



Memorial Sloan Kettering
Cancer Center

Rising PSA post HIFU

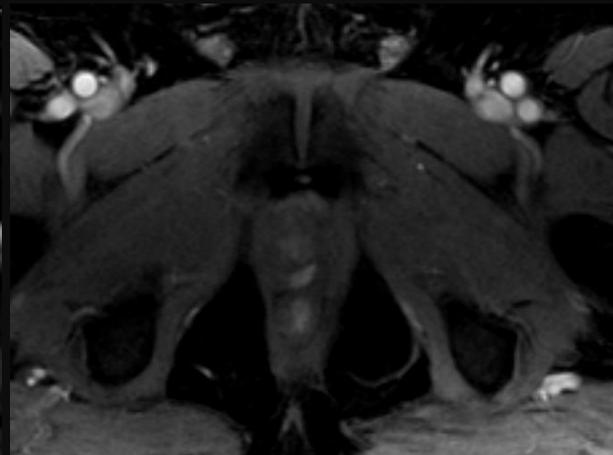
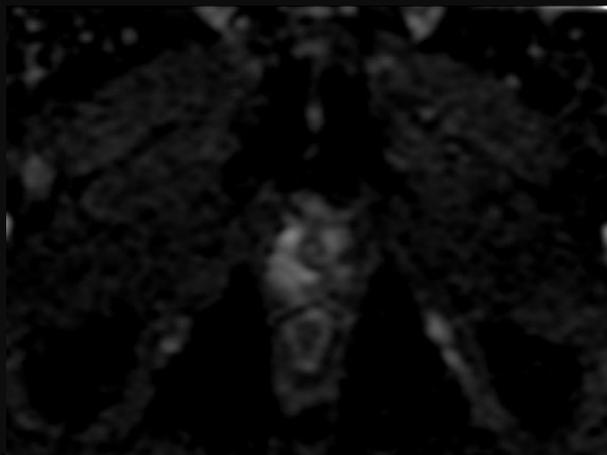
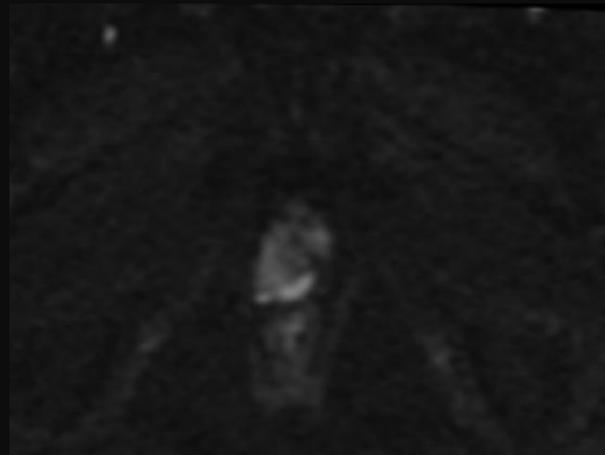
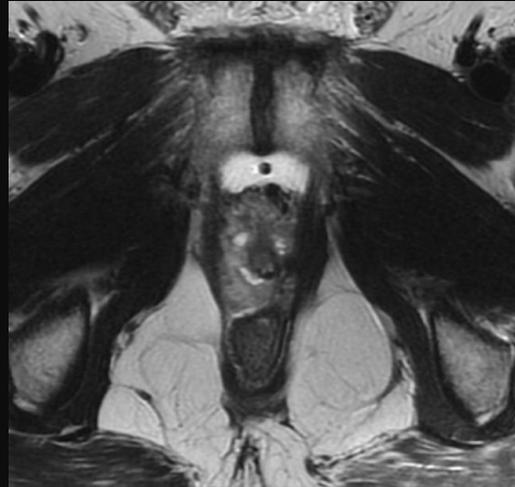
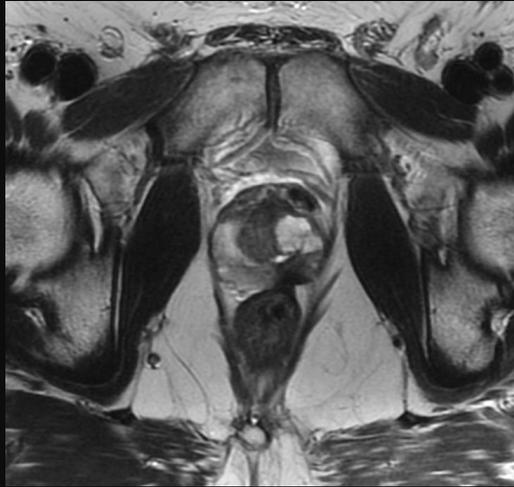
Alberto Vargas, MD
Chief, Body Imaging Service
Director of Genitourinary Radiology
Sloan-Kettering Cancer Center
New York

