



IIT Guwahati

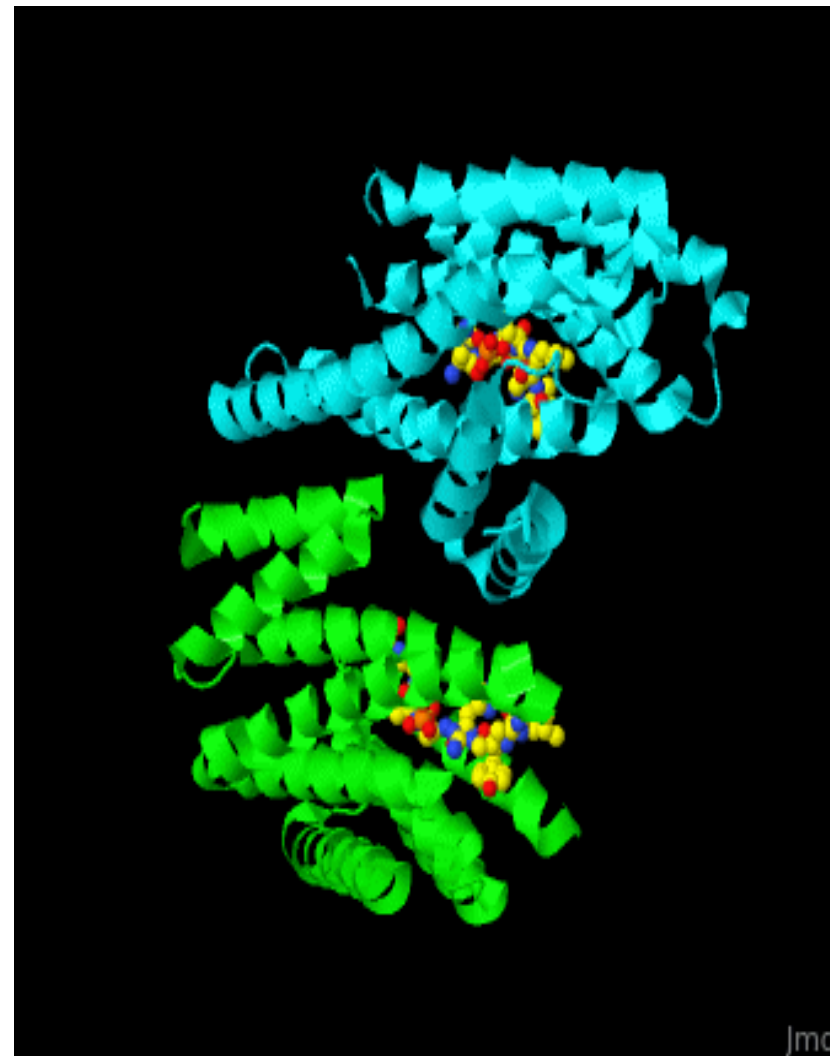
Lecture 17

Course BT 631

Protein Structure function and Crystallography

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Quaternary structure of Proteins

Proteins containing more than one polypeptide chains, exhibit an additional level of Structure organization. Each polypeptide chain is called a **subunit**.

The arrangement and the nature of their contacts define the Quaternary structure.

Subunits are held together by **weak non covalent interactions**.

Quaternary structure of a protein can have identical or non-identical subunits. e.g. Triose-phosphate isomerase is a homodimer.

