Anesthesia Reference Manual

Acknowledgments

Portions of the anesthetic and antibiotic regimens were taken from:

Veterinary Anesthetic Drug Quick Reference. Veterinary Anesthetic Drug Quick Reference; Blaze CA; Glowaski MM; 2004.

Pain Management in Animals. Pain Management in Animals; Flecknell P; Waterman-Pearson A; 2000

Ferrets, Rabbits, and Rodents-Clinical Medicine and Surgery. Ferrets, Rabbits, and Rodents-Clinical Medicine and Surgery; Hillyer EV; Quesenberry KE; 1997

The Laboratory Swine. The Laboratory Swine; Bollen PJA; Hansen AK; Rasmussen HJ; 2000

The Laboratory Nonhuman Primate. The Laboratory Nonhuman Primate; Fortman JD; Hewett TA; Bennett BT; 2002

The Laboratory Canine. The Laboratory Canine; Field G; Jackson TA; 2007

The Laboratory Hamster & Gerbil. The Laboratory Hamster & Gerbil; Field KJ; Sibold AL; 1999

Plumb's Veterinary Drug Handbook. Plumb's Veterinary Drug Handbook; Plumb DC; 2018

Part Number 391-0055-001
Rev. 53

Data Sciences International (DSI)
119 14th Street NW ▪ Suite 100 ▪ St. Paul, MN 55112
Telephone: (1-651) 481-7400 ▪ 1-800 262-9687
Fax: (1-651) 481-7417
Website: www.datasci.com

Table of Contents

Introduction 3
Mice 6
Rats 8
Hamsters 10
Gerbils 12
Guinea Pigs 14
Ferrets 16
Rabbits 18
Cats 20
Dogs 22
Minipigs 24
Non-human Primates 26

Introduction

This manual is intended to be a guideline for selecting the proper anesthesia, analgesic and antibiotic regimens used in common laboratory animals. It does not account for every possible anesthetic combination or for every available drug. Nor does it include every species that may be used in a laboratory setting. Therefore, further recommendations regarding the appropriate drug regimen in relation to the intended species to be used should be referred to your staff veterinarian or IACUC.

"The proper use of anesthetics and analgesics in research animals is an ethical imperative…The selection of the most appropriate analgesic or anesthetic should reflect professional judgment as to which best meets clinical and humane requirements without compromising the scientific aspects of the research protocol."[1]

Anesthesia

Anesthetic agents may be selected for the purpose of restraint, general anesthesia, regional anesthesia, analgesia and euthanasia. It is important to know the specific action and potential complication of each drug before using it. It is also important to be familiar with the species intended to be used.

Anesthesia produces a variety of responses that are determined partially by the physiology and behavior of the species. Many anesthetic agents alter normal control of

[1] Guide for the Care and Use of Laboratory Animals, NRC, *National Academy Press*, 1996

respiratory rate, blood pressure and heart rate. These changes must be closely monitored during the anesthetic period and may require intervention if the changes exceed the normal range of values for the species.

Temperature regulation can also be hindered by anesthesia. Hypothermia and hyperthermia can be equally dangerous. Either one will prolong the recovery period and may result in death. The use of supplemental heat sources such as warm water bottles, heating pads or bair huggers are important to maintain baseline body temperature during surgery and after surgery. The use of hats and socks may also prove helpful in smaller primates.

Route of drug administration may play a significant role in the anesthetic regimen as well. With the exception of inhalant (gas) anesthesia, most anesthetic drugs are administrated by injection at a specific site or region of the body. Differences in drug absorption and time from administration to response have been well documented. The ranking for patient response following anesthetic drug administration (ranked from most to least predictable) is:

- Intravenous (IV)
- Intramuscular (IM)
- Subcutaneous (SQ or SC)
- Intraperitoneal (IP)

The duration of the drug effect is generally shortest with IV followed by IM, SQ, and IP. There is a relationship, therefore, between the speed of drug effect and the duration of the effect that it produces. This may be an important factor in the effective drug dose required to produce the desired endpoint.

