

DEPARTMENT OF CHEMISTRY  
ART & SCIENCES

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: 02/25/2022

PROJECT TITLE: Structural and biochemical analysis of key enzymes in ADP-ribosylation cycle

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**Project Description**

ADP-ribosylation is a transient post-translational modification that has widespread effects on DNA repair and replication, gene expression, and cell fate in mammals. ADP-ribosylation is cytotoxic when accumulated and thereby dynamically regulated by ADP-ribosylation turnover enzymes. Small-molecule inhibitors targeting ADP-ribosylation metabolism has shown promise in precision cancer medicine, and inhibitors of poly(ADP-ribose) polymerases (PARPs) specifically kill BRCA1/2-deficient breast tumors.

We are working on the structure, mechanism, and drug discovery of key proteins in the ADP-ribosylation cycle. We are highly interested in determining the structures of and developing new high-throughput assays for protein-of-interests. These are the pre-requisite steps to discover new cancer-selective therapeutics through a high-throughput screening.

The UPRISE student in our group will be primarily trained in expression, purification, and crystallization of ADP-ribosylation-metabolizing proteins to determine their structures with and without ligands. He/she will obtain strong background and hands-on experience in X-ray crystallography and various quantitative biochemical tools, including GST-pull down and time-resolved fluorescence resonance energy transfer (TR-FRET), which will help them to better understand biology and medicine in the future.