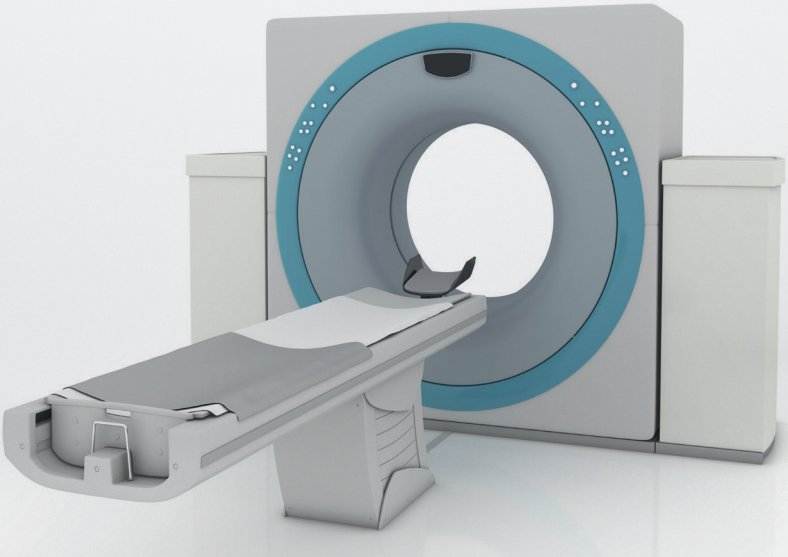
HIP-PLAN®

CT scan protocol

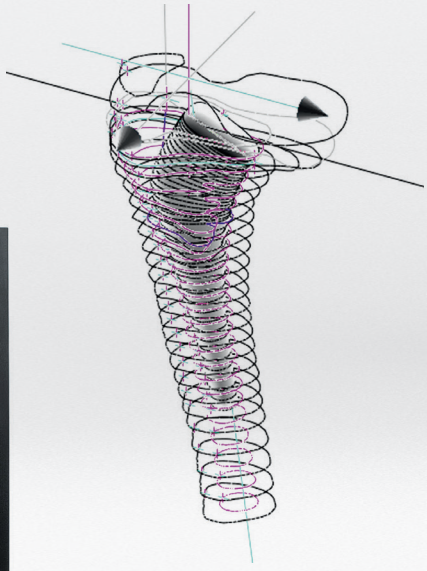


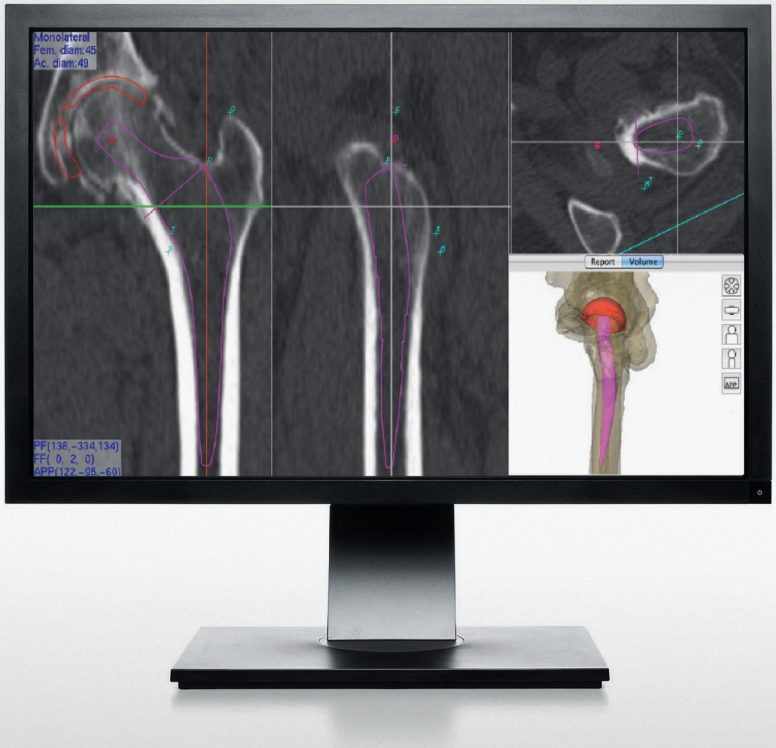
symbios
custom-made for you

Document objective

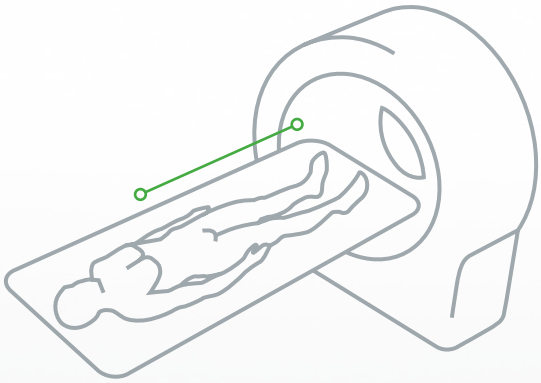
This document specifies the protocol for the acquisition of CT images that are compatible with the HIP-PLAN®[1] 3D hip planning software. When combined with Symbios standard hip implants, the HIP-PLAN® allows orthopaedic surgeons to plan and reconstruct their patients with an increased accuracy[3][4][5] compared to conventional x-ray templating. Since 1989, Symbios also uses its 3D planning software to design custom-made hip prosthesis[6][7][8].

As the accuracy of the HIP-PLAN® relies on the CT images that have been acquired, it is essential to follow as closely as possible the parameters described in this protocol, even though it might differ from hip imaging protocols routinely used by your institution for diagnosis purpose.



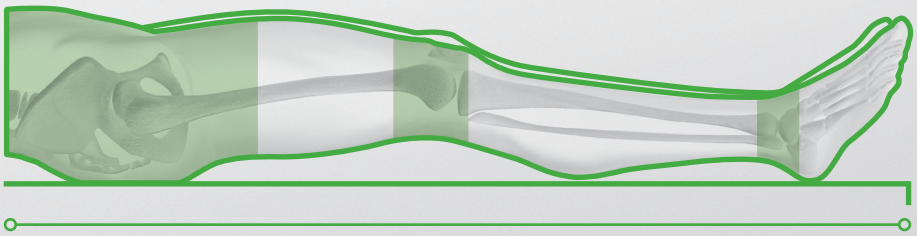


Patient's position



1 The patient should be supine with the feet forward.

2 The legs of the patient should be extended and aligned to the table axis. Slight hip flexion is permitted if the patient is experiencing pain.



COURSE RANGE TO BE COVERED
DURING ACQUISITION

3 Check that the maximum course range of the table is sufficient to allow an examination starting from the top of the pelvis to the foot on the side to be operated.

Important: It is essential that the patient is comfortably settled in order to prevent motion during the examination. Cushions and straps may be used to maintain the patient's position.

Image series

The protocol consists of a single acquisition composed of three separate spiral scans. The three reconstructed series should be axial and should provide slices that are adjacent.

	Series	Slice thickness and spacing (mm)	Reconstructed FOV (mm)	Resolution (px)	Voltage (kV)
	PELVIS	1.25 to 2 mm	500	512 x 512	120
	RIGHT / LEFT HIP	**0.5 to 0.8 mm**	200	512 x 512	120
	KNEES	1.25 to 2 mm	500	512 x 512	120
	ANKLES	1.25 to 2 mm	500	512 x 512	120
	SCOUTVIEW FACE	-	-	-	-
	SCOUTVIEW PROFIL	-	-	-	-

Note: Both frontal and sagittal scout views (topograms) are required for the proper use of HIP-PLAN®, and they should be performed with the highest possible resolution.

