

# MRI Abdomen Routine

Updated 11/04/23

Reviewed 05/14/25

Indications: liver, spleen, adrenal and renal indications and other general abdominal indications (other than those for pancreas, MRCP and Eovist protocols).

Full Abdomen FOV: Lung bases to iliac crest or to bottom of liver/spleen/kidneys if they extend low (top/bottom coverage), anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence        | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|-----------------------|---------------|-------|---------|------------|----------|-------------|
| T2 HASTE/SSFSE        | T2 COR        | cor   | no      | 7          | 1.4      | front       |
| T2 HASTE/SSFSE        | T2 AX         | ax    | no      | 7          | 1.4      | top         |
| T2 HASTE/SSFSE        | T2 FS AX      | ax    | yes     | 7          | 1.4      | top         |
| In/Out Phase w/ DIXON | IN/OUT AX     | ax    | no      | 5          | 1        | top         |
| T1 VIBE/LAVA          | T1 FS PRE COR | cor   | yes     | 3.5        | 0.6      | front       |
| T1 VIBE/LAVA          | T1 FS PRE AX  | ax    | yes     | 3.5        | 0.6      | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the arterial phase bolus track and trigger when contrast reaches the renal arteries.

|                            |                 |     |     |     |     |       |
|----------------------------|-----------------|-----|-----|-----|-----|-------|
| T1 VIBE/LAVA               | T1 FS ART AX    | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA               | T1 FS 3 MIN COR | cor | yes | 3.5 | 0.6 | front |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 7   | 1.4 | top   |
| T1 VIBE/LAVA               | T1 FS 5 MIN AX  | ax  | yes | 3.5 | 0.6 | top   |

## **RECONS:**

axial and coronal subtractions

# MRI Pelvis Routine (Unisex)

Updated 07/05/25

Reviewed 07/05/25

Indications: Ovarian cancers/masses/cysts/lesions, endometriosis, pelvic pain, lymphadenopathy and any pelvis exam which does not have a more specific protocol.

**Use uterus protocol for uterine fibroids & uterine bleeding (among other indications).**

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

If the mass/uterus/ovaries extend into the abdomen, increase craniocaudal coverage to include the entire structure.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
|----------------|-----------|-------|---------|------------|----------|-------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|                       |               |     |     |   |     |       |
|-----------------------|---------------|-----|-----|---|-----|-------|
| T2 HASTE/SSFSE        | T2 COR        | cor | no  | 5 | 1.4 | front |
| T2 TSE                | T2 SAG        | sag | no  | 4 | 1   | right |
| T2 TSE                | T2 AX         | ax  | no  | 3 | 1   | top   |
| T2 HASTE/SSFSE        | T2 FS SAG     | sag | yes | 4 | 1   | sag   |
| T2 HASTE/SSFSE        | T2 FS AX      | ax  | yes | 3 | 1   | top   |
| In/Out Phase w/ DIXON | IN/OUT AX     | ax  | no  | 4 | 1   | top   |
| T1 VIBE/LAVA          | T1 FS PRE SAG | sag | yes | 3 | 0.6 | right |
| T1 VIBE/LAVA          | T1 FS PRE AX  | ax  | yes | 3 | 0.6 | top   |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                            |                 |     |     |   |     |       |
|----------------------------|-----------------|-----|-----|---|-----|-------|
| T1 VIBE/LAVA               | T1 FS 35 SEC AX | ax  | yes | 3 | 0.6 | top   |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX | ax  | yes | 3 | 0.6 | top   |
| T1 VIBE/LAVA               | T1 FS POST SAG  | sag | yes | 3 | 0.6 | right |
| T1 VIBE/LAVA               | T1 FS POST COR  | cor | yes | 3 | 0.6 | front |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 5 | 1   | top   |

## **RECONS:**

axial and sagittal subtractions

# MRI Abdomen/Pelvis Combo

Updated 11/04/23

Reviewed 05/14/25

The exam includes orders/requisitions for both the abdomen and pelvis. Put all images into one folder to send to PACS.

Full Abdomen FOV: Lung bases to iliac crest or to bottom of liver/spleen/kidneys if they extend low (top/bottom coverage)  
anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to  
greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

MRCP FOV: above central intrahepatic bile ducts to bottom of gallbladder/pancreas (top/bottom coverage), front of gallbladder  
to few slices posterior to pancreas (front/back coverage), right of gallbladder to left of pancreatic tail (right/left coverage).

If the length of bore can't do top/bottom coverage in one scan without wrap, split abdomen and pelvis into two parts.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence        | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View  |
|-----------------------|---------------|-------|---------|------------|----------|-------------|----------------|
| T2 HASTE/SSFSE        | T2 AX         | ax    | no      | 7          | 1.4      | top         | abdomen/pelvis |
| T2 HASTE/SSFSE        | T2 FS AX      | ax    | yes     | 7          | 1.4      | top         |                |
| T1 VIBE/LAVA          | T1 FS PRE AX  | ax    | yes     | 3.5        | 0.6      | top         |                |
| T2 HASTE/SSFSE        | T2 COR        | cor   | no      | 7          | 1.4      | front       | abdomen        |
| In/Out Phase w/ DIXON | IN/OUT AX     | ax    | no      | 5          | 1        | top         |                |
| T1 VIBE/LAVA          | T1 FS PRE COR | cor   | yes     | 3.5        | 0.6      | front       |                |
| T2 TSE                | T2 SAG        | sag   | no      | 5          | 1        | right       | pelvis         |
| T1 VIBE/LAVA          | T1 FS PRE SAG | sag   | yes     | 3.5        | 0.6      | right       |                |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the arterial phase bolus track and trigger when contrast reaches the renal arteries.

|                            |                 |     |     |     |     |       |                |
|----------------------------|-----------------|-----|-----|-----|-----|-------|----------------|
| T1 VIBE/LAVA               | T1 FS ART AX    | ax  | yes | 3.5 | 0.6 | top   | abdomen        |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   | abdomen/pelvis |
| T1 VIBE/LAVA               | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right | pelvis         |
| T1 VIBE/LAVA               | T1 FS 3 MIN COR | cor | yes | 3.5 | 0.6 | front | abdomen        |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 7   | 1.4 | top   | abdomen/pelvis |
| T1 VIBE/LAVA               | T1 FS 5 MIN AX  | ax  | yes | 3.5 | 0.6 | top   |                |

If exam is for a **PANCREAS** indication, run the following sequences at the beginning of the exam:

|                |                |     |    |   |     |       |      |
|----------------|----------------|-----|----|---|-----|-------|------|
| T2 HASTE/SSFSE | MRCP THINS COR | cor | no | 4 | 0.8 | front | MRCP |
| T2 HASTE/SSFSE | MRCP THINS SAG | sag | no | 4 | 0.8 | right |      |
| T2 HASTE/SSFSE | MRCP THINS AX  | ax  | no | 4 | 0.8 | top   |      |

## RECONS:

abdomen - axial and coronal subtractions

pelvis - axial and sagittal subtractions

# MRI Chest

Updated 11/04/23

Reviewed 05/14/25

Indications: pericardial, mediastinal, thymic masses/cysts and bronchogenic cysts.

This protocol is not used for chest wall masses (use MSK protocols) or cardiac exams.

Check with rad to see if any additional sequences are needed based on history and/or prior images.

If no prior imaging, do axial T2 HASTE nonFS of the entire thorax to find the lesion.

Chest FOV: supraclavicular to adrenals (top/bottom coverage), anterior to posterior subq fat (front/back coverage),  
right to left subq fat (right/left coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence             | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------------------|---------------|-------|---------|------------|----------|-------------|
| T2 HASTE/SSFSE             | T2 COR        | cor   | no      | 5          | 1        | front       |
| T2 HASTE/SSFSE             | T2 SAG        | sag   | no      | 5          | 1        | right       |
| T2 HASTE/SSFSE             | T2 AX         | ax    | no      | 5          | 1        | top         |
| T2 HASTE/SSFSE             | T2 FS AX      | ax    | yes     | 5          | 1        | top         |
| Diffusion (b50, b800, ADC) | DIFFUSION AX  | ax    | yes     | 7          | 1.4      | top         |
| In/Out Phase w/ DIXON      | IN/OUT AX     | ax    | no      | 5          | 1        | top         |
| T1 VIBE/LAVA               | T1 FS PRE COR | cor   | yes     | 3.5        | 0.6      | front       |
| T1 VIBE/LAVA               | T1 FS PRE SAG | sag   | yes     | 3.5        | 0.6      | right       |
| T1 VIBE/LAVA               | T1 FS PRE AX  | ax    | yes     | 3.5        | 0.6      | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|              |                 |     |     |     |     |       |
|--------------|-----------------|-----|-----|-----|-----|-------|
| T1 VIBE/LAVA | T1 FS 20 SEC AX | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA | T1 FS POST COR  | cor | yes | 3.5 | 0.6 | front |
| T1 VIBE/LAVA | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right |
| T1 VIBE/LAVA | T1 FS POST AX   | ax  | yes | 3.5 | 0.6 | top   |

## RECONS:

axial, coronal and sagittal subtractions

# **MRI Pancreas (includes MRCP)**

Updated 11/04/23

Reviewed 05/14/25

Indications: pancreatic mass, pancreatitis, gallbladder disease, biliary obstruction, cholelithiasis, choledocholithiasis.

Use MRCP protocol for any of the above indications if the exam is ordered without IV contrast.

Full Abdomen FOV: Lung bases to iliac crest or to bottom of liver/spleen/kidneys if they extend low (top/bottom coverage), anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

MRCP FOV: above central intrahepatic bile ducts to bottom of gallbladder/pancreas (top/bottom coverage), front of gallbladder to few slices posterior to pancreas (front/back coverage), right of gallbladder to left of pancreatic tail (right/left coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence        | PACS Name      | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|-----------------------|----------------|-------|---------|------------|----------|-------------|---------------|
| T2 HASTE/SSFSE        | MRCP THINS COR | cor   | no      | 4          | 0.8      | front       | MRCP          |
| T2 HASTE/SSFSE        | MRCP THINS SAG | sag   | no      | 4          | 0.8      | right       |               |
| T2 HASTE/SSFSE        | MRCP THINS AX  | ax    | no      | 4          | 0.8      | top         |               |
| T2 HASTE/SSFSE        | T2 COR         | cor   | no      | 7          | 1.4      | front       | full abdomen  |
| T2 HASTE/SSFSE        | T2 AX          | ax    | no      | 7          | 1.4      | top         |               |
| T2 HASTE/SSFSE        | T2 FS AX       | ax    | yes     | 7          | 1.4      | top         |               |
| In/Out Phase w/ DIXON | IN/OUT AX      | ax    | no      | 5          | 1        | top         |               |
| T1 VIBE/LAVA          | T1 FS PRE COR  | cor   | yes     | 3.5        | 0.6      | front       |               |
| T1 VIBE/LAVA          | T1 FS PRE AX   | ax    | yes     | 3.5        | 0.6      | top         |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the arterial phase bolus track and trigger when contrast reaches the renal arteries.

|                            |                 |     |     |     |     |       |              |
|----------------------------|-----------------|-----|-----|-----|-----|-------|--------------|
| T1 VIBE/LAVA               | T1 FS ART AX    | ax  | yes | 3.5 | 0.6 | top   | full abdomen |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   |              |
| T1 VIBE/LAVA               | T1 FS 3 MIN COR | cor | yes | 3.5 | 0.6 | front |              |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 7   | 1.4 | top   |              |
| T1 VIBE/LAVA               | T1 FS 5 MIN AX  | ax  | yes | 3.5 | 0.6 | top   |              |

## **RECONS:**

axial and coronal subtractions

# MRI MRCP

Updated 11/04/23

Reviewed 05/14/25

Indications: cholecystitis, gallstones, biliary dilatation, choledocholithiasis, jaundice, pancreatitis, RUQ/epigastric pain.

Have the patient drink 16 oz water (if not NPO) 10 mins prior to beginning exam to distend to the duodenum and allow better visualization of the ampulla.

Full Abdomen FOV: Lung bases to iliac crest or to bottom of liver/spleen/kidneys if they extend low (top/bottom coverage), anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

MRCP FOV: above central intrahepatic bile ducts to bottom of gallbladder/pancreas (top/bottom coverage), front of gallbladder to few slices posterior to pancreas (front/back coverage), right of gallbladder to left of pancreatic tail (right/left coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence             | PACS Name       | plane  | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------------------|-----------------|--------|---------|------------|----------|-------------|---------------|
| T2 HASTE/SSFSE             | MRCP THINS COR  | cor    | no      | 4          | 0.8      | front       | MRCP          |
| T2 HASTE/SSFSE             | MRCP THINS SAG  | sag    | no      | 4          | 0.8      | right       |               |
| T2 HASTE/SSFSE             | MRCP THINS AX   | ax     | no      | 4          | 0.8      | top         |               |
| Radial Thick Slab          | MRCP THICK SLAB | radial | yes     | 50         | 25       | NA          |               |
| 3D Slab MRCP               | MRCP THIN SLAB  | cor    | yes     | 1          | 0        | front       |               |
| T2 HASTE/SSFSE             | T2 FS AX        | ax     | yes     | 7          | 1.4      | top         | full abdomen  |
| T1 VIBE/LAVA               | T1 FS PRE AX    | ax     | yes     | 3.5        | 0.6      | top         |               |
| In/Out Phase w/ DIXON      | IN/OUT AX       | ax     | no      | 5          | 1        | top         |               |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax     | yes     | 7          | 1.4      | top         |               |

## RECONS:

horizontal and vertical MIP spinners of the 3D MRCP sequence

Indications: FNH versus adenoma after inconclusive standard liver MR, cholangiocarcinoma, biliary anatomy, bile leak, hepaticojejunostomy evaluation, presurgical evaluation of colon metastases to the liver (when ordered as Eovist protocol).

**This protocol must be approved by a body Radiologist.**

After the 20 min images are obtained and if the exam is ordered for biliary anatomy, bile leak or hepaticojejunostomy evaluation, have a **body Radiologist check** images for adequate opacification of the biliary tree.

Can repeat axial and coronal T1s every 5 mins until biliary opacification is adequate.

Full Abdomen FOV: Lung bases to iliac crest or to bottom of liver/spleen/kidneys if they extend low (top/bottom coverage) anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

MRCP FOV: above central intrahepatic bile ducts to bottom of gallbladder/pancreas (top/bottom coverage), front of gallbladder to few slices posterior to pancreas (front/back coverage), right of gallbladder to left of pancreatic tail (right/left coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence        | PACS Name      | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|-----------------------|----------------|-------|---------|------------|----------|-------------|---------------|
| T2 HASTE/SSFSE        | MRCP THINS COR | cor   | no      | 4          | 0.8      | front       | MRCP          |
| T2 HASTE/SSFSE        | MRCP THINS SAG | sag   | no      | 4          | 0.8      | right       |               |
| T2 HASTE/SSFSE        | MRCP THINS AX  | ax    | no      | 4          | 0.8      | top         |               |
| In/Out Phase w/ DIXON | IN/OUT AX      | ax    | no      | 5          | 1        | top         | full abdomen  |
| T1 VIBE/LAVA          | T1 FS PRE COR  | cor   | yes     | 3.5        | 0.6      | front       |               |
| T1 VIBE/LAVA          | T1 FS PRE AX   | ax    | yes     | 3.5        | 0.6      | top         |               |

**CONTRAST** - 1 mL/sec 10 mL Eovist followed by 20 mL saline flush. All patients receive 10 mL Eovist regardless of weight.

For the arterial phase bolus track and trigger when contrast reaches the renal arteries.

|                            |                  |     |     |     |     |       |              |
|----------------------------|------------------|-----|-----|-----|-----|-------|--------------|
| T1 VIBE/LAVA               | T1 FS ART AX     | ax  | yes | 3.5 | 0.6 | top   | full abdomen |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX  | ax  | yes | 3.5 | 0.6 | top   |              |
| T1 VIBE/LAVA               | T1 FS 3 MIN COR  | cor | yes | 3.5 | 0.6 | front |              |
| T1 VIBE/LAVA               | T1 FS 5 MIN AX   | ax  | yes | 3.5 | 0.6 | top   |              |
| T2 HASTE/SSFSE             | T2 COR           | cor | no  | 7   | 1.4 | front |              |
| T2 HASTE/SSFSE             | T2 AX            | ax  | no  | 7   | 1.4 | top   |              |
| T2 HASTE/SSFSE             | T2 FS AX         | ax  | yes | 7   | 1.4 | top   |              |
| T1 VIBE/LAVA               | T1 FS 10 MIN AX  | ax  | yes | 3.5 | 0.6 | top   |              |
| T1 VIBE/LAVA               | T1 FS 10 MIN COR | cor | yes | 3.5 | 0.6 | front |              |
| Diffusion (b50, b800, ADC) | DIFFUSION AX     | ax  | yes | 7   | 1.4 | top   |              |
| T1 VIBE/LAVA               | T1 FS 15 MIN AX  | ax  | yes | 3.5 | 0.6 | top   |              |
| T1 VIBE/LAVA               | T1 FS 15 MIN COR | cor | yes | 3.5 | 0.6 | front |              |
| T1 VIBE/LAVA               | T1 FS 20 MIN AX  | ax  | yes | 3.5 | 0.6 | top   |              |
| T1 VIBE/LAVA               | T1 FS 20 MIN COR | cor | yes | 3.5 | 0.6 | front |              |

**RECONS:**

axial and coronal subtractions

# MRI Urinary Bladder

Updated 11/25/23

Reviewed 05/14/25

Indications: bladder mass, bladder diverticulum, female urethral/periurethral diverticulum.

Once patient arrives in the department, tell him/her not to use the bathroom and give the patient 16 oz water to drink immediately.

The bladder needs to be at least partially distended for the best exam.

If the patient has a Foley catheter, clamp it before exam to distend the bladder. Remember to unclamp it at the end of the exam.

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to

greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Bladder FOV: centered on bladder, FOV 13-15 cm, 320 x 320 matrix, cover several slices beyond bladder wall and mass in every plane.

If a MR cystogram is needed, the dilution is 2 mL Clariscan or 1 mL Gadavist added to 250 mL normal saline and mixed well.

The patient will need a Foley catheter for a cystogram.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|                |               |     |     |     |     |       |             |
|----------------|---------------|-----|-----|-----|-----|-------|-------------|
| T2 TSE         | T2 TSE AX     | ax  | no  | 3.5 | 0.5 | top   | bladder     |
| T2 TSE         | T2 TSE SAG    | sag | no  | 3.5 | 0.5 | right |             |
| T2 TSE         | T2 TSE COR    | cor | no  | 3.5 | 0.5 | front |             |
| T2 HASTE/SSFSE | T2 AX         | ax  | no  | 7   | 1.4 | top   | full pelvis |
| T2 HASTE/SSFSE | T2 FS AX      | ax  | yes | 7   | 1.4 | top   |             |
| T1 VIBE/LAVA   | T1 FS PRE SAG | sag | yes | 3.5 | 0.6 | right |             |
| T1 VIBE/LAVA   | T1 FS PRE AX  | ax  | yes | 3.5 | 0.6 | top   |             |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                             |                 |     |     |     |     |       |             |
|-----------------------------|-----------------|-----|-----|-----|-----|-------|-------------|
| T1 VIBE/LAVA                | T1 FS 20 SEC AX | ax  | yes | 3.5 | 0.6 | top   | full pelvis |
| T1 VIBE/LAVA                | T1 FS 60 SEC AX | ax  | yes | 3.5 | 0.6 | top   |             |
| T1 VIBE/LAVA                | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right |             |
| T1 VIBE/LAVA                | T1 FS POST COR  | cor | yes | 3.5 | 0.6 | front |             |
| Diffusion (b50, b1000, ADC) | DIFFUSION AX    | ax  | yes | 6   | 1   | top   |             |

Roll the patient 3 times on scanner to mix the excreted contrast in bladder.

|              |                |    |     |     |     |     |             |
|--------------|----------------|----|-----|-----|-----|-----|-------------|
| T1 VIBE/LAVA | T1 FS 5 MIN AX | ax | yes | 3.5 | 0.6 | top | full pelvis |
|--------------|----------------|----|-----|-----|-----|-----|-------------|

## RECONS:

axial and sagittal subtractions

# MRI Urogram

Updated 11/04/23

Reviewed 05/14/25

Indications: renal/ureteral stones, hydronephrosis, hydroureter, hematuria.

**This protocol must be approved by a body Radiologist.**

The exam includes orders/requisitions for both abdomen and pelvis. Put all images into one folder to send to PACS.

The patient should be NPO for at least 6 hrs (preferably 10-12 hrs prior to the exam).

Do not let the patient empty his/her bladder prior to getting on the scanner. The bladder is better evaluated when full.

The patient will receive 500 mL normal saline IV bolus starting 15 mins before getting patient on the table.

A nurse will administer 0.25 mg/kg IV furosemide (up to 5 mg) 5 mins before getting the patient on the table.

Contraindications to furosemide: patient not making urine, hypotension, allergy to Lasix or sulfa drugs.

Full Abdomen FOV: Lung bases to iliac crest or to bottom of liver/spleen/kidneys if they extend low (top/bottom coverage)  
anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to  
greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|                       |               |     |     |     |     |       |                |
|-----------------------|---------------|-----|-----|-----|-----|-------|----------------|
| T2 HASTE/SSFSE        | T2 COR        | cor | no  | 7   | 1.4 | front | abdomen/pelvis |
| T2 HASTE/SSFSE        | T2 AX         | ax  | no  | 7   | 1.4 | top   |                |
| T2 HASTE/SSFSE        | T2 FS AX      | ax  | yes | 7   | 1.4 | top   |                |
| 3D Slab MRU           | MRU THIN SLAB | cor | yes | 1   | 0   | front |                |
| T1 VIBE/LAVA          | T1 FS PRE AX  | ax  | yes | 3.5 | 0.6 | top   |                |
| In/Out Phase w/ DIXON | IN/OUT AX     | ax  | no  | 5   | 1   | top   | abdomen        |
| T2 HASTE/SSFSE        | T2 SAG        | sag | no  | 5   | 1   | sag   | pelvis         |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the arterial phase bolus track and trigger when contrast reaches the renal arteries.

|                            |                 |     |     |     |     |       |                |
|----------------------------|-----------------|-----|-----|-----|-----|-------|----------------|
| T1 VIBE/LAVA               | T1 FS ART AX    | ax  | yes | 3.5 | 0.6 | top   | abdomen        |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   | abdomen/pelvis |
| T1 VIBE/LAVA               | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right | pelvis         |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 7   | 1.4 | top   | abdomen/pelvis |
| T1 VIBE/LAVA               | T1 FS DELAY COR | cor | yes | 3.5 | 0.6 | front |                |
| T1 VIBE/LAVA               | T1 FS DELAY AX  | ax  | yes | 3.5 | 0.6 | top   |                |

## RECONS:

axial subtractions

# MRI Enterography

Updated 11/04/23

Reviewed 05/14/25

Indications: abdominal pain, inflammatory bowel disease, Crohns disease, ulcerative colitis, bowel obstruction, small bowel or colon mass (when ordered as enterography protocol).

Use MRI Enterography order/requisition for this exam. Put all images into one folder to send to PACS.

The patient drinks 1 bottle Volumen/CitraSelect at 45 mins, 30 mins and 15 mins prior to exam.

Use water if patient cannot tolerate Volumen/CitraSelect.

The patient drinks 16 oz water just before getting on the exam table to distend the stomach.

Image the patient in the prone position. Flip all images to supine positions before sending to PACS.

Enterography FOV: Top of small bowel to few slices below anus (top/bottom coverage), anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

If the length of the bore can't do top/bottom coverage in one scan without wrap, split abdomen and pelvis into two parts.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence  | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|-----------------|-----------|-------|---------|------------|----------|-------------|
| *Cine True FISP | CINE COR  | cor   | no      | 8          | 2        | front       |

**GLUCAGON** - 1 mg slow IV push just **after** the cine true FISP sequence.

|                |               |     |     |     |     |       |
|----------------|---------------|-----|-----|-----|-----|-------|
| T2 HASTE/SSFSE | T2 COR        | cor | no  | 5   | 0   | front |
| T2 HASTE/SSFSE | T2 FS COR     | cor | yes | 5   | 0   | front |
| T2 HASTE/SSFSE | T2 AX         | ax  | no  | 5   | 0   | top   |
| T2 HASTE/SSFSE | T2 FS AX      | ax  | yes | 5   | 0   | top   |
| T1 VIBE/LAVA   | T1 FS PRE COR | cor | yes | 3.5 | 0.6 | front |
| T1 VIBE/LAVA   | T1 FS PRE AX  | ax  | yes | 3.5 | 0.6 | top   |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                            |                  |     |     |     |     |       |
|----------------------------|------------------|-----|-----|-----|-----|-------|
| T1 VIBE/LAVA               | T1 FS 25 SEC COR | cor | yes | 3.5 | 0.6 | front |
| T1 VIBE/LAVA               | T1 FS 60 SEC COR | cor | yes | 3.5 | 0.6 | front |
| T1 VIBE/LAVA               | T1 FS 90 SEC AX  | ax  | yes | 3.5 | 0.6 | top   |
| Diffusion (b50, b800, ADC) | DIFFUSION AX     | ax  | yes | 7   | 1.4 | top   |
| T1 VIBE/LAVA               | T1 FS 5 MIN AX   | ax  | yes | 3.5 | 0.6 | top   |

\*The cine true FISP sequences is 20 images per slice, ~1 sec per image, average 6 coronal slices to cover small bowel anterior to posterior.

## **RECONS:**

axial and coronal subtractions

# MRI Rectal/Anal Mass

Updated 11/25/23

Reviewed 05/14/25

Indications: rectal or anal mass/cancer.

Have the patient empty his/her bladder just before getting on the table.

Full Pelvis FOV: Just above bifurcation to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Tumor oblique axial T2 HiRes FOV: centered on tumor, FOV 13-15 cm, 320 x 256 matrix, few slices above tumor to few slices below anus.

Anal canal oblique coronal T2 HiRes FOV: centered on anus, FOV 13-15 cm, 320 x 256 matrix, few slices anterior to anus to few slices posterior to anus.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T2 HASTE/SSFSE | T2 COR    | cor   | no      | 7          | 1.4      | front       | full pelvis   |
| T2 HASTE/SSFSE | T2 AX     | ax    | no      | 7          | 1.4      | top         |               |
| T2 HASTE/SSFSE | T2 FS AX  | ax    | yes     | 7          | 1.4      | top         |               |
| T2 TSE         | T2 SAG    | sag   | no      | 4          | 1        | right       |               |

Send the above sequences to PACS for a **body Radiologist check** to localize the mass, determine the oblique axial plane through the mass and the oblique coronal plane through the anus (if the mass approaches the anus).

**GLUCAGON** - 1 mg slow IV push **just before** the oblique sequences.

|                            |                  |         |     |     |     |       |             |
|----------------------------|------------------|---------|-----|-----|-----|-------|-------------|
| T2 TSE                     | T2 OBL AX        | obl ax  | no  | 3   | 0   | top   | mass        |
| Diffusion (b50, b800, ADC) | DIFFUSION OBL AX | obl ax  | yes | 6   | 1   | top   |             |
| T2 TSE                     | T2 TSE COR       | obl cor | no  | 3   | 0   | front | anal canal  |
| T1 VIBE/LAVA               | T1 FS PRE AX     | ax      | yes | 3.5 | 0.6 | top   | full pelvis |
| T1 VIBE/LAVA               | T1 FS PRE SAG    | sag     | yes | 3.5 | 0.6 | right |             |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

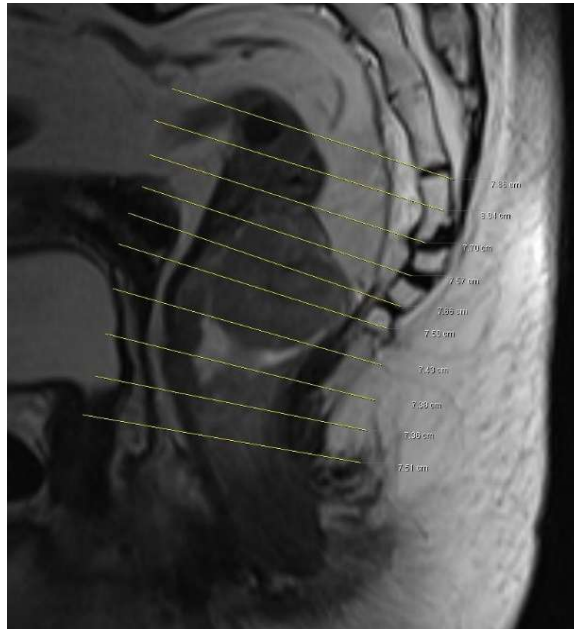
For the arterial phase bolus track and trigger when contrast reaches the renal arteries.

|              |                 |     |     |     |     |       |             |
|--------------|-----------------|-----|-----|-----|-----|-------|-------------|
| T1 VIBE/LAVA | T1 FS ART AX    | ax  | yes | 3.5 | 0.6 | top   | full pelvis |
| T1 VIBE/LAVA | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   |             |
| T1 VIBE/LAVA | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right |             |
| T1 VIBE/LAVA | T1 FS POST COR  | cor | yes | 3.5 | 0.6 | front |             |

## RECONS:

axial and sagittal subtractions

# MRI Rectal/Anal Mass



oblique axial angulation (perpendicular to the long axis of the **tumor** in the sagittal plane)



oblique coronal angulation (parallel to the long axis of the **anal canal** in the sagittal plane)

# MRI Pelvic Fistula

Updated 11/04/23

Reviewed 05/14/25

Indications: fistulas involving the rectum, colon, bladder or vagina.

**There is a separate protocol for perianal fistulas.**

Have the patient empty his/her bladder just before getting on the table.

Have female patients administer 30 mL US gel per vagina.

Full Pelvis FOV: Just above bifurcation to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
|----------------|-----------|-------|---------|------------|----------|-------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|                |               |     |     |     |     |       |
|----------------|---------------|-----|-----|-----|-----|-------|
| T2 HASTE/SSFSE | T2 COR        | cor | no  | 7   | 1.4 | front |
| T2 TSE         | T2 SAG        | sag | no  | 4   | 1   | right |
| T2 TSE         | T2 FS SAG     | sag | yes | 4   | 1   | right |
| T2 TSE         | T2 AX         | ax  | no  | 4   | 1   | top   |
| T2 TSE         | T2 FS AX      | ax  | yes | 4   | 1   | top   |
| T1 VIBE/LAVA   | T1 FS PRE SAG | sag | yes | 3.5 | 0.6 | right |
| T1 VIBE/LAVA   | T1 FS PRE COR | cor | yes | 3.5 | 0.6 | front |
| T1 VIBE/LAVA   | T1 FS PRE AX  | ax  | yes | 3.5 | 0.6 | top   |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                               |                 |     |     |     |     |       |
|-------------------------------|-----------------|-----|-----|-----|-----|-------|
| T1 VIBE/LAVA                  | T1 FS 35 SEC AX | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA                  | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA                  | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right |
| T1 VIBE/LAVA                  | T1 FS POST COR  | cor | yes | 3.5 | 0.6 | front |
| Diffusion<br>(b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 6   | 1   | top   |

**RECONS:**

axial, sagittal and coronal subtractions

# MRI Anal Fistula

Updated 06/30/25

Reviewed 05/14/25

Indications: anal and perianal fistula.

**There is a separate protocol for fistulas involving the rectum, colon, bladder or vagina.**

Have the patient empty his/her bladder just before getting on the table.

Full Pelvis FOV: Just above bifurcation to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Anal canal oblique axial T2 HiRes FOV: centered on anus, FOV 15-20 cm, 256 x 256 matrix, few slices above anus to few slices below anus.

