AbstractID: 11558 Title: Profile and Exposure Measurements in Axial and Helical Multi-slice Computed Tomography

Purpose: To investigate why organ doses for helical computed tomography (CT) scans were found to be up to 25% less than similar axial scans. The organ dose measurements were performed previously using thermoluminescent point dosimeters (TLD) in a pediatric phantom. **Method and Materials:** Tension rods were placed across the bore of the CT scanners, flanking the scan region, in order to support measurement devices without relying on the patient table which moves during helical scans. Under this configuration, the table was kept out of the scan region for all measurements. Beam profile measurements were made for 20mm and 40mm beam configurations using computed radiography (CR) plates and software to compute the FWHM of the profile. Exposure measurements were made with a 10cm pencil ion chamber in a 16cm head phantom, similar to standard CTDI measurements. These measurements were made for multiple 64-channel CT scanners in both axial and helical modes. For the exposure measurements, multiple scan parameters were varied including kVp, focal spot size, field of view, rotation time, exposure time, and pitch. Differences between axial and helical measurement results were compared. **Results:** Differences in FWHM values for the beam width measurements between axial and helical scan modes were found to be less than 1%. The normalized exposure values between axial and helical scans were found to be less than 1% in general. The only exceptions were caused by differing focal spot sizes and rotation times of less than 1 second, for which the difference was up to 2.5%, but still well within the manufacturer's tolerance. **Conclusion:** There were no substantial differences between axial and helical scans for the radiation profiles and exposure parameters we examined. Therefore, we conclude that the explanation for the axial/helical point dose differences must lie elsewhere. One possibility might be patient table mechanic.