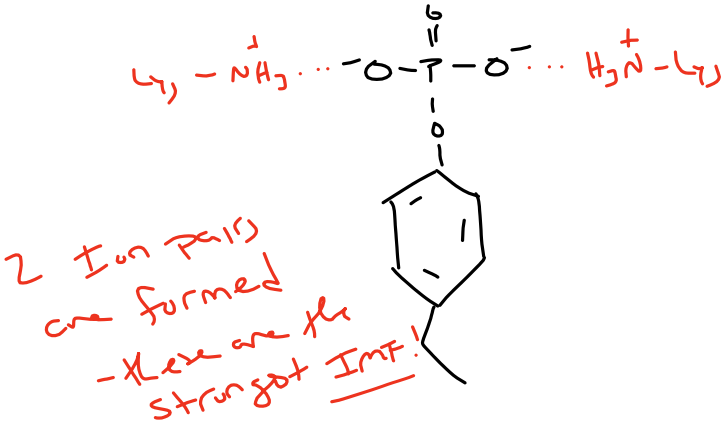
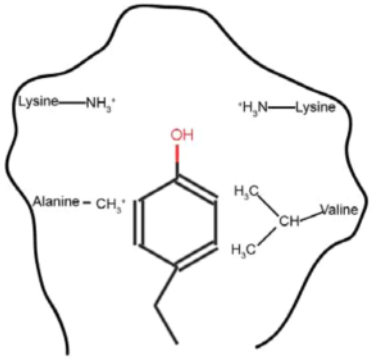
InsulinSignalingKey

Wednesday, March 29, 2017 1:48 PM

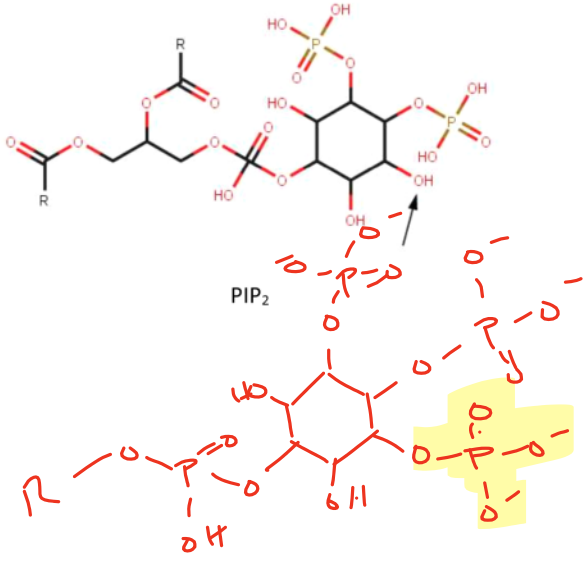
Insulin and Glucagon Signaling.

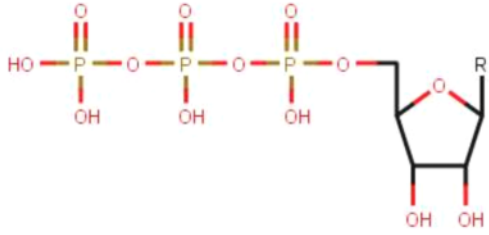
1. The cellular response to insulin is based on enzymes being able to recognize the difference between tyrosine and a tyrosine that is modified with a phosphate group. Below is an image of tyrosine interacting with the active site of Kinase A. Explain why the modified tyrosine will interact with this enzyme more favorably.





2. PI-3K is responsible for phosphorylating the 3 position of inositol rings. Below are the two substrates (PIP_2 and ATP). ADP is one product – predict the other (PIP_3). The arrow indicates the 3 position of the inositol ring.



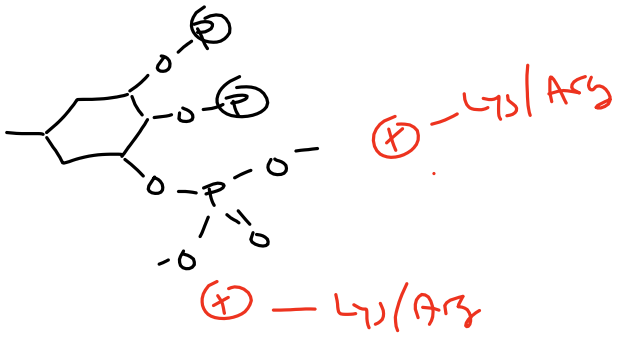


3. If an enzyme is able to recognize PIP2 but not PIP3, which molecule would have a lower Km for that enzyme?

higher affinity

PIP2 is recognized, so it binds more tightly

4. Many enzymes are able to recognize PIP_3 but not PIP_2. Sketch the active site on an enzyme that will bind to PIP_3 but not PIP_2. Clearly explain why PIP_2 will not bind favorably.



same idea as above... Two pair with the new phosphate

5. One of the cellular responses to insulin is an increased uptake of glucose. Glucose transporters work according to a concentration gradient (flow from high concentration to low concentration) and cannot prevent glucose from flowing out of the cell. The cell battles this by immediately converting glucose to glucose-6-phosphate upon entry to the cell. Propose two reasons why glucose 6 phosphate cannot leave the cell through a glucose transporter but glucose can. You are encouraged to use sketches to support your answer.

- Too big
- charged

6. Using any combination of text and sketch, explain how glucagon or epinephrine can result in the release of cAMP.