Austin Radiological Association

MRI Body Protocols

Adult 3T

Questions?

Last Update: 11/20/2024 9:59 AM

3T Body Protocols

3T Preferred Exams

ACR Requirement – Do Not Adjust

General Guidelines

BODY	
General	• NEVER hesitate to reach out to a radiologist for guidance!

Technique	• Siemens / GE terminology, other abbreviations:
	  ○ HASTE / SSFSE
	  ▪ 1.5T HASTE – ideal TR 1400, no less than 1200
	  ▪ 3T HASTE – ideal TR 1600, no less than 1200
	  ○ VIBE / LAVA
	  ○ TRUFI / Fiesta
	  ○ FLASH/SPGR/FL2D – with in-phase TE
	  ○ BH – Breath Hold
	• FB – Free Breathing
	• Careful of tight FOVs with the use of iPAT, the combination of the two can lead to artifacts.
	  ○ The FOV should include air on all sides.
	  ○ If using iPAT, must have at least two coil elements on in the phase direction.
	• Dixon – do not send non-fat sat series to PACS.

Prep	Bladder – CA • Full bladder – 24oz of water 30 minutes prior to exam Female - Oncology • Empty bladder • Instruct the patient to insert 20 -30 cc of KY jelly into the vagina. Prostate • 12 to 16 hours prior – Take 2 Dulcolax tablets • Limit last meal (at least 8 hrs. prior) to a small sandwich, Jell-O, soup or broth. • No dairy products. • 8-hours prior to exam. – Nothing to eat. May drink clear liquids

	• 1- hour prior to leaving home/arriving at the clinic – perform a saline fleet enema. Rectum • Do not prep patients with colostomies. • 24-hr bowel prep with 1 to 2-hr rectal suppository prior to exam. • Void prior to exam.

Protocol	• Volumes of organs - Volume measurement is performed by CT 3D Lab. Reserve study in pending 3D folder in PACS, e-mail *3DPostprocessing with details
	  ○ Prostate volumes are automatically performed in DynaCAD.
	• Prostates
	  ○ HCA Urologist; send images to HCA DynaCAD
	  – Andrew Barger, NP
	  – Dr. Chris Yang
	  – Dr. Kouskik Shaw, NPA Alecia Zuehlke
	  – Dr. Lawrence Tsai
	  – Dr. Matthew Pearson, PA Diane Warmoth
	  – Dr. Michael Trotter
	  – Dr. Samantha Thiry
	  – Dr. Sandeep Mistry, PA's Dustin Fontenot & Jason Ramsdell, Leonora Brown, RN
	  – Dr. Stacy Ong
	  – Dr. Subir Chhikara, PA's Ashley Dufour & Terry Farley
	  – Heather Lenz, PA
	  ○ PACS will auto push images to Seton DyncCAD, see Provider Comments for workflow.
	  – Aaron Laviana, MD
	  – Charles Osterberg, MD

Contrast	• Full dose by weight, 3ml/sec, followed by 20ml normal saline flush.
	  ○ Arterial phase is most crucial with liver imaging. Set up the Care Bolus in an axial plane and position slightly inferior to right side diaphragm. Initiate the immediate post once contrast is in descending aorta.
	  ○ 5-minute wait post injection for delayed post series.
	
	• Always perform T1 FS Axial Pre, even if not contrasting

	• MR Abdomen with immediate post contrast & can be done consecutively with female pelvis oncology or pelvis for rectal mass or cancer. Post pelvis performed after 2-minute abdomen. • Perform DatScans, X-ray or CT Body imaging prior to MR contrast exams.
Sedation	• MRCP – can sedate, but do not give patient oral contrast agent with radiologist approval. • Enterography – do not sedate. • Defecography – do not sedate.

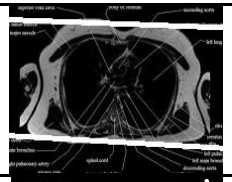
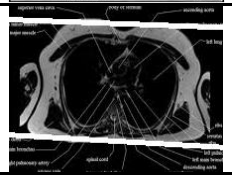
1.5T and 3T Preferred Exams

1.5T	3T
• Appendicitis during Pregnancy • Pelvis Placenta Accreta	• Abdomen for Iron and Fat Quantification (LiverLab) • Enterography • Female Pelvis for Cancer • Pelvis Bladder for Cancer • Pelvis Rectum for Cancer and Anal Fistula • Pelvis Urethral Diverticulum • Prostate • Pelvis RTP, Dr. Garza

Chest

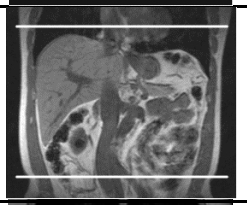
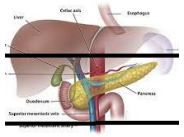
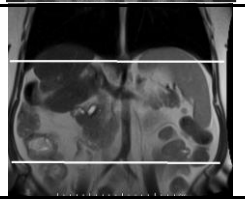
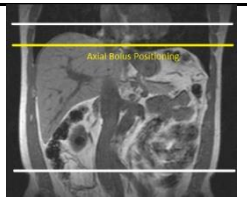
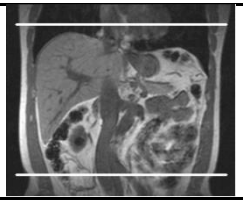
(mediastinum, pleura)

- Check with a Radiologist before performing an MR, may prefer CT.
- Perform for entire chest imaging, not chest wall

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 VIBE Ax T2 FS HASTE Ax	~360	5 x 0 ~60 slices	Perform HASTE IR for poor FS	
T1 VIBE Cor T2 FS HASTE Cor	~360	5 x 0 ~40 slices	Perform HASTE IR for poor FS	
T1 VIBE Sag T2 FS HASTE Sag	~360	5 x 0 ~64 slices	Perform HASTE IR for poor FS	
If with contrast, T1 FS VIBE Ax Pre BH T1 FS VIBE Ax Post BH	~360	5 x 0 ~60 slices		
T1 FS VIBE Cor Post BH	~360	5 x 0 ~40 slices		

Abdomen Routine

(Updated 4/8/24)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Cor FB	~360	8 x 2		
T2 HASTE Ax	~360	7 x 2 ~24 slices	Includes diaphragm through kidneys	
T1 Flash Ax **Optional for pancreatic indications*	~360	5 x 1	• Include entire pancreas • Perform MRCP for follow up pancreatic cysts 	
DIFF Ax	~360 100% pFOV	7 x 2 TE 57 4 avg.		Copies T2 HASTE Ax
T1 FS Dixon VIBE Ax Pre *Ax Care Bolus* T1 FS Dixon VIBE Ax Immediate Post T1 FS Dixon VIBE Ax 2 min Post T1 FS Dixon VIBE Ax Delayed Post	~360	3 x 0	Includes diaphragm through kidneys Begin immediate post once contrast is in the aorta, take into consideration timing of breath hold instructions.	
T2 FS Ax Trigger *T2 FS HASTE Ax* (if motion on TSE or trigger fail)	~360	7 x 2	Done after 2 min post	

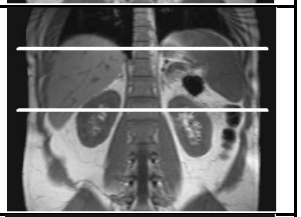
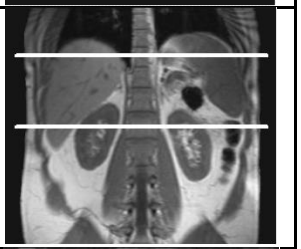
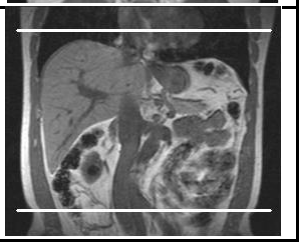
Send to PACS:

- Pre-FS Dixon VIBE: in phase, out of phase and FS series. Do not send the WS water series.
- Post-FS Dixon VIBE: FS and respective subtraction series. Do not send the in phase, out of phase or water series and respective subs.
- Care Bolus
- If study is without contrast, be sure to run T1 Dixon VIBE FS Ax Pre and T2 FS Ax Trigger must be performed

Adrenals

(Updated: 02/27/2017)

For follow-up with prior imaging of existing benign mass, IV contrast is not utilized

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Ax	~360	5 x 0		
T1 VIBE In/Out Ax	~360	2.5 x 0 ~44 slices		
T1 VIBE In/Out Cor	~360	3 x 0	Include diaphragm through bifurcation S-I	
T1 FS Dixon VIBE Ax Pre Care Bolus Ax T1 FS Dixon VIBE Ax Immediate Post T1 FS Dixon VIBE Ax Delayed Post	~360	3 x 0	Delayed series must be at least 5 min post injection.	
T2 FS Ax Trigger *T2 FS HASTE Ax* (if motion on TSE or trigger fail)	~360	7 x 2	Done after the immediate Post	

Send to PACS:

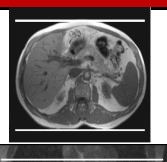
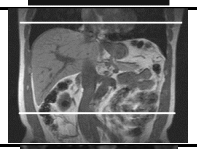
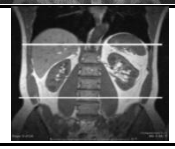
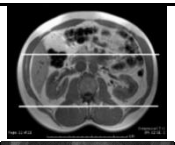
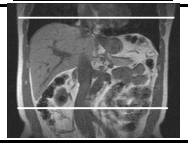
- Pre-FS Dixon VIBE: in phase, out of phase and FS series. Do not send the WS water series.
- Post-FS Dixon VIBE: FS and respective subtraction series. Do not send the in phase, out of phase or water series and respective subs.
- Care Bolus
- If study is without contrast, include the T1 Dixon VIBE FS Ax Pre and T2 FS Ax Trigger

Kidneys

(New finding and follow up renal lesion)

(Updated 12/2/19)

- Perform routine abdomen protocol if exam is follow up post nephrectomy. This is to better visualize the renal bed and surrounding organs
- Abdomen for tuberous sclerosis is a renal study

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Cor FB	~360	4 x 0 ~30 slices	Include entire abdomen liver through kidneys.	
T1 VIBE In/Out Ax	~360	3 X 0		
T1 Ax T2 HASTE Ax	~360	4 X 0 ~36 slices	Include kidneys and mass	
T1 FS Dixon VIBE Ax Pre *Ax Care Bolus* T1 FS Dixon VIBE Ax Immediate Post	~360	3 x 0	•	Copies center T1 Ax
T1 FS VIBE Cor post	~360	3 x 0	Perform after immediate post	
T2 FS Ax Trigger *T2 FS HASTE Ax* (if motion on TSE or trigger fail)	~360	7 x 2	Include entire abdomen, liver through kidneys. Done after VIBE fs COR post	
T1 FS Dixon VIBE Ax Delayed Post	~360	3 x 0	Delayed series must be at least 5 min post injection.	Copies T1 FS DIXON VIBE Pre

Send to PACS:

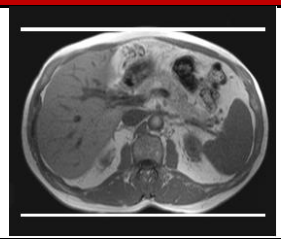
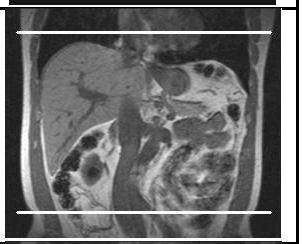
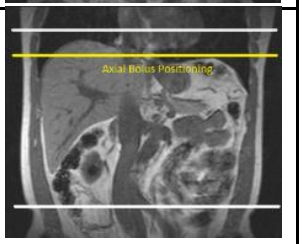
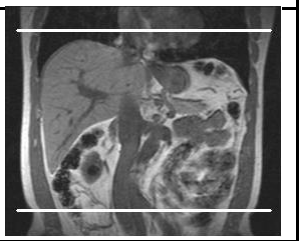
- Pre-FS Dixon VIBE: in phase, out of phase and FS series. Do not send the WS water series.
- Post-FS Dixon VIBE: FS and respective subtraction series. Do not send the in phase, out of phase or water series and respective subs.
- Care Bolus
- If study is without contrast, include the T1 Dixon VIBE FS Ax Pre and T2 FS Ax Trigger

Austin Kidney Associates: if requested for total kidney volume, reserve exam for 3D lab to process then send an email to 3D_Postprocessing@ausrad.com

Liver Routine

(hemangioma, lesion)

(Updated 12/2/19)

