



DHMC MSK MRI Protocol Book (Version II)

Last Updated 11/29/2020

Select from the following three options:

[Imaging Planes Setup / Coverage](#)

[Patient Positioning](#)

[Protocol Parameters](#)

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Key Points on Using this Protocol Book

- Some Protocols have multiple ways to Position, Setup Planes, and Options for Parameters. Always scroll down to check!!
- This protocol book was built using Siemens as the main brand of machine in mind.
- The parameters and positioning listed in this book will not work on every brand (GE, Siemens, Philips) or strength (1.5T, 3T) of machine. They are meant to use as a starting point and to build onto.
- This protocol book contains a lot of T2 Fat Sat sequences. One of the most common issues is these specific sequences not coming out with uniform Fat Saturation. It is important to recognize when this happens, and simply resolve the issue by including a STIR, or a T2 Dixon.
- If the patient is moving, **DO NOT REPEAT MORE THAN TWICE**. If you are going to repeat, **MAKE SURE YOU ADJUST SOMETHING**. Repeating with no adjustments made is pointless.
- Not everyone scans the same way, but using this book will help bring everyone on to the right track.
- Lastly, **ALWAYS DOCUMENT WHEN ISSUES ARRISE**. This lets the radiologist know if something happened, whether it be technical, or patient related.

MSK MRI Imaging Planes Setup / Coverage

Upper Extremities	Pelvis / Hips	Lower Extremities	Other
Elbow Arthrogram (G+)	Hip Arthrogram (G+)	Achilles Tendon (G-)	Pectoralis (G-)
Elbow Routine (G-)		Ankle Routine (G-)	Tumor Func. Baseline (G-/G+)
Finger/Thumb (G-)	Hip Labrum (G-)	Foot-Lis Franc (Midfoot) (G-)	Tumor Func. Follow/Up (G-/G+)
Hand/Wrist Arthritis (G-/G+)	Hip MOM 1.5T (G-)	Foot-Morton's Neuroma (Forefoot) Plantar Plate (G-)	Tumor Infection (G-/G+)
Neurogram - Extremity (G-)	Neurogram - Inguinal (G-)	Knee Arthrogram (G+)	Tumor Infection (G-)
Shoulder Arthrogram (G+)	Neurogram - Lumbosacral Plexus (G-)	Knee MOM 1.5T (G-)	
Shoulder Routine (G-)	Neurogram - Sciatic (G-) 1.5T	Knee Routine (G-)	
Wrist Arthrogram (G+)	Neurogram - Sciatic (G-) 3T	Myositis 1.5T (G-)	
Wrist Routine (G-)	Pelvis - Pubalgia (G-)	Tibia-Fibula Stress Fracture (G-)	
	Pelvis - Routine/Occult Fracture (G-)		
	Pelvis - SI Joints (G-)		

MSK MRI Positioning

Upper Extremities	Pelvis / Hips	Lower Extremities	Other
Elbow Arthrogram (G+)	Hip Arthrogram (G+)	Achilles Tendon (G-)	Pectoralis (G-)
Elbow Routine (G-)		Ankle Routine (G-)	Tumor Func. Baseline (G-/G+)
Finger/Thumb (G-)	Hip Labrum (G-)	Foot-Lis Franc (Midfoot (G-)	Tumor Func. Follow/Up (G-/G+)
Hand/Wrist Arthritis (G-/G+)	Hip MOM 1.5T (G-)	Foot-Morton's Neuroma (Forefoot) Plantar Plate (G-)	Tumor Infection (G-/G+)
Neurogram - Extremity (G-)	Neurogram - Inguinal (G-)	Knee Arthrogram (G+)	Tumor Infection (G-)
Shoulder Arthrogram (G+)	Neurogram - Lumbosacral Plexus (G-)	Knee MOM 1.5T (G-)	
Shoulder Routine (G-)	Neurogram - Sciatic (G-) 1.5T	Knee Routine (G-)	
Wrist Arthrogram (G+)	Neurogram - Sciatic (G-) 3T	Myositis 1.5T (G-)	
Wrist Routine (G-)	Pelvis - Pubalgia (G-)	Tibia-Fibula Stress Fracture (G-)	
	Pelvis - Routine/Occult Fracture (G-)		
	Pelvis - SI Joints (G-)		

MSK MRI Protocol Parameters / Sequences

Upper Extremities	Pelvis / Hips	Lower Extremities	Other
Elbow Arthrogram (G+)	Hip Arthrogram (G+)	Achilles Tendon (G-)	Pectoralis (G-)
Elbow Routine (G-)		Ankle Routine (G-)	Tumor Func. Baseline (G-/G+)
Finger/Thumb (G-)	Hip Labrum (G-)	Foot-Lis Franc (Midfoot) (G-)	Tumor Func. Follow/Up (G-/G+)
Hand/Wrist Arthritis (G-/G+)	Hip MOM 1.5T (G-)	Foot-Morton's Neuroma (Forefoot) Plantar Plate (G-)	Tumor Infection (G-/G+)
Neurogram - Extremity (G-)	Neurogram - Inguinal (G-)	Knee Arthrogram (G+)	Tumor Infection (G-)
Shoulder Arthrogram (G+)	Neurogram - Lumbosacral Plexus (G-)	Knee MOM 1.5T (G-)	
Shoulder Routine (G-)	Neurogram - Sciatic (G-) 1.5T	Knee Routine (G-)	
Wrist Arthrogram (G+)	Neurogram - Sciatic (G-) 3T	Myositis 1.5T (G-)	
Wrist Routine (G-)	Pelvis - Pubalgia (G-)	Tibia-Fibula Stress Fracture (G-)	
	Pelvis - Routine/Occult Fracture (G-)		
	Pelvis - SI Joints (G-)		

Elbow Positioning Preferred Method



SUPERMAN POSITION PREFERRED

Positioning Tips:

- Every scanner manufacturer provides different coils. On Siemens, the knee coil provides the best quality pictures compared to a flex coil.
- Superman position is preferred when scanning the elbow. Palm side should be facing up when placed in the knee coil. Arm needs to be as straight as possible with cushions filling the rest of the free space in the coil to prevent motion.
- Once positioned, place cushions under the hand so that it is not “dangling” out the other end and then place sandbags on top of hand to help minimize motion.
- At this point, MAKE SURE THE PATIENT IS COMFY, this is key for this position.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**



Elbow Positioning Alternative Method



Positioning Tips:

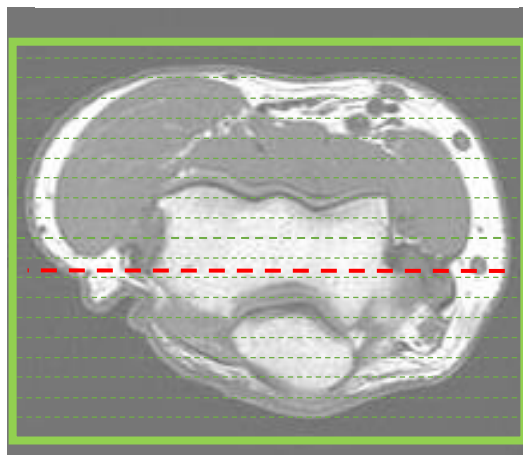
- When patient is unable to bring arm above head for the knee coil, we can use the small flex coil as demonstrated above.
- Patient will most likely need to be at a 45 degree angle. This allows for the elbow to be brought closer to iso-center of the machine.
- Patients with larger body habitus will be more difficult to position this way.
- At this point, MAKE SURE THE PATIENT IS COMFY, this is key for this position. Also place sandbags to prevent movement.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**

**ONLY TO BE USED AS AN
ALTERNATIVE. SHOULD
NOT BE DONE ROUTINELY.**

Elbow Imaging Planes / Setup

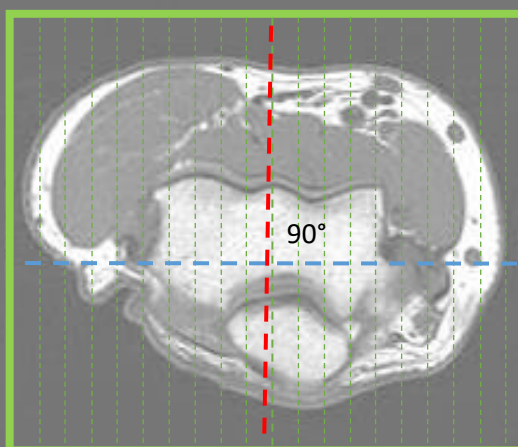
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Coronal Imaging Plane



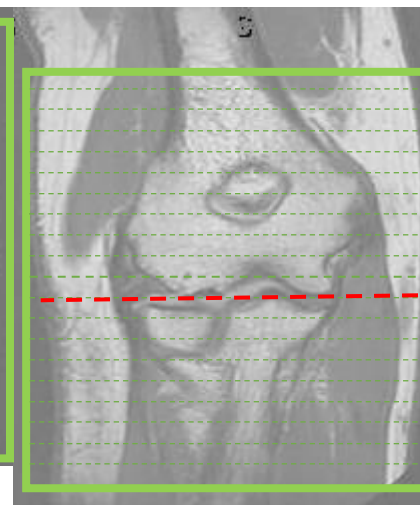
Prescribe plane parallel to medial and lateral epicondyles.

Sagittal Imaging Plane



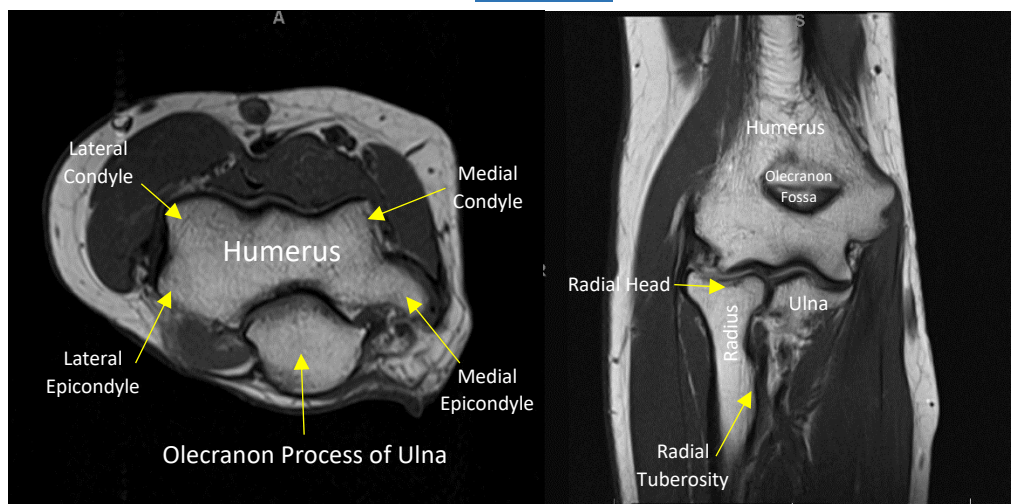
Prescribe plane perpendicular to coronal plane. Scan through entire elbow.

Axial Imaging Plane



Prescribe plane perpendicular to coronal plane. Scan from humeral metaphysis through radial tuberosity.

Anatomy



Elbow Arthrogram (G+)

Parameters / Sequences

AXIAL PD FS FSE
CORONAL PD FS FSE
CORONAL PD FSE
CORONAL T1 FS SE
SAGITTAL T1 FS SE
SAGITTAL T1 FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
AX PD FS	1800-3000	10-30	120	100	3	1	256	256	L/R	2	S->I	
COR PD FS	1800-3000	10-30	140	100	3	1	256	256	L/R	2	P->A	
COR PD	1800-3000	10-30	140	100	2	0	224	256	L/R	2	P->A	
COR T1 FS	400-700	10-30	140	100	3	0.5	224	320	L/R	2	P->A	
SAG T1 FS	400-700	10-30	140	100	3	0.5	224	320	S/I	2	L->R	
SAG T1	400-700	10-30	140	100	3	0.5	224	320	S/I	2	L->R	

Elbow Routine (G-)

Parameters / Sequences

AXIAL T1 SE
AXIAL T2 FS FSE
CORONAL PD FSE
CORONAL PD FS FSE
SAGITTAL PD FS FSE
SAGITTAL PD FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
AX T1	400-700	10-30	120	100	3	1	224	320	L/R	2	S->I	
AX T2 FS	2000-6000	80-120	120	100	3	1	256	256	L/R	2	S->I	
COR PD	1800-3000	10-30	140	100	3	0.3	224	320	L/R	2	P->A	
COR PD FS	1800-3000	10-30	140	100	3	0.3	256	256	L/R	2	P->A	
SAG PD FS	1800-3000	10-30	140	100	3	0.5	256	256	S/I	2	L->R	
SAG PD	1800-3000	10-30	140	100	3	0.5	224	224	S/I	1	L->R	

Hand / Wrist Arthritis / MCP Positioning

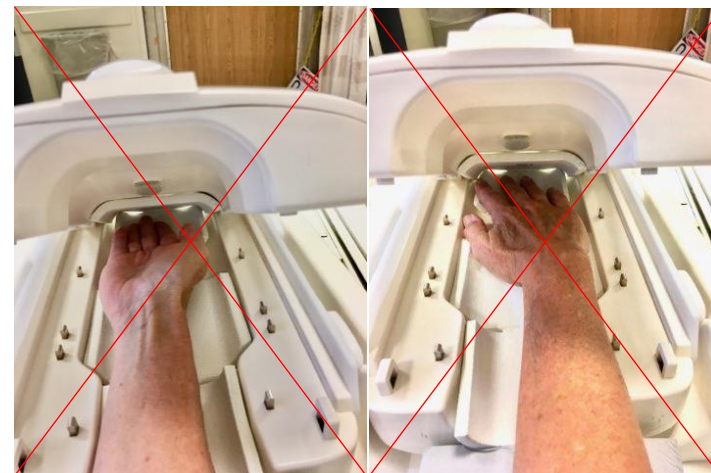
Right Way



Hand needs to be straight in the coil, with fingers together and palmer surface down. Arm needs to be parallel with hand especially when imaging wrist area.

DO NOT have hand/wrist in flexion, extension, pronated or arched as seen on the right. This will only cause difficulty when scanning and makes it difficult for the radiologist to read.

Wrong Way



SUPERMAN POSITION PREFERRED



Positioning Tips:

- Superman position is ALWAYS preferred if the patient is able. The key to this position is to make sure patient is as comfy as possible to minimize motion. USE CUSHIONS.
- The coil must be centered on the table and be as straight as possible. This will minimize the chances of gradient failure from overworked gradients.
- Place sandbags on the coil. Most often these coils are free floating and they will move if not immobilized!!



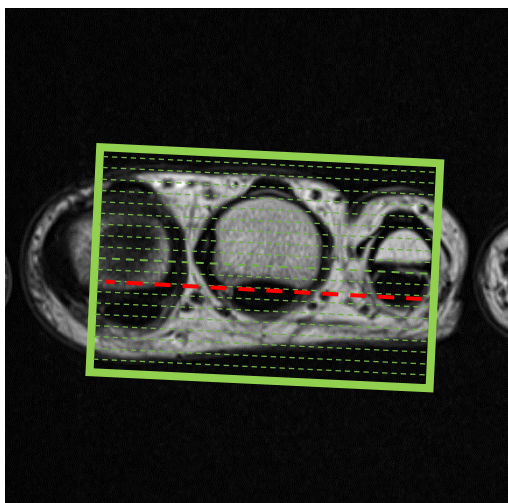
Finger/Thumb Planes / Setup

Dashed Red Line = Imaging Plane Angle/Slice Orientation

(Radiologist to Define FOV)

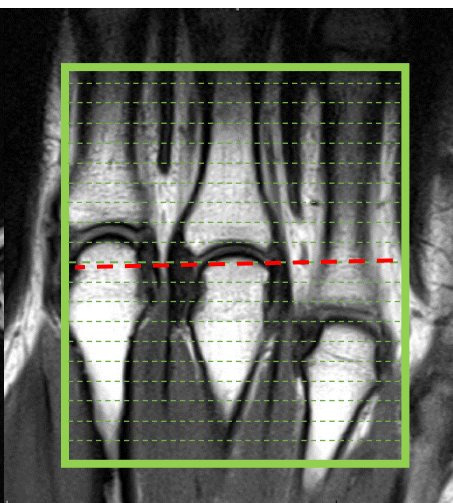
Digits 2-4

Coronal Imaging Plane



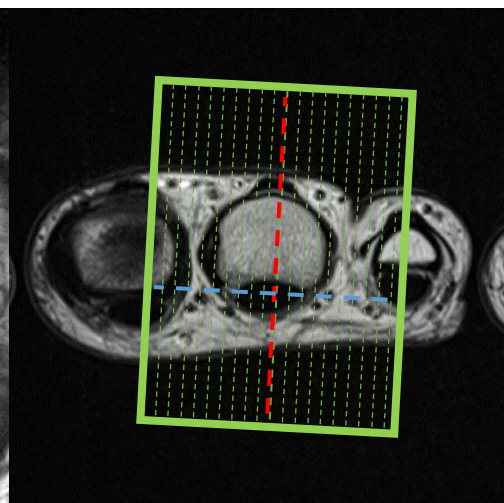
Prescribe plane parallel to head of the individual MCP joint being examined. Center on MCP joint.

Axial Imaging Plane



Prescribe plane parallel to MCP joint of the individual MCP joint being examined. Cover from mid metacarpal to just before the PIP Joint.

Sagittal Imaging Plane



Prescribe plane perpendicular to coronal imaging plane of the individual MCP Joint being examined. Cover from mid metacarpal to just before the PIP Joint.

For Anatomy, Refer to Hand / Wrist Arthritis

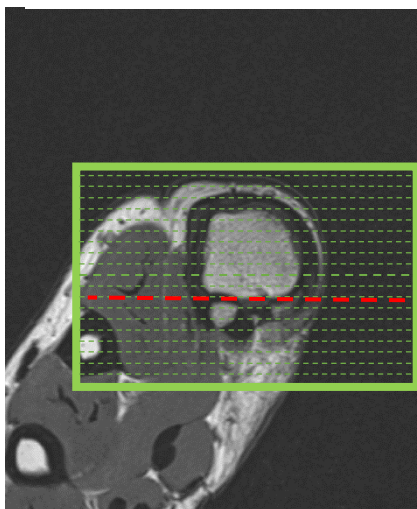
Finger/Thumb Planes / Setup (Continued)

Dashed Red Line = Imaging Plane Angle/Slice Orientation

(Radiologist to Define FOV)

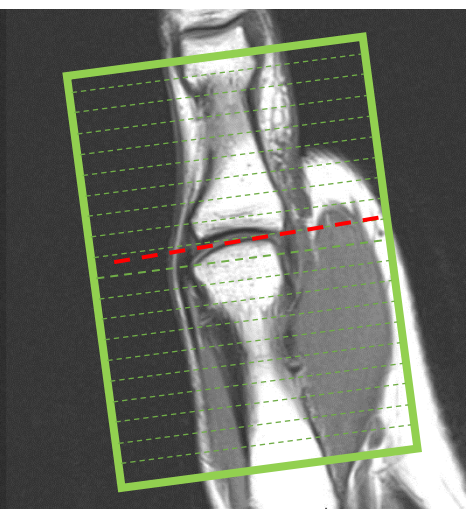
Digit 1 (Thumb)

Coronal Imaging Plane



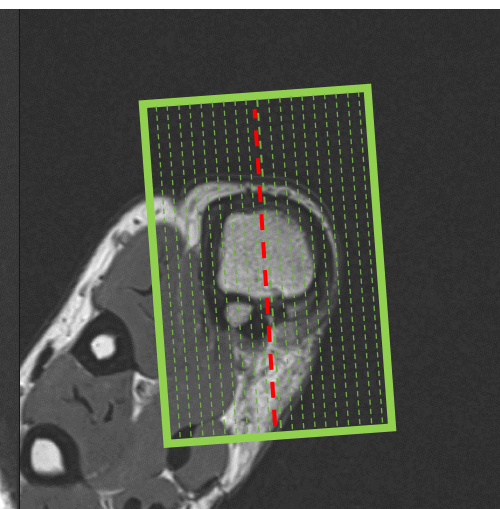
Prescribe plane parallel to head / sesamoid bones of the 1st MCP joint. Center on MCP joint.

Axial Imaging Plane



Prescribe plane parallel to the 1st MCP joint. Cover from mid metacarpal to just before the IP Joint.

Sagittal Imaging Plane



Prescribe plane perpendicular to coronal imaging plane of the 1st MCP joint. Cover from mid metacarpal to just before the IP Joint.

