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This guide has been designed for the investigator requiring information regarding the type and amount of tranquilizers, anesthetics, analgesics, and euthanasia agents used in the following laboratory animals: nonhuman primates, dog, cat, rabbit, guinea pig, rat, mouse, hamster, pig, sheep, and avian species.

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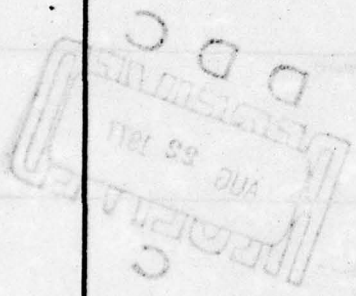

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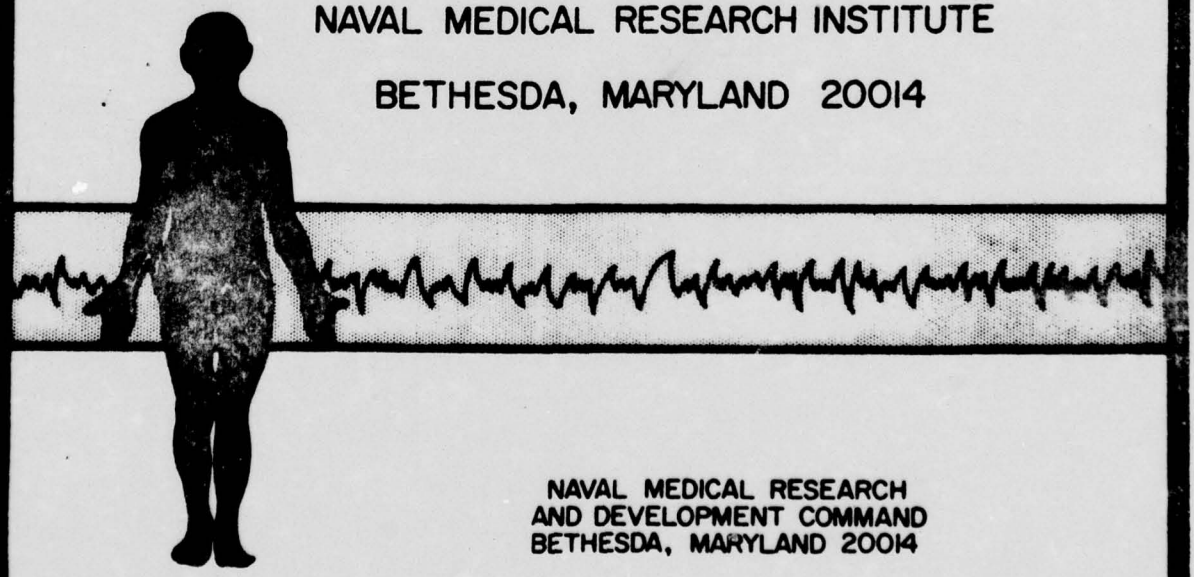

NAVAL MEDICAL RESEARCH
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MAY 1977

The opinions and statements contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy Department, the Department of the Air Force or the naval service at large.

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A Guide to the Type and Amount of Tranquilizers, Anesthetics, Analgesics and Euthanasia Agents for Laboratory Animals.

Abstract

This guide has been designed for the investigator requiring information regarding the type and amount of tranquilizers, anesthetics, analgesics, and euthanasia agents used in the following laboratory animals: nonhuman primates, dog, cat, rabbit, guinea pig, rat, mouse, hamster, pig, sheep, and avian species.

Key Words.

Laboratory animals; drug dosages; tranquilizers; anesthetics; analgesics; euthanasia.

INTRODUCTION

Public Law 91-579, Animal Welfare Act of 1970, and PL94-279, 1976 amendment to Animal Welfare Act, require that as part of the program of adequate veterinary care, guidelines and consultation be provided to research personnel with respect to the type and amount of tranquilizer, analgesic and anesthetic needed for each of the species used at the research facility. The following guide lists those drugs currently in use at the Naval Medical Research Institute (NMRI) and recommended by the Veterinary Medical Sciences Department (VMSD). These guidelines are not intended to restrict research activities, as their sole intent is to insure the continued humane care and treatment of animals used in research.

