AbstractID: 8765 Title: Depth dose and profile characteristics in the superficial buildup region near air interface for megavoltage photon beams using radiochromic EBT film stacks

Purpose: To measure the depth doses and profiles in the superficial buildup region for 6MV and 15MV photon beams using radiochromic EBT film stacks. **Method and Materials:** Eight radiochromic EBT film (lot#35076) strips ($3x20x0.024cm^3$) formed a stack (0.192cm). Each film stack was positioned above a solid phantom, with the top film layer at 100cm SSD, and surrounded by solid water slabs (0.2cm). The film stack was along the central cross plane of $10x10cm^2$ open field. This setup allowed dose measurement at depths from 0.012cm to 0.18cm at 0.024cm intervals. Each film stack was irradiated by 6MV or 15MV photon beam (Varian Cl-iX) with 1000 MU. Four repetitive runs were performed for each energy modality. All films were scanned using Epson4870 flatbed scanner with 48bit color and 0.0169cm pixel resolution. The pixel values were converted to doses using an established calibration curve. For each energy and depth, (1) the profile along the central line (1mm wide) covering the primary field and peripheral region, and (2) the central axis (CAX) doses ($1x1cm^2$) were obtained. **Results:** The primary beam doses were sensitive to depth, while those in the peripheral region remained insensitive. For 6MV and 15MV photon beams, (1) the CAX percent depth doses (PDD) at d = 0.012-0.18cm were 20%-60%, and 13%-40%, respectively; (2) the extrapolated CAX PDD at d=0 were 15% and 11%, respectively. Agreement with previously reported CAX PDD at surface using parallel plate thin window ion chamber and ultrathin TLD was found. The normalized primary beam dose profiles varied slightly with depths. **Conclusion:** The depth doses and profiles in the superficial buildup region near the air interface were quantified using radiochromic EBT film stacks. The proper incorporation of such characteristics in the treatment planning system should be considered when assessing the doses to skin and shallow tumors.