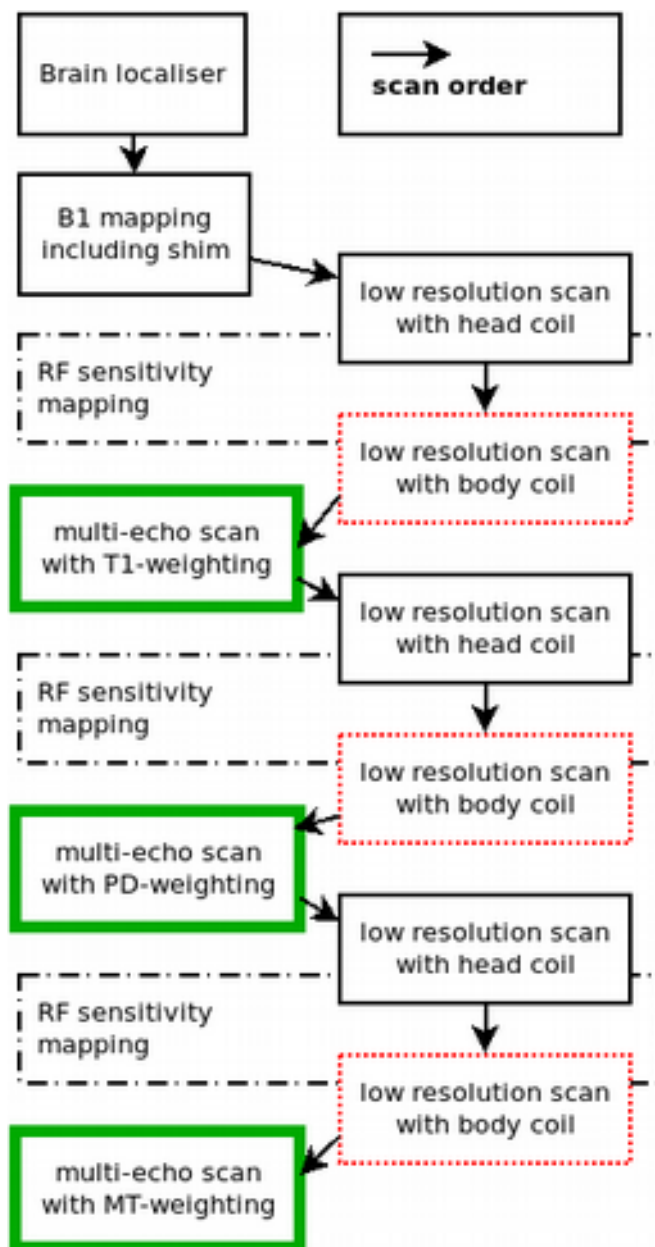


This document contains the **Siemens 3T MRI** (pages 2-3) and **Philips 3T MRI** (pages 4-7) protocol settings, which are specific for the study protocol within the traveling heads study performed in scope of the NISCI trial (<http://nisci-2020.eu/>). To keep it shorter, we deleted parameters, which does not differ from standard settings (as far as we knew) and which are redundant within standard PDF printouts.

Here's the complete list of protocols to be set up and the acquisition scheme:

- rf\_map (B1 mapping)
- RF\_sens\_head and RF\_sens\_body (RF sensitivity mapping)
- MPM\_T1 (multi-echo MPM)
- MPM\_PD (multi-echo MPM)
- MPM\_MT (multi-echo MPM)



rf\_map TA:2:14 Voxel size:4.0x4.0x5.0 mm

Source protocol: Siemens\SequenceRegion\ServiceSequences\DefaultProtocols\rf\_map