Anal canal oblique coronal T2 Hires FOV: centered on anus, FOV 15-20 cm, 256 x 256 matrix, few slices anterior to anus to few slices posterior to anus.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|              |               |         |     |     |     |       |             |
|--------------|---------------|---------|-----|-----|-----|-------|-------------|
| T2 TSE       | T2 SAG        | sag     | no  | 4   | 1   | right | full pelvis |
| T2 TSE       | T2 AX         | ax      | no  | 3   | 0   | top   |             |
| T2 TSE       | T2 OBL AX     | obl ax  | no  | 3   | 0   | top   | anal canal  |
| T2 TSE       | T2 FS OBL AX  | obl ax  | yes | 3   | 0   | top   |             |
| T2 TSE       | T2 OBL COR    | obl cor | no  | 4   | 0   | front |             |
| T1 VIBE/LAVA | T1 FS PRE SAG | sag     | yes | 3.5 | 0.6 | right | full pelvis |
| T1 VIBE/LAVA | T1 FS PRE COR | cor     | yes | 3.5 | 0.6 | front |             |
| T1 VIBE/LAVA | T1 FS PRE AX  | ax      | yes | 3.5 | 0.6 | top   |             |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

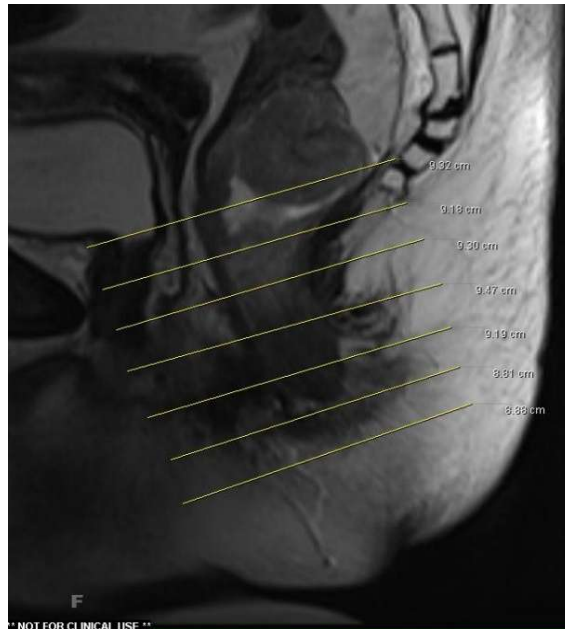
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                            |                 |     |     |     |     |       |             |
|----------------------------|-----------------|-----|-----|-----|-----|-------|-------------|
| T1 VIBE/LAVA               | T1 FS 35 SEC AX | ax  | yes | 3.5 | 0.6 | top   | full pelvis |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   |             |
| T1 VIBE/LAVA               | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right |             |
| T1 VIBE/LAVA               | T1 FS POST COR  | cor | yes | 3.5 | 0.6 | front |             |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 6   | 1   | top   |             |

**RECONS:**

axial, sagittal and coronal subtractions

# MRI Anal Fistula



oblique axial angulation (perpendicular to the long axis of the anal canal in the sagittal plane)



oblique coronal angulation (parallel to the long axis of the anal canal in the sagittal plane)

# MRI Uterus

Updated 07/05/25

Reviewed 07/05/25

Indications: cancers/masses/lesions of the uterus, endometrium, cervix & vagina; uterine fibroids and leiomyomas;  
uterine adenomyosis; vaginal/uterine bleeding, pre/post menopausal uterine bleeding & dysfunctional uterine bleeding.

**Use unisex protocol for ovarian cancers/masses/cysts, endometriosis & vulvar cancers.**

US Gel: patient administers 30 mL US gel into vagina.

US gel **required** for cervix & vaginal indications.

US gel **not required** for uterine indications, fibroids.

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Mass FOV: centered on mass, FOV 13-15 cm, 320 x 256 matrix, cover several slices above and below mass.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|                |          |     |     |   |     |       |             |
|----------------|----------|-----|-----|---|-----|-------|-------------|
| T2 HASTE/SSFSE | T2 COR   | cor | no  | 7 | 1.4 | front | full pelvis |
| T2 TSE         | T2 SAG   | sag | no  | 5 | 1   | right |             |
| T2 HASTE/SSFSE | T2 AX    | ax  | no  | 7 | 1.4 | top   |             |
| T2 HASTE/SSFSE | T2 FS AX | ax  | yes | 7 | 1.4 | top   |             |

Send the above sequences to PACS for a **body Radiologist check** to localize the lesion and determine the oblique axial plane through the lesion (see axial oblique examples on next patient).

|                                |                  |        |     |     |     |       |                                                                       |
|--------------------------------|------------------|--------|-----|-----|-----|-------|-----------------------------------------------------------------------|
| T2 TSE                         | T2 OBL AX        | obl ax | no  | 3.5 | 0.5 | top   | uterus, cervix or vagina<br>(depends on indication & lesion location) |
| Diffusion<br>(b50, b1000, ADC) | DIFFUSION OBL AX | obl ax | yes | 5   | 0   | top   |                                                                       |
| T1 VIBE/LAVA                   | T1 FS PRE SAG    | sag    | yes | 3.5 | 0.6 | right | full pelvis                                                           |
| T1 VIBE/LAVA                   | T1 FS PRE OBL AX | obl ax | yes | 3.5 | 0.6 | top   |                                                                       |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

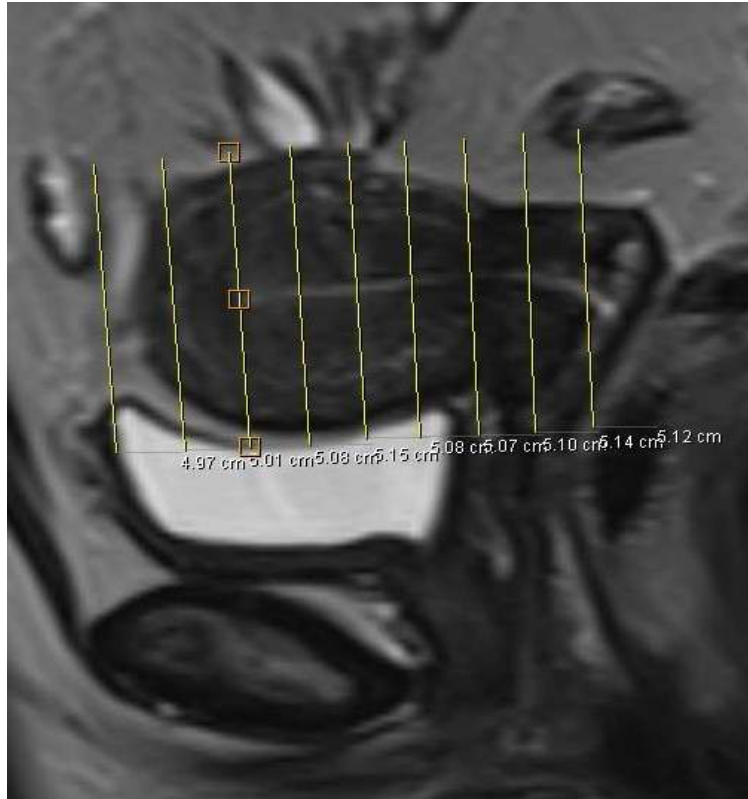
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|              |                     |        |     |     |     |       |             |
|--------------|---------------------|--------|-----|-----|-----|-------|-------------|
| T1 VIBE/LAVA | T1 FS 35 SEC SAG    | sag    | yes | 3.5 | 0.6 | right | full pelvis |
| T1 VIBE/LAVA | T1 FS 60 SEC SAG    | sag    | yes | 3.5 | 0.6 | right |             |
| T1 VIBE/LAVA | T1 FS 90 SEC OBL AX | obl ax | yes | 3.5 | 0.6 | top   |             |
| T1 VIBE/LAVA | T1 FS 120 SAG       | sag    | yes | 3.5 | 0.6 | right |             |
| T1 VIBE/LAVA | T1 FS 4 MIN OBL AX  | obl ax | yes | 3.5 | 0.6 | top   |             |
| T1 VIBE/LAVA | T1 FS 5 MIN AX      | ax     | yes | 3.5 | 0.6 | top   |             |

## RECONS:

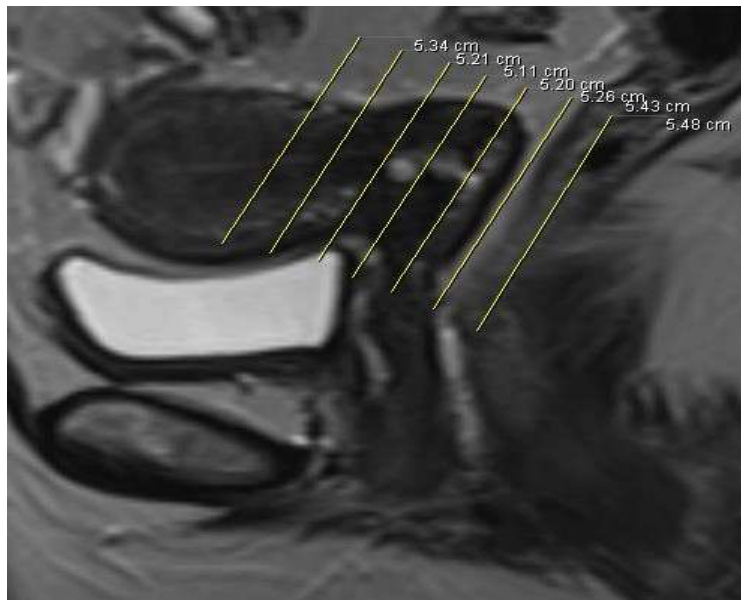
oblique axial and sagittal subtractions

# MRI Uterus



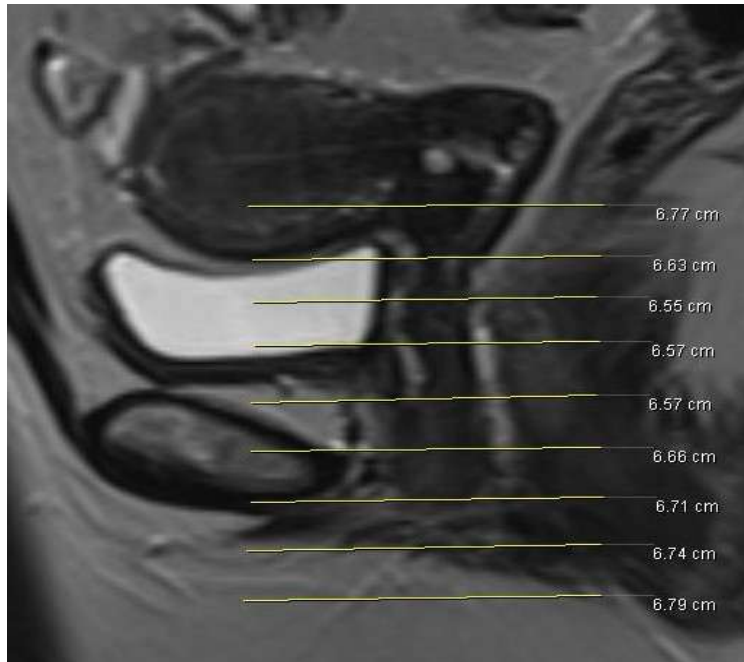
## **Uterine/Endometrial Lesions/Indications**

Oblique axial angulation (perpendicular to the long axis of the endometrial canal in the sagittal plane)



## **Cervical Lesions/Indications**

Oblique axial angulation (perpendicular to the long axis of the endocervical canal in the sagittal plane)



### **Vaginal Lesions/Indications**

Oblique axial angulation (perpendicular to the long axis of the vagina in the sagittal plane)

# MRI Uterus Congenital

Updated 07/05/25

Reviewed 07/05/25

Indications: congenital uterine/Mullerian anomalies, septate/arcuate/bicornuate/unicornuate/didelphys uterus.

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
|----------------|-----------|-------|---------|------------|----------|-------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|                |          |     |     |   |     |       |
|----------------|----------|-----|-----|---|-----|-------|
| T2 HASTE/SSFSE | T2 COR   | cor | no  | 7 | 1.4 | front |
| T2 TSE         | T2 SAG   | sag | no  | 5 | 1   | right |
| T2 HASTE/SSFSE | T2 AX    | ax  | no  | 7 | 1.4 | top   |
| T2 HASTE/SSFSE | T2 FS AX | ax  | yes | 7 | 1.4 | top   |

Send the above sequences to PACS for a **body Radiologist check** to determine the oblique axial and oblique coronal planes through the uterus and whether IV contrast is needed. Some congenital indications do not require IV contrast.

|              |               |         |     |     |     |       |
|--------------|---------------|---------|-----|-----|-----|-------|
| T2 TSE       | T2 OBL AX     | obl ax  | no  | 5   | 1   | top   |
| T2 TSE       | T2 OBL COR    | obl cor | no  | 5   | 1   | front |
| T1 VIBE/LAVA | T1 FS PRE SAG | sag     | yes | 3.5 | 0.6 | right |
| T1 VIBE/LAVA | T1 FS PRE AX  | ax      | yes | 3.5 | 0.6 | top   |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

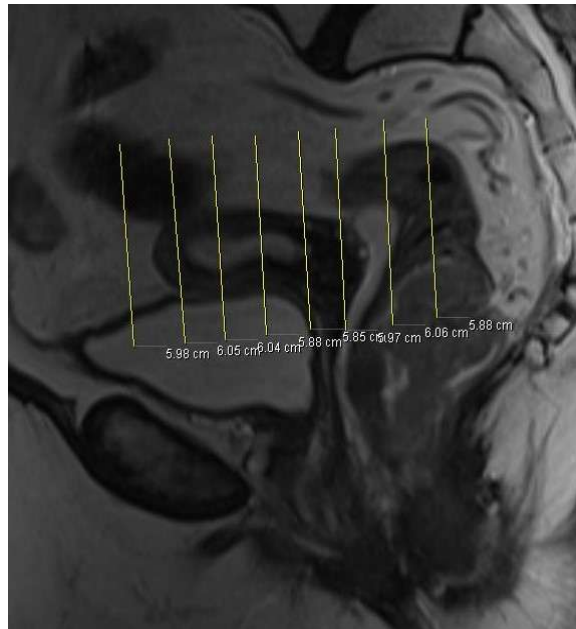
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                            |                 |     |     |     |     |       |
|----------------------------|-----------------|-----|-----|-----|-----|-------|
| T1 VIBE/LAVA               | T1 FS 35 SEC AX | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA               | T1 FS 70 SEC AX | ax  | yes | 3.5 | 0.6 | top   |
| T1 VIBE/LAVA               | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right |
| T1 VIBE/LAVA               | T1 FS POST COR  | cor | yes | 3.5 | 0.6 | front |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 6   | 1   | top   |

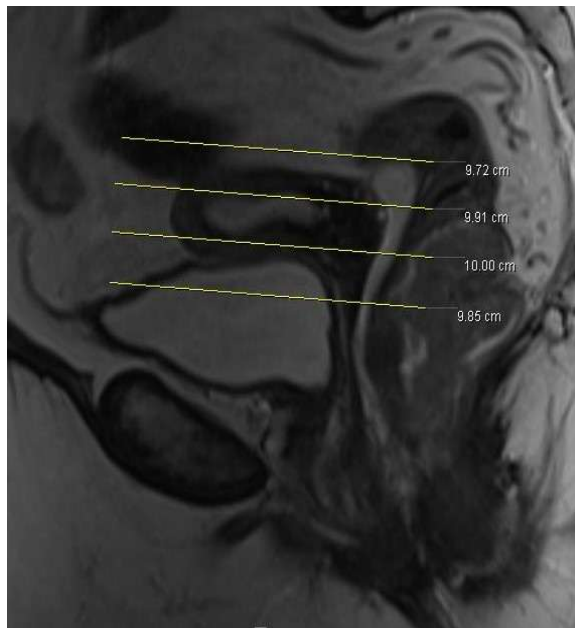
## RECONS:

axial and sagittal subtractions

# MRI Uterus Congenital



oblique axial angulation (perpendicular to the long axis of the endometrial canal in the sagittal plane)



oblique coronal angulation (parallel to the long axis of the endometrial canal in the sagittal plane)

# MRI Prostate

Updated 11/04/23

Reviewed 05/14/25

Indications: prostate cancer and other prostate issues.

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Prostate FOV: cover few slices beyond prostate and seminal vesicles in every plane.

T2 TSE: FOV 12-20 cm, in plane resolution  $\leq 0.7$  mm (phase) x  $\leq 0.4$  mm (frequency)

DWI: FOV 16-22 cm, in plane resolution  $\leq 2.5$  mm (phase) x  $\leq 2.5$  mm (frequency), TE  $\leq 90$  msec, TR  $\geq 3000$  msec

Dynamic T1 post: FOV 12-20 cm, in plane resolution  $\leq 2$  mm (phase) x  $\leq 2$  mm (frequency), TE  $< 5$  msec, TR  $< 100$  msec

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|

**GLUCAGON** - 1 mg slow IV push **just before** beginning imaging.

|                                   |                  |         |     |     |     |       |                             |
|-----------------------------------|------------------|---------|-----|-----|-----|-------|-----------------------------|
| T2 TSE                            | T2 SAG           | sag     | no  | 3   | 0   | right | prostate & seminal vesicles |
| T2 TSE                            | T2 OBL AX        | obl ax  | no  | 3   | 0   | top   |                             |
| T2 TSE                            | T2S OBL COR      | obl cor | no  | 3   | 0   | cor   |                             |
| Diffusion (b50, b800, b1400, ADC) | DIFFUSION OBL AX | obl ax  | yes | 6   | 1   | top   |                             |
| T2 HASTE/SSFSE                    | T2 AX            | ax      | no  | 7   | 1.4 | top   | full pelvis                 |
| T2 HASTE/SSFSE                    | T2 FS AX         | ax      | yes | 7   | 1.4 | top   |                             |
| T1 TSE                            | T1 AX            | ax      | no  | 8   | 2   | top   |                             |
| T1 VIBE/LAVA                      | T1 FS PRE        | ax      | yes | 3.5 | 0.6 | top   |                             |

**GLUCAGON** - 1 mg slow IV push **just before** giving IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|               |                |        |     |     |     |       |                             |
|---------------|----------------|--------|-----|-----|-----|-------|-----------------------------|
| *T1 VIBE/LAVA | T1 FS DYNAMIC  | obl ax | yes | 3   | 0   | top   | prostate & seminal vesicles |
| T1 VIBE/LAVA  | T1 FS POST AX  | ax     | yes | 3.5 | 0.6 | top   | full pelvis                 |
| T1 VIBE/LAVA  | T1 FS POST SAG | sag    | yes | 3.5 | 0.6 | right |                             |
| T1 VIBE/LAVA  | T1 FS POST COR | cor    | yes | 3.5 | 0.6 | front |                             |

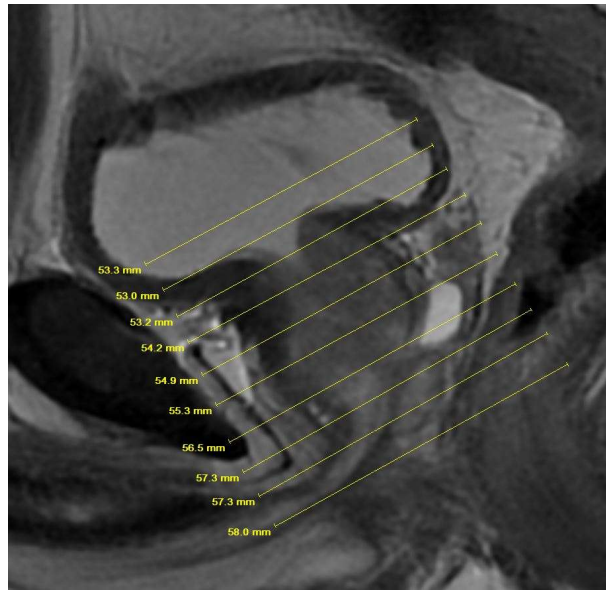
\*Dynamic post contrast phase is axial block every 7-10 secs beginning at injection and continuing for 2-3 mins

(similar to the dynamics in pituitary MR).

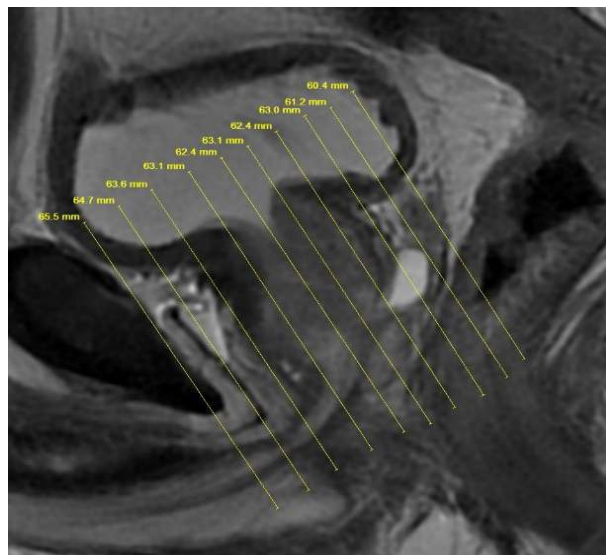
**RECONS:**

axial subtractions of the dynamic phases and axial whole pelvis

# MRI Prostate



oblique axial angulation (perpendicular to the long axis of the prostate in the sagittal plane)



oblique coronal angulation (perpendicular to the long axis of the prostate in the sagittal plane)

# MRI Penis/Scrotum

Updated 11/04/23

Reviewed 05/14/25

Indications: testicular/penile/scrotal tumor, infection, pain or trauma and implant integrity/malfunction.

Place a towel under the scrotum to elevate from between thighs. Penis is laid in midline pointing towards the patient's head and taped lightly in place.

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Penis/Scrotum FOV: FOV 18-20 cm, 256 x 256 matrix, cover several slices beyond penis and scrotum in every plane.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence             | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------------------|---------------|-------|---------|------------|----------|-------------|---------------|
| T2 HASTE/SSFSE             | T2 AX         | ax    | no      | 7          | 1.4      | top         | full pelvis   |
| T2 HASTE/SSFSE             | T2 FS AX      | ax    | yes     | 7          | 1.4      | top         |               |
| T2 TSE                     | T2 AX         | ax    | no      | 4          | 0.8      | top         | penis/scrotum |
| T2 TSE                     | T2 FS AX      | ax    | yes     | 4          | 0.8      | top         |               |
| T2 TSE                     | T2 COR        | cor   | no      | 4          | 0.8      | front       |               |
| T2 TSE                     | T2 SAG        | sag   | no      | 4          | 0.8      | right       |               |
| T1 VIBE/LAVA               | T1 FS PRE AX  | ax    | yes     | 3.5        | 0.6      | top         | full pelvis   |
| T1 VIBE/LAVA               | T1 FS PRE SAG | sag   | yes     | 3.5        | 0.6      | right       |               |
| Diffusion (b50, b800, ADC) | DIFFUSION AX  | ax    | yes     | 6          | 1        | top         |               |

Send the above sequences to PACS for a **body Radiologist check** to determine if IV contrast is needed. Some trauma and implant malfunction cases do not require IV contrast.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|              |                 |     |     |     |     |       |             |
|--------------|-----------------|-----|-----|-----|-----|-------|-------------|
| T1 VIBE/LAVA | T1 FS 20 SEC AX | ax  | yes | 3.5 | 0.6 | top   | full pelvis |
| T1 VIBE/LAVA | T1 FS 60 SEC AX | ax  | yes | 3.5 | 0.6 | top   |             |
| T1 VIBE/LAVA | T1 FS POST SAG  | sag | yes | 3.5 | 0.6 | right |             |
| T1 VIBE/LAVA | T1 FS POST COR  | cor | yes | 3.5 | 0.6 | front |             |

If the exam is for **penile implant integrity/malfunction**, add the following sequences at the end of the exam after the patient has inflated his implant:

|        |          |    |     |   |     |     |               |
|--------|----------|----|-----|---|-----|-----|---------------|
| T2 TSE | T2 AX    | ax | no  | 4 | 0.8 | top | penis/scrotum |
| T2 TSE | T2 FS AX | ax | yes | 4 | 0.8 | top |               |

## RECONS:

axial and sagittal subtractions

# MRI Defecography (Pelvic Floor)

Updated 06/16/25

Reviewed 06/16/25

Indications: fecal/urinary incontinence, constipation, urinary stasis, rectocele, cystocele, vaginal/uterine prolapse.

IV contrast is not given for this protocol.

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Parameters for cine sequences (20 images per run, 1 image per sec).

The sagittal slice for the trueFISP is midline small FOV showing the lower rectum and anal canal (see below image).

Repeat this sequence until the patient exhibits an adequate defecation attempt.

Many patients require multiple attempts before they understand and are comfortable enough to defecate on scanner.

Some patients are unable to defecate on the table no matter how many attempts they make.

The coronal slice for the trueFISP is small FOV through the anal canal (see below image).

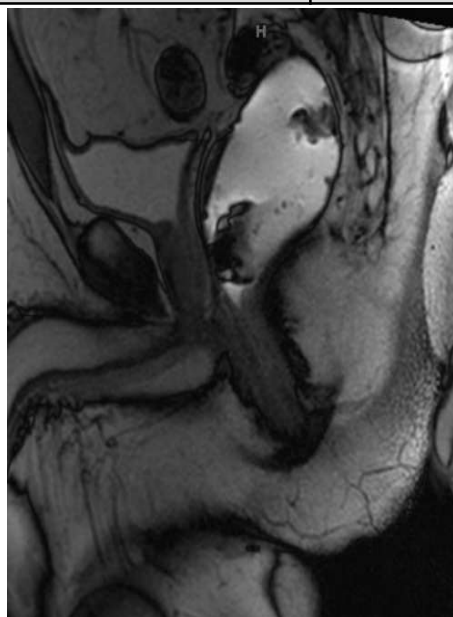
The axial slice for the trueFISP is small FOV through the upper anal canal (see below image).

Go to MRIMaster.com for a guide of proper positioning.

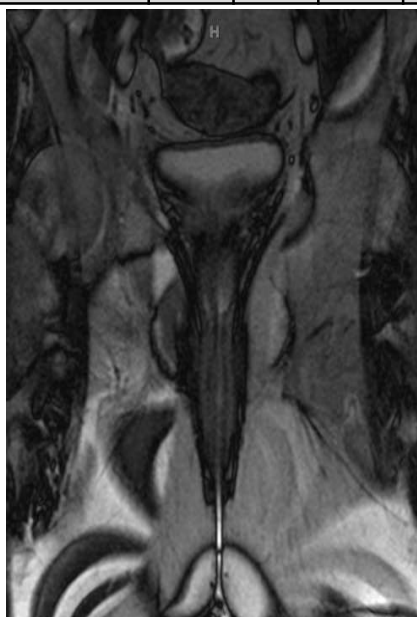
| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T2 HASTE/SSFSE | T2 COR    | cor   | no      | 7          | 1.4      | front       | full pelvis   |
| T2 TSE         | T2 SAG    | sag   | no      | 5          | 1        | right       |               |
| T2 TSE         | T2 AX     | ax    | no      | 5          | 1        | top         |               |
| T2 HASTE/SSFSE | T2 FS AX  | ax    | yes     | 7          | 1        | top         |               |

Have the patient administer 120 mL US gel via syringe into her/his rectum. Make sure the US gel is present/visible and that the pubic symphysis & distal coccyx are present on the first cine sagittal images prior to continuing with the remaining cines.

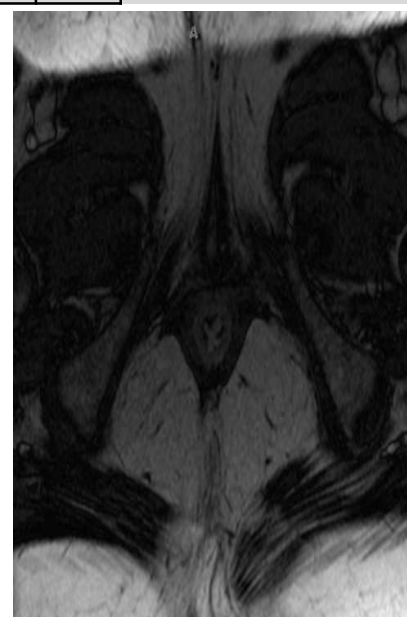
|                |            |     |    |     |   |       |                        |
|----------------|------------|-----|----|-----|---|-------|------------------------|
| Cine True FISP | CINE SAG 1 | sag | no | 1.4 | 1 | right | FOV as specified above |
| Cine True FISP | CINE SAG 2 | sag | no | 1.4 | 1 | right |                        |
| Cine True FISP | CINE SAG 3 | sag | no | 1.4 | 1 | right |                        |
| Cine True FISP | CINE COR   | cor | no | 1.4 | 1 | front |                        |
| Cine True FISP | CINE AX    | ax  | no | 1.4 | 1 | top   |                        |



sagittal FISP



coronal FISP



axial FISP

# **MRI Pregnant Patient**

Updated 11/20/23

Reviewed 05/14/25

**This protocol must be approved by a Radiologist.**

**IV contrast is not given unless a Radiologist approves regardless of how it is ordered.**

Charge as MR abdomen w/o or MR pelvis w/o depending on where the maximal pain is located.

Place skin marker at site of maximal pain. Center CC FOV at site of maximal pain.

There is a separate protocol for evaluating placental issues in pregnant patients.

Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b>         | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-------------------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T2 HASTE/SSFSE                | T2 COR           | cor          | no             | 5                 | 1               | front              |
| T2 HASTE/SSFSE                | T2 FS COR        | cor          | yes            | 5                 | 1               | front              |
| T2 HASTE/SSFSE                | T2 AX            | ax           | no             | 5                 | 1               | top                |
| T2 HASTE/SSFSE                | T2 FS AX         | ax           | yes            | 5                 | 1               | top                |
| T2 HASTE/SSFSE                | T2 SAG           | sag          | no             | 5                 | 1               | right              |
| True FISP                     | TRUE FISP AX     | ax           | no             | 5                 | 1               | top                |
| In/Out Phase w/ DIXON         | IN/OUT AX        | ax           | no             | 5                 | 1               | top                |
| T1 VIBE/LAVA                  | T1 FS AX         | ax           | yes            | 3.5               | 0.6             | top                |
| Diffusion<br>(b50, b800, ADC) | DIFFUSION AX     | ax           | yes            | 7                 | 1.4             | top                |

# MRI Placenta

Updated 11/25/23

Reviewed 05/14/25

Indications: morbidly adherent placenta, placenta accreta/increta/percreta, placenta previa, placental abruption.

