Name: _____

Biological Sciences 4087
Final Exam
12/8/2011

Total: 150 points + 5 bonus There are 6 pages and 16 questions on this exam. **Write out complete names; do not abbreviate. Include units.**

1.(24pts) The following quotations are from *Cell* 137 635 (09). Define the term in **bold**. FOLLOW THE DIRECTIONS IN ALLCAPS.

A. "…is widely used as a first line treatment for patients with **type 2 diabetes mellitus**."-

B. "CBP…also interacts with… **TATA box** binding protein…"-

C. "Equal total amounts of plasmid or **RNAi** were deployed."-

D. "Immunoprecipitation and **Immunoblot**"-

E. "The **expression vectors**…were as described previously."-

F. "However, the **O-glycosylation** of TORC2…makes it unable to be phosphorylated"DEFINE O-GLYCOSYLATION AND NAME THE O-GLYCOSYLATED AMINO ACID-

.

2.(10pts) The following questions relate to the paper for the take home problem set.

A. In the take home paper, the authors constructed a mutant S436A CBP.

S is _____

A is _____

B. Why did they use the S436A mutant CBP?

C. Name one pharmaceutical (NOT INSULIN) that is used to treat type 2 diabetes and describe its molecular mechanism of action (that is, what does the drug bind to or inhibit?)

3.(4pts) A. If pH = 7, $[H^+]$ = _____

B. Name an amino acid, the side chain of which can form a hydrogen bond.

_____

4.(4pts) A. A Ni-NTA column can be used to purify a protein tagged with _____.

B. A technique for separating proteins (in a denatured state) based on the molecular weight of their subunits is

_____

5.(4pts) A. The interaction between subunits of hemoglobin is called

_____ structure.

B. Binding of O_2 converts hemoglobin to the _____ state.

6.(4pts) A. An enzyme catalyzes its reaction by stabilizing _____.

B. A competitive inhibitor will cause an increase in the measured (CIRCLE ONE):

K_m V_{max}

7.(18pts) Identify the following structures. **Write out the complete name of each.**

A. _____

B. _____

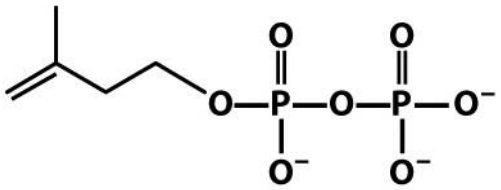
C. _____

D. _____

E. _____

F. _____

A.



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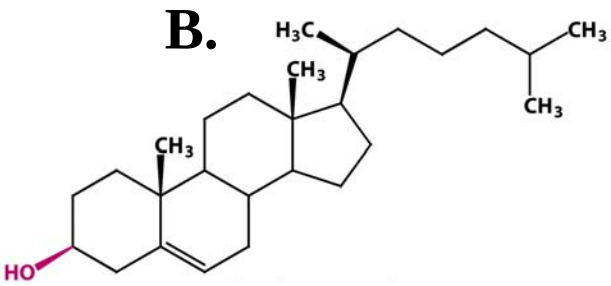

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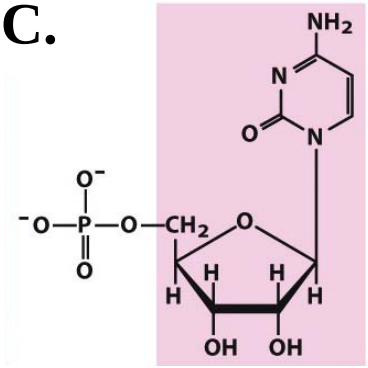

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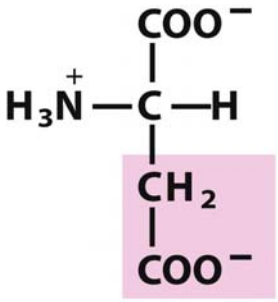

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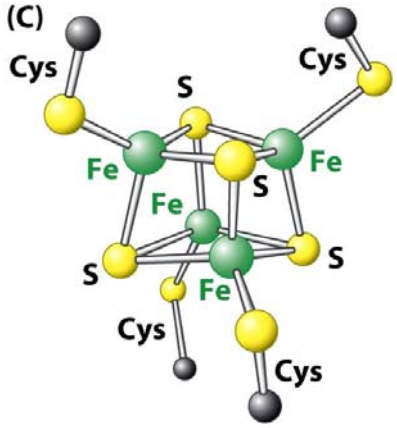

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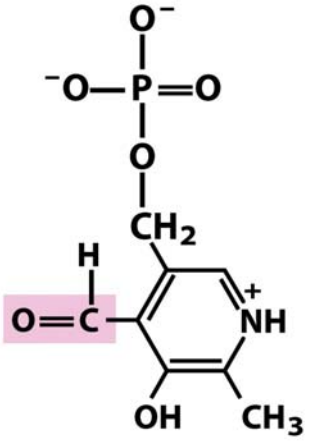

8.(21pts) Fill in the blanks.

PATHWAY	FUNCTION	REGULATORY ENZYME(S)	LOCATION IN CELL
	make A and G nucleotides		
citric acid cycle			
		Rubisco	
fatty acid β oxidation			
glycogen degradation			cytosol
		aspartate transcarbamolyase	
		carbamoyl phosphate synthetase I	cytosol and mitochondrion
		pyruvate carboxylase	cytosol, mitochondrion, endoplasmic reticulum

9.(12pts) A. Write out the complete pathway for photosynthetic electron transport.

B. Name the enzyme that synthesizes ATP in chloroplasts and mitochondria.

_____

10.(6pts) Fill in the blanks with regard to fatty acid synthesis.

A. Name the regulatory enzyme for fatty acid synthesis _____.

B. Fatty acid synthesis uses _____ as the reducing agent per round of adding 2 carbons.

C. For fatty acid synthesis, acetate groups are carried out of the mitochondrion in the form of

_____

11.(8pts) A. Nitrogenase complex is composed of two proteins:

_____ and _____

B. α-ketoglutarate is used to synthesize the amino acid _____.

C. Nitrogenase complex is protected from O_2 by _____.

D. Serotonin is made from the amino acid _____

12.(8pts) Answer the following for the hormone insulin and insulin signaling.

A. Name a pathway that is stimulated by the hormone insulin. _____

B. The insulin receptor is a receptor _____ kinase.

C. For insulin secretion by pancreatic β cells, glucose uptake and oxidation in the cells result in the formation of ATP, which closes _____..

D. In type 1 diabetes mellitus, fatty acid β oxidation in the liver coupled with increased gluconeogenesis result in the formation of excess acetyl CoA, which then forms excess

_____

13.(4pts) Name 4 effects of HIF-1 on hypoxic cells.

_____

_____

_____

_____

14.(8pts) Answer the following with regard to leptin signaling.
A. Leptin is (CIRCLE ONE)

ANOREXIGENIC OREXIGENIC

B. Leptin signaling stimulates _____ release by neurons, which binds to and activates β_3 adrenergic receptors in adipocytes.

C. This activates G_s, which in turn directly activates _____.

D. Protein kinase A is activated and stimulates the transcription and translation of

_____

15.(15pts) Define:
A. Shine-Dalgarno sequence-

B. farnesylation-

C. GLUT2-

D. FAD (write out the complete name and define)-

E. ^{18}F-2-fluoro-2-deoxyglucose-

16.(bonus 5 pts) A. Name the reporter gene used to assay CREB binding to CRE in the take home paper.

_____

B. What is shRNA?