Episurf MRI Protocol Knee Epioscopy

Philips 1.5T and 3T

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1. Introduction

The Epioscopy Knee MRI protocol for Siemens MRI machines consists of six (or seven) MRI sequences. These include one 3D sequence and five (or six) 2D sequences:

Number	Type	Orientation	Pulse sequence
1	3D	Sagittal	SPACE
2	2D	Traversal/Axial	Tra PDW SPAIR
3	2D	Sagittal	Sag TSE PDW
4	2D	Sagittal	Sag TSE PDW SPAIR
5	2D	Coronal	Cor TSE PDW SPAIR
6	2D	Coronal	Cor T2W SPAIR
7 (optional)	2D	Sagittal	Sag T2W SPAIR

The settings for all these sequences are described in detail in the following text.

2. Protocol installation

2.1. Settings, The 3D sequence

Choose the sequence 3D View PDW. Make sure the settings are according to Table 1.

Table 1. 3D settings Philips

Tab	Setting	Value
Geometry	Uniformity	CLEAR
	FOV-FH (mm)	≈140*
	FOV-AP (mm)	≈160* (avoid folding artefacts)
	FOV-RL (mm)	≈160* (capture whole knee joint)
	ACQ voxel size FH (mm)	0.5
	ACQ voxel size AP (mm)	0.5
	ACQ voxel size RL (mm)	1
	Recon voxel size FH (mm)	≈ 0.30 (FH = AP, square pixels)
	Recon voxel size AP (mm)	
	Recon voxel size RL (mm)	0.5
	SENSE	Yes (If coil is SENSE compatible) - P reduction (AP) = 2 - S reduction (RL)) = 2.5
	Slice Orientation	Sagittal
	Fold-Over Direction	AP
Contrast	Scan mode	3D
	Technique	SE
	TE (ms)	1.5 T = 45 (user defined) 3 T = 30 (user defined)
	Flip Angle (deg)	100
	TR (ms)	1000 (user defined)
	Fat Supression	No
	TSE Factor	1.5 T = 30 3 T = 60
Motion	NSA	1

2.2. Settings, 2D sequences

The following 2D sequences are required

Number	Orientation	Pulse sequence	Optional pulse sequence
1	Traversal/Axial	PDW SPAIR	PDW SPIR
2	Sagittal	PDW	
3	Sagittal	PDW SPAIR	PDW SPIR
4	Coronal	PDW SPAIR	PDW SPIR
5	Coronal	T2W SPAIR	PDW SPIR
6 (optional)	Sagittal	T2W SPAIR	T2W SPIR

Sagittal T2W SPAIR (number 6) is only required if the patient has previously undergone a meniscal surgery.

Common settings for all 2D sequences:

Tab	Setting	Value
Geometry	Slice thickness (mm)	3
	slice gap	0.3 (user defined)

Reconstructed voxel size:

Tab	Recon voxel size	Value
Geometry	Sagittal FH/AP (mm)	Range 0.2 - 0.4 (square pixels) Use as low value as possible with regards to image quality and scanning time
	Coronal FH/RL (mm)	
	Traversal/Axial RL/AP (mm)	

3. Image acquisition

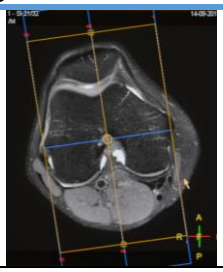
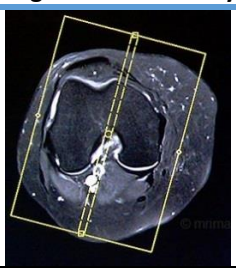
3.1. Procedure checkpoints

