

Science has been one of my passions for as long as I can remember. I have always loved asking the questions “why” and “how.” My interest in science burgeoned in a meaningful way when I chose to study chemical engineering at Stanford for my bachelors and masters degrees. I learned how to approach and solve problems in a systematic and meticulous fashion. I felt that I could tackle any problem whether it be understanding how to extract uranium oxide from uranium ore stockpiles using hot sulfuric acid as I did in my senior project or determining how to best study how two genes can interact to induce lymphomas in mouse models of cancer as I did during my undergraduate research.

My undergraduate research experience in the Felsher Laboratory especially solidified my love for the basic sciences and fueled my interests in medicine. For the first time, I was fortunate enough to be given significant autonomy in lab; I had my own project and had the opportunity to design my own experiments and determine the overall direction of my project. Being awarded the Firestone Medal as well as several other departmental accolades for my research served as further gestures of encouragement from Stanford University and my faculty mentors within my department to pursue scientific research as a career.

Moreover, my work as a research associate in the Weiss Laboratory at UCSF before joining the University of Chicago’s Medical Scientist Training Program (MSTP) last year, sparked my interest in the immune system and inspired me to choose the career path of a physician scientist. In the Weiss Laboratory, I studied how exposure of B cells to endogenous ligands to their B cell receptors could effectively tune the ability of B cells to mount an immune response. I learned through my research that in a non-pathogenic state, about 30% of our B cells are autoreactive but do not actively produce antibodies to their self antigens – i.e. 30% of the B cell population in our bodies are anergic. I was fortunate enough to publish this work along with some of the other work I performed in the Weiss lab in several high impact journals. In the Weiss lab, I worked under the direct mentorship of a physician-scientist who not only treats patients with autoimmune diseases, but also studies those diseases in the lab. Shadowing her in the clinic allowed me to see that being a physician is very special. She had the rare opportunity to directly provide emotional and practical support to her patients. The rewards of those interactions go far beyond the satisfaction of solving an abstract problem. Furthermore, I was impressed by how practicing clinical medicine could inspire scientific discovery and how research in the lab could inform her decisions on how to best treat her patients.

When I joined the MSTP at the University of Chicago last summer, I was extremely excited to experience the delicate interplay between science and patient care that is embodied by the physician-scientist career path. During my first year of medical school, I took advantage of some of the opportunities to provide assistance in the free clinics on the South Side of Chicago. Volunteering at the Maria Shelter has been an invaluable experience for me. At the Maria Shelter, I am constantly reminded of why I want to be a physician: not just for sheer interest in the mechanisms underlying disease progression, but also for the rare opportunity that physicians have to provide emotional support to their patients. I am especially interested in treating patients who have experienced abuse and making them feel empowered and free to express themselves. My domestic violence counseling training at the Apna Ghar shelter will provide me with the skills necessary for me to eventually treat this patient population effectively.

This past summer, I started my journey through my PhD in the Biophysical Sciences. My goal for graduate school was to bridge the gap between my background in chemical engineering and my love for basic immunology research. The biophysical sciences department's philosophy is to ideally have each graduating student start a brand new department in their future careers by bridging the gap between two disparate fields during their graduate studies. This philosophy along with the requirement of a dual mentored PhD resonated with me strongly. I have chosen one of my mentors to be Dr. Bozhi Tian, an assistant professor in the Chemistry Department and Searle Scholar, who studies nanoscale semiconductor devices that can be used to study biological systems. Dr. Tian published extremely high impact work in the Lieber Laboratory at MIT during his postdoctoral career and continues to win awards for his high caliber work and mentorship. Most importantly, he is an extremely humble mentor and someone who is open to thinking outside of the box – he is in fact the type of scientist I strive to be in the future. I am excited to work with Dr. Tian and a structural immunology laboratory to fabricate novel nanoscale Silicon-based semiconductor devices that can be used to provide electrical stimulation to T cells at very localized targets. In doing this, I would like to mimic the changes in membrane potential induced upon Calcium signaling in T cells in a controlled fashion. I hope to be able to study the conformational changes that may be induced in the T cell receptor-CD3 complex upon electrical stimulation with these nanoscale devices. These studies could be relevant to patients with autoimmune defects in their T cell Calcium signaling pathways. In the future, I hope to continue to fabricate and use novel materials to ask clinically important questions about biological systems. I would like to be able to one day treat patients with autoimmune disorders and study how those disorders arise in the lab. Furthermore, I hope to incorporate my interests in patient populations that have experienced domestic violence and using music as a therapeutic tool into my career as well.