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Cor FB	~360	8 x 2		
T2 HASTE Ax	~360	7 x 2 ~24 slices		
T1 FS Dixon VIBE Ax Pre *Ax Care Bolus* T1 FS Dixon VIBE Ax Immediate Post T1 FS Dixon VIBE Ax 2 min Post T1 FS Dixon VIBE Ax Delayed Post	~360	~3 x 0	Start immediate post once contrast is in the aorta, take into consideration time for breath hold instructions.	
T2 FS Ax Trigger *T2 FS HASTE Ax* (if motion on TSE or trigger fail)	~360	7 x 2	Done after the 2 min Post	

Send to PACS:

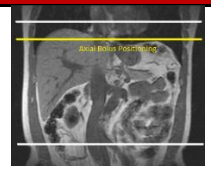
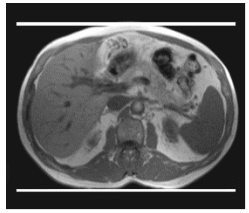
- Pre-FS Dixon VIBE: in phase, out of phase and FS series. Do not send the WS water series.
- Post-FS Dixon VIBE: FS and respective subtraction series. Do not send the in phase, out of phase or water series and respective subs.
- Care Bolus
- If study is without contrast, include the T1 Dixon VIBE FS Ax Pre and T2 FS Ax Trigger

Eovist

(focal nodular hyperplasia)

(Updated 1/26/24)

- A Body radiologist must approve all Eovist studies if a previous ARA study does not recommend Eovist.
- GFR testing is necessary if the patient has kidney disease, diabetes, hypertension, multiple myeloma, solid organ transplant, severe hepatic disease, or ordered by an oncologist.
- Do not perform at ARA non-CT sites.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Ax	~360	7 x 2		
T1 FS Dixon VIBE Ax Pre *Ax Care Bolus* T1 FS Dixon VIBE Ax Immediate Post T1 FS Dixon VIBE Ax 2 min Post T1 FS Dixon VIBE Ax 5 min Post	~360	3 x 0	Start immediate post once contrast is in the aorta, take into consideration time for breath hold instructions.	
T2 FS Ax Trigger *T2 HASTE FS Ax* (if motion on TSE or trigger fail	~360	7 x 2		
T2 SPAIR FS HASTE Cor FB T2 HASTE Cor BH	~360	8 x 2		
T1 FS DIXON VIBE Cor 20 min Post	~360	3 x 0		
T1 FS Dixon VIBE Ax 20 min Post	~360	3 x 0		Copies everything from pre

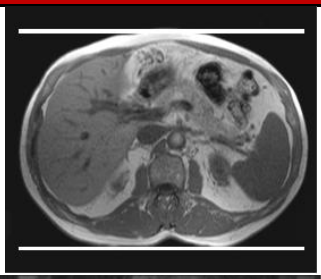
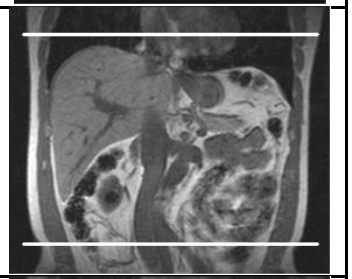
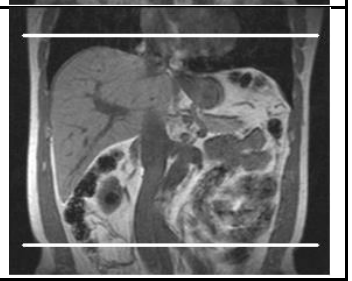
Send to PACS:

- Pre-FS VIBE: in phase, out of phase and FS series. Do not send the WS water series.
- Post-FS VIBE: FS and respective subtraction series. Do not send the in phase, out of phase or water series and respective subs.
- Care Bolus
- If study is without contrast, include the T1 VIBE FS Ax Pre and T2 FS Ax Trigger

Gaucher disease or Lipidosis

(Updated: 08/6/15)

- This study does not need contrast, If contrast is ordered, add pre/post dynamic sequences from routine liver study
- Include both liver and spleen

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE T1 Cor	~360	8 x 2		
T1 In/Out Ax T2 HASTE Ax T2 FS Ax T2 Heavy TE Ax (TE>200)	~360	7 x 2		
T2 FS HASTE Ax	~360	10 x 0	Typically used for volume measurement	

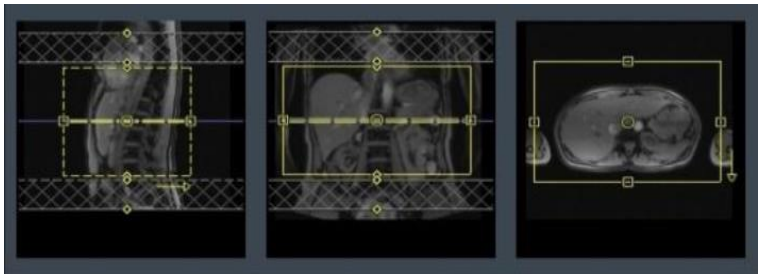
- If contrast is given, use any VIBE series without motion artifact for measurement
- Volume measurement is normally done by 3D technologist. Reserve study in pending 3D folder in PACS, e-mail * 3DPostprocessing 3D_Postprocessing@ausrad.com with details
- If 3D post processing is down, measurement is done using ROI tool in viewer of the MR console. Using ROI tool, trace around the liver on each image in which the liver is seen. Save these images in a new series and send to PACS. Add the area(in square centemeters) of the ROI of each image together and enter this information into the notes in PACS
- Repeat measurement process for spleen

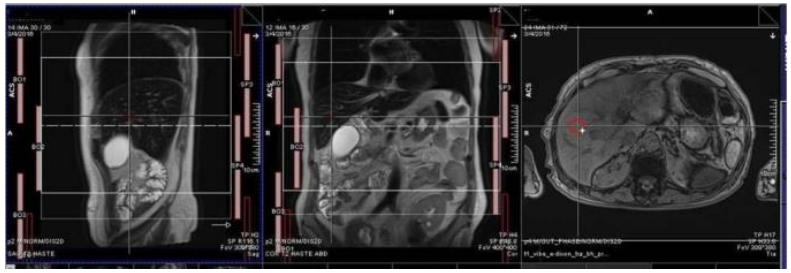
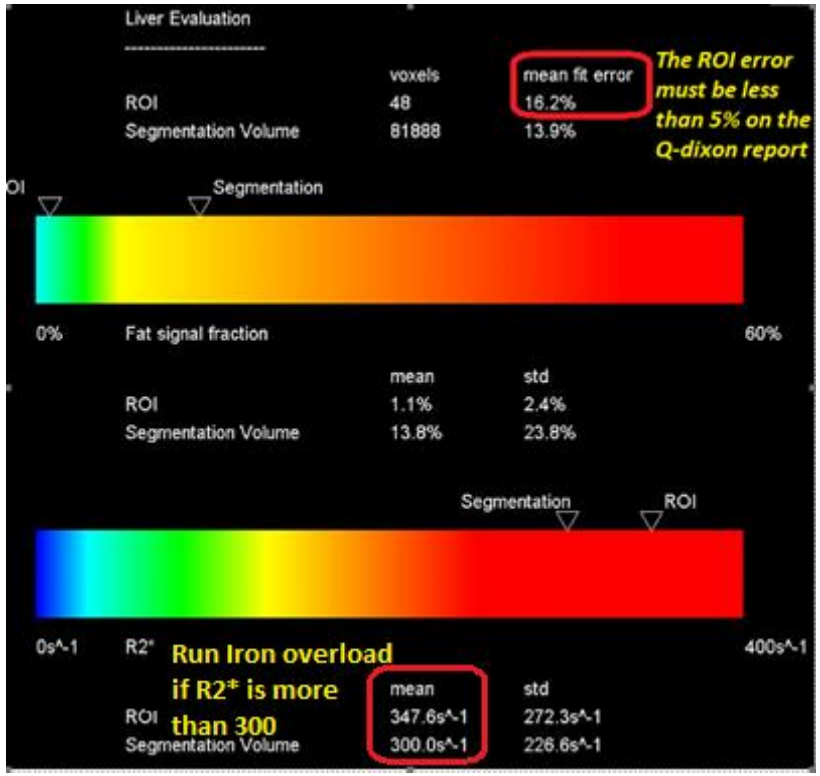
LiverLab: Adult Iron and Fat Quantification *

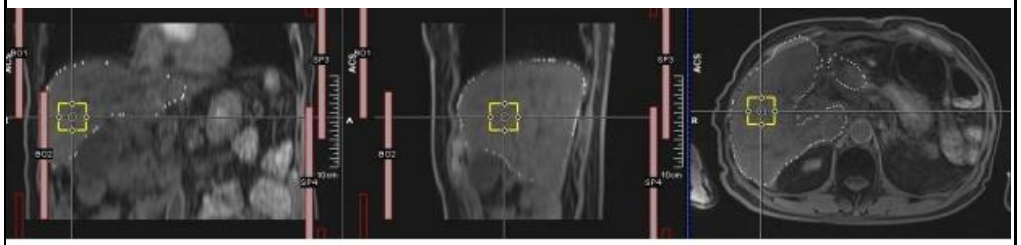
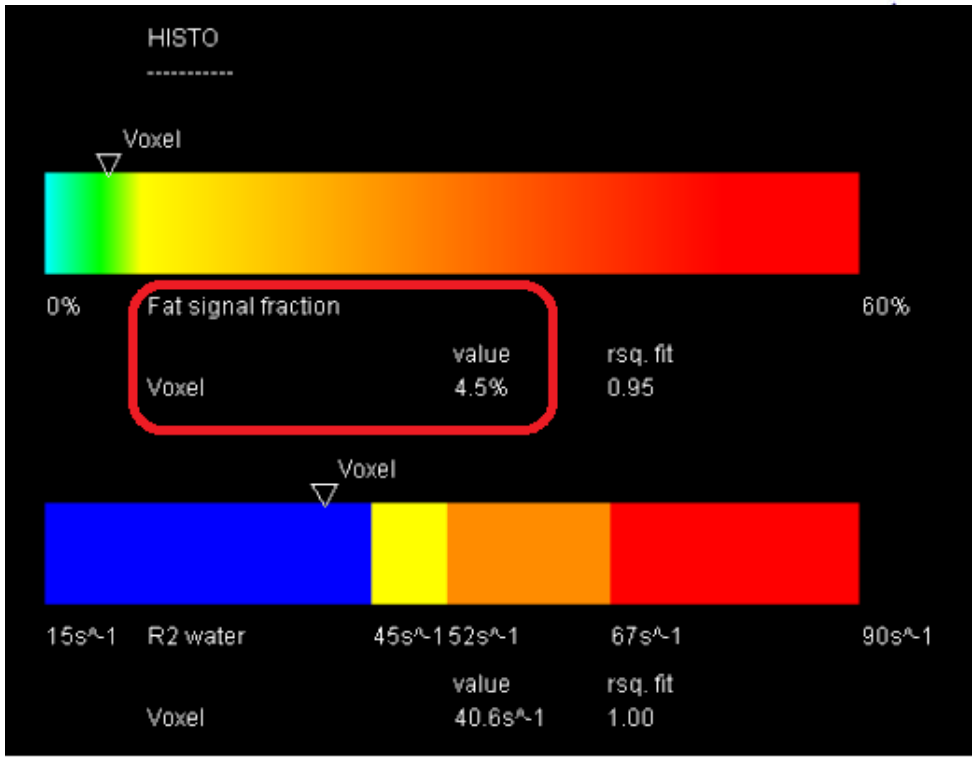
Wilson Parke 3T Only

