

# East Tennessee State University University Committee on Animal Care

## Guidelines for Rodent Survival Surgery

Purpose: These guidelines apply to all surgical procedures performed on rodents at ETSU in which the animals are expected to recover from anesthesia.

General: These Guidelines were formulated and approved by the University Committee on Animal Care (UCAC) as an information source for the experienced investigator and technical staff and as a teaching tool for students and other individuals new to the field of experimental surgery. Deviations from the NIH Guide must be brought to the attention of and must be approved by the UCAC prior to being initiated.

### **Pre-operative Procedures:**

1. A separate room used primarily for aseptic procedures on rodent is desirable; however a conventional laboratory setting is acceptable as long as the procedures are performed on a clean, uncluttered lab bench or table surface. The surface should be wiped clean with an appropriate surface disinfectant (see Table 1) before use and/or covered with a clean drape.
2. Rodents intended for surgery may be fasted or fed as indicated by the protocol. Fasting reduces gastro-intestinal contents and provides more intra-abdominal space for the surgeon. Fasting is not required to prevent vomiting in rodents, it does not occur in these animals. Feeding may be required to highlight anatomical structures such as mesenteric lymphatics or to administer premedications to the animals.
3. A proper method of anesthesia should be selected. If gas anesthetics are used, appropriate methods for gas scavenging must be provided to avoid personnel exposure. The animal must be maintained in a surgical plane of anesthesia throughout the procedure. Vital signs of the animal must be monitored throughout the procedure.
4. The surgical site should be prepared in an area separate from where the surgery is to be conducted. Hair should be removed from the surgical site by clippers or depilatory for a distance of at least 2 cm around the incision. The surgical site should then be treated to reduce bacterial flora on the skin. Alcohol as a single agent is adequate for preparing skin for invasive surgery. Plain soap, aqueous quaternary ammonium compounds, or hexachlorophene are not recommended as single agents unless the skin is sensitive to all acceptable antimicrobial products.
5. Draping the surgical site with a sterile drape (disposable or reusable) is recommended to avoid contamination of incision, instruments, and supplies.

### **Operative Procedures:**

1. The surgical procedure itself must be performed or directly supervised by a trained and experienced individual. Individuals unfamiliar with aseptic surgical procedures should contact the DLAR veterinarian for information or training.
2. The surgeon and any assistants working in the immediate surgical field should wash and dry their hands before donning gloves for the surgical procedure. If the surgical procedure involves contact between the surgical incision and the surgeon's hands/fingertips then sterile surgical gloves must be worn. Performing surgery in which only sterile instruments contact the surgery site does not require the use of sterile surgical gloves. It is preferred to also wear clean outer garment, such as a clean lab coat and surgical mask. The surgeon should wear his/her hair back or protected with a cap.
3. All instruments, supplies and wound closure material used should be sterile, refer to UCAC guidelines for "Sterilization of Instruments & Supplies for Aseptic Surgery Procedures on Animals". Surgical procedures may be performed on multiple animals during a single session using one sterile surgical pack, providing care is taken to avoid contamination. As an added precaution between animals the instruments may temporarily be stored in a hot glass bead sterilizer or be soaked in a sterilant and rinsed in sterile saline, or flamed with 95% alcohol between animals. Also, if appropriate precautions are taken to minimize contamination of surgical gloves, it is adequate to rinse the gloves with a sterilant. If surgical gloves become contaminated by handling nonsterile items, the gloves should be replaced.
4. Pleural and peritoneal incisions should be closed in several layers. Sterile absorbable suture materials (see Table 2) should be used for these closures. The skin should be closed using nonabsorbable or absorbable suture material. Interrupted suture patterns are recommended. If nonabsorbable suture material is used it should be removed 7 - 14 days post-op. The use of sterile staples to close a skin incision is acceptable but careful attention should be given to placement and spacing to prevent the clips either tearing out or catching on caging equipment. Wound clips have a higher potential for post-operative infection, tissue tear, and other side effects.
5. Antibiotics may be used prophylactically. The use of antibiotics solely to compensate for non-sterile surgical technique is unacceptable.

