# RCI

# MRI Protocols

**Updated 12/01/2024**

# ***ABDOMEN PROTOCOLS***

## MRA BILATERAL LOWER EXTREMITY with and without contrast (MRA RUNOFF)

**ROUTINE 3 STATIONS**

### LOC LOWER LEG
- FLASH sequence (3T)
- FOV 40, SL 8/48mm

### LOC FEMUR
- FLASH sequence (3T)
- FOV 45, SL 8/48mm

### LOC ABD/PELVIS
- FLASH sequence (3T)
- FOV 50, SL 8/48mm

### ABD/PELVIS SCOUT
- Vessels scout
- FOV 50, slab, 5mm

### LEGS SCOUT
- Vessels scout
- FOV 50, slab 2, 5/49mm

### LOWER LEGS SCOUT
- Vessels scout
- FOV 50, slab 2, 5/78mm

### FL3D COR PRE LLEG
- FOV 43, slab, 1.5/20mm

### FL3D COR PRE FEMUR
- FOV 43, slab, 1.5/20mm

### FL3D COR PRE ABD/PELVIS
- FOV 45, slab, 1.5/20mm

### CARE BOLUS

### FL3D COR POST ABD/PELVIS

### FL3D COR POST FEMUR

### FL3D COR POST LLEG

***CONTRAST ADMINISTRATION**- GADOBENATE DIMEGLUMINE (MULTIHANCE) 15, 20, OR 30ML, IV, RATE - POWER INJECTED .6-1.5ML/S,TIME-ONCE

Reviewed 11/4/2013 MMH

# MRA BILATERAL LOWER EXTREMITY with and without contrast (MRA RUNOFF)

## ROUTINE 4 STATION

**LOC ANKLE**
**LOC LOWERLEG**
**LOC FEMUR**
**LOC ABD/PELVIS**
**ABD/PELVIS VESSEL SCOUT**
**LEGS VESSEL SCOUT**
**LOWERLEGS VESSEL SCOUT**
**FL3D COR PRE ANKLE**
**FL3D COR PRE LLEG**
**FL3D COR PRE FEMUR**
**FL3D COR PRE ABD/PELVIS**
**CARE BOLUS COR**
**FL3D COR POST ABD/PELVIS**
**FL3D COR POST FEMUR**
**FL3D COR POST LLEG**
**FL3D COR POST ANKLE**

***CONTRAST ADMINISTRATION**- GADOBENATE DIMEGLUMINE (MULTIHANCE) 15, 20, OR 30ML, IV, RATE - POWER INJECTED .6-1.5ML/S,TIME-ONCE

Reviewed 11/4/2013 MMH

# MRA ABDOMEN with and without contrast (MRA RENAL)

**LOC**

**COR T2 LOC BH**

- Haste sequence(3T)
- Multiple breath holds

**AX T2 BH**

- Haste sequence(3T)
- Multiple breath holds

**SCOUT ABDOMEN**

**FL3D COR PRE**

**CARE BOLUS**

**FL3D COR POST**

**FL3D COR DELAYED POST**

***CONTRAST ADMINISTRATION**-GADOBENATE DIMEGLUMINE (MULTIHANCE), 20ML GIVEN, IV, RATE - POWER INJECTED, 2ML/SEC. REQUIRED, TIME-ONCE

REVIEWED 10/01/2024 MMH

# ABDOMEN without contrast (APPENDIX)

****1.5T preferred over 3T, when available (including in pregnancy), USE LOW SAR****

**LOCALIZER non breathheld (for navigator series and DWI)**
**LOCALIZER breathhold**
**COR T2 HASTE NON FS(BH)**

- NON FS, Breathhold
- HASTE MBH sequence (3T)
- FOV 38-42 (depending on pt size)
- Cover through liver to pubs
- SL 4/1.0mm

**COR T2 NON FS FREEBREATHING (NAVIGATOR)**

- NON FS, non breathhold
- HASTE/SSFSE or Haste Navigator freebreathing (3T or 1.5 Siemens)
- FOV 38-42 (depending on pt size)
- Cover through liver to pubs
- SL 4/1.2mm

**AX T2 NON FS FREEBREATHING (NAVIGATOR)**

- NON FS, non breathhold
- HASTE/ SSFSE or Haste Navigator freebreathing (3T or 1.5 Siemens)
- Cover through mid liver to pubs
- FOV 38-42 (depending on pt size)
- SL 5/1.0 mm

**AX T2 FS (BH)**

- FS, Breathhold
- TRUFISP MBH sequence (3T or 1.5 Siemens)
- Cover through mid liver to pubs
- FOV 38-42 (depending on pt size)
- SL 5/1.0 mm

**COR T2 FS (BH)**

- FS, Breathhold
- TRUFISP MBH sequence (3T or 1.5 Siemens)
- Cover through liver to pubs
- FOV 38-42 (depending on pt size)
- SL 5/0mm

**AX T1 IN/OUT OF PHASE (BH)**

- Breathhold
- IN/ OUT OF PHASE (1.5 or 3T)
- Cover through mid liver to pubs
- FOV 38-42 (depending on pt size)
- SL 5/1.0mm

**AX T1 3D FS (BH)**

- FS, breathhold
- VIBE sequence
- Cover through mid liver to pubs
- FOV 38-42 (depending on size)
- slab, SL 3/0 mm

**AX DIFFUSION**

- Cover through mid liver to pubs
- Non breathheld, should be around 5 minute scan
- B-value 50, 800, 1000/ Will look like DWI in brain, shades of black and gray

# ABDOMEN without contrast (APPENDIX)continued…

## LIMITED FOV**CHECK WITH RAD TO SEE IF NEED THESE:

**AX T2 NON FS HASTE THINS (BH)**

- Through cecum-right flank to lower pelvis
- Breathheld
- Same series as MRCP thins

**COR T2 NON FS HASTE THINS (BH)**

- Through cecum-right flank to midline
- Breathheld
- Same series as MRCP thins

**COR T2 OBL NON FS HASTE**

- Through cecum- right flank to midline

*****CHECK IMAGES WITH RADIOLOGIST BEFORE DONE WITH PT. TO SEE IF NEED ANY MORE IMAGING*****

REVIEWED 10/1/2024 HM

# ABDOMEN without contrast (ACCRETA)

**LOCALIZER**

- Breathhold

**COR T2**

- Non FS
- Breathhold
- HASTE MBH sequence (3T)
- FOV 38, SL 6/ 1.8mm
- Cover from diaphragm down to pubs

**AX T2 UPPER**

- Non FS
- Breathhold
- HASTE MBH sequence(3T)
- FOV 38, SL 5/ 1.0mm
- Cover from diaphragm down to pubs (do 2 sets of axials, overlapping each set) Set #1

**AX T2 LOWER**

- Non FS
- Breathhold
- HASTE MBH sequence(3T)
- FOV 38, SL 5/1.0 mm
- Cover from diaphragm down to pubs (do 2 sets of axials, overlapping each set) Set #2

**AX T2 FS UPPER**

- FS
- Breathhold
- HASTE MBH sequence(3T)
- FOV 38, SL 5/1.0 mm
- Cover from diaphragm down to pubs (do 2 sets of axials, overlapping each set) Set #1

**AX T2 FS LOWER**

- FS
- Breathhold
- HASTE MBH sequence(3T)
- FOV 38, SL 5/1.0 mm
- Cover from diaphragm down to pubs (do 2 sets of axials, overlapping each set) Set #2

**SAG T2**

- Non FS
- Breathhold
- HASTE MBH sequence(3T)
- FOV 38, SL 5/1.0mm
- Cover from diaphragm down to pubs

**SAG T2 FS**

- FS
- Breathhold
- HASTE MBH sequence(3T)
- FOV 38, SL 5/1.0mm
- Cover from diaphragm down to pubs

**AX T1 3D FS UPPER**

- FS
- VIBE sequence
- FOV 38, SL 3/ 0mm

**AX T1 3D FS LOWER**

- FS
- VIBE sequence
- FOV 38, SL 3/ 0mm

**SAG T1 3D FS**

- FS
- VIBE sequence
- FOV 38, SL 3/0mm

**SAG T2**

- TRUFISP sequence (3T)
- Non FS
- FOV 40, SL 6/ 1.2mm
- TR 3.51, TE 1.54

**AX T2 UPPER**

- TRUFISP sequence (3T)
- Non FS
- FOV 40, SL 6/ 1.2mm
- TR 3.51, TE 1.54

**AX T2 LOWER**

- TRUFISP sequence (3T)
- Non FS
- FOV 40, SL 6/ 1.2mm
- TR 3.51, TE 1.54

**AX DWI UPPER**

- FOV 40, SL 6/ 1.2mm
- Cover from diaphragm down to pubs (do 2 sets of axials, overlapping each other) Set #1

**AX DWI LOWER**

- FOV 40, SL 6/ 1.2MM
- Cover from diaphragm down to pubs (do 2 sets of axials, overlapping each other) Set #2

****CHECK IMAGES WITH RADIOLOGIST BEFORE ENDING EXAM TO MAKE SURE THEY DO NOT WANT ANYTHING ELSE****

REVIEWED 10/1/2024 HM

# ABDOMEN with and without contrast (MRCP,PANCREAS,KIDNEY,LIVER,ADRENAL)

**PACE LOCALIZER FREE BREATHING (use for Navigator series)**

**LOCALIZER BH**

**COR T2 HASTE (BH)**

- HASTE (Siemens)-Multiple breathhold
- FOV 38, SL 5/1.0mm
- Set up off Localizer BH

**COR T2 HASTE (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 38, SL 5/1.0mm
- Set up off Pace free breathing localizer

**AX T2 NON FS HASTE (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 34, SL 5/1.0mm
- Cover liver through kidneys
- Set up off Pace free breathing localizer

**AX T2 FS HASTE (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 34, SL 3/.5mm
- Cover liver through kidneys
- Set up off Pace free breathing localizer
- Copy to AX T2 NON FS

**AX T2 FISP (BH)**

- Multiple breath hold
- FISP or FIESTA
- FOV 34, SL 5/1.0mm
- Cover liver through kidneys

**COR T2 FS BH 3 SLAB THICKS**

- HASTE (BREATHHOLD)
- FOV 30
- 3 Slabs, Cover just through the common bile duct, one straight, one angled through head of pancreas, other angled through tail of pancreas, centered over duct

**COR T1 3D FS VIBE PRE (BH)**

- **BREATH** HELD
- 3D VIBE, FOV 40

**COR T2 3D THIN (ONLY FOR MRCP/PANCREAS)**

- SPACE(3T) FREE BREATHING
- FOV 35, SL 1 slab, SL .9mm (3T)
- Cover just through bile duct/pancreas, MAKE SURE GET THROUGH EXTRA-HEPATIC DUCT COMPLETELY ANTERIOR TO POSTERIOR
- Navigator, have pt breathe normal throughout test, will be 5 min or longer

**COR T2 THIN NON FS (BH)(ONLY FOR MRCP/PANCREAS)**

- HASTE(3T) -BREATHHOLD
- FOV 28, SL 3/0mm
- Cover just through bile duct/pancreas

**AX T2 THIN NON FS (BH) (ONLY FOR MRCP/PANCREAS)**

- HASTE(3T)
- Multiple breath hold
- FOV 34, SL 3/.5mm Cover just through bile ducts/pancreas
- Make sure you get all the way through ampulla vater

**AX DIFFUSION**

- Through entire abdomen, cover through liver and kidneys
- Non breathheld, should be around 5 minute scan
- Will look like DWI in brain, shades of black and gray
- B-value 50, 800, 1000

**AX T1 3D FS VIBE DIXON PRE (BH)**

- VIBE(3T), use ***DIXON sequence if available (send all images- In & Out of phase, Water, Fat)***
- Breath hold
- FOV 38, 1 slab, 3mm
- Cover entire liver and kidneys
- Use DIXON method (under Contrast tab, check Dixon box, click on … tab and make sure all choices are checked- Water, Fat, In Phase, and Opposed phase)

**AX T1 IN/OUT OF PHASE (OPT- only do if you cannot do Ax T1 3D W/DIXON)**

- FOV 38, SL 4.5/1.0mm
- Multiple breath hold
- Cover liver through kidneys

**3 PL LOC (OPTIONAL)**

- Center over SMA (Superior Mesenteric Artery) area
- Run if you cannot find the SMA, to help find it to set up bolus

**AX CARE BOLUS**

- Center on SMA, just above renal arteries (look for 2 dots just above renal arteries on T2 Cor images, should be the bottom dot)
- FOV 40, 1 slab, SL 22/0mm
- Once you find the SMA, center over it, run series, when images come up, inject contrast, then as soon as the SMA gets bright, hit F12 or stop button. Breathe pt. (breath in, breath out, another breath in and hold it-about a 4 second delay) then hit F12 or start again so the immediate post series runs

**AX T1 3D VIBE DIXON FS IMMED. POST**

- Copy to pre (everything)
- Do SUBTRACTIONS
- Only send Water images on POST (look to see which ones are fat suppressed and those are the ones to send, usually labeled WATER)

**AX T1 3D DIXON FS 70 SEC. POST**

- Copy to pre (everything)
- Do SUBTRACTIONS

**AX T1 3D DIXON FS 3 MIN. POST**

- Copy to pre (everything)
- Do SUBTRACTIONS

**COR T1 3D DIXON FS 5 MIN. POST**

****ONLY send WATER (FAT SUPPRESSED images) on ALL POST****

****Pre VIBE DIXONS- send all images**

****If do VIBE DIXONS- you do NOT need to do additional IN/OUT OF PHASE separate**

****Do *Subtraction* on ALL ABDOMENS the AX FS VIBE DIXONS (FS images only)**

***MAKE SURE ON COR T2 3D THIN NAVIGATOR-YOU ARE GETTING THROUGH THE AMPULLA/PANCREATICOBILIARY JUNCTION, MAKE SURE EXTRA-HEPATIC DUCT IS COMPLETELY INCLUDED FROM ANTERIOR TO POSTERIOR**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - POWER INJECTED 2ML/SEC , TIME-ONCE

# ABDOMEN without contrast
# (MRCP without)

**PACE LOCALIZER FREE BREATHING (use for Navigator series)**

**LOCALIZER BH**

**COR T2 (BH)**

- HASTE(Siemens)-Multiple breathhold
- FOV 38, SL 5/1.0mm
- Set up off Localizer BH

**COR T2 HASTE (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 38, SL 5/1.0mm
- Set up off of pace localizer freebreathing

**AX T2 FS (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 34, SL 5/1.0mm
- Cover liver through kidneys
- Set up off Pace localizer freebreathing

**AX T2 NON FS (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 34, SL 5/1.0mm
- Cover liver through kidneys
- Copy to AX T2 FS series

**AX T2 THIN NON FS (BH)**

- HASTE(3T) Non FS
- Multiple breath hold
- FOV 34, SL 3/.5mm (3T)
- Cover just through bile ducts
- Make sure you get all the way through ampulla vater

**AX DIFFUSION**

- Through entire abdomen, cover through liver and kidneys
- Non breathheld, should be around 5 minute scan
- Will look like DWI in brain, shades of black and gray
- B-value 50, 800, 1000

**COR T2 FS 3 SLAB THICKS (BH)**

- HASTE(3T)
- FOV 30
- 3 Slabs, Cover just through the common bile duct, one straight, one angled through head of pancreas, other angled through tail of pancreas, centered over duct

**COR T1 3D FS VIBE DIXON PRE (BH)**

- VIBE, use ***DIXON sequence if available (send all images- In & Out of phase, Water, Fat)***
- FOV 40
- Use DIXON method (under Contrast tab, check Dixon box, click on … tab and make sure all choices are checked-Water, Fat, In Phase, and Opposed phase)

**COR T2 3D THIN (ONLY FOR MRCP/PANCREAS)**

- SPACE(3T) Navigator, FREEBREATHING
- FOV 35, SL 1 slab, SL .9mm
- Cover just through bile duct/pancreas, MAKE SURE GET THROUGH EXTRA-HEPATIC DUCT COMPLETELY ANTERIOR TO POSTERIOR
- Navigator, Set up off Pace localizer freebreathing- have pt breathe normal throughout test, will be 5 min or longer

# ABDOMEN without contrast (MRCP without)

**COR T2 THIN NON FS (BH) (ONLY FOR MRCP/PANCREAS)**

- HASTE(3T), Non FS
- FOV 28, SL 3/0mm
- Cover just through bile duct/pancreas,

**AX T1 3D VIBE DIXON FS PRE (BH)**

- VIBE, use ***DIXON sequence if available (send all images- In & Out of phase, Water, Fat)***
- Breath hold
- FOV 38, 1 slab, 3mm
- Use DIXON method (under Contrast tab, check Dixon box, click on … tab and make sure all choices are checked- Original echoes, Water, Fat, In Phase, and Opposed phase)

**AX IN/OUT PHASE (OPT- ONLY DO IF DO NOT HAVE AX T1 3D FS W/ DIXON)**

- FOV 38, SL 4.5/1.0mm
- Multiple breath hold
- Cover liver through kidneys
- Cover pancreas and bile ducts

****Pre VIBE DIXONS- send all images**

****If do VIBE DIXONS- you do NOT need to do additional IN/OUT OF PHASE separate**

***MAKE SURE ON COR T2 3D THIN NAVIGATOR-YOU ARE GETTING THROUGH THE AMPULLA/PANCREATICOBILIARY JUNCTION, MAKE SURE EXTRA-HEPATIC DUCT IS COMPLETELY INCLUDED FROM ANTERIOR TO POSTERIOR**

REVISED 10/1/2024 HM

# Limited ABDOMEN without contrast (MRCP short protocol without)

- Indications for using specific protocol:
  - When question is to rule out obstructing ductal stone, cholecystitis, choledolithiasis
  - Always call radiologist to ask what MRCP protocol they want to use-
    - MRCP w/wo
    - MRCP w/o
    - MRCP short protocol/limited (usually use only after hours/on call)
- Use especially after hours and during on call and weekends

## 3 Plane Localizer

**COR T2 BH**

- HASTE(Siemens)-Multiple breathhold
- FOV 38, SL 5/1.0mm
- Set up off Localizer BH

**AX T2 FS BH**

- HASTE(Siemens)-Multiple breathhold
- FOV 38, SL 5/1.0mm
- Set up off Localizer BH

**AX T2 THIN BH**

- HASTE(3T)
- Multiple breath hold
- FOV 34, SL 3/.5mm (3T)
- Cover just through bile ducts

**COR T2 FS BH 3 SLAB THICKS**

- HASTE(3T)
- FOV 30
- 3 Slabs, Cover just through the common bile duct, one straight, one angled through head of pancreas, other angled through tail of pancreas, centered over duct

**COR T2 THIN (ONLY FOR MRCP/PANCREAS)**

- HASTE(3T)
- FOV 28, SL 3/0mm
- Cover just through bile duct/pancreas

**COR T2 3D THIN (ONLY FOR MRCP/PANCREAS)**

- SPACE(3T) Navigator
- FOV 35, SL 1 slab, SL .9mm
- Cover just through bile duct/pancreas, MAKE SURE GET THROUGH EXTRA-HEPATIC DUCT COMPLETELY ANTERIOR TO POSTERIOR
- Navigator, Set up off Pace localizer freebreathing- have pt breathe normal throughout test, will be 5 min or longer

# ABDOMEN with and without contrast (EOVIST LIVER)

***NEED WEIGHT DOSING CHART FOR EOVIST, BECAUSE YOU DON'T GIVE THE FULL NORMAL AMOUNT****

**PACE LOCALIZER FREE BREATHING (use for Navigator series)**

**LOCALIZER (BH)**

**COR T2 (BH)**

- HASTE(Siemens)-Multiple breathhold
- FOV 38, SL 5/1.0mm
- Set up off Localizer BH

**COR T1 3D FS VIBE DIXON PRE (BH)**

- VIBE, use ***DIXON sequence if available (send only Water image(FS))***
- FOV 40
- Use DIXON method (under Contrast tab, check Dixon box, click on … tab and make sure all choices are checked- Original echoes, Water, Fat, In Phase, and Opposed phase)

**AX T1 3D VIBE DIXON FS PRE (BH)**

- VIBE, use ***DIXON sequence if available (send all images- In & Out of phase, Water, Fat, and Originals)***
- Breath hold
- FOV 38, 1 slab, 3mm
- Use DIXON method (under Contrast tab, check Dixon box, click on … tab and make sure all choices are checked- Original echoes, Water, Fat, In Phase, and Opposed phase)

**AX T1 IN/OUT OF PHASE (OPT- only do if you cannot do Ax T1 3D W/DIXON)**

- FOV 38, SL 4.5/1.0mm
- Multiple breath hold
- Cover liver through kidneys

**AX CARE BOLUS**

- Center on SMA, just above renal arteries (look for 2 dots just above renal arteries on T2 Cor images, should be the bottom dot)
- FOV 40, 1 slab, SL 22/0mm
- Once you find the SMA, center over it, run series, when images come up, inject contrast, then as soon as the SMA gets bright, hit F12 or stop button. Breathe pt. (breath in, breath out, another breath in and hold it-about a 4 second delay) then hit F12 or start again so the immediate post series runs

**AX T1 3D DIXON FS IMMED. POST (BH)**

- Copy to pre
- Only send Water images on POST (look to see which ones are fat suppressed and those are the ones to send, usually labeled WATER)

**AX T1 3D DIXON FS 70 SEC. POST (BH)**

**AX T1 3D DIXON FS 3 MIN. POST (BH)**

**COR T1 3D DIXON FS 5 MIN. POST (BH)**

**AX T2 FS (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 34, SL 5/1.0mm
- Cover liver through kidneys
- Set up off Pace localizer freebreathing

**AX T2 NON FS (FREEBREATHING) using navigator-based repiratory signal**

- HASTE FREEBREATHING-UseNavigator
- FOV 34, SL 5/1.0mm
- Cover liver through kidneys
- Copy to AX T2 FS series

