Austin Radiological Association

# CT MSK Protocols

Questions?

Last Update: 11/7/2024 3:41 PM

# PROTOCOLS



**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

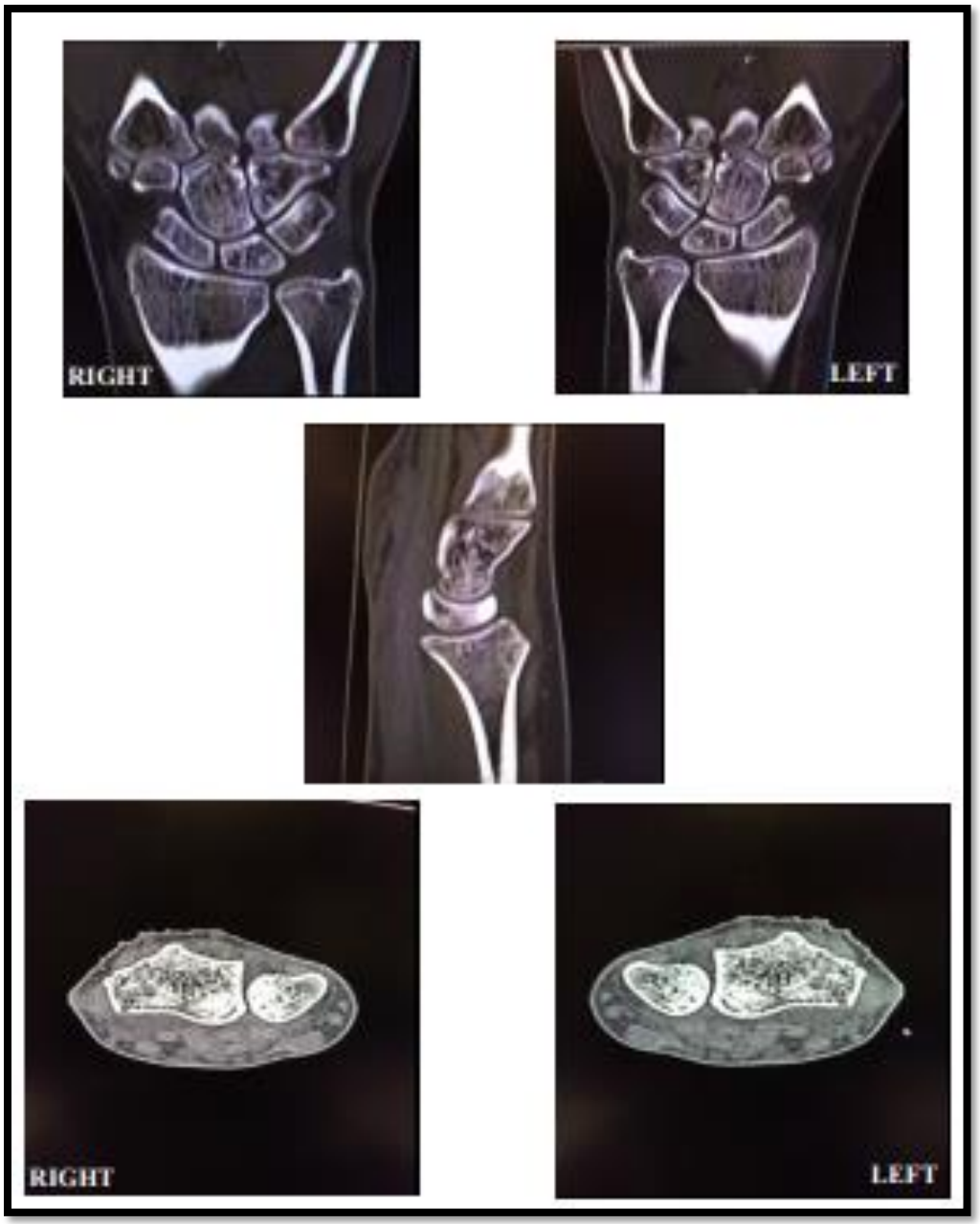
# CT IMAGE ORIENTATION FOR MSK CASES

CT images on MSK cases frequently need to be manually re-oriented in order to display according to the Radiologist's preferences in PACS. The following is a guide to how images of various exams should appear in Synapse. When axial images are not obtained in the true plane, axial reformats must be done.

- **HAND / FINGER:** Coronal – Fingers up, Palm facing away from you. Sagittal – Fingers up, Palm facing to the left. Axial – Palm down, the thumb should be on the same side of the image as the Coronal images.


*Back to MSK Protocol Page*

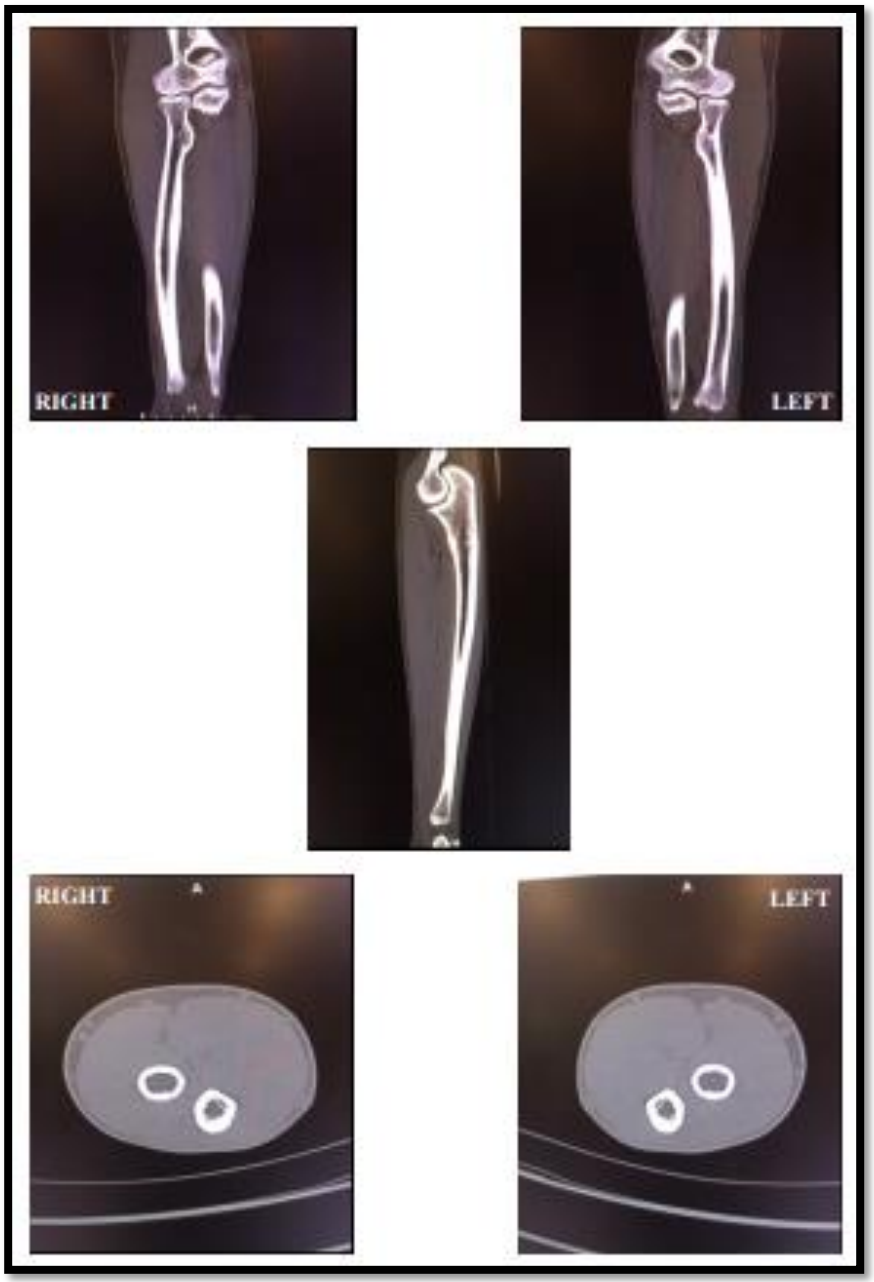
- **WRIST:** Coronal – Fingers up, Palm facing away from you. Sagittal – Fingers up, Palm facing to the left. Axial – Palm down, the radius should be on the same side of the image as the Coronal images.




*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

- **FOREARM:** Coronal – Hand down, Palm facing toward you. Sagittal – Hand down, Palm facing to the left. Axial – Palm facing upwards, radius should be on the same side of the image as the Coronal images

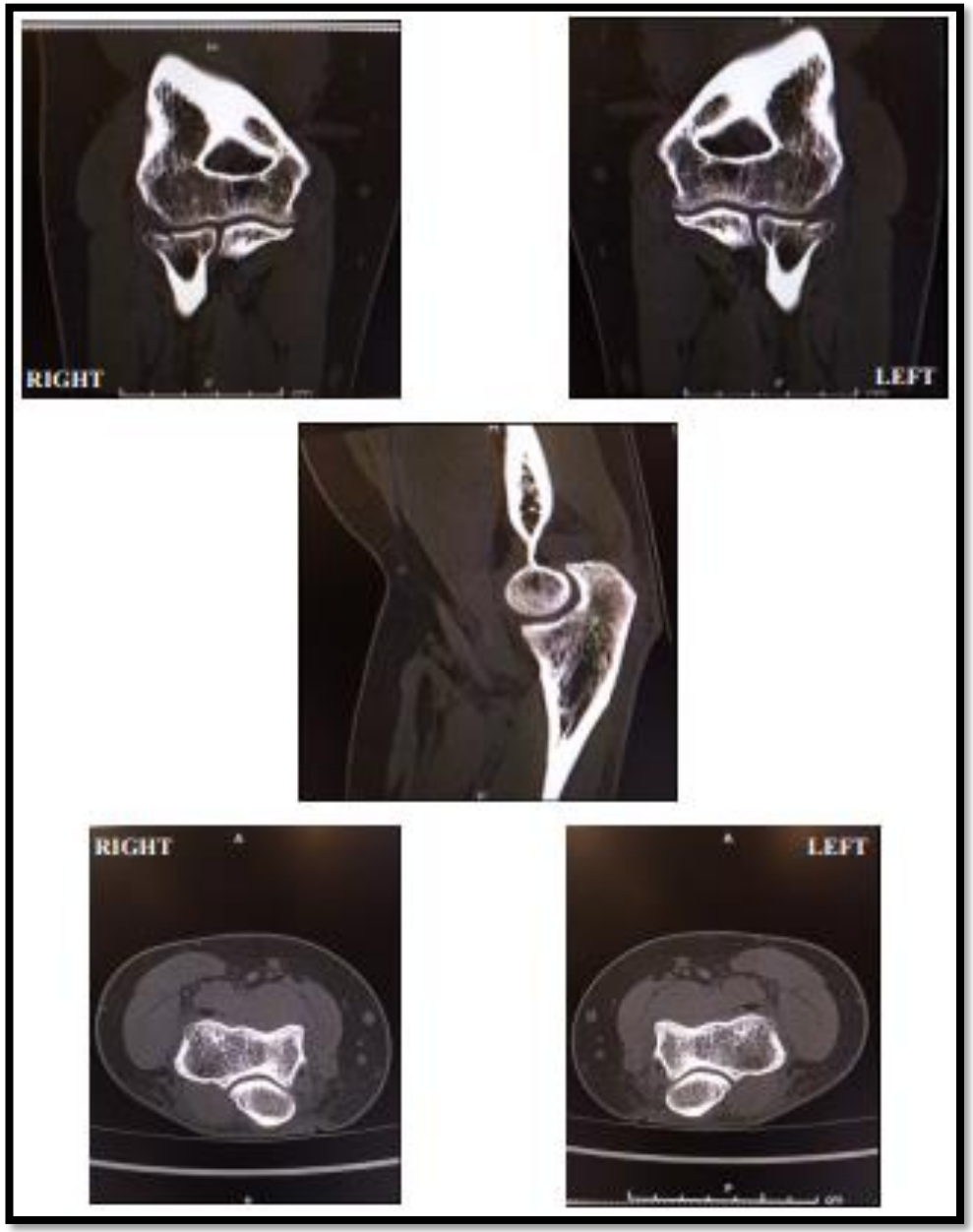



.

*Back to MSK Protocol Page*

*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

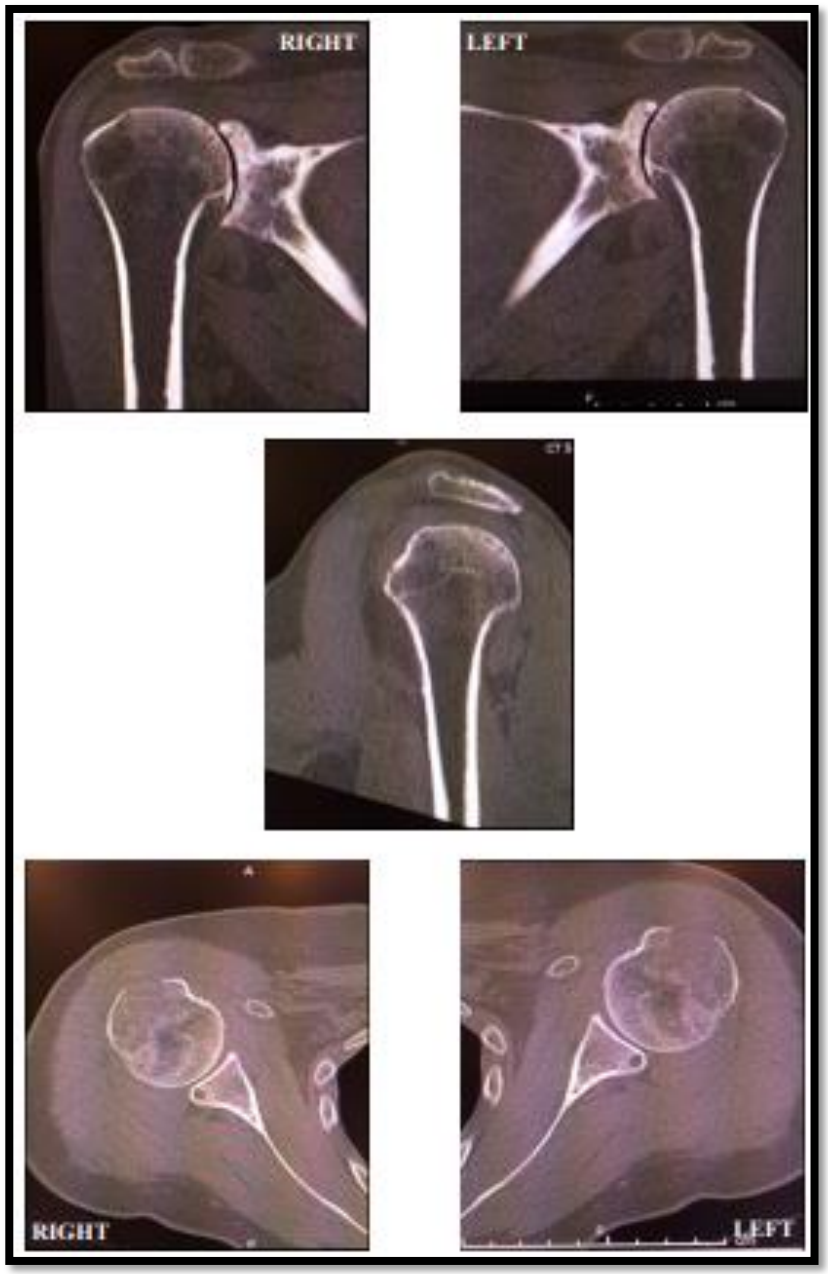
- **ELBOW:** Coronal – Hand down, Palm facing toward you. Sagittal – Hand down, Palm facing to the left. Axial – Palm facing upwards, radius should be on the same side of the image as the Coronal images.




*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

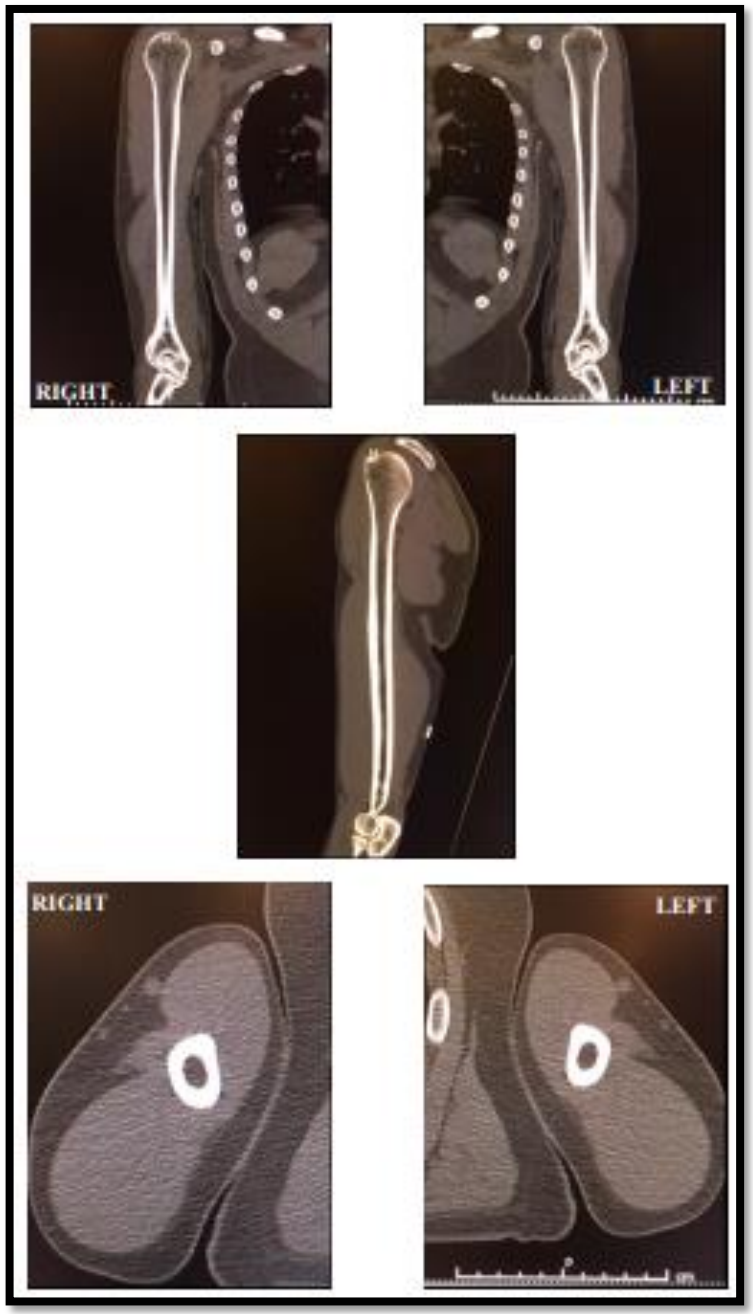
- **SHOULDER:** Coronal – anatomical position with patient facing toward you. Sagittal – anterior side of the patient facing to the left. Axial – anterior side of the patient facing upwards, the head of the humerus should be on the same side of the image as the Coronal images.




*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

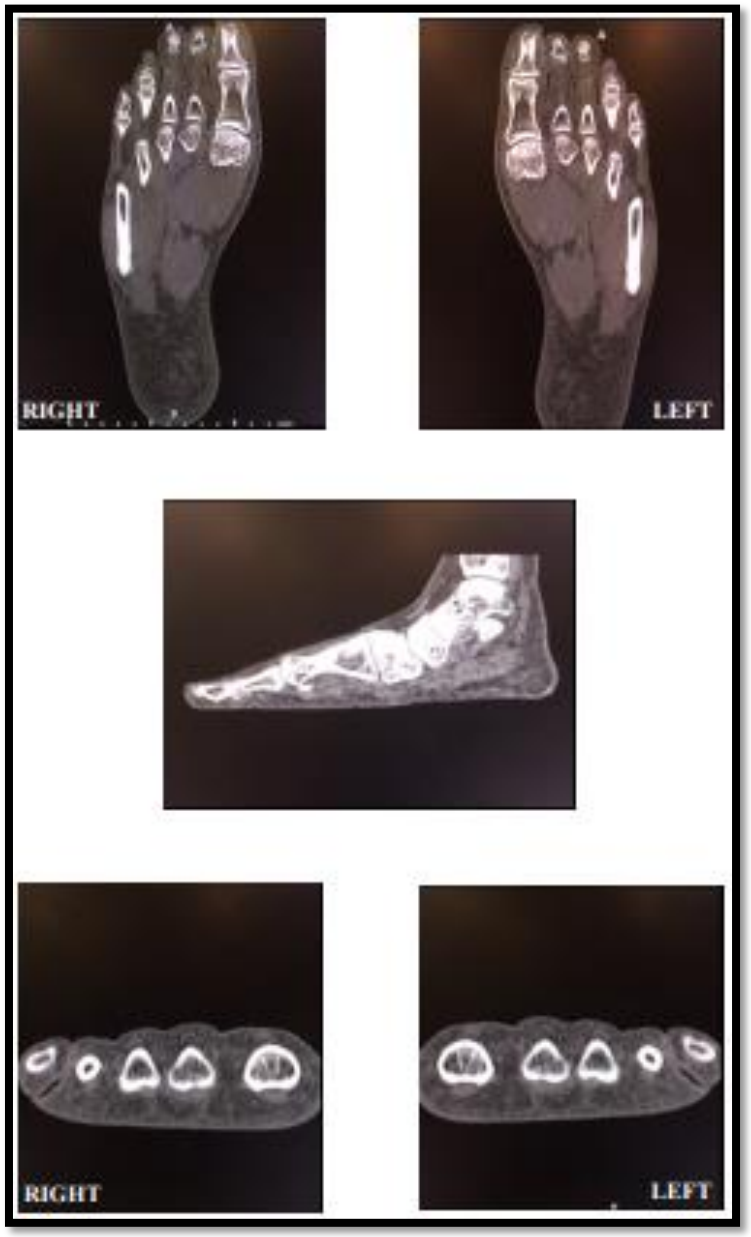
- **HUMERUS:** Coronal – anatomical position with patient facing toward you. Sagittal – anterior side of the patient facing to the left. Axial – anterior side of the patient facing upwards, the humerus should be on the same side of the image as the Coronal images.




