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| Authorization: Dr. N. Place, IACUC Chair | Author: Dr. M. Martin, Dr. V. Kirsipuu |

RABBIT ANESTHESIA

1. PURPOSE

- 1.1. The purpose of this Animal Care and Use Procedure (ACUP) is to describe commonly used methods of anesthetizing rabbits. This ACUP is approved by the Cornell Institutional Animal Care and Use Committee (IACUC). Any deviation must be approved by the IACUC prior to its implementation.

2. SCOPE

- 2.1. This ACUP is intended for use by those at the Center for Animal Resources and Education (CARE) at Cornell, University staff, and Cornell University investigators who anesthetize rabbits.

3. INTRODUCTION

- 3.1. This ACUP presents anesthetic considerations and protocol options commonly encountered with rabbits; contact CARE veterinary staff for assistance with determining pre-anesthetic and anesthetic drugs, and drug protocols. All drugs must be approved by the IACUC prior to use. Check the expiration dates on all drugs; do not use any drugs past the expiration date. Contact CARE at care@cornell.edu for more information or for assistance.

4. MATERIALS AND EQUIPMENT

- 4.1. Gas anesthesia machine
- 4.2. Anesthesia monitoring devices
- 4.3. Anesthesia record sheet
(<https://ras.research.cornell.edu/care/documents/Forms/Anesthesia%20Record.pdf>)
- 4.4. Endotracheal tubes or laryngeal mask airway (e.g. V-gel) Laryngoscope (optional)
- 4.5. Plain gauze roll
- 4.6. Gauze squares
- 4.7. Sterile eye lubricant
- 4.8. Lidocaine lubricant
- 4.9. Long cotton swab
- 4.10. Sterile 0.9% saline or Lactated Ringer's Solution (LRS)

- 4.11. Intra-venous drip set (pediatric 60 drip/ml)
- 4.12. Intra-venous catheter and cap
- 4.13. Bandage tape
- 4.14. Antiseptic (e.g., Nolvasan®)
- 4.15. Needles and syringes
- 4.16. Anesthesia / Analgesia drugs (see sections 9.1, 9.2, and 9.3)
- 4.17. BAAM (Beck Airway Airflow Monitor) (optional)

5. PROCEDURE

- 5.1. Consider factors that can affect the choice of anesthetics. These include:
 - 5.1.1. Breed, age, health status, concurrent medication, and demeanor / disposition of patient.
 - 5.1.2. Length and type of operation or procedure to be performed.
 - 5.1.3. Possible effect of the anesthesia on the scientific objectives of the study.
 - 5.1.4. Special facilities and equipment required (e.g., volatile anesthetics).
 - 5.1.5. Personal knowledge, experience, preference and skill with available agents.
- 5.2. Perform a pre-anesthetic evaluation of the rabbit and obtain an accurate weight.
- 5.3. Do not fast rabbits prior to anesthesia, but be sure oral cavity is free of gross food particles.
- 5.4. Premedication: administer per section 9.1, 0-5 minutes before induction if given IV and 10-20 minutes before induction if given SQ or IM.

NOTE: An analgesic must be administered preoperatively for procedures that may result in pain.

5.4.1. Intravenous Injection Locations:

- 5.4.1.1. Cephalic vein
- 5.4.1.2. Lateral saphenous vein
- 5.4.1.3. Auricular vein

5.4.2. Intramuscular Injection Locations:

- 5.4.2.1. Cranial thigh (quadriceps)
- 5.4.2.2. Lumbar spinal epaxial muscles

NOTE: Sciatic nerve damage can occur if the needle is pointed medially or cranially for a caudal thigh muscle injection. Due to this risk, this injection location is not preferred. Avoid injecting into areas of pathology or surgical implants.

5.4.3. Subcutaneous injections: administer subcutaneous injections in the interscapular region, the lateral thoracic, or lumbar dorsal region.

- 5.5. Place an intravenous catheter to maintain venous access and for administration of intravenous fluids.

