As a child, I would sneak into my grandfather's study to explore his collection of scorpions in jars and take his books from the accessible bottom shelf. Although before my eyes he was just my grandfather, as I grew up I found out he was also a dedicated researcher and professor at the Central University of Venezuela. He had a contagious enthusiasm for his work developing snake and scorpion antivenoms that soon ignited and fed my curiosity for science. To me, my grandfather is the clearest example of the life I want to live, the life of a scientist: never-ending study, wonder, creativity, hard work, sacrifice and an enormous desire to help others.

Born and raised in Venezuela, I spent most of my life swimming until I became a member of the Venezuelan national team. My athletic performance offered me the opportunity to attend the University of Puerto Rico, Rio Piedras Campus (UPR-RP) enrolled under the Molecular and Cell Biology program on a full athletic scholarship. During swimming practices, I regularly observed people rehabilitating from knee or peripheral nerve injuries. I soon became interested not only in how their healing occurred, but also my own hurting muscles after a hard workout session. Thus, in the summer of 2016, I joined Dr. José García-Arrarás' lab, where he studies nerve and intestinal regeneration using the sea cucumber, *Holothuria glaberrima*, as an animal model. During my junior year, I built basic research skills and collaborated with a graduate student. Our work was studying the effects of the canonical Wnt pathway's modulation upon early intestinal regeneration in *H. glaberrima*. Using Wnt pathway modulators, both our *in vivo* and *in vitro* results support the positive role of Wnt signaling in the formation of *H. glaberrima* intestine through increased dedifferentiation of mesenterial muscle. I assisted in testing different small molecules that modify Wnt signaling, performed immunohistochemistry assays and analyzed the data. For this, I was included as co-author in a paper in the Developmental Biology journal. During this time, I got immersed in how some molecular mechanisms of development modulate regenerative processes of adult tissues. Yet more, it was fascinating to find that differentiated cells could regress to an earlier developmental stage to regenerate the lost organ. At that moment, swimming practices kept me away from exploring the concepts that intrigued me.

Burning to understand the mechanisms leading to regeneration, I successfully applied to the Maximizing Access to Research Careers (MARC) Program, and gave up my swimming scholarship to pursue science. I embarked on a project aiming to elucidate the specific sequence and relationship of the cellular processes occurring during the early regeneration in *H. glaberrima*. Using inhibitors, I modulated two cellular events involved in the early regenerative process: cell proliferation and apoptosis. The interference of both cell proliferation and cell death increased and decreased, respectively, muscle cells dedifferentiation. Surprisingly, none of these events seemed to be crucial for regeneration to occur. For my senior thesis, I am currently investigating whether reactive oxygen species (ROS) account for the earliest activation of sea cucumber gut regeneration using both inhibitors and fluorescent probes. Being a researcher at Dr. García-Arrarás' lab is the most important experience of my undergraduate career. There, I learned to be more meticulous in planning, annotating and reading, and found support and guidance when presenting my research to diverse audiences. Furthermore, the close collaboration with other lab mates underscored the importance of sharing ideas to improve experimental design and data analysis.

Fueled by my passion for research, throughout college I sought out to explore new scientific communities that enriched my growing expertise in developmental biology. As a junior, I successfully applied to the Leadership Alliance and conducted research at Brown University in Dr. Ruhul Abid's lab in the Rhode Island Hospital. There, I studied the effects of long-term exposure of coronary arteries to NADPH oxidase-derived ROS after myocardial infarction (MI). ROS are known to function as signaling molecules that contribute to endothelial cells (EC) proliferation

and capillary density; potentially, they could improve MI outcomes through vessels outgrowth towards the ischemic area. Using tetracycline-conditional transgenic mice to increase ROS levels in EC of coronary vessels, I found that MI outcomes did not improve in the tetracycline-treated mice when compared to those not treated. This suggests a pathological effect from increased and prolonged ROS exposure after MI. Near the end of the summer, most of my experiments did not yield the expected results. I learned firsthand something my grandfather was never able to teach me: that a great part of being a scientist also means analyzing the negative results and using that data to design future experiments. Working in a clinical setting soon emphasized the importance and urgency of translating basic science discoveries to improve human health.

I eagerly sought for research experiences in stem cell biology with the new perspective of applying basic biological knowledge to revolutionize treatments − not only for the rehabilitating swimmers or torn muscles I initially envisioned− but for countless conditions such as degenerative or autoimmune diseases and congenital malformations. Hence, in the summer of 2018, I participated in the Amgen Scholars Program at Stanford University, in the lab of Dr. Irving Weissman. For my project, I assessed the effects of human's commonly used mobilization treatments on the long-term hematopoietic stem cells (LT-HSCs) and myeloid-biased LT-HSCs pool in mice. Mobilization treatments are meant to stimulate stem cells out of the bone marrow into the bloodstream, making them available for collection and future reinfusion. I found mobilization treatments are in fact mobilizing, although in small amounts, LT-HSC into peripheral blood, and that mobilized peripheral blood contains normal ratios of myeloid-biased to balanced stem cells. This summer affirmed my passion for stem cells and regenerative medicine and a commitment to pursue a degree in that area.

As a graduate student, I aim to contribute to elucidating how molecular and epigenetic mechanisms regulate self-renewal, cell fate and differentiation of stem cells during development, regeneration, and cancer. The University of Chicago hosts renowned faculty that shares my interests; within the Molecular Biosciences home area, I have identified many potential key advisors. Dr. Bruce Lahn's research on how cell fate of pluripotent stem cells become progressively restricted during development, which is synthesized in his innovative "occlusis" model, stimulate and drive my desires to pursue my graduate studies at the University of Chicago. Also, Dr. Tong-Chuan He's investigations on how the Wnt and BMP pathways regulate mesenchymal stem cell's lineage commitment and Dr. Jill de Jong's studies on the mechanisms regulating healthy HSC function in the bone marrow and after transplantation using a zebrafish model, align with both my interests and previous experiences in Wnt signaling pathway, as well as hematopoietic stem cells and aquatic animal models. Additionally, the University of Chicago's teaching assistantship and professional development opportunities, such as the CCT Fellows Program and Individual Teaching Consultations, will strengthen my preparation to become a professor leading a research team in the future. My goal is to extend my knowledge and resources far beyond a laboratory environment by providing scientific exposure and research opportunities to underrepresented minorities. The University of Chicago counts with the Neighborhood Schools Program, which would help me fulfill such professional goals.

Moving to a new country to attend college and sustaining a long swimming career along with my education has given me confidence in my tenacity, patience and motivation to thrive in unfamiliar and highly competitive settings. I believe that my education and scientific preparation make me a qualified candidate for the Development, Regeneration and Stem Cell Biology PhD Program at the University of Chicago.