

**UNIVERSITY OF CALIFORNIA SAN DIEGO
INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE**

Policies and Guidelines for Animal Surgery

The University of California is committed to the improvement of human and animal health and the advancement of science. When these pursuits involve surgical procedures in animals, UCSD is committed to their humane care and use as specified in the [Guide for the Care and Use of Laboratory Animals](#), the [PHS Policy](#) and the [Animal Welfare Act](#). All surgical procedures in animals must be pre-approved by the IACUC. The campus veterinarian is required to provide guidance or oversight to surgery programs and post-surgical care. Both the IACUC and Campus Veterinarian are required by federal law to suspend animal activities not in compliance with federal regulations.

Definitions

Survival surgery: a surgical procedure from which an animal is expected to regain consciousness.

Non-Survival Surgery: a surgical procedure from which an animal is euthanized before regaining consciousness.

Minor Survival Surgery: a surgical procedure that does not expose a body cavity and causes little or no physical impairment. Examples include wound suturing, peripheral vessel cannulation, and placement of subcutaneous implants.

Major Survival Surgery: a surgical procedure that penetrates and exposes a body cavity or produces substantial impairment of physical or physiologic functions. Examples include laparotomy, thoracotomy, craniotomy, orthopedic procedures, limb amputation and enucleation.

Multiple Major Survival Surgeries are usually not approved by the IACUC. If an investigator requests approval of multiple major survival surgeries, the investigator must provide rigorous scientific justification

General Responsibilities of Principal Investigators

1. Assuring adequately trained surgical staff:

Each person involved with a study needs appropriate training to adequately perform the duties required. Training can be provided by the laboratory or through classes offered by ACP or individual Principal Investigators.

Adequate surgical training must be provided to ensure that good surgical technique is practiced including asepsis, gentle tissue handling, minimal dissection of tissue, appropriate use of instruments, effective hemostasis and suturing techniques.

Individuals trained in human surgery may need additional training in other species' variations in anatomy, physiology, the effects of analgesic and anesthetic drugs, or in postoperative procedures.

The [Guide](#) states that, "The PHS Policy and the AWRs place responsibility with the IACUC for determining that personnel performing surgical procedures are appropriately qualified and trained in the procedures to be performed." This is accomplished by Committee assessment of qualifications of personnel submitted through Personnel Qualifications forms. As such, only people listed on an approved protocol and specified as participants in surgical procedures may participate in those procedures. The protocol application process includes a place to list personnel who will perform surgical procedures as well as space for describing each person's qualifications and training. Adding additional surgical personnel must be approved by amendment to an approved protocol before participation in surgery.

2. Performing procedures as approved by the IACUC:

All surgical procedures to be performed on animals at UCSD must be described in an animal protocol and approved by the IACUC before being performed on animals. The description of these procedures is part of the protocol application process. Post-surgical care must be addressed in the protocol, including where animal recovery will take place, how often the animals will be monitored, and the criteria for cessation of monitoring.

Changes to an approved surgical procedure must also be approved by the IACUC before implementation.

Policies and Guidelines for Rodent Surgery

Specific Responsibilities of Principal Investigators:

(The Campus veterinarian and Animal Care Program are available to assist with any or all of these requirements.)

1. Assuring appropriate presurgical planning, presurgical evaluation and preparation

Presurgical planning is critical to the success of surgical procedures in animals. Presurgical planning should include input from all members of the surgical team. The surgical plan should identify personnel, their roles and training needs; equipment and supplies required for the procedures planned; the location and nature of the facilities in which the procedures will be conducted; and preoperative animal health assessment and postoperative care.

Appropriate pre-surgical evaluations are required to assure that the prospective patient is in good health. The withholding of food is not necessary in rodents unless specifically required by the protocol or surgical procedure. Water should not be withheld unless required by the protocol. Withholding of food for more than six hours should be discussed with a veterinarian.

2. Performing all surgical procedures in facilities approved by the IACUC.

Survival Surgery can be performed in a small, dedicated space that allows for the minimization of contamination from other activities in the room during surgery. In general, rodent survival surgery should be performed in the vivarium in order to decrease the risk of catastrophic contamination of animals colonies associated with transport of animals out of and back into the vivarium. While survival surgical procedures can be performed outside the vivarium, this practice depends on policies associated with specific vivaria. Facilities for rodent survival surgery must be specified and approved by the IACUC in the animal use protocol.

Non-Survival Surgery can be performed outside of approved surgical suites but the location must be specified and approved by the IACUC in the animal use protocol.

