AbstractID: 6378 Title: Sub-second CT scanner with a 64-row amorphous silicon flat panel

Purpose: To increase the data acquisition speed and detection limits of amorphous silicon flat panels for use in a low cost multidetector-row CT (MDCT) scanner with diagnostic image quality.

Methods and Materials: A bench-top sub-second flat panel (FP) multidetector-row CT system has been developed using three 64-row FP detectors. Each FP is 30 cm x 3.3 cm in active area with 576 x 64 pixels that are 0.52 mm per side. A high degree of parallel processing is used to speed the data acquisition from the panels. The FPs are overlapped slightly enabling a scan diameter of 50 cm and slice volumes up to 20 mm. The system has been tested with various detachable scintillators and scans of performance and anthropomorphic phantoms are compared with their diagnostic MDCT scans.

Results: The FP MDCT system can achieve full rotation 600 projection scans in 0.5 seconds with 32 rows and 0.6 second partial rotation scans with 64 rows. The image quality of 20 cm diameter performance phantom scans is comparable to a commercial MDCT scanner with similar technique/dose. Medium sized body scans are nearly comparable except for artifacts due to the panel overlaps and lag. Thus far, large body phantom scans are less comparable due to the additional dynamic range requirement, which are not optimized with the current ASIC amplifiers.

Conclusion: The results indicate the potential for FP MDCT to be used as a less expensive and less complex alternative to crystalline silicon detectors on MDCT scanners. There is pressure to increase the number of MDCT rows beyond 64 in cardiac imaging to achieve single organ coverage in one scan rotation. The use of larger area FP detectors to achieve greater than 256 rows exists and the sub second speed can be achieved with compensations and a high degree of parallel processing.