

AbstractID: 8174 Title: GafChromic EBT film for Cone-Beam CT dose measurement - Preliminary study

Purpose: To find a new method for Cone-Beam CT dose measurement

Materials and Method: EBT-1417 films (Lot: 47171-02I, ISP) were irradiated on a Varian 21EX Linac (VMS) using 6 MV photon beams to the following doses: 2, 4, 6, 8, 10, 12, 16, 20, 30, 50, 80, and 100 cGy to construct a dose calibration curve. A NIST traceable ion chamber was inserted in the phantom to check for Linac output consistency during film irradiation process. The time error of Linac was measured to be less than 0.005 MU. These films were scanned with Vidar VXR-16 (Vidar Systems Corporation) after 2 hours post exposure to guarantee full development. The CBCT irradiated EBT films were also scanned using Vidar scanner in the similar way and were analyzed by RIT113 software. The Vidar scanner had been calibrated with NIST provided step wedge (SN L4592). The Acuity simulator (VMS) was used for CBCT measurement. The standard full fan with bowtie filter was used. The EBT-1417 film was sandwiched in the center of two solid water slabs, and was placed at the central axis plane of the simulator. To increase the EBT film response, three CBCT scans were delivered to the same region of interest.

Results: The CBCT dose on the central axis level in a slab phantom was about 5.3 cGy after three Cone-Beam CT scans. A single scan would have given about 1.8 cGy. Three dimension dose map showed relatively uniform distribution throughout the plane.

Conclusion: We utilized an attractive feature of EBT film, e.g. minimal energy dependence from keV to MeV range, for CBCT dose measurement. Preliminary results showed that EBT film is a potentially promising solid-state dosimeter for measuring dose in CBCT. Evaluation of sensitivity and uniformity for EBT film response at low dose levels is under way.