

TITLE: Radiation late-effects on pulmonary vascular tissue

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RESEARCH PROJECT DESCRIPTION (brief overview of background, hypothesis, methods, role of medical student, funding and relevant publications)

Conformal stereotactic radiation therapy (SRT) has vastly improved cancer treatment outcomes. However, in the lung, radiation toxicity manifests as progressive loss of vasculature and development of fibrosis. Our goal is to apply quantitative analysis of follow-up CT chest scans in patients receiving radiation to the lung to study the development of vascular pruning and fibrosis as a function of local radiation dose and other treatment and patient factors.

Our interest in quantifying lung radiation fibrosis is described in more detail here: <http://odell.radonc.med.ufl.edu/MIACALab/proj4.php>

Our efforts in quantifying vascular pruning are described in more detail here: <http://odell.radonc.med.ufl.edu/MIACALab/proj2.php>

There are several potential projects within this area of research. We have access to chest CT scans and radiation treatment plans for ~100 lung SRT patients and using our tools we have the ability to ask, for the first time:

- a. What is the time course of pulmonary vascular response in humans?
- b. Does early loss of vascular tissue correlate to and/or predict long-term pulmonary fibrosis?
- c. How is the radiation dose response of lung tissue affected by patient-specific factors such as history of smoking, chemotherapy, and other co-morbidities such as COPD?

Clinician-scientists in other fields are interested in applying our tools to their work and there is potential for a medical student to work jointly with them. These include quantifying the loss of brain vasculature in pediatric patients receiving proton therapy of tumors of the brain; creating 3D models of the vasculature of the kidney as a visual aid during surgical resection of kidney tumors; and monitoring the development of lung vasculature in extreme pre-term gestation infants.