

# ROBARTS RESEARCH INSTITUTE

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

Standard Operating Procedure #220-01  
Last Updated: August 15, 2008

### Emergency Fire

#### 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 Working within and around the high field MRI requires in depth training on safety and Standard Operating Procedures, and documented proof of other necessary training. See SOP#120-01 "[Safety and Operator Training](#)".
- 1.5 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. Signs of a Potential Fire

- 2.1 There are signs of a potential fire present before a fire occurs. Operators need to be aware of the signs to prevent injury to the volunteer/patient and other experimental support personnel in the magnet room, equipment room and the control room during a scan session.
- 2.2 The first sign of a potential fire is often an irregular noise, for example a loud popping sound or a sudden stop of the gradients. It is imperative that the operator determine the cause of the irregular noise before continuing with the scan session.
- 2.3 The second sign of a potential fire is often a subtle detection of an odour.

- 2.4 The third sign of potential fire is small amounts of smoke. There may not be enough smoke to set off the detector, so it is important to always be aware of the possibility of the presence of smoke. If anyone in the control room, equipment room or the magnet room notices smoke, even if the smoke detector alarm is not sounding, the procedure below must be followed.
- 2.5 The final case is one in which the smoke detector has gone off and an alarm is sounding in the magnet room.
- 2.6 In each of the above circumstances the operator must:
  - 2.6.1 Abort the current acquisition.
  - 2.6.2 Put the gradient amplifier into standby mode. See either SOP#320-01 "3T MRI System Shutdown" or SOP#325-01 "7T MRI System Shutdown" for the procedure.
  - 2.6.3 Remove the volunteer/patient from the scanner.
  - 2.6.4 Investigate the source of the irregular noise, odour or smoke.
  - 2.6.5 Close the magnet room door and turn off the blower fan (located on the left side of the filter plate closet, outside of the magnet room).
  - 2.6.6 Immediately notify the Facility Manager.
- 2.7 It is important to keep in mind that any smoke or odour caused by heat can contain chemicals that are harmful if inhaled. Limit your exposure and close the magnet room door to prevent the noxious fumes from permeating the rest of the building.

### 3. **Emergency Fire Procedure**

- 3.1 Remember to use common sense! There are three basic steps to follow:
  - 3.1.1 Ensure your own safety,
  - 3.1.2 Ensure the safety of others in the facility,
  - 3.1.3 Contain the fire if possible. If it is not possible to contain the fire, follow the procedure in section 4 "Emergency Fire Procedure for Uncontrollable Fires".
- 3.2 Shut off the electrical power to the magnet and equipment room, by hitting one of the three system electrical shutdown buttons (this will NOT quench the magnet). They are located:
  - 3.2.1 On the wall to the left of the operator station, the highest one on the wall.
  - 3.2.2 In the equipment room, to the right as you enter the door.
  - 3.2.3 In the magnet room, to the right as you enter the door.
- 3.3 Remove the volunteer/patient from the scanner.
  - 3.3.1 If it is safe to do so, unplug the cables at the back of the magnet.
  - 3.3.2 Press the red EMERGENCY STOP button on the side of the bed, to unlock it and then pull the bed out manually using the handle at the end of the bed. If you were not able to unplug the cables, it may be difficult to pull the bed all the way out.
  - 3.3.3 If the volunteer/patient is not responding, not breathing or is in respiratory distress and does not have a pulse or is in cardiac distress, follow the procedure set out in SOP#210-01 "Emergency Code Blue".

- 3.4 Contain the fire.
  - 3.4.1 The non-magnet fire extinguisher is located to your left before you enter the magnet room door, opposite to the projector cart. There is a sign posted above the fire extinguisher indicating its location.
  - 3.4.2 If possible, use the non-magnetic fire extinguisher to put out the fire. If the fire is larger than a soccer ball, DO NOT approach or attempt to put out the fire, instead proceed to section 4 and follow the steps outlined in “Emergency Fire Procedure for Uncontrollable Fires”.
  - 3.4.3 If you have attempted to put out the fire, but it is not possible to contain it using the non-magnetic fire extinguisher, proceed to section 4 and follow the steps outlined in “Emergency Fire Procedure for Uncontrollable Fires”.
- 3.5 Close the magnet room door and turn off the blower fan (located on the left side of the filter plate closet on the outside of the magnet room).
- 3.6 Have someone call UWO Emergency Dispatch at Ext. 88911 or, if alone, call yourself and explain that there was a small, controllable fire that has been extinguished in the 3T MRI Facility at Robarts.
- 3.7 Evacuate the building to avoid smoke or if the fire alarm is sounding.
- 3.8 Notify the Facility Manager or Director immediately following the incident. The facility staff must then file an appropriate UWO incident report of the situation (contact Ron Noseworthy).

#### 4. **Emergency Fire Procedure for Uncontrollable Fires**

- 4.1 Always remember to:
  - 4.1.1 Ensure your own safety,
  - 4.1.2 Ensure the safety of others in the facility.
- 4.2 Follow steps 3.2 – 3.5 in section 3 “Emergency Fire Procedure”.
- 4.3 If the fire is uncontrollable and cannot be contained using the non-magnetic fire extinguisher and the fire is INSIDE the magnet room: Quench the magnet following SOP#230-01 “Emergency Quench Procedure”.
- 4.4 From a safe place call the UWO Emergency Dispatch at Ext. 88911 and inform them that there is an uncontrollable fire in the 3T MRI Facility at Robarts.
  - 4.4.1 The UWO Emergency Dispatch will contact the Fire Department directly and will notify Robarts Security. Robarts security will pull the fire alarm if it is not already sounding.
- 4.5 Evacuate the building, and pull the fire alarm if it is not already sounding.
- 4.6 Meet the fire department at the exterior door
  - 4.6.1 Give them details regarding the incident including the specific location of the fire and whether or not the magnet has been quenched.
  - 4.6.2 If the fire is OUTSIDE the magnet room and the magnet has not been quenched the fire fighters must be informed that the magnet is still at field. The fire fighters

must not enter the magnet room with their gear donned; doing so could cause serious injury to themselves or anyone near the magnet at the time.

4.6.3 If the fire fighters deem it necessary to enter the magnet room with their gear donned, quench the magnet following SOP#230-01 "Emergency Quench".

4.7 Notify the Facility Manager or Director immediately following the incident. The facility staff must then file an appropriate UWO incident report of the situation.