This guide is not intended to be a complete source of information regarding the use of tranquilizers, anesthetics and analgesics in laboratory animals. Personnel unfamiliar with the use of these drugs in animals are encouraged to consult with the veterinarians in VMSD regarding the selection of the best drug(s) for the desired procedure, the specific research need, the contraindications for the various drugs in animals, the techniques and methods of administration of the drugs, the duration of effects, the treatment of overdosage, and other possible effects on the research protocol. Information regarding other animal species and the use of other drugs can also be obtained from VMSD veterinarians.

The age, weight, and health status of each animal should be carefully evaluated before using particular drug and dose schedules. VMSD veterinarians are available to assist with these evaluations.

Succinylcholine, curare, or curare-type drugs do not have any analgesic, cataleptoid, or psychosedative properties and should not be used to alleviate pain or discomfort.

Ether, because of explosive potential and the irritating effect on the respiratory tract, is not recommended as an anesthetic or euthanasia agent.

Chloroform is not recommended as an anesthetic or euthanasia agent due to the carcinogenic and toxic effects on humans and animals, even in adjacent rooms.

It is required that laboratory animals be placed on analgesic medication after they have undergone major surgical procedures unless the administration of the analgesics would interfere with the experimental protocol.

A carbon dioxide chamber and inhalant anesthetic machines are available in VMSD for investigator use.

NONHUMAN PRIMATES

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics*		
Atropine sulfate	0.04mg/kg	IM, IV, SC
Morphine	1-3mg/kg(chimpanzee) 0.5-0.75mg/kg(other primates)	SC SC
Meperidine(Demerol^{R})	10mg/kg (chimpanzee)	IM
Droperidol-Fentanyl (Innovar^{R})	0.05ml/kg	IM
Acetylpromazine maleate(Acepromazine^{R})	0.5-1mg/kg	IM, SC
Chlorpromazine (Thorazine ^{R})	1-6mg/kg	IM
Meprobamate(Miltown^{R})	100-400mg/kg	PO
Phencyclidine Hydrochloride (Sernylan^{R})		
Pan sp(chimpanzee)	0.5-0.7mg/kg	IM
Papio sp(baboon)	0.5-0.8mg/kg	IM
Saimiri sp(squirrel monkey)	0.5-0.7mg/kg	IM
Macaca mulatta (Rhesus)	0.5-1.0mg/kg	IM
Macaca nemestrina (pigtail macaque)	0.5-1.5mg/kg	IM
Macaca fascicularis (cynomologous)	0.5-1.5mg/kg	IM

* Preanesthetics include chemical restraint agents, sedatives, tranquilizers, and anticholinergics.

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics (cond'd.)		
Ketamine Hydrochloride (Vetalar®)		
Chimpanzee	5.0-7.5mg/kg	IM
Pigtail	5.0-7.5mg/kg	IM
Stumptail (*Macaca arctoides*)	5.0-7.5mg/kg	IM
Rhesus	5.0-10.0mg/kg	IM
Baboon	10.0-12.0mg/kg	IM
Cynomologous	12.0-15.0mg/kg	IM
Squirrel Monkey	12.0-15.0mg/kg	IM
10ml Ketamine Hydrochloride mixed with 1ml Acepromazine®		Use at same dose as Ketamine only
Anesthetics		
Injectable		
Phencyclidine Hydrochloride		
Chimpanzee	0.8-1.1mg/kg	IM
Baboon	0.8-1.0mg/kg	IM
Squirrel monkey	0.8-1.5mg/kg	IM
Rhesus	1.0-3.0mg/kg	IM
Pigtail macaque	1.5-3.0mg/kg	IM
Cynomologous	1.6-3.0mg/kg	IM
Ketamine		
Chimpanzee	10.0-15.0mg/kg	IM
Pigtail	20.0-25.0mg/kg	IM

