On Call™

ONCOLOGY IMAGING GUIDE

IMPORTANT NOTE

This procedure provides only the information required by Bodycad to design and manufacture personalized restorations. The procedure described in this document may differ from the procedure used for diagnostic purposes. The physician is responsible for determining whether further tests are required for diagnostic purposes. In this document, CT stands for Computed Tomography or Computerized Axial Tomography.

Introduction and purpose

Through its mission, The Pursuit of Orthopaedic Perfection™, Bodycad aims to bring to market personalized restorations designed from a virtual 3D model of the patient's anatomy. The 3D model of the bone is produced by Bodycad Imager software, which employs 3D image segmentation from the patient's CT. More specifically, the present protocol provides healthcare professionals with information on scanning requirements for the capture of patient CTs of the lower extremities, for use by these algorithms.

It is important to closely follow this protocol, as this will produce a more accurate 3D model and enhance the precision of the personalized restoration. A high-quality image will provide the best results in terms of a high level of accuracy.

General Scanning procedure

Patient preparation for CT or MRI scanning

- Any non-fixed metallic objects worn by the patient must be removed.
- Patient must stay stationary. If movement occurs, the scanning must be restarted.
- Make the patient as comfortable as possible.
- Support may be installed in order to prevent motion or rotation of the body part to be scanned during the whole scanning.
- Put a pillow between the two feet in order to create a space of about 10 cm.

GENERAL CT SCANNING REQUIREMENTS

CT scanning instructions

- Acquire only primary axial slices.
- No edge enhancement.
- No oblique reconstruction.
- No gantry tilt.
- Provide reformatted coronal and sagittal slices.
- The images must be provided in standard DICOM format only. Lossy compression is prohibited.

Field of view

- Position the table so that the area scanned is centered in the field of view.
- Do not change the field of view, the table height nor the reconstruction center during the scanning.

CT Scanning Parameters

Slice Thickness	1 mm or smaller (0.6 mm is desirable)
Slice Increment	Equal to Slice Thickness
Field of View	Choose the smallest possible FOV that will capture the bones of interest and partial skin and soft tissue.
Matrix	512 x 512
KVP	120 to 140 kVp
Algorithm / Kernel	_ Bone or Boneplus (GE) _ Ultra-high resolution, at least U40 or higher (Siemens) _ At least B60f or higher (Siemens) _ Other kernels that give as much high bone contrast as possible with respect to the surrounding tissue. _ Ensure that there is no edge enhancement.
mAs	Automatic value from the machine

SPECIFIC CT SCANNING REQUIREMENTS FOR THE HIP

Patient position

— The patient must be in a supine position with feet first (FFS) into the gantry.

— The legs are fully straight, without rotation.

— Ensure that there is no rotation of the pelvis.

— The arms are folded upward to the head.

— Support may be used in order to maintain the required patient.

— position. As an example, put a small pillow under the knee.

Region of interest

— Images must be acquired about 5 cm above the most superior point of the

— ilium to about 5 cm below the most inferior point at the ischium (Figure 1).

— Partial skin and soft tissue must be captured with the bone regions.

Figure 1

Full Pelvis

SPECIFIC CT SCANNING REQUIREMENTS FOR THE KNEE

Patient position

— The patient must be in a supine position with feet first (FFS) into the gantry.

— The legs are extended, without rotation.

— Support may be used in order to maintain the required patient position.

Region of interest

— Images must be acquired 1/3 of the distal femur to about 1/3 of the proximal tibia and must include the patella (Figure 2).

— Partial skin and soft tissue must be captured with the bone regions (Figure 3).

Figure 2
3D Model

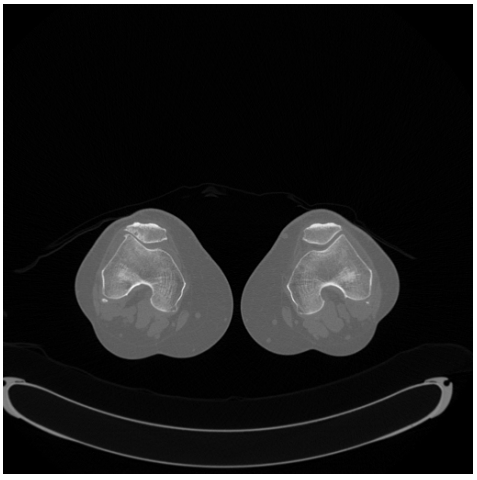

Figure 3
Sample of Axial Image

SPECIFIC CT SCANNING REQUIREMENTS FOR THE FEMUR OR THE TIBIA

Patient position

— The patient must be in a supine position with feet first (FFS) into the gantry.

— The legs should be as parallel as possible to the table horizontally, without rotation.

— The knees are in full extension, without rotation.

— The patient's feet are arranged as perpendicular as possible relative to the table, the toes pointing straight up.

— The arms are folded upward to the head.

— Support may be used in order to maintain the required patient position. As an example, provide ankle support in order to stabilize the leg; put a lumbar support to prevent from back pain.

— Refer to Figure 4 and Figure 5 for this patient position.

