

Proteins

Structure & Function

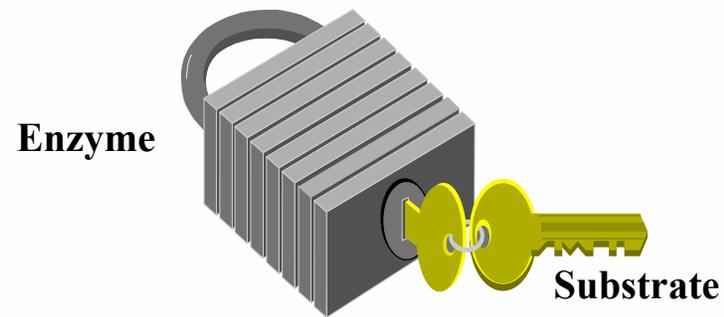
What are Proteins

- ♦ **Proteins** are complex molecules that composed of hundreds to thousands of **amino acids**
- ♦ Perform critical tasks of the body.
 - Regulate chemical reactions within the body.
 - Make up the physical structures of cells and tissues.
 - Coordinate communication between body tissues.



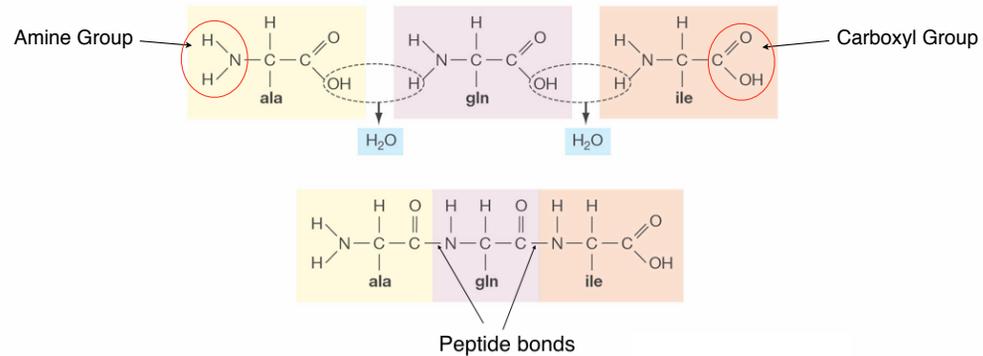
Protein Function

- ♦ A protein's **structure** determines its function, so changes in a protein's structure may also alter its function.



Polypeptides

- ♦ Amino acids are covalently bonded through dehydration synthesis to form polypeptides.



Primary Structure

- ♦ **Primary structure** is the specific order of amino acids that make up a protein.

...GTGCATCTGACTCCTGAGGAGAAG...
...CACGTAGACTGAGGACTCCTCTTC... DNA

TRANSCRIPTION

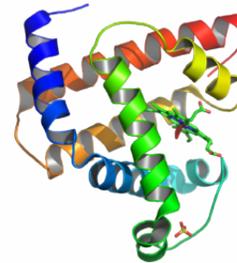
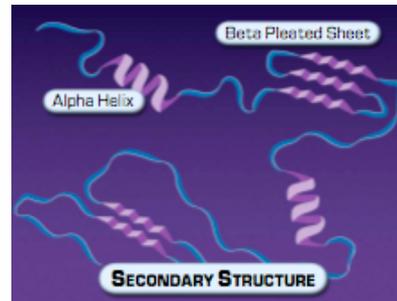
GUGCAUCUGACUCCUGAGGAG mRNA

