

AbstractID: 2816 Title: Clinical feasibility of "jaws-only" IMRT using Direct Aperture Optimization

Purpose: To demonstrate the clinical feasibility of delivering IMRT treatment plans using only independent collimators.

Method and Materials: The Direct Aperture Optimization (DAO) technique is used to optimize the jaw positions and the relative weights assigned to each aperture. Since all of the delivery constraints imposed by the jaws are incorporated into the optimization, the need for leaf sequencing is eliminated. This allows for "jaws-only" IMRT plans with a significantly reduced number of segments as compared with "jaws-only" plans produced with the traditional two-step IMRT approach. We applied the DAO "jaws-only" technique to three clinical cases: an abdomen, a prostate, and a head and neck. For each case, "jaws-only" DAO (JODAO) plans were produced with 5, 10, 15, 20, and 25 apertures. For comparison, a DAO plan was created that utilized an MLC (MLCDAO). The resulting JODAO and MLCDAO plans were delivered to a phantom using an Elekta Precise linear accelerator.

Results: The results demonstrate that between 15 and 25 "jaws-only" apertures are required per beam direction to obtain conformal IMRT treatment plans that are comparable to the MLCDAO plans. The delivery times for the JODAO plans were between 15 and 20 minutes. This compares to the delivery times of 7 to 12 minutes for the MLCDAO plans.

Conclusions: Using DAO, it is possible to create IMRT treatment plans that utilize only independent collimators. In addition, these "jaws-only" plans can be delivered in a reasonable amount of time. This can make IMRT feasible in clinics which have linear accelerators not equipped with an MLC.