Name:_____ Dr. Reichler's Bio 325-uex Fall 2008 Quiz 9/18

1) What evidence indicates that all of the signal transduction chain between DNA damage and inhibition of RNA polymerase I occurs in the nucleolus?

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

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

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

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

6) 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?

7) What happens at translation initiation that explains the common functions of the 5' cap and poly-A tail?

8) What are the three RNA molecules involved in translation, and what does each do?

9) There are 64 codons, what are two reasons that there are less than 64 tRNA's?

10) Which ribosome would have a longer polypeptide attached to it, one at the 5' end or the 3' end of the mRNA?

Answers:

1) What evidence indicates that all of the signal transduction chain between DNA damage and inhibition of RNA polymerase I occurs in the nucleolus?
When individual nucleoli were targeted for DNA damage, the response only occurred in the damaged nucleoli.

2) 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.

3) 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.

4) 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.

5) 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.

6) 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.

7) What happens at translation initiation that explains the common functions of the 5' cap and poly-A tail?
The mRNA loops around so the 5'-cap and poly-A tail are close together.

8) What are the three RNA molecules involved in translation, and what does each do?
rRNA- serves as a platform for translation to occur and makes the peptide bond. tRNA- matches with the mRNA and brings the appropriate amino acid. mRNA- contains the codons for stringing the amino acids together.

9) There are 64 codons, what are two reasons that there are less than 64 tRNA's?
There are start and stop codons plus wobble.

10) Which ribosome would have a longer polypeptide attached to it, one at the 5' end or the 3' end of the mRNA?
At the 3' end. Translation starts at the 5' end and moves to the 3' end.