Society of Abdominal Radiology Colorectal & Anal Cancer Disease-Focused Panel
Rectal Cancer Pelvis MRI Protocol for GE 1.5T & 3T Scanners

(compatible with scanners running DV platform)

Step-by-step Instructions for Protocol Installation & Use

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SAR
Society of Abdominal Radiology

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Protocol Installation

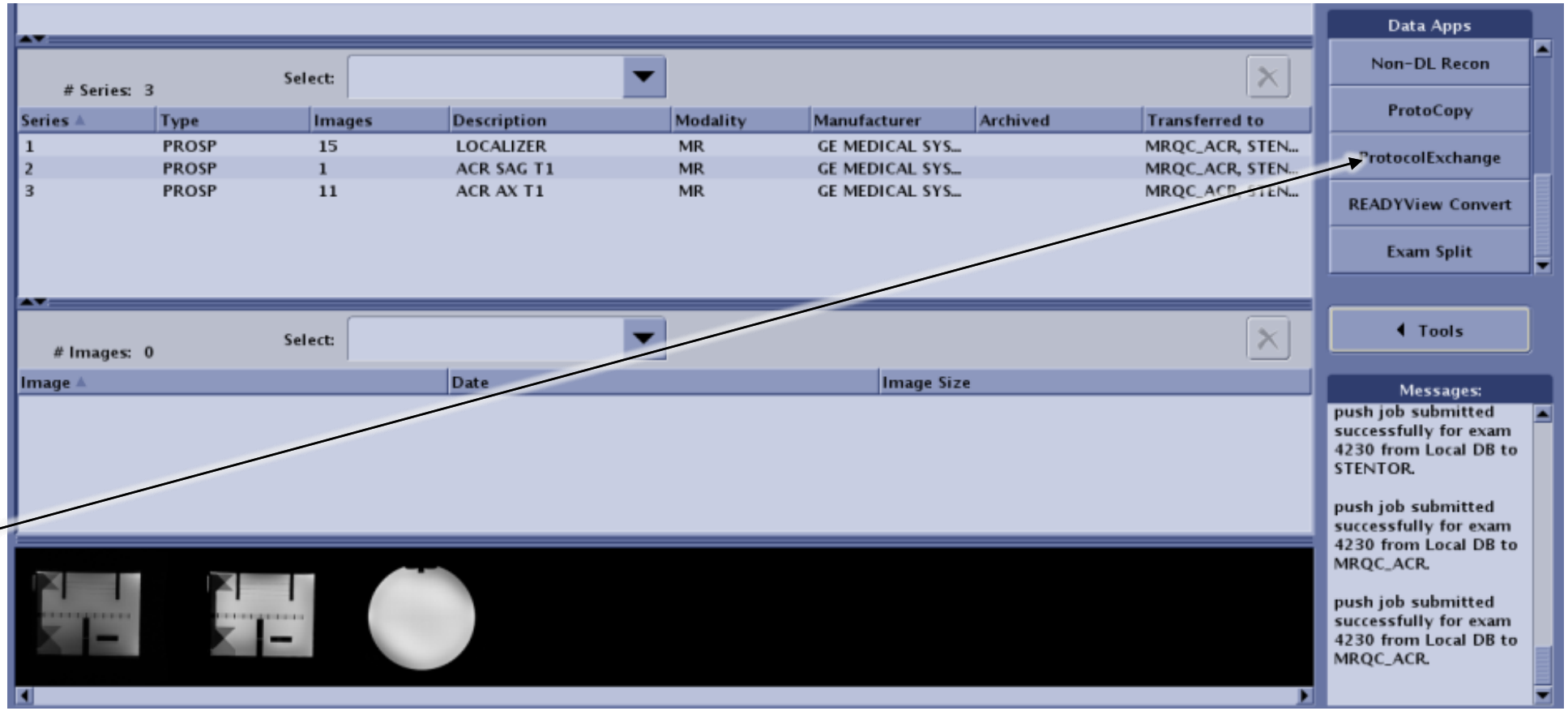
(shown for transfer from USB drive to GE scanner running MR30.1 software – appearance will differ for other software versions)

Executable protocol files and protocol PDFs are available for free download at:
https://abdominalradiology.org/sar-subpages/dfp-panels/

Protocol Installation

(shown for GE scanner running MR30.1 software; appearance will differ for other software versions)

#1: Click Protocol Exchange.

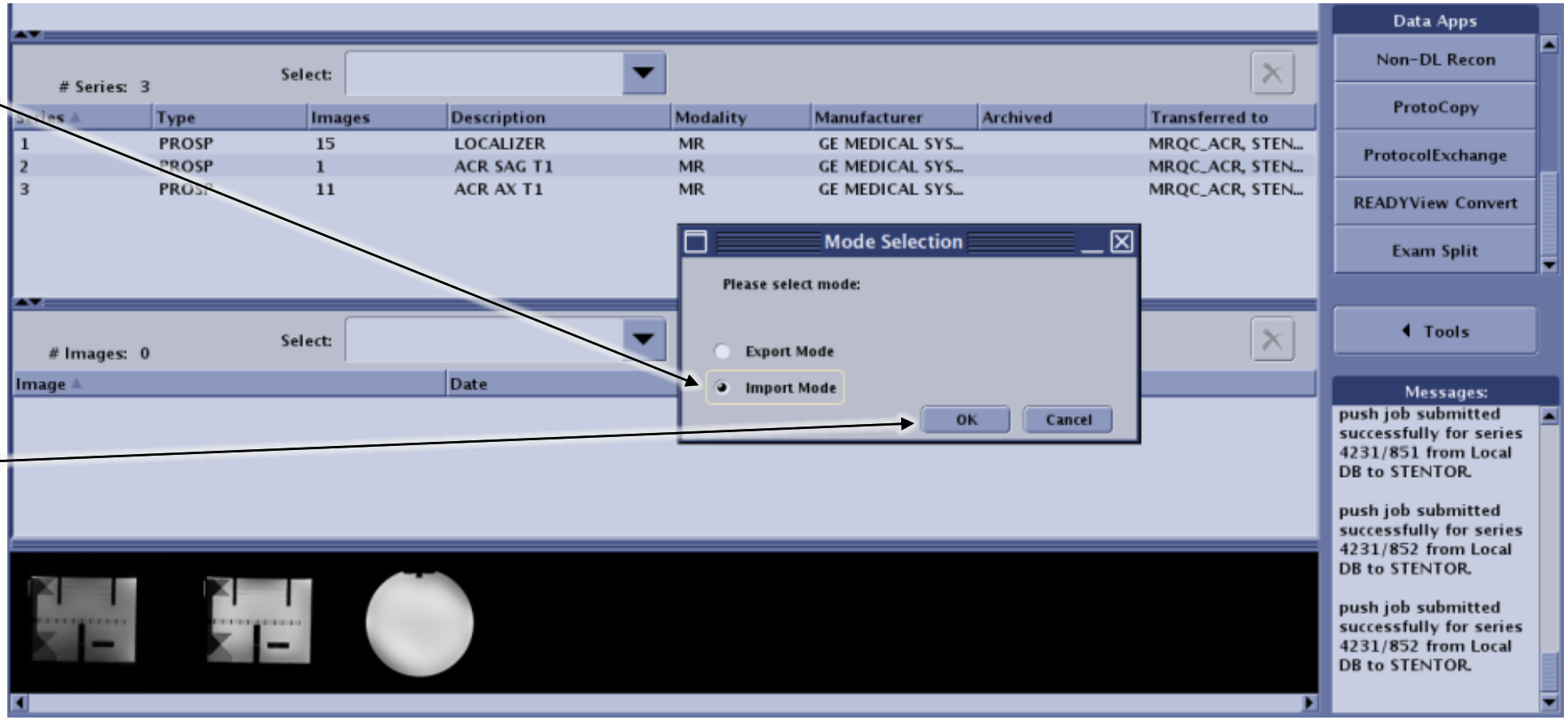


Protocol Installation

(shown for GE scanner running MR30.1 software; appearance will differ for other software versions)

#2: Select Import Mode.

