MET-RADS in 10 cases

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MET-RADS-P[1]
METastasis Reporting And Data System for Prostate Cancer

Imaging recommendations designed to promote **standardisation** and **diminish variations** in

ACQUISITION	INTERPRETATION	REPORTING

of Whole-body MRI (**WB-MRI**) in patients with Advanced Prostate Cancer

1. Padhani AR, et al. Eur Urol. 2017 Jan; 71(1): 81–92.

ACQUISITION

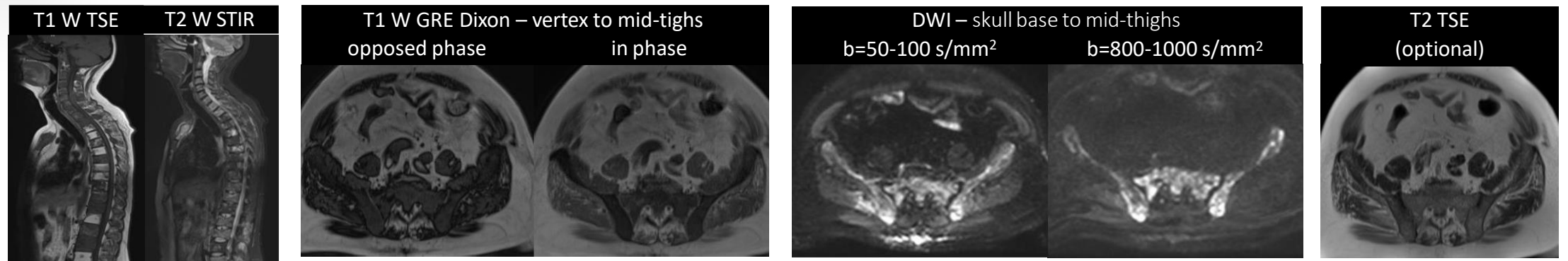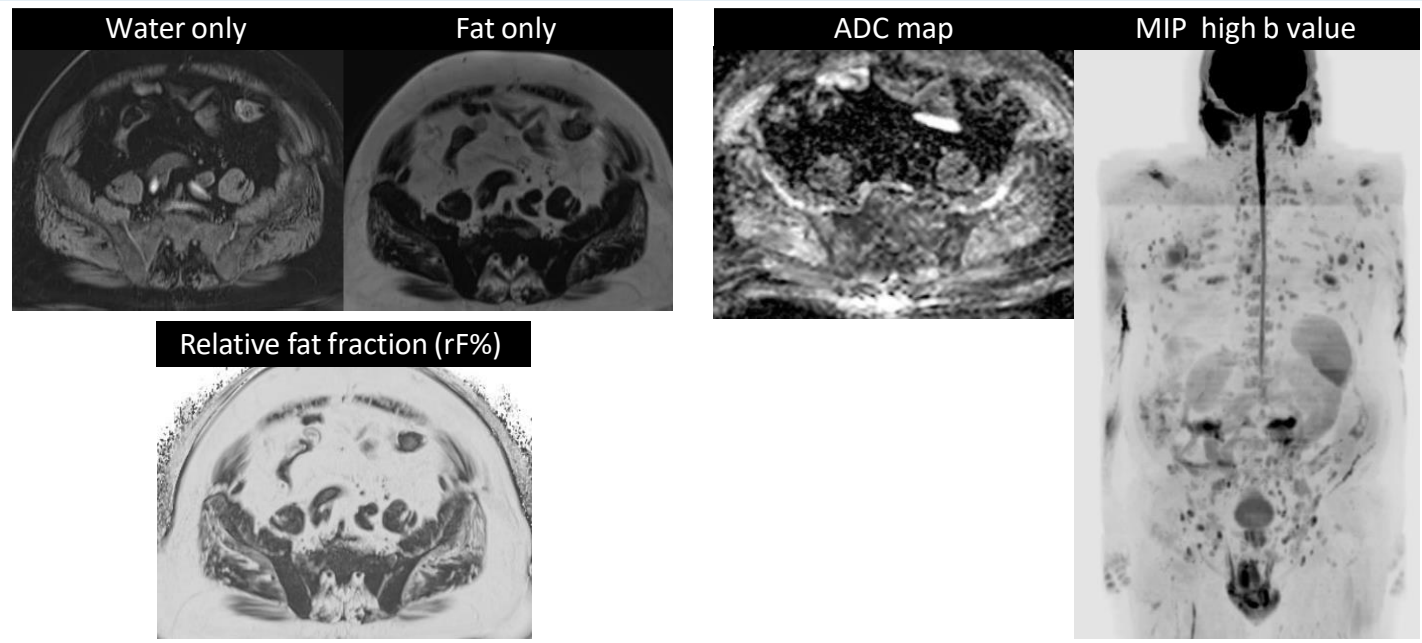|	Sequence description	Core protocol
1	**Whole spine–sagittal, T1 W, TSE**, 4–5 mm slice thickness	Yes
2	**Whole spine–sagittal, STIR** (preferred) or fat suppressed T2 W, 4–5 mm slice thickness	Yes
3	**Whole body (vertex to mid thighs)–T1 W, GRE Dixon** technique. **Fat image reconstructions** are mandatory • A 3D FSE T1 W sequence offering multiplanar capability may be performed as an alternative to replace sequences 1 and 3	Axial (5 mm) or coronal (2 mm)
4	**Whole body (skull base to mid-thighs)–axial, diffusion weighted,** STIR fat suppression, 5–7 mm contiguous slicing, multiple stations • **ADC calculations** with mono-exponential data fitting • Coronal b800–1000 multiplanar reconstructions • **3D-MIP** reconstructions of highest b-value images	2 b-values b50–100 s/mm² b800-–1000 s/mm²
5	**Whole body (vertex to mid thighs)–axial, T2 W, TSE** without fat-suppression, 5 mm contiguous slicing, multiple stations, preferably matching the diffusion weighted images	Option

