



Standard Operating Procedure (SOP)

Title: Scanner Preparation and Pre-scan Procedures	SOP No. SAIL-MRI-SOP-01
	Version No. 02
	Effective Date: July 28, 2017
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1. Purpose

This SOP describes and outlines the proper preparation and set-up of the 7T MRI scanner for scanning sessions in the SAIL MRI facility.

2. Scope

Applicable to all studies involving scanning with the 7T MRI scanner in the SAIL MRI facility.

3. Responsibility

- 3.1 The MRI technician, under the supervision of the SAIL Manager, is responsible for maintaining safety and security standards within the SAIL MRI facility.
- 3.2 The MRI technician, under the supervision of the SAIL Manager, is responsible for the inspection and maintenance of the equipment within the SAIL MRI facility. As such, he/she is responsible for reporting any problem with and/or damage to the equipment to the SAIL Director as soon as possible.
- 3.3 The MRI technician is responsible for the reporting of any accidents and/or incidents that occur within the SAIL MRI facility. These incidents will be documented and recorded on accident/incident forms as provided by SAIL in accordance with RI-MUHC policies.
- 3.4 Only trained SAIL MRI technical staff are permitted to operate the 7T MRI scanner. If external observers and/or collaborators are to be involved in the scan process, their participation will need approval from both the SAIL Director and the Principal Investigator(s) involved in the study.
- 3.5 The pre-scan preparations preceding all scanning sessions as described in this SOP are the responsibility of the MRI technician.

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4. Materials

- Medical tape
- Cotton swabs
- Temperature probe covers
- Ophthalmic ointment
- Biohazard bags
- Selected RF coil
- Selected scan bed
- Tuning-matching tool
- Anesthesia induction chamber
- Benchtop liner
- Personal Protective Equipment (PPE)

5. MR Safety and Conduct

- 5.1 Be sure to remove all metallic objects and magnetic sensitive materials (e.g. data cards and cards with magnetic strips) before entering the MRI magnet room (Room E.S2.8183.1).
- 5.2 Persons with defibrillators, pacemakers, insulin pumps, dosage devices for medication, metallic prostheses or implants, are restricted from gaining access to the MRI magnet room.
- 5.3 In order to gain access, all personnel and/or collaborators who will need to enter the MRI magnet room must first complete a MR safety orientation at the SAIL.

6. Procedure

6.1 Scanner Preparation

- 6.1.1 Remove all metallic and magnetic field susceptible objects (e.g. keys, coins, cell phone, credit and ID cards).
- 6.1.2 Switch on the MR gradients hardware, the gas scavenger, and the animal heat ventilation unit in the MR electronic room (E.S2.8183).
- 6.1.3 Unlock and enter MRI magnet room (E.S2.8183.1), turn on lights and perform a quick visual inspection of the 7T MRI scanner, its accessories, and the general state of the room. Clean if necessary.

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- 6.1.4 Turn on the heating unit.
- 6.1.5 Select and install the appropriate animal scan bed.
- 6.1.6 Check that the RF coil is appropriate for the scan subject, study, and scan bed. The coil should be appropriately tuned, matched, and connected prior to scanning.
- 6.1.7 Assemble all the necessary scanner preparation materials (see Materials: Section 4) ensuring that all the necessary components are readily available. Replenish items as necessary.
- 6.1.8 Prepare any additional components necessary for the scan as per the particular experimental protocol (AUP) (e.g. injectables, stimuli, and/or other manipulations to be applied to the subject during the scan).
- 6.1.9 At the MRI console in Room E.S2.8183, open desktop PC and configure the settings for the respiration, temperature, and any additionally monitored vital signs as outlined in the particular experimental protocol (see SAIL-MRI-SOP-03 for *In-Scan Animal Health Monitoring Procedures*).

6.2 Animal Subject Preparation

- 6.2.1 When manipulating animals, all mandatory PPEs should be put on: bonnet, mask, gloves, and sleeves.
- 6.2.2 In the room ES2.8100, remove the selected subject from its cage, and weigh the animal on the calibrated scale, noting its strain, weight, sex, and registered birth date.
- 6.2.3 If isoflurane or sevoflurane anesthesia is required by the study, cover the bottom of the induction chamber with benchtop liner and place the animal in the induction chamber for anesthesia as per SAIL-MRI-SOP-02. If alternative anesthetic agents are used, please follow the procedures as outlined in the study AUP.
- 6.2.4 While the subject is being anesthetized, prepare scan bed anesthesia apparatus by covering it with a clean benchtop liner.
- 6.2.5 Once the animal is adequately anesthetized, take the animal still in the induction chamber into the scanner room and position it on the bed and tooth-bar.
- 6.2.6 Apply ophthalmic ointment to the eyes of the animal, and arrange/attach the standard vital sensors to the subject. Standard sensors include: (1) a rectal temperature probe

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set up in a feedback loop with the heated ventilation to ensure proper temperature regulation, and (2) a pressure sensor that non-invasively registers the respiration rate, allowing monitoring of the animal's general health and anesthetic depth (SAIL-MRI-SOP-03).

- 6.2.6 Check to ensure that there are no loose connections or loose tubing/wiring hanging from the bed. Affix elements as necessary with medical tape and secure the subject in its final position on the scan bed by inserting its head into the nose cone and tightening the set screw and tightening nut by hand.
- 6.2.7 Additional sensors may be included as per the respective study AUP. The incorporation and application of these non-standard sensors (e.g. ECG) will be in compliance with the protocols and procedures for the installation and use as defined and outlined in the said AUP (see SAIL-MRI-SOP-03 for *In-Scan Animal Health Monitoring Procedures*).
- 6.2.8 Return to the observation suite and double-check that the sensors are monitoring properly. If not, check software settings, hardware connections and re-position sensor components. If working properly, proceed to pre-scan procedures.

6.3 Pre-scan procedures

- 6.3.1 Once respiration rate and temperature have stabilized within acceptable ranges (35-37 degrees Celsius and respiration rates between 85-155 breaths per minute for mice and 50-80 breaths per minute for rats), set up a patient profile in the Bruker Biospin Paravision 6.Xsoftware. Enter all pertinent study and scan information (e.g. age, sex, weight, study, and scan designation) being sure to observe proper naming conventions.
- 6.3.2 Select, set-up, and run a 'tripilot scout' to generate a reference image.
- 6.3.3 Based on the image, re-align and/or re-position the animal and/or scan bed as necessary to locate the center point to the center of your region-of-interest. Undo the scout scan and repeat the scout scan process until the center-point is optimally located.
- 6.3.4 Select, set-up, and run a wobble scan.
- 6.3.5 Adjust the matching and tuning of the RF coil. Once properly adjusted, close the panel door and return to the MRI console.
- 6.3.6 Begin your scan sequence as indicated per experimental protocols.

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7. References

SAIL-SOP-02: Animal Management

SAIL-MRI-SOP-02: Anesthesia Induction and Maintenance

SAIL-MRI-SOP-03: In-Scan Subject Health Monitoring

McGill SOP 110- Mouse anesthesia

McGill SOP 111- Rat anesthesia

8. Appendices

None.

