# AbstractID: 3543 Title: Clinical Evaluation of Direct Machine Parameter Optimization Algorithm for Head and Neck IMRT Treatment

**Purpose:** Because many critical structures are in close proximity to target volumes, cancers of the head and neck (H&N) are often suited for treatment with IMRT. However, the time required to generate and deliver a clinically acceptable IMRT plan can be significantly longer than a conventional plan. This study evaluated a new inverse planning algorithm, DMPO (direct machine parameter optimization), with attention to parameter settings, plan quality and treatment efficiency for H&N cancers.

**Method and Materials:** The Pinnacle treatment planning system version 7.4 was used. The DMPO allows users to limit the number of total MLC segments (N) for treatment. After a user-defined number of iterations (*n*) for pencil beam optimization, the DMPO generates MLC segments for each field for dose calculations using a convolution algorithm. Both the MLC leaf positions and the weight of each segment are then optimized until cost tolerance or iteration number is reached. Treatment plans generated using DMPO were compared with H&N cases that were previously treated using an older version (6.2). The plan quality was compared using cost functions and DVHs of target volumes and critical structures. The total monitor units and MLC segments for treatment were compared for different combinations of *n* and N.

**Results:** The DMPO provided plans of DVHs similar to clinical cases with significantly less planning time. More importantly, the total MU and MLC segments for treatment delivery were reduced by 40% to 50%. Cost functions changed only slightly on *n* and N and total MU increased as *n* increased, but was independent of N. Our preliminary data indicated a combination of *n*=10-15 with 10 segments per field appeared to be optimal for most H&N cases.

**Conclusion:** The DMPO algorithm generated more efficient plans while providing equal or better quality than the previous plans for IMRT treatment.