Important	Comment
Use a knee coil.	
Place the knee as close as possible to the epicenter of the main coil.	This is to minimize geometrical distortions.
Patient must not move during and between scans.	
The protocol consists of one (1) 3D-sequence and five (5) 2D-sequences, thus six (6) sequences in total.	All sequences must have a field of view (FOV) that covers the whole femoral bone and articulating cartilage.
One additional 2D sequence (Sag T2 SPAIR) should be scanned if the patient has previously undergone a meniscal surgery	
The required reconstructed voxel size for the 3D sequence is 0.3x0.3x0.5 mm.	The 3D sequence is used to create a 3D representation of the knee. The voxel resolution is very important for this process.
Folding artefacts must not interfere with the bones or articulating cartilage.	Apply Fold-Over Suppression (in the Geometry tab) if a lot of folding artifacts are present
Common parameters for the 2D sequences are listed to the right.	**Slice thickness** = 3 mm **Slice gap (user defined)** = 0.3 mm **Reconstructed Pixel size:** as small as possible, but not larger than 0.4x0.4mm (square pixels)
Use accelerating techniques (ex Sense) as long as the image quality is maintained.	

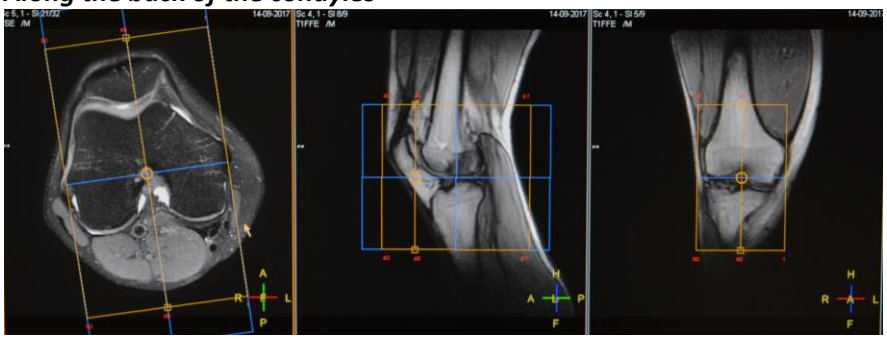
3.2. Field of view (FOV)

Make sure that the FOV fully covers the bones and articulating cartilage. This applies to all sequences.

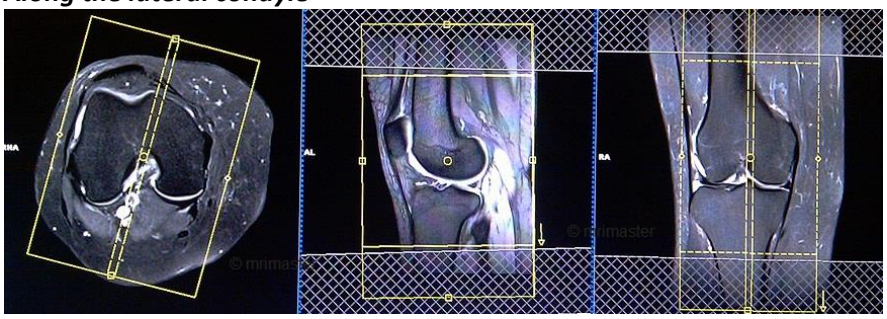
The sagittal sequences shall be oriented either along the back of the condyles or along the lateral condyle, as specified in the table below:

Along the back of the condyles	Along the lateral condyle
	
Sag 3D VIEW PDW	Sag PDW
Sag PDW SPAIR	
Sag T2W SPAIR (optional sequence)	

Along the back of the condyles



Along the lateral condyle



3.3. Voxel size

Sequence	Required Recon voxel size	Note
3D-sequence	0.3x0.3x0.5	Pixel sizes between 0.25x0.25 to 0.35x0.35 mm will be accepted (square pixels).
2D-sequences	0.4x0.4x3.0 (maximum)	Use as small pixel size as possible with regards to image quality and scanning time. A Recon voxel size of 0.4x0.4x3.0 mm is the maximum voxel size that will be accepted.

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4. Examples of MR images acquired according to the specific protocol

Number	Type	Orientation	Pulse sequence
1	3D	Sagittal	3D View PDW, along the back of the condyles
2	2D	Sagittal	PDW, along the lateral condyle
3	2D	Sagittal	PDW SPAIR, along the back of the condyles
4	2D	Coronal	PDW SPAIR
5	2D	Coronal	T2W SPAIR
6	2D	Transversal	PDW SPAIR
Optional	2D	Sagittal	T2W SPAIR, along the back of the condyles