AbstractID: 8613 Title: 18F-FLT PET imaging of proliferative response to an EGFR inhibitor in HNSCC xenograft mouse models.

Purpose: Growing interest in targeted cancer therapies requires increasingly sophisticated understanding of response in tumor microenvironments. This work quantifies the proliferative response of two murine xenograft tumor models to an EGFR (epidermal growth factor receptor) inhibitor, cetuximab, using FLT-PET imaging.

Materials and Methods: Athymic mice harboring human head and neck squamous cell carcinoma (HNSCC) xenografts were injected with ^{18}F-FLT, a proliferation marker, and imaged on an Inveon microPET/CT scanner. MicroPET/CT imaging was performed on days one and five. Mice were then treated with cetuximab on days two and four with appropriate IgG controls. PET values were normalized by injected dose and weight ($^{\%ID}$/g) and evaluated in the tumor region.

Results: Inhibition of FLT proliferation signal following cetuximab administration was statistically significant in a paired t-test. Average FLT uptake in the tumor decreased from 54 ± 15 $^{\%ID}$/g to 26 ± 7 $^{\%ID}$/g ($p = 0.037$) in cetuximab-treated SCC-1483 xenografts and from 45 ± 12 $^{\%ID}$/g to 22 ± 6 $^{\%ID}$/g ($p = 0.035$) in cetuximab-treated SCC-1 xenografts. Maximum and cumulative FLT uptake showed similar trends. Initial proliferation rates and magnitude of treatment response were greater in the SCC-1483 cell line. IgG controls did not show a significant change in FLT uptake.

Conclusion: This work demonstrates the capability to measure the effect of a molecular inhibitor of EGFR signaling on proliferation within the tumor microenvironment as measured by ^{18}F-FLT PET. This technique should improve understanding of tumor response to EGFR inhibitor therapy and may provide a valuable tool to assess early treatment response to cetuximab in humans.