University at Buffalo The State University of New York **Lab Animal Facilities**	**STANDARD OPERATING PROCEDURE** **Rodent Surgery**	**Quality Form** SOP # **2.A.3** Revision: **02** Last Reviewed: **02/17/2025** Appendix: **1. Rodent Anesthesia &/or Surgery Report** **2. Rodent Treatment Stickers**

1.0 **PURPOSE**:
To describe the guidelines for rodent (mouse, rat, hamster) surgeries conducted on animals housed in the LAF.

2.0 **SCOPE**:
This applies to all personnel involved in surgical procedures or post-operative monitoring/care conducted on rodents.

3.0 **DEFINITIONS**:
Survival Surgery: A surgery in which the animal is expected to recover from anesthesia. If an animal dies unexpectedly during a procedure (i.e., euthanasia is not a planned end point of the procedure), the complication should be documented on the surgery report.

Non-Survival Surgery: A surgery in which euthanasia is the planned end point of the procedure. A surgery report should be completed, and the method of euthanasia documented.

Major Surgery: A surgery that penetrates and exposes a body cavity, produces substantial impairment of physical or physiologic functions, or involves extensive tissue dissection or transection. Examples of major surgery are laparotomy (abdominal surgery), thoracotomy, joint replacement, or limb amputation. Stereotaxic surgery may or may not be considered major surgery, depending on the anticipated impact on the animal post-operatively. Multiple major survival surgeries must be scientifically justified in the approved IACUC protocol.

Minor Surgery: A surgery that does not expose a body cavity and causes little or no physical impairment. An example of a minor surgery is peripheral vessel cannulation.

4.0 **PROCEDURES**:

4.1 Surgical Facility:

4.1.1 Surgery should be conducted in a designated surgical area. This can be a dedicated OR, or an area in the lab that is clean, uncluttered, does not have through traffic, and is not used for other lab work.

a. Within the surgery facility, there should be separate spaces for animal prep, surgeon prep, surgery, and recovery.

b. Surgical tables, instrument stands, chairs and prep areas should be made of impervious material that can be disinfected (e.g., stainless steel). Cardboard, cloth and wood surfaces are not acceptable. If the

surgery table is draped, the drape should be changed between animals to ensure cleanliness.

4.2 Instrument/Supply Preparation:

4.2.1 Sterile instruments and supplies must be used for survival surgeries.

4.2.2 Instruments must be autoclaved each day.

a. For rodents, instruments can be re-sterilized using a glass bead sterilizer for up to 7 consecutive surgeries on the same day. See SOP 4.A.32.

4.2.3 Instruments can be autoclaved in autoclavable pouches or double wrapped packs. Do NOT use aluminum foil to autoclave instruments.

a. All instrument packs should be labeled with the date of sterilization and the date of expiration. A chemical indicator (e.g., SteriGage) should be placed inside each pack to ensure that conditions to achieve sterility are met inside each pack.

i. Instrument pouches stored in a closed cabinet expire 12 months from the date of autoclaving.

ii. Instrument pouches stored on an open shelf expire 6 months from the date of autoclaving.

iii. Instruments in a double wrapped pack (cloth/drape) stored in a closed cabinet expire 6 months from the date of autoclaving.

iv. Instruments in a double wrapped pack stored on an open shelf expire 3 months from the date of autoclaving.

4.2.4 Non-autoclavable supplies should be purchased pre-sterilized whenever possible. If supplies cannot be purchased sterile, they should be sterilized with cold sterilant (e.g., glutaraldehyde/"Wavicide") or subject to ethylene oxide (if available in the lab; LAF does not have this method available).

a. Formalin desiccators should NOT be used for sterilization.

b. Alcohol is NOT a high-level sterilant.

4.2.5 Instrument packs and supplies should be opened aseptically in the surgical area. The instruments and supplies should only come in contact with a sterile surface.

4.3 Animal Preparation:

4.3.1 Animal preparation should take place in an area separate from where the surgery is to be conducted.

4.3.2 Animals should be anesthetized using pharmaceutical grade anesthetics as approved in the IACUC protocol.

a. Once anesthetized, supplemental heat must be provided. Water circulating blankets or far infrared warming pads are recommended. Animals should never be placed on or next to static heat devices (drugstore heating pad, rice bags, etc.).

