



**Biosafety Manual  
And Standard Operating Procedures (SOP)  
For Animal Imaging at  
Biosafety Level 2**

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Chapel Hill**

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Marsico Hall, 125 Mason Farm Rd.

Rooms SB223, SB227, SB228, SB229, SB230, B217, and GMB UB61

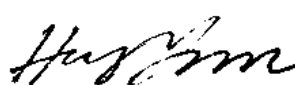




## STANDARD OPERATING PROCEDURE FOR SMALL ANIMAL IMAGING LABORATORY

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**TITLE:**  
**BRIC SMALL ANIMAL IMAGING FACILITY STANDARD OPERATING  
PROCEDURES**

### APPROVALS

<b>Approver's Name &amp; Dept. (Typed)</b>	<b>Approver's Signature</b>	<b>Date</b>		
<b>Principal Investigator(s): Hong Yuan</b>		5/25/2022		
<b>EHS Executive Director: Catherine Brennan</b>		6/8/2022		
<b>Craig Fletcher, DVM, PhD, DACLAM, Director, DCM</b>		<table border="1" style="display: inline-table;"> <tr> <td>Date</td> <td>5/20/22</td> </tr> </table>	Date	5/20/22
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## Authorization

All investigators accessing to the BRIC Small Animal Imaging facility are to be approved prior to entry into the following imaging labs located in room SB223, SB227, SB228, SB229, SB230, and B217 in Marsico Hall, and GMB room UB61. Any person conducting animal imaging studies, must submit a signed Project Form in your Lab Safety Plan (Appendix-A) certifying that all IACUC and EHS requirements have been met including registrations, training, and immunizations.

### 1. Purpose

This document provides a comprehensive source for performing imaging of small animals that do or may contain Biosafety Level 2 level organisms. **Biosafety Level 2** organisms are a broad spectrum of indigenous moderate-risk agents that are present in the community and associated with human disease of varying severity. Described are procedures to be used to ensure a safe working environment while working with regulated recombinant DNA modified cells, infectious microorganisms, human cell lines, or human ex vivo cells. The manual will be reviewed annually by the Facility Director in conjunction with personnel from UNC EHS and the Institutional Biosafety Committee for changes and corrections.

### 2. Introduction and Scope

As a core facility, the type of work performed and agents used will vary with investigator. Animal species anticipated are mice and rats mainly. Types of samples anticipated to be used within the Imaging Room are live animals or animal tissues injected with BSL2 organisms, or cells lines either human or animal containing BSL2 organisms. Investigators will be required to detail on the Project Form (see Appendices A) the species, samples, sources, and known microorganisms.

The potential may exist for aerosol generation with viable biohazardous or potentially biohazardous materials during animal imaging. Therefore, containment and protection of the instrument operator from these potentially infectious materials is a safety priority. Biological specimens can harbor unknown as well as known pathogens. Materials may include laboratory animals deliberately infected with infectious agents and/or handling human samples that may contain agents such as human immunodeficiency virus and hepatitis viruses. The procedures described below are designed to protect the instrument operator and eliminate any dispersed organisms by proper cleaning and disinfectant procedures.



### 3. Description of Physical Environment.

The BRIC Small Animal Imaging Labs are located in the suite SB210G (for floor diagram see Appendix B) in the Marsico and a satellite imaging lab in the GMB UB61. Imaging labs that allow BSL2 study are described in the Table-1. Each imaging lab will contain all support equipment. Each imaging lab is under negative pressure relative to the hallway. Supply and exhaust air has been approved by IACUC as meeting requirements for animal studies. The door to the hallway is posted with a sign that identifies when BSL-2 imaging work is in progress. Each lab is equipped with ID card reader for room access. No cell culture, harvesting, or other manipulations not directly related to Imaging will be performed in the Imaging Labs.

