Rodent Optical Imaging

- Reflectance Fluorescence/ Bioluminescence
- Fluorescence Molecular Tomography (FMT)

IACUC Standard Procedure
Effective Date: May 2016

Description of procedure:

1. Bioluminescence or Reflectance Fluorescence Imaging

Mice or rats will be imaged under general anesthesia. Bioluminescence substracts (such as D-luciferin) or fluorescent probes will be injected via IP (intraperitoneal), IV (intravenous) or SC (subcutaneous) routes. After injection, depending on the bioluminescence substract or the imaging agent being used, there may be a delay prior to imaging, during which the animal may be allowed to recover from anesthesia. Skilled operators are not required to anesthetize animals for IP, IV or SC injections.

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 deg C and will be visually monitored throughout the scan. Each session will last 5-20 minutes.

Following the imaging scan, the animal will be allowed to recover from anesthesia and housed in the UCSF LARC space for repeated imaging studies if needed. At the conclusion of the imaging study, the animal may be euthanized or allowed to recover from anesthesia and housed in a LARC “in-and-out barrier” or other approved site.

2. Fluorescence Molecular Tomographic (FMT) Imaging

Mice or rats will be imaged under general anesthesia. Fluorescent probes for optical tomographic imaging will be injected via IP (intraperitoneal), IV (intravenous) or SC (subcutaneous) routes. After injection, depending on the specific imaging agent being used, there may be a delay prior to imaging, during which the animal may be allowed to recover from anesthesia. Skilled operators are not required to anesthetize animals for IP, IV or SC injections.

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 animal cassette and be placed inside the imaging scanner, equipped with the anesthesiz system at 37 deg C. The 3-D optical imaging is performed via the detection of fluorescence signals emitted from the probes that have been injected into the animal and are excited by a laser at a specified wavelength. Each imaging session will last 30-60 minutes.

Following the imaging scan, the animal will be allowed to recover from anesthesia and housed in the UCSF LARC space for repeated imaging studies if needed. At the conclusion of the imaging study, the animal may be euthanized or allowed to recover from anesthesia and housed in a LARC “in-and-out barrier” or other approved site.
3. Multi-modality Imaging with FMT

After the completion of the FMT imaging, while the animal is under anesthesia in the same positioning cassette, the animal can then be placed onto the micro-CT scanner. Following the standard procedure of micro-CT imaging, the animal will be scanned for 30-60 min. When the CT scan is completed, the animal is allowed to recover from anesthesia and housed in the UCSF LARC space for repeated imaging studies if needed. At the conclusion of the imaging study, the animal may be euthanized or allowed to recover from anesthesia and housed in a LARC “in-and-out barrier” or other approved site.

4. If you are collaborating with the Radiology department, you must generate a modification to your approved IACUC protocol in RIO. This modification should include the following:

a. An explanation of why you are adding the imaging procedures
b. Addition of the Radiology personnel who will be handling your animals and performing the procedures
c. Addition of the locations (specific rooms) where the procedures will take place and where the animals will be housed
d. Addition of all contrast agents, anesthesia, analgesia, etc. to the “Agents” section in RIO
e. In lieu of describing the procedures listed here, you may reference this document. For example, “imaging procedures will be carried out as described in the “RODENT OPTICAL IMAGING” Standard Procedure.
f. This modification must be reviewed and approved before imaging may begin. Contact the IACUC office 476-2197 with questions.

Regulated materials:

- This procedure generally uses inhalant anesthesia (e.g., isoflurane) Alternative anesthetics that are acceptable are controlled substances (e.g., ketamine, pentobarbital) require a Controlled Substances Authorization.
- All agents should be listed in the “Agents” section of the protocol in RIO.

Agents:

- Isoflurane, potential injectables depending on protocol.
- This procedure involves anesthesia and injected contrast media.
- All agents administered to animals should be listed in the “Agents” section of RIO (Section I).

Adverse effects, monitoring, and management:

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<thead>
<tr>
<th>Procedure, Agent or Phenotype</th>
<th>Potential Adverse Effects</th>
<th>Management</th>
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Imaging Agents

| None anticipated | None needed |

Radiation dose from CT

| Nausea (Manifested as generalized ill appearance) and/or diarrhea | We will image the animal acutely and under anesthesia, and then will euthanize the animal. |

Bioluminescence substracts

| None anticipated | None needed |

Monitoring Parameters

| General appearance and behavior | Daily Monday - Friday | Yes, if abnormal |

Describe the conditions, complications, and criteria (e.g. uncontrolled infection, loss of more than 15% body weight, etc.) that would lead to removal of an animal from the study, and describe how this will be accomplished (e.g. stopping treatment, euthanasia).

An affected animal will be removed from the study if it exhibits signs such as labored respiration, decreased appetite or activity, poor grooming, distress, uncontrolled infection, uncontrolled edema or BCS <2. Any such conditions, complications, and instances will be documented. Animals removed from the study will be euthanized.