

University of Pennsylvania-Radiology

Small Animal Imaging Facility

Standard Operating Procedure

Title: Instructions for use of Nuclear Medicine Imaging Core of the Small Animal Imaging Facility

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Approval: Eric Blankemeyer, Technical Director, Nuclear Medicine Imaging Core

- I. **Purpose:** The purpose is to provide instructions on using the Nuclear Medicine Imaging Core of the Small Animal Imaging Facility (SAIF).
- II. **Responsibilities and Scope:** All researchers who are involved in Nuclear Medicine Imaging studies in the SAIF are responsible for reading and following this SOP.
- III. **Definitions:**
 - a. Small Animal Imaging Facility (SAIF): This facility provides multi-modality radiological imaging and image analysis for small animals, mainly mice and rats. The assets of the SAIF include state-of-the-art instrumentation and recognized staff. SAIF currently provides four Sub-Cores of imaging modalities: 1) MRI/ MRS Imaging Core: magnetic resonance imaging (MRI) and spectroscopy (MRS), 2) PET, SPECT, CT Nuclear Medicine Imaging Core: positron emission tomography (PET), single photon emission tomography (SPECT), and computed tomography (CT), 3) Optical-Bioluminescence and Fluorescence Molecular Imaging Core, 4) Ultrasound Imaging Core, giving researchers access to a broad spectrum of imaging modalities. A number of ancillary facilities are devoted to Chemistry, Radiochemistry, Image Analysis and Animal Tumor Models.
 - b. Nuclear Medicine Imaging (NMI): This facility provides multi-modality radiological imaging, specifically PET, SPECT, and CT, and image analysis for small animals, mainly mice and rats.

- c. Environmental Health and Radiation Safety (EHRS): The department responsible for training in the safe handling and use of radioactive material.

IV. Procedures:

Any PIs who plan on using the PET, SPECT, and/or CT imaging modalities of SAIF must familiarize themselves with this SOP.

a. Required Training:

- i. Online training provided by EHRS for Radiation Safety (SAIF Radiation Safety) and Laboratory Safety (<https://ehrs.upenn.edu/radiationsafety/topics/radiation-safety-training>).
- ii. In-lab training given by the imaging staff. Lab staff must sign off that the researcher is authorized to work in the imaging lab. This includes hands-on training for handling syringes/injecting animals with radioactivity and properly using a survey meter to monitor for contamination and exposure rates.
- iii. In-lab radiation safety refresher training will be given and documented.
- iv. Annual lab safety update will need to be taken on the EHRS website.

b. Transporting Radioactivity to the Imaging Lab

- i. For imaging studies with activity ordered from the Cyclotron, the lab staff or researcher will obtain an EHRS approval number before transporting activity to the imaging facility.
- ii. For imaging studies with activity ordered from an outside vendor, the lab staff or researcher will obtain an EHRS approval number prior to receiving activity. Upon delivery, a wipe test will be performed and documented.
- iii. For imaging studies with the researcher bringing activity into the lab, the researcher will obtain an EHRS approval number and notify the lab staff.
- iv. For imaging studies with animals being injected with activity prior to arriving at the imaging facility, the researcher will obtain an EHRS approval number and notify the lab staff.

c. Responsibilities before and during the study

- i. All touch surfaces including bench tops, drawer handles, and cabinet doors will be wiped down with appropriate disinfectant.
- ii. Absorbent pads will be placed on all surfaces, including induction boxes, where radioactivity will be used.
- iii. All users are required to don appropriate PPE (mask, gloves, lab coat, safety glasses) for the duration of the imaging session.
- iv. The researcher prepares the animal for injection.
- v. Lab staff or trained research staff draw up the dose.

- vi. The researcher injects the animal.
 - vii. Imaging lab staff or trained research staff operate the imaging equipment and complete the study.
- d. Responsibilities after imaging
- i. Survey the work area and equipment for radioactivity.
 - ii. Dispose of all contaminated absorbent pads in radioactive waste. Noncontaminated materials may be placed in regular trash.
 - iii. Wipe down all working surfaces with Clidox provided in the lab.
 - iv. Wipe down equipment and used animal beds with Clidox provided in the lab.
 - v. Induction boxes are to be cleaned with soap and water.
- e. Radioactive animal handling after imaging
- i. Animals and their waste may not be released from John Morgan B96 or B96H until no longer radioactive, defined as a reading of no higher than 3 times the background of the survey meter.
 - ii. All animal storage and associated surveys must be documented in the "John Morgan B96H Animal Storage for Decay and Monitoring" log.
 - iii. When animals are placed or removed from the quarantine room, the floor of the room must be surveyed to ensure there is no contamination.
 - iv. Animal care is the responsibility of the researcher. Animals must be checked at least once per day. If an animal will be stored over a weekend, arrangements must be made for access to the lab prior to the study date.
 - v. Lab staff or trained researchers must survey all animals and waste before being released.
- f. Radioactive waste
- i. Potentially contaminated items must be surveyed before disposal.
 - ii. Researchers may never dispose of radioactive waste. Waste may only be disposed of by lab staff.
 - iii. Before disposal, all radioactive trash must be stored until the survey metering reading is below 3x the background reading.
 - iv. Bags to be stored for decay must be labeled with the isotope and date.
- g. Radioactive animal transfers
- i. Imaging staff must document the transfer in the "John Morgan B96H Animal Storage for Decay and Monitoring" log.
 - ii. The researcher must obtain an EHRS approval number for the lab receiving the animal using an estimate of the activity in the animal when transferred.

h. Animal death

- i. If an animal dies during imaging or storage for decay, the lab staff or researcher will place the carcass in a black bag, label it with the date, isotope, and PI and place it in the freezer in JMB B96H until decayed. A note will be made in the “John Morgan B96H Animal Storage for Decay and Monitoring” log.

VI. Safety Considerations:

a. General Radiation Safety Rules:

- a. Eating, drinking, smoking, and applying cosmetics are prohibited in lab areas.
- b. All personnel must wear a lab coat and gloves when handling activity and animals. A lab coat must also be worn if someone is standing near where activity is being handled (i.e., near the L-block or an animal administration). Open-toed shoes and shorts are prohibited in the lab areas when activity or animals are present.
- c. All researchers and lab staff should follow ALARA principles to minimize radiation doses to themselves, such as maintaining distance from animals once they have been administered activity.
- d. Radiation dosimeters are required to be worn if researchers or lab staff handle activity amounts greater than listed in the Research Lab User’s Guide located on the EHRS website.

b. Handling activity

- a. Activity may only be handled by trained researchers or lab staff.
- b. Doses are to be drawn behind the L-block.

c. Notifying EHRS

- a. EHRS is to be notified in the case of personnel contamination or loss of radioactive material.

d. Spill response

- a. In the event of a spill, all personnel in the area are to be notified and to limit access to the spill.
- b. Prevent the contamination from spreading by covering the spill with absorbent pads or paper towels.
- c. Lab staff will be responsible for notifying EHRS and decontamination of the area.

VII. References: None

VIII. Attachments: None

IX. Document History:

Version Number	Effective Date	Author	Reason
1	November 10, 2005	I. Lee	New
2	December 8, 2005	I. Lee	Revised
3	January 19, 2006	I. Lee	Revised