**This protocol must be approved by a Radiologist.**

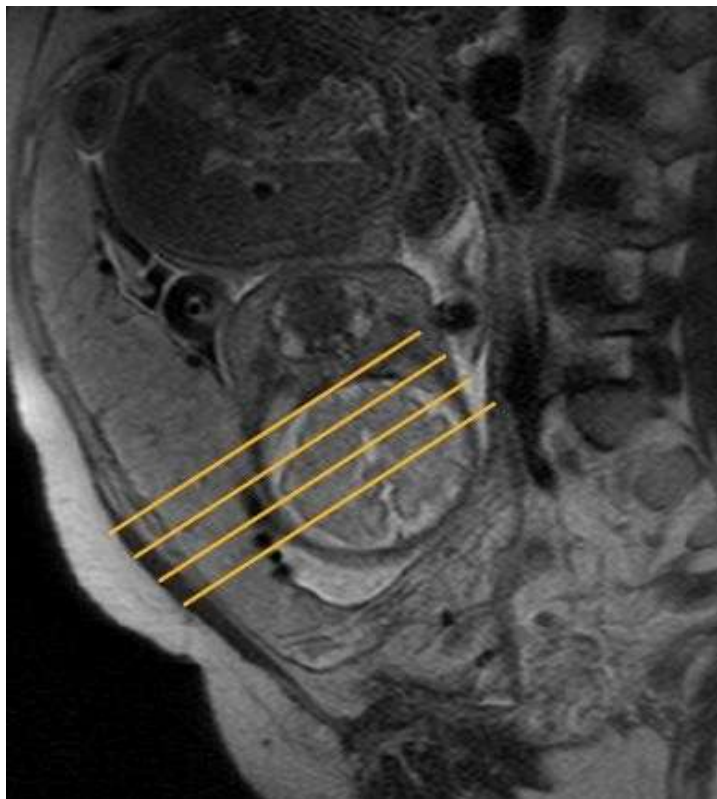
**IV contrast is not given unless a Radiologist approves regardless of how it is ordered.**

Full Uterus FOV: Top to bottom coverage to include entire pelvic or entire uterus whichever is larger, greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

The oblique axial plane is relative to the long axis of the placenta (see below picture).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane  | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|--------|---------|------------|----------|-------------|
| T2 TSE         | T2 SAG    | sag    | no      | 4          | 1        | right       |
| T2 TSE         | T2 OBL AX | obl ax | no      | 4          | 1        | top         |
| T2 HASTE/SSFSE | T2 AX     | ax     | no      | 6          | 1        | top         |
| T2 HASTE/SSFSE | T2 FS AX  | ax     | yes     | 6          | 1        | top         |
| T2 HASTE/SSFSE | T2 COR    | cor    | no      | 6          | 1        | front       |
| T1 VIBE/LAVA   | T1 FS SAG | sag    | yes     | 5          | 0.5      | right       |
| T1 VIBE/LAVA   | T1 FS AX  | ax     | yes     | 5          | 0.5      | top         |



oblique axial angulation (perpendicular to the long axis of the placenta in the sagittal plane)

# MRI ER Adult

Updated 11/04/23

Reviewed 05/14/25

Indications: primary indication is ER patients who refuse or cannot undergo CT imaging.

**This protocol must be approved by a Radiologist.**

**IV contrast is not given unless a Radiologist approves regardless of how it is ordered.**

If IV contrast is approved, just run the AP combo protocol.

The exam includes orders/requisitions for both the abdomen and pelvis. Put all images into one folder to send to PACS.

Place skin marker at site of maximal pain.

Full Abdomen FOV: Lung bases to iliac crest or to bottom of liver/spleen/kidneys if they extend low (top/bottom coverage) anterior to posterior subq fat (front/back coverage), right to left subq fat (right/left coverage).

Full Pelvis FOV: Iliac crests to few slices below introitus/anus (top/bottom coverage), greater trochanter to greater trochanter (right/left coverage), anterior pelvic wall skin to posterior buttock skin (front/back coverage).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence             | PACS Name    | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------------------|--------------|-------|---------|------------|----------|-------------|---------------|
| T2 HASTE/SSFSE             | T2 COR       | cor   | no      | 7          | 1.4      | front       | full abdomen  |
| T2 HASTE/SSFSE             | T2 AX        | ax    | no      | 7          | 1.4      | top         |               |
| T2 HASTE/SSFSE             | T2 FS AX     | ax    | yes     | 7          | 1.4      | top         |               |
| T1 VIBE/LAVA               | T1 FS AX     | ax    | yes     | 3.5        | 0.6      | top         |               |
| In/Out Phase w/ DIXON      | IN/OUT AX    | ax    | no      | 5          | 1        | top         |               |
| Diffusion (b50, b800, ADC) | DIFFUSION AX | ax    | yes     | 7          | 1.4      | top         |               |
| T2 HASTE/SSFSE             | T2 SAG       | sag   | no      | 5          | 1        | right       | full pelvis   |
| T2 HASTE/SSFSE             | T2 AX        | ax    | no      | 7          | 1.4      | top         |               |
| T2 HASTE/SSFSE             | T2 FS AX     | ax    | yes     | 7          | 1.4      | top         |               |
| T1 VIBE/LAVA               | T1 FS AX     | ax    | yes     | 3.5        | 0.6      | top         |               |
| Diffusion (b50, b800, ADC) | DIFFUSION AX | ax    | yes     | 7          | 2        | top         |               |

# **MRI Pediatric Patient**

Updated 11/20/23

Reviewed 05/14/25

**This protocol must be approved by a Radiologist.**

**IV contrast is not given unless a Radiologist approves regardless of how it is ordered.**

Charge as MR abdomen w/o or MR pelvis w/o depending on where the maximal pain is located.

Place skin marker at site of maximal pain. Center CC FOV at site of maximal pain.

There is a separate protocol for evaluating placental issues in pregnant patients.

Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b>         | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-------------------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T2 HASTE/SSFSE                | T2 COR           | cor          | no             | 5                 | 1               | front              |
| T2 HASTE/SSFSE                | T2 FS COR        | cor          | yes            | 5                 | 1               | front              |
| T2 HASTE/SSFSE                | T2 AX            | ax           | no             | 5                 | 1               | top                |
| T2 HASTE/SSFSE                | T2 FS AX         | ax           | yes            | 5                 | 1               | top                |
| T2 HASTE/SSFSE                | T2 SAG           | sag          | no             | 5                 | 1               | right              |
| True FISP                     | TRUE FISP AX     | ax           | no             | 5                 | 1               | top                |
| In/Out Phase w/ DIXON         | IN/OUT AX        | ax           | no             | 5                 | 1               | top                |
| T1 VIBE/LAVA                  | T1 FS AX         | ax           | yes            | 3.5               | 0.6             | top                |
| Diffusion<br>(b50, b800, ADC) | DIFFUSION AX     | ax           | yes            | 7                 | 1.4             | top                |

# **MRI Brain Routine (and Fast Stroke)**

Updated 07/04/24

Reviewed 05/14/25

## **Routine Brain:**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG    | sag   | no      | 5          | 2        | left        |
| T2             | T2 FS AX  | ax    | yes     | 5          | 1.5      | base        |
| T1             | T1 AX     | ax    | no      | 5          | 1.5      | base        |
| *T1            | T1 COR    | cor   | no      | 5          | 1.5      | back        |
| FLAIR          | FLAIR AX  | ax    | no      | 5          | 1.5      | base        |
| **SWI          | SWI AX    | ax    | no      | 5          | 1.5      | base        |
| DWI            | DWI AX    | ax    | yes     | 5          | 1.5      | base        |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                       |             |     |    |   |      |      |
|-----------------------|-------------|-----|----|---|------|------|
| T1                    | T1 POST AX  | ax  | no | 5 | 1.5  | base |
| T1                    | T1 POST COR | cor | no | 5 | 1.5  | back |
| T1                    | T1 POST SAG | sag | no | 5 | 2    | left |
| ***3D T1 FSPGR/MPRAGE | AX THINS    | ax  | no | 1 | none | base |

\*Add the T1 COR pre contrast if the indication is hydrocephalus and/or NPH.

\*\*GRE if SWI is not available.

\*\*\*Add the 3D T1 brain lab sequence in the following patients: known, suspected or previously treated brain mass; known cancer or metastatic workup and patients with headache.

For the 3D T1 brain lab sequence: no angulation, anterior nose to posterior skull (front/back coverage) and top of skull to bottom of mandible (top/bottom coverage).

## **Fast Stroke Protocol:**

|       |          |    |     |   |     |      |
|-------|----------|----|-----|---|-----|------|
| FLAIR | FLAIR AX | ax | no  | 5 | 1.5 | base |
| **SWI | SWI AX   | ax | no  | 5 | 1.5 | base |
| DWI   | DWI AX   | ax | yes | 5 | 1.5 | base |

\*\*GRE if SWI is not available.

# MRI Brain (with Orbits)

Updated 02/12/20

Reviewed 05/14/25

Use orbits field-of-view (FOV) and angulations as in the images below.

Notify a Radiologist if there is a brain abnormality to see if additional sequences are needed.

Go to MRIMaster.com for a guide of proper positioning.

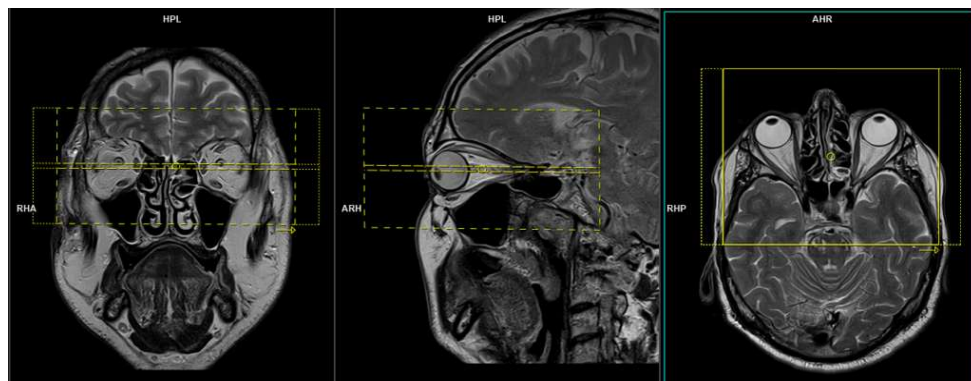
| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 SAG    | sag   | no      | 5          | 2        | left        | whole brain   |
| T2             | T2 FS AX  | ax    | yes     | 5          | 1.5      | base        |               |
| FLAIR          | FLAIR AX  | ax    | no      | 5          | 1.5      | base        |               |
| DWI            | DWI AX    | ax    | yes     | 5          | 1.5      | base        |               |
| T1             | T1 COR    | cor   | no      | 3          | 0.5      | back        | orbits        |
| STIR           | STIR COR  | cor   | no      | 3          | 0.5      | back        |               |
| T2             | T2 FS AX  | ax    | yes     | 3          | 0.5      | base        |               |
| T1             | T1 AX     | ax    | no      | 3          | 0.5      | base        |               |
| T2             | T2 SAG    | sag   | no      | 3          | 0.5      | base        |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |      |             |
|----|----------------|-----|-----|---|-----|------|-------------|
| T1 | T1 FS POST COR | cor | yes | 3 | 0.5 | back | orbits      |
| T1 | T1 FS POST AX  | ax  | yes | 3 | 0.5 | base |             |
| T1 | T1 POST AX     | ax  | no  | 5 | 1.5 | base | whole brain |



coronal FOV and angulation (parallel to the optic nerves in the axial plane)



axial FOV and angulation (parallel to the optic nerves in the coronal plane)

# MRI Brain (for Seizure)

Updated 11/19/23

Reviewed 05/14/25

Use temporal lobes field-of-view (FOV) and angulations as in the images below.

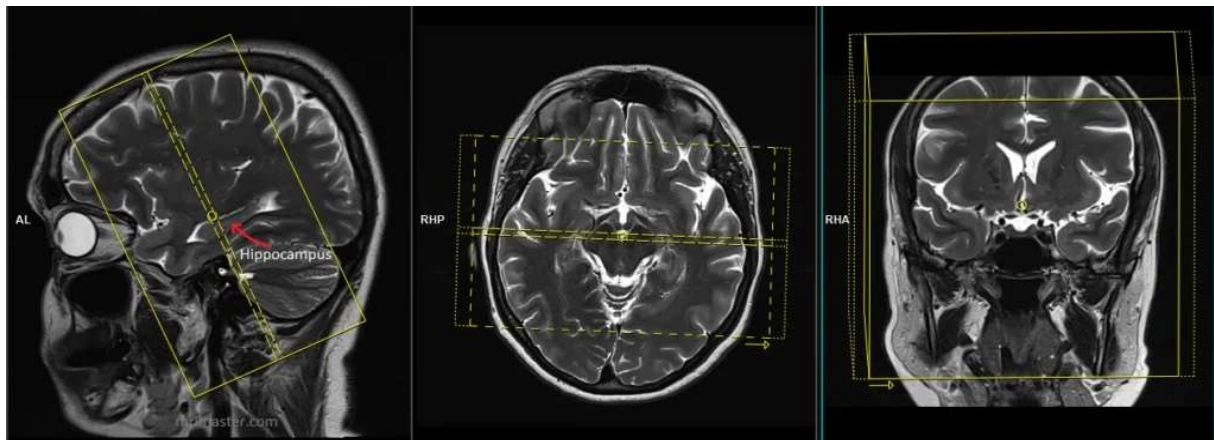
Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name       | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View  |
|----------------|-----------------|-------|---------|------------|----------|-------------|----------------|
| T1             | T1 SAG          | sag   | no      | 5          | 2        | left        | whole brain    |
| T2             | T2 FS AX        | ax    | yes     | 5          | 1.5      | base        |                |
| T1             | T1 AX           | ax    | no      | 5          | 1.5      | base        |                |
| FLAIR          | FLAIR AX        | ax    | no      | 5          | 1.5      | base        |                |
| *SWI           | SWI AX          | ax    | no      | 5          | 1.5      | base        |                |
| DWI            | DWI AX          | ax    | yes     | 5          | 1.5      | base        |                |
| T2             | T2 COR THINS    | cor   | no      | 3          | 0.2      | back        | temporal lobes |
| FLAIR          | FLAIR COR THINS | cor   | no      | 3          | 0.5      | back        |                |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |             |     |    |   |     |      |             |
|----|-------------|-----|----|---|-----|------|-------------|
| T1 | T1 POST AX  | ax  | no | 5 | 1.5 | base | whole brain |
| T1 | T1 POST COR | cor | no | 5 | 1.5 | back |             |

\*GRE if SWI is not available.



coronal FOV and angulation (perpendicular to the long axis of the hippocampus in the sagittal plane)

Temporal lobe coronal plane is perpendicular to the long axis of the hippocampus on sagittal images and perpendicular to the midline on coronal images (see image below).

Cover the entire temporal lobes front to back.

# **MRI Brain (for Multiple Sclerosis)**

Updated 11/15/22

Reviewed 05/14/25

Use orbits field-of-view (FOV) and angulations as in the images below.

Go to MRIMaster.com for a guide of proper positioning.

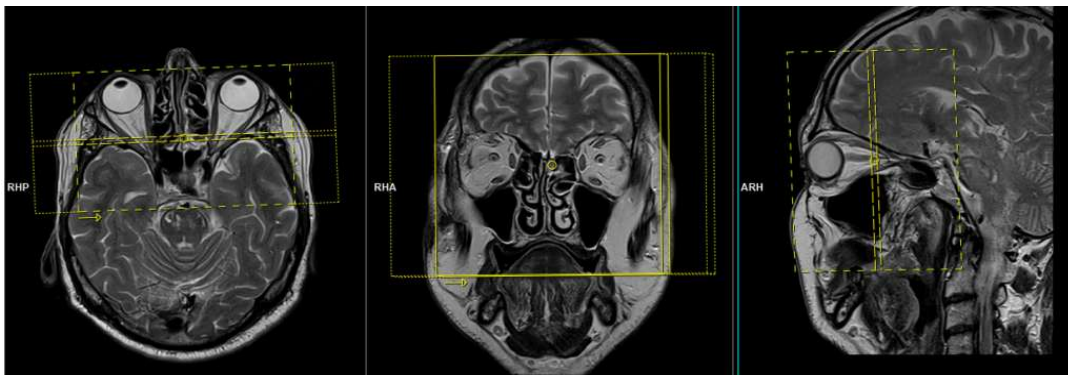
| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 SAG    | sag   | no      | 5          | 2        | left        | whole brain   |
| *T2 FLAIR CUBE | FLAIR SAG | sag   | yes     | 1.4        | none     | base        |               |
| T2             | T2 FS AX  | ax    | yes     | 5          | 1.5      | base        |               |
| T1             | T1 AX     | ax    | no      | 5          | 1.5      | base        |               |
| FLAIR          | FLAIR AX  | ax    | no      | 5          | 1.5      | base        |               |
| **SWI          | SWI AX    | ax    | no      | 5          | 1.5      | base        |               |
| DWI            | DWI AX    | ax    | yes     | 5          | 1.5      | base        |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                   |     |     |   |     |      |             |
|----|-------------------|-----|-----|---|-----|------|-------------|
| T1 | T1 POST AX        | ax  | no  | 5 | 1.5 | base | whole brain |
| T1 | T1 POST COR       | cor | no  | 5 | 1.5 | back |             |
| T1 | T1 FS POST ORBITS | cor | yes | 3 | 0.5 | back | orbits      |

\*Sagittal FLAIR 3 mm thick 0.5 mm gap if FLAIR CUBE sequence is not available.

\*\*GRE if SWI is not available.



coronal FOV and angulation (parallel to the optic nerves in the axial plane)

# **MRA Head (Circle of Willis)**

Updated 11/15/22

Reviewed 05/14/25

MRA without IV contrast is the preferred exam for COW evaluation (as opposed to without and with). Check with a Radiologist before performing without and with unless the exam was ordered by a Neurologist.

## **WITHOUT ONLY:**

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| 3D TOF                | 3D TOF AX        | ax           | yes            | 0.7               | 0.1             | base               |

## **RECONS:**

horizontal and vertical MIP spinners

## **WITHOUT & WITH:**

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| 3D TOF                | 3D TOF AX        | ax           | yes            | 0.7               | 0.1             | base               |
| 3D T1                 | 3D T1 PRE SAG    | sag          | no             | 1                 | 0.2             | left               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|       |                |     |    |   |     |      |
|-------|----------------|-----|----|---|-----|------|
| 3D T1 | 3D T1 POST SAG | sag | no | 1 | 0.2 | left |
|-------|----------------|-----|----|---|-----|------|

## **RECONS:**

sagittal subtractions

horizontal and vertical MIP spinners of both the TOF and post contrast sequences

# **MRA Neck (Carotids)**

Updated 11/15/22

Reviewed 05/14/25

## **WITHOUT ONLY:**

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| 2D TOF                | 2D TOF AX        | ax           | no             | 3                 | 0.9             | base               |

## **RECONS:**

horizontal MIP spinners of both carotids together and each separately

## **WITHOUT & WITH:**

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| 2D TOF                | 2D TOF AX        | ax           | no             | 3                 | 0.9             | base               |
| 3D T1                 | 3D T1 PRE COR    | cor          | no             | 1                 | 0.2             | back               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|       |               |     |    |   |     |      |
|-------|---------------|-----|----|---|-----|------|
| 3D T1 | 3D T1 PRE COR | cor | no | 1 | 0.2 | back |
|-------|---------------|-----|----|---|-----|------|

## **RECONS:**

coronal subtractions

horizontal MIP spinners of both carotids together on the TOF sequence

horizontal MIP spinners of both carotids together and each separately on the post contrast sequence

# MRI Head Venogram

Updated 05/07/25

Reviewed 05/14/25

This exam is only performed at Riverside hospital.

## Riverside Protocol:

| Pulse Sequence | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|---------------|-------|---------|------------|----------|-------------|
| 3D Vel MRV T2  | T2 SAG        | sag   | no      | 1.4        | none     | left        |
| 3D Vel MRV T1  | T1 SAG        | sag   | no      | 1.4        | none     | left        |
| T2             | T2 SAG        | sag   | no      | 3          | 0.5      | left        |
| 3D T1          | 3D T1 PRE SAG | sag   | no      | 2          | none     | left        |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                     |                 |     |    |   |      |      |
|---------------------|-----------------|-----|----|---|------|------|
| 3D T1               | 3D T1 PRE SAG 1 | sag | no | 2 | none | left |
| 3D T1               | 3D T1 PRE SAG 2 | sag | no | 2 | none | left |
| 3D T1               | 3D T1 PRE SAG 3 | sag | no | 2 | none | left |
| *3D T1 FSPGR/MPRAGE | AX THINS        | ax  | no | 1 | none | base |

## RECONS:

subtractions of all 3 post contrast sequences

horizontal and vertical MIP spinners of the 1st and 2nd post contrast sequences

## Other Sites Protocol:

| Pulse Sequence | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|---------------|-------|---------|------------|----------|-------------|
| 3D T1          | 3D T1 PRE SAG | sag   | no      | 0.9        | 1        | left        |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|                     |                 |     |    |     |      |      |
|---------------------|-----------------|-----|----|-----|------|------|
| 3D T1               | 3D T1 PRE SAG 1 | sag | no | 0.9 | 1    | left |
| 3D T1               | 3D T1 PRE SAG 2 | sag | no | 0.9 | 1    | left |
| *3D T1 FSPGR/MPRAGE | AX THINS        | ax  | no | 1   | none | base |
| T2                  | T2 COR          | cor | no | 3   | 0.5  | back |

## RECONS:

subtractions of both post contrast sequences

horizontal and vertical MIP spinners of both post contrast sequences

# MRI Pituitary

Updated 10/18/23

Reviewed 05/14/25

Use pituitary field-of-view (FOV) and angulations as in the images below.

Notify a Radiologist if there is a brain abnormality to see if additional sequences are needed.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|---------------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 SAG        | sag   | no      | 4          | 1        | left        | whole brain   |
| T1             | T1 PIT SAG    | sag   | no      | 3          | 0        | left        | pituitary     |
| T1             | T1 PIT COR    | cor   | no      | 3          | 0        | left        |               |
| T2             | T2 FS PIT COR | cor   | yes     | 3          | 0        | back        |               |

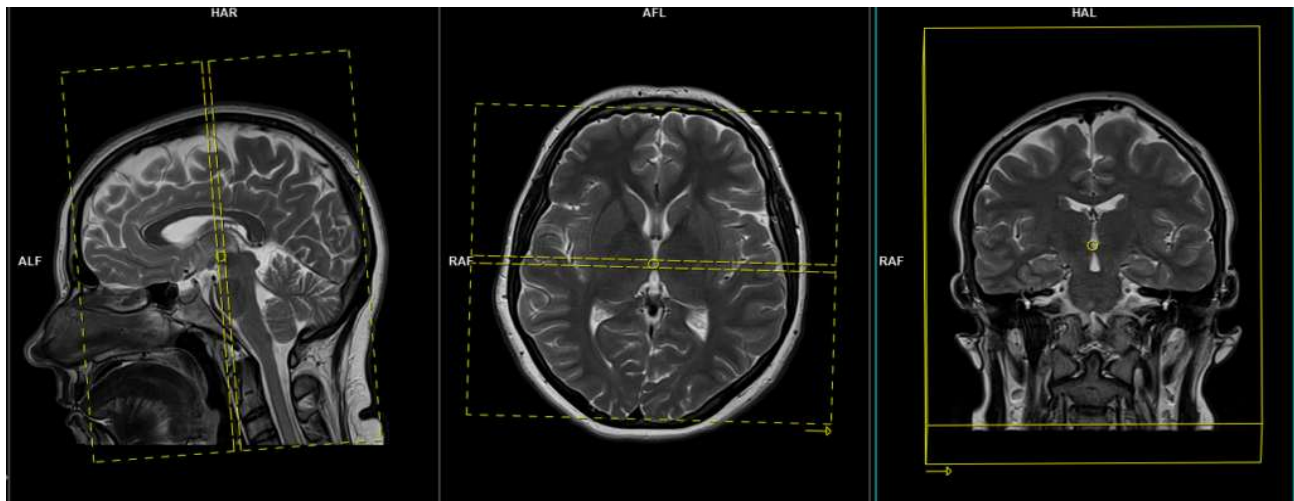
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|     |                |     |     |   |     |      |             |
|-----|----------------|-----|-----|---|-----|------|-------------|
| *T1 | T1 DYNAMIC     | cor | no  | 3 | 0   | back | pituitary   |
| T1  | T1 FS POST SAG | sag | yes | 3 | 0   | left |             |
| T1  | T1 FS POST COR | cor | yes | 3 | 0   | back |             |
| T1  | T1 POST AX     | ax  | no  | 5 | 1.5 | base | whole brain |

\*Do dynamic post contrast images in patients with microadenoma (unknown or follow-up), abnormal hormone levels, elevated prolactin level and pituitary bleed/hemorrhage.

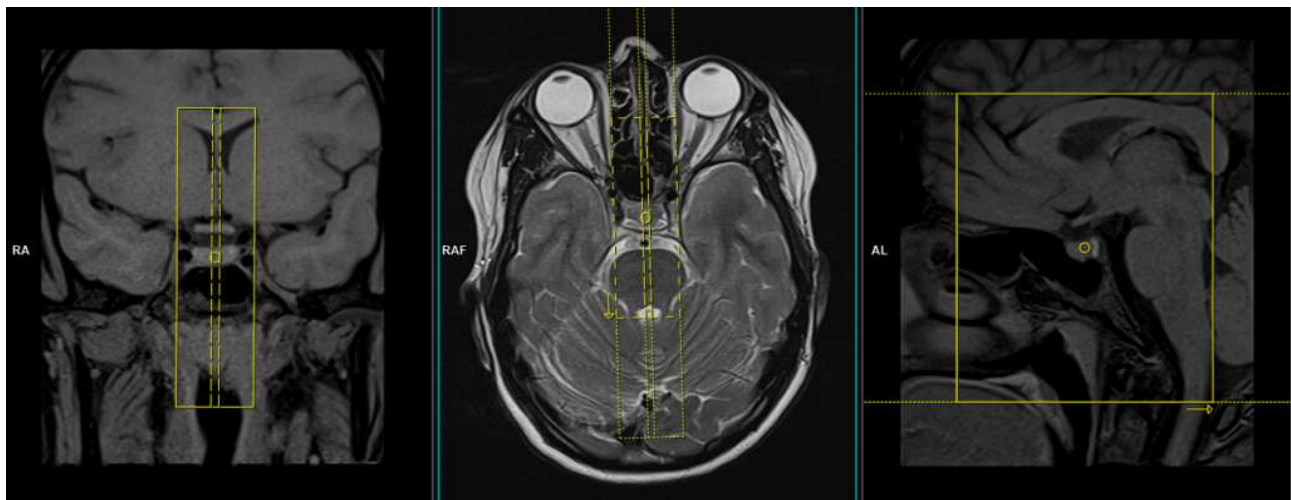
For all other indications, omit the dynamic sequences and hand inject.

Ask a Radiologist if you are unsure whether to do dynamic post contrast imaging or hand injection.



coronal FOV and angulation (perpendicular to the sella turcica in the sagittal plane)

# MRI Pituitary



sagittal FOV and angulation (parallel to the midline of the brain in the axial plane)

# MRI Paranasal Sinuses

Updated 11/22/23

Reviewed 05/14/25

Notify a Radiologist if a brain abnormality is present to determine the need for additional sequences.

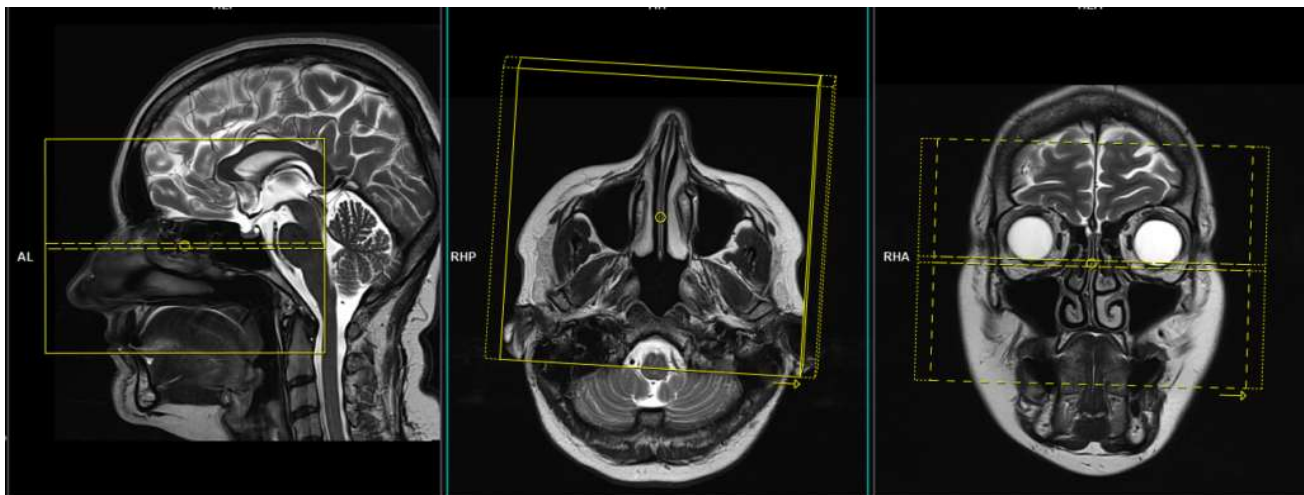
Use sinuses field-of-view (FOV) and angulations as in the images below.

Go to [MRIMaster.com](http://MRIMaster.com) for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 SAG    | sag   | no      | 3          | 0        | left        | sinuses       |
| T1             | T1 AX     | ax    | no      | 3          | 0.9      | base        |               |
| T1             | T1 COR    | cor   | no      | 3          | 0        | back        |               |
| T2             | T2 AX     | ax    | no      | 3          | 0.9      | base        |               |
| T2             | T2 FS COR | cor   | yes     | 3          | 0        | back        |               |

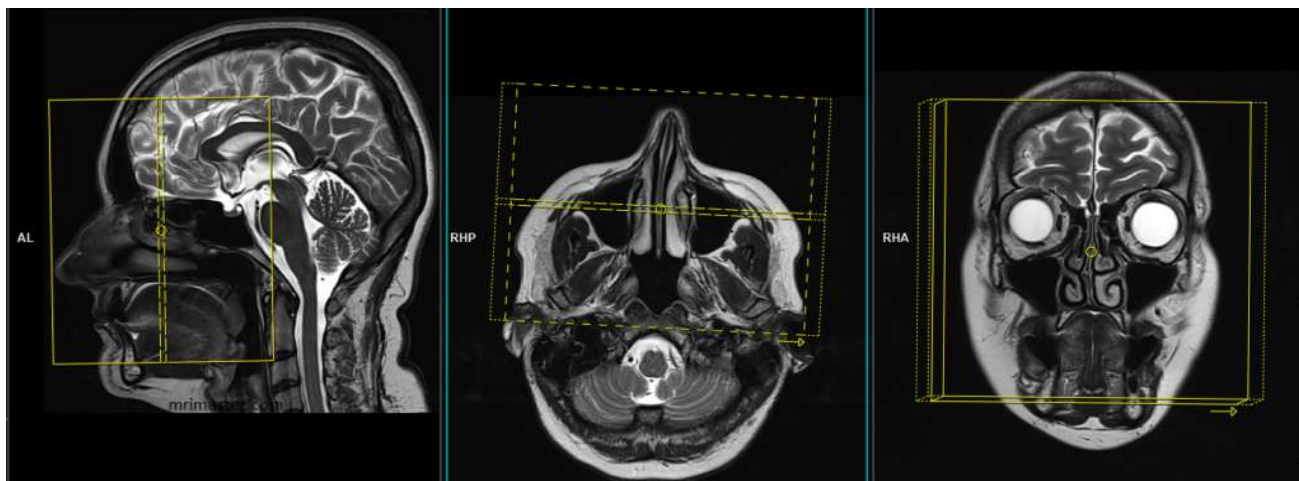
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |      |             |
|----|----------------|-----|-----|---|-----|------|-------------|
| T1 | T1 FS POST AX  | ax  | yes | 3 | 0.9 | base | sinuses     |
| T1 | T1 FS POST COR | cor | yes | 3 | 0   | back |             |
| T1 | T1 POST SAG    | sag | no  | 5 | 1.5 | base | whole brain |



axial FOV and angulation (parallel to the hard palate in the axial plane)

# MRI Paranasal Sinuses



coronal FOV and angulation (perpendicular to the hard palate in the sagittal plane)



sagittal FOV and angulation (parallel to the nasal septum in the axial plane)

# MRI IACs (Internal Auditory Canals)

Updated 03/22/25

Reviewed 05/14/25

Use IACs field-of-view (FOV) and angulations as in the images below.

