Rodent* Optical Imaging

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

IACUC Standard Procedure
Effective Date: October 2023

UCSF Office of Research
Institutional Animal Care and Use Program

Description of procedure:

1. Bioluminescence or Reflectance Fluorescence Imaging

Rodents will be imaged under general anesthesia. Bioluminescence substrate (such as D-luciferin) or fluorescent probes will be injected via IP (intraperitoneal), IV (intravenous), or SC (subcutaneous) routes following IACUC standard procedure for injection.

The rodent 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. Each session will last 5-20 minutes.

2. Fluorescence Molecular Tomographic (FMT) Imaging

Rodents will be imaged under general anesthesia. Fluorescent probes for optical tomographic imaging will be injected via IP (intraperitoneal), IV (intravenous), or SC (subcutaneous) 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 animal cassette and be placed inside the imaging scanner, equipped with the anesthesia system and temperature maintained at 37 ˚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 light at a specified wavelength. Each imaging session will last 30-60 minutes.

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 may then be placed onto the micro-CT scanner. Following the standard procedure of micro-CT imaging, the animal will be scanned for 30-60 minutes.

4. IACUC Protocol Details

The IACUC protocol should provide a narrative explaining 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 RIO 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 (Section I).

Adverse effects, monitoring, and management:

Adverse Effects		
Procedure, Agent or Phenotype	**Potential Adverse Effects**	**Management**
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 substrates	None anticipated	None needed

Monitoring Parameters		
Monitoring Parameters	**Frequency**	**PI/Lab will Document**
General appearance and behavior	Per-protocol	Per-protocol

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.
Removal criteria from the original research protocol continues as part of the imaging procedure

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