For Anatomy, Refer to Hand / Wrist Arthritis

Finger/Thumb (G-)

Parameters / Sequences

(Radiologist to Define FOV)

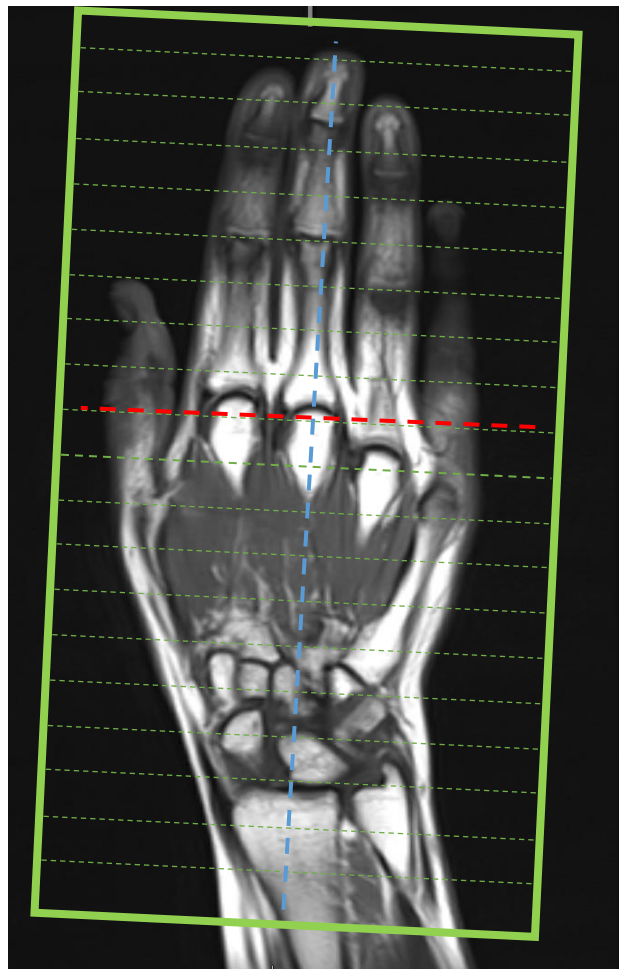
AXIAL T1 FSE
AXIAL PD FS FSE
CORONAL PD FSE
CORONAL PD FS FSE
SAGITTAL PD FS FSE
SAGITTAL PD FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
AX T1	400-700	10-30	80	100	2	1	224	244	L/R	2	S->I	
AX PD FS	1800-3000	10-30	80	100	2	1	256	256	L/R	2	S->I	
COR PD	1800-3000	10-30	80	100	2	0.3	224	224	L/R	2	P->A	
COR PD FS	1800-3000	10-30	80	100	2	0.3	256	256	L/R	2	P->A	
SAG PD FS	1800-3000	10-30	80	100	2	0.3	256	256	A/P	2	L->R	
SAG PD	1800-3000	10-30	80	100	2	0.3	224	320	A/P	2	L->R	

Hand / Wrist Arthritis Imaging Planes / Setup

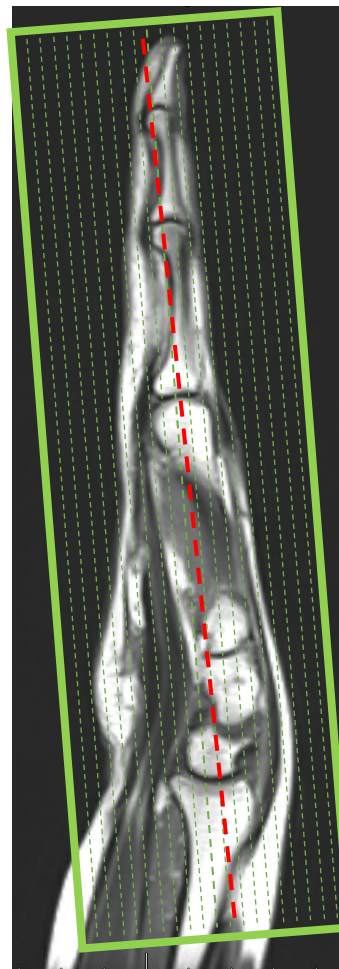
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial Imaging Plane



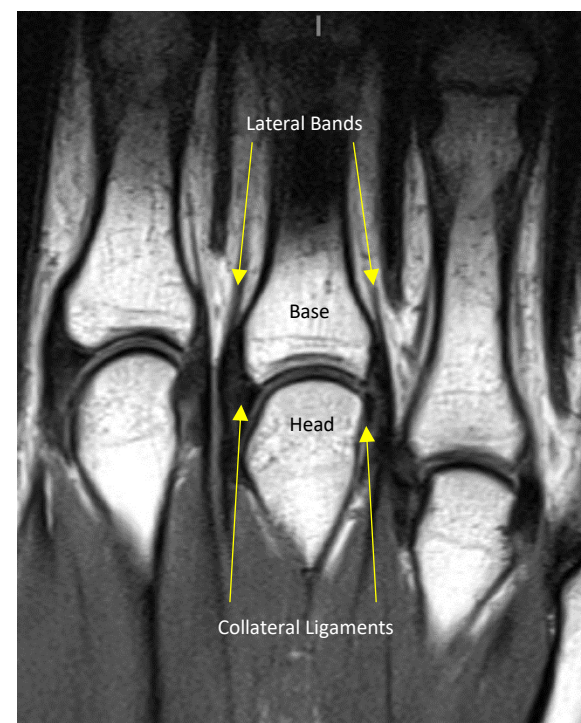
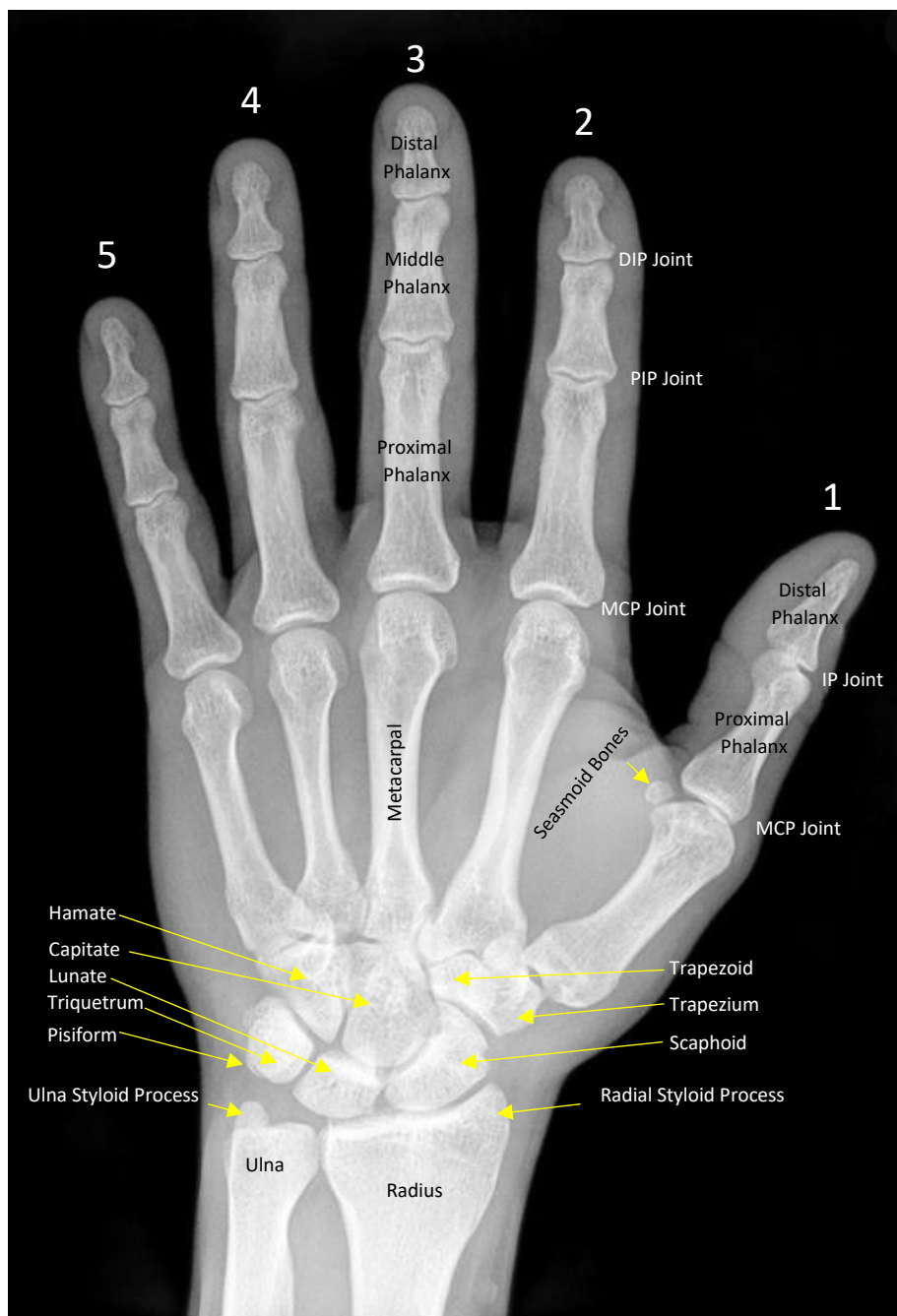
Prescribe plane perpendicular to line drawn (blue) along the mid-sagittal plane of the 3rd finger

Coronal Imaging Plane



Prescribe plane parallel to line drawn (red) along mid-coronal plane of 3rd finger.

Hand / Wrist / Finger Anatomy



Hand / Wrist Arthritis (G-/G+) 3T

Parameters / Sequences

CORONAL T1 FSE
 CORONAL STIR FSE
 AXIAL T2 FS DIXON
 CORONAL VIBE FS WE
 CORONAL VIBE FS WE POST (**SUBTRACTIONS***)
 AXIAL VIBE WE FS POST

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR T1	400-700	10-30	200	100	3	0.3	250	384	L/R	4	L->R	
COR STIR	4000	45	200	100	3	0.3	192	256	L/R	2	L->R	
AX T2 FS DIXON	2000-6000	80-120	130	100	3	1	182	320	A/P	2	S->I	
COR VIBE FS PRE/POST	12.3	7.38	220	100	0.7/80 slab	0	256	256	L/R	1	S->I	
AX VIBE FS POST	12.3	7.38	130	100	1/80 slab	0	256	256	A/P	1	S->I	

Neurogram – Extremity Positioning

This protocol is to be adapted to any extremity on the body. The positioning of the patient within the scanner will be similar if not exactly how you would scan any other body part. The difference with this protocol as compared to your routine body parts, is that this protocol usually requires more coverage. This means you won't be able to always use your common coils. You will end of using the larger flex coils to get the signal coverage needed.

[Hand Positioning](#)

[Elbow Positioning](#)

[Knee Positioning](#)

[Foot Positioning](#)

Neurogram – Extremity Imaging Planes / Setup

This protocol is to be adapted to any extremity on the body. FOV and other parameters will change depending on what part of the body you are scanning. For the most part, body parts will only be scanned in the axial, coronal, or sagittal plane unless otherwise specified by the protocoling radiologist. Below are the links that will bring you back to the common body parts imaging planes and setup.

[**Hand Planes**](#)

[**Elbow Planes**](#)

[**Knee Planes**](#)

[**Foot Planes**](#)

Neurogram - Extremity (G-) 3T-SIEMENS SCANNER ONLY

Parameters / Sequences

CORONAL STIR 3D Space

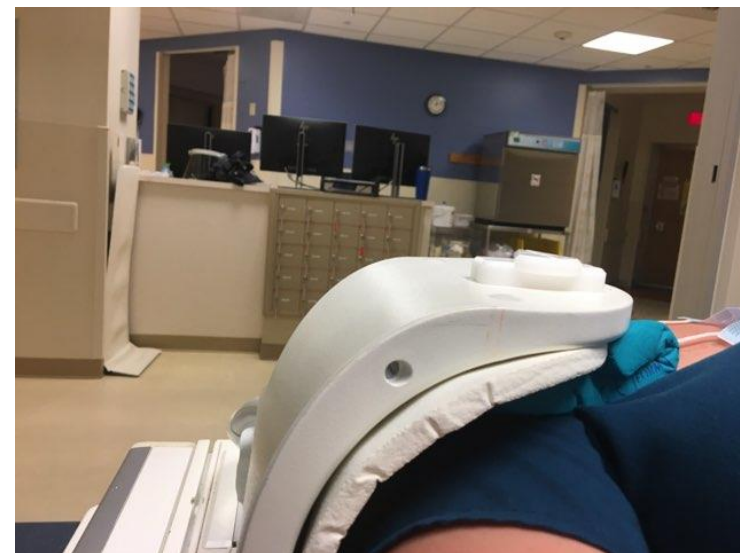
AXIAL AND SAGITTAL REFORMAT OF 3D DATA

AXIAL T1 FSE

AXIAL T2 FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR STIR 3D Space	3500	194	320	100	1.2	0	256	243	S/I	1.4	P->A	TI: 220
AX T1	400-700	10-30	150	100	2	0.4	512	512	A/P	1	S->I	
AX T2 FS	2000-6000	80-120	150	100	2	0.4	448	448	A/P	1	S->I	

Shoulder Positioning



Positioning Tips:

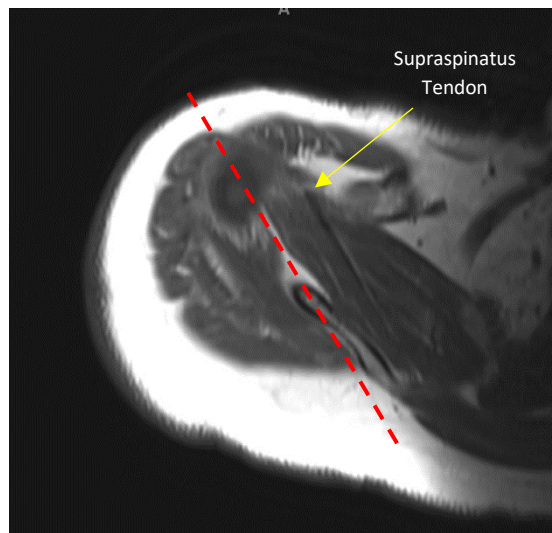
- Arm should be parallel with the body. May need pillows and cushions to elevate arm. Hand position should be between lateral-palmer surfaces up. If out of this range, humerus will rotate out of profile.
- Cushions may need to be placed within shoulder coil to prevent movement.
- Once arm is in position, take pillow and wrap around the arm. Either strap down as demonstrated to the right, or take wedge cushions and place between pillow and wall of scanner when sending in. This will compress arm to side and prevent motion.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**



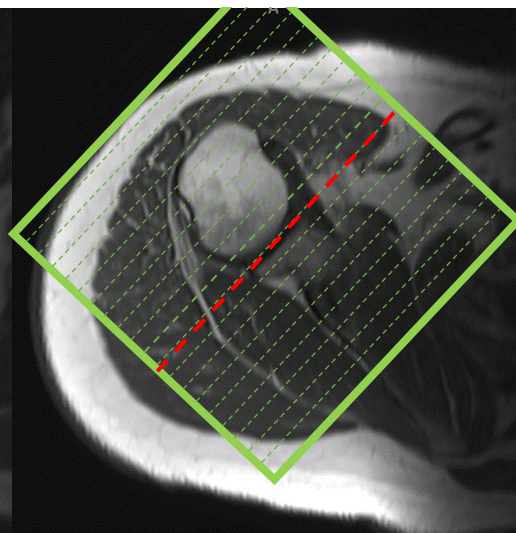
Shoulder Imaging Planes / Setup

Dashed Red Line = Imaging Plane Angle/Slice Orientation

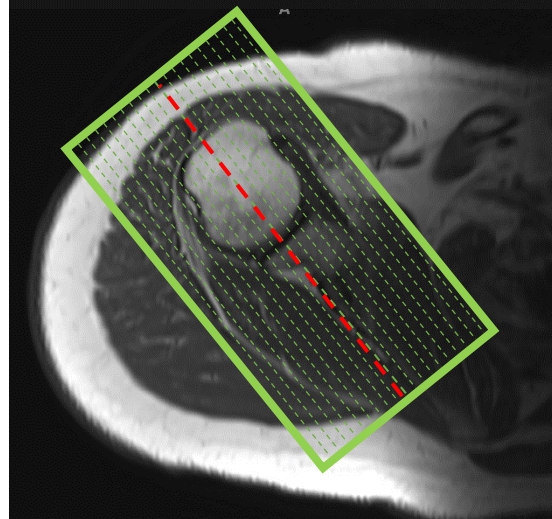
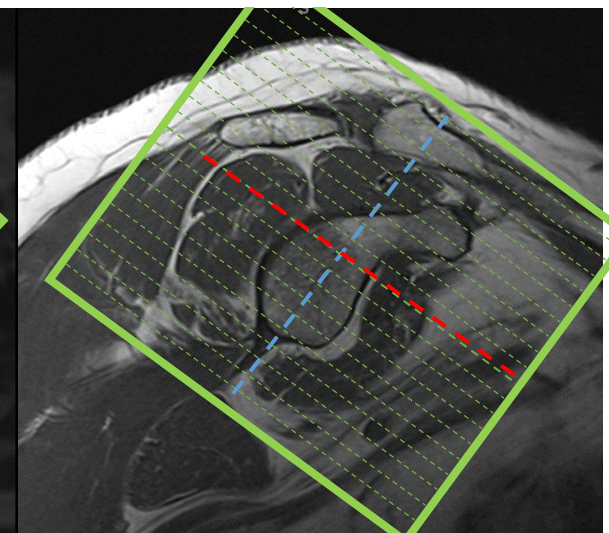
Coronal Oblique Imaging Plane



Sagittal Oblique Imaging Plane



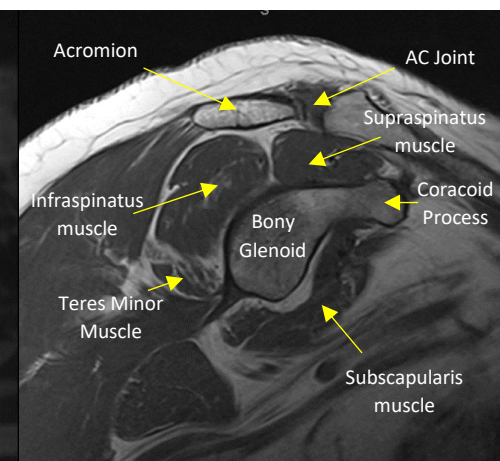
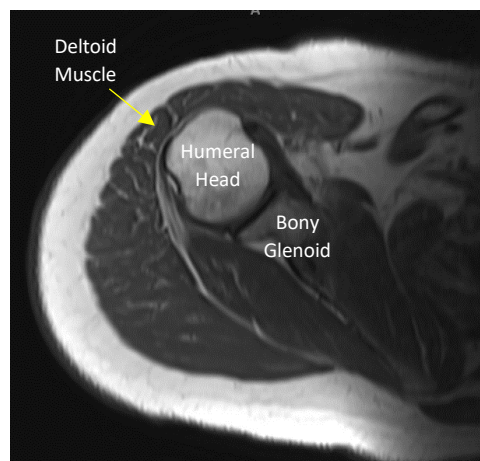
Axial Oblique Imaging Plane



Prescribe sagittal plane off axial images with line parallel to bony glenoid. Image from mid-scapula through deltoid muscle.

Using the sagittal plane, look for the tear drop as shown above. Prescribe axial plane perpendicular to blue line drawn. Cover from above AC joint to below proximal humeral diaphysis

Anatomy

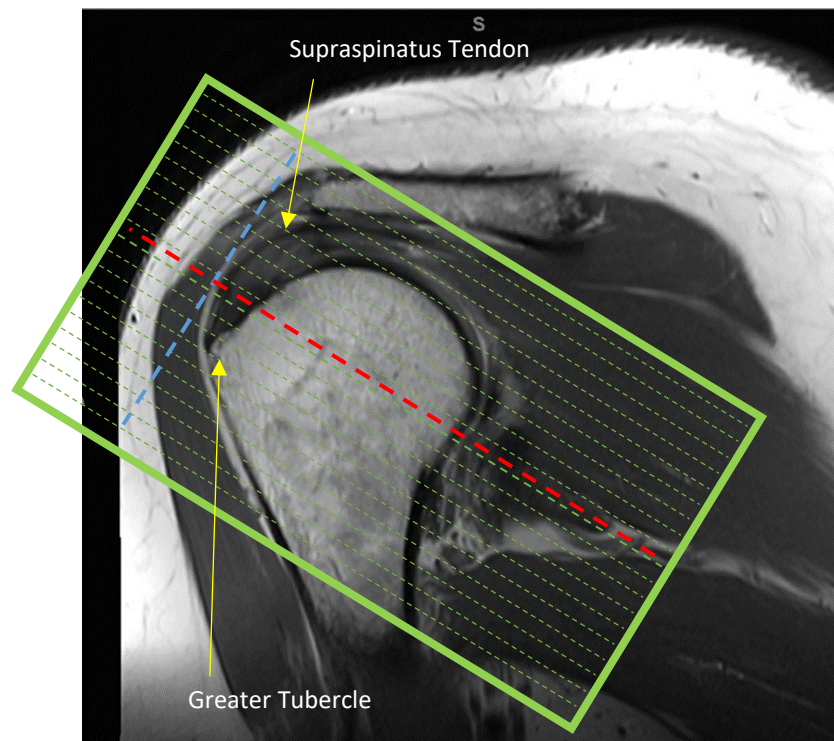


Prescribe plane parallel to the supraspinatus tendon. Cover the whole humeral head including the tendons.

Shoulder Imaging Planes / Setup (Continued)

Dashed Red Line = Imaging Plane Angle/Slice Orientation

Sagittal Oblique Cuff Imaging Plane



Using the coronal oblique plane, find the supraspinatus tendon that runs along the humeral head and attaches at the greater tubercle. Prescribe plane perpendicular to tendon just above the attachment point. Cover the whole humeral head.

Shoulder Arthrogram (G+) 3T

Parameters / Sequences

CORONAL OBLIQUE T2 FS FSE
 CORONAL OBLIQUE T1 FS FSE
 SAGITTAL OBLIQUE T1 FS FSE
 SAGITTAL OBLIQUE T1 FSE
 AXIAL OBLIQUE PD FS FSE
 AXIAL OBLIQUE T1 FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR OBL T2 FS	2000-6000	80-120	140	100	2	0.5	224	320	S/I	2	P->A	
COR OBL T1 FS	400-700	10-30	140	100	2	0.5	224	320	S/I	2	P->A	
SAG OBL T1 FS	400-700	10-30	140	100	2	1	224	320	S/I	2	L->R	
SAG OBL T1	400-700	10-30	140	100	2	1	224	320	S/I	2	L->R	
AX OBL PD FS	1800-3000	10-30	140	100	3	0.5	269	384	S/I	2	S->I	
AX OBL T1 FS	400-700	10-30	140	100	3	0.5	269	384	A/P	2	S->I	

Shoulder Routine (G-)

Parameters / Sequences

CORONAL OBLIQUE T2 FS FSE
 CORONAL OBLIQUE PD FSE
 SAGITTAL OBLIQUE T1 FSE
 SAGITTAL OBLIQUE PD FS FSE
 SAGITTAL OBLIQUE T2 FS (CUFF VIEW) FSE
 AXIAL OBLIQUE PD FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR OBL T2 FS	2000-6000	80-120	150	100	3	0.3	384	384	S/I	2	P->A	
COR OBL PD	1800-3000	10-30	150	100	3	0.3	384	384	S/I	2	P->A	
SAG OBL T1	400-700	10-30	150	100	3	0.3	288	320	S/I	2	L->R	
SAG OBL PD FS	1800-3000	10-30	150	100	3	0.3	384	384	S/I	2	L->R	
SAG OBL T2 FS (CUFF VIEW)	2000-6000	80-120	150	100	3	0.3	384	384	A/P	2	L->R	
AX OBL PD FS	1800-3000	10-30	150	100	3	0.3	384	384	R/L	2	S->I	

Wrist Positioning

Right Way



Hand needs to be straight in the coil, with fingers together and palmer surface down. Arm needs to be parallel with hand especially when imaging wrist area.