*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

- **FOOT:** Axial – Toes pointing up, plantar surface of the foot facing toward you. Sagittal – Toes pointing to the left. Coronal – plantar surface of the foot facing down, the big toe should be on the same side of the image as on the Axial images.




*Back to MSK Protocol Page*

# ROUTINE EXTREMITY-Revised-7/14/2021

CTDI: ~20 mGy per acquisition

**Used for evaluation of:**

- Humerus
- Forearm
- Femur
- Knee
- Tib/Fib

**PT Positioning:** Place anatomy of interest in true anatomical position *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above/below through above/below the anatomy of interest

**DFOV:** Focused DFOV ~10 to 15cm; appropriate for anatomy of interest.

## Scan Parameters:

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @ 3ml/sec
  - 50 second delay
- Scan from above/below through above/below the anatomy of interest
- Reconstruction left to right or anterior to posterior

## PACS series in order as performed:

- Topogram
- 2x2 Axial bone
- 2x2 Axial Soft Tissue
- 2x2 Coronal Bone/ST
- 2x2 Sagittal Bone/ST
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

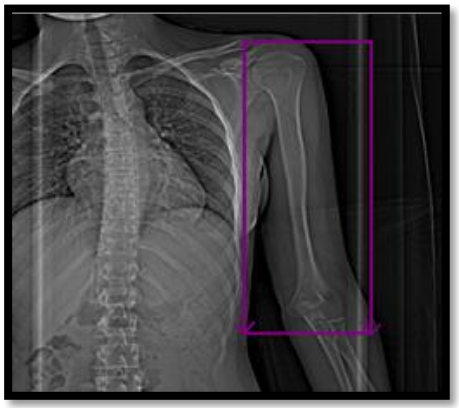
*Back to MSK Protocol Page*

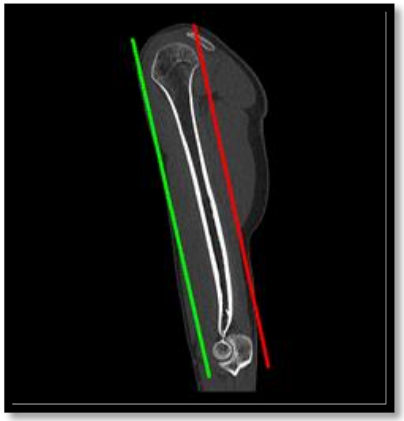
**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Humerus

Scan range- To above Acromium through elbow joint.

(*Limited studies must include at least one joint)*





# Forearm

Scan range- To include above elbow joint through wrist.

(*Limited studies must include at least one joint)*

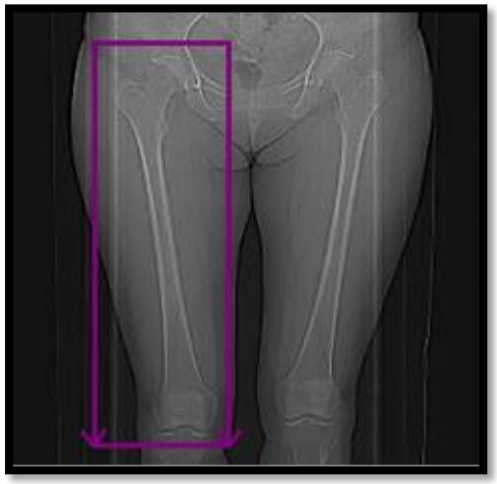
*Back to MSK Protocol Page*

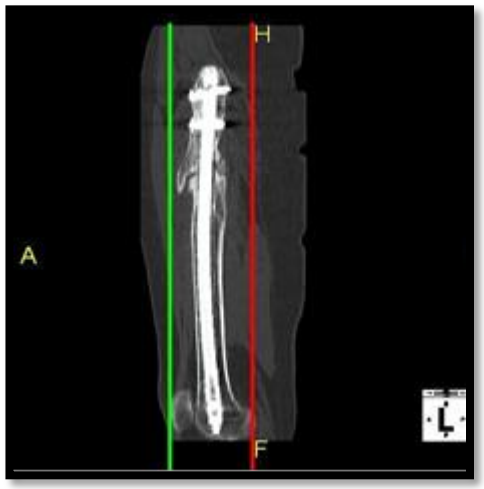
**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Femur

Scan range- To include above Acetabulum through knee joint

(*Limited studies must include at least one joint)*





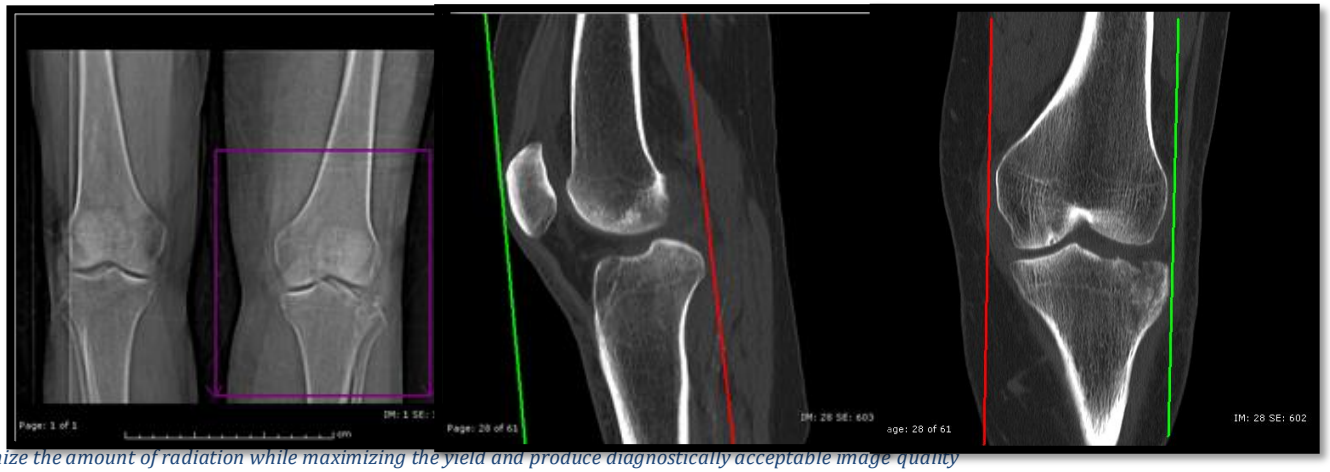


# Knee

Scan range- To include distal femur through proximal tib/fib

**Knee Arthrogram:**

- Scan range to include affected knee
- If a patient presents with either a partial or total joint replacement it is necessary to provide a pre and a post arthrogram CT scan.



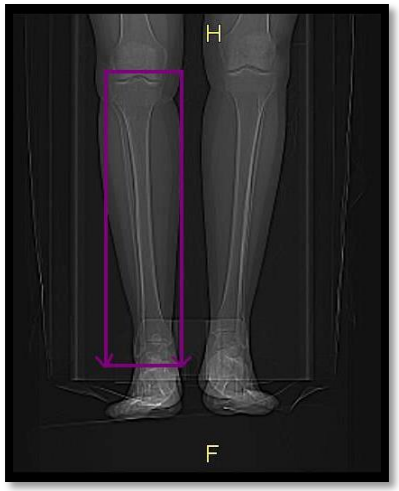
*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

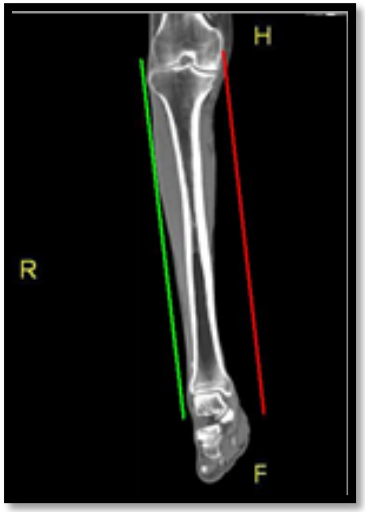
# Tibia/Fibula

Scan range- To include above knee joint through ankle joint.

*(Limited studies must include at least one joint)*








*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ROUTINE EXTREMITY SCAN PROTOCOLS

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | Helical |
| Detector Configuration | 12 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 0.9 | 0.8 | 0.8 | | Pitch | 0.531.:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Small Body |
| Quality ref mAs | 70 | 60 | 60 | | Auto mA range | 80-300 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | No |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 18 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| **Recon 1 Bone Axial** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | **Group 1 Bone** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Increment (mm) | 2.5 |
| **Recon 2 ST** | | | | | Type | Full |
| Kernel | I31s Med Smooth | I31s Med Smooth | I40s Medium | | ASIR | None |
| Window | Mediastinum | Mediastinum | Extremity | | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | **Recon 2 Bone Reform** | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | Bone Plus |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 1500/450 |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 0.625 |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | Slice Increment (mm) | 0.625 |
| Window | Osteo | Osteo | Osteo | | Type | Full |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | ASIR | None |
| Slice Thickness (mm) | 2 | 2 | 2 | | | |
| Slice Increment (mm) | 2 | 2 | 2 | | **Recon 3 ST** | |
| **Coronal/Sagittal ST** | | | | | Algorithm | Standard |
| Kernel | I41s Med Smooth | I41s Med Smooth | I40s medium | | Window Width/ Level | 350/40 |
| Window | Mediastinum | Mediastinum | Extremity | | Slice Thickness (mm) | 2.5 |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 2.5 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | SS10 |
| | | | | | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# HI-RESOLUTION EXTREMITY-Revised-7/14/2021

CTDI: ~13 mGy per acquisition

**Used for evaluation of:**

- Ankle
- Elbow
- Hand
- Wrist
- Foot/ Calcaneus
- Toes
- Fingers

**PT Positioning:** Place anatomy of interest in true anatomical position *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above/below through above/below the anatomy of interest

**DFOV:** Focused DFOV ~10 to 15cm; appropriate for anatomy of interest.

## Scan Parameters:

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @3ml/sec
  - 50 second delay
- Scan from above/below through above/below the anatomy of interest
- Reconstruction left to right or anterior to posterior

## PACS series in order as performed:

- Topogram
- 1X1 Axial bone
- 1X1 Axial Soft Tissue
- 1X1 Coronal Bone/ST
- 1X1 Sagittal Bone/ST
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ANKLE

**Scan range-** Scan to include distal tibia/fibula through entire calcaneus

**Ankle Arthrogram:**

- Scan range to include affected ankle
- If a patient presents with either a partial or total joint replacement it is necessary to provide a pre and a post arthrogram CT scan.

# Foot/ Calcaneus

Scan range- Scan to include above ankle joint through entire foot

**Limit the DFOV to the hind foot if only concerned about the calcaneous**

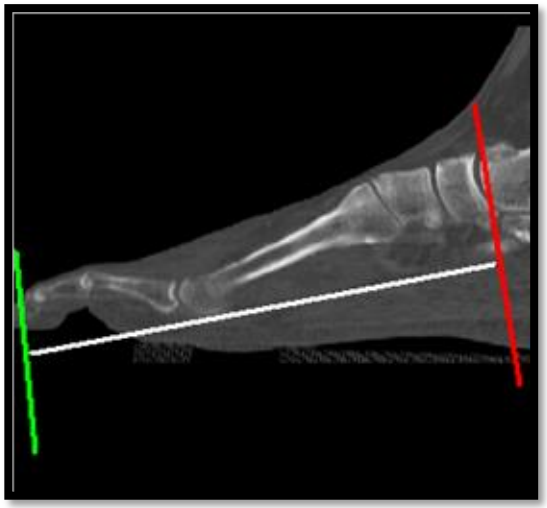

*Back to MSK Protocol Page*

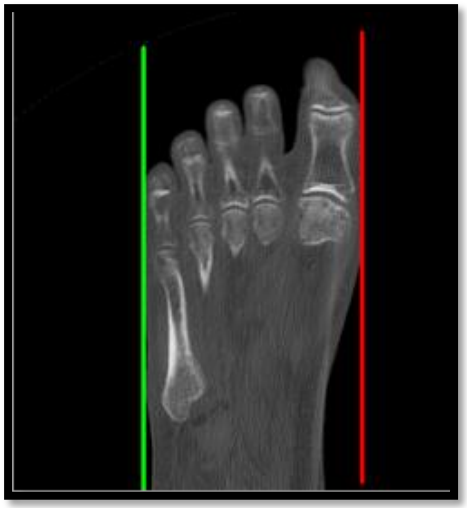
*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Toes

**Scan range-** Scan to include entire toes

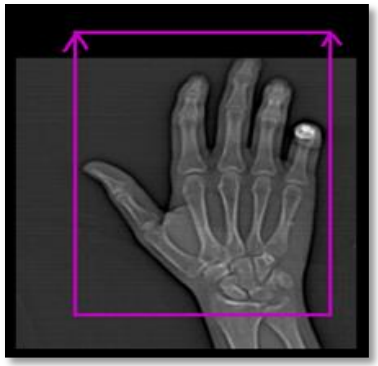
**Limit the DFOV to the digit of concern and the adjacent digits**

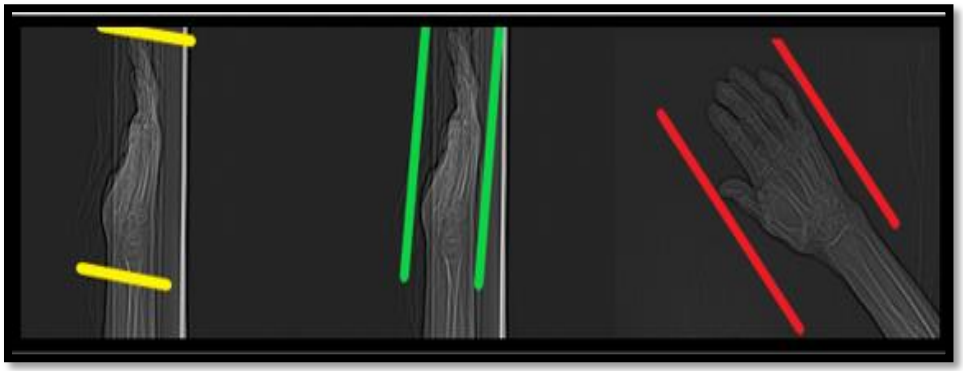


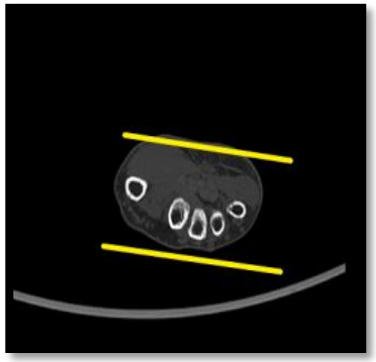


# Hand

**Scan range**- Scan to include entire carpals through fingertips







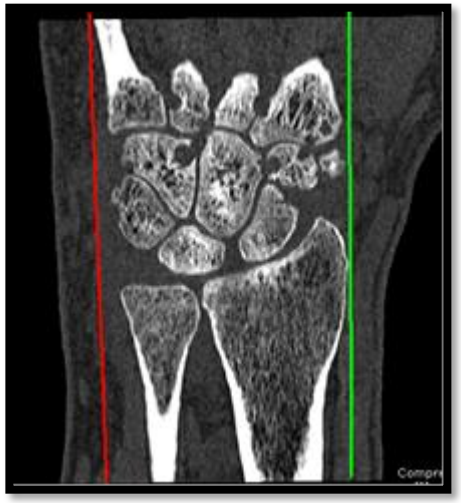
Align all planes, create axial reformat if patient is not in true anatomical position

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Wrist

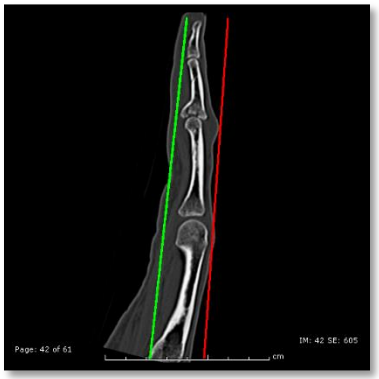
**Scan range-** Scan to include entire wrist



# Fingers

**Scan range-** Scan to include entire fingers

**Limit the DFOV to the digit of concern and the adjacent digits**



*Back to MSK Protocol Page*

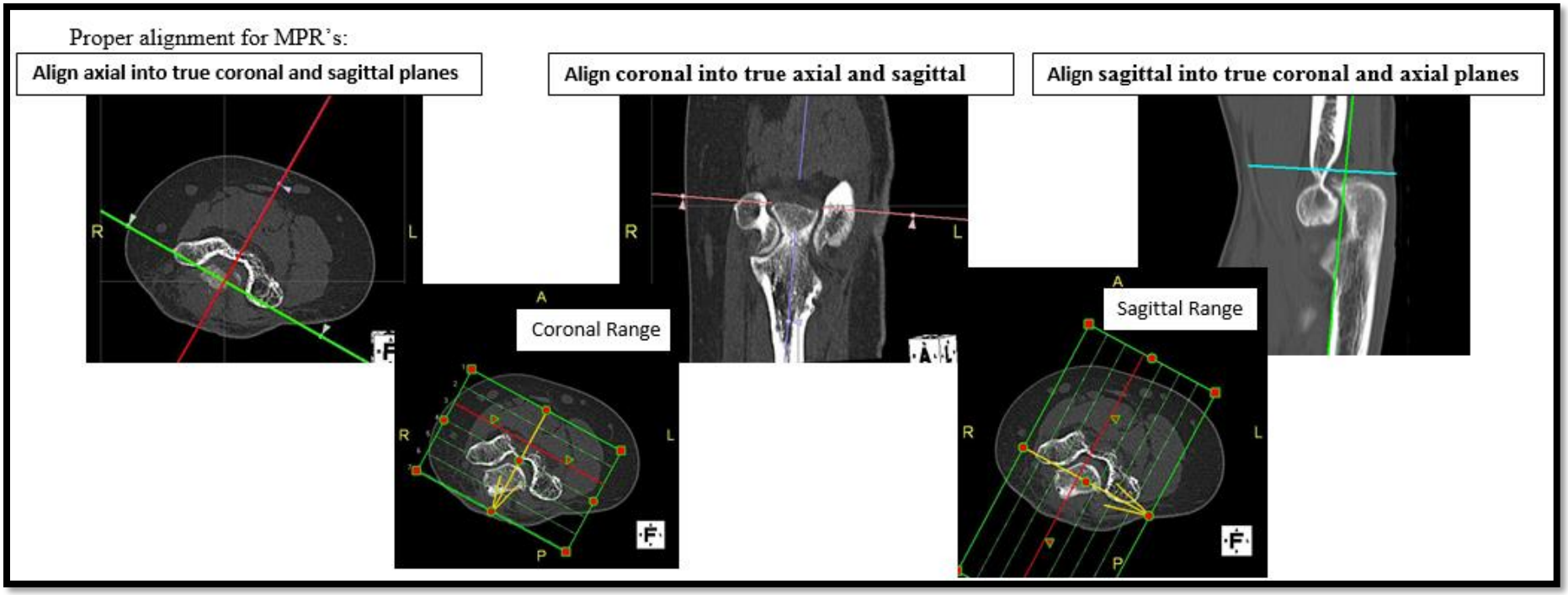
**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Elbow

**Scan range-** Scan to include distal humerus through proximal forearm

**Elbow Arthrogram:**

- Scan range to include affected elbow
- If a patient presents with either a partial or total joint replacement it is necessary to provide a pre and a post arthrogram CT scan.




