AbstractID: 14323 Title: Using textural features derived from 18F-FDG PET imaging for predicting cancer treatment outcomes

Purpose: [18F] 2-Fluoro-2-deoxy-D-glucose (FDG) PET imaging is a common imaging modality used in planning and assessing outcome in radiation therapy. It has been shown that the variations of Standardized Uptake Values (SUV) and, more recently, Tumor Volume (TV) could predict treatment outcomes. Here, we propose the use of textural features, reflecting physiological informations such as vascularization and global/local tumor heterogeneity, and investigate the interest of such measures within this context.

Method and Materials: 45 esophagus cancer patient treated with combined radiochemotherapy between 2003 and 2007 were retrospectively considered and classified as complete, partial or non responders according to the EORTC criteria. Region Of Interests (ROI) delimiting the tumor zone were segmented in the pretreatment [18F]-FDG PET scans. Thirty nine textural features were extracted from the intensity histograms, co-occurrence matrix, neighborhood gray-level difference matrix and area or alignment in 3D of voxels of similar intensity. The prognostic value of each features was investigated using Kruskal-Wallis test.

Results: Features that well characterize tumor heterogeneity correlated strongly with therapy response. This was especially the case for features computed considering the combination of voxels of the same intensity and the local homogeneity extracted from the co-occurrence matrix. Features obtained from neighborhood voxel gray-level difference matrices were less useful since they strongly depend on lesion size and are mostly reliable for large tumours.

Conclusion: These results suggest that certain textural features can offer better predictive value than SUV for the cancer treatment outcomes. Because these features characterize different physiological parameters it could be possible to further improve results by combining such features. In future studies we will focus on multivariate analysis for the extraction of feature combinations, eventually complimented by other clinical information. In addition, the use of these textural features will be exploited for predicting patient survival.