Abstract ID: 19194  Title: Evaluation of the Spatial Concordance Between the Intratumoral Patterns of 18F-FLT and 18F-FDG Uptake in a Small Animal Tumor Model

Purpose: PET imaging allows for the visualization of tumor microenvironment and identification of aggressive or radioresistant tumor subvolumes that can be targeted with an escalated radiation dose. Multiple PET tracers have been developed for visualization of different aspects of tumor microenvironment; however, the spatial distribution of tracers in tumors is equally affected by tumor tissue viability and tracer delivery limitations. Given these issues and the low resolution associated with PET imaging, two different PET tracers can produce very similar images. Therefore, it is important to demonstrate that a novel PET tracer does provide additional useful information to that obtained with other tracers. This study investigates the added value of performing 18F-FLT PET imaging as well as 18F-FDG imaging.

Methods: Head and neck tumor xenografts grown in nude mice were used to study intratumoral tracer distributions. 18F-FDG and 18F-FLT PET images were obtained on subsequent days using a small animal PET/CT. Pinnacle 9 was used to deformably register the CT image from the FLT PET/CT to the FDG PET/CT image set. The generated deformation was applied to the FLT PET image to achieve an unbiased FLT to FDG PET image registration. The Pearson correlation coefficient between FDG and FLT was calculated voxel-by-voxel within a tumor contour. Overlap analysis of thresholded tracer distributions was carried out by comparing Dice similarity coefficients.

Results: Both SQ20B and FaDu tumors showed a moderate voxel-by-voxel correlation between FDG and FLT intratumoral patterns of uptake with an average rho value of .56 and .63 respectively (range .37-.76) despite significant differences in tumor morphology. The average volumes under the dice coefficient surface for SQ20B and FaDu tumors were not significantly different.

Conclusions: Despite being equally affected by the issues of tracer delivery, necrosis and PET resolution, FDG and FLT PET images displayed an observable difference at clinically relevant thresholds.

Funding Support, Disclosures, and Conflict of Interest:

No conflicts of interest