

# GUIDELINES- Survival Surgery in Rodents and Lower Vertebrates

Version 3.3

## I. Introduction

The Animal Welfare Act (AWA) and the Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals require that research, testing and teaching activities using animals be performed in such a way as to minimize discomfort, distress and pain to the animals. When these activities involve surgery, they must include appropriate provisions for pre, intra, and postoperative care consistent with established veterinary medical and nursing practices. Survival surgical procedures will be performed using aseptic procedures such as the use of sterile surgical gloves, sterile instruments and aseptic technique.

To assure compliance with the AWA and the PHS Policy, the UIC Animal Care Policy, section IX.A., contains the following language: Investigators or instructors performing any surgical procedure on an animal shall conform to the requirements stated in the *Guide for the Care and Use of Laboratory Animals (Guide)*. A facility intended for aseptic surgery shall be used only for that purpose and shall be maintained and operated to insure cleanliness and directed and staffed by trained personnel. Aseptic technique shall be used on all animals undergoing survival surgery. Survival surgery on rodents and lower vertebrates does not require a special facility, but should be performed in a dedicated space appropriately managed to minimize contamination from other activities in the room.

## II. Institutional Guidelines

The following guidelines have been written to help investigators assure that work done under their supervision complies with the UIC Animal Care Policy. The Committee recognizes that some characteristics of common laboratory rodent and lower vertebrate surgery - such as small incision sites, few personnel in the surgical team, manipulation of multiple animals at one time and procedures of short duration (compared to surgery in larger species) may make modifications in standard aseptic techniques desirable or necessary.

**A. Recordkeeping** – To comply with the *Guide* and PHS Policy and to ensure continual AAALAC accreditation, the institution is required to have an institution-wide program to document intraoperative and postoperative care and monitoring of rodents, birds and lower vertebrates. To accomplish this goal, the ACC requires investigators to document all anesthetics and analgesics given to every animal undergoing surgical procedures, as well as document postoperative monitoring on the “UIC Small Animal (Rodents/Frogs/Birds) Surgical Record”. Investigators should refer to the BRL guideline entitled “Procedure for Maintaining the UIC Small Animal (Rodents/Frogs/Birds) Surgical Record” for further details on recordkeeping. These documents are available on the BRL website at [www.brl.uic.edu](http://www.brl.uic.edu).

**B. Personnel Training and Qualifications** According to the *Guide*, personnel who perform surgical procedures must receive appropriate training to ensure that they use good surgical technique. This should include supervised training of individuals while they are learning a procedure. This training may come from fellow lab members if they are practiced in the technique, other investigators, or, if the procedure is a new technique, then the veterinary staff should be consulted. Training should include: knowledge of the biology and behavior of the animal species to be used; an understanding of how pain and distress affect their behavior; a working knowledge of the anesthetic and analgesic drugs that will be used and how to monitor the adequacy of their effect; an understanding of aseptic principles and how to apply those principles to the procedure(s) to be performed; a knowledge of the surgical anatomy relevant to the procedure; and demonstrated proficiency in performing the technique before working unsupervised. In addition, all individuals that intend to perform the surgical procedure, or care for the animals during the perioperative period, must be included in Appendix 3 of the protocol and their level of expertise and training documented and approved by the ACC.

**C. Preoperative Planning and Care** - A positive surgical outcome starts with a healthy, well-acclimatized patient. The animal's health should be assessed prior to surgery. Only animals that appear healthy should be used. The extent of this

examination will vary with the species of animal and type of surgery to be performed. The animal should be acclimatized to its new environment for a minimum of three to five days prior to surgery or other experimental manipulation. Handling animals in a manner that minimizes stress will also help maintain animal health and well-being.

As part of preoperative planning, the investigator must verify that the surgical procedure is included on the approved ACC protocol. In addition, the investigator is required to ensure all necessary supplies (including analgesics) are available to perform the procedure and appropriate support staff is available to monitor the animals, including during the postoperative period, in accordance with the approved ACC protocol.