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Ketamine (cont'd.)		
Stumptail	20.0-25.0mg/kg	IM
Rhesus	20.0-25.0mg/kg	IM
Baboon	20.0-25.0mg/kg	IM
Cynomologous	20.0-25.0mg/kg	IM
Squirrel Monkey	25.0-30.0mg/kg	IM
10ml Ketamine mixed with 1ml Acepromazine^{R}	Use same dose as Ketamine only.	
Pentobarbital (Nembutal^{R})	20-25mg/kg to effect	IV
2.5% Thiopental (Pentothal^{R})	25mg/kg to effect	IV
2.5% Thiamylal (Surital^{R})	25mg/kg to effect	IV
Inhalants		
Halothane (Fluothane^{R})	To effect Induction 1-4% Maintenance 0.5%-2%	Face Mask or endotracheal tube
Halothane & Nitrous oxide (50% oxygen: 50% Nitrous Oxide)	To effect Induction 1-4% Maintenance 0.5-1%	Face Mask or endotracheal tube
Methoxyflurane (Penthrane^{R}) (Metofane^{R})	To effect Induction 3-4% Maintenance 0.25-1%	Face Mask or endotracheal tube
Analgesics		
Morphine	0.5-0.7mg/kg	SC
Meperidine (Demerol^{R})	3-11mg/kg	IM
Pentazocine (Talwin^{R})	1.5-3mg/kg Not to exceed total dose of 60mg	IM, SC

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Euthanasia		
Somlethol[R]	1ml/10 lb	IV
Pentobarbital	80mg/kg(39mg/lb)	IV

DOG

(Canis familiaris)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
Atropine	0.04mg/kg	IM, IV, SC
Acetylpromazine	0.5-1mg/kg 1-3mg/kg	IM, SC, IV PO
Chlorpromazine	1-6mg/kg 0.5-8mg/kg	IM PO
Meprobamate	100-400mg/kg	PO
Xylazine (Rompun^{R})	1mg/kg 2mg/kg	IV IM, SC
Meperidine	10-20mg/kg	IM, SC
Morphine	1-1.5mg/kg	IM, SC
Droperidol-Fentanyl Use atropine prior to IV dosage.	1ml/15-20 lbs 1ml/25-60 lbs.	IM IV
Anesthetics		
Injectable		
Pentobarbital	25-30mg/kg to effect	IV
Thiopental	15-25mg/kg to effect	IV
Thiamylal	15-20mg/kg to effect	IV
Inhalants		
Halothane	To effect Induction 1-4% Maintenance 0.5-2%	Endotracheal tube
Halothane and Nitrous oxide (50% oxygen:50% nitrous oxide)	To effect	Endotracheal tube
Methoxyflurane	To effect Induction 3-4% Maintenance 0.25-1%	Endotracheal tube

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Analgesics		
Pentazocine	1.5-3mg/kg	IM
Xylazine	1mg/kg 2mg/kg	IV IM, SC
Meperidine	10-20mg/kg	IM, SC, PO
Morphine	1-1.5mg/kg	SC
Droperidol-Fentanyl	1ml/15-20 lbs	IM
Euthanasia		
Somlethol^{R}	1ml/10 lbs	IV
Pentobarbital	80mg/kg	IV

CAT

(Felis catus)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
Atropine	0.04mg/kg	SC, IM, IV
Acetylpromazine	1-2mg/kg 1-3mg/kg	IM, SC, IV PO
Ketamine	11mg/kg	SC
10ml Ketamine mixed with 1ml Acepromazine	Use at same dose as Ketamine only.	
Meperidine	Do not exceed 11mg/kg	SC, IM
Xylazine	1-2mg/kg	IM, SC
Meprobamate	50mg/kg	PO
Anesthetics		
Injectable		
Ketamine (or Ketamine/Acepromazine mixture)	22-33mg/kg	IM
Pentobarbital	30mg/kg to effect	IV
2½% Thiopental	15-25mg/kg to effect	IV
Alpha Chloralose	75-85mg/kg to effect	IV
Alpha Chloralose Given with Pentobarbital	70mg/kg 12mg/kg	IP IP