The general health and status of the anesthetic candidate should also be considered. Knowledge of what normal is for the species is very important in evaluating the patient. Some things to consider for selecting the proper anesthesia are:

- Age
- Weight
- Diet
- Pregnancy Status
- Health issues; such as diabetes or hypertension

Changes in or signs that may indicate systemic abnormalities include:

- Food and Water Consumption
- Excretory Function
- Activity or Sleep Pattern

- Breathing Rate
- Discharge from eyes or nose
- Lethargy
- Incoordination
- Coughing

If any abnormality is present, surgery should be reconsidered until it is resolved.

Analgesia

Pain is a complex experience that typically results from stimuli that damage tissue or have the potential to damage tissue.[2] Species vary in their response to pain so the criteria for assessing pain in various species can differ. Vocalization, depression, abnormal appearance or posture, and immobility can all be indicators of pain or distress.

The use of pre- and post-surgical analgesics is strongly encouraged for all surgical manipulations performed on laboratory animals. Some things to consider for selecting the proper analgesics are:

- Age
- Species
- Type and Degree of Pain
- Length of Operative Procedure
- Effects on Specific Organs

Antibiotics

The use of peri-operative antibiotics may be applied at the discretion of the investigator. The combination of sterile transmitter packaging and proper aseptic technique is typically all that is required for successful surgical outcomes. The use of antibiotics should not be a substitute for performing proper sterile or aseptic surgical technique.

Always refer to your staff veterinarian or IACUC for proper anesthetic protocols and training prior to performing any experiments on live animals.

[2] Guide for the Care and Use of Laboratory Animals, NRC, *National Academy Press*, 1996

Mice

The mouse presents an anesthetic challenge because of its small size and varied response to anesthetic drugs within strains and genders. Intravenous access and endotracheal intubation are difficult. Drug overdose is a significant factor in anesthetic deaths in mice. Fasting is not recommended.

Anesthetics – Mice

Name of Drug	Dosage	Route
Atropine	0.05 mg/kg	SQ, IM
Acepromazine	0.5-2.5 mg/kg	SQ, IM
Diazepam	3.0-5.0 mg/kg	SQ, IM
Midazolam	1.0-2.0 mg/kg	SQ, IM
Glycopyrrolate	0.01-0.02 mg/kg	SQ, IM
Xylazine*	10.0-15.0 mg/kg	SQ, IM
Ketamine with Xlyazine*	50.0-200.0 mg/kg 5.0-10.0 mg/kg	SQ, IM
Acepromazine with Ketamine	2.5-5.0 mg/kg 50.0-150.0 mg/kg	SQ, IM
Thiopental	25.0-50.0 mg/kg	IP
Pentobarbital	30.0-90.0 mg/kg	IP
Xylazine* with Tiletamine-zolazepam (Telazol)	10.0 mg/kg 10.0-30.0 mg/kg	IM

Isoflurane	3-5% Isoflurane with 1 liter per minute of Oxygen (For Induction) 1-3% Isoflurane with 1/2 liter per minute of Oxygen (For Maintenance)	Inhalation

*If needed, the reversal agent is Yohimbine (0.2 mg/kg IV)

Analgesics – Mice

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.05-0.10 mg/kg	SQ	Every 8-12 hours
Bupivacaine	1.0 mg/kg	Local/splash block	Single dose
Butorphanol	1.0-2.0 mg/kg	SQ, IM	Every 4 hours
Morphine	2.0-5.0 mg/kg	SQ, IM	Every 4 hours
Carprofen	5.0 mg/kg	SQ, Oral	Every 24 hours
Meloxicam	2.0 mg/kg	SQ, Oral	Every 24 hours
Aspirin	120.0 mg/kg	Oral	Every 4 hours
Ibuprofen	30.0 mg/kg	Oral	Every 24 hours

Antibiotics – Mice

Name of Drug	Dosage	Route	Frequency
Ampicillin	20.0-100.0 mg/kg	SQ, Oral	Total dose divided every 8 hours
Enrofloxacin	2.5-10.0 mg/kg	SQ, Oral	Every 12 hours

Rats

Many of the issues discussed for mice are applicable to this species as well. Endotracheal intubation can be also be difficult due to their smaller size. Fasting is not recommended.

