AbstractID: 10617 Title: Ramping and overscanning contributions to patient dose in helical CT

Purpose: In helical computed tomography (CT) scans, slices adjacent to the clinical volume of interest, known as z overscanning lengths, are acquired for reconstruction. Additionally, CT machines undergo a transient power state, known as tube ramping, to reach full power. This investigation will characterize the dependence of tube ramping time and z overscanning length on pitch, rotation time, beam collimation, and reconstruction slice width. These relationships will be utilized to determine the contributions to patient dose. **Methods and Materials:** A real-time fiber optic coupled dosimetry system with 10 ms temporal resolution is interfaced with three organic scintillators with 0.157 mm^3 volumes. A Siemens Somatom Sensation 16 multislice helical CT scanner is used for the study with pitches varying from 0.5 to 1.5; rotation speeds between 0.5 and 1.5 seconds per rotation; reconstructed slice widths of 2.0 to 10.0 mm; and beam collimation of either 12 or 24 mm. One dosimeter remains stationary while two dosimeters are translated through the beam to provide real-time profiles of the x-ray field. **Results:** The ramping time was found to be independent of pitch and represented 0.5% of the total scan time. The z overscanning length was found to be monotonically increasing with pitch and represents anywhere from 14.3% to 35.9% of the total scan length. **Conclusions:** While ramping time remained constant, it has been demonstrated that z overscanning length is heavily dependent upon pitch – a high pitch added 7.1 cm to a 20.3 cm clinical scan length. Both z overscanning and ramping time must be taken into consideration when planning and managing patient dose. The effect of rotation time, beam collimation, and reconstruction slice width on ramping time and z overscanning length will be investigated in future work.