

CT Mako Knee

Updated 05/05/24

Reviewed 05/15/25

Indications - pre surgical evaluation for knee joint replacement.

Bill under CT LE w/o Contrast charge. Do not include separate hip, knee and ankle charges.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Patient positioning:

Patient in supine position feet first with both knees and ankles aligned.

Elevate the knee of interest slightly with a rolled towel or blanket.

Motion rod should be placed along lateral aspect of leg.

Wrap the Velcro strap one complete revolution around the rod.

Do not allow patient movement between or during the scans.

Topogram - iliac crests through feet.

Craniocaudal scan coverage (see image below):

Hip - above femoral head to lesser trochanter of femur. FOV must be <500 mm.

Knee - 10 cm above knee joint to 10 cm below knee joint. FOV must be <250 mm.

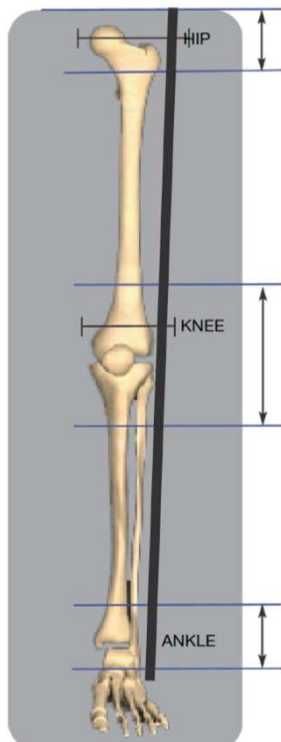
Ankle - few centimeters above ankle joint through bottom of talus. FOV must be <500 mm.

Matrix must be 512 x 512 squared.

IV Contrast: not given for this protocol.

For **GE scanners**, it is essential for the 1st recon thickness on the scanner to match the 1st recon thickness in this protocol book for the prescribed Noise Index to be valid. The 1st recon should generally be the thickest recon in the protocol.

Prepare an uncompressed DICOM disc containing all images (without DICOM viewer).



Craniocaudal Scan Coverage



Metal Rod Placement

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SIEMENS PARAMETERS & RECONS

For Hip, Knee and Ankle scans:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time
Sensation 16	spiral	120	200	on	NA	0.80	16	0.75	0.5
Go Up 32	spiral	130	200	on	on 170	0.80	32	0.7	1.0
Sensation 64	spiral	120	200	on	NA	0.90	64	0.6	0.5
Definition 64	spiral	120	200	on	on	0.80	64	0.6	1.0
Go Top 64	spiral	120	200	on	on 170	0.80	64	0.6	1.0
Drive 128	spiral	120	200	on	on	0.80	128	0.6	1.0
Force 192	spiral	120	200	on	on	0.80	192	0.6	1.0

HIP RECONS

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX HIP BONE	3.0	3.0	Br59 / B60	bone/osteo	3	head/feet
COR HIP BONE	3.0	3.0	Br59 / B60	bone/osteo	3	front/back
SAG HIP BONE	3.0	3.0	Br59 / B60	bone/osteo	3	left/right

Mako specific recon.

KNEE RECONS

AX KNEE BONE	3.0	3.0	Br59 / B60	bone/osteo	3	head/feet
COR KNEE BONE	3.0	3.0	Br59 / B60	bone/osteo	3	front/back
SAG KNEE BONE	3.0	3.0	Br59 / B60	bone/osteo	3	left/right
AX KNEE THINS	0.75	0.75	Br59 / B60	bone/osteo	3	head/feet

Mako specific recon.

ANKLE RECONS

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX ANKLE BONE	3.0	3.0	Br59 / B60	bone/osteo	3	head/feet
COR ANKLE BONE	3.0	3.0	Br59 / B60	bone/osteo	3	front/back
SAG ANKLE BONE	3.0	3.0	Br59 / B60	bone/osteo	3	left/right

Mako specific recon.