An additional anesthetic concern in rats is related to genetically hypertensive animals. Certain anesthetic agents may increase blood pressure and add to the risk of peri-anesthetic complications. Caution should be used when selecting the anesthetic regimen for hypertensive rats.

Anesthetics – Rats

Name of Drug	Dosage	Route
Atropine	0.05 mg/kg	SQ, IM
Acepromazine	0.5-2.5 mg/kg	SQ, IM
Diazepam	3.0-5.0 mg/kg	SQ, IM
Midazolam	1.0-2.0 mg/kg	SQ, IM
Glycopyrrolate	0.01-0.02 mg/kg	SQ, IM
Xylazine*	5.0-15.0 mg/kg	SQ, IM
Ketamine with Xlyazine*	40.0-90.0 mg/kg 3.0-5.0 mg/kg	SQ, IM
Acepromazine with Ketamine	2.5-5.0 mg/kg 50.0-150.0 mg/kg	SQ, IM
Thiopental	25.0-40.0 mg/kg	IP
Pentobarbital	30.0-50.0 mg/kg	IP
Xylazine* with Tiletamine-zolazepam (Telazol)	5.0-10.0 mg/kg 10.0-30.0 mg/kg	IM

Isoflurane	3-5% Isoflurane with 1 liter per minute of Oxygen (For Induction) 1-3% Isoflurane with 1/2 liter per minute of Oxygen (For Maintenance)	Inhalation

*If needed, the reversal agent is Yohimbine (0.2 mg/kg IV)

Analgesics – Rats

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.01-0.05 mg/kg 0.10-0.25 mg/kg	SQ, IV Oral	Every 8-12 hours
Bupivacaine	1.0 mg/kg	Local/splash block	Single dose
Butorphanol	1.0-2.0 mg/kg	SQ, IM	Every 2-4 hours
Morphine	2.0-5.0 mg/kg	SQ, IM	Every 4 hours
Carprofen	5.0 mg/kg	SQ, Oral	Every 24 hours
Meloxicam	1.0 mg/kg	SQ, Oral	Every 24 hours
Aspirin	100.0 mg/kg	Oral	Every 4 hours
Ibuprofen	15.0 mg/kg	Oral	Every 24 hours

Antibiotics - Rats

Name of Drug	Dosage	Route	Frequency
Ampicillin	20.0-100.0 mg/kg	SQ, Oral	Total dose divided every 8 hours
Enrofloxacin	2.5-10.0 mg/kg	SQ, Oral	Every 12 hours

Hamsters

Hamsters are not naturally aggressive but can become so if startled. Endotracheal intubation may be difficult due to their small size. Fasting can be done 8-12 hours prior to anesthesia.

Anesthetics – Hamsters

Name of Drug	Dosage	Route
Atropine	0.05 mg/kg	SQ, IM
Acepromazine	0.5-5.0 mg/kg	SQ, IM
Diazepam	3.0-5.0 mg/kg	SQ, IM
Midazolam	1.0-2.0 mg/kg	SQ, IM
Glycopyrrolate	0.01-0.02 mg/kg	SQ, IM
Xylazine*	8.0-10.0 mg/kg	SQ, IM
Ketamine with Xlyazine*	50.0-150.0 mg/kg 5.0-10.0 mg/kg	SQ, IM
Acepromazine with Ketamine	2.5-5.0 mg/kg 50.0-150.0 mg/kg	SQ, IM
Thiopental	40.0 mg/kg	IP
Pentobarbital	60.0-90.0 mg/kg	IP
Xylazine* with Tiletamine-zolazepam (Telazol)	10.0 mg/kg 10.0-30.0 mg/kg	IM

Isoflurane	3-5% Isoflurane with 1 liter per minute of Oxygen (For Induction) 1-3% Isoflurane with 1/2 liter per minute of Oxygen (For Maintenance)	Inhalation