*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# HI-RESOLUTION EXTREMITY SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | Helical |
| Detector Configuration | 12 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 0.9 | 0.8 | 0.8 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 39.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 70 | 60 | 60 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| **Recon 1 Bone Axial** | | | | | **Recon 1 ST Axial** | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | Algorithm | Standard |
| Window | Osteo | Osteo | Osteo | | Window Width/ Level | 450/ 35 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Thickness (mm) | 1.25 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 |
| Slice Increment (mm) | 1 | 1 | 1 | | Type | Full |
| **Recon 2 ST** | | | | | | |
| Kernel | I31s Med Smooth | I31s Med Smooth | I41s Medium | | | |
| Window | Mediastinum | Mediastinum | Extremity | | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | | |
| Slice Thickness (mm) | 1 | 1 | 1 | | | |
| Slice Increment (mm) | 1 | 1 | 1 | | | |
| **Coronal/ Sagittal Bone** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | **Recon 2 Reformats** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Standard |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 450/ 35 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 0.625 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 |
| **Coronal/Sagittal ST** | | | | | ASIR | SS50 |
| Kernel | I41s Med Smooth | I41s Med Smooth | I40s Medium | | | |
| Window | Mediastinum | Mediastinum | Extremity | | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | | |
| Slice Thickness (mm) | 1 | 1 | 1 | | | |
| Slice Increment (mm) | 1 | 1 | 1 | | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ULTRA HI-RESOLUTION EXTREMITY-Revised-7/14/2021

CTDI: ~13 mGy per acquisition

**Used for evaluation of:**

- Carpal Bones
- Sub 1mm evaluation as requested

**PT Positioning:** Place anatomy of interest in true anatomical position *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above/below through above/below the anatomy of interest

**DFOV:** Focused DFOV ~10 to 15cm; appropriate for anatomy of interest.

## Scan Parameters:

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @3ml/sec
  - 50 second delay
- Scan from above/below through above/below the anatomy of interest
- Reconstruction left to right or anterior to posterior

## PACS series in order as performed:

- Topogram
- 0.6 x 0.6 Axial bone
- 0.6 x 0.6 Axial Soft Tissue
- 0.6 x 0.6 Coronal Bone/ST
- 0.6 x 0.6 Sagittal Bone/ST
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ULTRA HI-RESOLUTION EXTREMITY SCAN PROTOCOL

| **Scanner** | **Perspective** | **Definition AS 40** | **Definition AS 64** | | **Scanner** | **Optima 660** |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | Helical |
| Detector Configuration | 12 x 0.6 | 32 x 0.6 | 16 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 1 |
| Pitch | 0.9 | 0.8 | 0.85 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Small Body |
| Quality ref mAs | 70 | 60 | 60 | | Auto mA range | 80-300 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | No |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 18 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 0% |
| **Recon 1 Bone Axial** | | | | | **Recon 1 Bone Axial** | |
| Kernel | B70s Sharp | B70s Sharp | U70u Sharp | | Algorithm | Bone Plus |
| Window | Osteo | Osteo | Osteo | | Window Width/ Level | 1500/450 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Thickness (mm) | 0.625 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Slice Increment (mm) | 0.625 |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Type | Full |
| **Recon 2 ST** | | | | | ASIR | None |
| Kernel | I31s Med Smooth | I31s Med Smooth | U70u Medium | | | |
| Window | Mediastinum | Mediastinum | Extremity | | **Recon 2 ST** | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Algorithm | Standard |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Window Width/ Level | 350/50 |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Slice Thickness (mm) | 0.625 |
| **Coronal/ Sagittal Bone** | | | | | Slice Increment (mm) | 0.625 |
| Kernel | B70s Sharp | B70s Sharp | B70s sharp | | Type | Full |
| Window | Osteo | Osteo | Osteo | | ASIR | SS20 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | | |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | **Recon 3 Bone Reformats** | |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Algorithm | Bone Plus |
| **Coronal/Sagittal ST** | | | | | Window Width/ Level | 1500/450 |
| Kernel | I41s Med Smooth | I41s Med Smooth | U70u Medium | | Slice Thickness (mm) | 0.625 |
| Window | Mediastinum | Mediastinum | Extremity | | Slice Increment (mm) | 0.625 |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Type | Full |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | ASIR | None |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# CARPAL BONES

**PT Preparation: Place anatomy of interest in true anatomical position**

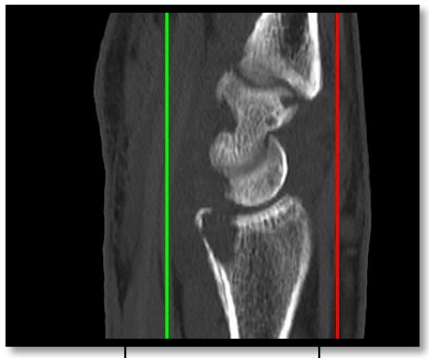
**(Please note reason for protocol changes)**

**Setup:**

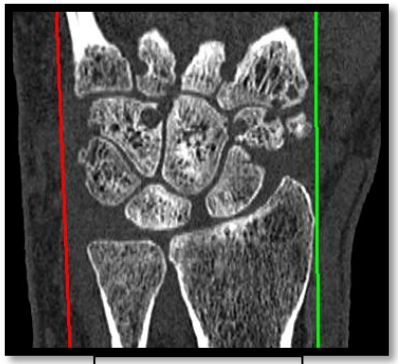
1 AP scout to include entire wrist.

**DFOV:**

1. Focused DFOV appropriate for anatomy of interest
2. Scan to include entire wrist.

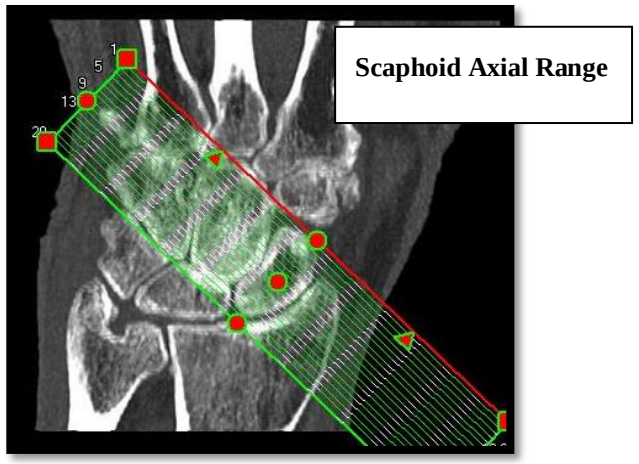


Coronal Range

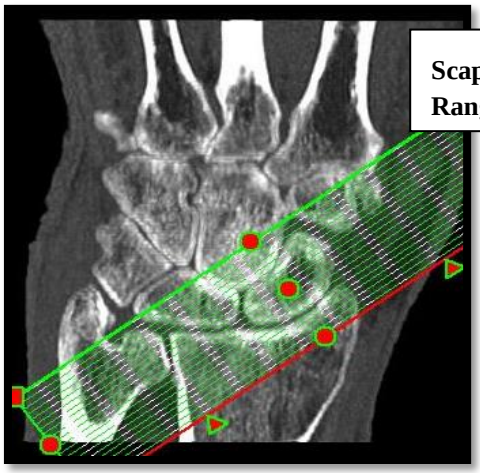


Sagittal Range

**Perform additional focused MPR's for all scaphoid/ Navicular studies. Do not use smaller than 100 DFOV**




**Scaphoid Axial Range**



**Scaphoid Sagittal Range**

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# HIP-Revised-8/24/2016

CTDI: ~20 mGy per acquisition

**PT Positioning:** Place anatomy of interest in true anatomical position ; Turn patient's feet inward so that the feet are pointing toward each other

*(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above the iliac crest through the symphysis pubis

**DFOV:** Focused DFOV ~15-20cm; appropriate for anatomy of interest.

**Scan Parameter Routine Hip:**

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @3ml/sec
  - 50 second delay
- Scan from above the iliac crest through the proximal femur, include entire fracture/prosthesis
  - If a patient presents with a hip prosthesis it is necessary to provide an additional axial/coronal reconstruction that includes bilateral hips in the field of view

## Arthrogram Hip:

- Scan range to include the affected hip joint with a DFOV of 15cm
  - If a patient presents with either a partial or total joint replacement it is necessary to provide pre and post arthrogram CT scan

## PACS series in order as performed:

- Topogram
- 2x2 Axial bone
- 2x2 Axial Soft Tissue
- 2x2 Coronal/Sagittal Bone
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

When Patient presents with a Hip Prosthesis please send the following in addition to standard series

- 2X2 Axial Bilateral Hip Bone
- 2X2 Coronal Bilateral Hip Bone

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# HIP SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 |
|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral |
| Detector Configuration | 32 x 1.2 | 32 x 1.2 | 16 x 1.2 |
| Rotation Time (sec) | 1 | 1 | 0.5 |
| Pitch | 0.95 | 0.95 | 1 |
| Scan FOV | Large | Large | Large |
| CareDose4D | On | On | On |
| Quality ref mAs | 105 | 105 | 105 |
| kVp | 130 | | |
| ref kVp | | 140 | 140 |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast |
| | | | |
| **Recon 1 Bone** | | | |
| Kernel | B70s Sharp | B70s Sharp | B70f Very Sharp |
| Window | Osteo | Osteo | Osteo |
| SAFIRE/ADMIRE | 0 | 0 | 0 |
| Slice Thickness (mm) | 2 | 2 | 2 |
| Slice Increment (mm) | 2 | 2 | 2 |
| | | | |
| **Soft Tissue** | | | |
| Kernel | I41s Medium + | I41f Medium + | I41f Medium |
| Window | Mediastinum | Mediastinum | Pelvis |
| SAFIRE/ADMIRE | 2 | 2 | 2 |
| Slice Thickness (mm) | 2 | 2 | 2 |
| Slice Increment (mm) | 2 | 2 | 1 |
| | | | |
| **Coronal/ Sagittal** | | | |
| Kernel | B70s Sharp | B70s Sharp | B70f Very Sharp |
| Window | Osteo | Osteo | Extremity |
| SAFIRE/ADMIRE | 0 | 0 | 0 |
| Slice Thickness (mm) | 2 | 2 | 2 |
| Slice Increment (mm) | 2 | 2 | 2 |

| Scanner | Optima 660 |
|---|---|
| Scan Type | Helical |
| Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 0.5 |
| Pitch | 0.532:1 |
| Speed (mm/rot) | 10.62 |
| Scan FOV | Large Body |
| Auto mA range | 80-300 |
| kVp | 120 |
| Smart mA | On |
| Noise Index | 15 |
| ASIR | 0% |
| | |
| **Recon 1 Axials** | |
| Algorithm | Bone plus |
| Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 2.5 |
| Type | Full |
| ASIR | None |
| | |
| **Recon 2 Reformat Bone** | |
| Algorithm | Bone plus |
| Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 0.625 |
| Slice Increment (mm) | 0.625 |
| Type | Full |
| ASIR | None |
| | |
| **Recon 3 ST** | |
| Algorithm | Standard |
| Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 2.5 |
| Type | Full |
| ASIR | SS20 |
| | |
| **Recon 4 3D** | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ConforMIS Hip-Revised-3/09/2020

CTDI: ≤25 mGy per acquisition

**PT Preparation:**

- **The patient must be in the supine position at iso-center in the gantry**
- **Legs in *complete extension* with toes internally rotated 15 degrees**
- **Immobilization is Essential to prevent motion, use the wooden foot board with straps**
- **No sponges or pillows**

**Setup:**

1. Lateral/PA scout from above the iliac crest to below tibial plateau

*** When an implant or other device is present in the opposite hip or knee please use metal artifact reduction software or a metal artifact reduction technique increasing KVP by 15% to reduce the artifacts in the affected joint ***

**Scan Parameters:**

- Top of Pelvis to mid knee joint **38 - 45 cm DFOV**
- **mAs ~100-200**
- **Rotation 1**
- **Pitch 1**

**PACS Series**:

1. Topogram
2. 1 x 0.5 Axial
3. 1x1 Coronal MPR
4. 1x1 Sagittal MPR
5. Patient Protocol/Dose Report

*Back to MSK Protocol Page*

*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ConforMIS Hip Scan Protocol

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Helical |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 1 |
| Pitch | 1 | 1 | 1 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 150 | 150 | 150 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 140 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 8 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 0% |
| | | | | | | |
| **Recon 1 CD set** | | | | | **Recon 1 CD Set** | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Algorithm | Bone Plus |
| Window | Osteo | Osteo | Osteo | | Window Width/ Level | 1500/450 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Thickness (mm) | 1.25 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 |
| Slice Increment (mm) | 0.5 | 0.5 | 0.5 | | Type | Plus |
| | | | | | ASIR | none |
| **Coronal/ Sagittal** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | **Recon 2 Reformats** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 0.625 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 |
| | | | | | Type | Plus |
| | | | | | ASIR | SS20 |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Stryker Hip Map-Revised-8/23/2021

CTDI: ≤25 mGy per acquisition

Used for Femoroacetabular Impingement Analysis

**PT Preparation:**Positioning on CT Flat Table Top

Patient Supine, Feet First, legs flat on the table

- Ensure Hips, Knees and Feet are in NEUTRAL alignment
- No cushions/wedges under legs/feet
- Tape feet together for stability
- Ensure on scout images the relative heights of the ASIS are symmetric

**Setup:** LONG scout, PA/Lateral, above Pelvis thru upper Tib/Fib

**General Scan Requirements/Recommendations:**

- No motion artifact
- FOV ≤ 500mm
- Bone Kernel
- 120-140 kV / 200-250 mA

**Scan Parameters:**

- **Pelvis + Proximal Femur**
    1. Scan above the pelvis to at least 180mm below the lesser trochanter
- **Knee**
    1. Scan from the joint line between femur and tibia to include 100mm of proximal femur

**Reconstructions:**

1. 1x1 mm Axial Pelvis/Trochanters
2. 1x1 mm Coronal Bone Pelvis/Trochanters
3. 1x1 mm Axial Knees
4. 1x1 mm Coronal Bone Knees

**PACS Series**: Topogram, Bilateral Pelvis/Trochanters, Coronal Pelvs/Trochanters, Bilateral Knees, Coronal Knees, Dose Report/Patient Protocol

***SEE ATTACHED PAGES***

*Back to MSK Protocol Page*

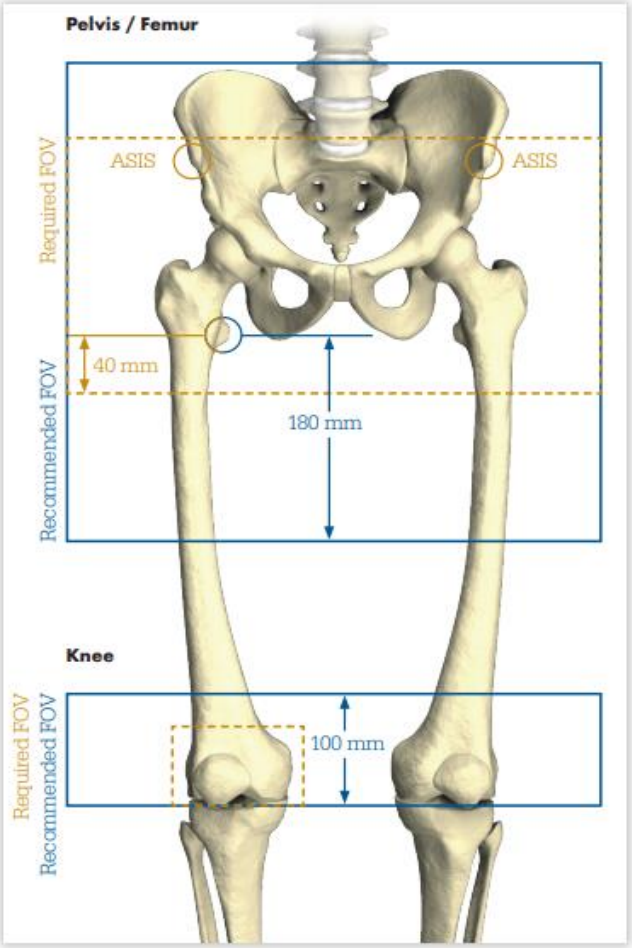
**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# HipMap Femoroacetabular Impingement Analysis

stryker

**Data Acquisition Protocol**

## CT scanning protocol




### Imaging requirements

A scan must include at least the bilateral pelvis and proximal femur. If a knee scan is included femoral torsion will be measured. In such a case the pelvis and knee need to be scanned in the same frame of reference.

### Pelvis + proximal femur

- Required slice increment / slice thickness: ≤1 mm.
  No gap.
- Recommended field of view (FOV):
  Include the entire bilateral pelvis and at least 180 mm below the lesser trochanter.
- Minimally required FOV:
  Bilateral scan from at least the left and right anterior superior illiac spines (ASIS) to at least 40 mm below the lesser trochanter.

### Knee

- Required slice increment / slice thickness: ≤ 5 mm.
  No gap.
- Recommended FOV:
  Include bilateral knees from at least the joint line between the femur and the tibia to 100 mm proximal on the femur.
- Minimally required FOV:
  Unilateral knee scan.

### Number of slices below lesser trochanter

| Slice interval spacing, mm | Distance, mm | Number of slices |
|---|---|---|
| 0.500 | 180 | 360 |
| 0.625 | 180 | 288 |
| 0.750 | 180 | 240 |
| 0.875 | 180 | 206 |
| 1.000 | 180 | 180 |

Customer Service: Stryker Sports Medicine
Phone: +1 866 596 2022 (toll free)
Email: SMWest@stryker.com
Website: stryker.com
Address: 5676 Greenwood Plaza Blvd. Ste. 200 Greenwood Village, CO 80111 USA



*Back to MSK Protocol Page*

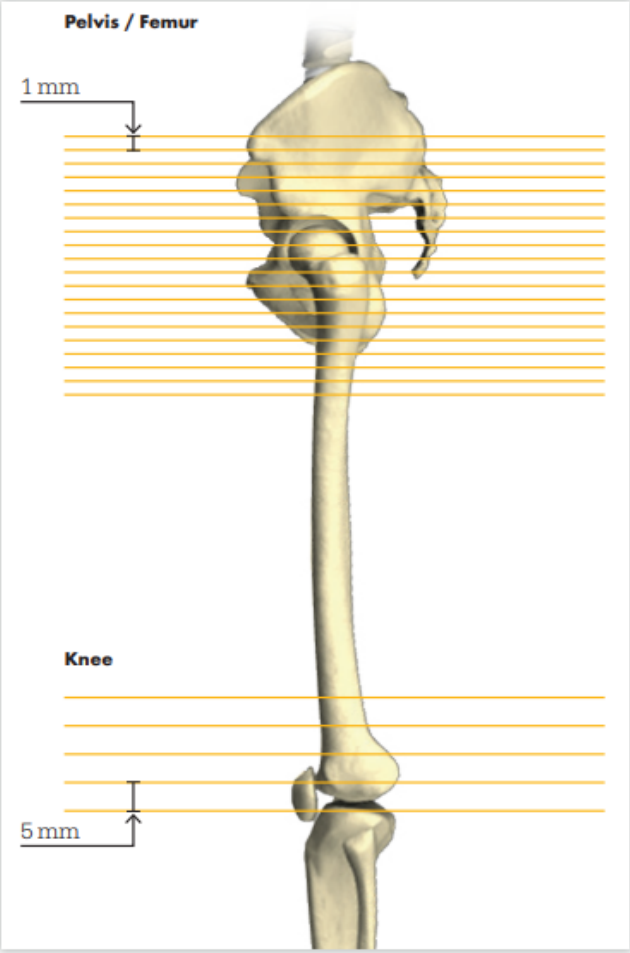
**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# HipMap Femoroacetabular Impingement Analysis

stryker

**Data Acquisition Protocol**

## CT scanning protocol




### General scan requirements

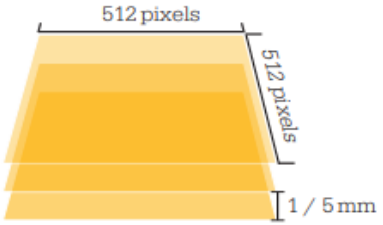
- Original axial slices using helical (spiral) scanning
- Data format: DICOM 3 compatible
- No compression
- No annotations embedded in the files
- No motion artifacts

### General scan recommendations

- Field of view: ≤ 500 mm
- Reconstruction kernel: Bone
- Energy settings: 120-140 kV / 200-250 mA
- Patient position: supine
- No metal-induced image artifacts
- Minimize pelvic obliquity:
  - Ensure that the hips and knees are in NEUTRAL alignment: no excessive internal or external rotation
  - Ensure on the scout image that the relative heights of the ASIS are symmetric

### Imaging acceptance

- Scans that fullfill the requirements and recommendations will be processed. Scans that deviate from recommendations are subject to further evaluation and may need to be rejected.