3. Performing surgical procedures with appropriate/adequate surgical technique

Survival Surgery - Modified Aseptic Technique

- Lab personnel must wear dedicated clothing (e.g. lab coat), gloves, and other appropriate personal protective equipment
- Shaving or hair removal in the operative field unless it can be documented that this is not indicated.
- Preparation of the surgical site with an antiseptic solution such as povidone iodine.
- It is recommended that instruments be maintained sterile throughout all procedures. At a minimum, instruments must be sterile at the start of the first surgery of a daily series of surgeries. [Accepted methods of instrument sterilization.](#)
- The use of exam or surgical gloves. Gloves should be cleaned (disinfected) between each animal.
- Sterilization of implanted devices (catheters, osmotic pumps, etc.).
- All rodent surgery must be performed in an area dedicated for that purpose.

Non-Survival Surgery

For studies in which local bacterial contamination of tissues, or sepsis, could influence study outcomes, standard aseptic technique is recommended. Such studies include long term (>8 hours) terminal surgeries and collection

of samples for tissue or microbial culture.

At a minimum, it is recommended that lab personnel wear dedicated clothing (e.g. lab coat), gloves, and other appropriate personal protective equipment when euthanizing animals for tissue collection. In addition, the area used for tissue collection should not be used for other purposes during the tissue collection and the area should be cleaned and disinfected after each use.

4. Providing proper anesthesia and analgesia

Animals must be properly anesthetized for all surgical procedures as required by federal regulations. Consultation or assistance is available through the ACP (Caution: Exposure to waste anesthetic gas can result in occupational disease for people who are overexposed to these chemicals. Contact [EH&S](#) for assistance). The extent of monitoring necessary during surgery depends upon the anesthetic regimen, the animals' clinical condition, and the invasiveness of the procedure and may need to include body temperature, heart, and respiratory rates. Body temperature should be maintained (for non-survival surgery lasting at least 45 minutes, body temperature should also be maintained). External heat sources, such as recirculating water blankets or "Delta Phase Pads" (Braintree Scientific) are recommended. Heat lamps and commercial household-type heating pads are not permitted.

5. Providing appropriate post-surgical care and analgesia

It is the responsibility of the principal investigator to assure that their animal receives adequate post-surgical care. This care begins with recovery from anesthesia and may extend for days or weeks depending on post-surgical outcome and study design. The post-surgical care of animals encompasses weekends and holidays, and must be performed by trained individuals.

Continuous and careful observation of animals immediately postoperatively requires systematic monitoring of thermoregulation, cardiovascular and respiratory function, and postoperative pain and discomfort. Guidelines can be found at [Post-anesthetic monitoring guidelines](#). During recovery from anesthesia, the administration of supportive fluids, analgesics, and other drugs may be indicated. Animals should not be left unattended until they are physiologically stable, conscious, and able to maintain sternal recumbency without assistance.

After anesthetic recovery, monitoring is often less intense but should include attention to basic biologic functions of intake and elimination and behavioral signs of postoperative pain, monitoring for post-surgical infections, monitoring of the surgical incision, bandaging as appropriate, and timely removal of skin sutures.

Appropriate medical records must be maintained and any complications or concerns should be reported to the veterinary staff of the Animal Care Program.

6. Maintaining appropriate documentation of activities associated with surgery

P.I. must assure documented observations daily for five days. If problems occur at a later date in the study, the animal must be observed daily until resolved. If permanently instrumented, after the initial 5 days, observations will be made weekly until removal of the instrument of final disposition of the animal.

Policies and Guidelines for Mammalian Surgery other than rodents

Specific Responsibilities of Principal Investigators:

(The Campus veterinarian and Animal Care Program are available to assist with any or all of these requirements.)

1. Assuring appropriate presurgical planning, presurgical evaluation and preparation

Presurgical planning is critical to the success of surgical procedures in animals. Presurgical planning should include input from all members of the surgical team, including the surgeon, anesthetist, veterinarian, surgical technicians, animal care staff, and investigator. The surgical plan should identify personnel, their roles and training needs; equipment and supplies required for the procedures planned; the location and nature of the

facilities in which the procedures will be conducted; and preoperative animal health assessment and postoperative care.

Appropriate pre-surgical evaluations are required to assure that the prospective patient is in good health. All animals scheduled for any survival surgical procedure must receive a preoperative physical evaluation by a qualified person. This may range from brief observations to identifying specific laboratory baseline values and must be documented.