### **Post-Operative:**

1. Postsurgical care should include observation of the animal to ensure uneventful recovery. The animal should be kept dry and warm - supplementary heat may be provided with an incandescent lamp or with a water-circulating heating pad. The animal should be closely monitored until it regains sternal recumbency and should be returned to the housing quarters only after it recovered fully from anesthesia. Thereafter, the animal should be observed daily for any signs of pain, discomfort, or infection. Pain in rodents may be identified by observing the animal's reluctance to move about, eat, drink, and/or vocalization with handling. Analgesics should be provided as appropriate (see Table 3).

2. Any additional requirements for a procedure may be prescribed as part of a protocol if justified by the attending veterinarian or the UCAC.

### **References:**

1. Guide for the Care and Use of Laboratory Animals, US Department of Health and Human Services, Public Health Service, National Research Council, 1996.
2. Simmons B.P. (1983). CDC Guidelines for the Prevention and Control of Nosocomial Infections. Am. J. Infect. Control, Vol.11(3): 97-120.
3. American College of Veterinary Anesthesiologists' Position Paper on the Treatment of Pain in Animals. J. Am. Vet. Med. Assoc., Vol 213, pp 628-630
4. Harkness, J.E., Wagner, J.E. (1995). The Biology of Rabbits and Rodents. Lea & Febiger, Philadelphia, 4th edition
5. 1993 Report of the AVMA Panel on Euthanasia J. Am. Vet. Med. Assoc., 202, pp 229-249

### **Appendix:**

Table 1. Recommended Hard Surface Disinfectants (Adapted from the nih.gov/ARAC website)  
For table tops and equipment, not for use on living tissue.

Always follow manufacturer's instructions.

- Alcohol -70% ethyl alcohol, 85-90% isopropyl alcohol
  - Contact time required is 15 minutes.
  - Contaminated surfaces take longer to disinfect. Remove gross contamination before using.
  - Inexpensive.
  - May support bacterial growth.
- Quaternary Ammonium, (Roccal®, Cetylcode®)
  - Rapidly inactivated by organic matter.
  - Compounds may support growth of gram negative bacteria.
- Chlorhexidine, Nolvason®, Hibiclens®
  - Presence of blood does not interfere with activity.
  - Rapidly bactericidal and persistent.
  - Effective against many viruses.
- Chlorine, Sodium hypochlorite (Clorox® 10%), Chlorine dioxide (Clidox®, Alcide®)
  - Corrosive
  - Presence of organic matter reduces activity.
  - Chlorine dioxide must be fresh (<14 days old)
  - Kills vegetative organisms within 3 minutes of contact.
  - Can be used as a sterilant if material is exposed for >6 hrs.
- Aldehydes, Glutaraldehyde (Cidex®, Cide Wipes®)
  - Rapidly disinfects surfaces.
  - Can be used as a sterilant if material is exposed for >10 hrs.
  - Toxic -Exposure limits have been set by OSHA.

- Phenolics, (Lysol®, TBQ®, Amphyl®)
  - Less affected by organic material than other disinfectants.

\* The use of common brand names as examples does not indicate a product endorsement.

Table 2. Suture Material Recommended for Rodent Surgery (Adapted from the nih.gov/ARAC website)

- Vicryl®, Dexon®
  - Absorbable: 60 - 90 days.
  - Ligate or suture tissues where an absorbable suture is desirable.
- PDS®, Maxon®
  - Absorbable: 6 months.
  - Ligate or suture tissues especially where an absorbable suture and extended wound support is desirable.
- Prolene®
  - Nonabsorbable
  - Inert.
- Nylon
  - Nonabsorbable
  - Inert.
- Silk
  - Nonabsorbable. (Caution: tissue reactive and may wick microorganisms into the wound).
  - Excellent handling.
  - Preferred for cardiovascular procedures.
- Chromic gut
  - Absorbable
  - Versatile material.
- Stainless steel wire, wound clips, staples
  - Nonabsorbable
  - Requires instrument for removal.

\* The use of common brand names as examples does not indicate a product endorsement.

Suture gauge selection: Use the smallest gauge suture material that will perform adequately.

Cutting and reverse cutting needles: Provide edges that will cut through dense, difficult to penetrate tissue, such as skin.

Non-cutting, taper point or round needles: have no edges to cut through tissue, used primarily for suturing easily torn tissues such as peritoneum or intestine.

**Approved by the ETSU University Committee on Animal Care: July 12, 2007**