# ABDOMEN with and without contrast (EOVIST LIVER) continued…

**AX T2 FISP (BH)**

- Multiple breath hold
- FISP or FIESTA
- FOV 34, SL 5/1.0mm
- Cover liver through kidneys

**COR T2 FS BH 3 SLAB THICKS (BH)**

- HASTE(3T)
- FOV 30
- 3 Slabs, Cover just through the common bile duct, one straight, one angled through head of pancreas, other angled through tail of pancreas, centered over duct

**AX T1 3D DIXON FS 15 MIN. POST (BH)**

**AX DIFFUSION (FB)**

- Through entire abdomen, cover through liver
- Non breathheld, should be around 5 minute scan
- Will look like DWI in brain, shades of black and gray
- B-value 50, 800, 1000

**AX T1 3D DIXON FS 20 MIN. POST (BH)**

**COR T1 3D DIXON FS 20 MIN. POST (BH)**

***CONTRAST ADMINISTRATION**- GADOXETATE (EOVIST), DOSE PER WEIGHT GIVEN, IV, RATE - POWER INJECTED 2ML/SEC , TIME-ONCE

REVIEWED 10/1/2024 HM

# ABDOMEN with and without contrast (ENTEROGRAPHY)

**** DO NOT USE STRAW, SHAKE BOTTLES WELL- Pt needs to drink 4 (1700ml) bottles of Volumen/CitraSelect-(barium sulfate) prepared over 45 minutes, one bottle every 15 min., after 4th bottle, have them drink 1 glass of water, pt. needs to walk around for 10-15 min. to get contrast into small bowel. Have pt, empty bladder right before starting exam. NURSE TO ADMINISTER 1 IM GLUCAGON ALSO. **USE MULTIHANCE**

***MAKE SURE TO COVER ALL THE WAY THROUGH RECTUM***

**MULTIPLANE LOC NON BREATHHOLD**

**MULTIPLANE LOC (BH)**

**COR T2 TrueFISP FS (BH)**

- FOV 38-40, SL Thickness 5 or 6/0
- TrueFISP FS Sequence
- Breath held

**COR T2 HASTE (FREEBREATHING) using navigator-based repiratory signal**

- FOV 38-40, SL Thickness 5 or 6/0
- Non Breathheld

**CHECK WITH RAD FOR ADEQUATE CONTRAST/HAVE NURSE GIVE GLUCAGON 1 IM IMMEDIATEY**

**AX T2 TrueFISP FS ABDOMEN (BH)**

- FOV 35-40, SL Thickness 5 or 6/0
- Cover all the way through liver and kidneys
- TrueFISP FS Sequence
- Breath held

**AX T2 TrueFISP FS PELVIS (BH)**

- FOV 35-40, SL Thickness 5 or 6/0
- Make sure overlapped with axial abdomen series, making sure to cover through rectum
- TrueFISP FS Sequence
- Breath held

**AX DIFFUSION ABDOMEN (FREEBREATHING)**

- Through entire abdomen, cover through liver
- Non breathheld, should be around 5 minute scan
- Will look like DWI in brain, shades of black and gray
- B-value 50, 800, 1000

**AX DIFFUSION PELVIS (FREEBREATHING)**

- Cover through entire pelvis, make sure you get through rectum
- Make sure overlapped with axial abdomen DWI
- Non breathheld, should be around 5 minute scan
- Will look like DWI in brain, shades of black and gray
- B-value 50, 800, 1000

**COR T1 3D FS (BH) PRE**

- VIBE Sequence
- Breath held
- Cover through liver down through rectum

**AX T1 3D FS ABDOMEN PRE (BH)**

- VIBE(3T)
- Breath hold
- FOV 38, 1 slab, 3mm (3T)
- Cover through liver and kidneys

## ABDOMEN with and without contrast (ENTEROGRAPHY) continued…

**AX T1 3D FS PELVIS PRE (BH)**

- VIBE(3T)
- Breath hold
- FOV 38, 1 slab, 3mm (3T)
- Make sure overlapped with axial abdomen
- Cover through pelvis, make sure get through rectum

***GIVE CONTRAST THROUGH IV, WAIT 1 MINUTE, THEN SCAN POST*

**COR T1 3D FS VIBE (BH) POST GAD**

- Copy pre

**AX T1 3D FS ABDOMEN (BH) POST GAD**

- Copy pre

**AX T1 3D FS PELVIS (BH) POST GAD**

- Copy pre

**NEED TO POST PROCESS AXIAL ABDOMEN AND PELVIS SO THEY ARE STACKED ON TRUFISP, DWI (TRACE IMAGES-HIGHEST B VALUE), VIBES PRE AND POST** IF THE FACILITY HAS THE ABILITY**

****CONTRAST ADMINISTRATION**- GADOBENATE DIMEGLUMINE (MULTIHANCE), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE – HAND INJECTED , TIME-ONCE

REVIEWED 10/1/2024 HM

# ABDOMEN with and without contrast (UROGRAM)

****Have pt drink 500ml water before starting exam, NPO 4 hours prior to study****
**Make sure get above kidneys and all the way through the bladder****
****Make sure get above kidneys and all the way through the bladder****

**COR T2 HASTE**

**AX T2 HASTE UPPER (BH)**

- FOV 35-40, SL Thickness 5/0, Breathheld
- Cover from above kidneys down to pelvis, overlapping with lower set

**AX T2 HASTE LOWER (BH)**

- FOV 35-40, SL Thickness 5/0, Breathheld
- Make sure overlap with upper axial haste series, cover pelvis all the way through bladder

**AX T2 FS HASTE UPPER (BH)**

- Same as above, copy to HASTE UPPER

**AX T2 FS HASTE LOWER (BH)**

- Same as above, copy to HASTE LOWER

**IN/OUT OF PHASE UPPER-**ONLY DO IF YOU DO NOT DO VIBE DIXON

**IN/OUT OF PHASE LOWER-**ONLY DO IF YOU DO NOT DO VIBE DIXON

**AX DWI UPPER**

- Cover same as AXIAL HASTE UPPER

**AX DWI LOWER**

- Cover same as AXIAL HASTE LOWER

**COR T1 FS VIBE (BH)**

- FOV 38-40, SL Thickness 3/0, 3D VIBE FAT SUPPRESSED
- Cover from above kidneys down all the way through bladder
- Breathheld

**AX T1 VIBE DIXON UPPER (BH)**

- FOV 35-40, SL Thickness 3/0, VIBE(3T), use ***DIXON sequence if available (send all images- In & Out of phase, Water, Fat)***
- Breathheld
- Cover same as AXIAL HASTE UPPER
- Use DIXON method (under Contrast tab, check Dixon box, click on … tab and make sure all choices are checked- Original echoes, Water, Fat, In Phase, and Opposed phase)

**AX T1 VIBE DIXON LOWER (BH)**

- FOV 35-40, SL Thickness 3/0, VIBE(3T), use ***DIXON sequence if available (send all images- In & Out of phase, Water, Fat)***
- Cover same as AXIAL HASTE LOWER, make sure overlap slices from AX T1 VIBE UPPER
- Use DIXON method (under Contrast tab, check Dixon box, click on … tab and make sure all choices are checked- Original echoes, Water, Fat, In Phase, and Opposed phase)

**COR T2 SPACE-THICK SLAB (THRU URETERS ONLY)**

- 3D SPACE- SET UP TO COVER THE URETERS

**COR T1 3D VIBE FS IMMED. POST (BH)**

- Copy to pre (everything), 3D VIBE FAT SUPPRESSED

**COR T1 3D VIBE FS 90 SEC. POST (BH)**

- Copy to pre (everything)

**COR T1 3D VIBE FS 3 MIN. POST (BH)**

- Copy to pre (everything)

## ABDOMEN with and without contrast (UROGRAM) continued…

**AX T1 VIBE DIXON UPPER POST (BH)**

- Copy to pre (everything)
- SEND ONLY WATER IMAGES (FAT SUPPRESSED)

**AX T1 VIBE DIXON LOWER POST (BH)**

- Copy to pre (everything)
- SEND ONLY WATER IMAGES (FAT SUPPRESSED)

**COR T1 3D VIBE FS 5 MIN. DELAY POST(BH)**

- Copy to pre (everything)

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - POWER INJECTED 2ML/SEC , TIME-ONCE
REVIEWED 10/1/2024 HM

# *RADIOLOGY CONSULTANTS OF IOWA, PLC*
# *SOFT TISSUE/BONE MASS PROTOCOL*

Soft Tissue/Bone Mass MRI protocol for evaluation of musculoskeletal soft tissue and bone masses. This includes the following MRI sequences:

**Pre Contrast**

1. Axial T1
2. Axial T2 Fat Sat
3. Axial Gradient Echo
4. Axial T1 Fat Sat (without contrast)
5. Sagittal or coronal T1
6. Sagittal or coronal T2 Fat Sat or STIR
7. Sagittal or coronal T2 Fat Sat or STIR

*The technologist will choose the best plane to evaluate the mass for sequences 5 and 6. IF the mass is anterior or posterior in location, then sagittal T1, T2 Fat Sat images will be acquired. IF the mass is medial or lateral in location, then coronal T1 and STIR images will be acquired.*

*Whichever plane is not performed under sequences 5 and 6, will be utilized for sequence 7. For example, if sagittal T1/T2 Fat Sat images are obtained for sequences 5 and 6, then sequences 7 would be coronal STIR images. If coronal T1/STIR images are acquired for sequences 5 and 6, then sagittal T2 Fat Sat images would be performed for sequence 7.*

**Post Contrast**

8. Axial T1 Fat Sat
9. Sagittal or coronal T1 Fat Sat (best plane for evaluating the mass as selected for sequences 5 and 6.)

If the technologist has questions regarding the selection of the sagittal or coronal plane as the best plane of evaluation, please contact one of the musculoskeletal radiologists.

The mass should be denoted with a bead marker.

D VanRoekel, M.D./cshort Reviewed 10/1/2024

# *RADIOLOGY CONSULTANTS OF IOWA, PLC*
# *OSTEOMYELITIS PROTOCOL*

Osteomyelitis MRI protocol for evaluation of
musculoskeletal extremities infection/osteomyelitis.
This includes the following MRI sequences:

**Pre Contrast**

1. Axial T1
2. Axial T2 FS
3. Cor T1
4. Cor T2 FS
5. Sag T1
6. Sag T2 FS

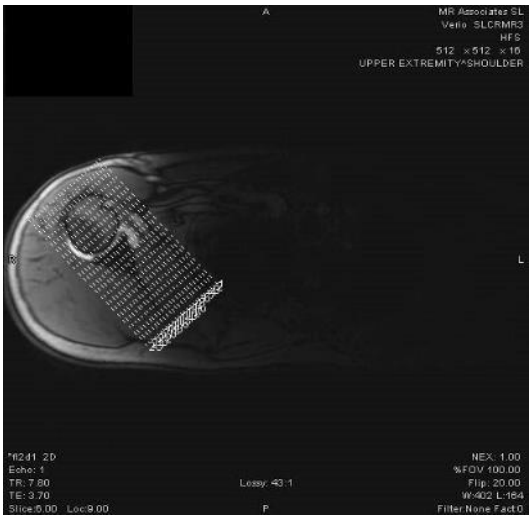
**Post Contrast**

1. Axial T1 FS Post
2. Cor or Sag T1 FS Post (which ever plane is the best plane to evaluate infection/osteo)

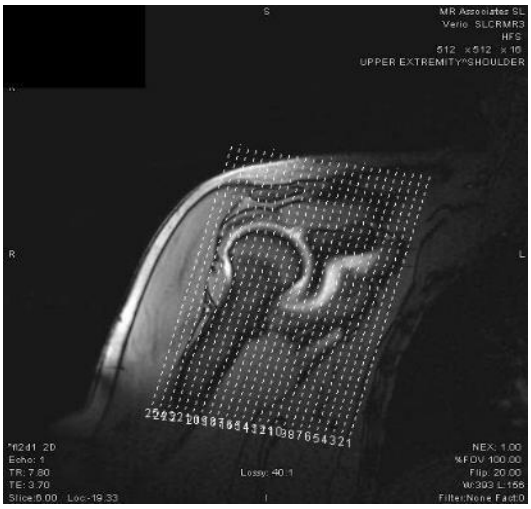
****SMALL JOINTS ONLY: Hand, wrist, foot, ankle, and digits**
**Replace either Sag T2 FS or Cor T2 FS with Sag or Cor STIR, whichever plane images area of concern**

Reviewed DV 10/1/2024

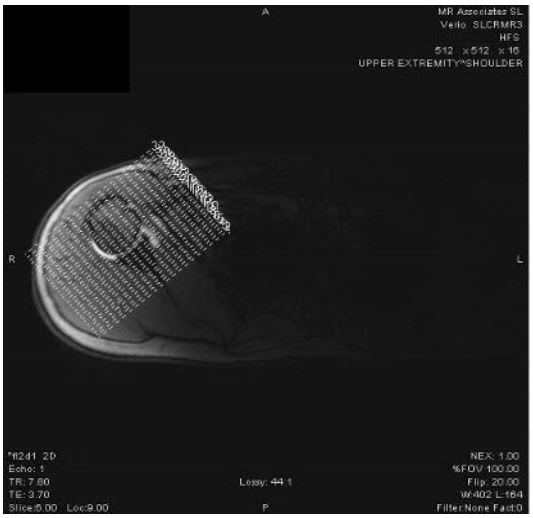
# ***Shoulder Imaging Planes***



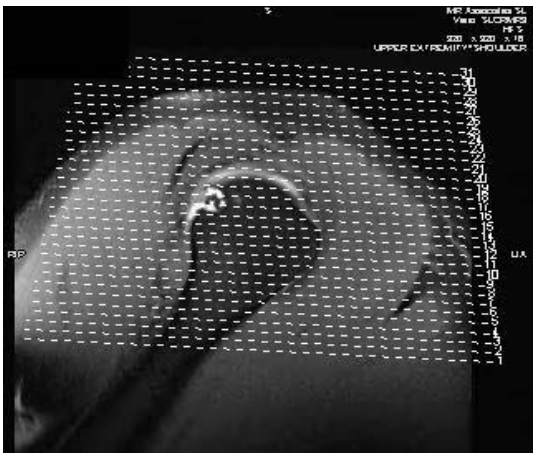

***Oblique Coronal***



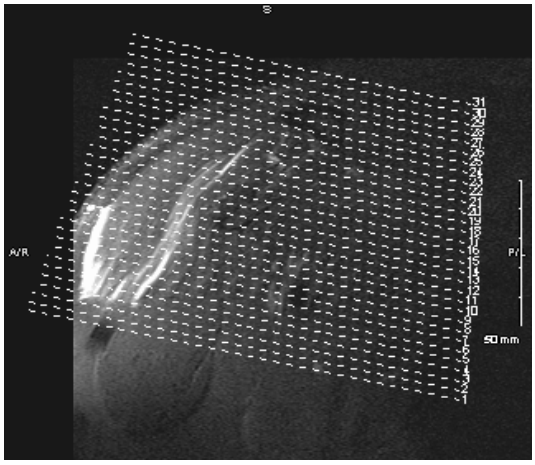

***Oblique Sagittal***




***Oblique Sagittal***



***Axial***




***Axial***

# UPPER EXTREMITY JOINT R/L without contrast (SHOULDER)

**3 PLANE LOC**

**COR T2 FS**

- FOV 15/ SL 3/ .3mm

**SAG T2 FS**

- FOV 15/ SL 3/ .3mm

**SAG T1**

**AX PD FS**

- FOV 16/ SL 3/ .3mm

**AX T2 GRADIENT ECHO**

- FLASH(3T) sequence (Gradient echo sequence)
- **Make sure include all of acromion**
- Same parameters as above, copy axial above

**If for mass, refer to mass protocol for all extremities on page 23**
** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/1/2024 DV

## UPPER EXTREMITY JOINT R/L with contrast (SHOULDER ARTHROGRAM)

**3 PLANE LOC**
**AX T1 FS**
**AX T2 FS**
**COR T2 FS**
**COR T1 FS**
**SAG T2 FS**
**SAG T1**
**SAG T1 FS**
**SAG T1 FS OBL DISLOCATION** (ONLY IF PATIENT CAN TOLERATE)

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/1/2024 DV

## UPPER EXTREMITY R/L without contrast (HUMERUS)

**COR T1**

- FOV 34/ SL 3/ .9mm

**COR T2 STIR**

**AX T1**

- FOV 20/ SL 4/ 1.2mm

**AX T2 FS**

**SAG T1**

- FOV 34, SL 4/ 1.2mm

**SAG T2 FS**

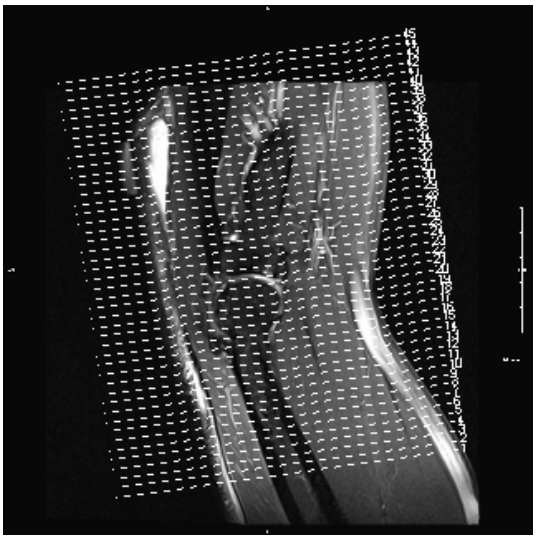
****If for mass, refer to mass protocol for all extremities on page 23****

**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

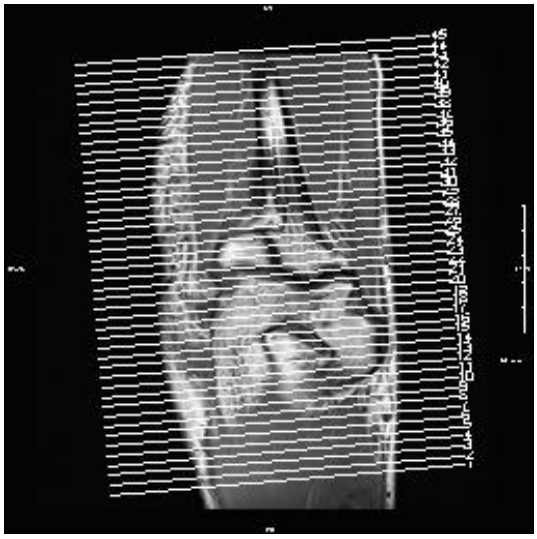
***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

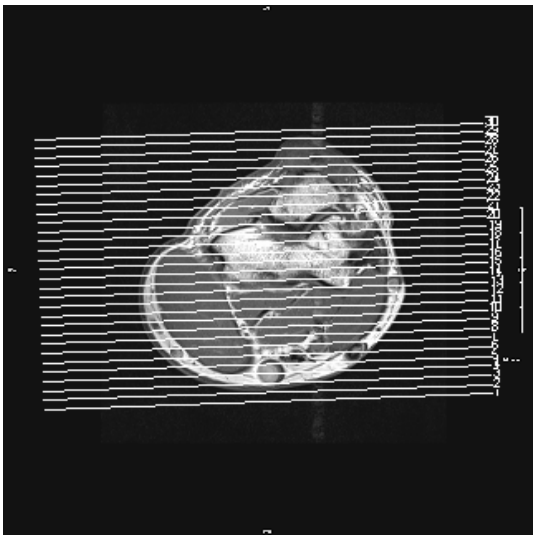
# ***Elbow Imaging Planes***



***Axial***



***Axial***



***Coronal***

***Sagittal***

# UPPER EXTREMITY JOINT R/L without contrast (ELBOW)

**AX T1**

- FOV 13, SL 3.5/.4mm, A/P

**AX T2 FS**

**COR T2 FS**

- BLADE (3T)
- Same parameters as above

**COR T2 GRE**

- MEDIC(3T)

**SAG T1**

- FOV 13, SL 3.5/.4mm, A/P

**SAG T2 FS**

**AX T2 FS FABS VIEW**

- FOV 13, SL 3/.3mm, A/P
- *ONLY* do if BICEPS TEAR
- Position elbow in 90 degrees, set up lines from elbow joint through forearm ½ way

*****Make sure include radial tuberosity if for biceps tear*****

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024

# UPPER EXTREMITY JOINT R/L with contrast (ELBOW ARTHROGRAM)

**AX T1 TSE FS**

- FOV 11, SL 3.5/.4mm, A/P

**AX T2 FS**

**COR T1 FS**

- FOV 11, SL 2/.5mm, R/L

**COR T1**

**COR T2 FS**

**COR GRE**

- MEDIC(3T)
- FOV 14, SL 3/.3mm, F/H

**SAG T2 FS**

- FOV 11, SL 3.5/.4mm, A/P

***CONTRAST ADMINISTRATION**- GADOTERATE MEGLUMINE (CLARISCAN), 1-15ML GIVEN, INTRA-ARTICULAR, FLUORO INJECTED, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# UPPER EXTREMITY R/L without contrast (FOREARM)

**AX T1**

- FOV 17, SL 3.5/.4mm, A/P

**AX T2 FS**

**AX GRE**

**COR T1**

- FOV 17, SL 3.5/.4mm, F/H

**COR T2 FS**

**SAG T1**

- FOV 17, SL 3.5/.4mm, A/P

**SAG T2 FS**

****If for mass, refer to mass protocol for all extremities on page 23****

**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# UPPER EXTREMITY R/L without contrast (INTEROSSEOUS FOREARM)

## LOCALIZER

## 3 PL LOCALIZER

## AX T1 PROX. FOREARM

- TSE sequence
- FOV 20 or 17, SL 3.5/2mm
- R/L

## AX T2 FS PROX. FOREARM

- TSE sequence
- (same parameters as above)

## GRE AX PROX. FOREARM

- MEDIC sequence
- (same parameters as above)

## AX T1 DISTAL FOREARM

- TSE sequence
- (same parameters as above)

## AX T2 FS DISTAL FOREARM

- TSE sequence
- (same as above)

## GRE AX DISTAL FOREARM

- MEDIC sequence
- (same parameters as above)

****Next 3 sequences make sure to include through elbow to through wrist, bigger FOV****

## COR T2 FS

- TSE sequence
- FOV 30, SL 3.5/.4mm
- A/P-phase encoding dir.

