



Veterinary Recommended Anesthetic Plans for Rodents

GOAL: To provide recommendations for anesthetic plans for procedures or survival surgery in rodents. Consultation with the Veterinary Staff during the project design phase is highly encouraged.

DEFINITIONS:

Anesthesia – A state characterized by a loss of sensation due to the pharmacologic depression of nerve function

General Anesthesia - a state of unconsciousness with the absence of pain sensation over the entire body. Depth of anesthesia must always be verified (e.g. lack of deep pain response in the limb) prior to creating a surgical incision or performing a painful procedure.

FORMULARY

ISOFLURANE inhalant anesthesia for rodent procedures is the **METHOD OF CHOICE** due to its wide safety margin, reliability, ease of administration, and rapid return to consciousness for animals after exposure has ended.

Drug	Dose	Frequency	Route	Recommendations
Isoflurane <u>PREFERRED</u>	Mouse or Rat: 4-5% induction, 1-2 % maintenance	Continuous	Inhalant	The use of an Isoflurane vaporizer is strongly recommended as it allows for ease in control of the anesthetic depth. Additionally, the system provides for appropriate scavenging of residual anesthetic required to minimize personnel exposure.

Injectable anesthetic cocktails such as ketamine/xylazine may also provide effective general anesthesia but the animal's response can be variable based on strain, size and gender. Verification of surgical depth is needed throughout the procedure. Recovery from injectable anesthetics can be lengthy and personnel must be available cage side until animals are moving normally. Maintaining body temperature via an external heat source is important in speeding up recovery and minimizing post-operative death due to hypothermia. If additional anesthetic is needed to reach a sufficient surgical plane, re-dosing should consist of **ketamine alone** to minimize cardiovascular effects (e.g. respiratory and cardiac depression) and subsequent death of animals.

Drug	Dose	Frequency	Route	Recommendations
Atropine/ Ketamine/ Xylazine	Mouse or Rat 0.05/80- 110/5-10 mg/kg	Once, re-dose with 1/3 to 1/2 of the original Ketamine dose ONLY*	IP	Atropine is given to counteract the cardiac and respiratory depression caused by xylazine and to minimize the possibility of heart block



Ketamine/ Xylazine	Mouse or Rat 80-110/5-10 mg/kg	Once, re-dose with 1/3 to ½ of the original Ketamine dose ONLY*	IP	1ml Ketamine (100mg/ml) 0.5ml Xylazine (20mg/ml) 8.5ml sterile saline Mice: 0.1ml per 10 gm of body weight will provide a 100 mg/kg Ketamine/ 10 mg/kg Xylazine dose
Ketamine/ Acepromazine	Rat 75/2.5 mg/kg	Once, re-dose with 1/3 to ½ of the original Ketamine dose ONLY*	IP	
Ketamine/ Xylazine/ Acepromazine	Mouse 50/5/0.5 mg/kg	Once, re-dose with 1/3 to ½ of the original Ketamine dose ONLY*	IP	
Telazol/ Butorphanol/ Dexmedetomidine	Mouse 22 – 33/ 0.05 – 0.08/ 1.1 – 1.7 mg/kg	Once	IP	To make: use 2.5 mL dexmedetomidine (0.5 mg/mL) and 2.5 mL butorphanol (10 mg/mL) to reconstitute 100 mg telazol, THEN dilute 1:10 (0.1 mL drug mixture +0.9 mL sterile water. Mice: 0.1 mL per 30 – 45g animal will provide the correct dose range. Reverse with atipamezole.

Abbreviations Used: IP = intraperitoneal

Reversal

Agents are available to reverse Alpha-2 agonist and thus hasten post op recovery or lighten depth of anesthesia.

Agent	Rodent Dose	Route
Yohimbine	2.1 mg/kg Mouse	IP
Atipamezole	2.5 mg/kg Rat, 1 mg/kg Mouse	IP

Post-Operative Analgesia

Survival procedures and surgeries require careful consideration of post-operative pain management and both pharmacologic and non-pharmacologic analgesics should be provided in keeping with appropriate veterinary care. **Withholding of analgesics requires IACUC approval.**



RESOURCES:

- IACUC Rodent Survival Surgery Policy <http://orrrp.osu.edu/files/2013/07/Rodent-Survival-Surgery.pdf>
- ULAR Veterinary Best Practices <http://ular.osu.edu/resources/veterinary-best-practices/>
 - Approved Analgesia Plans for Rodent Survival Surgery
 - Rodent Survival Surgery Best Practices
- Gaertner, DJ, TM Hallman, FC Hankenson, MA Batchelder. 2008. Anesthesia and Analgesia in Rodents. Anesthesia and Analgesia in Laboratory Animals. Second Edition, Academic Press, CA.
- Hawk, CT, SL Leary, TH Morris. 2005. Formulary for Laboratory Animals, Third Edition.
- Flecknell, P et al. (2015). Chapter 24: Preanesthesia, Anesthesia, Analgesia, and Euthanasia in J. G. Fox et al (Ed.), *Laboratory Animal Medicine 3rd Edition* (pp. 1135 – 1200). Boston, MA: Elsevier Academic Press.