

University of Notre Dame
Institutional Animal Care and Use Committee
Guide for Anesthesia and Analgesia of Laboratory Animals

This list is provided as a guide for the selection of appropriate anesthetic and analgesic regimens. The compounds and dosages listed are sufficient for most procedures performed on animals at the University of Notre Dame. Other compounds, routes, and dosages can be used, per IACUC approval, and added to this list. Questions on laboratory animal anesthesia or analgesia should be directed to Dr. Mark Suckow, Ms. Kay Stewart, RVT, LATG, or Ms. Valerie Schroeder, RVT, LATG at 631-6085.

General

It is important for humane reasons to assure that pain to laboratory animals is minimized. For these reasons, adequate anesthesia during procedures and adequate analgesia following procedures is critical. An appropriate agent will provide an adequate amount of pain insensation with a minimum amount of drug. It is important to assess the degree of anesthesia prior to beginning, and during any procedure. Arousal following a firm pinch of the animal's toe suggests a light level of anesthesia. Likewise, fast respiration, vocalization, and presence of reflexes (e.g. palpebral reflex) are all signs of light anesthesia. It is important to monitor these parameters not only during initial anesthesia induction, but also during the procedures. Animals that demonstrate a diminished anesthetic depth during a procedure may require supplemental anesthetic to be given. Analgesics are normally provided to animals following potentially painful procedures. Any procedure that could be expected to cause more than momentary pain or discomfort in a person should be assumed to do so in an animal also, and thereby merit the use of an analgesic post-procedurally. Signs of pain might include reluctance to move, vocalization, anorexia, or excessive tactile attention being paid to an incision site. Because of the differences in responses of individual animals and the possible need to supplement an animal with additional doses of a drug, the dosage of anesthetics and analgesics are normally presented as ranges.

FLSC offers training in many areas including: anesthetic administration, monitoring and post-operative care. Inhalation anesthetic administration is available using a specialty rodent anesthetic machine, a standard small animal anesthetic machine or anesthetic chamber. To reserve these for use or to answer any questions regarding use of anesthetic agents, anesthetic machines, handling of animals, or other procedures contact the staff of the Freimann Life Science Center at 631-6085.

Mice

Anesthetics

1. **“Rodent Cocktail”** 9 parts ketamine (100mg/ml) + 9 parts xylazine (20mg/ml) + 3 parts acepromazine (10 mg/ml) + 79 parts sterile saline.

Dosage: 0.25 - 0.35 ml/mouse IP or (body weight x 10) - 50 = ml/mouse IP

2. **Isoflurane**

Dosage: Inhalation to effect

3. **Sodium Pentobarbital**

Dosage: 35 - 50 mg/kg IP note: Nembutal brand is prepared as a 50 mg/ml solution.

Analgesics

1. **Butorphanol**

Dosage: 0.5-3.0 mg/kg SQ (every four hours)

Rats

Anesthetics

1. **Ketamine/Xylazine 2:1** 2 parts ketamine (100mg/ml) + 1 part xylazine (20mg/ml)
Dosage: 0.3- 0.8 ml/rat IM
2. **Sodium Pentobarbital**
Dosage: 35 - 50 mg/kg IP note: Nembutal brand is prepared as a 50 mg/ml solution.
3. **“Rodent Cocktail”** 9 parts ketamine (100mg/ml) + 9 parts xylazine (20mg/ml) + 3 parts acepromazine (10 mg/ml)+ 79 parts sterile saline.
Dosage: 0.3 - 1.5 ml/rat IP note: marked variation in response has been observed to occur between animals, best used in young rats 3 - 5 weeks of age.
4. **Isoflurane**
Dosage: Inhalation to effect
5. **Halothane**
Dosage: Inhalation to effect

Analgesics

1. **Butorphanol** (10 mg/ml)
Dosage: 2 mg/kg SQ (every four hours)
2. **Aspirin**
Dosage: 100mg/kg PO

Sedatives

1. **Acepromazine** (10mg/ml)
Dosage: 1.0 - 3.0 mg/kg IM or IP
2. **Xylazine** (20mg/ml)
Dosage: 1-5 mg/kg IM or IP

Rabbits

Anesthetics

1. **Ketamine/Acepromazine 10:1** 10 parts ketamine (100mg/ml) + 1 part acepromazine (10mg/ml)
Dosage: 0.3 -0.4 ml/rabbit for light anesthesia during exsanguination
2. **Butorphanol/Acepromazine 1:1** 1 part butorphanol + 1 part acepromazine
Dosage: 0.3 - 0.35 ml/rabbit IM
3. **Ketamine/Xylazine**
Dosage: Ketamine (100mg/ml) 35mg/kg IM Xylazine (20mg/ml) 5-10mg/kg IM For 35-90 minutes of anesthesia
4. **Ketamine/Xylazine/Acepromazine**
Dosage: Ketamine (100mg/ml) 25mg/kg IM +Xylazine (20mg/ml)5mg/kg IM + Acepromazine (10mg/ml) 2.5mg/kg IM For prolonged anesthesia
5. **Isoflurane**
Dosage: Inhaled to effect

