

AbstractID: 13752 Title: Evaluation of a commercial Monte Carlo dose calculation algorithm for electron beam treatment planning

**Purpose:** To evaluate the accuracy of the electron Monte Carlo (eMC) dose calculation algorithm included in the Eclipse treatment planning system. **Method and Materials:** Multiple tests were planned to explore the system behaviour in configurations encountered in clinical practices. The first series of test were performed in a homogeneous water phantom. Measured and eMC calculated dose distributions were compared for different combinations of energy/applicator/depth. Three different inhomogeneous solid phantoms simulating high and low density materials were constructed to explore various heterogeneity conditions; a small air cylinder, a lung phantom and a chest wall phantom. The test under study is the lung inhomogeneity which consists of cork slabs. In all cases, comparisons are made between measurements, carried out by means of XV-2 films, and eMC and Pinnacle computations. Finally, the evaluation of the eMC algorithm for a clinical case, a nose cancer, was conducted. **Results:** The eMC validation in the water phantom and in the lung phantom is shown to be accurate. The maximum observed discrepancy between measurements and eMC is 2.5%. For the lung case, Pinnacle does not correctly model the electron scattering. The retrospective study of the clinical case, which presents scatter perturbations by air cavities, shows planar dose difference up to 20% between Pinnacle and eMC. **Conclusion:** eMC algorithm showed good agreements with measurements in simple homogeneous and heterogeneous phantoms. Comparatively to the electron pencil beam algorithms of Pinnacle, the eMC calculations more precisely predict large dose perturbations due to inhomogeneities.