AbstractID: 7470 Title: ROI-based response assessment using pre- and post-RT ^{18}F-FDG PET/CT

Purpose: To assess the therapy-induced changes of head and neck cancers using ^{18}F-FDG PET/CT imaging studies performed prior to and following the completion of a course of radiotherapy (RT) through a region-of-interest based (ROI) analysis.

Method and Materials: As part of an ongoing study, nine patients with carcinoma of the head and neck had PET/CT imaging studies performed prior to the start of treatment (range: 4 – 58 days; median: 36 days) and following the conclusion of treatment (range: 33 – 63 days; median: 59 days). RT contours, created with the Pinnacle treatment planning system and CT simulation images, from physician-approved plans were collected to align with pre- and post-RT PET/CT images. Utilizing in-house developed software, the contours were deformed to the pre- and post-RT PET/CT images through a non-rigid registration. The non-rigidly aligned RT contours were then used as ROIs to collect data from the pre-and post-RT PET images. The standard uptake value (SUV) was calculated assuming that identical structures were contained in the pre- and post-RT deformed volumes, which were altered by anatomic changes as a result of RT.

Results: For the GTV contour, the mean pre- and post-RT SUV and standard deviation was (5.6 ± 0.9) and (2.4 ± 0.6), respectively. Within the GTV, the mean maximum SUV prior to RT was (23 ± 4.6), while after the conclusion of RT, the mean maximum SUV was (5.0 ± 1.9). Additionally, the mean ratio of the pre- to post-RT mean SUV was (2.5 ± 0.7), indicating an overall decrease in uptake of the tracer in tissues within the GTV contour.

Conclusion: Through the use of deformable image registration, the feasibility of ^{18}F-FDG PET/CT ROI-based analyses of RT-induced changes in patients with head and neck cancers has been demonstrated.

Conflict of Interest (only if applicable):