

**Purpose:**

We have initiated a phase I/II prostate SBRT trial using doses up to 50 Gy delivered in 5 fractions. With the small requisite margins, intrafraction prostate motion may compromise target coverage and/or dose to organs at risk. The purpose of this study is to investigate CTV coverage and dose to normal tissues, in the presence of intrafraction prostate motion, when different PTV margins and rectal immobilization strategies are employed.

**Methods:**

Nine prostate cancer patients treated with a rectal balloon and stereotactic body frame were selected for this study. Patients received 50 Gy in five fractions delivered with 13 coplanar 10 MV photon beams. The SBRT plans used 0, 1, 2, and 3mm PTV margins. The tracking data from the Calypso Localization System were used to calculate motion probability density functions (PDFs). Calypso tracking data from conventionally fractionated prostate patients, treated without rectal balloons, were used to generate another set of PDFs. The planned static dose distributions were convolved with the PDFs to generate the delivered dose distributions. The planned and delivered doses were evaluated.

**Results:**

The mean planned dose to the CTV, PTV and bladder was slightly higher than the delivered dose. The CTV volume covered by the prescription dose decreased when intrafraction motion is accounted for, but remains 100% with 3mm margins and greater than 97% for no PTV margin. The mean planned dose to anterior rectal wall was less than the delivered dose and the conventionally fractionated group was higher than the SBRT group.

**Conclusions:**

This study demonstrates that the dosimetric impact of intrafraction motion during prostate SBRT delivery with 3mm margins is not clinically significant with or without a rectal balloon. Use of a rectal balloon can reduce the delivered dose to the rectum and the severity of early bowel toxicity.