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Inhalants		
Methoxyflurane	To effect Induction 3-4% Maintenance 0.25-1%	Endotracheal Tube
Halothane	To effect Induction 1-4% Maintenance 0.5-2%	Endotracheal Tube
Halothane & Nitrous oxide (50% oxygen: 50% Nitrous oxide)	To effect Induction 1-4% Maintenance 0.5-1%	Endotracheal Tube
Analgesics*		
Meperidine	5-11mg/kg	IM, SC, PO
Xylazine	2mg/kg	IM, SC
*Morphine is contraindicated in the cat.		
Euthanasia		
Somlethol^{R}	1ml/10 lbs	IV
Pentobarbital	80mg/kg	IV

RABBIT

(Oryctolagus cuniculus)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
Atropine	0.05-0.5mg/kg	SC, IM
Droperidol-Fentanyl	0.1-0.22ml	IM
Acetylpromazine	1mg/kg	IM, SC
Ketamine	15-50mg/kg	IM
10ml Ketamine mixed with 1ml Acepromazine	Use at same dose as Ketamine only.	
Chlorpromazine	10-25mg/kg	IV, IM
Diazepan (Valium^{R})	5-10mg/kg	IM
Meprobamate	50-150mg/kg	IM
Anesthetics		
Injectable		
Xylazine	8.8mg/kg	IM
follow in 10 minutes with Ketamine	50mg/kg	IM
Ketamine (or Ketamine/Acepromazine mixture)	50mg/kg	IM
follow in 10 minutes with 2½% Thiopental	To effect	IV
Pentobarbital	20-40mg/kg to effect	IV

Use dilute solution (12-15mg/cc)
Small margin of safety in rabbit

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Dial Urethane	1-1.6gm/kg	IP, IV
Alpha Chloralose	120mg/kg	IV
1% Thiamylal	To effect	IV
Inhalants		
Halothane	To effect	Face Mask
Methoxyfluorane	To effect	Face Mask
Analgesics		
Meperidine	2-10mg/kg	IM, IV
Pentazocine	1.5-3mg/kg	IM
Euthanasia		
Somlethol^{R}	1ml/10 lbs	IV
Pentobarbital	80mg/kg	IV
Carbon Dioxide	To effect	Chamber

GUINEA PIG

(Cavia porcellus)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetic		
Atropine	0.5mg/kg	SC, IM
Droperidol-fentanyl	0.06-0.08ml/kg	IM
Morphine	2-5mg/kg	IM, SC
Ketamine	22-44mg/kg	IM
10ml Ketamine mixed with 1ml Acetylpromazine	Use at same dose as Ketamine Only	IM
Chlorpromazine	0.5-25mg/kg	IM
Meprobamate	100mg/kg	IM
Anesthetics		
Injectable		
Pentobarbital	15-30mg/kg	IP
Thiopental	12-16mg/kg to effect 20mg/kg	IV IP
Droperidol-fentanyl	0.66-0.88ml/kg	IM
Ketamine (or Ketamine/Acepromazine mixture)	44mg/kg	IM
Dial Urethane	1500mg/kg	IP
Inhalant		
Methoxyfluorane	To effect	Bell Jar or Face Mask
Halothane	To effect	Bell Jar or Face Mask
Analgesics		
Meperidine	2-10mg/kg	IM
Pentazocine	2-3mg/kg	IM

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Euthanasia		
Somlethol[R]	0.1 ml/1 lb	IP
Pentobarbital	80mg/kg	IP
Carbon Dioxide	To effect	Chamber
Decapitation	-	-