Routine		Contrast	
Slices	18	Flip angle 1	90 deg
Dist. factor	100%	Measurements	1
Position	Isocenter	Resolution	
Orientation	Sagittal	Base resolution	64
Phase enc. dir.	A >> P	Phase resolution	100%
FoV read	256 mm	Image Filter	Off
FoV phase	100%	Distortion Corr.	Off
Slice thickness	5 mm	Prescan Normalize	Off
TR	2000 ms	Normalize	Off
TE 1	14 ms	B1 filter	Off
Averages	1	Raw filter	Off
Filter	None	Elliptical filter	Off
Coil elements	{head_neck}	System	
		Shim mode	Standard

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**RF\_sens\_head** TA:9.8 s PAT:Off Voxel size:4.0x4.0x4.0 mm

Source protocol: Siemens\head\library\\_3D\t1\_fl3d\_sag\_p4\_iso\_1.0

Routine		Prescan Normalize	Off
Nr. of slab groups	1	Normalize	Off
Slabs	1	B1 filter	Off
Position	Isocenter	Raw filter	Off
Orientation	Sagittal	Elliptical filter	Off
Phase enc. dir.	A >> P	Slice resolution	100%
Phase oversampling	0%	Slice partial Fourier	Off
Slice oversampling	0%	Geometry	
FoV read	256 mm	Nr. of slab groups	1
FoV phase	87.50%	Slabs	1
Slice thickness	4 mm	Position	Isocenter
TR	4.6 ms	Phase enc. dir.	A >> P
TE	2 ms	Phase oversampling	0%
Averages	1	Slice oversampling	0%
Concatenations	1	Slices per slab	44
Filter	None	System	
Coil elements	{head_neck}	Coil Combine Mode	Sum of Squares
Contrast		Auto Coil Select	Off
MTC	Off	Shim mode	Standard
Magn. preparation	None	Sequence	
Flip angle	6 deg	Introduction	On
Fat suppr.	None	Dimension	3D
Water suppr.	None	Elliptical scanning	On
SWI	Off	Phase stabilisation	Off
Averaging mode	Short term	Averaging mode	Short term
Measurements	1	Multi-slice mode	Interleaved
Reconstruction	Magnitude	Asymmetric echo	Off
Multiple series	Each measurement	Contrasts	1
Resolution		Bandwidth	480 Hz/Px
Base resolution	64	Flow comp.	No
Phase resolution	100%	Allowed delay	0 s
Phase partial Fourier	Off	RF pulse type	Fast
Interpolation	Off	Gradient mode	Normal
PAT mode	None	Excitation	Non-sel.
Image Filter	Off	RF spoiling	On
Distortion Corr.	Off		

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**Rf\_sens\_body**

same as before, but coil elements = body  
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MPM protocol starting next page...