1000902900 Rev. A

Customer Service: Stryker Sports Medicine
Phone: +1 866 596 2022 (toll free)
Email: SMWest@stryker.com
Website: stryker.com
Address: 5676 Greenwood Plaza Blvd. Ste. 200 Greenwood



*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Hip Map Stryker Scan Protocol

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Spiral | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 32 x 0.6 | | Detector Coverage (mm) | 20 | |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.8 | |
| Pitch | 1 | 1 | 1 | | Pitch | 0.531:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 150 | 150 | 150 | | Auto mA range | 100-500 | |
| kVp | 130 | | | | kVp | 120 | |
| ref kVp | | 140 | 140 | | Smart mA | On | |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 | |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% | |
| | | | | | | | |
| **Hip/Pelvis** | | | | | **Recon 1 Pelvis** | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Algorithm | Bone Plus | |
| Window | Osteo | Osteo | Osteo | | Window Width/ Level | 1500/450 | |
| SAFIRE/ADMIRE | 0 | | 0 | | Slice Thickness (mm) | 0.625 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 | |
| Slice Increment (mm) | 1 | 1 | 1 | | Type | Full | |
| | | | | | ASIR | None | |
| **Bilat knees** | | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | **Recon 2 Knee** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 1.25 | |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Increment (mm) | 1.25 | |
| | | | | | Type | Full | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Hip Zimmer Biomet PMI-Revised-6/09/2020

CTDI: ≤25 mGy per acquisition

**PT Preparation:**

- **The patient must be in the supine position at iso-center in the gantry**
- **Legs in *complete extension* so femurs are positioned parallel to the horizontal plane of table with toes internally rotated 15 degrees**
- **Immobilization is Essential to prevent motion, use the wooden foot board with straps**
- **No sponges or pillows**

**Setup:**

2. Lateral/PA scout from above the iliac crest to below tibial plateau

*** When an implant or other device is present in the opposite hip or knee please use a metal artifact reduction technique increasing KVP by 15% to reduce the artifacts in the affected joint ***

**Scan Parameters:**

- Top of Iliac Crest to mid femurs or below existing femoral implant
- Perform two femoral condyle slices to show anteversion if patient does **NOT** have an existing implant
- ***Do NOT change FOV or X and Y coordinates***
- **38 – 45 cm DFOV to include entire pelvis**
- **Standard or ST Algorithm**

**PACS Series**:

1. Topogram
2. 1x1 Axial
3. 1x1 Femoral Condyle Slices (if applicable)
4. 1x1 Coronal MPR
5. 1x1 Sagittal MPR
6. Patient Protocol/Dose Report

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Hip Zimmer Biomet PMI Scan Protocol

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Helical |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.5 |
| Pitch | 1 | 1 | 1 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 150 | 150 | 150 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 140 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| | | | | | | |
| **Femur CD set** | | | | | **Recon 1 Femur CD Set** | |
| Kernel | B41s Medium | B41s Medium | B40s Medium | | Algorithm | BonePlus |
| Window | Abdomen | Abdomen | Abdomen | | Window Width/ Level | 1500/450 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Thickness (mm) | 2.5 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 2.5 |
| Slice Increment (mm) | 1 | 1 | 1 | | Type | Full |
| | | | | | ASIR | none |
| **Coronal/ Sagittal** | | | | | | |
| Kernel | B41s Medium | B41s Medium | B40s Medium | | **Recon 2 Reformats** | |
| Window | Abdomen | Abdomen | Abdomen | | Algorithm | Bone Plus |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 0.625 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 |
| | | | | | Type | Full |
| **Condyle CD set** | | | | | ASIR | None |
| Kernel | B41s Medium | B41s Medium | B40s Medium | | | |
| Window | Abdomen | Abdomen | Abdomen | | **Recon 1 Condyle CD Set** | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Algorithm | STND |
| Slice Thickness (mm) | 1 | 1 | 1 | | Window Width/ Level | 350/45 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 1.25 |
| | | | | | Slice Increment (mm) | 1.25 |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Hip MAKO Protocol-Revised-11/28/2022

Kyle, MID, RCP, SM, WP ONLY

PT Preparation:

CTDI: ≤25 mGy per acquisition

**The patient must be supine, feet first, iso-center in the gantry**

- **Position to minimize pelvic obliquity by:**
  - **Aligning both ankles and knees**
  - **Ensure in true supine position by palpating the anterior superior iliac spines and comparing relative height above the CT scanner bed**
  - **Align longitudinal axis of the body with longitudinal axis of CT scanning bed**
- **Ensure patient is comfortable and relaxed**
- **Move metallic components out of scan range**

**Setup:**

1. PA/Lateral scout from above the iliac crest through the knees

**Scan Parameters:**

**Pelvis and Proximal Femur**

- FOV to include entire pelvis (medial/lateral/anterior/posterior/superior) and at least 180mm below the lesser trochanter on the femur

******Do Not Exceed a 500mm FOV******

- kV 120-140
- mA 200-250
- Pitch 1
- Slice of 1mm x 1mm (no gap/overlap)
- Bone Algorithm
- Don't include table on scan

**Bilateral Knee**

- Knee FOV to include bilateral knee-joint lines between femur and tibia and 10cm proximal to joint line on femur

  ******Do Not Exceed a 500mm FOV******
- kV 120-140
- mA 200-250
- Pitch 1
- Slice of 2 mm x 2 mm (no gap/overlap)
- Bone Algorithm
- Don't include table on scan

**Reconstructions:**

- Pelvis/Proximal Femur CD Data Set
- Coronal/Sagittal Pelvis Proximal Femur
- Knee CD Data Set
- Coronal/Sagittal Knee
- **PACS Series:** Pelvis/Proximal Femur CD Data Set, Coronal/Sagittal affected Hip, Knee CD Data Set, Coronal/Sagittal affected Knee *PROTECT SCAN*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

## 1. PATIENT SETUP AND CONFIGURATION

- Scan patient in supine position feet first, anytime before MAKOplasty® THA procedure (up to 8 weeks in advance).
- Position patient to minimize pelvic obliquity through the following measures:
  - Align both ankles and both knees
  - Ensure patient is in true supine position by palpating the anterior superior iliac spines and comparing relative height above the CT scanner bed
  - Align longitudinal axis of the body with longitudinal axis of CT scanning bed

## 2. IMAGING REQUIREMENTS

**Two regions:**

- Continuous scan with regions (using one series or topogram with two groups)

**Pelvis + Proximal Femur**

- 0.5 - 1mm interval spacing throughout the scan. No gap / no overlap
- Axial slices (1:1 pitch) using helical (spiral) scanning
- FOV: Scan includes the entire bi-lateral pelvis (Medial/ Lateral/Anterior/Posterior/Superior) and at least 180mm below the lesser trochanter on the femur
- Table not included in the scan
- Complete Scanning and Data reconstruction in bone
- 512 x 512 matrix: Image must be a square
- kV: 120 - 140
- mA: 200 - 250

**Knee**

- 2.0 - 5.0mm interval spacing throughout the scan
- Axial slices (1:1 pitch) using helical (spiral) scanning
- FOV: Scan includes bilateral knee - joint lines between femur and tibia and 10cm proximal to joint line on femur
- Complete scanning and data reconstruction in bone
- 512 x 512 matrix: Image must be a square
- kV: 120 - 140
- mA: 200 - 250

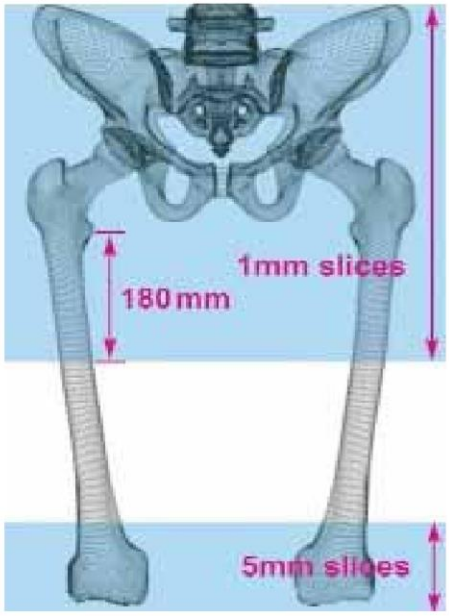



*Figure 1. Scan Location and Characteristics*

**FOV should not exceed 500 mm**

| Slice Interval Spacing, mm | Distance mm | Number of Slices |
|---|---|---|
| 0.500 | 180 | 360 |
| 0.625 | 180 | 288 |
| 0.750 | 180 | 240 |
| 0.875 | 180 | 206 |
| 1.000 | 180 | 180 |

*Back to MSK Protocol Page*

## 3. POSITIONING THE PATIENT

*During the scan, the pelvis and leg must remain motionless.*

**Imaging Artifacts**

- Ensuring the patient is comfortable and relaxed is an important factor for achieving a motionless scan
- If metallic components are present in the pelvis or proximal femur, it may not be possible to obtain an image of significant quality to support a RIO® THA procedure
- Move metallic component away from scan region, if possible or use a metal suppression scan protocol

## 4. POST SCAN EXAMINATION

**Scan Region**

The physician and CT technologist should verify the following:

- Patient's orientation is correct
- Regions of interest in protocol are visible in dataset
- Image slice thickness resulted as required by the protocol
- Bone images in scan image are not degraded by metal-induced artifacts

## 5. DATASET TRANSFER

Archive all rendered images onto a single CD in DICOM 3 compatible format.

Include:

- Patient Name: (First and Last)
- Surgeon Name (Last)
- Operative Side (L,R or Bi)
- Gender (M or F)
- Date of Surgery xx/xx/xxxx

*Back to MSK Protocol Page*

# MAKO HIP SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Helical | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 | |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.5 | |
| Pitch | 1 | 1 | 1 | | Picth | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed | 19.37 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 200 | 200 | 200 | | Auto mA range | 100-500 | |
| kVp | 120-140 | 120-140 | 120-140 | | kVp | 120 | |
| ref kVp | | | | | Smart mA | On | |
| Optimize Slider position | | 3 | 3 | | Noise Index | 15 | |
| | | | | | ASIR | 40% | |
| **Pelvis and femur** | | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B30s Med smooth | | **Recon 1 Pelvis/Femur** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus | |
| SAFIRE/ADMIRE | 2 | 2 | 0 | | Window Width/ Level | 1500/450 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 0.625 | |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 | |
| | | | | | Type | Full | |
| **Knee** | | | | | ASIR | None | |
| Kernel | B70s Sharp | B70s Sharp | B40s Medium | | | | |
| Window | Osteo | Osteo | Osteo | | **Recon Knee** | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Algorithm | Bone Plus | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Window Width/ Level | 1500/450 | |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 1.25 | |
| | | | | | Slice Increment (mm) | 1.25 | |
| | | | | | Type | Full | |
| | | | | | ASIR | None | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# MY HIP/GOLDBERG-Revised-12/29/2023

CTDI: ≤25 mGy per acquisition

**PT Positioning:**

- Patient is supine iso-center in the gantry with anatomy of interest in true anatomical position
- Both legs must be in complete extension
- The feet have to be perpendicular to the table with the toes pointing straight up and secured so motion is prevented
- No sponge or pillow should be placed beneath the knees or ankles
- All scans must be performed in the same coordinate system

**Setup:** AP and lateral scouts from above the crest through the toes

**DFOV:** See Scan Parameters

**Scan Parameters:**

- Pelvis + Proximal femurs 50 cm DFOV
    - 2 cm above the iliac crests and extend to 15 cm below the lesser trochanter
- Knees 50 cm DFOV
    - Both femoral and tibial parts of the knee joint must be included in knee series.
    - Include atleast 5 cm of the distal femur and extend atleast 5cm past beginning of fibula
- Ankle 50 cm DFOV
    - Include atleast 5 cm of distal tibia and extend past the lateral malleolus

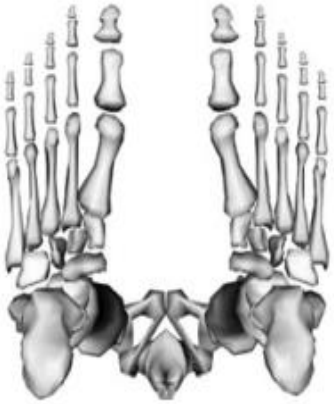
**PACS series in order as performed:**

- Topogram
- 1x1 Hip CD Data Set
- 1x1 Knee CD Data Set
- 1x1 Ankle CD Data Set
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

## 2. PATIENT POSITION

The patient must be in supine position at the isocenter in the gantry. The legs must be in complete extension. No sponge or pillow should be placed beneath the knee or ankle. The critical aspect is the position of the foot, which must be perpendicular to the table with the toe pointing straight up (see image below).



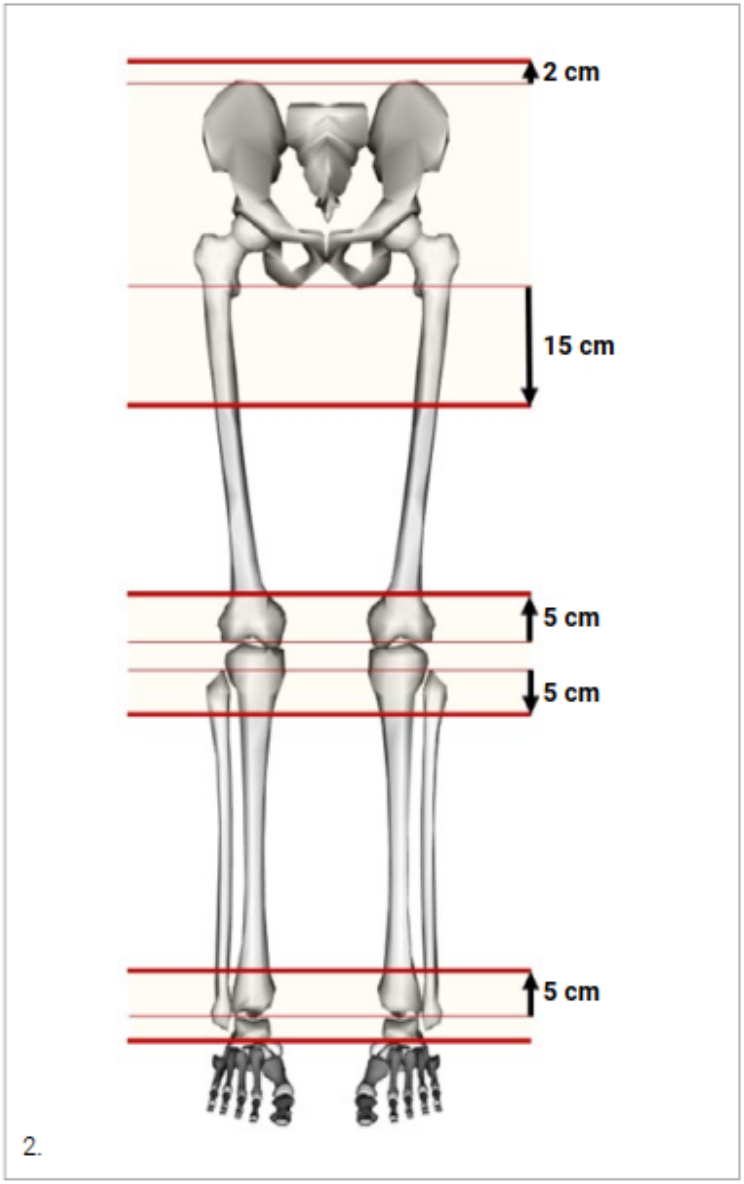
YES

NO

1.

It is important to secure the position of the foot to prevent motion and the consequent loss of accuracy when assessing and correcting any misalignment of the knee.

The following figure shows the accepted scan ranges:




2.

**PELVIS + PROXIMAL FEMURS**
The scan must start at least **2 cm** above the iliac crests and extend to **15 cm** below the lesser trochanter.

**KNEES**
Both femoral and tibial parts of the knee joint must be included in the knee series. The scan must include at least **5 cm** of the distal femur and must extend to at least **5 cm** past the beginning of the fibula.

**ANKLES**
The ankle series must include at least **5 cm** of the distal tibia and extend past the lateral malleolus.

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

## 3. IMAGE ACQUISITION

The acquisition consists of three (3) separate short **spiral axial scans**:

1. Both hips
2. Both knees
3. Both ankles

**The mandatory acquisition consists of the short spiral axial scan of both hips.** The knee and ankle series can be optionally added in order to obtain a complete evaluation. Please check with your surgeon the segments to scan.

All scans must be performed in the same coordinate system (frame of reference).

### TIP FOR GE USERS

If no protocol has been predefined between scan ranges select "Repeat series" to scan the next range. **Do not** select "Add a group".

### TIP FOR TOSHIBA USERS

Between scan ranges select "Quit series" and use original scout to scan the next range.



## 4. FIELD OF VIEW (FOV)

The **requested bone regions** must be captured completely as specified below:

- **Hip**: pelvis + proximal femur (left + right)
- **Knee**: distal femur, fibula, and proximal tibia contours (left + right)
- **Ankle**: medial and lateral malleolus (left + right)

### CAUTION

Metal parts in the FOV or in its proximity may produce artifacts that may lead to inaccurate and/or unsuccessful segmentation and landmark detection. If metallic artifacts occur, it is useful to apply a MAR (Metal Artifact Reduction) algorithm.

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# MY HIP/GOLDBERG SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | Axial | Axial | Axial | | Scan Type | Helical |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 0.95 | 0.95 | 0.8 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Eff mAs | 120 | | | | Auto mA range | 100-500 |
| kVp | 110 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 | 3 | | Noise Index | 15 |
| | | | | | ASIR | 40% |
| **Hip** | | | | | | |
| Kernel | B20s Smooth | B20s Smooth | B20s Smooth | | **Hip CD Data Set** | |
| Window | Osteo | Osteo | Extremity | | Algorithm | Standard |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 |
| | | | | | Type | Plus |
| **Knee** | | | | | ASIR | SS40 |
| Kernel | B20s Smooth | B20s Smooth | B20s Smooth | | | |
| Window | Osteo | Osteo | Extremity | | **Knee** | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Algorithm | Standard |
| Slice Thickness (mm) | 1 | 1 | 1 | | Window Width/ Level | 350/ 40 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 0.625 |
| | | | | | Slice Increment (mm) | 0.625 |
| **Ankle** | | | | | Type | Full |
| Kernel | B20s Smooth | B20s Smooth | B20s Smooth | | ASIR | None |
| Window | Osteo | Osteo | Extremity | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **Ankle** | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Algorithm | Standard |
| Slice Increment (mm) | 1 | 1 | 1 | | Window Width/ Level | 350/40 |
| | | | | | Slice Thickness (mm) | 1.25 |
| | | | | | Slice Increment (mm) | 1.25 |
| | | | | | Type | Full |
| | | | | | ASIR | None |
| | | | | | | |

c

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# FEMORAL ANTEVERSION-Revised-11/26-2012

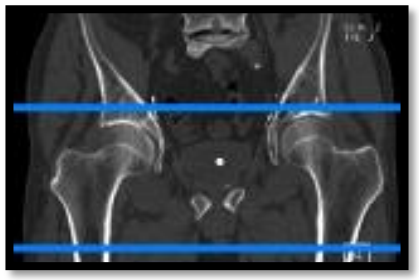
CTDI: ≤25 mGy per acquisition

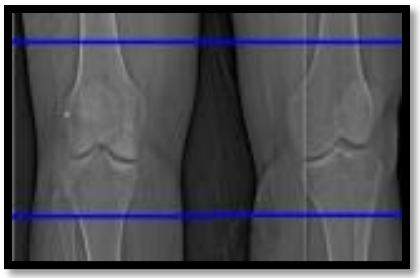
**PT Positioning:**

- Patient is supine feet first legs flat on table
- Tape feet together
- Tape knees if extra stability is needed
- No sponge or pillow should be placed beneath legs or feet

**Setup:** AP and lateral scouts from above the crest through the toes

**DFOV:** Appropriate for patient body habitus





## Scan Parameters:

- Hips
  - Above the femoral heads through the lesser trochanters
- Knees
  - Above the femoral physis through tops of tibia
- Ankles
  - Above the ankle syndesmosis through the talar domes

## PACS series in order as performed:

- Topogram
- 3x3 Bilateral Hip
- 3x3 Bilateral Knee
- 3x3 Bilateral Ankle
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

