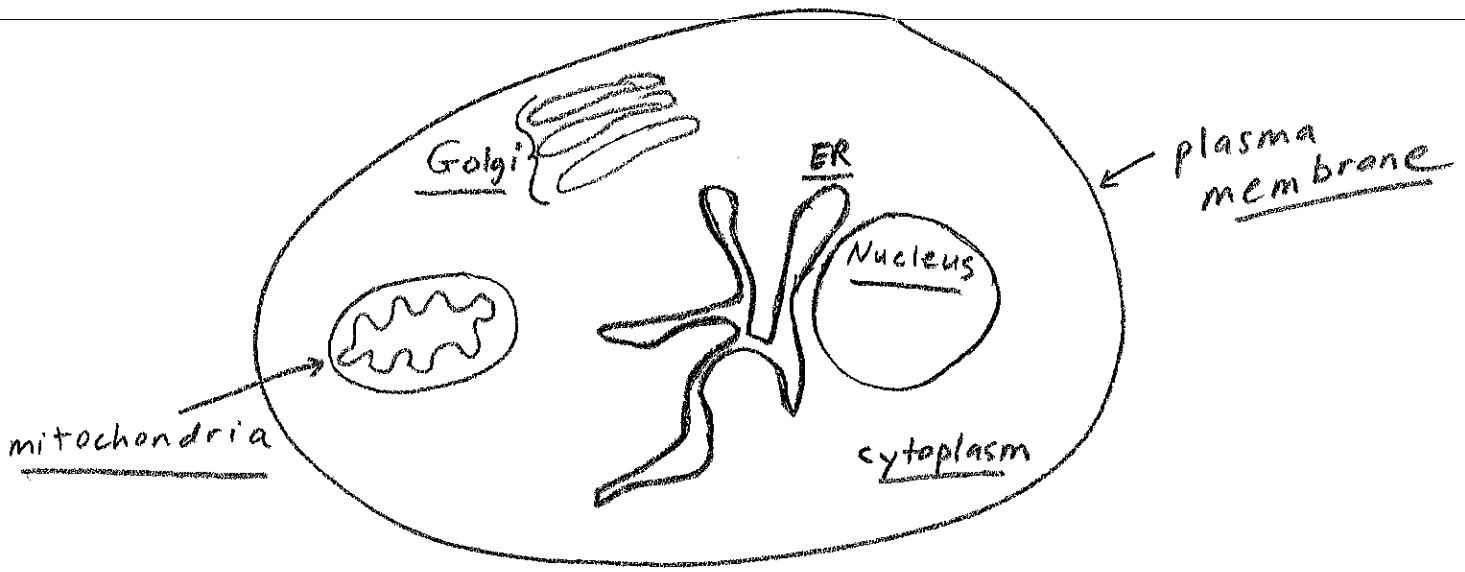
BIOSC 1820
Metabolic Pathways and Regulation
Spring, 2010
Prof. Jeffrey L. Brodsky
Quiz #2
February 10, 2010

NAME: _____

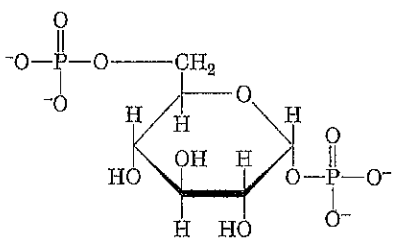
1. Place the following letters, corresponding to each enzyme name, within the correct subcellular compartment or membrane in the following cartoon of a cell:

A. glucose-6-phosphatase in a liver cell
B. glucokinase in a liver cell when high levels of fructose-6-phosphate are present
C. A G-protein coupled receptor
D. Phosphofructokinase-1



2. The following molecule is an intermediate in the reaction catalyzed by which enzyme?

_____



3. The generation of _____

from _____

provides the favorable energy to drive the covalent attachment of UDP onto glucose during glycogen synthesis.

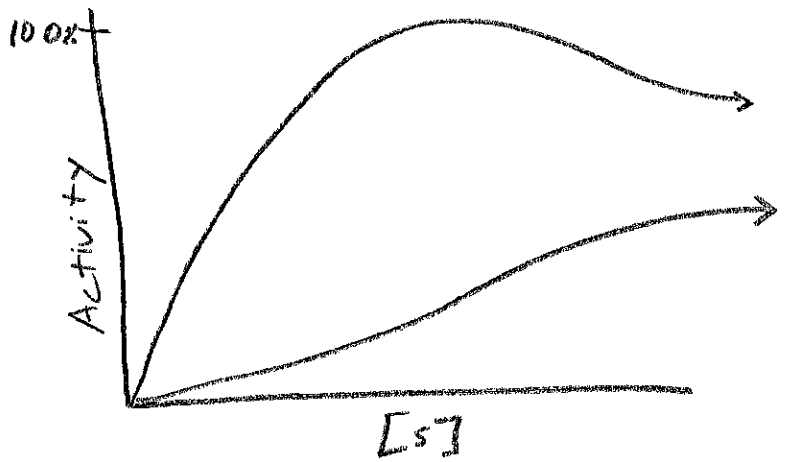
4. What would be the effect on blood sugar levels if you expressed a form of phosphofructokinase-2/fructose-2,6-bisphosphatase that could not be phosphorylated? Why?