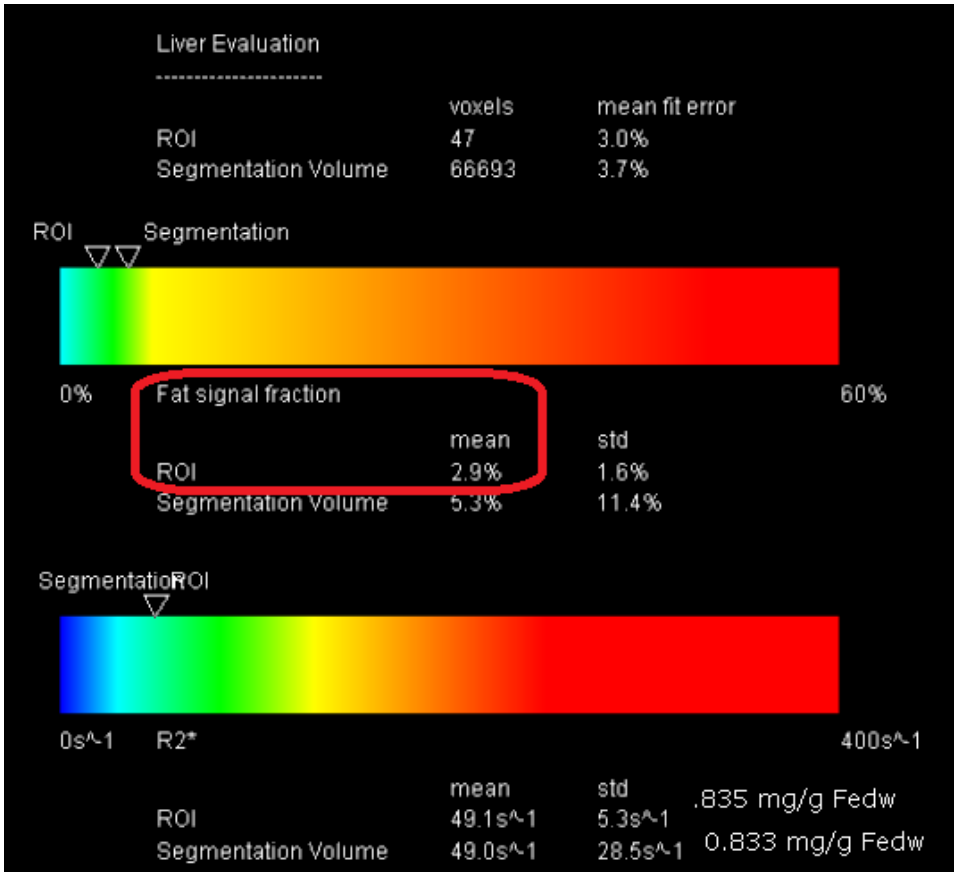
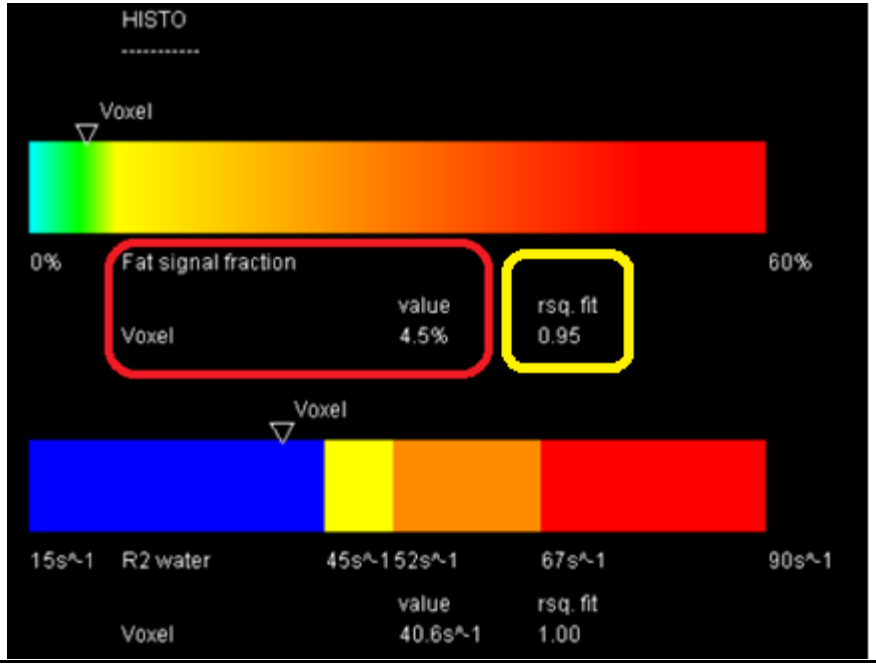
(Updated 8/31/20)

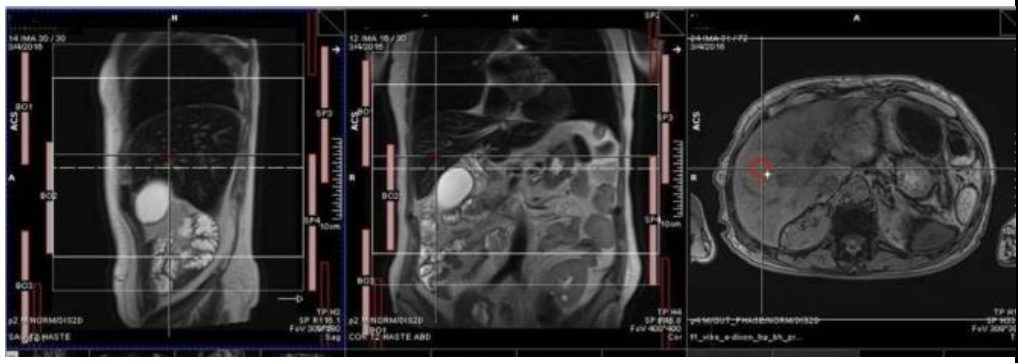
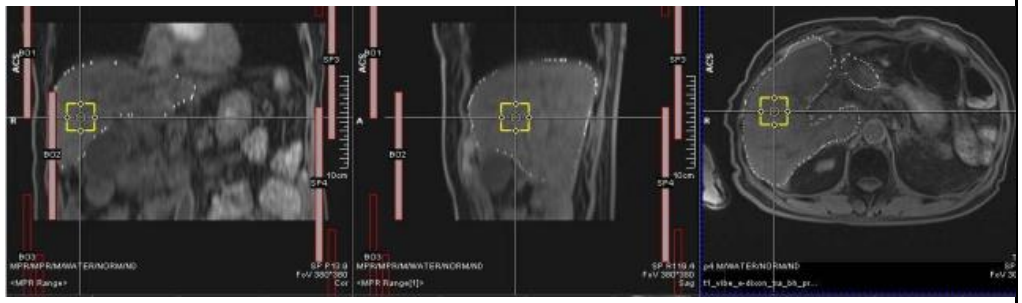
If 3T contraindicated, perform conventional multi-echo protocol on applicable 1.5T

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 FS e-DIXON VIBE Ax, BH	Auto Coverage	3 x 0 Auto Slice coverage	• DOT will automatically adjust FOV and slice coverage. • Slices should be tight to **only include liver**. Add or remove slices, if needed. • A larger than usual FOV is needed; do not decrease the FOV. • Results provide an automated liver segmentation (tracing of liver) & evaluation report recommending iron or fat deposition. • Review t1_vibe_e-DIXON_axial_W_SEG for accurate segmentation (tracing) of liver. Repeat the sequence if other anatomy is included. • BEFORE proceeding, confirm e-DIXON_**W** is the correct FS image, if a DIXON swap occurs repeat the series. DIXON swap will cause an abnormal high fat result	 (Excess slices lead to inaccurate liver segmentation)

T1 FS q-DIXON VIBE Ax, BH *iPAT4	Auto Coverage TE: 1.05, 2:46, 3:69, 4.92, 6.15, 7.38	3.5 x 0 Auto Slice coverage	• **The e-dixon sequence needs to finish loading before you open the q-dixon sequence.** • Use the e-dixon axial W seg sequence to place the red ROI. • Left click on the center of the red ROI to remove the ROI, now scroll through the liver, and find an area with no vessels. • Left click again to place the ROI back on the liver, avoiding GB or large vessels • Window level the axial image to be sure the ROI is not on any vessels. • Confirm the ROI is in the liver in all **3 planes** by using the reference lines. • For large patients, place the red ROI very anterior on the liver for better signal. • Review the q-DIXON report before starting the HISTO. • The ROI mean fit error must be less than 5%, if not then reposition the ROI and repeat the sequence • If the R2* mean (bottom bar) is more than 300 on the q-dixon report, run the optional Iron overload q-dixon and histo sequences.	 

HISTO, BH (single voxel spectroscopy)	The HISTO report provides the fat fraction value	• *** The Q-dixon sequence needs to finish loading before you open the HISTO sequence** • Before opening the HISTO, make sure you load the **e-Dixon_axial _W seg** sequence into the graphic segment. • The HISTO is set to **REF** not ISO, only non-distortion images may be used to position the HISTO. • Do not move the location of the voxel unless it is on a blood vessel then slightly move the voxel. • If the voxel location is incorrect compared to the q-dixon ROI, close the HISTO, load the e-Dixon_axial W seg sequence in the graphic segments and reopen the HISTO. • Create a sag and cor MPR of the liver to set up the HISTO (sag LL and cor LL) from the e-Dixon Ax seg **ND** (non-distortion) sequence. • Send it to applications/3D/MPR. (If the e-dixon seg ND sequence is not available then highlight the e-dixon W seg in the database and select evaluation & undo 2d distortion correction to create a non- distortion sequence • Load the 2 MPRs into the graphic segments along with e-dixon axial W_seg sequence and use the reference lines to find the center to each voxel. • Highlight all 3 graphic segments and then save as Histo placement	 

Evaluating the fat fraction value		• The radiologist will report the fat fraction value from the HISTO report. • Compare the fat fraction value on the Q-dixon report (2.9%) and HISTO report (4.5%) to make sure they are close in range. If not, repeat the HISTO and slightly move the voxel to avoid any large vessels. • On the HISTO report, make sure the **rsq. The fit** highlighted in yellow is 0.95 or higher. If it is lower than 0.95, repeat the HISTO and slightly move the voxel to avoid any large vessels. • The fat fraction on the HISTO should never be more than 50%, if so, please repeat the HISTO and slightly move the voxel to avoid any large veins.	 

Optional: Iron Overload Q-dixon and HISTO sequences			
FS q-DIXON VIBE Ax high iron, BH *iPAT2	Auto coverage 3.5 x 0 TE: 1.02, 2.0, 2.98, 3.96, 4.94, 5.92	See above	
HISTO high iron, BH (single voxel spectroscopy)		See above	

LiverLab Post Processing

- Send to PACS: all e-dixon, q-dixon, and HISTO report. Do not send e-dixon or q-dixon "F," the non-FS image or HISTO series.

- Post Processing:

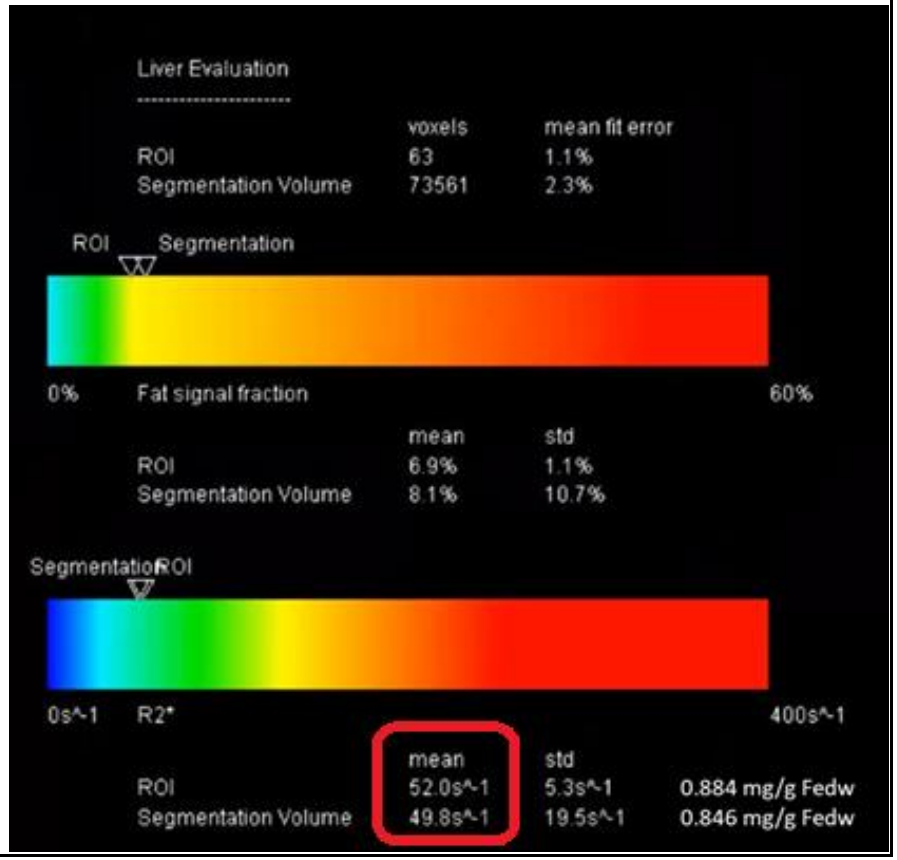
- Load q-dixon report into Viewing Tab, calculate and annotate liver iron content (LIC). The report displays R2* and must be converted to mg/g Fedw.