4.3.3 Once the animal is anesthetized, a small amount of plain, sterile **ophthalmic** ointment (artificial tears) should be instilled in each eye to prevent corneal drying.

a. Use only ophthalmic products. Do not use Vaseline/petroleum jelly or other non-ophthalmic ointments.

b. Do not apply ophthalmic ointments with cotton swabs as the swabs can cause corneal damage. Ointments should be applied with a clean, gloved finger.

4.3.4 Prepare the animal by removing hair from the surgical site. This can be accomplished via clipping of the hair with #40 clipper blades on an electric clipper or using depilatory creams.
   a. Depilatory creams should only be left on the skin for 30-60 seconds, then must be thoroughly rinsed with water (avoid soaking the animal) before proceeding with aseptic preparation of the surgical site.

4.3.5 Aseptically prepare the surgical site with a 3-step solution preparation. The minimum contact time for asepsis is 5 minutes.
   a. First scrub the site with antiseptic soap (e.g. chlorhexidine or betadine **scrub**), followed by a 70% ethanol wipe, repeated at least 3 times.
   b. The final step is to paint the site with antiseptic solution (iodine or chlorhexidine **solution**).
   c. Minimize soaking the body of the rodent as this could lead to hypothermia and possible death.

4.3.6 Move the animal to the surgical area, using caution to not contaminate the aseptically prepped surgical site. Supplemental heat must be provided in the surgical area.

4.4 Surgeon Preparation:

4.4.1 The person performing the surgical procedure should be wearing a CLEAN lab coat or scrub top. If the procedure is being performed in a barrier or ABSL-2 or -3 area, PPE protocols should be followed.

4.4.2 The surgeon should don a hair cover (bouffant or surgeon's cap). Long hair must be tied back. The surgeon should also don a mask.

4.4.3 The surgeon should wash their hands with antiseptic soap/scrub for 5 minutes prior to surgery. A sterile towel should be used to dry the hands.

4.4.4 All survival surgeries must be performed by a surgeon wearing sterile, surgical gloves. If the gloves become contaminated by touching a non-sterile item, they must be changed.
   a. Exam gloves cannot be autoclaved to render them sterile.
   b. Spraying surgical or exam gloves with alcohol does not sterilize them.

4.5 Surgery:

4.5.1 The animal should be maintained in a surgical plane of anesthesia throughout the procedure. Monitoring of anesthetic depth is critical. Periodic observation, at least every 10 minutes, of respiration, mucous membrane and/or extremity color, and toe pinch (withdrawal) reflex are recommended.

4.5.2 The surgical site should be draped with **sterile** drapes (disposal surgical drape, plastic drape, or tightly woven, re-usable cloth drape). The drape should be large enough to provide an adequate sterile surgical field, and at the surgical site only aseptically prepped skin (no unclipped fur) should be visible through a fenestration.

4.5.3 All procedures and supplies used for surgery should be in accordance with the approved IACUC protocol that the animal is listed under.

4.6 Post-Operative Care:

4.6.1 Move the animal to a recovery area away from the surgery area with provided supplemental heat.

4.6.2 Monitor vital signs at least every 15 minutes during recovery. All monitoring should be recorded on the "Rodent Anesthesia &/or Surgery Report."

a. Each animal's recovery should be recorded individually.

b. Subcutaneous fluids should be administered following any procedure that lasts more than 15 minutes, or following shorter procedures that involve blood loss or collection.

i. It is recommended that fluids be warmed to body temperature prior to administration.

ii. The SQ fluid volume for **mice** is **1-2 mL.**

iii. The SQ fluid volume for **rats** is **5-10 mL.**

4.6.3 Provide analgesics as required in the approved IACUC protocol, and record the administration on the "Rodent Anesthesia &/or Surgery Report" form.

a. It is generally recommended that animals undergoing survival surgeries that would be expected to cause pain if performed on a human, receive analgesics at the time of surgery, then for at least 2 full days post-operatively.

b. Multimodal anesthesia is recommended, depending on the nature of the study.

c. If analgesics cannot be provided, a thorough scientific justification must be provided in the approved IACUC protocol.

d. Examples of analgesic plans:

i. Local anesthetic at the incision site during surgery, followed by SQ NSAID administration, then repeat NSAID administration at 24 and 48 hours post-procedure.

ii. Local anesthetic at the incision site, then a single dose of extended relief opioid expected to last 72 hours post-op.