*If needed, the reversal agent is Yohimbine (0.2 mg/kg IV)

Analgesics - Hamsters

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.05-0.1 mg/kg	SQ	Every 6-12 hours
Bupivacaine	1.0 mg/kg	Local/splash block	Single dose
Butorphanol	1.0-2.0 mg/kg	SQ, IM	Every 2-4 hours
Morphine	2.0-5.0 mg/kg	SQ, IM	Every 4 hours
Carprofen	5.0 mg/kg	SQ, Oral	Every 24 hours
Meloxicam	1.0 mg/kg	SQ, Oral	Every 24 hours
Aspirin	240.0 mg/kg	Oral	Every 24 hours
Ibuprofen	15.0 mg/kg	Oral	Every 24 hours

Antibiotics – Hamsters

Name of Drug	Dosage	Route	Frequency
Ciprofloxacin	10.0 mg/kg	Oral	Every 12 hours
Enrofloxacin	5.0-10.0 mg/kg	IM, Oral	Every 12 hours

Gerbils

Gerbils are gentle by nature. Endotracheal intubation may be difficult due to their small size. Fasting can be done 8-12 hours prior to anesthesia.

Anesthetics – Gerbils

Name of Drug	Dosage	Route
Atropine	0.05 mg/kg	SQ, IM
Diazepam	3.0-5.0 mg/kg	SQ, IM
Midazolam	1.0-2.0 mg/kg	SQ, IM
Glycopyrrolate	0.01-0.02 mg/kg	SQ, IM
Xylazine*	5.0-10.0 mg/kg	SQ, IM
Ketamine with Xlyazine*	50.0-70.0 mg/kg 2.0-3.0 mg/kg	SQ, IM
Pentobarbital	60.0 mg/kg	IP
Xylazine* with Tiletamine-zolazepam (Telazol)	5.0 mg/kg 10.0-30.0 mg/kg	IM
Isoflurane	3-5% Isoflurane with 1 liter per minute of Oxygen (For Induction) 1-3% Isoflurane with 1/2 liter per minute of Oxygen (For Maintenance)	Inhalation

*If needed, the reversal agent is Yohimbine (0.2 mg/kg IV)

Analgesics – Gerbils

Name of Drug	Dosage	Route	Frequency
Bupivacaine	1.0 mg/kg	Local/splash block	Single dose
Buprenorphine	0.05-0.1 mg/kg	SQ	Every 6-12 hours
Butorphanol	1.0-2.0 mg/kg	SQ, IM	Every 2-4 hours
Morphine	2.0-5.0 mg/kg	SQ, IM	Every 4 hours
Carprofen	5.0 mg/kg	SQ, Oral	Every 24 hours
Meloxicam	1.0 mg/kg	SQ, Oral	Every 24 hours
Aspirin	240.0 mg/kg	Oral	Every 24 hours
Ibuprofen	15.0 mg/kg	Oral	Every 24 hours

Antibiotics – Gerbils

Name of Drug	Dosage	Route	Frequency
Ciprofloxacin	10.0 mg/kg	Oral	Every 12 hours
Enrofloxacin	5.0-10.0 mg/kg	IM, Oral	Every 12 hours

Guinea Pigs

The small size and docile behavior of guinea pigs makes this species a popular research model. Endotracheal intubation can be difficult due to their small size. Fasting is not necessary but can be done if needed.

