

Guide Questions for Topic: Basic Translation & Protein Folding

Terms

Codon, start codon, & stop codon	eukaryotic initiation factors (eIFs)
5' UTR (untranslated region) & 3' UTR	eIF2, eIF2B, eIF4E, PABP
Open reading frame	eukaryotic elongation factors (eEFs)
tRNA & aminoacyl tRNA synthetase	Release factors
Large vs. small ribosomal subunits	Chaperones & Hsp70 proteins
rRNA	Chaperonins
Translation initiation, elongation, & termination	

The Basics

1. What does the term "5' UTR" refer to in the context of mRNAs?
2. What does the term "3' UTR" refer to in the context of mRNAs?
3. What does the term "open reading frame" refer to in the context of mRNAs?
4. What class of enzymes is responsible for linking amino acids to their cognate tRNAs?
5. What does the term "charged tRNA" refer to?
6. What amino acid would be linked to the tRNA with the sequence 5'-AGU-3' as its anticodon?
(HINT: Keep in mind that during base pairing between mRNA and tRNA sequences, the strands run anti-parallel, as they do also in double-stranded DNA.)
7. During translation, amino acids are added to the _____ end of the pre-existing polypeptide through formation of a _____ bond, which is catalyzed by _____.
8. Ribosomes represent an example of a ribozyme. Why is this the case?

The Mechanism of Translation

9. Cell biologists have defined three sequential stages through which translation takes place. They are _____, _____, and _____.
10. What role do eukaryotic Initiation Factors (eIFs) play in translation of an mRNA?

11. Thinking back to the list of protein functions we discussed during Topic 3: Protein Function and Regulation, how might you classify the eIFs (excluding eIF2B) based on their role in translation?
12. eIF2B belongs to the _____ class of enzymes. Its activity is essential for translation in cells because it _____.
13. If you treated cells with a compound that inhibits the activity of eIF2B, what effect would it have?
14. What role do eukaryotic Elongation Factors (eEFs) play in translation?
15. Imagine a ribosome in the middle of translating a 300 amino acid protein (in other words, it has polymerized the first 150 amino acids of the protein). The tRNA that is attached to the polypeptide synthesized so far would be located in the _____ of the ribosome. The tRNA attached to 151st amino acid would enter the ribosome at the _____. After the formation of a peptide bond between the 150th and 151st amino acid, a tRNA would be released from the ribosome through the _____.
16. How do stop codons cause translation to terminate?

Protein Folding

17. Why are chaperones critical for protein folding in cells?
18. How does the Hsp70 family of chaperones contribute to protein folding in cells?
19. How do chaperonins contribute to protein folding in cells?