Analgesics

1. **Butorphanol** (10mg/ml)
Dosage: 0.1 - 1.5 mg/kg IV or 1.0 - 7.5 mg/kg SQ or IM
2. **Asprin**
Dosage: 100 mg/kg PO in solution

Sedatives

1. **Acepromazine** (10mg/ml)
Dosage: 0.75 - 2.0 mg/kg IM or 0.1 - 0.2 mg/rabbit SQ
2. **Xylazine** (20mg/ml)
Dosage: 3.0 - 9.0 mg/kg IM

Gerbils

Anesthetics

1. **Ketamine/Xylazine 7:3** 7 parts ketamine (100mg/ml) + 3 parts Xylazine (20mg/ml)

Dosage: 0.04 - 0.08 ml/gerbil SQ

2. **Ketamine/Acepromazine**

Dosage: Ketamine (100mg/ml) 75 mg/kg IM or IP + Acepromazine (10mg/ml) 3 mg/kg IM or IP

3. **Isoflurane**

Dosage: Inhaled to effect

Analgesics

1. **Butorphanol** (10mg/ml)

Dosage: 1 -5 mg/kg IM or SQ (every 2 - 4 hours)

Sedatives

1. **Xylazine** (20mg/ml)

Dosage: 8- 10 mg/kg IM or SQ

Hamsters

Anesthetics

1. **Ketamine/Xylazine**

Dosage: Ketamine (100mg/ml) 100 - 200 mg/kg IP + Xylazine (20mg/ml) 5 - 10 mg/kg IP

2. **Ketamine/Acepromazine**

Dosage: Ketamine (100mg/ml) 150mg/kg IM + Acepromazine (10mg/ml) 5mg/kg IM

3. **Sodium Pentobarbital**

Dosage: 50 - 90 mg/kg IP note: Nembutal brand is prepared as a 50 mg/ml solution.

4. **Isoflurane**

Dosage: Inhaled to effect

Analgesics

1. **Butorphanol** (10mg/ml)

Dosage: 1 -5 mg/kg IM or SQ (every 2 - 4 hours)

Sedatives

1. **Acepromazine** (10mg/ml)

Dosage: 0.5 - 5.0 mg/kg IM or SQ

2. **Xylazine** (20mg/ml)

Dosage: 8.0 - 10.0 mg/kg IM or S

Frogs

Anesthetics

1. **Tricainemethanesulfonate (MS-222)**

Dosage: Immersion to effect in solution of 1 - 3 grams/L tap water

2. **Benzocaine 0.02% solution**

Dosage: Immersion to effect

3. **Sodium Pentobarbital**

Dosage: 0.65 ml/frog IP note: Nembutal brand is prepared as a 50 mg/ml solution.

Chickens

Anesthetics

1. **Isoflurane**

Dosage: Inhaled to effect

2. **Ketamine/Xylazine**

Dosage: Ketamine (100mg/ml) 40mg/kg IM + Xylazine (20mg/ml) 10 mg/kg IM

Fish

Anesthetics

1. **Tricainemethanesulfonate (MS-222)**

Dosage: Immersion to effect in solution of 1 - 3 grams/L tap water

2. **2-phenoxyethanol**

Dosage: Immersion to effect in solution of 0.1 - 0.5 ml/L

Guinea Pigs

Anesthetics

1. **"Guinea Pig Cocktail"** 2 parts Ketamine(100mg/ml) +1 parts Xylazine(20mg/ml) +3 parts Acepromazine(10 mg/ml)

Dosage: 0.2 - 0.6 ml/guinea pig SQ (0.6 ml is the maximum dose regardless of body weight)

2. **Ketamine/Xylazine**

Dosage: Ketamine (1000mg/ml) 30mg/kg IM, IP or SQ + Xylazine (20mg/ml) 0.15 - 5.0 mg/kg IM, IP or SQ

3. **Sodium Pentobarbital**

Dosage: 40- 55 mg/kg IP note: Nembutal brand is prepared as a 50 mg/ml solution.

4. **Isoflurane**

Dosage: Inhalation to effect

Analgesics

1. **Butorphanol** (10mg/ml)

Dosage: 0.5 - 3.0 mg/kg IM, IP or SQ (every 2 - 4 hours)

Non-Human Primates

Consult with Dr. Mark Suckow, Ms. Kay Stewart, RVT, LATG, or Ms. Valerie Schroeder, RVT, LATG
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