

## 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.  $\alpha$  helix
2.  $\beta$  sheet
  - a. parallel
  - b. antiparallel
3.  $\beta$  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. Introduction

### B. Non-covalent Mods.

1. allostery
  - a. allosteric binding site
    - 1) feedback inhibition
2.  $Ca^{++}$  switching
  - a. switch proteins
3. GTPase switching

### C. Covalent Mods.

1. phosphorylation
  - a. kinase
  - b. phosphatase
2. proteolytic cleavage
  - a. proteinase
  - b. zymogens