# FEMORAL ANTEVERSION SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | Axial | Axial | Axial | | Scan Type | Axial |
| Detector Configuration | 32 x 1.2 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.5 |
| Pitch | 0.95 | 0.95 | 0.8 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Eff mAs | 105 | | | | Auto mA range | 80-300 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 | 3 | | Noise Index | 15 |
| | | | | | ASIR | 50% |
| **Bilateral Hips** | | | | | | |
| Kernel | I30s Med Smooth | I30s Med Smooth | B20s Med Smooth | | **Bilateral Hips** | |
| Window | Mediastinum | Mediastinum | Extremity | | Algorithm | Standard |
| SAFIRE/ADMIRE | 2 | 2 | 0 | | Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 3 | 3 | 3 | | Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 3 | 3 | 3 | | Slice Increment (mm) | 2.5 |
| | | | | | Type | Full |
| **Bilateral Knees** | | | | | ASIR | 20 |
| Kernel | I30s Med Smooth | I30s Med Smooth | B20s Med Smooth | | | |
| Window | Mediastinum | Mediastinum | Extremity | | **Bilateral Knees** | |
| SAFIRE/ADMIRE | 2 | 2 | 0 | | Algorithm | Standard |
| Slice Thickness (mm) | 3 | 3 | 3 | | Window Width/ Level | 350/40 |
| Slice Increment (mm) | 3 | 3 | 3 | | Slice Thickness (mm) | 2.5 |
| | | | | | Slice Increment (mm) | 2.5 |
| **Bilateral Ankles** | | | | | Type | Full |
| Kernel | I30s Med Smooth | I30s Med Smooth | B20s Med Smooth | | ASIR | None |
| Window | Mediastinum | Mediastinum | Extremity | | | |
| SAFIRE/ADMIRE | 2 | 2 | 0 | | **Bilateral Ankles** | |
| Slice Thickness (mm) | 3 | 3 | 3 | | Algorithm | Standard |
| Slice Increment (mm) | 3 | 3 | 3 | | Window Width/ Level | 350/40 |
| | | | | | Slice Thickness (mm) | 2.5 |
| | | | | | Slice Increment (mm) | 2.5 |
| | | | | | Type | Full |
| | | | | | ASIR | None |
| | | | | | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

ARA DIAGNOSTIC IMAGING

# FOREARM MATERIALISE-Revised-8/25/2020

CTDI: ~20 mGy per acquisition

**PT Positioning/Setup :**

- Head first prone with both arms above head, palms in full supination
- If the above position is not achievable, please have patient position both arms so that the palms of the hands are facing each other
- If the patient is unable to lie prone, please have the patient lay supine with arms raised above the head
- No gantry tilt

**DFOV:** Using 110-120 kVp scan from above the elbow through the entire carpometacarpal joint

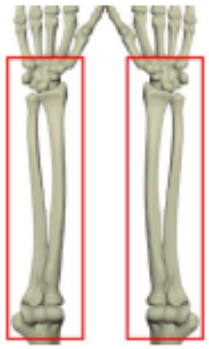
## PACS series in order as performed:

- Topogram
- 0.6 x 0.6 **Axial Bone CD DATA SET DFOV of 20 cm (Bilateral)
- 1 x 1 Axial RT forearm Bone/ST
- 1 x 1 Axial LT forearm Bone/ST
- 1 x1 Coronal RT forearm Bone/ST
- 1 x 1 Coronal LT forearm Bone/ST
- 1 x1 Sagittal RT forearm Bone/ST
- 1 x1 Sagittal LT forearm Bone/ST
- Patient Protocol/Dose Report

*Back to MSK Protocol Page*

"DEVIATIONS FROM THIS PROTOCOL MAY RESULT IN AN UNUSABLE SCAN AND DELAY OF SURGERY"

## Scanning Parameters

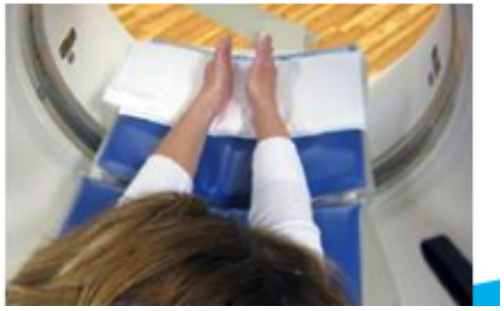


| | |
|---|---|
| Region of interest / Axial Scan | From the **elbow to the carpometacarpal joint** |
| | **Bilateral**- prefer a single acquisition; individual scans are acceptable |
| Collimation | Slice thickness: **0.625mm** or smaller |
| | Slice increment: **Contiguous** Slices |
| | **No** Gantry Tilt or Obliqueness or Oblique Reconstructions |
| kVp | 90-120 (higher for obese patients or metal hardware in scan region) |
| mAs | As given by the automatic system |
| Pitch | Use **1** or smaller |
| Field of View (FOV) | **200mm x 200mm** or smaller. Use the smallest FOV possible to capture the required bone regions. Capturing all of the soft tissue is unnecessary. |
| Matrix | Use a **512 x 512 matrix** |
| Kernel / Algorithm | Bone / Details |
| Table Position | Area to be scanned should be centered in the scan field. **DO NOT** raise or lower the CT table between slices, or alter the X or Y centering between scans. Center Points must be identical. |
| Reconstruction | **NO** secondary reconstructions, images must be scanned at the given parameters or smaller<br>**NO** reformatting into coronal or sagittal planes, no MPR's or 3D reconstructions |
| Data Anonymization | Do not erase patient name and ID- ensure necessary rights are obtained for transfer of data to Materialise. Data will be anonymized by Materialise after cross-check with prescription of the surgeon to ensure the images of the right patient are provided. |

**General Scan Requirements :**

- Remove any non-fixed metal prosthesis, jewelry, and zippers that might interfere with the region to be scanned.
- Make the patient comfortable and instruct him/her not to move during the procedure. If any movement is detected the patient will need to be rescanned as this will prevent the accurate development of the patient-specific model.
- **If possible, scan the forearms in the position of greatest deformity, with both limbs in as close to the same position as possible (ex. full supination to demonstrate subluxation of the radial head).** Otherwise, position the patient prone with arms in front of him/her and with palms facing each other in the neutral position. If this is not possible, position the patient in the supine position.
- Scan forearms with (both) arms above the head and the head out of the FOV, if possible. Make sure the patient's elbows are propped up, if needed, to allow for even scanning within the same plane. Place forearms as close together as possible to fit into the designated FOV. Scan each arm separately if both arms do not fit within the required FOV.

**Provide the complete data set of ONLY the raw/original/axial DICOM images. Lossy Compression is NOT allowed** (ISO_10918_1, ISO_14495_1, ISO_1544_1, or ISO_13818_1). Retain a permanent archive (PACS) copy of the RAW data of images (As scanned by the original parameters, uncompressed). We recommend building a "Materialise Forearm" in your CT scanner with the appropriate ranges & parameters.



**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# FOREARM MATERIALISE SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 32 x 0.6 | | Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 0.8 | 0.8 | 0.8 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 39.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 60 | 60 | 60 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| CD Data set BILAT | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Recon 1 CD Set | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone |
| SAFIRE/ADMIRE | | | | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Slice Thickness (mm) | 0.625 |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Slice Increment (mm) | 0.625 |
| ST right and ST left | | | | | Type | Plus |
| Kernel | I31s medsmooth | I31s medsmooth | I31s medsmooth | | | SS40 |
| Window | Mediastinum | Mediastinum | Mediastinum | | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Recon 2 Reformats | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Algorithm | Standard |
| Slice Increment (mm) | 1 | 1 | 1 | | Window Width/ Level | 450/ 35 |
| Bone RT/Bone LT | | | | | Slice Thickness (mm) | 0.625 |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Slice Increment (mm) | 0.625 |
| Window | Osteo | Osteo | Osteo | | ASIR | SS50 |
| SAFIRE/ADMIRE | | | | | | |
| Slice Thickness (mm) | 1 | 1 | 1 | | | |
| Slice Increment (mm) | 1 | 1 | 1 | | | |
| Coronal/Sagittal Bone | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | | |
| Window | Osteo | Osteo | Osteo | | | |
| SAFIRE/ADMIRE | | | | | | |
| Slice Thickness (mm) | 1 | 1 | 1 | | | |
| Slice Increment (mm) | 1 | 1 | 1 | | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# MY KNEE/GOLDBERG-Revised-11/10/2011

CTDI: ≤25 mGy per acquisition

**PT Positioning:**

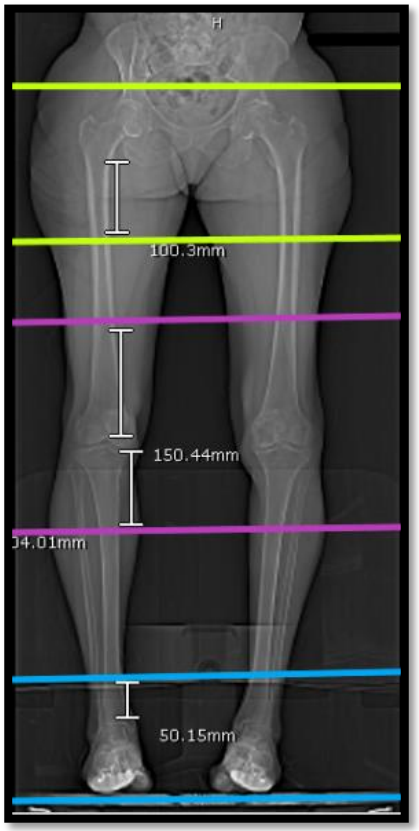
- Patient is supine iso-center in the gantry with anatomy of interest in true anatomical position
- Leg of interest must be in complete extension
- The foot has to be perpendicular to the table with the toes pointing straight up and secured so motion is prevented
- No sponge or pillow should be placed beneath the knee or ankle of interest
- If the patient presents with hardware in the contra-lateral leg it is crucial to try to move that leg out of the scan view by:
    - Place a pillow or sponge under the contra-lateral leg
    - Have the patient bend the contra-lateral knee so that the metal is as far away from the extremity of interest

**Setup:** AP and lateral scouts from above the crest through the toes

**DFOV:** See Scan Parameters

**Scan Parameters:**

- Hip 20-30 cm DFOV
    - Whole femoral head along with at least 10 cm of femur
- Affected Knee 20-25 cm DFOV
    - Scan must extend to at least 15 cm towards the hip and 10 cm towards the ankle
- Ankle 15-20 cm DFOV
    - Scan must include at least 5 cm of tibia and extend past the calcaneus




**PACS series in order as performed:**

- Topogram
- 1x1 Hip CD Data Set
- 0.6 x 0.6 Knee CD Data Set
- 1x1 Ankle CD Data Set
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# MY KNEE SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | Axial | Axial | Axial | | Scan Type | Helical |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 0.95 | 0.95 | 0.8 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Eff mAs | 120 | | | | Auto mA range | 100-500 |
| kVp | 110 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 | 3 | | Noise Index | 15 |
| | | | | | ASIR | 40% |
| **Hip** | | | | | | |
| Kernel | B20s Smooth | B20s Smooth | B20s Smooth | | **Hip CD Data Set** | |
| Window | Osteo | Osteo | Extremity | | Algorithm | Standard |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 |
| | | | | | Type | Plus |
| **Knee** | | | | | ASIR | SS40 |
| Kernel | B20s Smooth | B20s Smooth | B20s Smooth | | | |
| Window | Osteo | Osteo | Extremity | | **Knee** | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Algorithm | Standard |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Window Width/ Level | 350/ 40 |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Slice Thickness (mm) | 0.625 |
| | | | | | Slice Increment (mm) | 0.625 |
| **Ankle** | | | | | Type | Full |
| Kernel | B20s Smooth | B20s Smooth | B20s Smooth | | ASIR | None |
| Window | Osteo | Osteo | Extremity | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **Ankle** | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Algorithm | Standard |
| Slice Increment (mm) | 1 | 1 | 1 | | Window Width/ Level | 350/40 |
| | | | | | Slice Thickness (mm) | 1.25 |
| | | | | | Slice Increment (mm) | 1.25 |
| | | | | | Type | Full |
| | | | | | ASIR | None |
| | | | | | | |

c

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# CONFORMIS KNEE -Revised-3/09/2020

CTDI: ≤25 mGy per acquisition

**PT Positioning:**

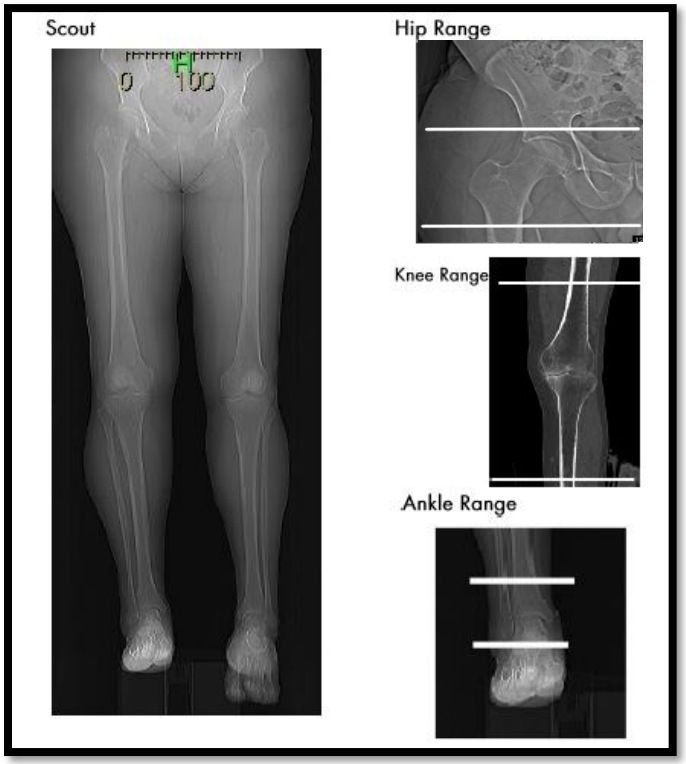
- Patient is supine iso-center in the gantry with anatomy of interest in true anatomical position
- Leg of interest must be in complete extension
- The foot has to be perpendicular to the table with the toes pointing straight up and secured so motion is prevented
- No sponge or pillow should be placed beneath the knee or ankle of interest
- If the patient presents with hardware in the contra-lateral leg it is crucial to try to move that leg out of the scan view by:
    - Place a pillow or sponge under the contra-lateral leg
    - Have the patient bend the contra-lateral knee so that the metal is as far away from the extremity of interest

**Setup:** AP and lateral scouts from above the crest through the toes

**DFOV:** See Scan Parameters

**Scan Parameters:**

- Hip 20-30 cm DFOV
    - Whole femoral head
- Affected Knee 20-25 cm DFOV
    - Scan must include at least 1/3 of the distal femur through 1/2 of proximal tibia
- Ankle 15-20 cm DFOV
    - Centered at the tibiotalor joint space the scan must include at least 2cm above the joint to 2 cm below




## PACS series in order as performed:

- Topogram
- 2 x 2 Hip
- 1 x 0.5 Knee
- 1 x 1 Knee Coronal/Sagittal
- 2 x 2 Ankle
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# CONFORMIS KNEE SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 0.6 | 0.6 | 0.5 | | Rotation Time (sec) | 0.8 |
| Pitch | 1 | 1 | 1 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Eff mAs | 60 | 60 | 60 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 140 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 | 3 | | Noise Index | 15 |
| | | | | | ASIR | 50% |
| **Hip** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B60f Sharp | | **Hip CD Set** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Standard |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Increment (mm) | 2.5 |
| | | | | | Type | Full |
| **Knee** | | | | | ASIR | None |
| Kernel | B70s Sharp | B70s Sharp | B60f Sharp | | | |
| Window | Osteo | Osteo | Osteo | | **Knee** | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Algorithm | Standard |
| Slice Thickness (mm) | 1 | 1 | 1 | | Window Width/ Level | 350/40 |
| Slice Increment (mm) | 1 | 1 | 0.5 | | Slice Thickness (mm) | 1.25 |
| | | | | | Slice Increment (mm) | 0.625 |
| **Ankle** | | | | | Type | Full |
| Kernel | B70s Sharp | B70s Sharp | B60f Sharp | | ASIR | None |
| Window | Osteo | Osteo | Osteo | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **Ankle** | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | Standard |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 350/40 |
| | | | | | Slice Thickness (mm) | 2.5 |
| | | | | | Slice Increment (mm) | 2.5 |
| | | | | | Type | Full |
| | | | | | ASIR | None |
| | | | | | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# KNEE:ZIMMER- BIOMET-IMPERIAL-Revised-9/10/2012

## CTDI: ≤25 mGy per acquisition

**PT Positioning:**

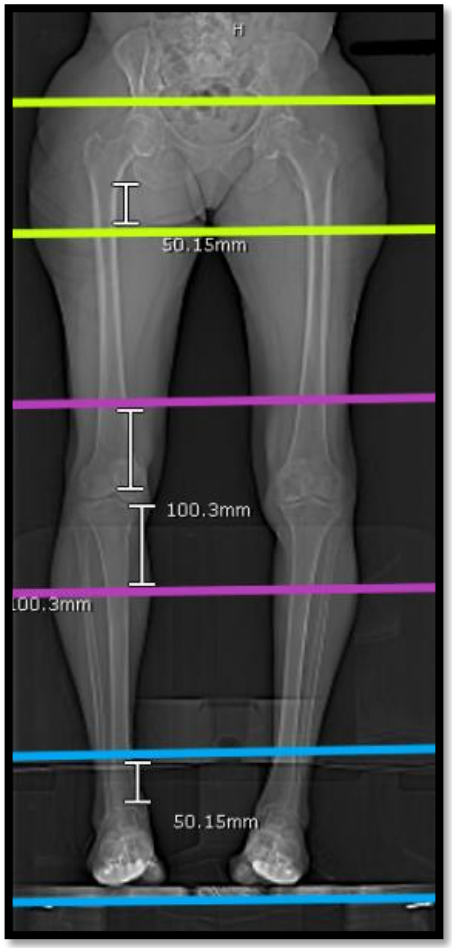
- Patient is supine iso-center in the gantry with anatomy of interest in true anatomical position
- Leg of interest must be in complete extension
- The foot has to be perpendicular to the table with the toes pointing straight up and secured so motion is prevented
- No sponge or pillow should be placed beneath the knee or ankle of interest
- If the patient presents with hardware in the contra-lateral leg it is crucial to try to move that leg out of the scan view by:
    - Place a pillow or sponge under the contra-lateral leg
    - Have the patient bend the contra-lateral knee so that the metal is as far away from the extremity of interest

**Setup:** AP and lateral scouts from above the crest through the toes

**DFOV:** See Scan Parameters

**Scan Parameters:**

- Hip 25-30 cm DFOV
    - Whole femoral head along with at least 5 cm of femur
- Affected Knee 20-25 cm DFOV
    - Scan must extend to at least 10 cm towards the hip and 10 cm towards the ankle
- Ankle 15-20 cm DFOV
    - Scan must include at least 5 cm of tibia and extend through the foot




**PACS series in order as performed:**

- Topogram
- 1x1 Hip CD Data Set
- 0.6 x 0.6 Knee CD Data Set
- 1x1 Ankle CD Data Set
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# KNEE: BIOMET-IMPERIAL SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 0.6 | 0.6 | 0.8 | | Rotation Time (sec) | 0.8 |
| Pitch | 1 | 1 | 1 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Eff mAs | 60 | 60 | 60 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 140 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 | 3 | | Noise Index | 15 |
| | | | | | ASIR | 50% |
| **Hip** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B20s Smooth | | **Hip** | |
| Window | Osteo | Osteo | Extremity | | Algorithm | Standard |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 |
| | | | | | Type | Full |
| **Knee** | | | | | ASIR | None |
| Kernel | B70s Sharp | B70s Sharp | B20s Smooth | | | |
| Window | Osteo | Osteo | Extremity | | **Knee** | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Algorithm | Standard |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Window Width/ Level | 350/40 |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Slice Thickness (mm) | 0.625 |
| | | | | | Slice Increment (mm) | 0.625 |
| **Ankle** | | | | | Type | Full |
| Kernel | B70s Sharp | B70s Sharp | B20s Smooth | | ASIR | None |
| Window | Osteo | Osteo | Extremity | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **Ankle** | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Algorithm | Standard |
| Slice Increment (mm) | 1 | 1 | 1 | | Window Width/ Level | 350/40 |
| | | | | | Slice Thickness (mm) | 1.25 |
| | | | | | Slice Increment (mm) | 1.25 |
| | | | | | Type | Full |
| | | | | | ASIR | None |
| | | | | | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# MAKO KNEE - Revised- 9/14/2022

Kyle, MID, RCP, SM, WP ONLY

CTDI: ≤25 mGy per acquisition

****SEE ATTACHED FORMS****

**PT Preparation:**

- **Supine, feet first with foot secured in an upright position with a rolled towel/blanket wrapped around bottom of the foot to secure the ankle *see image below**
- **Elevate the knee of the patient slightly with a rolled towel or blanket**
- **Wrap the Velcro strap one complete revolution around the rod as shown *see image below Do this for both Velcro straps, one at the hip position and one at the ankle *see image below**
- **Set the motion rod on the patient to pass from just proximal of hip center to distal of ankle center**
- **Adjust femoral and tibial straps to secure the rod**
- **Verify the rod is in both anterior/posterior and medial/lateral field of view for all scan regions**
- **Ensure patient is comfortable and relaxed**
- **If metallic components are present in non-operative leg, attempt to isolate the non-operative leg from scan region.**
- **If metallic components are present in operative leg, it may not be possible to obtain an image of quality to support the MAKO procedure.**

**Setup:** PA/Lateral scout from above the iliac crest through the foot

**Scan Parameters:**

1. **Hip**
   to include the entire femoral head and motion rod. Center around the femoral head.
   - DFOV 500 mm
   - kV 120-140
   - mA 200-400mA *Auto Exposure Control if available
   - Pitch 1
   - Slice of 2 mm x 2 mm (no gap/overlap)
   - Bone Algorithm
2. **Knee**
   with a scan region of a minimum of 10cm above and 10cm 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.
   - DFOV 250 mm
   - kV 120-140
   - mA 200-400mA *Auto Exposure Control if available
   - Pitch 1
   - Slice of 0.6 mm x 0.6 mm (no gap/overlap)
   - Bone Algorithm

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

3. **Ankle**

to include the medial and lateral malleoli and motion rod. Center around the ankle joint.