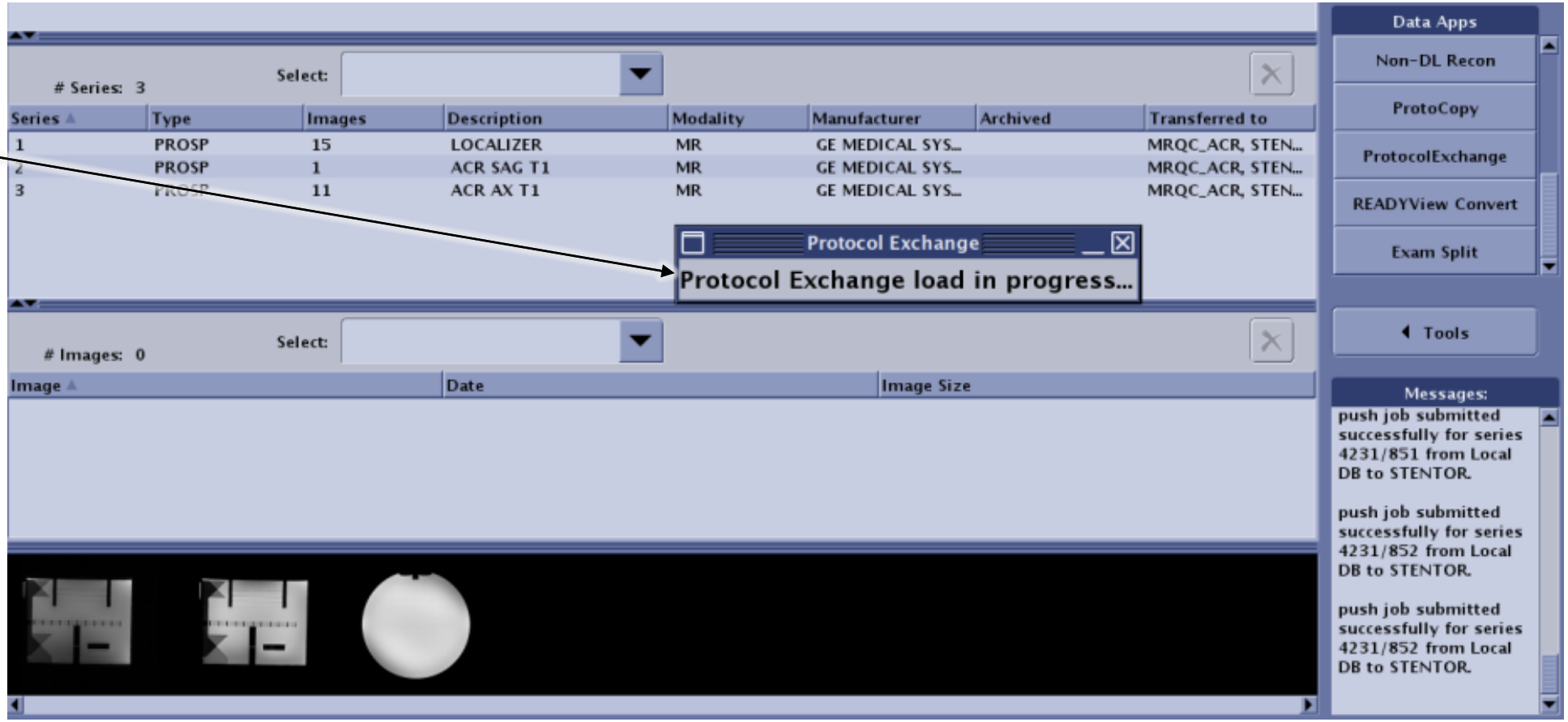
#3: Click OK.



Protocol Installation

(shown for GE scanner running MR30.1 software; appearance will differ for other software versions)

#4: Protocol Exchange loading message should appear.

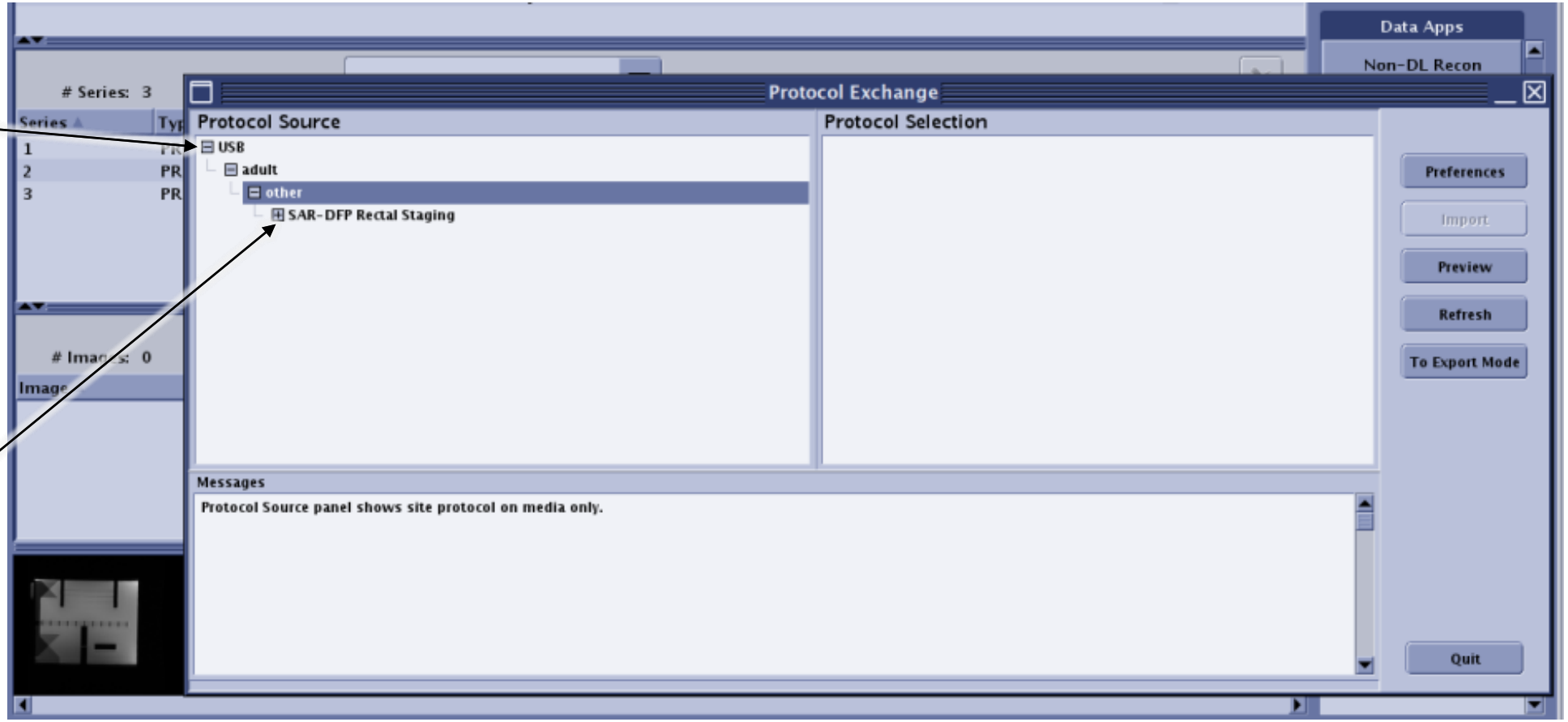


Protocol Installation

(shown for GE scanner running MR30.1 software; appearance will differ for other software versions)

#5: Select USB in the Protocol Source window.

#6: Navigate through hierarchy to identify the “SAR-DFP Rectal Staging” protocol at the folder level.