Guinea pigs also need a daily intake of Vitamin C to remain healthy. For the best surgical outcome, it is advised to pre-treat the animal's drinking water with 1.0 grams Vitamin C per 1.0 liter of water seven days before surgery. Immediately post-operatively, inject Vitamin C at a dosage of 30.0 mg/kg subcutaneously. The animal's drinking water should be treated with 1.0 grams Vitamin C per 1.0 liter of water for 14 days after surgery as well.[3]

Anesthetics – Guinea Pigs

Name of Drug	Dosage	Route
Atropine	0.05 mg/kg	SQ, IM
Acepromazine	0.5-1.5 mg/kg	SQ, IM
Diazepam	1.0-5.0 mg/kg	SQ, IM
Midazolam	1.0-2.0 mg/kg	SQ, IM
Glycopyrrolate	0.01-0.02 mg/kg	SQ, IM
Xylazine*	5.0-10.0 mg/kg	SQ, IM
Ketamine with Xlyazine*	20.0-40.0 mg/kg 3.0-5.0 mg/kg	IM
Acepromazine with Ketamine	0.5-1.0 mg/kg 20.0-50.0 mg/kg	IM
Thiopental	20.0 mg/kg	IP

[3] Hess P; Rey M; Wanner D; Steiner B; Clozel M. Measurements of blood pressure and electrocardiogram in conscious freely moving guineapigs: a model for screening QT interval prolongation effects. *Laboratory Animals*; 2007; 41(4); 470-480.

Pentobarbital	15.0-30.0 mg/kg	IP
Isoflurane	3-5% Isoflurane with 1 liter per minute of Oxygen (For Induction) 1-3% Isoflurane with 1/2 liter per minute of Oxygen (For Maintenance)	Inhalation

*If needed, the reversal agent is Yohimbine (0.2 mg/kg IV)

Analgesics – Guinea Pigs

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.05 mg/kg	SQ	Every 8-12 hours
Bupivacaine	1.0 mg/kg	Local/splash block	Single dose
Meloxicam	0.1-0.3 mg/kg	SQ, Oral	Every 24 hours
Morphine	2.5 mg/kg	SQ, IM	Every 4 hours
Aspirin	86.0 mg/kg	Oral	Every 4 hours

Antibiotics – Guinea Pigs

Name of Drug	Dosage	Route	Frequency
Ciprofloxacin	5.0-15.0 mg/kg	Oral	Every 12 hours
Enrofloxacin	2.5-10 mg/kg	SQ, IM, Oral	Every 12 hours

Ferrets

Ferrets are a popular research model because they share many common anatomic, metabolic, and physiologic traits with humans. Endotracheal intubation can be performed easily. Fasting can be done 4-8 hours prior to anesthesia if the animal does not have an insulinoma.

Anesthetics – Ferrets

Name of Drug	Dosage	Route
Atropine	0.02-0.04 mg/kg 0.01-0.02 mg/kg	SQ, IM IV
Acepromazine	0.025-0.1 mg/kg 0.025-0.05 mg/kg	SQ, IM IV
Diazepam	0.5-2.0 mg/kg 0.4-0.8 mg/kg	SQ, IM IV
Midazolam	0.3-1.0 mg/kg	SQ, IM
Glycopyrrolate	0.01-0.02 mg/kg 0.005-0.01 mg/kg	SQ, IM IV
Xylazine*	1.0-2.0 mg/kg	SQ, IM
Ketamine	10.0-30.0 mg/kg 10.0 mg/kg	SQ, IM IV
Ketamine with Xlyazine*	10.0-30.0 mg/kg 1.0-2.0 mg/kg	IM
Acepromazine with Ketamine	0.05-0.3 mg/kg 10.0-30.0 mg/kg	IM

Isoflurane	3-5% Isoflurane with 1 liter per minute of Oxygen (For Induction) 1-3% Isoflurane with 1 liter per minute of Oxygen (For Maintenance)	Inhalation

*If needed, the reversal agent is Yohimbine (0.2 mg/kg IV)

Analgesics – Ferrets

Name of Drug	Dosage	Route	Frequency
Bupivacaine	1.0 mg/kg	Local/splash block	Single dose
Buprenorphine	0.01-0.03 mg/kg	SQ, IM, IV	Every 6-12 hours
Butorphanol	0.4 mg/kg	IM	Every 4 hours
Meloxicam	1.0 mg/kg	SQ, Oral	Every 24 hours
Morphine	0.5-2.0 mg/kg	SQ, IM	Every 4-6 hours
Flunixin	0.5-2.0 mg/kg	SQ	Every 12-24 hours
Aspirin	200.0 mg/kg	Oral	Every 12 hours