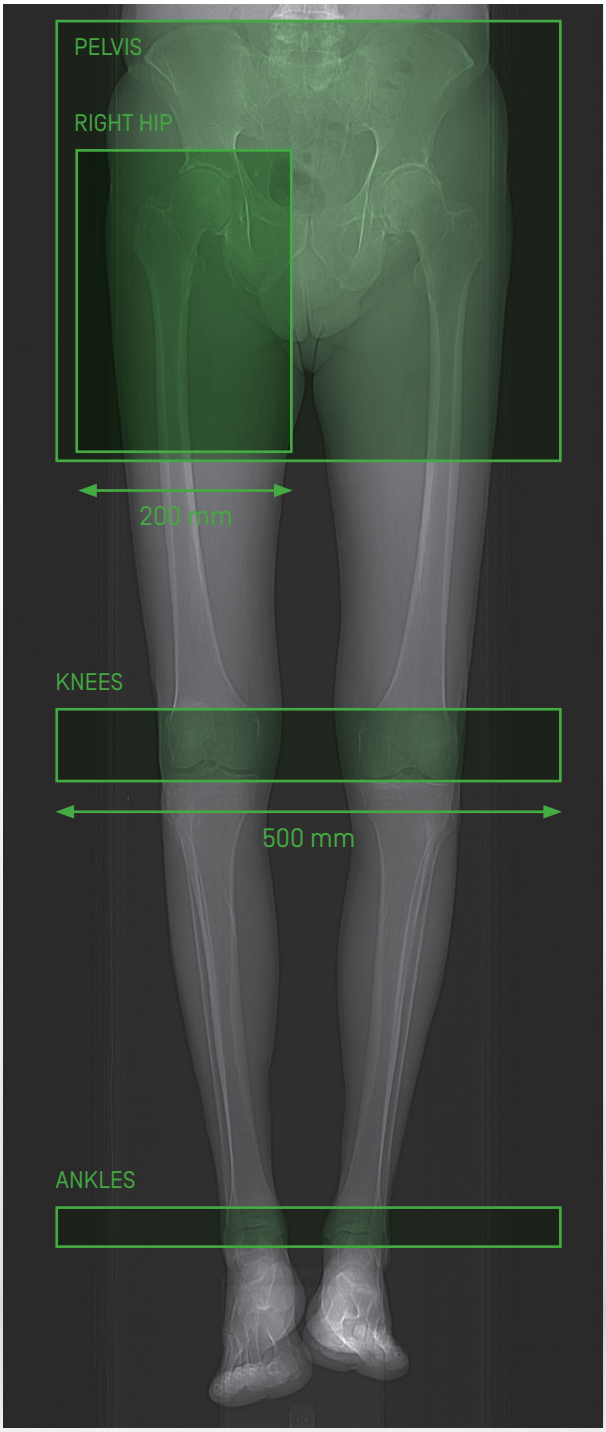
Scanner settings

Acquisition mode	Spiral	
Collimation and pitch parameters	Define parameters as to allow a reconstruction with the lowest slice thickness as possible* (max. 0.8 mm)	
Reconstruction kernel for soft tissue**	GE Healthcare	Detail
	SIEMENS	B31
	TOSHIBA	FC13
	PHILIPS	B
Images resolution	512 x 512 pixels	
Voltage	120 (kV)	
Charge (mAs)	Adapted to avoid artifacts according to the patient's morphology	

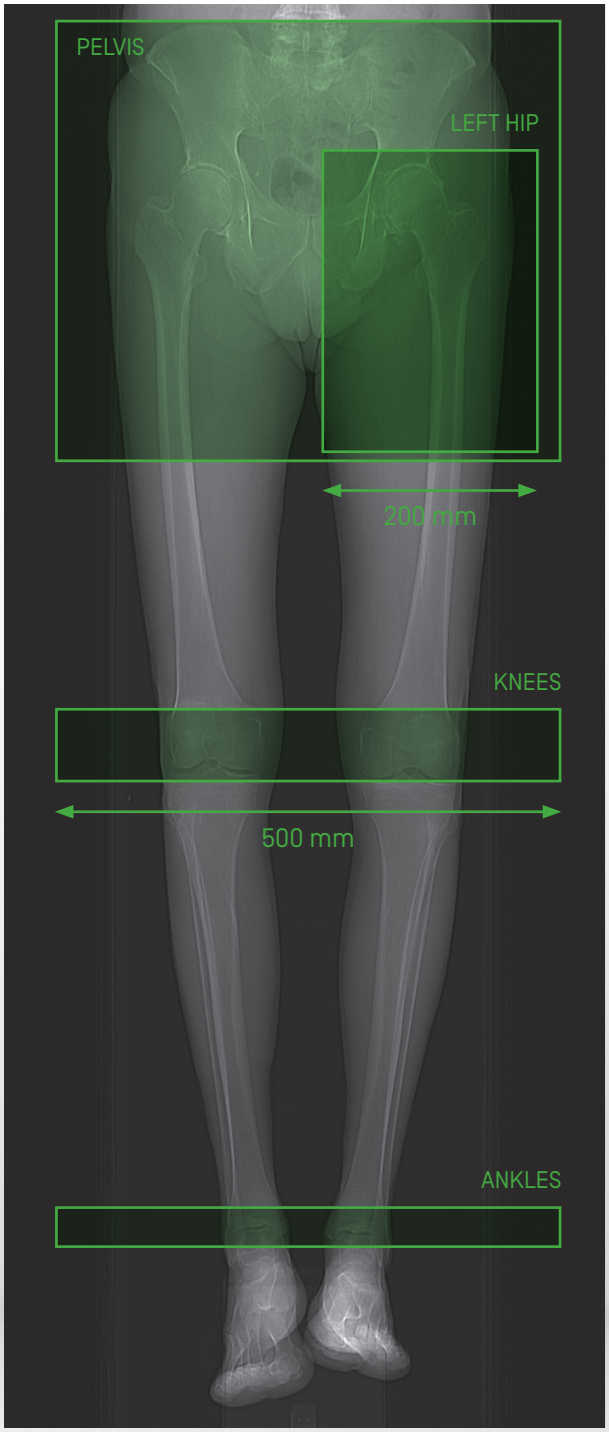
(*) The minimum slice thickness can vary from a machine model to another according to the parameters that are set. However, the expected optimal thickness should be in between 0.5 mm and 0.8 mm.