DO NOT have hand/wrist in flexion, extension, pronated or arched as seen on the right. This will only cause difficulty when scanning and makes it difficult for the radiologist to read.

Wrong Way



SUPERMAN POSITION PREFERRED



Positioning Tips:

- Superman position is ALWAYS preferred if the patient is able. The key to this position is to make sure patient is as comfy as possible to minimize motion. USE CUSHIONS.
- The coil must be centered on the table and be as straight as possible. This will minimize the chances of gradient failure from overworked gradients.
- Place sandbags on the coil. Most often these coils are free floating and they will move if not immobilized!!



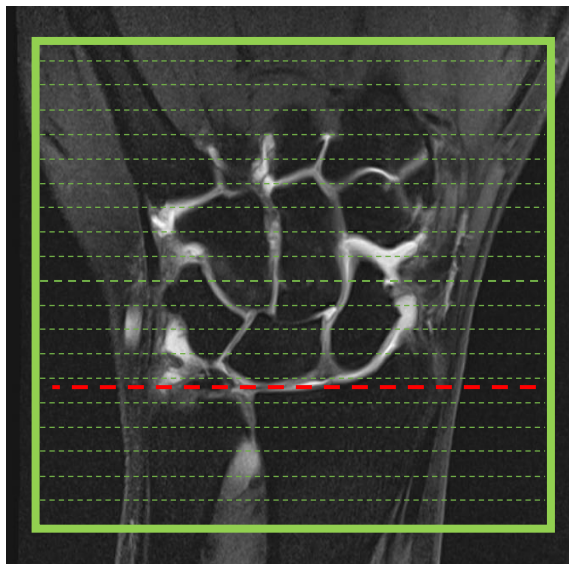
Wrist Imaging Planes / Setup

Dashed Red Line = Imaging Plane Angle/Slice Orientation

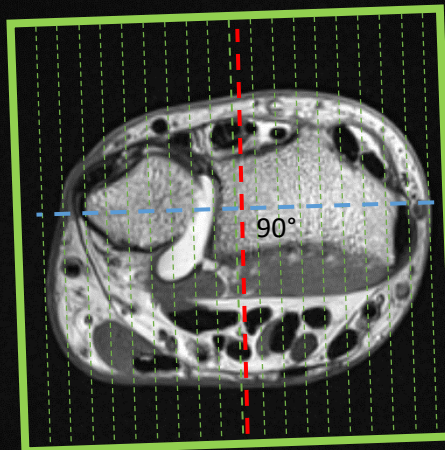
Axial Imaging Plane

Sagittal Imaging Plane

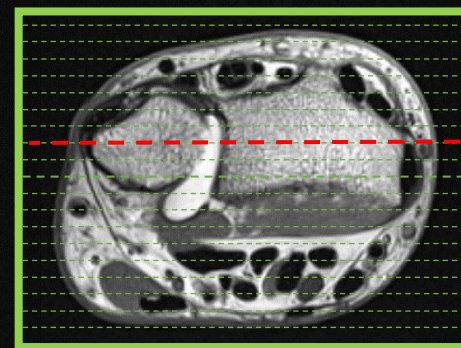
Coronal Imaging Plane



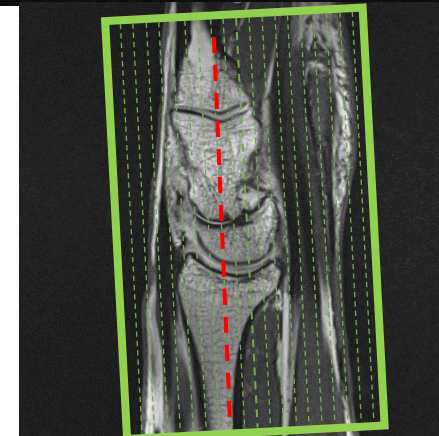
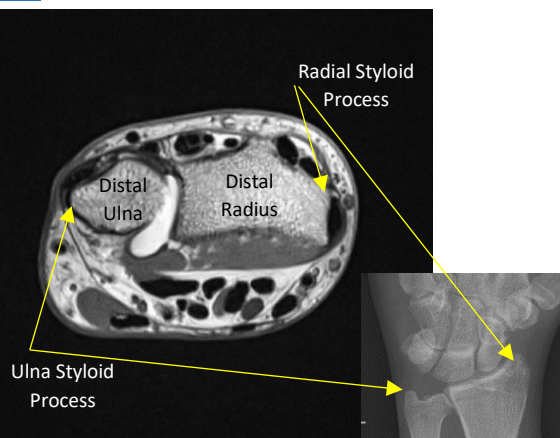
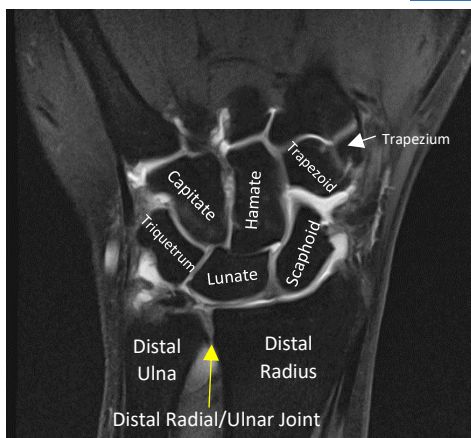
Prescribe plane parallel to distal radius. Scan from proximal metacarpals through distal radial/ulnar joint.



Prescribe plane perpendicular to coronal plane. Scan through entire wrist.



Anatomy



Prescribe plane parallel to line drawn from ulnar styloid through radial styloid. Scan through entire wrist.

Wrist Arthrogram (G+)

Parameters / Sequences

AXIAL T2 FS FSE
AXIAL T1 FS FSE
CORONAL T1 FS FSE
CORONAL PD FS FSE
SAGITTAL T1 FSE
SAGITTAL PD FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
AX T2 FS	2000-6000	80-120	100	100	2	0.2	320	320	L/R	2	S->I	
AX T1 FS	400-700	10-30	100	100	2	0.2	320	320	L/R	2	S->I	
COR T1 FS	400-700	10-30	100	100	2	0.2	320	320	S/I	2	P->A	
COR PD FS	2000-6000	80-120	100	100	2	0.2	320	320	S/I	2	P->A	
SAG T1	400-700	10-30	100	100	2	0.3	512	512	A/P	2	L->R	
SAG PD FS	1800-3000	10-30	100	100	2	0.3	512	512	A/P	2	L->R	

Wrist Routine (G-)

Parameters / Sequences

AXIAL PD FSE
 AXIAL PD FS FSE
 CORONAL PD FSE
 CORONAL PD FS FSE
 SAGITTAL PD FS SE
 SAGITTAL T1 FSE
*****OPTIONAL IF REQUESTED BY RADIOLOGIST*****
 CORONAL 3D DESS

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
AX PD	1800-3000	10-30	100	100	2	0.2	320	320	L/R	2	S->I	
AX PD FS	1800-3000	10-30	100	100	2	0.2	320	320	L/R	2	S->I	
COR PD	1800-3000	10-30	100	100	2	0.2	320	320	S/I	2	P->A	
COR PD FS	1800-3000	10-30	100	100	2	0.2	320	320	S/I	2	P->A	
SAG PD FS	1800-3000	10-30	100	100	2	0.3	256	256	A/P	2	L->R	
SAG T1	400-700	10-30	100	100	2	0.3	512	512	A/P	2	L->R	
OPTIONAL IF REQUESTED BY RADIOLOGIST												
COR 3D DESS	12.67	4.60	100	100	.8	0	192	192	S/I	1	P->A	

Hip Positioning

Right Way



Wrong Way



**Toes NEED to be taped together
with cushions in between to
bring hips into profile.**

Positioning Tips:

- Patient should be going into scanner head first unless claustrophobic to prevent SAR issues.
- Always tape the toes together with cushions in between. This brings the hips into profile, and makes the easier to image.
- A single body coil should be placed over the pelvis.
- If patient has a normal body habitus, have them place hands on chest away from coil (as demonstrated above). This will help prevent wrap issues.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**



Axial View of Hip

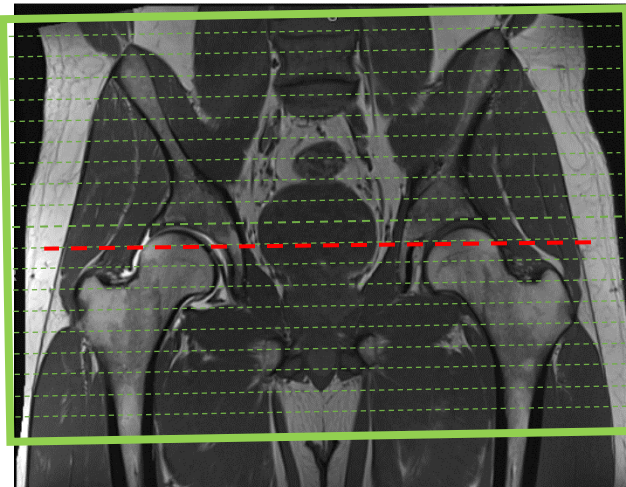
In profile

NOT in profile

Hip Imaging Planes / Setup

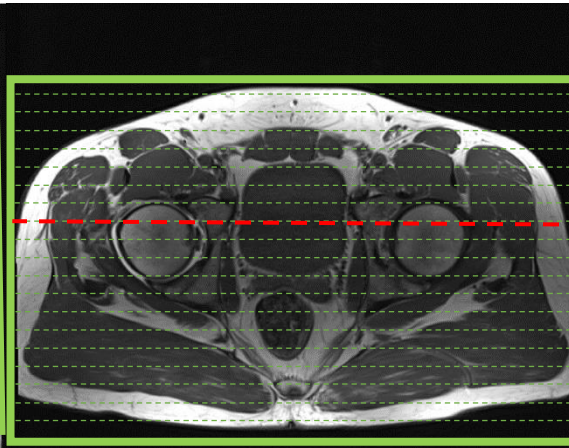
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial PELVIS Imaging Plane



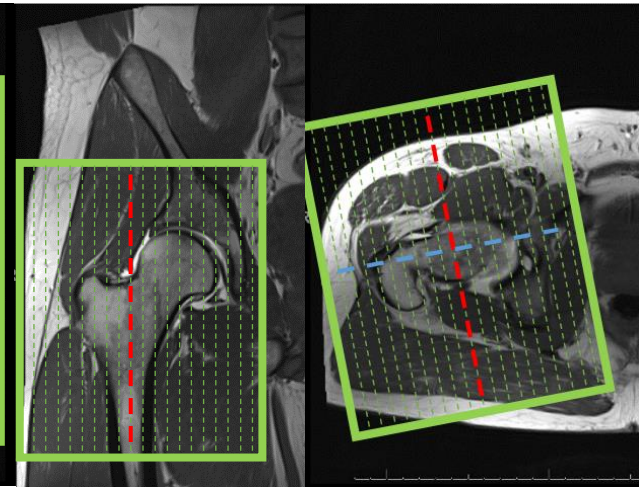
Prescribe plane axial to the body. Use the superior border of the femoral heads to angle axial to pelvis / body.

Coronal PELVIS Imaging Plane



Prescribe plane coronal to the body. Use the anterior border of the femoral heads to angle axial to pelvis / body.

Sagittal HIP Imaging Plane

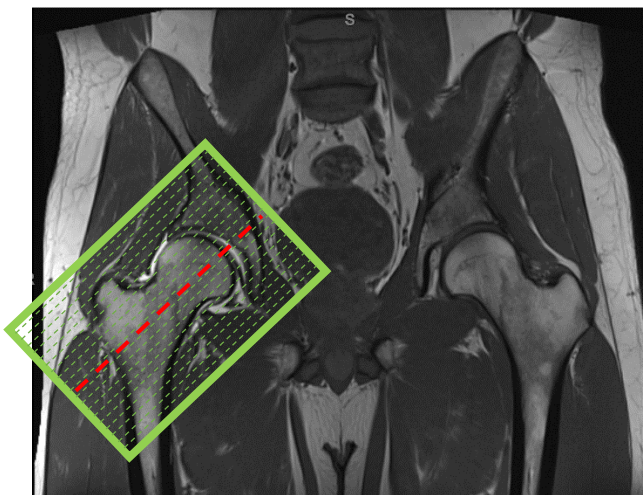


Center over hip. Angle perpendicular (blue line) to the femoral neck on the axial slices.

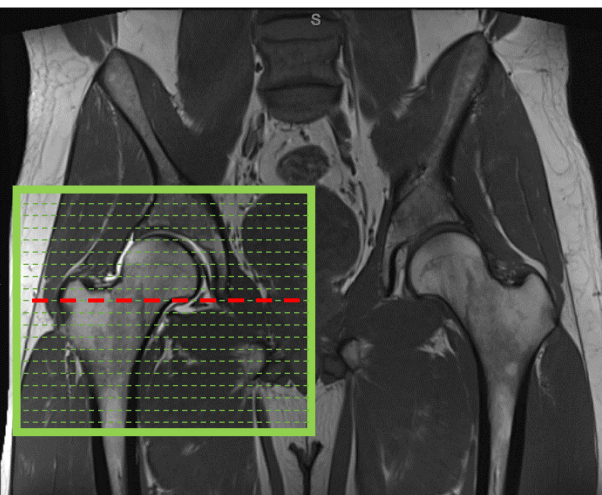
Axial Oblique HIP Imaging Plane

Axial HIP Imaging Plane

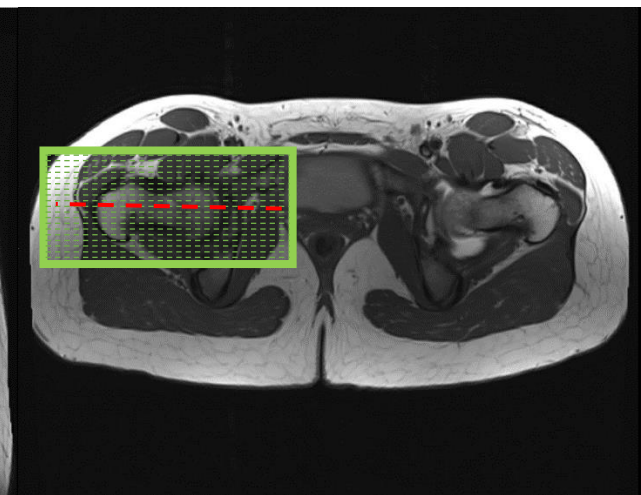
Coronal HIP Imaging Plane



Prescribe plane parallel to femoral neck in the coronal plane. Include both trochanters.

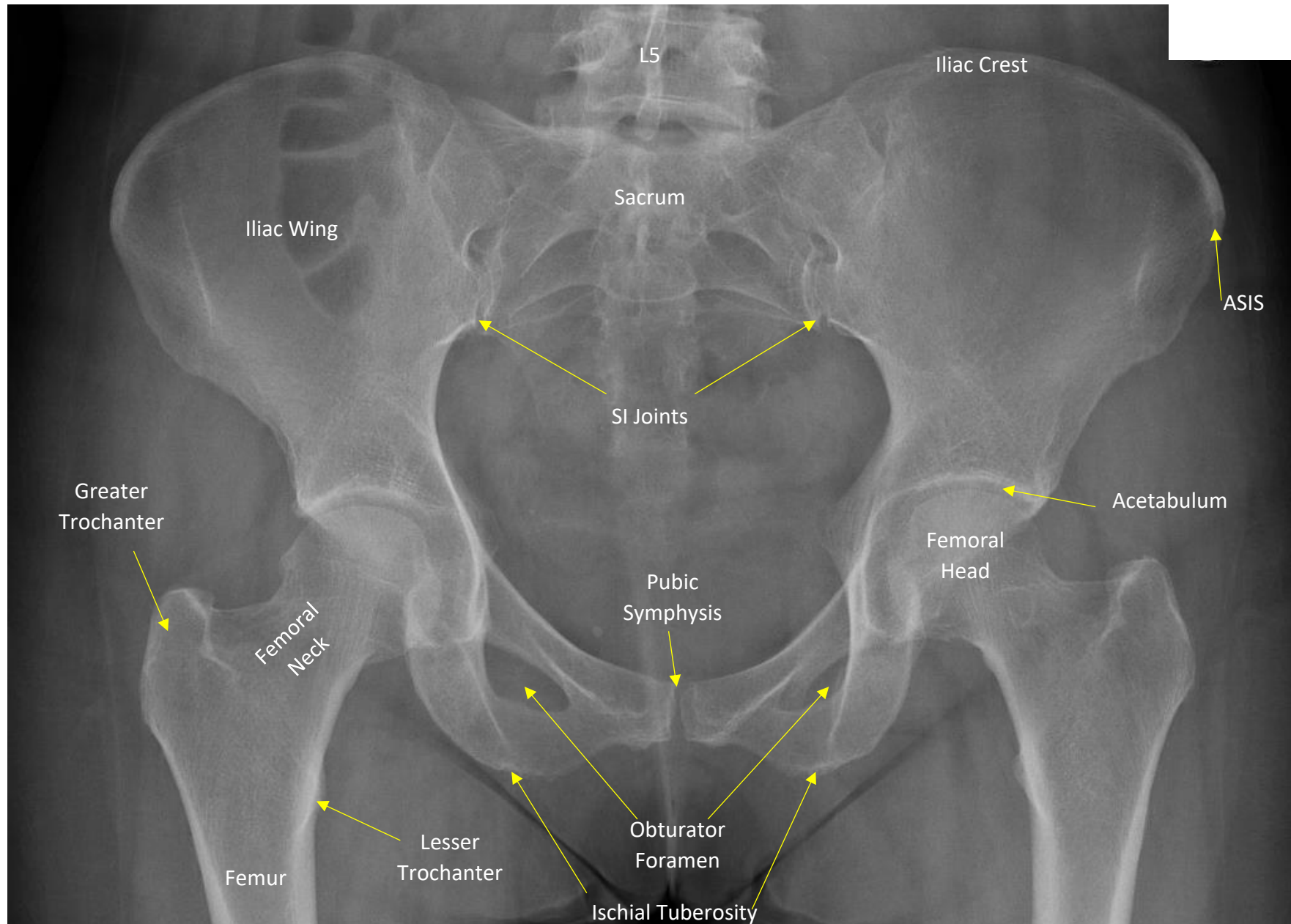


Prescribe plane axial to body. Cover entire hip from above femoral head to below lesser trochanter.



Prescribe plane parallel to femoral neck in the axial plane. Include the entirety of the hip anterior to posterior

Hip / Pelvis Anatomy



Hip Arthrogram (G+) 3T

Parameters / Sequences

CORONAL STIR FSE Pelvis
 CORONAL T1 FSE Pelvis
 AXIAL PD FSE Hip
 AXIAL OBLIQUE T1 FS FSE Hip
 CORONAL T1 FS FSE Hip
 CORONAL T2 FS FSE Hip
 SAGITTAL PD FSE Hip

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE %			PHASE	FREQ				
COR STIR Pelvis	3830	29	400	75	3	1	320	208	S/I	1	P->A	
COR T1 Pelvis	400-700	10-30	400	75	3	1	512	346	S/I	1	P->A	
AX PD Hip	1800-3000	10-30	180	100	2.5	0.3	320	288	A/P	1	S->I	
AX OBL T1 FS Hip	400-700	10-30	180	100	2.5	0.3	256	256	A/P	2	S->I	ANGLE PARALLEL TO THE NECK OF THE HIP
COR T1 FS Hip	400-700	10-30	180	100	2.5	0.3	256	256	S/I	2	P->A	
COR T2 FS Hip	2000-6000	80-120	180	100	2.5	0.3	320	288	S/I	1	P->A	
SAG PD Hip	1800-3000	10-30	180	100	3	0.5	320	256	S/I	1	L->R	

Hip Labrum (G-) 3T

Parameters / Sequences

CORONAL T1 FSE Pelvis
CORONAL STIR FSE Pelvis
CORONAL PD FS FSE Hip
SAGITTAL PD FS FSE Hip
AXIAL OBLIQUE PD FS FSE Hip

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR T1 Pelvis	400-700	10-30	400	75	4	.5	384	512	L/R	1	P->A	
COR STIR Pelvis	3830	29	400	75	4	.5	320	208	S/I	1	P->A	
COR PD FS Hip	1800-3000	10-30	180	100	3	.5	240	320	H/F	2	P->A	
SAG PD FS Hip	1800-3000	10-30	180	100	3	.5	240	320	H/F	2	L->R	
AX OBL PD FS Hip	1800-3000	10-30	180	100	3	.5	269	384	A/P	1	H->F	ANGLE PARALLEL TO THE NECK OF THE HIP

Hip Metal on Metal Imaging Planes / Setup

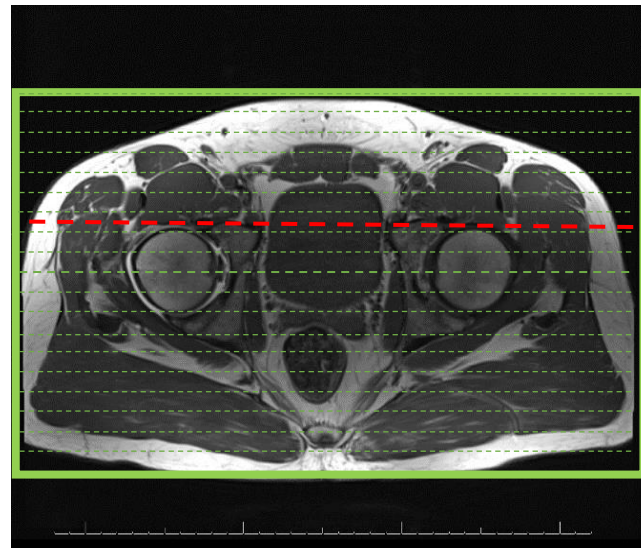
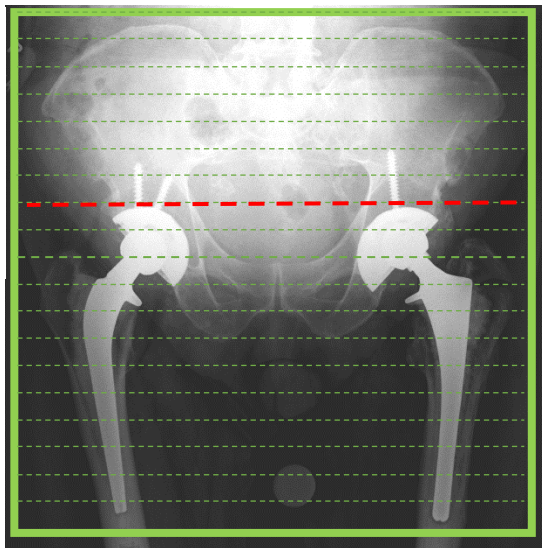
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial Imaging Plane

Coronal Imaging Plane

Prescribe plane axial to the body. Cover from above Iliac Crest to below tip of the arthroplasty.