Antibiotics – Ferrets

Name of Drug	Dosage	Route	Frequency
Amoxicillin	10.0-20.0 mg/kg	SQ, Oral	Every 12-24 hours
Penicillin G Procaine	20,000 IU/kg	IM	Every 12 hours
Ciprofloxacin	10.0 mg/kg	Oral	Every 12 hours
Enrofloxacin	5.0-15.0 mg/kg	SQ, IM, Oral	Every 12 hours

Rabbits

Rabbits can be difficult to anesthetize safely for a number of reasons. They must be properly handled and restrained to ensure that self injury does not occur to the hind limbs or spine. Rabbits have a long, narrow oral cavity which can make passage of an endotracheal tube difficult. Fasting is not recommended.

Anesthetics – Rabbits

Name of Drug	Dosage	Route
Atropine	0.04-2.0 mg/kg 0.04-1.0 mg/kg	SQ, IM IV
Acepromazine	0.025-0.1 mg/kg 0.025-0.05 mg/kg	SQ, IM IV
Diazepam	0.5-2.0 mg/kg 0.4-0.8 mg/kg	SQ, IM IV
Midazolam	1.0-2.0 mg/kg	SQ, IM, IV
Glycopyrrolate	0.01-0.05 mg/kg 0.005-0.01 mg/kg	SQ, IM IV
Xylazine*	3.0-5.0 mg/kg 1.0 mg/kg	SQ, IM IV
Ketamine	20.0-40.0 mg/kg 10.0-15.0 mg/kg	SQ, IM IV
Ketamine with Xlyazine*	20.0-40.0 mg/kg 3.0-5.0 mg/kg	IM
Acepromazine with Ketamine	0.25-1.0 mg/kg 25.0-40.0 mg/kg	IM

Thiopental	15.0-20.0 mg/kg (after sedation)	IV
Pentobarbital	20.0-40.0 mg/kg	IV
Propofol	5.0-8.0 mg/kg	IV
Isoflurane	1-3% Isoflurane with 1 liter per minute of Oxygen	Inhalation

*If needed, the reversal agent is Yohimbine (0.2 mg/kg IV)

Analgesics – Rabbits

Name of Drug	Dosage	Route	Frequency
Bupivacaine	1.0 mg/kg	Local/splash block	Single dose
Buprenorphine	0.01-0.05 mg/kg	SQ, IM, IV	Every 6-12 hours
Butorphanol	0.1-0.5 mg/kg	SQ, IM, IV	Every 4 hours
Morphine	2.0-5.0 mg/kg	SQ, IM	Every 4 hours
Carprofen	4.0 mg/kg	SQ	Every 24 hours
Meloxicam	0.2 mg/kg	SQ	Every 24 hours
Aspirin	100.0 mg/kg	Oral	Every 4-6 hours

Antibiotics – Rabbits

Name of Drug	Dosage	Route	Frequency
Penicillin G Procaine	20,000-60,000 IU/kg	SQ, IM	Every 24 hours
Enrofloxacin	5.0-15.0 mg/kg	SQ, IM, Oral	Every 12 hours

Cats

Cats are not as commonly used in research. Endotracheal intubation is generally recommended during surgical procedures and can be performed easily with the animal in sternal recumbency. Fasting is recommended at least 8-12 hours prior to surgery.

Anesthetics – Cats

Name of Drug	Dosage	Route
Atropine	0.02-0.04 mg/kg 0.01-0.02 mg/kg	SQ, IM IV
Acepromazine	0.025-0.1 mg/kg 0.025-0.05 mg/kg	SQ, IM IV
Diazepam	0.1-0.4 mg/kg 0.1-0.2 mg/kg	SQ, IM IV
Midazolam	0.1-0.3 mg/kg	SQ, IM, IV
Glycopyrrolate	0.01-0.02 mg/kg 0.005-0.01 mg/kg	SQ, IM IV
Xylazine*	0.5-1.0 mg/kg 0.25-0.5 mg/kg	SQ, IM IV
Ketamine	7.0-10.0 mg/kg 10.0 mg/kg	SQ, IM IV
Thiopental	10.0-15.0 mg/kg (after sedation)	IV
Telazol (Tiletamine-Zolazepam)	10.0-12.0 mg/kg	IM

