

## AbstractID: 6943 Title: Evaluation of CT extended field of view imaging impact on radiation therapy treatment planning

### **Purpose:**

CT imaging of patients for radiotherapy treatment planning frequently includes anatomy that extends beyond the 50cm nominal field-of-view (nFOV): 28.35% of the 575 CT scans we acquired from July-December 2006. The purpose of this study was to evaluate 1) the degradation of Hounsfield units (HU) in the extended field of view (eFOV), and 2) the dosimetric impact of ignoring or correcting this degradation within the treatment planning system (TPS).

### **Method and Materials:**

CT images were acquired at maximum FOV (82cm) on a diamond-shaped 30x30x13cm solid-water phantom, challenging the reconstruction algorithm's ability to model the truncated projection data adequately. A unique dataset was acquired for 19 phantom locations (1cm intervals outside of the nFOV) and each imported into a TPS. Each phantom was contoured using a threshold of -200HU. A single treatment beam with isocenter placed at the center of the phantom was planned to deliver 100cGy to isocenter for each CT data set; dose map comparisons with and without homogenous correction for density ( $HU > -700 = 1\text{gm/cc}$ ) were performed relative to the control phantom within the nFOV.

### **Results:**

Significant variation of HU was observed as a function of phantom displacement outside the nFOV (range +513 to -873HU); most dramatically ~5cm beyond the nFOV border. If uncorrected, these changes in HU produced significant dose errors. Plans were compared to control plans and dose difference maps were generated; uncorrected images 3cm outside the nFOV demonstrated >5% difference, where overriding HU values above -700HU maintained <5% error for phantom positions ~10cm beyond nFOV.

### **Conclusion:**

HU values differ significantly for anatomy 2cm outside the nFOV, can be visualized and should be corrected for dose calculations. These results show <5% dose error can be accomplished for anatomy extending ~10cm beyond the nFOV (which accounts for 98% of eFOV patients here).