Name:_____ Dr. Reichler's Bio 325-uex Spring 2009 Quiz 2/26

1) What would be the effect on a eukaryotic cell that lacked the enzymes for histone acetylation?

2) What would the approximate sequence be of a single strand of DNA that could potentially form four-stranded DNA?

3) What about the distribution of putative DNA quadruplex sequences indicates that they have a specific function in cells?

4) How would understanding DNA quadruplexes help treat cancer?

5) You are interested to see if two genes, pizzagood and tacosgood, that are transcribed in response to the same stimuli. What information from DNA might help you determine this?

6) Regarding question #5, in relation to the location of the gene, where would you expect to find this information?

7) What information can be coded for in the 3' UTR of an mRNA?

8) What mechanism might explain the presence of plentiful mRNA but little protein being present?

9) Where would you expect to find a functional microRNA?

10) How could a microRNA lead to decreased mRNA levels?

11) 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?

12) 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?

Answers:

1) Gene expression would be reduced. Histone acetylation is needed to unpackage genes so that transcription factors etc can have access.

2) Some four repeats of G's interspersed with a few non-G nucleotides.

3) There are not randomly distributed in the genome. There are more common in telomeres and promoters.

4) Because of their involvement in telomeres, which need to be elongated for a cancer cell to keep dividing, and their presence in the promoters of oncogenes.

5) Look in the promoters and see if there are similar sequences that would bind to transcription factors thereby activating transcription.

6) Within a few thousand nucleotides of the transcription start site, or further away as enhancers.

7) Binding of miRNA and transport of mRNA

8) Binding of miRNA that blocks translation or the binding of a regulatory protein that blocks translation, as in the ferritin protein.

9) In the cytoplasm, attached to the 3' UTR of an mRNA blocking translation or in the nucleus attached to the promoter of a gene inducing methylation.

10) Some miRNAs can interact with the matching gene sequence, inducing methylation of the DNA that blocks transcription.

11) 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.

12) 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.