TRANSLATION

Val His Leu Tyr Phe Gly Gly Polypeptide

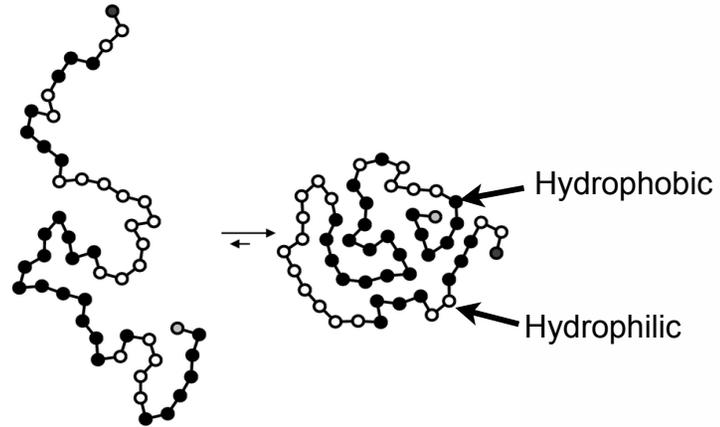
Secondary Structure

- ♦ **Secondary structure** is caused by hydrogen bonding within an amino acid strand creating folds, turns, and helices.



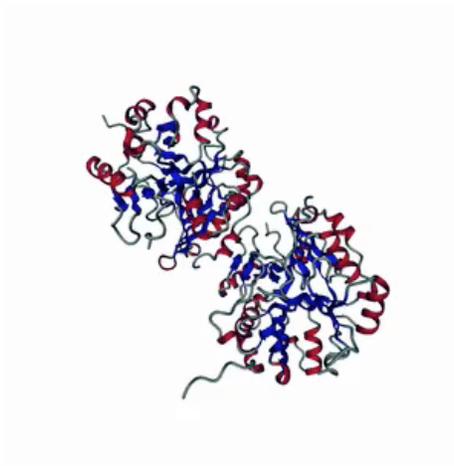
Tertiary Structure

- ♦ **Tertiary structure** is the unique 3D shape that is caused by the interactions between amino acids and their surroundings.

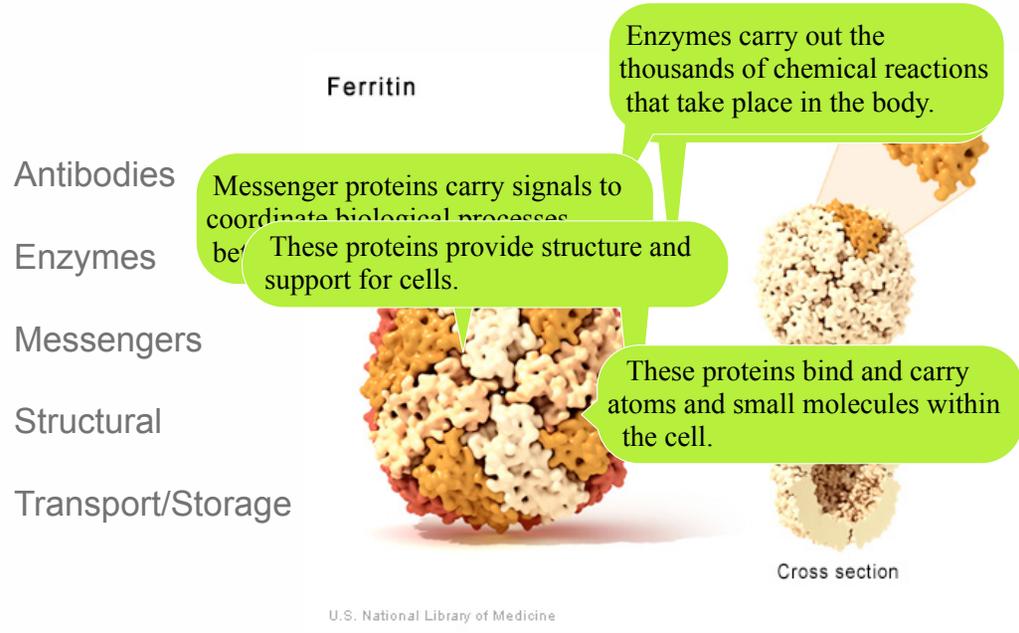


Quaternary Structure

- ♦ **Quaternary structure** is the combination of two or more polypeptide subunits into one protein.