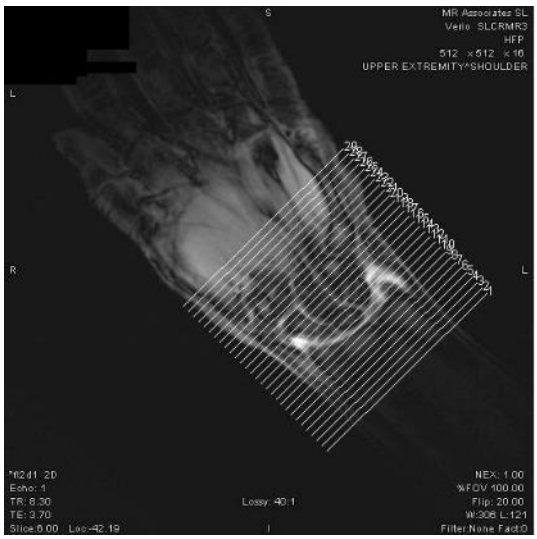
## SAG T2 FS

- TSE sequence
- FOV 30, SL 3.5/.4mm
- R/L-phase encoding dir.

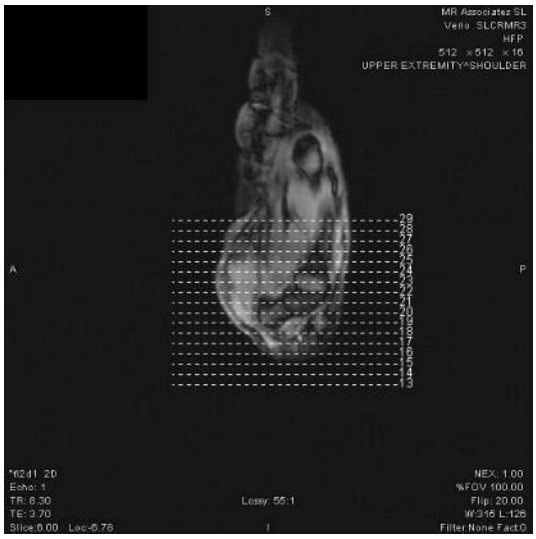
## GRE COR

- MEDIC sequence
- FOV 30, SL 3.5/.4mm
- A/P-phase encoding dir.

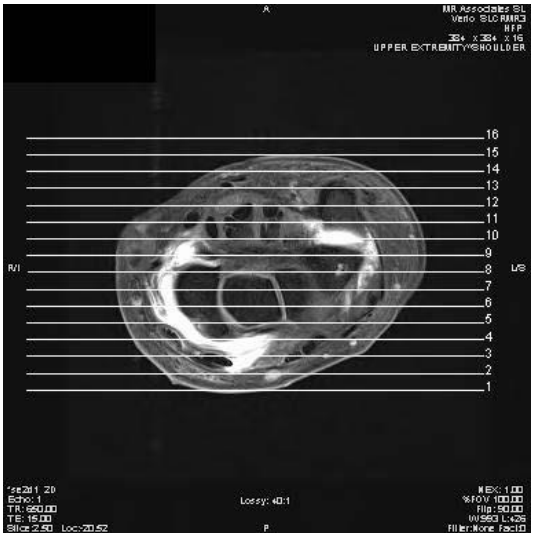
# ***Wrist Imaging Planes***




***Axial***

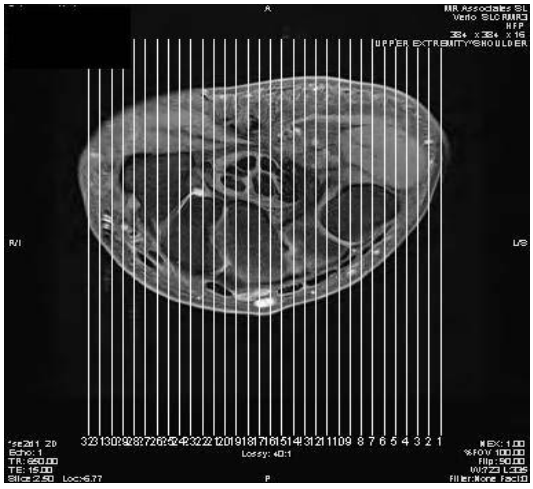



***Axial***




***Coronal***


***Sagittal***




***Sagittal***

# UPPER EXTREMITY JOINT R/L without contrast (WRIST)

**AX T1**

- FOV 8, SL 2.5/.3mm, R/L

**AX T2 FS**

**COR T2 FS**

**COR T1**

- FOV 8, SL 2/.4mm, R/L
- TSE(3T),FSE(1.5T)

**SAG T2 FS**

**COR GRE**

- MEDIC(3T)

**AX T2 FS (OPTIONAL-FOR MOTION ONLY)**

- BLADE(3T)
- Same parameters as above

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# UPPER EXTREMITY JOINT R/L with contrast (WRIST ARTHRO)

## AX T1 FS

- FOV 7, SL 2.5/.3mm, A/P

## AX T2 FS

- BLADE(3T)/FSE(1.5T)

## COR T1 FS

- FOV 7, SL 3/.3mm, R/L

## COR T2 FS

## COR T1

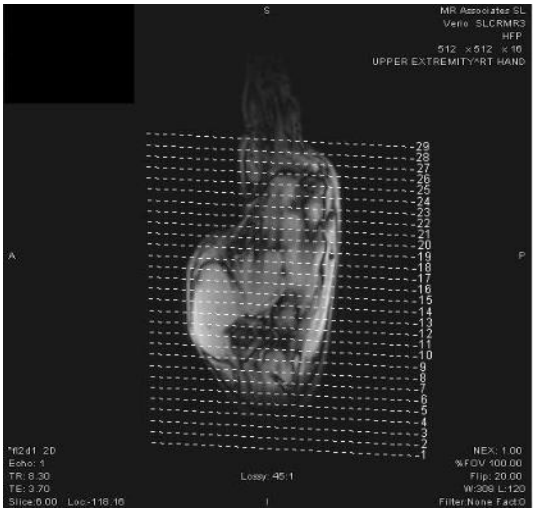
## SAG T2 FS

- FOV 7, SL 2/ .2mm, A/P

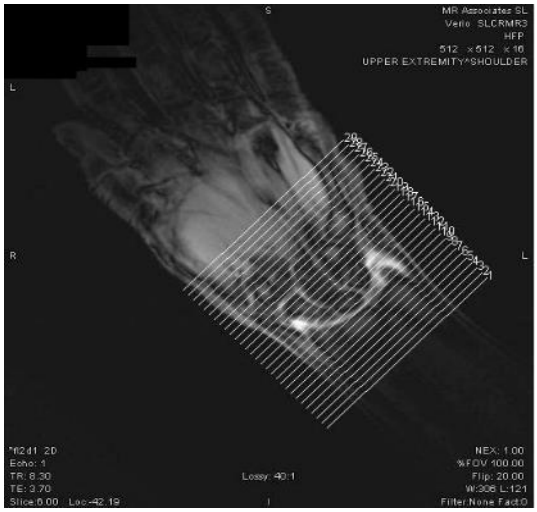
***CONTRAST ADMINISTRATION** GADOTERATE MEGLUMINE (CLARISCAN), 1-15ML GIVEN, INTRA-ARTICULAR, FLUORO INJECTED, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

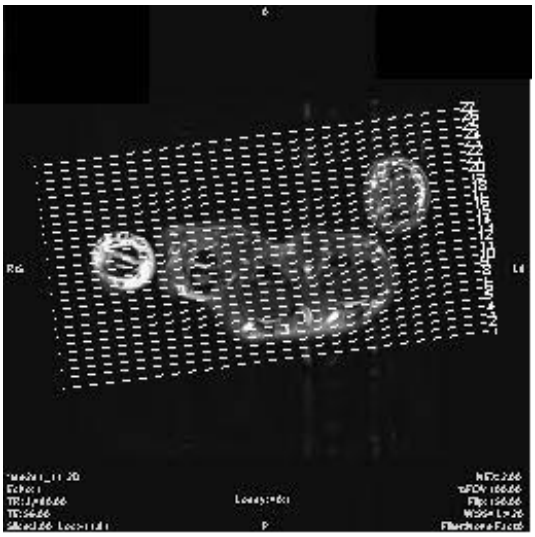
# ***Hand Imaging Planes***



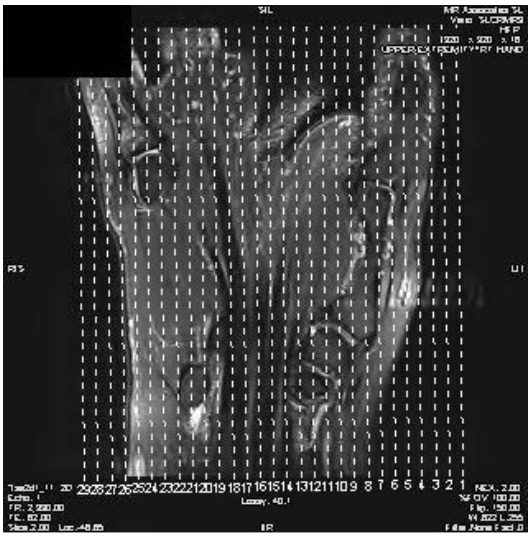
***Axial***



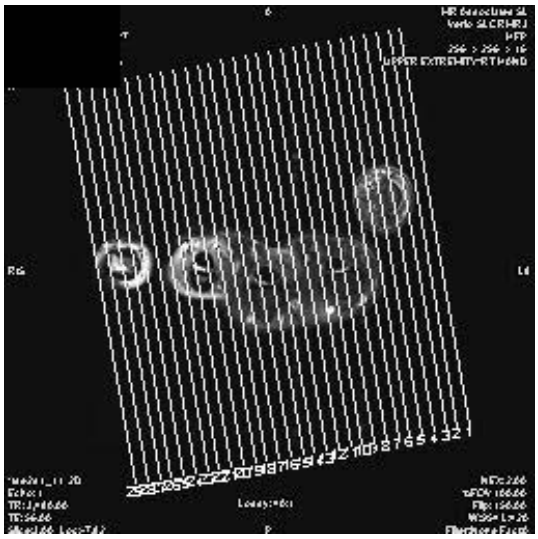
***Axial***



***Coronal***



***Sagittal***



***Sagittal***

## UPPER EXTREMITY R/L without contrast (HAND)

**COR T2 FS**
**COR T1**
- FOV 21,SL 2/.4mm, A/P

**AX T2 FS**
**AX T1**
- FOV 15, SL 4/.8mm, R/L

**SAG T2 FS**
**SAG T1**
- FOV 21, SL 2/.4mm, A/P

***If poor FS, do STIRS OR DIXONS(SEND ONLY WATER IMAGE-FS)***

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

## UPPER EXTREMITY R/L with and without contrast (RA HANDS)

**AX T1**

- FOV 15, SL 4/.8mm, R/L

**SAG T2 FS**

- FOV 21, SL 2/.4mm, A/P

**COR T1**

- FOV 21, 2/.4mm, A/P

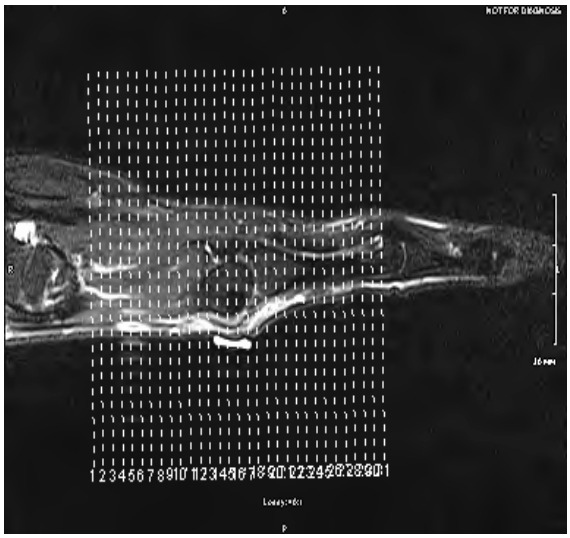
**COR T2 FS**
**COR T1 FS PRE**
**AX T1 FS POST**
**COR T1 FS POST**

**GET THROUGH CARPALS TO THROUGH MCP JOINTS**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

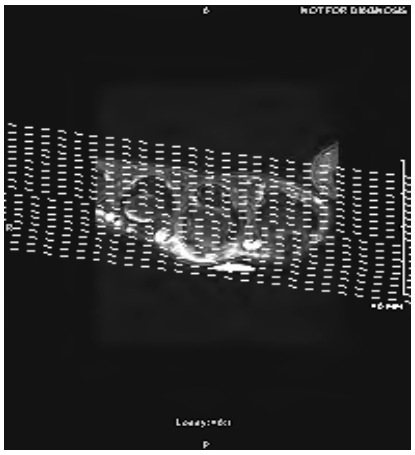
REVIEWED 10/1/2024 DV

# ***Finger Imaging Planes***

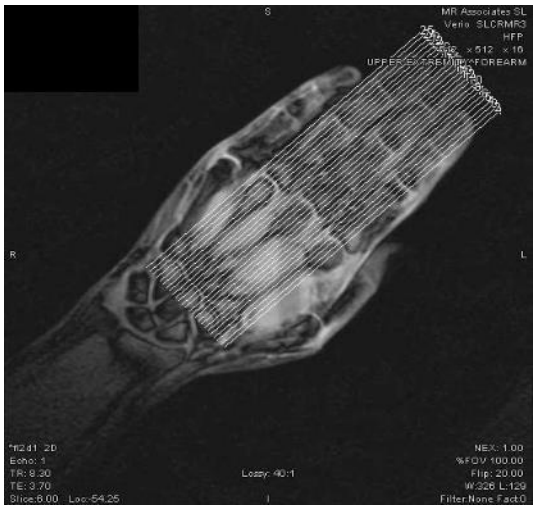


***Axial***

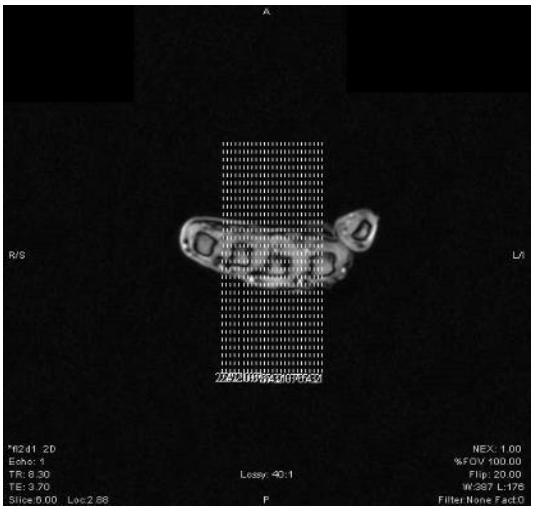

***Axial***



***Coronal***



***Sagittal***



***Sagittal***

## UPPER EXTREMITY JOINT R/L without contrast (FINGER)

****Include 1-2 adjacent fingers in FOV in all planes****

**COR T2 FS**

- FOV 21, SL 2/.4mm, R/L

**SAG T2 FS**

- FOV 18, SL 1.5/.3mm, A/P

**AX T2 FS**

- FOV 8, SL 2/.4mm, R/L

**COR T1**

**SAG T1**

**AX T1**

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

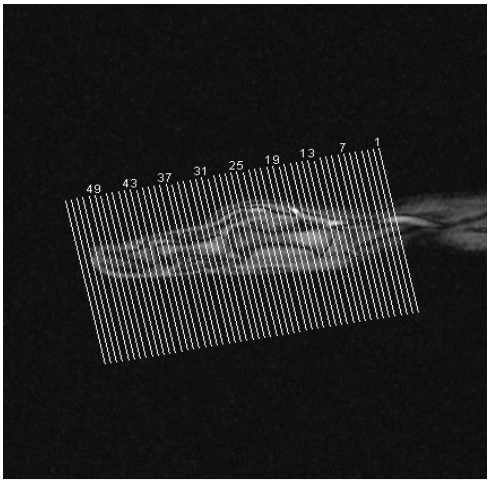
## UPPER EXTREMITY JOINT R/L without contrast (FINGER PULLEY)

**SAG T2 FS STRAIGHT**
**AX T2 FS STRAIGHT**
**COR T2 FS**
**SAG T1**
**AX T1**
**SAG T2 FS FLEXED**
**AX T2 FS FLEXED**

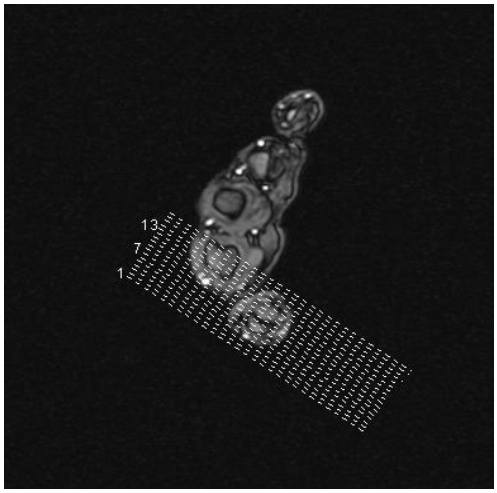
** FOR PULLEY RUPTURE OR FLEXOR TENDON INJURY**
BEND FINGER AROUND TAPE ROLL FOR FLEXED VIEWS

REVIEWED 10/01/2024 DV

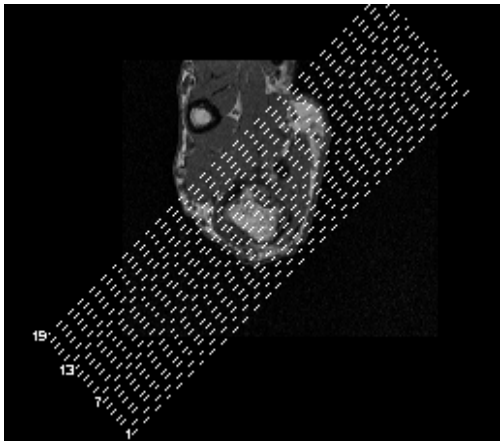
# ***Thumb Imaging Planes***




***Axial***




***Coronal***




***Sagittal***

# UPPER EXTREMITY JOINT R/L without contrast (THUMB)

**USE FOR ROUTINE AND ULNAR COLLATERAL LIGAMENT EVALUATION**

**LOC**

**LOC #2**

**LOC #3**

**AX T2 FS**

- FOV 8, SL 2/.4mm(3T)

**SAG T2 FS small FOV**

- FOV 12, SL 1.5/.3mm(3T)
- Set up off 1st MC Head, off axials, angle with thumb

**COR T2 FS small FOV**

- FOV 12, SL 1.5/.3MM(3T)
- Set up off 1st MC Head, off axials and sags, angle with thumb
- Copy T1 parameters

**COR T2 STIR small FOV**

**AX T1 TSE**

**SAG T1 TSE small FOV**

**COR T1 TSE small FOV**

****If for mass, refer to mass protocol for all extremities on page 23****

**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# UPPER EXTREMITY R/L without contrast (SCAPULA)

***Use body coil under body, center scapula over coil, turn spine coils OFF***

**LOCALIZER**

**SAG T1**

- FOV 22, SL 4/.4mm

**SAG T2 FS**

- (same parameters as above)

**COR T1**

- FOV 22, SL 4/.4mm
- F/H

**COR T2 FS**

- (same parameters as above)

**AX T1**

- FOV 22, 5/1.2mm
- A/P

**AX T2 FS**

- (same parameters as above)

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# UPPER EXTREMITY R/L without contrast (CLAVICLE)

***Use body coil under body, center scapula over coil, turn spine coils OFF***

**LOCALIZER**

**SAG T1**

- FOV 22, SL 4/.4mm

**SAG T2 FS**

- (same parameters as above)

**COR T1**

- FOV 22, SL 4/.4mm
- F/H

**COR T2 FS**

- (same parameters as above)

**AX T1**

- FOV 22, 5/1.2MM
- A/P

**AX T2 FS**

- (same parameters as above)

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# UPPER EXTREMITY R/L with and without contrast (BRACHIAL PLEXUS)

**Cover affected side only, Cover from shoulder joint to through spine**
**Cover from at least base of skull down through arch**

**LOCALIZER 3 PLANE**

**COR T1**

- TSE(3T) FSE (1.5T)
- FOV 20, SL 3.5/1mm
- H/F

**COR STIR**

- (same parameters as above)

**COR T1 BILATERAL LARGE FOV**

- Include both sides of brachial plexus, Large FOV

**AX T1**

- TSE(3T) FSE (1.5T)
- FOV 20, SL 4/1mm
- L/R

**AX STIR**

- (same parameters as above)

**SAG T1**

- TSE(3T) FSE (1.5T)
- FOV 20, SL 4/1mm
- A/P

**SAG STIR**

- (same parameters as above)

**COR T1 FS POST**

- TSE(3T) FSE(1.5T)
- Copy pre

**AX T1 FS POST**

- TSE(3T) FSE(1.5T)
- Copy pre

**SAG T1 FS POST**

- TSE(3T) FSE(1.5T)
- Copy pre

**MUST HAVE HAD A MRI CERVICAL SPINE RECENTLY W/I LAST 12 MTHS, BEFORE DOING A BRACHIAL, OK WITH RADIOLOGIST **

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

# UPPER EXTREMITY R/L without contrast
# PECTORALIS MAJOR (PECT MUSCLE)

**LOC**

**AX T1 TSE**

- FOV 22, SL 4/1mm
- Scan from superior humeral head through distal humerus, make sure get through humeral head laterally. Get through pect muscle inferiorly, angle with muscle