**NOTICE: If the investigator cannot comply with these requirements, the surgical procedure MUST NOT be performed.**

Investigators should refer to the “UIC Rodent Surgical Classifications and Analgesic Guidelines”, which is on the ACC website (<http://tiger.uic.edu/depts/ovcr/research/protocolreview/acc/policies/index.shtml>), for the recommendations on analgesics and postoperative monitoring required for surgical procedures. Recommendations are made based on the level of invasiveness of the procedure and expected level of pain. The use of analgesics must be described in the approved ACC protocol. If a regimen is used that varies from the “UIC Rodent Surgical Classifications and Analgesic Guidelines”, the ACC may require justification. If postoperative analgesics cannot be used, then scientific justification including appropriate references and/or documentation must be provided in the approved ACC protocol. Postoperative monitoring and administration of analgesics MUST be performed as described in the approved UIC ACC protocol. Postoperative analgesia and monitoring must be recorded on the “UIC Small Animal (Rodents/Frogs/Birds) Surgical Record”. These records must be maintained in the lab for one year following the procedure and should be available upon request by the ACC.

**D. Anesthetics and Analgesics** - The appropriate choice of an anesthetic protocol is essential for optimal surgical outcomes. The AWA requires that the principal investigator consult with a veterinarian about the use of anesthetics and analgesics. If volatile agents are used, an appropriate scavenging system should be in place in accordance with UIC Environmental Health and Safety Policy and the UIC-ACC guidelines for the Use of Inhalation Aesthetics for Laboratory Animals. The depth of anesthesia should be assessed and determined to be appropriate prior to the initiation of a surgical procedure. This is achieved by checking that the animal does not respond to toe pinch. Anesthetic depth and the physiological status of the animal should then be assessed throughout the procedure. This may be accomplished by re-assessing the response to toe pinch or other reflexes, as well as by evaluating respiratory rate and color of skin/tissue intraoperatively. The anesthetics given as well as anesthetic monitoring must be recorded on the “UIC Small Animal (Rodents/Frogs/Birds) Surgical Record”.

**E. Surgical Area** - Survival surgery should be performed in an area that is easy to sanitize and is not being used for any other purpose at the time of surgery. Clipping of hair and anesthetic recovery of animals should occur in the room separate from the surgical procedure. This area should be kept uncluttered and free of dirt and debris and should be disinfected before and after each session. Examples of appropriate surface disinfectants include Clidox®, MB-10®, Virkon®, Roccal®, Quatricide®, Nolvasan® or 10% bleach solution. The surgical area should have minimal traffic, adequate lighting, and, if possible, have positive air pressure in relation to adjacent areas.

**F. Surgical Procedures** - Surgery should be performed using aseptic technique.

#### *Preparation of the Surgical Site*

This involves appropriate animal preparation, which usually includes the following: clipping of hair at the surgical site; cleaning (disinfecting) the surgical site and draping the surgical site to prevent contamination. Cleaning the incision site in rodents can be done using alcohol (70%), an iodine based solution, or a hexachlorophene or iodine based or other surgical detergent. If a surgical detergent (scrub) is used to prepare the incision site, then the site must be rinsed with alcohol and/or sterile water and followed by a final iodine solution application. The surgical site should be cleaned beginning with the center of the surgical field (incision site) working outward. To help prevent hypothermia, the animal's body should be kept as dry as possible during the preparation of the incision site, and solutions, scrubs, and/or alcohol only applied to the surgical area.

### *Surgical Attire*

Aseptic technique includes the use of gloves, gown or clean lab coat, and sterile instruments by the surgeon(s). In addition, a cap and mask may be helpful to prevent contamination. Only sterile instruments, equipment, and other surgical supplies should come in contact with the surgical site after it is prepared.

### *Preparation of Surgical Instruments*

Surgical instruments are defined as any tool or device that contacts tissues during the surgical procedure (this includes dental burs for drilling). For many rodent surgical procedures, the tip is the only part of the instrument that actually touches the tissue/organ. For these surgeries, it is acceptable to sterilize the tip of the instruments provided that the rest of the instrument is clean. To do this, instruments may be washed with standard kitchen detergent and dried with a clean cloth. Next, instrument tips are heated in a glass bead sterilizer for 15 seconds. Instrument tips **MUST** be allowed to cool approximately one minute before placing them in contact with tissue. Instruments must be kept in the surgical field, such as on a sterile towel, gauze or drape, so they are not contaminated following sterilization. For surgical procedures that warrant the sterilization of only the tips, one set of instruments may be used on multiple rodents during a single session. To do this, instruments should be wiped free of tissue and debris. The instruments tips should be placed in the hot bead sterilizer for 15 seconds. Again, the tips **MUST** be allowed to cool for approximately 1 minute.

