain arranged and held together, as in haemoglobin (four chains).
disulfide bridge	a covalent bond between the sulfur atoms in the R groups of two cysteine amino acids.
ionic bond	a bond between R groups with opposite charges; stronger than a hydrogen bond.

I can...

- [ ] Role of hydrogen bonds, ionic bonds and disulfide bridges in protein structure
- [ ] Relationship between primary, secondary, tertiary and quaternary structure and protein function
- [ ] A functional protein may contain one or more polypeptides

EXAM TRAP

Peptide bonds hold only the primary structure. Tertiary structure is held by hydrogen bonds, ionic bonds and disulfide bridges. Quaternary is not 'more than one amino acid'.

5 marks: what earns them

1. Primary structure is the sequence / order of amino acids in a polypeptide chain
   Not: the amino acids (no sequence); number of amino acids
2. Quaternary structure is more than one polypeptide chain (four in haemoglobin) joined / associated together
   Not: more than one amino acid; a long chain
3. A different amino acid has a different R group, so different hydrogen bonds, ionic bonds or disulfide bridges form (in different places)
   Not: peptide bonds change; the bonds break (no link to R group)
4. So the polypeptide folds differently / the tertiary structure (3D shape) changes
   Not: the shape changes (no link to the bonds)
5. So the protein can no longer carry out its function / the shape is not suitable for its job
   Not: the protein is destroyed

Remember

Sequence decides bonds.
Bonds decide shape.
Shape decides function.

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