



## UNIVERSITY OF SOUTH ALABAMA

### IACUC POLICY: RODENT SURVIVAL SURGERY

#### **Overview:**

This policy applies to all rodent survival surgical procedures performed at the University of South Alabama. Major survival surgery on rodents must be performed using sterile instruments, gloves, masks, and aseptic procedures to minimize microbial contamination of exposed tissues. Minor surgical procedures must also be performed using sterile instruments and aseptic technique but examination gloves can be used if sprayed liberally with disinfectant.

#### **Definitions:**

##### Acute surgery:

A surgical procedure where the animal is euthanized prior to recovery. Nonsurvival surgery.

##### Aseptic:

Free of pathogenic microorganisms.

##### Contact time:

Kill time or dwell time. The amount of time an EPA-registered disinfecting or sterilizing product needs to be present on a surface in order to be effective against the microorganisms listed on its label.

##### Disinfection:

The chemical or physical process that involves the destruction of pathogenic organisms. Disinfection is not the same as sterilization.

##### Major vs. minor surgical procedures (as per *The Guide*, 8<sup>th</sup> edition, page 117):

*“As a general guideline, major survival surgery (e.g., laparotomy, thoracotomy, joint replacement, and limb amputation) penetrates and exposes a body cavity, produces substantial impairment of physical or physiologic functions, or involves extensive tissue dissection or transection. Minor survival surgery does not expose a body cavity and causes little or no physical impairment; this category includes wound suturing, peripheral vessel cannulation, percutaneous biopsy, routine agricultural animal procedures such as castration, and most procedures routinely done on an “outpatient” basis in veterinary clinical practice. Animals recovering from these minor procedures typically do not show significant signs of post-operative pain, have minimal complications, and return to normal function in a relatively short time.”*

##### Nonsurvival surgery:

A surgical procedure where the animal is euthanized prior to recovery. Acute surgery.

##### Survival surgery:

A surgical procedure, major OR minor, from which the animal is expected to recover from anesthesia.

##### Sterilization:

The process whereby all viable microorganisms are eliminated or destroyed. The criterion of sterilization is the failure of organisms to grow if a growth supporting medium is supplied.

**Instrument preparation:**

1. Sterile instruments must be used. Autoclaving of instruments is preferred but bead sterilizers or cold sterilization may be used. Alcohol is NOT a suitable sterilant for instruments. If using cold sterilization for instruments, follow manufacturer's instructions for mixing, shelf life (often very short!), contact time, and disposal.
2. Cold sterilization is effective only if there is adequate contact time. The product must remain in contact with the instruments for the full contact time. The instruments must remain wet or submerged for the entire contact time for that product.

**Examples of chemicals for cold sterilization:**

Chemical	Contact Time
2% Glutaraldehyde	10 hours
8% Formaldehyde plus 70% alcohol	18 hours
7% stabilized hydrogen peroxides (Virox, Sporox)	8 hours
7.35% hydrogen peroxide and 0.23% peracetic acid (EndoSpox plus, Actril, Spor-Klenz)	3 hours
Chlorine dioxide 1:5 solution (Clidox)	6 hours
1.37% Sodium hypochlorite (Alcide)	6 hours

3. If performing a "batch" of surgeries, one pack of instruments may be used for every 4-6 animals. However, instruments must be wiped clean and disinfected between animals and care must be taken not to contaminate instruments between animals. Instruments must be placed on a sterile surface (i.e. a drape) between animals.
4. Instrument disinfection is effective only if there is adequate contact time. The product must remain in contact with the instruments for the full contact time. The instruments must remain wet or submerged for the entire contact time for that product.

**Examples of chemicals for disinfection between individual animals during batch surgeries:**

Chemical	Contact Time	Considerations
Alcohols (70% ethyl alcohol or 85% isopropyl alcohol)	15 minutes	Organic matter must not be present
Aldehydes (Cidex, Metricide, Cetylcide-G, Wavicide)	12 minutes for high level disinfection and <3 minutes for intermediate level disinfection	
Chlorine dioxide (Clidox, Alcide);	3 minutes	Organic matter must not be present
Chlorhexidine (Novalsan, Hibiclens)	15 minutes	Chlorhexidine is NOT effective against <i>Pseudomonas</i>
Potassium peroxymonosulfate (Virkon)	10 minutes	
Sodium hypochlorite (Clorox 10% solution)	3 minutes	Organic matter must not be present

**Procedures for preparation of surgical field, animal, and surgeon:**

1. Surgery must be conducted in a disinfected and uncluttered area. This designated area (i.e. bench, counter, or table) must be cleaned and disinfected prior to use and after use. Access to the area by personnel not directly involved in the surgery must be limited when surgery is being performed.
2. Disinfectant solutions should be made and stored according to manufacturer directions. Surface disinfection is effective only if there is adequate contact time. The product must remain in contact with the surface for the full contact time. The surface must remain wet or submerged for the entire contact time for that product.