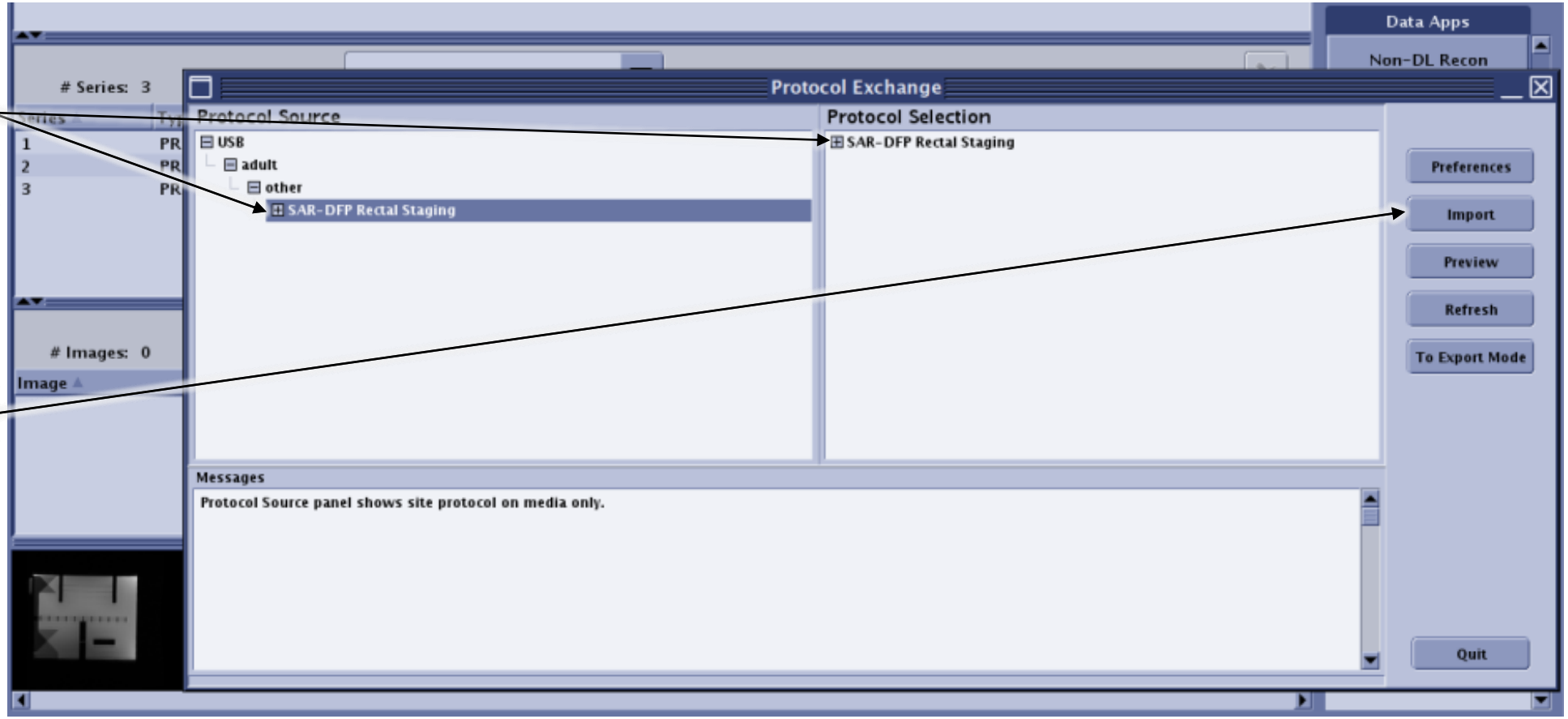


Protocol Installation

(shown for GE scanner running MR30.1 software; appearance will differ for other software versions)

#7: Click on the protocol to transfer it to the Protocol Selection window.

#8: Click Import.



Protocol Use

General notes on the protocol's sequences

- Provided sequences are divided into a set of *core* sequences that we believe should be part of any rectal cancer pelvic MRI protocol and a set of *optional* sequences that can be run based on institutional preferences.
- All sequences are designed for use by both older and newer MR scanners; institutions with newer scanners may opt to modify or replace certain sequences to utilize more advanced features, potentially further improving image quality or reducing scan time (e.g., simultaneous multi-slice DWI, readout-segmented DWI, deep learning-based reconstruction, etc.).
- If a sequence is replaced rather than modified, we recommend that the basic technical parameters (e.g., slice thickness, TR, TE, etc.) be preserved as much as possible.

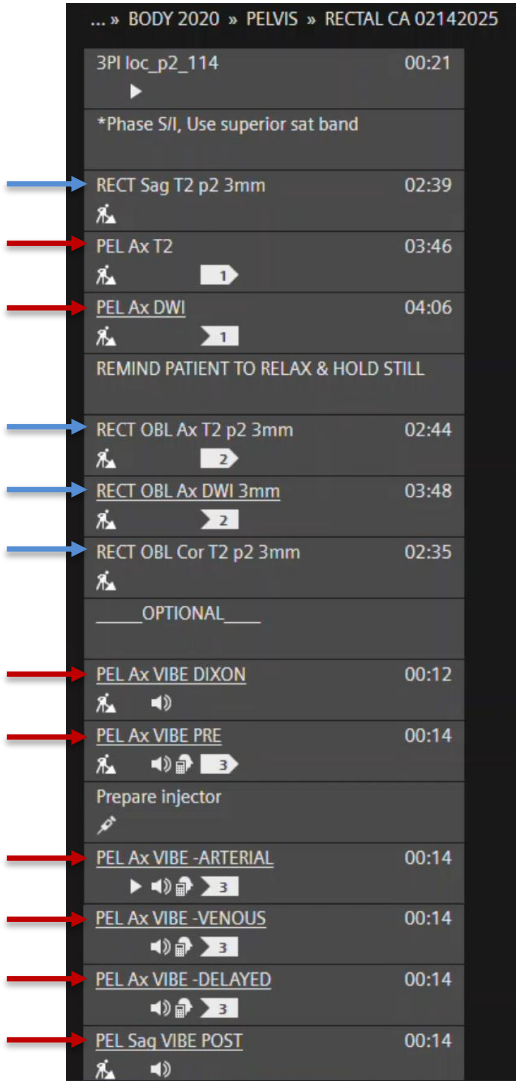
For a more detailed discussion of specific sequences, please see the following manuscript published by our group: https://pubmed.ncbi.nlm.nih.gov/36899281/

Pre-MRI patient preparation:

- Consider IV or IM anti-spasmolytic agent (e.g., glucagon, hyoscyamine) to reduce motion artifact from peristalsis
- Consider mini-enema or rectal gel to eliminate/displace stool and gas to reduce susceptibility artifact on DWI
  - Mini-enema reference: https://link.springer.com/article/10.1007/s00261-020-02718-w
  - Rectal gel reference: https://www.ajronline.org/doi/10.2214/AJR.24.31942

Protocol Use

- Sequences with RECT prefix (blue arrows) – small FOV focused on the tumor and mesorectum
- Sequences with PEL prefix (red arrows) – large FOV including entire pelvis (cover IMA origin through inguinal nodes)



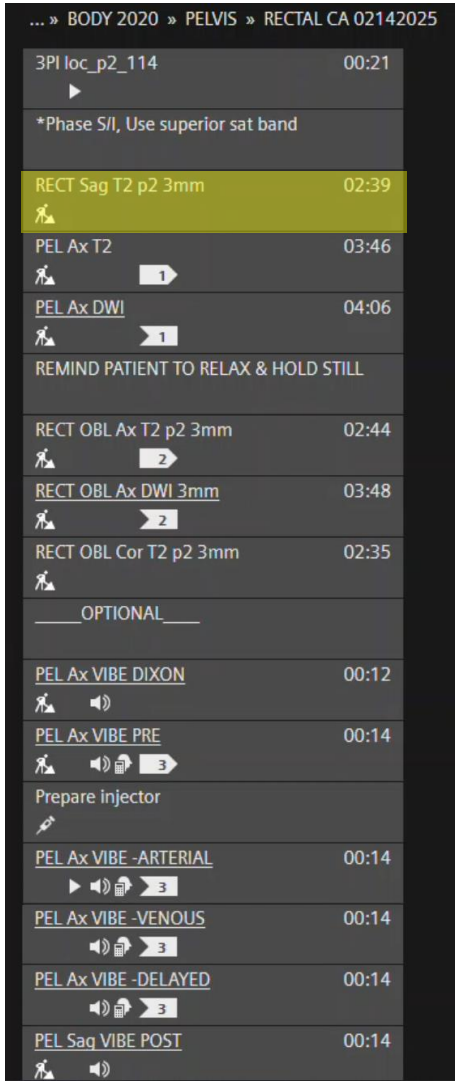
Three-plane localizer (whole pelvis)