Quaternary structure of Proteins

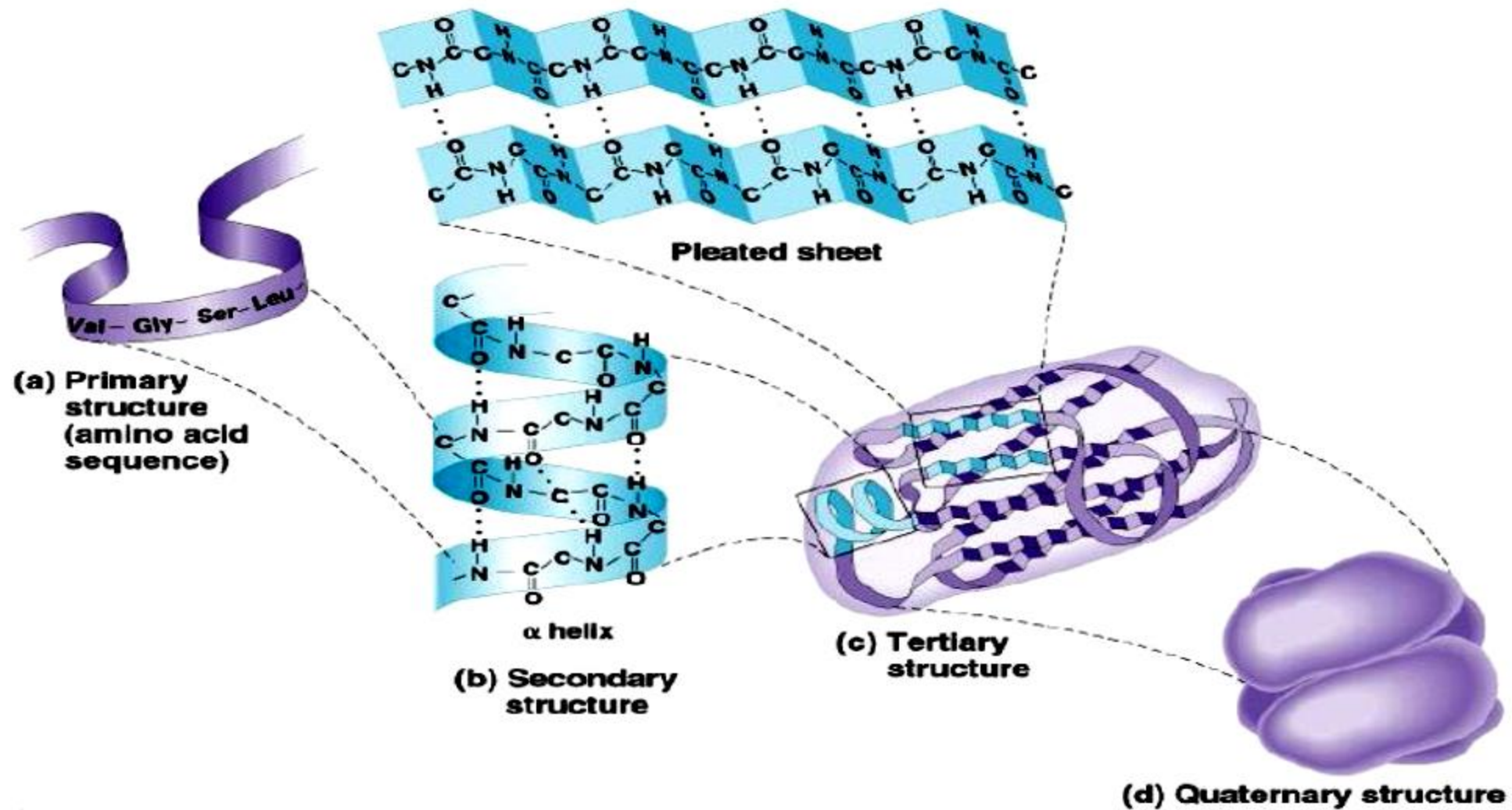
When the subunits are different (non-identical), each subunit tends to have a different function. A common way for describing such proteins is to use Greek letters for each type of subunit and subscript numeral to specify numbers of units. A protein designated $\alpha_2\beta\gamma$ consists of two α units and one each of β and γ .

Haemoglobin is a tetramer containing two different subunits called as α and β subunits normally written as $\alpha_2\beta_2$. Glutamate dehydrogenase is a homohexamer.

