

**PORTLAND VETERANS AFFAIRS MEDICAL CENTER
SUBCOMMITTEE ON ANIMAL STUDIES (PVAMC SAS)
ANIMAL CARE AND USE GUIDELINES**

CHECK ONE:

- I agree to comply with the following guidelines.
- I have attached written justification for deviation from these guidelines, and a description of the methods to be employed.

Principal Investigator

Date

GUIDELINES FOR ANESTHESIA, ANALGESIA AND TRANQUILIZATION

Background. Federal criteria for granting SAS approval of animal protocols includes the provision that pain and distress must be avoided or discomfort/pain/distress be minimized through appropriate sedation, analgesia or anesthesia. The *Guide for the Care and Use of Laboratory Animals* (NIH publication No. 86-23, revised 1996) further states that "If a painful procedure must be conducted without the use of an anesthetic analgesic, or tranquilizer -- because such use would defeat the purpose of the experiment -- the procedure must be justified in writing in the animal protocol approved for the study and **supervised directly by the responsible investigator.**" The Office for Protection from Research Risks (OPRR) *Institutional Animal Care and Use Committee Guidebook (NIH Publication No. 92-3415)* defines analgesia as "a state of insensibility to pain without loss of consciousness," and anesthesia as "a state of lack of awareness or sensitivity, with or without loss of consciousness."

Guidelines. For any procedure that will or has the potential to produce pain and distress in laboratory animals,

1. The agent(s) and the dose, route, and frequency of administration of each agent must be listed in the Animal Component of Research Protocol.
2. Principal Investigators must choose a regimen from the attached list of commonly used referenced regimens, or they may propose other anesthetic/analgesic/tranquilizer regimens, provided that either the appropriate published references are provided to the SAS or the Principal Investigator can otherwise demonstrate the efficacy of the proposed regimen.
3. During the course of the procedure, accurate written documentation of anesthetic/analgesic/tranquilizer administration must be maintained. When requested, such documentation must be made available to the VMO, SAS, or other appropriate federal and state agencies. The VMU has developed a form to facilitate this documentation (refer to "Post-Procedural Monitoring Record," with the Guidelines).
4. If analgesic agents will be given on an as needed basis after a potentially painful procedure, accurate written documentation of the assessment of the animals' well-being by a trained individual must be maintained. When requested, such documentation must

be made available to the VMO, SAS, or other appropriate federal and state agencies. The VMU has developed a form to facilitate this documentation (refer to "Post-Procedural Monitoring Record," with the Guidelines).

- 4-5. If a painful procedure must be conducted without the use of an anesthetic, analgesic, or tranquilizer,
 - a. The Principal Investigator must supply written justification for the omission of anesthetics, analgesics, or tranquilizers,
 - b. the procedure must be approved by the SAS, and
 - c. the procedure must be **supervised directly by the responsible Principal Investigator.**

6. After the administration of an anesthetic agent, post-procedural care must include observing and providing supportive care to the animal until it is fully ambulatory, at intervals not to exceed 15 minutes. Supportive care can include:
 - a. Prevention of hypothermia by placing the animal in a warm cage or room, providing a warm water bottle or circulating warm water blanket, or by radiant heat from a light bulb. Be cautious with supplemental heat sources as they can easily cause thermal injury if used inappropriately (i.e. if an unconscious animal is left unattended).
 - b. To prevent dehydration and speed recovery, warm fluids (0.9% saline or equivalent, ~37°C) may be administered subcutaneously or intraperitoneally at 1-2 ml/100 gm body weight.
 - c. To prevent cannibalism, house animals individually until fully ambulatory.
 - d. If recovery from anesthesia will be prolonged (i.e. over 1 hour), the animal should be rotated from side to side every 15 minutes to minimize hypostatic pulmonary congestion. This practice should be continued until the animal is able to maintain sternal recumbancy or sit.

Researchers requiring additional information on the selection of anesthetics, analgesics, and tranquilizers should contact the PVAMC Veterinary Medical Unit, x57610.

MICE				
CLASS	AGENT	DOSE	ROUTE	REF.
Anticholinergic	Atropine	0.04 mg/kg	IM, SC	1
Tranquilizer	Diazepam	5 mg/kg	IP	2
	Acepromazine	1 mg/kg	IM	12
Neuroleptanalgesic	Droperidol+ Fentanyl	0.002-0.005 ml/gm of a 10% solution	IM	1
Dissociative Anesthetics	Ketamine	100-200 mg/kg	IM, IP	7
	Ketamine+ Xylazine	80 mg/kg+ 16 mg/kg	IP	3
	Ketamine+ Acepromazine	100 mg/kg+ 2.5 mg/kg	IM	12
	Ketamine+ Xylazine+ Acepromazine	22-44 mg/kg+ 2.5 mg/kg+ 0.75 mg/kg	IM	1
Barbiturate	Pentobarbital	5 mg/kg (neonates)	IP	1
	Pentobarbital	35-70 mg/kg	IV	1
	Pentobarbital	40-90 mg/kg	IP	1
	Thiopental	25-50 mg/kg	IV	1,7
	Thiamylal	25-50 mg/kg	IV	1,7
Analgesic	Acetaminophen	300 mg/kg q 4 hr	PO	4
	Meperidine	20-40 mg/kg	IP	1
	Meperidine	10-20 mg/kg q 2-3 hr	SC, IM	4
	Aspirin	120 mg/kg q 4 hr	PO	4
	Buprenorphine	0.05-0.1 mg/kg q 6-12 hr	SC	4
	Butorphanol	1-5 mg/kg q 4 hr	SC	4
	Codeine	60-90 mg/kg q 4 hr	PO	4
	Codeine	20 mg/kg	SC	4
	Morphine	2-5 mg/kg q hr	SC	4
	Morphine	5-10 mg/kg	IP	4
	Nalbuphine	4-8 mg/kg q ?4 hr	IM	4

