GUIDELINES FOR POSTOPERATIVE RECOVERY
FOLLOWING RODENT SURGICAL PROCEDURES

Background: This guideline provides a description of minimal postoperative recovery procedures for rodent survival surgeries to be followed unless alternate procedures have been outlined in the Institutional Animal Care and Use Committee (IACUC) approved protocol. If a principal investigator (PI) wishes to deviate from the approved Standard Operating Procedure (SOP), changes must be outlined and justified in the protocol application (approval of the protocol indicates approval of the deviation from this guideline for that protocol only).

It is the researcher’s responsibility to ensure that adequate postoperative/post anesthetic care is provided. The individual(s) providing postoperative care must be familiar with the IACUC approved protocol, have the skills and abilities to perform the assessments as indicated below, and must be able to provide support in case of complications. An example of a postoperative monitoring checklist is given on page 3. The aim of this guideline is to:

- Provide for a rapid, smooth and pain free recovery
- Reduce the chances of complications
- Identify and correct as quickly as possible, any complications that occur

A. Immediate Recovery Period

The period from cessation of anesthesia or completion of surgery until sternal recumbency (on its four legs) is regained.

1. Animals are carefully observed every 15-20 minutes; anesthetized animals are never left unattended.
2. The animal is to be clean of any dried blood or any materials that may wick bacterial contaminates into the surgical site and the animal can be placed or wrapped on a clean towel or surgical drape and placed in a clean dry cage to prevent hypothermia. Surgical bedding is provided by Veterinary Services to provide the animal with a clean dry environment. To prevent possible injury to the anesthetized animal, recovery should be accomplished with singly housed animals.
3. Extremities (feet or tail) are palpated or rectal temperature is taken to prevent hypothermia.
4. Additional eye lubricant may be instilled at this time.
5. Any anesthetic of 30 minutes duration or longer will usually result in hypothermia, plastic bottles or bags of warm (not hot to the touch) water, a Snuggle Safe Microwave Disc, or a hot water circulation pad is provided for supplemental heat. Electric heating pads or Infrared (IR) heating lamps should never used; severe thermal burns may occur due to the suppression of dermal reflexes in the anesthetized animal.
6. Rate and depth of respiration is visually monitored.
7. Color of mucous membranes, ears and tail are monitored to confirm normal tissue perfusion.
8. Reflexes (i.e. pedal, palpebral and eye position) are monitored to assess recovery from anesthesia.
9. If recovery is protracted, animal is turned every 15 minutes to improve respirations and decrease recovery time.
10. For surgical procedures longer than 45-60 minutes and/or where fluid loss due to hemorrhage or evaporation is anticipated, fluid support will be provided. Warmed subcutaneous (Ringer’s Lactate or sterile saline) are given at the rate of 10-15 ml/kg/hour to prevent dehydration and/or electrolyte imbalance (contact Veterinary Services for methods, routes of administration and fluid types).
11. The analgesic regime will be followed as indicated in the approved protocol. The Principal Investigator (PI) acknowledges that familiarity with the protocol is essential for all staff involved in this protocol. Unless justification to the contrary is provided, all animals will receive at least 24 hours of analgesia following any surgical procedure.
12. The procedure performed and any complications experienced will be noted on the animal's cage card.

B. Intermediate Recovery Period

The period from sternal recumbency until the animal is able to walk.

1. If no complications arise, animal is monitored and care provided as described above every 30 to 60 minutes.
2. Analgesia is provided as stated in the approved protocol.
3. Once animal is moving around the cage it will be placed on regular bedding. Food will be provided on the cage floor and a water gel pack may be provided for hydration. Soaked rodent chow, enrichment feed (rodent bacon softies or berry treats) can be provided by the researcher (obtained from the Veterinary Services staff).

C. Long Term Recovery Period

The period before normal activity resumes and the incision is healed.

