PMI® Patient-Matched Implants

CT Protocols
The prevention of motion is critical for 3D imaging and modeling. Instruct the patient on the importance of holding completely still during the scan.

The following instructions are very important. Please read them carefully before scanning.

**Scanning the Patient and Technical Factors (for all scanners)**

**Slice Thickness**: See specific protocols.

**Field of View**: Magnify or zoom image so it fills the entire screen without cutting off any of the anatomy for imaging. The FOV must not be changed during the scan.

**Table Position**: The CT couch must **not** be raised or lowered between slices. The X and Y centering must **not** be altered between slices.

**Matrix**: Quality images can be obtained from any scan matrix, although a high resolution 512 x 512 matrix should be used whenever possible.

**Algorithm**: **A standard or soft tissue algorithm** with no edge enhancement must be used. Do **not** use bone algorithm.

**Note**: Do not use metal artifact reduction (MAR/OMAR).

**Slice Spacing**: All slices must be contiguous or overlapping. Slice thickness and table increment is dependent on anatomy.

**Data Collection**: We accept CD-ROM in **DICOM** format off all CT machines.

CT Image data (not raw data) is required for patient modeling. Do **not** send hard copy X-rays.

Please contact the PMI department for assistance with CT Protocol requirements. via email pmi.imaging@zimmerbiomet.com or by phone at (574) 371-0557.

CT data may be submitted for reconstruction:

Ship to:
PMI Imaging Group
Zimmer Biomet
2392 N Boeing Road
Warsaw, IN 46582
Revision Hip/Acetabulum Replacement (Triflange)

Femurs must be positioned so they are parallel to the horizontal plane of the table. Patient needs to be in A/P position with feet inverted.

Start: Top of iliac crest
Stop: Mid-femur or below existing femoral

Slice Thickness and Spacing: 2 mm by 2 mm, 2.5 mm by 2.5 mm, or 3 mm by 3 mm
Field of View: 38 – 44 cm FOV, depending on patient size. Needs to include full pelvis.
Algorithm: A standard or soft tissue algorithm, no bone enhancement
Note: Do not use metal artifact reduction (MAR/OMAR).
Primary Femoral Hip Stem (CT based hip)

Femurs must be positioned so they are parallel to the horizontal plane of the table. Patient needs to be in A/P position with feet inverted.

**Start**: Top of iliac crest

**Stop**: Mid-femur or below existing femoral

*Perform two femoral condyle slices (to show anteversion).

Do not change FOV or X and Y coordinates.

**Slice Thickness and Spacing**: 2 mm by 2 mm, 2.5 mm by 2.5 mm, or 3 mm by 3 mm

**Field of View**: 38 – 44 cm FOV depending on patient size. Needs to include full pelvis.

**Algorithm**: A standard or soft tissue algorithm, no bone enhancement
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Acetabulum/Pelvis for Oncology

Position patient in A/P with feet inverted, no rotation. Entire pelvis in FOV.

Start: Top of iliac crest
Stop: Ending slice just below ischial tuberosity
Slice Thickness and Spacing: 2 mm by 2 mm, 2.5 mm by 2.5 mm, or 3 mm by 3 mm
Field of View: 38 – 44 cm FOV, depending on patient size. Needs to include full pelvis.
Algorithm: A standard or soft tissue algorithm, no bone enhancement
Note: Do not use metal artifact reduction (MAR/OMAR).
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Knee: Primary or Revision

Slice Thickness and Spacing: 1 mm by 1 mm, 1.25 mm by 1.25 mm, or 2 mm by 2 mm

Field of View: 25–35 cm FOV, depending on patient size

Algorithm: A standard or soft tissue algorithm, no bone enhancement

Note: Do not use metal artifact reduction (MAR/OMAR).

