AbstractID: 11357 Title: Backscatter Correction Factor for Megavoltage Photon Beam

Purpose*:** For routine clinical dosimetry of photon beams, it is often necessary to add backscatter phantom material to ensure full backscatter. Available data, however, only exists for Co-60 and 9cm thickness is required to achieve full backscatter condition. This study is to establish the minimum backscatter thickness required for 6 and 15MV photon beams and to determine the correction factor for backscatter material in case of insufficient thickness. ***Material and method: Backscatter correction factor, BCF(s,d,t), is defined as the ratio of absorbed dose measured on phantom central-axis with square field size s and thickness d of full backscatter to that with backscatter thickness t. Measurements were performed in SAD geometry with a 0.125cc thimble chamber. The field sizes are 5x5, 10x10, 20x20 and 30x30cm at depth of dmax (1.5 cm for 6MV and 3 cm for 15MV), 5 and 20cm for backscatter thicknesses of 2, 4, 5, 8 and 10cm. To verify 10cm thickness provides full backscattering, we also measured at 11cm and 20cm. 7.5cm Styrofoam is placed behind the solid-water pieces to avoid backscattering from the table. A convolution method is used to calculate BCF using Monte-Carlo (MC) generated point-spread kernels for clinical photon beams between Co-60 and 24MV. ***Result and discussion:*** MC simulation agrees with the measurements within 0.8% in the same physical trend. We've attributed the difference between the measurement and calculation to difference in beam quality. BCF increases for decreasing energies and increasing field sizes. The largest correction occurs at depth of maximum dose, 0.978 for 6MV and 0.988 for 15MV.***Conclusion***: We concluded that backscatter thickness is 6.5cm for 6MV and 5.5cm for 15MV. If 4cm backscatter thickness is used, BCF is 0.995 and 0.988 for 10x10 and 30x30cm under 6MV and is 0.996 and 0.993 for 10x10 and 30 x30cm under 15MV at dmax respectively.