

At the age of 11, my life took an unexpected turn when I was abruptly pulled out of school due to a mysterious disorder that had left me unable to sit in a classroom without experiencing symptoms akin to panic attacks. For nearly a year, my family and I embarked on a frustrating journey through the healthcare system, trying to understand the source of my distress. It was a draining period where I often felt helpless in my mind. Simultaneously, I am part of a Cuban refugee family of fundamentalist Seventh-Day Adventists. We have faced formidable challenges and persevered through unwavering determination and a steadfast belief system that emphasizes the importance of community, which I am grateful for and respect. However, in this environment, the pursuit of science to explore and understand the world was not readily embraced or encouraged.

However, a crucial turning point emerged when a medical doctor recognized my physical symptoms stemmed from a psychological one. I began seeing a psychologist, and over nine months, I returned to school. It almost seemed like magic, but I was left feeling frustrated by my mind and bewildered by how it had seemingly betrayed me. My personal struggle created a profound desire to see the world anew and imprinted a desire to understand the brain.

Intellectual Merit: Determined to close my knowledge gaps and explore the connection between psychology and science, as a high schooler, I reached out to Dr. Joseph, a researcher specializing in bone marrow cancer research at my local university. I walked to Dr. Joseph's lab at the local university every day after school and after work. There, I gained insights into the process of science through hypothesis testing, data collection, and scientific integrity and obtained hands-on experience with basic laboratory techniques. My curiosity was not only acknowledged but also nurtured. This nurturing allowed me to pursue answers, even when those answers weren't immediately apparent.

Upon entering university, my fascination with the mind remained, leading me to a major in neuroscience. I eagerly sought opportunities across campus to gain deeper insights into the brain and the scientific discovery process. During my first quarter, one such opportunity came through the Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science (SEA-PHAGES) course. Over two quarters, we collected soil samples from the city to isolate, test, and characterize bacteriophage genomes under the guidance of virologists and microbiologists. This hands-on experience helped me develop essential scientific skills and a deeper appreciation for the importance of scientific research in addressing real-world issues, such as the potential use of bacteriophages in tuberculosis treatment. Our efforts led to **a first-author poster, a secondary poster presented at the American Society for Virology, winning second place for overall poster presentation, and a co-authorship published in Microbiology resource announcements¹.**

The following year, I declared my major in neuroscience and dove headfirst into neuroscience-specific courses. During this time, I was introduced to the EEG, and it was love at first sight. My passion for understanding the brain led me to join Dr. Le Dantec's lab, where I explored various aspects of learning, working memory, time perception, emotional processing, and human cognition. I spent the year absorbing the foundational principles of neuroscience and applying them to design innovative experimental paradigms. I read extensive literature to develop original research ideas and even connected fellow students and other volunteer test subjects to EEG and tDCS systems to analyze Event-Related Potentials (ERPs) in several experimental paradigms involving eccentricity, duration discrimination, and the effects of minor electrical pulses on working memory and learning. The subsequent summer, I undertook the ambitious task of building a Faraday cage to reduce external noise interference with EEG recordings. I taught myself OBS code to integrate an original user interface system with EEG recording, allowing for the creation and recording of cues directly onto EEG data. During this time, I honed my EEG analytics and statistical analysis skills. It was a challenging endeavor, but it was immensely rewarding. My journey in Dr. Le Dantec's lab continued even after my graduation. **Over six years, we completed numerous projects, resulting in six first-author posters, two co-first-author posters, papers presented at national conferences², and await three first-author publications in review.** In Dr. Le Dantec's lab, I cultivated qualities like determination, boundless curiosity, and a profound joy in pursuing research.

Simultaneously, I explored animal models in research by joining a marine invertebrate physiology lab under the guidance of Dr. Lloyd Trueblood. In the lab, I studied the effects of ocean acidification on octopus, salps, and crabs, with a particular focus on understanding how *Octopus rubescens* developed hemocyanin isoforms to facilitate more efficient oxygen transport in environments across varying pH levels. Working with these remarkable marine creatures taught me the profound responsibility one carries when working with living organisms. This experience led to an opportunity to work with octopuses and other marine animals in their natural habitat at Rosario Beach in Washington State for an entire academic quarter. **My research efforts in the marine physiology lab were recognized with the prestigious Kwirim fellowship award, granted to only three students to conduct research in Washington State.** During our three months in the field, our team built research equipment, including custom oxygen deprivation tanks, to test the impact of elevated CO₂ pressure (pCO₂) on various invertebrate and vertebrate species. We characterized polymorphism in *Octopus rubescens* throughout the Salish Sea and were the first to record metabolic rates at varying pCO₂ levels in various deep-water species. **Our research garnered first-place poster awards at national and international conferences³ and has been published in *Frontiers in Physiology*⁶, with ongoing work for additional publications in the same journal.**

In the summer before my senior year, I delved into cancer research at Loma Linda University, investigating precision medicine and theranostic approaches to human prostate, breast, and brain cancer cells under the guidance of Dr. Frankis Almaguel. My role as a research assistant encompassed every aspect of the research process, from designing experiments to conducting independent benchwork and data analysis. I performed tasks such as western blots and MTT assays and carried out cell culture work, often unsupervised. I also contributed to the localization of ENO-2 enzymes in glioblastoma multiforme cancer cells through immunohistochemistry and immunostaining. **This research led to an award-winning poster presentation and an ongoing publication.** Furthermore, I took on the responsibility of introducing new hardware into the lab and explaining its functionalities to the principal investigator, post-doctoral supervisors, graduate students, and fellow undergraduate researchers.

