AbstractID: 6400 Title: Intensity Modulated radiotherapy of Breast Cancer Using Direct-Machine-Parameter-Optimization

Purpose: To design an efficient step-and-shot IMRT technique for breast CA and compare the results with other established treatment planning techniques.

Methods and Materials: The technique was based on a modified Direct Machine Parameter Optimization (DMPO) method, where some of the inversely optimized segments were adjusted by the user in order to allow for skin "fall-off". During DMPO, the optimized fluence was converted into segments where the segment shape and weight became part of the optimization; thereby, forcing segments that did not satisfy the requirements to be discarded. A set of 20 breast CA patients was used to develop the technique and compare it with a 3D-conformal with optimized wedges and a forward-optimized technique with manually defined segments.

Results: Dose distribution and DVH analysis of all patient plans resulted superior PTV coverage with better dose homogeneity and lower lung and heart doses for our IMRT technique, compared to the two other techniques. The number of segments can be controlled by the user and the resulted MUs for delivery are less that those needed for the 3D-conformal with optimized wedges technique.

Conclusions: DMPO can be effectively used on a routine breast IMRT treatment planning since it allows the user to modify the number and shapes of selected segments quickly and efficiently. Thus, this method solves the issue of patient and PTV setup uncertainty and motion by allowing the creation of "fall-off" defined by the user, on patient-to-patient basis. The technique can be easily extended to 4-field plans were the two anterior and posterior oblique fields are added for more complex PTVs. Dose uniformity to the PTV (due to the electronic compensation) and lower doses to the lungs and heart are the major advantages of our method.