AbstractID: 7593 Title: Inverse planning ability to protect the bulb of the penis in HDR-brachytherapy

The objective of this work is to evaluate the ability to protect the bulb of the penis with an inverse planning (IP) dose optimization for HDR-brachytherapy of the prostate. CT scans are used for CT-based dose planning. Target (PTV) and organs at risk, usually including urethra, bladder and rectum are contoured. Once the catheters are digitized and the anatomy is contoured, our in house IP routine based on simulated annealing is called. This dose optimization tool determines which of all possible dwell positions will become active and calculate the dwell time values to fulfill dose constraints applied on each target and each organ at risk. This method has been used for 27 prostate treatments. Once the anatomy is contoured, the IP routine found the solution to the dose constraints in 34 seconds of CPU time in average. The IP routine generated treatment plans with conformal dose distribution around the target. The average V100, V150 and HI are respectively 96%, 34% and 62%. Afterward, the bulb of the penis has been contoured on 17 cases. For each case, the IP routine was called a second time to take into account this new volume. In average, the V75 of the dose to the bulb of the penis is reduced to 80% for a small penalty of 2% on the target coverage. This dose optimization tool reduced significantly the planning time and opens the possibility to protect organs at risk such as the bulb of the penis. Research supported by Nucletron Corporation.