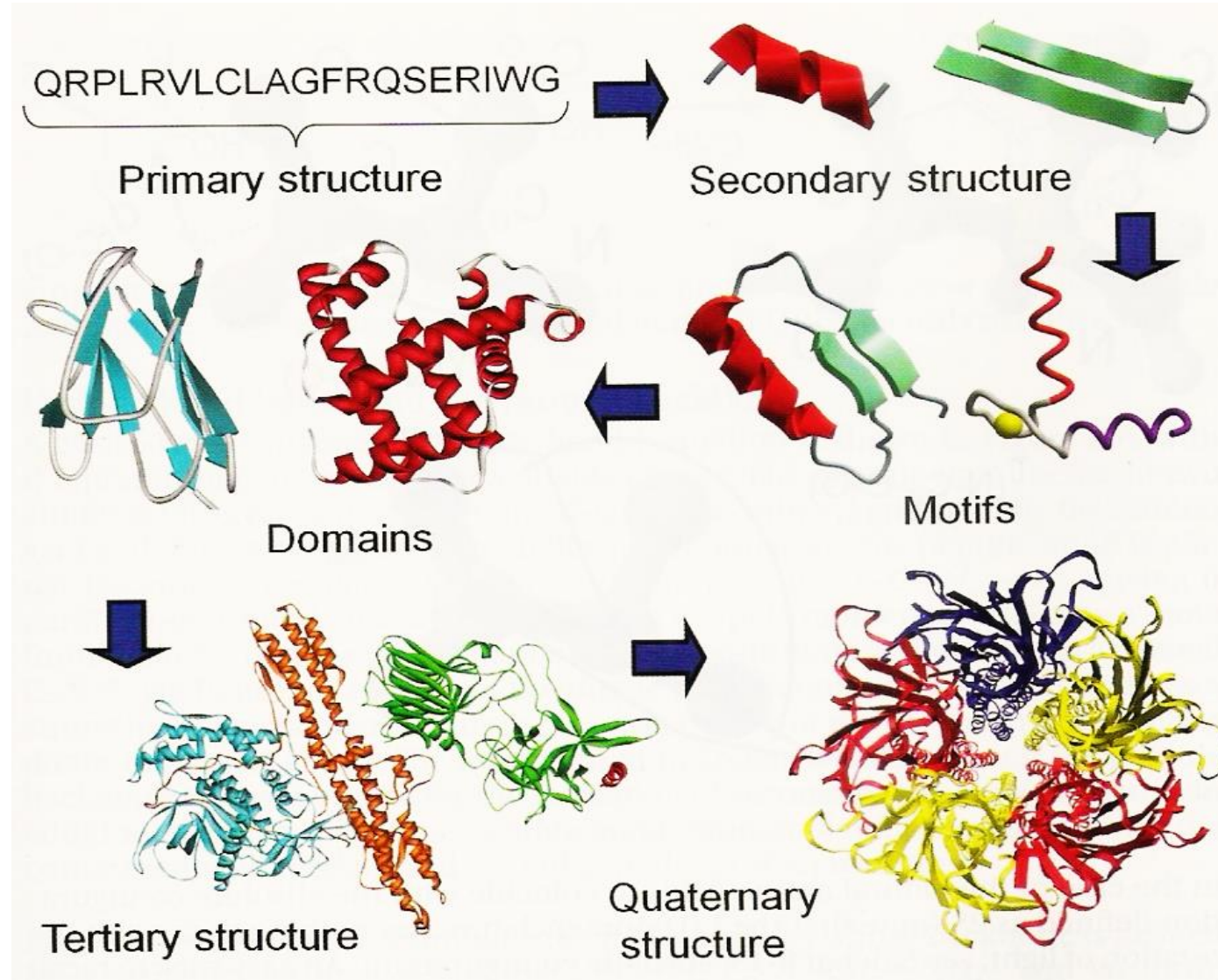
Quaternary structure shown by proteins allows the formation of catalytic or binding sites at the interface between subunits.

Oligomeric enzymes undergo conformational changes upon binding with ligands or substrates that cause regulation of biological activity, such enzymes are called allosteric enzymes. e.g. Phospho-fructokinase and Glutamate dehydrogenase.

Quaternary structure of Proteins



Quaternary structure of Proteins



Protein Structure Hierarchy

- Proteins and polypeptides are macromolecules assembled from 20 common L-amino acids.
- The sequence of amino acid constitutes the primary structure, the first level of organization or protein structure.
- Secondary structure elements are formed by distinct back bone interactions.
- The secondary structure elements are organized in small motifs and can form one or more independently folding domains.
- The arrangement of domains defines the tertiary structure.
- Several subunits can assemble together to give quaternary structure.

Protein Hierarchy

