

**TRANQUILIZERS, ANALGESICS AND ANESTHETICS FOR USE IN RODENTS & LAGOMORPHS**

*(All doses listed mg/kg)*

DRUG - GENERIC (TRADE)	MOUSE	RAT	HAMSTER	GUINEA PIG	RABBIT
<b>ANTICHOLINERGICS</b>					
<i>(dose / route of administration)</i>					
Atropine	0.04 <sup>1</sup> / SC	0.05 <sup>1</sup> / SC	0.04 <sup>1</sup> / SC	0.05 <sup>1</sup> / SC	0.05 <sup>1</sup> / IM
Glycopyrrolate (Robinul-V)		0.5 <sup>1</sup> / IM	0.5 <sup>1</sup> / IM		0.1 <sup>1,2</sup> / SC, IM 0.01 <sup>1</sup> / IV
<b>MINOR TRANQUILIZERS</b>					
Diazepam (Valium)	5.0 <sup>1</sup> / IM, IP <i>(Light sedation)</i>	2.5 <sup>1</sup> / IM, IP <i>(Light sedation)</i>	5.0 <sup>1</sup> / IM, IP <i>(Light to mod sedation)</i>	2.5 <sup>1</sup> / IM, IP <i>(Heavy sedation)</i>	0.5-2.0 <sup>1</sup> / IM, IV, IP <i>(Light to mod sedation)</i>
Midazolam (Versed)	5.0 <sup>1</sup> / IM, IP <i>(Light to mod sedation)</i>	5.0 <sup>1</sup> / IP <i>(Light sedation)</i>	5.0 <sup>1</sup> / IP <i>(Light sedation)</i>	5.0 <sup>1</sup> / IM, IP <i>(Heavy sedation)</i>	0.5-2.0 <sup>1</sup> / IM, IV, IP <i>(Light to mod sedation)</i>
<b>MAJOR TRANQUILIZERS</b>					
Acepromazine Maleate	2.0-5.0 <sup>1</sup> / SC, IP <i>(Light sedation)</i>	2.5 <sup>1</sup> / IM, IP <i>(Light sedation)</i>	2.5 <sup>1</sup> / IP <i>(Light sedation)</i>	2.5-5.0 <sup>1</sup> / IP <i>(Light to mod sedation)</i>	1.0 <sup>1</sup> / IP <i>(Moderate sedation)</i>
<b>ALPHA 2 AGONISTS</b>					
Xylazine HCl (Rompun)	5.0-10.0 <sup>1</sup> / IP <i>(Light sedation, mild to mod analgesia)</i>	1.0-5.0 <sup>1</sup> / IM, IP <i>(Light to heavy sedation, mild to mod analgesia)</i>	1.0-5.0 <sup>1</sup> / IM, IP <i>(Light to heavy sedation, mild to mod analgesia)</i>	3.0-5.0 <sup>4</sup> / IM <i>(Light to mod sedation)</i>	2.0 – 5.0 <sup>1</sup> / IM <i>(Light to mod sedation, mild to mod analgesia)</i>
Medetomidine (Domitor)	0.03-0.1 <sup>1</sup> / SC <i>(Light to deep sedation, mild to mod analgesia)</i>	0.03-0.1 <sup>1</sup> / SC, IP <i>(Light to heavy sedation, mild to mod analgesia)</i>	0.03-0.1 <sup>1</sup> / SC, IP <i>(Light to heavy sedation, mild to mod analgesia)</i>		0.1 – 0.5 <sup>1</sup> / SC, IM <i>(Light to heavy sedation, mild to mod analgesia)</i>
<b>REVERSALS FOR ALPHA 2 AGONISTS</b>					
Atipamezole (Antesedan) <sup>A</sup> <i>Specific antagonist</i>	0.1-1.0 <sup>1</sup> / SC, IM, IP, IV	0.1-1.0 <sup>1</sup> / SC, IM, IP, IV	0.1-1.0 <sup>1</sup> / SC, IM, IP, IV	0.1-1.0 <sup>1</sup> / SC, IM, IP, IV	0.1-1.0 <sup>1</sup> / SC, IM, IP, IV
Yohimbine (Yobine) <i>Non-Specific antagonist</i>	0.5 <sup>1</sup> / IM 0.2 <sup>1</sup> / IV	0.5 <sup>1</sup> / IM 0.2 <sup>1</sup> / IV	0.5 <sup>1</sup> / IM 0.2 <sup>1</sup> / IV	0.5 <sup>1</sup> / IM 0.2 <sup>1</sup> / IV	0.5 <sup>1</sup> / IM 0.2 <sup>1</sup> / IV
<b>OPIOID ANALGESICS</b>					
Meperidine HCl (Demerol)	10-20 q 2-3h <sup>5</sup> / SC, IM	10-20 q 2-3h <sup>5</sup> / SC, IM	20 q 2-3h <sup>3</sup> / SC, IM	10-20 q 2-3 h <sup>4</sup> / SC 10-20 q 2-4h <sup>4</sup> / IM	5.0-10 q 2-3h <sup>5</sup> / SC, IM
Morphine Sulfate	2.0-5.0 q 4h <sup>5</sup> / SC, IM	2.0-5.0 q 4h <sup>5</sup> / SC, IM	2.0-5.0 q 2-4h <sup>3</sup> / SC, IM	2.0-5.0 q 2-4h <sup>1</sup> / SC, IM	2.0-5.0 q 4h <sup>5</sup> / SC, IM
<b>NARCOTIC AGONIST-ANTAGONIST ANALGESICS</b>					
Buprenorphine HCl (Buprenex) <sup>B</sup>	0.05-0.1 q 8-12h <sup>5</sup> / SC	0.01-0.05 q 8-12h <sup>5</sup> / SC, IV	0.05-0.5 q 8-12h <sup>3</sup> / SC, IM	0.05 q 8-12h <sup>5</sup> / SC 0.05 q 8-12 <sup>4</sup> / IM	0.01-0.05 q 6-12h <sup>5</sup> / SC, IM, IV
Buprenorphine SR Lab <sup>9</sup> (Buprenex SR Lab)	0.5–1.0 q 72h / SC <i>(0.5mg/ml conc)</i>	1.0-1.2 q 72h / SC <i>(0.5mg/ml conc)</i>			0.1 q 72h / SC <i>(1.0mg/ml conc)</i>
Butorphanol Tartrate (Torbugesic)	1.0-2.0 q 4h <sup>5</sup> / SC, IM	1.0-2.0 q 2-4h <sup>5</sup> / SC, IM	1.0-5.0 q 2-4h <sup>3</sup> / SC, IM	0.025-0.4 q 4-12h <sup>4</sup> / SC, IM	0.1-0.5 q 4h <sup>5</sup> / SC, IM, IV
Nalbuphine HCl (Nubain) <sup>C</sup>	2.0-4.0 q 4h <sup>5</sup> / IM	1.0-2.0 q 4h <sup>5</sup> / IM	4.0-8.0 q 3h <sup>3</sup> / SC, IM	1.0-2.0 q 4h <sup>5</sup> / IM	1.0-2.0 q 4h <sup>5</sup> / IM, IV
<b>OPIOID ANTAGONIST</b>					
Naloxone (Narcan) <sup>D</sup>	0.01-0.1 <sup>1</sup> / SC, IM, IV	0.01-0.1 <sup>1,5</sup> / SC, IM, IV	0.01-0.1 <sup>1</sup> / SC, IM, IV	0.01-0.1 <sup>1</sup> / SC, IM, IV	0.01-0.1 <sup>1</sup> / SC, IM, IV

