

AbstractID: 11236 Title: Comparison of Pre- and Post-Implant Prostate Volume Segmentation Using Trans-Rectal Ultrasound and Computed Tomography

Purpose: To quantitatively evaluate differences in prostate volume measurements via transrectal ultrasound (TRUS) and computed tomography (CT) used for dosimetric planning in prostate brachytherapy.

Method and Materials: Prostate volume measurements were made in 83 prostate brachytherapy patients. One to two weeks prior to implantation, patients were placed in the dorsal lithotomy position, and prostate volumes were measured via TRUS. Immediately afterward, patients were rescanned using CT to allow for comparison of CT and TRUS measurements. On treatment day, patients were rescanned via TRUS before and after implantation and were rescanned by CT within an hour after procedure completion. The prostate and urethra were delineated by the same physician on all scans, and prostate volumes were calculated.

Results: Substantial correlation was found between pre-/post- implant prostate US volumes ($R^2=0.7998$), pre-/post- implant CT volumes ($R^2=0.7872$), and pre-implant US and post-implant CT volumes ($R^2=0.8352$). However, it was found that the difference between pre- and post-implant volume measurements varied with the combination of modalities compared. For pre- vs post-implant TRUS, post-implant prostate volumes averaged 26.1% larger than those measured prior to treatment. For pre- vs. post- implant CT, post-implant measurements averaged 58.9% greater. Post-implant CT measurements averaged 23.8% greater than post-implant TRUS measurements.

Conclusion: While it would be ideal to use the same method to measure pre- and post-implant volumes, this is not generally practiced. Prostate volumes measured using TRUS and CT show a distinct relationship, but it is important to note that this does not mean that the modalities provide the same values for the same prostate. In addition, the relationship between pre-implant TRUS and CT is not identical to that between post-implant TRUS and CT. Therefore, it is not possible to state that accurate comparison of pre- and post-implant dosimetric plans can be accomplished when different imaging modalities are used for each.