As I approached the end of my senior year, I successfully crafted and defended my honors thesis, based on work from the Almaguel lab; *novel Enolase-1 Inhibitors Cause Cell Death in Docetaxel Resistant Prostate Cancer Through Targeted Glycolysis Inhibition*. The impact of my work extended beyond the laboratory and into the clinic, where patients were being treated using the knowledge the lab had developed. **My achievements over the years of research were highlighted in the school-wide news and drew international media attention. Upon graduation, I received the *College of Arts and Science Dean's Outstanding Student Award*, unanimous departmental faculty recognition as *The Senior of the Year for Neuroscience*, the *Department of Psychology and Neuroscience Honors Award*, *cum laude* Latin honors, and nominated for the *University President's Award*⁴.**

After my senior year, I was accepted as a post-bac research fellow at the National Institutes of Health (NIH), working in Dr. Harold Burgess's lab. Here, I have been actively involved in investigating the behavioral neurogenetics of autism and schizophrenia. My research contributions have advanced brain imaging and ablation techniques in zebrafish and contributed to optimizing laser, chemical, and novel combinatory ablation methods to target specific brain regions associated with waking arousal and startle behavior, providing insights into behavioral changes associated with those mechanisms.

In addition, I taught myself R Programming and utilized advanced computational skills to develop spatial brain models, enriching our comprehension of the intricate relationships between brain structure and function. I have also been involved in creating genetically modified zebrafish strains and adding them to the national database to be used across the NIH. These efforts have advanced our understanding of brain morphometry and genetic influences on brain structure and specific neuronal influence on behavioral function. My experience at the NIH has taught me the value of meticulous attention to detail, the importance of effective interdisciplinary communication, and the significance of collaborative work within research teams. **My dedication to research at the NIH has resulted in the presentation of three posters at national conferences, one poster scheduled for the Society for**

Neuroscience conference in November, two committee-selected conference talks, intermural conference presentations, and a first-author publication in preparation.

I am excited to continue exploring the complexities of the human brain, unraveling the mysteries of neurogenetics, and pushing the boundaries of scientific knowledge. My dedication and joy in making meaningful contributions to the world of science and research remains as strong as ever.

Broader Impacts: Coming from a family of refugees myself and attending school at the most diverse Hispanic-serving institution in the US⁵, I've dedicated my undergraduate free time to fostering diversity, inclusion, and equity within my community. In various leadership roles, some of which included the honors student council president, the student association executive chair, the constitution bylaws chair, and the student wellness sub-committee for outreach and LGBTQ+ individuals. In these roles I advocated for students' financial needs, chaired policy focuses meetings, established digital community hubs, mentored students, advised on curriculum changes for the neuroscience department, removed school-wide policy related to inequitable registration fees, fought to change policy related to room, board, and meal requirements, and set up financial workshops so underserved students could get access to financial aid, planning, and other resources. My contributions extended to organizations like the Riverside County Library System where I went beyond tutoring adult language learners by helping secure citizenship and search for jobs, the La Sierra University Food Distribution Program where I led a sub-team dedicated to organizing and distributing food to over 150 vulnerable families every week for the duration of the 2020 – 2021 academic year, and the Inland Empire Health Plan focused on building digital infrastructure to connect over 50,000 individuals with housing, food, and other basic needs to government resources.

However, it was the transformative experience of volunteering for nine months in Mauritania, Africa, that revealed the dramatic real-world impact of addressing disparities rooted in inadequate infrastructure, education, and medical intervention. Collaborating with local government and village officials, our team created educational materials, mobile clinics, and census research, providing vital insights for local government and healthcare providers to address community needs. Additionally, as a program manager for ADRA in Nouakchott, Mauritania, I was responsible for the development and implementation of medical expos, food and medical supply distribution, and made it my mission to mediate relationships between local authorities and individuals living with the local culturally 'taboo' diseases such as AIDS, leprosy, and cancer so that they could have access to the same social support as others. In addition, we ended up successfully testing and implementing recycled bottle houses for colonies of people suffering with leprosy to encourage the government to enact policy change with cheaper, stronger, and eco-friendly housing initiatives. For my efforts in and out of school, **I was honored with the Howe Student Mission Scholarship upon return to the United States and the University Service and Leadership Award upon graduation.**

Last year, I founded the Columbia Community Outreach Group to develop and implement health expos connecting people living in the Columbia community to medical professionals and resources for mental health, nutrition, and alcohol addiction, and am volunteering with Homes Not Borders, where we collect, distribute, and set up furniture and housing for Afghan refugees.

Throughout my life, diversity, equity, and inclusion, hasn't been an 'ideal' but rather a needed reality for my family's survival. I am alive today because of the incredible support I have received by a loving community who recognized that I had worth when others didn't. I, in turn, have dedicated my life to recognizing and advocating for diversity's pivotal role in holistic problem-solving, particularly in academia, research, and leadership. In search of fulfilling this commitment, and having aunts that has passed to cancer, and another currently dealing with terminal stages of cancer, **three months ago I remotely joined the Florez lab at Harvard dedicated to advancing research focusing on women with lung cancer, cancer health disparities, and social justice issues affecting medical education, hoping to contribute to societal well-being through inclusive research within academia.**

¹Miller, G., et al. (2019). *Microbiology Resource Announcements*, 8(15), 10-1128. ²Western Psychological Association(WPA), ³Society for Integrative and Comparative Biology(SiCB), ⁴<https://lasierra.edu/arts-and-sciences/deans-award>, ⁵<https://lasierra.edu/article/wall-street-journal-again-ranks-la-sierra-no-1-in-nation-for-diversity/>, ⁶Trueblood, L. A. et al. *Frontiers in Physiology*, 13, 2531.