5. Place the following molecules/enzymes in the correct order in the glucagon response pathway (write the letters, in order, on the line below):

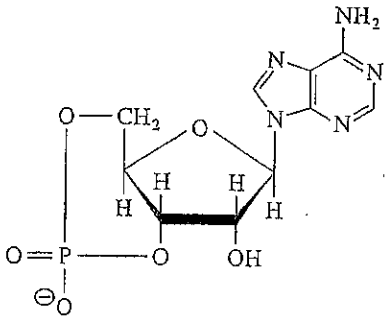
A. the cAMP-dependent protein kinase
B. glycogen phosphorylase
C. adenylate cyclase
D. debranching enzyme

_____

6. The following curves show the activity-substrate relationship for fructose 1,6-bisphosphatase. Label the curves that represent the relationship in (A) the presence of fructose-2,6-bisphosphate and (B) the absence of fructose-2,6-bisphosphate



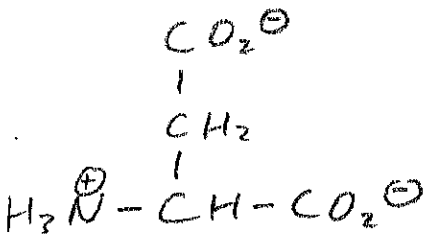
7. Which enzyme catalyzes the breakdown of the following molecule?



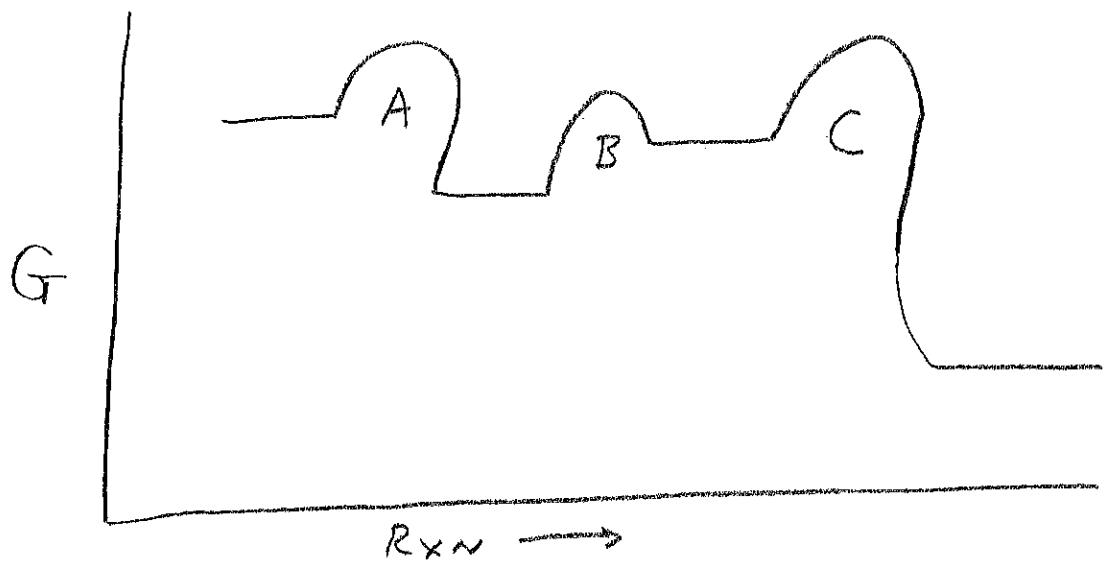
8. An increase in cytoplasmic calcium acts on each of the following EXCEPT:

A. protein kinase C
B. calmodulin kinase
C. $InsP_3$ release from the ER
D. phosphorylase kinase
E. None of the above; they are all acted on by calcium

9. Draw the structure and write the name of the product of the following reaction:



10. Assume that the following diagram represents the free energy change for a multi-step metabolic pathway. Which step(s) might be most prone to regulation?



11. At first, it seems odd that insulin favors glycolysis in the liver since the role of insulin is usually thought to be required to aid in the storage of metabolites; in fact, as we learned, insulin inhibits glycogen breakdown by activating protein phosphatase-1. So, why is it necessary that insulin activates glycolysis?

Recitation

12. What is the name of the promoter that was used to control the expression of the insulin analogue, and why was this promoter chosen?

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