Prescribe plane axial to the arthroplasty. Cover all the hardware (S-I).



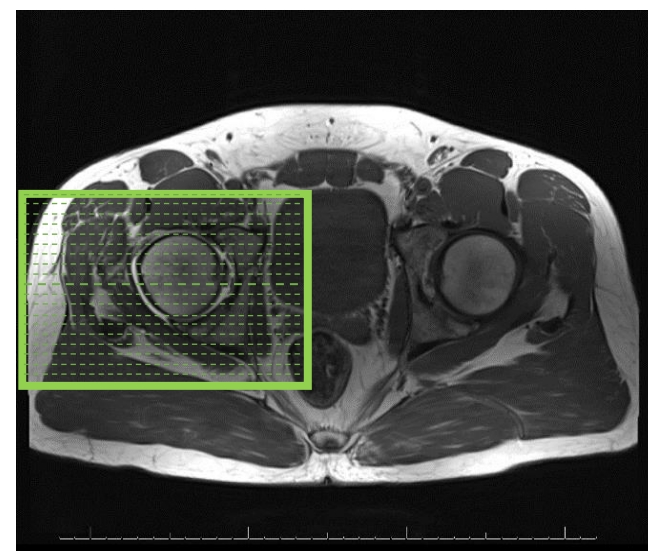
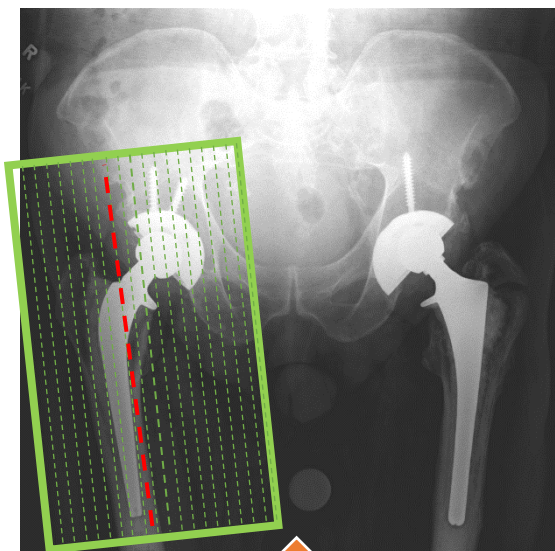
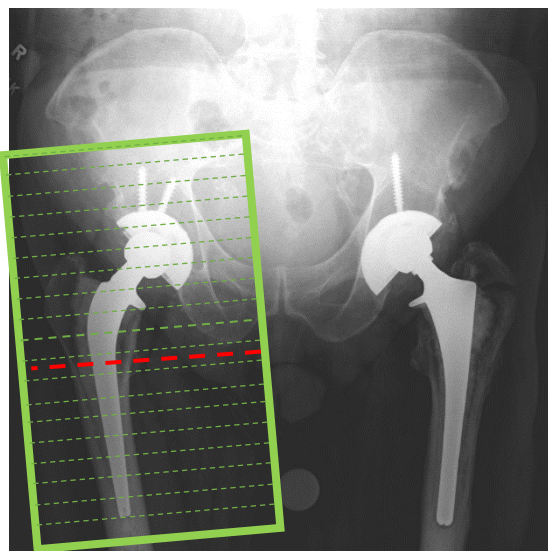
Prescribe coronal plane to the body. Cover from skin to skin (A-P).

Prescribe coronal plane to the arthroplasty. Cover all the hardware (A-P).

Axial Arthroplasty Imaging Plane

Sagittal Arthroplasty Imaging Plane

Coronal Arthroplasty Imaging Plane



Prescribe plane sagittal to arthroplasty. Cover all hardware (L-R).

Hip Metal on Metal (G-) (1.5T ONLY)

Parameters / Sequences

CORONAL T1 (Iliac Crest – Arthroplasty)

CORONAL STIR MAVRIC (Iliac Crest – Arthroplasty)

AXIAL T2 FSE (Iliac Crest – Arthroplasty)

AXIAL T1 FSE (Iliac Crest – Arthroplasty)

AXIAL STIR FSE Small FOV (Hip Arthroplasty)

CORONAL STIR FSE Small FOV (Hip Arthroplasty)

SAGITTAL STIR FSE Small FOV (Hip Arthroplasty)

SAGITTAL T1 FSE Small FOV (Hip Arthroplasty)

*****OPTIONAL FOR SCANNERS THAT DON'T HAVE MAVRIC/SEMAC/MARS AS AN OPTION*****

CORONAL STIR (Iliac Crest – Arthroplasty)

Sequence	TR	TE	FOV(MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR T1	400-700	Min	440	100	3.6	0	256	512	S/I	1	P->A	LG FOV
COR STIR MAVRIC	4000-5000	40	440	100	3.6	0	256	512	S/I	1	P->A	LG FOV
AX T2	2000-6000	34	360	100	5	0	256	512	A/P	2	S->I	LG FOV
AX T1	400-700	Min	360	100	5	0	512	512	A/P	1	S->I	LG FOV
AX STIR	4000	50/130TI	260	100	4	0	256	512	A/P	2	S->I	Hip Arthroplasty
COR STIR	4000	50/130TI	260	100	4	0	320	512	S/I	2	P->A	Hip Arthroplasty
SAG STIR	4000	50/130TI	260	100	2.5	0	320	512	S/I	2	L->R	Hip Arthroplasty
SAG T1	400-700	Min	260	100	2.5	0	512	512	S/I	1	S->I	Hip Arthroplasty
OPTIONAL FOR SCANNERS THAT DON'T HAVE MAVRIC/SEMAC/MARS AS AN OPTION												
COR STIR	4000	50/130TI	260	100	4	0	320	512	S/I	2	P->A	LG FOV

Neurogram – Inguinal Positioning



Positioning Tips:

- Patient should be going into scanner head first unless claustrophobic to prevent SAR issues.
- A single body coil should be placed over the posterior pelvis.
- Patient's hands should be above their head if possible with padding between the hands, head and coil. Also make sure to place pillow under ankles for comfort. **COMFORT IS KEY WITH THIS EXAM.**
- Have the patient breath nice and easy.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**

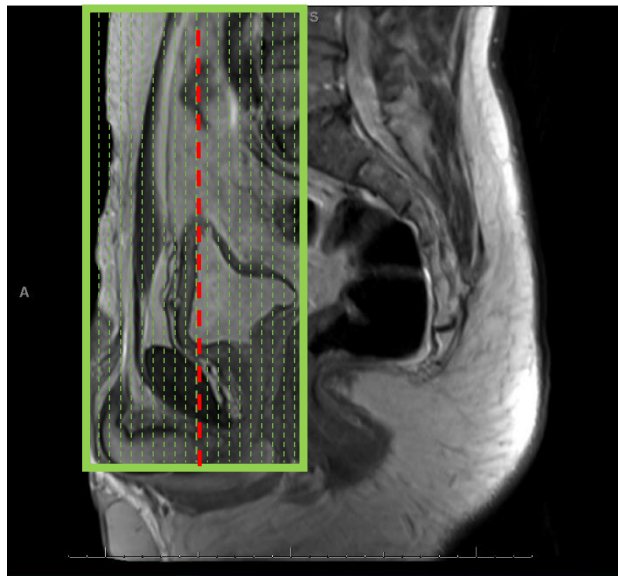
Patient should be going head first, prone into the scanner. This helps reduce SAR issues.



Neurogram - Inguinal Imaging Planes / Setup

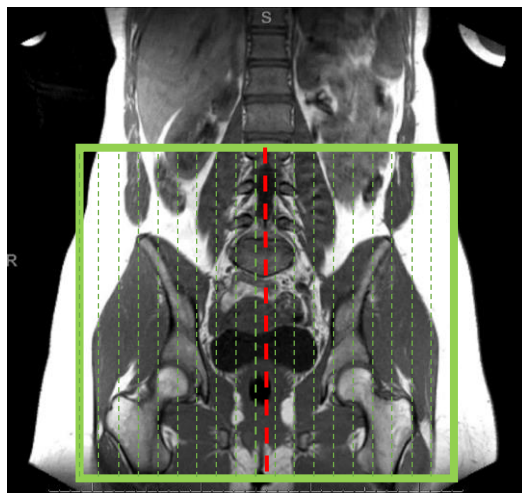
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Coronal Imaging Plane



Prescribe plane perpendicular to body. Cover all of the anterior AND lateral abdominal muscles thru the symphysis to the level of the sacral promontory (anterior margin of the LS junction).

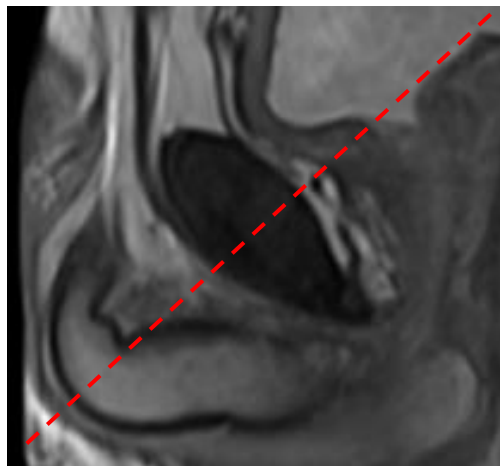
Sagittal Imaging Plane



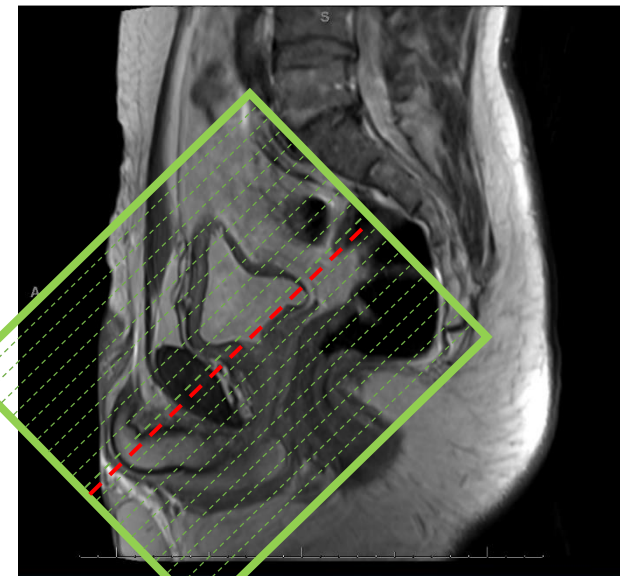
<-Plane Sagittal to pelvis. Make sure to cover the lateral margins of the abdominal wall muscles.

Prescribe plane Axial to the pelvis. -> Cover from 2-3in above the iliac wings thru lesser trochanters. Make sure to include the anterior AND lateral abdominal muscles in the FOV.

Axial Oblique Angle

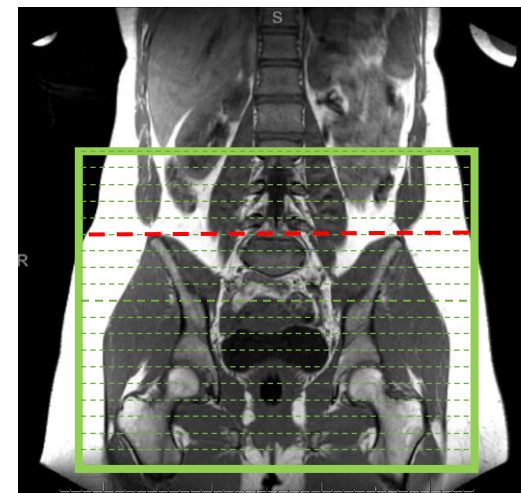


Axial Oblique Imaging Plane



Prescribe plane perpendicular to the orientation of the symphysis pubis at midline.

Axial Imaging Plane



Neurogram - Inguinal (G-)

Parameters / Sequences

SAGITTAL PD FSE

AXIAL T1 FSE

CORONAL STIR 3D SPACE

AXIAL AND SAGITTAL REFORMATS OF 3D DATA

AXIAL PD OBL SPAIR

AXIAL T1 OBL

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
SAG PD	1800-3000	10-30	300	100	4	1	320*	320*	S/I	2	L -> R	Orthogonal to the body
AX T1	400-700	10-30	300	100	4	1	320*	320*	R/L	2	S -> I	
COR STIR 3D SPACE	1500	91	300	100	1.3	0	256	256	R/L	1	P -> A	
AX OBL PD SPAIR	1800-3000	10-30	240	100	2	0	320*	320*	R/L	1	S -> I	Perpendicular to the symphysis pubis
AX OBL T1	400-700	10-30	240	100	2	0	320*	320*	R/L	1	S -> I	

*Matrix is interpolated x2

**SPAIR is the method of fat saturation used

Neurogram - Lumbosacral Plexus / Sciatic Nerve Positioning



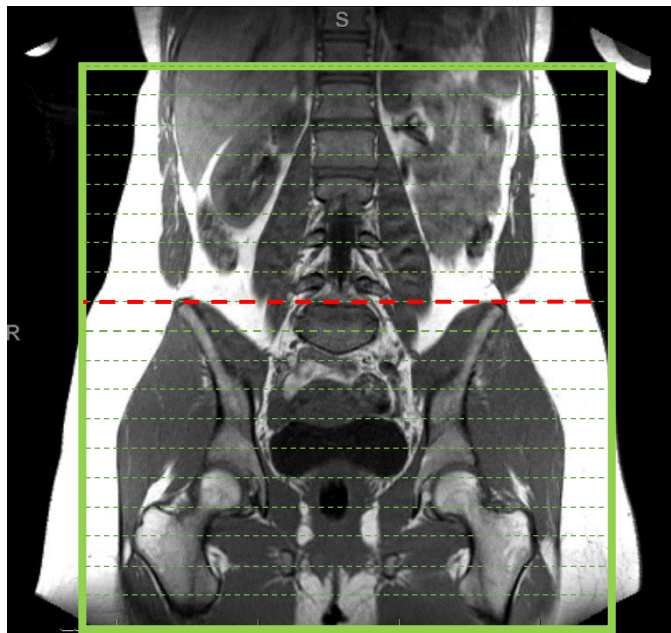
Positioning Tips:

- Patient should be going into scanner head first unless claustrophobic to prevent SAR issues.
- Two body coil should be placed over the anterior abdomen/pelvis. You will most likely be turning off coil elements in the upper body coil. We only need signal up through (L1 for Lumbosacral Plexus, L3 for Sciatic Nerve).
- Patient's hands should be by their sides if possible with padding between the arms, coil and body. Also make sure to place pillow under ankles for comfort.
- Have the patient breath nice and easy.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**

Neurogram - Lumbosacral Plexus Imaging Planes / Setup

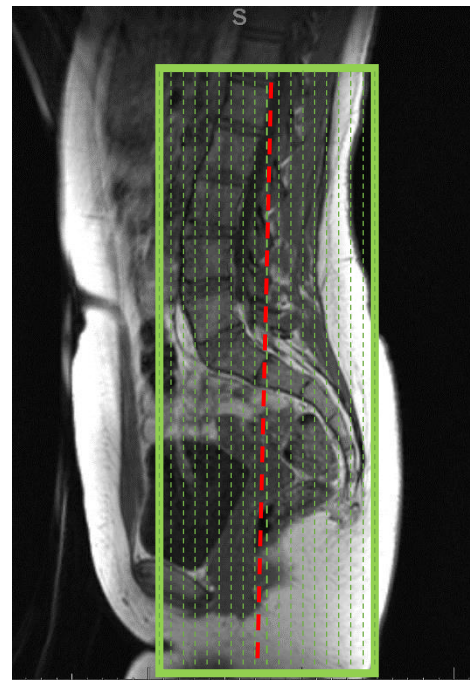
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial Imaging Plane



Prescribe plane axial to the body A-P. Rotation can be checked on the coronal plane by using the tops of the hips as a guide. **Coverage should be from L1 through the Lesser Trochanter.**

Coronal Imaging Plane



Prescribe plane coronal to the body. **Cover from anterior hip to posterior of the sacrum.**

Pelvic Anatomy can be seen under Hip / Pelvis Anatomy

Neurogram - Lumbosacral Plexus (G-) 3T Siemens preferred

Parameters / Sequences

CORONAL 3D SPACE

AXIAL AND SAGITTAL REFORMAT OF 3D DATA

CORONAL T1 FSE

AXIAL T1 FSE

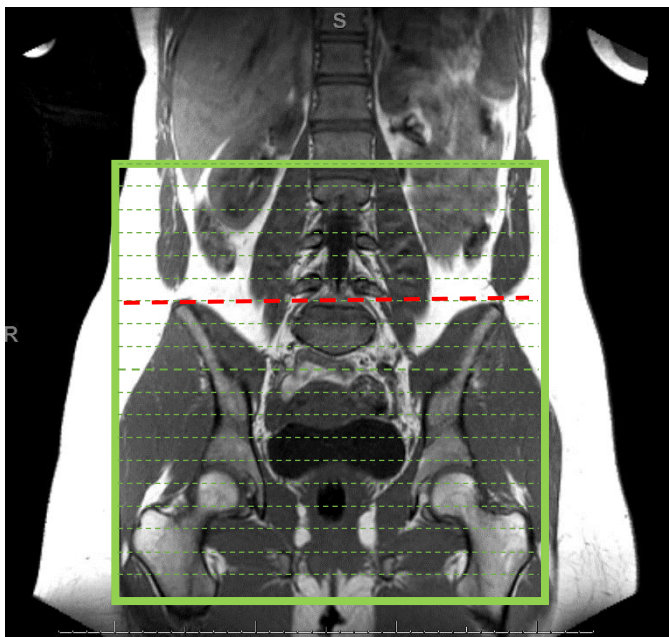
AXIAL T2 FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
COR 3D Space	1500	102	360	100	1.4	0	256	256	R/L	1.4	P->A	
COR T1	400-700	10-30	360	100	2	0	384	308	R/L	2	P->A	
AX T1	400-700	10-30	330	100	4	1	256	205	A/P	3	S->I	
AX T2 FS	2000-6000	80-120	330	100	4	1	320	256	A/P	3	S->I	

Neurogram – Sciatic Imaging Planes / Setup

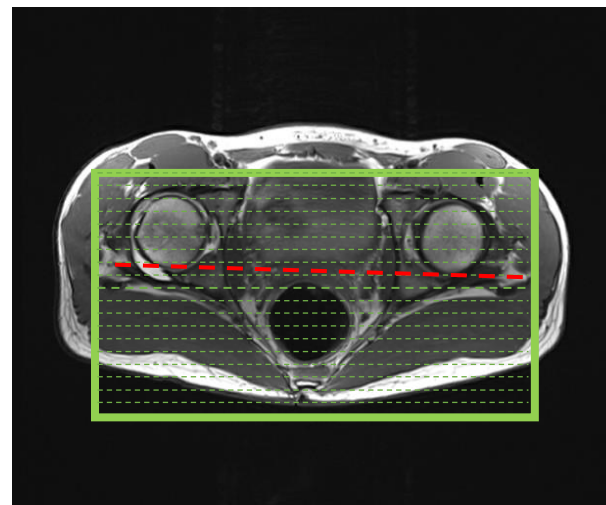
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial Imaging Plane



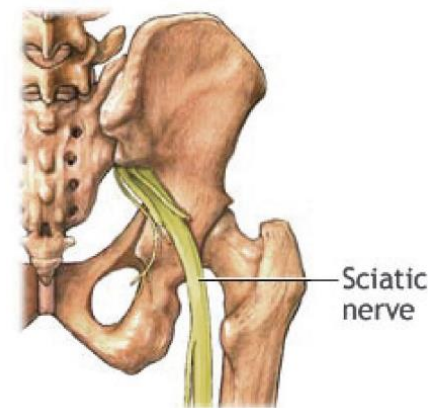
Prescribe plane axial to the body S-I. Rotation can be checked on the coronal plane by using the tops of the hips / femoral heads as a guide. Coverage should be from L3 through the Isthmic Tuberosity

Coronal Imaging Plane



Prescribe plane coronal to the body A-P. Rotation can be checked on the axial plane by using the femoral heads. Coverage should be from just anterior to the femoral heads all the way posterior through the sacrum.