**AX T2 FS**

**COR STIR**

- FOV 22, SL 4/1mm
- Angle off axial with muscle, cover entire muscle, get all the way through humerus

**SAG STIR**

- FOV 22, SL 4/1mm
- Angle off axial and coronal, perpendicular to Cor plane

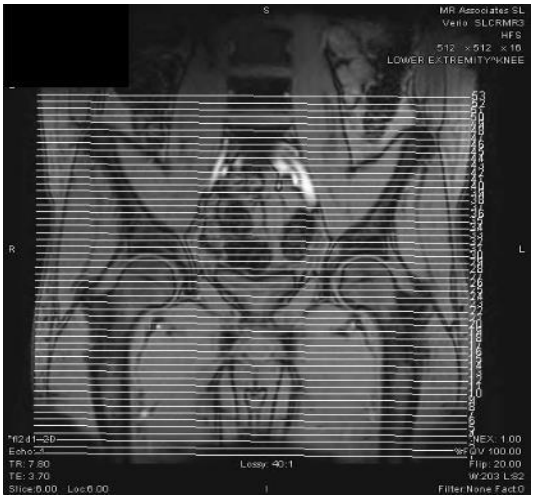
**AX T2 FS small FOV**

- FOV 20, SL 4/1mm

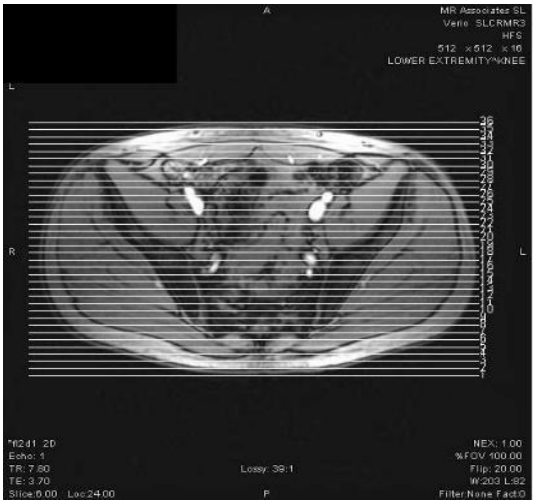
****CHECK WITH RADIOLOGIST AFTER THESE IMAGES TO SEE IF THEY WANT ANYTHING ELSE****

REVIEWED 10/01/2024 DV

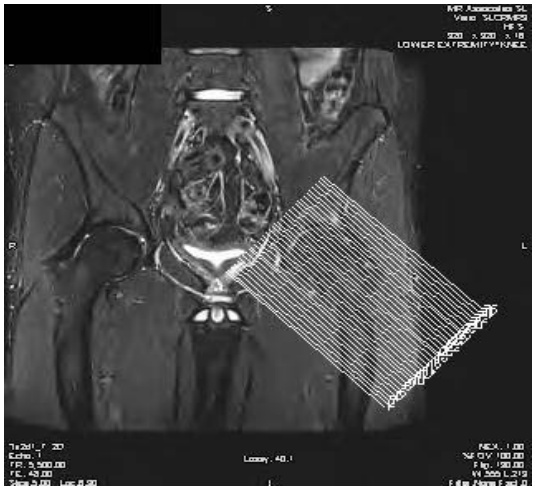
# ***Hip Imaging Planes***




***Axial***




***Coronal***



***Axial Oblique***


***Sagittal Proton Density***

# LOWER EXTREMITY JOINT R/L without contrast (HIP)

## COR T2 STIR

- FOV 38, SL 4/ 1.2mm

## COR T1

## AX T2 FS

- FOV 38, SL 5/ 1.5mm
- Straight lines from below lesser trochanters to top of crest

## AX T1

## AX PD FS OBL (UNI)

- FOV 18, SL 3/ .5mm
- Parallel to femoral neck

## COR T2 FS (UNI)

- FOV 16, SL 3/ .5mm
- Straight coronal

## COR T2 GRE (UNI)

- FOV 18, SL 3/ .5mm
- MEDIC (3T) Gradient Echo
- *DO FOR ABNORMAL BONE MARROW, MASS, OR BLOOD*

## SAG PD FS (UNI) STRAIGHT

- FOV 18/ SL 3/ 1.0 mm
- Straight sagittal

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# LOWER EXTREMITY JOINT R/L with contrast (HIP ARTHROGRAM) (LABRUM TEAR)

## COR T2 STIR

- FOV 38, SL 3/.9mm
- Cover both hips, large FOV, *GET THROUGH ENTIRE PELVIS*

## COR T1

- Same parameters as above

## COR T2 FS (UNI)

- FOV 16, SL 3/.5mm

## COR T1 FS (UNI)

## AX T1 FS (UNI)

## AX T2 FS (UNI)

## SAG T1 FS (UNI)

## AX PD FS OBL (UNI)

- Parallel to femoral neck

***CONTRAST ADMINISTRATION**- GADOPENTETATE DIMEGLUMINE (CLARISCAN), 1-15ML GIVEN, INTRA-ARTICULAR, FLUORO INJECTED, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

## LOWER EXTREMITY R/L without contrast (FEMUR)

***ONLY DO LOWER AND UPPER BOTH, IF NEED TO GET JOINT TO JOINT AND CAN'T GET A BIG ENOUGH FOV***OTHERWISE COVER JOINT CLOSEST TO PROBLEM/PAIN AREA*

**COR T2 STIR**
- Through entire pelvis
- FOV 36, SL 4/ 1.6mm

**COR T1 UPPER** (same)

**COR T2 STIR UPPER**
- FOV 36, SL 4/ 1.6mm

**AX T1 UPPER**
- FOV 22, SL 5/ 1.5mm

**AX T2 STIR UPPER**

**SAG T1 UPPER**
- FOV 36, SL 4/ 1.6mm

**SAG T2 FS UPPER**

**COR T1 LOWER**

**COR STIR LOWER**

**AX T1 LOWER**

**AX T2 STIR LOWER**

**SAG T1 LOWER**

**SAG T2 FS LOWER**

***If Fat Suppression is not good on T2 FS, do a T2 Dixon instead and only send the fat suppression image (Water) OR if you do not have Dixon do a STIR**

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

# LOWER EXTREMITY JOINT R/L without contrast (KNEE)

## SAG PD HIGHER

- FOV 14, SL 3/ .3mm
- Center higher, include entire patella suprapatellar recess and entire tibial tubercle
- Cover as much soft tissue as possible without going up in FOV

## SAG T2 FS HIGHER

- BLADE(3T)/ FSE OR TSE
- Copy to Sag PD

## COR T2 FS LOWER

- FOV 14, SL 3/.3mm
- Center right on joint line, include entire patella and entirety of popliteal vessels posteriorly
- Include entire MCL inferiorly, 7cm inferior to joint line

## COR T1 LOWER

## AX T2 FS

- FOV 14, SL 3/.3mm
- Include as much soft tissue as possible in FOV, without going up in FOV
- Include entire patella and entire tibial tubercle

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# LOWER EXTREMITY R/L without contrast (LOWER LEG)

**COR T1**

- FOV 34, SL 3/.9mm, R/L

**COR T2 STIR**

**AX T1**

- FOV 18, SL 4/1.2mm, A/P

**AX T2 FS**

**SAG T1**

- FOV 34, SL 3/.9mm

**SAG T2 STIR**

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

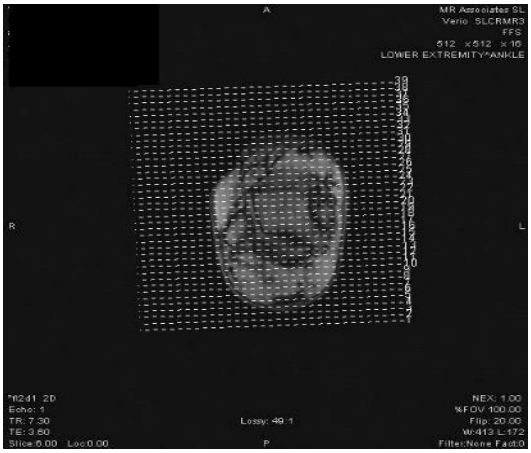
***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

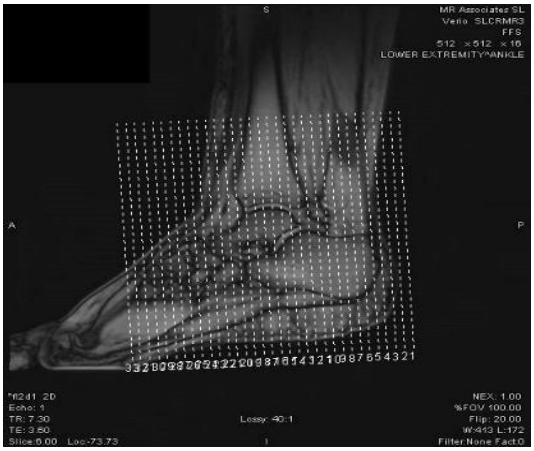
# ***Ankle Imaging Planes***

***Axial***

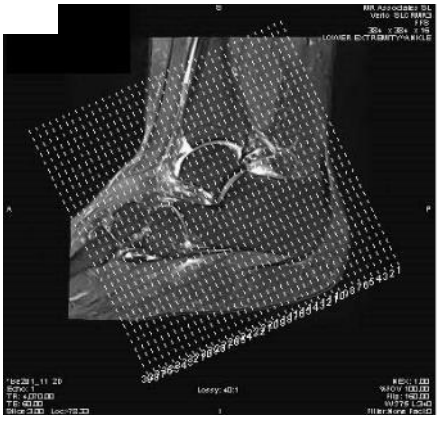
***Axial***



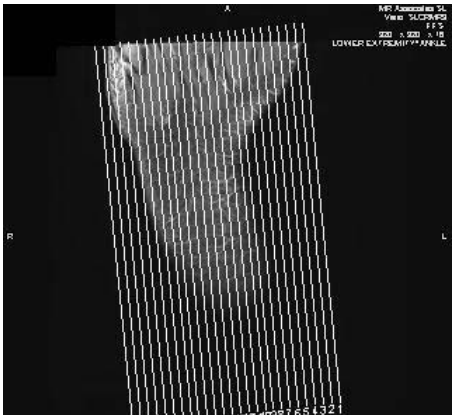
***Coronal - perpendicular to calcaneus***



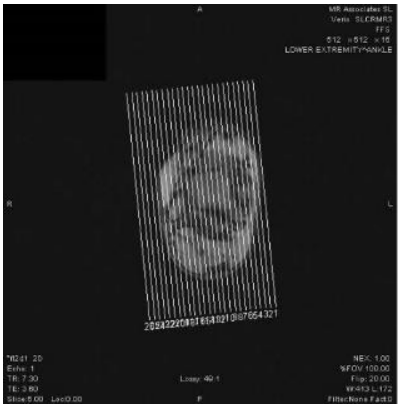
***Coronal - perpendicular to calcaneus***



***Oblique Coronal***



***Sagittal - parallel to calcaneus***



***Sagittal - parallel to calcaneus***

# LOWER EXTREMITY JOINT R/L without contrast (ANKLE/HINDFOOT)

**AX T1**

- FOV 14, SL 3/ .6 mm

**AX T2 FS**

**SAG T1**

- FOV 14, SL 3/ .6 mm
- SET UP OFF AXIAL, ANGLE PARALLEL TO SPACE BETWEEN TIB AND LATERAL MALLEOLUS, MAKE SURE CENTERED IN ALL 3 PLANES

**SAG T2 FS**

**COR T1**

- FOV 14, SL 3.5/ .7 mm
- SET UP OFF AXIAL, ANGLE PERPENDICULAR TO SPACE BETWEEN TIB AND LATERAL MALLEOLUS, MAKE SURE CENTERED IN ALL 3 PLANES

**COR T2 FS**

**AX T2 FS OBL**-OBLIQUE WITH TIBIAL TENDON

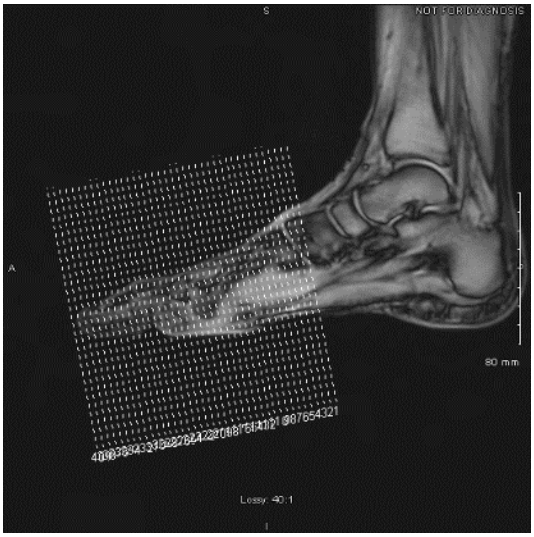
- FOV 14, SL 3/ .6 mm
- SET UP OFF SAG, OBL WITH TIBIAL TENDON, MAKE SURE CENTERED IN ALL 3 PLANES

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

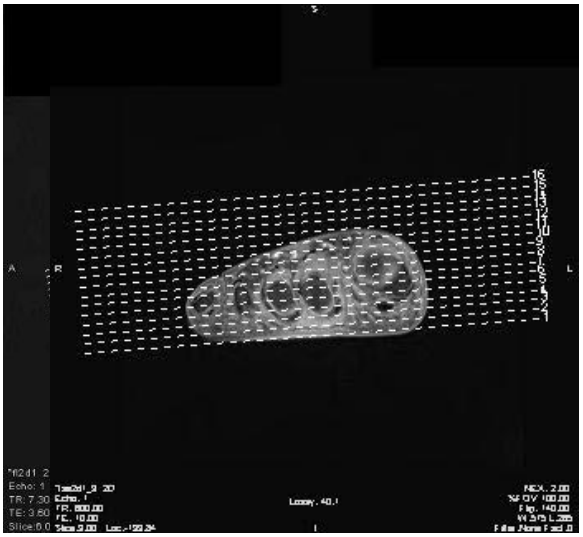
***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

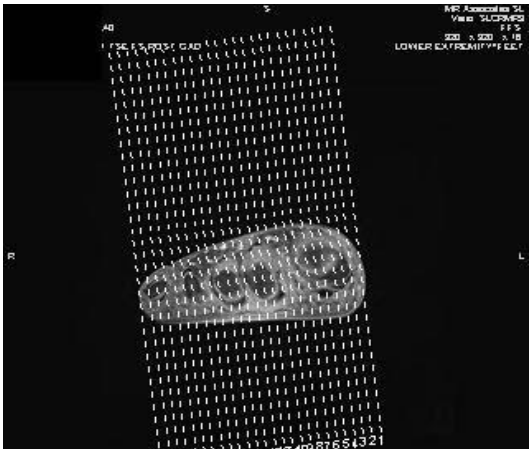
# ***Foot Imaging Planes***




***Axial***



***Coronal***



***Sagittal***

# LOWER EXTREMITY R/L without contrast (FOOT)

**AX T1**

- FOV 12, SL 3.5/.7mm

**AX T2 FS**

**SAG T1**

- FOV 14, SL 3/.6mm

**SAG T2 FS**

**COR T1**

- FOV 14, SL 3/.3mm

**COR T2 FS**

**SAG STIR **for forefoot only****

**(Do COR STIR or SAG STIR if FAT SAT is not good OR can do a DIXON)**

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

****If for neuroma, *ALSO* do an AXIAL T2 STIR PRE through forefoot****
****FOREFOOT ONLY- Do SAG STIR instead of SAG T2 FS****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# PELVIS without contrast

**COR T2 STIR**

**COR T1**

**AX T2 FS**

- COVER ABOVE CREST THROUGH THE LESSER TROCHANTER

**AX T1**

**SAG T2 FS SMALL FOV**

- TSE/FSE Sequence
- MAKE SURE GET HIP TO HIP, AND BELOW SCROTUM TO TOP SACRUM
- FOV 22, SL 4/ 1.0mm

**SAG T1**

- OPTIONAL, ASK RAD

**SAG T2 FS**

- OPTIONAL, ASK RAD

*IF HAVING TROUBLE WITH FAT SUPPRESSION ON T2 FS, DO A DIXON AND SEND ONLY THE WATER IMAGE(FS)

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# PELVIS without contrast (SACRUM/COCCYX)

**COR T2 STIR OBL**

- FOV 24, SL 3/ .3mm
- Angle with sacrum

**COR T1**

**AX T2 FS OBL**

- FOV 22, SL 3/ 1.0mm
- Angle with sacrum

**AX T1 OBL**

**SAG T1 (SACRAL FX ONLY)**

- FOV 24, SL 3/ .3mm

**SAG STIR (SACRAL FX ONLY)**

****If for mass, refer to mass protocol for all extremities on page 23****
**** If for osteomyelitis/infection, refer to osteomyelitis protocol for all extremities on page 24****

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# PELVIS without contrast
# (SPORTS HERNIA)

****Have pt. empty bladder before scan ****

**LOC**

**COR T2 STIR**

- Large FOV, cover from crest down thru scrotum, get anterior enough
- FOV 38, SL 4/1.2mm

**COR T1**

- TSE/ FSE Sequence
- Copy lines to COR T2

**AX T2 FS**

- TSE/FSE Sequence
- Large FOV, cover from scrotum to crest
- FOV 36, SL 5/1.5mm

**AX T1**

- TSE/FSE Sequence
- Copy lines to AX T2

**SAG T2 FS**

- TSE/FSE Sequence
- Make sure get hip to hip, and below scrotum to top of sacrum
- FOV 22, SL 4/ 1.0mm

**SAG T1**

- TSE/FSE Sequence
- Copy lines to SAG T2

**AX T2 FS OBL**

- TSE/FSE Sequence
- Small FOV, set up off Sag, angle lines parallel with pelvic wing (arcuate line), make sure get pubs anterior and posterior
- FOV 22, SL 3/ 1.0mm

**AX T1 OBL**

- TSE/FSE Sequence
- Copy lines to AX T2 OBL

# PELVIS with and without contrast
# (FEMALE PELVIS)(UTERUS/FIBROIDS)

***ON BREATHHOLD SEQUENCES, SCAN ON EXPIRATION**
***MONITOR THAT PATIENT IS BREATH-HOLDING. BREATHE PATIENT SLOWLY SO THEY HAVE TIME TO FOLLOW INSTRUCTIONS. DO NOT START SCAN UNTIL PATIENT HAS STOPPED BREATHING.**

### COR T2 NON FS FREEBREATHING NAVIGATOR

- HASTE (SEIMENS) FREEBREATHING NAVIGATOR SERIES
- FOV 40, Cover from top of kidneys through pelvis, *make sure to get top of kidneys ON*
- Cover sacrum to anterior abdominal wall

### SAG T2 NON FS

- BLADE(3T(Siemens) OR FSE
- Use Superior Sat Band for motion
- FOV 20-24mm, SL 4/ 1.2mm, A/P
- Cover mid femoral head to mid femoral head, include labia/perineum, STRAIGHT

### AX T1 STRAIGHT

- FOV 20-24mm, SL 4/1.2mm, R/L
- TSE(3T)/FSE(1.5T)
- Use Superior Sat Band for motion
- Scan iliac crest to perineum, make sure get labia/perineum, STRAIGHT

### AX T2 NON FS STRAIGHT

- BLADE(Siemens) OR FSE
- Copy to Ax T1
- Use Superior Sat Band for motion

### COR T2 FS STRAIGHT

- BLADE (Siemens) or FSE/TSE
- FOV 20-24, SL 5/1.5mm, R/L
- Use Superior Sat Band for motion
- Cover sacrum to anterior abdominal wall, include labia/perineum, STRAIGHT

### AX DWI

- Match scan parameters for AX T1

### AX T1 VIBE FS PRE (BH) STRAIGHT

- FOV 24-26mm, SL 3/0mm, R/L (Copy FOV to AX T1)
- Make sure include labia/perineum, STRAIGHT
- Use Superior Sat Band for motion
- BREATHHOLD, SCAN ON EXPIRATION

***OPTIONAL____**

**(Do ONLY FOR UTERINE/MULLERIAN ANOMALY)**

### COR OBLIQUE T2 NON FS *OPTIONAL*

- BLADE (Siemens) or FSE/TSE, FOV 20-24mm, R/L
- Use Superior Sat Band for motion
- Scan from top of uterus to perineum, slices should be along the LENGTH of the uterus
- CALL RAD FOR PLANNING!

### AX OBLIQUE T2 NON FS OPTIONAL

- BLADE (Siemens) or FSE/TSE, FOV 20-24mm, R/L
- Use Superior Sat Band for motion
- Slices should be along the SHORT AXIS of uterus.
- CALL RAD FOR PLANNING!

