Magnetic Resonance Research Center
University of Pittsburgh
MRRC 006: Siemens 7 Telsa System

PURPOSE:
This SOP describes the day-to-day duties and procedures for the personnel operating the 7 Telsa (7T) system in order to maximize smooth operation. To ensure optimal research productivity, if three personnel described below are not available, the MRRC Director and the Collaborating Principal Investigator will decide how to bring the on-site team up to full strength. *No scanning can take place on the 7T system without the minimum personnel described below*.

BACKGROUND:
Background

The 7T MR system is a unique component of the University of Pittsburgh MRRC. By virtue of its high SNR (~7/3 increase compared to our 3T systems), the 7T is able to acquire measurements of human physiology and function at high resolution and accuracy that are of importance for studies in neuroscience and psychology. However, the 7T is also more properly regarded as a true "research" MR system, as this system is not (yet) FDA approved. Furthermore, as many of the advanced measurements performed on the 7T have been established by MRRC faculty and scientists, the steps (setup, acquisition, and data analysis/processing) are unique to the 7T. As such, the normal management and operation of the 7T MR differs from the conventional 3T systems (which are all FDA approved).

Operations

Required Personnel:

1) Two individuals from the MRRC (either two MR Scientists or one MR Scientist and an MR Technologist)
2) One individual from the collaborating project (denoted here as Collaborating Researcher).
3) All personnel working at the 7T need to be have completed all MR safety training and be knowledgeable regarding high-field MR safety.

Duties of the MR Scientist:

1) The MR Scientist is responsible for the overall MR aspects of the study.
2) Prior entry of the volunteer into the magnet room, the MR Scientist will ensure that the transceiver and shim hardware are functional.
3) The MR Scientist will ensure that the fiber optic visual detector is properly positioned within the transceiver.
4) The MR Scientist will be responsible for ensuring that all personnel and study volunteers are compliant with the relevant MR safety rules.
5) The MR Scientist will be responsible the RF optimization and B0 shimming for each study. This is performed on the parallel Shim PC with data flow handled in an interleaved fashion with the MR Technologist.
6) The MR Scientist will be responsible for data management and any MR spectroscopic reconstructions.

Duties of the MR Technologist (or MR Scientist #2 if a Technologist is unavailable)

1) the MR Technologist will ensure that adequate linens are available and on the magnet table and that adequate scrubs as needed are available for the subject prior to the volunteer entering the magnet room.
2) The MR Technologist will ensure that the various pads, hoses and monitoring equipment are present and functional.
3) The MR Technologist will ensure that personnel and volunteer entering the magnet room are MR safe.
4) the MR Technologist and the Collaborating Researcher will position the volunteer within the RF transceiver and magnet. RF transceiver tuning and matching will be performed after which the volunteer will be moved into the magnet.
5) The Technologist will be responsible for acquiring images (from the scanner console) as interleaved with the MR Scientist.
6) The Technologist will interact with the Collaborating Researcher to ensure that the images are acquired appropriately and in synchrony with any additional inputs/outputs for physiological and functional testing.

Duties of the Collaborating Researcher

1) The Collaborating Researcher is responsible for the overall adequate compliance of the volunteer with the demands of the project.
2) Prior entry of the volunteer into the magnet room, they will ensure that the volunteer is compliant with high-field MR safety requirements, and that they are appropriately attired (i.e., MRRC scrubs or appropriately screened clothing), and that any entertainment choices (e.g., video, audio) of the volunteer have been made.
3) Prior entry of the volunteer into the magnet room, they will ensure that the outputs from the ancillary PC(s), visual/auditory equipment as required by their study are functional.
4) During positioning of the volunteer in the MR system, the Collaborating Researcher will ensure adequate hearing protection, adequate comfort, and adequate visual and auditory interactions with the volunteer. This includes but is not limited to: placing ear plugs and pads, attaching auditory hose, providing emergency squeeze ball, positioning within the transceiver, placing additional sheets/blankets/knee support as needed (e.g., ask the volunteer whether additional sheets needed), checking auditory volume and control from the console room, and checking video output on the magnet room screen.
5) The Collaborating Researcher will ensure that adequate physiological monitoring (as needed for that particular study) is adequately functioning with the volunteer.
6) The Collaborating Researcher ensure that the volunteer's multiple tubes and instrumentation are appropriately placed.
7) They will move the volunteer into the magnet with the assistance of the MR Technologist.
    a. **N.B.,** The entire process from entering the magnet room to positioning the volunteer in the magnet itself should take less than 10min.
8) The Collaborating Researcher will interact with the MR Technologist and MR Scientist during the study to ensure that needed instructions and acquisitions are performed.
9) At the end of the study, the Collaborating Researcher will assist the Technologist and/or Scientist to withdraw the subject from the magnet. The ancillary PC and visual/auditory input equipment will be turned off or left on per discussion with the Technologist or Scientist (pending a following study).
10) The Collaborating Researcher will accompany the volunteer with any after-MRI testing and will accompany the volunteer out of the MR suite.
11) The Collaborating Researcher will be responsible for saving and collecting any non-MR based data.