

## Chemistry

- pH – How pH can affect the charge on molecules
- Chirality – how to determine and how it may affect drug properties

## Molecular interactions:

- Electrostatic (charge-charge)
- van der Waals
- Hydrogen bonds

## Hydrophobic effect:

- Entropy of water
- Role in protein folding and membrane assembly

## Protein stability:

- **Importance of the following in stabilizing proteins**
  - van der Waals
  - H-bonds
  - Hydrophobic effect
  - Disorder of the chain
- How might mutations affect the stability of a protein

## Ligand Binding

- Stabilizing interactions (charges, van der Waals, H-bonds, hydrophobic effect)
- Binding curves,  $K_D$  as 1/2 way point in binding,  $\frac{1}{2}$  sites occupied.
- Lower  $K_D$  higher affinity, tighter binding

## Enzymes

- Rate increase by stabilization of the transition state
- Active site:
  - Residues that bind specific substrates
  - Residues that are responsible for chemical reactions

## Diseases due to inactive enzymes in metabolic pathways

- Build-up of intermediates prior to the step – often toxic

## Carbohydrates

- Lactose and lactose intolerance
- Glycogen, structure and biological function

## Lipids and Membranes

- Liposomes and drug delivery
- Cholesterol
- Regulation
  - Effect of mutations in the LDL receptor on regulation

## DNA

- Overall structure
  - Double stranded
  - Anti-parallel
  - Basepairing: A-T, G-C
- Translation from DNA to protein sequence – use of codon table (provided)