AbstractID: 9072 Title: dynamic delivery of IMRT using independent jaws

Purpose: This study aims to evaluate a jaw-trajectory algorithm for delivering intensity-modulated beams using independent jaws in dynamic mode. **Method and Materials:** The algorithm builds up an optimization model for the problem of generating jaw trajectories for a desired beam intensity map and solves the problem with adaptive simulated annealing technique. Like leaf trajectory for MLC, a jaw trajectory is composed of a series of control points. When delivering a beam in dynamic mode, all four conventional jaws move continuously and independently. The performance of the proposed algorithm was evaluated through comparing the delivery time of dynamic jaws (DJaw) with that of dynamic MLC (DMLC) for 74 intensity maps of prostate cases and 45 maps of nasopharynx cases. The preconditions for the comparison were that MLC leaves had a width of 1 cm; MLC Leaf trajectories were generated with the algorithm proposed by Spirou et al (Med. Phys, 1994); DJaw delivered desired intensity maps as accurately as or even more accurately than DMLC. **Results:** DJaw delivery time was 1.8 ± 0.76 and 2.6 ± 1.6 times of DMLC's for 74 intensity maps of prostate cases and 45 large-size intensity maps of nasopharynx cases respectively. For 8 prostate maps, DJaw delivery time actually was shorter than DMLC's, because those maps were small and had minor intensity modulations. **Conclusion:** Although the delivery time of DJaw usually is longer than that of DMLC, and the difference increases with the size and the complexity of intensity map, the absolute delivery time of DJaw is expected to be 20mins or less. Plus its advantages (i.e., continuous spatial resolution, sharper penumbra, no interleaf leakage or tongue and groove effect, low cost and easy maintenance) over DMLC, DJaw has the potential to become the choice of some (small) institutes for their IMRT practice.