# PELVIS with and without contrast
# (FEMALE PELVIS)(UTERUS/FIBROIDS) continued…

**POST CONTRAST----**

**AX T1 VIBE FS POST (BH) STRAIGHT**

- Copy parameters to AX VIBE PRE
- BREATHHOLD, SCAN ON EXPIRATION

**SAG T1 VIBE FS POST (BH) STRAIGHT**

- FOV 20-24mm, SL 3/0mm, A/P
- Use Superior Sat Band for motion
- BREATHHOLD, SCAN ON EXPIRATION

**COR T1 VIBE FS POST (BH) STRAIGHT**

- FOV 20-24mm, SL 3/0mm, F/H
- Use Superior Sat Band for motion
- BREATHHOLD, SCAN ON EXPIRATION

## (CERVICAL CANCER ADDITIONAL IMAGING PROTOCOL)

**Same as female pelvis protocol PLUS:**

**AX T2 OBL NON FS (image a set up, image b is what it should look like)**

- SMALL FOV 250-ANGLE WITH SHORT AXIS OF CERVIX STRIPE
- COVER THROUGH ALL OF UTERUS, OVARIES, VAGINA, AND ANY MASSES

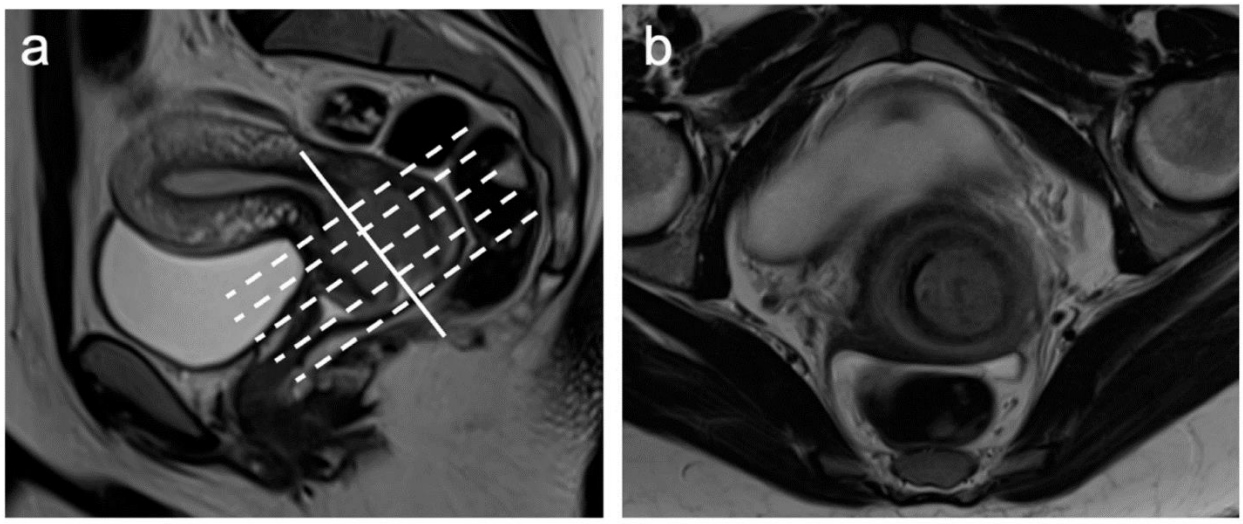
**COR T2 OBL NON FS**

- SMALL FOV 220-ANGLE WITH LONG AXIS OF CERVIX
- COVER THROUGH ALL OF UTERUS, OVARIES, VAGINA, AND ANY MASSES

**AX DWI OBL**

- SMALL FOV 250- COPY TO AX T2 OBL NON FS

small FOV T2 non-fat sat oblique axial through the cervix



**PELVIS with and without contrast**
**(PROSTATE)**

*****THE FOLLOWING DOCUMENTATION REQUIREMENTS- DOCUMENTS SHOULD BE SCANNED INTO THE PACS WITH THE EXAM IMAGES FOR RADIOLOGIST REVIEW:**

**FOR SCREENING EXAM OR UNTREATED PROSTATE CANCER**

1. **ALL AVAILABLE PRIOR PSA VALUES**
2. **PROSTATE BIOPSY RESULTS WITH THE PROSTATE SECTOR MAP**

**FOR EXAMS FOLLOWING TREATMENT TO EVALUATE FOR RECURRENCE**

1. **CLINIC NOTE WITH THE TREATMENT HISTORY FOR PROSTATE CA**
2. **ALL AVAILABLE PSA VALUES**
3. **ANY RECENT PERTINENT BIOPSY RESULTS**

**Patient prep:**

1. **Wait 6-12 weeks after prostate biopsy or procedure to minimize hemorrhage in imaging.**
2. **Home administered micro enema morning of 1 hour prior to exam. MUST BE DONE OR PT WILL BE R/S**
3. **Avoid ejaculation for 72 hours prior to exam to distend seminal vesicles. (Optional-can still scan pt. if not done)**
4. **Evacuate rectum immediately prior to exam preferred. (Optional-can still scan pt. if not done)**
5. **Light meal on day of exam and no caffeine preferred. (Optional- can still scan pt. if not done)**

**Power Injector- injection rate 2-3cc/sec**
**DO ON 1.5T if patient has hip replacements**

## PELVIS with and without contrast (PROSTATE) continued…

**2 Protocol options:** IF pt does NOT have a hx of prostate cancer and PSA < 10- omit AX T1 LARGE FOV AND DWI LARGE FOV

IF pt DOES have a hx of prostate cancer and/OR PSA > 10, biopsy proven prostate ca, do the WHOLE PROTOCOL

### AX T1 LARGE FOV

- Whole pelvis with larger FOV to include pelvic sidewalls. Extend from common iliac bifurcation through symphysis pubs
- FOV 38, SL 5/1.5 mm

### AX DIFFUSION LARGE FOV

- Whole pelvis same FOV as T1 (copy parameter from Axial T1)

### AX T1 SMALL FOV

- Set up straight, Include seminal vesicles and extend through entire prostate
- FOV 16, SL 2/0 mm (FOV can be between 12-20cm)

### AX T2 SMALL FOV

- Copy parameters above

### SAG T2 SMALL FOV

- Include seminal vesicles and extend through entire prostate
- FOV 16, SL 3/0mm

### COR T2 SMALL FOV

- Set up lines off of sagittal midline images, straight
- FOV 16 , SL 3/0mm
- Include seminal vesicles and extend through entire prostate

### AX DIFFUSION 50-800,

- 2 B Values-50-800
- FOV 23, SL 4/0 mm
- Copy slice position ONLY from other small FOV axials, not slice thickness

### AX DIFFUSION 50-1500

- 2 B Values-50-1500
- FOV 23, SL 4/0 mm
- Copy slice position from other ax diffusion

### AX T1 FS FL 3D DYNAMIC POST

- Vibe Sequence
- Inject and wait til 5$^{th}$ measurement to start scan (25 measurements)
- Cover same as other axials

### AX T1 FS POST LARGE FOV

- Copy to pre

** If having trouble with Fat suppression, use a DIXON series**

***DO EXAM ON 1.5T IF PT HAS JOINT REPLACEMENT***

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - POWER INJECTED, TIME-ONCE REVISED 10/01/2024 HM

# PELVIS with and without contrast

# (PROSTATE) (**1.5T WITH METALLIC IMPLANTS**)

**2 Protocol options:** IF pt does NOT have a hx of prostate cancer and PSA < 10-omit AX T1 LARGE FOV AND DWI LARGE FOV

IF pt DOES have a hx of prostate cancer and/OR PSA > 10, biopsy proven prostate ca, do the WHOLE PROTOCOL

## AX T1 LARGE FOV

- Whole pelvis with larger FOV to include pelvic sidewalls. Extend from common iliac bifurcation through symphysis pubs
- FOV 38, SL 5/1.5 mm

## AX DIFFUSION LARGE FOV

- Whole pelvis same FOV as T1 (copy parameter from Axial T1)

## AX T1 SMALL FOV

- Set up straight, Include seminal vesicles and extend through entire prostate
- FOV 16, SL 3/0 mm (FOV can be between 12-20cm)

## AX T2 (MARS or WARP) SMALL FOV

- Copy parameters above
- Metal suppression sequence

## AX T2 SMALL FOV(OPT)

- Copy parameters above

***-IF GETTING LOTS OF ARTIFACT, USE METAL ARTIFACT REDUCTION SOFTWARE (AKA: WARP OR MARS) FOR: SAG T2 SMALL FOV AND COR T2 SMALL FOV SEQUENCES-***

## SAG T2 SMALL FOV

- Include seminal vesicles and extend through entire prostate
- FOV 16, SL 3/0mm

## COR T2 SMALL FOV

- Set up lines off of sagittal midline images, straight
- FOV 16, SL 3/0mm
- Include seminal vesicles and extend through entire prostate

## AX DIFFUSION 50-800,

- 2 B Values-50-800
- FOV 23, SL 4/0 mm
- Copy slice position ONLY from other small FOV axials, not slice thickness

## AX DIFFUSION 50-1500

- 2 B Values-50-1500
- FOV 23, SL 4/0 mm
- Copy slice position from other ax diffusion

## AX T1 FL 3D DYNAMIC POST

- Vibe Sequence, **USE DIXON SEQUENCES SO THAT YOU HAVE FS AND NON FS IMAGES AND SEND BOTH, if you do not have DIXON do NON FS only**
- Inject and wait til 5th measurement to start scan (25 measurements)
- Cover same as other axials

## AX T1 FS POST LARGE FOV

- Copy to pre

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - POWER INJECTED, TIME-ONCE

REVISED 10/01/2024 HM

# PELVIS with and without contrast (RECTUM)

**** Call nurse to give glucagon, when pt is on table ready to go in tube to start scan.**

**All scans should be checked by one of the abdominal specialty trained radiologists prior to completing exam.

**Colonoscopy report must be scanned in with paperwork.

**LOCALIZER 3 PLANE**

- FOV 40cm

**SAG T2 NON FS STRAIGHT**

- TSE OR BLADE (Siemens), TSE (Philips), or FSE (GE)
- FOV 22cm, PHASE ENCODE: A/P

**AX T1 NON FS STRAIGHT**

- DIXON (Siemens) Non FS(Make sure send correct series, Non FS)
- FOV 22cm, PHASE ENCODE: R/L
- Coverage: From common iliac bifurcation through ischial tuberosities

**AX T2 NON FS STRAIGHT**

- TSE OR BLADE (Siemens), TSE (Philips), or FSE (GE)
- FOV 22cm, PHASE ENCODE: Transverse R/L

**COR T2 NON FS STRAIGHT**

- BLADE OR FSE (Siemens), TSE (Philips), FSE (GE)
- FOV 22cm, PHASE ENCODE: Transverse F/H

**AX T1 OBL NON FS HIGH RESOLUTION (REFER TO IMAGE #1)**

- TSE OR FSE, Non FS
- Angle perpendicular to long axis of the tumor, set up off Sagital, If rectum curves where tumor is located, then 2nd set of AX T2 images should be obtained
- FOV 20cm, SL 3/0mm, PHASE ENCODE: R/L, Sat band superior
- Matrix 350 x 320

**AX T2 OBL HIGH RESOLUTION (REFER TO IMAGE #1)**

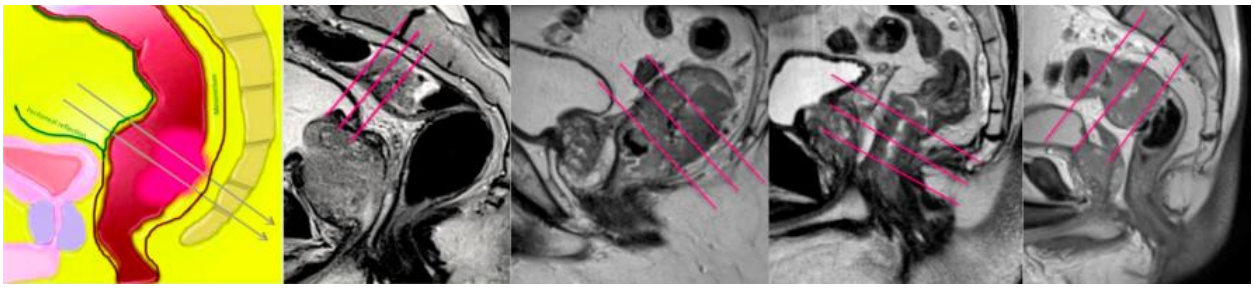
- TSE OR FSE, Non FS
- (same parameters as above, SL 3/0mm) Copy T1 OBL
- Angle perpendicular to long axis of the tumor, set up off Sagital, If rectum curves where tumor is located, then 2nd set of AX T2 images should be obtained

***(OPT)AX T2 OBL HIGH RES 2nd SET for LOW RECTAL TUMORS* (REFER TO IMAGE #1)**

- TSE OR FSE, FOV: 20cm, 350 x 320 matrix, phase encode: R/L
- Do when rectal tumor is within 5cm of anal sphincter
- Oblique perpendicular to the LONG AXIS of tumor

Perpendicular to the long axis of the tumor. If the rectum curves where the tumor is located, then a second set of axial T2 images should be obtained.

**IMAGE #1**



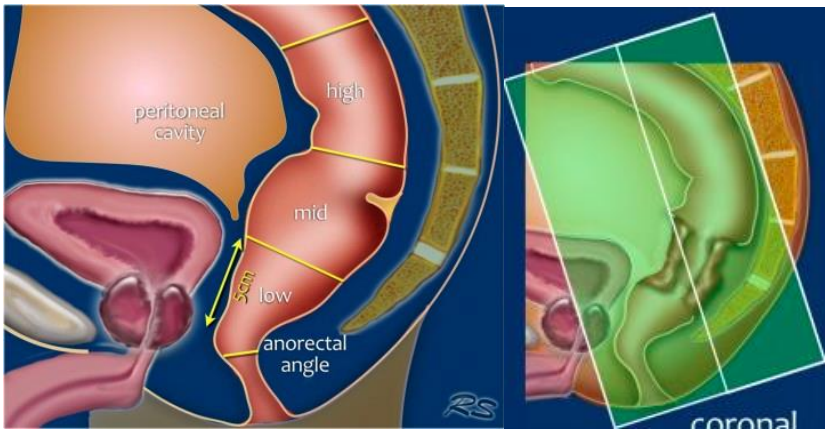
# PELVIS with and without contrast (RECTUM) continued…

***(OPT)COR T2 OBL HIGH RES 2nd SET for LOW RECTAL TUMORS* (REFER TO IMAGE #2)**

- TSE OR FSE, SL 3/0mm
- Do when rectal tumor is within 5cm of anal sphincter
- Oblique along the LONG AXIS of anal canal

For low rectal tumors, within 5 cm of the anal sphincter*
Oblique T2 along the long axis of the anal canal , phase encode: transverse

**IMAGE #2**




**AX DIFFUSION W/ ADC**

- ADC values, b values 50,400, 800
- FOV 25cm, PHASE ENCODE: A/P

**AX 3D T1 FS PRE**

- GRE, VIBE (Siemens), THRIVE (Philips), or FAME (GE)
- FOV 24cm, 1MM SLICES, (ISOTROPIC .8 X .8 X .8) PHASE ENCODE: A/P

***GIVE CONTRAST, HAND INJECT, THEN CONTINUE SCANNING***

**AX 3D T1 FS POST**

- GRE, VIBE (Siemens), THRIVE (Philips), or FAME (GE)
- Copy center to pre axial, NOT slices, same coverage as AX T1 STRAIGHT

**SAG 3D T1 FS POST**

- GRE, VIBE (Siemens), THRIVE (Philips), or FAME (GE)
- Copy center to pre T1 Sag, NOT slices, same coverage as SAG T2 STRAIGHT

**COR T1 FS POST**

- GRE, VIBE (Siemens), THRIVE (Philips), or FAME (GE)
- Copy center to pre T1 Cor, NOT slices, same coverage as COR T2 STRAIGHT

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

***MEDICATION ADMINISTRATION**- GLUCAGON 1MG IM

Reviewed 10/01/2024 HM

# PELVIS with and without contrast
# (ANAL/RECTAL FISTULA/PERI-RECTAL ABSCESS)

*Include from gluteal fold to through rectum*

**LOCALIZER 3 PLANE**

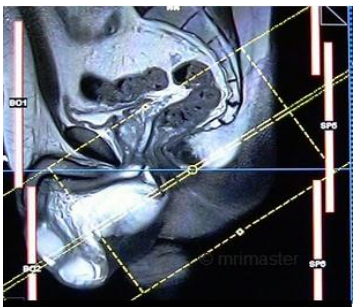
- FOV 40

**SAG T2 NON FS**

- TSE or FSE
- FOV 22, SL 3.5/.6mm- 26 slices
- A/P, phase FOV 100%, phase oversampling 43%
- Cover straight lines perpendicular between hip jts, L/R, include all perineum in FOV

**AX T2 OBL FS**

- TSE or FSE
- FOV 23, SL 3.5/.6mm-46
- R/L, phase FOV 100%, phase oversampling 80%
- Scan perpendicular to anal canal, cover from acetabular roof through perineum

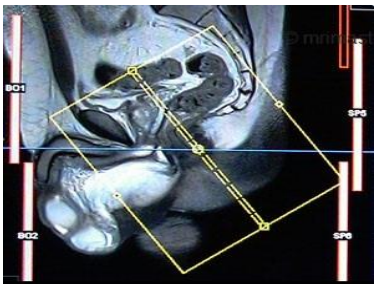

Ax Coverage- Scan perpendicular to anal canal. Cover from acetabular roof through perineum.

**AX T2 OBL NON FS**

- Copy to previous AX T2

**COR T2 OBL NON FS**

- TSE OR FSE
- FOV 23, SL 3.5/.6mm-50 slices
- R/L, phase FOV 100%, phase oversampling 80%
- Scan parallel to anal canal, include entire perineum in FOV


Coronal Coverage- Scan parallel to anal canal. Include the entire perineum in the FOV.

**AX T1 OBL (NON FS)**

- Copy to AX T2

**AX T1 3D VIBE DIXON PRE**

- FOV 23, SL 2.2/0mm- slab 104 slices
- A/P, phase FOV 100%, slice oversampling 100%
- Copy AX T2 center of slices only, and adjust to have similar coverage as AX T2
- Send ONLY the water image (should look FS) FOR DIXON SERIES

**HAND INJECT---**

**AX T1 3D VIBE DIXON POST**

- Copy pre
- Send ONLY the water image (should look FS)

**COR T1 3D VIBE DIXON POST**

- FOV 23, SL 3/0mm- slab 80 slices
- R/L, phase FOV 102.5%, phase oversampling 100%
- Free breathing, cover similar to COR T2
- Send ONLY the water image (should look FS) FOR DIXON SERIES

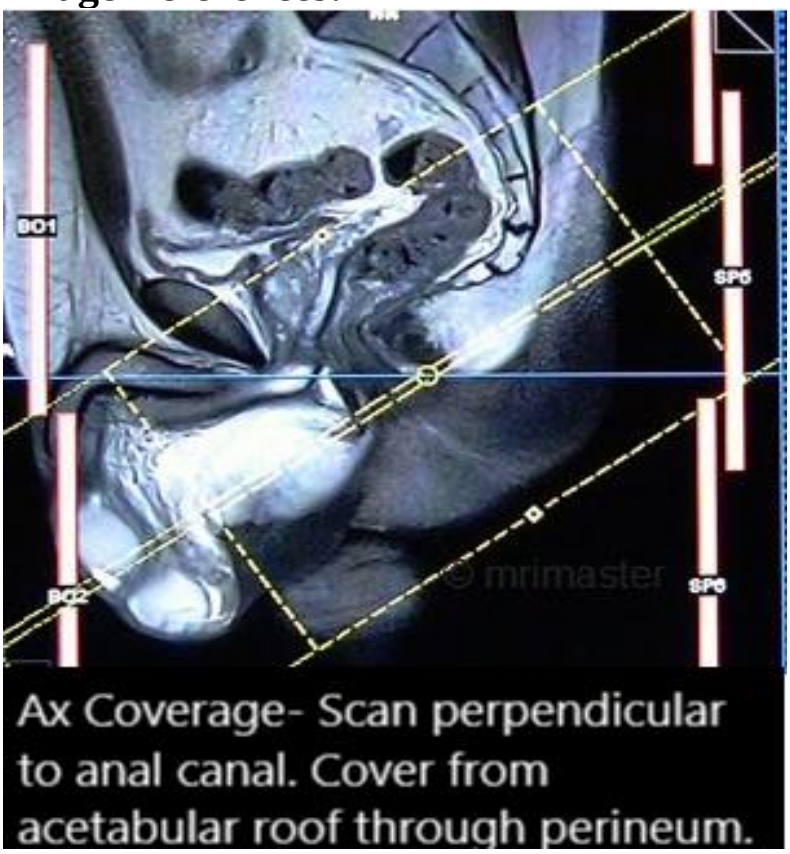
**SAG T1 3D VIBE DIXON POST**

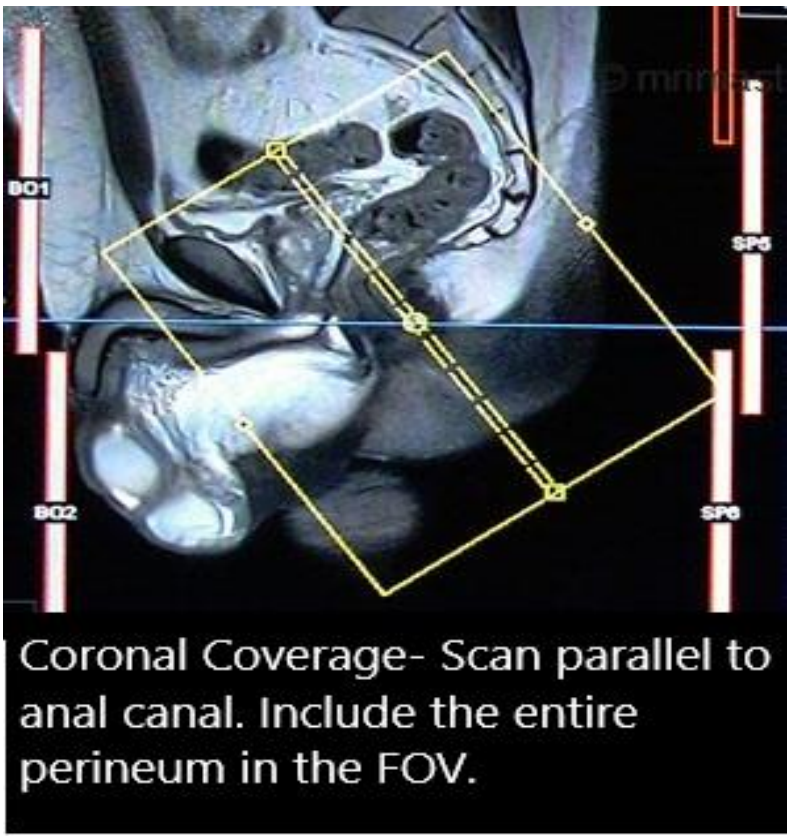
- FOV 23, SL 3/0mm-slab 64 slices
- A/P, phase FOV 102.5%, phase oversampling 100%
- Free breathing, cover similar to SAG T2
- Send ONLY the water image (should look FS) FOR DIXON SERIES