Table-1: BSL2 Lab and room number within SAI Facility

Imaging Modality/Labs	Room Number
Optical Imaging	Marsico SB223
Ultrasound Imaging	Marsico SB229
SPECT/CT Imaging	Marsico SB227
PET/CT Imaging	Marsico SB228
Procedure Room	Marsico SB230
Intravital Microscopy	Marsico B217
Satellite Imaging Lab in GMB	GMB UB61

### 4. Emergency Contact Information and Procedures

#### 4.a. Emergency Phone Numbers

Fire and Medical Emergencies .....911  
 Security Issues/Police .....911  
 Police Non-Emergency... ..2-8100  
 Environment Health & safety... ..2-5507  
 Employee Health.....6-9119  
 Facility Director’s contact - Office: 919-843-3813  
 Emergency/After Hours: 919-641-8696

#### 4.b. Emergency Procedures

In case of fire, push alarm button, secure the animal (s), remove PPE, and evacuate immediately with the animals.  
 If a very small fire is involved, a fire extinguisher is located in the hall. If any injury to a laboratory worker occurs it should be reported to the Facility Director immediately.



Medical attention, if required, shall be initiated immediately. Administer first aid outside of the Imaging room. Move the person only if the individual is ambulatory unless risk of additional injury is likely.

If a personal injury accident involves a biohazardous material spill, move the individual away from the spill. If the individual is ambulatory, remove all PPE material (especially if contaminated) following approved PPE doffing procedures. Do not attempt to move a non-ambulatory patient unless failure to do so may result in further injury. Medical personnel will determine whether it is safe to move injured individual. Inactivate spill after individual is removed.

## 5. General Practices

**All general laboratory safety practices (BMBL current edition, Lab Safety Manual) will apply to this laboratory including the following.**

1. No eating, drinking, smoking, handling contact lenses, or applying cosmetics is permitted.
2. Gloves are to be worn at all times.
3. Mouth pipetting is not permitted.
4. All procedures should be performed in a manner to minimize the likelihood of spills and aerosols.
5. Razor blades, scalpels, hypodermic needles or any other sharp objects are to be used only when no alternative exists. Storage of such devices should be done to prevent accidental cutting/piercing of skin. All such devices will be discarded in a provided approved "sharps" disposal container.
6. Any work surface used should be decontaminated using approved disinfectant for agent. All general work surfaces (especially horizontal) will be decontaminated weekly.
7. All materials supplies provided by the Imaging Lab should be stored in cabinets, drawers or other containers to minimize exposure to any aerosols.
8. All waste materials will be discarded into orange biowaste plastic bags and returned to the investigator's lab to be autoclaved.
9. Only plastic ware will be used – no glass pipettes, test tubes etc.
10. Only closed toe shoes will be permitted.

## 6. Medical Surveillance

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All research personnel that work in the Imaging Lab must comply through University Environment, Health and Safety (EHS) with the requirements listed on the Biohazards Section of the Laboratory Safety Plan.

All exposures, accidental or potential, shall be reported to University Employee Occupational Health Clinic (UEOHC) immediately by calling 6-9119 (or Healthlink, 966-7890 if after hours/weekend/University holidays) and EHS. Examples are PPE failure, splash or sharps injury. The UEOHC representative will help categorize the risk of developing occupationally-acquired infection and providing advice on appropriate post-exposure treatment. UEOHC is open M-F, 8:30am-4:30pm.

## 7. Requests for Use of Imaging Lab

The safety of the Imaging Lab staff and its users are of primary concern. To assure assignment of proper safety practices, procedures, and to document potential exposure in the event of accidents it is necessary to collect detailed accurate information about all materials used in the Imaging Lab. Prior to use the imaging facility a "Project Form" (Appendix A) must be properly filled out, and submitted (See the online instruction <https://www.med.unc.edu/bric/small-animal-imaging/services/study-initiation/> )

The form must be received at least 48 hours before the scheduled use time. Any changes to a previously submitted form must be submitted in writing at least 48 hours before the time. The form will be reviewed by the Facility Director and an appropriate containment assigned based on risk will be reviewed. Failure to submit forms in a timely manner may result in loss of appointment and incurring of charges.

## 8. Transport To and From the Imaging Lab

The transportation of animals and samples to and from the BRIC Small Animal Imaging Lab must be performed following the UNC IACUC and EHS guidelines. All samples will be transported in a leak proof container that reduces the likelihood of spills (e.g. Igloo cooler). Containers with hard plastic surfaces are best. The outer surfaces of the carrier must be sprayed with disinfectant before the carrier leaves the PI's laboratory or ABSL-2 space.

Gloves should not be worn when transporting carriers from the investigator's laboratory to the imaging lab. A biohazard warning label must be affixed to the surface of the outermost container.

