



BROWN

Institutional Animal Care and Use Committee (IACUC)

Rodent Surgery Policy

Date of IACUC Review and Approval: October 4, 2019

I. Definitions:

- **Survival Surgery:** a surgical procedure from which an animal is expected to completely recover from anesthesia, even if briefly
- **Non-Survival (Terminal) Surgery:** a surgical procedure during which an animal is euthanized before recovery from anesthesia
- **Major Surgery:** any surgery that penetrates and exposes a body cavity, produces substantial impairment of physical or physiologic functions, or involves extensive tissue dissection or transection
- **Minor Surgery:** any surgery that does not expose a body cavity and causes little or no physical impairment; examples include wound suturing, peripheral vessel cannulation, and percutaneous biopsy
- **Aseptic Technique:** pre-operative and surgical techniques used to reduce microbial contamination to the lowest possible practical level
- **Sterilization:** the process whereby all viable microorganisms are eliminated or destroyed
- **Disinfection:** the chemical or physical process that involves the destruction of pathogenic organisms

II. General:

- The term survival surgery applies to any situation where surgical procedures are conducted and the animal recovers from anesthesia, regardless of the anesthetic time interval and how long until euthanasia. The use of good surgical technique to improve experimental outcomes is well established in the reduction of post-surgical complications, including infections, improved survival rates, and a more rapid return to basal physiological state. Anesthetic depth monitoring and post-operative monitoring is required for all survival surgeries.
- A non-survival (terminal) surgery is one in which the animal is euthanized during the procedure, while under a surgical plane of anesthesia. Anesthetic depth monitoring is required for any non-survival procedure expected to last longer than 15 minutes.
- This document is intended to assist principle investigators (PIs) performing surgical manipulations in rodent species and is consistent with those described in the *Guide for the Care and Use of Laboratory Animals (The Guide)*, the *USDA Animal Welfare Act/Regulations (AWA/AWR)*, and *Public Health Service Policy on Humane Care and Use of Laboratory Animals*.

III. Requirements for All Surgical Procedures:

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- Planning Prior to Protocol Submission to the Institutional Animal Care and Use Committee (IACUC): A veterinarian must be involved with the planning of all surgical procedures; this is most effectively done *prior* to protocol submission to the IACUC. The purpose of this discussion is to identify the roles of individual personnel, determine any training requirements, to discuss anesthesia/analgesic drugs, the surgical procedure itself and expected outcomes, if any support or equipment is needed, the location where the surgeries will occur, and pre-operative assessment and post-operative care.

- Requirements for Principal Investigators (PIs):
 - It is the responsibility of the PI to ensure that all personnel are adequately trained in anesthesia administration and monitoring, aseptic technique, good surgical technique, post-procedural support during the recovery period, and record keeping.
 - All rodent surgical procedures must be performed in a designated surgery area in the laboratory. This area must be clean, uncluttered and not being used at the same time for other laboratory procedures. Alternatively, Animal Care Facility (ACF) procedure or surgical areas may be scheduled for use.
 - The use of aseptic procedures for all survival surgeries is required, regardless of the interval of survival.
 - Conduct a continuing and thorough assessment of the surgical outcomes to ensure that the appropriate procedures are followed and potential complications are detected, addressed, and reported as necessary (see [Brown's Policy on Reporting Animal Welfare Concerns, Adverse Events, Unanticipated Problem\(s\), and Non-compliance](#)).

- Training: The PI and all personnel responsible for performing rodent survival surgery must be trained in the essential elements of good surgical technique listed below. This training can be provided by qualified personnel in the laboratory, by a veterinarian, or by a veterinary technician.
 - Asepsis
 - Administration of anesthesia and analgesia, including complete monitoring records
 - Gentle tissue handling
 - Appropriate maintenance and handling of surgical instruments
 - Effective hemostasis
 - Correct use of suture materials and patterns

IV. Requirements for Non-Survival (Terminal) Surgeries:

- *Please refer to the IACUC Guidelines for Non-Survival (Terminal) and Survival Surgery in Rodents for explicit guidance in conducting non-survival (terminal) surgical procedures in rodents.*
- PPE must be worn, which includes: gown (if in facility) or lab coat (if in lab), bouffant cap, mask, and booties.
- A procedure room within the facility or a dedicated space in the lab may be used to conduct these surgeries. The location should be indicated in your IACUC protocol. The area should be uncluttered and clean.
- At a minimum, the surgical site should be clipped and the surgeon should wear gloves.
- Surgical instruments do not need to be sterilized, but they must be clean and free of debris.
- Documentation of the surgery must occur. This must include: the PI name, the protocol number, the procedure, the surgeon name, the species, the identification number of the animal (or number of animals), and any drugs provided. For any procedure >15 minutes, anesthetic monitoring must be

documented. Final disposition, including primary and secondary methods of euthanasia, must be recorded. Please see **VI: Record Keeping** and Appendix 1 of this document for more details.

