AbstractID: 9541 Title: Utility of 2D diode array for electron beam QA and commissiong

Purpose: To assess the utility of a detector consisting of a plane of 445 diodes embedded within a solid water equivalent material (MapCheck) as an alternative to a scanning water tank for a) electron beam commissioning of a radiation treatment planning system (rtps); b) electron beam quality assurance (QA); and c) patient specific electron treatment QA.
Method and Materials: Two dimensional dose information was captured at various depths placing solid water equivalent material onto the MapCheck surface. Electron energies of 6, 9, 12, 16 and 20 MeV produced by Varian linear accelerators at fields sizes ranging from 2x2 to 25x25cm^2 were scanned. MapCheck was also used to measure electron dose distributions and outputs for patient customized cutouts. Data were collected for the same electron energies, field sizes and patient cut-outs using the scanning water phantom and the results were compared to those obtained from MapCheck. Lastly, the water tank and the previously used electron beam energies and field sizes were modeled on the Pinnacle rtps and the obtained beam profiles and percentage depth dose (%DD) distributions were compared with Mapcheck results.
Results: Comparison of %DD and profiles demonstrated good agreement between Mapcheck data, water tank data, and Pinnacle rtps modeled data. High-dose, low-dose-gradient comparisons indicates excellent agreement to within 1% among the three modalities. Field size comparisons show mostly sub-millimeter agreement.
Conclusion: Electron beam commissioning and QA typically involves the collection of central axis %DD and profiles at various depths and field sizes. The current gold standard is to use the remote scanning water tank which may be a time consuming procedure. Our results show that the 2D array diode detector known as MapCheck can reliably be used as an alternative to the scanning water tank for beam commissioning, rtps modeling and patient specific QA for electron beams.