

RADIATION ONCOLOGY  
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2024

PROJECT TITLE: Characterizing Neuroinflammatory Responses in Radiation-Induced Brain Injury: Organotypic Brain Slice Validation and Analysis

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**Project Description****Area of Research:**

Radiation-induced brain injury (RIBI) following radiotherapy, focusing on microglial pathophysiology, neuroinflammation, and the validation of an organotypic ex vivo brain slice model.

**Research Tasks for the Student:**

Develop an organotypic ex vivo brain slice model to assess the ignition of gliosis and neuroinflammation post-radiation.  
Establish experimental conditions for quantifying dose-dependent effects on gliosis and neuro-inflammation using brain slices.  
Employ GFAPGFP/+ (astrocytes) and CX3CR1GFP/+ (microglia) brain slices for quantification via flow cytometry, immuno-fluorescence, and -chemistry.

**Mentor's Training:**

Provide guidance in developing the organotypic brain slice model and experimental conditions.  
Train the student in flow cytometry, immuno-fluorescence, and -chemistry techniques for quantification.  
Assist in understanding and interpreting results obtained from the brain slice experiments.

**Mentor's Expectations:**

Eagerness to learn and adapt to experimental techniques involved in organotypic brain slice cultures, flow cytometry, and immuno-fluorescence.  
Diligent observation and documentation of experimental procedures and results.

Willingness to engage in literature review and incorporate findings into experimental design.

Openness to guidance and collaboration while working towards understanding the role of inflammation and astrogliosis in RIBI and potential therapeutic avenues.

Specific Requirements Expected from the Mentor:

Clear communication of experimental protocols and techniques.

Availability for regular discussions and troubleshooting sessions.

Encouragement to develop critical thinking and analytical skills in interpreting experimental outcomes.

Support in the preparation of reports and presentations to document findings and progress.

This project aims to validate the organotypic brain slice model for assessing early mechanisms of RIBI, omitting the investigation into MG3 microglia as an anti-inflammatory therapy.