The matrix for the axial CISS sequence must be squared in order to create coronal CISS reconstructions.

Notify a Radiologist if there is a brain abnormality to see if additional sequences are needed.

Go to MRIMaster.com for a guide of proper positioning.

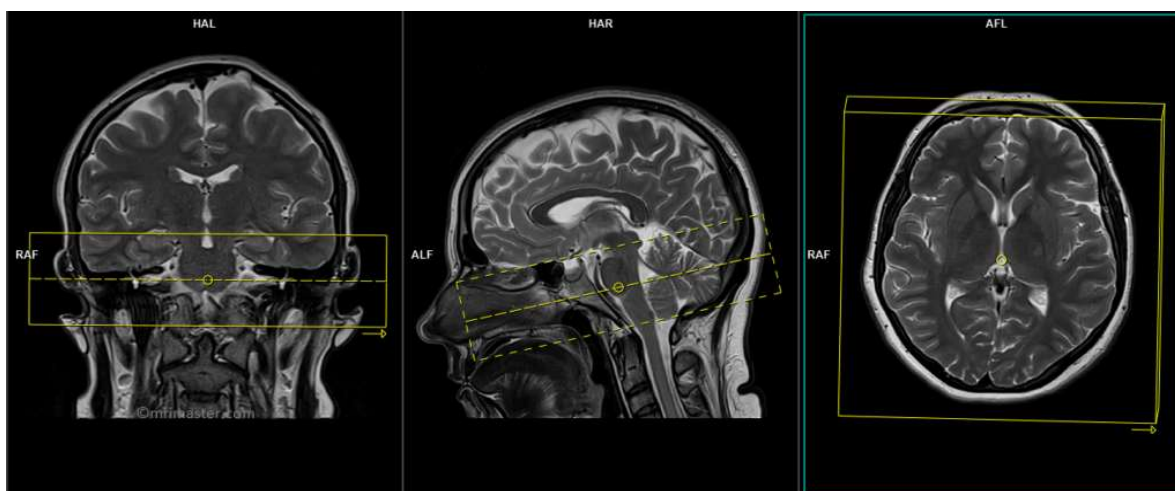
| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 SAG    | sag   | no      | 5          | 2        | left        | whole brain   |
| FLAIR          | FLAIR AX  | ax    | no      | 5          | 1.5      | base        |               |
| T1             | T1 AX     | ax    | no      | 3          | 0        | base        | IACs          |
| T1             | T1 COR    | cor   | no      | 3          | 0        | back        |               |
| CISS           | CISS AX   | ax    | no      | 1          | 0.2      | base        |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

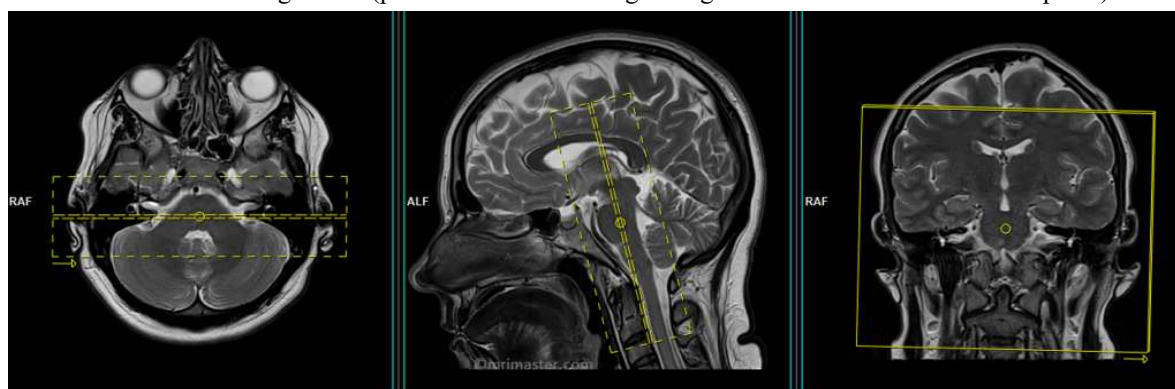
|    |                |     |     |   |     |      |             |
|----|----------------|-----|-----|---|-----|------|-------------|
| T1 | T1 FS POST AX  | ax  | yes | 3 | 0   | base | IACs        |
| T1 | T1 FS POST COR | cor | yes | 3 | 0   | back |             |
| T1 | T1 POST AX     | ax  | no  | 5 | 1.5 | base | whole brain |

## RECONS:

sagittal MPR reconstructions of the axial CISS sequence (1.0 mm thick by 0.2 mm spacing)



axial FOV and angulation (parallel to the line along the right and left IACs in the coronal plane)



coronal FOV and angulation (parallel to the line along the right and left IACs in the axial plane)

# MRI Trigeminal Neuralgia

Updated 11/22/23

Reviewed 05/14/25

Ask a Radiologist to determine the skull base field-of-view (FOV).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 SAG    | sag   | no      | 5          | 2        | left        | whole brain   |
| FLAIR          | FLAIR AX  | ax    | no      | 5          | 1.5      | base        |               |
| DWI            | DWI AX    | ax    | yes     | 5          | 1.5      | base        |               |
| T1             | T1 AX     | ax    | no      | 3          | 0.9      | base        | skull base    |
| T1             | T1 COR    | cor   | no      | 3          | 0        | back        |               |
| T2             | T2 AX     | ax    | no      | 3          | 0.9      | base        |               |
| T2             | T2 FS AX  | ax    | yes     | 3          | 0.9      | base        |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |      |             |
|----|----------------|-----|-----|---|-----|------|-------------|
| T1 | T1 FS POST AX  | ax  | yes | 3 | 0.9 | base | skull base  |
| T1 | T1 FS POST COR | cor | yes | 3 | 0.9 | back |             |
| T1 | T1 POST AX     | ax  | no  | 5 | 1.5 | base | whole brain |

# MRI Skull Base

Updated 11/22/23

Reviewed 05/14/25

Ask a Radiologist to determine the skull base field-of-view (FOV).

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 SAG    | sag   | no      | 5          | 2        | left        | whole brain   |
| FLAIR          | FLAIR AX  | ax    | no      | 5          | 1.5      | base        |               |
| DWI            | DWI AX    | ax    | yes     | 5          | 1.5      | base        |               |
| T1             | T1 AX     | ax    | no      | 3          | 0.9      | base        | skull base    |
| T1             | T1 COR    | cor   | no      | 3          | 0        | back        |               |
| T2             | T2 AX     | ax    | no      | 3          | 0.9      | base        |               |
| T2             | T2 FS AX  | ax    | yes     | 3          | 0.9      | base        |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |      |             |
|----|----------------|-----|-----|---|-----|------|-------------|
| T1 | T1 FS POST AX  | ax  | yes | 3 | 0.9 | base | skull base  |
| T1 | T1 FS POST COR | cor | yes | 3 | 0.9 | back |             |
| T1 | T1 POST AX     | ax  | no  | 5 | 1.5 | base | whole brain |

# MRI Chiari Flow

Updated 11/22/23

Reviewed 05/14/25

| Pulse Sequence         | PACS Name   | plane | fat sat | slice (mm) | gap (mm) | first slice |
|------------------------|-------------|-------|---------|------------|----------|-------------|
| 2D Phase Contrast Cine | 2D CINE SAG | sag   | no      | 5          | 0        | left        |

# MRI Neck Soft Tissue

Updated 08/24/24

Reviewed 05/14/25

Remind patient not to swallow during image acquisition to reduce motion artifact.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 AX     | ax    | no      | 6          | 1.2      | base        |
| T2             | T2 FS AX  | ax    | yes     | 6          | 1.2      | base        |
| T1             | T1 COR    | cor   | no      | 5          | 1        | back        |
| T2             | T2 FS COR | cor   | yes     | 5          | 1        | back        |
| T1             | T1 SAG    | sag   | no      | 4          | 1        | left        |
| T2             | T2 FS SAG | sag   | yes     | 4          | 1        | left        |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |             |     |     |   |     |      |
|----|-------------|-----|-----|---|-----|------|
| T1 | T1 POST AX  | ax  | yes | 6 | 1.2 | base |
| T1 | T1 POST COR | cor | yes | 5 | 1   | back |
| T1 | T1 POST SAG | sag | yes | 4 | 1   | left |

# **MRI Neck Parotid Glands**

Updated 01/15/21

Reviewed 05/14/25

Remind patient not to swallow during image acquisition to reduce motion artifact.

Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 AX            | ax           | no             | 3                 | 1.2             | base               |
| T2                    | T2 AX            | ax           | no             | 3                 | 1.2             | base               |
| T2                    | T2 FS AX         | ax           | yes            | 3                 | 1.2             | base               |
| T1                    | T1 COR           | cor          | no             | 3                 | 1.2             | back               |
| T2                    | T2 COR           | cor          | no             | 3                 | 1.2             | back               |
| T2                    | T2 FS COR        | cor          | yes            | 3                 | 1.2             | back               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |             |     |     |   |     |      |
|----|-------------|-----|-----|---|-----|------|
| T1 | T1 POST AX  | ax  | yes | 3 | 1.2 | base |
| T1 | T1 POST COR | cor | yes | 3 | 1.2 | back |
| T1 | T1 POST SAG | sag | yes | 3 | 1.2 | left |

# MRI Cervical Spine

Updated 03/17/20

Reviewed 05/14/25

Increase bandwidth and use IDEAL sequences if available for MARS protocol.

Go to MRIMaster.com for a guide of proper positioning.

## **Routine Cervical Spine:**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG    | sag   | no      | 3          | 0.3      | left        |
| T2             | T2 SAG    | sag   | no      | 3          | 0.3      | left        |
| T2             | T2 FS SAG | sag   | yes     | 3          | 0.3      | left        |
| T2 GRE         | GRE AX    | ax    | no      | 4          | 0.5      | top         |
| T2             | T2 FS AX  | ax    | yes     | 4          | 0.5      | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |      |
|----|----------------|-----|-----|---|-----|------|
| T1 | T1 FS POST SAG | sag | yes | 3 | 0.3 | left |
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.5 | top  |

## **MARS (Metal Artifact Reduction):**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG    | sag   | no      | 3          | 0.3      | left        |
| T2             | T2 SAG    | sag   | no      | 3          | 0.3      | left        |
| STIR           | STIR SAG  | sag   | no      | 3          | 0.3      | left        |
| T1             | T1 AX     | ax    | no      | 4          | 0.5      | top         |
| T2             | T2 AX     | ax    | no      | 4          | 0.5      | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |      |
|----|----------------|-----|-----|---|-----|------|
| T1 | T1 FS POST SAG | sag | yes | 3 | 0.3 | left |
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.5 | top  |

# **MRI Thoracic Spine**

Updated 05/18/20

Reviewed 05/14/25

Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T2 HiRes Localizer    | Localizer        | sag          | no             | 5                 | 0.5             | left               |
| T1                    | T1 SAG           | sag          | no             | 4                 | 1               | left               |
| T2                    | T2 SAG           | sag          | no             | 4                 | 1               | left               |
| *T2                   | T2 FS SAG        | sag          | yes            | 4                 | 1               | left               |
| T1                    | T1 AX            | ax           | no             | 4                 | 1               | top                |
| T2                    | T2 AX            | ax           | no             | 7                 | 3.5             | top                |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |      |
|----|----------------|-----|-----|---|---|------|
| T1 | T1 FS POST SAG | sag | yes | 4 | 1 | left |
| T1 | T1 FS POST AX  | ax  | yes | 4 | 1 | top  |

\*Add sagittal STIR (5 mm thick no gap) if sagittal T2 FS has blackout artifact.

# MRI Lumbar Spine

Updated 02/02/21

Reviewed 05/14/25

Increase bandwidth and use IDEAL sequences if available for MARS protocol.

Go to MRIMaster.com for a guide of proper positioning.

## **Routine Lumbar Spine:**

| Pulse Sequence | PACS Name  | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|------------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG     | sag   | no      | 4          | 1        | left        |
| T2             | T2 SAG     | sag   | no      | 4          | 1        | left        |
| T2             | T2 FS SAG  | sag   | yes     | 4          | 1        | left        |
| T1             | T1 AX      | ax    | no      | 5          | 1        | top         |
| T2             | T2 DISC AX | ax    | no      | 4          | 0.8      | top         |
| T2             | T2 AX      | ax    | no      | 5          | 1        | top         |
| T2             | T2 FS AX   | ax    | yes     | 5          | 1        | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |           |     |     |   |   |      |
|----|-----------|-----|-----|---|---|------|
| T1 | T1 FS SAG | sag | yes | 4 | 1 | left |
| T1 | T1 FS AX  | ax  | yes | 5 | 1 | top  |

## **MARS (Metal Artifact Reduction):**

| Pulse Sequence | PACS Name  | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|------------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG     | sag   | no      | 4          | 1        | left        |
| T2             | T2 SAG     | sag   | no      | 4          | 1        | left        |
| STIR           | STIR SAG   | sag   | no      | 4          | 1        | left        |
| T1             | T1 AX      | ax    | no      | 4          | 1        | top         |
| T2             | T2 DISC AX | ax    | no      | 4          | 0.8      | top         |
| T2             | T2 AX      | ax    | no      | 4          | 1        | top         |
| STIR           | STIR AX    | ax    | no      | 5          | 1        | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |      |
|----|----------------|-----|-----|---|---|------|
| T1 | T1 POST SAG    | sag | no  | 4 | 1 | left |
| T1 | T1 FS POST SAG | sag | yes | 4 | 1 | left |
| T1 | T1 POST AX     | ax  | no  | 4 | 1 | top  |

## **RECONS: (for MARS)**

sagittal and axial subtractions



# MRI Entire Spine

Updated 07/17/17

Reviewed 05/14/25

Indications: acute trauma, cord compression.

**This protocol must be approved by a Radiologist.**

IV contrast is not given for this protocol.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name          | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View  |
|----------------|--------------------|-------|---------|------------|----------|-------------|----------------|
| T1             | T1 SAG CERVICAL    | sag   | no      | 4          | 0.6      | left        | cervical spine |
| T2             | T2 FS SAG CERVICAL | sag   | yes     | 4          | 0.6      | left        |                |
| T1             | T1 SAG THORACIC    | sag   | no      | 4          | 0.6      | left        | thoracic spine |
| T2             | T2 FS SAG THORACIC | sag   | yes     | 4          | 0.6      | left        |                |
| T1             | T1 SAG LUMBAR      | sag   | no      | 4          | 0.6      | left        | lumbar spine   |
| T2             | T2 FS SAG LUMBAR   | sag   | yes     | 4          | 0.6      | left        |                |
| *T2            | T2 AX CERVICAL     | ax    | no      | 3          | 1        | top         | cervical spine |
| *T2            | T2 AX THORACIC     | ax    | no      | 7          | 3.5      | top         | thoracic spine |
| *T2            | T2 AX LUMBAR       | ax    | no      | 5          | 1        | top         | lumbar spine   |

\*Axial T2 sequences are optional.

# **MRI TMJs (Temporomandibular Joints)**

Updated 11/22/23

Reviewed 05/14/25

IV contrast is not given for this protocol.

Go to [MRIMaster.com](http://MRIMaster.com) for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 SAG CLOSED    | sag          | no             | 3                 | 0.3             | left               |
| T1                    | T1 SAG OPEN      | sag          | no             | 3                 | 0.3             | left               |
| T2                    | T2 FS COR CLOSED | cor          | yes            | 3                 | 0.3             | back               |
| T2                    | T2 FS AX CLOSED  | cor          | yes            | 3                 | 0.3             | base               |
| Gradient Cine         | GRE SAG RIGHT    | sag          | no             | 4                 | 0.3             | left               |
| Gradient Cine         | GRE SAG LEFT     | sag          | no             | 4                 | 0.3             | left               |

# MRI Brachial Plexus

Updated 11/19/23

Reviewed 05/14/25

Use brachial plexus field-of-view (FOV) and angulations as in the images below.

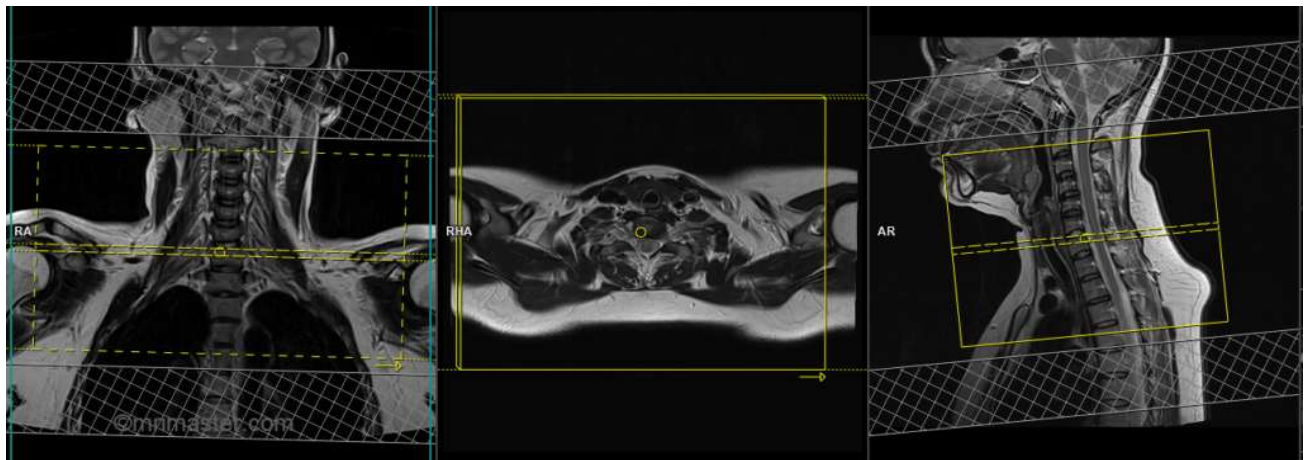
Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name      | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|----------------|-------|---------|------------|----------|-------------|
| T1             | T1 COR BILAT   | cor   | no      | 5          | 1.5      | back        |
| STIR           | STIR COR BILAT | cor   | no      | 5          | 1.5      | back        |
| STIR           | STIR AX BILAT  | ax    | no      | 5          | 2.5      | base        |
| T1             | T1 AX RIGHT    | ax    | no      | 5          | 2.5      | base        |
| T1             | T1 AX LEFT     | ax    | no      | 5          | 2.5      | base        |
| T1             | T1 SAG RIGHT   | sag   | no      | 5          | 2.5      | left        |
| T1             | T1 SAG LEFT    | sag   | no      | 5          | 2.5      | left        |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

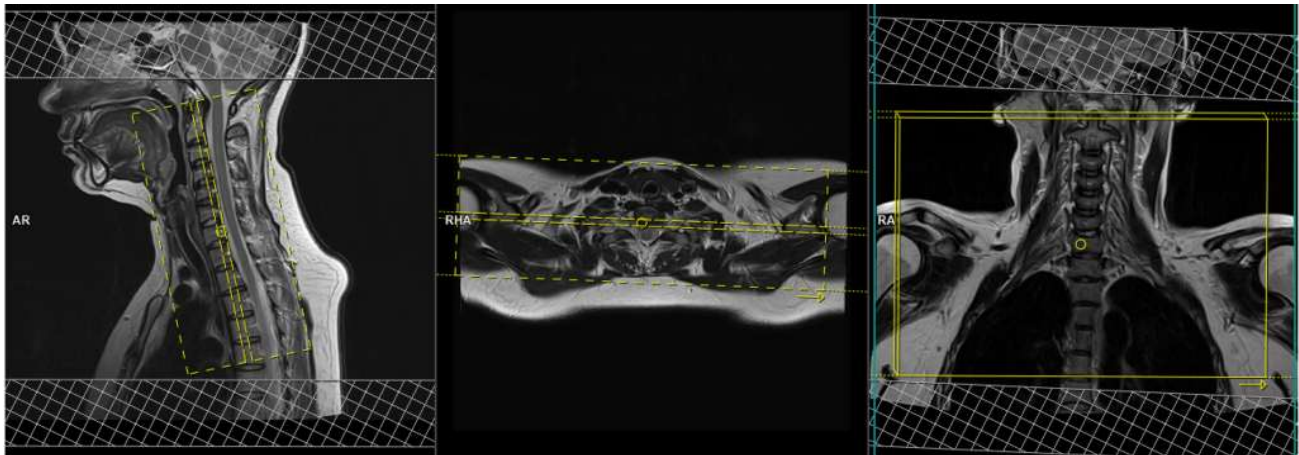
|    |                |     |     |   |     |      |
|----|----------------|-----|-----|---|-----|------|
| T1 | T1 FS POST AX  | ax  | yes | 5 | 1.5 | base |
| T1 | T1 FS POST COR | cor | yes | 5 | 2.5 | back |
| T1 | T1 FS POST SAG | sag | yes | 5 | 2.5 | left |

\*All post contrast sequences are only of the symptomatic side.

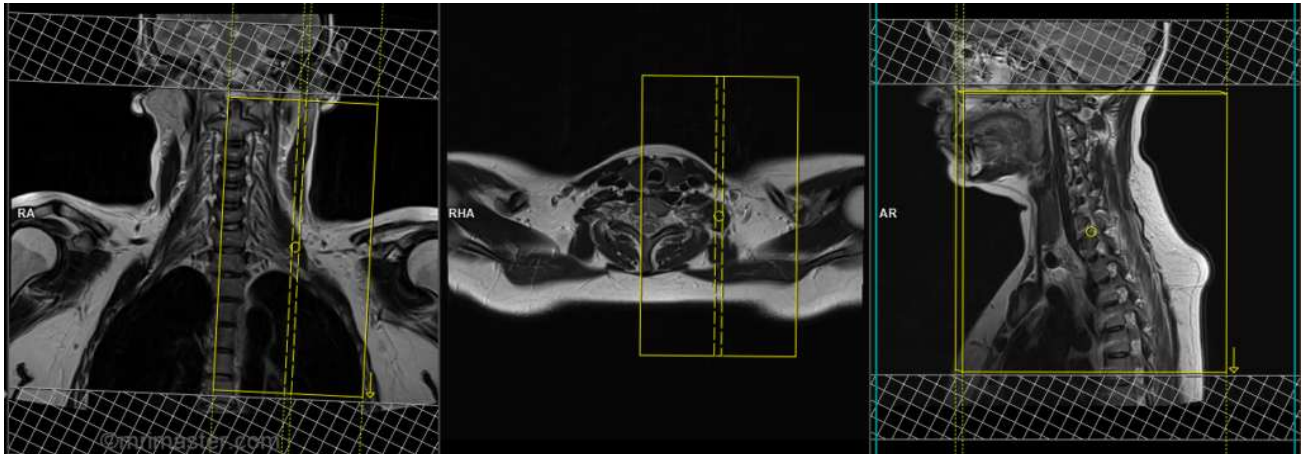


axial FOV & angulation (perpendicular to the spinal cord in the sagittal plane)

# MRI Brachial Plexus



coronal FOV & angulation (parallel to the spinal cord in the sagittal plane)



sagittal FOV & angulation (parallel to the spinal cord in the coronal plane)

# MRI Lumbar Plexus

Updated 11/19/23

Reviewed 05/14/25

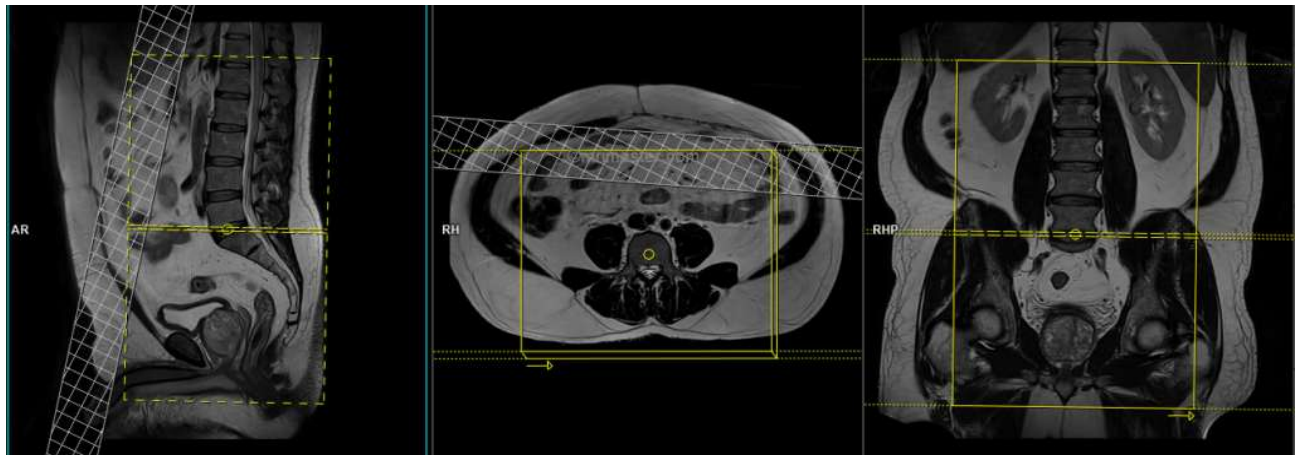
Use lumbar plexus field-of-view (FOV) and angulations as in the images below.

Go to [MRIMaster.com](http://MRIMaster.com) for a guide of proper positioning.

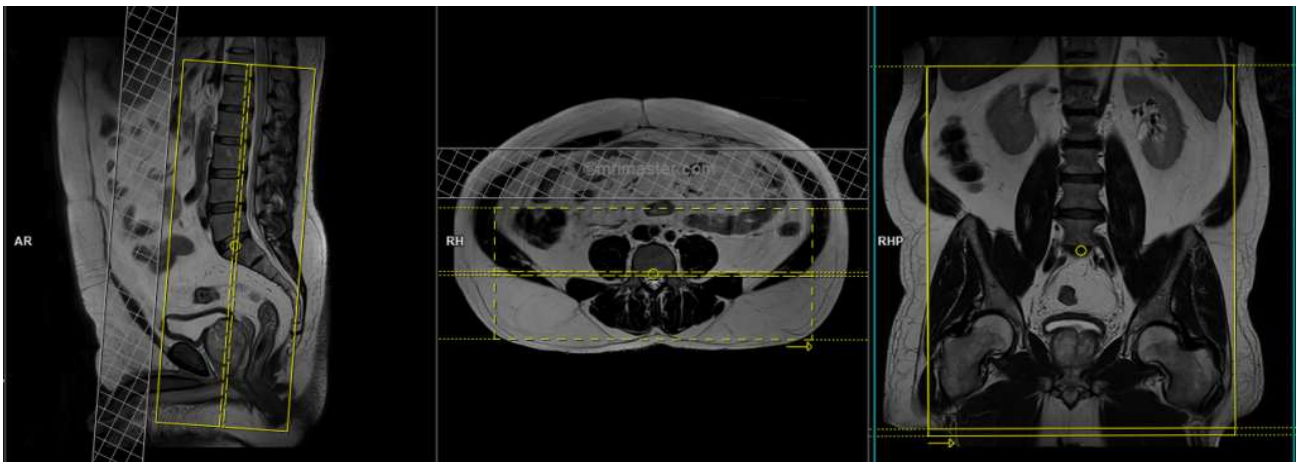
| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 AX     | ax    | no      | 6          | 1.2      | base        |
| T1             | T1 COR    | cor   | no      | 5          | 1        | back        |
| T2             | T2 FS AX  | ax    | yes     | 6          | 1.2      | base        |
| T2             | T2 FS COR | cor   | yes     | 5          | 1        | back        |
| T2             | T2 SAG    | sag   | no      | 6          | 1.2      | left        |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |      |
|----|----------------|-----|-----|---|-----|------|
| T1 | T1 FS POST AX  | ax  | yes | 6 | 1.2 | base |
| T1 | T1 FS POST COR | cor | yes | 5 | 1   | back |

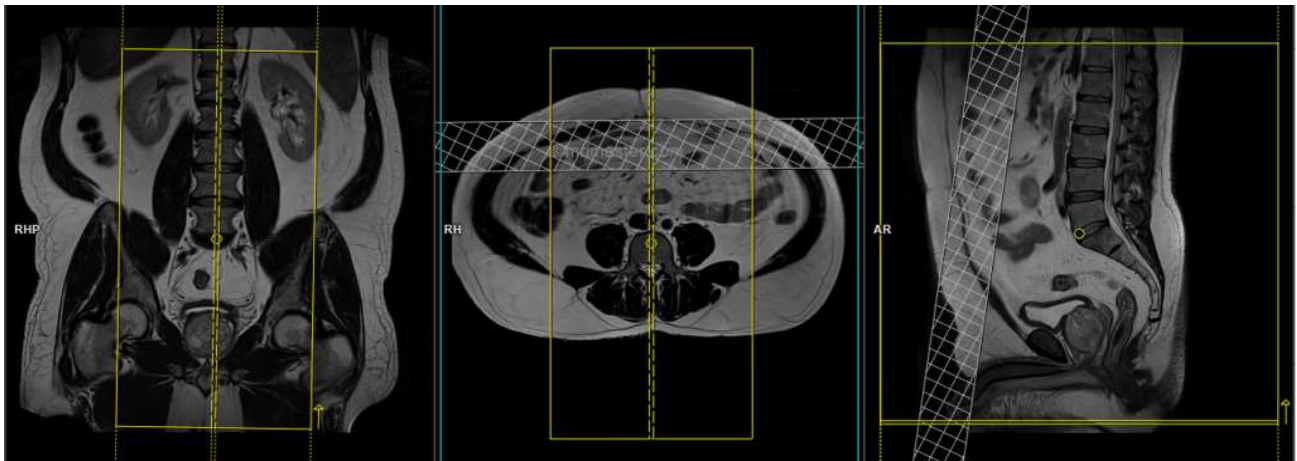


axial FOV & angulation (perpendicular to the spinal cord in the sagittal plane)



coronal FOV & angulation (parallel to the spinal cord in the sagittal plane)

# MRI Lumbar Plexus



sagittal FOV & angulation (parallel to the spinal cord in the coronal plane)

# **MRI Shoulder**

Updated 06/15/17

Reviewed 05/14/25

For an order for without and with IV imaging, please confirm that the exam is not for tumor or arthrogram before proceeding with this protocol.

Use field-of-view (FOV) and angulations as in the images below.

Go to MRIMaster.com for a guide of proper positioning.