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE Reviewed 10/01/2024 HM

**PELVIS with and without contrast**
**(ANAL/RECTAL FISTULA/PERI-RECTAL ABSCESS) continued…**

## Image References:



# ***SPINE PROTOCOLS***

## CERVICAL without contrast (ROUTINE/DISC DISEASE/DEGENERATIVE DISEASE)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS **

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials and right and left obliques :
    - MPR AX T2- 1 x1mm of entire SPACE data set parallel to mid lower cervical disks
    - 2-MPR OBL SAG T2-1 x1 mm,one through right and one through left foramina (angled 30 degrees from midsagittal plane, perp. to foramina)

**SAG T2**

- 3 mm, skip 0.3 mm, TSE sequence(3T)/FSE (1.5T)

**SAG T1**

- 3 mm, skip 0.3 mm, FLAIR or TSE sequence(3T)/ FSE(1.5T)

**SAG STIR**

**AX T2**

- 3 mm, skip 0.3 mm, TSE(3T) sequence/FSE(3T)

OPTIONAL :

**SAG T2 BLADE**

**OBL SAG T2 right** (if 3D SPACE T2 or similar sequence unavailable)

- 3 mm, skip 0.3 mm, TSE sequence(3T)/FSE (1.5T)
- through right foramina (angled 30$^{o}$ from midsagittal plane, perp. to right foramina)

**OBL SAG T2 left** (if 3D SPACE T2 or similar sequence unavailable)

- 3 mm, skip 0.3 mm, TSE sequence(3T)/FSE (1.5T)
- through left foramina (angled 30$^{o}$ from midsagittal plane, perp. to left foramina)

# CERVICAL with and/or without contrast (MS)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS **

**SAG T2**

**SAG T1**

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials and right and left obliques :
    - MPR AX T2- 1 x1mm of entire SPACE data set parallel to mid lower cervical disks
    - 2-MPR OBL SAG T2-1 x1 mm,one through right and one through left foramina (angled 30 degrees from midsagittal plane, perp. to foramina)

**SAG STIR**

**AX T2**

*ASK RADIOLOGIST IF NEED CONTRAST DEPENDING ON KNOWN MS/SURVEILLANCE OR R/O MS*

**SAG T1 POST**

**AX T1 POST**

OPTIONAL :

SAG T2 BLADE

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# CERVICAL with and/or without contrast (INFECTION/INTRADURAL METS/MASS)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS **

**SAG T2**
**SAG T1**
**SAG STIR**
**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials and right and left obliques :
    - MPR AX T2- 1 x1mm of entire SPACE data set parallel to mid lower cervical disks
    - 2-MPR OBL SAG T2-1 x1 mm,one through right and one through left foramina (angled 30 degrees from midsagittal plane, perp. to foramina)

**AX T2**
**AX T1**
**SAG T1 FS POST**
**AX T1 FS POST**

OPTIONAL :

SAG T2 BLADE

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# CERVICAL without contrast (TRAUMA)

***-Do when recent/acute MVA, fall, hx of fracture, cord injury, or hemorrhage w/in last month***

**DO NOT SEND ANY SCOUTS AND LOCALIZERS **

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials and right and left obliques :
    - MPR AX T2- 1 x1mm of entire SPACE data set parallel to mid lower cervical disks
    - 2-MPR OBL SAG T2-1 x1 mm,one through right and one through left foramina (angled 30 degrees from midsagittal plane, perp. to foramina)

**SAG T2**

**SAG T1**

**SAG STIR**

**SAG T2 GRE**

- MEDIC(3T) /Gradient Echo

**AX T2**-make sure start at skull base to get all of C1 & C2

**AX T1**-make sure start at skull base to get all of C1 & C2

OPT:

SAG T2 BLADE

REVIEWED 10/01/2024 BLH

# THORACIC without contrast (ROUTINE/DISC DISEASE/DEGENERATIVE DISEASE)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid thoracic disks)

**SAG T2**

- 3mm, skip 0.3 mm, TSE (3T)/FSE (1.5T)

**SAG T1**

- 3 mm, skip 0.3 mm, FLAIR(3T)/FSE(1.5T)

**SAG STIR**

**AX T2**

- Do axials through any abnormalities seen on sags
- 3 mm, skip 0.3 mm, TSE(3T)/FSE(1.5T)

**AX T1**

- Do axials through any abnormalities seen on sags
- 3 mm, skip 0.3 mm, TSE(3T)/FSE(1.5T)

OPT:

SAG T2 BLADE

REVIEWED 10/01/2024 BLH

# THORACIC with and/or without contrast (MS)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2**

- 3mm, skip 0.3 mm, TSE (3T)/FSE (1.5T)

**SAG T1**

- 3 mm, skip 0.3 mm, FLAIR(3T)/FSE(1.5T)

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid thoracic disks)

**SAG STIR**

**AX T2**

- Do axials through any abnormalities seen on sags
- 3 mm, skip 0.3 mm, TSE(3T)/FSE(1.5T)

**AX T1**

- Do axials through any abnormalities seen on sags
- 3 mm, skip 0.3 mm, TSE(3T)/FSE(1.5T)

*ASK RADIOLOGIST IF NEED CONTRAST DEPENDING ON KNOWN MS/SURVEILLANCE OR R/O MS*

**SAG T1 POST**

**AX T1 POST**

- If contrast given, do axials to match pre

OPTIONAL:

SAG T2 BLADE

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# THORACIC with and without contrast (INFECTION/INTRADURAL METS/MASS)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2**

**SAG T1**

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid thoracic disks)

**SAG STIR**

**AX T2**

- Do axials through any abnormalities seen on sags

**AX T1**

- Do axials through any abnormalities seen on sags

**SAG T1 FS POST**

**AX T1 FS POST**

- Do axials to match pre

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# THORACIC without contrast (TRAUMA)

***-Do when recent/acute MVA, fall, hx of fx, cord injury, or hemorrhage w/in last month***

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2**

**SAG T1**

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid thoracic disks)

**SAG STIR**

**AX T2**

- Call Radiologist and see what they want for axials

**AX T1**

- Call Radiologist and see what they want for axials

OPTIONAL:

SAG T2 BLADE

REVIEWED 10/01/2024 BLH

# LUMBAR without contrast (ROUTINE/DISC DISEASE/DEGENERATIVE DISEASE)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid lumbar disks)

**SAG T2**

- 3mm, skip 0.3 mm, TSE (3T)/FSE (1.5T)

**SAG T1**

- 3 mm, skip 0.3 mm, FLAIR(3T)/FSE(1.5T)

**SAG STIR**

**AX T2**

- 3 mm, skip 0.3 mm, TSE(3T)/FSE(1.5T)
- Cover all 5 disc levels in one series, unless unable to angle well (then do 2 separate sets, depending on angle of discs)

**AX T1**

- 3 mm, skip 0.3 mm, TSE(3T)/FSE(1.5T)
- Lower 3 levels unless surgery above L3 or uncertain, or if pathology seen above L3

**AX T2 UPPER LEVEL** (if need to do a 2nd set due to angle of discs)

Lumbar spine MRI for disc disease: Obtain the axial T2 images all in one series whenever possible. These should typically be performed in 3 slabs angled parallel to the disks in each slab, pedicle-to-pedicle (eg, 1st slab: L1 pedicle-L3 pedicle, 2nd slab: L3 pedicle-L4 pedicle, 3rd slab: L4 pedicle to mid-sacrum). This will help avoid skipping over disc fragments behind vertebral bodies or in the foramina, as can occur when angling through each disc separately. The slabs should be tailored to each patient, ie, in patients with steep angle of the L5-S1 disc, the lowest slab should be L5 pedicle to mid-sacrum, to stay near-parallel to the disc. (On 3T MR units, the T2 axials may need to be obtained as two separate series.) Axial T1 images should match the axial T2 images in slice position, angle, etc., but do not need to routinely include L1-L3, unless there has been surgery in that region, level of prior surgery is uncertain, or if pathology is seen in that region.

REVIEWED 10/01/2024 BLH

# LUMBAR with and without contrast
# (PRIOR LSPINE SURGERY)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid lumbar disks)

**SAG T2**

**SAG T1**

- T1 FLAIR(3T)/FSE(1.5T)

**SAG STIR**

**AX T2**

- TSE(3T)/FSE(1.5T)
- Cover all 5 disc levels in one series, unless unable to angle well (then do 2 separate sets depending on angle of discs)

**AX T1**

- TSE(3T)/FSE(1.5T)
- Lower 3 levels unless surgery above L3 or uncertain, or if pathology seen above L3

**AX T2 UPPER LEVEL** (opt) if need to do a 2nd set due to angle of discs

****Post Contrast only if had other back surgery than fusion and/or above fusion****

**SAG T1 FS POST**

**AX T1 POST**

- Match axial pre's

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

Lumbar spine MRI for disc disease: Obtain the axial T2 images all in one series whenever possible. These should typically be performed in 3 slabs angled parallel to the disks in each slab, pedicle-to-pedicle (eg, 1st slab: L1 pedicle-L3 pedicle, 2nd slab: L3 pedicle-L4 pedicle, 3rd slab: L4 pedicle to mid-sacrum). This will help avoid skipping over disc fragments behind vertebral bodies or in the foramina, as can occur when angling through each disc separately. The slabs should be tailored to each patient, ie, in patients with steep angle of the L5-S1 disc, the lowest slab should be L5 pedicle to mid-sacrum, to stay near parallel to the disc. (On 3T MR units, the T2 axials may need to be obtained as two separate series.) Axial T1 images should match the axial T2 images in slice position, angle, etc., but do not need to routinely include L1-L3, unless there has been surgery in that region, level of prior surgery is uncertain, or if pathology is seen in that region.

# LUMBAR with and without contrast (INFECTION/INTRADURAL METS/MASS)

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid lumbar disks)

**SAG T2**
**SAG T1**
**SAG STIR**
**AX T2**
**AX T1**
**SAG T1 FS POST**
**AX T1 FS POST**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# LUMBAR without contrast (TRAUMA)

***-Do when recent/acute MVA, fall, hx of fx, cord injury, or hemorrhage w/in last month***

**DO NOT SEND ANY SCOUTS AND LOCALIZERS EXCEPT COMPOSED WHOLE SPINE VIEW**

**SAG T1 COUNTING LOC C/T/LSPINE** - LOCALIZER OF COMPLETE SPINE WITH MARKERS FOR COUNTING PURPOSES – if cannot compose into a whole spine series, the same marker must be visible on both SAG series for counting

**SAG T2**

**SAG T1**

**SAG T2 3D SPACE**

- 3D Volumetric sequence (where available)
- 1 x 1 mm, isotropic voxels
- Do reformats in axials :
    - MPR AX T2- 1 x1mm of entire SPACE data set (angle parallel to mid lumbar disks)

**SAG STIR**

**AX T2**

**AX T1**

***Note:*** for axials do a slab covering entire Lumbar spine, may go to 4mm or 5mm slice thickness. However, if there are abnormal discs spaces you will still need to do axials parallel through those.

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# PELVIS with and without contrast (LUMBAR PLEXUS)

## COR T1

- FLAIR(3T)/FSE(1.5T)
- Cover from above conus through sacrum/coccyx, ant. to post. and sup. to inf.

## COR T2 FS

- TSE(3T)/FSE(1.5T)
- Copy above

## AX T2 FS

- TSE(3T)/FSE(1.5T)
- Cover from above conus through sacrum/coccyx

## AX T1

- TSE(3T)/FSE(1.5T)
- Copy above

## COR T2 OBL FS (or STIR)

- TSE(3T)/FSE(1.5T)
- Just through Sacrum/Coccyx, parallel to Sacrum

## COR T1 OBL

- FLAIR(3T)/FSE(1.5T)
- Copy above, parallel to Sacrum

## COR T1 FS POST

- Copy pre

## AX T1 FS POST

- Copy pre

## COR T1 OBL FS POST

- Copy pre

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# ***Head Protocols***

## HEAD without contrast (Adult and Peds Routine Head without)

**DO NOT SEND ANY LOCALIZERS ON ANY HEADS**

### SAG T1

- T1 FLAIR, TSE, or FSE sequence
- FOV 23, SL 4/ 1.2mm
- Make sure cover side to side all the way through brain

### AX T2 FLAIR FAT SAT

- FOV 22, SL 4/ 1.2mm

### AX DWI

- B0, 2000
- FOV 23, SL 4/1.2mm
- Slice angle and position should match Ax FLAIR and T2
- Do not copy slice angle and position on 3T however, due to P/F swaps and artifact

### AX T2 GRE or SWI

- STAR (HEMO) Gradient echo
- FOV 22, SL 5/ 1.0mm (1.5T), SL 1.5/ 0mm (3T)

### AX T2

- FSE or TSE sequence
- FOV 22, SL 4/ 1.2mm

### COR T2

- SSFSE (SINGLE SHOT FAST SPIN ECHO) OR HASTE

***IF FOR PEDIATRIC PATIENTS (17 YRS OR YOUNGER), REPLACE SAG T1 WITH T1 AX MPRAGE AND REFORMAT****

OPT, for moving patient:

AX T2

- SSFSE or HASTE

SAG T2

- SSFSE OR HASTE

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# HEAD without contrast (MOVING PATIENT/FAST HEAD)

## SAG T1

- 256 x160 Matrix/ 1 NEX
- Make sure cover side to side all the way through brain

## AX DWI

## AX T2 FLAIR

- PROPELLER (1.5T) or BLADE
- 256 X 160 Matrix/ ¾ Phase FOV

## AX T2

- SSFSE (SINGLE SHOT FAST SPIN ECHO) or HASTE

## COR T2

- SSFSE OR HASTE

## SAG T2

- SSFSE OR HASTE

## AX GRE

- 256 x 160 Matrix/ ¾ Phase FOV/ 1 NEX

## w/wo add:

## AX T1 PRE

- FLASH
- 256 x 160/ 1 NEX/ ¾ FOV

## AX T1 FS POST

- FLASH
- Same parameters as pre

## COR T1 FS POST

- FLASH
- 256 x 160/ 1 NEX/ ¾ FOV

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# HEAD with and without contrast (Adult and Peds Routine Head Gd)

**DO NOT SEND ANY LOCALIZERS ON ANY HEADS**

### AX T1

- T1 SE,TSE, or FLAIR(3TSiemens)
- FOV 22, SL 4/ 1.2mm

### AX T2 FLAIR FAT SAT

- FOV 22, SL 4/ 1.2mm

### AX DWI

- B0, 2000
- FOV 23, SL 4/1.2mm
- Slice angle and position should match Ax FLAIR and T2

## POST CONTRAST----------

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

### AX T2 GRE or SWI POST

- STAR (HEMO) Gradient echo
- FOV 22, SL 5/ 1.0mm (1.5T), SL 1.5/ 0mm (3T)

### AX T2 POST

### SAG T1 FS SPACE Whole Brain POST

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

****IF FOR PEDIATRIC PATIENTS (17 YRS OR YOUNGER), REPLACE SAG T1 SPACE PRE AND POST WITH T1 AX MPRAGE PRE AND POST (WITH REFORMATS)****

OPT, for moving patient:

SSFSE COR T2 **(and other sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# HEAD with and without contrast (Tumor follow-up, or r/o mets)

**DO NOT SEND ANY LOCALIZERS ON ANY HEADS**

## AX T1

- T1 SE,TSE, or FLAIR(3TSiemens)
- FOV 22, SL 4/ 1.2mm

## AX T2 FLAIR FAT SAT

- FOV 22, SL 4/ 1.2mm

## AX DWI

- B0, 2000
- FOV 23, SL 4/1.2mm
- Slice angle and position should match Ax FLAIR and T2
- Do not copy slice angle and position on 3T however, due to P/F swaps and artifact

## POST GAD----------

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

## AX T2 GRE or SWI POST

- STAR (HEMO) Gradient echo
- FOV 22, SL 5/ 1.0mm (1.5T), SL 1.5/ 0mm (3T)

## AX T2 POST

## SAG T1 FS SPACE Whole Brain POST

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:

SSFSE COR T2 **(and other sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# HEAD without contrast
# (MS)

**DO NOT SEND ANY LOCALIZERS ON ANY HEADS**

## SAG T1

- T1 FLAIR, TSE, or FSE sequence
- FOV 23, SL 4/ 1.2mm
- Make sure cover side to side all the way through brain

## AX T1

- T1 FLAIR (Siemens 3T), TSE, or FSE sequence

## AX T2 FLAIR FAT SAT

- FOV 22, SL 4/ 1.2mm

## AX DWI

- B0, 2000
- FOV 23, SL 4/1.2mm
- Slice angle and position should match Ax FLAIR and T2

## AX T2 GRE or SWI

## SAG T2 FLAIR

- Cover entire head, do not cut off any slices close to head or will wrap

## AX T2

## SSFSE COR T2

OPT, for moving patient:

**(sequences from moving patient protocol)**

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## HEAD with and without contrast
## (MS)

**DO NOT SEND ANY LOCALIZERS ON ANY HEADS**

### AX T1
- T1 FLAIR (Siemens 3T), TSE, or FSE sequence

### AX T2 FLAIR FAT SAT
- FOV 22, SL 4/ 1.2mm

### AX DWI
- B0, 2000
- FOV 23, SL 4/1.2mm
- Slice angle and position should match Ax FLAIR and T2

### AX T2 GRE or SWI
### SAG T2 FLAIR
- Cover entire head, do not cut off any slices close to head or will wrap

**POST CONTRAST----------**

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

### AX T2 POST
### AX T2 GRE or SWI POST
### SAG T1 FS SPACE Whole Brain POST
- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:

**(sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

## HEAD with and without contrast
## (SEIZURE Adult and Peds)

**DO NOT SEND ANY LOCALIZERS ON ANY HEADS**

**SAG T1**

**AX T2 FLAIR FAT SAT**

**AX DWI**

**AX T1**

**COR T2 FLAIR OBL**

- FLAIR sequence
- FOV 18, SL 3/.3mm, make sure A/P
- Angle perpendicular to Sylvian fissure
- Cover from ant. tip of temporal lobe to behind corpus callosum, with good R-L symmetry

**COR T2 HI RES OBL**

- IR sequence
- FOV 18, SL 3/ .3mm (3T) make sure A/P
- Angle perpendicular to Sylvian fissure (copy angle and slice position from COR T2 FLAIR OBL above)
- Cover from ant. tip of temporal lobe to behind corpus callosum, with good R-L symmetry

**POST CONTRAST----------**

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

**AX T2 GRE or SWI (If you DO NOT do contrast do PRE, DO POST-contrast if IV contrast is given)**

**AX T2 POST (If you DO NOT do contrast do PRE, DO POST-contrast if IV contrast is given)**

**AX 3D MPRAGE T1 POST**

- 1 x 1 mm, isotropic voxels
- Cover whole head, go down below foramen magnum
- Make MPR COR, 1 x 1 mm of entire data set
- Make MPR SAG, 1 x 1 mm of entire data set

OPT, for moving patient:

**(sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

## HEAD with and without contrast (IAC/CRANIAL NERVES 7 & 8)

**SAG T1**
**AX T2 FLAIR FS**
**AX DWI**
**AX T1**
**AX T2 SPACE**

- Thru IAC's only
- SL .5/0 3D SLAB, 56 slices
- Reformat into Coronals **DO NOT DO SAG RECONS !!**

**POST CONTRAST----**

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

**AX T2 GRE or SWI POST**
**AX T2 POST**
**AX T1 FS SPACE (IAC) POST**

- Thru IAC's only, can copy to T2 SPACE
- SL .5/0 3D SLAB, 56 slices, FOV 16
- Reformat into Coronals (1 x 1 or smaller, if can .5 x .5 or .7 x .7) **DO NOT DO SAG RECONS !!**

**SAG T1 FS SPACE Whole Brain POST**

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:
SSFSE COR T2 **(and other sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# HEAD without contrast
# (IAC/CRANIAL NERVES 7 & 8)

## SAG T1
## AX T2 FLAIR FAT SAT
## AX DWI
## AX T2 GRE/ or SWI
## AX T2 SPACE

- Thru IAC's only
- SL .5/0 3D SLAB, 56 slices
- Reformat into Coronals **DO NOT DO SAG RECONS !!**

## AX T2
## AX T1 WHOLE BRAIN
## AX T1 FS SPACE (IAC) pre

- Thru IAC's only, can copy to T2 SPACE
- SL .5/0 3D SLAB, 56 slices, FOV 16
- Reformat into Coronals (1 x 1 or smaller, if can .5 x .5 or .7 x .7) **DO NOT DO SAG RECONS !!**

## SAG T1 SPACE Whole Brain

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:

**(sequences from moving patient protocol)**

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# HEAD with and without contrast (ORBITS)

## SAG T1
## AX T2 FLAIR FAT SAT
## AX DWI
## AX T2 SPACE

- Thru orbits only
- SL .6/0 3D SLAB, 56 slices
- Reformat into Coronals (1 x 1 or smaller, if an .6 x .6) **DO NOT DO SAG RECONS !!**

## COR T2 FS FLAIR 3mm

- Fat Sat, FOV 18, SL 3/ .3mm (3T)
- FOV to include entire mandible to 3 cm above the orbits
- Cover from behind brainstem through anterior orbits

## POST CONTRAST----

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

## AX T2 GRE or SWI POST
## AX T2 POST
## AX T1 FS SPACE (ORBITS) POST

- Thru orbits only
- SL .6/0 3D SLAB, 56-104 slices, FOV 17
- Reformat into Coronals (1 x 1 or smaller, if can .6 x .6 or .7 x .7) **DO NOT DO SAG RECONS!!**

## SAG T1 FS SPACE Whole Brain POST

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:

**(sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML / LB. BASED ON PT. WT, IV, RATE - HAND INJ, TIME-ONCE

REVIEWED 10/01/2024 BLH

# HEAD with and without contrast (TRIGEMINAL/CRANIAL NERVES 1-6)

## SAG T1
## AX T2 FLAIR FAT SAT
## AX DWI
## AX T2 SPACE

- Thru just above sella down thru brainstem only
- SL .6/0 3D SLAB, 80-112 slices
- Reformat into Coronals (1 x 1, or smaller if possible)

## COR T2 FS FLAIR 3mm

- Fat Sat, FOV 18, SL 2.5/ .3mm (3T)
- FOV to include entire mandible to 3 cm above the orbits
- Cover from behind brainstem through anterior orbits

## POST CONTRAST----

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

## AX T2 GRE or SWI POST
## AX T2 POST
## AX T1 FS SPACE (Trig) POST

- Thru trigeminal only, cover just above sella down through brainstem (above and below) can copy to T2 SPACE
- SL .6/0 3D SLAB, 56-112 slices, FOV 17
- Reformat into Coronals (1 x 1 or smaller, if can .6 x .6 or .7 x .7) **DO NOT DO SAG RECONS !!**

## SAG T1 FS SPACE Whole Brain POST

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:

**(sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML / LB. BASED ON PT. WT, IV, RATE - HAND INJ, TIME-ONCE

REVIEWED 10/01/2024 BLH

## HEAD with and without contrast
## ( 9-12 OLFACTORY NERVES)

### SAG T1
### AX T2 FLAIR FAT SAT
### AX DWI
### AX T2 SPACE

- Thru olfactory, above sella thru mandibular angle only
- SL .7/0 3D SLAB, 112 slices or so
- Reformat into Coronals

### COR T2 FS FLAIR 3mm

- Fat Sat, FOV 18, SL 3/ .3mm (3T)
- FOV to include entire mandible to 3 cm above the orbits
- Cover from behind brainstem through anterior orbits

## POST CONTRAST----

***Make sure when doing contrast- DO Ax GRE and AX T2 post for timing of the contrast. We want to let contrast have time to infuse into tissues and contrast does not affect T2 image****

### AX T2 GRE or SWI POST
### AX T2 POST
### AX T1 FS SPACE (Olf) POST

- Thru olfactory only, cover above sella down through brainstem (above and below) can copy to T2 SPACE
- SL .6/0 3D SLAB, 56-112 slices, FOV 17
- Reformat into Coronals (1 x 1 or smaller, if can .6 x .6 or .7 x .7) **DO NOT DO SAG RECONS !!**

### SAG T1 FS SPACE Whole Brain POST

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:

**(sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML / LB. BASED ON PT. WT, IV, RATE - HAND INJ, TIME-ONCE

REVIEWED 10/01/2024 BLH

# HEAD with and without contrast (SELLA)

**Note:** ***This protocol is for pituitary microadenomas (such as prolactinoma).**
***For other sella region mass or macroadenoma > 1cm (whether pre-op or post-op): skip the Dynamic post coronal T1's**

## SAG T1 3 mm

- T1 FLAIR sequence
- FOV 23, SL 3/ 1 mm
- Make sure cover side to side all the way through brain

## AX T2 FLAIR FAT SAT

## AX DWI

## AX T2 GRE/ or SWI

## AX T2

## COR T2 HI RES

- IR sequence (3T)
- FOV 15, SL 2.5/ .3 mm (3T)
- Cover just through sella

## COR T1 THIN

- TSE Or FSE sequence
- FOV 10, SL 3/ .6mm (3T)
- Cover just through sella

## COR T1 DYNAMIC POST

- FL2D (3T)
- FOV 13, SL 2.5/ 0mm (3T)
- Run pre, then inject, autuomatically starts to scan after injection (Siemens)
- Will run four times

## SAG T1 THIN POST

- TSE or FSE sequence
- FOV 10, SL 3/ .6mm (3T)
- Cover just through sella

## COR T1 THIN POST

- Match pre, cover just through sella

## SAG T1 FS SPACE Whole Brain POST

- T1 3D Volumetric sequence
- Reformat in Axial and Coronal planes (1x1mm isotropic voxels)
- FOV 25, SL 1/1.0mm
- Make sure cover side to side all the way through brain

OPT, for moving patient:

**(sequences from moving patient protocol)**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML / LB. BASED ON PT. WT, IV, RATE – POWER INJECT 2ML/SEC, TIME-ONCE

# HEAD with and without contrast (PERFUSION)

## LOCALIZER

## SAG T1

- FLASH sequence (3T)

## AX T2 FLAIR

- FOV 22, SL 4/ 1.2mm

## AX T2 GRE/ or SWI

- STAR (HEMO) Gradient echo sequence

## AX DWI

- B0, 2000

## TOF 3D MULTISLAB

- FOV 20, 4 slab, SL .5mm (3T)/ and SL 1.8mm (1.5T)
- Foramen magnum to above corpus callosum (can increase slices per slab, or # slabs to get coverage)
- Do this unless told by rad not to, or if pt has had a recent CTA of brain

## PERFUSION POST

- FOV 23, SL 4/ 1.2mm
- TR 1500, TE 30, 1 AVG, P/E Dir. A/P (3T)
- See notes
- **START SCAN THEN INJECT AFTER 2ND OR 3RD PHASE**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

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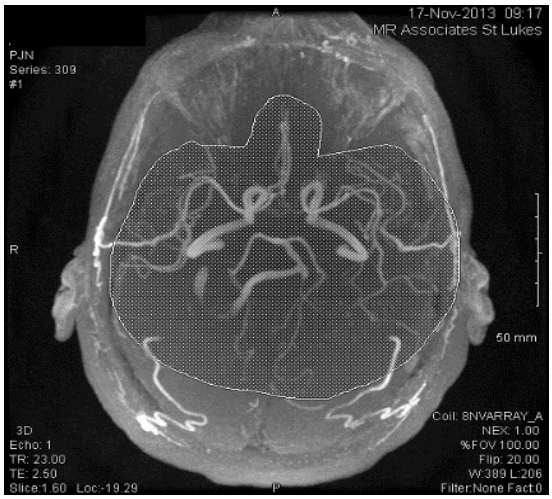
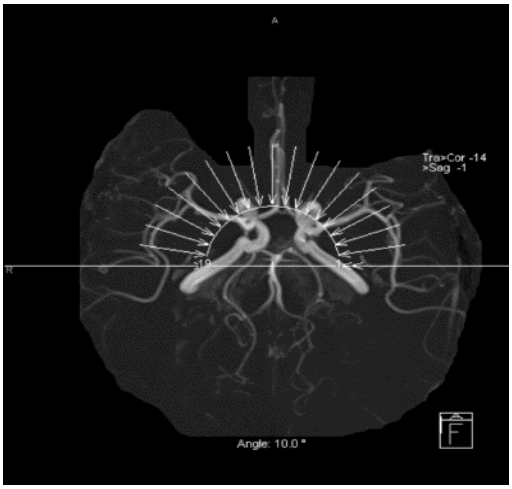
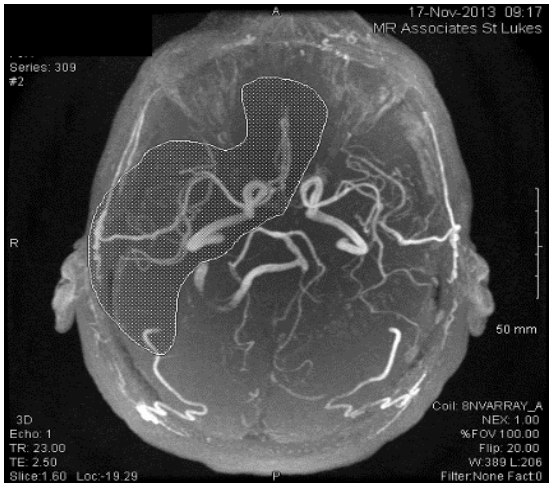
## ***MRA Head MIPs***



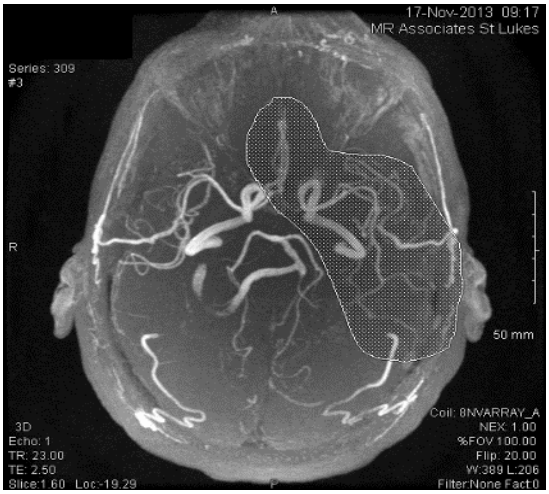

***MIP 1 → Turn $10^o$***



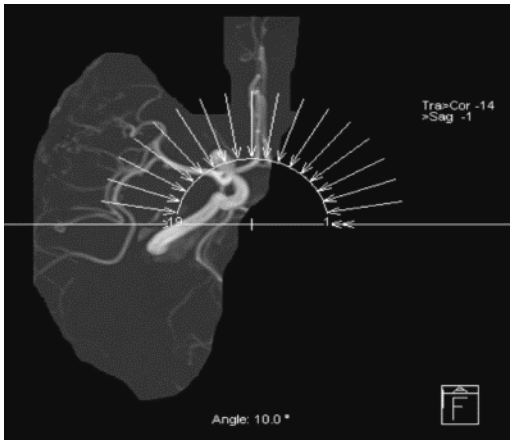

***MIP 1 → Turn $10^o$, $180^o$ arc***



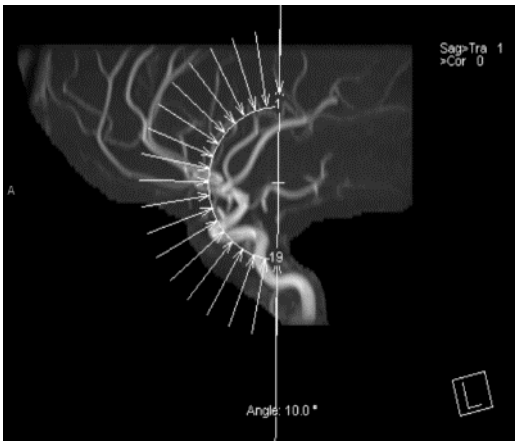

***MIP 2 → Turn and Flip $10^o$, $180^o$ arc***




***MIP 3 → Turn and Flip $10^o$, $180^o$ arc***



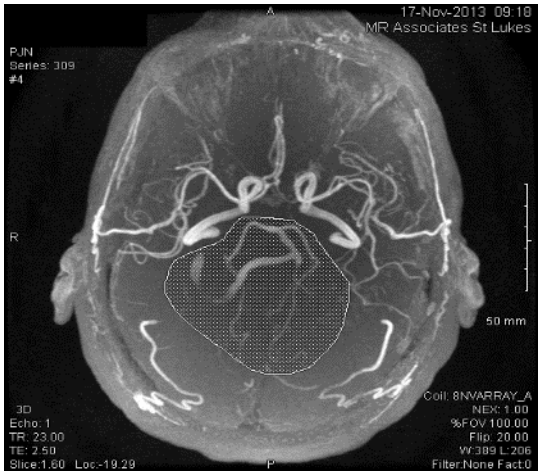

***MIP 2&3 → Turn $10^o$, $180^o$ arc***



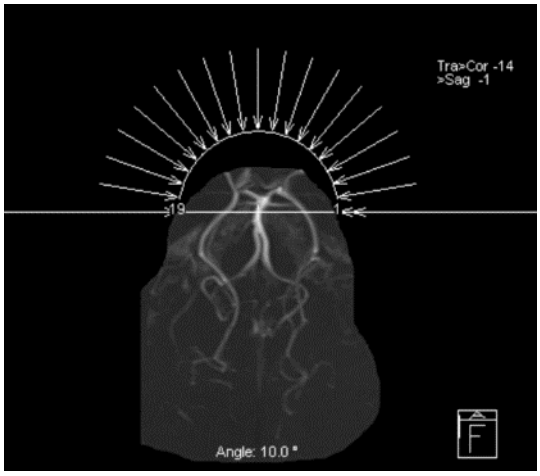

***MIP 2&3 → Flip $10^o$, $180^o$ arc***

(continued on next page)

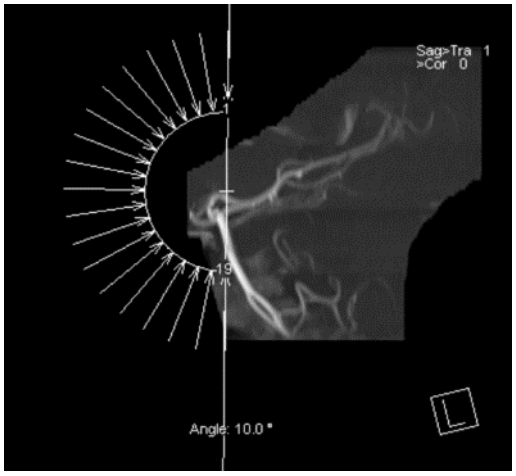
# ***MRA Head MIPs, cont.***




***MIP 4 → Turn and Flip $10^o$, $180^o$ arc***




***MIP 4 → Turn $10^o$, $180^o$ arc***




***MIP 4 → Flip $10^o$, $180^o$ arc***

# MRA HEAD without contrast

## LOCALIZER
## TOF 3D MULTISLAB

- FOV 18, 4 slab, SL 0.5mm(3T) and SL 1.8mm (1.5T)
- Foramen magnum to above corpus callosum (can increase slices per slab, or # slabs to get coverage)
- May have to go up to .6 or .7 in slice thickness if can't get coverage
- Axial

**__Note__: Do all MIPs by $10^{o}$, over $180^{o}$ arc

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# MRA HEAD with and without contrast

**LOCALIZER**

**TOF 3D MULTISLAB**

- Cover area of concern
- Axial

**AX VESSEL SCOUT**

- Cover lower head and neck to include carotids for setting up bolus

**FL3D COR PRE**

- Cover area of concern, can ask rad how much to cover

**CARE BOLUS COR**

- Set up off carotid, hit SCAN when see contrast brightest at level of C2

**FL3D COR POST**

**Note**: Do all MIPs by $10^{o}$, over $180^{o}$ arc

***CONTRAST ADMINISTRATION**-- GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - POWER INJECTED 2ML/SEC. REQUIRED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# MRV HEAD with and without contrast

**LOCALIZER**
**SAG T1**
**AX DWI**
**AX SWI or GRE**
**SAG 2D TOF**

- Do 3D reformats

**AX MPRAGE POST GAD**

- 1 X 1 mm, isotropic voxels
- Cover whole head, go down below foramen magnum
- Make MPR Coronals and Sagittals 1 x 1 mm of entire data set

**<u>Note</u>**: Do all MIPs by $10^{o}$, over $180^{o}$ arc

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REVIEWED 10/01/2024 BLH

# HEAD with and without contrast (SPECTROSCOPY)

*CSI- CHEMICAL SHIFT*

**LOC**

**SAG T2**

- FLAIR
- FOV 22, SL 4/ 1.2mm

**AX T2 FLAIR**

**COR T2 FLAIR**

**CSI SE 30**

- TR 1700, TE 30, AVG. 3
- Axial

**CSI SE 270**

- TR 1700, TE 270, AVG. 5
- Axial

*SVS-SINGLE VOXEL*

**LOC**

**SAG T2**

**AX T2 FLAIR**

**COR T2 FLAIR**

**SVS SE 30**

- TR 2000, TE 30, AVG. 80
- Axial

**SVS SE 270**

- TR 2000, TE 270, AVG. 192
- Axial

**SEE NOTES ON HOW TO DO SPECTROSCOPY**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# HEAD without contrast (AQUEDUCTAL FLOW)

***If no previous MRI brain without then do routine brain with flow sequences, if already have had a MRI brain, only do the flow sequences***

-Will need to use peripheral gating

**SAG T1**

**SAG T2 THIN**

- FSE sequence
- FOV 18, SL 3/.3mm
- Cover just through midbrain to evaluate aqueduct

**AX T2 FLAIR**

**AX DWI**

**AX GRE/ or SWI**

**AX T2**

**FL2D SAG PC**

- FOV 24, SL 4/1.2mm
- Sagittal
- TR 39, TE 10, AVG 2
- Set up off axial, parallel with sag sinus, then angle 5 degrees off

**FL2D AX PC**

-

REVIEWED 10/01/2024 BLH

# HEAD with and without (THERAPY PLANNING)

## AX T2 FLAIR

- SL 5/ 0mm
- Cover base of skull through top of skull

## AX T1

- FLAIR sequence (3T)
- SL 3/ 0mm
- Cover base of skull through top of skull

## AX T2 POST

- SL 3/ 0 MM
- Cover base of skull through top of skull

## AX T1 FS POST

- FLAIR sequence (3T)
- Copy pre

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

Reviewed 10/01/2024 BLH

# HEAD with contrast
# (STEALTH HEAD)

## LOC
## AX T1 FLAIR POST/ OR MPRAGE POST

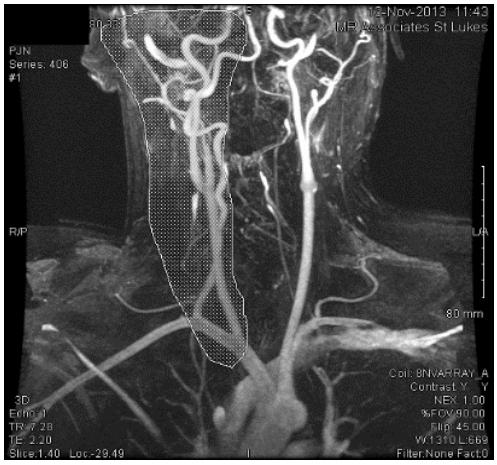
- SL 1.5/ 0mm (3T)
- COVER ENTIRE HEAD ABOVE FIDUCIAL MARKERS AND BELOW ALL FIDUCIAL MARKERS AND MAKE SURE GET TO TIP OF NOSE
- WILL BE LONG, PT HAS TO HOLD COMPLETELY STILL

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

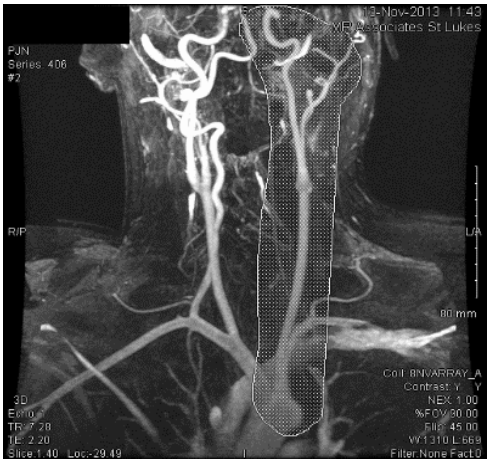
REVISED 10/01/2024 BLH

# NECK PROTOCOLS

## MRA Neck MIPs

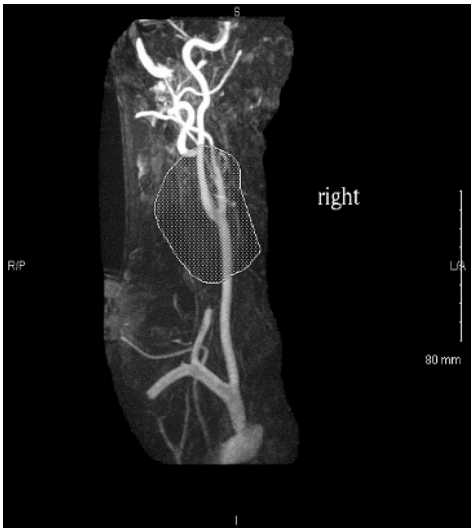



*MIP Right Carotid*

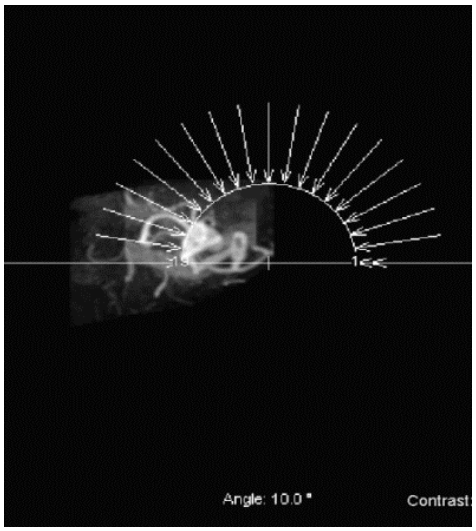



*MIP Left Carotid*

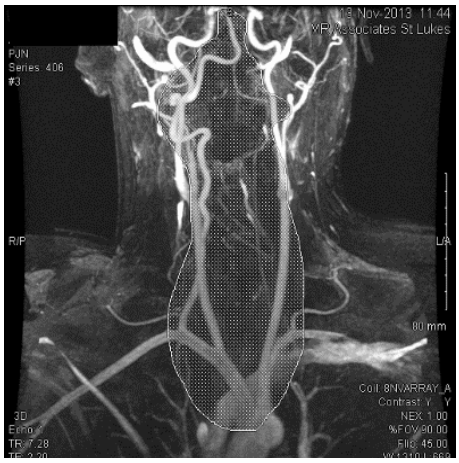

*MIP each Carotid only*




*MIP each Carotid bifurcation only*




*MIP each Carotid →Turn $10^{o}$,$180^{o}$*




*MIP Verts only →Turn $10^{o}$,$180^{o}$*


*MIP Verts only*

# MRA NECK with and without contrast (CAROTIDS)

**LOC**
**AX SCOUT**
**3D TOF OBL**
**FL3D COR PRE**
**CARE BOLUS**
**FL3D COR POST**

**PRE-CONTRAST FS AXIALS FOR DISSECTION PROTOCOL ONLY- DO BEFORE YOU INJECT:

**AX T2 FS DISSECTION**

- FOV 16, SL 3/.6mm, A/P (3T)
- Arch to mid Circle of Willis

**AX T1 FS DISSECTION**

- Copy Ax T2

**OPTIONAL: (but *ALWAYS* do if patient cannot have IV contrast):

**3D TOF BIFURCATION**

- Smaller FOV, focused on the carotid bifurcations (find bifurcations from initial 2D TOF)

