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### **1. PURPOSE**

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This Standard Operating Procedure (SOP) intends to describe the procedure for survival rodent surgery.

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### **2. RESPONSIBILITY**

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Principal investigator (PI) and their research staff.

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### **3. MATERIALS**

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- 3.1. Sterile isotonic solution for injection (e.g., Saline 0.9%)
  - 3.2. Analgesics
  - 3.3. Anesthetics
  - 3.4. Sterile ophthalmic ointment
  - 3.5. Electric clipper or depilatory cream
  - 3.6. Sterile Gauze
  - 3.7. Antiseptic solution for skin (e.g., chlorhexidine 4% solution)
  - 3.8. Heating pack, warming pad.
  - 3.9. Sterile surgical drapes
  - 3.10. Sterile surgical instruments
  - 3.11. Suture material or wound clips (Autoclips)
  - 3.12. Hot bead sterilizer and 70% alcohol (as a rinsing agent)
  - 3.13. Rodent Procedure Log and Post-Procedure cage cards
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### **4. PROCEDURE**

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- 4.1. Document the details of the surgical procedure in the Rodent Procedure Log.
- 4.2. Perform pre-operative procedures at a safe distance from the surgical environment to prevent contamination with hair.
- 4.3. Pre-operative Care:
  - 4.3.1. Administer general analgesic according to Rodent Analgesia SOP (SOP 101).
  - 4.3.2. Anesthetize the animal according to Rodent Anesthesia SOP (SOP 201).

- 4.3.3. Apply ophthalmic ointment in both eyes to prevent corneal desiccation. Re-apply as needed.
- 4.3.4. Administer subcutaneously from 0.2 to 0.5mL/10g body weight of isotonic fluids.
- 4.3.5. Remove hair over the surgical area with a clipper, and depilatory cream, allowing a perimeter of at least 1cm around the surgical site. Remove loose hair with gauze.
- 4.3.6. Wash the surgical site with 4% chlorhexidine or povidone-iodine solution. Be careful not to wet the animal.
- 4.3.7. Bring the animal into the surgical area.
- 4.3.8. Preparation of the surgical site:
  - 4.3.8.1. Apply 70% alcohol with gauze or swabs in a circular motion from the center of the surgical site to the exterior. Be careful not to wet a large area on the animal, as the evaporation of alcohol will lead to heat loss.
  - 4.3.8.2. Apply 4% chlorhexidine or povidone-iodine solution with gauze or swabs in a circular motion from the center of the surgical site to the exterior.
  - 4.3.8.3. Repeat steps 4.3.8.2 and 4.3.8.3 two more times.
- 4.3.9. Surgeon's preparation:
  - 4.3.9.1. Wash hands.
  - 4.3.9.2. Wear a surgical mask, bonnet, and clean gown.
  - 4.3.9.3. Use an aseptic technique.
  - 4.3.9.4. Wear sterile gloves.
  - 4.3.9.5. The surgeon must avoid touching non-sterile surfaces.
- 4.3.10. Cover the animal with a sterile drape.
  - 4.3.10.1. For minor surgical interventions, the drape can be placed only when suturing the wound to prevent sutures from meeting hair and skin around the surgical area.
  - 4.3.10.2. Surgical drapes must be sterile for the first animal and may be transferred to the following animal during serial surgeries. The top surface of the drape must never encounter non-aseptic areas and must not be soiled.

#### 4.4. Surgical Principles/Aseptic technique:

- 4.4.1. Ensure that all the available materials are at hand.
- 4.4.2. Begin surgery with clean and sterile surgical instruments, and handle instruments aseptically.
- 4.4.3. Designate a sterile area on the working surface for the sterile material (instruments, suture material, drapes, gauze, etc.).
- 4.4.4. Before surgery, verify the depth of anesthesia by loss of the animal's pedal withdrawal (toe pinch) reflex using smooth-tipped/non-toothed forceps.
- 4.4.5. Use a scalpel blade or scissors to make the smallest possible incision.
- 4.4.6. Avoid contact of tissues with fingers by using the tip of instruments.
- 4.4.7. Disinfect the instruments between each animal by dipping them in a hot glass bead sterilizer for approximately 30 seconds after removing any blood and debris (let cool completely). Infiltrate the wound with a local anesthetic, e.g., lidocaine and bupivacaine, before closing the skin. Refer to Rodent Analgesia SOP 101.
- 4.4.8. Close the different tissue layers separately, such as the abdominal muscles layer and skin. For some surgeries, subcutaneous tissue may need to be sutured independently from the skin to

prevent dead space.

