

Lecture 27

Saturday, July 17, 2021 07:15

Enzymes: The foundation of Cell Signaling

- Enzymes --> your metabolism
 - Enzymes: Primary Players in Metabolism and Cell Signaling Cascades
1. Metabolism is the sum of your chemical reactions
 2. Those reactions are catalyzed by enzymes
 - Endorphins are opiates that you produce "endogenously" (inside your insides as opposed to eating it)
 - o Mostly in the pituitary gland - though immune cells can make them too
 - Enzymes have an active site
 - o Substrate/reactant will bind to the active site
 - Enzymes are like sockets
 - o There's a specific socket for every specific plug
 - When they bind (creating that enzyme-and-substrate complex) there are a variety of different consequences
 - o And each consequence has a unique effect on your metabolism
- 1) Allosteric control (alternative binding site)
 - a. Allosteric activation = positive modulation
 - b. Allosteric deactivation = negative modulation
 - 2) Competitive inhibition
 - a. Inhibitor and substrate both going for same spot in an enzyme
 - 3) Noncompetitive inhibition
 - a. Binds to an allosteric site BUT there is no change in substrate affinity
 - b. No preference regarding binding state
 - c. Will change actual effect of what's happening at the active site
 - d. Can bind both inhibitor and substrate at the same time
 - 4) Uncompetitive inhibition
 - a. "potentiated" by the substrate; only binds to the enzyme *after* the enzyme has bound to the substrate
 - 5) Mixed inhibition

- a. Pretty much the same thing as noncompetitive except the inhibitor does have a preference of whether the enzyme is free or complexed
 - i. [Complexed meaning substrate has bound to enzyme?]
- 6) Suicide inhibition (violent version of competitive inhibition; irreversible)
 - a. The inhibitors are substrates that are derived from the enzyme's normal substrate
 - b. When the enzyme initiates catalysis (after binding to the inhibitor) that inhibitor gets modified in a way that irreversibly inhibits the enzyme
- 7) Accumulation of product
 - a. [I don't know]
- 8) Phosphorylation toggling active/inactive forms
 - a. [don't know either]
 - Glycogen synthase
 - Glycogen phosphorylase
 - o Has an active form and an inactive form
 - o Phosphorylate it and it turns on (its phosphorylation is induced by phosphorylase kinase)
 - o Glycogen synthase and it turns off
 - Phosphorylation activates glycogen phosphorylase
 - Phosphorylation deactivates glycogen synthase
 - Turn on protein kinase-A and will mobilize carbohydrates because of phosphorylation states