AbstractID: 9170 Title: Clinical utility of a portable ultrasound bladder scanner in prostate external-beam radiation therapy

Purpose:
External-beam radiation prostate patients are treated with a full bladder to minimize the amount of bladder in the field, to maintain a reproducible daily setup during treatment and to push the bowel away from the target volume. This work investigates the feasibility of using a portable hand-held ultrasound scanner, the BladderScan® (Verathon, Bothell, WA), to determine the degree of bladder fullness before each treatment.

Method and Materials:
First, the accuracy of the bladder scanner (BS) relative to volume estimates from axial and sagittal ultrasound images was examined. Daily ultrasound images were acquired immediately before treatment for each of five patients with a B-mode Acquisition and Targeting (BAT) ultrasound system (Best Nomos, Cranberry Township, PA). Bladder volume was estimated from the images by taking orthogonal measurements and using the formula 0.72*x*y*z. The BS was also used to determine bladder volume before each treatment, and the results were compared with the corresponding BAT measurements. Second, the accuracy of the BS relative to computed tomography (CT) was investigated. For a number of patients, the BS was used to measure bladder volume shortly after the simulation CT scan was acquired. The BS measurements were then compared with the bladder contour volumes calculated by a treatment planning system.

Results:
A strong correlation was found (r = 0.87 for all five patients combined) between the daily bladder volume estimated from BAT images and the BladderScan measurements. Preliminary results for 38 patients indicate that there is also a correlation between CT and BS volumes (r = 0.59).

Conclusion:
The bladder scanner provides a reasonable estimate of daily bladder volume. It is more efficient than BAT for this purpose, and could potentially be used to determine daily bladder volume for post prostatectomy patients as well as those with implanted fiducials.