

DEPARTMENT OF CANCER BIOLOGY
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2024

PROJECT TITLE: Metabolic reprogramming of renal cancer

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Project Description

Kidney cancer affects annually 300,000 worldwide and 65,000 in USA, with 100,000 and 14,000 deaths respectively. Clear cell renal cell carcinoma (ccRCC) is the most common type of renal cancer. ccRCC is characterized by mutations in several tumor suppressors positioned on the short arm of chromosome 3 (3p), including VHL, PBRM1, BAP1 and SETD2. We are investigating three important areas in ccRCC pathobiology: (1) Using molecular and biochemical approaches we interrogate mechanisms of tumor promoting and tumor suppressing autophagy and connections between autophagy and cancer metabolism. (2) Using systems biology approaches we investigate genomic, transcriptomic, metabolomic subtypes of ccRCC and the role of environmental factors such as metals and tobacco smoking in the etiology of these subtypes. (3) Using metallomics and metabolomics as well as molecular and biochemical approaches we investigate the role of copper in metabolic reprogramming during progression of ccRCC. The laboratory is focused on mechanistic research. We develop our research to follow bed-to bench-to bed pathway and use interdisciplinary approaches to identify targetable vulnerabilities for treatment of ccRCC.