

Short 3T MRI Protocol for Head & Neck MS study With Contrast

(NOTE: Please follow the sequence order)

Head - with Contrast (Center at the orbital ridge)					
Sequence Order	#1	#2	#3	#4 / #12	#13
	Dual Echo SWI	T2 WI	3D FLAIR	MPRAGE Pre/ Post Gad	3D VIBE Post Gad - Sagittal
Sequence	gre	tse	tse_vfl	tfl	fl3d_vibe
Orientation	Axial	Axial	Sagittal	Axial	Sagittal
TR (ms)	29	7080	6000	1750	3.97
TE (ms)	1 st TE = 6, 2 nd TE = 20	77	397	2.98	1.43
TI (ms)			2200	900	
FA (degree)	15	120		9	25
FOV (mm ²)	256x192	256x192	256x256	256x256	352x275
Matrix size	512x256	512x256	256x256	512x256	384x384
Nz/TH (mm)	128/2	100/2	160/1	192/1	256/0.9
Voxel size (mm ³)	0.5x1x2	0.5x1x2	1x1x1	0.5x1x1	0.9x0.9x0.9
Ave./Meas.	1	1	1	1	1
Phase oversmpl					
Slice oversmpl				16.7%	
Dist. factor	20%	0%	0%	50%	20%
Phase Enc. Dir	R>>L	R>>L	A>>P	R>>L	A>>P
iPAT	2/24	2/24	2/24	2/24	2/24
BW (Hz/pixel)	470 and 120	222	781	180	690
Flow Comp	Yes for 1 st TE, No for 2 nd TE	No	No	No	
Phase partial Fourier	Off	Off	Allowed	Off	6/8
Slice partial Fourier	Off	Off	7/8	Off	6/8
Flow Mode/Direction					
Venc. (cm/s)					
1 st Signal/Mode					
Echo spacing (ms)		11.1	3.32	7.6	
Turbo factor		18	141		
Echo trains per slice		6	1		
Coils	Head	Head	Head	Head	Head
Time	06:39	2:30	5:20	4:03x2	1:45
Total Time	06:39	9:09	14:29	22:35	24:20

Note:

- Position the subject at the orbital ridge.
- Slice position for the above sequences (Dual Echo SWI, T2, MPRAGE) should be true axial.
- If Dual Echo SWI is not possible at your center, run the sequence with a single echo TE = 20ms.
- 3D FLAIR and 3D VIBE POST GAD should be acquired in a sagittal plane.

Total Scan Time: ~ 47 minutes

Neck (CSF / Jugulars) - with Contrast (Center at the chin)							
Sequence Order	#5	#6	#7	#8	#9	#10	#11
	2D MRV (neck)	T2 WI	3D VIBE Pre Gad - Sagittal	3D MRV (Dynamic) <i>Inject Contrast after 3rd measurement for the 3D MRV</i>	3D VIBE Post Gad - Sagittal	Flow Quantification (CSF)	Flow Quantification (Jugulars)
Sequence	fl_tof	tse	fl3d_vibe	fl3d_ce	fl3d_vibe	fl_fq_retro	fl_fq_retro
Orientation	Axial	Sagittal	Sagittal	Coronal	Sagittal	Axial	Axial
TR (ms)	29	2800	3.97	3.31	3.97	95.25	95.25
TE (ms)	5.02	82	1.43	1.25	1.43	10	10
FA (degree)	60	160	25	20	25	20	20
FOV (mm ²)	320x256	256x256	352x275	340x255	352x275	256x256	256x256
Matrix size	512x256	384x268	384x384	384x384	384x384	448x448	448x448
Nz/TH (mm)	128/3	19/3	256/0.9	72/0.9	256/0.9	1/2.5	1/2.5
Voxel size (mm ³)	0.6x1.3x3	0.7x1x3	0.9x0.9x0.9	0.9x0.9x0.9	0.9x0.9x0.9	0.6x0.6x2.5	0.6x0.6x2.5
Ave./Meas.	1	1	1	1/15	1	1	1
Phase oversmpl		100%					
Slice oversmpl				11.1%			
Dist. factor	-25.0%	0%	20%	20%	20%	20%	20%
Phase Enc. Dir	A>>P	H>>F	A>>P	R>>L	A>>P	A>>P	A>>P
iPAT	2/24	None	2/24	PE: 2/48, 3D: 2/24	2/24	2/24	2/24
BW (Hz/pixel)	217	260	690	650	690	192	192
Flow Comp	Yes	Read				No	No
Phase partial Fourier		Allowed	6/8	6/8	6/8		
Slice partial Fourier			6/8	6/8	6/8		
Special Sat.	Tracking F						
Pre Saturation	Gap10mm; TH 40mm						
Flow Mode / Direction						Single Dir./ Through Plane	Single Dir./ Through Plane
Venc. (cm/s)						15	50
1 st Signal/Mode						Pulse/Retro	Pulse/Retro
Echo spacing (ms)		10.3					
Turbo factor		11					
Echo trains per slice		49					
Coils	Head+Neck +SP1,2	Head+Neck +SP1,2	Head+Neck +SP1,2	Head+Neck +SP1,2	Head+Neck +SP1,2	Head+Neck+S P1,2	Head+Neck+S P1,2
Time	6:57	2:22	1:45	2:52	1:45	1:42	1:42(x3)
Total Time	6:57	9:19	11:04	13:56	15:41	17:23	22:29

Note:

- Position the subject to the chin for the neck. Make sure to use HEA;HEP;NE1,2;SP1,2 coils are highlighted.
- Please put a pulse trigger on the patient's index finger.
- Flow quantification will be done perpendicular to the CSF flow at C2/C3 neck level with a venc of 15cm/sec, and perpendicular to the internal jugular veins (IJV's) at the C2/C3, C5/C6 and T1/T2 neck levels with a venc of 50cm/sec.

Now center at the brain to run the sequences #12 and #13 from page #1.