

Name: _____

Dr. Reichler's Bio 325-uex Fall 2008 Quiz 10/9

(This first question was included in last week's quiz, but I meant to include it in this week's quiz. Sorry for any confusion.)

- 1) What mechanism might explain the presence of plentiful mRNA but little protein being present?
- 2) How could a miRNA lead to decreased mRNA levels?
- 3) What are three differences between microRNA and silencing RNA?
- 4) If a cell needs to stop an enzyme from functioning, would degrading the mRNA or protein lead to a more rapid decrease in enzymatic activity?
- 5) How could looking at the sequence of a gene tell you where the protein was located? How could where in the gene you found this information tell you about where the protein might be located?
- 6) What is the connection between fetuses who are exposed to poor nutrition and smoking?
- 7) What is different about the genes of a totipotent cell versus a pluripotent cell?
- 8) What evidence suggests that DNA packaging is different between animal and plant cells?
- 9) Are the A, B, and C proteins that determine flower parts the first proteins to function in determining flower development?

Answers:

- 1) What mechanism might explain the presence of plentiful mRNA but little protein being present?
Binding of miRNA that blocks translation or the binding of a regulatory protein that blocks translation, as in the ferritin protein.
- 2) How could a miRNA lead to decreased mRNA levels?
Some miRNAs can interact with the matching gene sequence, inducing methylation of the DNA that blocks transcription.
- 3) What are three differences between microRNA and silencing RNA?
miRNA are produced by the cell; siRNA are introduced by humans. miRNA have imprecise matching with the target mRNA that leads to inhibition of translation; siRNA has precise base pairing with the target mRNA that leads to mRNA degradation. miRNA can inhibit transcription; siRNA cannot.

4) If a cell needs to stop an enzyme from functioning, would degrading the mRNA or protein lead to a more rapid decrease in enzymatic activity?

Protein degradation would immediately stop the function of the enzyme, while mRNA degradation would only be effective after the protein had been degraded or deactivated.

5) How could looking at the sequence of a gene tell you where the protein was located? How could where in the gene you found this information tell you about where the protein might be located?

Amino acids sequences can code for information about where a protein needs to be transported. Signal peptides are always at the beginning of the protein, while nuclear localization signals can be anywhere.

6) What is the connection between fetuses who are exposed to poor nutrition and smoking?

Both may lead to the adaptation to thriftiness as adults due to poor fetal nutrition.

7) What is different about the genes of a totipotent cell versus a pluripotent cell?

A pluripotent cell has already irreversibly packaged some of its DNA, none of the totipotent cell's DNA has been irreversibly packaged yet.

8) What evidence suggests that DNA packaging is different between animal and plant cells?

Most mature plant cells are totipotent while few mature animal cells are.

9) Are the A, B, and C proteins that determine flower parts the first proteins to function in determining flower development?

No, other genes must determine the four layers. Even when the A, B, or C genes are deleted, there are still 4 whorls.