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| <b>LABORATORY ANIMAL RESOURCES CENTER (LARC)</b>   |                                  |  |
| <b>Title:</b> Rat Anesthetic, Analgesic and Tranquilizing Drugs                                |                                  |   |
| <b>SOP#:</b> D-6   | <b>Date in Effect:</b> 1/11/2016 |   |
| <b>Revision #:</b> 1   | <b>Revision Date:</b> 1/11/2016  |   |
| <b>In Effect</b> <input checked="" type="checkbox"/> <b>Rescinded</b> <input type="checkbox"/> | <b>Date Rescinded:</b>           |   |
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**A) PURPOSE**

To provide guidelines to research personnel on the appropriate use of anesthetic, analgesic or tranquilizing (AATs) drugs for rat species.

**B) SCOPE**

AAT use will be limited to principal investigators and their technicians listed on an approved, current IACUC protocol, LARC veterinarians and LARC staff under veterinary supervision.

**C) RESPONSIBILITIES**

- 1) The tables below list some commonly used agents for rats, and are not all-inclusive.
- 2) If drug use will be for neonatal or geriatric animals, or if conditions such as organ compromise, pregnancy/lactation or obesity are present, consult with LARC veterinarian.
- 3) ANY drug to be used must be included in the applicable IACUC approved protocol before it may be used without direct AV consult and approval. Questions concerning use of these or any drugs for animal research should be addressed to the AV.
- 4) Use of non-pharmaceutical grade compounds such as urethane and Tribromoethanol (Avertin) must be scientifically justified and approved in the ACUC protocol. Such agents also require consultation and human risk assessment by the UTEP EH&S Department.
- 5) Maximum administration volumes for routes of injection in the adult rat are: IP <15.0cc; SC=5.0-10.0cc; IM < 0.3cc; IV < 0.5cc.
- 6) A rat is at a surgical plane of anesthesia if a hind toe pinch does not illicit limb withdrawal or an overt increase in respiratory rate; check every 5-10 minutes.
- 7) During anesthesia, monitor respiration and provide temperature support.
- 8) Proper licensure and storage for controlled substances must be observed, and every drug listed must be properly disposed upon expiration; they may NOT be kept for training purposes.

## D) DEFINITIONS

- 1) EH&S: Environmental Health & Safety
- 2) PO: Oral
- 3) SC: Subcutaneous
- 4) IP: Intraperitoneal
- 5) ID: Intradermal
- 6) IM: Intramuscular
- 7) IV: Intravenous
- 8) q: every; *e.g.*, q12h = every twelve hours; q3d = every three days

## E) PROCEDURES

- 1) Administration of substances should adhere to LARC SOP 3-D.
- 2) Proper training must be assured; if training is needed, contact the LARC.

## F) REAGENTS/MATERIALS

### GENERAL ANESTHETICS – INJECTABLE COCKTAILS FOR SURGICAL PLANE ANESTHESIA

| Drug Generic Name                     | Concentration   | Dose  | Route  | Indications / Comments  |
|---------------------------------------|---|---|--------|---|
| Ketamine + Xylazine                   | Ketamine<br>100mg/mL<br>Xylazine<br>20mg/mL                                 | Ketamine<br>80.0mg/kg<br>Xylazine<br>8.0mg/kg                                 | IP, IM | LOW DOSE<br>Surgical Anesthesia   |
| Ketamine + Xylazine                   | Ketamine<br>100mg/mL<br>Xylazine<br>20mg/mL                                 | Ketamine<br>90.0mg/kg<br>Xylazine<br>10.0mg/kg                                | IP, IM | HIGH DOSE<br>Surgical Anesthesia  |
| Ketamine + Dexmedetomidine            | Ketamine<br>100mg/mL<br>Dexmedetomidine<br>1mg/mL                           | Ketamine<br>75.0mg/kg<br>Dexmedetomidine<br>0.25mg/kg                         | IP     | Surgical Anesthesia   |
| Ketamine + Diazepam                   | Ketamine<br>100mg/mL<br>Diazepam<br>5mg/mL                                  | Ketamine<br>45-80mg/kg<br>Diazepam<br>5.0-10.0mg/kg                           | IP     | 45-60m of surgical anesthesia   |
| Propofol + Fentanyl + Dexmedetomidine | Propofol<br>10mg/mL<br>Fentanyl<br>0.05mg/mL<br>Dexmedetomidine<br>1.0mg/mL | Propofol<br>100mg/kg<br>Fentanyl<br>0.10mg/kg<br>Dexmedetomidine<br>0.05mg/kg | IP     | 25m of surgical anesthesia (30m restraint); rapid recovery when atipamezole reversal employed |

\*Occasionally ketamine effects (even when administered in a cocktail) mimic impending consciousness, which may be confirmed using a hind toe pinch to evaluate for withdrawal or respiratory increase prior to administration of additional anesthetic to avoid overdose.

