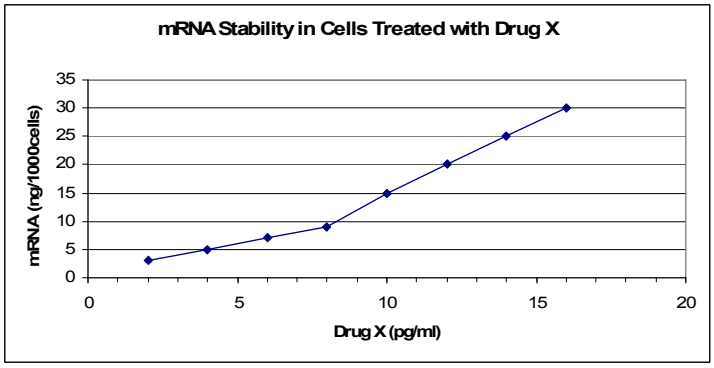
INS Biology Workshop 04-08-08
HOMEWORK DUE NEXT TUESDAY: Conceptual review questions from CHAPTER 18 and 14.

1. It is hypothesized that Drug X affects mRNA stability. To test this hypothesis, you added different amounts of Drug X to dishes containing the same number of mammalian cells, and then measured mRNA levels 1 hour post treatment. The following graph illustrates your results. A) Briefly interpret the results. B) In terms of translation and gene regulation, how might this be a problem? Be sure to explain your answer.



2. You are investigating Drug Z, which decreases the activity of histone acetyl transferase. In a recent experiment, you added different amounts of Drug Z to dishes containing the same number of mammalian cells and measured total mRNA levels after 1 hour. Please draw a graph illustrating the results you would expect. Be sure to explain your reasoning.

3. Sketch an example of alternate RNA splicing with two transcripts made from the same gene. Be sure to label the components of your diagram and show the relative size of the protein that is made from the different transcripts.

4. Explain the consequences of a mutation in the H1 protein such that it can no longer dimerize.

5. You are studying a gene that is alternatively spliced. You examine a particular cell type and find that splice variant "A" is present at 100 times the level of splice variant "B." One hypothesis is that splice variant "A" is spliced 100 times as frequently as splice variant "B." Propose another hypothesis to explain the difference.

6. Fill in the boxes to indicate the activities of the lac operon under the following conditions:

Special conditions	Sugar levels	Repressor (bound or not bound)	Adenylyl Cyclase activity (on or off)	CAP (bound or not bound)	Level of transcription (high, low, none)
O-	high lactose no glucose				
normal	high lactose high glucose				
lacI-	low lactose low glucose				
normal	high lactose low glucose				
lacZ-	high lactose no glucose				
CAP-	high lactose no glucose				
Promoter deleted	high lactose no glucose				
lacY-	no lactose high glucose				
Adenylyl cyclase -	high lactose no glucose				

7. Translational control occurs in different ways. First, proteins can interact with the mRNA and increase or decrease the life span of the mRNA. Second, mRNA can be "stored" until needed – at which point it is released for transcription. Third, proteins that are already present in a cell are activated by modification. Using your book, provide a specific example for each of these methods.