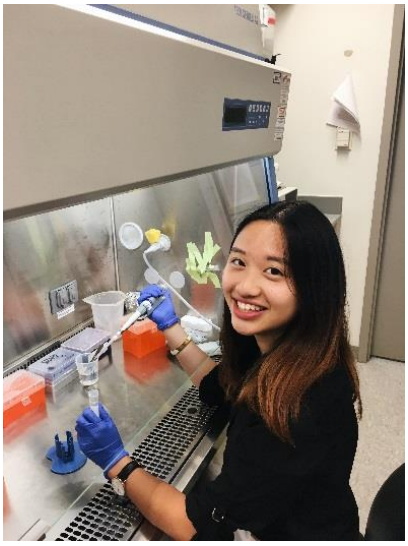

Tissue Engineering to Study Human Pigmentation and Skin Cancer
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The Penn Undergraduate Mentoring Program gave me the fortunate opportunity to work in Dr. Todd Ridky's laboratory, which focuses on using tissue engineering to learn about skin pigmentation and melanoma. More specifically, I worked with a graduate student on two projects, one that dealt with looking at the contribution of Rac1 in melanomagenesis, and another that dealt with CARs, which are chimeric antigen receptors on T-cells that target certain cells to kill.

The goal of the first project was to study Rac1, a protein that signals through pathways such as cell migration, proliferation, and drug resistance. The Rac1 pathway was found to be heavily involved in melanomagenesis, and so we want to manipulate the Rac pathway to see how it impacts the development of the cancer. Using QPCR and Western Blots, we can examine changes at both the transcriptional level and protein level. In the past, two-week OTCs were done to study the pathway in vivo, but we are currently in the middle of a four month mouse study to see the long term effects.

The goal of the second project was to identify the CAR target needed for effective melanoma treatment. The target receptor on melanocytes we looked at was MC1R. Both MSH, a melanocyte stimulating hormone, and ASIP, an agouti-signaling protein, bind directly to the MC1R receptor. A melanoma cell line we use, WM46, is known to have lesser amounts of MC1R comparatively to other melanoma cell lines so we are currently trying to create the perfect storm for targeting of the MC1R on the WM46 cells. Using Luciferin kill assays, we can test the impact of estrogen on MC1Rs on WM46 cells and MC1R on fibroblasts.

My ten weeks over the summer involved a lot of growth. I started off simply by practicing proper cell work technique. Melanocytes and fibroblasts require constant care, which could mean feeding, splitting, or expanding the cells. As the summer went on, I started learning and doing Western Blots on my own, infecting cells with pRRL Lentivirus, freezing and thawing cells, doing Luciferin kill assays, and more. Additionally, I saw how lab meetings work, learned the proper way to keep a lab notebook, and developed other essential skills for a researcher.

We are currently in the middle of these two projects, and small but informative leads have already been made. I will be continuing in Dr. Ridky's laboratory in the fall, and look forward to learning even more about both my specific projects and being a researcher in general.