3T Calculation: **LIC = 0.017 x R2* mg/g Fedw**

Example:
ROI **mean**: 0.017 × **52.0** = 0.884 mg/g Fedw
Segmentation Vol. **mean**: 0.017 × **49.8** = 0.846 mg/g Fedw

- Annotate mg/g Fedw values on the q-DIXON report series in PACS, for example see ACC 30943789, SAVE changes before exiting exam

Fat fraction - top color bar
Iron content (R2*) – lower color bar



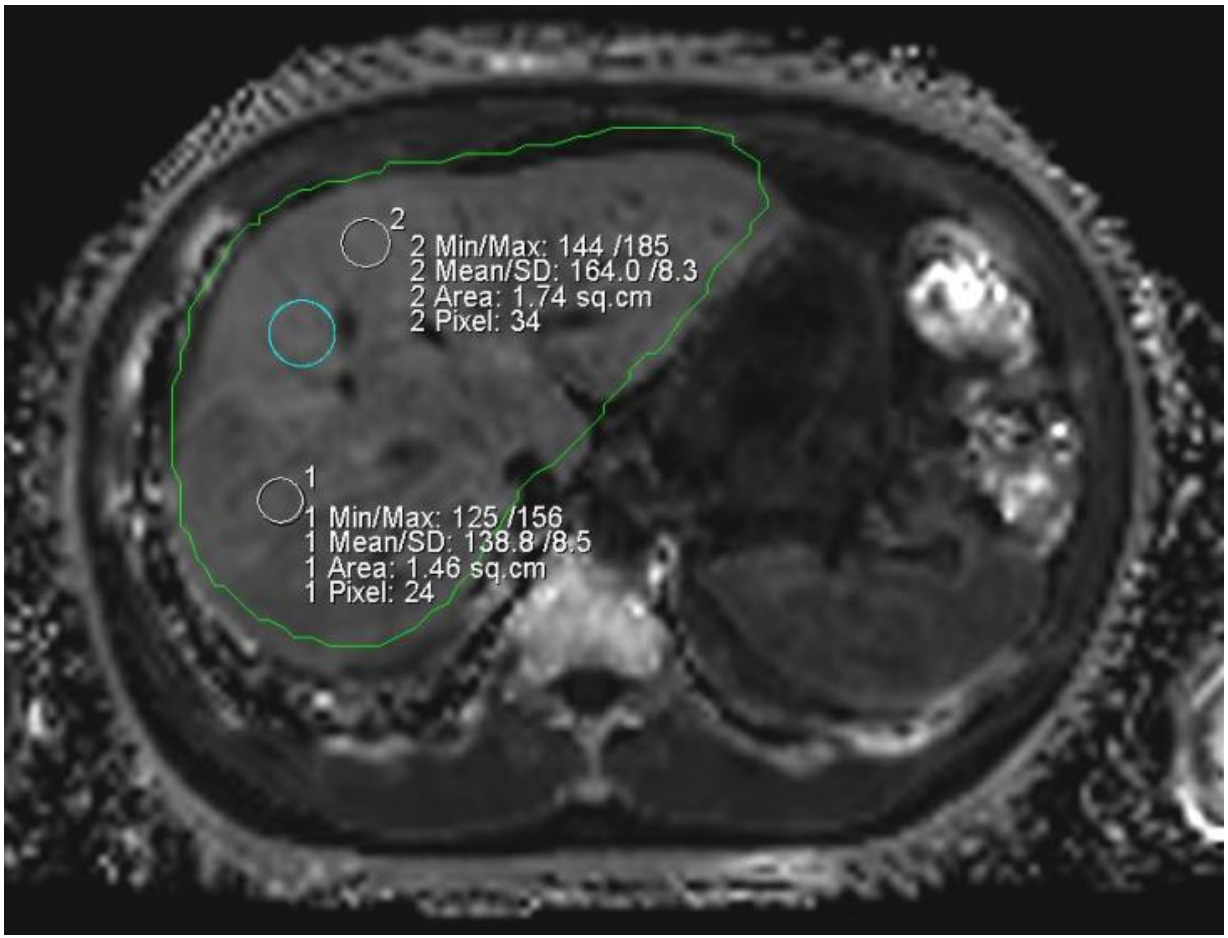
Trouble Shooting:

* If the radiologist does not like the placement of your red ROI on the Q-dixon sequence, you can use the R2* map sequence (vibe q-dixon axial R2s Eff) and make multiple freehand ROIs in the viewing tab as part of the post processing.

*Be sure the additional ROIs are not positioned over any vessels.

* Save the multi-ROI image under applications/DICOM/RGB.

*Only send the RGB image to PACS.

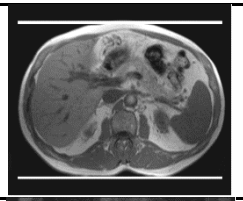
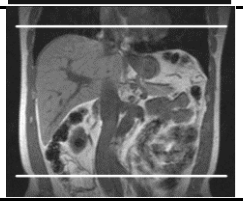


LiverLab: Pediatric Iron and Fat Quantification *

Wilson Parke 3T Only, 0 – 17 y/o

(Updated 5/25/23)

If 3T contraindicated refer PT to Dell Children's, do not perform at ARA on 1.5T.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 FS e-DIXON VIBE Ax FS q-DIXON VIBE Ax HISTO	See Adult Protocol			
T2 HASTE Cor FB	~340	8 x 2		
T1 FS HASTE Ax	~320	7 x 2		

- Send to PACS: all routine sequences plus LiverLab all e-dixon, q-dixon, and HISTO report. Do not send e-dixon or q-dixon "F," the non-FS image or HISTO series.
- Post Processing: See instructions on adult protocol

MRElastography

Wilson Parke 3T Only

(Updated 9/9/21)

Prep

- NPO for 6 hours

Room Setup

- The Active driver box in the equipment room is programmed to stay ON.

Patient Positioning

- Utilize cinch strap under black compression band.
- Offset the PT to the left of the table to ISO liver with arms above head.

Paddle (Passive Driver) Position

- Center paddle at level of xiphoid process to lateral aspect of PT
- Secure paddle firmly with compression band, this should be tight.
- Coil centered to paddle covering lateral aspect of PT.
- Confirm tubing is securely connected.

Patient Coaching

- Perform exam on expiration.
- Consistent expiration is needed to place liver in the same location for each slice.

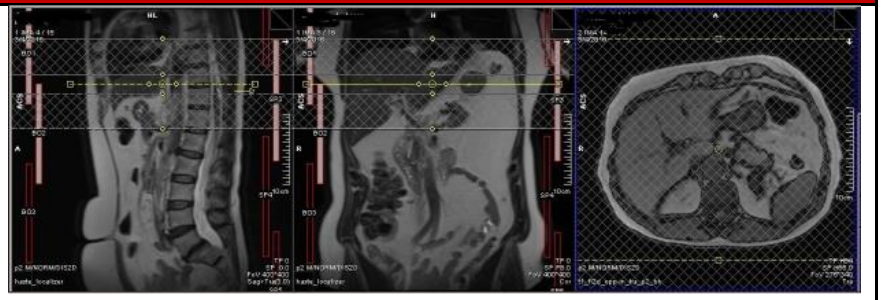
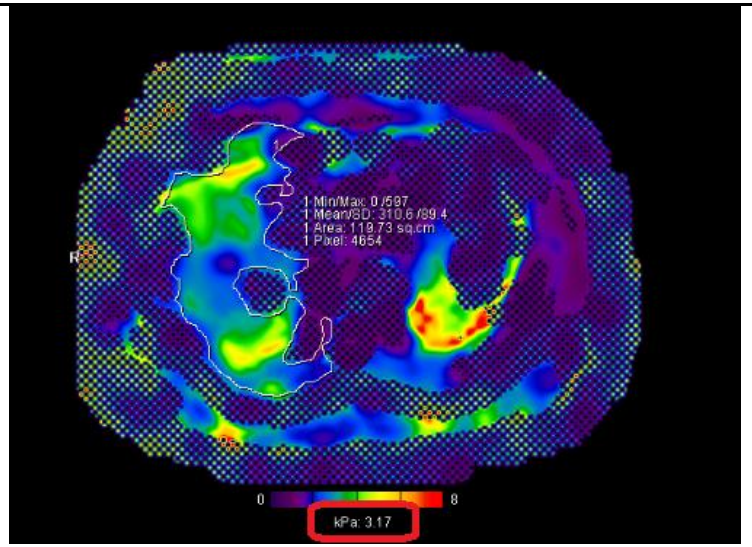
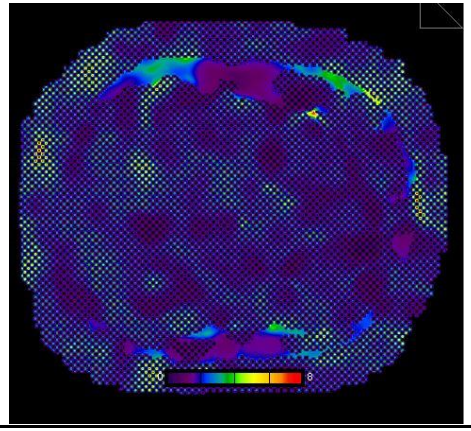
Helpful Tips & Trouble shooting:

- For large patients, the compression band must be tighter than normal.
- The kPa value should never be more than 10.

If the epiMRE shows all grid:

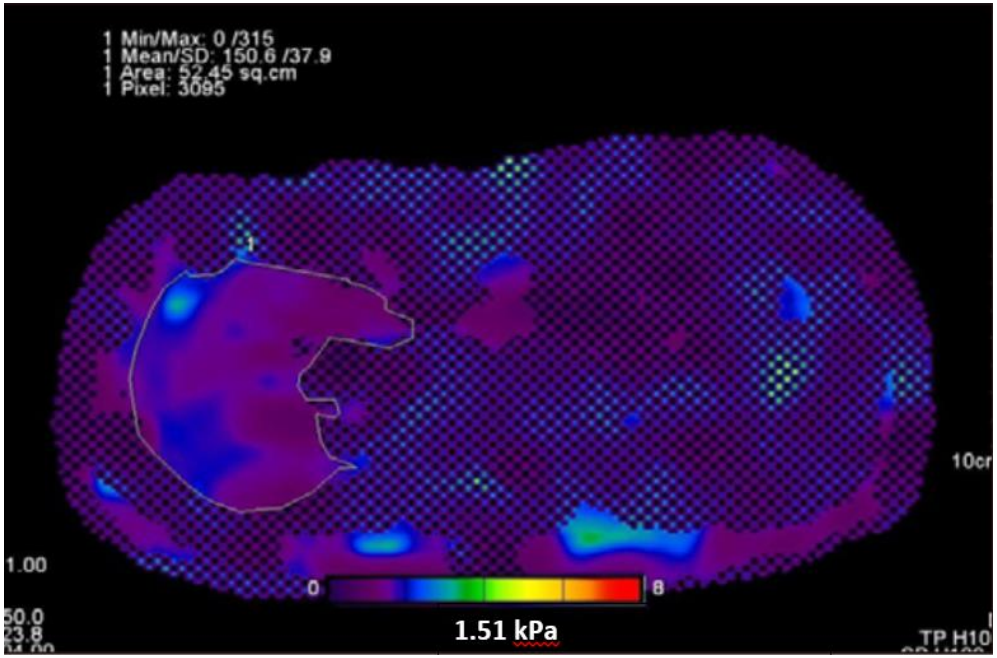
- Try moving the paddle placement anteriorly instead of laterally.
- Avoid the heart on the epiMRE axial.
- Confirm the tubing is securely connected.
- Verify the patient is NPO.
- If the patient has an MRCP and elastography, make sure they drink the juice after the elastography.

Adjusting Passive Driver Amplitude

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
epiMRE Ax	Adjust for 10% - 30% air gap on all sides	4 slices 8 x 2	• Position slices mid-liver avoiding heart and portal vein. • Avoiding the **heart** is more important than avoiding the portal vein.	
			• Valid epiMRE = shows a portion of non-grid liver	 (Don't forget to type the kPa value & save as RGB)
			• Failed epiMRE axial = liver covered in grid; no liver parenchyma visible to segment	

• Post Processing
- Send epiMRE axial_P_**StiffC95** and **haste** axial localizer to Viewing Tab
- Review all 4 images and select image with **largest** section of visualized liver parenchyma
-Set the haste ax loc to the **same slice position** as the Stiff 95. Use the haste loc for reference when tracing the liver.
- Select Tools > Freehand ROI and segment the visualized non-grid portion of the liver
- Divide the Mean by 100 (move decimal over to the left 2 places)
- Annotate at the bottom of the image

Example: Mean is 150.6 / 100 = 1.51 kPa
Round 2 decimal places



Lesions or other pathology is not considered normal liver parenchyma and may cause false results. Exclude these areas from your ROI.