- DFOV 500 mm
- kV 120-140
- mA 200-400mA *Auto Exposure Control if available
- Pitch 1
- Slice of 2 mm x 2 mm (no gap/overlap)
- Bone Algorithm

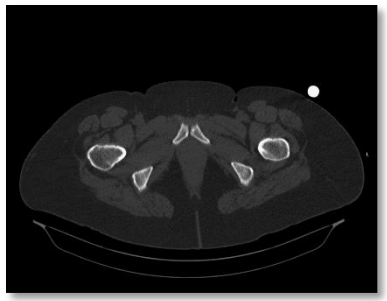
**Reconstructions:**

- Hip CD Data Set, Hip Coronal, Hip Sagittal
- Knee CD Data Set, Knee Coronal, Knee Sagittal
- Ankle CD Data Set, Ankle Coronal, Ankle Sagittal

**PACS Series:**

- Pelvis/Hip CD Data Set, Hip Coronal, Hip Sagittal, Knee CD Data Set, Knee Coronal, Knee Sagittal, Ankle CD Data Set, Ankle Coronal, Ankle Sagittal

******SEE ATTACHED FORMS******



A few examples of rod placement on different body habitus.

Anterior on the hip so the rod doesn't get cut off on axials, angled down to the ankle, but all the way through the foot

*Back to MSK Protocol Page*

## 1. KNEE SCAN PARAMETERS

| | |
|---|---|
| **Position/Landmark** | Supine, Feet First |
| **Topogram (Scout) Direction** | Cranio-Caudal. AP and Lateral scout |
| **kVp**<br>**mA (*if available)**<br>**Pitch** | 120-140kV (recommended 120 kVp)<br>Auto Exposure Control* (200-400 mA)<br>1:1 (no gaps) |
| **Helical Set**<br>Slice Thickness, Spacing, Algorithm | **Region** — **Thickness** — **Spacing** — **Algorithm**<br>Hip — 2-5 mm — 2-5 mm — Bone<br>Knee — 0.5-1 mm — 0.5-1 mm — Bone<br>Ankle — 2-5 mm — 2-5 mm — Bone |
| **Image Resolution Matrix** | 512 x 512 Matrix: Image must be a square |
| **DFOV** | Hip=500 mm, Knee=250 mm, Ankle=500 mm<br>Do not exceed limits. |
| **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. |

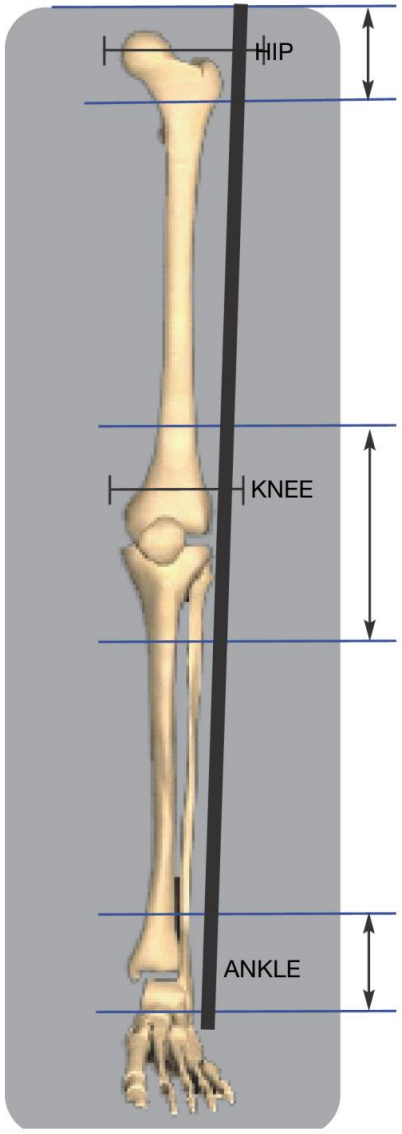



*Figure. 1. Scan Location and Characteristics*

*Back to MSK Protocol Page*

*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality

## 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.

*Figure 2.*

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.

*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.*

*Figure 3.*

## 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.

*Back to MSK Protocol Page*

# MAKO KNEE SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 |
|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 |
| Rotation Time (sec) | 1 | 1 | 1 |
| Pitch | 1 | 1 | 1 |
| Scan FOV | Large | Large | Large |
| CareDose4D | On | On | On |
| Quality ref mAs | 200 | 200 | 200 |
| kVp | 120-140 | 120-140 | 120-140 |
| ref kVp | | | |
| Optimize Slider position | | 3 | 3 |
| | | | |
| **Hip** | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp |
| Window | Osteo | Osteo | Osteo |
| SAFIRE/ADMIRE | 0 | 0 | 0 |
| Slice Thickness (mm) | 2 | 2 | 2 |
| Slice Increment (mm) | 2 | 2 | 2 |
| | | | |
| **Knee** | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp |
| Window | Osteo | Osteo | Osteo |
| SAFIRE/ADMIRE | 0 | 0 | 0 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 |
| | | | |
| **Ankle** | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp |
| Window | Osteo | Osteo | Osteo |
| SAFIRE/ADMIRE | 0 | 0 | 0 |
| Slice Thickness (mm) | 2 | 2 | 2 |
| Slice Increment (mm) | 2 | 2 | 2 |

| Scanner | Optima 660 |
|---|---|
| Scan Type | Spiral |
| Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 0.8 |
| Pitch | 0.984:1 |
| Speed (mm/rot) | 39.37 |
| Scan FOV | Large Body |
| Auto mA range | 100-500 |
| kVp | 120 |
| Smart mA | On |
| Noise Index | 15 |
| ASIR | 50% |
| | |
| **Hip** | |
| Algorithm | Standard |
| Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 2.5 |
| Type | Full |
| ASIR | None |
| | |
| **Knee** | |
| Algorithm | Standard |
| Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 0.625 |
| Slice Increment (mm) | 0.625 |
| Type | Full |
| ASIR | None |
| | |
| **Ankle** | |
| Algorithm | Standard |
| Window Width/ Level | 350/40 |
| Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 2.5 |
| Type | Full |
| ASIR | None |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# PROPHECY IN-BONE -Revised-5/13-2021

CTDI: ≤25 mGy per acquisition

Used for Wright Medical Prophecy In-Bone Evaluation Only

**PT Positioning:**

- Patient must be in the supine position and as close to iso-enter as possible in the gantry
- Leg of interest must be in complete extension in true anatomical position
- Foot perpendicular to the table, toes pointing straight up on the footboard, secured so motion is prevented
- No sponge or pillow should be used beneath the knee or ankle of interest
- If the patient presents with hardware in the contra-lateral leg, it is crucial to try to move that leg out of the scan field
    - Place a pillow or sponge beneath the contra-lateral leg
    - Have the patient bend the contra-lateral leg so metal is a far away from the extremity of interest
- Please contact a Lead CT Tech or Tech II for exam/image approval before the patient gets off the table or moves

**Setup:** Long scout, PA/Lateral from mid femur thru entire foot

**Scan Parameters:**

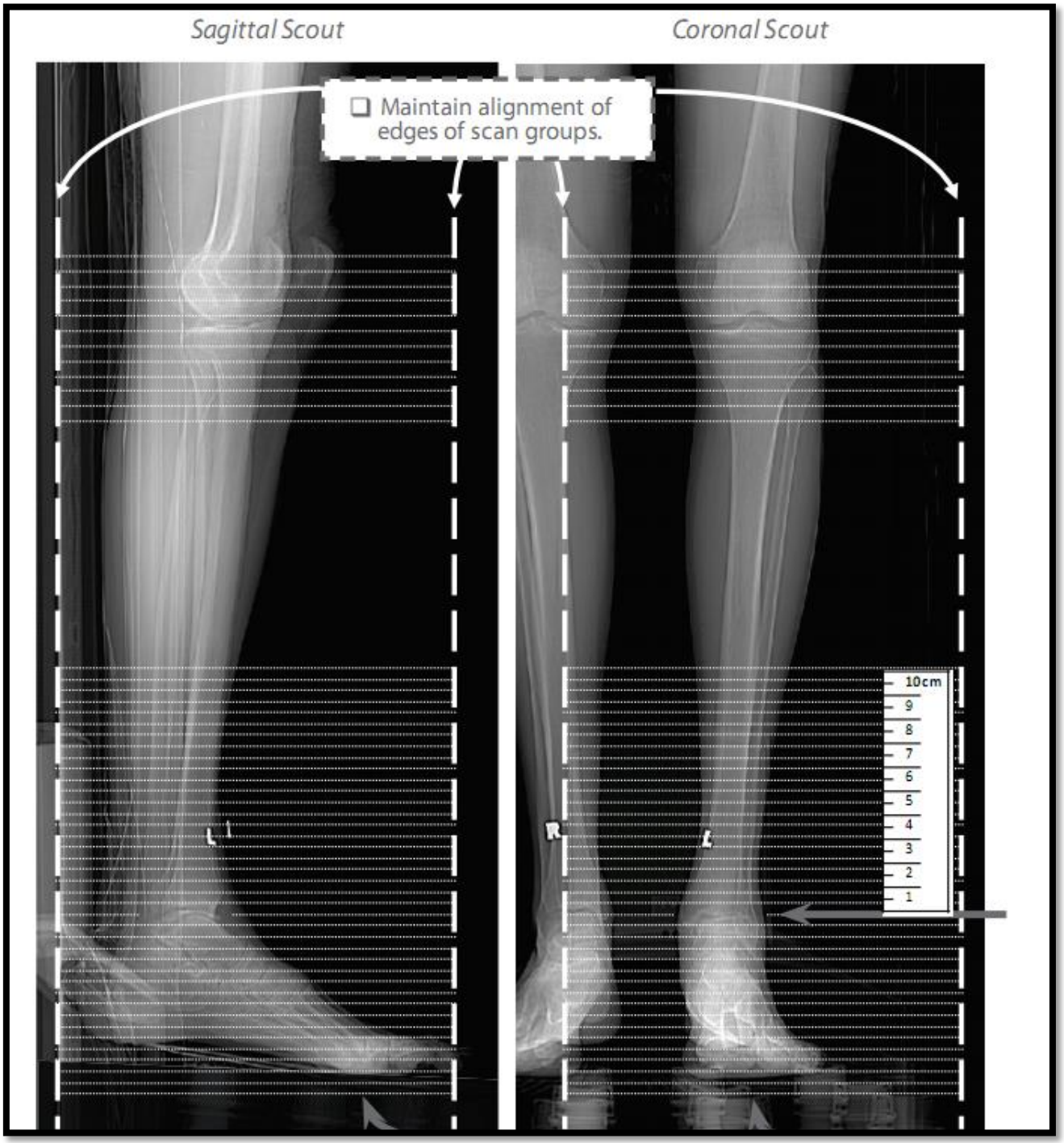
- Scans mush maintain the same X and Y coordinates and the same DFOV for both axial scans ~28-40cm DFOV
- Affected Knee
    - Scan must extend to at least 5 centimeters towards the hip and 5 centimeters towards the ankle
- Affected Ankle
    - Scan must include at least 10 centimeters of the tibia (measuring from the top of the ankle joint) and extend past the bottom of the entire foot to include the toes (see image below)

## PACS series in order as performed:

- Topogram
- LT or RT Knee CD Data Set
- LT or RT Knee Coronal/Sagittal
- LT or RT Ankle CD Data Set
- LT or RT Ankle Coronal/Sagittal
- Patient Protocol/Dose Report

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*




*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality

# PROPHECY IN-BONE SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Helical | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 | |
| Rotation Time (sec) | 0.6 | 0.6 | 0.5 | | Rotation Time (sec) | 0.5 | |
| Pitch | 1 | 1 | 1 | | Pitch | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.625 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 60 | 60 | 60 | | Auto mA range | 100-500 | |
| kVp | 10 | | | | kVp | 120 | |
| ref kVp | | 120 | 120 | | Smart mA | On | |
| Optimize Slider position | | 3 | 3 | | Noise Index | 15 | |
| | | | | | ASIR | 50% | |
| | | | | | | | |
| **Knee** | | | | | **Knee CD** | | |
| Kernel | B70s Sharp | B70s Sharp | B60f Sharp | | Algorithm | Bone Plus | |
| Window | Osteo | Osteo | Osteo | | Window Width/ Level | 1500/450 | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Thickness (mm) | 1.25 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 | |
| Slice Increment (mm) | 1 | 1 | 1 | | Type | Full | |
| | | | | | ASIR | None | |
| **Ankle** | | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70f Very Sharp | | **Knee Reformat** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 0.625 | |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 | |
| | | | | | Type | Full | |
| | | | | | ASIR | None | |
| | | | | | | | |
| | | | | | **Ankle CD** | | |
| | | | | | Algorithm | Bone Plus | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# LEG LENGTH- Revised- 03/25/2014

CT Leg Length is only performed on patients 2 yrs. of age and older

## Patient Positioning:

Patient positioned so that both ankle mortises are clearly visible

## Setup:

AP Topogram acquired from above the iliac crests through bottom of the feet (Cranial Caudal)

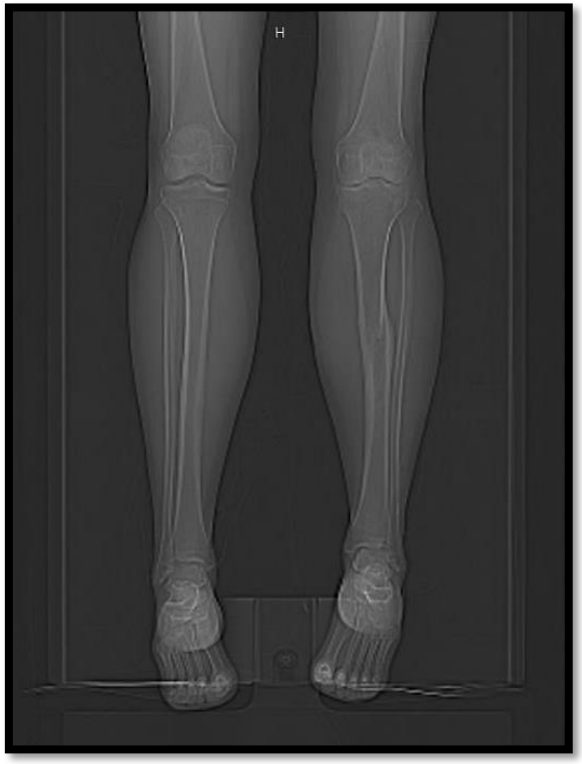
Lateral Topogram acquired from below the bottom of feet through the iliac crests (caudal cranial)

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

AP Topogram acquired from above the iliac crests through the bottom of the knees

AP Topogram acquired from above the knees through the bottom of the feet



*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

ARA DIAGNOSTIC IMAGING

# BONY PELVIS-Revised-3/08/2021

CTDI: ~10-20 mGy per acquisition

**PT Positioning:** Place anatomy of interest in true anatomical position ; Turn patient's feet inward so that the feet are pointing toward each other *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above the iliac crest through the symphysis pubis

**DFOV:** Appropriate for patient's body habitus. Use same DFOV as prior exam when available

## Scan Parameters:

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @3ml/sec
  - 50 second delay
- Scan from above the iliac crest through the ischial tuberosities

## PACS series in order as performed:

- Topogram
- 2x2 Axial bone
- 2x2 Axial Soft Tissue
- 2x2 Coronal/Sagittal Bone
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# BONY PELVIS SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | Spiral | Spiral | Spiral | | Scan Type | Spiral | |
| Detector Configuration | 32 x 1.2 | 32 x 1.2 | 16 x 1.2 | | Detector Coverage (mm) | 20 | |
| Rotation Time (sec) | 1 | 1 | 0.5 | | Rotation Time (sec) | 0.8 | |
| Pitch | 0.95 | 0.95 | 1 | | Pitch | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 105 | 105 | 105 | | Auto mA range | 100-500 | |
| kVp | 130 | | | | kVp | 120 | |
| ref kVp | | 140 | 140 | | Smart mA | On | |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 | |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% | |
| | | | | | | | |
| **Recon 1 Bone** | | | | | **Bone** | | |
| Kernel | B70s Sharp | B70s Sharp | B70f Very Sharp | | Algorithm | Bone | |
| Window | Osteo | Osteo | Osteo | | Window Width/ Level | 1500/450 | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Thickness (mm) | 2.5 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Slice Increment (mm) | 2.5 | |
| Slice Increment (mm) | 2 | 2 | 2 | | Type | Full | |
| | | | | | ASIR | None | |
| **Soft Tissue** | | | | | | | |
| Kernel | I31s Med Smooth | I31s Med Smooth | I41f Medium | | **ST Axial** | | |
| Window | Mediastinum | Mediastinum | Pelvis | | Algorithm | Standard | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Window Width/ Level | 450/ 35 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 2.5 | |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Increment (mm) | 2.5 | |
| | | | | | Type | None | |
| **Coronal/ Sagittal** | | | | | ASIR | SS50 | |
| Kernel | B70s Sharp | B70s Sharp | B70f Very Sharp | | | | |
| Window | Osteo | Osteo | Osteo | | **Bone Reformats** | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Algorithm | Bone Plus | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Window Width/ Level | 1500/450 | |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 0.625 | |
| | | | | | Slice Increment (mm) | 0.625 | |
| | | | | | Type | Plus | |
| | | | | | ASIR | None | |
| | | | | | | | |
| | | | | | **ST Reformats** | | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

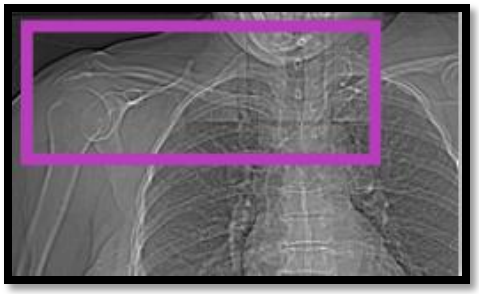
# CLAVICLE -Revised-9/12/2022

CTDI: ~20 mGy per acquisition

**PT Positioning:** Place anatomy of interest in true anatomical position, both arms positioned at patients side with both humerus supported to lie parallel to the table with palm supinated *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above to below the clavicle

**DFOV:** Appropriate for patient's body habitus ; Use same DFOV as prior exam when available



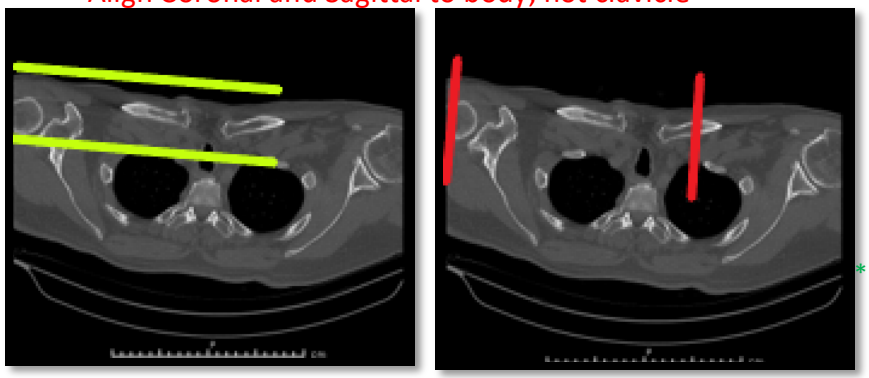
## Scan Parameters:

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @ 3ml/sec
  - 45 second delay
- Scan from above the above the clavicle through the both sterno-clavicular joints and acromioclavicular joint
- Scan to be obtained during breath hold

## PACS series in order as performed:

- Topogram
- 1x1 Axial Bone
- 1x1 Axial Soft Tissue
- 1x1 Coronal Bone
- 1x1 Coronal Soft Tissue
- 1x1 Sagittal bone only
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

