Updating Protocols on the New 3T East MR750 Scanner
(Nov 28, 2011)

The 3T East scanner at CFMRI has recently been upgraded to GE Discovery MR750 running software rev 22M4. If you plan to create protocols on the new MR750 scanner that match your old protocols from before the upgrade, please note the following changes in the new software. It may be necessary to modify your protocols due to these differences. If you need assistance with the modification, please feel free to sign up for an operator training via CFMRI website. During the training, our staff will guide you through the changes necessary for updating your protocols on the new scanner.

1. EPI

- Change in Echo Spacing (esp)
  The esp in EPI dictates how fast EPI images are acquired. The new scanner software uses shorter esps compared to the old system, e.g. for an FOV of 22cm with ramp sampling, esp is 416us in the new software, vs. 472us in the old software. Shorter esp means faster data acquisition, which reduces geometric distortion and allows more spatial coverage in a given TR. We recommend taking advantage of this improvement on the new scanner.

  However, if you are continuing an on-going project from before the upgrade and desire to retain the old esp, we have created a modified pulse sequence (psd) "**fmri_ucsd**". The sequence allows manually switching between the old and new esp by setting the **User CV8** (legacy mode). Set the **User CV8** to 1 to use the old esp, or 0 to use the new esp. The pulse sequence also provides other convenient features such as turning on and off Fermi filters or GE built-in physiological signal recording.

- Change in minimum slice thickness
  Due to concerns of Peripheral Nerve Stimulation (PNS), the minimum slice thickness on the new scanner is 2.9mm; whereas it was 2.4mm on the old system. We strongly recommend using GE default settings and prescribing slices thicker than 2.9mm to avoid PNS. However, if it is critical for you to use thinner slices, you can set the **Chem Sat** option to **fat** on the **graphical user interface.** This tells the scanner to use a different fat suppression pulse which does not limit the slice thickness. The downside is that the pulse has a slightly different slice profile which causes a minor decrease in the signal to noise ratio.

2. DTI

- Change in minimum slice thickness
  The new scanner limits the minimum slice thickness to 2.9mm in DTI for the same reason as in EPI (See above). If you prefer to use slices thinner than 2.9mm, the same work-around can be applied by setting the **Chem Sat** option to **fat** on the **graphical user interface**. This tells the scanner to use a different fat suppression pulse which does not limit the slice thickness. However, it does not suppress the fat equally well, and as a consequence, remaining fat signal may be seen in the images for research participants who have large amount of fat tissue around the skull. This is not a typical problem for EPI because of the long TE used in EPI fMRI and the short T2* of fat.

  On a case-by-case basis, we provide a modified DTI sequence which overwrites the minimum slice thickness to 2mm. This sequence is offered only to PIs who can demonstrate that PNS is not an issue for their projects or study population. Please contact us if you would like to consider using the modified DTI sequence.

Our staff is available to help with creating and modifying protocols on the new 3T East Scanner. Please feel free to sign up for training on our website or contact us directly at cfmri@ucsd.edu if you need any assistance.