AbstractID: 8718 Title: Investigation to replace CT by MRI in post-implant dosimetry of prostate permanent brachytherapy

Purpose: To investigate the use of MRI alone in post-implant dosimetry for prostate permanent brachytherapy.

Method and Materials: A patient's pelvic MRI was ordered 30 days post implant in addition to the CT scan. The MR images were acquired using all standard pulse sequences. T2 weighted in-phase images were used to delineate the prostate and out-of-phase images to localize the implanted seeds. A post-implant plan was generated on the MR images. We compared the results of MRI based dosimetry to CT based as well as CT/MRI fused techniques.

Results: Phantom studies were performed. A number of dummy seeds were implanted in a tissue-equivalent phantom and scanned on a Siemens 1.5T MR scanner. The out-of-phase MR images manifested significant signal loss artifacts at the seed locations due to susceptibility effects, resulting in enhanced seed visualization. After IRB approval, we acquired the post-implant CT and MRI for a seed implant patient. The dose coverage based on the CT images was 99.9%. A CT/MRI fusion modified the dose coverage to 90%. After seed localization from the out-of-phase MR images, a post-implant plan was generated on the MR images. The dose coverage was 91.4%.

Conclusion: Phantom and patient studies demonstrated the potential to use MRI alone in prostate post-implant dosimetry. Further investigation will be required to validate this technology.

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