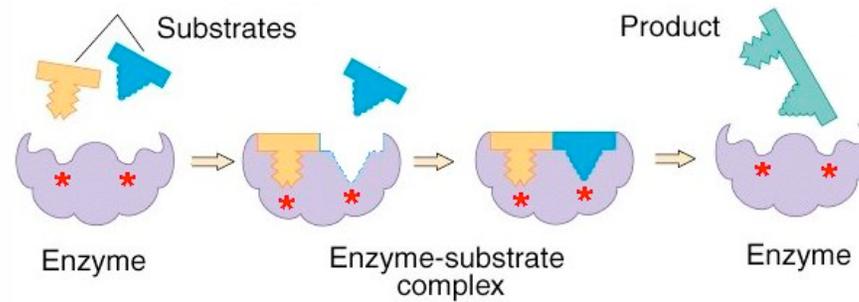


Protein Functions



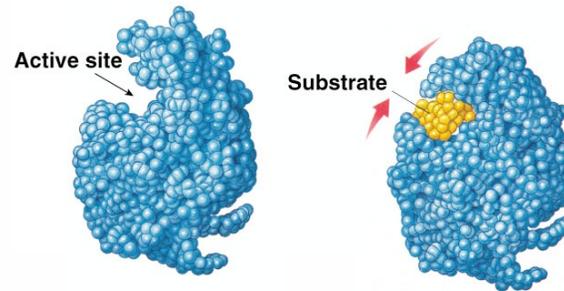
Enzymes

- ♦ An enzyme is a biological **catalyst** that increases the speed of chemical reactions.
- ♦ The **active site** on the enzyme is where reactants bind to be acted upon.
- ♦ The reactants are called the **substrate**.



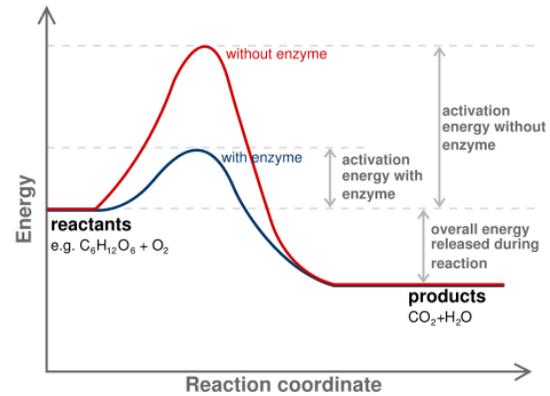
Induced Fit Model

- ◆ Induced fit model of enzyme action
 - 3D shape of enzyme matches substrate
 - substrate binding cause enzyme to change shape leading to a tighter fit
 - conformational change of protein
 - bring chemical groups in position to catalyze reaction

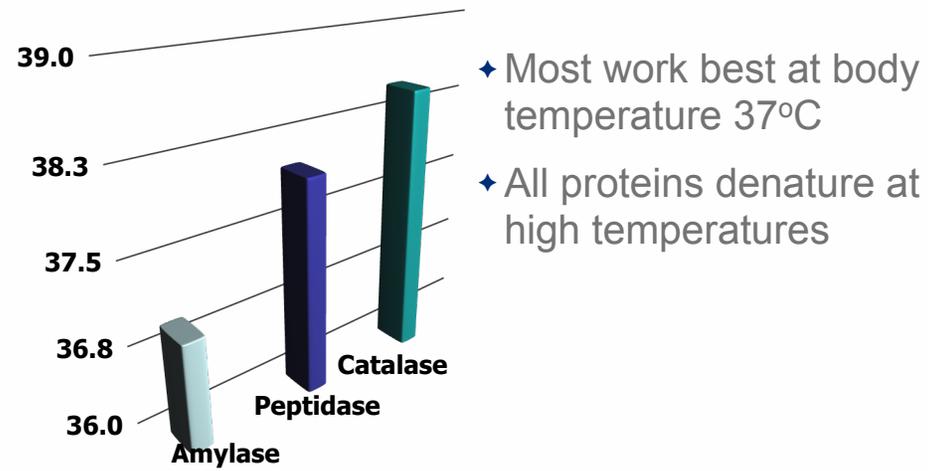


Activation Energy

- ♦ Enzymes work by reducing the amount of energy required for a reaction to occur.
- ♦ The energy needed for a reaction to occur is called the **activation energy**.



Enzymes and Temperature



Denaturing Proteins

- ♦pH
- ♦Salts
- ♦Detergents
- ♦Temperature

