

AbstractID: 10212 Title: Reference Dosimetry during CBCT acquisition using radiochromic film

Purpose: We describe a 2D reference dosimetry technique for measuring dose from cone-beam computed tomography (CBCT) scans using on-board imager (OBI) on Varian Clinac-iX linear accelerator that employs XR-QA radiochromic film model, specifically designed for dose measurements at low energy photons. We report on surface dose and percent depth dose (PDD) measurements during clinical CBCT procedures carried out on a humanoid Rando phantom.

Method and Materials: Response of XR-QA model GAFCHROMIC™ film reference dosimetry system was calibrated in terms of air kerma in air. To measure surface dose during CBCT acquisitions, pieces of XR-QA films were taped on surface of the Rando phantom. Also, film strips were placed between Rando slices in vertical and lateral direction in order to measure PDDs during CBCT scans for different sites and different CBCT protocols available on our imaging system. Spatial dosimetry was performed using Epson Expression 10000XL document scanner. Change in optical reflectance of the unexposed film piece was subtracted from the exposed one to obtain final *netR*, which was converted to dose using previously determined calibration curve.

Results: Our measurements show that skin dose can range from 0.07 cGy in Low Dose Head, to 4.64 cGy in Pelvis Spot Light CBCT protocol with uncertainty of 2% at higher doses, rising to 4% at 0.5 cGy and 12% at the lowest measured dose. Profiles obtained from film strip measurements show different dose distributions depending on the CBCT technique used and the anatomical site imaged.

Conclusions: In this work, we describe an air kerma in air based technique of measuring dose during CBCT scans using XR-QA model GAFCHROMIC™ film in combination with flat-bed document scanner. Main advantage of this system is that it does not require a priori knowledge of the backscatter factors and it provides 2D reference dosimetry at low kVp photon beams.