- 5.5.1.** Shave or pluck and aseptically prepare the catheter site.
- 5.5.2.** Cannulate and secure IV catheter in one of the following locations:
 - 5.5.2.1.** For peripheral vein access, use the auricular vein or cephalic vein.
 - 5.5.2.2.** If central vein access is required, place a jugular catheter.
 - 5.5.2.3.** For arterial blood collection, central ear artery is applicable.
- 5.5.3.** Administer 0.9% saline or Lactated Ringer's Solution at an average rate of 10 mL/kg/hour.
- 5.6.** Injectable Anesthesia (see section 9.2):
 - 5.6.1.** Use alone for short and non-invasive procedures.
 - 5.6.2.** Use for induction prior to intubation and the use of inhalant anesthesia.
- 5.7.** Use inhalant anesthetics for induction and / or maintenance of anesthesia.
 - 5.7.1.** Use a tight-fitting mask and proper restraint or preferably an induction chamber for inhalant induction of the patient.
 - 5.7.2.** Following sedation by injectable anesthetics or inhalant agents, place an endotracheal tube to maintain a level plane of anesthesia.
- 5.8.** Endotracheal Intubation:
 - 5.8.1.** Have appropriate sized endotracheal tubes ready (2.0–3.5 mm) and / or laryngeal mask airway (e.g., v-gels®).
 - 5.8.2.** Open the mouth and pull the tongue forward into the diastema.
 - 5.8.3.** Spray the larynx area with local anesthetic or dab larynx with lidocaine gel by using a long cotton-tip applicator.
 - 5.8.4.** Use a laryngoscope to guide the tube, or advance the tube blindly, into the trachea.
 - 5.8.5.** Use a BAAM (Beck Airway Airflow Monitor) and / or look for condensation on the inside of the tube during expiration to confirm correct placement.
 - 5.8.6.** Secure endotracheal tube by tying roll gauze around the tube and then behind the animal's head.
 - 5.8.7.** Hook up the endotracheal tube to the gas anesthesia machine and start the oxygen (approximately 400-1000mL/min) and isoflurane (approximately 1.5-2.0%).
- 5.9.** Maintenance of Anesthesia:
 - 5.9.1.** Keep rabbit warm by providing a heat source that will not burn throughout the duration of the anesthesia and until the rabbit has fully recovered from anesthesia.
 - 5.9.2.** Use monitoring devices to assess vital signs and anesthetic depth (ex: pulse oximetry, capnography, blood pressure, EKG, thermometer).
 - 5.9.3.** Never leave the rabbit unattended while anesthetized.

5.10. Recovery:

- 5.10.1. Turn off gas anesthetic vaporizer but keep oxygen running for 5 minutes.
- 5.10.2. Remove endotracheal tube when the rabbit begins to swallow.
- 5.10.3. Observe rabbit during recovery until fully awake.

5.11. Post-Operative Care:

- 5.11.1. Provide 24 hours of recovery time in a quiet, warm and dry area.
- 5.11.2. Supply food as soon as fully awake to promote gastrointestinal motility and prevent stasis. Use metoclopramide, cisapride, analgesia / NSAIDs, fluids, and force-feeding as needed if stasis occurs.

6. PERSONNEL SAFETY

- 6.1. Medical Emergencies: **CALL 911**.
- 6.2. Use only anesthetic machine with valid certificate (<12 months).
- 6.3. Avoid vapors from volatile drugs such as anesthetics, by proper use of scavenging equipment. Refer to [ACUP 712 Waste Anesthetic Gas Scavenging Systems](#).
- 6.4. Contact Cornell Environmental Health and Safety at <https://sp.ehs.cornell.edu/Pages/Home.aspx> or 255-8200 for concerns regarding the use of chemical agents and monitoring of waste anesthetics gas.
- 6.5. Monitor the use of chemical agents and assure that product safety recommendations are followed to protect the health and welfare of the humans and animals that are exposed to the agents.
- 6.6. Drugs that come under the control of the Drug Enforcement Agency (DEA) must be stored in a double-locked cabinet in a secure area.
- 6.7. When working with animals wear appropriate PPE, observe proper hygiene, and be aware of allergy, zoonosis, and injury risks. Refer to the [CARE Occupational Health and Safety webpage](#) for more information.

7. ANIMAL RELATED CONTINGENCIES

- 7.1. Post contact information for emergency assistance in a conspicuous location within the animal facility.
- 7.2. Emergency veterinary care is available at all times including after working hours and on weekends and holidays by calling the CARE (pager 1-800-349-2456).
- 7.3. Non-emergency veterinary questions & requests for animal care, email CARE veterinary staff at care@cornell.edu.

8. REFERENCES

- 8.1. Heard, D.L., Ed. *The Veterinary Clinics of North America Exotic Animal Practice: Analgesia and Anesthesia*, W.B. Saunders Company: Philadelphia, 2001.
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- 8.3. McKelvey, D. and Hollingshead, K.W. *Veterinary Anesthesia and Analgesia*, Mosby: St. Louis, 2003.

- 8.4. Kohn, D.F., Wixson, S.F., White, W.J. and Benson, G.J., Eds. *Anesthesia and Analgesia in Laboratory Animals*, Academic Press: New York, 1997.
- 8.5. Plumb, D.C. *Veterinary Drug Handbook*; Iowa State Press: Ames, Iowa, 1995.
- 8.6. Harcourt-Brown, F. *Textbook of Rabbit Medicine*: Reed Educational and Professional Publishing Ltd: Woburn, 2002.
- 8.7. Norwegian Reference Centre for Laboratory Animal Science & Alternatives:
<http://film.oslovet.norecopa.no>
- 8.8. Carpenter, J.W. and Marion, C.J., Ed. *Exotic Animal Formulary, 4th Ed.*, Elsevier: Philadelphia, 2013.
- 8.9. ACUP 712 Waste Anesthetic Gas Scavenging Systems:
http://ras.research.cornell.edu/care/documents_k/ACUPs/ACUP712.pdf
- 8.10. CARE Occupational Health and Safety webpage:
<http://ras.research.cornell.edu/care/OHS.html>