## **Routine Shoulder:**

| <b>Pulse Sequence</b> | <b>PACS Name</b>      | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|-----------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 AX                 | ax           | no             | 4                 | 0.5             | top                |
| PD                    | PD FS SAG             | sag          | yes            | 4                 | 0.5             | lateral            |
| DESS/PD               | DESS FS AX / PD FS AX | ax           | yes            | 4                 | 0.5             | top                |
| PD                    | PD COR                | cor          | no             | 4                 | 0.5             | front              |
| T2                    | T2 FS COR             | cor          | yes            | 4                 | 0.5             | front              |

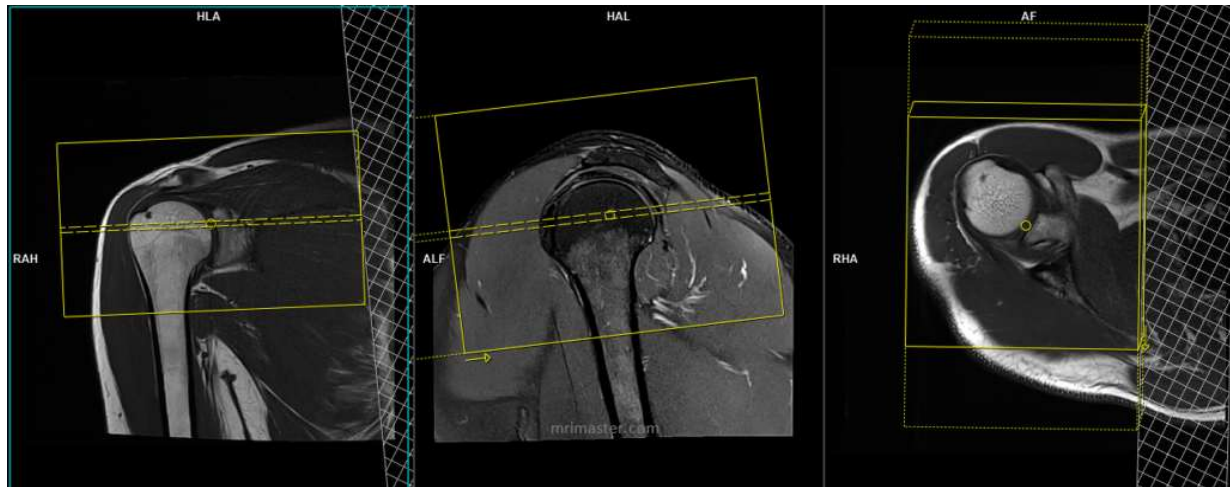
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.5 | top   |
| T1 | T1 FS POST COR | cor | yes | 4 | 0.5 | front |

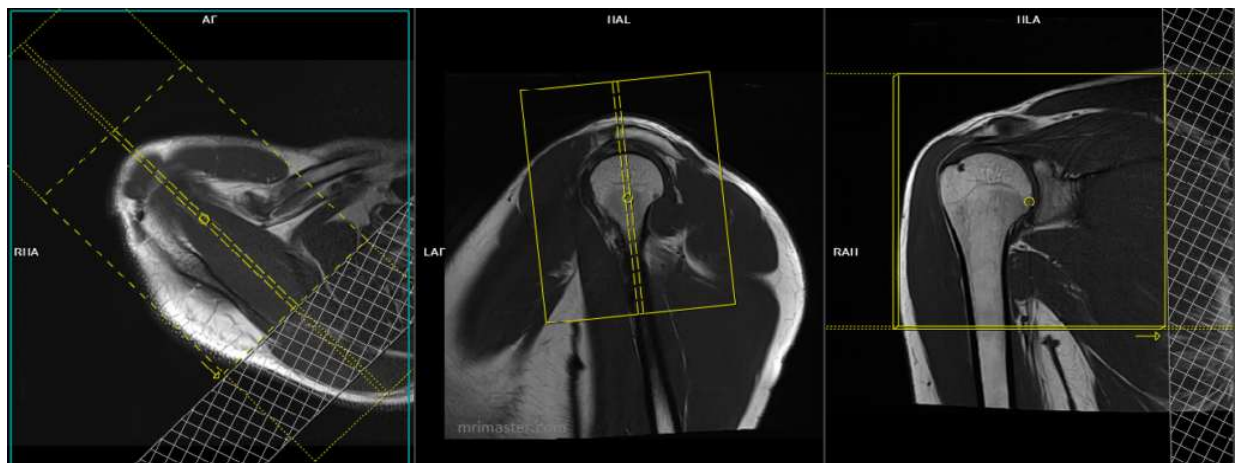
## **Shoulder Arthrogram:**

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 FS AX         | ax           | yes            | 4                 | 0.5             | top                |
| T1                    | T1 FS SAG        | sag          | yes            | 3                 | 0.3             | lateral            |
| T1                    | T1 FS COR        | cor          | yes            | 3                 | 0.3             | front              |
| T2                    | T2 FS COR        | cor          | yes            | 3                 | 0.3             | front              |
| T1                    | T1 FS ABER       | ax           | yes            | 4                 | 0.5             | top                |

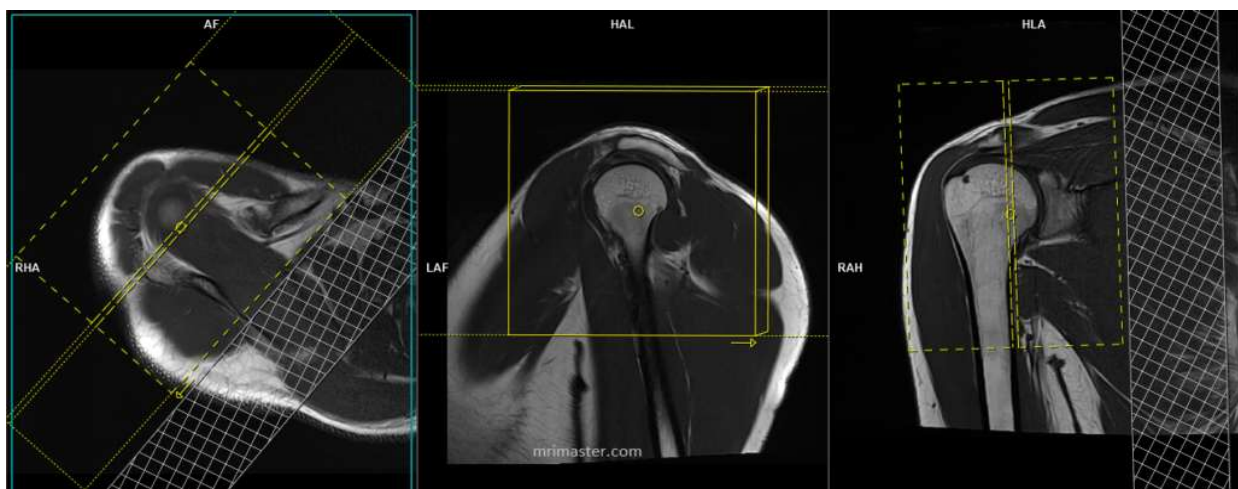
# MRI Shoulder



axial FOV and angulation (perpendicular to the glenohumeral joint in the coronal plane)



coronal FOV and angulation (parallel to the supraspinatus tendon in the axial plane)



sagittal FOV and angulation (perpendicular to the supraspinatus tendon in the axial plane)

# MRI Elbow

Updated 03/14/19

Reviewed 05/14/25

For an order for without and with IV imaging, please confirm that the exam is not for tumor or arthrogram before proceeding.

Use field-of-view (FOV) and angulations as in the images below

Go to MRIMaster.com for a guide of proper positioning.

## **Routine Elbow:**

| Pulse Sequence | PACS Name               | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-------------------------|-------|---------|------------|----------|-------------|
| T1             | T1 AX                   | ax    | no      | 4          | 0.5      | top         |
| STIR           | STIR AX                 | ax    | no      | 4          | 0.5      | top         |
| T1             | T1 COR                  | cor   | no      | 4          | 0.5      | front       |
| T2             | T2 FS COR               | cor   | yes     | 4          | 0.5      | front       |
| DESS/PD        | DESS FS COR / PD FS COR | cor   | yes     | 1          | 0.0      | front       |
| T2             | T2 FS SAG               | sag   | yes     | 4          | 0.5      | lateral     |

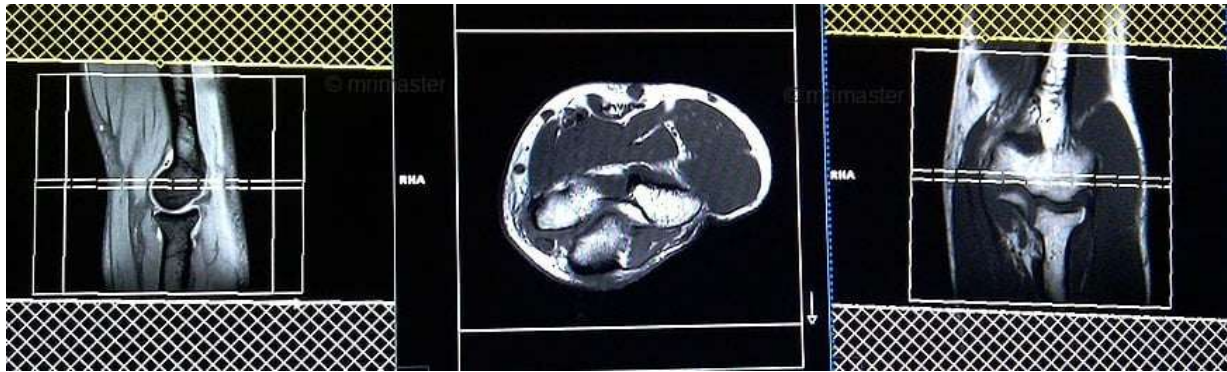
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.5 | top   |
| T1 | T1 FS POST SAG | sag | yes | 4 | 0.5 | front |

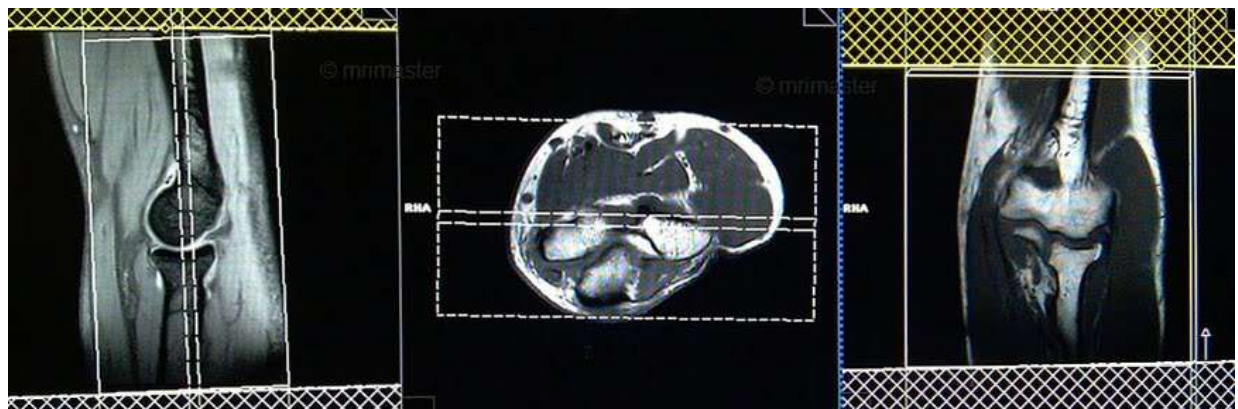
## **Elbow Arthrogram:**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 FS AX  | ax    | yes     | 4          | 0.5      | top         |
| T1             | T1 FS COR | cor   | yes     | 4          | 0.5      | front       |
| T1             | T1 FS SAG | sag   | yes     | 4          | 0.5      | lateral     |
| T1             | T1 COR    | cor   | no      | 4          | 0.5      | front       |
| T2             | T2 FS COR | cor   | yes     | 4          | 0.5      | front       |

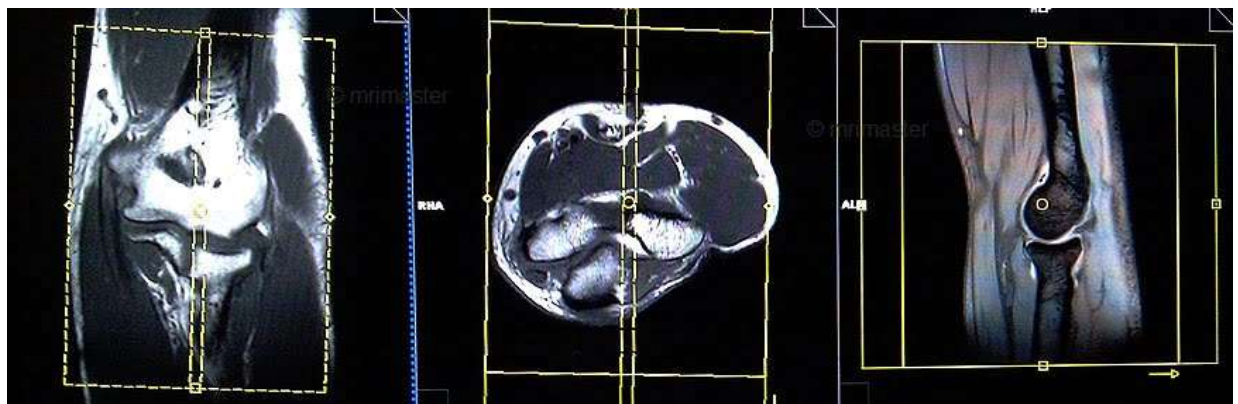
# MRI Elbow



axial FOV and angulation (parallel to the medial and lateral humeral epicondyle in the coronal plane)



coronal FOV and angulation (parallel to the medial and lateral humeral epicondyles in the axial plane)



sagittal FOV and angulation (perpendicular to the medial and lateral humeral epicondyles in the axial plane)

# MRI Wrist

Updated 05/26/20

Reviewed 05/14/25

For an order for without and with IV imaging, please confirm that the exam is not for tumor or arthrogram before proceeding.

Use field-of-view (FOV) and angulations as in the images below.

Go to MRIMaster.com for a guide of proper positioning.

## **Routine Wrist:**

| Pulse Sequence | PACS Name               | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-------------------------|-------|---------|------------|----------|-------------|
| T1             | T1 AX                   | ax    | no      | 3          | 0.5      | top         |
| PD             | PD FS AX                | ax    | yes     | 3          | 0.5      | top         |
| T1             | T1 COR                  | cor   | no      | 3          | 0.5      | front       |
| PD             | PD FS COR               | cor   | yes     | 3          | 0.5      | front       |
| T2             | T2 FS COR               | cor   | yes     | 3          | 0.5      | front       |
| STIR           | T2 STIR SAG             | sag   | no      | 3          | 0.5      | lateral     |
| DESS/PD        | DESS FS COR / PD FS COR | cor   | yes     | 1          | 0.0      | front       |

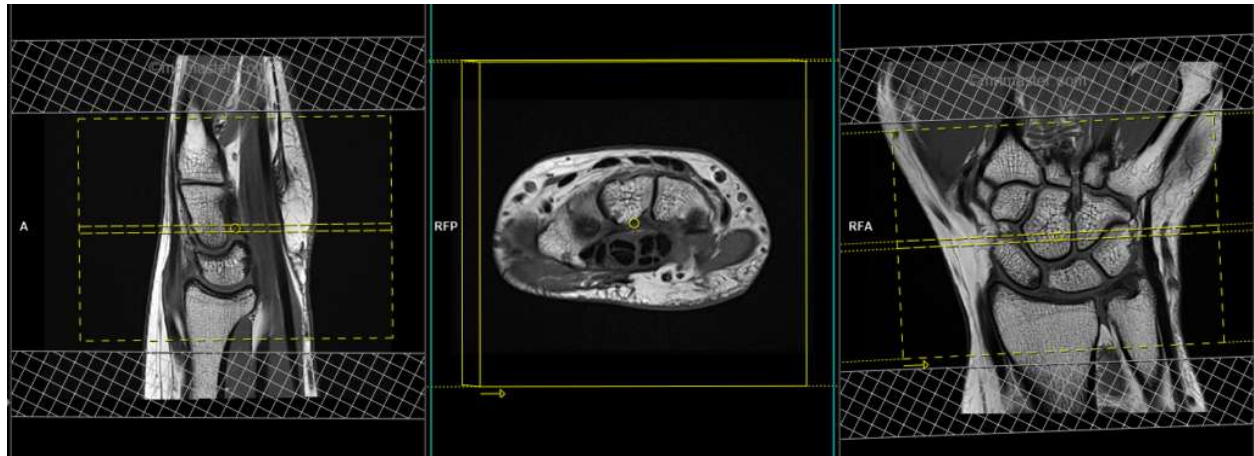
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST COR | cor | yes | 3 | 0.5 | front |
| T1 | T1 FS POST AX  | ax  | yes | 3 | 0.5 | top   |

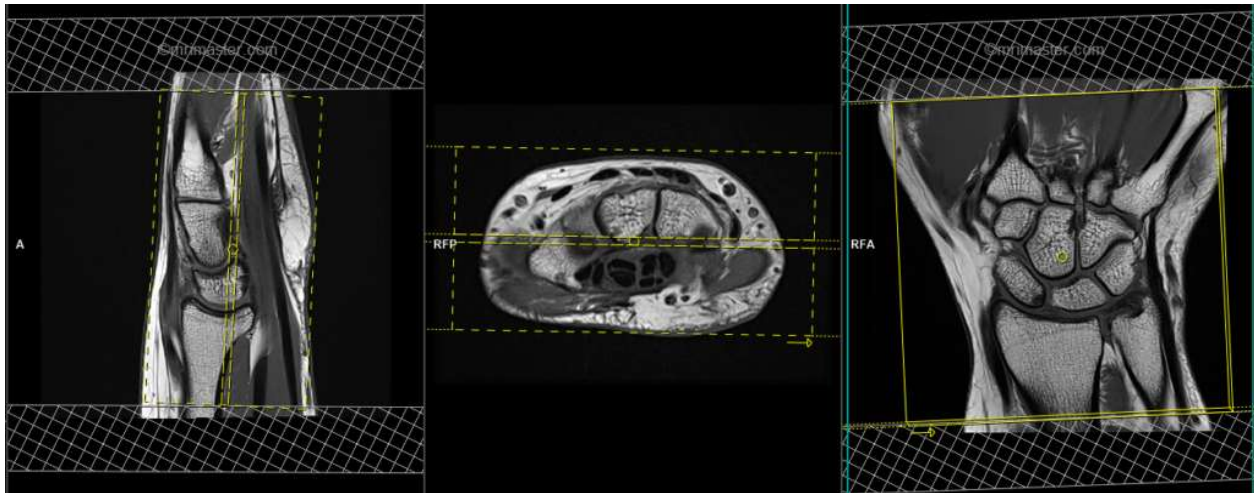
## **Wrist Arthrogram:**

| Pulse Sequence | PACS Name    | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|--------------|-------|---------|------------|----------|-------------|
| T1             | T1 FS AX     | ax    | yes     | 3          | 0.6      | top         |
| T1             | T1 FS COR    | cor   | yes     | 3          | 0.3      | front       |
| T1             | T1 FS SAG    | sag   | yes     | 3          | 0.6      | lateral     |
| T2             | T2 COR       | cor   | no      | 3          | 0.3      | front       |
| PD             | PD FS COR    | cor   | yes     | 3          | 0.6      | front       |
| PD             | PD FS SAG    | sag   | yes     | 3          | 0.6      | lateral     |
| 3D MERGE       | 3D MERGE COR | cor   | no      | 3          | none     | front       |

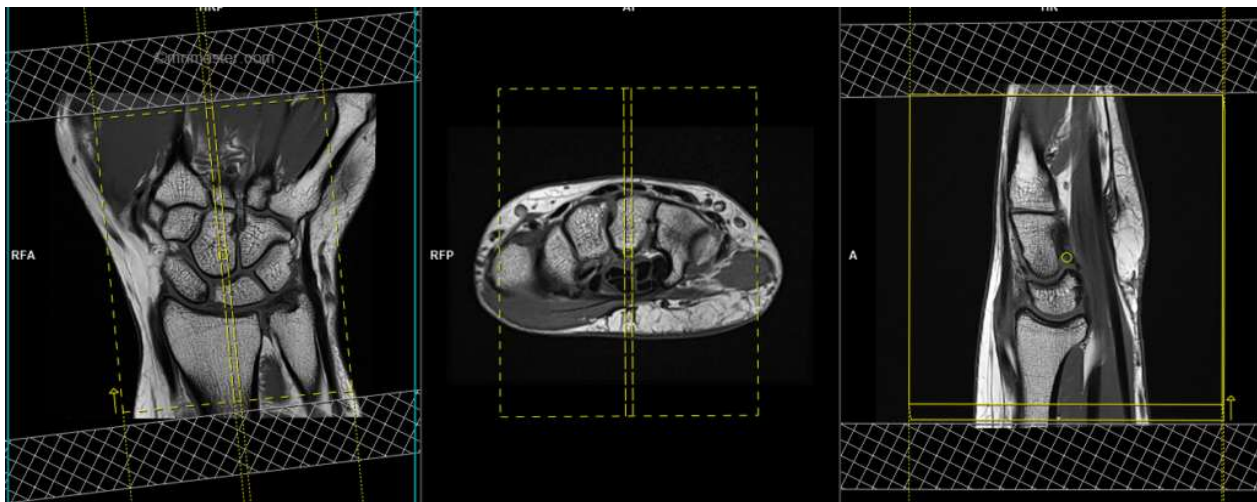
# MRI Wrist



axial FOV and angulation (horizontally across the carpal bones in the coronal plane)



coronal FOV and angulation (horizontally across the carpal bones in the axial plane)



sagittal FOV and angulation (vertically across the carpal bones in the axial plane)

# MRI Hand

Updated 03/01/21

Reviewed 05/14/25

## **Routine Hand:**

Use field-of-view (FOV) and angulations as in the images below.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name               | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-------------------------|-------|---------|------------|----------|-------------|
| T1             | T1 COR                  | cor   | no      | 3          | 0.3      | front       |
| STIR           | STIR COR                | cor   | no      | 3          | 0.3      | front       |
| DESS/PD        | DESS FS COR / PD FS COR | cor   | yes     | 3          | 0.3      | front       |
| STIR           | STIR SAG                | sag   | no      | 3          | 0.3      | lateral     |
| T1             | T1 SAG                  | sag   | no      | 3          | 0.3      | lateral     |
| T1             | T1 AX                   | ax    | no      | 4          | 0.0      | top         |
| T2             | T2 FS AX                | ax    | yes     | 4          | 0.0      | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST COR | cor | yes | 3 | 0.3 | front |
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.0 | top   |
| T1 | T1 FS POST SAG | ax  | yes | 3 | 0.3 | top   |

## **Both Hands for Arthritis:**

Use field-of-view (FOV) and angulations as in the images below.

Place both hands prone in the superman position with fingers slightly separated.

Include all skin superior to inferior.

Mid wrist through distal finger tips.

All fingers must be included in the FOV.

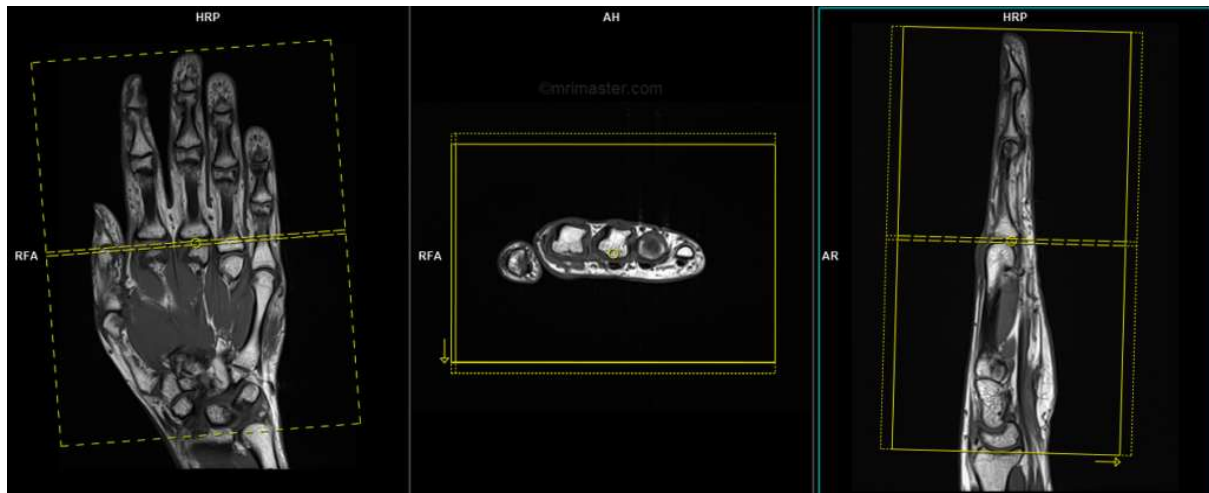
Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 COR    | cor   | no      | 3          | 0.3      | front       |
| STIR           | STIR COR  | cor   | no      | 3          | 0.3      | front       |
| T1             | T1 AX     | ax    | no      | 4          | 0.5      | top         |
| T2             | T2 FS AX  | ax    | yes     | 4          | 0.5      | top         |

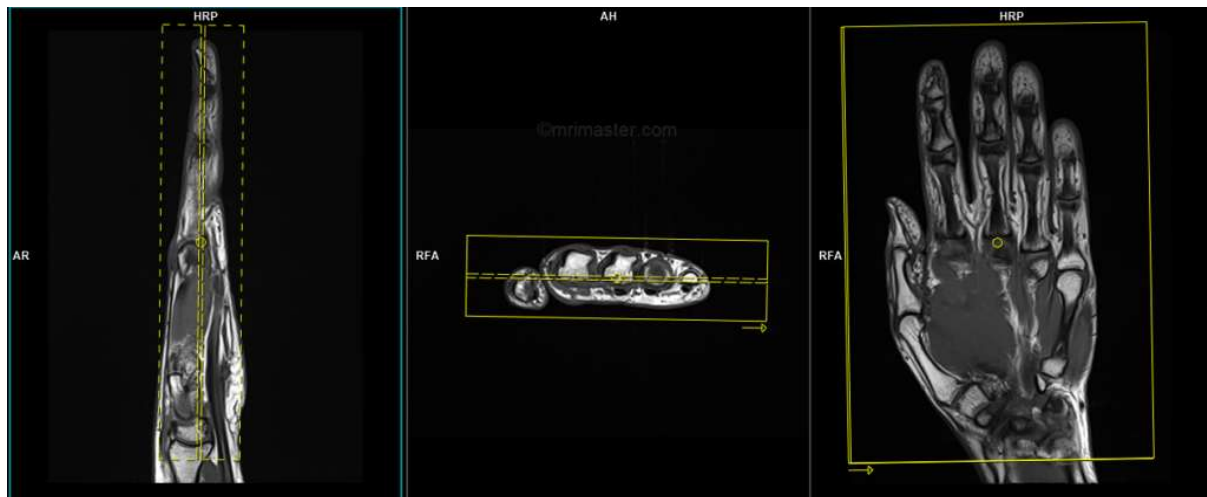
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST COR | cor | yes | 3 | 0.3 | front |
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.5 | top   |

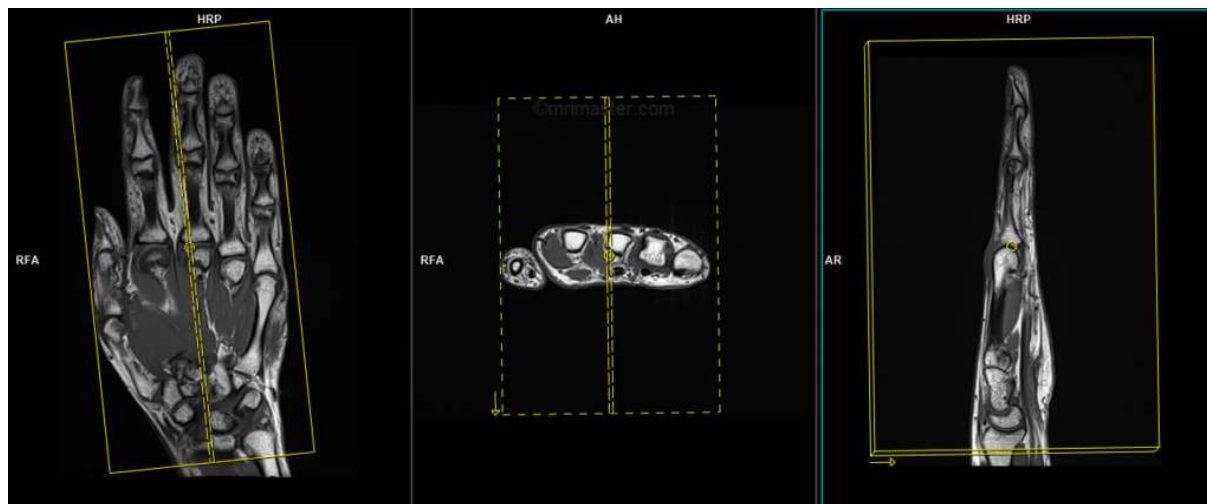
# MRI Hand



axial FOV and angulation (perpendicular to the metacarpal and phalangeal bones in the coronal plane)



coronal FOV and angulation (parallel to a line across the metacarpal bones in the axial plane)



sagittal FOV and angulation (perpendicular to the pectoralis muscle in the axial plane)

# **MRI Thumb/UCL**

Updated 07/17/17

Reviewed 05/14/25

Use field-of-view (FOV) and angulations as in the images below.

Use sesamoid bones for guide for choosing angles.

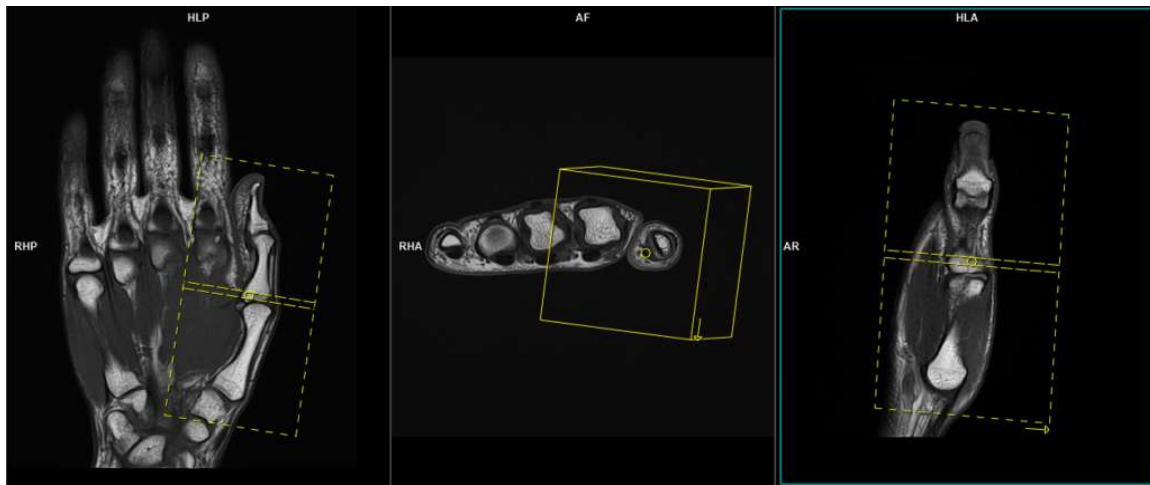
Confirm the planes with a MSK Radiologist before proceeding.

IV contrast is not given for this protocol.