Pelvic Anatomy can be seen under Hip / Pelvis Anatomy



Neurogram – Sciatic (G-) (1.5T Siemens)

Parameters / Sequences

CORONAL STIR 3D SPACE

AXIAL AND SAGITTAL REFORMAT OF 3D DATA

AXIAL T1 FSE

AXIAL T2 FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
COR STIR 3D Space	3500	194	320	100	1.2	0	256	243	S/I	1.4	P->A	TI: 220
AX T1	400-700	10-30	150	100	2	0.4	512	512	A/P	1	S->I	
AX T2 FS	2000-6000	80-120	150	100	2	0.4	448	448	A/P	1	S->I	

Neurogram – Sciatic (G-) 3T Siemens preferred

Parameters / Sequences

CORONAL 3D SPACE

AXIAL AND SAGITTAL REFORMAT OF 3D DATA

CORONAL T1 FSE

AXIAL T1 FSE

AXIAL T2 FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE			PHASE	FREQ				
COR 3D Space	1500	102	300	100	1.4	0	256	256	R/L	1.4	P->A	
COR T1	400-700	10-30	300	100	2	0	384	308	R/L	2	P->A	
AX T1	400-700	10-30	300	100	4	1	256	205	A/P	3	S->I	
AX T2 FS	2000-6000	80-120	300	100	4	1	320	256	A/P	3	S->I	

Pelvis Positioning

Right Way



Wrong Way



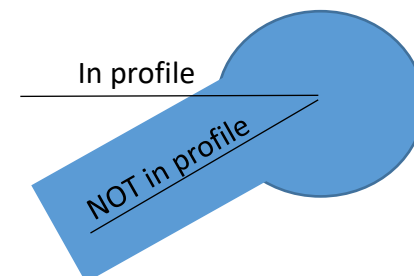
**Toes NEED to be taped together
with cushions in between to
bring hips into profile.**

Positioning Tips:

- Patient should be going into scanner head first unless claustrophobic to prevent SAR issues.
- Always tape the toes together with cushions in between. This brings the hips into profile, and makes the easier to image.
- A single body coil should be placed over the pelvis.
- If patient has a normal body habitus, have them place hands on chest away from coil (as demonstrated above). This will help prevent wrap issues.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**



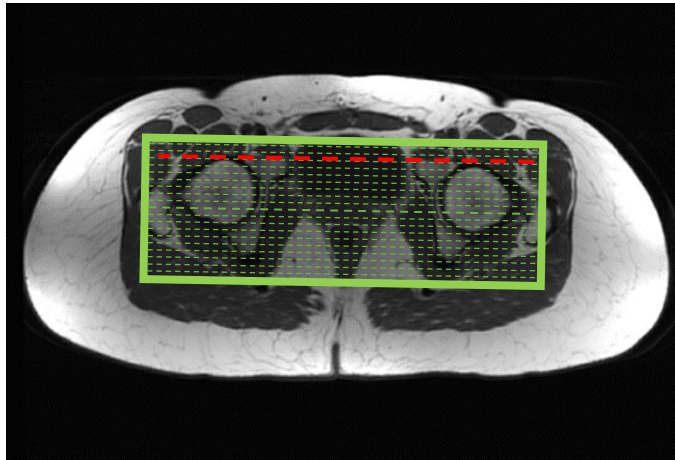
Axial View of Hip



Pelvis- Pubalgia Imaging Planes / Setup

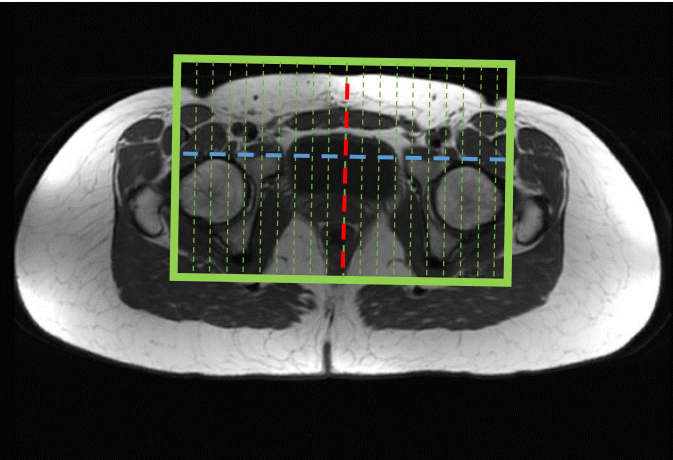
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Coronal Imaging Plane



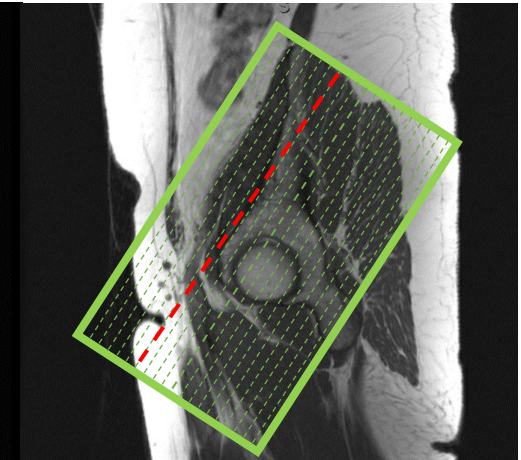
Prescribe coronal plane to the body. Cover from the anterior surface of the femoral head to no more than 1 inch posterior to the femoral heads. Use the femoral heads as a guide to determine the rotation of the pelvis.

Sagittal Imaging Plane

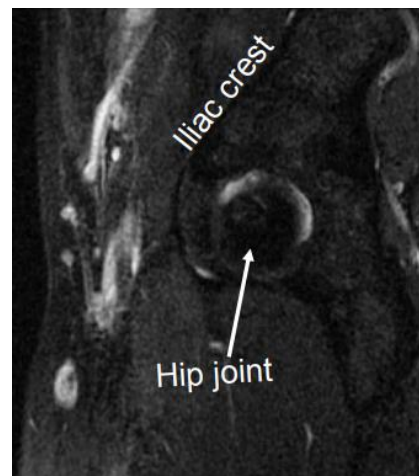


Prescribe sagittal plane to the body. Cover from side to side no farther than mid femoral neck bilaterally. Use the femoral heads as a guide to determine the rotation of the pelvis.

Axial Oblique Imaging Plane



Prescribe plane parallel to the anterior iliac crest as demonstrated to the left. Coverage should include the pubic symphysis in its entirety to about 1 inch posterior to the femoral head. Side to side should more than mid femoral necks bilaterally.



Pelvis- Pubalgia (G-)

Parameters / Sequences

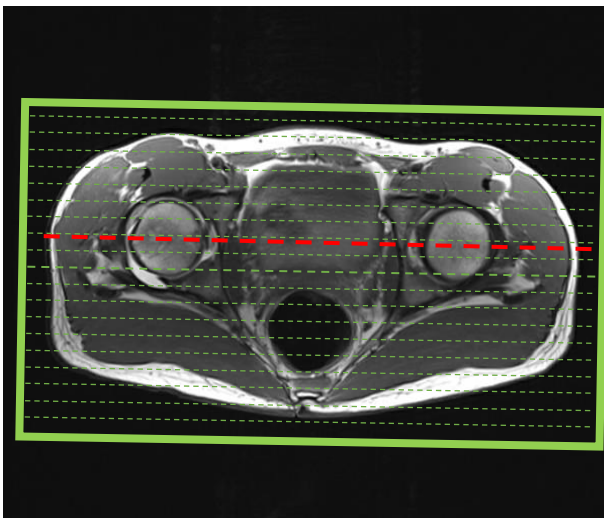
CORONAL STIR FSE
CORONAL T1 SE
SAGITTAL T2 FS FSE
AXIAL OBLIQUE T2 FS FSE
AXIAL OBLIQUE PD FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR STIR	4000	32	280	75	4	1	205	320	L/R	1	P->A	TI: 130
COR T1	400-700	10-30	280	75	4	1	256	320	L/R	2	P->A	
SAG T2 FS	2000-6000	80-120	200	100	4	1	192	256	A/P	2	L->R	
AX OBL T2 FS	1800-3000	80-120	200	100	4	1	192	256	A/P	2	S->I	
AX OBL PD FS	1800-3000	10-30	200	100	4	1	224	320	A/P	2	S->I	

Pelvis Imaging Planes / Setup

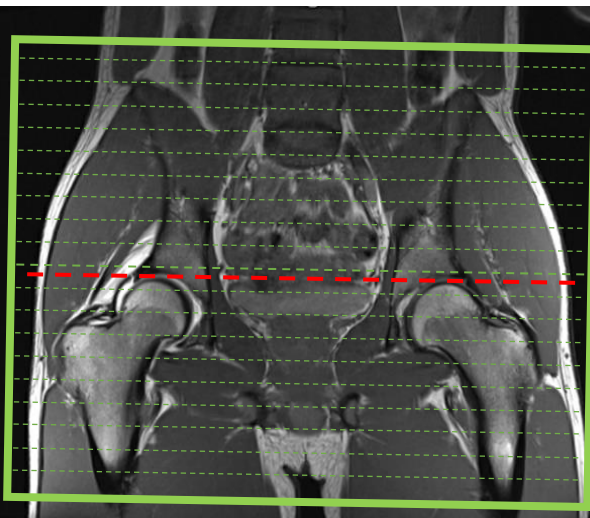
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Coronal Imaging Plane



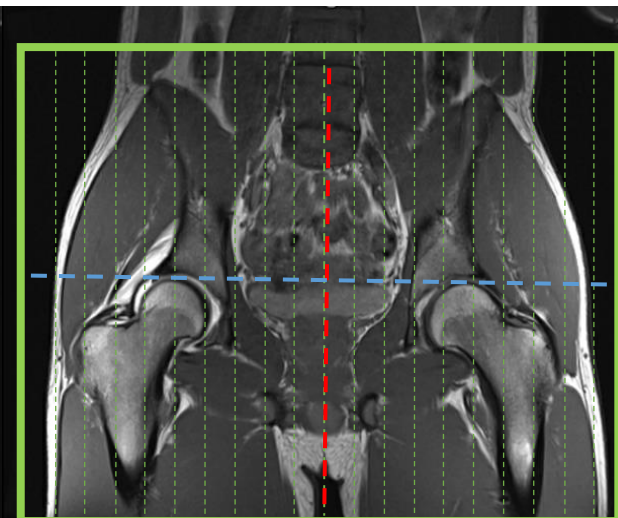
Prescribe coronal plane to the body. Cover from skin to skin. Use the femoral heads as a guide to determine the rotation of the pelvis.

Axial Imaging Plane



Prescribe plane axial to the body A-P. Rotation can be checked on the coronal plane by using the tops of the femoral heads. Cover from above the iliac crest to below the lesser trochanters.

Sagittal Imaging Plane



Prescribe plane sagittal to the body L-R. Rotation can be checked on the coronal plane by using the tops of the femoral heads. Plane should be perpendicular to blue line. Cover from skin to skin on the sides.

For Anatomy Refer to: Hip / Pelvis Anatomy

Pelvis Routine / Occult Fracture (G-)

Parameters / Sequences

CORONAL T1 FSE
CORONAL STIR FSE
AXIAL T2 FS FSE
SAGITTAL PD FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR T1	400-700	10-30	400	75	4	1	346	512	S/I	1	P->A	
COR STIR	4000	50	400	75	4	1	192	256	S/I	2	P->A	Ti: 130
AX T2 FS	2000-6000	80-120	400	100	4	1	188	320	A/P	2	S->I	
SAG PD FS	1800-3000	10-30	180	100	4	1	307	384	A/P	2	L->R	

Pelvis- SI Joints Positioning



When scanning the SI Joints, it's not imperative to tapes the toes together. You can have the patient just let them relax to the sides.

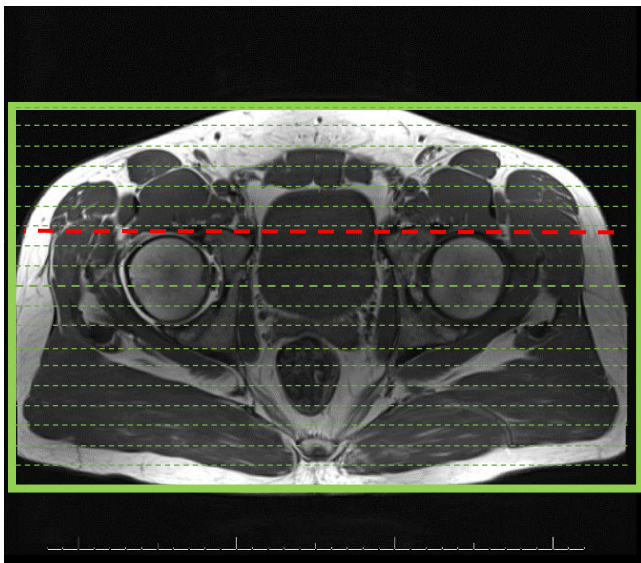
Positioning Tips:

- Patient should be going into scanner head first unless claustrophobic to prevent SAR issues.
- A single body coil should be placed over the pelvis.
- If patient has a normal body habitus, have them place hands on chest away from coil (as demonstrated above). This will help prevent wrap issues.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**

Pelvis- SI Joints Imaging Planes / Setup

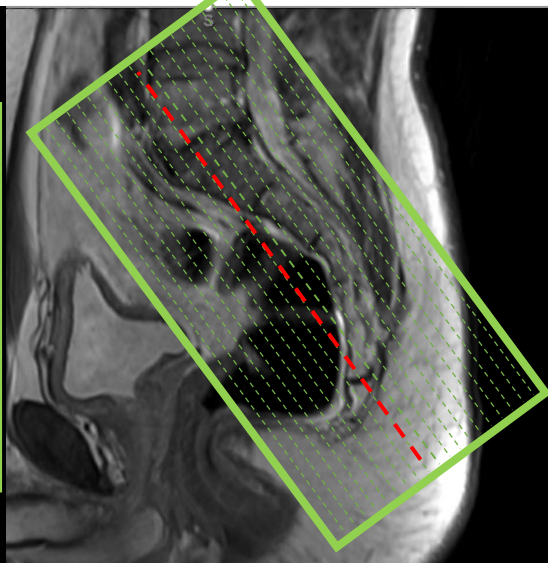
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Coronal Imaging Plane



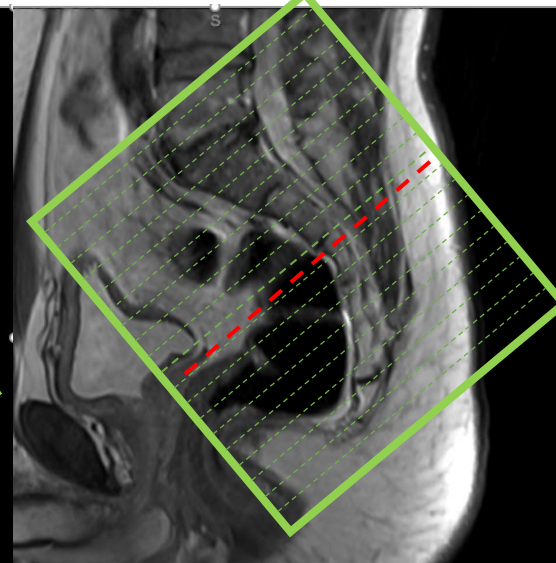
Prescribe plane parallel to the body.
Scan the pelvis in its entirety from
anterior to posterior.

Coronal Oblique Imaging Plane



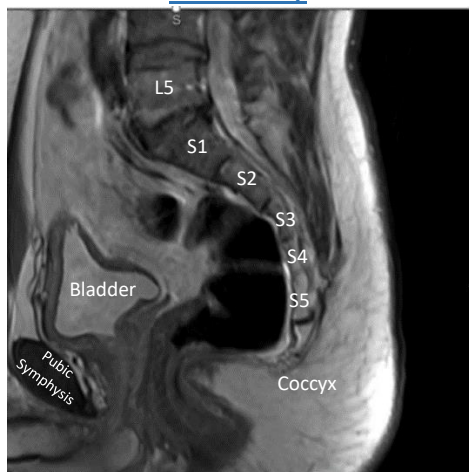
Prescribe plane parallel to
the line drawn from L5-S5.
(Red Line above)
Cover half inch anterior of L5
to half inch posterior to the
sacrum.

Axial Oblique Imaging Plane



Prescribe plane
perpendicular to the coronal
oblique plane. Cover from
L5 thru the Coccyx.

Anatomy



Pelvis- SI Joints (G-)

Parameters / Sequences

CORONAL STIR FSE (WHOLE PELVIS)

AXIAL OBLIQUE T2 FS FSE

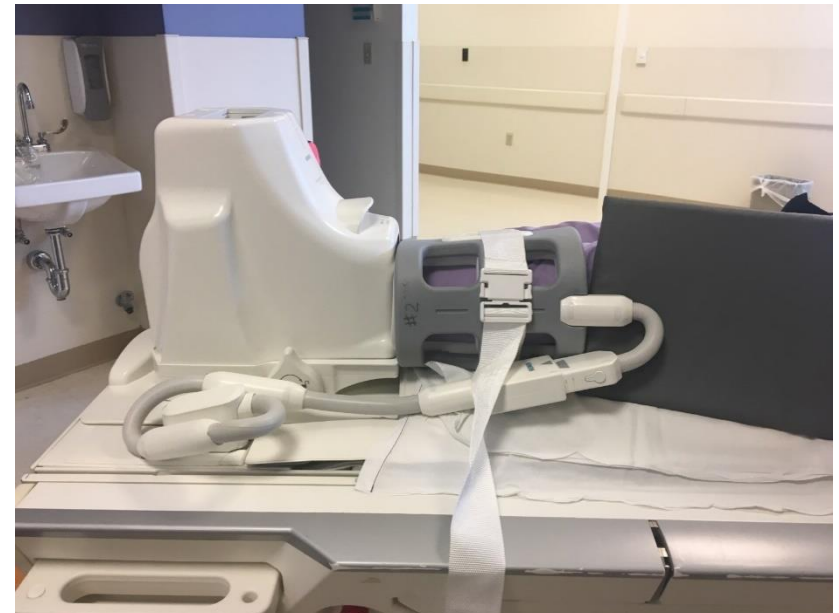
CORONAL OBLIQUE T2 FS FSE

CORONAL OBLIQUE T1 FSE

AXIAL OBLIQUE T1 FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR STIR	4000	50/130TI	360	75	4	1	256	320	S/I	2	P->A	Large FOV Pelvis
AX OBL T2 FS	2000-6000	80-120	200	100	3	0.3	240	320	L/R	4	S->I	
COR OBL T2 FS	2000-6000	80-120	200	100	3	0.3	240	320	L/R	4	P->A	
COR OBL T1	400-700	10-30	200	100	3	0.3	307	384	A/P	4	S->I	
AX OBL T1	400-700	10-30	360	100	4	1	358	448	L/R	2	S->I	

Achilles Tendon Positioning



Achilles Tendon Positioning Tips:

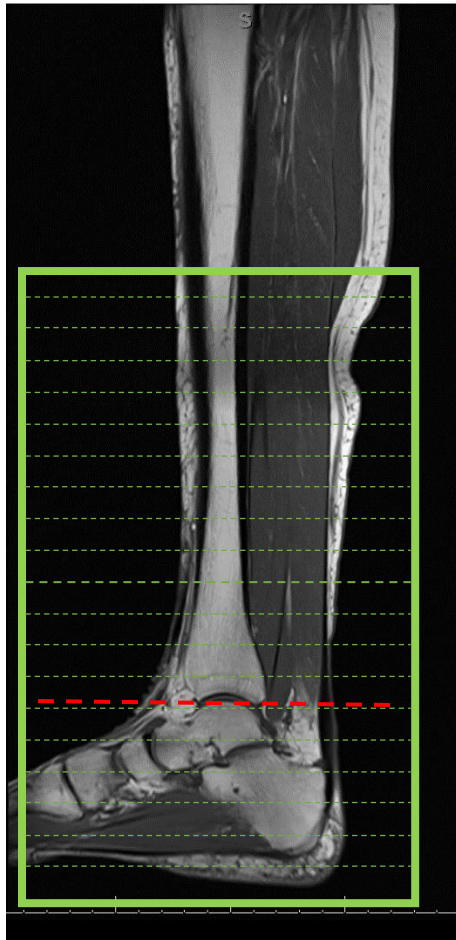
- Plantar surface of foot should be flat against bottom of foot/ankle coil. Foot should be 90° to leg. NOT BENT.
- Depending on size of foot, cushions may need to be placed on sides to prevent excessive motion within the coil.
- Once foot positioning is taken care of, take a small flex coil (Siemens) and wrap around leg adjacent to the foot/ankle coil. Coverage is needed up through the mid lower leg. Place a strap around coil to hold in place.
- Once patient is within scanner, place cushion against wall of machine for the opposing leg and move that leg off to the side to prevent wrap within the image.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**



Achilles Tendon Imaging Planes / Setup

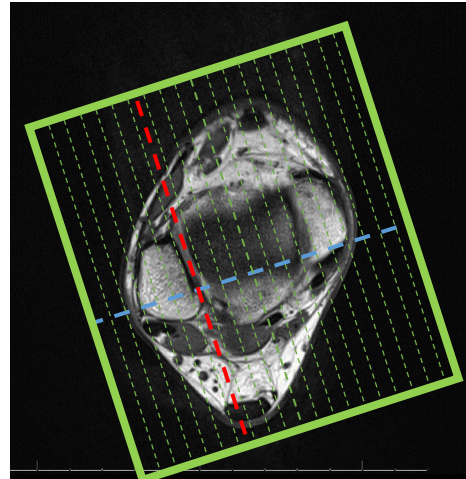
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial Imaging Plane



Prescribe plane axial to the leg. Coverage should extend from mid-calf all the way through the plantar surface of the foot. Include base of 5th metatarsal.

Coronal and Sagittal Imaging Plane

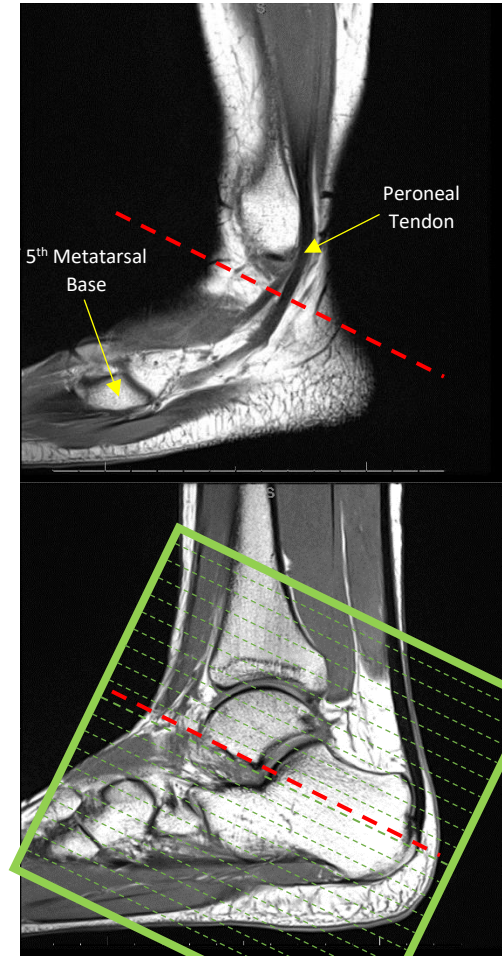


Coronal plane (blue): Prescribe a plane that bisects the medial malleolus, talar dome, and lateral malleolus. Sagittal plane (red): Prescribe a plane 90 degrees to the coronal plane

IMPORTANT NOTE:

The Achilles tendon extends all the way up to the mid-calf. Therefore it is very important to cover up through the mid-calf on the axial and sagittal sequences.