1. Research staff will check on the animal early the following day and at least daily thereafter. Individuals monitoring animals must have adequate skills and abilities to accomplish these assessments.
2. The incision site is checked for clear or purulent discharge, redness, swelling, pain, suture removal by the animal, or incision breakdown (dehiscence).
3. Signs of surgical complication such as herniation, infection, organ dysfunction, pain, incision site dehiscence, etc., will prompt a consultation with the UTEP Attending Veterinarian (AV).
4. Research staff will ensure that the animal is eating, drinking, eliminating, and locomoting normally.
5. Any abnormalities (i.e., dehydration, lethargy, inappetence) will warrant continued frequent monitoring and care; detailed records will be kept and be readily available. The animal will be weighed, provided with supplemental fluids (IV, SQ) and offered high energy foods.

6. Continued weight loss, dehydration and lethargy are not acceptable and may required early euthanasia.

**Summary:** The PI acknowledges that the above procedure represents minimum standards only. Animals experiencing complications will be afforded more frequent monitoring and care, and the UTEP Attending Veterinarian (AV) will be consulted for further guidance.

**Monitoring Systems:** An example of a postoperative monitoring system is illustrated on the following pages, but can and should be modified to fit your individual research needs.
Postoperative Monitoring Checklist (Parts A-C):

**A. Immediate Postoperative Period  (end of surgery until fully conscious)**

Date: ___________ Time: ___________ Initial Body Weight: ___________

Animal/Cage Number: ______ Procedure: ______________ USDA Pain Category: ____

Check all that apply:

- □ Analgesics *given perioperatively/postoperatively*
  
  *Only drugs listed in the protocol should be administered*
  
  - □ Buprenorphine (0.05mg/kg given SQ)
  - □ Carprofen (5 mg/kg given SQ)
  - □ Bupivacaine/Marcaine (1-2 mg/kg applied topically)
  - □ Flunixin Meglumine (2.5mg/kg mg/kg SQ/IM)
  - □ Others; _________________ dosing regimen as listed in protocol

- □ Animal placed on surgical bedding in clean dry caging

- □ Fluids (Warm saline given IP or SQ *during peri/postoperative period*)
  
  - 3 ml per 25 g mouse and 15 ml per 250 g rat per day (once or split in two)

- □ Heat (circulating warm water blanket, chemical packs, warm water bottles)
  
  *provided throughout surgery until animal is conscious*

- □ Special diet (moistened rodent chow, Clear H2O gel diet, NutriCal enrichment food)

Complete Part B for 72 hours from the time of recovery (including weekends) or state the reason below:

- □ Spontaneous death
- □ Euthanasia
- □ IACUC exemption from post procedure monitoring
- □ Other: _________________________________
B. Intermediate Recovery Period

Animal/Cage Number: __________ Date: _________ Procedure: _______________
Analgesic (Given every 8-12 PRN hours as needed)
Drug: ________________
Dose and route: ________________

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Review all boxes; N=normal; If abnormal, write in comment.

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<td>Other experimentally related signs</td>
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C. Long Term Monitoring (as stated in your protocol)

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Note on Antibiotics: If preoperative or postoperative treatment with broad spectrum injectable antibiotic is required, consider one of the following:
1. Baytril (enrofloxacin); rat dose is 2.5 - 5 mg/kg IM or SQ bid.
2. Cephalexin; rat dose is 15 mg/kg SQ bid.
3. Trimethoprim/sulfadiazine; rat dose is 0.5 ml/kg SQ of a 240 mg/ml solution.

Consult the UTEP Attending Veterinarian (AV) if you have any questions or concerns.

Key to medical abbreviations:

IM = Intramuscular injection
IP = Intraperitoneal injection
IV = Intravenous injection
SQ = Subcutaneous injection
PRN = Given as needed (latin "pro re nata")
SID = Once per day ("singulum in die")
BID = Twice per day ("bis in die")
TID = Three times per day ("ter in die")