

## AbstractID: 7621 Title: Dosimetric comparison of MapCheck with Monte Carlo simulations

**Purpose:** This study is to verify IMRT QA MapCheck measurement using Monte Carlo simulations.

**Method and Materials:** MapCheck (Sun Nuclear) contains 445 silicon diode detectors arranged in a 22×22-cm<sup>2</sup> area, of which 221 are located in the 10×10 cm<sup>2</sup> center. The diode spacing is 7.07 mm in the central portion and 14.14 outside of this area. The 2-cm water equivalent build-up is inherent in the device and additional 3-cm build-up is used for IMRT QA plan delivery at an SAD of 100 cm. The EGS4/MCSIM Monte Carlo package was used in this study. The MLC leaf sequence files for the IMRT plans were used for the Monte Carlo simulation.

**Results:** Ten prostate and head-and-neck IMRT QA plans were generated on the Eclipse treatment planning system and delivered on Varian machines. The average field size for the prostate plans was 9×6 cm<sup>2</sup>, and 14.5×16.7 cm<sup>2</sup> for the head-and-neck cases. For the prostate plans, the average dose at the reference point was 94.3 cGy by Mapcheck and 92.9 cGy by Monte Carlo. The difference was 1.5 %. For the head-and-neck plans, MapCheck measured 70.0 cGy while Monte Carlo predicted 69.5 cGy (a 0.7 % difference). The dose errors given by MapCheck and Monte Carlo were also compared. In the case of the prostate IMRT, MapCheck gave a dose error of 1.0 %, while Monte Carlo showed 0.5 %. In the case of head-and-neck, the 0.5 % of dose error by MapCheck was close to that (0.8 %) by Monte Carlo.

**Conclusions:** MapCheck can perform accurate dose measurement for IMRT QA. Considering the limitations of the detectors and design such as low spatial resolution, however, the Monte Carlo simulation can be used to verify MapCheck systematically and help improve its functions in future design.