4.6.4 Return the animal to its routine housing only after it has fully recovered from anesthesia, and identify the cage with a blue Post-Operative Observation card. This card is important to identify the animal for post-operative monitoring by the LAF veterinary staff. See SOP 2.C.3.

4.6.5 Completed "Rodent Anesthesia &/or Surgery Report" forms must be turned in on **the day of surgery**, once recovery is complete. Indicate on the form if any additional post-operative analgesics or treatments are required, as per the approved IACUC protocol, and indicate whether the principal investigator or LAF veterinary staff will administer them.

a. If assistance is required from the LAF veterinary staff to administer post-operative medications, this should be requested in advance. If LAF assistance is requested, medications must be provided and there will be a charge for veterinary technician time.

4.6.6 All animals should be monitored daily for at least 3 days post-op, especially noting any redness, discharge, or swelling at the surgical site, or

signs of poor recovery such as ruffled coats, dehydration, and lethargy. Any abnormal signs should be reported to the LAF Vet Staff.

4.6.7 Required post-operative analgesics must be administered, and a treatment sticker submitted to the LAF Vet Staff as documentation that the doses have been given.

4.6.8 Remove skin sutures or wound clips 7-10 days following surgery.

References:

1. National Institutes Of Health (U.S.). Office Of Laboratory Animal Welfare, & Applied Research Ethics National Association. (2008). *Institutional Animal Care and Use Committee guidebook.* (pp. 145–147). Office Of Laboratory Animal Welfare.
2. National Research Council. (2011). *Guide for the Care and Use of Laboratory Animals Eighth Edition* (pp. 115–123). Editorial: Washington, D.C. National Academies Press.

Approvals:

Name	Title	Date of Approval
Jennifer Peirick, DVM	LAF Director/Attending Veterinarian	11/12/24
Jolie McCutcheon, DVM	LAF Clinical Veterinarian	11/12/24
Amy B. Snyder, DVM	LAF Clinical Veterinarian	11/12/24
IACUC	N/A	02/17/2025

Change History:

Revision #	Description of Change	Effective Date
01	Adapted into updated SOP template; added sections on instrument/supply preparation, surgeon preparation, recommended analgesics; added treatment stickers to Appendix.	11/12/24
02	No changes, just adding IACUC review and approval.	02/17/2025

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University at Buffalo
The State University of New York

LABORATORY ANIMAL FACILITIES
RODENT ANESTHESIA &/OR SURGERY REPORT

DATE:_____ ANIMAL HOLDING ROOM #_____

PRINCIPAL INVESTIGATOR_____ IACUC#_____

EMERGENCY CONTACT_____ EMERGENCY PHONE #: _____EMAIL: _____

SPECIES: O **RAT** O **MOUSE** O **HAMSTER**

PROCEDURE PERFORMED_____

PERSON(S) PERFORMING PROCEDURE_____

ANESTHESIA: O ISOFLURANE

O KETAMINE/XYLAZINE: DOSE (mg/kg)_____ O I.P. O I.M.

O OTHER ANESTHETICS/SEDATIVES:_____

DOSE (mg/kg)_____ O S.C. O I.P. O I.M.

OPHTHALMIC OINTMENT (ARTIFICIAL TEARS) PLACED IN EYES? O YES O NO

ANALGESICS GIVEN BEFORE/DURING/IMMEDIATELY AFTER PROCEDURE:

DRUG _____ DOSE (mg/kg)_____ O S.C. O I.P. O I.M.

DRUG _____ DOSE (mg/kg)_____ O S.C. O I.P. O I.M.

DRUG _____ DOSE (mg/kg)_____ O S.C. O I.P. O I.M.

