Session 8

Unit 2

09/29

- Define Allostery
  The binding of a ligand to a protein that causes an effect at a spatially distinct site on the same protein.

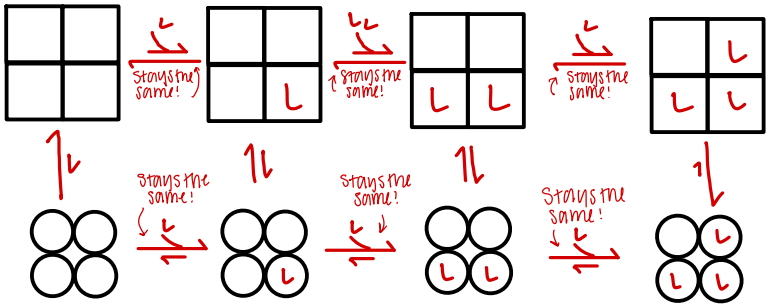
- Define ligand
  A molecule that binds to a specific site on a larger molecule. The ligand is what causes conformational change!

- Define binding site and active site
  Active site: imply enzymatic activity or chemical change. This is the spatially distinct site that is effected when a ligand binds.
  Binding site: site where a ligand binds to a protein or enzyme. There is NO chemical change present at this site.

- What are the general traits of allosteric interactions?
  1. Protein must at LEAST be a dimer
  2. Each subunit must be identical
  3. All subunits must exist in two conformations... R (relaxed) or T (Taut)

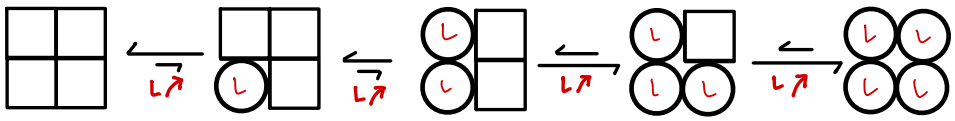
- What are the concerted/symmetrical assumptions?
  1. All subunits must be either R or T confirmation
  2. Ligand binds to R with HIGH affinity and Ligand binds to T with LOW affinity.
  3. The binding of the ligand shifts the equilibrium towards the R confirmation

- Draw the concerted model



- What are the Sequential model assumptions?
  1. Each subunit can exist in either R or T confirmation.
  2. Binding of ligand to a subunit in T confirmation changes ONLY that subunit to R confirmation
  3. Binding of a ligand increases the affinity of other subunits for the binding of that ligand.

- Draw the sequential model



- What are the subunits and quantities of hemoglobin?

  $\alpha_2\beta_2$

  alpha = 2, beta = 2 } so essentially $\alpha = \beta$

- Where does oxygen bind to hemoglobin?

  Interacts with the iron within the heme group

  Four oxygen molecules can bind to each hemoglobin (this is because of the four subunits). Each subunit has a heme group.

- What are the two confirmations (T and R) for the allosteric interaction of the heme group (Hb)?

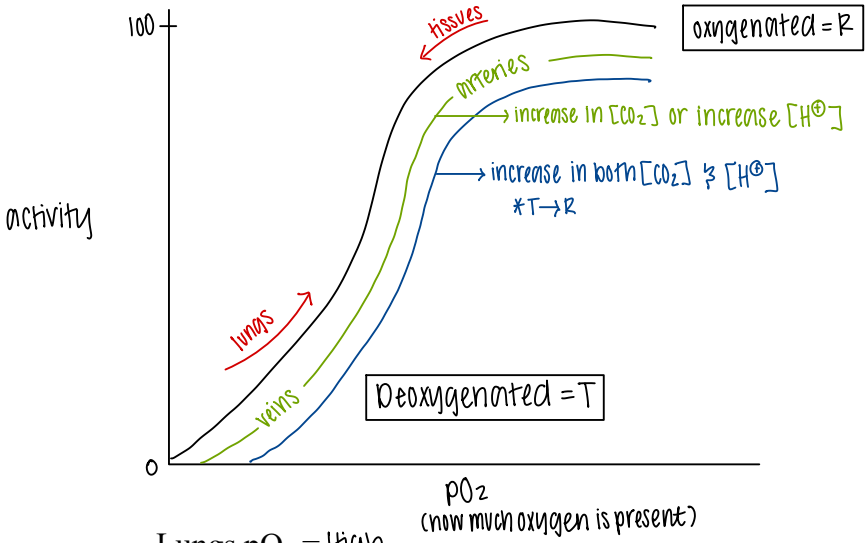
  R = Oxygenated

  T = Deoxygenated

- Name all of the ligands that the heme group of hemoglobin can bind with.

  Oxygen (O_2), H^+, and CO_2

- Draw the sigmoid curve with the graph. Label arteries, veins, lungs, tissue, and draw the new curves representing addition of CO_2 and H^+ concentrations.



Lungs pO_2 = High

Tissue pO_2 = low

*oxygen is binding in the lungs but dissociating in tissues

- How does the allosteric interaction of Hb and oxygen work with the sequential and concerted models?
  Sequential = seen in lab/its slower (stepwise)
  Concerted = actually happening in the body/happening much faster (occurring almost all at once)

- What does R to T shift represent?
  Decrease in concentration of oxygen

- What does T to R shift represent?
  Oxygen is binding and increasing in concentration. Affinity is increasing.