

# Pharmacy Student Summer Research Fellowship Proposal for 2022

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## **FACULTY INFORMATION:**

**NAME:** Nukhet Aykin-Burns, PhD

**DEPARTMENT:** Pharmaceutical Sciences, Division of Radiation Health

**LOCATION:** BioMed II – room # 441A-2

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## **PROJECT INFORMATION:**

**TITLE:** Role of IDH2 in mitochondrial metabolism following radiation

**LOCATION OF THE PROJECT:** BioMed II – rooms # 438-2 and 435-2

**BRIEF DESCRIPTION OF THE PROJECT:** Radiation induced liver disease (RILD) is the major limitation to use of radiotherapy in hepatocellular carcinomas (HCC). Therefore it is vital to determine mechanisms how ionizing radiation leads to RILD in order to design better HCC therapies with minimal side effects in normal tissues. IDH2 is a mitochondrial NADP<sup>+</sup>-dependent enzyme that supports regeneration of reduced glutathione (GSH) or reduced thioredoxin by providing NADPH to enzymes Glutathione Reductase or Thioredoxin Reductase. We proposed that IDH2 deficiency following radiation exposure exacerbates injury to the normal liver cells and contributes to RILD. With the help of UAMS Genetic Models Core, using CRISPR-Cas technology we generated multiple clones demonstrating a loss of IDH2 protein at different levels (between 40-100%). In this project we will characterize the metabolic changes (mitochondrial) in these cells in the absence and presence of radiation exposure.

## **STUDENT'S RESPONSIBILITIES-DUTIES IN THE PROPOSED PROJECT:**

- 1- To measure mitochondrial ETC proteins by Western Blotting in cells
- 2- To measure redox enzyme activities in cells
- 3- To determine mitochondrial metabolism using substrate utilization assays in cells
- 4- To determine mitochondrial bioenergetics in cells

**ESTIMATED TIME FOR PROJECT COMPLETION:** 10 weeks

**DOES THE WORK INVOLVE ANIMAL RESEARCH?** NO

**ORAL/POSTER PRESENTATION OPPORTUNITY @:** Annual National Meeting of Radiation Research Society, UAMS Student Research Day, Redox Biology Meetings

**MANUSCRIPT SUBMISSION:** Possible journal names for this work to be submitted: Radiation Research, Free Radical Biology and Medicine