CT Mako Knee

GE PARAMETERS & RECONS

For Hip, Knee and Ankle scans:

	Scan Type	SFOV	kV	mA Range	Noise Index	Smart mA	Slice Thick	Beam Coll	Pitch	Speed	Rot Time	Dose Red	ASIR
LS 16	helical	large	120	100-440	12.50	on	2.5	10	0.938	9.37	0.5	NA	NA
Opt 540	helical	large	120	100-440	12.50	on	2.5	10	0.938	9.37	0.5	NA	NA
LS VCT 64	helical	large body	120	100-450	16.00	on	2.5	40	0.984	39.37	0.5	20	20
Disc VCT 64	helical	large body	120	100-450	16.00	on	2.5	40	0.984	39.37	0.5	20	20

HIP RECONS

Name of Series	Thickness	Interval	Recon Algorithm/Mode	Window Width/Level	Recon Direction
AX HIP BONE	2.5	2.5	bone full	2500/480	head/feet
COR HIP BONE	2.5	2.5	bone full	2500/480	front/back
SAG HIP BONE	2.5	2.5	bone full	2500/480	left/right

Must be first recon.

Mako specific recon.

KNEE RECONS

AX KNEE BONE	2.5	2.5	bone full	2500/480	head/feet
COR KNEE BONE	2.5	2.5	bone full	2500/480	front/back
SAG KNEE BONE	2.5	2.5	bone full	2500/480	left/right
AX KNEE THINS	0.625	0.625	bone plus full	2500/480	head/feet

Must be first recon.

Mako specific recon.

ANKLE RECONS

AX ANKLE BONE	2.5	2.5	bone full	2500/480	head/feet
COR ANKLE BONE	2.5	2.5	bone full	2500/480	front/back
SAG ANKLE BONE	2.5	2.5	bone full	2500/480	left/right

Must be first recon.

Mako specific recon.

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PHILIPS PARAMETERS & RECONS

For Hip, Knee and Ankle scans:

	Scan Mode	kV	Avg mAs	Dose Index	3D Dose	Pitch	Detect	Colli	Rot Time	Scan Time
Incisive 128	helical	120	285	29	off	1.00	64	0.625	0.75	5.6

HIP RECONS

Name of Series	Thick	Interval	Filter	Window	iDose	Recon Direction
AX HIP BONE	3.0	3.0	YC	bone	3	head/feet
COR HIP BONE	3.0	3.0	YC	bone	3	front/back
SAG HIP BONE	3.0	3.0	YC	bone	3	left/right

Mako specific recon.

KNEE RECONS

AX KNEE BONE	3.0	3.0	YC	bone	3	head/feet
COR KNEE BONE	3.0	3.0	YC	bone	3	front/back
SAG KNEE BONE	3.0	3.0	YC	bone	3	left/right
AX KNEE THINS	0.75	0.75	YC	bone	3	head/feet

Mako specific recon.

ANKLE RECONS

AX ANKLE BONE	3.0	3.0	YC	bone	3	head/feet
COR ANKLE BONE	3.0	3.0	YC	bone	3	front/back
SAG ANKLE BONE	3.0	3.0	YC	bone	3	left/right

Mako specific recon.

1. KNEE SCAN PARAMETERS

Position/Landmark	Supine, Feet First																
Topogram (Scout) Direction	Cranio-Caudal. AP and Lateral scout																
kVp mA (*if available) Pitch	120-140kV (recommended 120 kVp) Auto Exposure Control* (200-400 mA) 1:1 (no gaps)																
Helical Set Slice Thickness, Spacing, Algorithm	<table><tr><th>Region</th><th>Thickness</th><th>Spacing</th><th>Algorithm</th></tr><tr><td>Hip</td><td>2-5 mm</td><td>2-5 mm</td><td>Bone</td></tr><tr><td>Knee</td><td>0.5-1 mm</td><td>0.5-1 mm</td><td>Bone</td></tr><tr><td>Ankle</td><td>2-5 mm</td><td>2-5 mm</td><td>Bone</td></tr></table>	Region	Thickness	Spacing	Algorithm	Hip	2-5 mm	2-5 mm	Bone	Knee	0.5-1 mm	0.5-1 mm	Bone	Ankle	2-5 mm	2-5 mm	Bone
Region	Thickness	Spacing	Algorithm														
Hip	2-5 mm	2-5 mm	Bone														
Knee	0.5-1 mm	0.5-1 mm	Bone														
Ankle	2-5 mm	2-5 mm	Bone														
Image Resolution Matrix	512 x 512 Matrix: <u>Image must be a square</u>																
DFOV	Hip=500 mm, Knee=250 mm, Ankle=500 mm <u>Do not exceed limits.</u>																
Scan Plan	Scan in the Axial plane, for all 3 regions (Hip, Knee, and Ankle)																
Scan Start/End Locations	Begin scan at the Hip, through the Knee, ending at and including the Ankle joint.																
Hip Region	Include the entire femoral head and motion rod. Center around the femoral head.																
Knee Region	Scan a region a minimum of 10 cm above and 10 cm below the distal femoral condyles. Include margin above the patellofemoral joint, margin below the distal boundary of the tibial tuberosity, and the motion rod. Center around the joint line.																
Ankle Region	Include the medial and lateral malleoli and motion rod. Center around the ankle joint.																
Images required for transfer	Transfer all Axial bone images of the Hip, Knee, and Ankle including the AP Topogram in DICOM format, to PACS or CD.																