Transportation through public areas is strongly discouraged and ABSL-2 infected animals cannot be moved between buildings. If the animal(s) must be moved through public areas, provide a secure, opaque transport cages and cover the cage in such a manner that the animals are not visible and that the cover does not compromise ventilation. This rule applies to empty cages as well. Covering the empty cages will reduce the risk of health hazards to the public as well as reduce the curiosity of the



public. DCM has wheeled transport cages that may be available for use with larger species. Please contact the DCM ABSL-2 veterinarian if you wish to transport animals outside of the DCM cubicle space, as additional training will be required, and transportation will be approved on a case by case basis.

For more details please reference the Animal Transport and Biosecurity Policy at [https://research.unc.edu/wp-content/uploads/sites/61/2012/11/CCM3\\_020209.pdf](https://research.unc.edu/wp-content/uploads/sites/61/2012/11/CCM3_020209.pdf)

## 9. Personal Protective Equipment

When handling and imaging materials in the BRIC Small Animal Imaging Lab, minimum PPE will include a disposable gown, disposable gloves, shoe covers, and eye and/or face protection (shield).

## 10. Approved Disinfectant

The following reagents are approved for use in the SAI facility as disinfectants:

- Virkon (1%)
- 70% ethanol or isopropyl alcohol

## 11. General Lab Rules

### 11.a. Before Imaging Study

Visually check the lab space. If apparently uncleaned areas are seen from previous experiment, please contact the facility staff or call the phone number listed on the wall.

Gently wipe the tabletop with approved disinfectant for agent.

solution before any study. No eating, drinking, smoking, and cosmetics in the imaging facility.

### 11.b. After Imaging Study

Shutdown the anesthesia system, exit the imaging software by closing the software window, and copy all your image data to your own portable drive or CD disks

Clean and disinfect the imaging platform inside the imaging chamber, the workspace, the induction chamber, the nose cone, and any other areas that may have come into contact with animals. All surfaces that come into contact with the animal must be wiped down with approved disinfectant. Wipe the imaging platform/sheet with the 70% Isopropyl alcohol solution after Virkon as it might produce artifact signal if left wet on the sheet.

There should be no debris (e.g. blood, fur, tape, or fluids) left on any part of the imaging system or workspace.

Discard all needles in the sharp container provided, and discard all other remaining waste.

Take off PPE before leaving the lab.

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## 12. BSL-2 Study Rules

**Note: For BSL2 study, the above general cleaning procedures should be followed in addition to the following BLS2 specifically related procedures.**

- 1) Prior to your BSL2 study, the “Project Form” (Appendix A) must be properly filled out, and submitted online:  
[https://www.med.unc.edu/bric/small-animal-imaging/Study\\_Initiation](https://www.med.unc.edu/bric/small-animal-imaging/Study_Initiation)
- 2) Before your BSL2 study, schedule a meeting with the Director of the Small Animal Imaging facility, Dr. Hong Yuan (919-843-3813) about your BSL2 study and send a copy of EHS approved Laboratory Safety Plan Biohazard Registration Form along with your approved animal protocol.
- 3) Users will schedule the study at least 24 hours prior to the study on the iLab calendar. (iLab calendar instruction can be found in our website). **It is preferred that BSL2 studies are scheduled as the last study for the day.** If you can't schedule at the end of the day, please send email to [bricsai@med.unc.edu](mailto:bricsai@med.unc.edu) to notify the SAI staff before the study. We will block 30min out on the calendar after your study. When scheduling studies on the iLab calendar, please explicitly indicate the “BSL2 study” in the “Study notes” section in the reservation page.
- 4) On the day of the study, please bring an orange biohazard trash bag with you when you come to the imaging facility. Please also bring your own lab coat, safety eyewear, and shoe cover. Also bring some orange biohazard bags. The facility will provide gloves and masks. If you need additional supplies from the facility, please contact Dr. Hong Yuan or other facility staff before your study.
- 5) Before you enter the imaging lab, place the shoe covers to your shoes. After you leave the lab, collect the used shoe covers into the biohazard bag.
- 6) Positioning the provided BSL-2 sign on the Imaging Lab door, close the door during your study, and handle materials carefully to minimize the formation of aerosols.
- 7) Remember to dispose of all biological wastes in your orange biohazard bag. The facility will provide biohazard sharps container to collect all sharps in contact with biological hazards.
- 8) After the imaging study, thoroughly wipe off all external surfaces with the disinfect solution (Virkon) provided by the facility. Collect all of the wastes from your imaging study into your own biohazard bag. **Please note that you can not leave the biohazard bag in the imaging facility. You must bring it to your lab.**
- 9) Remove gloves and apply hand sanitizer before opening the door. Take off the BSL-2 sign on the Imaging Lab door.
- 10) Take all animals, wastes, and other supplies back to your lab.

