

AbstractID: 1879 Title: Impact of IMRT Delivery Technique for Partial Breast Irradiation

In IMRT, the leaf sequencer converts optimized fields into a series of trajectories for SMLC or DMLC delivery. SMLC and DMLC delivery techniques were evaluated for partial breast irradiation plans for cases with four beams (each divided into 1×1 cm² beamlets). Optimized fields were sequenced for SMLC using Bortfeld's technique and for DMLC using a sliding window algorithm with partial synchronization. Ion chamber and film measurements were made for each technique at 5 cm depth in a phantom for delivery at 400 mu/min. Each field was evaluated for the total number of monitor units because of concern about transmission dose and for delivery time because PBI treatments will be respiratory-gated. Dosimetric differences between SMLC and DMLC fields were dependent on the field modulation. The tongue-and-groove effect was seen for some SMLC fields. In fields with steep modulation, DMLC fields showed additional dose adjacent to hot beamlets because of leaf synchronization. The number of required monitor units for individual cases was 30-70% greater for DMLC compared to SMLC delivery. However, the dose outside the field for each technique agreed to within measurement error. For the fields studied, the DMLC delivery time ranged from 30-80% less than for SMLC. This analysis shows that for the respiratory-controlled treatments for PBI IMRT, tradeoffs of time and delivery-related dosimetric effects must be considered.

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