9. APPENDIX

- 9.1. Table of Rabbit Tranquilizers, Sedatives, and Other Agents. Doses taken from Carpenter, J.W. and Marion, C.J., Ed. *Exotic Animal Formulary, 4th Ed.*, Elsevier: Philadelphia, 2013.

| Drug | Dose and Route | Duration of Effect | Notes |
|----------------------------------|--------------------------------------|--------------------|---|
| Glycopyrrolate | 0.01–0.1 mg/kg SC, IM, IV | 60 minutes | Reduced bronchial and salivary secretions, inhibition of vagal responses. Elevated heart rate may result |
| Doxapram | 2-5mg/kg SC, IV | Immediate – 15min | Respiratory stimulant emergency drug for apnea |
| Metoclopramide | 0.2-1 mg/kg PO, SC | 6-8 hours | Lower gastrointestinal prokinetic |
| Cisapride | 0.5mg/kg PO | 8-12 hours | Upper gastrointestinal prokinetic agent |
| Acepromazine | 0.25–1.0 mg/kg SC, IM, IV | 4 hours | Moderate sedative, peripheral vasodilation, no analgesia. Often given in combinations, see 9.2 for doses. |
| Fluid Therapy (LRS or 0.9% NaCl) | 10–20 mL/kg/h IV 10–15 mL/kg/h SC | | Use in surgical procedures >15min in length and/or GI stasis suspected |
| Xylazine | 1–5 mg/kg IM, SC | 30–60 minutes | Sedative, analgesic, muscle relaxant. Avoid in sick or debilitated animals, reverse with Yohimbine. Often given in combinations, see 9.2 for doses. |

| Drug | Dose and Route | Duration of Effect | Notes |
|--------------------|---|--------------------|---|
| Ketamine | 15–20 mg/kg IV 20-50 mg/kg IM | 60 minutes | Sedation; administer with other agents, see section 9.2. |
| Butorphanol | 0.1–1 mg/kg IM, IV q4h-6h 0.1-0.5mg/kg SC, IM, IV q4h 1-5mg/kg SC q4-6h | 4–6 hours | Analgesic, often given in combinations, see 9.2. |
| Buprenorphine | 0.01–0.05 mg/kg IM, IV, SC q6-12h | 6–12 hours | Moderate analgesia |
| Carprofen | 4 mg/kg IM, SC q24h 1.5-2.2mg/kg PO q12h | 12-24 hours | Analgesia, Non-steroidal antiinflammatory |
| Ketoprofen | 3 mg/kg IM, SC q24h | 24 hours | Analgesia, Non-steroidal antiinflammatory |
| Meloxicam | 0.2 mg/kg IM, SC 0.3 PO q24h X 10 days | 24 hours | Analgesia, Non-steroidal antiinflammatory |
| Yohimbine | 0.2-1mg/kg IM, IV | N/A | Xylazine reversal agent. |
| Lidocaine 1.5% | 2-4 mg/kg topical | 1 hour | Local anesthetic, fast onset; can use topically on glottis for intubation |
| Bupivacaine 0.125% | 1 mg/kg | 4-8 hours | Local anesthetic, slower onset than lidocaine |

NOTE: Some rabbits produce atropinesterase which degrades atropine into inactive products. For this reason, use glycopyrrolate instead of atropine.

9.2. Rabbit Anesthetics and Combinations

| Drug | Dose and Route | Duration of Effect | Notes |
|----------------------|----------------|--------------------|---|
| Tiletamine/Zolazepam | 3 mg/kg IM, IV | 20–30 minutes | Reported to cause renal necrosis in New Zealand White Rabbits at higher doses. Light-medium planes of anesthesia, dissociative. Not generally recommended for use in rabbits. |
| Propofol | 3–10 mg/kg IV | Until discontinued | Induction agent, rapid onset and recovery |

| Drug | Dose and Route | Duration of Effect | Notes |
|-----------------------------------|--|---|--|
| Ketamine + Xylazine + Butorphanol | 35 mg/kg ket + 5 mg/kg xylazine + 0.1 mg/kg butorphanol IM | ~30 minutes | Mix all in same syringe and administer IM |
| Ketamine + diazepam | 15 mg/kg ket + 0.3 mg/kg diazepam IM 10 mg/kg ket + 0.5 mg/kg diazepam IV | ~30 minutes; follow with isoflurane as may not reliably induce surgical plane | Mix all in same syringe and administer IM Mix all in same syringe and administer IV |
| Acepromazine + Butorphanol | 0.5 mg/kg + 0.5 mg/kg SC, IM | ~4 hours | Sedation, can be mixed in same syringe |
| Isoflurane | 5% induction 1%–3% maintenance | Until discontinued | Inhalant anesthetic |

10. HISTORY

| Date: | Event: |
|-----------|---|
| 06 DEC 18 | Most Recent Annual Review – Reviewed by: E. Silvela |
| 08 MAR 16 | New Format – Converted by: J. Kirby |
| 31 MAY 06 | New Issued – Original Author: Dr. M. Martin, Dr. V. Kirsipuu; Referee: Dr. J. Morrissey |