V. Requirements for Survival Surgeries:

- *Please refer to the IACUC Guidelines for Non-Survival (Terminal) and Survival Surgery in Rodents for explicit guidance in conducting survival surgical procedures in rodents.*
- PPE must be worn, which includes: gown (if in facility) or lab coat (if in lab), bouffant cap, mask, and booties.
- A procedure room within the animal facility or a dedicated space in the lab may be used to conduct these surgeries. The location should be identified in your IACUC protocol. The area should be uncluttered and clean.
- The surgical site must be clipped, must be aseptically prepared, and the surgeon must wear non-expired sterile surgical gloves. Animal preparation must be performed in a way such that it does not contaminate the area where surgery will be performed.
- Surgical instruments must be sterilized (autoclaved, ethylene oxide) at the start of the day. Validation of indicators (steam or ethylene oxide) must be checked for conversion prior to using instruments to ensure proper processing. If performing multiple surgeries, hot-bead sterilization of the instruments may occur between animals.
- Documentation of the surgery and post-operative care and progress must occur. This must include: the PI name, the protocol number, the procedure, the surgeon name, the species, the identification number of the animal (or number of animals), and any drugs, compounds or experimental agents provided. Intraoperative anesthetic monitoring must be documented. Post-operative monitoring must be performed in accordance with the approved protocol. Please see **VI: Record Keeping**, Appendix 2, and Appendix 3.
- After the procedure, animals must be placed in a clean cage, half on/half off of a warming pad and monitored until they are recovered. Recovery from a surgical procedure entails that the rodent is awake, alert, ambulatory and able to thermoregulate.
- After returning the animal to the rodent housing room, a Surgical Care card must be placed on the cage.

VI. Record Keeping:

- Records documenting any non-survival (terminal) surgery, survival surgery, and post-operative monitoring must be retained by the lab and readily available for review by the IACUC, the veterinary staff, and representative of regulatory and accrediting organizations. All rodent anesthesia and surgery records must be retained for a minimum of one (1) year. The following appendices are attached to use as-is or as a starting point for the lab to develop their own, procedure-specific form.
 - Appendix 1: Rodent Anesthesia Monitoring Record (Non-Survival Surgery)
 - Appendix 2: Rodent Anesthesia Monitoring Record (Survival Surgery)
 - Appendix 3: Rodent Post-Surgical Monitoring Record
 - **Note:** The length of monitoring noted in the protocol is a minimum. If there is any indication that the animal is not doing well, the record must extend beyond this period.

VII. References:

- NRC (National Research Council), Institute of Laboratory Animal Resources, Commission on Life Sciences. 2011. Guide for the Care and Use of Laboratory Animals, Washington D.C., National Academy Press.
- National Institutes of Health, Office of Laboratory Animal Welfare. 2015. PHS Policy on the

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Humane Care and Use of Laboratory Animals.

- The Animal Welfare Act, 7USC Sec 2131 et seq. Title 9, Code of Federal Regulations, parts 1, 2, & 3, January 1998.



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Rodent Anesthesia Monitoring Record (Non-Survival Surgery)

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|---------------------------------------|--------------------------------------|-----------------------------|-------------|--------------------|---------|------|
| Date: | PI: | Animal Protocol#: | Tag#/ID(s): | Species: | Strain: | Sex: |
| Procedure: | | Surgeon: | | Contact #: | | |
| Anesthetic Agent(s): Dose (mg), route | | Isoflurane _____% in oxygen | | Time of Induction: | | |
| Duration _____ hours | Surgical notes and/or complications: | | | | | |

Surgical Monitoring

| Animal Tag#/ID | Time | Negative Toe Pinch | Normal Breathing | Other (describe) | Animal Tag#/ID | Time | Negative Toe Pinch | Normal Breathing | Other (describe) | Animal Tag#/ID | Time | Negative Toe Pinch | Normal Breathing | Other (describe) |
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| <p>Post-Surgical Euthanasia</p> <p>(Method, dose, route as appropriate)</p> | |
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Rodent Anesthesia Monitoring Record (Survival Surgery)

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|---------------------------------------|-------------------|-----------------------------|-----------------------------------------------|------------|--------------------------|------|
| Date: | PI: | Animal Protocol#: | Tag#/ID(s): | Species: | Strain: | Sex: |
| Procedure: | | Surgeon: | | Contact #: | Pre-Surgical Weight (g): | |
| Anesthetic Agent(s): Dose (mg), route | | Isoflurane _____% in oxygen | Fluids: Dose (mLs), route, type | | | |
| Time of Induction: | Time of Recovery: | | Duration _____ hours | | | |
| Surgical notes and/or complications: | | | Pre-Surgical Analgesics (agent, dose, route): | | | |
| | | | Post-Surgical Analgesics: | | | |

Surgical Monitoring

| Animal Tag#/ID | Time | Negative Toe Pinch | Normal Breathing | Other (describe) | Animal Tag#/ID | Time | Negative Toe Pinch | Normal Breathing | Other (describe) | Animal Tag#/ID | Time | Negative Toe Pinch | Normal Breathing | Other (describe) |
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Rodent Post-Surgical Monitoring Record

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|--------------------------------------|-----|-------------------|-------------|------------|---------|--------------------------|
| Date: | PI: | Animal Protocol#: | Tag#/ID(s): | Species: | Strain: | Sex: |
| Procedure: | | Surgeon: | | Contact #: | | Pre-Surgical Weight (g): |
| Surgical notes and/or complications: | | | | | | |

| Post-Surgical Monitoring | | | | | | | | | | | | | | | | | |
|---------------------------------|------|------|--------------------------|------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------------|----------|
| | | | Incision site | | Posture | | Activity | | | | Hydration Status | | Appetite | | | | |
| Animal Tag#/ID(s) | Date | Time | Dry and intact | Other (describe) | Hunched | Normal posture | Normal activity | Decreased activity | Inactive | Moribund | Weight (g) | Normal | Dehydrated | Normal | Not eating | Additional comments and observations: | Initials |
| | | | <input type="checkbox"/> | | <input type="checkbox"/> | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| | | | <input type="checkbox"/> | | <input type="checkbox"/> | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
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| Post-Surgical Analgesics | | | | | |
|---------------------------------|------|------|------------------------------------|------------------|----------|
| Animal Tag#/ID(s) | Date | Time | Analgesic- Agent and Concentration | Dose (mg), route | Initials |
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