MPM\_T1 TA:3:50 PAT:2 Voxel size:1.0x1.0x1.0 mm

Source protocol: Siemens\head\library\\_3D\t1\_fl3d\_sag\_p4\_iso\_1.0

Routine		Image Filter	Off
Nr. of slab groups	1	Distortion Corr.	Off
Slabs	1	Accel. factor 3D	1
Position	Isocenter	Mode	3D
Orientation	Sagittal	Unfiltered images	On
Phase enc. dir.	A >> P	Prescan Normalize	On
Phase oversampling	0%	Normalize	Off
Slice oversampling	0%	B1 filter	Off
FoV read	256 mm	Raw filter	Off
FoV phase	87.50%	Elliptical filter	Off
Slice thickness	1 mm	Slice resolution	91%
TR	18.0 ms	Slice partial Fourier	6/8
TE 1	2.46 ms	Geometry	
TE 2	4.92 ms	Nr. of slab groups	1
TE 3	7.38 ms	Slabs	1
TE 4	9.84 ms	Dist. factor	20%
TE 5	12.30 ms	Position	Isocenter
TE 6	14.76 ms	Phase enc. dir.	A >> P
Averages	1	Phase oversampling	0%
Concatenations	1	Slice oversampling	0%
Filter	Distortion	Slices per slab	176
Corr.(3D)		Multi-slice mode	Interleaved
Coil elements	HEA;HEP	Series	Interleaved
Contrast		System	
MTC	Off	Body	Off
Magn. preparation	None	Save uncombined	Off
Flip angle	25 deg	Coil Combine Mode	Sum of Squares
Fat suppr.	None	Sequence	
Water suppr.	None	Introduction	On
SWI	Off	Dimension	3D
Averaging mode	Short term	Elliptical scanning	On
Measurements	1	Phase stabilisation	Off
Reconstruction	Magnitude	Averaging mode	Short term
Multiple series	Each	Multi-slice mode	Interleaved
measurement		Asymmetric echo	Off
Resolution		Contrasts	6
Base resolution	256	Bandwidth 1	480 Hz/Px
Phase resolution	91%	Flow comp. 1	No
Phase partial Fourier	Off	Readout mode	Bipolar
Interpolation	Off	Allowed delay	0 s
PAT mode	GRAPPA	RF pulse type	Fast
Accel. factor PE	2	Gradient mode	Normal
Ref. lines PE	24	Excitation	Non-sel.
Reference scan mode	Integrated	RF spoiling	On

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MPM\_PD TA:3:50 PAT:2 Voxel size:1.0x1.0x1.0 mm

same as T1, but Flip angle = 4 deg  
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MPM\_MT TA:7:52 PAT:2 Voxel size:1.0x1.0x1.0 mm

same as T1/PD, but TR = 37.0 ms, Flip angle = 6 deg, MTC = On (Contrast Card)  
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Philips protocol parameters starting next page...

## B1 map

SmartSelect	yes	TR	user defined
Coil 1 (exclude)	None	(ms)	30
Uniformity	CLEAR	Halfscan	no
FOV		Water-fat shift	maximum
FH (mm)	256	Shim	volume
AP (mm)	240	ShimAlign	yes
RL (mm)	170	mDIXON	no
ACQ voxel size		Fat suppression	no
FH (mm)	4	Water suppression	no
AP (mm)	4	MTC	no
RL (mm)	10	Research prepulse	no
Recon voxel size		Diffusion mode	no
FH (mm)	1	Multi-transmit	no
AP (mm)	1	SAR mode	high
RL (mm)	5	B1 mode	default
Fold-over suppression	no	SAR allow first level	yes
Slice oversampling	default	PNS mode	high
ENCASE enable	no	Gradient mode	default
Reconstruction matrix	256	SoftTone mode	no
SENSE	no	Cardiac synchronization	no
CS-SENSE	no	Respiratory compensation	no
Stacks	1	Navigator respiratory comp	no
slices	34	Flow compensation	no
slice orientation	sagittal	fMRI echo stabilisation	no
fold-over direction	AP	NSA	1
fat shift direction	F	Angio / Contrast enh.	no
Stack Offc.		Quantitative flow	no
AP (P=+mm)	-24.0336266	Manual start	no
RL (L=+mm)	2.33173585	Dynamic study	no
FH (H=+mm)	17.2416954	Preparation phases	auto
Ang.		Interactive F0	select
AP (deg)	-1.09899402	B1 field map	yes
RL (deg)	0.0476288982	field map technique	dual TR
FH (deg)	1.77370369	TR extension	150
Free rotatable	no	selective	yes
Multi-chunk	no	grad spoil factor	10
Large table movement	no	MIP/MPR	no
PlanAlign	no	SWIp	no
REST slabs	0	Images	M, (3) no
Shim Size		Autoview image	M
AP (mm)	199.917542	Calculated images	B1, (3) no
RL (mm)	190	Reference tissue	Grey matter
FH (mm)	225.881744	Recon compression	No
Offc.		Preset window contrast	soft
AP (P=+mm)	-24.7313118	Reconstruction mode	real time
RL (L=+mm)	2.24584699	Save raw data	no
FH (H=+mm)	22.8373032	Hardcopy protocol	no
Ang.		Image filter	system default
AP (deg)	-1.09899402	Geometry correction	default
RL (deg)	0.0476288982	Elliptical k-space shutter	default
FH (deg)	1.77370369	IF_info_seperator	1634755923
Patient position	head first	Research Options used	47
Patient body position	head first	Total scan duration	03:36.1
Patient orientation	supine	Rel. SNR	312.167328
Patient body orientation	supine	Act. TR/TE (ms)	30 / 2.2
Scan type	Imaging	ACQ matrix M x P	64 x 60
Scan mode	3D	ACQ voxel MPS (mm)	4.00 / 4.00 / 10.0
technique	FFE	REC voxel MPS (mm)	1.00 / 1.00 / 5.00
Contrast enhancement	T1		
Acquisition mode	cartesian		
Fast Imaging mode	none		
Echoes	1		
partial echo	no		
shifted echo	no		
TE	shortest		
Flip angle (deg)	60		

