

Rodent* Magnetic Resonance Imaging (MRI)

- MRI and Contrast Enhanced (MRI) IACUC Standard Procedure
Effective Date: October 2023



Description of procedure:

1. Magnetic Resonance Imaging (MRI)

Animals will be imaged under general anesthesia. The animal will be anesthetized prior to the actual imaging process, and then maintained under anesthesia during the imaging study. The animal will be positioned within the scanner, with the imaging platform maintained at 37°C and will be visually monitored throughout the scan.

MRI is performed by observing the spins of the proton in the nuclei of particular atoms within tissue as their nuclear spins are perturbed from equilibrium (in a static magnetic field) using radio-frequency excitations in a large magnetic field. The rates of relaxation (T1, T2, T2*, T1rho) are intrinsic properties of tissue and are affected by the tissue microenvironment, water diffusion, and magnetic field strength, among other things. These differences in relaxation rates can be visualized as contrast changes within a grayscale image.

Following the scan, the animal will be allowed to recover from anesthesia unless undergoing a terminal procedure. Each session can last between 60-240 minutes. At the end of the imaging studies, the animal will be returned to the approved housing location.

2. Contrast Enhanced MRI

Animals will be imaged under general anesthesia. The animal will be injected with Gadolinium-diethylenetriamine penta-acetic acid (Gd-DTPA), other Gadolinium chelates or MR contrast agents suitable for MR imaging via IP (intraperitoneal) or IV (intravenous) routes following IACUC standard procedure for injection.

The animal will be anesthetized prior to the actual imaging process, and then maintained under anesthesia during the imaging study. The animal will be positioned within the scanner, with the imaging platform maintained at 37 °C, and will be visually monitored throughout the scan. The MRI is performed as described previously.

Following the scan, the animal will be allowed to recover from anesthesia unless undergoing a terminal procedure. Each session can last 60-240 minutes. At the end of the imaging studies, the animal will be returned to the approved housing, location.

3. IACUC Protocol Details

The IACUC protocol should provide a narrative describing the purpose of the imaging procedure(s) and how it relates to the experimental objectives.

Personnel:

- If the imaging procedures will be performed by Core personnel under a Core’s IACUC protocol, indicate this in (Section F.2) your IACUC protocol.
- If Radiology and Biomedical Imaging department personnel will handle your animals and perform imaging as part of a collaboration, add Radiology personnel to Section D. of your IACUC protocol.

Agents:

- Isoflurane, potential injectables and contrast agents depending on protocol will be used.
- All agents administered to animals should be listed in the “Agents” section of RIO.

Adverse effects, monitoring, and management:

Adverse Effects		
Procedure, Agent or Phenotype	Potential Adverse Effects	Management
Standard Contrast Agents	None anticipated	None needed
Monitoring Parameters		
Monitoring Parameters	Frequency	PI/Lab will Document
General appearance and behavior	Per-protocol	Per-protocol
<p>Describe any experimental endpoints that would result in removal of an animal from study. For all investigators housing animals with tumor formation, skin lesions, neurological deficits, or Category E studies, list the expected endpoints of the animal model and the criteria for euthanasia.</p>		
<p>Removal criteria from the original research protocol continues as part of the imaging procedure.</p>		

*In this IACUC Standard Procedure, “rodent” refers to: laboratory rats and mice, gerbils, guinea pigs, hamsters, naked mole rats, spiny mice, and voles.