

AbstractID: 7020 Title: Stereotactic radiotherapy for lung cancer using flattening filter free accelerator

Purpose: To assess the feasibility of stereotactic radiation therapy for lung cancer using photon beams from an accelerator operated without a flattening filter. To determine potential benefits and drawback of using unflattened beams for this type of treatment.

Methods and Materials: Treatment plans were generated for 10 lung cancer patients with small, less than 3 cm diameter, isolated lesions using a dose prescription of 12.5 Gy/fx, the standard for these treatments in our clinic. Plans were generated with Eclipse 8.0 (Varian Medical Systems) commissioned with beam data measured on a Clinac 21EX (Varian Medical Systems) operated with and without the flattening filter. For each patient two plans were generated, one with and one without the flattening filter. All patients were forward planned using wedges and/or static multileaf collimator with one or two segments per field.

Results: Removal of the flattening filter increased the dose rate. For 6 MV beams the total beam-on time per plan was lower by a factor of 2.31 ± 0.02 in plans with unflattened beams. The median beam-on time per field was reduced from 37s with the filter to 15s without one, suggesting the feasibility of breath-hold treatments with unflattened beams for a majority of patients. These comparisons were made assuming the same current of electrons incident on the bremsstrahlung target. The median difference between maximum and minimum doses in the planning target volume divided by the mean target dose was 0.21 with, and 0.22 without the filter. Differences in doses to organs at risk were within approximately ± 10 cGy without significant advantage of one modality over another.

Conclusion: Dose distributions in treatment plans with unflattened beam were close to those achieved with flattened beams, but required substantially lower beam-on time, increasing the feasibility of breath-hold gated treatments.

Conflict of Interest: Research is sponsored by Varian Medical Systems.