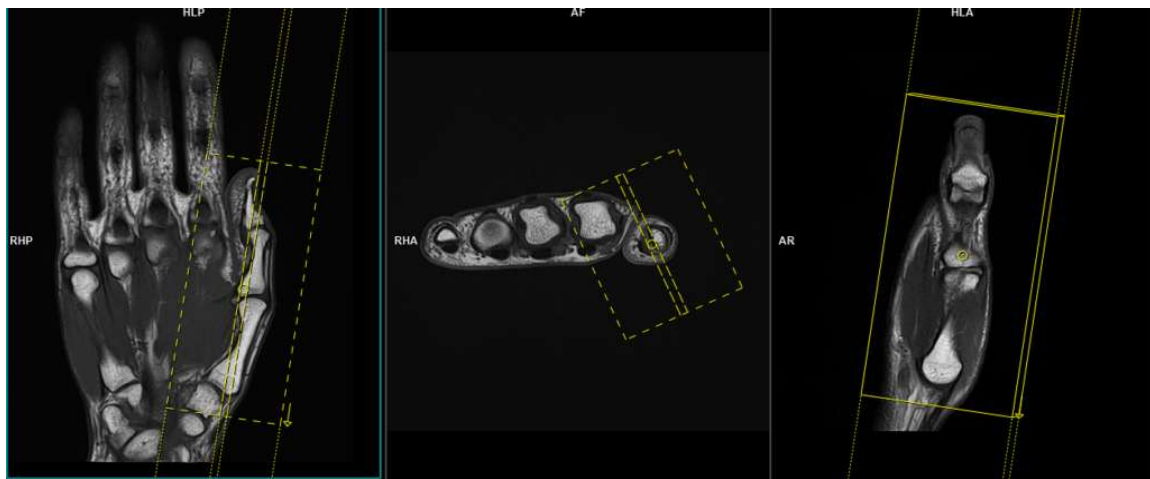
Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 AX            | ax           | no             | 3                 | 0.3             | top                |
| T2                    | T2 FS AX         | ax           | yes            | 3                 | 0.3             | top                |
| T1                    | T1 COR           | cor          | no             | 3                 | 0.3             | front              |
| T2                    | T2 COR           | cor          | no             | 3                 | 0.3             | front              |
| STIR                  | STIR SAG         | sag          | no             | 3                 | 0.3             | lateral            |

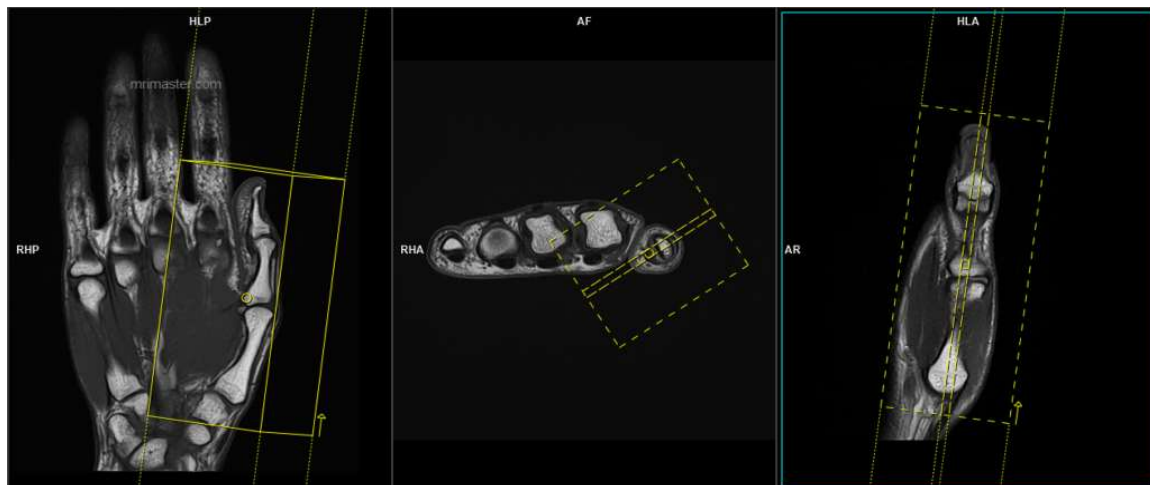
# MRI Thumb/UCL



axial FOV and angulation (perpendicular to the metacarpal and phalanx bones in the sagittal plane)



coronal FOV and angulation (parallel to the metacarpal and phalanx bones in the sagittal plane)



sagittal FOV and angulation (perpendicular to the pectoralis muscle in the axial plane)

# MRI Hip

Updated 06/10/21

Reviewed 05/14/25

For an order for without and with IV imaging, please confirm that the exam is not for tumor or arthrogram before proceeding.

Use field-of-view (FOV) and angulations as in the images below (unless otherwise specified in protocol):

Go to MRIMaster.com for a guide of proper positioning.

## **Routine Hip:**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 COR    | cor   | no      | 5          | 1        | front       | whole pelvis  |
| T1             | T1 AX     | ax    | no      | 5          | 1        | top         | hip joint     |
| T2             | T2 FS AX  | ax    | yes     | 5          | 1        | top         |               |
| STIR           | STIR COR  | cor   | no      | 5          | 1.5      | front       |               |
| T1             | T1 SAG    | sag   | no      | 4.5        | 1        | lateral     |               |
| T2             | T2 FS SAG | sag   | yes     | 4.5        | 1        | lateral     |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |     |     |         |           |
|----|----------------|-----|-----|-----|-----|---------|-----------|
| T1 | T1 FS POST AX  | ax  | yes | 5   | 1   | top     | hip joint |
| T1 | T1 FS POST SAG | sag | yes | 4.5 | 1   | lateral |           |
| T1 | T1 FS POST COR | cor | yes | 5   | 1.5 | front   |           |

## **MARS AND/OR PSEUDOTUMOR EVALUATION:**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| T1             | T1 COR    | cor   | no      | 5          | 1        | front       | whole pelvis  |
| T1             | T1 AX     | ax    | no      | 6          | 1.5      | top         | hip joint     |
| T2             | T2 AX     | ax    | no      | 6          | 1.5      | top         |               |
| STIR           | STIR AX   | ax    | no      | 6          | 1.5      | top         |               |
| T1             | T1 COR    | cor   | no      | 5          | 1        | front       |               |
| T2             | T2 COR    | cor   | no      | 5          | 1        | front       |               |
| PD             | PD SAG    | sag   | no      | 5          | 1        | lateral     |               |

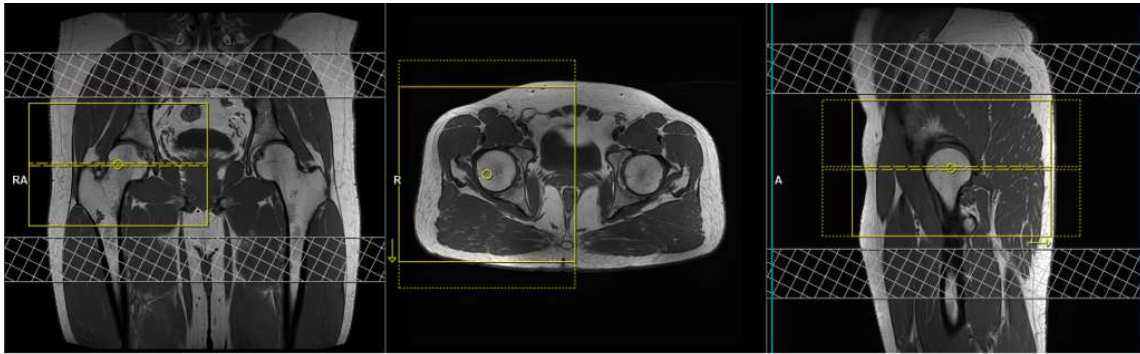
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |             |     |    |   |     |         |           |
|----|-------------|-----|----|---|-----|---------|-----------|
| T1 | T1 POST AX  | ax  | no | 6 | 1.5 | top     | hip joint |
| T1 | T1 POST COR | cor | no | 5 | 1   | and     |           |
| T1 | T1 POST SAG | sag | no | 4 | 0.5 | lateral |           |

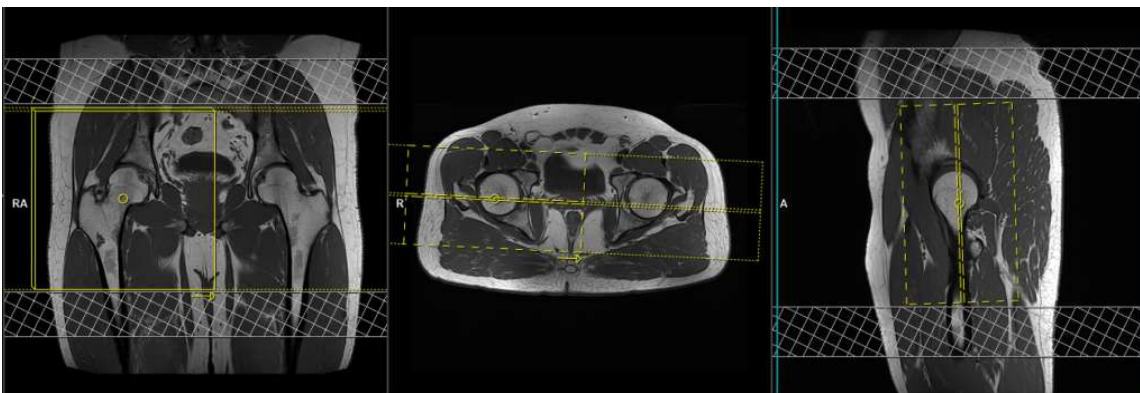
## **RECON (for MARS):**

axial and coronal subtractions

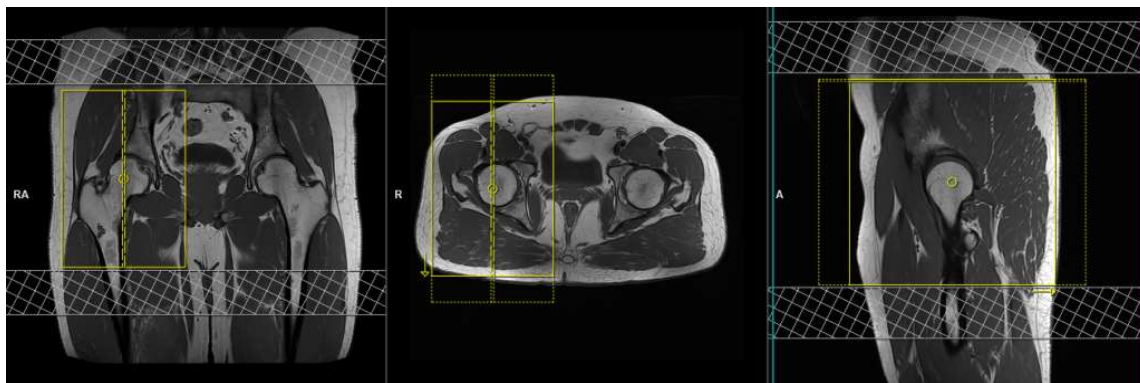
# MRI Hip



axial FOV and angulation (horizontal across the femoral heads in the coronal plane)



hip coronal FOV and angulation (perpendicular to the acetabulum in the axial plane)



hip sagittal FOV and angulation (parallel across the femoral heads in the coronal plane)

# MRI Hip Arthrogram

Updated 10/08/19

Reviewed 05/14/25

Use field-of-view (FOV) and angulations as in the images in the hip routine protocol.

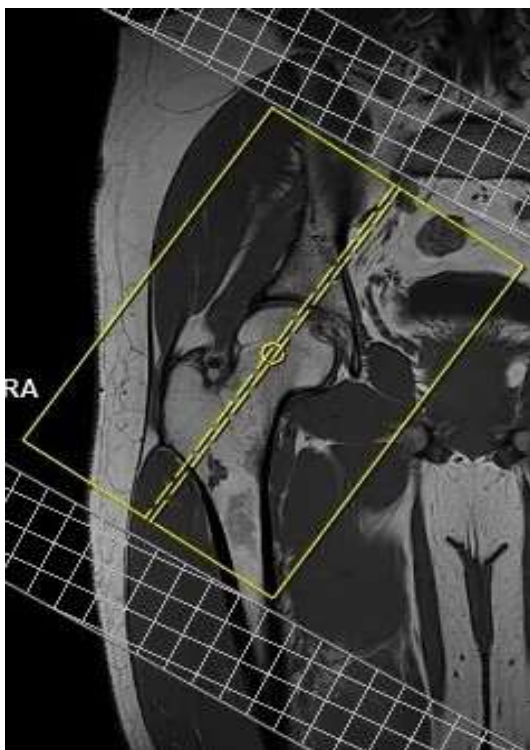
The oblique planes are relative to the long axis of the femoral neck as visualized in the coronal plane (see below images):

The axial oblique plane is parallel to the long axis of the femoral neck

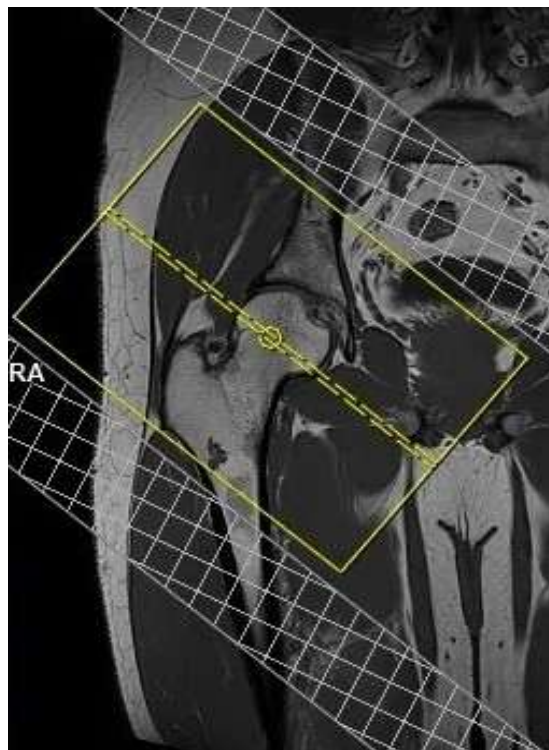
The sagittal oblique plane is perpendicular to the long axis of the femoral neck

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name     | plane   | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|---------------|---------|---------|------------|----------|-------------|
| T1             | T1 FS AX      | ax      | yes     | 5          | 1        | top         |
| T1             | T1 SAG        | sag     | no      | 4          | 0.5      | lateral     |
| T1             | T1 FS SAG     | sag     | yes     | 4          | 0.5      | lateral     |
| T1             | T1 FS COR     | cor     | yes     | 5          | 1.5      | front       |
| T2             | T2 FS COR     | cor     | yes     | 5          | 1.5      | front       |
| T1             | T1 FS OBL AX  | obl ax  | yes     | 4          | 0.5      | top         |
| T1             | T1 FS OBL SAG | obl sag | yes     | 4          | 0.5      | front       |



Axial Oblique  
(parallel to long axis of the femoral neck)



Sagittal Oblique  
(perpendicular to long axis of the femoral neck)

# MRI Knee

Updated 03/04/21

Reviewed 05/14/25

For an order for without and with IV imaging, please confirm that the exam is not for tumor or arthrogram before proceeding.

Use field-of-view (FOV) and angulations as in the images below.

Go to MRIMaster.com for a guide of proper positioning.

## **Routine Knee:**

| Pulse Sequence | PACS Name              | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|------------------------|-------|---------|------------|----------|-------------|
| PD             | PD FS AX               | ax    | yes     | 4          | 1        | top         |
| T1             | T1 COR                 | cor   | no      | 4          | 0.5      | front       |
| DESS/PD        | DESS FS AX / PD FS COR | COR   | yes     | 1          | 0.5      | top         |
| PD             | PD FS SAG              | sag   | yes     | 4          | 0.5      | lateral     |
| T2             | T2 SAG                 | sag   | no      | 4          | 0.5      | lateral     |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.5 | top   |
| T1 | T1 FS POST COR | cor | yes | 4 | 0.5 | front |

## **MARS:**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| PD             | PD AX     | ax    | no      | 4          | 1        | top         |
| STIR           | STIR AX   | ax    | no      | 4          | 1        | front       |
| T1             | T1 COR    | cor   | no      | 4          | 1        | front       |
| PD             | PD COR    | cor   | no      | 4          | 1        | front       |
| T2             | T2 COR    | cor   | no      | 4          | 1        | front       |
| PD             | PD SAG    | sag   | no      | 4          | 1        | lateral     |
| T1             | T2 SAG    | sag   | no      | 4          | 1        | lateral     |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |        |     |    |   |   |       |
|----|--------|-----|----|---|---|-------|
| T1 | T1 AX  | ax  | no | 4 | 1 | top   |
| T1 | T1 COR | cor | no | 4 | 1 | front |

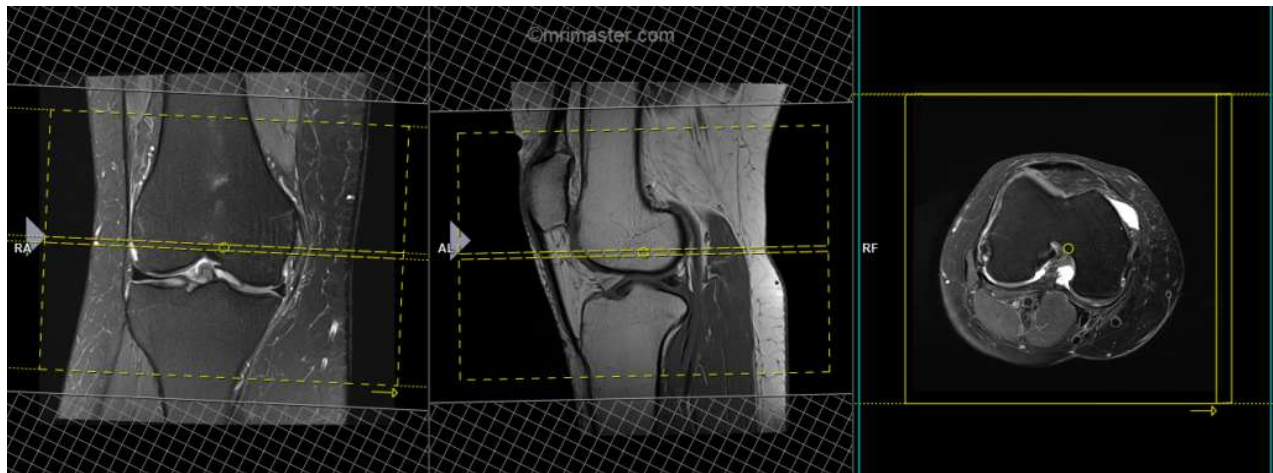
## **RECON (for MARS):**

coronal subtractions

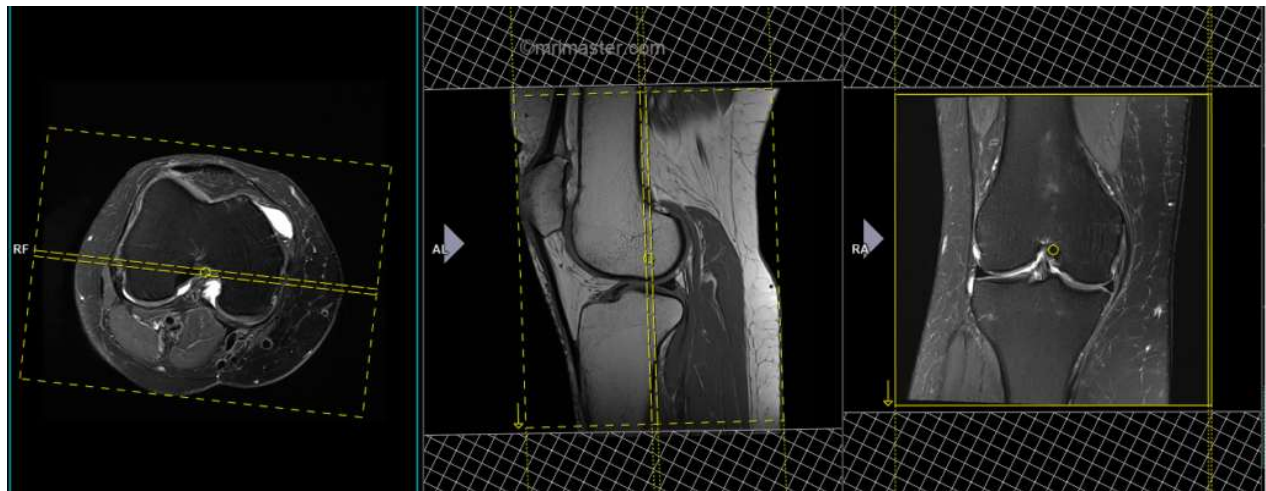
## **Knee Arthrogram:**

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 FS AX  | ax    | yes     | 4          | 0.5      | top         |
| T1             | T1 FS SAG | sag   | yes     | 4          | 0.5      | lateral     |
| T1             | T1 FS COR | cor   | yes     | 4          | 0.5      | front       |
| T2             | T2 FS AX  | ax    | yes     | 4          | 0.5      | top         |
| T2             | T2 FS SAG | sag   | yes     | 4          | 0.5      | lateral     |
| T2             | T2 FS COR | cor   | yes     | 4          | 0.5      | front       |

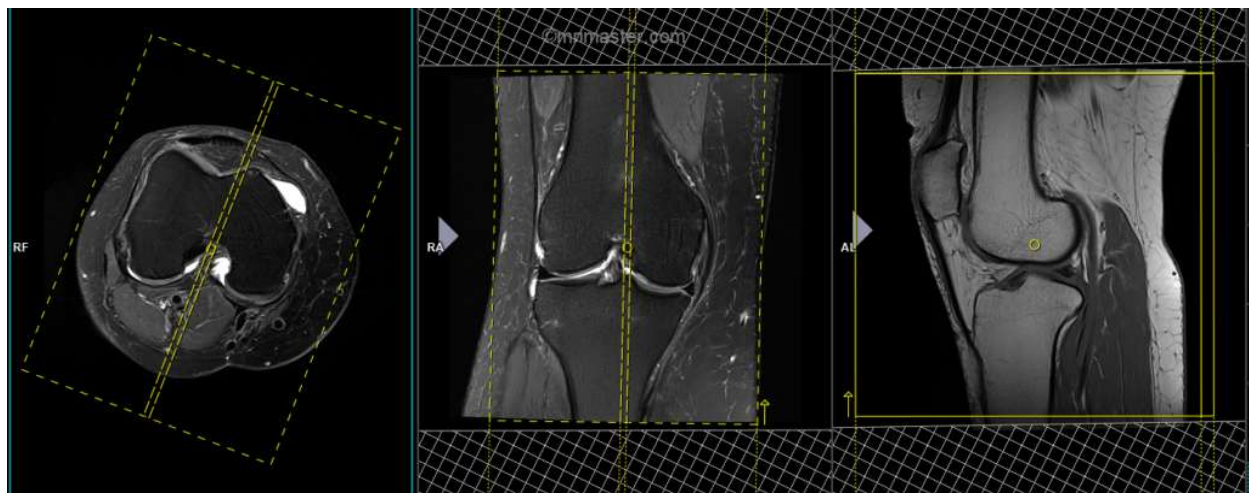
# MRI Knee



axial FOV and angulation (parallel to the medial and lateral condyles in the coronal plane)



coronal FOV and angulation (parallel to the medial and lateral condyles in the axial plane)



sagittal FOV and angulation (parallel to ACL in the axial plane)

# **MRI Ankle/Hindfoot**

Updated 02/10/20

Reviewed 05/14/25

Use field-of-view (FOV) and angulations as in the images below.

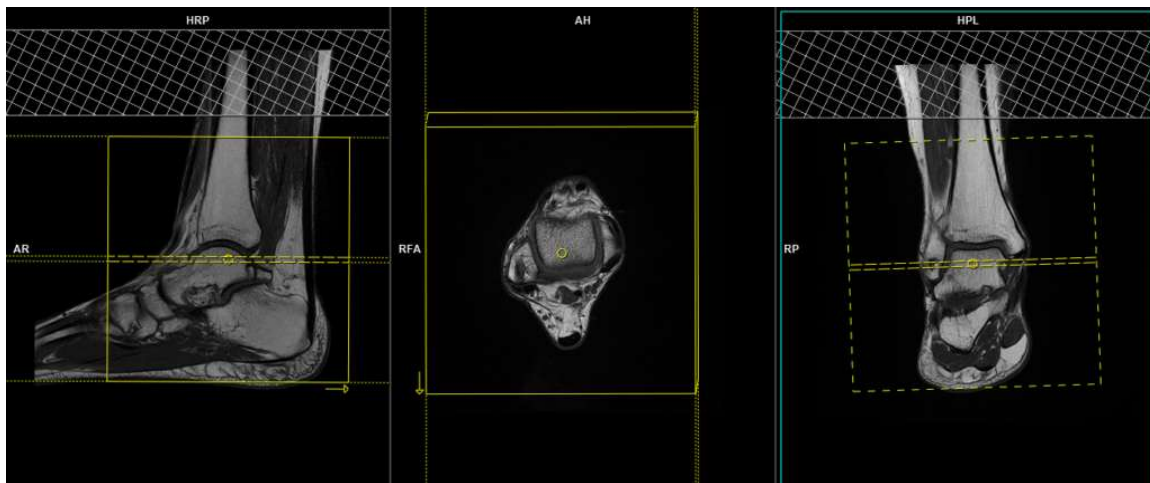
Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b>        | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|-------------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 SAG                  | sag          | no             | 3                 | 0.3             | lateral            |
| PD                    | PD FS SAG               | sag          | yes            | 3                 | 0.3             | lateral            |
| PD                    | PD AX                   | ax           | no             | 4                 | 0.5             | top                |
| PD                    | PD FS AX                | ax           | yes            | 4                 | 0.5             | top                |
| T2                    | T2 FS AX                | ax           | yes            | 4                 | 0.5             | top                |
| T1                    | T1 COR                  | cor          | no             | 4                 | 0.5             | front              |
| DESS/PD               | DESS FS COR / PD FS COR | cor          | yes            | 4                 | 0.5             | front              |

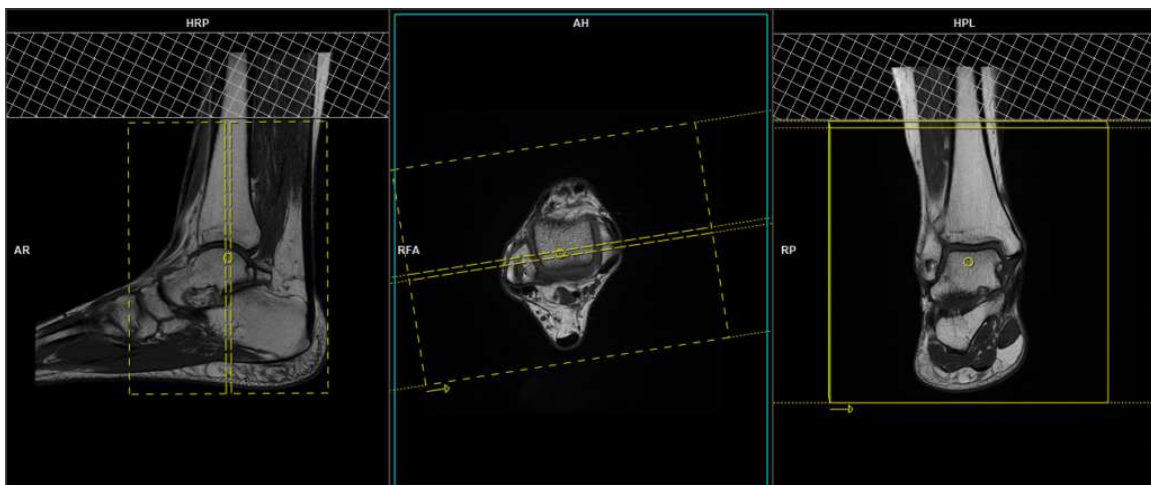
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST AX  | ax  | yes | 4 | 0.5 | top   |
| T1 | T1 FS POST COR | cor | yes | 4 | 0.5 | front |
| T1 | T1 FS POST SAG | sag | yes | 3 | 0.3 | sag   |

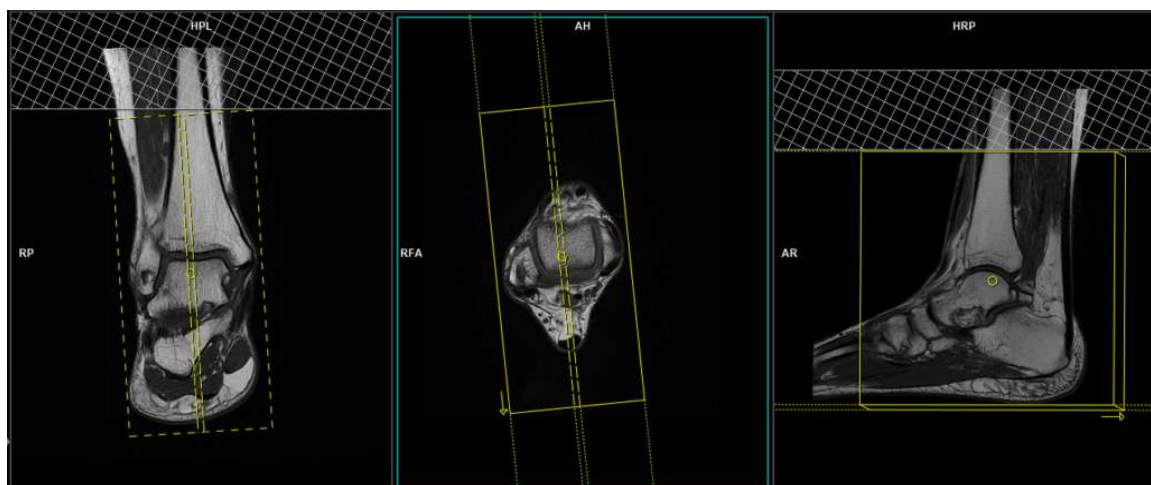
# MRI Ankle/Hindfoot



axial FOV and angulation (parallel to the tibio-talar joint in the coronal plane)



coronal FOV and angulation (parallel to the line along the medial and lateral malleoli in the axial plane)



sagittal FOV and angulation (perpendicular to the pectoralis muscle in the axial plane)

# **MRI Forefoot/Midfoot**

Updated 02/18/21

Reviewed 05/14/25

Use field-of-view (FOV) and angulations as in the images below.