**Examples of chemicals for disinfection of surgical area (bench, counter, hood, or table):**

Chemical	Contact Time	Considerations
Alcohols (70% ethyl alcohol or 85% isopropyl alcohol)	15 minutes	Organic matter must not be present
Aldehydes (Cidex, Cidex wipes)	<3 minutes	
Chlorine dioxide (Clidox, Alcide);	3 minutes	Organic matter must not be present
Chlorhexidine (Novalsan, Hibiclens)	15 minutes	Chlorhexidine is NOT effective against <i>Pseudomonas</i>
Phenolics (Lysol)	20 minutes	
Potassium peroxymonosulfate (Virkon)	10 minutes	
Quaternary Ammonium (Roccal, Quatricide)	10 minutes	Organic matter must not be present
Sodium hypochlorite (Clorox 10% solution)	3 minutes	Organic matter must not be present

3. The animal must be placed on a sterile drape (preferred) or disinfected surface. If not using sterile drape(s), then the surface must be disinfected between animals.
4. Depending on the duration and type of procedure, apply sterile ophthalmic ointment to eyes and administer sterile lactated ringers (LRS) or saline subcutaneously. Be sure that you are using a product labelled "for injection" and not a product marketed for use *in vitro*. Once the bag or bottle of fluids has been opened, it must be stored under refrigeration and needs to be used or discarded within 2 weeks.
5. Body temperature should be maintained during the procedure. Recirculating water blankets, "click heat" pads, or heat lamps can be used for this purpose.
6. Anesthetic regimens must be tailored to the procedure and should include pre-emptive analgesia. Generally speaking, inhalant anesthesia is preferred. However, there are injectable alternatives. Please contact the attending veterinarian for assistance in selecting the most appropriate anesthetic regimen for your protocol. Methods of anesthesia cannot be changed to a previously approved protocol without an approved amendment through the IACUC.
7. Remove hair from the surgical site using clippers or Nair. If using Nair, be certain to thoroughly rinse the area to remove all traces of the product.
8. Prepare the surgical site with chlorhexadine (preferred) or betadine. Alcohol alone is not a suitable disinfectant for the surgical site. To properly prepare the surgical site, clean the skin at least 3 times with the disinfectant, working from the center of the site to the

- outside (alcohol can be used to alternate with chlorhexidine for this purpose, but not as the sole agent).
9. Instruments must be placed on a sterilized surface (see above section for instrument preparation). The inside of the autoclaved packet will remain sterile if it is not touched and can be used for this purpose. Alternatively, a sterile drape or towel can be used. Instruments and suture must never touch outside of the sterile surgical field.
  10. Surgeons must wear a clean lab coat or scrubs, a facemask, and gloves. Sterile gloves should be worn for major surgical procedures. Examination gloves may be worn for minor procedures but should be liberally sprayed with disinfectant prior to performing the procedure.

**Intra-Operative:**

1. The animal must be maintained in a surgical plane of anesthesia throughout the procedure. Loss of hind limb toe-pinch reflex is generally accepted as an acceptable means of determining anesthetic depth. Other methods include monitoring heart rate and respiration rate and checking for loss of palpebral reflex. If using injectable anesthesia, animals may need to be “re-dosed” for longer procedures.
2. Begin surgery with sterile instruments and handle them aseptically.
3. Instruments, suture, and gloves may be used for a series of similar surgeries performed at the same time (“batch surgeries”) provided they are maintained clean and disinfected between animals.
4. Monitor and maintain the rodent's vital signs. Notations should be made at least every 15 minutes in the procedure/treatment record.
5. Handle tissues gently and prevent tissue from drying. The use of sterile saline applied with sterile gauze to moisten the tissue(s) can be helpful.
6. Close surgical wounds using appropriate techniques and materials. Sterile suture must be used. Contact veterinary staff if you need help selecting the correct suture material for your procedure.

**Post-Operative:**

1. Move the animal(s) to a warm, dry area and monitor during recovery. Recirculating water blankets can be used under the rodent cage to help with homeostasis.
2. Provide analgesics if not administered intra-operatively.
3. Skin sutures should be removed 10- 14 days post-operatively.
4. Maintain a post-procedure care record (PPRC) and make daily (or more frequent) notations. ALL post-procedure care should be detailed in this record, including administration of analgesics, special food (i.e. diet gel), and fluid administration. This record needs to be maintained in the animal room so that veterinary staff can make additional notations in the record and can determine if additional supportive care is needed.
5. Seek veterinary assistance in case of complications (infection, wound dehiscence, etc.) or if you have any questions or concerns.

**Key points:**

The following table lists several key points which were described in this Policy document.

<b>Important points</b>	<b>Comments</b>
Sterile instruments and suture MUST be used.	If performing multiple surgeries on rodents at the same time, instruments may be disinfected between animals. It is recommended that a new sterile pack or new set of sterile instruments be used every 4-6 animals.
Alcohol cannot be used to sterilize instruments or as the sole agent to prepare the surgical site.	Alcohol CAN be used to disinfect instruments between animals during “batch” surgeries provided that contact time is adequate. Alcohol can be used in conjunction with chlorhexidine or betadine when prepping the surgical site.
Cold sterilization of instruments and disinfection of surfaces or instruments (between animals during batch surgeries) is only effective if contact time is adequate.	Refer to the tables in this Policy and read the manufacturers instructions when using products for sterilization and disinfection.
Maintain a sterile field.	Place the animal on a disinfected surface or sterile drape (preferred) and place instruments and sterile suture on a sterile surface (drape or inside of the autoclave packet).
Monitor anesthetic depth frequently.	Record observations at least every 15 minutes.
Maintain a PPRC.	Record observations, pain medications administered, and any supportive care.
<b>***Ask DCM veterinary staff for help if you have any questions or concerns.***</b>	

**References:**

Guide for the Care and Use of Laboratory Animals. National Research Council (US) Committee for the Update of the Guide for the Care and Use of Laboratory Animals. 8th edition. Washington (DC): National Academies Press (US); 2011. SURGERY: pp115-120.

NIH Guidelines for Survival Rodent Surgery.

[https://oacu.oir.nih.gov/system/files/media/file/2023-05/b6-rodent\\_survival\\_surgery.pdf](https://oacu.oir.nih.gov/system/files/media/file/2023-05/b6-rodent_survival_surgery.pdf)