Presentation

Title Slide:

- Title of the Presentation: "Investigating Gene Expression Regulation in Francisella tularensis: Role of Ribosomal Protein bS21"
- Your Name: [Your Name]
- Date: [Presentation Date]

Introduction:

- Introduce your research area: Cell and Molecular Biology with a focus on gene expression regulation during translation in Francisella tularensis.
- Highlight the importance of understanding gene expression regulation in bacteria.
- State your research objectives: Examine the role of ribosomal protein bS21 in regulating gene expression during translation in Francisella tularensis.

Background and Literature Review:

- Explain the significance of Francisella tularensis as a bacterial model.
- Describe the role of ribosomes in translation and the importance of ribosomal proteins.
- Briefly discuss the general concept of gene expression regulation at the translation level.
- Highlight the existing knowledge gaps regarding the function of ribosomal protein bS21 in gene expression regulation.

Research Questions:

- Present the research questions your study aims to address:
    1. Why does the genome of Francisella tularensis encode for three different homologs of bS21?
    2. Does the incorporation of each homolog of bS21 into the ribosome affect ribosome structure?

3. Does the incorporation of each homolog of bS21 into the ribosome affect translation efficiency?

Research Methods:

- Explain your proposed methods for answering the research questions:
  - Measurement of translation efficiency using an in vitro reporter assay.
  - Designing a plasmid template for the assay.
  - Purification of active ribosomes from Francisella tularensis.

Plasmid Template Design:

- Describe the considerations and steps involved in designing the plasmid template.
- Highlight the elements included in the plasmid, such as reporter gene, regulatory sequences, and potential bS21 homologs.

Ribosome Purification:

- Explain the process of purifying active ribosomes from Francisella tularensis.
- Highlight the importance of obtaining pure and functional ribosomes for the assay.

Results (anticipated):

- Present the preliminary findings you've mentioned:
  - In cells without bS21-2, translation of mRNAs with the pdpA 5´ UTR is reduced.
  - Introduction of an ideal Shine-Dalgarno sequence negates the positive effect of bS21-2 on translation.
- Mention that these observations were made in the in vivo system of F. tularensis cells.

In Vitro Replication and Methodology:

- Describe how you plan to replicate and study these results in vitro:
  - Using an in vitro translation kit.
  - Introducing a plasmid with modified 5´ UTR of pdpA fused to a reporter gene.
  - Including F. tularensis ribosomes.

- Explain how this approach will help you identify the minimal components necessary for bS21-2 regulation.

Plasmid Modification and Ideal Shine-Dalgarno:

- Discuss the plasmid design that enables modification of 5´ UTRs.
- Explain the rationale behind modifying the pdpA Shine-Dalgarno to an ideal sequence.
- Emphasize the significance of this modification in testing the role of bS21-2 in translation regulation.

Expected In Vitro Findings:

- Describe your expectations for the in vitro assay with the ideal Shine-Dalgarno sequence:
  - Anticipate that the regulatory effects of bS21-2 will disappear.
  - Emphasize the importance of these findings in uncovering the relationship between 5´ UTR sequences and bS21-2 regulation.

Implications and Future Directions:

- Discuss the broader implications of your research:
  - Advancing the understanding of gene expression regulation in F. tularensis.
  - Shedding light on the role of ribosomal protein bS21-2 in bacterial virulence.
- Suggest possible future directions based on these findings:
  - Investigating other virulence genes and their regulatory mechanisms.
  - Exploring the applicability of these findings to other bacterial species.

Conclusion:

- Summarize the key points of your presentation:
  - The role of ribosomal protein bS21-2 in regulating gene expression.
  - The impact of 5´ UTR sequence modifications on bS21-2 regulation.
- Reinforce the significance of your research in advancing the field of microbiology.

Acknowledgments and References:

- Acknowledge individuals, mentors, and institutions that supported your research.
- List the references you've used to inform your study and presentation.