GCS Reflection Paper

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On my Grand Challenge Scholars application, I wrote that come my senior year of college, I hoped to “enrich and broaden my educational experience” through the GCS program, allowing me to “deepen my learning, not only as a student, but as a person”. As I reflect on my undergraduate career, the GCS program has been an integral portion of my Duke experience that has contributed to my growth as a person. The multifaceted nature of this program fit well with my passions for both engineering and medicine, allowing me to explore various facets of medicine that aren’t readily apparent through BME coursework. These experiences have enabled me to witness current challenges with healthcare firsthand and strengthened my motivation to be part of the future that aims to improve these shortcomings.

Through the research component, I was able to spend more than three years working as a researcher in the Holley Lab studying snoRNAs and their role on mRNA transcription and translation. Our lab was able to demonstrate the first in vivo instance of the genetic regulatory role snoRNA-guided 2’-O-methylation (Nm) could play on mRNA of a gene called Peroxidasin (Pxdn), which was very exciting. Interestingly, the Nm modification increased Pxdn mRNA expression but inhibited protein translation. Thus, the Nm modification served as a significant post-transcriptional regulatory mechanism to regulate physiologic gene expression in vivo. In addition, I worked on a senior thesis trying to take this a step further to map the transcriptome-wide set of mRNA targets of Nm by snoRNA, which could provide exciting targets for future therapeutic interventions and drugs for a wide variety of diseases. Beyond the biological knowledge gained, I was also able to learn to become more perseverant and resilient in the face of failure. There would be countless times when an experiment would not work out as expected, or when a precious sample that took weeks to prepare would not yield viable results. Though I would initially be disappointed at these results and be hesitant to present them to my mentor, I gradually learned that these “failures” are perhaps more important to discuss, as they can reveal valuable insights into our protocols and bring about interesting questions leading to different directions.

The interdisciplinary curriculum has allowed me to branch out to broaden my understanding of the factors that contribute to medicine and health. Psychology 101 taught me the importance of understanding the mental state of an individual, as one’s mental state can significantly affect the outcome of a treatment. Psychology 221 dove further into how personality

processes affect our emotions, cognitions, and behavior, reinforcing the need to consider an individual from a holistic perspective before deciding on the best route of care. Sociology 110 introduced ethical controversies surrounding healthcare, particularly ones that arise from income, gender, or racial inequality. These inequalities should always be kept in mind in the context of medicine such that marginalized groups do not suffer from lower quality of care. Finally, Biology 213 expanded my knowledge on cutting-edge research regarding causes and treatments for some of the most prevalent, debilitating neurological diseases today.

The DukeEngage Uganda program I did to fulfill the global experience component was a truly transformative, immersive experience that broadened my horizons on the status of healthcare across the world. Witnessing many of the struggles of hospital personnel firsthand due to poor sanitation conditions and lack of resources strengthened my motivation to strive towards engineering better medicines that can be used not only in America but in low-resource settings as well. Physically interacting with patients and hospital staff in Uganda also allowed me to establish treasurable relationships and gave me a precedent for how to interact with people from different cultures. I hope to utilize what I have experienced to continue being involved with global health projects in the future that aim to improve the state of healthcare in low-resource settings.

The Bass Connections project I was involved in as part of the innovation and entrepreneurship experience was a special project that allowed me to apply my interests in a real-world setting. Given how rapidly advancements in technology are transforming our world, I had always thought that this would significantly change how the healthcare sector operates in the future. One way in which technology is being utilized by patients is the formation of online patient communities across various platforms. However, these communities often remain disconnected and secluded, with physicians and researchers not knowing of their presence. By extensively catalogging these online patient communities, we aimed to connect patients to potentially life-saving research regarding new, cutting-edge treatments for various diseases. Moreover, for those suffering from particularly rare diseases, this could provide access to a valuable support network that patients had never known of before. What I really enjoyed about this project is that the project was entirely team-driven, meaning we had to ask our own questions and refine our own methodologies to perform research. This was intellectually exciting, and also deepened the bonds formed with the members of our team as we worked collectively to decide how best to move this project forward.

To fulfill the service learning requirement, I took on various volunteering roles, including working as a surgical waiting rooms volunteer, Duke Eye Center volunteer, and COVID social support program volunteer. In my first two positions at the Duke Hospital and Duke Eye Center, I learned how little it takes for a volunteer to make a positive impact on a visitor. Something as simple as providing directions could make a loved one feel more relaxed in my company during an otherwise nervous, worrying hospital environment. These experiences helped familiarize myself with the professionalism and manners working in a clinical setting. The COVID social support program made me appreciate the great diversity of people living in the near Durham community, as well as how COVID disrupted the lives of so many so deeply. Witnessing these needs up close reminded me of the great impact we could have by using our resources to give back to the community.

My future plans are to keep the valuable lessons I have learned from these experiences in mind as I pursue the path towards becoming a physician. The process of exploring how to “engineer better medicines” through this program has made me discover new things about myself and the world we live in. I will keep what I have experienced firsthand in mind as I work towards becoming a physician who can both provide personalized care to patients and perform research that can contribute towards the creation of better medicines.