

AbstractID: 12292 Title: Quality Control Management of Low-Dose Cone Beam CT (CBCT) Dental and Eye & Ear Scanners

Purpose: The use of low-dose CBCT scanners in dental and eye&ear clinics is becoming very popular. Due to limited literature and guidance on the quality control (QC) management for these units, we investigate the need for a systematic approach to QC for these special scanners. **Methods and Materials:** QC that included image quality tests, radiation safety checks and dosimetry measurements has been performed for three different CBCT dental scanners (XORAN-miniCAT, i-CAT, ILUMA). The tests were based on manufacturer provided phantoms and they included: *uniformity and noise* (water in a plastic bowl was used as phantom for this test), *high contrast and linearity*, *spatial resolution* and *image artifacts*. For all three scanners, pre-defined scanning protocols are selected by the manufacturer in order to run the specific tests. For dosimetry measurements, the standard head CTDI PMMA phantom was used, along with calibrated CTDI ion chamber and electrometer. **Results:** The i-CAT and MiniCAT passed all the image quality tests, during the first QC testing. *Spatial resolution:* 14 lp/mm was visible for the i-CAT and 16 lp/mm for the MiniCAT. *High contrast and linearity:* both scanners measured within the expected range and showed linearity with a correlation coefficient of 0.999. *Uniformity and noise:* both scanners satisfied the required ranges by the manufacturer. For the ILUMA scanner the manufacturer was contacted to remotely adjust the appropriate parameters in the reconstruction software in order to satisfy the required tolerances for the tests performed. The dose measurements were: $CTDI_w = 3.5-5.5$ mGy for all scanners. **Conclusions:** We have seen that these low-dose systems have the appropriate image quality for dental applications. The dose levels are much lower than in conventional adult CT scanning protocols (i.e., 58mGy for typical sinus scans). Perhaps a more systematic QC approach for these systems will be necessary to be developed in the near future.