DRUG - GENERIC (TRADE)	MOUSE	RAT	HAMSTER	GUINEA PIG	RABBIT
<b>NSAIDS</b>					
Acetaminophen (Tylenol, Tempra)	200 daily <sup>1</sup> / PO	200 daily <sup>1</sup> / PO			
Aspirin	120 once <sup>1</sup> / PO	100 once <sup>1</sup> / PO		80-90 <sup>1</sup> / PO	100 once <sup>1</sup> / PO
Carprofen (Rimadyl)	5.0 daily <sup>5</sup> / PO, SC	5.0 daily <sup>5</sup> / PO, SC			1.5 q12 h <sup>5</sup> / PO 4.0 daily <sup>5</sup> / SC
Flunixin Meglumine (Banamine)	2.5 q12-24h <sup>5</sup> / SC	2.5 q12-24h <sup>5</sup> / SC	2.5 q12-24h <sup>3</sup> / SC, IM		1.0 q12-24h <sup>5</sup> / SC
Ibuprofen (Advil)	30 daily <sup>5</sup> / PO	15 daily <sup>5</sup> / PO			
Ketoprofen (Toradol)	5.0 daily <sup>1</sup> / SC	5.0 daily <sup>5</sup> / PO, SC			3.0 daily <sup>5</sup> / SC
Meloxicam (Metacam)	5.0 daily <sup>1</sup> / PO, SC	1.0 daily <sup>1</sup> / PO, SC		0.1-0.3 daily <sup>1</sup> / PO, SC	0.6-1.0 daily <sup>1</sup> / PO, SC
<b>INJECTABLE ANESTHETICS</b>					
Ketamine HCL (Ketaset, Ketalar) <sup>E</sup>	100-200 <sup>1</sup> / IM, IP <i>(Deep sedation, mild to mod analgesia)</i>	50-100 <sup>1</sup> / IM, IP <i>(Deep sedation, immobilization, mild to mod analgesia)</i>	50-100 <sup>1</sup> / IP <i>(Deep sedation, immobilization, mild to mod analgesia)</i>	100 <sup>1</sup> / IM, IP <i>(Heavy sedation, light analgesia)</i>	25-50 <sup>1</sup> / IM <i>(Moderate to heavy sedation, mild to mod analgesia)</i>
Pentobarbital (Nembutal) <sup>F,G</sup>	40-50 <sup>1</sup> / IP <i>(Immobilization, light anesthesia for 20-40 minutes)</i>	40-50 <sup>1</sup> / IP <i>(Light anesthesia for 15-60 minutes)</i>	50-90 <sup>1</sup> / IP <i>(Immobilization, light anesthesia for 30-60 minutes)</i>	37 <sup>1</sup> / IP <i>(Surgical anesthesia for 60-90 minutes)</i>	30-45 <sup>1</sup> / IV <i>(Light to moderate anesthesia for 20-30 minutes)</i>
Propofol (Diprivan, Rapinovet)	26 <sup>1</sup> / IV <i>(Surgical anesthesia for 5-10 minutes)</i>	10 <sup>1</sup> / IV <i>(Surgical anesthesia for 5 minutes)</i>			10 <sup>1</sup> / IV <i>(Light anesthesia for 5-10 minutes)</i>
Thiopental (Pentothal)	30-40 <sup>1</sup> / IV <i>(Surgical anesthesia for 5-10 minutes)</i>	30 <sup>1</sup> / IV <i>(Surgical anesthesia for 10 minutes)</i>			30 <sup>1</sup> / IV <i>(Surgical anesthesia for 5-10 minutes)</i>
Tribromoethanol (Avertin) <sup>H</sup>	240 <sup>1</sup> / IP <i>(Surgical anesthesia for 15-45 minutes)</i>				
<b>INJECTABLE ANESTHETIC COMBINATIONS</b> <i>(drug dose/drug dose – route of administration)</i>					
Ketamine/Acepromazine	100 / 5.0 - IP <sup>1</sup> <i>(Immobilization, light anesthesia for 20-30 minutes)</i>	75 / 2.5 - IP <sup>1</sup> <i>(Light anesthesia for 20-30 minutes)</i>	150 / 5.0 - IP <sup>1</sup> <i>(Immobilization, light anesthesia for 45-120 minutes)</i>	100 / 5.0 - IM <sup>1</sup> <i>(Immobilization, light anesthesia for 45-120 minutes)</i>	50 / 1.0 - IM <sup>1</sup> <i>(Surgical anesthesia for 20-30 minutes)</i>
Ketamine/Acepromazine/Xylazine <sup>I</sup>	80-100 / 3.0 / 10 - IP <sup>1</sup> <i>(Surgical anesthesia for 30-40 minutes)</i>	40-50 / 0.75 / 2.5 - IM, IP <sup>1</sup> <i>(Surgical anesthesia)</i>			35 / 1.0 / 5.0 - SC, IM <sup>1</sup> <i>(Surgical anesthesia for 45-75 minutes)</i>
Ketamine/Diazepam	100 / 5.0 - IP <sup>1</sup> <i>(Immobilization, light anesthesia for 20-30 minutes)</i>	75 / 5.0 - IP <sup>1</sup> <i>(Light anesthesia for 20-30 minutes)</i>	70 / 2.0 - IP <sup>1</sup> <i>(Immobilization, light anesthesia for 30-45 minutes)</i>	100 / 5.0 - IM <sup>1</sup> <i>(Immobilization, light anesthesia for 30-45 minutes)</i>	25 / 5.0 - IM <sup>1</sup> <i>(Surgical anesthesia for 20-30 minutes)</i>
Ketamine/Medetomidine	75 / 1.0 - IP <sup>1</sup> <i>(Surgical anesthesia for 20-30 minutes)</i>	75 / 0.5 - IP <sup>1</sup> <i>(Surgical anesthesia for 20-30 minutes)</i>	100 / 0.25 - IP <sup>1</sup> <i>(Surgical anesthesia for 30-60 minutes)</i>	40 / 0.5 - IP <sup>1</sup> <i>(Moderate anesthesia for 30-40 minutes)</i>	15 / 0.25 - SC, IM <sup>1</sup> <i>(Surgical anesthesia for 20-30 minutes)</i>
Ketamine/Midazolam	100 / 5.0 - IP <sup>1</sup> <i>(Immobilization, light anesthesia for 20-30 minutes)</i>	75 / 5.0 - IP <sup>1</sup> <i>(Light anesthesia for 20-30 minutes)</i>			
Ketamine/Xylazine	80-100 / 10 - IP <sup>1</sup> <i>(Surgical anesthesia for 20-</i>	75-100 / 10 - IP <sup>1</sup> <i>(Surgical anesthesia for 20-</i>	200 / 10 - IP <sup>1</sup> <i>(Surgical anesthesia for 30-60 minutes)</i>	40 / 5.0 - IP <sup>1</sup> <i>(Surgical anesthesia for 30 minutes)</i>	35 / 5.0 - IM <sup>1</sup> 10 / 3.0 - IV <sup>1</sup> <i>(Surgical anesthesia for 25-40 minutes IM, 20-30</i>