Align Coronal and Sagittal to body, not clavicle



*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# CLAVICLE SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 | |
| Rotation Time (sec) | 1.5 | 1.5 | 1 | | Rotation Time (sec) | 0.8 | |
| Pitch | 1.3 | 1.3 | 0.8 | | Pitch | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 120 | 120 | 120 | | Auto mA range | 100-500 | |
| kVp | 130 | | | | kVp | 120 | |
| ref kVp | | 120 | 120 | | Smart mA | On | |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 20 | |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% | |
| **Recon 1 Bone Axial** | | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | **Bone Axial** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 1.25 | |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 | |
| **Recon 2 ST** | | | | | Type | Full | |
| Kernel | I31s medsmooth | I31s medsmooth | I31s medsmooth | | ASIR | None | |
| Window | Shoulder | Shoulder | Shoulder | | | | |
| SAFIRE/ADMIRE | 3 | 3 | 2 | | **Recon 2 Reformats** | | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Algorithm | Bone | |
| Slice Increment (mm) | 1 | 1 | 1 | | Window Width/ Level | 1500/450 | |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 0.625 | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | Slice Increment (mm) | 0.625 | |
| Window | Osteo | Osteo | Osteo | | Type | Full | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | ASIR | None | |
| Slice Thickness (mm) | 1 | 1 | 1 | | | | |
| Slice Increment (mm) | 1 | 1 | 1 | | **ST** | | |
| **Coronal ST** | | | | | Algorithm | Standard | |
| Kernel | I31s medsmooth | I31s medsmooth | I31s medsmooth | | Window Width/ Level | 350/45 | |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 | |
| SAFIRE/ADMIRE | 3 | 3 | 2 | | Slice Increment (mm) | 1.25 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Type | Full | |
| Slice Increment (mm) | 1 | 1 | 1 | | ASIR | SS20 | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER ROUTINE-Revised-9/16/2022

CTDI: ~25 mGy per acquisition

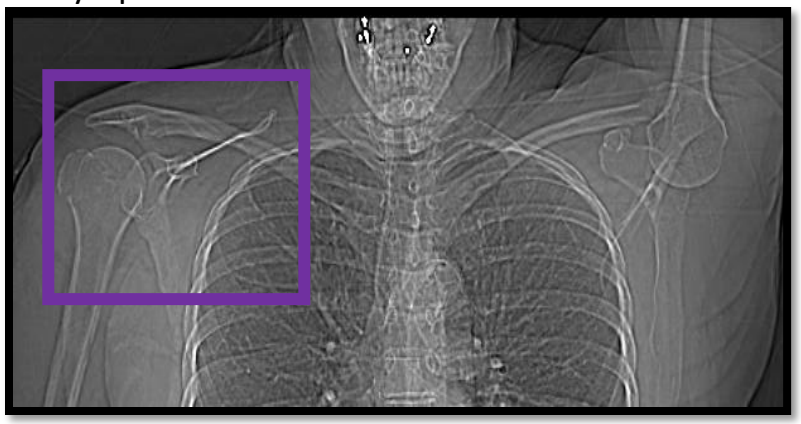
**PT Positioning:** Patient in true anatomical position, humerus supported to lie parallel to the table and palm supinated, opposite arm raised above head

**Setup:** AP and lateral scouts from above the clavicle through the area of interest

**DFOV:** 18cm

## Scan Parameters Routine Shoulder:

- IV Contrast**:** IV access to be obtained in arm contra-lateral to patient's symptoms
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @ 3ml/sec
  - 45 second delay
- Scan from above the clavicle through the area of interest during breath hold



## PACS series in order as performed:

- Topogram
- 2x2 Axial bone/soft tissue
- 2x2 Coronal/Sagittal Bone
- 2x2 Coronal/Sagittal ST
- 3D Images (if needed)
- Dose report and/or Patient Protocol Page

**Alignment for true Coronal and Sagittal Planes**


*Back to MSK Protocol Page*

*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 | |
| Rotation Time (sec) | 1.5 | 1.5 | 1 | | Rotation Time (sec) | 1 | |
| Pitch | 1 | 0.6 | 0.8 | | Pitch | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 120 | 120 | 120 | | Auto mA range | 100-500 | |
| kVp | 130 | | | | kVp | 120 | |
| ref kVp | | 120 | 120 | | Smart mA | On | |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 | |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% | |
| **Recon 1 Bone Axial** | | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | **Shoulder** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Standard | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 300/35 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 2.5 | |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Increment (mm) | 2.5 | |
| **Recon 2 ST** | | | | | Type | Full | |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | ASIR | SS10 | |
| Window | Shoulder | Shoulder | Shoulder | | | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | **Bone** | | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | Bone Plus | |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 1500/450 | |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 2.5 | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | Slice Increment (mm) | 2.5 | |
| Window | Osteo | Osteo | Osteo | | Type | Full | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | ASIR | None | |
| Slice Thickness (mm) | 2 | 2 | 2 | | | | |
| Slice Increment (mm) | 2 | 2 | 2 | | **Bone Reformats** | | |
| **Coronal ST** | | | | | Algorithm | Bone Plus | |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | Window Width/ Level | 1500/450 | |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 0.625 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full | |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | None | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER: ARTHREX VIP OR ACTIVATE MATCH POINT/DJO-Revised-10/14/2019

CTDI: ≤25 mGy per acquisition

**PT Positioning:** Patient is supine with humerus along the trunk of the scan table, opposite arm raised, No gantry tilt

**Setup:** AP and lateral scouts from above the clavicle through the scapula

**DFOV:** 20-25cm for the CD Data Set, 18cm for other recons

## Scan Parameters:

- 130-140 kVP
- Scan from above the clavicle though the entire scapula during breath hold

## PACS series in order as performed:

- Topogram
- DFOV 20-25cm ; 0.6 x 0.6 Axial ST CD Data Set
- DFOV 18 cm ; 2x2 Axial Bone
- DFOV 18 cm ; 2x2 Axial ST
- DFOV 18 cm ; 2x2 Coronal Bone
- DFOV 18 cm ; 2x2 Sagittal Bone
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ARTHREX VIP OR ACTIVATE MATCH POINT/DJO SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 | |
| Rotation Time (sec) | 1.5 | 1.5 | 1 | | Rotation Time (sec) | 0.8 | |
| Pitch | 1 | 0.6 | 0.8 | | Pitch | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 120 | 120 | 120 | | Auto mA range | 100-500 | |
| kVp | 130 | | | | kVp | 140 | |
| ref kVp | | 120 | 120 | | Smart mA | On | |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 | |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% | |
| **CD Data Set** | | | | | | | |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | **Bone** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus | |
| SAFIRE/ADMIRE | 2 | 2 | 0 | | Window Width/ Level | 1500/450 | |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Slice Thickness (mm) | 2.5 | |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Slice Increment (mm) | 2.5 | |
| **Shoulder Bone** | | | | | Type | Full | |
| Kernel | B80s Sharp | B80s Sharp | B70s Very Sharp | | ASIR | SS40 | |
| Window | Shoulder | Shoulder | Shoulder | | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **ST** | | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | Standard | |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 450/35 | |
| **ST Axial** | | | | | Slice Thickness (mm) | 2.5 | |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | Slice Increment (mm) | 2.5 | |
| Window | Shoulder | Shoulder | Shoulder | | Type | Plus | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | ASIR | None | |
| Slice Thickness (mm) | 2 | 2 | 2 | | | | |
| Slice Increment (mm) | 2 | 2 | 2 | | **CD Set** | | |
| **Coronal/Sagittal Bone** | | | | | Algorithm | Standard | |
| Kernel | B80s Sharp | B80s Sharp | B70s Very Sharp | | Window Width/ Level | 450/35 | |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 0.625 | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Increment (mm) | 0.625 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Plus | |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | None | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER: BLUEPRINT TOURNIER-Revised-1/17/2020

CTDI: ≤25 mGy per acquisition

**PT Positioning:** Patient is supine with humerus along the trunk of the scan table, opposite arm raised, No gantry tilt

**Setup:** AP and lateral scouts from above the clavicle through the scapula

**DFOV:** 25cm for the CD Data Set, 18cm for other recons

## Scan Parameters:

- 130-140 kVP
- Scan from above the clavicle though the entire scapula during breath hold

## PACS series in order as performed:

- Topogram
- DFOV 25cm ; 1x0.6 Axial Bone CD Data Set
- DFOV 18 cm ; 2x2 Axial Bone
- DFOV 18 cm ; 2x2 Axial ST
- DFOV 18 cm ; 2x2 Coronal Bone
- DFOV 18 cm ; 2x2 Sagittal Bone/ST
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# BLUEPRINT SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral |
| Detector Configuration | 32 x 0.6 | 40 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1.5 | 0.5 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 1 | 0.6 | 0.8 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 120 | 50 | 120 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 140 |
| ref kVp | | 120 | 140 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 20 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 30% |
| **CD Data Set** | | | | | | |
| Kernel | B31s Med Smooth | B31s Med Smooth | B70s Very Sharp | | **Bone** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone |
| SAFIRE/ADMIRE | 2 | 2 | 0 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 1 | 1 | 0.6 | | Slice Increment (mm) | 2.5 |
| **Shoulder Bone/Cor/Sag** | | | | | Type | Full |
| Kernel | B80s Very Sharp | B80s Very Sharp | B70s Very Sharp | | ASIR | SS40 |
| Window | Osteo | Osteo | Osteo | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **ST** | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | Standard |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 350/40 |
| **ST Axial** | | | | | Slice Thickness (mm) | 2.5 |
| Kernel | B31s Med Smooth | B31s Med Smooth | I31s Med Smooth | | Slice Increment (mm) | 2.5 |
| Window | Shoulder | Shoulder | Shoulder | | Type | Full |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | ASIR | SS40 |
| Slice Thickness (mm) | 2 | 2 | 2 | | | |
| Slice Increment (mm) | 2 | 2 | 2 | | **Bone Reformat/CD Data Set** | |
| **Sagittal ST** | | | | | Algorithm | Bone |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | Window Width/ Level | 1500/450 |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 0.625 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | None |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER: EXACTECH GPS-Revised-6/19/2018

CTDI: ≤25 mGy per acquisition

**PT Positioning:** Patient is supine with humerus along the trunk of the scan table, opposite arm raised, No gantry tilt

**Setup:** AP and lateral scouts from above the clavicle through the scapula

**DFOV:** 25cm for the CD Data Set, 18cm for other recons

## Scan Parameters:

- 130-140 kVP
- Scan from above the clavicle though the entire scapula during breath hold

## PACS series in order as performed:

- Topogram
- DFOV 25 cm; 1x1 Axial Bone CD Data Set
- DFOV 18 cm; 1x1 Axial Bone
- DFOV 18 cm; 1x1 Axial ST
- DFOV 18 cm; 1x1 Coronal Bone
- DFOV 18 cm; 1x1 Sagittal Bone
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# CT-Scan Acquisition Protocol
for Exactech GPS Shoulder Application

Pre-requisites for the CT scan examination:

Date
- CT exam should be performed **less than 6 months** prior to the surgery.

Format
- DICOM Format
- Modality = '**CT**'
- Hounsfield encoding
- Uncompressed images
- Non-encrypted and non-anonymized images (*patient sex and birthdate can be fake but must be present*)

Resolution
- Pixels are square and constant for all the images
  - The minimal resolution for an image is 0.3 x 0.3 mm/pixel (i.e. 512 pixels represent at least 154 mm)
  - **The maximal resolution for an image is 0.8 x 0.8 mm/pixel** (i.e. 512 pixels represent no more than 410 mm)
- The interspace distance between consecutive slices is constant for the whole exam.
  - Minimum distance: 0.3 mm
  - **Maximum distance : 1 mm**
- The CT-scan images are pure **axial** slices (gantry tilt = 0°)


Dimension
- The examination includes the entire scapula, complete to medial border and distal tip:

Recommendations
- The CT-scan will typically contain between 200 and 450 images.
- The patient must not move during the exam.
- Injectable contrast must not be used, as it can occlude imaging and reconstruction of the CT scan.
- Recommendation for machine settings: kilo volt peak (KVP) >= 120
- Exam can be rejected if images quality is altered. This can be caused by:
  - Patient motion during examination
  - Metallic artifacts

The CT-scan must be stored on a CD-ROM or a USB stick.

**INFORMATION**

ExactechGPS was CE approved in 2010. Total Shoulder Arthroplasty application was CE approved in 2016. CE 0459
For additional product information, please contact:

Manufacturer:
Blue Ortho
6 Allée de Bethléem
38610 Gières – FRANCE
e-mail: service@blue-ortho.com



**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# EXACTECH GPS SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 |
|---|---|---|---|
| Scan Type | spiral | spiral | spiral |
| Detector Configuration | 32 x 0.6 | 40 x 0.6 | 64 x 0.6 |
| Rotation Time (sec) | 1.5 | 0.5 | 1 |
| Pitch | 1 | 0.6 | 0.8 |
| Scan FOV | Large | Large | Large |
| CareDose4D | On | On | On |
| Quality ref mAs | 120 | 50 | 50 |
| kVp | 130 | | |
| ref kVp | | 120 | 140 |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast |
| | | | |
| **CD Data Set** | | | |
| Kernel | I31s Med Smooth | I31s Med Smooth | B70s Very Sharp |
| Window | Osteo | Osteo | Osteo |
| SAFIRE/ADMIRE | 2 | 2 | 0 |
| Slice Thickness (mm) | 1 | 1 | 1 |
| Slice Increment (mm) | 1 | 1 | 0.75 |
| | | | |
| **Soft Tissue** | | | |
| Kernel | I31s Med Smooth | I31s Med Smooth | I31s Med Smooth |
| Window | Shoulder | Shoulder | Shoulder |
| SAFIRE/ADMIRE | 2 | 2 | 2 |
| Slice Thickness (mm) | 1 | 1 | 1 |
| Slice Increment (mm) | 1 | 1 | 1 |
| | | | |
| **Bone/Cor/Sag** | | | |
| Kernel | B80s Very Sharp | B80s Very Sharp | B70s Very Sharp |
| Window | Osteo | Osteo | Osteo |
| SAFIRE/ADMIRE | 0 | 0 | 0 |
| Slice Thickness (mm) | 1 | 1 | 1 |
| Slice Increment (mm) | 1 | 1 | 1 |

| Scanner | Optima 660 |
|---|---|
| Scan Type | spiral |
| Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 0.8 |
| Pitch | 0.984:1 |
| Speed (mm/rot) | 19.37 |
| Scan FOV | Large Body |
| Auto mA range | 100-350 |
| kVp | 140 |
| Smart mA | On |
| Noise Index | 20 |
| ASIR | 30% |
| | |
| **Bone** | |
| Algorithm | Bone Plus |
| Window Width/ Level | 1500/ 450 |
| Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 1.25 |
| Type | Full |
| ASIR | SS40 |
| | |
| **Recon 2 ST** | |
| Algorithm | Standard |
| Window Width/ Level | 350/ 45 |
| Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 1.25 |
| Type | Full |
| ASIR | SS40 |
| | |
| **CD Data Set** | |
| Algorithm | Bone |
| Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 1.25 |
| Type | Full |
| ASIR | None |
| | |
| **ST Reformat** | |
| Algorithm | Standard |
| Window Width/ Level | 400/40 |
| Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 0.75 |
| Type | Full |
| ASIR | SS40 |
| | |
| **Bone reformat** | |
| Algorithm | Bone Plus |
| Window Width/ Level | 1500/ 450 |
| Slice Thickness (mm) | 1.25 |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER: MATERIALISE TRUSIGHT-Revised-10/10/2019

CTDI: ≤25 mGy per acquisition

**Setup:** AP and lateral scouts from above the clavicle through the scapula

- Head first supine
- Place both arms along the trunk on the scan table
  - If a shoulder implant is present in the contralateral arm it is required to raise that arm above the head
- Palm of hands should be facing the body sides
- No gantry tilt

**DFOV:** 25cm for the CD Data Set, 18cm for other recons

## Scan Parameters:

- 130-140 kVP
- Scan from above the clavicle though the entire scapula during breath hold
  - If both shoulders are requested, reconstruct them independent of one another

## PACS series in order as performed:

- Topogram
- DFOV 25 cm ; 1 x 0.5 Axial ST CD Data Set
- DFOV 18 cm ; 2x2 Axial Bone
- DFOV 18 cm ; 2x2 Axial ST
- DFOV 18 cm ; 2x2 Coronal Bone
- DFOV 18 cm ; 2x2 Sagittal Bone
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

# MATERIALISE TRUSIGHT SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1.5 | 1.5 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 1 | 0.6 | 0.8 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 120 | 120 | 120 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 140 |
| ref kVp | | 120 | 140 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| **CD data set** | | | | | | |
| Kernel | I31s Med Smooth | I31s Med Smooth | B70s Very Sharp | | **Recon 1 Bone** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus |
| SAFIRE/ADMIRE | 2 | 2 | 0 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 0.5 | 0.5 | 0.6 | | Slice Increment (mm) | 2.5 |
| **Shoulder Bone** | | | | | Type | Full |
| Kernel | B80s Sharp | B80s Sharp | B70s Very Sharp | | ASIR | SS40 |
| Window | Osteo | Osteo | Osteo | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **ST** | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | STND |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 450/35 |
| **Soft Tissue** | | | | | Slice Thickness (mm) | 2.5 |
| Kernel | I31s Med Smooth | I31s Med Smooth | I31s Med Smooth | | Slice Increment (mm) | 2.5 |
| Window | Shoulder | Shoulder | Shoulder | | Type | Plus |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | ASIR | None |
| Slice Thickness (mm) | 2 | 2 | 2 | | | |
| Slice Increment (mm) | 2 | 2 | 2 | | **CD SET** | |
| **Coronal/ Sagittal Bone** | | | | | Algorithm | STND |
| Kernel | B80s Sharp | B80s Sharp | B70s Very Sharp | | Window Width/ Level | 450/35 |
| Window | Osteo | Osteo | Osteo | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Increment (mm) | 0.625 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Plus |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | None |
| | | | | | | |
| | | | | | **REFORMAT** | |
| | | | | | Algorithm | Bone Plus |
| | | | | | Window Width/ Level | 1500/450 |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

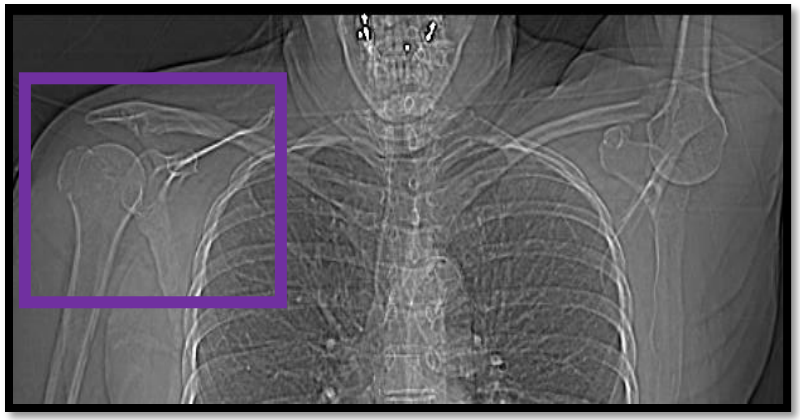
# SHOULDER ARTHROGRAM-Revised-2/17/2018

CTDI: ~25 mGy per acquisition

**PT Positioning:** Patient in true anatomical position, humerus supported to lie parallel to the table and palm supinated, opposite arm raised above head**Setup:** AP and lateral scouts from above the clavicle through the area of interest

**DFOV:**

- Arthrogram Should 14cm



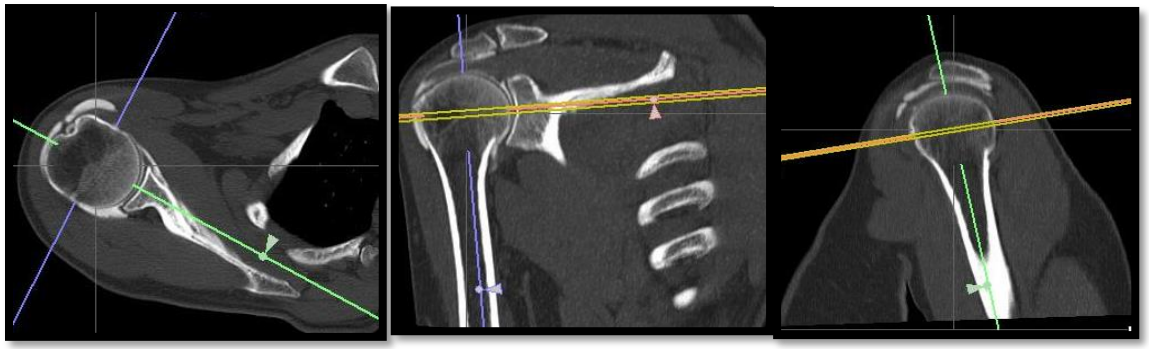
## Scan Parameters:

- Scan range to include the affected shoulder joint during breath hold
  - Pre-Imaging needed if patient has metal

## PACS series in order as performed:

- Topogram
- 2x2 Axial bone/soft tissue
- 2x2 Coronal/Sagittal Bone
- 2x2 Coronal/Sagittal ST
- 3D Images (if needed)
- Dose report and/or Patient Protocol Page