(**) For better imagery quality (noise reduction), the reconstruction filter for soft tissue is recommended.

Right hip protocol



Left hip protocol



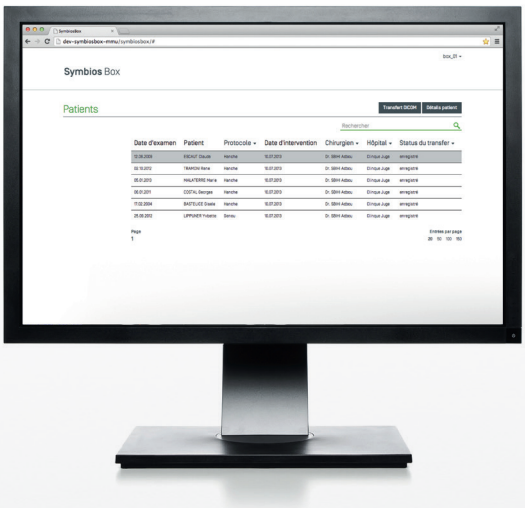
Important:
Adhere to the series as indicated above, particularly:

- PELVIS series: Include the iliac crests as well as the distal femoral isthmus.
- HIPS series: Include the acetabulum as well as the distal femoral isthmus (including the false acetabulum in cases of congenital hip dysplasia).
- KNEES series: Include the entire distal femoral epiphysis.
- ANKLES series: Base the series around tibio-talar articulation.

Sending images to Symbios

There are several methods available for sending scanned images to Symbios:

1



Online (Symbios Box)

The most simple and effective method is to transfer the scanned images to Symbios via the Symbios Box. The Symbios Box is compatible with PACS/DICOM and is installed on the local area network (LAN) at your medical imaging center. This allows it to communicate with your PACS and to safely send DICOM type images to Symbios over the internet.

Safer

The Symbios Box uses a highly sophisticated algorithm in order to encode the DICOM data during online transfer. Data confidentiality for your patients is guaranteed!

Faster

Because the data is sent directly via the internet, we receive the DICOM images at Symbios in less than 20 minutes*. We are therefore able to get a head start on designing custom-made implants for surgeons and their patients!

Simpler

All you need is a regular internet browser (such as Chrome, Safari, Internet Explorer, Firefox, etc) to access the patient list and transfer the relevant DICOM images to Symbios. No more burning CD-ROMs!

For more information about the Symbios Box, contact your Symbios representative.

(*) Time taken to send images online may change subject to image size and the speed of your internet connection.

2

In person or by post (CD-ROM)

You can save the DICOM images onto a disk (CD-ROM or DVD-ROM) in uncompressed format and give them to your Symbios representative yourself or send them by post to the following address:

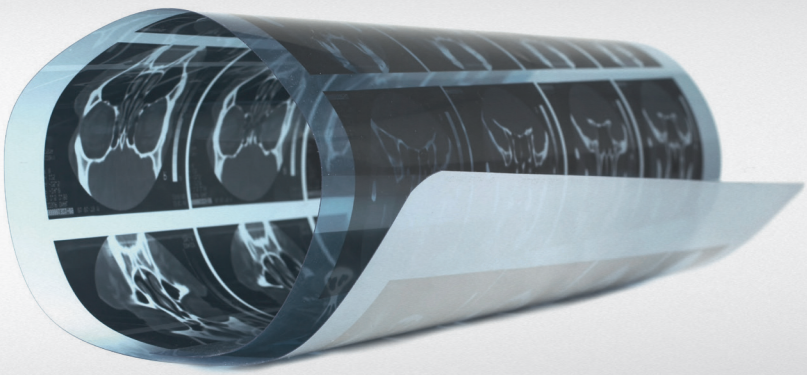
Symbios Orthopédie SA
Custom Hip Department
Avenue des Sciences 1
1400 Yverdon-les-Bains
Switzerland

Radiation exposure

As reported by Huppertz et al.[2], "a mean effective dose of 4.0 mSv (SD 0.9 mSv) modeled by the BMI ($p < 0.0001$) was calculated" when using the HIP-PLAN® CT scan protocol procedure.

Data confidentiality

Symbios undertakes to respect the confidentiality of the patient's data, and to return it if requested.



References

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Huppertz A, Radmer S, Asbach P, Juran R, Schwenke C, Diederichs G, Hamm B, Sparmann M.
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Sariali E, Mouttet A, Pasquier G, Durante E, Catonne Y.
Journal of Bone and Joint Surgery (British) 2009, vol. 91-B, n°3.

(4) Comparisons of preoperative three-dimensional planning and surgical reconstruction in primary cementless total hip arthroplasty.
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