

AbstractID: 11501 Title: Effect of Rectal Balloon Filling Content on Rectal Wall Dose Distribution in Prostate Radiotherapy

Purpose: To estimate the dose difference at the level of the rectal wall for air- and water-filled rectal balloons for conformal and IMRT prostate treatment plans. **Method and Materials:** A Radiadyne rectal balloon was filled with 100 cc of either air or water and placed in water equivalent phantom. CT simulations of the phantom were performed with air and water-filled balloons. Eight marked points along the circumference of the balloon were identified. Treatment fields for both conformal and IMRT prostate plans were copied and calculated on both phantom image sets using the Varian Eclipse TPS v8.1 (AAA). Thermoluminescent detectors (TLDs) were then positioned at each of the 8 marked positions. A treatment fraction was delivered to the phantom using a Varian 2300 IX, 15MV photon beam. The dose measured at corresponding positions was then compared between water vs. air and against the Eclipse calculated dose. **Results:** The measurements confirm a difference in dose deposited along the rectal wall for air- and water-filled rectal balloons. Points along the anterior rectal wall saw an increase in dose for water-filling relative to air-filling, while points along the posterior rectal wall exhibited a reduction in dose for water-filling relative to air. The average dose increase along the anterior wall for IMRT and conformal plans was 12% (range 10-15%; IMRT) and 7% (range 3-13%; conformal) respectively, while the average dose decrease along the posterior wall was 7% (range 3-11%; IMRT) and 11% (range 0-18%) respectively. **Conclusion:** This study demonstrates the need for careful consideration when implementing rectal balloons clinically, as a dose increase of 12% could result along the anterior rectum for water-filling vs. air-filling.