

## AbstractID: 4827 Title: Evaluation of the Accuracy of the Electron Monte Carlo Algorithm in Eclipse Treatment Planning System

**Purpose:** To evaluate the accuracy of Varian electron Monte Carlo (eMC) dose calculation algorithm after commissioning in Eclipse by comparing the output factors, profiles and PDDs generated from the algorithm to those measured in water.

**Method and Materials:** A synthetic CT data set of a flat-water phantom was created in Eclipse Treatment Planning System. Dose distributions in the water phantom were generated with the eMC algorithm for multiple field sizes, with open and custom inserts, for multiple energies, and at 100cm and 110cm SSD. The algorithm parameters were 1% accuracy, medium 3-D Gaussian smoothing method and calculation grid sizes of 1-2mm. In water measurement of profiles and PDDs were performed with a Wellhofer scanning tank system. Output factors were measured as the ratio of output relative to the calibration condition.

**Results:** For output factor comparisons, the mean difference is 0.2% for 100cm SSD and 1.6% for 110cm SSD, and the standard deviation is 0.6% and 0.7% respectively. The plot of PDDs from eMC plans overlaid with those of the measurements show good agreements except for the first 1 to 2 mm on the surface. eMC plans display surface dose by interpolating the dose at the first grid point inside the phantom and the first grid point outside the phantom, resulting in the surface underdose. Profile plot comparisons show good agreements for FWHM (difference <2mm) and for dose in the plateau region. For large cone sizes of 20x20 and 25x25, eMC profiles exhibit a flatter plateau region versus the round shoulders observed in the profiles measured in water.

**Conclusions:** Our evaluation demonstrated that the eMC algorithm performs well in a homogeneous water phantom with both open and custom inserts and at both standard and extended SSD.