

Name: _____

Dr. Reichler's Bio 325-uex Spring 2009 Quiz 2/5

- 1) If a muscle cell is responding to epinephrine (a hormone involved in the fight or flight response), and the response will involve a change in gene expression, where will the three steps in signal transduction occur?
- 2) What are two reasons for the seemingly complex nature of signal transduction?
- 3) What is role of calcium in the two reasons that you gave in #2?
- 4) Nucleotides should be able to be added to either end of RNA, but are only added at the 3' end. Why?
- 5) How are the interactions of RNA polymerase with the promoter different in prokaryotic and eukaryotic promoters, and how does this affect transcription initiation?
- 6) How is the information in a mature mRNA different from the coding region of the gene?
- 7) Are the number of genes comprising an organisms genome necessarily indicative of the number of different proteins that can be produced by that organism?
- 8) In the experiment looking at the function of the 5' cap and poly-A tail, what two things did the researchers measure and what did each measurement tell them?

Answers:

1) If a muscle cell is responding to epinephrine (a hormone involved in the fight or flight response), and the response will involve a change in gene expression, where will the three steps in signal transduction occur?

Perception on the plasma membrane, Transduction in the cytoplasm to the Nucleus where the response will occur.

2) What are two reasons for the seemingly complex nature of signal transduction?

Amplification of the signal and signal specificity.

3) What is role of calcium in the two reasons that you gave in #2?

Calcium is an easy way to amplify a signal and different spatial or temporal distributions of calcium can give specific responses.

4) Nucleotides should be able to be added to either end of RNA, but are only added at the 3' end.

Why?

Error repair can only occur at the 3' end. If removing incorrect nucleotides at the 5' end, there are no tri-phosphates to provide energy for making the covalent bond between nucleotides.

5) How are the interactions of RNA polymerase with the promoter different in prokaryotic and eukaryotic promoters, and how does this affect transcription initiation?

Prokaryotic RNA polymerase can bind directly to the promoter in the presence of sigma factor.

Eukaryotic RNA polymerase needs several transcription factors to bind the promoter before it can begin transcription.

6) How is the information in a mature mRNA different from the coding region of the gene?

The 5'-cap and the poly-A tail are added, and introns are removed.

7) Are the number of genes comprising an organisms genome necessarily indicative of the number of different proteins that can be produced by that organism?

No. Alternate splicing and RNA editing can make multiple mRNA's, and therefore multiple proteins, from one gene.

8) In the experiment looking at the function of the 5' cap and poly-A tail, what two things did the researchers measure and what did each measurement tell them?

The half-life of the mRNA to look at mRNA stability. Light emission to look at the amount of protein produced from the mRNA.