

AbstractID: 10200 Title: Evaluation of Z-axis resolution for axial and helical scanning modes on MDCT

Purpose: To evaluate Z-axis resolution for axial and low pitch helical scanning modes on a multi-detector CT (MDCT). Axial scanning, performed in a cine mode, and helical scanning are both presently used to acquire 4D-CT data sets.

Method and Materials: The slice sensitivity profile (SSP) is considered as an indicator of Z-axis resolution. The CT-SSP Phantom (Model 76-412, Fluke Biomedical) was used. The scans were performed on a Philip's Brilliance Big Bore 16 slice scanner. The phantom was scanned at incremental distances from the CT isocenter from 0mm to 200mm. The 16x1.5mm collimation mode, standard resolution and standard recon filter were used for both helical and axial modes. For helical scans, the pitch was varied between 0.04 and 0.08. The slices were reconstructed at 0.2mm increments. For axial mode, a 0.5mm increment was used. The effective slice thickness or Z-axis resolution was calculated as the full width at half maximum (FWHM) of the SSP.

Results: For helical scan modes, the measured slice thickness remained below 2mm for all points in the X/Y plane. In axial mode, the FWHM of the SSP plot was 1.5 +/-0.3mm with the phantom well centered. At 20cm from the CT isocenter, the measured Z-axis resolution was close to 5.0mm.

Conclusions: When imaging with high Z-axis resolution is required, axial mode scanning should be utilized when the region of interest is small and the patient is well centered within CT gantry. For scans where Z-axis resolution must be maintained over a large area, helical mode scanning would be preferred. When performing 4D-CT using cine axial scans, the Z-axis resolution can be compromised near the periphery of the imaging plane.