## 13. Spill cleanup

If materials are spilled in the Imaging Lab or onto the floor during BSL-2 Imaging they



will be immediately cleaned up and the surface disinfected with approved disinfectant as follows:

1. Remove contaminated outer gloves.
2. Notify others in lab of spill.
3. Decontaminate all personnel, clothing and exit laboratory
4. Notify Facility Director (Director will notify EHS if necessary).
5. Allow aerosols to settle for 30 minutes.
6. Re-enter wearing PPE.
7. Carefully dilute spill from outside edges using appropriate disinfectant.
8. Allow 20 minutes contact time.
9. Clean-up with paper towels.
10. Decontaminate clean-up materials.
11. Wash hands thoroughly.

## 14. Waste Decontamination

**14.a. Solid Waste** - All solid waste shall be collected in an orange biohazard bag provided by the investigator. No sharps shall be placed in this bag. Filled bags are loosely closed with tape and returned to the investigator's lab for autoclaving according to the EHS biohazard waste policy. The bags should be sealed if they are brought through hallways to prevent any generation of aerosols and potential for spill. The exterior of the bag should be wiped or thoroughly sprayed with disinfectant prior to removal from the imaging room.

**14.b. Sharps** – Sharps are to be disposed of in the red Sharp containers that are provided by the Imaging Lab. The sharps containers will be removed and capped when reaching 2/3-full to prevent over-filling. Sharps containers will be autoclaved in the Marsico Hall before disposing.

## 15. Exposure Response

### 15.a. Non-intact skin exposure (needlestick, cut, bite)

1. Remove contaminated gloves.
2. Use hand sanitizer before opening door.
3. Quickly go to the restroom just outside the door and wash the wound with soap and water for 5 minutes.
4. Ask facility staff for help. If no one is available, call the facility contact phone number posted on BSL-2 door sign.
5. Decontaminate and/or remove protective lab clothing and proceed immediately to UEHC. If the injury requires immediate medical attention, go to the Emergency Room.

### 15.b. Mucous membrane exposure (including contact with eyes, nose, and mouth):



1. Remove contaminated gloves.
2. Use hand sanitizer before opening door.
3. Quickly go to the nearest eye wash station (one in the hallway, the other ones in the room SB230, B217) and flush the area with running water for at least 5 minutes. Eyes should be flushed for 15 minutes.
4. Ask facility staff for help. If no one is available, call the facility contact phone number posted on BSL-2 door sign.
5. Decontaminate and/or remove protective lab clothing and proceed immediately to UEOHC. If the injury requires immediate medical attention, go to the Emergency Room.



## Appendix A

Online Project Registration Form is located in the following webpage:

<https://www.med.unc.edu/bric/small-animal-imaging/services/study-initiation/>

### BRIC SAI Project Registration Form

\* Required

**Date \***

**PI Name \***

**PI Organization/Department \***

**PI Phone \***

**PI E-mail \***

**Other Participants names and E-mail contacts \***  
(If no other participants, please indicate "None")

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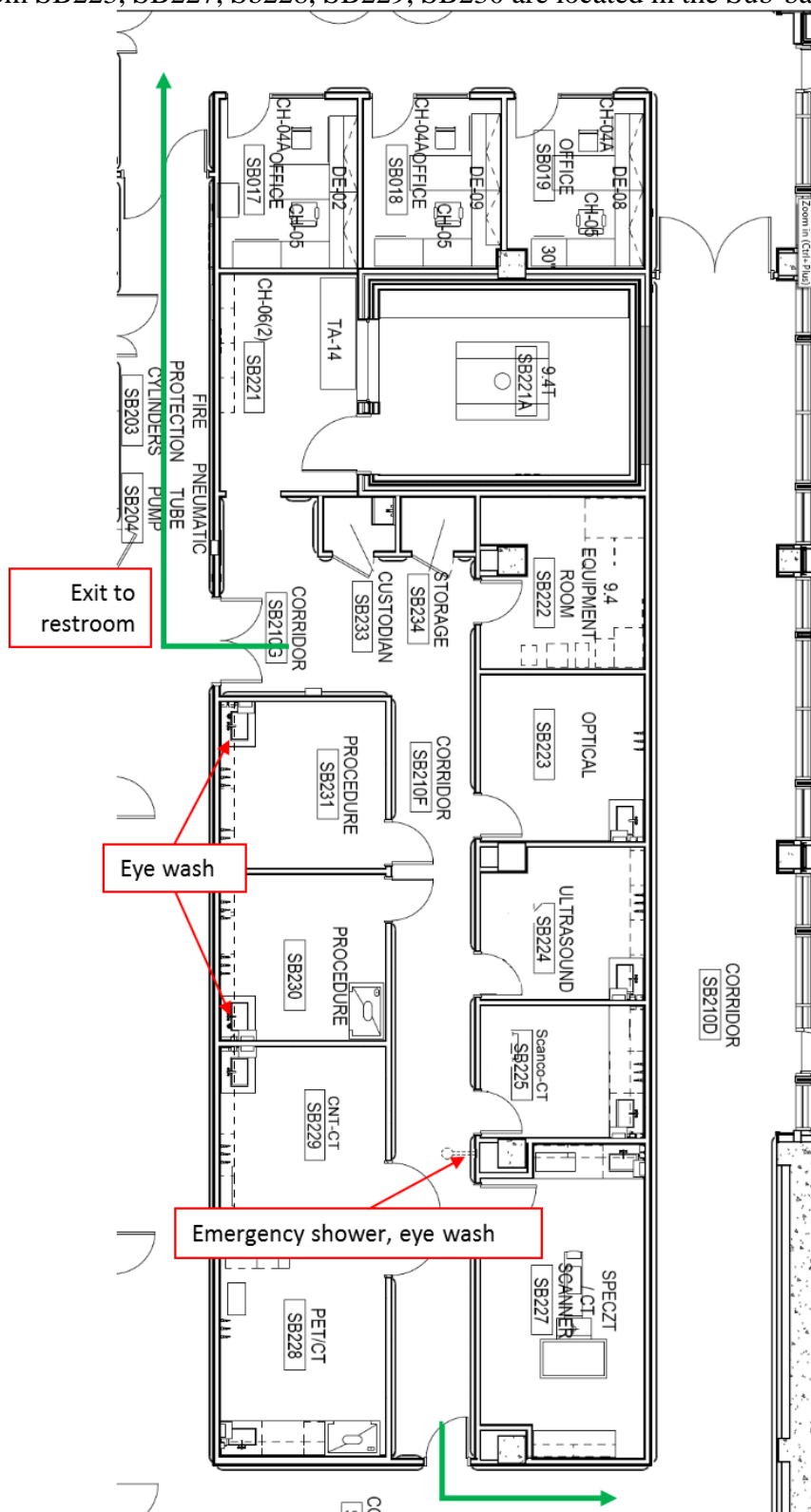
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### Appendix B

### BRIC Small Animal Imaging Facility Floor Layout

Room SB223, SB227, Sb228, SB229, SB230 are located in the Sub-basement, Marsico Hall:



### History of Revisions

Revision	Page(s)	Date
Updated floorplans	14, 15	4/14
Updated building information/room numbers	Throughout	4/14
Room number changed from 124/125 to 122	Title page, pgs 4 & 5	3/11
Deleted “and the door to the room 125 is equipped with punch code entry security system”	5	3/11
Changed Darren Trembl to Kara Milton under Environment, Health and Safety	5	3/11
Changed University Employee Occupational Health Clinic to Environment, Health and Safety	6	3/11
Added HealthLink information	6	3/11
Changed “exposure to the skin to non-intact skin exposure (needlestick, cut, bite)”	9	3/11
Added Medical Surveillance and Entry/Training requirements when working with human samples	6	10/11