RAT

(Rattus norwegicus)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
Atropine	15mg/100gm	SC, IP, IM
Chlorpromazine	25mg/kg	SC, IP, IM
Droperidol-Fentanyl	0.13ml/kg	IM
Ketamine (Use dilute solution 10mg/ml)	22-44mg/kg	IM
10ml Ketamine mixed with 1ml Acepromazine	Use at same dose as Ketamine only	IM
Chlordizepoxide (Librium^{R})	1-40mg/kg	IP
Diazepam	0.5-15mg/kg	IP
Pentobarbital	Up to 20mg/kg	IP
Meprobamate	150mg/kg	IP, IM
Anesthetics		
Injectable		
Pentobarbital Sodium (Use dilute solution 6mg/ml)	30-50mg/kg	IP
Droperidol-Fentanyl	0.2ml/kg	IM
Ketamine(Use dilute solution 10mg/ml)	44mg/kg	IM
1% Thiamylal	30mg/kg	IP
1% Thiopental	20-40mg/kg	IP

Drug Indication/Drug	Dosage/Body	Method of Administration
Alpha Chloralose	55mg/kg	IP
Dial Urethane	780mg/kg	IP
Pentobarbital used simultaneously with Chloral Hydrate	40mg/kg 160mg/kg	IP IP
Inhalant		
Halothane	To effect	Face mask, Bell jar or Nose cone
Methoxyflurane	To effect	Face mask, Bell jar or Nose cone
Analgesics		
Morphine	5mg/kg	SC
Meperidine	2mg/kg	IM
Pentazocine	2-3mg/kg	IM
Euthanasia		
Somlethol^{R}	0.2ml/adult	IP
Pentobarbital	80mg/kg	IP
Carbon Dioxide	To effect	Chamber
Decapitation		

MOUSE

(Mus musculus)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
Atropine	10-25mg/kg	IP
Chlorpromazine	50mg/kg	IM
Ketamine (Use dilute solution 10mg/ml)	22-44mg/kg	IM
10ml Ketamine mixed with 1ml Acetylpromazine	Use at same dose as Ketamine only.	
10% Solution Droperidol-Fentanyl	0.1-0.2ml/100gm	IM
Meprobamate	100mg/kg	IM
Anesthetics		
Injectable		
Pentobarbital (Use dilute solution 6mg/ml)	0.03-0.07mg/gm	IP
10% solution Droperidol-Fentanyl	0.5ml/100gm	IM
Ketamine (or Ketamine/Acepromazine mixture)(Use dilute solution 10mg Ketamine per ml)	22-44mg/kg	IM
1% Thiopental	25mg/kg	IP
1% Thiamylal	30mg/kg	IP
Alpha Chloralose	114mg/kg	IP

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Inhalant		
Methoxyfluorane	To effect	Bell Jar, Nose Cone
Halothane	To effect	Bell Jar, Nose Cone
Analgesics		
Meperidine	2mg/kg	IP
Pentazocine	2-3mg/kg	IM
Euthanasia		
Somlethol^{R}	0.1ml/mouse	IP
Pentobarbital	80mg/kg	IP
Carbon Dioxide	To effect	Chamber
Cervical Dislocation	-	-
Decapitation	-	-

HAMSTER

(Mesocricetus auratus)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
10% solution Droperidol-Fentanyl	0.1ml/100gms	IM
Ketamine	22-44mg/kg	IM
10ml Ketamine mixed with 1ml Acetylpromazine	Use at same dose as Ketamine only	
Chlorpromazine	0.5mg/kg	IM
Meprobamate	100mg/kg	IM
Anesthetics		
Injectable		
Pentobarbital (Use dilute solution 6mg/ml)	30-50mg/kg	IP
1% Thiamylal	30mg/kg	IP
1% Thiopental	40mg/kg	IP
Ketamine (or Ketamine/Acetylpromazine mixture)	44mg/kg	IM
Inhalant		
Methoxyfluorane	To effect	Bell jar, Nose cone, Face mask
Halothane	To effect	Bell jar, Nose cone, Face mask
Analgesics		
Meperidine	2mg/kg	IM
Pentazocine	2-3mg/kg	IM