Propofol	4.0-6.0 mg/kg	IV
Isoflurane	1-3% Isoflurane with 1 liter per minute of Oxygen	Inhalation

*If needed, the reversal agent is Yohimbine (0.1 mg/kg IV)

Analgesics – Cats

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.005-0.020 mg/kg	SQ, IM, IV	Every 6-12 hours
Butorphanol	0.2-0.8 mg/kg	SQ, IM	Every 2-4 hours
Morphine	0.1-0.2 mg/kg	SQ, IM, IV	Every 6-8 hours
Carprofen	2.0-4.0 mg/kg 2.0 mg/kg	SQ, IV Oral	Single dose Every 24 hours
Meloxicam	0.2 mg/kg 0.3 mg/kg-for 1 day, then 0.1 mg/kg for 3 days	SQ Oral	Single dose Every 24 hours
Ketoprofen	2.0 mg/kg	SQ	Every 24 hours

Antibiotics – Cats

Name of Drug	Dosage	Route	Frequency
Amoxicillin	10.0 mg/kg	Oral	Every 12 hours
Cephalexin	10.0 mg/kg	Oral	Every 8 hours
Enrofloxacin	5.0 mg/kg	Oral	Every 24 hours

Dogs

Dogs are commonly used in research due to their size, availability, ease of care, and gentle nature. Endotracheal intubation is generally recommended during surgical procedures and can be performed easily with the animal in sternal recumbency. Fasting is recommended at least 8-12 hours prior to surgery.

Anesthetics - Dogs

Name of Drug	Dosage	Route
Atropine	0.02-0.04 mg/kg 0.01-0.02 mg/kg	SQ, IM IV
Acepromazine	0.025-0.1 mg/kg 0.025-0.05 mg/kg	SQ, IM IV
Diazepam	0.1-0.5 mg/kg 0.1-0.2 mg/kg	SQ, IM IV
Midazolam	0.1-0.3 mg/kg	SQ, IM, IV
Glycopyrrolate	0.01-0.02 mg/kg 0.005-0.01 mg/kg	SQ, IM IV
Xylazine*	0.5-2.0 mg/kg 0.25-0.5 mg/kg	SQ, IM IV
Ketamine	11.0-22.0 mg/kg 10.0 mg/ml	SQ, IM IV
Thiopental	10.0-15.0 mg/kg (after sedation)	IV
Telazol (Tiletamine-Zolazepam)	6.6-13.0 mg/kg	IM

Propofol	4.0-6.0 mg/kg	IV
Isoflurane	1-3% Isoflurane with 1 liter per minute of Oxygen	Inhalation

*If needed, the reversal agent is Yohimbine (0.1 mg/kg IV)

Analgesics – Dogs

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.005-0.020 mg/kg	SQ, IM, IV	Every 6-12 hours
Butorphanol	0.2-0.6 mg/kg	SQ, IM, IV	Every 2-4 hours
Morphine	0.1-1.0 mg/kg	SQ, IM, IV	Every 4-6 hours
Carprofen	4.0 mg/kg 4.0 mg/kg	SQ, IV Oral	Single dose Every 24 hours
Meloxicam	0.2 mg/kg 0.2 mg/kg-for 1 day, then 0.1 mg/kg for 3 days	SQ Oral	Single dose Every 24 hours
Ketoprofen	2.0 mg/kg	SQ	Every 24 hours

Antibiotics – Dogs

Name of Drug	Dosage	Route	Frequency
Amoxicillin	10.0 mg/kg	Oral	Every 12 hours
Cephalexin	35.0 mg/kg	Oral	Every 12 hours
Enrofloxacin	2.5-5.0 mg/kg	Oral	Every 12 hours

Minipigs

Minipigs are a popular research model due to their small size. This allows for easier handling, smaller housing requirements and a smaller quantity of test compounds to be used. Endotracheal intubation can be difficult but is generally recommended and can be performed with the animal in dorsal, lateral, or sternal recumbency. Fasting should be done 12-24 hours prior to surgery.

