TRA-MINW

MRI Pelvis Protocol – Prostate 3T Only

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Last Reviewed: July 2018

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Standard uses: Elevated PSA with negative biopsy, elevated PSA prior to biopsy (provide target), recent diagnosis of prostate cancer with concern for extra-capsular extension.

Notes: This examination can only be ordered by urologists.

The patient should ideally be 6 weeks post biopsy (if not consult radiologist).

The following information should be available to the radiologist at the time of MRI exam performance and interpretation:

1. Recent serum prostate-specific antigen (PSA) level and PSA history
2. Date and results of prostate biopsy, including number of cores, locations and Gleason scores of positive biopsies (with percentage of core involvement when available)
3. Other relevant clinical history, including digital rectal exam (DRE) findings, medications (particularly in the setting of hormones/hormone ablation), prior prostate infections, pelvic surgery, radiation therapy, and family history

1.5T should be considered when a patient has an implanted device that has been determined to be MR conditional at 1.5T, but not at 3T.

1.5T is preferred when patients are safe to undergo MRI at 3T, but the location of an implanted device may result in artifact that could compromise image quality (e.g., bilateral metallic hip prosthesis).

Patient prep: Should be NPO for >4 hours prior to study if possible. Have patient void before examination. The patient should evacuate the rectum, if possible, just prior to the MRI exam. If an ERC is not used and the rectum contains air on the initial MR images, it may be beneficial to perform the mpMRI exam with the patient in the prone position or to decompress the rectum using suction through a small catheter.

Oral contrast: None.

Coil: Body coil.

Coverage: Position the coil such that there is good coverage and signal from the prostate.

Intravenous contrast:

Dose: 0.1mmol/kg standard GBCA or equivalent high relativity GBCA

Injection rate: 2-3cc/sec starting with continuous image data acquisition (should be the same for

all exams)

Anti-peristaltic agent: None.

Sequences:

1. **Localizer**
    a. FOV - 400mm
    b. 6mm thickness
    c. TR 7.8
    d. TE 3.69

2. **Localizer #2 (re-center on prostate)**
    a. FOV - 400mm
    b. 6mm thickness
    c. TR 7.8
    d. TE 3.69

3. **Sagittal T2 fast SE (Turbo SE, Fast SE)**
    a. FOV - 160 mm
    b. Goal parameters
        i. 3mm thickness
        ii. TR 6000
        iii. TE 100
        iv. Averages - 2
        v. Concatenations - 2
        vi. Phase – R-L

4. **Axial T2 fast SE (Turbo SE, Fast SE)**
    a. FOV - 160 mm
    b. Goal parameters
        i. 3mm thickness
        ii. TR 6000
        iii. TE 100
        iv. Averages - 2
        v. Concatenations - 2
        vi. Phase – R-L

5. **Axial DWI/ADC**
    a. Free breathing
    b. FOV – 210 mm (center slice to T2 axial)
    c. Goal parameters = 50/600/1350

6. **Coronal T2 fast SE (Turbo SE, Fast SE)**
    a. FOV - 160 mm
    b. Goal parameters
        i. 3mm thickness
        ii. TR 6000

iii. TE 100
iv. Averages - 2
v. Concatenations - 2
vi. Phase – R-L

7. **Axial T1 fast SE (Turbo SE, Fast SE) Small FOV**
    a. FOV = 160mm
    b. TR 440
    c. TE 12
    d. Averages – 2
    e. Concatenations – 5
    f. Phase – R-L

8. **Axial T1 Large FOV In-Out Phase**
    a. To cover from iliac crest to pelvic floor
    b. FOV – 380 mm
    c. 6 mm slice thickness
    d. TR 180
    e. TE – 1.54
    f. TE – 2.86
    g. Averages – 1
    h. Concatenations – 2
    i. Phase – A-P

9. **T2 STIR Axial Large FOV**
    a. To cover from iliac crest to pelvic floor
    b. FOV – 380 mm
    c. TR 4220
    d. TE -113.0
    e. Averages – 1
    f. Concatenations – 5
    g. Phase A-P

10. **T1 PRECONTRAST Dynamic 3D-GE with fat suppression (T1 VIBE, LAVA, TIGRE) Large FOV**
    a. FOV – 380 mm
    b. 5 mm slice thickness
    c. TR – 3.47
    d. TE – 1.26
    e. Averages – 1
    f. Concatenations – 1
    g. Phase – A-P

11. **T1 PRECONTRAST Dynamic 3D-GE with fat suppression (T1 VIBE, LAVA, TIGRE) Small FOV**
    a. FOV – 160 mm
    b. 3 mm slice thickness
    c. TR – 3.70
    d. TE – 1.39
    e. Averages – 1

f. Concatenations – 1
g. Phase – A-P

12. POSTCONTRAST T1 Ultra fast 3D-GE with fat suppression (VIBE, LAVA, TIGRE) – Axial Small FOV

a. Contrast – start contrast 5 seconds into first measurement
b. FOV – 160 mm
c. 3 mm slice thickness
d. TR – 3.70
e. TE – 1.39
f. Averages – 1
g. Concatenations – 1
h. Measurements – 12
i. Phase – A-P

13. POSTCONTRAST T1 Ultra fast 3D-GE with fat suppression (VIBE, LAVA, TIGRE) – Axial Large FOV

a. FOV – 380 mm
b. 5 mm slice thickness
c. TR – 3.47
d. TE – 1.26
e. Averages – 1
f. Concatenations – 1
g. Phase – A-P

14. Axial T2 fast SE (Turbo SE, Fast SE) - Additional

a. FOV - 200 mm
b. Goal parameters
    i. 3mm thickness
    ii. TR 3752
    iii. TE 100
    iv. Averages - 3
    v. Concatenations - 2
    vi. Phase – R-L

15. Subtraction images should be included for all post-contrast imaging

Radiologist's perspective:

Advances in technology (both in software and hardware) have led to the development of multiparametric MRI (mpMRI), which combines anatomic T2W with functional and physiologic assessment, including diffusion-weighted imaging (DWI) and its derivative apparent-diffusion coefficient (ADC) maps, dynamic contrast-enhanced (DCE) MRI, and sometimes other techniques such as in-vivo MR proton spectroscopy. These technologic advances, combined with a growing interpreter experience with mpMRI, have substantially improved diagnostic capabilities for addressing the central challenges in prostate cancer care: 1) Improving detection of clinically significant cancer, which is critical for reducing mortality; and 2) Increasing confidence in benign diseases and dormant malignancies, which are not likely to cause problems in a man's lifetime, in order to reduce unnecessary biopsies and treatment.

Consequently, clinical applications of prostate MRI have expanded to include, not only locoregional staging, but also tumor detection, localization (registration against an anatomical reference), characterization, risk stratification, surveillance, assessment of suspected recurrence, and image guidance for biopsy, surgery, focal therapy and radiation therapy.

Please direct any questions or concerns to any of the body radiologists.

References

Weinreb JC, Barentsz JO, Choyke PL, Cornud F, Haider MA, Macura KJ, Margolis D, Schnall MD, Stern F, Tempany CM, Thoeny HC, Verma S. Weinreb JC. PI-RADS Prostate Imaging-Reporting and Data System:2015,Version 2. Eur Urol 2016;69(1):16-40