

This presentation will focus on methods to validate non-invasive PET radiotracers for the quantification of loco-regional hypoxia. MicroPET images will be shown of different hypoxia tracers and their uptake kinetics discussed. The use of compartmental analysis to define parametric images will be compared against single late time point imaging. Digital autoradiography will be used to determine the intra-tumoral distributions of different hypoxia tracers, which will be compared against endogenous hypoxia-related proteins, exogenous hypoxia markers and hypoxia reporter-gene expression. Experiments to validate PET imaging of tumor hypoxia using image guided partial oxygen probes will be discussed. The lecture will conclude with efforts to clinical quantify the hypoxia distribution in head and neck patients.

Learning Objectives:

1. Understand the different methods of detecting hypoxia (direct pO_2 probe measurement, immunohistochemistry and surrogate imaging approaches).
2. Learn how potential hypoxia radiotracers are validated.
3. Understand the difference between static images of hypoxia radiotracer uptake versus parametric images of tumor hypoxia.
4. Understand the challenges of dose painting loco-regional hypoxia