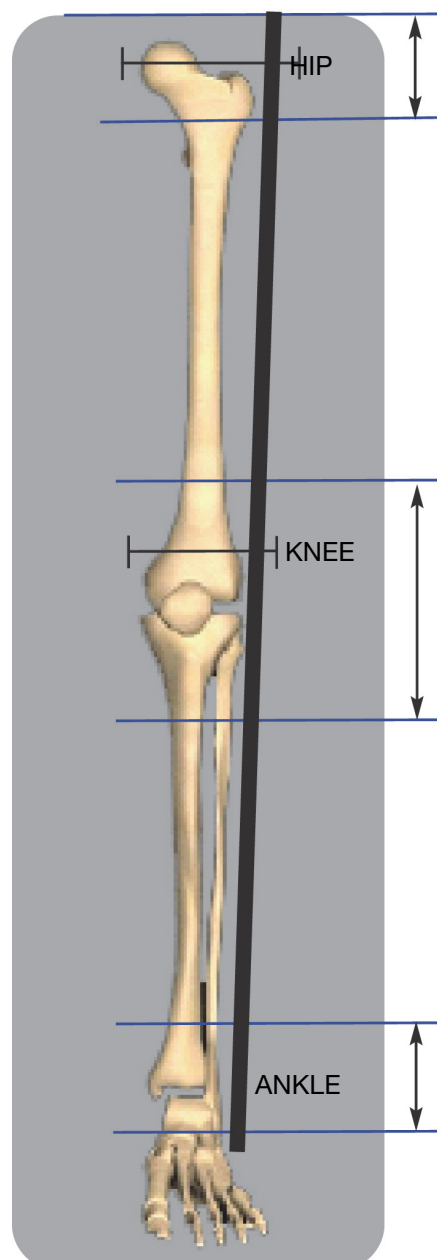


Figure. 1. Scan Location and Characteristics

2. POSITIONING THE PATIENT



During the scan, the pelvis, leg, and Motion Rod must remain motionless.

1. Position patient supine, feet first with foot secured in an upright position with a rolled towel or blanket wrapped around the bottom of the foot to secure the ankle as shown.
2. Elevate the knee of the patient slightly with a rolled towel or blanket.
3. Wrap the velcro strap one complete revolution around the rod as shown in Figure 2. Do this for both Velcro straps, one at the hip position and one at the ankle position as shown.
4. Set the Motion Rod on the patient to pass from just proximal of Hip Center to distal of Ankle Center as shown in Figure 3.
5. Adjust the femoral and tibial straps to secure the rod.
6. Verify the rod is in both anterior/posterior and medial/lateral field of views for all scan regions.



Figure 2.



The velcro strap must be wrapped around the rod in one complete revolution, before wrapping around the leg. Straps should be snug, but not excessively tight.

3. CONSIDERATIONS

- Scan patient anytime before procedure (up to 8 weeks in advance)
- Ensure the patient is comfortable and relaxed. This is critical for achieving a motionless scan
- If metallic components are present in the operative leg, it may not be possible to obtain an image of significant quality to support a Mako procedure. If metal components are present in the non-operative leg (e.g. knee components), attempt to isolate the non-operative leg from the scan region.



Figure 3.

4. POST SCAN EXAMINATION

The Physician and CT Technologist should verify the following:

- Patient's orientation is correct
- Regions of interest in Figure 1 are visible in dataset
- Scan includes complete femoral head, knee joint and ankle joint
- Image Slice thickness and FOV is correct
- Motion Rod is visible and complete (full circle is present) in all slices
- Bone images in scan image are not degraded by metal-induced artifacts

5. DATA SET TRANSFER

Archive all acquired images onto single CD in DICOM 3 compatible format

Do not include DICOM viewer

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PN 200004 Rev 11 01/16
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