CT SCAN PROTOCOL
Bone Tumor

Purpose and Summary

The purpose of this CT protocol is to obtain detailed data regarding the 3-dimensional characteristics of the bone and the tumor. The resulting scans will be used to prepare a virtual 3D model and surgical plan for the removal of the tumor. This virtual 3D model is intended for the design of custom instrumentation or a custom implant. This document contains CT protocols for scanning the tibia, femur or hip.

Additional images that help locating the tumor are also requested. This includes MR images of the tumor to provide additional soft tissue views. The MR images are only used for the planning of the resection around the tumor, and not for guide and implant design. For these MR images no defined protocol is required; diagnostic MR images are sufficient. Additional information like PET-CT images or radiology reports may also be provided.

NOTE

CT scan quality can directly affect the design of guides and implants. Please ensure that all protocol steps are followed for optimum scan quality.

General Scan Requirements

- Remove any non-fixed metal prosthesis, jewelry, zippers that might interfere with the region to be scanned.
- Discuss the procedure with the patient. The patient must not move during any part of the scanning sequence.
- Position the patient to maximize comfort and minimize motion.
- Only true axial slices are allowed: no oblique or reformatted images and no gantry tilt. If additional algorithms can be applied and seem beneficial to facilitate diagnostics (e.g. muscle window or bone window, scatter reduction), these DICOM sets can be added, but separately from the required images.

TABLE POSITION

Set the table so that the area to be scanned is centered in the field of view.

FIELD OF VIEW (FOV)

Scan all slices with the same FOV, reconstruction center and table height (coordinate system).

Use the smallest FOV possible to capture all required bone regions.

Capturing all soft tissue is not necessary, only the bony regions are of interest.

RECONSTRUCTION

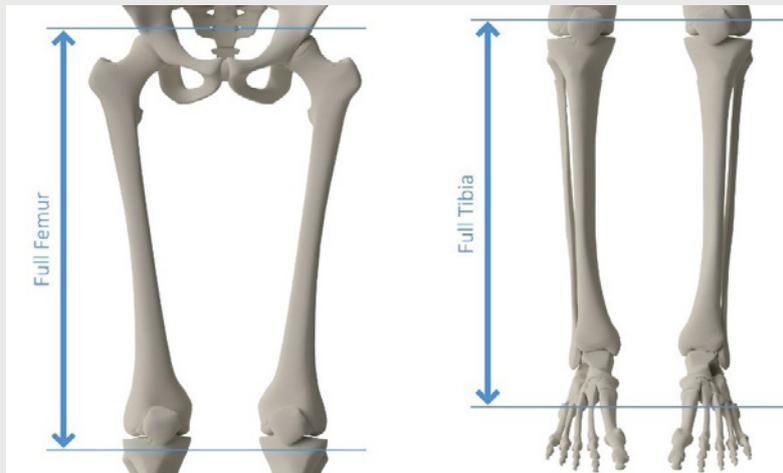**No** obliqueness; no gantry tilt and no oblique reconstructions.

No secondary reconstructions; images must be scanned at the given parameters or smaller.

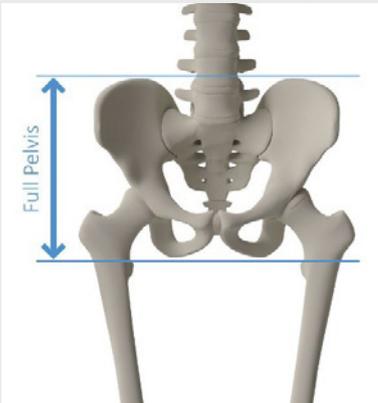**No** reformations into coronal and sagittal planes; no MPR's.

No 3D reconstruction. The raw data should be provided. 3D reconstructions may be forwarded as an extra to the requested CT data.

hospital.materialise.com

Area of interest: Femur or Tibia

Patient position	Position the patient supine, feet first. Patellae pointing forward and the knee in extension, toes should be pointing up.
	Ankle support is recommended to restrict external rotation of the knee and stabilize the leg.
	Lumbar support is recommended to relieve back pain while the legs are extended.
	If an implant is present in the contralateral leg, elevate the contralateral knee to prevent the artifact from affecting the surgical side.
Region of interest	Capture the full femur or tibia, from joint to joint.

Area of interest: Hip

Patient position	Patient lying on the back, legs extended.	
	A small pillow under the legs is allowed for support.	
	No tilt or lift of the pelvis.	
	Arms folded upward, away from the pelvis.	
Region of interest of Helical Scan	All bony regions of the complete pelvis: from just above the most superior point of the ilium down to just below the most inferior point at the ischium.	

SCAN PARAMETERS

Collimation	Slice thickness: 1.5mm or smaller
	Slice increment: 50% overlap
Field of View (FOV)	Use the smallest FOV possible to capture the required bone regions:
	• Unilateral leg: 250mm or smaller
	• Hip or bilateral leg: 320mm or smaller
Matrix	Use a 512 x 512 matrix
Algorithm	Use a standard or soft tissue algorithm with no edge enhancement
Pitch	1 or smaller
kVp	120–140 (higher for obese patients or metal hardware in scan region)
mAs	As given by the automatic system.

DATA TRANSMISSION

File format:

- Submit Dicom format only.
- Uncompressed Dicom data is necessary for processing. Lossy and other forms of compression is not allowed.
- The scanner should be set to DICOM format "raw image", with no compression. If loading from PACs, import and export the scan as DICOM files with the uncompressed option.

Data anonymisation:

- Do not erase patient name and ID – Ensure necessary rights are obtained for transfer of data to Materialise.
- Data will be anonymized by Materialise on receipt of the data, after cross-check with prescription of the surgeon to ensure the images of the right patient are provided.

Scan data:

Only send the following images:
- The requested CT images at the given parameters
- The accompanying scout view
- The diagnostic images that help locating the tumor. This may include: MR images, PET-CT images or radiology reports.

IMPORTANT

Your site should keep an archive (PACS) copy of the CT exams, in **uncompressed** DICOM format and the original scanning parameters.

Transfer scan data to Materialise:

A) By DVD or CD-ROM, labeled and shipped to
   Materialise N.V.
   Attn. ir. Liesbet Goossens / imaging
   Technologielaan 15
   3001 Leuven
   BELGIUM

B) via FTP upload details can be provided
   on simple request by sending an e-mail
   to: cases@materialise.be, or call +32 16 744 955

NOTE

It is advised to use a dedicated
courier service and check for
(short) delivery duration!

Send notification

Finally, notify Materialise of your shipment/upload,
either by sending an email to: cases@materialise.be,
or simple call +32 16 744 955.

Please mention the name of the surgeon, patient ID,
and name of the zip file that has been uploaded.

hospital.materialise.com