Anesthetics – Minipigs

Name of Drug	Dosage	Route
Atropine	0.01-0.05 mg/kg	SQ, IM, IV
Acepromazine	0.11-2.2 mg/kg	IM
Diazepam	0.5-10 mg/kg 0.44-2.0 mg/kg	IM IV
Midazolam	0.1-0.5 mg/kg	IM, IV
Glycopyrrolate	0.004-0.01 mg/kg	IM
Xylazine*	0.2-2.2 mg/kg	IM
Ketamine	2.0-33.0 mg/kg	IM, IV
Thiopental	5.0-25.0 mg/kg	IV
Telazol (Tiletamine-Zolazepam)	1.0-8.8 mg/kg	IM
Propofol	1.0-8.0 mg/kg	IV
Isoflurane	1-3% Isoflurane with 1 liter per minute of Oxygen	Inhalation

*If needed, the reversal agent is Yohimbine (0.05 mg/kg IV)

Analgesics – Minipigs

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.20-0.30 mg/kg 0.005-0.10 mg/kg 0.01-0.12 mg/kg	SQ IM IV	Every 6-12 hours
Butorphanol	0.1-0.4 mg/kg	SQ, IM, IV	Every 4-6 hours
Carprofen	0.5-4.0 mg/kg	SQ, IM, IV	Every 24 hours
Ketoprofen	1.0-3.0 mg/kg	SQ, IM, IV	Every 24 hours

Antibiotics – Minipigs

Name of Drug	Dosage	Route	Frequency
Amoxicillin	11.0-13.0 mg/kg	Oral	Every 24 hours
Ampicillin	20.0 mg/kg	SQ, IM	Every 8 hours
Enrofloxacin	2.5 mg/kg	IM	Every 24 hours

Non-human Primates

Primates are similar in anatomy and physiology to humans. They can be aggressive and require special housing requirements. Endotracheal intubation can be difficult and should be performed while the animal is in dorsal recumbency. Fasting should be done 8-12 hours prior to surgery.

Anesthetics – NHP

Name of Drug	Dosage	Route
Atropine	0.05 mg/kg	IM
Glycopyrrolate	0.005-0.01 mg/kg	IM
Ketamine	5.0-25.0 mg/kg	IM
Thiopental	15.0-20.0 mg/kg	IV
Pentobarbital	5.0-15.0 mg/kg	IV
Telazol (Tiletamine-Zolazepam)	4.0-6.0 mg/kg	IM
Propofol	2.5-10 mg/kg	IV
Isoflurane	1-3% Isoflurane with 1 liter per minute of Oxygen	Inhalation

Analgesics – NHP

Name of Drug	Dosage	Route	Frequency
Buprenorphine	0.01 mg/kg	IM, IV	Every 6-8 hours
Morphine	1.0-2.0 mg/kg	SQ, IM	Every 4 hours

Carprofen	2.0-4.0mg/kg	SQ, Oral	Every 24 hours
Ketoprofen	3.0-5.0 mg/kg	SQ, IM	Every 24 hours
Meloxicam	0.2-0.3 mg/kg	SQ, IM, Oral	Every 24 hours
Aspirin	20.0 mg/kg	Oral	Every 6-8 hours

Antibiotics – NHP

Name of Drug	Dosage	Route	Frequency
Amoxicillin	7.0-11.0 mg/kg	SQ, IM	Every 24 hours
Ampicillin	5.0 mg/kg	IM	Every 12 hours
Cefazolin	25.0 mg/kg	IM, IV	Every 12 hours
Ciprofloxacin	16.0-20.0 mg/kg	Oral	Every 12 hours
Enrofloxacin	5.0 mg/kg	IM, Oral	Every 24 hours