Instructions for *RECT Sag T2 p2 3mm* sequence

Instructions for *RECT Sag T2 p2 3mm* sequence

Optional sequences

Protocol Use: RECT Sag p2 3mm

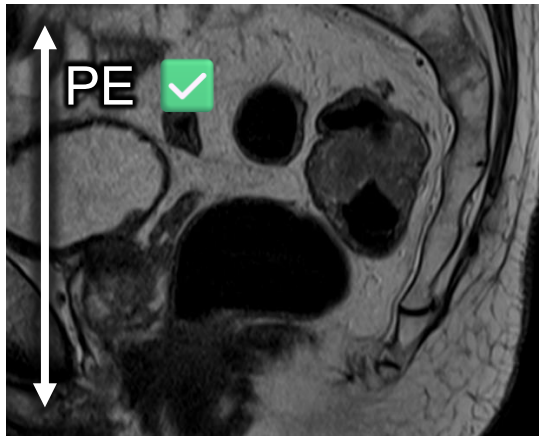


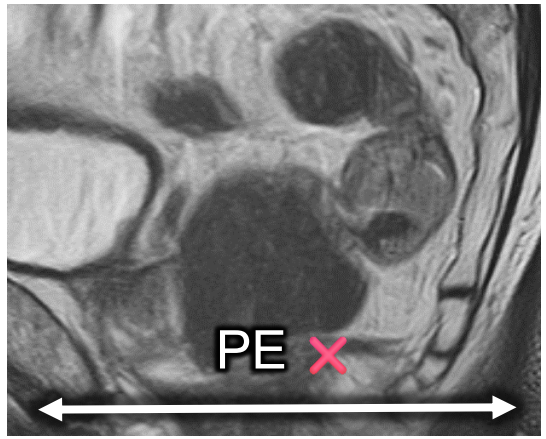
Notes:

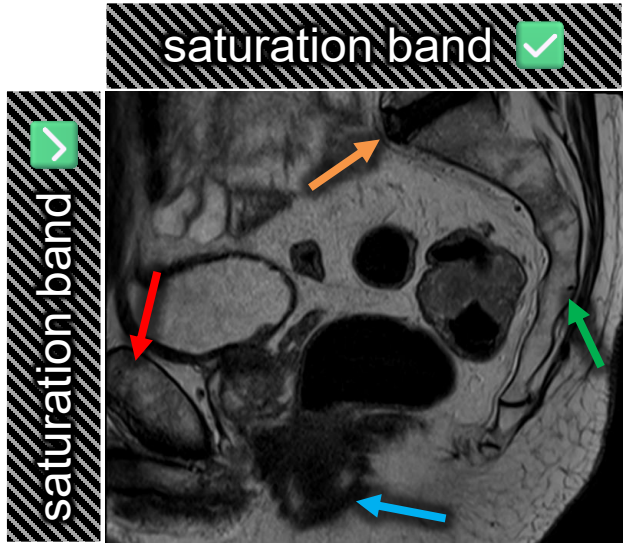
1. Phase-encoding (PE) direction should be craniocaudal rather than anterior-posterior to avoid ghosting from the anterior abdominal wall.

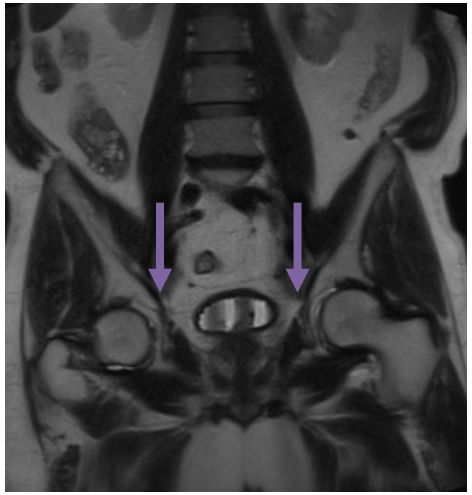
2. Using localizers, ensure that sequence covers from the sacral promontory (→) to the anal verge (→) craniocaudally; from the sacrum (→) to the pubic symphysis (→) anteroposteriorly; and from right pelvic sidewall to left pelvic sidewall laterally (→).

3. Confirm that saturation bands have been automatically placed just anterior and cranial to the specified field of view to reduce motion artifacts.

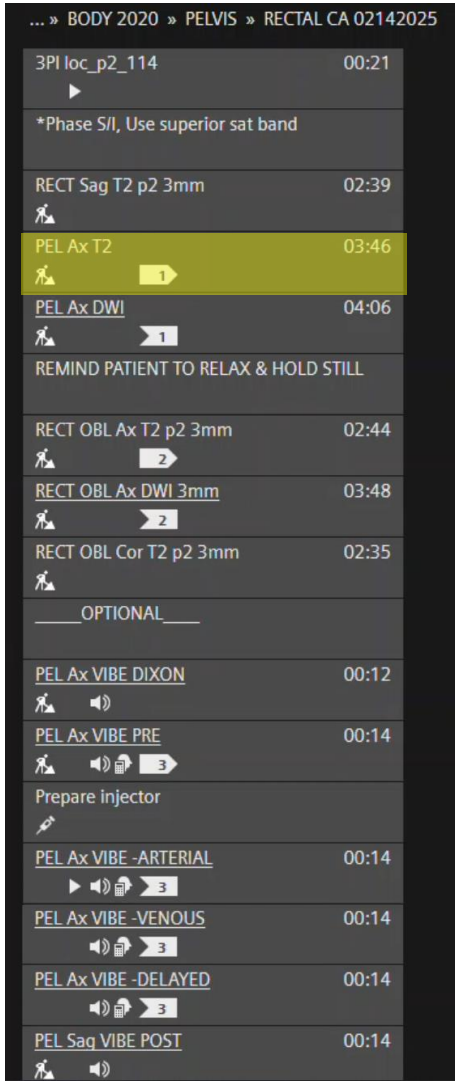








Protocol Use: PEL Ax T2



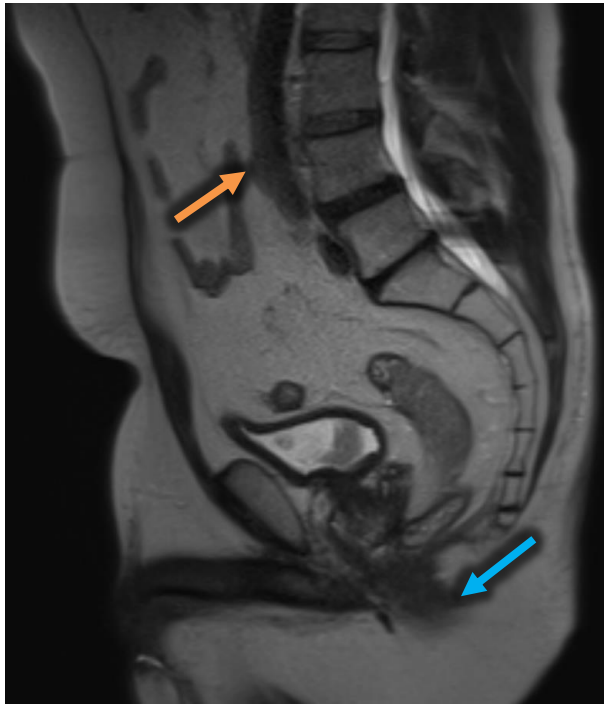
Notes:

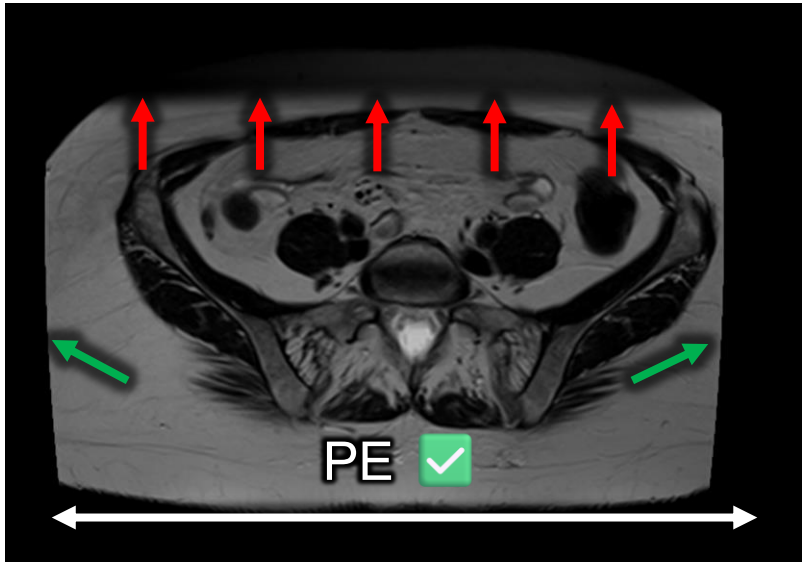
1. Using localizers, ensure that craniocaudal coverage extends from the inferior mesenteric artery origin (→), which is usually several centimeters above the aortic bifurcation, through the anal verge (→).

2. Using localizers, ensure that craniocaudal coverage includes all osseous, muscular, and visceral structures. It is okay to exclude portions of subcutaneous fat (→), particularly in overweight patients.

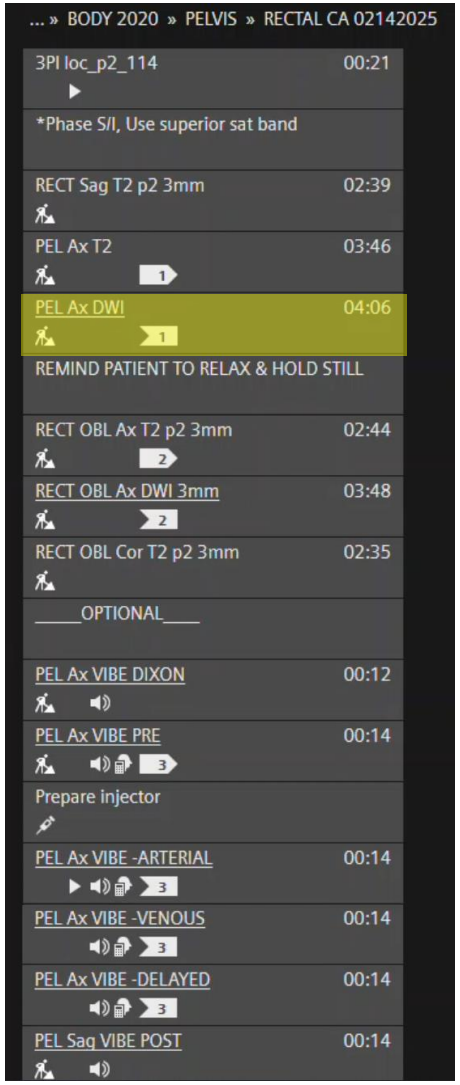
3. Ensure that phase-encoding (PE) direction is oriented right-left.

4. Saturation band should also be placed over the anterior abdominal wall (→) to reduce motion artifacts.



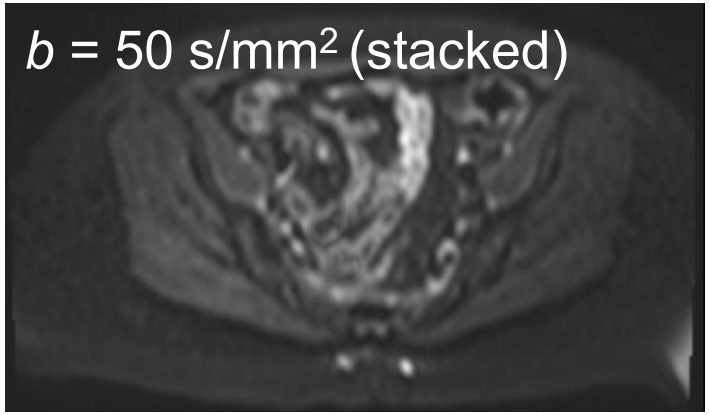


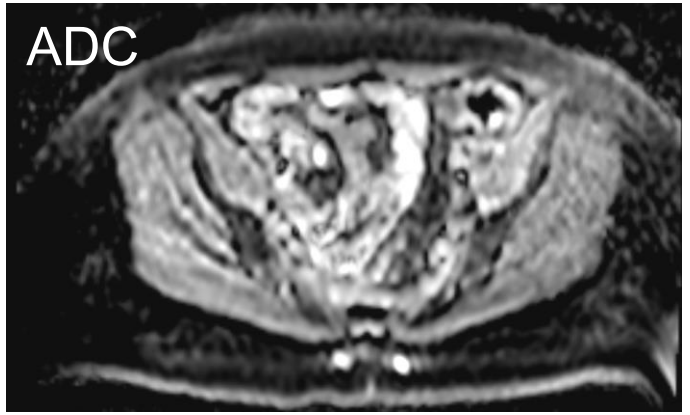
Protocol Use: PEL Ax DWI

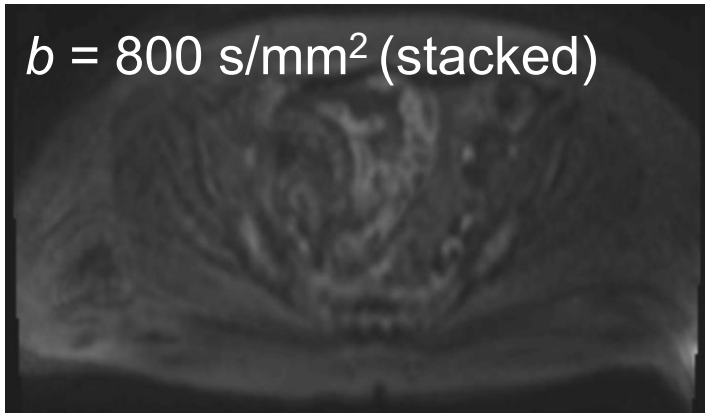


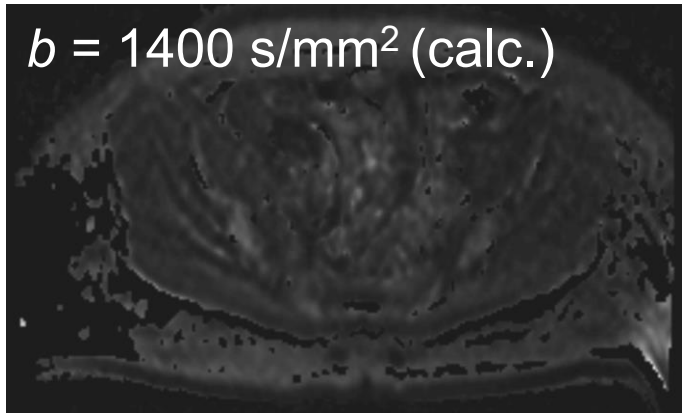
Notes:

1. Coverage should match that of the *PEL Ax T2* sequence.
2. This sequences generates four image sets, as shown below.

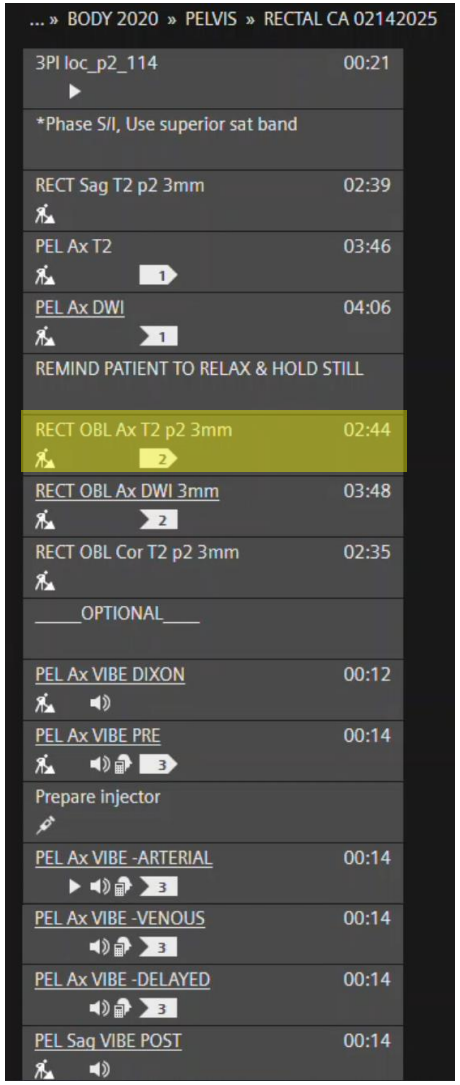








Protocol Use: RECT OBL Ax T2 p2 3mm



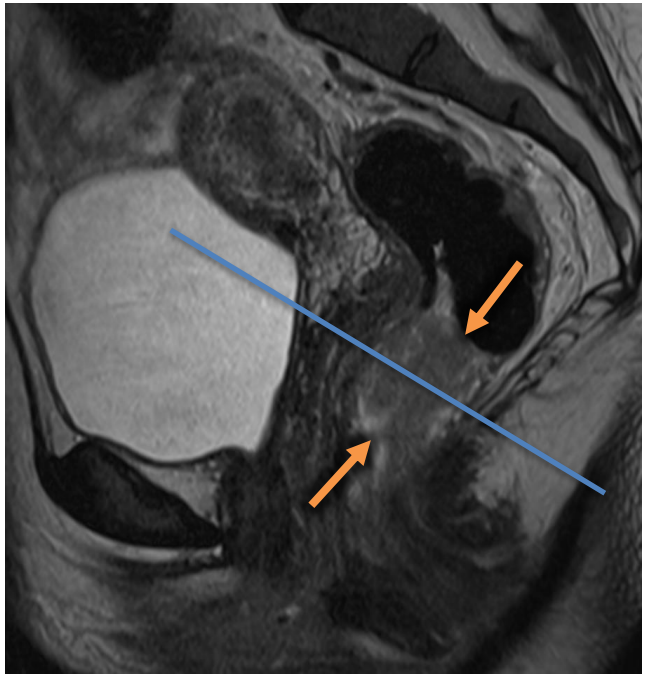
Notes:

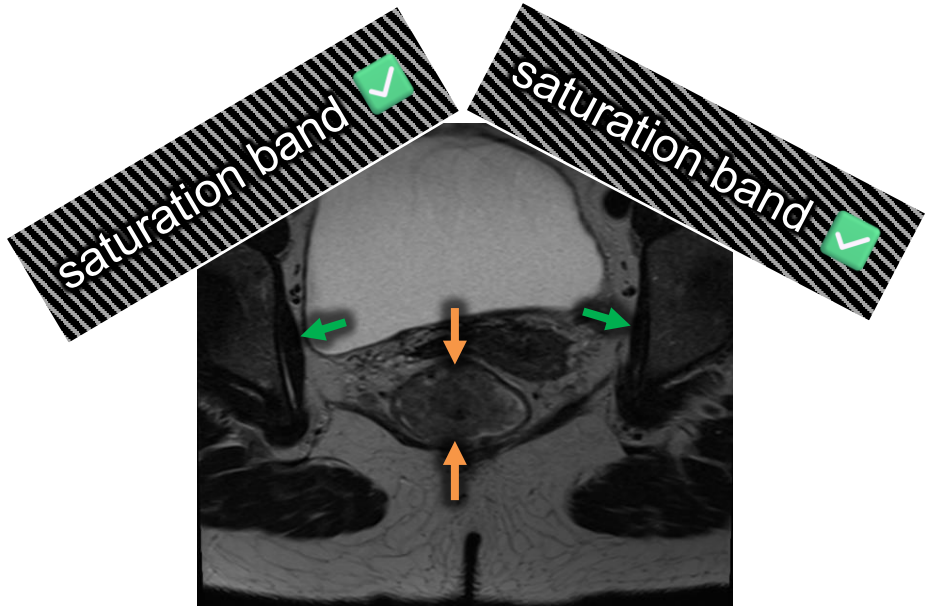
1. Using the *RECT Seg T2 p2 3mm* sequence for reference, set this sequence's obliquity (blue line) to be perpendicular to the orientation of the rectal lumen at the location of the tumor (→), as shown. Some tumors may "follow the bend" of the rectum. Use the middle of the tumor's longitudinal extent to define the obliquity.

2. The default through-plane coverage of the sequence should be centered on the tumor (→). Additional slices may be added for tumors involving a long length of the rectum.

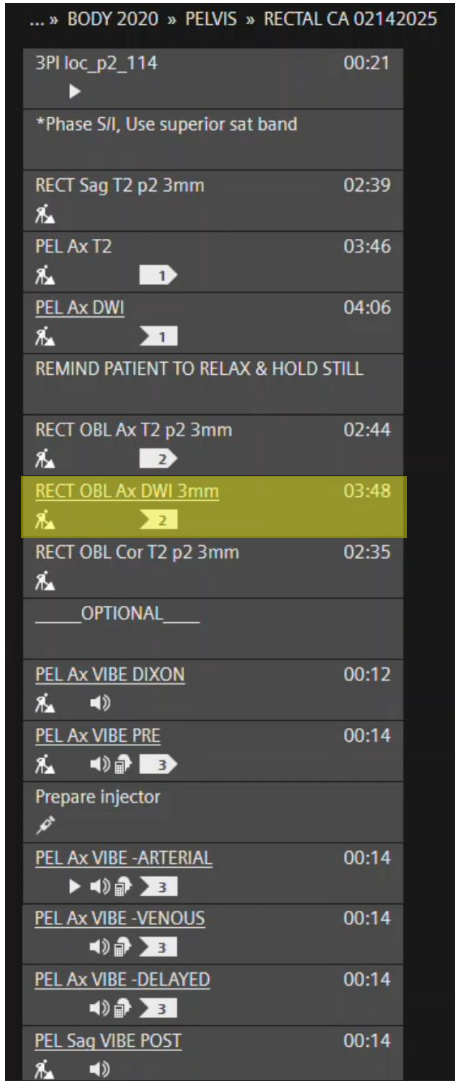
3. The default in-plane coverage should be centered on the tumor (→) and should include the pelvic side-walls (→).

4. Ensure that saturation bands are situated along the anterolateral aspects of the axial field-of-view.





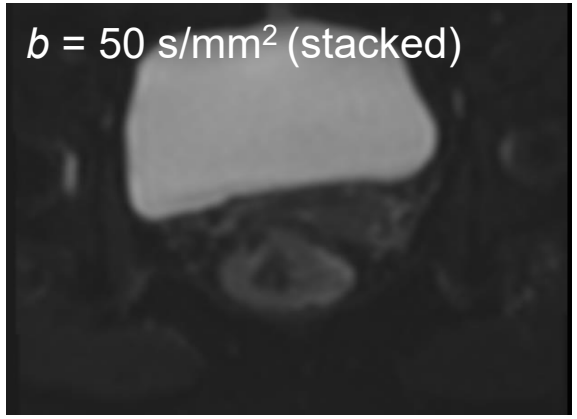
Protocol Use: RECT OBL Ax DWI 3mm

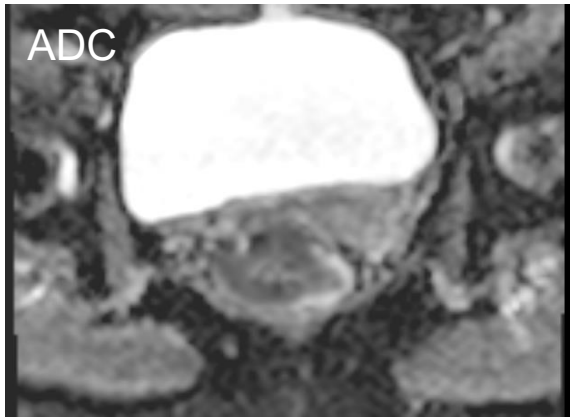


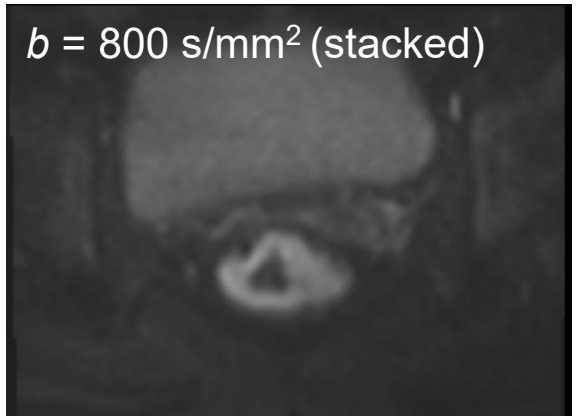
Notes:

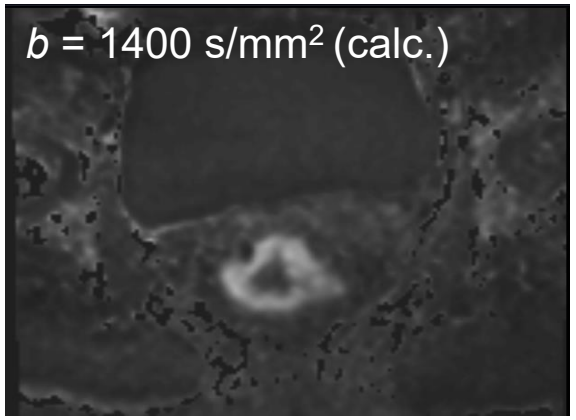
1. Coverage and slice orientation (i.e., obliquity) should match that of the *RECT OBL Ax T2 p2 3 mm* sequence to facilitate cross-sequence correlation of imaging findings.

2. This sequences generates four image sets, as shown below.

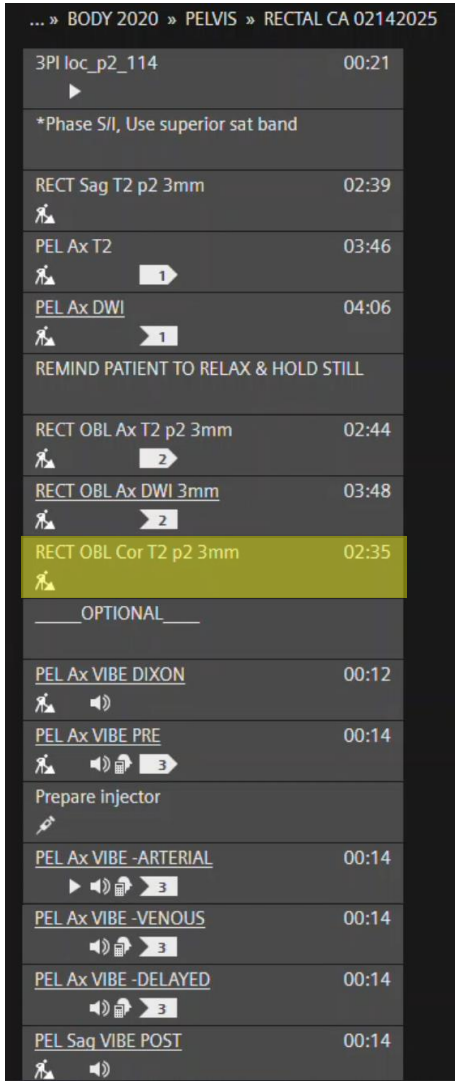








Protocol Use: RECT OBL Cor T2 p2 3mm



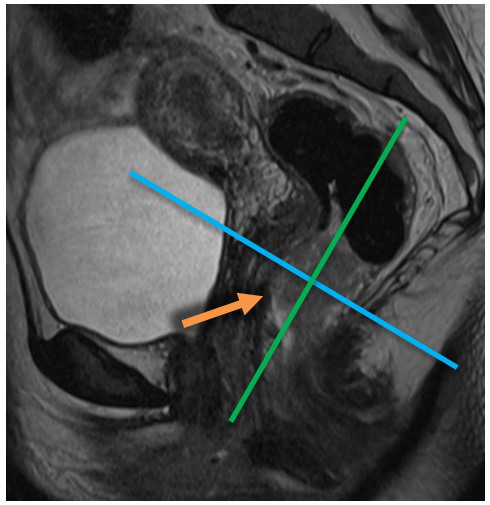
Notes:

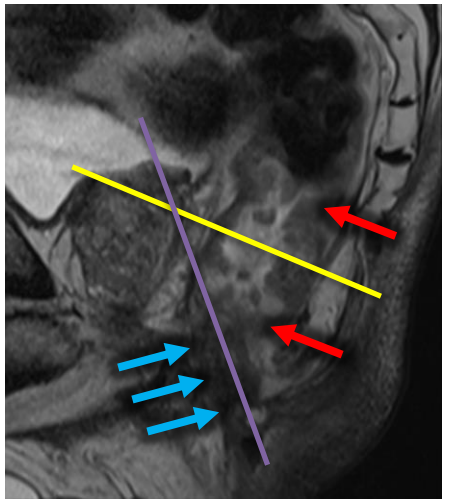
1. Use the *RECT Seg p2 3mm* sequence for planning.

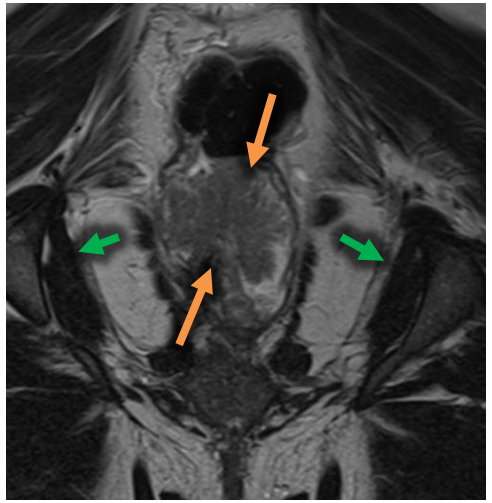
2. For tumors (→) in the upper or middle rectum, set this sequence's obliquity (green line) to be perpendicular to the previously defined obliquity (blue line) for the *RECT OBL Ax T2p2 3mm* sequence acquisition.

3. For tumors (→) in the low rectum (i.e., inferior margin near or involving the anal sphincter complex), set this sequence's obliquity (purple line) to be parallel to the anal canal (→) rather than perpendicular to the plane used for the *RECT OBL Ax T2p2 3mm* sequence acquisition (yellow line).

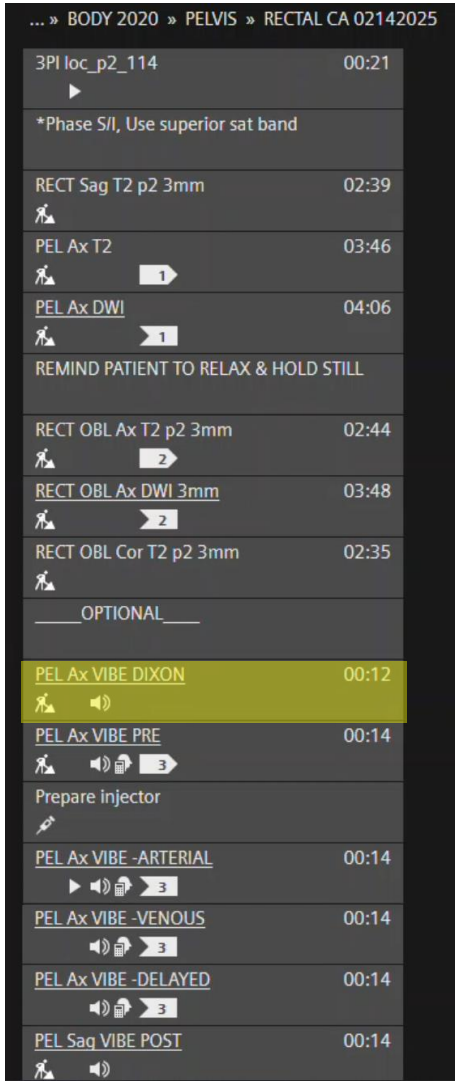
4. The default in-plane coverage should be centered on the tumor (→) and should include the pelvic side-walls (→).