****Note**: Do all MIPs by 10°, over 180° arc

***CONTRAST ADMINISTRATION**- GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - POWER INJECTED 2ML/SEC. REQUIRED, TIME-ONCE

REVIEWED 10/01/2024 BLH

## SOFT TISSUE NECK with and without contrast

******GET OK'D BY RADIOLOGIST TO DO, PREFERRED CT NECK OVER MRI PER RADIOLOGIST***** ***(see memo sent out 7/23/24 per rad)***

**COR T1**

- TSE(3T)/FSE(1.5T)

**AX T1**

- TSE(3T)/FSE(1.5T)

**AX T1 FS**

**COR T2 FS POST**

- TSE or BLADE(3T)/FSE(1.5T)

**AX T2 FS POST**

- TSE or BLADE(3T)/FSE(1.5T)

**COR T1 FS POST**

**AX T1 FS POST**

OPT :

**COR VIBE FS POST**

- 1 x 1 mm, isotropic voxels
- 25 FOV
- Make MPR AXIAL, 1 x 1 mm of entire data set
- Make MPR SAG, 1 x 1 mm of entire data set

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVISED 10/01/2024

# SOFT TISSUE NECK with and without contrast (VOCAL CORDS)

## COR T1 3MM

- FOV 24, SL 3/.6mm (3T)
- Center on vocal cords

## COR T2 FS 3MM

- BLADE(3T)
- Same parameters as above

## AX T1 4MM

- TSE(3T)/FSE(1.5T)
- FOV 20, SL 4/.6mm (3T)
- IAC through pulm. artery until see start of ascend. & descending aorta

## AX T2 FS 4MM

- BLADE(3T)
- Same parameters as above

## AX T2 FS 3MM

- BLADE(3T)
- FOV 20, SL 3/.4mm (3T)
- Through vocal cords only

## AX T1 3MM

- TSE(3T)/FSE(1.5T)
- Same parameters as above
- Through vocal cords only

## COR T1 FS 3MM POST

- Same parameters as above
- Center on vocal cords

## AX T1 FS 4MM POST

- Same parameters as above
- IAC through pulm. artery until see start of ascend. & descending aorta

## AX T1 FS 3MM POST

- Same parameters as above
- Through vocal cords only

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# SOFT TISSUE NECK with and without contrast (TONGUE)

**COR T1**

- FOV 20, SL 3/.9mm

**COR T2 FS**

**AX T1**

- FOV 20, SL 3/.9mm

**AX T1 FS**

**AX T2 FS**

- BLADE(3T)

**SAG T1**

- FOV 20, SL 3.5/1mm

**SAG T2 FS**

- BLADE(3T)

**COR T1 FS POST**

**AX T1 FS POST**

**SAG T1 FS POST**

**FOR ALL IMAGES, COVER FROM IAC DOWN TO ARCH, MAKE SURE ANTERIOR ENOUGH TO GET ALL OF FACE/TONGUE**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BLH

# TM JOINTS BILATERAL without (TMJ)

**Scan both sides at same time, using head coil**
Use clicker, to have pt open and close mouth

## AX T2 LOC

## SAG T1 CLOSED

- FOV 10, SL 2/.4mm, A/P
- Scan without pt opening mouth
- Set up perpendicular to TMJ

## SAG T1 OPEN

- Scan after pt clicks mouth open as wide as can(don't have them close clicker, will use it again)

## SAG T2 CLOSED

- Have pt rest and close mouth

## SAG T2 OPEN

- Have pt open mouth and put clicker in again

## COR T2 TSE CLOSED

- Rest and close mouth
- Set up parallel with TMJ

## COR T1 TSE CLOSED

- FOV 10, SL 2/ .4 mm
- Rest and close mouth
- Copy to T2

## RT. SAG T2 TSE CLOSED TO OPEN

- Put 1-2 slices thru TMJ
- Dynamic/Cine series
- Will have pt. keep mouth closed, ***start scan***, 10 sec. pause, have pt. click 5 times and stop, then it will scan again, another pause, have click again, etc., keep doing til pt can't do anymore

## LT. SAG T2 TSE CLOSED TO OPEN

- Put 1-2 slices thru TMJ
- Dynamic/Cine series
- Will have pt. keep mouth closed, ***start scan***, 10 sec. pause, have pt. click 5 times and stop, then it will scan again, another pause, have click again, etc., keep doing til pt can't do anymore

## *OPTIONAL:*

## *SAG T2 CLOSED TO OPEN*

## *COR T1 2D CLOSED TO OPEN*

- *10* sec. pause between each picture for pt to click 5 times, pt does till can't anymore
- See what series doc wants (sag T2 or cor T1 2D)

# ***BREAST MRI***

## **BILATERAL BREAST with and without contrast w/ CAD (BREAST CA)(3T or 1.5T)**

**3 PL LOC**
**AX STIR**
**AX T1 NON FS**
**AX T1 FS DYNAMIC PRE AND POST**

- 60 Sec. delay after previous scan is done, inject at 25sec., scan will autostart
- Subtraction, MIPS, and color maps are calculated automatically
- Run pre, gives you a break, when time gets down to 25 sec., inject, scan will automatically start

OPT.___
SAG T1 HI RES VIBE

**If have silicone implants do an additional view :

**AX IR Silicone Suppressed**

* Make sure Silicone is suppressed, will look dark on pics
* Want peak on Silicone

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 BD

# BILATERAL BREAST without contrast w/o CAD (BREAST IMPLANT-SILICONE or SALINE)

**3 PL LOC**

**AX T2 STIR**

**AX IR WATER SUPPRESSED**

- Silicone will be bright
- Center on far right peak

**AX IR SILICONE SUPPRESSED**

- Silicone will be dark
- Center on far left peak

**Check with rad after these images to see if Sag is needed :

**SAG IR WATER SAT BLADE (Choose Left or Right)**

- Center on Water, Silicone will be bright

REVIEWED 10/01/2024 BD

# MR GUIDANCE BX/ASP/INJ S & I with and without contrast (BREAST BIOPSY)

**3 PLANE LOC**
**SAG T1 VIBRANT OR VIBE PRE**
** GIVE CONTRAST, THEN SCAN**
**SAG T1 VIBRANT OR VIBE POST CONTRAST**
**SAG T1 VIBRANT OR VIBE POST CONTRAST #2** (do 2 sets, copied to prev.)
**AX T1 VIBRANT OR VIBE POST CONTRAST**

- Only go through area of concern/ lesion
- Biopsy planning will be done, send imaging to cadstream to use SureLoc

**SAG VIBRANT OR VIBE POST NDL**
**AX T1 VIBRANT OR VIBE POST NDL**
**SAG T1 VIBRANT OR VIBE POST BX**
**AX T1 VIBRANT OR VIBE POST BX**
**SAG VIBRANT OR VIBE POST CLIP**
**AX VIBRANT OR VIBE POST CLIP**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED BD

# MR GUIDANCE BX/ASP/INJ S & I with and without contrast (BREAST NEEDLE LOC)

**3 PLANE LOC**
**SAG T1 VIBRANT OR VIBE PRE**
**SAG T1 VIBRANT OR VIBE POST GAD**
**AX T1 VIBRANT OR VIBE POST GAD**
**SAG VIBRANT OR VIBE POST NDL**
**AX T1 VIBRANT OR VIBE POST NDL**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED

# ***CARDIAC/AORTA***

***Talk to radiologist prior to scan, protocol subject to change per patient****

## MRA CHEST with and without contrast/ or without (AORTA) DILATATION, AORTIC ANEURYSM,DISSECTION

**3 PLANE LOC**
**AX DOUBLE IR**
**SAG DOUBLE IR**
**SAG OBL (CANDYCANE) DOUBLE IR**
**AX SSFSE (BH) FAT**
**ASK RAD IF NEED TO GIVE CONTRAST, SOMETIMES WILL NOT NEED
**CONTRAST****
**SAG MASK PRE**
**SAG INJECTED**

- Will inject when see contrast bright mid descending aorta

**SAG DELAYED POST**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE – POWER INJECTED, TIME-ONCE

REVIEWED 10/01/2024 SJB

**MRA CHEST without contrast - if can't have contrast (AORTA)**

***Talk to radiologist prior to scan, protocol subject to change per patient***

**3 PLANE LOC**
**CAL SCAN**
**AX DOUBLE IR**
**SAG DOUBLE IR**
**SAG OBL (CANDYCANE) DOUBLE IR**
**AX FIESTA (BH)**
**AX SSFSE FS (BH)**

REVIEWED 10/01/2024 SJB

# CMR MORPHOLOGY/FUNCTION with and without contrast

## (CARDIAC FUNCTION, CARDIAC PERFUSION, MASS,VIABILITY, MITRAL VALVE REGURGITATION, HYPERTROPHIC CARDIOMYOPATHY, THICKENED VENTRICULAR WALL, ARVD, RT VENTRICULAR DYSPLASIA)

***Talk to radiologist prior to scan, protocol subject to change per patient**  USE MULTIHANCE***

**Localizer**
**Localizer @ Isocenter**
**Thorax Cor Ax Localizer**

- Center over heart
- Include all of heart

### AA Heart Scout/Loc

- ***DO NOT MOVE ANGLE,*** can move up or down, but don't change angle
- Look for egg (Lt. ventricle), make sure get all the way through
- Center over heart
- Include all of heart

### Ax Bright Blood TruFi

- Non Breathhold
- Straight Axial through heart
- Cover all of heart
- Increase FOV if needed so don't get wrap (if pt is big)

### AX Dark Blood (DIR)

- Non Breathhold
- Copy to Axial Bright Blood
- Straight through heart

### Sag Dark Blood (DIR)

- Non Breathhold
- Straight Sagital all the way through heart

### Cor Dark Blood (DIR)

- Non Breathhold
- Straight Coronal all the way through heart

### Sag Obl Dark Blood (DIR)

- Non Breathhold
- Candy cane view, angle with the arch
- Cover just through arch, don't cover whole heart

## Straight Ax Cine (ARVD)

- Multiple Breathhold
- Straight through heart, just cover through left ventricle, make sure get all on

## Define Long Axis

- Multiple Breathhold
- This is a quick localizer that will bring up 3 views (2, 3, & 4 chamber views) has 3 separate lines
- You want to check each area of heart to make sure they match the picture, if not move them accordingly so they do match.

## 2 Chamber Cine (1 slice)

- Breathhold
- Will be set up already from the Define Long Axis (should look just like the 2 CH view on Define Long Axis)
- Cine image

## 4 Chamber Cine (7 slices)

- Multiple Breathholds
- Will be set up already from the Define Long Axis
- Add 7 slices, to get all the way through heart (per Dr. Burke)
- Bisects left atrium and left ventricle

## 3 Chamber Cine (1 slice)

- Breathhold
- Will already be set up from the Define Long Axis

## LVOT Cine (1 slice)

- Breathhold
- Set up off of 3 CH view, bisect LVOT, aortic valve, & ascending aorta
- After setting up line, RT. CLICK, PERPENDICULAR on 3 CH view *or if you don't have a line to set up , RT. CLICK, PERPENDICULAR*

## Define SAX Loc

- Breathhold
- Short Axis view
- Set up off 4 CH view, line perpendicular to septum, covering above valve to through apex

## SAX Cine Stack

- Multiple Breathhold
- Copied from Define SAX (set up same way)
- Short Axis Cine
- Lines perpendicular to Septum
- **Series that you use to calculate the ejection/fraction and thickness for Lt. Ventricle****

## Aortic Valve Cine (OPT)** *Can be done post contrast after injection while waiting the 8-10min)*

- Breathhold
- Set up off 3 CH and LVOT views
- Set up parallel to aortic valve
- Apply slices, then rt. click perpendicular, put right *ON* valve

## Perfusion Test (Pre)

- Non Breathhold (free breathing)
- Run to make sure there is no wrap, image is good
- Has 2 sets of slices, 1 slice (4 CH view) & 3 slices/slab (2 CH view)
- Make sure you pick 4 CH 1 slice series and 2 CH 1 slice series to set up off of
- On 2 CH slab, pull in SAX cine stack, go to good image, rt. click, copy image position, then move slices to meat of heart (middle)
- On 4 CH slice, pull in 4 CH stack, rt. click, copy image position
- Then go to physio tab and check to make sure you can acquire all the slices w/I the R to R interval
    - If it is not w/I R to R, change acquisition window (minimize it) & go down in phase partial fourier (resolution tab) to 6/8

## Perfusion Injection (Post)

- Start scan, then inject
- Copied to Perfusion test pre
- After injecting, will wait 8-10 minutes before doing TI Scout imaging
- Want to see atrium and ventricles get really bright and myocardium get black, then start to get gray after so many passes
- Let it run all the way through (finish scan)

**Can scan Phase Contrast/Flow Series during the 8-10minute wait**

*AT 8-10 MINUTES:*

TI Scout 8-10min.

- Copied to Short Axis slice
- Put in meat of heart
- This is where you will pick your optimal TI time
- Run sequence, open series and page through to find the image where the myocardium (left ventricle) is solid black (blackest), but no ghosting, then look at numbers in left lower image window, should say TI 280
- Always add 30 sec. to whatever it says (example 280, so use 310) for TI time for the next 2 series

## SA Tfi Psir Single Shot Delay

- Short Axis Trufisp phase sensitive inversion recovery
- Short Axis
- Breathhold
- Should already be set up/ copied from previous define step (Define Short Axis)
- Change TI time to what you picked from the TI scout
- Images should be nice and suppressed, myocardium black

## LAX Tfi Psir Single Shot Delay

- Long Axis Trufisp phase sensitive inversion recovery
- Breathhold
- 3 Slices: 2, 3, and 4 chamber (like the Define Long Axis)
- Already set up / copied to the Define Long Axis

***CONTRAST ADMINISTRATION**- GADOBENATE DIMEGLUMINE (MULTIHANCE), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - POWER INJECTED 2ML/SEC. REQUIRED, TIME-ONCE

REVIEWED 10/01/2024 SJB

# THORAX MEDIASTINUM without contrast (STERNUM)

**3 PL LOC**
**COR T1**
**COR T2 FS**
**AX T1**
**AX T2 FS**
**SAG T1**
**SAG T2 FS**

REVIEWED 10/01/2024 DV

# THORAX MEDIASTINUM with and without contrast (STERNUM) MASS,LESION,INFECTION

**3 PL LOC**
**COR T1**
**COR T2 FS**
**AX T1**
**AX T2 FS**
**SAG T1**
**SAG T2 FS**
**COR T1 FS POST**
**AXIAL T1 FS POST**
**SAG T1 FS POST**

** Ask radiologist make sure protocol is all they want**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

# THORAX MEDIASTINUM with and without contrast (CHEST WALL) MASS,LESION, INFECTION

**3PL LOC**
**AX T1 FS 3D VIBE PRE (BH) (OPTIONAL)**
**COR T1**
**COR T2 FS**
**AX T1**
**AX T2 FS**
**SAG T1**
**SAG T2 FS**
**COR T1 FS POST**
**AXIAL T1 FS POST**
**SAG T1 FS POST**

** Ask radiologist make sure protocol is all they want**

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

REVIEWED 10/01/2024 DV

## WHOLE BODY without contrast
## for Li Frameni Syndrome and Multiple Myeloma

Arms straight down on top of thighs, hands resting on top of thighs, tape toes together if possible
-Head coil on and both abdomen array coils on-one on chest and the other abdomen down to pelvis as far as can cover
-Center mid brain, make sure get all of head/brain on pics
-Autocoil select on
-DO NOT angle on whole body imaging, add slices instead to cover skin to skin
-Protocol FOV-USES TIM PLANNING (should have on already-under Geometry tab), want each step to overlap each other on Coronals, has 4 steps generally
-When moving boxes, MOVE SLOWLY, it tends to have a lag, so if you move lines too fast it messes up-BE PATIENT
-You can have different number of slices per group and it will still compose
-If the patient SARS during the series, that series will not automatically compose, but you can manually compose (USE ADAPTIVE COMPOSING)-

* Pick all 4 sets in that specific series, click on Applications, then click on Composing, select Adaptive composing and Apply

-If you get an error for table position because table can't move in anymore, open last series that errored, select the bottom box and move it up a little bit (make sure coupled graphics is off before moving), then hit save and it should run

DWI's notes if rads ever want inverted images : (this is if they want it to look like PET imaging

- Click on DWI Comp B800 and put into MPR, save series, load that series into viewer, rt. Click, select series, image, invert, save series
- Also, can go into protocol, into the DWI series, body tab, gray scale, click off- invert

# WHOLE BODY without contrast
# for Li Frameni Syndrome and Multiple Myeloma continued….

## LOCALIZER

- Use 45 FOV for Bigger Pt and 35 FOV for smaller pts.
- Center mid brain, make sure get whole head on images

## COR T2 STIR

- Cover the whole brain to thigh ( as low as you can go)
- Cover anterior to posterior anatomy, skin to skin, add slices if need to
- Move each slab/step separately, can move up/down and forward/backward
- Each slab can have a different number of slices if needed
- Will have 4 steps

## COR VIBE

- Copy slice position and STEPS ( should have 4 steps) from COR STIR, then make adjustments to # of slices
- Non FS
- Have pt, hold breath for chest, abdomen, and pelvis series

## AX DIFFUSION

- Include all of brain
- DO NOT overlap slices
- Make sure coupled graphics on and move accordingly, MOVE IN SMALL INCREMENTS because the machine has a lag
- Make MPR's COR and SAG 4 x 1 recons from B800 images ***(IF POSSIBLE)***
- If get an error for table position, decrease slices and move last step up until it lets you scan
- If it errors out for during series, you may have to go to top of screen to View tab, click on Tim Planning UI, hover over little icons (pick Align parallel), which should realign axial slices by doing this, fixing the problem, then re-run series

## **If need to get pt's lower legs and feet on **
## End exam, put pt. in feet first, center at ankle or just above

## LOCALIZER FEET FIRST

- Autocoil select on and cover from above knees and down to ankles, make sure you overlap the thigh from rest of whole body scan
- Use head coil, put feet in, and put body array flex coil on over legs

## COR T2 STIR FEET FIRST

- Coupled graphics on, cover from above knees down to ankles, make sure you overlap the thigh from rest of whole body scan
- Cover skin to skin anterior to posterior

## COR VIBE FEET FIRST

- Copy slice position and steps to COR T2 STIR

## AX DIFFUSION FEET FIRST

- DO NOT overlap slices
- Cover from above knees down to ankles, overlapping thigh from rest of whole body scan
- B values of 50 and 800 with ADC map
- Slice thickness to match T1 and T2 sequences
- Make MPR's COR and SAG 4 x 1 recons from B800 images (IF POSSIBLE)

# MRA PE CHEST with and without contrast

INDICATIONS:

1. Patient with history of anaphylaxis to CT IV contrast

2. Patient with eGFR < 30 **mL/minute** AND not on dialysis is a relative indication

**LOCALIZER**
- 3 PLANE LOCALIZER
- COVER WHOLE CHEST ANTERIOR AND POSTERIOR VESSELS, AORTA

**AX BRIGHT BLOOD TRUFI (NON BH)**
- COVER WHOLE HEART, AORTA, AND CHEST

**4CHAMBER VIEW**
- USE THIS SEQUENCE TO WATCH CONTRAST COME IN, USE FOR CARE BOLUS

**AX T1 FS 3D VIBE PRE (BH) (OPTIONAL)**
- COVER WHOLE CHEST ANTERIOR AND POSTERIOR, VESSELS, AND AORTA
- BREATHHOLD

COR BRIGHT BLOOD TRUFI (NON BH)- (add if doing a noncontrast exam),
- COVER WHOLE CHEST ANTERIOR AND POSTERIOR, VESSELS, AND AORTA
- ***this should be rarely needed, i.e. 1. patient with gadolinium contrast allergy AND CT IV contrast anaphylaxis or 2. Gadolinium contrast allergy AND eGFR < 30 **mL/minute** AND not on dialysis***

**AX T1 FS STARVIBE (NON BH)**
- COVER WHOLE CHEST ANTERIOR AND POSTERIOR, VESSELS, AND AORTA

**MRA COR PRE Angio fl3d (T1 3D SPGR)**
- COVER WHOLE CHEST ANTERIOR AND POSTERIOR, VESSELS, AND AORTA
- BREATHHOLD

**CARE BOLUS COR**
- USE 4 CHAMBER SERIES TO SET UP
- PICK 4 CHAMBER VIEW, COPY IMAGE POSITION
- THIS IS WHERE YOU ARE GOING TO WATCH FOR THE CONTRAST TO COME IN
- INJECT WHEN THE RIGHT VENTRICLE IS FULL OF CONTRAST, JUST BARELY IN LEFT VENTRICLE

**MRA COR POST Angio fl3d (T1 3D SPGR)**
- COPY TO PRE
- BREATH HOLD

**MRA COR DELAYED POST Angio fl3d (T1 3D SPGR)**

**AX T1 FS STARVIBE POST (NON BH)**
- COPY TO PRE

**AX T1 FS 3D VIBE POST (BH) (OPTIONAL)**
- COVER WHOLE CHEST ANTERIOR AND POSTERIOR, VESSELS, AND AORTA
- BREATHHOLD

***CONTRAST ADMINISTRATION**-GADOTERATE MEGLUMINE (CLARISCAN ), .1ML PER LB. BASED ON PT. WEIGHT, IV, RATE - HAND INJECTED, TIME-ONCE

**MRA PE CHEST with and without contrast continued….**

(Image of Injected MRA PE CHEST)