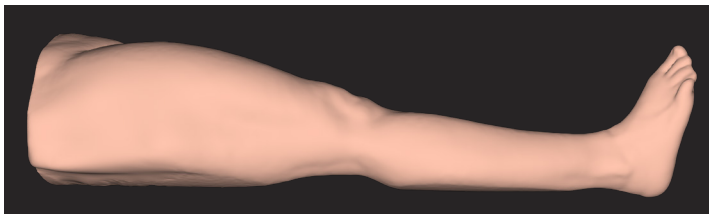

Figure 4

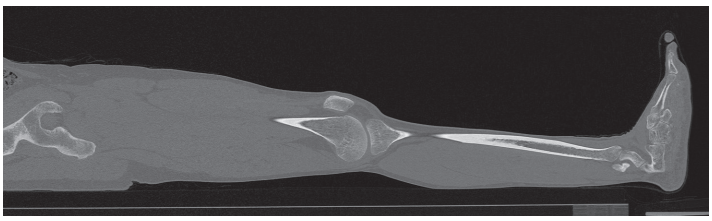

Figure 5

Region of interest

— Images must be acquired from the anterior inferior iliac spine to the ankle and should include at least the talus. The entire foot can be included (Figure 6).

— Partial skin and soft tissue must be captured with the bone regions (Figure 7).

Figure 6
Sample of Axial Image

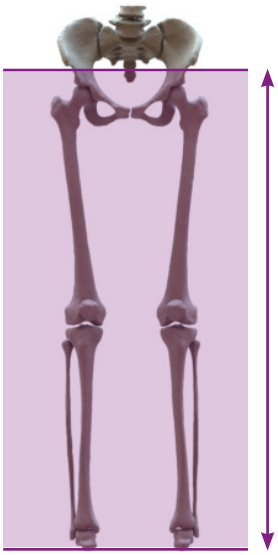

Figure 7
Full leg

GENERAL MRI SCANNING REQUIREMENTS

In addition to the patient CT images, MR images of the tumor are required so as to get precise delineation of the tumor with respect to the surrounding bone and soft tissue region.

MRI scanning instructions

— No oblique reconstruction.

— The images must be provided in standard DICOM format only. Lossy compression is prohibited.

— Use appropriate coil for scanned body part; for example, use the knee coil for the knee.

Patient position

— The patient must be in a supine position with feet first (FFS) into the gantry.

— The legs are fully straight, without rotation.

— Ensure that there is no rotation of the body part to be scanned.

— Support may be used in order to maintain the required patient position and to ensure patient comfort.

MRI SCANNING PARAMETERS

Slice Thickness	1 mm or smaller
Slice Increment	Equal to Slice Thickness
Acquisition type	3D with isotropic spatial resolution
Field of view	Choose the smallest possible FOV that permits to capture appropriately the tumor and the surrounding bones and soft tissue
Matrix	512 x 512
Protocol name	_ The physician has the responsibility to define the appropriate MRI protocols so as to get the maximum precision about the tumor _ Questions may be addressed to Bodycad if additional information or validation about the MR imaging protocol is required

Region of interest

Images must be acquired inside a bounding box of 5 to 10 cm from either side of the tumor, along the acquisition axis (Figure 8).

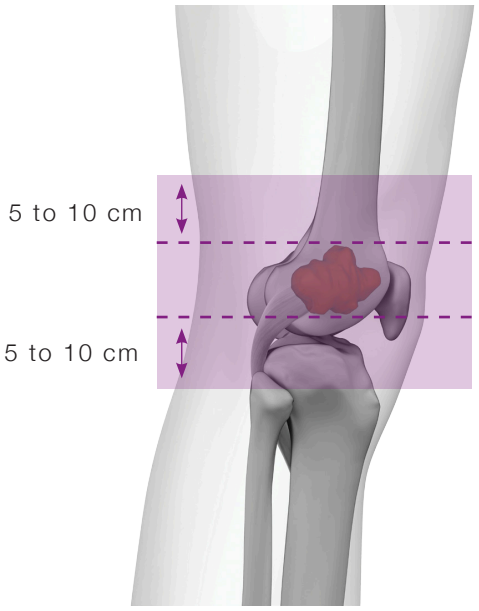

Figure 8

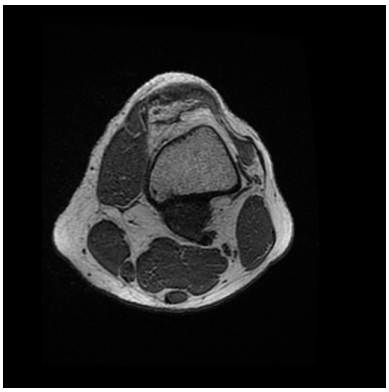

Figure 9
Example of MR Image

Data anonymization and privacy

— Be sure that the required rights for transmitting data to Bodycad are respected.

— The patient name and ID must be kept in the transmitted data.

— The transmitted data will be anonymized by Bodycad before the whole process of personalized restoration begins. This anonymization follows the established Bodycad quality procedure and patient privacy guidelines.

Transmission of images

File format and instructions :

— Use only DICOM format, without lossy compression.

— Provide the images with the parameters, the scout view, additional images, notes.

Mail

Send the labelled CD or DVD to the following address:

BC OnCall™ Imaging
Bodycad Laboratories Inc.
2035, Haut-Bord Street
Quebec City (QC) G1N 4R7
Canada

Online

Use our online tool for sending data:

preplink

preplink.bodycad.com

— Please contact **oncall@bodycad.com** or call **418 527-1388** ask for BC OnCall™ department for shipping account numbers.

— Ensure that the CD or DVD is packaged appropriately in order to avoid breakage during transport.

If you require any further information, please contact us at **oncall@bodycad.com** or call **418 527-1388** and ask for the BC OnCall™ department.

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