

AbstractID: 10278 Title: Can a flat panel cone beam CT imager pass the American College of Radiology CT accreditation requirements for head scans?

**Purpose:** To evaluate the performance of a flat panel cone-beam CT system with the American College of Radiology (ACR) CT Accreditation Program.

**Methods and Materials:** A bench-top flat panel (FP) cone-beam CT system using the Varian Medical Systems 4030CB panel and G424/B130 x-ray tube with a rotating stage were used. The FP was operated in the dynamic gain mode with a frame rate of 15 fps and a scan time of 42 seconds and 625 views. The source and detector geometry were such that a full-fan head size 25 cm field-of-view was reconstructed. The Gammex Inc. 464 ACR accreditation phantom and ACT automated evaluation software were used to form an unbiased pass/fail determination of the ACR head scan criteria. Standard CTDI dosimetry measurements were performed with a 16 cm diameter PMMA phantom and Victoreen 660 survey meter with 10 cm ionization chamber.

**Results:** The ACR phantom has 4 sections, which are to evaluate a number of performance criteria. The scans were performed at a measured  $CTDI_{100}$  of 45 mGy absorbed dose in air. These results are from the first attempt at using the ACR phantom on the FP CBCT system. The image quality was sufficient to pass the majority of the criteria, but failed to pass the CT number accuracy by 1 HU on the acrylic sample and by 1-2 HU on the CT number uniformity test.

**Conclusion:** The results indicate that the CT number accuracy and uniformity are areas that can be improved with better software beam hardening and scatter corrections. Also these scans were taken without an anti scatter grid, which if used should improve CT number uniformity. Therefore, there are significant indications that we can pass all categories of the ACR head accreditation tests. Additional test are then to be performed on a C-arm based system.