

# Signaling and Gene expression

1 Select the BEST answer. The role of a specific transcription factor (NFAT is one example) is to:

- A Bind specific DNA sequences known as enhancers.
- B Orient the ribosome to begin with the start codon.
- C Bind to both a specific DNA sequence (enhancer) and to a co-activator protein with enzymatic activity that modifies histones.
- D Bind to the promoter of a gene.
- E All of the above are correct.

2 Select the best answer. A promoter

- A is found at the 5' end of a prokaryotic operon and is bound by a sigma factor and RNA pol.
- B is found at the 5' end of a eukaryotic gene and is the binding site for the general set of transcription factors, along with RNA pol
- C is a sequence of deoxynucleotides.
- D All of the above are correct.

3 The primase enzyme must contain a nuclear localization signal sequence or "tag".

- A True
- B False
- C
- D

4 A kinase

- A is an enzyme involved in transcription of mRNA.
- B rapidly and reversibly modifies a target protein by adding a phosphate group.
- C is the enzyme that chops up microRNA in the cell.
- D Rapidly and reversibly modifies a target protein by removing a phosphate group.

5 Select the best answer. The ribosome

- A is composed of a small and large subunit. The ribosome interacts with the mRNA and tRNA molecules, but does not synthesize peptide bonds between amino acids.
- B is composed of a small and large subunit. The ribosome interacts with the mRNA and tRNA molecules, and synthesizes the peptide bonds between amino acids.

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- C begins synthesizing a protein with the first codon it runs into on the mRNA regardless of the DNA sequence of that codon.
- D assembles at the 3' end of the mRNA molecule in both prokaryotes and eukaryotes.

6 Why is adding a phosphate group (phosphorylation) to target proteins during signaling a big deal?

- A Phosphorylation can change the target protein's shape (or conformation).
- B Phosphorylation may allow the target protein to interact with other proteins within the cell, allowing relay of the signal.
- C The target protein's activity may be increased or decreased following phosphorylation.
- D All of the above are true.

7 In terms of the material for the upcoming exam:

- A I am feeling fairly comfortable – bring it on!
- B I am not ready for the exam, but know that if I finish the problems and homework and review the keys, I'll be ready.
- C I have a lot of work left to do...yet I know there are office hours, TA sessions, keys, problems, and the homework to help pull it together.
- D I feel hopelessly lost. Help! Maybe I've forgotten there are office hours, TA sessions, keys, problems, and the homework to help pull it together this week.

## Answer Key: Signaling and Gene expression

| Question | Key |
|----------|-----|
| 1        | C   |
| 2        | D   |
| 3        | A   |
| 4        | B   |
| 5        | B   |
| 6        | D   |
| 7        |     |