<b>RF_sens_head</b>			mDIXON	no
			Fat suppression	no
SmartSelect	yes		Water suppression	no
Coil 1 (exclude)	None		MTC	no
Uniformity	CLEAR		Research prepulse	no
FOV			Diffusion mode	no
	FH (mm)	256	Multi-transmit	no
	AP (mm)	240	SAR mode	high
	RL (mm)	176	B1 mode	default
ACQ voxel size			SAR allow first level	yes
	FH (mm)	4	PNS mode	high
	AP (mm)	4	Gradient mode	maximum
	RL (mm)	4	SoftTone mode	no
Recon voxel size			Cardiac synchronization	no
	FH (mm)	1	Respiratory compensation	no
	AP (mm)	1	Navigator respiratory comp	no
	RL (mm)	4	Flow compensation	no
Fold-over suppression	no		fMRI echo stabilisation	no
Slice oversampling	no		NSA	1
ENCASE enable	no		Angio / Contrast enh.	no
Reconstruction matrix	256		Quantitative flow	no
SENSE	no		Manual start	no
CS-SENSE	no		Dynamic study	no
Stacks	1		Preparation phases	auto
	slices	44	Interactive F0	no
	slice orientation	sagittal	B1 field map	no
	fold-over direction	AP	MIP/MPR	no
	fat shift direction	F	SWIp	no
Multi-chunk	no		Images	M, (3) no
Large table movement	no		Autoview image	M
PlanAlign	no		Calculated images	(4) no
REST slabs	0		Reference tissue	Grey matter
Patient position	head first		Recon compression	No
Patient body position	head first		Preset window contrast	soft
Patient orientation	supine		Reconstruction mode	immediate
Patient body orientation	supine		Save raw data	no
Scan type	Imaging		Hardcopy protocol	no
Scan mode	3D		Image filter	system default
	technique	FFE	Uniformity correction	no
Contrast enhancement	T1		Geometry correction	default
Acquisition mode	cartesian		Elliptical k-space shutter	default
Fast Imaging mode	none		IF_info_seperator	0
Echoes	1		Total scan duration	00:08.9
	partial echo	no	Rel. SNR	42.3680992
	shifted echo	no	Act. TR/TE (ms)	4.6 / 2.0
TE	user defined		ACQ matrix M x P	64 x 60
	(ms)	2	ACQ voxel MPS (mm)	4.00/4.00/4.00
Flip angle (deg)	6		REC voxel MPS (mm)	1.00/1.00/4.00
TR	user defined		Scan percentage (%)	100
	(ms)	4.6	Act. slice gap (mm)	0
Halfscan	yes		Act. WFS (pix) / BW (Hz)	0.898 / 483.4
	factor Y	0.625	Min. WFS (pix) / Max. BW (Hz)	0.082/5277.0
	factor Z	1	Min. TR/TE (ms)	4.0 / 1.54
Water-fat shift	user defined			
	(pixels)	0.899999976		
Shim	auto			

