

ROBARTS RESEARCH INSTITUTE

CENTRE FOR FUNCTIONAL AND METABOLIC MAPPING: 3T/7T MRI FACILITY

Standard Operating Procedure #300-01
Last Updated: August 15, 2008

General Experimental

1. Introduction

- 1.1 Research involving Magnetic Resonance Imaging (MRI) at high magnetic field strengths present unique hazards to both research subjects and individuals working within and around the MRI system. Consequently, the potential for serious personal injury is present due to the sheer size and strength of the static magnetic field along with the immense flexibility of the research system and associated peripheral hardware.
- 1.2 The static magnetic field in the 3T/7T MRI Facility is always present. It is important that all those entering the facility be aware of the presence of the field, as it cannot be detected by our person in any way, i.e. magnetic fields cannot be felt, seen, or smelt.
- 1.3 There exist dangerous and potentially lethal levels of electricity in both the 3T and 7T MRI systems. As such, it is important that all individuals working around the MRI systems be aware of the dangers and therefore knowledgeable as to the safety issues concerning electricity. Furthermore, current carrying cables, connections and junction points in the vicinity of the main magnetic field are particularly susceptible to damage due to the extreme Lorentz forces created through the normal operation of the system. Periodically, the effects of prolonged mechanical fatigue will result in breakage causing electrical arcing, sparking and high heat levels before the system can shut down. There therefore becomes a high potential for personal injury and the possibility of a fire being ignited.
- 1.4 During certain types of MRI data collection, there exists high, and therefore potentially dangerous, acoustic sound pressure levels (SPL). All those entering the facility must be made aware of this risk and be instructed as to the proper precautionary measures to be taken. Any patients, volunteers and/or research personnel present in the magnet room during an MRI experiment must wear appropriate hearing protection as outlined in SOP#200-01 "General Safety".
- 1.5 As a result of the potential for serious injury, access to the 3T/7T MRI Facility is restricted, and requires permission. See SOP#100-01 "MRI Facility Access Approval Policy", and SOP#110-01 "MRI Facility Visitor Approval Policy".
- 1.6 It is imperative that all personnel who are within and around the 3T/7T MRI Facility always keep in mind the potential safety risks, and act in accordance with the guidelines set out in the Standard Operating Procedures.

2. General Set Up Procedure

- 2.1 All volunteers/patients must be screened for incompatible medical devices as listed in SOP#200-01 "General Safety", and according to SOP# 130-01 "New Protocols and Ethics"

before entering the 3T/7T MRI Facility.

- 2.2 The Operator must Log On to the console at the beginning of the scan session. See SOP#400-01 "System Billing Guide and Standard Rates".
- 2.3 The volunteer/patient, all experimental support personnel, the operator, and anyone going into the magnet room, must remove all metallic objects from their person before crossing the 5 Gauss line as marked on the floor and on signs in the 3T/7T MRI Facility. For a list of articles see SOP#200-01 "General Safety".
 - 2.3.1 The operator is responsible to screen all objects entering the magnet room for ferrous components.
 - 2.3.2 All objects, not already in the magnet room, should not be brought into the magnet room, unless they are necessary for the successful execution of the experiment, and have been tested using a permanent magnet in the control room, or have been viewed and permitted for entry by one of the Facility Director, Manager or Head Technician.
- 2.4 It is mandatory for the volunteer/patient, and all others who will be present in the magnet room during the scan session to wear hearing protection either in the form of earplugs or headphones provided by the 3T/7T MRI Facility.
- 2.5 It is imperative that all research support personnel present in the magnet room be aware of the responsibilities and risks associated with equipment as it is operating. This includes areas of high electrical activity and potential mechanical failure points. A safe operating distance from these designated areas must always be taken into accordance. Failure to do so could result in severe injury or death!
- 2.6 The Operator will advance the volunteer/patient into the magnet at his/her own discretion. If the operator feels at any time that the volunteer/patient is not comfortable and may panic, s/he may refuse to advance them into the magnet and may cancel the scan session.

3. **Responsibilities of the Operator**

- 3.1 The operator is responsible to ensure the physical and emotional safety of all research personnel and volunteers/patients within the magnet room. This includes wearing proper hearing protection and being made aware of the critical operating areas.
- 3.2 The operator is responsible to ensure that all necessary patient safety devices are operational for a scan session. It is at the discretion of the operator to cancel the scan session at any time if any or all of the safety devices are not operational. All patient safety devices are listed below. Not all safety devices may be necessary for all experiments.
 - 3.2.1 Emergency squeeze ball
 - 3.2.2 Audio system
 - 3.2.3 Camera
 - 3.2.4 Crash cart / AED
 - 3.2.5 Fire extinguisher
 - 3.2.6 Smoke detector
- 3.3 The operator is responsible to notify the Facility Manager or Head Technician of any patient safety device that is not operational.
- 3.4 The operator is responsible to notify the Facility Manager or Head Technician of any

peripheral device that is not operational. Peripheral devices include but are not limited to:

- 3.4.1 Stimulus Projection Systems
- 3.4.2 Physiological Monitoring Devices
- 3.4.3 Control or Stimulus Presentation Computers
- 3.4.4 Projection Screens
- 3.4.5 RF Coils

- 3.5 It is the responsibility of the operator to screen all items entering the magnet room for ferrous components. A strong hand held magnet is made available for such testing.
- 3.6 The operator is responsible to place any soiled linen in the laundry hamper under the bench of the storage area in the entrance hall. No soiled linen is to be kept inside the magnet room.
- 3.7 The operator is responsible for returning all peripheral devices and any other item used during the scan session, to their original holding places upon completion of the scanning session.

4. **Responsibilities of the Facility**

- 4.1 The facility is responsible to check all Primary devices daily. Primary devices are as follows:
 - 4.1.1 The magnet system.
 - 4.1.2 All patient safety devices.
- 4.2 The facility will inform operators and investigators of malfunctions of Primary devices, if their scan time will be affected.
- 4.3 Secondary devices will not be checked daily. Secondary devices are all peripheral devices as listed in section 3.3. If one of these devices fails, the facility may out of courtesy inform operators and investigators. If the facility is aware of failure of a specific secondary device that will affect upcoming scan time, the facility will notify the appropriate operators and investigators.