2025 Summer Scholar Profile: Yiqiao (Peter) Wang

Hi everyone! My name is Yiqiao (Peter) Wang. I am a rising junior at UCLA double majoring in Molecular, Cell, and Developmental Biology and Music Performance. At UCLA, I work as both a volunteer researcher and lab technician in Dr. John Belperio's lab, which focuses on preventing Chronic Lung Allograft Dysfunction (CLAD), a condition where donor lungs fail after transplant because the host's immune system attacks them. Under the mentorship of Dr. Vyacheslav Palchevskiy, I model immune responses in CLAD in vitro through mixed lymphocyte reactions, where I combine immune cells from two mouse strains to simulate host–donor interactions after a transplant. Just as host immune cells recognize and attack donor cells as foreign, the two strains of mouse immune cells recognize each other and release inflammatory factors. Using this model, I test immunosuppressive drug candidates to see whether they can suppress inflammatory factor secretion, reflecting their potential to protect donor lungs from immune rejection.

At the Buck Institute, I work in Dr. Dan Winer's lab, which explores the intersection of aging and immunity. Under the guidance of Dr. Taylor Valentino, I study how simulated microgravity impacts human immune cell function. Immune dysfunction is a common problem for astronauts returning from space. Understanding how immune cells react and become dysfunctional in microgravity is important because it allows us to understand the role which gravity, a force that is often overlooked due to its omnipresence, plays in supporting the immune system. Furthermore, this research allows us to potentially translate methods capable of rescuing immune dysfunction in microgravity to improve overall immune function under earth's gravity. Previous research in our lab showed that microgravity impairs the cytoskeleton, the protein network that maintains cell shape, movement, and organization. Disruption of the cytoskeleton limits immune cells' ability to travel through the body and fight infection.

Before I joined Dr. Valentino, in collaboration with the Haney lab at UPENN, he identified a gene with strong links to cytoskeletal regulation. They generated monocytes, a type of premature immune cell, lacking this gene. We found that under simulated microgravity, monocytes lacking this cytoskeleton organizer gene die at much higher rates—an effect not seen under Earth's gravity. Knowing the functional importance of this gene to the cytoskeleton, I hypothesized that cells without it will have impaired ability to adjust their shape and reorganize their cellular contents. Those cells are especially vulnerable in simulated microgravity because gravity pulls down on cellular molecules to contribute to their localization, so cells under simulated microgravity may require adaptation genes to reorganize their delocalized molecules. To test this hypothesis, I generated preliminary data, staining neutral and polar lipids, both easy to be observed and known to be compartmentalized, and found that under simulated microgravity they became more evenly distributed, indicating that microgravity has indeed disrupted their localization. Currently, I am identifying the specific pathways through which gravity regulates the cytoskeleton, with the goal of developing treatments to restore immune cell survival in microgravity. Ultimately, I hope these strategies can also be applied to strengthen cytoskeletal and immune function under Earth's gravity.