Introduction

The Graham lab focuses on using system biology approaches to comprehend and develop new therapeutic approaches for cancer and other human diseases.

During the SHINE program, I had the opportunity to work in the Graham lab and be involved in my PhD mentor, Belinda Garana’s project in enzymatic regulation of glycolysis in breast cancer cells.

Objective

**Objective:**
Use gateway cloning to put genes for enzymes in a lentiviral destination vector.

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<th>Introduction</th>
<th>Skills Learned</th>
<th>Impact of Graham Lab’s Research</th>
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<td>Gateway cloning ○ Tool to move the gene of interest from the entry vector to the destination vector.</td>
<td>• <strong>Gateway cloning</strong> ○ Tool to move the gene of interest from the entry vector to the destination vector.</td>
<td>Gateway cloning is a powerful tool because the lentiviral destination vector allows us to: ○ Create virus to infect breast cancer cells ○ Adds copy of gene to DNA ○ Increases the amount of enzymes ○ Measure how much the enzyme affects the metabolism of glucose ○ Choose which enzymes to target for possible therapy for breast cancer</td>
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<td><strong>Bacteria culture</strong> Plate Liquid Culture</td>
<td>• <strong>Plasmid DNA Mini-Prep</strong></td>
<td><strong>Acknowledgements</strong></td>
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<td>▪ <strong>Plasmid DNA Mini-Prep</strong> Allows us to amplify the DNA and use antibiotics to select for colonies with the desired reaction product.</td>
<td>▪ <strong>Nanodrop</strong></td>
<td>I would like to thank Professor Nicholas Graham and my PhD mentor, Belinda Garana for giving me an amazing experience of working in the lab and being a part of one of their projects and thank Dr. Katie Mills and Dr. Megan Herrold for making it a wonderful SHINE experience. I would also like to thank Ms. Ross, Ms. Gutierrez, Ms. Matos, Mr. C, and Ms. Bridget Netter for giving me the opportunity to attend the SHINE program. Finally, I would like to thank my family and friends for motivating me throughout this experience.</td>
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How This Relates to Your STEM Coursework

When starting SHINE, at first I was not comfortable pipetting because I had never used those kind of pipettes and now I feel very comfortable pipetting liquids into other liquids and transferring small volumes of it gave me a more steady hand as well. Processes like making bacteria liquid culture plates and tubes, using a centrifuge, making agarose gel for processes like gel electrophoresis has become more comfortable to me. With this I also learned more about PCR and chain reaction, the central dogma of biology and better understand how gateway cloning works. All of these things could be really helpful when taking my AP Biology class next year in high school.

Next Steps for Me/Advice for Future SHINE Students

To future SHINE students, you will not regret attending the SHINE program because SHINE:
• Gives you an actual hands on experience in the type of field you are interested in.
• Is an advantageous learning experience; don’t be afraid to ask you mentors questions, you don’t need to stress yourself out.

I will continue to use this experience to give me an idea of what I would like to do in life. I will also do some research on chemical engineering because I found it a field I am interested in.