DRUG - GENERIC (TRADE)	MOUSE	RAT	HAMSTER	GUINEA PIG	RABBIT
	30 minutes)	30 minutes)			minutes IV)
Ketamine/Xylazine/Butorphanol					35 / 5.0 / 0.1 IM <sup>1</sup> (Surgical anesthesia for 60-90 minutes)
Tiletamine/Zolazepam (Telazol)	80 IP <sup>1</sup> (Immobilization)	40 IP <sup>1</sup> (Light anesthesia for 15-25 minutes)	50-80 IP <sup>1</sup> (Immobilization, light anesthesia for 20-30 minutes)	40-60 IM <sup>1</sup> (Immobilization)	
Tiletamine/Zolazepam/Xylazine			30 / 10 IP <sup>1</sup> (Surgical anesthesia for 30 minutes)		
<b>INHALANT ANESTHETICS</b> (MAC values listed) *Halothane and Methoxyflurane are no longer available in the United States					
Isoflurane (Forane, Aerrane)	1.34 Swiss Webster <sup>6</sup>	1.46 Sprague Dawley <sup>6</sup>		1.15 Hartley <sup>7</sup>	2.05 NZW <sup>8</sup>
Nitrous Oxide	275 <sup>1</sup>	150 <sup>1</sup>			
Sevoflurane	2.5 <sup>1</sup>	2.7 <sup>1</sup>			3.7 <sup>1</sup>

