

AbstractID: 6372 Title: Determination of Correction Factors for a 2D Diode Array Measurements in MV Photon Beams

Purpose: To evaluate the accuracy of MapCheck measurements for range of field-sizes, SSDs and depths.

Method and Materials: Central axis measurements for various collimator settings (3x3cm² to 40x40cm²), SSDs (80cm, 90cm, 100cm and 110cm) and depths (5cm, 10cm, 20cm) for 6 and 15 MV-photon beams were performed using MapCheck and PTW MP3 system (0.125cc IC). Correction factor was determined as the ratio of IC to MapCheck measurements. Backscattering effect was assessed by comparing the MapCheck measurements with and without 10cm thick water-equivalent backscattering material. Phantom scattering effect was evaluated by taking the ratio of MapCheck with backscattering material to the IC measurements under electron equilibrium conditions. This was also compared to the theoretical calculation using ratios of phantom scatter factor between an infinite large and 30 by 30 cm² phantom. For 15MV, additional effect due to heterogeneity structure in the Mapcheck needs to be added.

Results: The total correction factor for 6MV-photon beams was up to 9.5%, mostly due to the lack of phantom scattering in MapCheck measurements when the field-sizes larger than 30cm. The result was consistent with theoretical analysis with phantom scatter alone. The backscatter correction factor varied by 3% and increased with increasing field-size. For 15MV, the total correction factor was up to 8%. The difference between the measured correction factor and theoretical calculation is attributed to heterogeneity factor, about 2% and is a function of field-size only.

Conclusion: We have determined correction factors for MapCheck which is a function of the scaled field-size and depth only and can be mostly explained by lack of phantom scattering for large fields. A theoretical model is provided for general case when the solid phantom used is not 30x30 cm².

Conflict of Interest (only if applicable):