HAMSTER

(Mesocricetus auratus)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
10% solution Droperidol-Fentanyl	0.1ml/100gms	IM
Ketamine	22-44mg/kg	IM
10ml Ketamine mixed with 1ml Acetylpromazine	Use at same dose as Ketamine only	
Chlorpromazine	0.5mg/kg	IM
Meprobamate	100mg/kg	IM
Anesthetics		
Injectable		
Pentobarbital (Use dilute solution 6mg/ml)	30-50mg/kg	IP
1% Thiamylal	30mg/kg	IP
1% Thiopental	40mg/kg	IP
Ketamine (or Ketamine/Acetylpromazine mixture)	44mg/kg	IM
Inhalant		
Methoxyfluorane	To effect	Bell jar, Nose cone, Face mask
Halothane	To effect	Bell jar, Nose cone, Face mask
Analgesics		
Meperidine	2mg/kg	IM
Pentazocine	2-3mg/kg	IM

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Euthanasia		
Somlethol[R]	0.2ml/hamster	IP
Pentobarbital Sodium	80mg/kg	IP
Carbon Dioxide	To effect	Chamber
Decapitation		

PIG

(Sus scrofa)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
Atropine	0.04mg/kg	IM
Meperidine	1-2mg/kg	IM
Droperidol-Fentanyl	1ml/14kg	IM
Ketamine	20mg/kg	IM
Anesthetics		
Injectable		
5% Thiopental	10mg/kg to effect	IV
4% Thiamylal	10-20mg/kg to effect	IV
Pentobarbital	10-30mg/kg to effect	IV
Inhalants		
Halothane	To Effect Induction 4% Maintenance 0.5-1.5%	Endotracheal Tube
Halothane, Nitrous oxide (50% oxygen: 50% nitrous oxide)	To effect	Endotracheal Tube
Analgesics		
Meperidine	1-2mg/kg	IM
Droperidol-Fentanyl	1ml/14kg	IM
Phenylbutazone	1000-2000mg 1-2mg/lb	PO IV
Euthanasia		
Somlethol^{R}	1ml/10 lb	IV
Pentobarbital	80mg/kg	IV

SHEEP

(Ovis aries)

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Preanesthetics		
Atropine	0.2mg/kg	IV
	Repeat 0.2mg/kg every 15-30 mins.	IV
Acetylpromazine	0.55mg/kg	IV
Ketamine	7mg/kg	IV
Anesthetics		
Injectable		
Pentobarbital	30-40mg/kg	IV
Ketamine	7mg/kg(maintenance with 3mg/ml drip)	IV
5% Thiopental	22mg/kg to effect	IV
Xylazine	0.2mg/lb	IV
Inhalants		
Halothane	To effect Induction 5% Maintenance 0.5-2%	Face Mask
Halothane and Nitrous oxide (50% oxygen:50% Nitrous oxide)	To effect	Endotracheal Tube
Analgesics		
Meperidine	2-5mg/kg	IV
Methampyrone(Dipyrone) (Novin®)	0.5-2.0ml	IV, SC, IM
Phenylbutazone	2000mg	PO
	1-2mg/lb	IV
Xylazine	0.1mg/kg	IV

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Euthanasia		
Somlethol^{R}	1ml/10 lb	IV
Pentobarbital	80mg/kg	IV

AVIAN

Drug Indication/Drug	Dosage/Body Weight	Method of Administration
Anesthetics		
Injectable		
Ketamine:		
Pigeon	60mg/kg	IM
Small Birds (Parakeets, etc.)	33-99mg/kg	IM
Large Birds (Chickens, etc.)	15-20mg/kg	IM
Equithesin^{R} (Chloralhydrate, pentobarbital & magnesium sulfate)	2-2.5ml/kg	IM
	1-1.5ml/kg	IV
Inhalants		
Halothane	To effect	Nose cone, Bell jar
Methoxyflurane	To effect	Nose cone, Bell jar
Euthanasia		
Pentobarbital	80mg/kg	IV
Carbon dioxide	To effect	Chamber

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