It is advantageous in many studies to introduce the animals to your laboratory setting for training or for habituation to a restraint device before beginning the project. Investigators must assure that animals are appropriately fasted before administration of general anesthetics and elective surgical procedures.

Non-Human Primates: Food should generally be withheld 8 -12 hours before anesthesia in adult non-human primates.

Ruminants: Food should generally be withheld 24 - 48 hours prior to anesthesia and water 12 - 24 hours prior to anesthesia in adult ruminants.

Dogs: Food should generally be withheld 8 -12 hours before anesthesia in adult dogs.

Pigs: Food should generally be withheld 8 -12 hours before anesthesia in adult pigs.

2. Performing all surgical procedures in facilities approved by the IACUC

Survival Surgery must be conducted only in facilities intended for that purpose as defined by the NIH [Guide](#) and approved by the IACUC. The following sites are currently approved Survival Surgery Areas at UCSD: BSB B104, CTF A050 and C310, SRL 106 and 114, EFS CVL, and the SWC surgery suite.

Non-Survival Surgery can be performed outside of approved surgical suites but the location must be specified and approved by the IACUC in the animal use protocol.

3. Performing surgical procedures with appropriate/adequate surgical technique

Survival Surgery

All survival surgery must be performed using aseptic technique. Aseptic technique encompasses a number of practices and procedures to reduce microbial contamination of surgical sites to the lowest possible practical level. In general, survival surgical procedures should be performed using the same aseptic practices common in veterinary and human medicine. The guidelines below are to be followed when performing survival surgery:

Surgeon:

Preparation and attire of the surgeon includes the following:

Surgical scrub/hand wash

Standard surgical attire: mask, shoe covers, cap, sterile gloves and gown.

Animal Preparation:

The incision site and an adequate surrounding area should be prepared by removing all hair. If the hair is excessively dirty, the animal may require bathing before the surgical procedure. Usually after anesthesia has been induced, the hair is removed by clipping with electric clippers. A razor or depilatory cream may also be used.

The skin should then be cleaned and disinfected. A chlorhexidine or iodine-based detergent (e.g. Povidone, Betadine) and a sterile gauze sponge can be used to scrub the area.

The surgical site should always be cleaned by scrubbing along the proposed incision line and then proceeding outward. The sponge should never be brought from the contaminated edge of the surgical area back into the clean center.

An ophthalmic lubricating ointment should be applied to the eyes to prevent drying.

The use of sterile surgical drapes is required.

Instruments:

All instruments that come into direct contact with the surgical area must be sterile. Sterilization of instruments can be achieved in a number of ways:

- a) *Steam* (autoclave)
- b) *Chemical* sterilants (Note, alcohol is not a sterilant.)
- c) *Ethylene oxide* (arranged through the UCSD School of Medicine. Ethylene Oxide is a regulated chemical carcinogen; any use at UCSD must be approved by [Environment, Health, and Safety](#))

If surgeries are to be performed on consecutive animals, surgical instruments must be sterilized between animals. This can be achieved by using multiple surgical packs, chemical sterilants, or use of a hot bead sterilizer.

Non-Survival Surgery

For studies in which local bacterial contamination of tissues, or sepsis, could influence study outcomes, standard aseptic technique is recommended. Such studies include long term (>8 hours) terminal surgeries and collection of samples for tissue or microbial culture.

At a minimum, it is recommended that lab personnel wear dedicated clothing (e.g. lab jacket), gloves, and other appropriate personal protective equipment when euthanizing animals for tissue collection. In addition, the area used for tissue collection should not be used for other purposes during the tissue collection and the area should be cleaned and disinfected after each use.

4. Providing proper anesthesia and analgesia

Animals must be properly anesthetized for all surgical procedures as required by federal regulations. Consultation or assistance is available through the ACP (*Caution: Exposure to waste anesthetic gas can result in occupational disease for people who are overexposed to these chemicals. Contact [EH&S](#) for assistance*). The extent of monitoring necessary during surgery depends upon the anesthetic regimen, the animals' clinical condition, and the invasiveness of the procedure and may need to include body temperature, heart, and respiratory rates. The frequency of monitoring must be stated in the protocol and documented during the procedure. Such monitoring may need to be continuous at 5-15 min intervals. Other necessary variables may include blood pressure, pulse quality, urine output, hematocrit, ECG, blood gases and pH. Therapeutic drugs administered during the procedure must be recorded. Intravenous parenteral fluids must be administered when required to maintain normal hydration in invasive surgical or extended anesthesia cases. Body temperature should be maintained (for non-survival surgery lasting at least 2 hours, body temperatures should also be maintained). External heat sources, such as recirculating water blankets or "Delta Phase Pads" (Braintree Scientific) are recommended. Heat lamps and commercial household-type heating pads are not permitted.