Axial Oblique Imaging Plane



Prescribe plane perpendicular to peroneal tendon. Scan from distal tibia through 5th metatarsal base (Peroneal Tendon attachment).

Achilles Tendon (G-)

Parameters / Sequences

SAGITTAL T1 FSE
SAGITTAL T2 FS
AXIAL T2 FS FSE
AXIAL T1 FSE
AXIAL OBLIQUE T2 FS FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG T1	400-700	10-30	200	100	3	1	320	384	A/P	1	L->R	
SAG T2 FS	2000-6000	80-120	200	100	3	1	307	384	A/P	2	L->R	
AX T2 FS	2000-6000	80-120	120	100	4	1	307	384	L/R	2	S->I	
AX T1	400-700	10-30	120	100	4	1	307	384	L/R	1	S->I	
AX OBL T2 FS	2000-6000	80-120	140	100	4	1	307	384	L/R	2	S->I	

Ankle / Foot Positioning

RIGHT WAY



WRONG WAY



Ankle / Foot Positioning Tips:

- Plantar surface of foot should be flat against bottom of foot/ankle coil. Foot should be 90° to leg. NOT BENT.
- Depending on size of foot, cushions may need to be placed on sides to prevent excessive motion within the coil.
- Some foot/ankle coils have option to tilt. Use this to your advantage for patient comfort but make sure the foot remains 90° to the leg. This may require a cushion under the knee (Example to the right).
- Once patient is within scanner, place cushion against wall of machine for the opposing leg and move that leg off to the side to prevent wrap within the image.

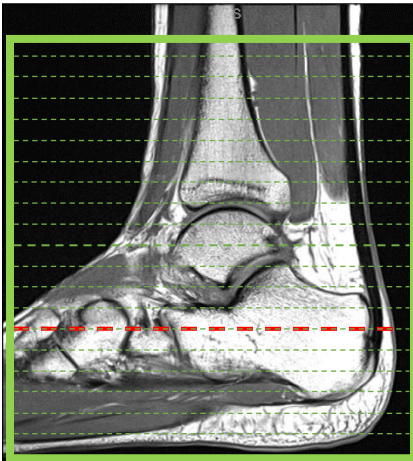


- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**

Ankle Imaging Planes / Setup

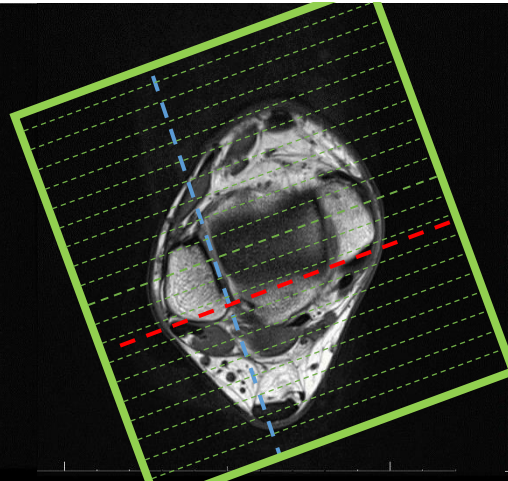
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial Imaging Plane



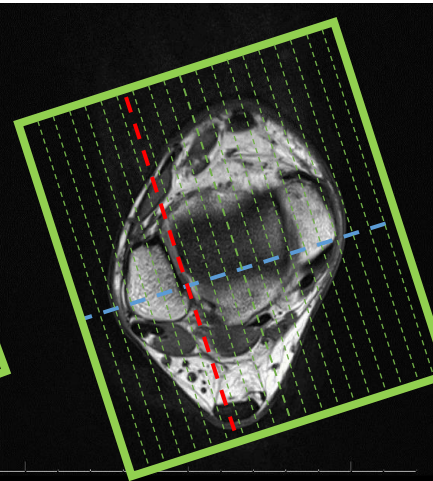
Prescribe plane parallel to axis of calcaneus. Scan ankle from distal tibia through subcutaneous soft tissues (include plantar fascia).

Coronal Imaging Plane



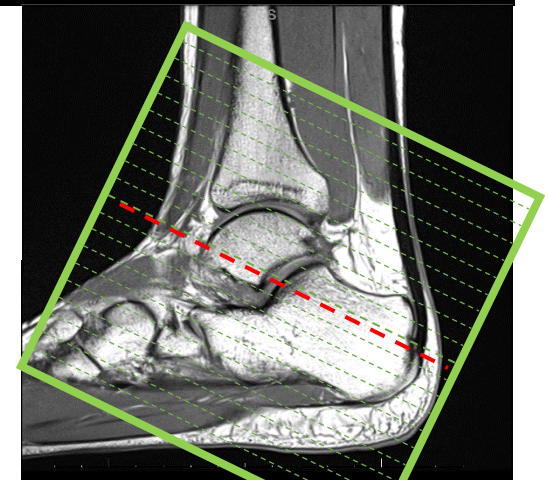
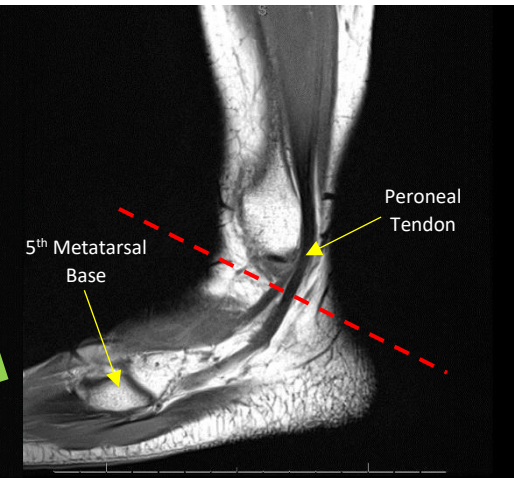
Coronal plane (red): Prescribe a plane that bisects the medial malleolus, talar dome, and lateral malleolus. Scan ankle from calcaneus through metatarsal bases.

Sagittal Imaging Plane



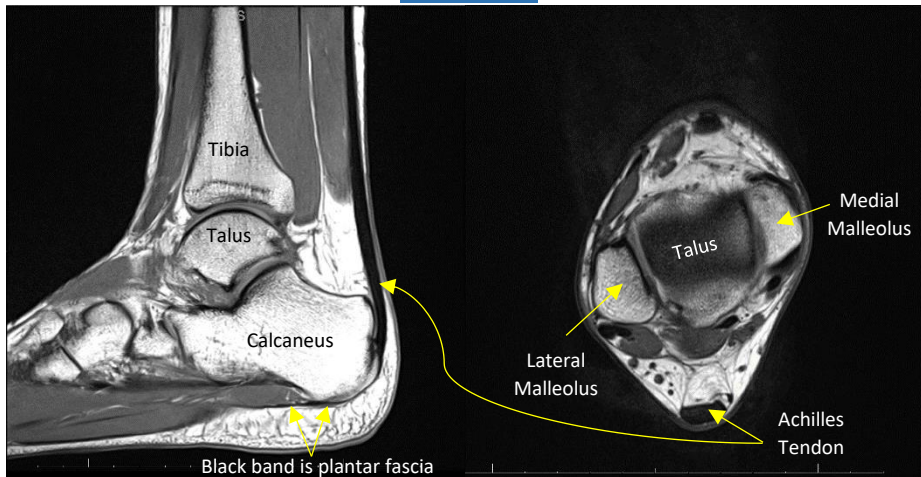
Sagittal plane (red): Prescribe a plane 90 degrees to the coronal plane (blue). Cover ankle from medial through lateral malleolus.

Coronal Oblique Imaging Plane



Prescribe plane perpendicular to peroneal tendon. Scan from distal tibia through 5th metatarsal base (Peroneal Tendon attachment).

Anatomy



Ankle Routine (G-)

Parameters / Sequences

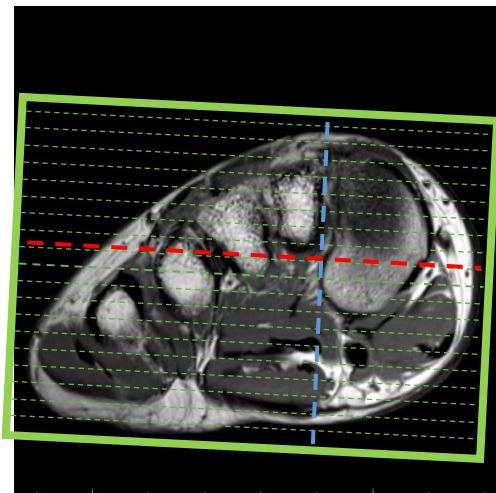
SAGITTAL PD FSE
 SAGITTAL STIR FSE
 AXIAL T1 FSE
 AXIAL T2 FS FSE
 CORONAL T2 FS FSE
 CORONAL OBLIQUE PD FSE
 SAGITTAL 3D T2 CUBE FS/DESS (**DHMC ONLY**)

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE %			PHASE	FREQ				
SAG PD	1800-3000	10-30	180	100	3	1	358	448	A/P	1	L->R	
SAG STIR	4000	47	180	100	3	1	192	256	A/P	2	L->R	
AX T1	400-700	10-30	160	100	4	1	358	448	A/P	1	S->I	
AX T2 FS	2000-6000	80-120	160	100	4	1	256	320	A/P	1	S->I	
COR T2 FS	2000-6000	80-120	180	100	3	1	358	448	R/L	1	P->A	
COR OBL PD	1800-3000	10-30	150	100	3	1	384	384	A/P	1	S->I	
SAG DESS FS	13.48	5	180	100	1	0.2	275	320	A/P	1	L->R	DHMC ONLY

Foot- Lis Franc Joint (Midfoot) Imaging Planes / Setup

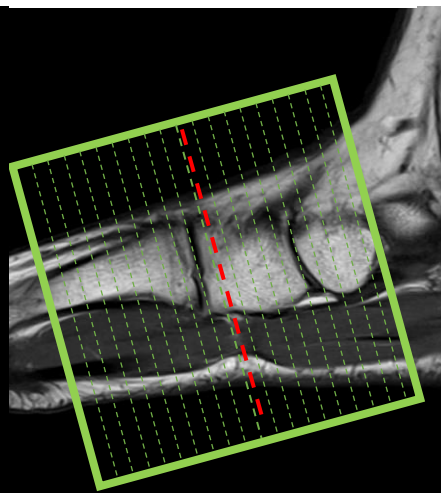
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Long Axis Imaging Plane



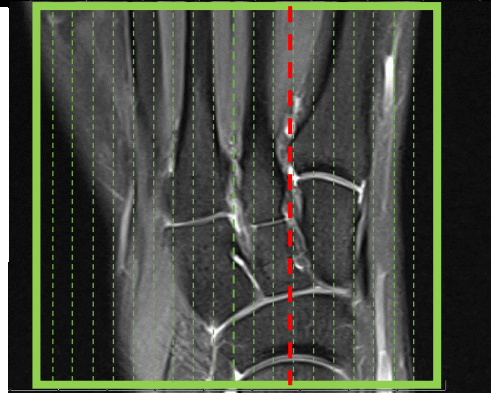
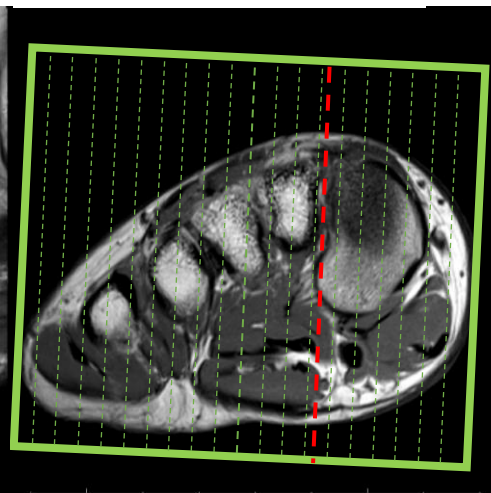
Prescribe plane perpendicular to the line drawn between the 1st and 2nd metatarsal base. Cover entire foot

Short Axis Imaging Plane



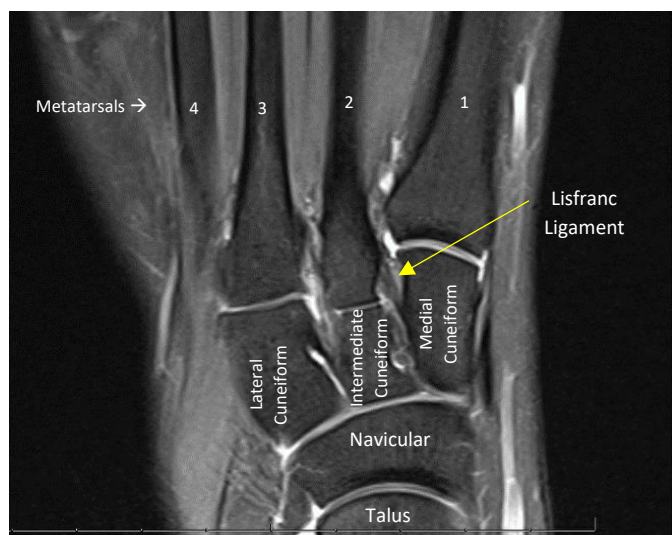
Prescribe plane perpendicular to the 1st and 2nd metatarsal on the sagittal view. Cover from navicular to mid metatarsal.

Sagittal Imaging Plane



Prescribe plane parallel to the joint between the 1st and 2nd metatarsal on the coronal and axial plane. Cover foot side to side in entirety.

Anatomy



INTERESTING NOTE:

The Lisfranc's Ligament attaches the medial cuneiform bone to the base of the second metatarsal. The Lisfranc's Joint however encompasses the bases of all the metatarsals meeting with the small bones of the midfoot.

Foot- Lis Franc Joint (Midfoot) (G-)

Parameters / Sequences

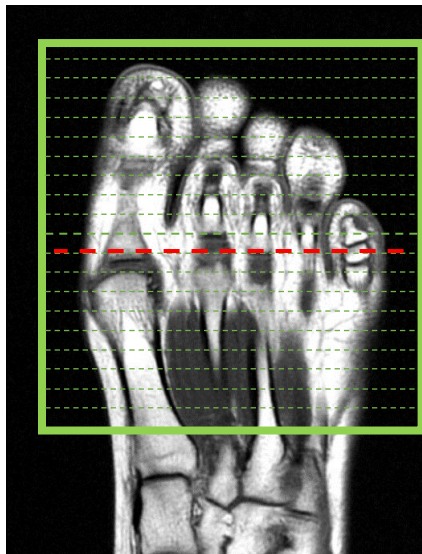
SAGITTAL PD FSE
 SHORT AXIS (SAX) PD FSE
 SHORT AXIS (SAX) T2 FS FSE
 LONG AXIS (LAX) T2 FS FSE
 LONG AXIS (LAX) T1 FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG PD	1800-3000	10-30	140	100	3	0.3	307	384	A/P	2	L->R	
SAX PD	1800-3000	10-30	140	100	4	0.4	307	384	L/R	2	S->I	
SAX T2 FS	2000-6000	80-120	140	100	4	0.4	307	384	L/R	2	S->I	
LAX T2 FS	2000-6000	80-120	140	100	3	0.3	307	384	L/R	2	P->A	
LAX T1	400-700	10-30	140	100	3	0.3	307	384	L/R	1	P->A	
OPTIONAL- SAGITTAL ALONG THE LONG AXIS (LAX) OF THE METATARSAL OF INTEREST												
SAG T1	400-700	10-30	140	100	3	0	307	384	A/P	2	L->R	

Foot- Morton's Neuroma (Forefoot) Plantar Plate Imaging Planes / Setup

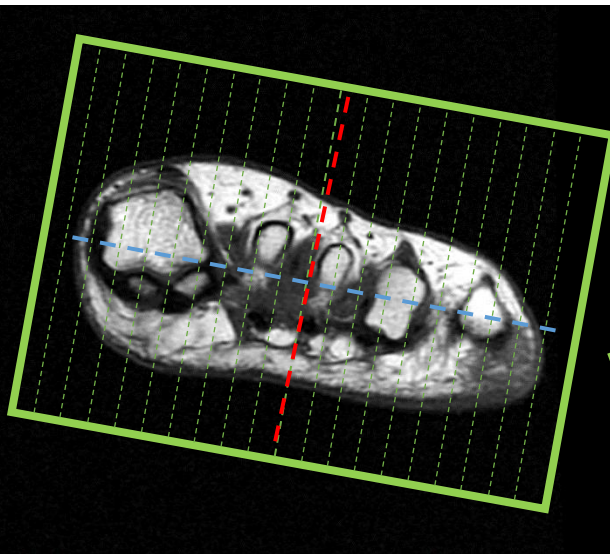
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Short Axis Imaging Plane



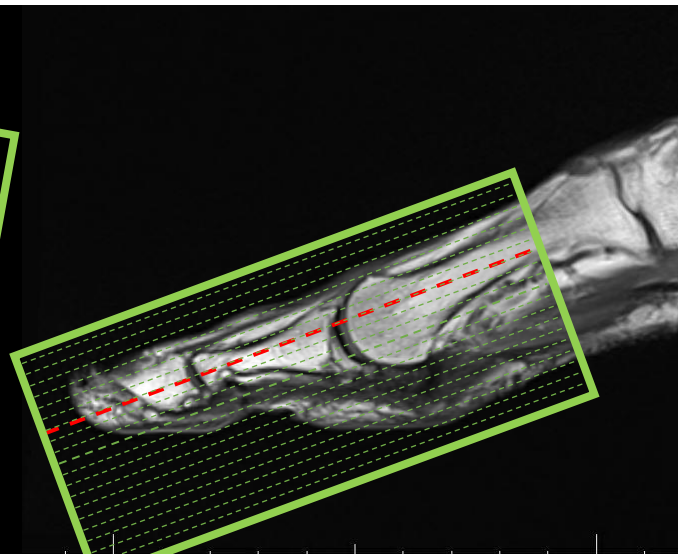
Prescribe plane perpendicular to the phalanges in the long axis plane. Cover from mid metatarsal through the toes.

Sagittal Imaging Plane

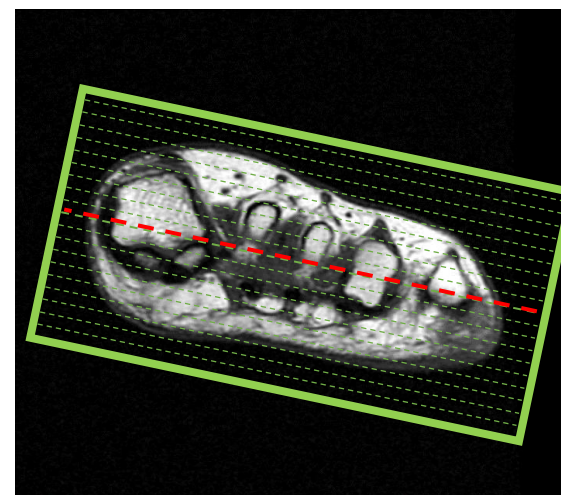
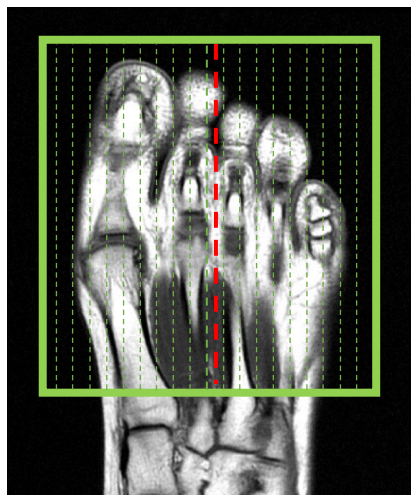
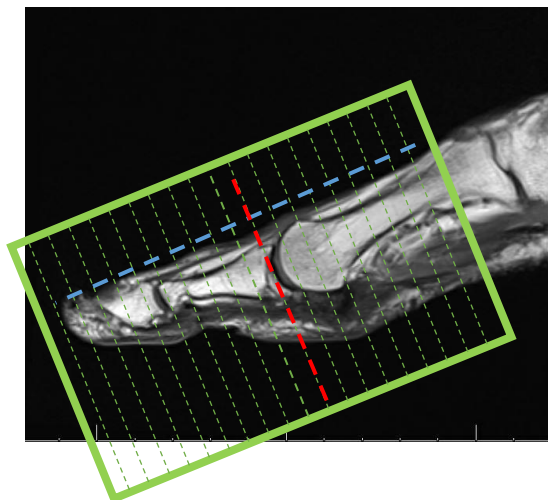


Prescribe plane perpendicular to the line (blue) drawn along the heads of the metatarsals on the SAX plane. Cover from side to side completely.