- Select Patient > Save As > Append images to series
- Click OK, go to Browser
- Select epiMRE_P_StiffC95 (4 images with 1 color image), Select Applications > DICOM Tools > **Save as RGB**

• Send to PACS:
  - epiMRE axials (epi_Mag, gre P_Stiff, epi P_Conf, epi P_Wave) including new epi Stiff95_RGB series = 5 series total
  - Do not send P_P (phase images) and original StiffC95 (grey scale images) series

MRCP

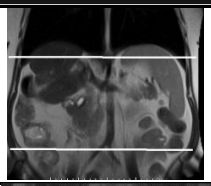
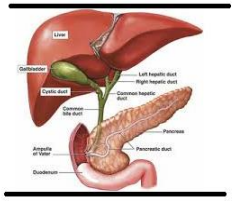
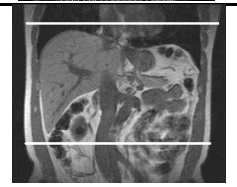
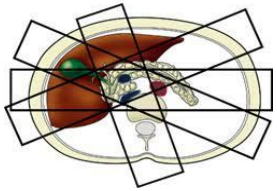
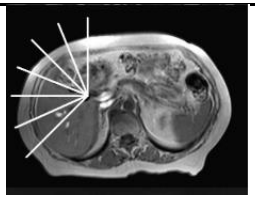
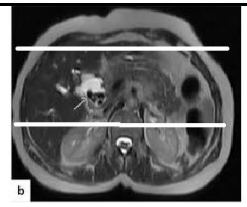
(follow-up pancreatic cysts, gallbladder, bile duct)

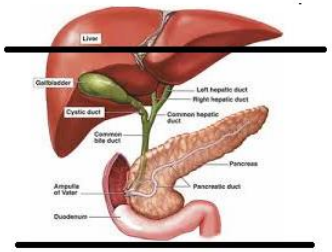
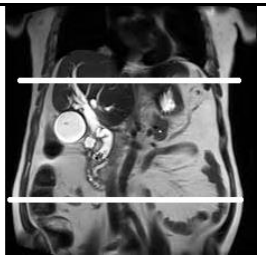
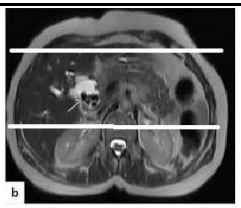
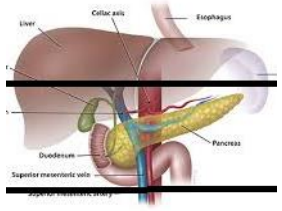
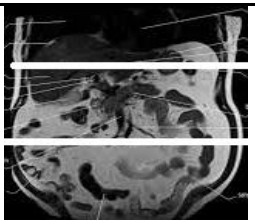
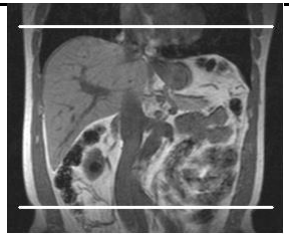
(Updated 9/20/24)

Prep

- NPO for 8 hours
- 12oz. of Pineapple or Blueberry (if diabetic) juice 10-15 minutes prior to scanning. Do not provide if sedating.
- Cannot be performed same day as PET/CT due to water only restriction.

- Include entire pancreas for any pancreatic indications.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Cor	~360	8 x 2		
T1 Flash Ax	~360	5 x 1	For pancreas indications only.	
T2 HASTE Ax T2 FS Ax Trigger-*done after post 2min* *T2 FS HASTE Ax* (if motion on TSE or trigger fail)	~360	7x 2	Include liver, gallbladder, pancreas, spleen, biliary system, and duodenum. 	
Radial thick slab MRCP	~250	40-80 thick ~6 slices	Scan 1 image per location with angles similar to what is pictured. Radial projection through biliary system. 	
T2 HASTE IR Cor hires	~300	3 x 0	Include pancreas and biliary system as shown in the image	

T2 HASTE IR Ax hires	~300	4 x 0	Include right and left main hepatic ducts through pancreatic head and duodenum. Including the kidneys might be necessary to include the duodenum. (A common mistake is to clip the duodenum) 	
T2 3D Cor MRCP Trigger	~380	1.5 x 0	Include gallbladder, biliary system, and pancreas. MPRs • Lateral & Tumble	
T1 Ax BH (only if MRCP is for a pancreatic indication)	~360	5 x 1	Include entire pancreas 	
T1 FS Dixon VIBE FS Ax Pre *Ax Care Bolus* T1 FS Dixon VIBE Ax Immediate Post T1 FS Dixon VIBE Ax 2 min Post T1 FS Dixon VIBE Ax Delayed Post	~360	3 x 0	Include liver, gallbladder, pancreas, spleen, biliary system, and duodenum. Delayed series must be at least 5 min post injection.	

Send to PACS:

- Pre-FS Dixon VIBE: in phase, out of phase and FS series. Do not send the WS water series.
- Post-FS Dixon VIBE: FS and respective subtraction series. Do not send the in phase, out of phase or water series and respective subs.
- Care Bolus
- If study is without contrast, include the T1 Dixon VIBE FS Ax Pre and T2 FS Ax Trigger

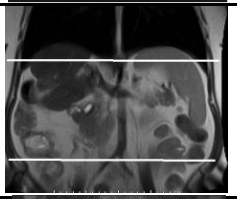
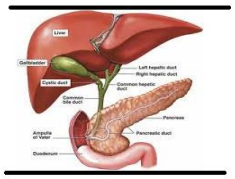
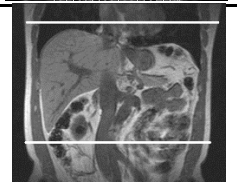
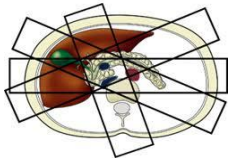
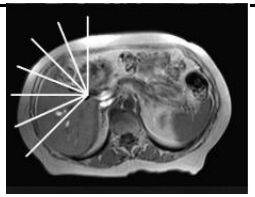
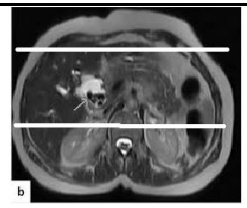
MRCP Non-contrast

(Updated: 07/11/17)

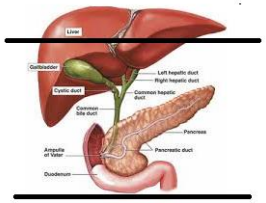
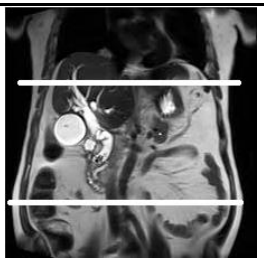
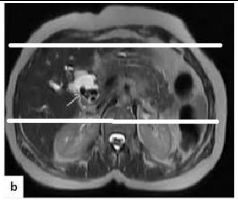
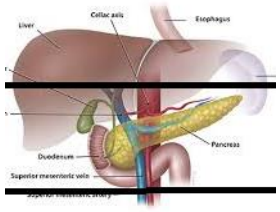
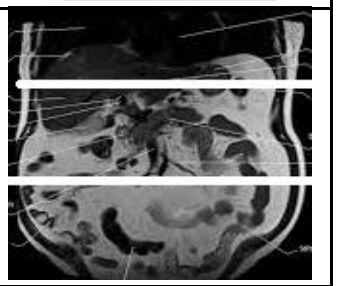
Prep

- NPO for 8 hours
- 12oz. of Pineapple or Blueberry (if diabetic) juice 10-15 minutes prior to scanning. Do not provide if sedating.
- Do not perform on the same day as PET/CT due to water only restriction.

- Include entire pancreas for any pancreatic indications.

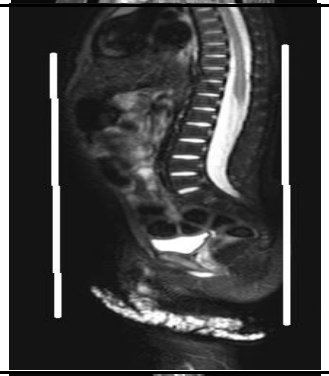
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Cor	~360	8 x 2		
T1 Flash Ax	360	5 x 1	For pancreas indications only.	
T2 HASTE Ax T2 FS Ax Trigger *T2 FS HASTE Ax* (if motion on TSE or trigger fail	~360	7 x 2 ~24 slices	Include liver, gallbladder, pancreas, spleen, biliary system, and duodenum 	
T1 FS Dixon VIBE Ax Pre	~360	3 x 0		
Radial thick slab MRCP	250	40 - 80 mm	Scan 1 image per location with angles similar to what is pictured. Radial projection through biliary system. 	
T2 HASTE IR Cor hires	300	3 x 0	Include pancreas and biliary system as shown in the image	

- continued next page -

T2 HASTE IR Ax hires	300	4 x 0	Include right and left main hepatic ducts through pancreatic head and duodenum. Including the kidneys might be necessary to include the duodenum. (A common mistake is to clip the duodenum) 	
T2 3D Space Cor MRCP Trigger	~360	1.5 x 0	Include gallbladder, biliary system, and pancreas. MPRs Lateral & Tumble	
T1 Ax BH (only if MRCP is for a pancreatic indication)	~360	5 x 1	Include entire pancreas 	
Send to PACS: • Pre-FS Dixon VIBE: in phase, out of phase and FS series. Do not send the WS water series.				

Bone Survey for Metastasis

- Only performed at MID, QRY, & CIC

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Cor Upper STIR Cor Upper	~480 (include orbits to diaphragm)	8 x 0		
T1 Sag Upper STIR Sag Upper	~480 (spine only, include orbits to diaphragm)	6 x 0		
T1 Cor Lower STIR Cor Lower	~480 (include diaphragm to femoral heads)	8 x 0		
T1 Sag Lower STIR Sag Lower	~480 (spine only, include diaphragm to femoral heads)	6 x 0		

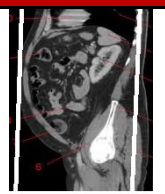
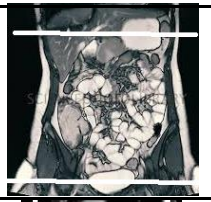
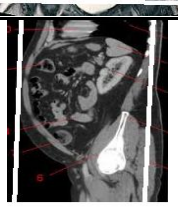
Enterography *

(Updated 2/29/24)

Prep

- NPO for 4 hours
- Adult 3 Breeza oral contrast at 60, 40, & 20 minutes prior to the exam / Pedi 2 Breeza oral contrast at 60 & 30 minutes prior to the exam. Do not perform without oral contrast.
- Void prior to starting exam to avoid any disruptions.
- Do not perform on the same day as PET/CT due to water only restriction.

- Do not scan on an Espree scanner due to limited Head to foot FOV. Include **mid liver to mid bladder.**
- Administer ½ of the Glucagon dose at the beginning of the exam and the other ½ prior to contrast injection.
- Scan patient in prone if possible
- Do not sedate.
- No arterial phase or delayed imaging required.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Cor TRUFI Cor	~380	6 x 0.6		
T2 FS SPAIR HASTE Cor FB (Upper / Lower)			TIM planning to compose upper and lower	
T2 HASTE Ax T2 FS HASTE Ax	~360	5 x 1		
T1 VIBE In/Out Ax		4 x 0		
T1 FS VIBE Cor Pre *Administer Glucagon and contrast* T1 FS VIBE Cor Immediate Post T1 FS VIBE Cor 90 second Post	~380	1.3 x 0		
T1 FS FLASH Cor Post		6 x 0.6		
T1 FS FLASH Ax Post	~360	5 x 1		

- Include T1 FS VIBE Cor on all Enterography studies without contrast. Adult non-contrast requires rad approval

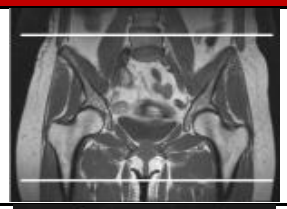
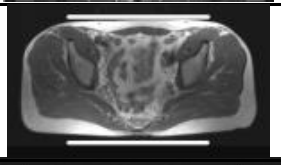
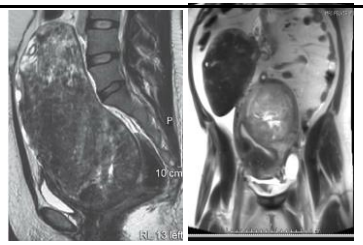
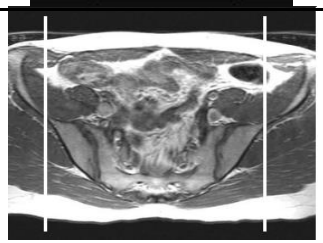
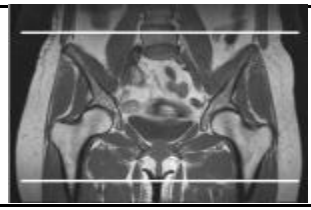
Female Pelvis - Routine

(Updated 11/28/23)

Prep

- Empty bladder
- If bladder is area of interest, then image with full bladder

- Indications: routine, adenomyosis, endometriosis, adnexal mass, uterine fibroids, Pre/Post uterine fibroid embolization (UFE), etc.
- Increase FOV and/or slice coverage to include uterus with any fibroids in its entirety on both sagittal and coronal views, i.e., do not images as cor upper and cor lower. This is so that the rads can provide an accurate measurement of uterus and tumors.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	~360 Pixel Area ≤ 2.4 mm²	5 0 x 1.5*	ACR: must include entire boney pelvis	
T2 HASTE Ax T2 FS Ax Trigger	~240 Pixel Area ≤ 1.0 mm²	5 x 1.5*	ACR: must include vaginal introitus through iliac crests & pelvic sidewalls	
T2 HASTE Cor	~240 (increase FOV if need)	4 x 1		
T2 Sag T2 HASTE Sag *(if motion on tse sag)*	~200 Pixel Area ≤ 1.0 mm² (increase FOV if needed)	3.5 x 0.5*	 example of a giant uterine mass in one FOV)	
T1 FS Dixon Ax Pre T1 FS Dixon Ax Post	~360 Pixel Area ≤ 2.4 mm²	3 x 0	ACR: must include entire boney pelvis	
T1 FS Sag Post	~200	3.5 x 0.5	For fibroids or pre/post UFE only.	

