

ISMRM Reproducibility Team Challenge: Key Sequence Parameters

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In the ISMRM reproducibility team challenge, we try to make the product MPRAGE and EPI scans as similar as possible to the Pulseseq scans for comparison. The key sequence parameters for MPRAGE and EPI product scans on Siemens scanners are listed below. Please try to adapt the sequence parameters for GE scans. You do not have to make the Product protocol exactly the same as the Pulseseq protocol but just try to align the Product protocol with the corresponding Pulseseq protocol as much as possible.

Note: Please try to keep and FOV position and the adjustment shim volume the same for both product and Pulseseq scans.

MPRAGE Sequence Parameters

Orientation: Sagittal (it would be good if you use a structured phantom to check the orientation of Product sequence matches Pulseseq sequence or not)

Phase encoding direction: from anterior to posterior (A>>P)

FOV = 192*240*256 mm³ ([partition, phase, readout])

Matrix size = 192*240*256 ([partition, phase, readout])

Resolution = 1*1*1 mm³ ([partition, phase, readout])

TR = 2500 ms; TE = 3.37 ms; TI = 1100 ms; TA = 5:38 min

Magnetization preparation: non-selective inversion recovery pulse

Flip angle = 7 degree (for non-selective excitation)

Acceleration: integrated GRAPPA; acceleration factor PE = 2; reference lines PE = 32; acceleration factor 3D = 1.

Asymmetric Echo = “off”; readout oversampling = 2.

Coil combination: Sum of Squares

Shimming strategy: Siemens-provided automatic **“standard” shim** (if possible, please also use similar vendor-provided automatic shim on GE)

Readout Bandwidth: 200 Hz/Px (it is $1/\text{ADC_duration}$)

Echo spacing = 7.94 ms

Excitation = “Non-selective”; RF pulse type = “Fast”; Gradient mode = “Normal”; Flow compensation = “None”; RF spoiling = “On”

EPI Sequence Parameters

Number of slices = 48; Slice thickness = 3.0 mm; Slice Distance factor = 0% (there is no slice overlapping)

Phase Oversampling = 0%. Readout oversampling factor = 2

FOV Read = 220 mm; FOV Phase = 220 mm; FOV in Slice-selective direction = $3.0 * 48$ mm.

Image matrix size = $80 * 80 * 48$ ([read, phase, slice])

Image resolution = $2.8 * 2.8 * 3.0$ mm³

Orientation = “Transversal”; Phase Encoding Direction = “A>>P” (from anterior to posterior)

TR = 3630.0 ms; TE = 33.00 ms.

Flip angle = 90 degree (slice-selective excitation)

Fat-water contrast = “Fat Saturation”

Acceleration Mode = “None” (no parallel imaging, etc.)

Multi-slice Mode = “Interleaved” (slice order is interleaved, e.g. 1,3,5,7....47, 2,4,6,8....48)

Coil combination = “Sum of Squares”

Shimming strategy: Siemens-provided automatic **“standard” shim** (if possible, please also use similar vendor-provided automatic shim on GE)

Readout bandwidth = 1562 Hz/px ($1/\text{ADC_duration}$)

Echo spacing = 0.7 ms