## Legend

- A. Highly specific antagonist. Dose required varies depending on dose of xylazine or medetomidine administered.
- B. Slower onset than naloxone and nalbuphine, but longer acting
- C. Almost as rapid acting as naloxone, maintains post-operative analgesia
- D. Reverses analgesia and respiratory depression
- E. Ketamine when used alone provides poor muscle relaxation and little to no deep analgesia during abdominal surgery. It's recommended to combine ketamine with a tranquilizer. See injectable anesthetic combinations.
- F. Narrow safety margin; poor analgesic
- G. Dilute commercial preparation 1:10 if necessary
- H. The Animal Care Program does not recommend the use of this drug as it is a non-pharmaceutical grade product that if incorrectly prepared or stored, can be irritating to the peritoneum. There may be a high rate of mortality if the animal is anesthetized a second time with this agent.
- I. Blood pressure with this combination can be significantly reduced

## References: Rodents/Lagomorphs

1. Flecknell PA. Laboratory Animal Anesthesia 3<sup>rd</sup> Edition. London: Academic Press, 2009.
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3. Field KJ, Sibold AL. The Laboratory Hamster and Gerbil. Boca Raton: CRC Press, 1999
4. Terril LA, Clemons DA. The Laboratory Guinea Pig. Boca Raton: CRC Press, 1998
5. Flecknell PA, Waterman-Pearson A. Pain Management in Animals. London: WB Saunders, 2000.
6. Mazze RI, Rice SA, Baden JM. Halothane, isoflurane, and enflurane MAC in pregnant and non pregnant female and male mice and rats. Anesthesiology 1985; 62: 339-341.
7. Seifen AB, Kennedy RH, Bray JP, Seifen E. Estimation of minimum alveolar concentration (MAC) for halothane, enflurane, and isoflurane in spontaneously breathing guinea pigs. Laboratory Animal Science 1989; 39: 579-58.
8. Drummond JC. MAC for halothane, enflurane, and isoflurane in the new zealand white rabbit: and a test for the validity of MAC determinations. Anesthesiology 1985; 62: 336-338.
9. Refer to manufacturer ZooPharm <http://wildpharm.com/medications/labanimals/item/3-buprenorphine-sr-1ml.html>