### RF\_sens\_body

same as RF\_sens\_head, except following settings:

SmartSelect	no
clinical modes	BODY_QUAD.Complete
Coil 1	Q-Body

**MPM\_T1**

SmartSelect	yes	factor Y	0.625
Coil 1 (exclude)	None	factor Z	1
Uniformity	Synergy	Water-fat shift	user defined
FOV		(pixels)	0.899999976
	FH (mm)	Shim	auto
	AP (mm)	mDIXON	no
	RL (mm)	Fat suppression	no
ACQ voxel size	FH (mm)	Water suppression	no
	AP (mm)	MTC	no
	RL (mm)	Research prepulse	no
Recon voxel size	FH (mm)	Diffusion mode	no
	AP (mm)	Multi-transmit	no
	RL (mm)	SAR mode	high
Fold-over suppression	no	B1 mode	default
Slice oversampling	default	SAR allow first level	yes
ENCASE enable	no	PNS mode	high
Reconstruction matrix	256	Gradient mode	maximum
SENSE	yes	SofTone mode	no
	P reduction (AP)	Cardiac synchronization	no
	S reduction (RL)	Respiratory compensation	no
CS-SENSE	no	Navigator respiratory comp	no
Stacks	1	Flow compensation	no
	slices	fMRI echo stabilisation	no
	slice orientation	NSA	1
	fold-over direction	Angio / Contrast enh.	no
	fat shift direction	Quantitative flow	no
Stack Offc.	AP (P=+mm)	Manual start	no
	RL (L=+mm)	Dynamic study	no
	FH (H=+mm)	Preparation phases	auto
	Ang.	Interactive F0	no
	AP (deg)	B1 field map	no
	RL (deg)	MIP/MPR	no
	FH (deg)	SWIp	no
	Free rotatable	Images	M, (3) no
Multi-chunk	no	Autoview image	M
Large table movement	no	Calculated images	(4) no
PlanAlign	no	Reference tissue	Grey matter
REST slabs	0	Recon compression	No
Patient position	head first	Preset window contrast	soft
Patient body position	head first	Reconstruction mode	immediate
Patient orientation	supine	Save raw data	no
Patient body orientation	supine	Hardcopy protocol	no
Scan type	Imaging	Image filter	system default
Scan mode	3D	Uniformity correction	no
	technique	Geometry correction	default
Contrast enhancement	T1	Elliptical k-space shutter	default
Acquisition mode	cartesian	IF_info_seperator	0
Fast Imaging mode	none	Total scan duration	03:37.4
Echoes	6	Rel. SNR	2.27444863
	partial echo	Act. TR/TE1/delta TE (ms)	18 / 2.4 / 2.4
	shifted echo	ACQ matrix M x P	256 x 240
TE first	user defined	ACQ voxel MPS (mm)	1.00/1.00/1.00
	(ms)	REC voxel MPS (mm)	1.00/1.00/1.00
	echospadding	Scan percentage (%)	100
	(ms)	Act. slice gap (mm)	5.96E-08
	flyback	Act. WFS (pix) / BW (Hz)	0.907/478.7
Flip angle (deg)	25	Min. WFS (pix) / Max. BW (Hz)	0.329/1319.6
TR	user defined	Min. TR/TE1/delta TE (ms)	17 / 2.0 / 2.4
	(ms)		
Halfscan	yes		

**MPM\_PD and MPM\_MT on next page...**

**MPM\_PD**

same as **MPM\_T1**, except following settings:

Flip angle (deg)	4	Total scan duration	03:37.4
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**MPM\_MT**

same as **MPM\_T1**, except following settings:

Flip angle (deg)	6	Research Options used	26
TR	user defined	Total scan duration	09:39.8
(ms)	48		
MTC	off res. multi		
nr repetitions	1		
angle	220		
duration	8		
frequency	1000		