5. Providing appropriate post-surgical care and analgesia.

It is the responsibility of the principal investigator to assure that their animal receives adequate post-surgical care. This care begins with recovery from anesthesia and may extend for days or weeks depending on post-surgical outcome and study design. The post-surgical care of animals encompasses weekends and holidays, and should be performed by trained individuals.

Continuous and careful observation of animals immediately postoperatively requires systematic monitoring of thermoregulation, cardiovascular and respiratory function, and postoperative pain and discomfort.

Post-anesthetic monitoring guidelines:

During recovery from anesthesia, the administration of supportive fluids, analgesics, and other drugs may be indicated. Animals should not be left unattended until they are physiologically stable, conscious, and able to maintain sternal recumbency without assistance.

After anesthetic recovery, monitoring is often less intense but should include attention to basic biologic functions of intake and elimination and behavioral signs of postoperative pain, monitoring for post-surgical infections, monitoring of the surgical incision, bandaging as appropriate, and timely removal of skin sutures.

Appropriate medical records must be maintained and any complications or concerns should be reported to the veterinary staff of the Animal Care Program.

6. Specific Requirements for Survival Surgical Procedures

All animals undergoing surgical procedures must have documented observations daily until suture removal and adequate healing of the surgical site (generally 7-10 days). After adequate healing has occurred, documented observations will be made according to the approved animal use protocol, with a minimum of weekly documented observations.

The Principal Investigator or a designated staff member must observe animals that exhibit pain, distress, discomfort, handicap, or other health complications daily during the period of time that the problem exists.

Any procedure that involves exposed instrumentation, catheterization, bandage, etc. must be observed daily until removal of the apparatus and adequate healing of associated sites has occurred. Externalized catheters or instrumentation must be covered or contained to prevent damage that might result in exsanguinations. Such dressings must be kept clean.

Animals with health complications or at significant risk of postoperative infection should have body temperature monitored and documented during these periods. Animals with externalized instrumentation should have body temperature monitored and documented according to the frequency described in the protocol.

Analgesia must be provided as described in the approved IACUC protocol. If an animal exhibits unalleviated pain or distress not approved by the IACUC, veterinary staff consultation is required.

7. Maintaining appropriate documentation of activities associated with surgery.

Post-Surgical Records

The post-surgical record is composed of three specific forms: Post-Anesthetic Recovery Record, Daily Progress Notes, and Daily Observation Sheets. All three forms must be used with all non-rodent mammalian species with the exception of rabbits, which do not require a Daily Observation Sheet. The investigator is responsible for maintaining only two of the forms (Post-Anesthetic Recovery and Daily Progress Notes). Animal husbandry staff completes the Daily Observation Sheets. The IACUC or veterinary staff must approve any modifications to these forms. Standard forms are available at the office of each animal facility.

Post-Anesthetic Recovery Record

- Used on day of procedure only.
- Frequency of observations and physiologic parameters monitored and recorded are at the discretion of the investigator but should concur with the post-surgical care described in the Animal Use Protocol as well as with the UCSD Post-surgical Monitoring Guidelines.
- Particular attention should be given to the periodic recording of thermoregulation, cardiovascular and respiratory function, as well as postsurgical pain or discomfort.

Daily Progress Notes

- Two types
 - Daily Progress Notes - Page One
Initiated on the day following the procedure
Top of form must be filled out completely
 - Daily Progress Notes - Continuation Page
Initiated when Page One is complete
- Healthy animals are observed a minimum of once a day. Frequency of observations of sick animals (those with medical problems or complications) depends upon the severity of the condition and the treatment regimen. After adequate healing has occurred, documented observations will be made according to the approved animal use protocol, with a minimum of weekly documented observations. It is recommended that body temperature of chronically instrumented animals be monitored on a regular basis. All observations of animals must be entered in the medical record.

Daily Observation Sheet

- Top portion must be filled out completely by investigator staff
- Sheet is maintained by the animal facility staff and is kept on a clipboard on the door of the animal's kennel or on the wall outside the room
- Must be returned to the animal facility staff at the time of final disposition of the animal.
- If your protocol stipulates that animals are to be trained or habituated to a restraint device before surgery, these sessions should be documented.