AbstractID: 8185 Title: A novel method of MRI correlate with electron density information for Radiotherapy Treatment Planning

Purpose: MRI (Magnetic Resonance Image) provided excellent soft tissue resolution and functional images for treatment target delineation. For MRI based treatment planning, electron density of the organ or structures of interest were manual assigned. In this study, we developed a new method to correlate MRI images with electron density information for radiotherapy treatment planning dose calculation.

Method and Materials: We implement a neural-network structure with two MRI sequences inputs and the output end correlates with CT images that belong to the same patient to be a training target. The iterative training process was designed to keep the best fit parameters of neural-network in order to enlarge the similarity between Neural-Network outputs and CT images. After the training process, MR images can be converted into a Homemade CT like image (HCT) for radiotherapy treatment plan dose calculation. The real CT 、CT with union density and HCT were compared and analyzed with their characteristics for radiotherapy dose calculation.

Results: Our HCT provides more precise, convenient and heterogeneous dose distribution than manual assigned or union density for MRI-only treatment plans. The Monitor Unit calculated from prescribe dose was within ± 3% when compared with CT based treatment planning.

Conclusion: A novel method of MRI correlates with electron density information for Treatment Planning dose calculation purpose was purposed. The converting algorithm was created by a non-linear method, and searching for solutions using numerical approaching.