

Utarbeidet av AA	Standard operasjonsprosedyre Recommended surgical analgesic protocols for rodents	Versjon: 3,0 Utarbeidet: 27.05.2014 Revidert: 30.10.2014 Revidert: 09.11.2020
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General anesthesia produces loss of consciousness, but in unconscious animals, painful stimuli will still be transmitted and processed by the central nervous system. Central hypersensitivity can develop in the spinal cord and brain, causing perception of postoperative pain to be increased. Some general anesthetics (such as Xylazine and Medetomidine) have some analgesic properties, but there is often a need for additional analgesia when performing surgery.

Information about the recommended drugs

Opioids: Exert their effects on the opiate receptors in the central nervous system. Are effective for acute, deep, or visceral pain. Potential side effects: respiratory depression, nausea, pica (rats), constipation.

NSAIDs: Act primarily to reduce the synthesis of prostaglandins. Are effective for pain associated with inflammation. Potential side effects: gastric or intestinal ulceration, changes in renal function, changes in platelet function.

Local anesthetics: Have their effect on the nerves at the site of injection. Can reduce the need for frequent redosing of opioids and NSAIDs. Systemic toxicity (seizures) can result from over dosage or accidental IV injection.

Dosages

Systemic analgesics

Drug	Mouse (mg/kg)	Rat (mg/kg)	Duration	Type of drug
Buprenorphine (Temgesic)	0.05-0.1 SC	0.01-0.05 SC	6-12 h (more frequently during the first 24 hours after surgery)	Opioid
Meloxicam (Metacam)	2-5 SC/PO	1-2 SC/PO	12-24 h	NSAID

Local anesthetics

Drug	Onset	Duration	Rec. dose	Toxic dose
Lidocaine (Xylocain)	1-3 min	20-40 min	2-4 mg/kg	10 mg/kg
Bupivacain (Marcain)	20 min	6-8 hours	1-2 mg/kg	6 mg/kg

Injected in incision site and underlying tissues.

Can be mixed in the same syringe – get the benefits from both drugs.

Dilute for more accurate dosing and realistic volume to infuse at the incision site.

Recommended analgesic protocols for mice and rats

Mild pain

Preemptive (once)		Lidocain/bupivacaine as local infiltration AND meloxicam
Post-surgical (if necessary)	Drug Frequency	Meloxicam Once

Mild to moderate pain – option 1

Preemptive (once)		Lidocain/bupivacaine as local infiltration AND buprenorphine
Post-surgical	Drug Duration	Buprenorphine 1-2 days

Mild to moderate pain – option 2

Preemptive (once)		Lidocain/bupivacaine as local infiltration AND buprenorphine AND meloxicam
Post-surgical	Drug Duration	Buprenorphine or meloxicam, or both 1-2 days

Moderate to severe pain

Preemptive (once)		Lidocain/bupivacaine as local infiltration AND buprenorphine AND meloxicam
Post-surgical	Drug Duration	Buprenorphine 2 days AND meloxicam (highest dose) 2-3 days
	Drug Duration	AND consider morphine for severe pain (not standard at CoMed) As needed

Examples of mild, moderate and severe post-surgical pain in mice and rats*

Mild:

- Subcutaneous pump or pellet implantation
- Tail clipping

Moderate:

- Vascular catheterization
- Embryo transfer
- Ovariectomy
- Orchidectomy
- Craniotomy

Severe:

- Orthopedic Procedures
- Thoracotomy
- Organ transplantation
- Major laparotomy procedures

*IMPORTANT CONSIDERATION: This is a guideline for classifying pain categories to common surgical procedures in mice and rats. The classification must be considered against other factors, such as length of procedure, extent of tissue dissection, degree of blood loss, materials implanted, unexpected surgical events, health status, age, strain, and surgeon's experience and skill.

When considering the analgesic protocol, possible side effects and effects on your scientific data must also be taken into consideration.