- Send subtractions to PACS.

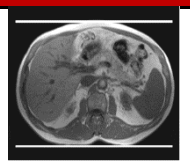
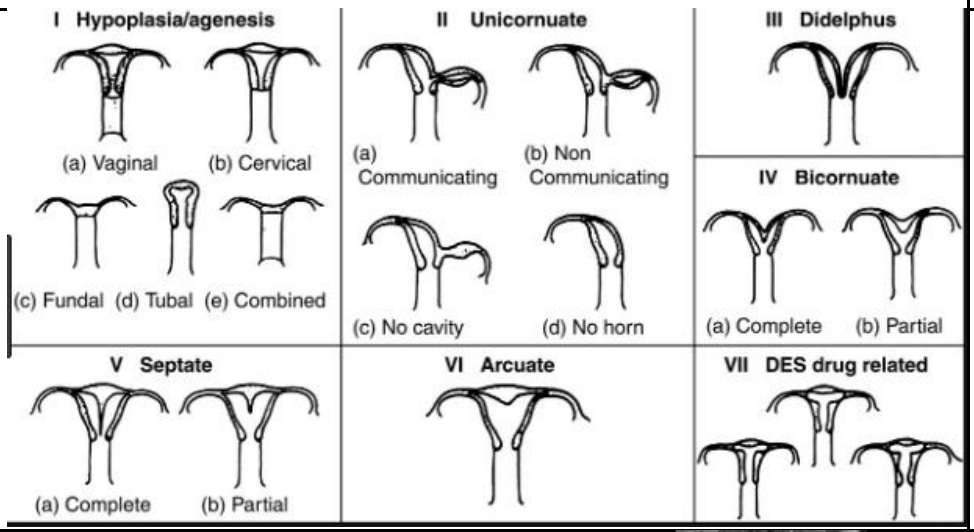
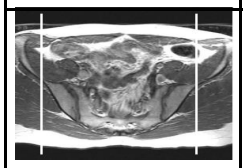
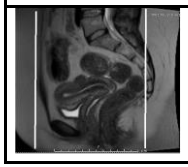
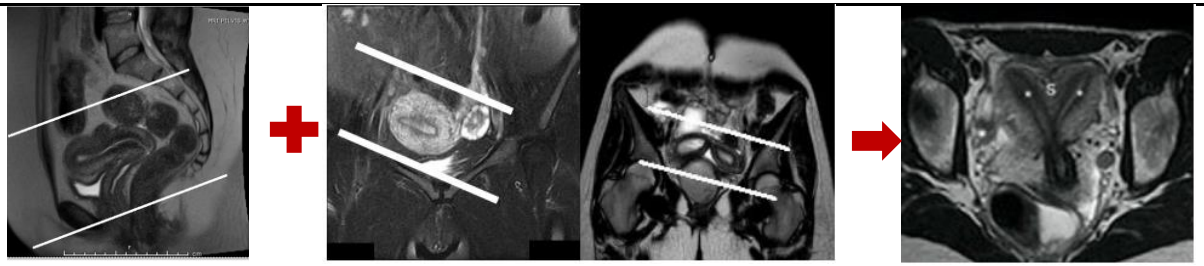
* ACR Requirements – Do not adjust parameters.

Mullerian Duct

(Updated 11/04/19)

Prep
- Empty bladder

- Infertility, Unicornuate, Arcuate, Bicornuate, Septate, or Didelphic

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 HASTE Cor - abdomen	~360	8 x 2	*Renal agenesis is sometimes associated with mullerian duct anomalies	
T1 Ax	~340	5 X 1.5		
T2 HASTE Ax BH T2 FS Ax Trigger	~240	5 X 1.5		
T2 Sag T2 HASTE Sag (if motion on tse sag)	~200	3.5 X 0.5		
T2 FS Cor	~240	4 x 1		
T2 HASTE Obl Ax loc (short axis) A haste *3-plane loc positioned parallel/perpendicular to uterus should be ran before this sequence for better planning of the Oblique scans.	~240	4 x 1		
T2 Obl (long axis - parallel to long axis to uterus)	~200	4 X 0		

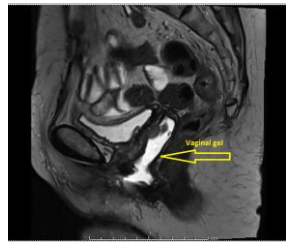
Oncology *

(MRPERONCS: Uterine, Ovarian, Endometrial, Cervical, Vaginal CA and Dr. Wu RTP)

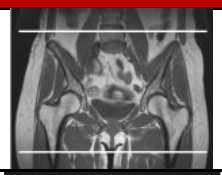
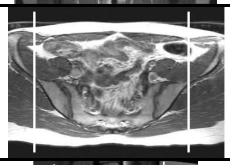
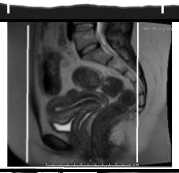
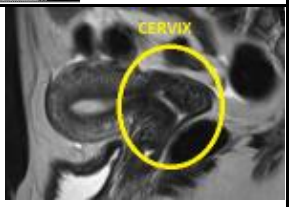
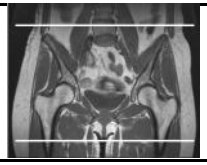
(Updated 1/17/24)

Prep

- Empty bladder
- Instruct the patient to insert 20 -30 cc of KY jelly into the vagina.



For known cancer of Uterus, endometrium, cervix, vagina, adnexa and any Dr. Wu and Dr. Wu RTP. Typically referred by oncology/gynecological oncology. Do not run this for fibroids or evaluation of cancer without prior positive pelvic female organ findings. This is not a screening exam for metastasis.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	~340 (minimum FOV to include entire bony pelvis)	5 x 1.5		
T2 FS Ax Trigger T2 HASTE Ax	240			
T2 TSE Sag T2 HASTE Sag (if T2 Sag has any motion)	200	3.5 x 0.5		
T2 HASTE Cor	240	4 x 1		
T2 Obl Ax Hires (if for cervical cancer)	160	2.5 x 0 (True axials through long axis of cervix)		 
Diffusion Ax (B0, B400, B800 Values, 1400 calc)	260	3.6 X 0, ~46 slices	Cover area of interest, consult with rad if needed	
T1 FS DIXON Ax Pre T1 FS DIXON Ax Post	~340 (minimum FOV to include entire bony pelvis)	3 x 0		
T1 FS Sag Post	200	3.5 x 0.5		Copies T2 Sag
Send subtractions to PACS				

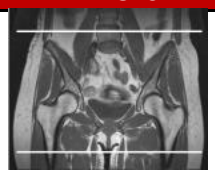
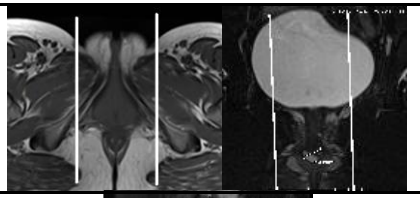
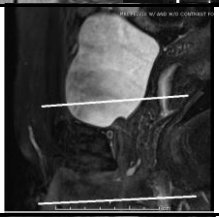
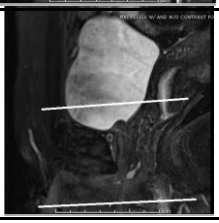
Urethral Diverticulum *

(Updated 12/2/2019)

Prep

- Empty bladder

- Instruct the patient to hold still and relax the pelvic muscles during imaging.
- Increase phase oversampling on larger patients to avoid/reduce wrap around artifact.
- Contact radiologist for male patients; may want retrograde Urogram fluoroscopy

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	~340 (minimum FOV to include entire bony pelvis)	5 x 1.5		
T2 Sag Hires	180	2.5 X 0 24 slices		
T2 FS Ax Hires T2 Ax Hires	180	2.5 X 0 24 slices		
T2 Cor Hires	180	2.5 X 0 24 slices		
T1 FS Ax Hires Pre T1 FS Ax Hires Post	180	2.5 X 0		

- Send subtractions to PACS

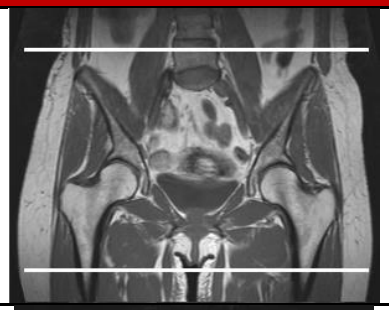
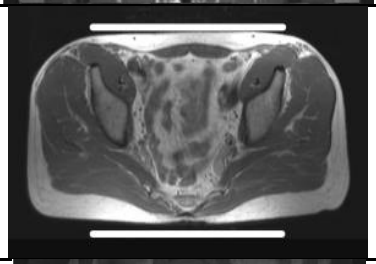
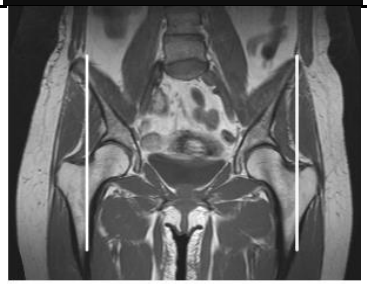
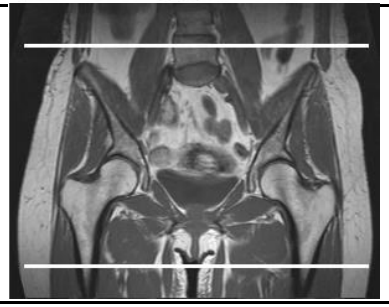
Male Pelvis - Routine

(Updated 12/6/19)

Prep

- Empty bladder
- If bladder is area of interest, then image with full bladder

- Post cystectomy (bladder removal) patients, run the routine male pelvis protocol and add the diffusion axial sequence

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	~360 (minimum FOV to include entire boney pelvis)	7 x 1		
T2 HASTE Ax T2 FS Ax	240	7 x 1		
T2 HASTE Cor	240	4 x 1		
T2 HASTE Sag	~240	5 x 1		
T1 FS DIXON Ax pre T1 FS DIXON Ax Post (2-minute delay)	~360 (minimum FOV to include entire boney pelvis)	3 x 0		

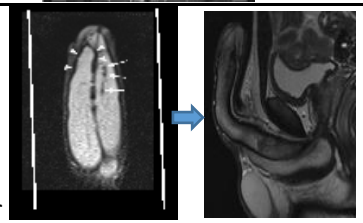
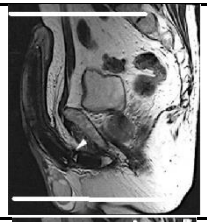
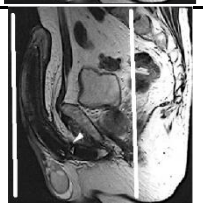
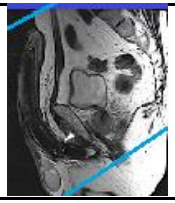
Penis

(MRPECS: urethral discharge, etc.)

(Updated 11/20/24)

Prep
- Empty bladder

- Instruct patient to position anatomy midline, straight and pointing down.