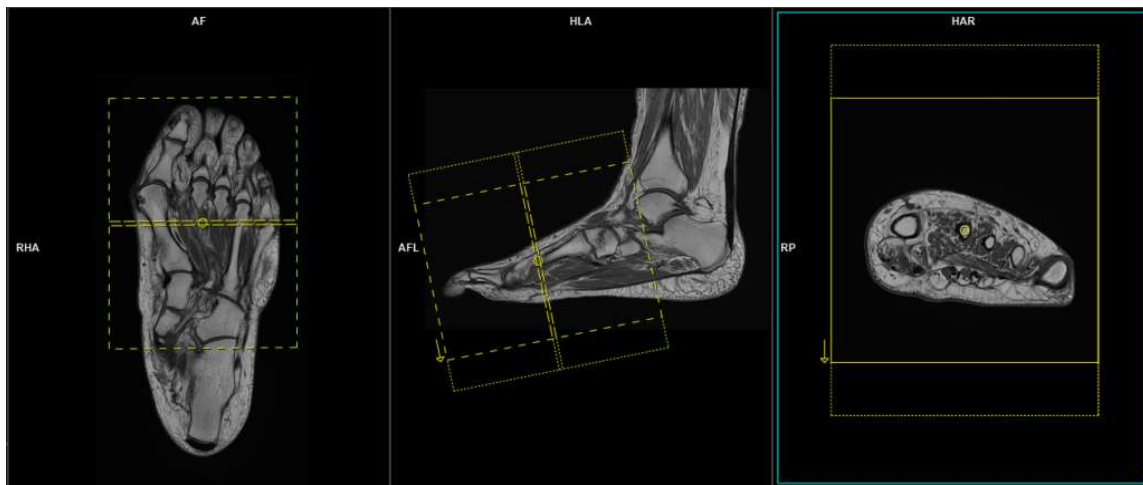
Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 AX            | ax           | no             | 5                 | 1               | top                |
| STIR                  | STIR AX          | ax           | no             | 5                 | 1               | top                |
| T1                    | T1 COR           | cor          | no             | 5                 | 1               | front              |
| STIR                  | STIR COR         | cor          | no             | 5                 | 1               | front              |
| T1                    | T1 SAG           | sag          | no             | 3                 | 0.5             | lateral            |
| T2                    | T2 FS SAG        | sag          | yes            | 3                 | 0.5             | lateral            |

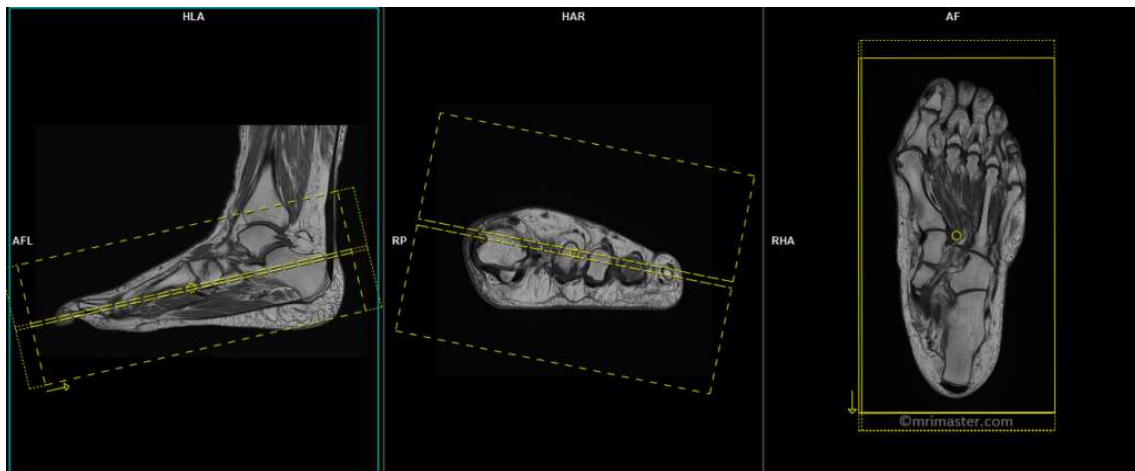
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST AX  | ax  | yes | 5 | 1   | top   |
| T1 | T1 FS POST COR | cor | yes | 5 | 1   | front |
| T1 | T1 FS POST SAG | sag | yes | 3 | 0.5 | sag   |

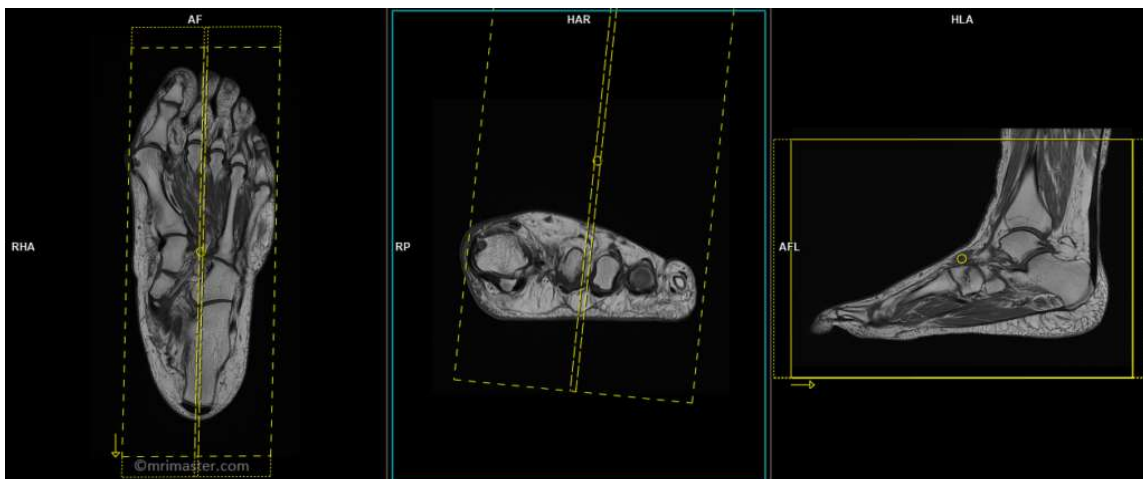
# MRI Forefoot/Midfoot



axial FOV and angulation (perpendicular to the metatarsal and phalanges bones in the sagittal plane)



coronal FOV and angulation (parallel to the metatarsal and phalanges bones in the sagittal plane)



sagittal FOV and angulation (perpendicular to the pectoralis muscle in the axial plane)

# MRI Long Bones

Updated 11/23/23

Reviewed 05/14/25

Use this protocol for non tumor/infection indications involving the humerus, forearm, femur or tibia/fibula.

If the indication is for a focal concern, use a small field-of-view (FOV) centered on the area of interest.

Otherwise use a field-of-view (FOV) centered on the long bone with coverage as follows:

include the joints on both ends of the bone (top/bottom coverage)

include anterior and posterior soft tissues (front/back coverage)

include lateral and medial soft tissues (right/left coverage)

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 AX     | ax    | no      | 6          | 2        | top         |
| T2             | T2 FS AX  | ax    | yes     | 6          | 2        | top         |
| T1             | T1 COR    | cor   | no      | 6          | 1        | front       |
| T2             | T2 FS COR | cor   | yes     | 6          | 1        | front       |
| T1             | T1 SAG    | sag   | no      | 6          | 1        | lateral     |
| STIR           | STIR SAG  | sag   | no      | 6          | 1        | lateral     |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |         |
|----|----------------|-----|-----|---|---|---------|
| T1 | T1 FS POST AX  | ax  | yes | 6 | 2 | top     |
| T1 | T1 FS POST COR | cor | yes | 6 | 1 | front   |
| T1 | T1 FS POST SAG | sag | yes | 6 | 1 | lateral |

# MRI Bony Pelvis Routine

Updated 05/14/25

Reviewed 05/14/25

Use field-of-view (FOV) centered on the pelvis.

Go to [MRIMaster.com](http://MRIMaster.com) for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 COR    | cor   | no      | 5          | 1        | front       |
| STIR           | STIR COR  | cor   | no      | 5          | 1        | front       |
| T1             | T1 AX     | ax    | no      | 5          | 1        | top         |
| T2             | T2 FS AX  | ax    | yes     | 5          | 1        | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |       |
|----|----------------|-----|-----|---|---|-------|
| T1 | T1 FS POST COR | cor | yes | 5 | 1 | front |
| T1 | T1 FS POST AX  | ax  | yes | 5 | 1 | top   |

# **MRI Bony Pelvis Infection**

Updated 06/15/17

Reviewed 05/14/25

Use small field-of-view (FOV) centered on the area of interest.

Craniocaudal - iliac crests through lesser trochanters.

Anteroposterior - anterior to pubic symphysis through posterior to coccyx.

Right left - lateral trochanter to lateral trochanter.

Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 AX            | ax           | no             | 5                 | 1               | top                |
| T2                    | T2 FS AX         | ax           | yes            | 5                 | 1               | top                |
| T1                    | T1 COR           | cor          | no             | 5                 | 1               | front              |
| STIR                  | STIR COR         | cor          | no             | 5                 | 1               | front              |
| *T1                   | T1 SAG           | sag          | no             | 6                 | 1.5             | right              |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |       |
|----|----------------|-----|-----|---|---|-------|
| T1 | T1 FS POST AX  | ax  | yes | 5 | 1 | top   |
| T1 | T1 FS POST COR | cor | yes | 5 | 1 | front |

\*Add T1 sagittal sequence if the sacrum is the area of concern.

# **MRI Bony Pelvis Mass**

Updated 06/15/17

Reviewed 05/14/25

Use small field-of-view (FOV) centered on the area of interest with borders marked with skin capsule.

Angle imaging planes as per routine protocols.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 AX     | ax    | no      | 5          | 1        | top         |
| T1             | T1 FS AX  | ax    | yes     | 5          | 1        | top         |
| T2             | T2 AX     | ax    | no      | 5          | 1        | top         |
| T2             | T2 FS AX  | ax    | yes     | 5          | 1        | top         |
| T1             | T1 COR    | cor   | no      | 5          | 1        | front       |
| T2             | T2 FS COR | cor   | yes     | 6          | 1        | front       |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |       |
|----|----------------|-----|-----|---|---|-------|
| T1 | T1 FS POST AX  | ax  | yes | 5 | 1 | top   |
| T1 | T1 FS POST COR | cor | yes | 5 | 1 | front |

## **RECONS:**

axial subtractions

# MRI Sacrum

Updated 02/02/21

Reviewed 05/14/25

Use field-of-view (FOV) centered on the sacrum.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG    | sag   | no      | 5          | 1        | right       |
| T2             | T2 SAG    | sag   | no      | 5          | 1        | right       |
| STIR           | STIR SAG  | sag   | no      | 5          | 1        | right       |
| T1             | T1 AX     | ax    | no      | 5          | 1        | top         |
| T1             | T1 FS AX  | ax    | yes     | 5          | 1        | top         |
| T2             | T2 FS AX  | ax    | yes     | 5          | 1        | top         |
| T2             | T2 FS COR | cor   | yes     | 5          | 1        | front       |
| T1             | T1 COR    | cor   | no      | 5          | 1        | front       |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |       |
|----|----------------|-----|-----|---|---|-------|
| T1 | T1 FS POST AX  | ax  | yes | 5 | 1 | top   |
| T1 | T1 FS POST SAG | sag | yes | 5 | 1 | right |
| T1 | T1 FS POST COR | cor | yes | 5 | 1 | front |

## RECONS:

axial subtractions

# MRI SI Joints

Updated 07/16/17

Reviewed 05/14/25

Use field-of-view (FOV) centered on the sacrum & SI Joints.

Angle to the plane of the sacrum for the coronal sequences.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View |
|----------------|-----------|-------|---------|------------|----------|-------------|---------------|
| STIR           | STIR AX   | ax    | no      | 7          | 1        | top         | whole pelvis  |
| T1             | T1 COR    | cor   | no      | 7          | 1        | front       |               |
| T1             | T1 AX     | ax    | no      | 3          | 1.5      | top         | SI joints     |
| T2             | T2 FS AX  | ax    | yes     | 3          | 1.5      | top         |               |
| T1             | T1 COR    | cor   | no      | 3          | 0        | front       |               |
| T2             | T2 FS COR | cor   | yes     | 3          | 0        | front       |               |
| T1             | T1 SAG    | sag   | no      | 3          | 1        | right       |               |
| STIR           | STIR SAG  | sag   | no      | 3          | 1        | right       |               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |           |
|----|----------------|-----|-----|---|-----|-------|-----------|
| T1 | T1 FS POST AX  | ax  | yes | 3 | 1.5 | top   | SI joints |
| T1 | T1 FS POST COR | cor | yes | 3 | 0   | right |           |

# MRI Clavicle

Updated 05/13/19

Reviewed 05/14/25

Use field-of-view (FOV) and angulations as in the images below.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG    | sag   | no      | 3          | 1        | lateral     |
| STIR           | STIR SAG  | sag   | no      | 3          | 1        | lateral     |
| T1             | T1 AX     | ax    | no      | 4          | 1.5      | ax          |
| T1             | T1 FS AX  | ax    | yes     | 4          | 1.5      | ax          |
| T2             | T2 AX     | ax    | no      | 4          | 1.5      | ax          |
| T2             | T2 FS AX  | ax    | yes     | 4          | 1.5      | ax          |

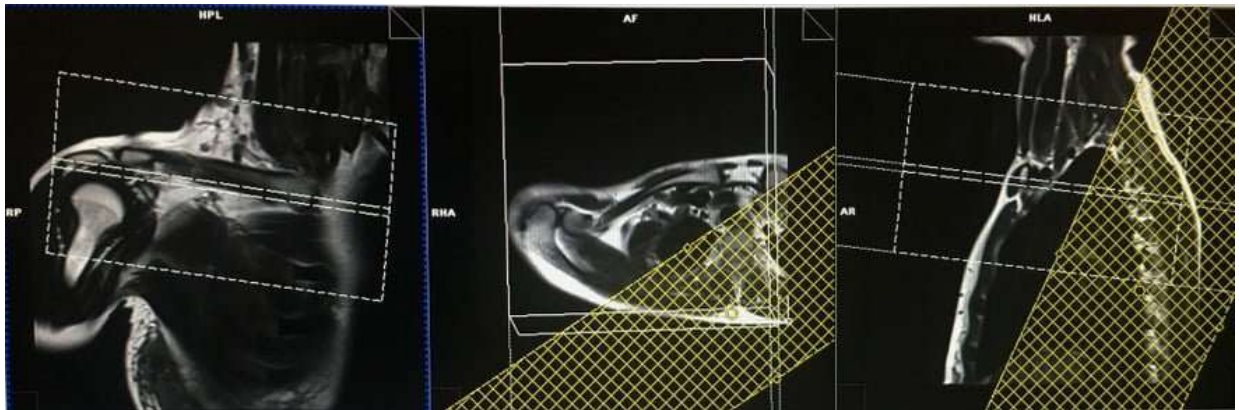
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |         |
|----|----------------|-----|-----|---|-----|---------|
| T1 | T1 FS POST AX  | ax  | yes | 4 | 1.5 | top     |
| T1 | T1 FS POST COR | cor | yes | 3 | 1   | front   |
| T1 | T1 FS POST SAG | sag | yes | 3 | 0.8 | lateral |

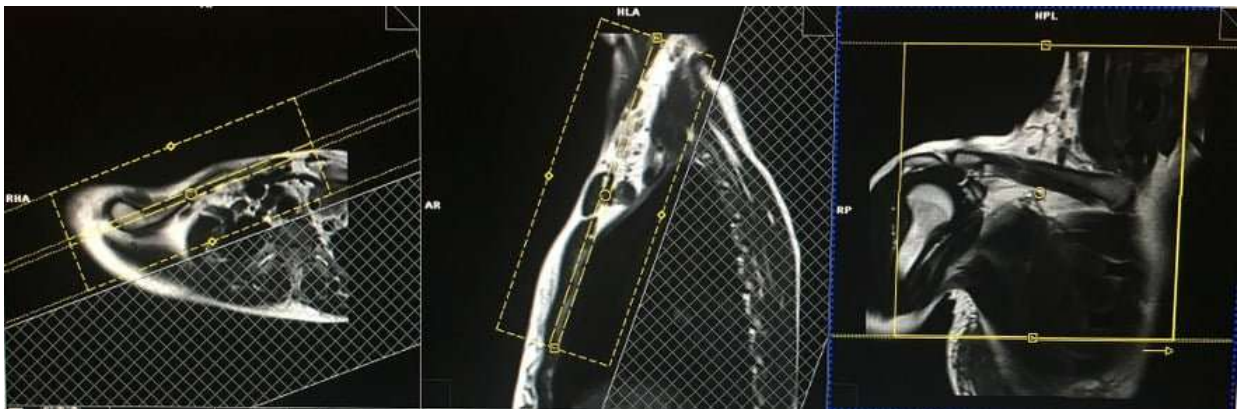
## RECON:

axial subtractions

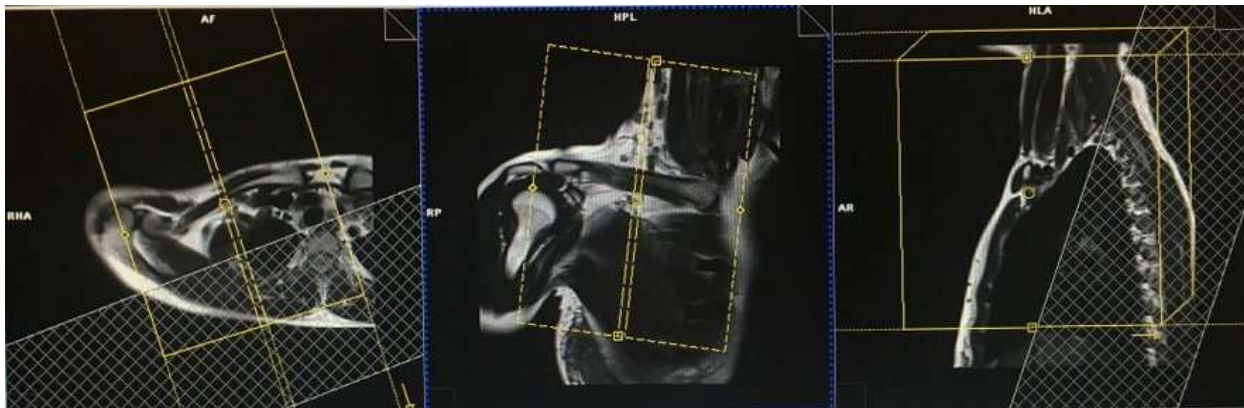
# MRI Clavicle



axial FOV and angulation (parallel to the clavicle in the coronal plane)



coronal FOV and angulation (parallel to the clavicle in the axial plane)



sagittal FOV and angulation (perpendicular to the clavicle in the axial plane)

# **MRI Sternum**

Updated 06/15/17

Reviewed 05/14/25

Image prone if possible to decrease respiratory motion.

Use field-of-view (FOV) and angulations as in the images below.

Go to [MRIMaster.com](http://MRIMaster.com) for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 AX            | ax           | no             | 6                 | 1               | top                |
| T2                    | T2 AX            | ax           | no             | 6                 | 1               | top                |
| STIR                  | STIR AX          | ax           | no             | 6                 | 1               | top                |
| T1                    | T1 COR           | cor          | no             | 2                 | 0.5             | front              |
| STIR                  | STIR COR         | cor          | no             | 2                 | 0.5             | front              |
| T1                    | T1 FS SAG        | sag          | yes            | 4                 | 1               | right              |

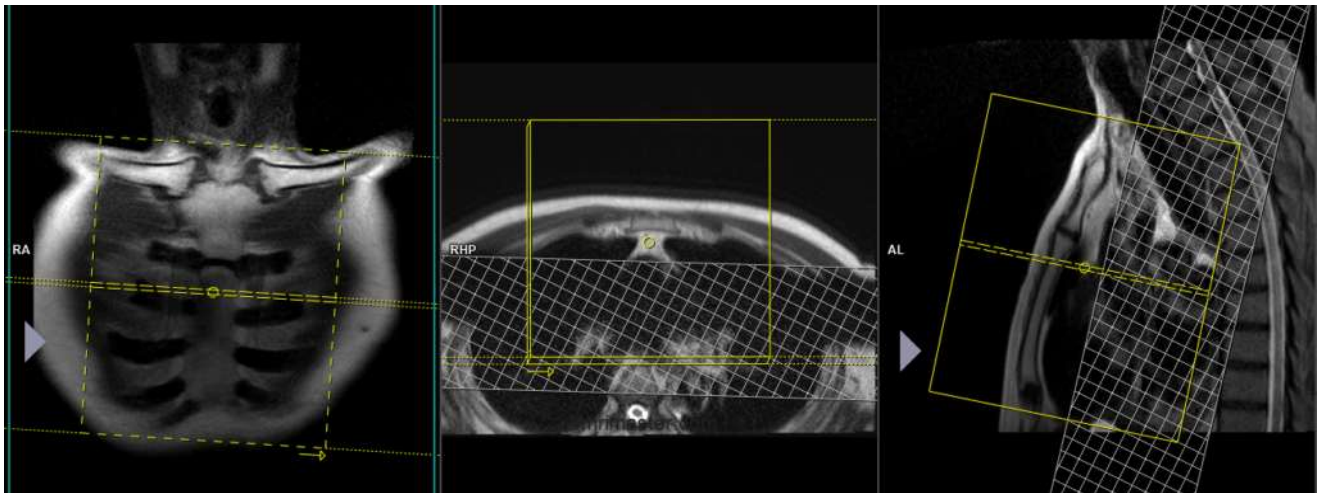
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |   |       |
|----|----------------|-----|-----|---|---|-------|
| T1 | T1 FS POST AX  | ax  | yes | 6 | 1 | top   |
| T1 | T1 FS POST SAG | sag | yes | 4 | 1 | right |

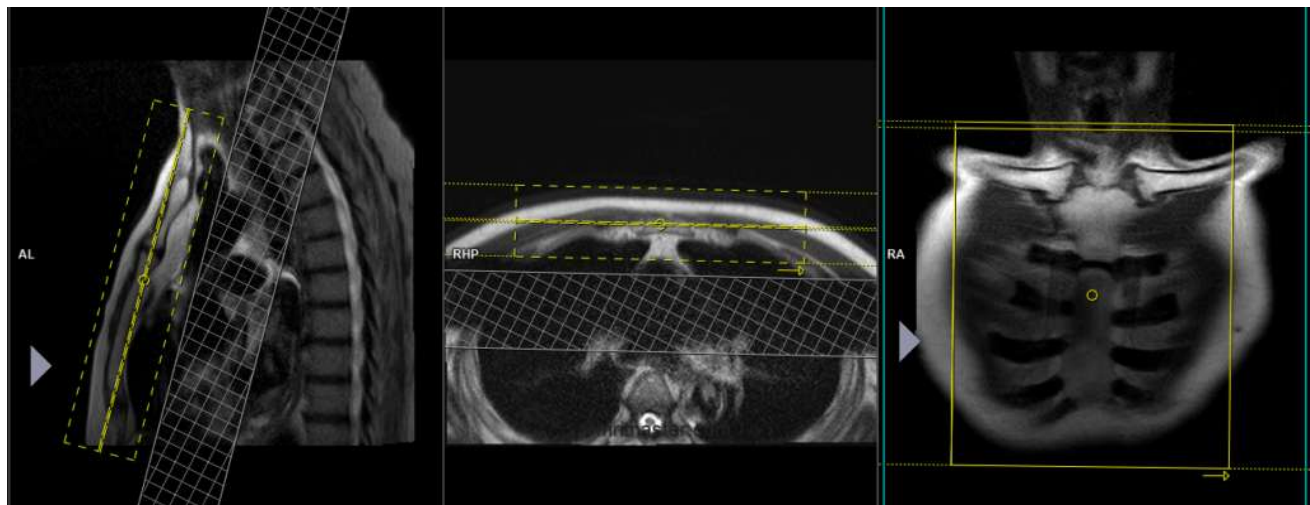
## **RECON:**

sagittal subtractions

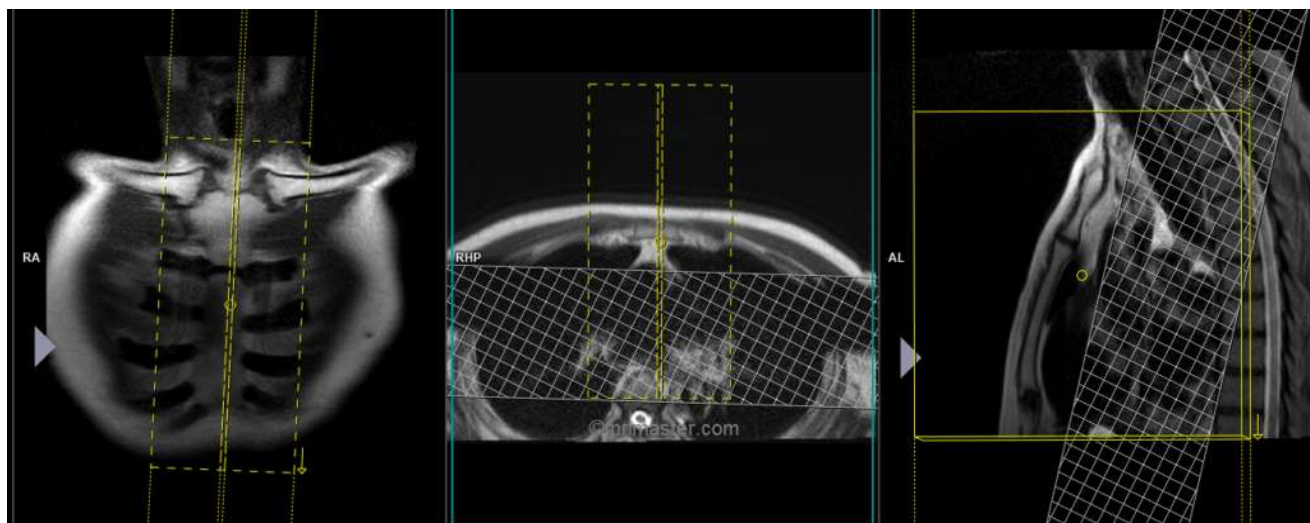
# MRI Sternum



axial FOV and angulation (perpendicular to the sternum in the sagittal plane)



coronal FOV and angulation (parallel to the sternum in the sagittal plane)



sagittal FOV and angulation (parallel to the sternum in the coronal plane)

# MRI Sternoclavicular Joints

Updated 07/30/23

Reviewed 05/14/25

Use field-of-view (FOV) and angulations as in the images below.

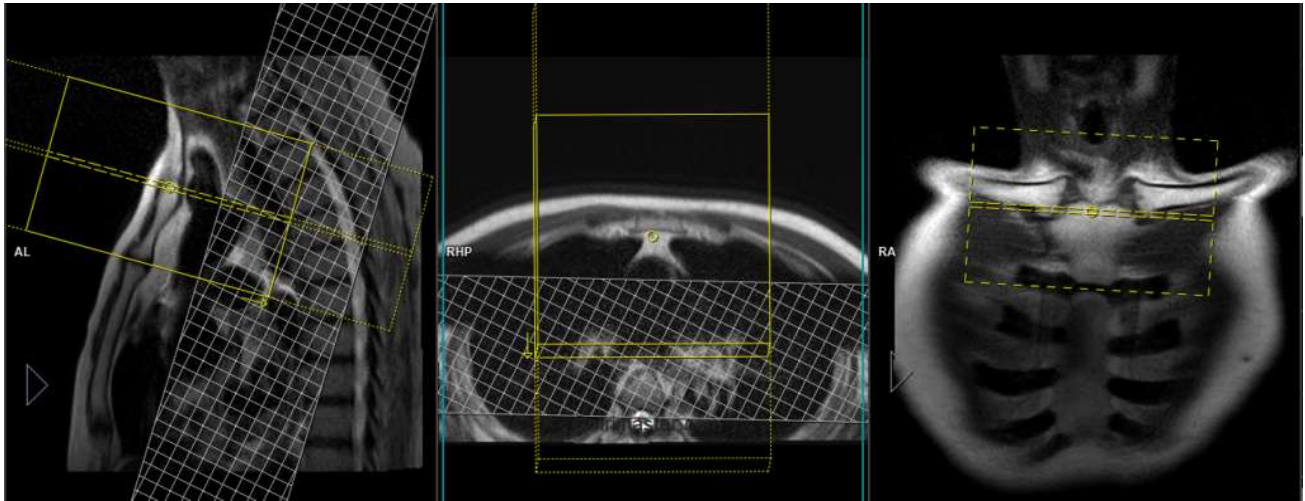
Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 SAG    | sag   | no      | 3          | 1        | right       |
| STIR           | STIR SAG  | sag   | no      | 3          | 1        | right       |
| T1             | T1 COR    | cor   | no      | 3          | 0.8      | front       |
| T2             | T2 FS COR | cor   | yes     | 3          | 0.8      | front       |
| T1             | T1 AX     | ax    | no      | 4          | 1.5      | top         |
| T2             | T2 FS AX  | ax    | yes     | 4          | 1.5      | top         |

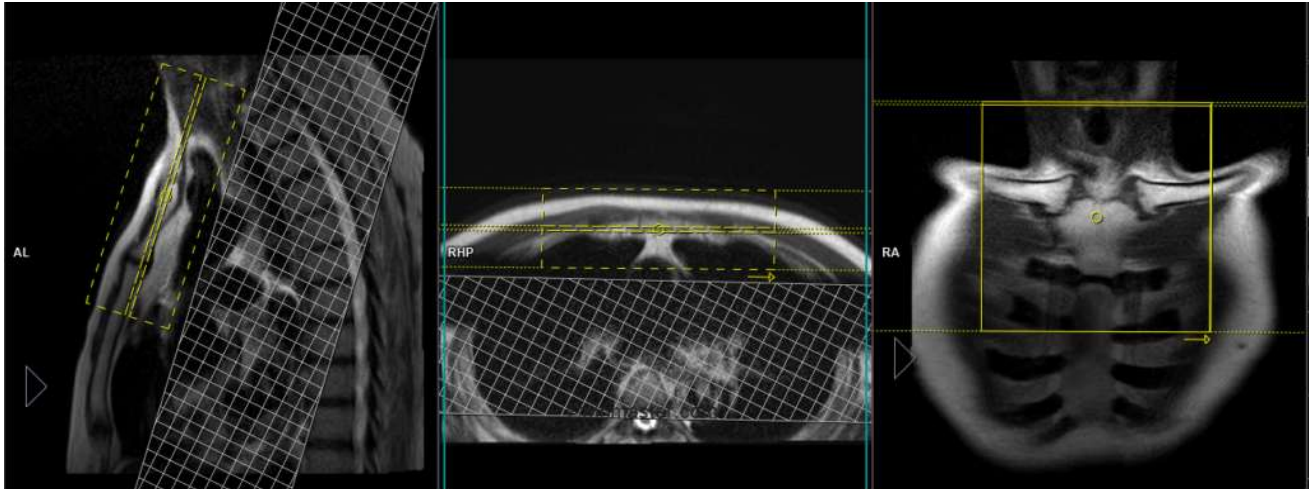
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST AX  | ax  | yes | 4 | 1.5 | top   |
| T1 | T1 FS POST COR | cor | yes | 3 | 1   | front |
| T1 | T1 FS POST SAG | sag | yes | 3 | 0.8 | right |

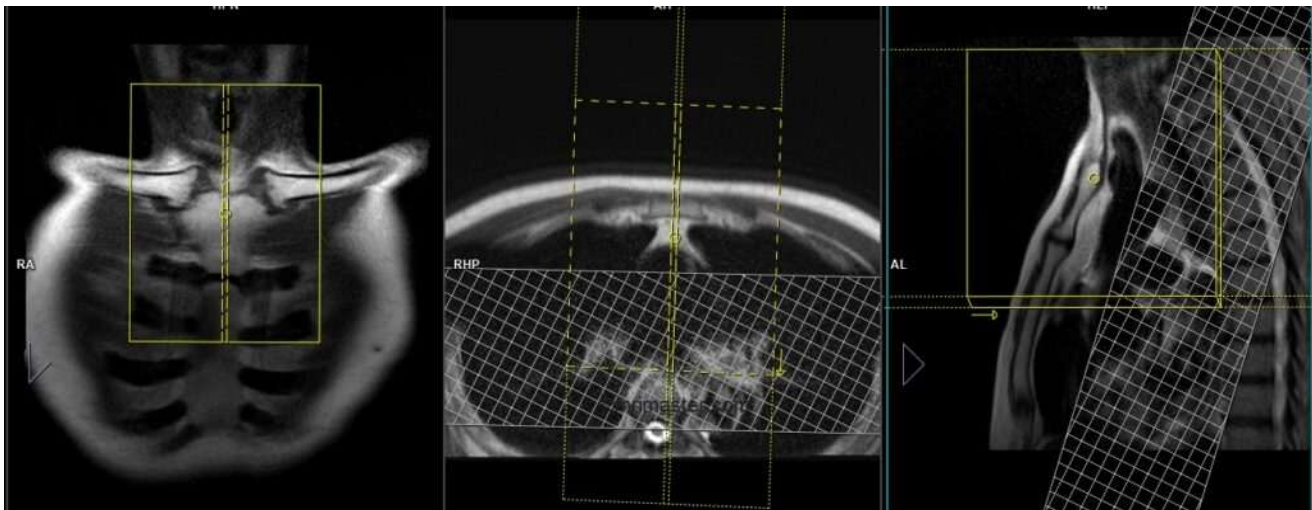
# MRI Sternoclavicular Joints



axial FOV and angulation (perpendicular to the manubrium in the sagittal plane)



coronal FOV and angulation (parallel to the manubrium in the sagittal plane)



sagittal FOV and angulation (parallel to the manubrium in the coronal plane)

# **MRI Pectoralis**

Updated 05/28/18

Reviewed 05/14/25

Use field-of-view (FOV) and angulations as in the images below.

Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 SAG           | sag          | no             | 3                 | 1               | lateral            |
| T1                    | T1 FS SAG        | sag          | yes            | 3                 | 1               | lateral            |
| STIR                  | STIR SAG         | sag          | no             | 3                 | 1               | lateral            |
| T1                    | T1 COR           | cor          | no             | 3                 | 0.8             | front              |
| T2                    | T2 FS COR        | cor          | yes            | 3                 | 0.8             | front              |
| T1                    | T1 AX            | ax           | no             | 4                 | 1.5             | top                |
| T2                    | T2 FS AX         | ax           | yes            | 4                 | 1.5             | top                |

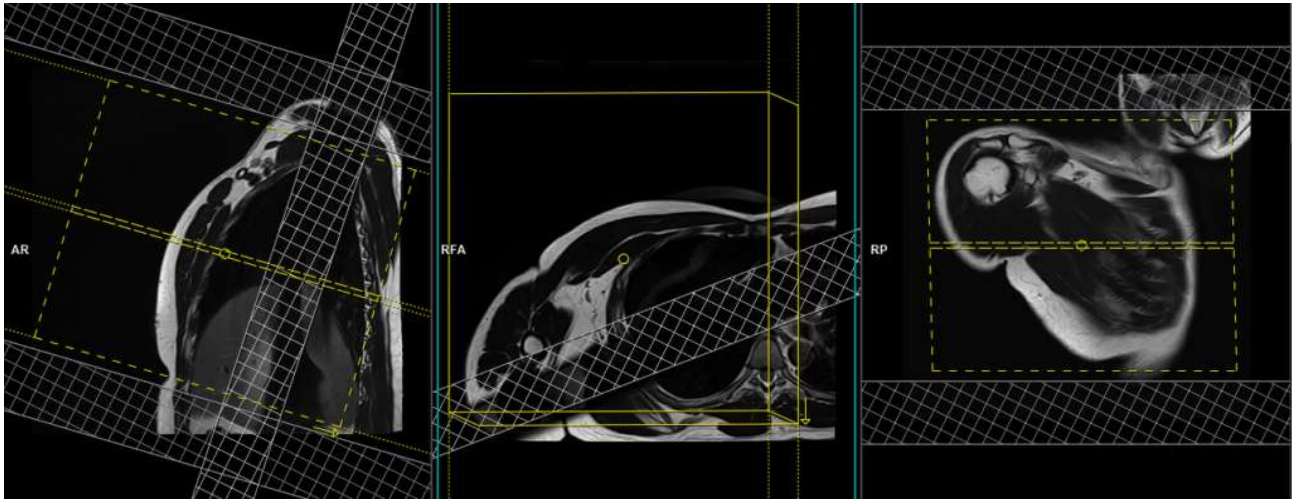
**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |         |
|----|----------------|-----|-----|---|-----|---------|
| T1 | T1 FS POST AX  | ax  | yes | 4 | 1.5 | top     |
| T1 | T1 FS POST SAG | sag | yes | 3 | 1   | lateral |
| T1 | T1 FS POST COR | cor | yes | 3 | 0.8 | front   |

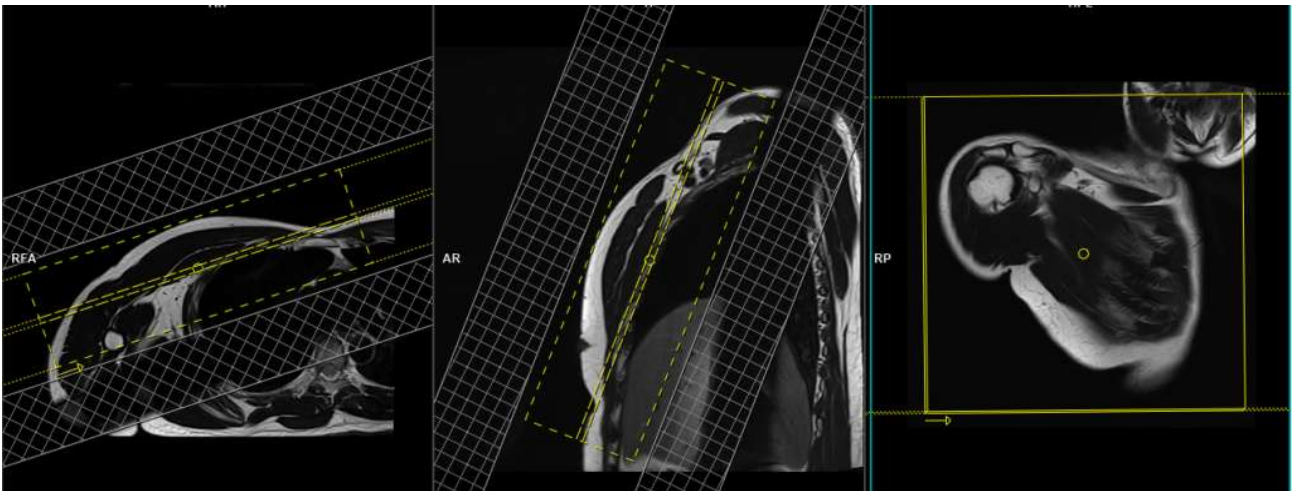
## **RECON:**

sagittal subtractions

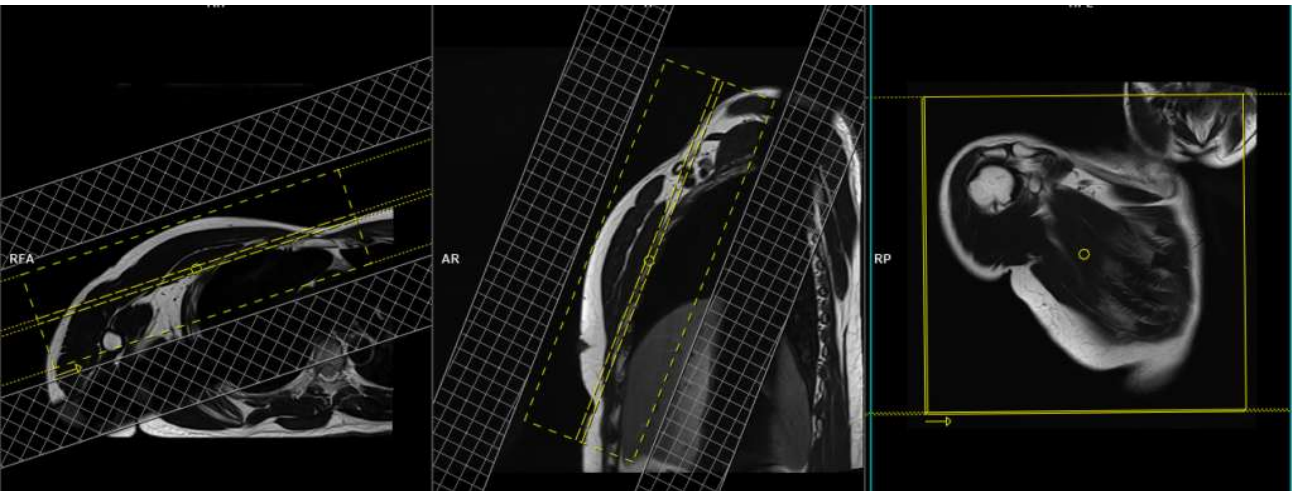
# MRI Pectoralis



axial FOV and angulation (horizontally across the pectoralis muscle in the coronal plane)



coronal FOV and angulation (parallel to the pectoralis muscle in the axial plane)



sagittal FOV and angulation (perpendicular to the pectoralis muscle in the axial plane)

# **MRI MSK Infection/Osteomyelitis**

Updated 07/20/20

Reviewed 05/14/25

Use small field-of-view (FOV) centered on the area of interest.

Angle imaging planes as per routine protocols.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------|-------|---------|------------|----------|-------------|
| T1             | T1 AX     | ax    | no      | 5          | 1.5      | top         |
| STIR           | STIR AX   | ax    | no      | 5          | 1.5      | top         |
| T1             | T1 COR    | cor   | no      | 4          | 1        | front       |
| T2             | T2 FS COR | cor   | yes     | 4          | 1        | front       |
| T1             | T1 SAG    | sag   | no      | 4          | 1        | lateral     |
| T2             | T2 FS SAG | sag   | yes     | 4          | 1        | lateral     |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                |     |     |   |     |       |
|----|----------------|-----|-----|---|-----|-------|
| T1 | T1 FS POST AX  | ax  | yes | 5 | 1.5 | top   |
| T1 | T1 FS POST COR | cor | yes | 4 | 1   | front |
| T1 | T1 FS POST SAG | sag | yes | 4 | 1   | sag   |

# **MRI MSK Mass/Tumor**

Updated 03/22/25

Reviewed 05/14/25

This protocols is for use with both osseous/bone and soft tissue masses/tumors.

Use small field-of-view (FOV) centered on the area of interest with borders marked with skin capsule.

Angle imaging planes as per routine protocols.

Go to MRIMaster.com for a guide of proper positioning.

| <b>Pulse Sequence</b> | <b>PACS Name</b>     | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|----------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T1                    | T1 AX                | ax           | no             | 5                 | 1               | top                |
| T1                    | T1 FS AX             | ax           | yes            | 5                 | 1               | top                |
| T2                    | T2 AX                | ax           | no             | 5                 | 1               | top                |
| T2                    | T2 FS AX             | ax           | yes            | 5                 | 1               | top                |
| T1                    | *T1 PRE BEST LONG    | vary         | no             | 5                 | 1               | vary               |
| T2                    | *T2 FS PRE BEST LONG | vary         | yes            | 5                 | 1               | vary               |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|    |                       |      |     |   |   |      |
|----|-----------------------|------|-----|---|---|------|
| T1 | *T1 FS POST BEST LONG | vary | yes | 5 | 1 | vary |
| T1 | T1 FS POST AX         | ax   | yes | 5 | 1 | top  |

\* The best long axis plane is either coronal or sagittal depending on the location of the tumor:

Do sagittal plane if the tumor is in the anterior or posterior soft tissues relative to the bones.

Do coronal plane if the tumor is in the lateral or medial soft tissues relative to the bones.

Ask a MSK radiologist if you are unsure which plane to use.

## **RECON:**

best long and axial subtractions

# **MRI Lesion Detection**

Updated 02/17/20

Reviewed 05/14/25

Indications: newly diagnosed breast cancer, follow-up after neoadjuvant therapy, post lumpectomy with positive margins,  
high-risk & intermediate-risk patients, metastatic cancer of probable breast origin, inconclusive diagnostic evaluation.

Patient is scanned in the prone position to decrease respiratory motion artifact.

Rotate images to anatomic position prior to sending images to PACS.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|
| T2                    | T2 AX BILAT      | ax           | no             | 4                 | 1               | top                |
| STIR                  | STIR AX BILAT    | ax           | no             | 4                 | 1               | top                |
| 3D T1                 | T1 FS PRE RIGHT  | sag          | yes            | 2                 | none            | right              |
| 3D T1                 | T1 FS PRE LEFT   | sag          | yes            | 2                 | none            | right              |
| T1                    | T1 FS DYN        | ax           | yes            | 1.6               | none            | top                |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|       |                  |     |     |     |      |       |
|-------|------------------|-----|-----|-----|------|-------|
| 3D T1 | T1 FS DYN        | ax  | yes | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | 1.6 | none | top   |
| 3D T1 | T1 FS POST RIGHT | sag | yes | 2   | none | right |
| 3D T1 | T1 FS POST LEFT  | sag | yes | 2   | none | right |

## **RECONS:**

axial subtraction of the 1st dynamic post contrast sequence

sagittal subtractions of right and left breast

horizontal & vertical MIP spinners the 1st dynamic post contrast sequence

# MRI Implant Integrity

Updated  
11/18/2023

Indications: implant rupture, implant deformity, assess implant deformity.

Patient is scanned in the prone position to decrease respiratory motion artifact.

Rotate images to anatomic position prior to sending images to PACS.

IV contrast is not given for this protocol.

| Pulse Sequence | PACS Name     | plane | fat sat | slice (mm) | first slice |
|----------------|---------------|-------|---------|------------|-------------|
| STIR           | STIR AX BILAT | ax    | no      | 4          | top         |
| T1             | T1 AX BILAT   | ax    | no      | 5          | top         |
| STIR           | STIR RIGHT    | sag   | no      | 4          | right       |
| T1             | T1 RIGHT      | sag   | no      | 5          | right       |
| STIR           | STIR LEFT     | sag   | no      | 4          | right       |
| T1             | T1 LEFT       | sag   | no      | 5          | right       |

# MRI Implant Integrity

Updated 03/03/25  
Reviewed 05/14/25

Indications: implant rupture, implant deformity, assess implant deformity.

Patient is scanned in the prone position to decrease respiratory motion artifact.

Rotate images to anatomic position prior to sending images to PACS.

IV contrast is not given for this protocol.

| Pulse Sequence | PACS Name          | plane | fat sat | water sat | slice (mm) | gap (mm) | first slice |
|----------------|--------------------|-------|---------|-----------|------------|----------|-------------|
| T1             | T1 AX BILAT        | ax    | no      | NA        | 4          | 1        | top         |
| T2             | T2 AX BILAT        | ax    | no      | NA        | 4          | 1        | top         |
| STIR           | STIR AX BILAT      | ax    | no      | no        | 4          | 1        | top         |
| STIR           | AX SILICONE        | ax    | no      | yes       | 4          | 1        | top         |
| STIR           | SAG RIGHT SILICONE | sag   | no      | yes       | 4          | 1        | right       |
| STIR           | SAG LEFT SILICONE  | sag   | no      | yes       | 4          | 1        | right       |

# MRI Breast Combo

Updated 05/04/25

Reviewed 05/14/25

Indications: combined lesion detection & implant integrity protocols.

Patient is scanned in the prone position to decrease respiratory motion artifact.

Rotate images to anatomic position prior to sending images to PACS.

| Pulse Sequence | PACS Name          | plane | fat sat | water sat | slice (mm) | gap (mm) | first slice |
|----------------|--------------------|-------|---------|-----------|------------|----------|-------------|
| T1             | T1 AX BILAT        | ax    | no      | NA        | 4          | 1        | top         |
| T2             | T2 AX BILAT        | ax    | no      | NA        | 4          | 1        | top         |
| STIR           | STIR AX BILAT      | ax    | no      | no        | 4          | 1        | top         |
| STIR           | AX SILICONE        | ax    | no      | yes       | 4          | 1        | top         |
| STIR           | SAG RIGHT SILICONE | sag   | no      | yes       | 4          | 1        | right       |
| STIR           | SAG LEFT SILICONE  | sag   | no      | yes       | 4          | 1        | right       |
| 3D T1          | T1 FS PRE RIGHT    | sag   | yes     | NA        | 2          | none     | right       |
| 3D T1          | T1 FS PRE LEFT     | sag   | yes     | NA        | 2          | none     | right       |
| T1             | T1 FS DYN          | ax    | yes     | NA        | 1.6        | none     | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|       |                  |     |     |    |     |      |       |
|-------|------------------|-----|-----|----|-----|------|-------|
| 3D T1 | T1 FS DYN        | ax  | yes | NA | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | NA | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | NA | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | NA | 1.6 | none | top   |
| 3D T1 | T1 FS DYN        | ax  | yes | NA | 1.6 | none | top   |
| 3D T1 | T1 FS POST RIGHT | sag | yes | NA | 2   | none | right |
| 3D T1 | T1 FS POST LEFT  | sag | yes | NA | 2   | none | right |

## RECONS:

axial subtraction of the 1st dynamic post contrast sequence

sagittal subtractions of right and left breast

horizontal & vertical MIP spinners the 1st dynamic post contrast sequence

# **MRI Breast Biopsy**

Updated 05/09/25

Reviewed 05/14/25

Patient is scanned in the prone position to decrease respiratory motion artifact.

Use MRI Breast Core Biopsy Right and Breast Core Biopsy Left charges.

Rotate images to anatomic position prior to sending images to PACS.

| Pulse Sequence | PACS Name       | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|-----------------|-------|---------|------------|----------|-------------|
| 3D T1          | T1 FS PRE RIGHT | sag   | yes     | 2          | none     | right       |
| 3D T1          | T1 FS PRE LEFT  | sag   | yes     | 2          | none     | right       |
| T1             | T1 FS PRE AX    | ax    | yes     | 1.6        | none     | top         |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|       |                 |    |     |     |      |     |
|-------|-----------------|----|-----|-----|------|-----|
| 3D T1 | T1 FS 1 MIN AX  | ax | yes | 1.6 | none | top |
| 3D T1 | T1 FS 2 MINS AX | ax | yes | 1.6 | none | top |

Send axial subtractions of both post contrast sequences to PACS.

Target the lesion to biopsy.

Place needle guide and obturator.

|       |                 |    |     |     |      |     |
|-------|-----------------|----|-----|-----|------|-----|
| 3D T1 | T1 FS OBTURATOR | ax | yes | 1.6 | none | top |
|-------|-----------------|----|-----|-----|------|-----|

Perform biopsy and place biopsy clip.

|       |            |    |     |     |      |     |
|-------|------------|----|-----|-----|------|-----|
| 3D T1 | T1 FS CLIP | ax | yes | 1.6 | none | top |
|-------|------------|----|-----|-----|------|-----|

To mammography for post clip placement imaging.

# MRA Chest

Updated 11/04/23

Reviewed 05/14/25

Indications: aortic aneurysm/dissection and pulmonary embolus.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|---------------|-------|---------|------------|----------|-------------|
| T2 HASTE/SSFSE | T2 AX         | ax    | no      | 5          | 1        | top         |
| T2 HASTE/SSFSE | T2 FS AX      | ax    | yes     | 5          | 1        | top         |
| True FISP      | TRUE FISP COR | cor   | no      | 5          | 1        | front       |
| T1 VIBE/LAVA   | T1 FS PRE AX  | ax    | yes     | 3.5        | 0.6      | top         |
| 3D FLASH T1    | 3D T1 PRE SAG | sag   | no      | 1.35       | 0.27     | right       |
| 3D FLASH T1    | 3D T1 PRE COR | cor   | no      | 1.35       | 0.27     | front       |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the angio phase bolus track and trigger when contrast reaches the ascending aorta.

|               |                 |     |     |      |      |       |
|---------------|-----------------|-----|-----|------|------|-------|
| 3D FLASH T1   | 3D T1 ANGIO SAG | sag | no  | 1.35 | 0.27 | right |
| 3D FLASH T1   | 3D T1 ANGIO COR | cor | no  | 1.35 | 0.27 | front |
| *T1 VIBE/LAVA | T1 FS POST AX   | ax  | yes | 3.5  | 0.6  | top   |
| *T1 VIBE/LAVA | T1 FS POST SAG  | sag | yes | 3.5  | 0.6  | right |
| *T1 VIBE/LAVA | T1 FS POST COR  | cor | yes | 3.5  | 0.6  | front |

\*The post T1 VIBE/LAVA sequences are begun just after the 3D angio sequences finish scanning.

## **RECONS:**

sagittal subtractions of the angio sequence

axial and coronal MPRs of the subtracted sagittal angio sequence (3 mm thick no gap)

horizontal MIP spinners of the subtracted sagittal angio sequence

axial subtractions of the T1 VIBE/LAVA sequence

# MRA Renal

Updated 11/04/23

Reviewed 05/14/25

Indications: renal artery stenosis and hypertension.

FOV for the T2 HASTE/SSFSE and T1 VIBE/LAVA sequences is normal abdomen FOV.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence        | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|-----------------------|---------------|-------|---------|------------|----------|-------------|
| T2 HASTE/SSFSE        | T2 COR        | cor   | no      | 7          | 1.4      | front       |
| T2 HASTE/SSFSE        | T2 AX         | ax    | no      | 7          | 1.4      | top         |
| T2 HASTE/SSFSE        | T2 FS AX      | ax    | yes     | 7          | 1.4      | top         |
| In/Out Phase w/ DIXON | IN/OUT AX     | ax    | no      | 5          | 1        | top         |
| T1 VIBE/LAVA          | T1 FS AX      | ax    | yes     | 3.5        | 0.6      | top         |
| 3D FLASH T1           | 3D T1 PRE COR | cor   | no      | 1.35       | 0.27     | front       |
| 3D FLASH T1           | 3D T1 PRE SAG | sag   | no      | 1.35       | 0.27     | right       |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the angio phase bolus track and trigger when contrast reaches the renal arteries.

|               |                 |     |     |      |      |       |
|---------------|-----------------|-----|-----|------|------|-------|
| 3D FLASH T1   | 3D T1 ANGIO COR | cor | no  | 1.35 | 0.27 | front |
| 3D FLASH T1   | 3D T1 ANGIO SAG | sag | no  | 1.35 | 0.27 | right |
| *T1 VIBE/LAVA | T1 FS POST AX   | ax  | yes | 3.5  | 0.6  | top   |
| *T1 VIBE/LAVA | T1 FS POST COR  | cor | yes | 3.5  | 0.6  | front |

\*The post T1 VIBE/LAVA sequences are begun just after the 3D angio sequences finish scanning.

## **RECONS:**

coronal subtractions of the angio sequence

axial and sagittal MPRs of the subtracted coronal angio sequence (3 mm thick no gap)

vertical MIP spinners of the subtracted coronal angio sequence

axial subtractions of the T1 VIBE/LAVA

# MRA Mesenteric/Portal

Updated 11/04/23

Reviewed 05/14/25

Indications: mesenteric ischemia, mesenteric artery stenosis and portal vein thrombosis.

FOV for the T2 HASTE/SSFSE and T1 VIBE/LAVA sequences is normal abdomen FOV.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|---------------|-------|---------|------------|----------|-------------|
| T2 HASTE/SSFSE | T2 COR        | cor   | no      | 7          | 1.4      | front       |
| T2 HASTE/SSFSE | T2 AX         | ax    | no      | 7          | 1.4      | top         |
| T2 HASTE/SSFSE | T2 FS AX      | ax    | yes     | 7          | 1.4      | top         |
| T1 VIBE/LAVA   | T1 FS AX      | ax    | yes     | 3.5        | 0.6      | top         |
| 3D FLASH T1    | 3D T1 PRE SAG | sag   | no      | 1.35       | 0.27     | right       |
| 3D FLASH T1    | 3D T1 PRE COR | cor   | no      | 1.35       | 0.27     | front       |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the angio phase bolus track and trigger when contrast reaches the renal arteries.

|               |                 |     |     |      |      |       |
|---------------|-----------------|-----|-----|------|------|-------|
| 3D FLASH T1   | 3D T1 ANGIO SAG | sag | no  | 1.35 | 0.27 | right |
| 3D FLASH T1   | 3D T1 ANGIO COR | cor | no  | 1.35 | 0.27 | front |
| *T1 VIBE/LAVA | T1 FS POST AX   | ax  | yes | 3.5  | 0.6  | top   |
| *T1 VIBE/LAVA | T1 FS POST COR  | cor | yes | 3.5  | 0.6  | front |

\*The post T1 VIBE/LAVA sequences are begun just after the 3D angio sequences finish scanning.

## **RECONS:**

sagittal subtractions of the angio sequence

axial and coronal MPRs of the subtracted sagittal angio sequence (3 mm thick no gap)

horizontal and vertical MIP spinners of the subtracted sagittal angio sequence

axial subtractions of the T1 VIBE/LAVA

# MRA Pelvis

Updated 11/04/23

Reviewed 05/14/25

Indications: pre surgical uterine artery embolization for fibroids and pelvic renal transplant.

FOV for the T2 HASTE/SSFSE and T1 VIBE/LAVA sequences is normal pelvis FOV.

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name     | plane | fat sat | slice (mm) | gap (mm) | first slice |
|----------------|---------------|-------|---------|------------|----------|-------------|
| T2 HASTE/SSFSE | T2 COR        | cor   | no      | 7          | 1.4      | front       |
| T2 TSE         | T2 SAG        | sag   | no      | 5          | 1        | right       |
| T2 TSE         | T2 AX         | ax    | no      | 5          | 1        | top         |
| T2 HASTE/SSFSE | T2 FS AX      | ax    | yes     | 7          | 1.4      | top         |
| T1 VIBE/LAVA   | T1 FS SAG     | sag   | yes     | 3.5        | 0.6      | right       |
| T1 VIBE/LAVA   | T1 FS AX      | ax    | yes     | 3.5        | 0.6      | top         |
| 3D FLASH T1    | 3D T1 PRE COR | cor   | no      | 1.35       | 0.27     | front       |

If ordered for a renal transplant, have a **body Radiologist check** before contrast to see if any additional sequences are needed.

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the angio phase bolus track and trigger when contrast reaches the aortic bifurcation.

|                            |                 |     |     |      |      |       |
|----------------------------|-----------------|-----|-----|------|------|-------|
| 3D FLASH T1                | 3D T1 ANGIO COR | cor | no  | 1.35 | 0.27 | front |
| *T1 VIBE/LAVA              | T1 FS POST AX   | ax  | yes | 3.5  | 0.6  | top   |
| *T1 VIBE/LAVA              | T1 FS POST SAG  | sag | yes | 3.5  | 0.6  | right |
| *T1 VIBE/LAVA              | T1 FS POST COR  | cor | yes | 3.5  | 0.6  | front |
| Diffusion (b50, b800, ADC) | DIFFUSION AX    | ax  | yes | 6    | 1    | top   |
| T1 VIBE/LAVA               | T1 FS DELAY AX  | ax  | yes | 3.5  | 0.6  | top   |

\*The post T1 VIBE/LAVA sequences are begun just after the 3D angio sequences finish scanning.

## **RECONS:**

coronal subtractions of the angio sequence

axial and sagittal MPRs of the subtracted coronal angio sequence (3 mm thick no gap)

horizontal and vertical MIP spinners of the subtracted coronal angio sequence

axial and sagittal subtractions of the T1 VIBE/LAVA

# MRA Runoff (Iliofemoral)

Updated 11/18/23

Reviewed 05/14/25

Go to MRIMaster.com for a guide of proper positioning.

| Pulse Sequence | PACS Name   | plane | fat sat | slice (mm) | gap (mm) | first slice | Field of View  |
|----------------|-------------|-------|---------|------------|----------|-------------|----------------|
| 3D FLASH T1    | LOWER PRE   | cor   | no      | 1.5        | 0.3      | front       | lower legs     |
| 3D FLASH T1    | THIGHS PRE  | cor   | no      | 1.5        | 0.3      | front       | thighs         |
| 3D FLASH T1    | ABD/PEL PRE | cor   | no      | 1.5        | 0.3      | front       | abdomen/pelvis |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

For the angio phase bolus track and trigger when contrast reaches the renal arteries.

|             |              |     |    |     |     |       |                |
|-------------|--------------|-----|----|-----|-----|-------|----------------|
| 3D FLASH T1 | ABD/PEL POST | cor | no | 1.5 | 0.3 | front | abdomen/pelvis |
| 3D FLASH T1 | THIGHS POST  | cor | no | 1.5 | 0.3 | front | thighs         |
| 3D FLASH T1 | LOWER POST 1 | cor | no | 1.5 | 0.3 | front | lower legs     |
| 3D FLASH T1 | LOWER POST 2 | cor | no | 1.5 | 0.3 | front | lower legs     |
| 3D FLASH T1 | LOWER POST 3 | cor | no | 1.5 | 0.3 | front | lower legs     |

## RECONS:

### abdomen/pelvis

coronal subtractions of the angio sequence

axial MPRs of the subtracted coronal angio sequence (3 mm thick no gap)

horizontal MIP spinners of the subtracted coronal angio sequence

### thighs

coronal subtractions of the angio sequence

axial MPRs of the subtracted coronal angio sequence (3 mm thick no gap)

horizontal MIP spinners of the subtracted coronal angio sequence

### lower legs

coronal subtractions of the 1st angio sequence

axial MPRs of the subtracted coronal 1st angio sequence (3 mm thick no gap)

horizontal MIP spinners of the subtracted coronal 1st angio sequence

# **MRI Extremity Lymphangiogram**

Updated 06/07/18

Reviewed 05/14/25

Bill as MRI Extremity w/ + w/o Contrast and MRA Extremity w/ + w/o Contrast.

Place hand of arm to be imaged on IV board palm up. Place IV in opposite arm.

Use body coil. Need to image from wrist to shoulder. May need to break up sequences into two sets (shoulder/arm and forearm/wrist). If in two sets, overlap some at elbow and name sequences upper and lower.

The arm being imaged needs to remain stationary as subtractions may be needed.

After the tech has positioned patient on scanner, he/she will Chloroprep and lather viscous lidocaine around the web spaces of the hand of the arm to be imaged.

Supplies needed for hand injection – 1 pair sterile gloves, 1 pack sterile blue towels, 1 pack 4x4s,

4 1 mL tuberculin syringes w/ needles attached, 1 3 way stopcock, 1 12 mL syringe, 1 3.5 cm 18 g needle,

2 Chloropreps, 30 mL Clariscan, 1 bottle/ampule 1% lidocaine, 1 bottle 0.5% bupivacaine and

1 bottle viscous lidocaine.

| <b>Pulse Sequence</b> | <b>PACS Name</b> | <b>plane</b> | <b>fat sat</b> | <b>slice (mm)</b> | <b>gap (mm)</b> | <b>first slice</b> | <b>Field of View</b> |
|-----------------------|------------------|--------------|----------------|-------------------|-----------------|--------------------|----------------------|
| T2 TSE                | T2 FS AX UPPER   | ax           | yes            | 4                 | 0.5             | top                | upper arm            |
| T2 TSE                | T2 FS AX LOWER   | ax           | yes            | 4                 | 0.5             | top                | lower arm            |
| T1 VIBE/LAVA          | T1 FS AX UPPER   | ax           | yes            | 3                 | 0               | top                | upper arm            |
| T1 VIBE/LAVA          | T1 FS AX LOWER   | ax           | yes            | 3                 | 0               | top                | lower arm            |

Inject 1 mL of contrast mix into each of the 4 web spaces of the hand using tuberculin syringes. Inject over a few seconds.

Mixture is 10 mL contrast, 1 mL 1% lidocaine and 1 mL 0.5% bupivacaine. Inject into web spaces without worrying about making a wheal like with breast lymphoscintigraphy.

|              |                    |    |     |   |   |     |           |
|--------------|--------------------|----|-----|---|---|-----|-----------|
| T1 VIBE/LAVA | T1 FS 5 MIN LOWER  | ax | yes | 3 | 0 | top | lower arm |
| T1 VIBE/LAVA | T1 FS 5 MIN UPPER  | ax | yes | 3 | 0 | top | upper arm |
| T1 VIBE/LAVA | T1 FS 10 MIN LOWER | ax | yes | 3 | 0 | top | lower arm |
| T1 VIBE/LAVA | T1 FS 10 MIN UPPER | ax | yes | 3 | 0 | top | upper arm |
| T1 VIBE/LAVA | T1 FS 15 MIN LOWER | ax | yes | 3 | 0 | top | lower arm |
| T1 VIBE/LAVA | T1 FS 15 MIN UPPER | ax | yes | 3 | 0 | top | upper arm |
| T1 VIBE/LAVA | T1 FS 20 MIN LOWER | ax | yes | 3 | 0 | top | lower arm |
| T1 VIBE/LAVA | T1 FS 20 MIN UPPER | ax | yes | 3 | 0 | top | upper arm |
| T1 VIBE/LAVA | T1 FS 25 MIN LOWER | ax | yes | 3 | 0 | top | lower arm |
| T1 VIBE/LAVA | T1 FS 25 MIN UPPER | ax | yes | 3 | 0 | top | upper arm |
| T1 VIBE/LAVA | T1 FS 30 MIN LOWER | ax | yes | 3 | 0 | top | lower arm |
| T1 VIBE/LAVA | T1 FS 30 MIN UPPER | ax | yes | 3 | 0 | top | upper arm |

**CONTRAST** - 2 mL/sec standard dose gadolinium (0.2 mL/kg Clariscan or 0.1 mL/kg Gadavist) followed by 20 mL saline flush.

|              |                 |     |     |   |   |       |           |
|--------------|-----------------|-----|-----|---|---|-------|-----------|
| T1 VIBE/LAVA | T1 FS VEN LOWER | ax  | yes | 3 | 0 | top   | lower arm |
| T1 VIBE/LAVA | T1 FS VEN UPPER | ax  | yes | 3 | 0 | top   | upper arm |
| T1 VIBE/LAVA | T1 FS POST COR  | cor | yes | 3 | 0 | front | whole arm |