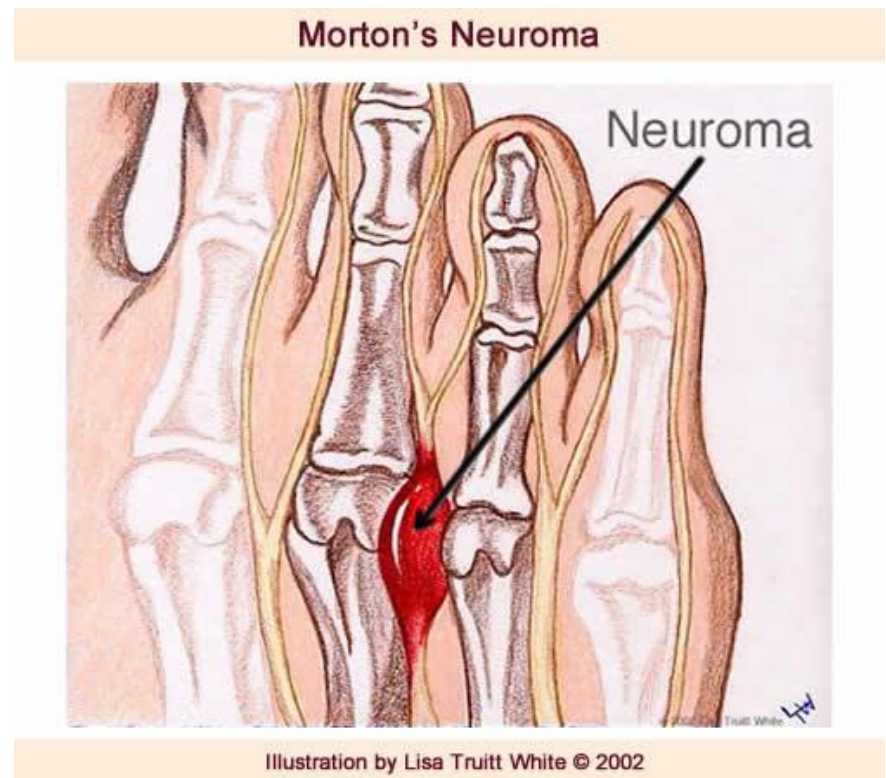
Long Axis Imaging Plane



Prescribe plane parallel to line (red) drawn along the axis of the toes on the sagittal plane. Make sure to rotate so slices go through metatarsals at the same time. (Below)



Foot- Morton's Neuroma (Forefoot) Plantar Plate Anatomy



Foot- Morton's Neuroma (Forefoot) Plantar Plate (G-)

Parameters / Sequences

SHORT AXIS (SAX) T1 FSE
SHORT AXIS (SAX) T2 FS FSE
LONG AXIS (LAX) T1 FSE
LONG AXIS (LAX) T2 FS FSE
SAGITTAL PD FSE
SAGITTAL STIR FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAX T1	400-700	8	100	100	3	0.3	307	384	L/R	2	S->I	
SAX T2 FS	2000-6000	58	100	100	3	0.3	307	384	L/R	2	S->I	
LAX T1	400-700	8	140	100	3	0.3	192	256	L/R	3	L->R	
LAX T2 FS	2000-6000	58	140	100	3	0.3	307	384	L/R	2	P->A	
SAG PD	1800-3000	20	140	100	3	0.3	307	384	A/P	2	L->R	
SAG STIR	4000	50	140	100	3	0.3	192	256	A/P	2	L->R	

FOV's for MRI Infection of Foot

Forefoot/toes: Using scan planes from Morton's Neuroma protocol, please extend FOV to scan from TMT joints to tip of 1st toe. ([Morton's Neuroma](#))

Midfoot: Using scan planes from Lisfranc protocol, please extend FOV to scan from Talonavicular joint to 1st MTP. ([LisFranc](#))

Hindfoot/ankle: standard ankle FOV and scan planes. ([Ankle](#))

[Forefoot / Toes](#)



[Midfoot](#)

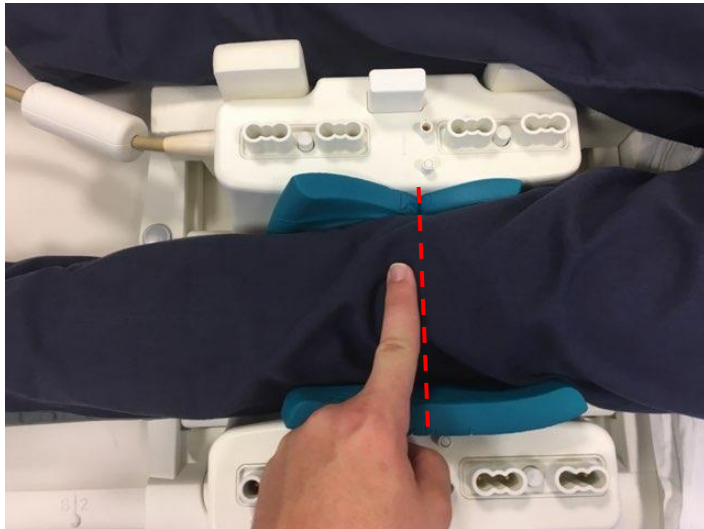


[Hindfoot / Ankle](#)



Knee Positioning

Apex of Patella is used for Centering



Leg positioned straight in coil with NO rotation!



Comfort and Immobility is KEY!!



Tips for Knee Positioning:

- For patients with small knees, place cushions on sides and top to PREVENT room within the coil for motion.
- Place cushions under the lower leg that is being imaged. This relieves stress on the foot and prevents motion.
- Place sandbags on sides of foot and across ankle. This helps with immobility and reminds patient to keep leg still.
- Once patient is within scanner, place cushion against wall of machine for the opposing leg and move that leg off to the side to prevent wrap within the image.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**



Knee Positioning (Alternative Method)

Used for Knees that DONT FIT in standard coil and for patients WITH Total Knee Replacements

Leg positioned straight in coil with NO rotation!



Comfort and Immobility is KEY!!



Center the knee in the middle of coil as you normally would.

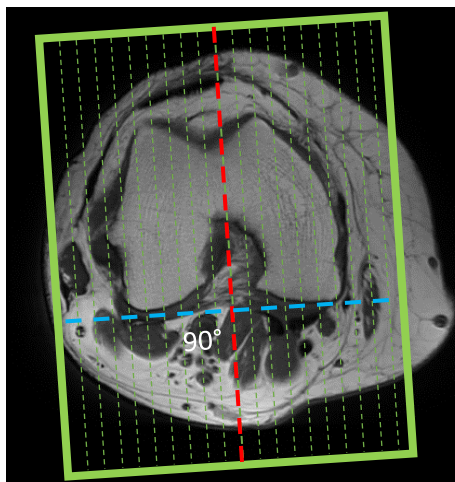
Tips for Knee Positioning:

- Use large flex coil and wrap around the knee. Ok to overlap on Siemens. Place strap around to hold together.
- Be sure to make sure leg is in center (or as close) of table.
- Place cushions under the lower leg that is not being imaged to reduce strain.
- Place sandbags on sides of the lower leg being imaged and even across the ankle. This will help immobilize leg.
- Once patient is within scanner, place cushion against wall of machine for the opposing leg and move that leg off to the side to prevent wrap within the image.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!**

Knee Imaging Planes / Setup

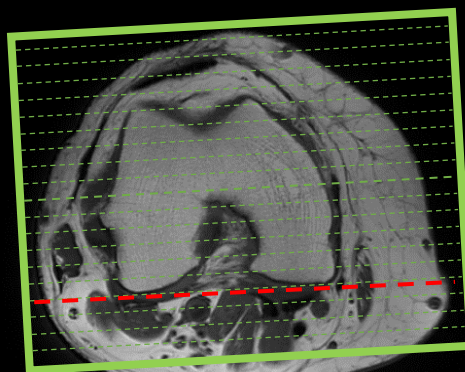
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Sagittal Imaging Plane



Prescribe plane perpendicular to coronal plane.
Scan from the medial to the lateral femoral condyle.

Coronal Imaging Plane



Prescribe plane with line parallel to femoral condyles.
Image entire knee.

Axial Imaging Plane

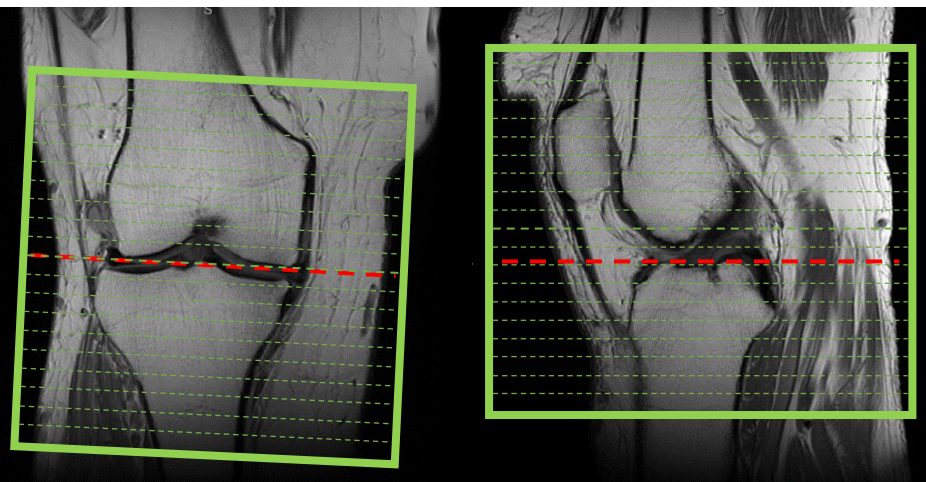
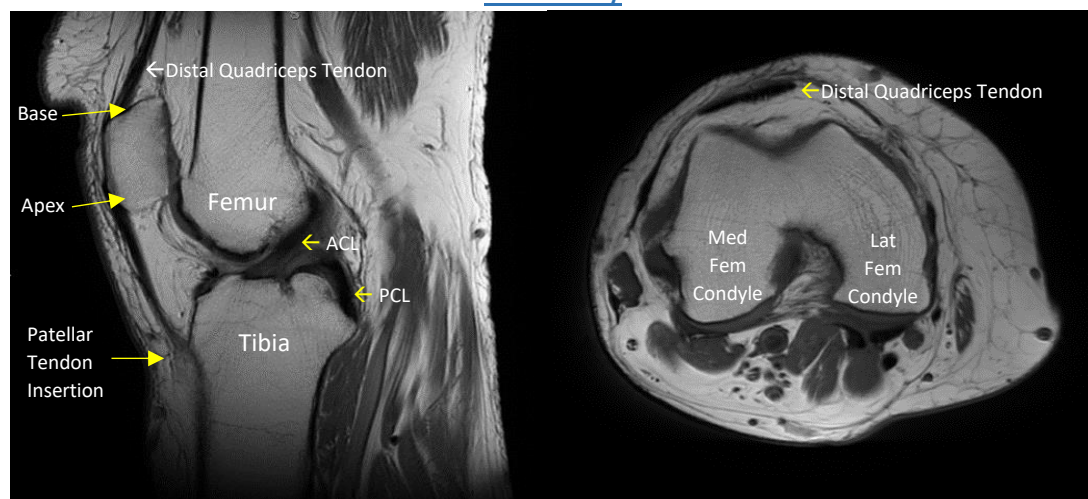


Image from distal quad tendon through patellar tendon insertion.

Anatomy

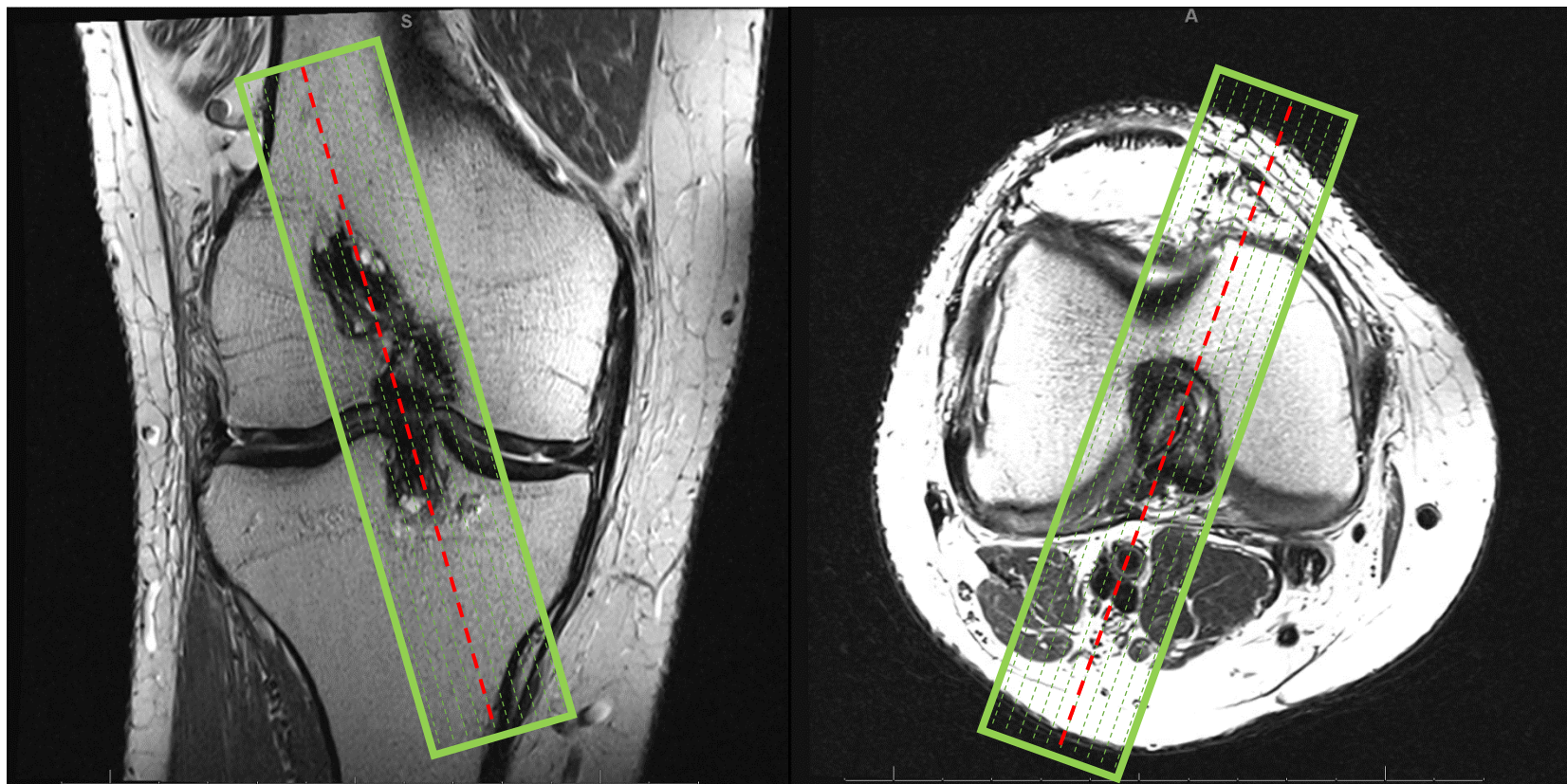


Knee Imaging Planes / Setup (Continue)

Dashed Red Line = Imaging Plane Angle/Slice Orientation

*****Only when requested by Radiologist*****

Sagittal Oblique Plane (S/P ACL Reconstruction)



This sequences is 6-10 slices maximum to cover the ACL Repair. Using the Coronal and Axial planes, prescribe slices to cover the ACL Repair. Images will be angled one way or the other depending on the direction of the repair. THIS IS NOT A WHOLE KNEE SEQUENCE!!

Knee Arthrogram (G+)

Parameters / Sequences

SAGITTAL PD FS FSE
SAGITTAL T1 FS FSE
CORONAL PD FS FSE
CORONAL T1 FS FSE
AXIAL T2 FS FSE
AXIAL T1 FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG PD FS	1800-3000	10-30	160	100	3	.5	224	320	H/F	2	L->R	
SAG T1 FS	400-700	10-30	160	100	3	.5	240	320	H/F	1	L->R	
COR PD FS	1800-3000	10-30	160	100	3	.5	384	384	L/R	1	P->A	
COR T1 FS	400-700	10-30	160	100	3	.5	240	320	L/R	1	P->A	
AX T2 FS	2000-6000	80-120	120	100	4	1	256	320	L/R	1	H->F	
AX T1	400-700	10-30	120	100	4	1	256	320	L/R	1	H->F	

Knee Metal on Metal (G-) (GE Scanner 1.5T Only) (DHMC Preferred)**Planes same as Knee Routine. Make sure to cover entire Total Knee Replacement****Parameters / Sequences**

SAGITTAL 3D PD MAVRIC
 SAGITTAL 3D PD MAVRIC STIR
 CORONAL PD FSE
 CORONAL T1 FSE
 AXIAL STIR FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG 3D PD MAVRIC	6000	8.8	240	100	3.6	0	256	512	H/F	1	L->R	EDR,FAST,ARC,MRF,ETL-24,36-loc per slab
SAG 3D STIR MAVRIC	5000	8.3	240	100	3.6	0	256	512	H/F	1	L->R	EDR,FAST,ARC,MRF,Irp,36-loc per slab,ETL-24,Inv time-150
COR PD	1800-3000	10-30	180	100	2.5	0	320	512	H->F	4	P->A	FC,NPW,EDR,TRF,FAST,ARC,MRF,ETL-16
COR T1	400-700	10-30	180	100	4	.8	410	512	H/F	3	P->A	FC,NPW,EDR,TRF,FAST,ARC,MRF,ETL-16
AX STIR	4000	50/130 TI	180	100	4	2	192	256	L/R	3	H->F	FC,NPW,EDR,TRF,FAST,ARC,MRF,ETL-16

Knee Metal on Metal (G-) (Siemens Scanner 1.5T Only)**Planes same as Knee Routine. Make sure to cover entire Total Knee Replacement**

Parameters / Sequences

CORONAL STIR FSE

CORONAL T1 FSE

SAGITTAL STIR FSE

SAGITTAL T1 FSE

AXIAL STIR FSE

AXIAL T1 FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR STIR	4000	50/130 TI	180	100	4	.8	192	256	H/F	3	P->A	
COR T1	400-700	10-30	180	100	4	.8	410	512	H/F	3	P->A	
SAG STIR	4000	50	180	100	3	1	192	256	H/F	3	L->R	
SAG T1	400-700	10-30	180	100	3	1	256	512	H/F	3	L->R	
AX STIR	4000	50/130 TI	180	100	4	2	192	256	L/R	3	H->F	
AX T1	400-700	10-30	180	100	4	2	256	512	H/F	3	L->R	

Knee Routine (G-)

Parameters / Sequences

SAGITTAL PD FSE
SAGITTAL PD FS FSE
CORONAL PD FSE
CORONAL PD FS FSE
AXIAL T2 FS FSE
AXIAL T1 FSE

OPTIONAL IF REQUESTED BY RADIOLOGIST
SAGITTAL OBLIQUE PD (S/P ACL RECONSTRUCTION)
SAG 3D DESS/CUBE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG PD	1800-3000	10-30	160	100	3	0.5	314	448	H/F	2	L->R	
SAG PD FS	1800-3000	10-30	160	100	3	0.5	240	320	H/F	1	L->R	
COR PD	1800-3000	10-30	160	100	3	0.6	384	512	L/R	1	P->A	
COR PD FS	1800-3000	10-30	160	100	3	0.6	384	512	L/R	2	P->A	
AX T2 FS	2000-6000	80-120	160	100	3	0.6	240	320	L/R	2	P->A	
AX T1	400-700	10-30	160	100	4	1	240	320	L/R	1	S->I	
OPITONAL IF REQUESTED BY RADIOLOGIST												
SAG OBL PD	1800-3000	10-30	160	100	3	0.5	320	320	L/R	2	S->I	IF POST ACL REPAIR
SAG 3D DESS /CUBE	1500	60	160	100	1.2	0	224	224	H/F	1	L->R	ETL=80,BW 41.6, EDR,FAST,ZIP512,ZIP2,FR,MF

Myositis Positioning



Use posterior head coil for ankle coverage / signal. Body coil laying over the toes makes for an uncomfortable exam.



Ankle / Foot Positioning Tips:

- This exam is bilateral lower extremities. You want to make sure your coils have plenty of coverage from the hips down through the ankle. Larger patients may require moving coils halfway through the exam. Example below.
- Place feet taped together in the middle of the head coil as demonstrated in the middle picture and if there is still room, place cushions around feet to discourage movement.
- On a patient with a smaller habitus, the coils can be positioned as above on a Siemens machine. GE and Philips will require you to move the coil halfway through the exam no matter the size of the patient because of the coil size.
- Make sure hands are up and out of the way of the way, preferably above the coils. This will prevent wrap.

• **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**

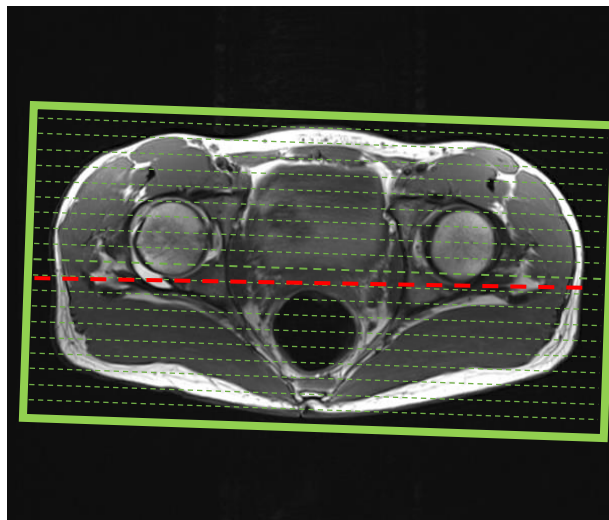


Larger patients require moving coils halfway through the exam from femur coverage to lower leg coverage or vice versa. Continue to use posterior head coil for signal in the ankles!!

Myositis Imaging Planes / Setup

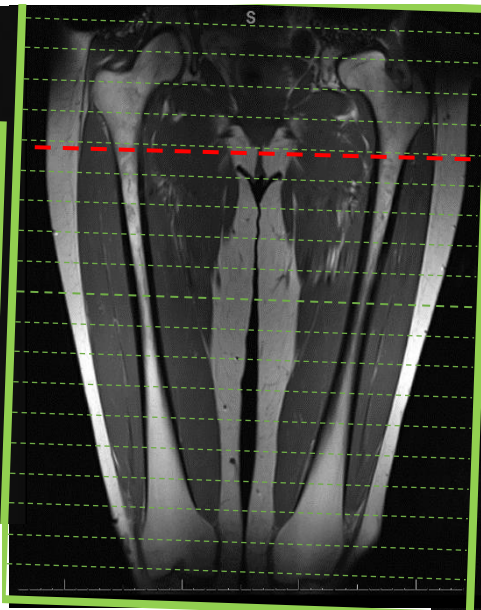
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Coronal Imaging Plane (Hip to Knee)



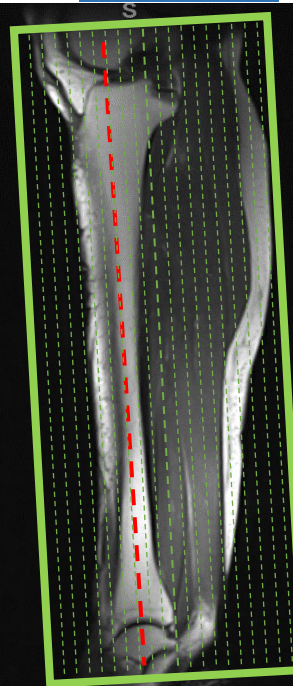
Using the Axial images, prescribe the plane coronal to the body. Femoral Head can be used to determine rotation. Cover from above femoral heads to below knee joints.

