University of Maryland School of Medicine
Department of Radiation Oncology

Tran Lab

Phuoc T. Tran, MD, PhD
Professor
Vice Chair for Research

Under the direction of **Phuoc T. Tran, MD, PhD**, the laboratory has been continuously funded by the federal government (NIH and DoD) and foundations for more than a decade. The team's research utilizes a variety of transgenic mouse models, noninvasive imaging, and traditional molecular, biochemical, and cell biology approaches. The Tran Lab's overarching goal is to translate basic findings into novel improvements in the prevention, diagnosis, and treatment of human malignancies by studying:

- Pathways critical for development, progression, and maintenance of prostate, lung, and liver tumors
- Transitions between epithelial and mesenchymal cellular states and implications for tumorigenesis, metastasis, metabolism, treatment resistance, and radiation-induced fibrosis
- Novel targeted agents as tumor selective radiosensitizers to increase the therapeutic ratio of clinical radiotherapy.

Since joining Maryland in 2021, Dr. Tran and his team, in collaborations across our 3 divisions, have generated more than $13 million in federal funding and support for research activities to initiate a vigorous program in precision radiation oncology. In August 2022, Dr. Tran received a >$7.8 million cross-disciplinary U54 award to establish the Radiation Oncology Biology Integration Network on Oligometastasis (ROBIN) Center at Maryland.

Ren Lab

Lei Ren, PhD
Professor
Director, Medical Physics Research

This innovative laboratory, under the direction of **Lei Ren, PhD,** is focused on image-guided radiation therapy and the development and application of artificial intelligence (AI) in radiation oncology. The team's goal is to develop novel imaging and therapy technologies to improve the precision and outcome of radiation treatments with high efficiency and minimal imaging dose. Areas of research include:

- Developing deep learning techniques for deformable image registration, image synthesis, image reconstruction, image augmentation, 4D imaging, radiomics, clinical decision making, and outcomes prediction
- Exploring deep learning and biomechanical modeling techniques to generate on-board hybrid virtual MRI/cone-beam CT images to enhance soft tissue contrast for target localization in liver radiotherapy
- Creating new AI technologies for synthesizing highly realistic eXtended Modular ANthropomorphic (XMAN) phantoms for motion management and virtual clinical trials in radiation therapy
- Developing new techniques for proton dose verification, including prompt gamma imaging and proton acoustic imaging

Dr. Ren has held multiple NIH R01 awards. In 2022, he was awarded an R01 for almost $3 million to advance the XMAN technology and its applications in virtual clinical trials. In 2023, he was awarded another R01 for almost $3 million to develop prompt gamma imaging for proton dose verification.

Precision radiation oncology relies on the collaborative integration of basic physics, radiobiology science, translational studies, and clinical trial research to advance understanding of the many factors that affect successful radiation treatment. The Department of Radiation Oncology is dedicated to the pursuit of this goal across our broad range of activities, with a mission to focus the benefits of precision radiation oncology on treatments individualized to the specific needs of every patient.