

AbstractID: 1197 Title: Investigation of CT-MRI Image Intensity Correlation for MRI-Based Dose Calculation

The accuracy of MRI-based dose calculation for radiation therapy treatment planning relies on the precise knowledge of the patient geometry such as tissue types, densities and organ/structure contours. MR imaging provides better soft tissue contrast for target and organ delineation than CT imaging. However, MRI does not provide the material density information, which is critical to heterogeneity correction in treatment planning dose calculation. In this work, we investigate the correlation between CT numbers and MR numbers using different pulse sequences to identify bone and air from soft tissue to improve dose calculation accuracy in heterogeneous geometry. We have used CT and several MR pulse sequences to image the same patients. We then fuse the images and identify different tissues and densities on these images. The CT and MR numbers were compared to find correlations between MRI and CT as a function of material density. The results show that for air cavities, the T1 image intensities have higher values than T2 image intensities, but for bones, the same range of values are found for both T1 and T2. It is also apparent that for both T1 and T2 acquisitions, MR numbers for bones are always higher than air cavities, which provides a basis for automated bone-air detection in the conversion of MRI to material/density for accurate dose calculation. Our preliminary results show that tissue heterogeneity has little effect on dose calculation in the pelvic region but may introduce significant uncertainties in head and neck treatment planning.