SAN DIEGO STATE UNIVERSITY

IACUC Guidelines

Surgical Management, Monitoring and Record Keeping

IACUC Approved: 11/14/2022

A. PURPOSE

To ensure that the care and use of animals are being met with the highest standards, and to aid personnel involved in or responsible for surgical procedures on animals.

B. DEFINITIONS

1. Surgery: a procedure that involves instruments and techniques to incise the skin and/or penetrate a body cavity for diagnostic or therapeutic reasons.
2. Survival surgery: any surgical procedure in which the animal regains consciousness after anesthesia. Also referred to as chronic surgery.
3. Non-survival surgery: any surgical procedure in which the animal is euthanized before it regains consciousness. Also referred to as terminal or acute surgery.
4. Major surgery: any surgical procedure that penetrates and exposes a body cavity or produces substantial impairment of physical or physiological functions. Examples: laparotomy, thoracotomy, craniotomy, joint replacement, and limb amputation.
5. Minor surgery: any surgical procedure that does not penetrate or expose a body cavity and causes little or no physical impairment. Examples: wound suturing, short-term catheterization of a peripheral blood vessel, implantation of subcutaneous pellets or osmotic pumps. Please note that the implantation of chronic intravenous catheters (e.g. jugular, anterior vena cava) while technically considered minor surgery require special considerations due to the risk of potentially severe post-surgical complications. Refer to the SDSU IACUC guideline “Maintenance of Chronic Indwelling Devices”.

C. PRE-OPERATIVE CONSIDERATIONS

1. **Approval**
   - **a.** All surgical procedures must be detailed in a current SDSU IACUC approved animal protocol. No surgeries are permitted prior to that approval.
2. **Surgical Procedure Area**
   - a. Survival procedures, major or minor, in rodents must be performed in a clean, disinfected surface free of clutter, traffic and air drafts; temporally dedicated to the surgical procedure; e.g., animal procedure room or biological safety cabinet, using

aseptic technique. Refer to SDSU IACUC guidelines: 'Rodent Survival Surgery" and "Rodent Non-Survival Surgery".

3. **Animal Health Status and Acclimation**
   - **a.** It is essential to ensure that only healthy animals are subjected to surgery, unless indicated otherwise on the approved protocol.
   - **b.** Rodents must be received from approved vendors or be appropriately quarantined, and should have negative serology for murine pathogens and appear clinically normal (unless otherwise described in the approved animal protocol).
   - **c.** Prior to surgery, animals should be allowed to stabilize a minimum of 48hours following arrival.

4. **Animal Handling and Restraint**
   - **a.** Proper handling and restraint will help prevent injury and minimize stress to the animals and personnel. Investigators must ensure that all personnel handling animals be properly trained.

5. **Immediate Preoperative Period Fasting**
   - **a.** Since mice and rats lack the ability to vomit, fasting is not required prior to anesthesia and surgery.

6. **Anesthesia and Analgesia**
   - **a.** Animals must be properly anesthetized prior to aseptic preparation.
   - **b.** When possible, pre-emptive analgesia should be administered as a part of balanced anesthesia. Alternatively, analgesics should be administered immediately upon the conclusion of the surgical procedure, prior to the animal regaining consciousness.
   - **c.** A topical ophthalmic ointment should be applied to the eye to keep the corneas moist during anesthesia.
   - **d.** Refer to SDSU IACUC guidelines: "Anesthesia and Analgesia for Laboratory Animals – Reference Document" and "Isoflurane Gas Anesthesia Machine Operation".

7. **Aseptic Technique**
   - **a.** In order to reduce microbial contamination, survival surgery, whether major or minor, in all species must be performed using aseptic techniques. Minimally, this includes, ensuring the designated surgical area and equipment is sterile and disinfected before and after its use, preparing the surgical site so that it is free of hair or fur and cleansed with antiseptic solution (povidone iodine, chlorhexidine, alcohol) and wearing appropriate surgical attire.
   - **b.** Refer to SDSU IACUC guidelines: 'Rodent Survival Surgery", "Rodent Non-Survival Surgery", and "Instrument Cleaning, Packing and Sterilization".

D. INTRA- OPERATIVE CONSIDERATIONS

1. **Heat support and fluid therapy**

a. Anesthetics reduce the ability of the animals to maintain adequate body temperature. An external heat source must be provided during anesthesia by means of a circulating water blanket, heating pad or heating lamp. Extreme care should be taken when using heating pads or heating lamps to avoid causing thermal burns or hyperthermia before, during and after the surgical procedure.

b. When moderate to extensive blood loss is anticipated, the animals should be provided with a source of fluids such as saline or lactated Ringer's solution ("LRS"). Fluids are generally administered subcutaneously to rodents (e.g., 1-2 ml LRS).