ACQUISITION

	Sequence description	Core protocol	Extensions for comprehensive assessments
1	**Whole spine–sagittal, T1 W, TSE**, 4–5 mm slice thickness	Yes	–
2	**Whole spine–sagittal, STIR** (preferred) or fat suppressed T2 W, 4–5 mm slice thickness	Yes	–
3	**Whole body (vertex to mid thighs)–T1 W, GRE Dixon** technique. **Fat image reconstructions** are mandatory • A 3D FSE T1 W sequence offering multiplanar capability may be performed as an alternative to replace sequences 1 and 3	Axial (5 mm) or coronal (2 mm)	Axial and coronal
4	**Whole body (skull base to mid-thighs)–axial, diffusion weighted,** STIR fat suppression, 5–7 mm contiguous slicing, multiple stations • **ADC calculations** with mono-exponential data fitting • Coronal b800–1000 multiplanar reconstructions • **3D-MIP** reconstructions of highest b-value images	2 b-values b50–100 s/mm^2 b800-–1000 s/mm^2	3 b-values (additional b500–600 s/mm^2)
5	**Whole body (vertex to mid thighs)–axial, T2 W, TSE** without fat-suppression, 5 mm contiguous slicing, multiple stations, preferably matching the diffusion weighted images	Option	Yes
6	Regional assessments including dedicated prostate, small field of view spine, brain studies, and contrast enhancement	No	Yes

SEQUENCE COMPONENTS (core protocol)

T1 W TSE | T2 W STIR

T1 W GRE Dixon – vertex to mid-tighs
opposed phase | in phase

DWI – skull base to mid-thighs
b=50-100 s/mm² | b=800-1000 s/mm²

T2 TSE (optional)

RECONSTRUCTIONS

Water only | Fat only

ADC map | MIP high b value

Relative fat fraction (rF%)

INTERPRETATION

BONE METASTASES
(RECIST non-measurable)

Morphologic criteria
- Size/number
- Fat repopulation

Functional imaging (DWI)
- ADC for assessing response

MEASURABLE DISEASE
- Soft tissue lesions
- Lymph nodes
- Measurable bone metastases

RECIST 1.1[1] / PCGW3[2] criteria

1. Eur J Cancer. 2009 Jan;45(2):228-47.
2. J Clin Oncol. 2016 Apr 20;34(12):1402-18.

Response Assessment Categories (RAC)

	BONE METASTASES	SOFT TISSUES (LN, Visceral mets)
RAC 1 Highly likely to be responding	• Return of normal marrow (decrease in number/size, from diffuse to focal, sclerosis, fat dot/halo signs) • ↑ ADC (from ≤1400µm^2/s to >1400µm^2/s or ≥40% increase from baseline*)	• RECIST Complete response (CR) • RECIST Partial response (PR)
RAC 2 Likely to be responding	• Evidence of improvement, but not enough to fulfil criteria for RAC 1 • ↑ ADC (from ≤1000µm^2/s to <1400µm^2/s or >25% but >40% increase from baseline*)	• ↓ size not meeting RECIST 1.1 criteria for PR
RAC 3 No change	• No observable change	No observable change (SD)
RAC 4 Likely to be progressing	• Evidence of worsening disease, but not enough to fulfil criteria for RAC 5 (or equivocal new lesions, or relapse disease) • ↑ SI on high b value images (with ADC <1400µm^2/s)	• ↑ size not meeting RECIST 1.1 criteria for PD • Equivocal new lesions
RAC 5 highly likely to be progressing	• Unequivocal ↑in metastases number/size (or new pathologic fractures /cord compression requiring treatment, from focal to diffuse) • New lesions with high SI on high b-value and ADC 600-1000µm^2/s)	• RECIST Progressive Disease (PD)

- 7 bone regions
- 7 soft tissue regions

- Within each region:
  - Presence of disease (Y/N)
  - Primary RAC
  - Secondary RAC

- Overall assessment
  - Dominating patterns of response
  - Synthetic overview (CR/PR/SD/PD)
  - Mention of mixed response

MET-RADS Prostate Report

- 7 bone regions
- 7 soft tissue regions

- Within each region:
  - Presence of disease (Y/N)
  - Primary RAC
  - Secondary RAC

- Overall assessment
  - Dominating patterns of response
  - Synthetic overview (CR/PR/SD/PD)
  - Mention of mixed response

REPORTING

- 7 bone regions
- 7 soft tissue regions

- **Within each region:**
  - Presence of disease
  - Primary RAC
  - Secondary RAC

- Overall assessment
  - Dominating patterns of response
  - Synthetic overview (CR/PR/SD/PD)
  - Mention of mixed response

MET-RADS Prostate Report

Soft tissues — RECIST criteria
Bones — MET-RADS criteria

- 7 bone regions
- 7 soft tissue regions

- Within each region:
  - Presence of disease (Y/N)
  - Primary RAC
  - Secondary RAC

- Overall assessment
  - Dominating patterns of response
  - Synthetic overview (CR/PR/SD/PD)
  - Mention of mixed response

OVERALL ASSESSMENT	No dis	CR	PR	SD	PD	Mixed
Primary						Minor or major
Nodes						for progressive lesions
Viscera						overall SD/PR assessments
Bones			RAC 1/2	RAC3	RAC 4/5	