Axial Imaging Plane (Hip to Knee)



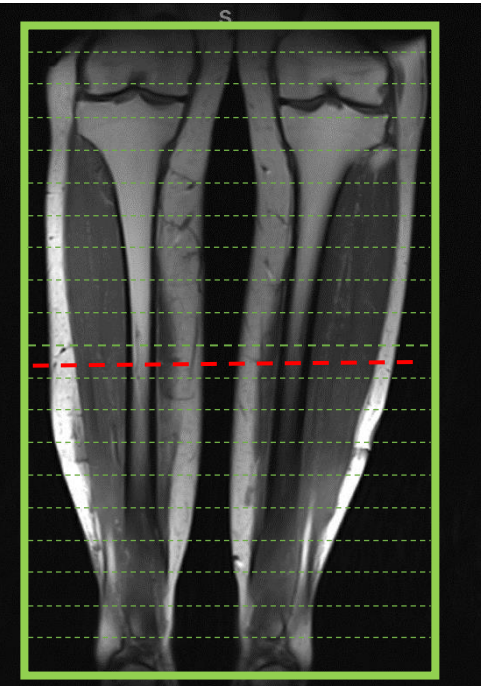
Prescribe plane axial to the body. Cover from above the femoral heads to below the knee joints.

Coronal Imaging Plane (Knee to Ankle)



Using the Axial images, prescribe the plane coronal to the body. Knees can be used to determine rotation. Cover the knee joints down through the lateral malleolus on both legs.

Coronal Imaging Plane (Knee to Ankle)



Prescribe plane axial to the body. Cover from the knee joints down through the lateral malleolus on both legs.

All Imaging for Myositis is done BILATERALLY

Myositis (G-) 1.5T Only

Parameters / Sequences

Hip to Knee:

CORONAL STIR FSE

AXIAL STIR FSE

AXIAL T1 FSE

Knee to Ankle:

CORONAL STIR FSE

AXIAL STIR FSE

AXIAL T1 FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR STIR x2	4000	50/130TI	420	100	5	1	192	320	L/R	2	P->A	
AX STIR x2	4000	50/130TI	420	100	7	2	192	320	A/P	2	S->I	
AX T1 x2	400-700	10-30	420	100	7	2	240	320	A/P	2	S->I	

Tibia-Fibula Stress Fracture Positioning



Stress Fracture Leg Positioning Tips:

- This exam is partially bilateral lower extremities. You want to make sure your coils have plenty of coverage from the knees down through the ankles.
- Place feet taped together in the middle of the head coil as demonstrated in the far left picture and if there is still room, place cushions around feet to discourage movement.
- On a patient with a smaller habitus, a single coil can be positioned as above on a Siemens machine.
- Make sure hands are up and out of the way of the way, preferably above the coils. This will prevent wrap.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!!!**

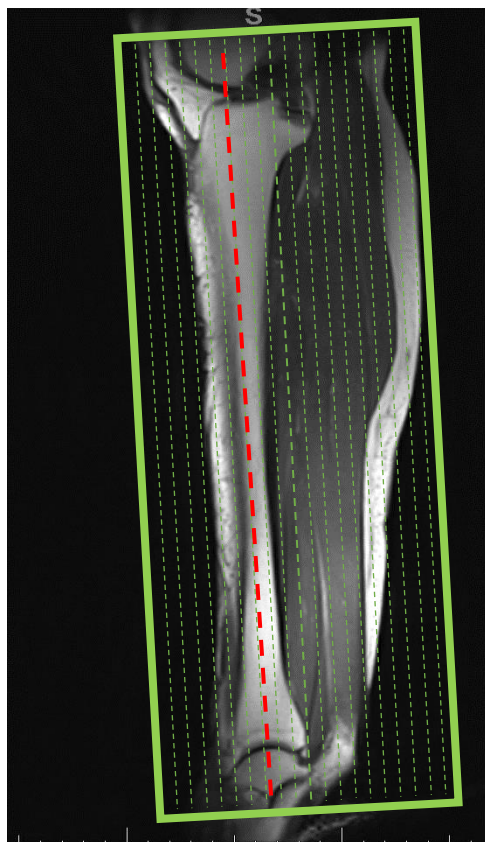


Larger habitus patients will require that you place two coils landscape on the lower extremity to get signal coverage.

Tibia-Fibula Stress Fracture Imaging Planes / Setup

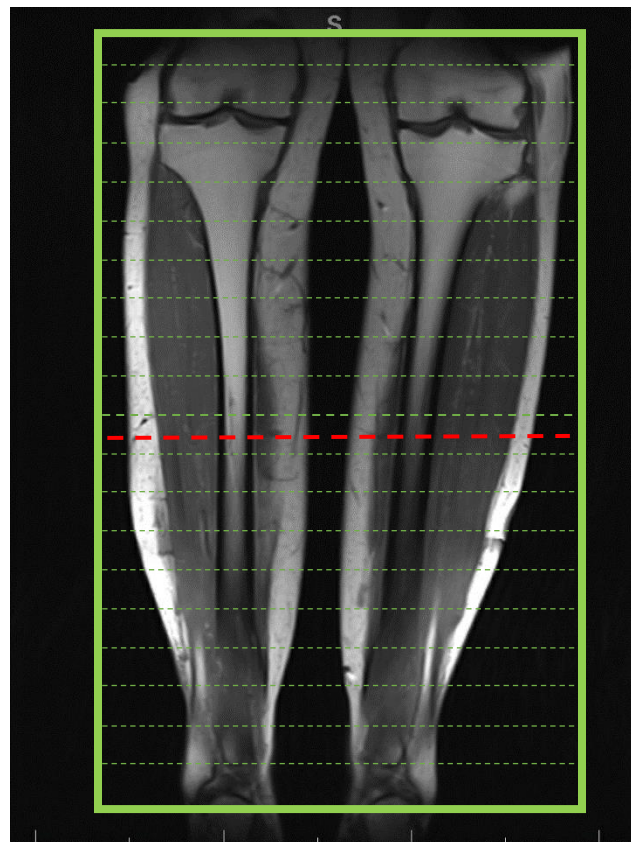
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Coronal Imaging Plane (Bilateral)



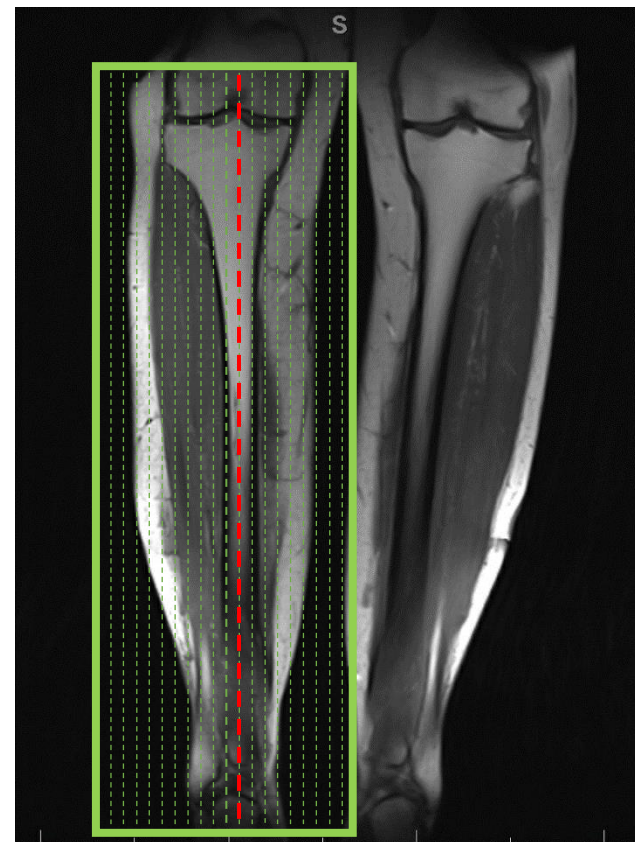
Prescribe plane parallel to the Tibia. Cover the leg in its entirety. Scan bilaterally.

Axial Imaging Plane (Bilateral)



Prescribe plane perpendicular to the tibia. Scan from above the knee joint to below the lateral malleolus bilaterally.

Sagittal Imaging Plane (Affected Leg Only)



Prescribe plane perpendicular to coronal plane. Scan the affected leg only in its entirety from left to right.

Tibia-Fibula Stress Fracture (G-)

Parameters / Sequences

CORONAL T1 FSE

CORONAL STIR FSE

AXIAL T1 FSE

AXIAL STIR FSE

SAGITTAL T2 FS FSE (AFFECTED LEG ONLY)

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
COR T1	400-700	10-30	400	100	4	1	512	512	L/R	1	P->A	Bilateral
COR STIR	4000	80/130TI	400	100	4	1	224	320	L/R	2	P->A	Bilateral
AX T1	400-700	10-30	400	100	4	1	512	512	L/R	1	S->I	Bilateral
AX STIR	4000	80/130TI	400	100	4	1	224	320	L/R	2	S->I	Bilateral
SAG T2 FS	2000-6000	80-120	180	100	4	1	224	320	A/P	2	L->R	Affected leg only

Pectoralis Positioning



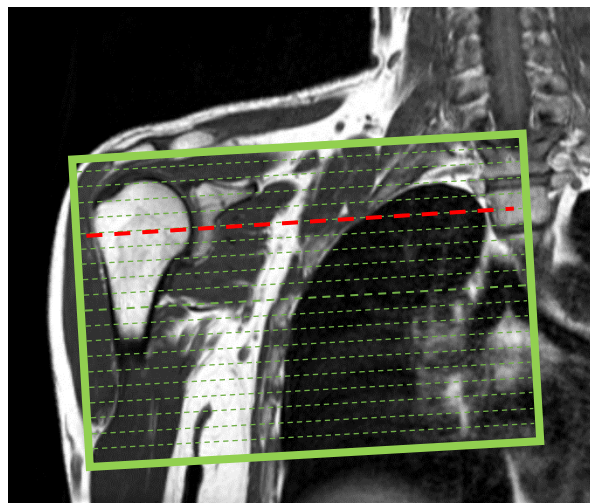
Pectoralis Positioning Tips:

- Patient needs to be flat on their back with the arm of the affected side in external rotation. Placing sandbags as demonstrated in the far right picture helps achieve this. Our arms naturally wants to pronate because it is a comfier position.
- Place a single body coil on the anterior chest surface and secure down with straps.
- Instruct the patient to breath nice and easy. You want to minimize the motion of the chest when imaging which can be at sometimes the most difficult part of the exam.
- **MOST IMPORTANT- MAKE SURE PATIENTS SKIN IS NOT TOUCHING WALL OF THE MACHINE, WIRES FROM THE COILS AND NO SKIN TO SKIN CONTACT TO PREVENT BURNING!**

Pectoralis Imaging Planes / Setup

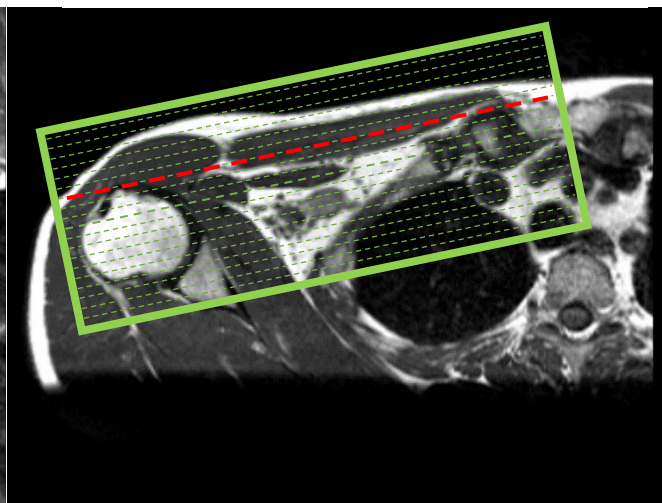
Dashed Red Line = Imaging Plane Angle/Slice Orientation

Axial Imaging Plane (Bilateral)



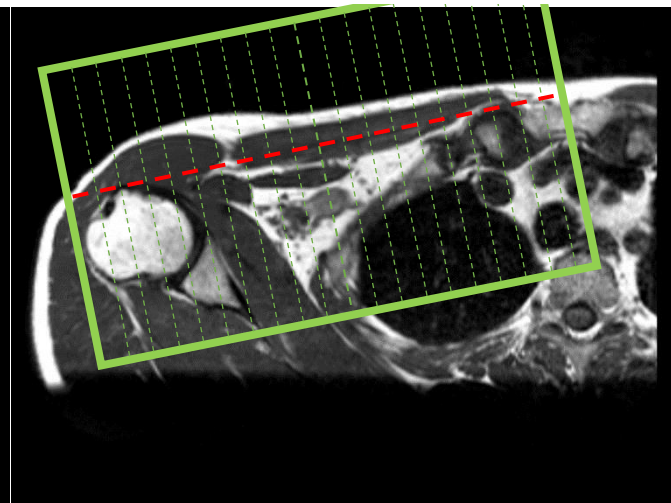
Prescribe plane axial to the body.
Coverage should be from 1 inch superior to the humeral head down through the xiphoid process (T10).
Side to side should be from mid sternum through the humeral head.

Coronal Oblique Imaging Plane



Prescribe plane parallel to the red line drawn between the anterior humerus and anterior sternum. Coverage should be from anterior surface to about a half inch posterior to the humeral head. Coverage S-I is same as axial

Sagittal Oblique Imaging Plane



Prescribe plane perpendicular to the coronal plane. Cover from lateral side of humeral head to mid-sternum.
Coverage S-I is same as axial.

Pectoralis (G-)

Parameters / Sequences

AXIAL PD FS FSE
AXIAL T2 FS FSE
CORONAL T1 OBL FSE
CORONAL T2 FS OBL FSE
SAGITTAL T1 FSE
SAGITTAL STIR FSE

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
AX PD FS	1800-3000	10-30	200	100	5	1	224	288	L/R	3	S->I	
AX T2 FS	2000-6000	80-120	200	100	5	1	224	288	L/R	3	S->I	
COR OBL T1	400-700	10-30	200	100	3	1	224	288	L/R	4	P->A	
COR OBL T2 FS	2000-6000	80-120	200	100	3	1	224	288	L/R	4	P->A	
SAG T1	400-700	10-30	200	100	5	1	224	320	A/P	2	L->R	
SAG STIR	4000	50/170TI	200	100	5	1	192	256	A/P	2	L->R	

Tumor/Infection, Tumor Functional Baseline / Follow-Up Imaging

The following protocols can be adapted to any extremity in the body. The parameters listed below are meant as a starting point when setting the scan up.

- For any lump or mass, please place a skin marker at the site of palpable abnormality. For any infection, please place a skin marker at site of wound. If there is no wound, this needs to be documented in the tech notes in eDH.
- 3T is the preferred choice when scanning the following protocols if available.
- FOV, slice thickness, and gap can all be adjusted to the body part you are scanning. As the scanning technologist, USE YOUR BEST JUDGEMENT in deciding what the appropriate parameters would be best for the body part that you are examining.
- Most of the time, you will need to be using the flex body coils. The reason being is that when imaging tumors, the dedicated coils (knee, shoulder, etc...) will not always have the coverage requirements that are need to do the scan.
- Comfort is also a major key in these exams do to the amount of sequences that need to be scanned.
- Depending on what body part you are scanning and the body habitus of the patient, the traditional T2 FS will not always be uniform. It is therefore important to recognize when this happens and include a STIR in addition.
- For MRI for foot infection, radiologist will indicate FOV using “Forefoot”, “Midfoot” or “Hindfoot”, please use FOV and scan planes indicated here. [\(Foot FOV's\)](#)

Tumor Functional Baseline (G-/G+) 3T Siemens

Parameters / Sequences

JOINT-JOINT SEQUENCES

SAGITTAL T1 FSE– joint to joint

CORONAL STIR FSE- joint to joint

TUMOR ONLY SEQUENCES

AXIAL T2 FS FSE

AXIAL T1 FSE

AXIAL In/Out Phase (1st)

AXIAL VIBE FS Pre

DCE 1 Measurement Pre

DCE 20 Measurements

AXIAL VIBE FS Post (***SUBTRACTIONS***)

CORONAL VIBE FS Post

SAGITTAL VIBE FS Post

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE %			PHASE	FREQ				
SAG T1	400-700	10-30	380	80	4	1	520	640	R/L	2	P->A	Joint-Joint
COR STIR	4010	46	180	100	3	0.5	192	256	R/L	2	P->A	Joint-Joint
AX T2 FS	2000-6000	80-120	150	100	3	0.5	307	384	R/L	2	S->I	Tumor Only
AX T1	400-700	10-30	150	100	3	0.5	307	384	R/L	2	S->I	Tumor Only
AX In/Out Phase	349	2.26/3.90	300	100	6	1.5	192	192	A/P	1	S->I	Tumor Only
AX VIBE FS Pre	16.3	9.54	150	100	1	0.2	256	256	R/L	1	S->I	Tumor Only
DCE 1 Measurement	2.68	1.07	256	100	3	0.5	192	192	R/L	1	P->A	Tumor Only
DCE 20 Measurements	2.68	1.07	256	100	3	0.5	192	192	R/L	1	P->A	Tumor Only
AX VIBE FS Post	16.3	9.54	150	100	1	0.2	256	256	R/L	1	S->I	Tumor Only
COR VIBE FS Post	15.9	9.54	220	100	1	0.2	256	256	R/L	1	P->A	Tumor Only
SAG VIBE FS Post	16.0	9.54	200	100	1	0.2	256	256	H/F	1	L->R	Tumor Only

Tumor Functional Follow-Up (G-/G+) 3T Siemens

Parameters / Sequences

JOINT-JOINT SEQUENCES

SAGITTAL T1 FSE

CORONAL STIR FSE

TUMOR ONLY SEQUENCES

AXIAL T2 FS FSE

AXIAL T1 FSE

AXIAL VIBE FS Pre

DCE 1 Measurement Pre

DCE 20 Measurements

AXIAL VIBE FS Post (**SUBTRACTIONS**)

CORONAL VIBE FS Post

SAGITTAL VIBE FS Post

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG T1	400-700	10-30	180	100	3	0.5	192	256	S/I	2	L->R	Joint-Joint
COR STIR	4010	46	180	100	3	0.5	192	256	R/L	2	P->A	Joint-Joint
AX T2 FS	2000-6000	80-120	150	100	3	0.5	307	384	R/L	2	S->I	Tumor Only
AX T1	400-700	10-30	150	100	3	0.5	307	384	R/L	2	S->I	Tumor Only
AX VIBE FS Pre	16.3	9.54	150	100	1	0.2	256	256	R/L	1	S->I	Tumor Only
DCE 1 Measurement	2.68	1.07	256	100	3	0.5	192	192	R/L	1	P->A	Tumor Only
DCE 20 Measurements	2.68	1.07	256	100	3	0.5	192	192	R/L	1	P->A	Tumor Only
AX VIBE FS Post	16.3	9.54	150	100	1	0.2	256	256	R/L	1	S->I	Tumor Only
COR VIBE FS Post	15.9	9.54	220	100	1	0.2	256	256	R/L	1	P->A	Tumor Only
SAG VIBE FS Post	16.0	9.54	200	100	1	0.2	256	256	H/F	1	L->R	Tumor Only

Tumor / Infection (G-/G+)

Parameters / Sequences

Place skin markers around Mass if Palpable. If NO Palpable Mass, Leave Note in eDH for radiologist

Place skin markers around Wound. If NO Wound, Leave Note in eDH for radiologist

SAGITTAL T1 FSE

CORONAL STIR FSE

AXIAL T2 FS FSE

AXIAL T1 FSE

AXIAL VIBE FS Pre

AXIAL VIBE FS POST (**SUBTRACTIONS**)

SAGITTAL VIBE FS POST

CORONAL VIBE FS POST

WHEN SCANNING FEET, THE RADIOLOGIST WILL REFER TO WHAT SECTION OF THE FOOT THEY WANT-(FOREFOOT, MIDFOOT, HINDFOOT)

[CLICK HERE TO SEE FOOT FOV'S FOR \(FOREFOOT, MIDFOOT, HINDFOOT\)](#)

Sequence	TR	TE	FOV (MM)		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG T1	400-700	10-30	400	100	3	0.5	192	256	S/I	2	L->R	
COR STIR	4000	47	400	100	4	1	192	256	L/R	1	P->A	
AX T2 FS	2000-6000	80-120	400	100	4	1	307	384	L/R	2	S->I	
AX T1	400-700	10-30	400	100	4	1	307	384	L/R	2	S->I	
AX VIBE FS PRE	12.3	7.8	400	100	1/80 slab	0	256	256	L/R	2	S->I	
AX VIBE FS POST	12.3	7.8	400	100	1/80 slab	0	256	256	L/R	2	S->I	
SAG VIBE FS POST	12.3	7.8	400	100	1/80 slab	0	256	256	L/R	2	P->A	
COR VIBE FS POST	12.3	7.8	400	100	1/80 slab	0	256	256	A/P	2	L->R	

Tumor / Infection (G-)

Parameters / Sequences

Place skin markers around Mass if Palpable. If NO Palpable Mass, Leave Note in eDH for radiologist

Place skin markers around Wound. If NO Wound, Leave Note in eDH for radiologist

SAGITTAL T1 FSE
SAGITTAL STIR FSE
AXIAL T1 FSE
AXIAL STIR FSE
CORONAL T1 FSE
CORONAL STIR FSE

WHEN SCANNING FEET, THE RADIOLOGIST WILL REFER TO WHAT SECTION OF THE FOOT THEY WANT-(FOREFOOT, MIDFOOT, HINDFOOT)

[CLICK HERE TO SEE FOOT FOV'S FOR \(FOREFOOT, MIDFOOT, HINDFOOT\)](#)

Sequence	TR	TE	FOV		SLICE	GAP	MATRIX		PHASE DIR	NEX	SCAN DIR	OTHER
			FREQ	PHASE%			PHASE	FREQ				
SAG T1	400-700	10-30	18	100	3	0.3	307	384	A/P	2	L->R	
SAG STIR	4000	50	18	100	3	0.3	192	256	A/P	2	L->R	TI: 130
AX T1	400-700	10-30	14	100	3	1	307	384	L/R	2	S->I	
AX STIR	4000	50	14	100	3	1	307	384	A/P	2	S->I	TI:130
COR T1	400-700	10-30	14	100	3	0.3	307	384	L/R	2	P->A	
COR STIR	4000	50	14	100	3	0.3	192	256	L/R	2	P->A	TI: 130