LOCAL ANESTHETICS (e.g., BUPIVACAINE, LIDOCAINE, SEPTOCAINE) USED DURING PROCEDURE:

DRUG _____ DOSE_____ LOCATION APPLIED_____

DRUG _____ DOSE_____ LOCATION APPLIED_____

ARE ANY ADDITIONAL POST-OPERATIVE ANALGESICS OR MEDICATIONS REQUIRED IN YOUR PROTOCOL? O YES O NO

WHO WILL ADMINISTER THEM? O PI STAFF O LAF STAFF

*LAF assistance **MUST** be requested at least 72 hours in advance at lafvetstaff@buffalo.edu (additional charges will apply)*

DRUG _____ DOSE (mg/kg)_____ FREQUENCY (TIMES/DAY)_____ O S.C. O ORAL O _____

FOR HOW LONG? O 1 DAY POST O 2 DAYS POST O 3 DAYS POST O 7 DAYS POST O OTHER_____

DRUG _____ DOSE (mg/kg)_____ FREQUENCY (TIMES/DAY)_____ O S.C. O ORAL O _____

FOR HOW LONG? O 1 DAY POST O 2 DAYS POST O 3 DAYS POST O 7 DAYS POST O OTHER_____

A "Treatment Sticker" must be completed and submitted for each dose of analgesic administered each day.

ANIMAL CAGE CARD #_____ WEIGHT:_____ DURATION OF PROCEDURE:_____

PROCEDURE OBSERVATIONS/COMMENTS/COMPLICATIONS: _____

_____

_____

ADDITIONAL INJECTABLE ANESTHESIA NEEDED? O NO O YES - RECORD DRUG, DOSE, ROUTE: _____

EUTHANIZED? O FATAL PLUS O CO2 O CERVICAL DISLOCATION O DECAPITATION O OTHER: _____

VOLUME (mL) OF FLUIDS GIVEN AFTER PROCEDURE S.C._____

POST PROCEDURE MONITORING (OBSERVE AND RECORD AT LEAST EVERY 15 MIN)

TIME	COLOR OF MEMBRANES/EXTREMITIES	RESPIRATORY RATE	WITHDRAWAL REFLEX	COMMENTS/ADDITIONAL TREATMENTS
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	

ANIMAL CAGE CARD #_____ WEIGHT:_____ DURATION OF PROCEDURE:_____

PROCEDURE OBSERVATIONS/COMMENTS/COMPLICATIONS: _____

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ADDITIONAL INJECTABLE ANESTHESIA NEEDED? O NO O YES - RECORD DRUG, DOSE, ROUTE: _____

EUTHANIZED? O FATAL PLUS O CO2 O CERVICAL DISLOCATION O DECAPITATION O OTHER: _____

VOLUME (mL) OF FLUIDS GIVEN AFTER PROCEDURE S.C._____

POST PROCEDURE MONITORING (OBSERVE AND RECORD AT LEAST EVERY 15 MIN)

TIME	COLOR OF MEMBRANES/EXTREMITIES	RESPIRATORY RATE	WITHDRAWAL REFLEX	COMMENTS/ADDITIONAL TREATMENTS
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	

ANIMAL CAGE CARD #_____ WEIGHT:_____ DURATION OF PROCEDURE:_____

PROCEDURE OBSERVATIONS/COMMENTS/COMPLICATIONS: _____

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ADDITIONAL INJECTABLE ANESTHESIA NEEDED? O NO O YES - RECORD DRUG, DOSE, ROUTE: _____

EUTHANIZED? O FATAL PLUS O CO2 O CERVICAL DISLOCATION O DECAPITATION O OTHER: _____

VOLUME (mL) OF FLUIDS GIVEN AFTER PROCEDURE S.C._____

POST PROCEDURE MONITORING (OBSERVE AND RECORD AT LEAST EVERY 15 MIN)

TIME	COLOR OF MEMBRANES/EXTREMITIES	RESPIRATORY RATE	WITHDRAWAL REFLEX	COMMENTS/ADDITIONAL TREATMENTS
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	
	O PINK O PALE O BLUE	O NORMAL O FAST O SLOW	O YES O NO	

Remember to place a blue Post-Op card on the front of each cage when returning the cage to the room.

RODENT TREATMENT

DATE_______________ TIME___________ INITIALS___________

IACUC#______________________ PI_______________________

Drug____________________ Dose___________ Route_________

Drug____________________ Dose___________ Route_________

CAGE CARD #

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RODENT TREATMENT

DATE_______________ TIME___________ INITIALS___________

IACUC#______________________ PI_______________________

Drug____________________ Dose___________ Route_________

Drug____________________ Dose___________ Route_________

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