2. **Patient Monitoring**

a. Adequate patient monitoring during anesthesia and surgery is fundamental to a successful outcome. Rodents should be monitored for respiratory function (rate and pattern), color of the gums and paws (pink is normal) and response to the toe-pinch reflex stimulation.

3. **Record Keeping**

a. An Anesthesia/Surgery record must be kept, which includes information regarding the surgical procedure performed, premedication, anesthetic and analgesic drugs administered, and notes on the patient during recovery.

b. When applicable other parameters may be recorded such as heart rate, respiratory rate, mucous membrane color, and body temperature.

c. Cages must be labeled with the date and name/ type of surgery that was performed.

d. Refer to SDSU IACUC guideline: "Record Keeping for Animal Procedures".

E. POST-OPERATIVE CONSIDERATIONS

a. Wound closure

- Unless otherwise indicated on the protocol, non- absorbable suture and/ or surgical staples/ wound clips must be removed within 10-14 days post-operatively, unless the wound is not healed within that time, or the endpoint is sooner than that time.
-

b. Care and Record Keeping

- Adequate post-operative care enhances an animal's recovery by improving its physiologic status and minimizing pain and distress.
- Personnel must be appropriately trained to identify and manage postoperative problems.
- All care and monitoring must be recorded in a surgery log with records relatable to identifying information on each cage card. Surgery logs must be maintained in the animal housing room for lab personnel, OLAC staff, and veterinarian review.

c. Post-Operative Stages

The post-operative period has been arbitrarily divided into five stages:

A. Stages 4 and 3 – Anesthetic Recovery

B. Stage 2 – Acute Postoperative Period

C. Stage 1 – Long-term Postoperative Period

D. Stage 0 – Normal.

Stage 4: Anesthetic Recovery Period

- **i.** Animal is unconscious or semi-conscious, unable to sit or maintain sternal recumbence.
- **ii.** Do not leave unattended.
- **iii.** Whenever possible, monitor the following parameters every fifteen minutes: Body temperature, heart rate and character, respiratory rate and pattern, color of gums and paws, jaw-tone, response to toe-pinch and a check of the incision for bleeding.
- **iv.** 4 Turn animal from side to side every fifteen to thirty minutes to prevent lung congestion.
- **v.** Maintain adequate body temperature as indicated above.
- **vi.** Supply additional fluids if the animal appears dehydrated.

Stage 3: Anesthetic Recovery Period

- **i.** Animal is conscious, can right itself or sit, but cannot stand.
- **ii.** When resists handling, or becomes aroused when handled return the animal to its home cage. Rodents should be placed in a clean, unoccupied cage free of bedding, or with a paper towel on top of the bedding, to prevent aspiration pneumonia.
- **iii.** Examine several times throughout the day.
- **iv.** Monitor the parameters mentioned above, if feasible, and note the attitude and degree of activity.

Stage 2: Acute Postoperative Period

- **i.** Animal can stand and move about; not yet eating and drinking normally. This is normal for the first one to two days post-procedure.
- **ii.** Monitor attitude and level of activity, food and water consumption and elimination, body temperature, condition of the operative site.

Stage 1: Chronic Postoperative Period

- **i.** Animal is active, alert, eating and drinking normally, with skin sutures in place.
- **ii.** Animals are also considered Stage 1 if they have chronic indwelling catheter.
- **iii.** Continue to examine daily as above and administer all prescribed medications, and record daily observations and medication administration for 7-14 days or until sutures are removed, if applicable.
- **iv.** Remove sutures at seven to fourteen days after surgery.
- **v.** Change any bandage/dressing as indicated by the veterinarian.
- **vi.** Maintain any vascular catheters daily as outlined in the protocol. Record maintenance. Record body weights at least weekly.

Stage 0: Normal Animals

- **i.** Stage 0 animals are normal.
- **ii.** Skin sutures, bandages and catheters have been removed.
- **iii.** Resume regular daily health checks.

Note: If post-surgical complications arise, the animal is again considered to be in Stage 1.

F. POST- SURGICAL DATA COLLECTION

a. Animals who undergo a survival surgical procedure should be allowed to recover for at least 48-72 hours prior to data or tissue collection.
b. Procedures that are non- survival, with sole purpose of tissue collection, refer to Policy on Euthanasia.
c. If samples are being collected for tissue or microbial cultures, then aseptic techniques should be followed to prevent contamination.