The following common abbreviations are used to describe routes of administration of various agents:

IM Intramuscular
IP Intraperitoneal
IV Intravenous
SC Subcutaneous
PO Per os; given by mouth; orally
q every

RATS				
CLASS	AGENT	DOSE	ROUTE	REF.
Anticholinergic	Atropine	0.05 mg/kg	IM, IP, SC	12
	Glycopyrrolate	0.5 mg/kg	IM	16
Tranquilizer	Diazepam	2-4 mg/kg	IP, IM, IV	12
	Acepromazine	1 mg/kg	IM	12
	Chlorpromazine	1-2 mg/kg	IM	1
Neuroleptanalgesic	Droperidol+ Fentanyl	0.13 ml/kg (sedation)	IM, IP	11
	Droperidol+ Fentanyl	0.33 ml/kg (surgical plane some procedures)	IM, IP	9
Dissociative Anesthetics	Ketamine	50 mg/kg (sedative)	IM	3
	Ketamine+ Xylazine	75-90 mg/kg+ 5-8 mg/kg (anesthetic)	IM	13
	Ketamine+ Pentobarbital	60 mg/kg+ 21 mg/kg	IV	1
	Ketamine+ Acepromazine	75 mg/kg+ 2.5 mg/kg	IM	12
	Ketamine+ Xylazine+ Acepromazine	22-44 mg/kg+ 2.5 mg/kg+ 0.75 mg/kg	IM	1
Barbiturate	Pentobarbital	30-40 mg/kg (to effect)	IV	1
	Pentobarbital	35-45 mg/kg	IP	1,9
	Thiopental	20 mg/kg	IV	1
	Thiamylal	20 mg/kg	IV	1
Analgesic	Meperidine	10-20 mg/kg q 2-3 hr	SC, IM	4
	Buprenorphine	0.01-0.05 mg/kg q 6-12 hr	SC	4
	Butorphanol	2.0 mg/kg q 4 hr	SC	4
	Codeine	60-90 mg/kg q 4 hr	SC	4
	Morphine	2-5 mg/kg q hr	SC	4
	Nalbuphine	1-2 mg/kg q 3 hr	IM	4

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RABBITS				
CLASS	AGENT	DOSE	ROUTE	REF.
Anticholinergic	Atropine	0.05-0.5 mg/kg §	SC	1
	Glycopyrrolate	0.1 mg/kg	IM	16
Tranquilizer	Diazepam	5-10 mg/kg	IM	2
	Acepromazine	1-10 mg/kg	IM	1
	Xylazine	3-9 mg/kg	IV	1
	Xylazine	5 mg/kg	IM	7
Neuroleptanalgesic	Droperidol+ Fentanyl	0.125 ml/kg	IM	2
	Droperidol+ Fentanyl	0.062 ml/kg (sedation)**	SC	14
Dissociative Anesthetics	Ketamine	44 mg/kg	IM	1,7
	Ketamine	15-20 mg/kg	IV	7
	Ketamine+ Xylazine	35 mg/kg+ 5 mg/kg	IM	1
	Ketamine+ Diazepam	30 mg/kg+ 5 mg/kg (sedation)	IM	3
Barbiturate	Pentobarbital	25-40 mg/kg *	IV	7
	Methohexital	4-10 mg/kg *	IV	2
	Thiopental	30 mg/kg	IV	12
	Thiamylal	31 mg/kg, use 1% solution	IV	9
Analgesic	Meperidine	10 mg/kg q 2-3 hr	SC, IM	4
	Buprenorphine	0.01-0.05 mg/kg q 6-12 hr	SC, IV	4
	Butorphanol	0.1-0.5 mg/kg q 4 hr	IV	4
	Meperidine	10 mg/kg q 2-3 hr	SC, IM	4
	Morphine	2-5 mg/kg q 2-4 hr	SC, IM	4
	Pentazocine	5 mg/kg q 2-4 hr	IV	4
	Nalbuphine	1-2 mg/kg q 3 hr	IV	4

§ Approximately 33% of all rabbits have an atropinesterase that can inactivate atropine

* Use diluted solution

** Dilute with approximately 2 ml sterile saline prior to administration

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