York MRI Facility

Standard Operating Procedure #50-01

General Experimental Procedures

1. Introduction

1.1. Research involving Magnetic Resonance Imaging (MRI) at high magnetic field strengths presents 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 flexibility of the research system and associated peripheral hardware.

1.2. The static magnetic field in the York 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 in any way, i.e. magnetic fields cannot be felt, seen or smelled. Ferromagnetic objects brought into the magnet room could quickly become dangerous projectiles, and the magnetic field can also interfere with the operation of certain medical implants.

1.3. During MRI data acquisition the subject being imaged is also exposed to rapidly changing magnetic fields due to pulsed magnetic field gradients, and fields oscillating at radiofrequencies around 128 MHz for 3 T. These time-varying fields are much weaker than the static field (up to 10 mT or 100 gauss) but create additional safety risks and all personnel working with the MRI equipment must be aware of these risks.

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 take. 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 #31-02 “General Safety Procedures”.

1.5. As a result of the potential for serious injury, access to the York MRI Facility is restricted, and requires permission. See SOP #10-02 “Restricted Access Policy”.

1.6. It is imperative that all personnel who are within and around the York 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. The Operator must log their time on the “3T MRI Log Sheet” located on the counter to the right of the operator console. See SOP #70-01 “System Billing Guide and Standard Rates”.

2.2. The volunteer/patient, all experimental support personnel, the operator, and anyone going into the magnet room, must be screened for incompatible medical devices by completing the “Magnetic Resonance Safety Screening Form”, and must remove all metallic objects from their person before crossing the 5 Gauss line as marked on the floor and on signs in the York MRI Facility. For a list of articles see SOP #31-02 “General Safety Procedures”.

2.2.1. The operator is responsible for screening all objects entering the magnet room for ferrous components.

2.2.2. No 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 either the Facility Director or Safety Officer.

2.3. 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 York MRI Facility.

2.4. 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 maintained. Failure to do so could result in severe injury or death.

2.5. 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 Principal Investigator and Research Personnel

3.1. The principal investigator or research personnel must inform their operator of a cancelation of scan time as soon as possible. The operator will then immediately remove the entry from the online schedule so that another user may book the time.

3.2. It is the responsibility of the principal investigator or research personnel to ensure that their scanning session ends punctually at the specified time as listed on the online schedule. An experiment will not be allowed to exceed the scheduled time unless:

3.2.1. there is time available on the schedule following the session and the operator agrees to stay and operate the scanner for the extra time.

3.2.2. OR the researcher and operator scheduled in the subsequent scanning slot both agree to allow the extra time.

3.3. At least one member of the research team (i.e., the principal investigator or a member of their team) must be present in the control room for the duration of each scan session. These individuals must have successfully completed MRI safety training.

3.4. It is the responsibility of the principal investigator or research personnel to communicate the requirements of research tasks to participants prior to/during scan sessions.

3.5. To maintain a safe environment in and around the MRI system, the principal investigator or research personnel must follow the operator's instructions at all times. If the operator requests assistance with setting up the equipment and/or a participant within the MRI for a scan session, the principal investigator or research personnel should be prepared to assist the operator.

4. Responsibilities of the Operator

4.1. The Operator is responsible for 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.

4.2. The operator is responsible for ensuring 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 of the safety devices are not operational. All patient safety devices are listed below. Not all safety devices may be necessary for all experiments.

4.2.1. Emergency squeeze ball
4.2.2. Audio system
4.2.3. Camera
4.2.4. Fire extinguisher
4.2.5. Smoke detector
4.2.6. Oxygen Sensor

4.3. The operator is responsible for notifying the Facility Director or Safety Officer of any patient safety device that is not operational.

4.4. The operator is responsible for notifying the Facility Director or MRI Technologist of any peripheral device that is not operational. Peripheral devices include but are not limited to:

4.4.1. Stimulus Projection Systems
4.4.2. Task Feedback Systems
4.4.3. Control or Stimulus Presentation Computers
4.4.4. Projection Screens
4.4.5. RF Coils

4.5. 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.

4.6. The operator is responsible for placing any soiled linen in the laundry hamper.

4.7. The operator is responsible for returning all peripheral devices, including RF Coils and any other items used during the scan session, to their original holding places upon completion of the scanning session.

5. Responsibilities of the Facility

5.1. The facility is responsible for checking all Primary devices daily. Primary devices are as follows:

5.1.1. The magnet system.
5.1.2. All patient safety devices.

5.2. The facility will inform operators and investigators of malfunctions of Primary devices, if their scan time will be affected.

5.3. Secondary devices will not be checked daily. Secondary devices are all peripheral devices as listed in section 4.4. 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.