

Radiation therapy is a critical component in the management of cancer. However, our understanding of radiotherapy must continue to grow with improvements in conformality (e.g., IMRT) and as more targeted agents become available. Maximizing the therapeutic ratio will require a thorough understanding of biology of tumors and normal tissues. Small animal models of tumor response and normal tissue toxicity can provide unique insights into these issues, but have inherent limitations and challenges which must be overcome. As small animal image-guided radiation therapy (IGRT) becomes feasible, one of the most important issues becomes "What questions do we want to ask?". Pure radiotherapy questions such as dose, volume, and time/fractionation can be explored in appropriate small animal tumor models while monitoring normal tissue effects. When combined with the ever-increasing number of targeted agents, small animal IGRT becomes a powerful pre-clinical tool that may allow optimal selection of agents and improve the timing and sequencing of concurrent therapies. After strong models of tumor control and normal tissue response are established, exploration of response biomarkers including novel imaging modalities becomes feasible. The wide-spread availability of small animal multi-modality imaging including CT, MR, optical, and US combined with novel contrast agents makes this an especially rich area of exploration. Some examples of previous small animal radiotherapy experiments with a brain tumor model and ongoing exploration of normal tissues effects in lung will be reviewed and potential future studies attempting to link pre-clinical and clinical data will be outlined.

Educational Objectives:

At the end of this lecture, the audience will be able to:

1. Describe some of the challenges of small animal models.
2. Discuss the range of biologic experiments which may be feasible.