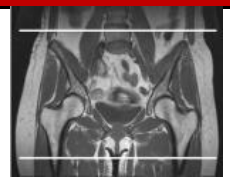
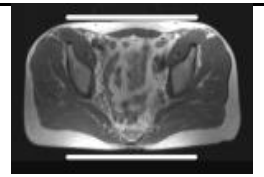
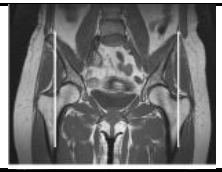
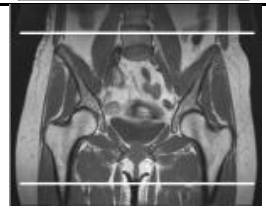
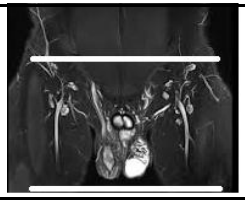
SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	~340 (minimum FOV to include entire pelvis, penis, and testes)	7 x 1		
T2 Sag hires	~200	2.5 x 0.5		 or 
T2 Ax hires	~200	2.5 x 0.5		
T2 Cor hires	~180	2.5 x 0.5		
T1 FS DIXON VIBE Obl Ax Pre T1 FS DIXON VIBE Obl Ax Post	~240	2 x 0		

Testicles

(Updated 12/6/19)

Prep

- With empty bladder
- Build up testes using a folded towel. Secure penis to pelvis.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	~360 (minimum FOV to include entire pelvis and testes)	7 x 1		
T2 HASTE Ax T2 FS Ax	~240 (Include Pelvis and testes)	7 x 1		
T2 HASTE Cor	280	4 x 1		
T2 HASTE Sag	~280	5 x 1		
T2 FS Ax Hires T2 HASTE Ax Hires	~200	3 x 1		
T1 FS DIXON Ax pre T1 FS DIXON Ax Post (2-minute delay)	~360 (minimum FOV to include entire pelvis and testes)	3 x 0		
T1 FS Ax Hires Post	~200	3 x 1		

Prostate – Diagnostic *

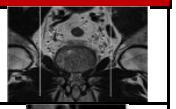
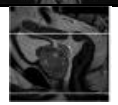
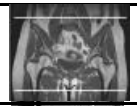
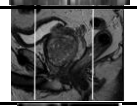
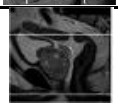
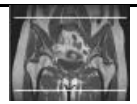
MRPRPFCS, MRI PROSTATE W/ PERFUSION AND 3D WITH AND WITHOUT CONTRAST

(Updated 5/15/24)

Prep

- 12 to 16-hr bowel prep with water enema 1 to 2-hrs prior to exam. Includes dietary restrictions.
- Void prior to exam.

- Prostate volumes are performed in DynaCAD.
- If 3T is contraindicated, MRI may be performed on 1.5T SW MR3 Aera preferred; CP MR1 Espree or MPT MR2 Espree backup. See 1.5T protocol page.
- Wait to image 4 – 6 weeks post biopsy due to residual edema; does not apply to patients with recent positive biopsy.
- Minimal wrap is OK, must not interfere with prostate or seminal vesicles

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 Sag	160	2.5 x 0		
Diffusion Ax (B0, 400, 800 Value, 1400 calculated)	~200	3.6 x 0 (~33 slices)	• Include from top of seminal vesicles through urogenital diaphragm. • Save Trace B-Values into individual series. • Review for susceptibility artifact	
T2 Ax	~180	3 x 1	• Include from top of seminal vesicles through urogenital diaphragm. • Best image quality required, repeat for motion	
T1 Ax	~360	5 x 1.5	• Include entire bony pelvis from L5-lesser through trochanter	
T2 Cor	~180	3 x 1	• Include seminal vesicles	
T1 TWIST Ax Dynamic Perfusion Pre/Post	~180	3 x 0	• Include from top of seminal vesicles through urogenital diaphragm. • Scan time is approximately 6-minutes. • 60 total measurements • Begin contrast injection after the second measurement. • Inject at 3ml/sec	
T1 FS DIXON Ax Post	~360 (minimum FOV to include entire boney pelvis)	3 x 0		

Send: Review Provider Comments for appropriate DynaCAD destinations; do not rename series or add “repeat”

- PACS: T2 Sag, T2 Ax, T1 Ax full pelvis, T2 Cor, Diff ADC & Calc, T1 Vibe Axials, renamed B0 Value, B400 Value, B800 Value, any repeats.
- DynaCAD (ARA, HCA, Seton): T2 Sag, T2 Ax, T1 Ax full pelvis, T2 Cor, Diff ADC map, T1 TWIST Axials

Tech Notes: Include DynaCAD location, example: ARA CAD, Seton CAD, HCA CAD. Include PSA & biopsy date(s)

Post Prostatectomy *

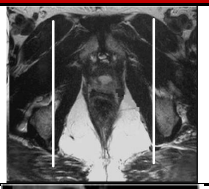
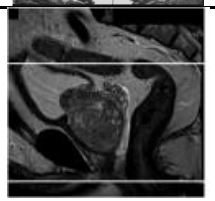
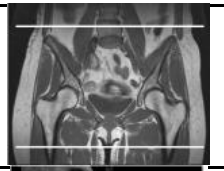
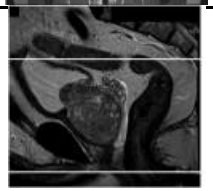
MRPRCS, MRI PROSTATE WITH AND WITHOUT CONTRAST / MRPRS, MRI PROSTATE WITHOUT CONTRAST

(Updated 5/13/24)

Prep

- 12 to 16-hr bowel prep with water enema 1 to 2-hrs prior to exam. Includes dietary restrictions.
- Void prior to exam.

- If 3T is contraindicated, MRI may be performed on 1.5T SW MR3 Aera preferred; CP MR1 Espree or MPT MR2 Espree backup. See 1.5T protocol page.
- Minimal wrap is OK, must not interfere with prostate or seminal vesicles

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 Sag	160	2.5 x 0		
Diffusion Ax (B 0, 400, 800 Value, 1400 calculated)	~200	3.6 x 0 (~33 slices)	• Include from top of seminal vesicles through urogenital diaphragm. • Split and save B-Values into its own series. • Review for susceptibility artifact	
T2 Ax T2 FS Ax T1 Ax	~200	3 x 1	• Include from top of seminal vesicles through urogenital diaphragm. • T2 Ax: best image quality required, repeat for motion	
T1 Ax	~360	5 x 1.5	• Include entire bony pelvis from L5-lesser through trochanter	
T1 TWIST Ax Dynamic Perfusion Pre/Post	~180	3 x 0	• Include from top of seminal vesicles through urogenital diaphragm. • Scan time is approximately 6-minutes. • 60 total measurements • Begin contrast injection after the second measurement. • Inject at 3ml/sec	
T1 FS DIXON Ax Post	~360	3 x 0		

Send:

- PACS: T2 Sag, T2 Ax, T1 Ax full pelvis, T2 Cor, Diff ADC & Calc, T1 Vibe Axials, renamed B0 Value, B400 Value, B800 Value, any repeats.
- DynaCAD: do not send

Prostate Non-contrast

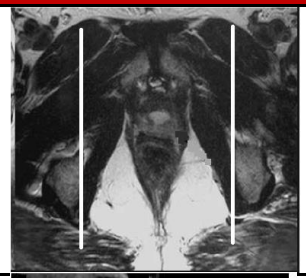
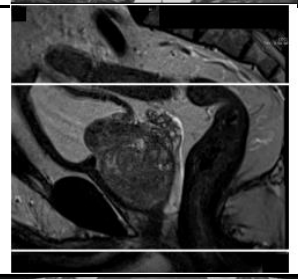
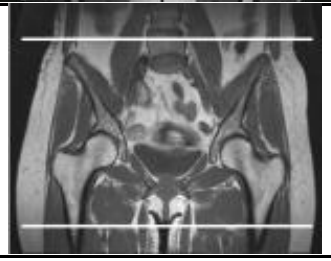
(Dr. HSU)

MRPRS, MRI PROSTATE WITHOUT CONTRAST

Prep

- 12 to 16-hr bowel prep with water enema 1 to 2-hrs prior to exam. Includes dietary restrictions.
- Void prior to exam.

- If 3T is contraindicated, MRI may be performed on 1.5T SW MR3 Aera preferred; CP MR1 Espree or MPT MR2 Espree backup. See 1.5T protocol page.
- Patients with recent positive prostate biopsy can have their MRI immediately and do not have to wait 4-6 weeks for the inflammation to do down

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 Sag	160	3 X 0 ~30 slices		
Diffusion Ax (B 0, 400, 800 Value, 1400 calculated)	~200	3.6 X 0 (~33 slices)	• Includes urogenital diaphragm through seminal vesicles. • Split and save B-Values into its own series. • Review for susceptibility artifact	
T2 Ax	~150	3 X 1 ~30 slices	• Includes urogenital diaphragm through seminal vesicles. • Best image quality required, repeat for motion	
T2 Ax	~400 100 PFOV	3 X 0 ~38 slices	Skin to skin, no angles	
T1 Ax	~340 (minimum FOV to include entire bony pelvis)	5 X 1.5 ~40 slices		

Pelvis

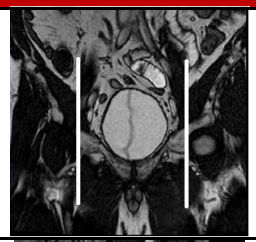
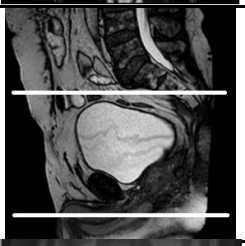
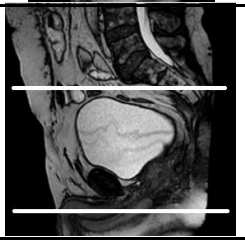
Bladder – Cancer *

(Updated 11/02/20)

Prep

- Full bladder – 24oz of water 30 minutes prior to exam

- If 3T is contraindicated; perform on 1.5T at MID, QRY, VIL, CP, GTN, or RCP
- Post cystectomy (bladder removal) patients, run the routine male pelvis protocol and add the diffusion axial sequence

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 Sag	160	2.5 x 0		
Diffusion Ax (B 0, 400, 800 Value, 1400 calculated)	~200	3.6 x 0	• Include from top of bladder through urogenital diaphragm. • Split and save B-Values into its own series. • Review for susceptibility artifact	
T2 Ax	~180	3 x 1	• Include from top of bladder through urogenital diaphragm	
T1 Ax	~360	5 x 1.5	• Include entire bony pelvis from L5-lesser through trochanter	
T2 Cor	~180	3 x 1		
T1 TWIST Ax Dynamic Perfusion Pre/Post	~180	3 x 0	• Include from top of bladder through urogenital diaphragm. • 60 total measurements • Begin contrast injection after the second measurement. • Inject at 3ml/sec	

Rectum – Cancer *

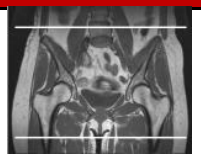
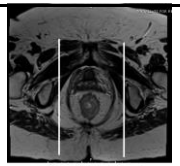
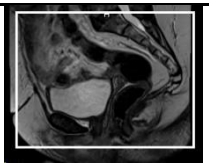
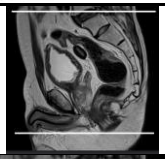
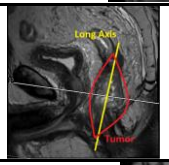
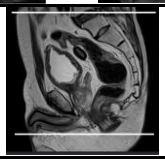
(mass, lesion, tumor, bleeding)

(Updated 5/15/24)

Prep

- Do not prep patients with colostomies.
- 12 to 16-hr bowel prep with water enema 1 to 2-hrs prior to exam. Includes dietary restrictions.
- Void prior to exam.

- If biopsy clip present reschedule patient accordingly. Add on a KUB the day before prep begins to confirm the clip has passed.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 Ax	~340 (min FOV to include entire bony pelvis)	6 x 1		
T2 Sag	200	2.5 x 0 36 slices	Mid L5 down to anal verge	 
Diffusion Ax (B0, 400, 800 Value, 1400 calculated)	260	3.6 x 0 46 slices	Mid L5 down to anal verge. Review for susceptibility artifact.	
T2 Obl Cor	240	2.5 x 0	Consult radiologist for angle; if unavailable, angle parallel with the long axis of the mass.	
T2 Obl Ax	240	2.5 x 0 L5-ischium	Consult radiologist for angle; if unavailable, angle perpendicular to the long axis of the mass.	 
T1 Dixon VIBE FS Ax Pre T1 Dixon VIBE FS Ax Post	240	2 72 slices/slab	Mid L5 down to anal verge	

- Send subtractions to PACS

Rectum – Fistula *

(pain, abscess, fissure, pilonidal cyst)

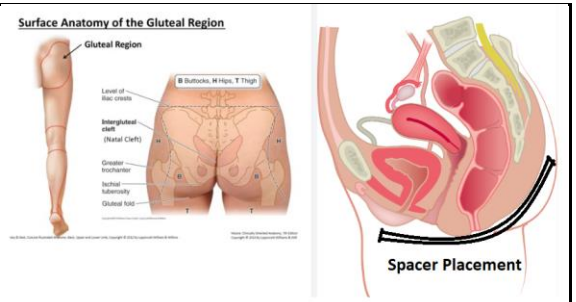
(Updated 11/20/24)

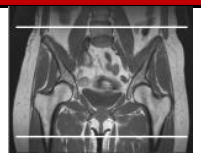
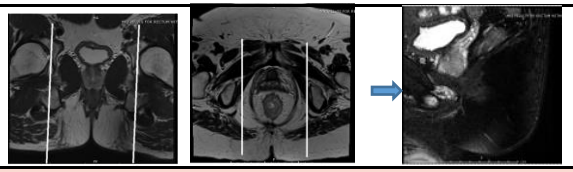
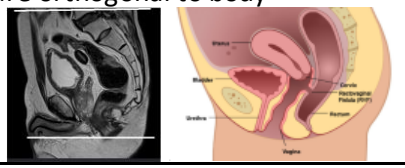
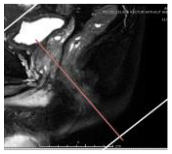
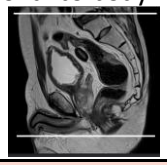
Prep

- Do not prep patients with colostomies.
- 12 to 16-hr bowel prep with water enema 1 to 2-hrs prior to exam. Includes dietary restrictions.
- Void prior to exam.