4.4.9. Keep suture material in the sterile field between each animal.

4.4.10. Recommended suture and wound closure.

**Table 1**

TISSUE	SUTURE MATERIAL	SIZE	NEEDLE
Abdominal muscle	Assucryl (non-braided absorbable)	3-0, 4-0	Taper
Subcutaneous tissues	Assucryl (non-braided absorbable)	5-0	Reverse-cutting
Skin	Assucryl (non-braided absorbable) or Polyamide-nylon or	3-0, 4-0	Cutting Reverse-cutting
	Wound clips (Autoclips)	7mm or 9mm	

**Table 2**

MATERIAL SELECTION FOR SURGICAL CLOSURES	
Suture	Properties
Assucryl (pink)	Braided material; absorbable within 60-90 days. Where absorbable suture is needed. Use to ligate or suture tissues
Assucryl (gray)	Monofilament material; absorbable within 6 months. For use in ligation or suturing where extended wound support is needed
Nylon	Monofilament. Nonabsorbable. Inert. Good tensile strength and minimal tissue Reactivity.
Silk	Braided, nonabsorbable. (Caution: can cause tissue reactions and may wick microorganisms into the wound). Used in soft tissue procedures, not for skin closure.
Chromic Gut	Monofilament, absorbable. Soft tissue and ligation procedures; may cause moderate tissue reactions.
Stainless Steel Wound Clips, Staples	Nonabsorbable. Requires a unique instrument for steel/staple insertion and removal.
Surgical Adhesive, Vet Bond	Skin adhesive. The area needs to be dry and free of blood; it can cause an exothermic reaction at the time of placement on the skin, so limiting the volume applied is essential.

#### 4.5 Surgical Monitoring and Supportive Care:

- 4.5.1 Provide a contact heat source to prevent hypothermia.
- 4.5.2 Frequently monitor the presence of reflexes, the respiratory rate and breathing pattern, and heart rate when available.
- 4.5.3 Adjust the depth of anesthesia according to monitored parameters (presence of reflexes, respiratory rate, breathing pattern, heart rate).
- 4.5.4 In the case of respiratory arrest, stop anesthesia, administer oxygen, and rapidly compress

the thorax between thumb and index at an 80-120/min frequency.

#### 4.6. Post-operative Care:

- 4.6.1. Post-operative care begins immediately following surgery, lasts at least 3 days, and extends for up to 10 days.
- 4.6.2. Post-operative animals should be identified with a post-Procedure cage card.
- 4.6.3. Do not return animals that have not recovered to an animal housing room.
- 4.6.4. Observe the animal until it regains righting reflexes; do not leave recovering animal unattended. Observe respiration and whiskers movement, tail tonus, nociceptors response, and muscle tone).
- 4.6.5. Prevent heat loss and maintain the animal in contact with a heat source or inside a heated cabinet until it regains righting reflexes.
- 4.6.6. Administer oxygen if necessary.
- 4.6.7. For surgeries exceeding 60 minutes, or if there is significant blood loss, administer an additional 0.2 to 0.5mL/10 g body weight of isotonic fluids subcutaneously.
- 4.6.8. Monitor animals daily for at least the first 3 days following the surgery. Monitor and contact veterinary care staff if recovery is prolonged beyond 3 days. Record all supportive care provided.
  - 4.6.8.1. Repeat analgesics post-surgically according to Rodent Analgesia SOP 101.
  - 4.6.8.2. Provide moistened food at the bottom of the cage.
  - 4.6.8.3. Administer subcutaneously from 0.2 to 0.5mL/10g body weight of isotonic fluids.
  - 4.6.8.4. Examine the wound daily for signs of inflammation or infection, such as redness, swelling, or purulent discharge.
  - 4.6.8.5. Ensure adequate wound closure presence of sutures or wound clips.
  - 4.6.8.6. Measure body weight.
  - 4.6.9. Remove skin sutures or wound clips after 7 to10 days.

**SOP 301 RODENT SURGERY**

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*Approved by the BGU Animal Policy and Welfare Oversight Committee*