### GENERAL ANESTHETICS –SINGLE AGENTS FOR SURGICAL PLANE ANESTHESIA

| Drug Generic Name               | Concentration               | Dose                                | Route  | Indications / Comments   |
|---------------------------------|-----------------------------|-------------------------------------|--------|--|
| Isoflurane                      | 4-5% / Liter O <sub>2</sub> | To Effect                           | Inhal. | Induction of Surgical Anesthesia                                   |
| Isoflurane                      | 1-3% / Liter O <sub>2</sub> | As required                         | Inhal. | Maintenance of Surgical Anesthesia                                 |
| Pentobarbital                   | 50mg/mL                     | 40.0mg/kg (LOW)<br>60.0mg/kg (HIGH) | IP     | CV/pulmonary depression severe                                     |
| Tiletamine/Zolazepam (Telazol™) | 10mg/mL each (per 1mL)      | 20.0-40.0mg/kg                      | IP     | 30-60m of surgical anesthesia                                      |
| Tribromoethanol (Avertin)       | 20mg/mL                     | 250.0mg/kg                          | IP     | NON-survival Surgical Anesthesia                                   |
| Urethane                        |                             | 1000mg/kg                           | IP     | NON-survival; may be combined with alpha-chloralose, 55-65mg/kg IP |

### EMERGENCY DRUGS FOR REVERSAL OR RESCUE SITUATIONS

| Drug Generic Name | Concentration | Dose           | Route          | Indications / Comments   |
|-------------------|---------------|----------------|----------------|--|
| Atipemazole       | 5mg/mL        | 0.5-1.0mg/kg   | SC, IM, IP, IV | REVERSES ONLY Xylazine or dexmd. (alpha2 agonists) NOT ketamine* |
| Glycopyrrolate    | 0.2mg/mL      | 0.02-0.05mg/kg | SC, IM         | Anticholinergic – bradycardia rescue                             |

### TRANQUILIZERS/SEDATIVES – INJECTABLE SINGLE AGENTS FOR LIGHTER ANESTHESIA

| Drug Generic Name | Concentration | Dose         | Route  | Indications / Comments |
|-------------------|---------------|--------------|--------|------------------------|
| Acetylpromazine   | 10mg/mL       | 2.0-5.0mg/kg | SC, IP | Lt. to Hvy. Sedation   |
| Diazepam          | 5mg/mL        | 2.0-5.0mg/kg | IP, IM | Light/Mod Sedation     |
| Midazolam         | 5mg/mL        | 5.0mg/kg     | IP, IM | Light/Mod Sedation     |
| Xylazine          | 20mg/mL       | 1.0-3.0mg/kg | IP     | Lt. to Hvy. Sedation   |

### LOCAL ANESTHETICS – INJECTABLES FOR LOCAL SITE ANESTHESIA/ANALGESIA

| Drug Generic Name | Concentration | MAXIMUM Dose | Route          | Indications / Comments          |
|-------------------|---------------|--------------|----------------|---------------------------------|
| Lidocaine         | 1%            | 10.0mg/kg    | SC, ID, splash | Onset: 1-3m<br>Duration: 20-40m |
| Bupivacaine       | 0.25%         | 5.0mg/kg     | SC, ID, splash | Onset: 20m<br>Duration: 4-6h    |

## ANALGESICS – INJECTABLE & ORAL DRUGS FOR SYSTEMIC PAIN RELIEF

| Drug Generic Name | Dose                              | Route    | Frequency         | Indications / Comments   |
|-------------------|-----------------------------------|----------|-------------------|--------------------------|
| Acetaminophen     | 1.0 – 2.0 mg/mL in Drinking Water | PO       | Change bottle q3d | NSAID; In Drinking Water |
| Buprenorphine     | 0.01-0.05mg/kg                    | SC,IP,IV | q8-12h            | Opioid                   |
| Buprenorphine     | 0.10-0.25mg/kg                    | PO       | q8-12h            | Opioid                   |
| Butorphanol       | 2.0mg/kg                          | SC       | q4h               | Opioid                   |
| Carprofen         | 5.0mg/kg                          | SC       | q12-24h           | NSAID                    |
| Flunixin          | 1.1-2.5mg/kg                      | SC,IM    | q12h              | NSAID                    |
| Ibuprofen         | 10.0-30.0mg/kg                    | PO       | q4h               | NSAID                    |
| Ketoprofen        | 5.0mg/kg                          | SC       | q24h              | NSAID                    |
| Meloxicam         | 1.0-2.0mg/kg                      | PO, SC   | q24h              | NSAID                    |

### G) EQUIPMENT

- 1) Needles for parenteral administration should be of the appropriate gauge and length; as a general rule, 25-22g needles of 0.5-1.0" in length are appropriate for most routes.
- 2) Many drugs are susceptible to degradation by light, heat or both. If you are uncertain about light sensitivity, ensure it and any aliquots are stored in amber or foil-wrapped containers (and properly labeled on the outside of the wrapping).
- 3) A precision vaporizer is used to deliver inhalants unless approved by the IACUC.

### H) SAFETY PRECAUTIONS

- 1) Utilize proper and adequate restraint while administering injections to avoid human and animal injury. Humans are exquisitely sensitive to xylazine; do not recap needles.
- 2) Preparation of substances such as urethane and others presents a safety risk; consult with EH&S for proper instruction and personal protective equipment (PPE).

### I) REFERENCES

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