Soleen Ghafoor, MD
Fellow Oncologic Body Imaging
Sloan-Kettering Cancer Center
New York

58 year old patient with rising PSA after HIFU for Gleason 3+3 prostate cancer 6 years prior.

PSA 4.2 ng/mL (post-HIFU nadir 0.8 ng/mL).

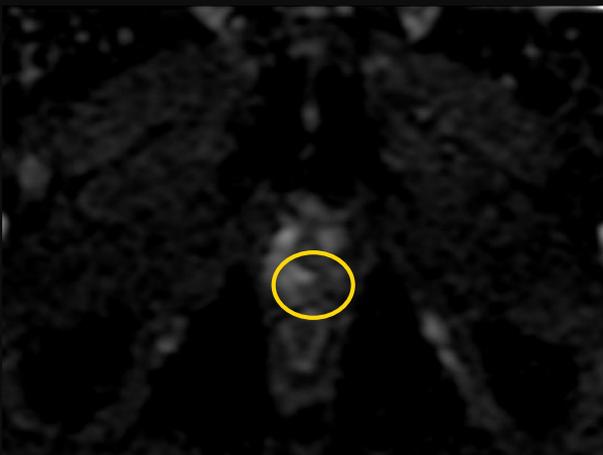
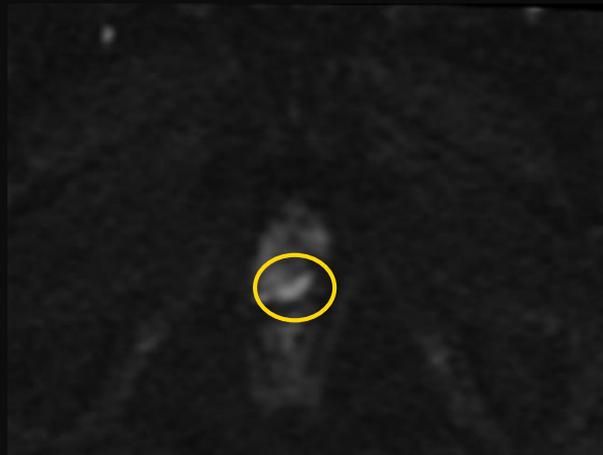
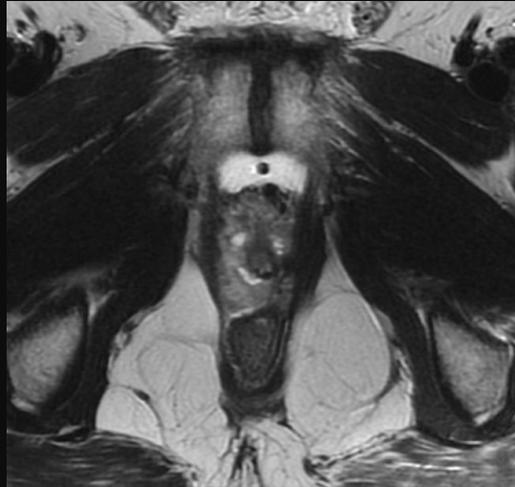
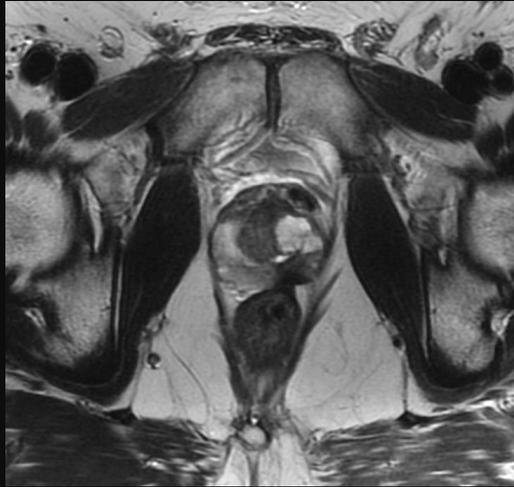