Protocol Use: PEL Ax VIBE DIXON

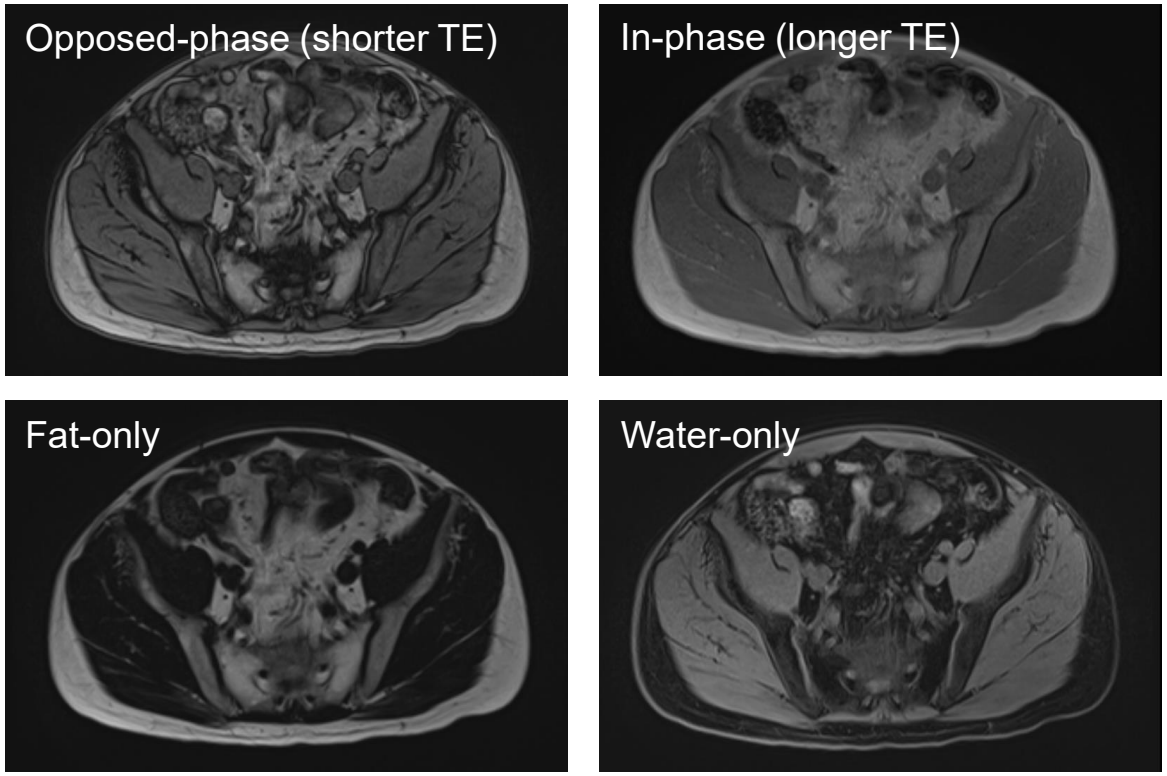


Notes:

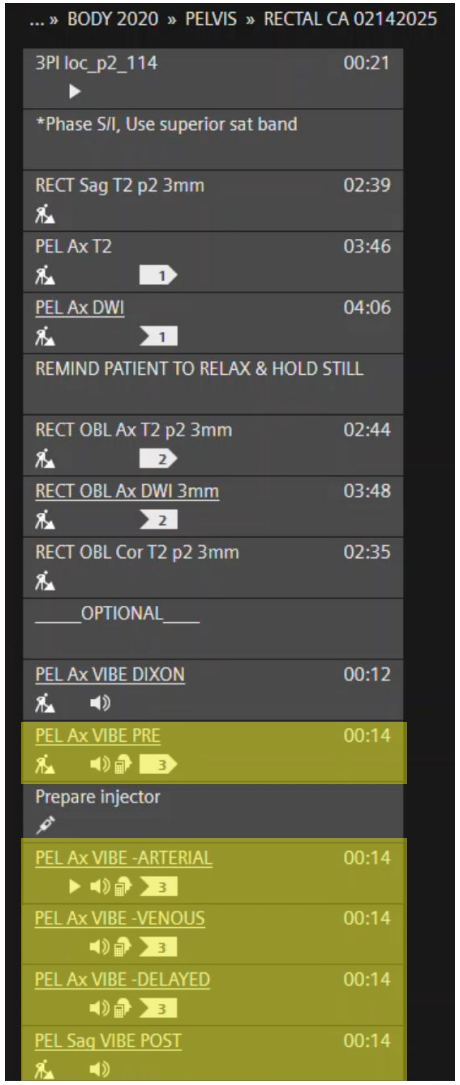
1. This sequence is optional. The acquisition time is quite short. It can be useful for characterizing incidental bone lesions and for identifying foci of extraluminal gas (longer TE in-phase images).

2. Coverage should match that of the *PEL Ax T2* sequence.

3. This sequences generates four image sets, as shown below.



Protocol Use: PEL Ax VIBE (pre/post-contrast)

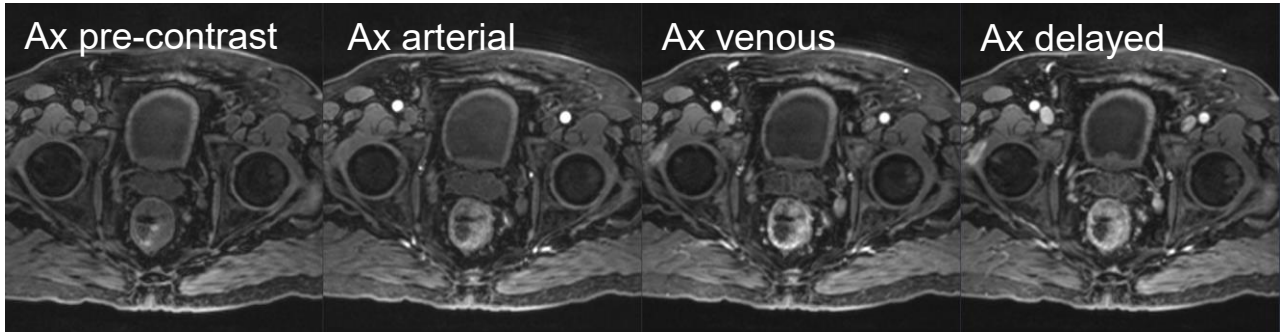


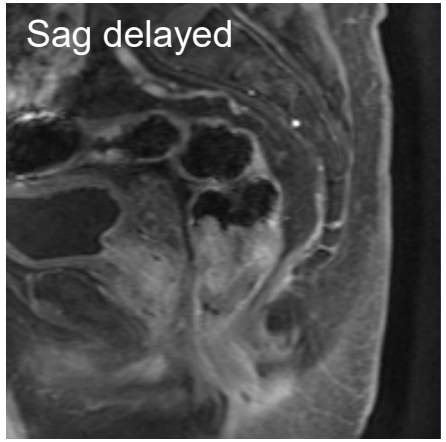
Notes:

1. These sequences are optional. Their acquisition time is relatively short. Contrast-enhanced T1-weighted images are generally not needed at initial staging but may be helpful for post-treatment restaging and surveillance in the watch-and-wait setting, particularly if the diffusion-weighted images are degraded by artifacts.

2. For axial acquisitions, coverage should match that of the *PEL Ax T2* sequence. Acquisitions are performed at 30 sec (arterial), 60 seconds (venous), and 120 sec (delayed) post-contrast.

3. For sagittal acquisition, coverage should match that of the *RECT Seg p2 3mm* sequence. Acquisition is performed immediately after the axial images are complete.





Questions or comments?

We’d love to hear from you!

Please shoot us an email:

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SAR
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