
MODULE 6: ALTERNATIVE SPLICING

ANSWER SHEET

Q1. Given that exons are shown by the black boxes, and introns are shown by thin lines with arrowheads in the FlyBase Genes track, what does this tell us about the first intron of *tra-RB* compared to that of *tra-RA*?

Q2. Given what you know about the initiation of translation, which of the 3 possible reading frames is used for both the *tra-RA* and *tra-RB* products?

Q3. Give the coordinate for the last base of the first exon for *tra-RA*

Q4. Give the coordinate for the last base of the first exon for *tra-RB*

Q5. What is the consensus sequence for the 5' splice site (donor site)?

Q6. What are the coordinates for the 5' splice site in *tra-RA*?

Q7. What are the coordinates for the 5' splice site in *tra-RB*?

Q8. What is the phase at this splice site?

Q9. What are the coordinates for the first base of the second exon in *tra-RB*?

Q10. What is the consensus sequence for the 3' splice site?

Q11. What are the coordinates for the 3' splice site in intron 1 of *tra-RB*?

Q12. What phase do we anticipate?

Q13. Given this, what is the reading frame for *tra-RB* exon2?

Q14. Does this make sense, given the location of stop codons?

Q15. What are the coordinates for the first base of the second exon in *tra-RA*?

Q16. What is the consensus sequence for the 3' splice site?

Q17. What are the coordinates for that sequence in intron 1 of *tra-RA*?

Q18. Given the phase at the donor site, what phase are we looking for here?

Q19. Given this, what is the reading frame for *tra-RA* exon 2?

Q20. Does this make sense, given the location of stop codons?

Q21. From your analysis of the RA isoform of *tra* in Module 5, how many amino acids does the *tra-RA* protein product have?

Now look at the *tra-RB* isoform:

Q22. What are the coordinates for exon 1?

Q23. Given the reading frame that you established for *tra-RB*, does translation continue through exon 2, or is it terminated by a stop codon?

Q24. What are the coordinates for the translated portion of exon 2?

Q25. How many amino acids does the protein translated from the *tra-RB* isoform have?

Q26. Is it likely that the protein translated from *tra-RB* could play the same functional role played by the protein translated from *tra-RA*?

Q27. Gene model for tra-RB:

Coordinate for start of translation: _____
Coordinate for last base of exon 1: _____
Coordinate for first base of exon 2: _____
Coordinate for last base of exon 2: _____
Coordinate for first base of exon 3: _____
Stop codon coordinates: _____

Summary Question 1. How does the polypeptide translated from the tra-RB isoform differ from the polypeptide translated from the tra-RA isoform? What are the consequences of these differences on protein function?

Summary Question 2. Discuss how the bigger mRNA leads to creation of a smaller polypeptide!!

Summary Question 3. Consider how alternative splicing could allow many different proteins to be encoded by the same gene.

Summary Question 4. Based on the gene structure of the two isoforms of *tra* shown in the "FlyBase Genes" track, provide a hypothesis that could explain this difference in RNA-Seq read coverage between the adult males sample and adult females sample.