

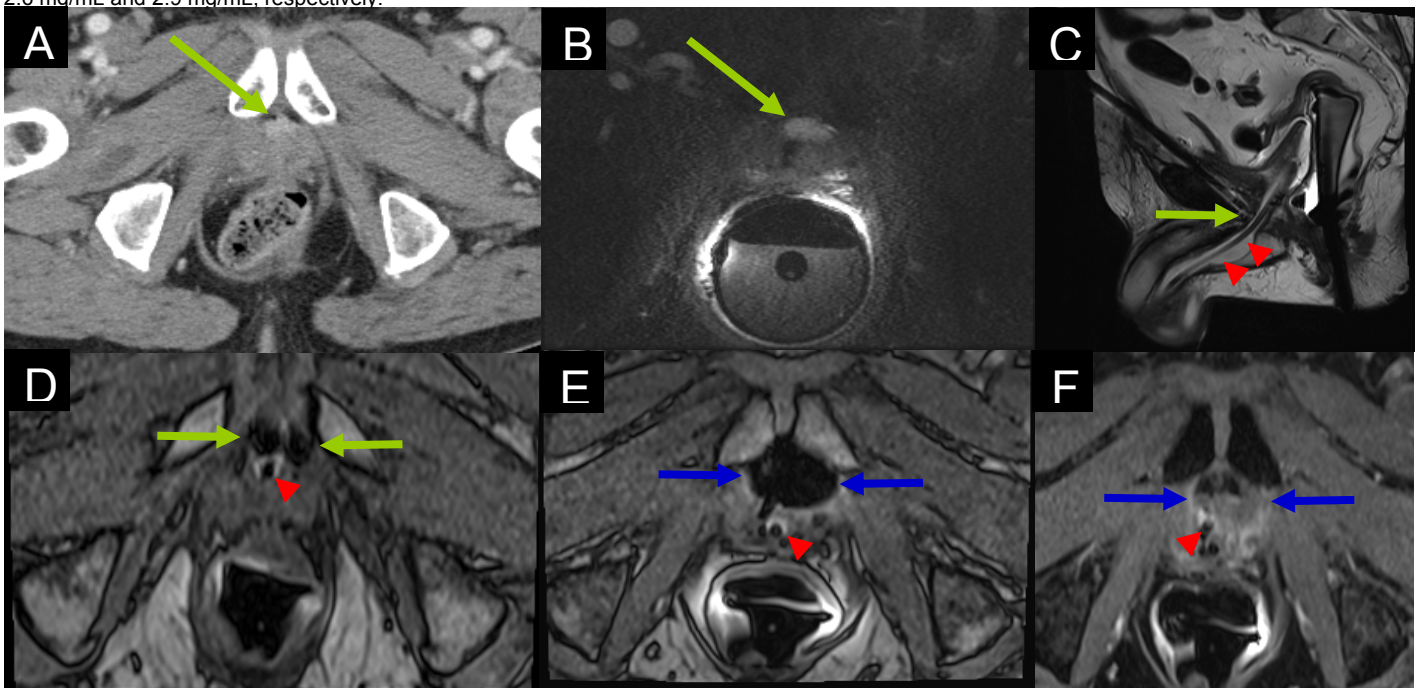
## MR-Guided Trans-perineal Cryoablation of Locally Recurrent Prostate Adenocarcinoma Following Radical Prostatectomy

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**Background:** Besides skin cancer, prostate cancer is the most common cancer in American men. In 2005, the American Cancer Society (ACS) estimated that 232,090 new cases of prostate adenocarcinoma cancer (PAC) were diagnosed in the United States alone(1). However, prostate cancer recurrence following definitive therapy can be as high as 25% after 15 years (2). Local recurrences of PAC are associated with a significant risk of disease progression (3). The current standard of therapy is salvage external beam radiation therapy. However, the local tumor control rate with irradiation for palpable recurrence in patients who have undergone radical prostatectomy ranges from 58-100% (4). Detection of these local recurrences can be achieved using serial PSA coupled with dynamic contrast enhanced (DCE) MRI (5). Our hypothesis is that MR-guided cryoablation can be used in the setting of prostate bed PAC recurrence to perform a precise image-guided focal ablation.

**Methods:** This was a retrospective review under IRB approval of two patients with prior radical retropubic prostatectomy(RRP) and focal abnormalities in the prostate bed on DCE MRI, which were subsequently found to be biopsy-proven recurrent PAC were treated using MR-guided cryoablation (Galil Medical, Minneapolis, MN). Lesions ranged from 9-17mm and were located in the prostate bed. Patients had no known other metastases at the time of treatment. Imaging was performed using a wide-bore 1.5T MRI (Espree, Siemens Healthcare, Erlangen, Germany). For either ablation, 2-3 probes were used in each case. Probes were placed in position under intermittent MR guidance and using a MR compatible perineal guidance template (Visualase, Houston, TX). A MRI compatible urethral warming catheter (Galil Medical, Yokneam, Israel) was used to prevent urethral thermal damage during the ablation. Sequential intra-procedural MR imaging was used during the procedure to monitor ablation zone growth with procedure treatment duration determined by ablation zone coverage of the lesion.

**Results:** Both patients with recurrent prostate cancer in the prostate bed were successfully treated with MR-guided cryoablation. Figure 1 demonstrates images from a patient treated with MR-guided cryoablation. Panel A shows contrast enhanced CT revealing abnormal enhancement anterior to the urethral anastomosis (Green arrow). Panel B is a DCE, T1-weighted liver acquisition with volume acquisition (LAVA) MRI with endorectal coil showing similar results with better delineation of tumor margin (Green arrow). Panel C demonstrates a sagittal T2-weighted TSE image during MR-guided probe placement (Green arrow) anterior to the urethral anastomosis from a retropubic approach with the urethral warming catheter also in place (Red arrowheads). Panel D demonstrates final tip position after placement of two retropubic probes on axial T1-weighted volume interpolated breathhold examination (VIBE) without fat saturation (Green arrow). Panel E shows axial image of maximal iceball formation from the two probes anterior to the urethra (Blue arrows) and urethra posterior to the ablation zone (Red arrowhead). Intraprocedural MR monitoring with ice ball growth imaging allowed tailoring of treatment duration to lesion size. Immediate post-ablation DCE MRI (Panel F) demonstrated no discrete residual tumor enhancement (Blue arrows) with urethra just posterior to the ablation zone (Red arrowhead). All patients retained continence and potency after the procedure similar to their preprocedural baseline. Post ablation PSA level declined to undetectable (less than 0.10 mg/mL) and 0.11 mg/mL compared to pre-ablation values of 2.6 mg/mL and 2.9 mg/mL, respectively.



**Conclusions:** These are the first known cases of salvage MR-guided ablation therapy for PAC recurrences and cryoablation. These demonstrate feasibility and safety of MR-guided cryoablation in the post-surgical prostate bed.

### References:

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