

AbstractID: 7384 Title: Investigation of the use of transmission type detectors for daily IMRT patient dose reconstruction

Purpose: To study the feasibility of using transmission type detectors for daily IMRT patient dose reconstruction and verification.

Methods and Materials: Because of the complexity of IMRT there is a need for quality assurance for every patient. However, the daily delivered intensities may vary slightly from the planned ones. In this work we investigated the use of transmission type detectors and films for the verification of daily dose delivered to the patient. Films were placed at various distances from the source in air to measure the beam intensity. The fluence maps were also reconstructed from calculations of the TPS at the same planes. Monte Carlo simulations of the same geometries were performed and the intensity maps were also extracted at the same planes. Instead of film, a tray mounted transmission detector can also be used.

Results: The film measurements were compared to TPS predicted intensity maps. Corrections based on the Monte Carlo study were applied to remove the electron contamination from the measured intensity maps since it was not accounted by the TPS. MC results indicate that the corrections due to the contaminant electrons can be 15 to 20% for 6MV beams. The corrected measured intensity map was used to calculate and reconstruct the daily dose to the patient using Monte Carlo. The results show good agreement between measurements using films and Monte Carlo calculations.

Conclusions: Transmission detectors such as films can be used in order to compare the delivered intensity maps against the TPS predicted ones. The dose to the patient can be reconstructed using Monte Carlo based on the delivered intensity map and the dose can be potentially verified for each fraction, especially if a cone beam CT is performed daily.