**Alignment for true Coronal and Sagittal Planes**



*Back to MSK Protocol Page*

*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER ARTH SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 | |
| Rotation Time (sec) | 1.5 | 1.5 | 1 | | Rotation Time (sec) | 0.8 | |
| Pitch | 1 | 0.6 | 0.8 | | Pitch | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 120 | 120 | 120 | | Auto mA range | 100-500 | |
| kVp | 130 | | | | kVp | 120 | |
| ref kVp | | 120 | 120 | | Smart mA | On | |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 | |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% | |
| **Recon 1 Bone Axial** | | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | **Bone** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Slice Thickness (mm) | 1.25 | |
| Slice Increment (mm) | 2 | 2 | 2 | | Slice Increment (mm) | 1.25 | |
| **Recon 2 ST** | | | | | Type | Full | |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | ASIR | SS40 | |
| Window | Shoulder | Shoulder | Shoulder | | | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | **ST** | | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | Standard | |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 350/40 | |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 1.25 | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | Slice Increment (mm) | 1.25 | |
| Window | Osteo | Osteo | Osteo | | Type | Full | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | ASIR | SS40 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | | | |
| Slice Increment (mm) | 2 | 2 | 2 | | **Bone Reformat** | | |
| **Coronal ST** | | | | | Algorithm | Bone | |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | Window Width/ Level | 1500/450 | |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 0.625 | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full | |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | none | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# SHOULDER: ZIMMER-BIOMET-SIGNATURE ONE- Revised-7/11/2017

CTDI: ≤25 mGy per acquisition

**PT Positioning:**

- Patient must be in supine position at iso-center in the gantry
- Place the affected arm extended along the side of the body with the wrist externally rotated (at least 45 degrees) with palm up, place the opposite arm over head

**Setup:** AP and lateral scouts from above the clavicle through the scapula

**DFOV:**

- 25cm for the CD Data Set
- 18cm for other recons

## Scan Parameters:

- 120 kVP ; 0.625mm slice thickness or smaller ; ST Algorithm with no edge enhancement
- Scan from above the acromion process to below inferior angle of scapula
    - If patient presents with humeral implant please extend the scan 3cm below the implant

## PACS series in order as performed:

- Topogram
- DFOV 25 cm ; 0.625 x 0.625 Axial ST CD Data Set
- DFOV 18 cm ; 2x2 Axial Bone
- DFOV 18 cm ; 2x2 Axial ST
- DFOV 18 cm ; 2x2 Coronal Bone
- DFOV 18 cm ; 2x2 Sagittal Bone
- DFOV 18 cm ; 2x2 Sagittal ST
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# ZIMMER-BIOMET SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral |
| Detector Configuration | 32 x 0.6 | 40 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 1.5 | 0.5 | 0.5 | | Rotation Time (sec) | 0.8 |
| Pitch | 1 | 0.6 | 0.6 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 39.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 120 | 50 | 50 | | Auto mA range | 100-350 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 20 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 30% |
| | | | | | **Recon 1 RT/LT** | |
| **CD Data Set** | | | | | Algorithm | Bone Plus |
| Kernel | I31s Medsmooth | I31s Medsmooth | I31s Medsmooth | | Window Width/ Level | 1500/450 |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 1.25 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Type | Full |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | ASIR | SS40 |
| | | | | | **ST** | |
| **Soft Tissue** | | | | | Algorithm | STND |
| Kernel | I31s Medsmooth | I31s Medsmooth | I31s Medsmooth | | Window Width/ Level | 450/35 |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 1.25 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | ss40 |
| | | | | | **Biomet Set** | |
| **Bone** | | | | | Algorithm | STND |
| Kernel | B80s very sharp | B80s very sharp | B80s very sharp | | Window Width/ Level | 350/45 |
| Window | Osteo | Osteo | Osteo | | Slice Thickness (mm) | 0.625 |
| SAFIRE/ADMIRE | 1 | 1 | 1 | | Slice Increment (mm) | 0.625 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Plus |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | None |
| | | | | | **ST Reformat** | |
| **Coronal/Sagittal** | | | | | Algorithm | STND |
| Kernel | B80s very sharp | B80s very sharp | B80s very sharp | | Window Width/ Level | 400/40 |
| Window | Osteo | Osteo | Osteo | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Increment (mm) | 0.75 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | SS40 |
| | | | | | **Bone Reformat** | |
| **Soft Tissue Sagittal** | | | | | Algorithm | Bone Plus |
| Kernel | I31s Medsmooth | I31s Medsmooth | I31s Medsmooth | | Window Width/ Level | 1500/450 |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 0.625 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | SS40 |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

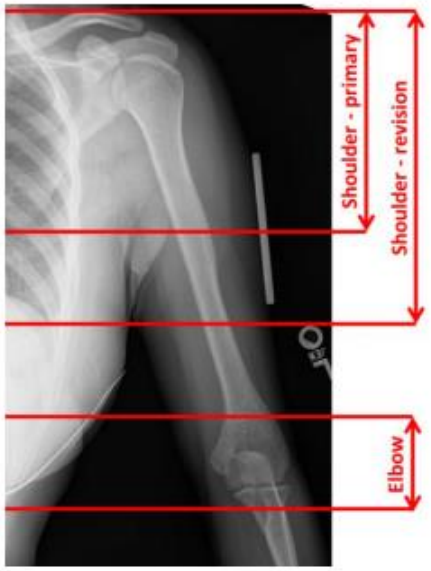
# SHOULDER: MEDACTA MY SHOULDER-Revised-07/03/24

CTDI: ≤25 mGy per acquisition

*** Do NOT perform arthro CT scan as Medacta will reject contrasted scans due to inaccurate 3D modeling***

**PT Positioning:**

- Patient must be in supine position at iso-center of the gantry
- The arm of interest must be in neutral rotation, as close to gantry center as possible, the interested forearm must be in complete extension.
- No sponge or pillows placed under arm
- Opposite arm is above the head




**Setup:** AP and lateral scouts from above the clavicle through the elbow

**DFOV:**

- Shoulder 15-30 cm to include entire scapula
- Elbow 15-20 cm
- Recon sets 180cm

## Scan Parameters:

- 120 kVP ; 0.625mm slice thickness or smaller , no larger than 1.0
- ***Shoulder-*** Craniocaudal direction, start above the acromioclavicular joint and stop around:

  -10 cm below the lesser tubercle in case of a primary arthroplasty. Make sure that the whole scapula is scanned (inferior angle included)

  -20 cm below the lesser tubercle in case of a revision arthroplasty
- ***Elbow-*** The scan must start atleast 5cm above the epicondyles and stop at about 5 cm below the epicondyles

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

**PACS series in order as performed:**

- Topograms
- CD Data Set shoulder
- CD Data Set elbow
- Coronal/Sagittal Bone shoulder and elbow
- Coronal/Sagittal ST shoulder and elbow
- Dose report and Patient Protocol Page

*Back to MSK Protocol Page*

# MEDACTA MY SHOULDER SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 1.5 | 1.5 | 1 | | Rotation Time (sec) | 0.8 |
| Pitch | 1 | 0.6 | 0.8 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 120 | 120 | 120 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| **Recon 1/2 Shoulder & elbow** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | **Recon 1/2 Shoulder & elbow** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 |
| **Recon 2 ST** | | | | | Type | Full |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | ASIR | SS40 |
| Window | Shoulder | Shoulder | Shoulder | | | |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | **ST** | |
| Slice Thickness (mm) | 2 | 2 | 2 | | Algorithm | Standard |
| Slice Increment (mm) | 2 | 2 | 2 | | Window Width/ Level | 350/40 |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 1.25 |
| Kernel | B70s Sharp | B70s Sharp | B70s Very Sharp | | Slice Increment (mm) | 1.25 |
| Window | Osteo | Osteo | Osteo | | Type | Full |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | ASIR | SS40 |
| Slice Thickness (mm) | 2 | 2 | 2 | | | |
| Slice Increment (mm) | 2 | 2 | 2 | | **Bone Reformat** | |
| **Coronal ST** | | | | | Algorithm | Bone |
| Kernel | B31s Med Smooth | B31s Med Smooth | B31s Med Smooth | | Window Width/ Level | 1500/450 |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 2 | 2 | 2 | | Slice Increment (mm) | 0.625 |
| Slice Thickness (mm) | 2 | 2 | 2 | | Type | Full |
| Slice Increment (mm) | 2 | 2 | 2 | | ASIR | none |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# STERNOCLAVICULAR JOINTS-Revised-9/14/2017

CTDI: ~10-20 mGy per acquisition

**PT Positioning:** Patient is supine with arms down *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above to below the SC joints

**DFOV:** Appropriate for patient's body habitus. Use same DFOV as prior exam when available

## Scan Parameters:

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @3ml/sec
  - 50 second delay
- Scan from above the the SC joints to below the SC joints during breath hold to Include BOTH SC joints
  - Okay to use the Sternum protocol on the scanner

## PACS series in order as performed:

- Topogram
- 1x1 Axial bone
- 1x1 Axial Soft Tissue
- 1x1 Coronal/Sagittal Bone
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# STERNOCLAVICULAR JOINTS SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 32 x 0.6 | | Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 1.5 | 1.5 | 1.5 | | Rotation Time (sec) | 0.8 |
| Pitch | 1.3 | 1.3 | 1.3 | | Pitch | 0.984:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 39.37 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 120 | 120 | 120 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| Recon 1 Bone Axial | | | | | Recon 1 ST Axial | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Algorithm | Standard |
| Window | Osteo | Osteo | Osteo | | Window Width/ Level | 450/ 35 |
| SAFIRE/ADMIRE | | | | | Slice Thickness (mm) | 5 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 5 |
| Slice Increment (mm) | 1 | 1 | 1 | | Type | Full |
| Recon 2 ST | | | | | | |
| Kernel | I31s medsmooth | I31s medsmooth | I31s medsmooth | | | |
| Window | Shoulder | Shoulder | Shoulder | | | |
| SAFIRE/ADMIRE | 3 | 3 | 3 | | | |
| Slice Thickness (mm) | 1 | 1 | 1 | | | |
| Slice Increment (mm) | 1 | 1 | 1 | | | |
| Coronal/ Sagittal Bone | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Recon 2 Reformats | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Standard |
| SAFIRE/ADMIRE | | | | | Window Width/ Level | 450/ 35 |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 2.5 |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# STERNUM -Revised-2/11/2022

CTDI: ~10-20 mGy per acquisition

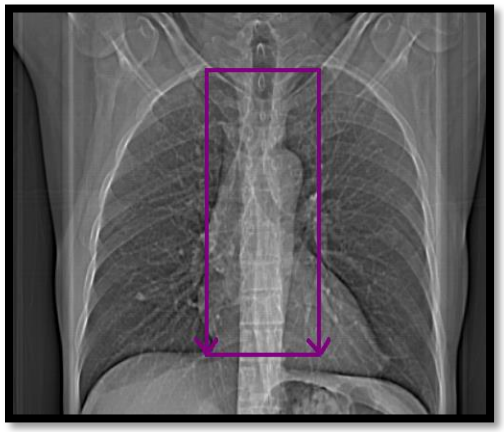
**PT Positioning:** Patient is supine with arms above head *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above the manubrium through the xyphoid process

**DFOV:** Appropriate for patient's body habitus. Use same DFOV as prior exam when available

## Scan Parameters:

- IV Contrast:
  - At the discretion of the radiologist
  - 75 ml of 350 mg/dl non-ionic contrast @3ml/sec
  - 50 second delay
- Scan from above the manubrium though the xyphoid process during breath hold



## PACS series in order as performed:

- Topogram
- 1x1 Axial bone
- 1x1 Axial Soft Tissue
- 1x1 Coronal/Sagittal Bone
- 1x1 Coronal/Sagittal Soft Tissue
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# STERNUM SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 | |
|---|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral | |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 32 x 0.6 | | Detector Coverage (mm) | 20 | |
| Rotation Time (sec) | 1 | 1.5 | 1.5 | | Rotation Time (sec) | 0.5 | |
| Pitch | 0.65 | 1.3 | 1.3 | | Pitch | 0.984:1 | |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 19.37 | |
| CareDose4D | On | On | On | | Scan FOV | Large Body | |
| Quality ref mAs | 135 | 120 | 120 | | Auto mA range | 100-500 | |
| kVp | 130 | | | | kVp | 120 | |
| ref kVp | | 120 | 120 | | Smart mA | On | |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 | |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% | |
| **Recon 1 Bone Axial** | | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | **Bone** | | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Slice Thickness (mm) | 1.25 | |
| Slice Increment (mm) | 1 | 1 | 1 | | Slice Increment (mm) | 1.25 | |
| **Recon 2 ST** | | | | | Type | Full | |
| Kernel | I31s Med Smooth | I31s Med Smooth | I31s Med Smooth | | ASIR | SS20 | |
| Window | Shoulder | Shoulder | Shoulder | | | | |
| SAFIRE/ADMIRE | 3 | 3 | 3 | | **ST** | | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Algorithm | Standard | |
| Slice Increment (mm) | 1 | 1 | 1 | | Window Width/ Level | 350/40 | |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 1.25 | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Slice Increment (mm) | 1.25 | |
| Window | Osteo | Osteo | Osteo | | Type | Full | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | ASIR | SS20 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | | | |
| Slice Increment (mm) | 1 | 1 | 1 | | **Reformat** | | |
| **Coronal ST** | | | | | Algorithm | Bone Plus | |
| Kernel | I31s Med Smooth | I31s Med Smooth | I31s Med Smooth | | Window Width/ Level | 1500/450 | |
| Window | Shoulder | Shoulder | Shoulder | | Slice Thickness (mm) | 1.25 | |
| SAFIRE/ADMIRE | 3 | 3 | 3 | | Slice Increment (mm) | 1.25 | |
| Slice Thickness (mm) | 1 | 1 | 1 | | Type | Plus | |
| Slice Increment (mm) | 1 | 1 | 1 | | ASIR | None | |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# WRIST ARTHROGRAM-Revised-8/08/2012

CTDI: ~13 mGy per acquisition

**PT Positioning:** Place anatomy of interest in true anatomical position *(Please note reason for protocol changes)*

**Setup:** AP and lateral scouts from above/below anatomy of interest

**DFOV:** Focused DFOV ~ 7 cm; appropriate for anatomy of interest. (FOV should be narrowed to include intra-articular contrast only)

## Scan Parameters:

- Scan from above to below the anatomy of interest

## PACS series in order as performed:

- Topogram
- 0.6 x 0.6 Axial bone
- 0.6 x 0.6 Axial Soft Tissue
- 0.6 x 0.6 Coronal Bone
- 0.6 x 0.6 Sagittal Bone
- 3D images (if needed)
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

# WRIST ARTHROGRAM SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | Helical |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 32 x 0.6 | | Detector Coverage (mm) | 20 |
| Rotation Time (sec) | 1 | 1 | 1 | | Rotation Time (sec) | 1 |
| Pitch | 0.8 | 0.8 | 0.8 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Small Body |
| Quality ref mAs | 60 | 60 | 60 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 120 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 0% |
| **Bone** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | **Recon 1 Bone Axial** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Slice Thickness (mm) | 0.625 |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Slice Increment (mm) | 0.625 |
| **Soft Tissue** | | | | | Type | Full |
| Kernel | I31s Med Smooth | I31s Med Smooth | I31s Med Smooth | | ASIR | None |
| Window | Mediastinum | Mediastinum | Mediastinum | | | |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | **ST** | |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Algorithm | Standard |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | Window Width/ Level | 350/50 |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 0.625 |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Slice Increment (mm) | 0.625 |
| Window | Osteo | Osteo | Osteo | | Type | Full |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | ASIR | SS20 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | | |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | **Bone Reformats** | |
| **Coronal/Sagittal ST** | | | | | Algorithm | Bone Plus |
| Kernel | I41s Med Smooth | I41s Med Smooth | I41s Med Smooth | | Window Width/ Level | 1500/450 |
| Window | Mediastinum | Mediastinum | Mediastinum | | Slice Thickness (mm) | 0.625 |
| SAFIRE/ADMIRE | 0 | 0 | 0 | | Slice Increment (mm) | 0.625 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Type | Full |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | ASIR | None |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# WRIST DRUJ-Revised-2/09/2022

CTDI: ~ 13 mGy per acquisition

Used for evaluation of Distal Radial Ulnar Joint

**PT Positioning:** Place anatomy of interest in true anatomical position, please note reason for protocol change

**Setup:** AP and lateral scouts from above to below anatomy of interest ; Mark symptomatic wrist with a BB
**DFOV:** To display bilateral wrists on axial recons

## Scan Parameters: **PT lying prone in superman position with arms above the head**

- Pronation
  - Scan acquired with patient's hands in the prone position below the radial ulnar joint thru the carpal bones
- Supination
  - Scan acquired with patient's hands in the supine position below the radial ulnar joint thru the carpal bones
  -

***It is crucial to position the hands in such a manner that they are symmetric with one another. We are looking for symmetry so both wrists need to mirror each and be acquired, reconstructed and displayed together with the same FOV used for both acquisitions****

## PACS series in order as performed:

- Topogram
- Bilateral Axial Prone
- Bilateral Axial Supine
- Symptomatic Supine Coronal
- Symptomatic Supine Sagittal
- Dose report and/or Patient Protocol Page

*Back to MSK Protocol Page*

*Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality

# WRIST DRUJ SCAN PROTOCOL

| Scanner | Perspective | Definition AS 40 | Definition AS 64 | | Scanner | Optima 660 |
|---|---|---|---|---|---|---|
| Scan Type | spiral | spiral | spiral | | Scan Type | spiral |
| Detector Configuration | 32 x 0.6 | 32 x 0.6 | 64 x 0.6 | | Detector Coverage (mm) | 40 |
| Rotation Time (sec) | 1 | 1 | 0.5 | | Rotation Time (sec) | 0.6 |
| Pitch | 0.8 | 0.8 | 0.5 | | Pitch | 0.531:1 |
| Scan FOV | Large | Large | Large | | Speed (mm/rot) | 10.62 |
| CareDose4D | On | On | On | | Scan FOV | Large Body |
| Quality ref mAs | 60 | 60 | 60 | | Auto mA range | 100-500 |
| kVp | 130 | | | | kVp | 120 |
| ref kVp | | 120 | 80 | | Smart mA | On |
| Optimize Slider position | | 3 w/o contrast | 3 w/o contrast | | Noise Index | 15 |
| Optimize Slider position | | 7 w/ contrast | 7 w/ contrast | | ASIR | 50% |
| **Bone** | | | | | | |
| Kernel | B70s Sharp | B70s Sharp | I70f Very Sharp AS | | **Prone bilateral Wrist** | |
| Window | Osteo | Osteo | Osteo | | Algorithm | Bone Plus |
| SAFIRE/ADMIRE | 0 | 0 | 1 | | Window Width/ Level | 1500/450 |
| Slice Thickness (mm) | 0.6 | 0.6 | 1 | | Slice Thickness (mm) | 1.25 |
| Slice Increment (mm) | 0.6 | 0.6 | 1 | | Slice Increment (mm) | 1.25 |
| **Soft Tissue** | | | | | Type | Full |
| Kernel | I31s Med Smooth | I31s Med Smooth | I30f Med Smooth | | ASIR | none |
| Window | Mediastinum | Mediastinum | Extremity | | | |
| SAFIRE/ADMIRE | 0 | 0 | 1 | | **Reformat Prone wrist** | |
| Slice Thickness (mm) | 0.6 | 0.6 | 1 | | Algorithm | Bone Plus |
| Slice Increment (mm) | 0.6 | 0.6 | 1 | | Window Width/ Level | 1500/450 |
| **Coronal/ Sagittal Bone** | | | | | Slice Thickness (mm) | 0.625 |
| Kernel | B70s Sharp | B70s Sharp | B70s Sharp | | Slice Increment (mm) | 0.3 |
| Window | Osteo | Osteo | Osteo | | Type | Full |
| SAFIRE/ADMIRE | 0 | 0 | 1 | | ASIR | none |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | | |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | **ST Prone** | |
| **Coronal/Sagittal ST** | | | | | Algorithm | Soft |
| Kernel | I41s Med Smooth | I41s Med Smooth | I41s Med Smooth | | Window Width/ Level | 350/45 |
| Window | Mediastinum | Mediastinum | Mediastinum | | Slice Thickness (mm) | 1.25 |
| SAFIRE/ADMIRE | 0 | 0 | 1 | | Slice Increment (mm) | 1.25 |
| Slice Thickness (mm) | 0.6 | 0.6 | 0.6 | | Type | Full |
| Slice Increment (mm) | 0.6 | 0.6 | 0.6 | | ASIR | SS20 |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*

# Protocol Review

CT Protocols are reviewed by the Radiation Safety Protocol Committee.

Committee members consists of ARA Radiation Safety Officer, Radiologists, ARA Outpatient Imaging Center Directors, Manager of Quality, Safety and Risk Management and Lead CT Technologists

| Protocol(s) Review Date |
| --- |
| 09/04/2024 |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |

**Protocol designed to minimize the amount of radiation while maximizing the yield and produce diagnostically acceptable image quality*