

Chapter 4 - Protein Structure and Function

I. Introduction

A. Proteins

II. Shape & Structure of Proteins

A. Primary structure

1. aas
2. peptide bonds
3. ends
4. naming
 - a. peptide, polypeptides, protein
5. size
 - a. daltons - kDa

B. Secondary structure

1. α helix
2. β sheet
 - a. parallel
 - b. antiparallel
3. β turn
4. irregular structure
5. random coil

C. Tertiary structure

1. non-covalent bonds
2. hydrophobic interactions
3. disulfide bonds
4. broad categories

D. Quaternary structure

1. homomeric
2. heteromeric

III. Additional Structures

A. Structural motifs

1. coiled-coil
2. leucine rich repeats
3. helix-turn-helix
 - a. EF hand
 - b. basic helix-loop-helix
 - c. zinc finger

B. Domains

1. classes

C. Fundamental classes

D. Proteome

IV. Protein Folding

A. Planar peptide bonds

B. Directing protein folding

1. native state
2. denaturation

C. Chaperones

1. families
 - a. molecular chaperones
 - b. chaperonins

D. Alternative folding

V. How Proteins Work

A. Binding

1. ligand
2. binding site
3. specificity
4. affinity - K_d

B. Enzymes

1. background
2. substrates
3. active Site
4. example
 - a. serine proteases
5. cofactors
 - a. metals / ions
 - b. small organic cpds
 - 1) vitamins
 - c. altered and replaced
6. Common pathway association
 - a. protein machines

VI. How Proteins Are Controlled

A. Long term control

1. Synthesis
2. Degradation
3. Location
 - a. organelle
 - b. membrane
4. Proteolytic cleavage
 - a. zymogens

B. Short term control

1. Inhibitors
 - a. competitive
 - b. allosteric regulation
 - 1) allosteric binding site
 - a) feedback inhibition
2. Ca^{++} switching
 - a. switch proteins
3. GTPase switching
4. Phosphorylation
 - a. kinase
 - b. phosphatase