

Quiz 3 Key (Ave 71, s.d. 20, high 93, low 29)  
BI-102-2, Fall '06, Dr. C. S. Tritt

Please keep your answers concise (more words will not necessarily lead to more points). Use the amount of space provided as a guide as to how detailed to make your answers. This is a 7 question, 2 page (2-sided) test! Each question is worth the same amount.

1. Name or describe the 2 classes of cell surface receptors.

Any 2 of the following (5 pts each): chemically gated channels, enzymatic receptors, G-protein linked receptors. Surface proteins, glycoproteins and glycolipids are surface markers (not receptors), but were worth half credit.

2. What is the general purpose and operating mechanism of *protein kinase* (also known as *enzyme*) *cascades*?

The general purpose of enzyme cascades is to amplify a small signal (5 pts). The amplification occurs because each activated enzyme molecule in the cascade can activate hundreds or thousands of other enzyme molecules that make up the next step in the cascade. This is shown below schematically:

A → A\*  
100B → 100B\*  
10,000C → 10,000C\*, etc.

Describing enzymes in general -6. Saying they always involve a second messenger -3. Just defining kinases -6. Not getting around to saying the purpose is amplification -2. I accepted answers to the effect of speeding response time because this is also true.

3. Explain the difference between endergonic and exergonic reactions.

Exergonic reactions have negative  $\Delta G$  values (the products have less free energy than the reactants) and are spontaneous. Endergonic reactions have positive  $\Delta G$  values (the products have more free energy than the reactants) and are not spontaneous. Saying or imply the reactions absorb or release heat is wrong (those are endothermic and exothermic reactions, respectively, but was worth 5 pts. Not mentioning spontaneity -3.

4. Describe a way in which regulation of a metabolic (biochemical) pathway can be accomplished?

Simply saying, "product inhibition" was sufficient. Full credit was given for describing the process of product inhibition in which a product of a pathway inhibits (generally allosterically) an early enzyme in the pathway. Just explaining why such regulation is important was worth 5 pts. Describing how lack of  $NAD^+$  slows or stops a reaction was -3 (its not regulation).

5. What is the key difference between aerobic and anaerobic respiration?

Aerobic respiration uses oxygen as its terminal (or primary) electron acceptor, while anaerobic respiration uses something else as the electron acceptor. The something else can be organic or inorganic. Not mentioning electrons, -2. Saying aerobic produces more ATP -6.

6. Name a common organic product of fermentation.

Lactate (or lactic acid) or ethanol. I accepted alcohol, although you should have been more specific. I gave 3 pts for FAD or  $\text{NAD}^+$ , which is wrong but related.

7. Why do naturally occurring fatty acids typically contain an even number of carbon atoms?

Because they are formed and broken down 2 carbons at a time using acetyl-CoA and  $\beta$ -oxidation, respectively (you only had to mention one of these for full credit). A lot of people missed this one. I gave 2 pts for saying you didn't know.