Positioning

- Place cloth spacer within the intergluteal cleft separating the buttocks.
- Scan through the patient's pathology, extending the scan through the buttocks inferiorly is frequently needed



SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax	~340 (min FOV to include entire bony pelvis)	6 x 1		
T2 FS Sag T2 Sag	160	2.5 x 0 36 slices (SI to SI joint)		
T2 Cor Obl*	240	2.5 x 0 76 slices	Anal Fistula - angled Slices parallel to anal canal (orange line) 	Rectovaginal Fistula - straight Slices are orthogonal to body 
T2 Obl Ax* T2 FS Obl Ax*	240	2.5 x 0	Slices perpendicular to anal canal 	Slices are orthogonal to body 
T1 FS Dixon VIBE Obl Ax Pre* T1 FS Dixon VIBE Obl Ax Post*	240	2 x 0 72 slices/slab		
History of Anal or Rectal CA				
Diffusion Ax* (B0, 400, 800 Value, 1400 calculated)	260	3.6 x 0 46 slices	Review for susceptibility artifact	Copies T2 Ax

* Slices are orthongal to the body for rectovaginal fistula

- Send subtractions to PACS

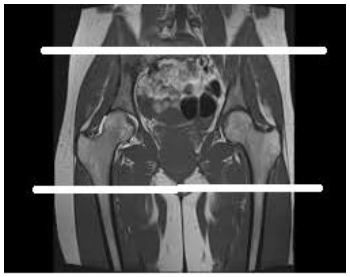
Radiation Therapy Planning

Female Pelvis RTP Non-contrast

PREP

- With empty bladder, unless specified otherwise by oncologist.

- RTP for Dr. Wu is oncology pelvis.
- Include entire anatomy in the FOV, skin to skin

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 3D Space Ax T2 FS Ax T1 Ax T1 FS Ax *Administer contrast, if needed* T1 FS Ax Post	include entire soft tissue pelvis, skin to skin from side to side and front to back	3 x 0 ~32 - 48 slices	Acquire enough slices to cover abnormality fully	 

Prostate Central Texas Cancer Center Therapy Staging - CTCC Protocol

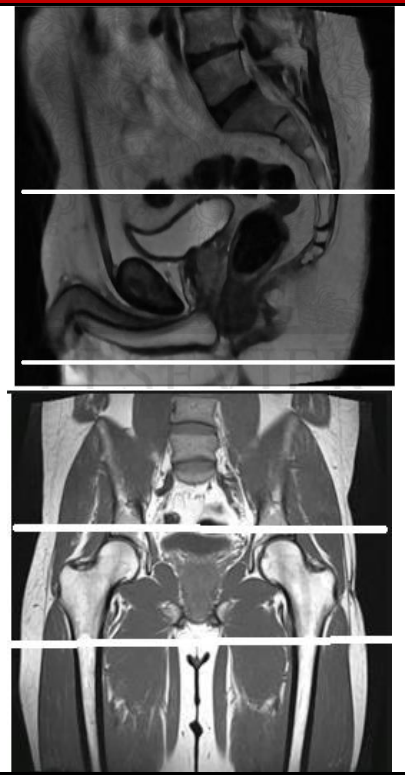
(Central Texas Cancer Center previously known as Austin Cancer Center)

PREP

- Full bladder, instruct the patient to drink 16 oz. of water one hour before their exam.

Slice Coverage

- Include entire anatomy, 100% FOV, skin to skin, no angle

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax T1 FS Ax T2 FS Ax T2 3D Ax	~400-500	3 x 0		

Prostate CyberKnife Therapy Planning Non-contrast

(Dr. Ghafoori)

PREP

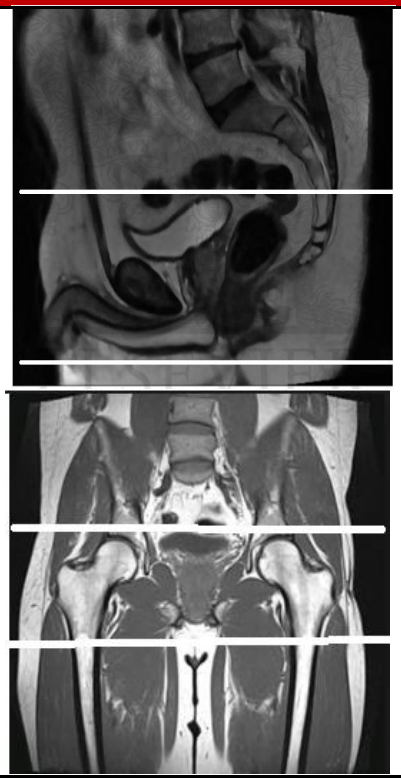
- Full bladder, instruct the patient to drink 16 oz. of water one hour before their exam.

Patient Positioning

- Feet first supine, tape feet together

Slice Coverage

- Include entire anatomy, 100% FOV, skin to skin, no angle

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 FS Ax T2 FS Ax *Administer contrast, if needed* T1 FS Ax Post	~400-500	2 x 0 ~54 slices		

Prostate RTP Dr. Garza *

(Updated 8/6/24)

PREP

- Full bladder, instruct the patient to drink 16 oz. of water one hour before their exam. Do not cancel the exam if it is not full.
- 12 to 16-hr bowel prep with 1 to 2-hr rectal suppository prior to exam. Includes dietary restrictions.

Patient Positioning

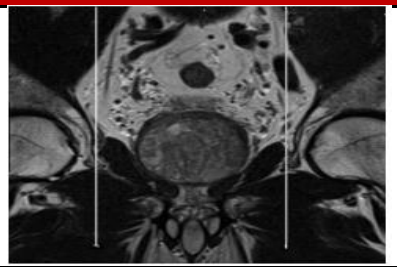
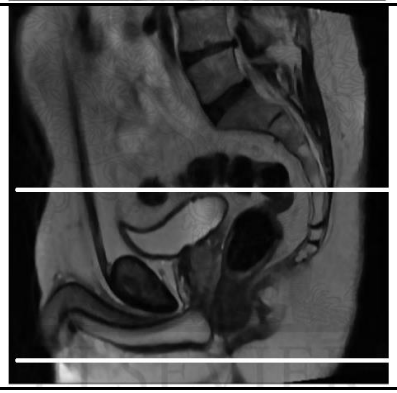
- Head-first supine, tape feet together

Slice Coverage

- 100% FOV, no angle
- No contrast

SpaceOAR Procedure

MRI is requested to be done 1 – 3 days' post gel insertion. Performing on same day does not allow enough time for gel/air to settle and will not show accurate position of gel in relation to fiducials and prostate. Gel begins to disintegrate in approximately 3 months & is no longer visible after 6 months. Typically, radiation therapy lasts approximately 2 months.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T2 Sag	160	2 x 0	Include seminal vesicles laterally	
Dr. Garza: T1 FS Ax T2 FS Ax	180	2 x 0	• Include from top of seminal vesicles through urogenital diaphragm. • Perform without FS in patients with total hip replacements.	

Prostate RTP Dr. Pahlajani *

(Updated 11/21/22)

PREP

- Full bladder, instruct the patient to drink 16 oz. of water one hour before their exam.
- If it is not full instruct the patient to drink & attempt same day imaging. Do not reschedule to a later DOS.
- 12 to 16-hr bowel prep with 1 to 2-hr rectal suppository prior to exam. Includes dietary resctrictions.

Patient Positioning

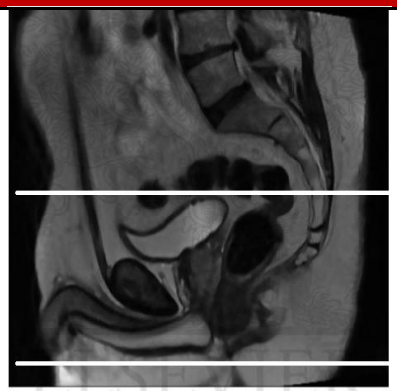
- Head-first supine, tape feet together

Slice Coverage

- 100% FOV, no angle
- No contrast

SpaceOAR Procedure

Perform MRI 1 – 3 days' post gel insertion. Performing on same day does not allow enough time for gel/air to settle and will not show accurate position of gel in relation to fiducials and prostate. Gel begins to disintegrate in approximately 3 months & is no longer visible after 6 months. Typically, radiation therapy lasts approximately 2 months.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 FS Ax T2 Ax (non-FS)	180	2.5 x 0	Include from top of seminal vesicles through urogenital diaphragm.	

Prostate RTP

(Dr. Rufus Mark)

PREP

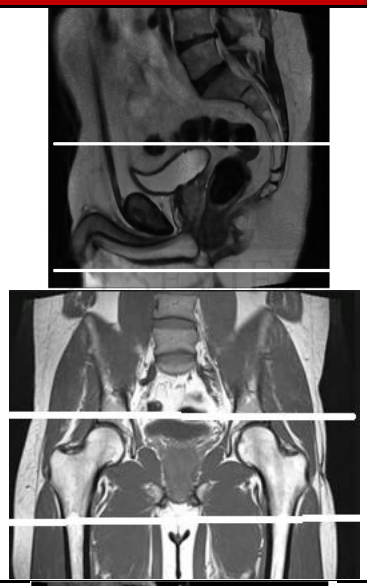
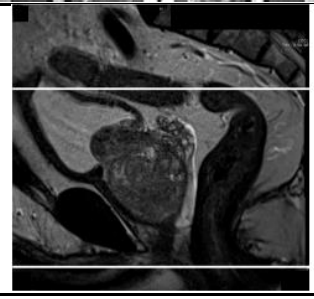
- Full bladder, instruct the patient to drink 16 oz. of water one hour before their exam.

POSITIONING

- Feet first supine, tape feet together

Slice Coverage

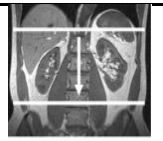
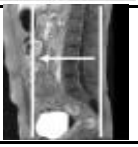
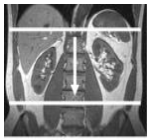
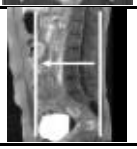
- Include entire anatomy, 100% FOV, skin to skin, no angle

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax T1 FS Ax T2 FS Ax T2 3D Ax	~400-500	3 x 0 ~54 slices	Include 10 cm above prostate to 6 cm below prostate	
T2 Ax T2 FS Ax (if post prostatectomy)	~140	3 x 0	Include from urogenital diaphragm through seminal vesicles	

Urogram

(Updated 9/20/24)

- Do not scan on an Espree due to the limited H-F FOV
- Administer 10 mg of Lasix IV prior to scanning.

SEQUENCE	FOV (mm)	SLICE (mm)	COMMENTS	IMAGES
T1 Ax T2 FS Ax	~340	8 x 0 ~42 slices	Include bladder through kidneys	
T2 HASTE Ax	~340	5 x 0 ~36 slices	Kidneys only	
T2 FS HASTE Cor	~380	5 x 0	Include kidneys, ureters, and bladder	
T1 FS VIBE Ax Pre *Ax Care Bolus* T1 FS VIBE Ax Post	~340	3 x 0	• Kidneys only • Begin immediate post once contrast is in the aorta, take into consideration of breath hold instructions.	
T1 FS VIBE Sag 5 min	~380	4 x 0 ~64 slices		
T1 FS VIBE Cor 10 min	~380	2.5 x 0 ~64 slices		
T1 FS VIBE Ax 10 min	~340	3 x 0		Copies T1 FS VIBE Ax Pre

- Consult a radiologist if you have any concern if enough contrast is visible in the kidneys, ureters, or bladder prior to removing the patient from the table.