SUCCESSFUL MRI SCANNING

Materialise Knee Guides

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CONTENTS

I PSI KNEE REPLACEMENT

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1. What is a PSI Knee Replacement?

A PSI Knee replacement uses imaging such as MRI to provide the surgeon with a 3D reconstruction of the patient's knee. Materialise prepares a virtual surgical planning using the 3D model, allowing the surgeon to trial different cutting planes, implant sizes, and implant types on the knee before entering the OR.

Once the surgeon approves the final surgical plan, Materialise will design surgical guides that fit specifically to the patient's femur and tibia. These guides are then manufactured using 3D printing. The guides will transfer the virtual surgical plan to the operating room, allowing the surgeon to perform the planned surgery by seamlessly pairing the patient's specific anatomy, the desired correction, and the surgical implants selected in the plan.

2. Why MRI?

MRI scanning provides a visualization of the existing cartilage in the patient's knee. The surgical guides are then designed to fit snugly onto the cartilage to provide a custom fit to the patient's anatomy.

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FOR QUESTIONS PLEASE CONTACT MATERIALISE CUSTOMER SERVICES

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II KEY STEPS TO A SUCCESSFUL PSI KNEE SCAN

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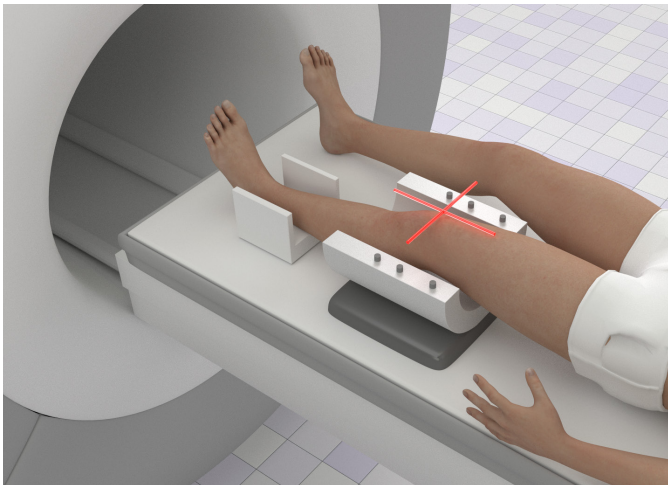
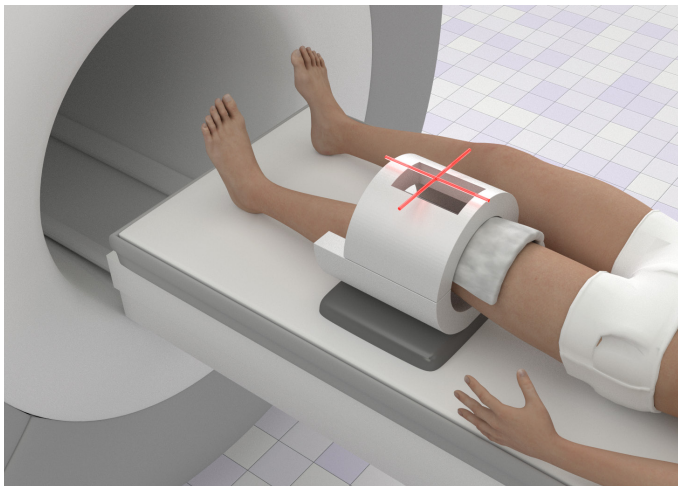
1. Patient Preparation

Give the patient the opportunity to take any medication for pain and/or anxiety as prescribed by the referring physician.
Discuss the procedure with the patient. Make sure they understand the table will move between scans.
Reinforce to the patient that any movement during or between the scans can result in a rescan.
Offer the restroom. This protocol will take approximately 20 min to complete for MRI.





2. Patient Positioning

Position the patient so the knee of interest is as close to the center of the table, left to right, as possible.
Rotation of the knee is allowed up to 20 degrees to make the patient comfortable.
Ensure the ankle is scanned on the same plane or slightly lower than the knee joint: the protocol allows for up to a 20 degree flexion of the knee joint. Do not hyper-flex the knee.
Immobilize the leg using sandbags and straps as necessary.
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.
Provide support for the contra-lateral leg as necessary.

3. Coil Placement for MRI scans

Please choose a coil that best fits the patient's anatomy.

The coil must be centered on the knee to capture 10cm above and 10cm below the knee joint.

Ensure that the coil is centered on the joint and the knee is as close to the iso-center as possible.

If using a Flex coil, be sure that the channels are on the anterior side of the knee and the opening is at the back of the knee.

4. Scanning the High-Resolution Knee for MRI

Fat Saturation must be ON.

The scan must cover the entire bony knee.

The knee should be centered in the field of view (FOV).

The image quality must be good enough to visualize the bone and cartilage borders on all slices.

5. Submitting the Images

Do not submit reconstructed or reformatted images. Original/primary scan data is requested.

Uncompressed Dicom data is requested for processing.

- No .jpg images or other image formats are acceptable
- Lossy compression is not recommended
  - Compression is generally applied to images by the PACs system or scanner.
  - Import/export uncompressed data when burning CDs.

III PSI KNEE SCAN FREQUENTLY ASKED QUESTIONS

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1. MY PATIENT CANNOT STRAIGHTEN THEIR LEG.

Rotation and/or flexion of the knee is allowed up to 20 degrees to make the patient comfortable. Please provide support for the lumbar, knee, and ankle as necessary.

2. DOES THE ANKLE NEED TO BE DORSIFLEXED?

No. However, the ankle should be as AP as possible. If necessary, sandbags and other immobilization devices are recommended.

3. DO I NEED TO SCAN BILATERAL ANKLES AND HIPS?

Bilateral ankles and/or hips may be scanned, if desired. But, do not increase FOV past the maximum allowed.

4. THE CONTRALATERAL KNEE HAS AN IMPLANT/METAL HARDWARE. WHAT DO I DO?

Position the knee as far away from the surgical side as possible; using sandbags to separate the legs and/or cushioning to raise the contra-lateral knee.

5. MY PATIENT HAS AN IMPLANT/ METAL HARDWARE IN THE KNEE CAUSING ARTIFACT.

If your patient has an implant or metal hardware in the distal femur or proximal tibia, the artifact may affect critical areas of the scan and the images will be unusable. Please follow-up with the local sales representative or Materialise NV for further assistance; the patient may need to be scanned with CT.

6. THE PATIENT HAS A HIP AND/OR ANKLE HARDWARE ON THE SURGICAL SIDE. CAN I STILL SCAN WITH AN MRI?

Yes. Be sure to use a Turbo or Fast Spin Echo with short echo spacing and a high number of echoes. You can also increase the resolution from 256x256 to 512x512, increase the bandwidth, and/or increase the number of averages to 2.

7. CAN I USE MORE THAN ONE CONCATENATION ON ANY SCAN?

One package or slab is preferred. It is acceptable for the TR of the ankle or hip to be greater than 800 when necessary to guarantee one slab.

8. WHAT PARAMETERS CAN I CHANGE?

- Do not change the slice thickness, slice increment, matrix, sequence, or FOV.
- Slice number will vary depending on patient size.
- TR and TE may vary depending on software.
- Bandwidth can be adjusted as necessary to accommodate for SNR and/or chemical shift.
- Flip Angle can be adjusted to improve SNR.

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