DEPARTMENT OF PHARMACEUTICAL SCIENCES
COLLEGE OF PHARMACY

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2026

PROJECT TITLE: Design and synthesis of target and mechanism specific anticancer agents

Amar Natarajan
Old Chem Building, Rm 809
2855 Campus Way,
Cincinnati, OH 45219
Email: nataraah@ucmail.uc.edu
Phone: (513) 558-7957

Project Description

Cancer is the second leading cause of deaths in the United States. Nearly 2 million people will be diagnosed with cancer in 2025 and a little over 600,000 deaths will be attributed to cancer. These sobering statistics indicates a need for novel cancer therapeutics. The goal of this project is to take a rational approach to design anticancer agents that will specifically target cancer associated proteins. These will then be synthesized, purified and characterized in the laboratory.

Since the late 1990s, genome- and proteome-wide screens have identified and characterized an array of cellular targets that support cancer growth. The molecular structures of several cancer associated protein targets have been elucidated. The development of computational prediction tools such as alpha fold has made it possible to visualize the structures of nearly every protein target. This inspired others and us to use state of the art software programs such as Schrödinger drug discovery suite to design small molecules that could bind to and alter the function of cancer associated protein targets.

The Natarajan lab has had a long-standing interest in developing small molecules as anticancer agents. Undergraduate UPRISE student researchers in the Natarajan lab will have the opportunity to use computational tools to design inhibitors against cancer associated targets. The student researcher under the direct supervision of a postdoctoral fellow will learn the art of organic synthesis, which will include the design of synthetic strategy to access the desired small molecule. They will acquire the skills essential for setting up reactions and executing organic transformations. The reactions will be monitored by thin layer chromatography (TLC) and the product will be isolated using either chromatographic techniques or recrystallization methods. The purity of the desired products will be determined using liquid

chromatography mass spectrometry (LCMS) and the structure validated by nuclear magnetic resonance (NMR).

The laboratory is composed of research assistants, graduate students, postdoctoral fellows and research scientists who are proficient in various aspects of drug discovery. Scientific rigor is a core principle of all research activities in the lab. The lab provides a safe, inclusive and supportive environment to explore science. We welcome curious and motivated UPRISE undergraduates to join us in the exciting journey toward discovery of novel cancer therapeutics.