

AbstractID: 1095 Title: IMRT dosimetry and determination of zero field size percent depth doses and tissue maximum ratios

Zero-field percent depth dose (PDD) and tissue maximum ratio (TMR) contain useful information of the primary beam for dose calculations based on primary and scatter components. It also allows accurate determination of beamlet dosimetry in IMRT. Zero-field PDD or TMR can only be extrapolated from the measured data for larger field sizes. Using a diode detector, SFD(0.2 mm diameter active volume), we measured the total scatter factor (S_{cp}), collimator scatter factor (S_c) and PDD in a water phantom over the range 1×1 - 10×10 cm² for 6 MV photons. The effect of detector size on small field dosimetry is also investigated for various detectors. Least squares fitting technique is used to extrapolate the beam data to zero field size. Phantom scatter factors (S_p) and TMRs are then calculated for the range 0×0 - 10×10 cm². TMRs calculated in this study agree to within 1% with the clinical data in the range 4×4 - 10×10 cm². The S_{cp} values obtained with pinpoint chamber, Exradin A-14 and SFD agree to within 2% over the range 1×1 - 10×10 cm², while the diamond detector, the 0.125cc and the 0.6 cc exhibit discrepancies from about 6% at large field size to 256% for 1×1 cm². In measurements with very small fields, it is critical to align accurately the beam and scanning detector axes and that a proper detector is used. It is important to obtain beam data to the smallest field size possible for zero-field dosimetry. Extrapolation from 4×4 or 3×3 cm² may result in 10% error in the zero-field data.