Harmonization of MPRAGE and EPI: Data Acquisition Instruction on Siemens

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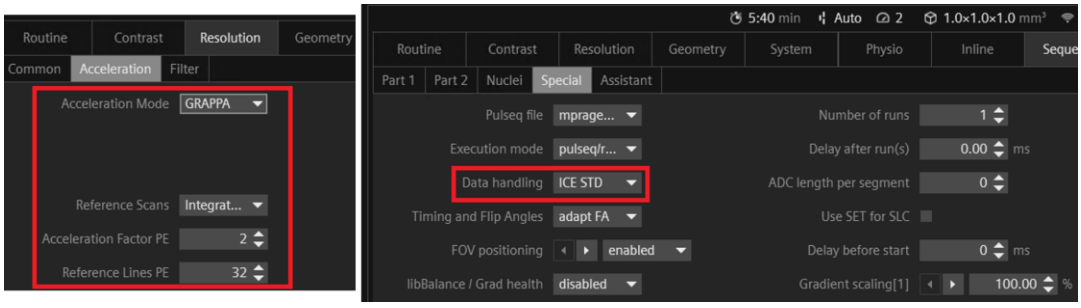
To extend our work from the 2023-24 ISMRM Reproducibility Team Challenge into a proper publication, I have updated the MPRAGE and EPI Pulseq-based sequences to achieve improved fat suppression and correct orientation between Siemens and GE systems.

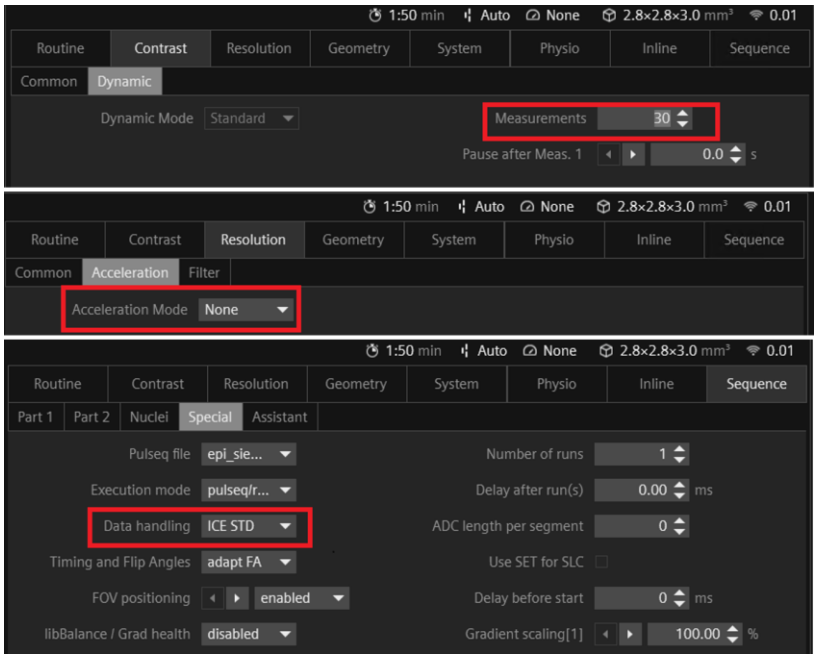
To compare MPRAGE and EPI data acquisition and image reconstruction between vendor-based and Pulseq-based protocols, we need to configure the vendor-based sequences to closely match the Pulseq-based sequences. Please refer to the document "*dataacq_imagerecon_workflow.pdf*" for detailed guidance. The key points are outlined below.

Notes:

1. Ensure the FOV position and the adjustment shim volume are the same for vendor-based and Pulseq-based scans.
2. Orientation: "Sagittal" for MPRAGE, "Transversal" for EPI. Phase Encoding Dir.: A>>P.
3. Fat suppression: "Fast Water Excitation" for MPRAGE, "Fat Saturation" for EPI.
4. Please use the automatic standard shim for B0 shimming.
5. Please be sure that the maximum pixel/voxel intensity doesn't violate the intensity threshold of 4096.
6. Please use the "Sum-of-Square" for coil combination.
7. To enable online reconstruction for Pulseq-based MPRAGE (*mprage_siemens.seq*), please turn on the iPAT card and select "ICE STD" for Numeris.X (ICE 3D for Numeris 4) for "Data handling" in the special card, as below:



8. To enable online reconstruction for Pulseq-based EPI (*epi_siemens.seq*), please be sure that the iPAT card is off and "Dynamic" -> "Measurements" is 30, and select "ICE STD" for Numeris.X (ICE 2D for Numeris 4) for "Data handling" in the special card, as below.



After completing data acquisition on both a structured phantom and a human brain, please send back the following materials:

- DICOM images and raw data of the vendor-based MPRAGE and EPI scans (for the phantom and the human brain).
- DICOM images and raw data of the Pulseq-based MPRAGE and EPI scans (for the phantom and the human brain).