For some rodent surgeries, more than the tip of the instrument comes into contact with the animal. In these cases the entire surface of the instruments should be sterilized. This may be done by several methods: 1) Instruments may be autoclaved using appropriate wrapping material and heat sensitive tape/indicator, 2) ethylene oxide sterilization for instruments that will not withstand autoclaving, or 3) chemical sterilization. There is an ethylene oxide sterilizer available in the BRL surgical suite; for more information on using this method, please call BRL surgery department at 6-6857. Instruments that have been sterilized by one of these methods may be used on multiple animals during a single session. To do this instruments are wiped free of tissue or debris, the tips are placed in a hot bead sterilizer for 15 seconds and allowed to cool for approximately 1 minute between animals. Small surgical instruments, such as dental burs, can be wiped clean and placed in a hot bead sterilizer for 15 seconds and allowed to cool for approximately 1 minute.

**It should be noted that alcohol is not considered a sterilant or a high-level disinfectant and should not be used as a chemical sterilant for instruments.**

### *Preparation of Implanted Materials*

For surgical procedures involving cranial implants such as cannulas, electrodes, and screws, there should be consideration of sterilizing implanted material prior to surgery. Options for sterilizing include autoclaving, the use of a hot bead sterilizer, ethylene oxide sterilization, or chemical sterilants. Based on the varying types of materials that may be implanted, it is best to contact the manufacturer for recommendations on sterilizing the materials. Alternate methods of sterilization should be discussed with the veterinary staff and may require scientific justification prior to approval.

### *Sterility and Tissue Handling*

Surgery should be performed in a manner that maintains sterility. It is particularly important to keep sterile instruments and supplies inside the sterile field. Tissues should be handled gently and carefully so that trauma is minimized and subsequently postoperative complications such as infection and pain are minimized. Skin should be closed with either a monofilament suture material or wound clips.

**G. Postoperative Care** - Postoperative care includes close observation during anesthetic recovery and provisions to maintain homeostasis through supplemental heat, fluids, etc., as indicated. Following recovery from anesthesia, the animal should be monitored in accordance with the approved ACC protocol. Amount of immediate postoperative monitoring is determined based on invasiveness of the surgery (see "UIC Rodent Surgical Classifications and Analgesic Guidelines"). Postoperative observations of the animals, such as adequate eating and drinking, integrity of the incision, and pain control should be recorded on the "UIC Small Animal (Rodents/Frogs/Birds) Surgical Record". Animals must be monitored for a minimum of two weeks following surgery. The required monitoring during the immediate post-operative period satisfies the requirement of monitoring for the first week as long as the animals are doing well. Two additional days of monitoring separated by 3-4 days are required during the second week. At that time, animals can be released from post-operative monitoring provided that skin sutures or wound clips are removed, the surgical site is

healed, and animals appear healthy. Postoperative analgesics should be administered as described in the approved UIC ACC protocol and also recorded on the “UIC Small Animal (Rodents/Frogs/Birds) Surgical Record”. Please see the “Procedure for Maintaining the UIC Small Animal (Rodents/Frogs/Birds) Surgical Record” for further details on postoperative record keeping.

Some typical signs of pain and distress in rodents include: partially closed eyelids, rough hair coat, hunched posture, failure to use nesting material (mice), reduced exploratory behavior, licking, biting, scratching, guarding, and aggressive vocalization when handled. Skin sutures or wound clips should be removed 7 to 10 days following surgery.

**H. Communication** – Investigative staff performing survival surgery on rodents and lower vertebrates are required to inform the veterinary staff by completing and submitting an online Small Animal Surgery Notification form. The form can be located on the BRL website ([www.brl.uic.edu](http://www.brl.uic.edu)) under the contacts tab.

In addition, the investigator has the responsibility to notify the veterinary staff should a situation arise resulting in the inability of the investigator to fulfill postoperative monitoring responsibilities and/or the administration of treatments. Should the veterinary staff be required to perform postoperative monitoring and/or administer treatments, any incurred costs will be charged to the investigator’s BRL account.