Select this color scheme for tables



Memorial Sloan Kettering
Cancer Center



Select this color scheme for tables



Memorial Sloan Kettering
Cancer Center

T2-weighted images show a small volume gland (22 cc) with distorted zonal anatomy, low signal scarring and fibrosis in the left posterior mid gland to apex without a clearly conspicuous lesion.

On diffusion weighted images, a focal lesion in the posterior midline apex next to the ablation zone is seen with corresponding early enhancement on dynamic contrast-enhanced images, suspicious for recurrent tumor.



Salvage robotic-assisted laparoscopic prostatectomy:
Gleason 3+4 Prostate Cancer (posterior apex)



Teaching Points (1/2)

Several focal therapies exist for the treatment of localized low-risk to intermediate risk prostate cancer (e.g. high-intensity focused ultrasound, cryotherapy, photodynamic therapy).

High-intensity focused ultrasound is based on conversion of mechanical energy into heat generating a cavitation effect leading to coagulation necrosis and is conducted under transrectal ultrasound guidance.

The MR imaging appearance of the prostate after HIFU depends on the **timing** after the procedure.

Early findings (within the **first month**) include periprostatic edema, loss of zonal differentiation, **swelling of the treated zone** (sometimes extending beyond the normal boundaries of the prostate gland resulting in “bulging” of the ablation zone), hemosiderin deposition as well as a **central non-enhancing area** surrounded by a reactive rim of hyperperfusion (sometimes the necrosis can extend to the periprostatic fat). **Later findings** (around **6 months and later**) include constriction of the ablation zone with **volume loss**, thickening of the prostatic capsule, and **low T2 signal periprostatic fibrosis and scarring**.



Teaching Points (2/2)

In the post-treatment setting, evaluation of anatomic T2-weighted sequences is often compromised by treatment-related changes and evaluation **largely depends on DWI/ADC and DCE**.

While bi-parametric MRI is increasingly used in the treatment- and biopsy-naïve setting, **DCE is essential in the treated prostate** (after hormonal, surgical, radiation or focal therapy).

Two at-risk zones for recurrent or residual tumor after HIFU exist:

- **Anterior gland**: This location is more difficult to access and commonly lies beyond the focal point of the transducer.
- **Apex**: due to the close proximity of the external sphincter, a safety margin is commonly used to spare this area and thus places the apex at increased risk for residual/recurrent tumor.



References

Location of residual cancer after transrectal high-intensity focused ultrasound ablation for clinically localized prostate cancer. Boutier R, Girouin N, Cheikh AB, Belot A, Rabilloud M, Gelet A, Chapelon JY, Rouvière O. BJU Int. (2011)

Multiparametric MRI for Suspected Recurrent Prostate Cancer after HIFU: Is DCE still needed Lotte, R., Lafourcade, A., Mozer, P. et al. Eur Radiol (2018)

MR imaging of treated prostate cancer. Vargas HA, Wassberg C, Akin O, Hricak H. Radiology (2012)

MR Imaging of Prostate after Treatment with High-Intensity Focused Ultrasound
Alexander P. S. Kirkham, Mark Emberton, Ivan M. Hoh, Rowland O. Illing, A. Alex Freeman, and Clare Allen. Radiology (2008)

Valerio M, Ahmed HU, Emberton M et al. The role of focal therapy in the management of localized prostate cancer: a systematic review. Eur Urol (2014)

The role of MRI for detection and staging of radio- and focal therapy-recurrent prostate cancer
van der Poel, H., Grivas, N., van Leeuwen, P. et al. World J Urol (2019)