* If metal in, start and stop at least 5 cm above and below metal implant

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Patella / Femoral Implant

Start: 10 cm above joint line
Stop: 3 cm below joint space

Slice Thickness and Spacing: 1 mm by 1 mm, 1.25 mm by 1.25 mm, or 2 mm by 2 mm

Field of View: 25 cm FOV, depending on patient size

Algorithm: A standard or soft tissue algorithm, no bone enhancement

Note: Do not use metal artifact reduction (MAR/OMAR).
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Elbow and Shoulder: Primary or Revision (VRS)

(Implant Example: Vault Reconstructive Shoulder System (VRS))

Start (see below)

Stop (see below)

Start: Above acromion process
Stop: 15 cm below top of humerus or 3 cm below existing implant
Slice Thickness and Spacing: 1 mm by 1 mm, 1.5 mm by 1.5 mm or 2 mm by 2 mm is acceptable
Field of View: 25 – 30 cm (Shoulder) and 15 - 20 cm (Elbow) FOV, depending on patient size. Needs to include entire scapula.
Algorithm: A standard or soft tissue algorithm, no bone enhancement
Note: Do not use metal artifact reduction (MAR/OMAR).

* A physical CD-Rom must be mailed to Zimmer Biomet PMI department.
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Elbow: Primary or Revision

**Note:** Have patient fully extend arm if possible.

**Note:** It is imperative that the technologist input the correct directional instructions before data acquisition is initiated (head first vs. feet first).

**Start:** 10 cm above joint line or 5 cm above existing implant

**Stop:** 8 cm below joint line or 5 cm below existing implant

**Slice Thickness and Spacing:** 1 mm by 1 mm, 1.25 mm by 1.25 mm, or 2 mm by 2 mm

**Field of View:** 15–20 cm FOV, depending on patient size

**Algorithm:** A standard or soft tissue algorithm, no bone enhancement

**Note:** Do not use metal artifact reduction (MAR/OMAR).
Wrist/Hand

Start: Tip of fingers
Stop: 4–5 cm proximal to carpal bones
Slice Thickness and Spacing: 0.625 mm by 0.625 mm, 1 mm by 1 mm, or 1.25 mm by 1.25 mm
Field of View: 15 cm FOV
Algorithm: A standard or soft tissue algorithm, no bone enhancement
Note: Do not use metal artifact reduction (MAR/OMAR).
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Sternum

Start: 5 cm above top of sternum
Stop: 5 cm below sternum
Slice Thickness: 1 mm by 1 mm, 1.25 mm by 1.25 mm, or 2 mm by 2 mm
Field of View: 25 cm–30 cm depending on patient size
Algorithm: A standard or soft tissue algorithm, no bone enhancement
Note: Do not use metal artifact reduction (MAR/OMAR).
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Ribs

Start: 5 cm above 1st rib  
Stop: 5 cm below last rib  
Slice Thickness: 1 mm by 1 mm, 1.25 mm by 1.25 mm, or 2 mm by 2 mm  
Field of View: 35 cm–44 cm depending on patient size  
Algorithm: A standard or soft tissue algorithm, no bone enhancement  
Note: Do not use metal artifact reduction (MAR/OMAR).
Ankle

Start: 15 cm above ankle joint
Stop: bottom of foot
Slice Thickness: .625 mm by .625 mm, 1 mm by 1 mm, or 2 mm by 2 mm
Field of View: 35 cm–44 cm depending on patient size
Algorithm: A standard or soft tissue algorithm, no bone enhancement
Note: Do not use metal artifact reduction (MAR/OMAR).
Long Bone Study (Oncology tumor case or long stem)

Start (see below)

Stop (see below)

Start (see below)

Stop (see below)

Start (see below)

Stop (see below)

Start (see below)

Stop (see below)

Start/Stop: Include both joints of the bone

Slice Thickness and Spacing: 1 mm by 1 mm, 1.25 mm by 1.25 mm, or 2 mm by 2 mm

Field of View: 25–35 cm FOV, depending on patient size

Algorithm: A standard or soft tissue algorithm, no bone enhancement

Note: Do not use metal artifact reduction (MAR/OMAR).
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