

# Analgesia Guidance for Rodent Procedures

## Important tips:

1. Expected post-procedural pain level is based on procedure being performed optimally by skilled personnel. Sub-optimal performance of any procedure is likely to produce MORE pain than is typical. If it is painful in humans, it is likely painful in animals.
2. Consider the effects of using the specific analgesic (NSAID or opioid) on the scientific objectives of the study.
3. Include multiple (or all) options in your protocol to maintain flexibility. See additional information on drugs below chart.
4. Animals should be monitored for pain as follows: moderate pain → at least once daily; severe pain → at least twice daily until analgesia regimen is complete and animal is stable/not exhibiting signs of distress (see green post-op card instructions on p.6).
5. Analgesia lasting longer than required is permitted (i.e., sustained release formulas can be used in most instances).
6. Other analgesic regimens may be proposed. These must be reviewed and approved prior to use. Please contact ASC for assistance: 362-3229.

Rodent Procedure Examples	Expected Post-procedural Pain Level	Analgesic Options (see additional info that follows)
<ul style="list-style-type: none"> <li>• IP, SC, or IV injection</li> <li>• Percutaneous catheter insertion</li> <li>• Tail snip</li> <li>• Toe clip</li> <li>• Ear notch</li> <li>• SC tumor implant by needle</li> <li>• Retro-orbital blood collection or injection (typically requires general anesthesia)</li> </ul>	<p>No Pain or Minimal Pain</p>	<ul style="list-style-type: none"> <li>• Analgesia is NOT required.</li> <li>• Any of the options below may be used if desired.</li> </ul> <p><b>In general, if anesthesia is not required, then analgesia is not required.</b></p>
<ul style="list-style-type: none"> <li>• Skin incision only (any site)</li> <li>• Subcutaneous implant (e.g., osmotic pump, pellet, transponder)</li> <li>• Catheter placement via cutdown</li> <li>• Punch biopsy of skin</li> <li>• Vascular access port implantation</li> <li>• Ocular (eye) procedure—minor</li> </ul>	<p>Mild Pain (analgesia to last at least 8 hours)</p>	<p><u>Option 1:</u> Local anesthetic <u>Option 2:</u> 1 dose of buprenorphine <u>Option 3:</u> NSAID (to last at least 8 hours)</p> <p><b>General anesthesia is required.</b></p>

<ul style="list-style-type: none"> <li>• Embryo transfer via <u>lumbar</u> incision</li> <li>• Castration/ Vasectomy</li> <li>• Parabiosis</li> <li>• Intracranial surgery—minor</li> <li>• Thyroidectomy</li> <li>• Thymectomy</li> <li>• Mammary fat pad manipulation</li> <li>• Orthopedic procedures—minor</li> <li>• Ocular (eye) procedure—moderate</li> <li>• Tissue dissection/transection (e.g. incisional biopsy or tumor removal)</li> </ul>	<p>Moderate Pain (analgesia needs to last 12-24 hours)</p>	<p><u>Option 1:</u> Lidocaine or Bupivacaine local at the time of surgery followed by NSAID (12-24 coverage)</p> <p><u>Option 2:</u> Buprenorphine followed by injectable NSAID (12-24 hour coverage)</p> <p><u>Option 3:</u> Buprenorphine followed by chewable NSAID tablets in cage (12-24 hour coverage)</p> <p><u>Option 4:</u> 1 dose of Buprenorphine-SR given 1 hour prior to surgery (lasts 72 hours)</p>
<ul style="list-style-type: none"> <li>• Thoracotomy (use of local anesthetic on incision site is highly desirable—see following pages)</li> <li>• Laparotomy (for C-section, GI, kidney, spleen, liver, reproductive, or other abdominal procedures)</li> <li>• Craniotomy—with bone removal—major</li> <li>• Laminectomy/Vertebral surgery</li> <li>• Nerve surgery</li> <li>• Ocular (eye) procedure—major</li> <li>• Orthopedic procedure—major</li> </ul>	<p>Severe Pain (analgesia needs to last 24-48 hours)</p>	<p><u>Option 1:</u> Lidocaine or Bupivacaine local at the time of surgery followed by buprenorphine +/- NSAID (thoracotomy)</p> <p><u>Option 2:</u> Buprenorphine followed by injectable NSAID (24-48 hour coverage)</p> <p><u>Option 3:</u> Buprenorphine-SR given 1 hour prior to surgery (lasts 72 hours); +/- local anesthetic; +/- Chewable NSAID tablets to reduce swelling and increase comfort</p>

\*Minor procedures typically do not result in permanent or chronic impairment. Healing is rapid with little obvious change in the area or organ.

\*Major procedures require more extensive tissue resection and organ involvement resulting in delayed healing or chronic inflammation.

# Additional Information on Rodent Analgesics

## 1. Systemic analgesics

### Buprenorphine (Buprenex®)

Narcotic/Opioid (Schedule III)

Drug concentration in ampule: 0.3 mg/ml

Dosages:

Rats: 0.01-0.05 mg/kg given SC or IP every 8-12 hours \*

Mice: 0.05 – 0.1 mg/kg given SC or IP every 8-12 hours

\*may cause pica (eating of non-food substances) in rats; use low dose for SD rats

### Buprenorphine-Sustained Release (“Bup-SR”)

Narcotic/Opioid (Schedule III) from [ZooPharm](#)—compounding pharmacy  
Buprenorphine SR-LAB releases over 72 hours and provides blood levels greater than 1.0 nanogram/ml in rodents for post-operative analgesia.

Drug Concentration: 1 mg/ml (5 ml vial)

Contact DCM to acquire.

Dosages:

Rats: 1.0 - 1.2 mg/kg\* *[for a single 72-hour SC injection]*

Mice: 0.5 – 1.0 mg/kg\* *[for a single 72-hour SC injection]*

Additional comments:

See FAQs at [SR Veterinary Technologies](#)

### Carprofen (Rimadyl®)

Non-steroidal anti-inflammatory (NSAID)

There are 2 formulations for dosing by different routes.

#### 1) Carprofen Oral (chewable tabs): from [Bio-serv](#)

Flavored chewable tablet containing 2 mg carprofen/5 gram tablet.

Placebo tab (no carprofen) can be used 3 days prior to surgery to acclimate the animal.

Leave on the cage floor for easy access; nutritionally complete. Stimulates appetite and allows mice time to recover undisturbed.

Dosages:

**Rat Average Dose:** One 5 gm Tablet/100 g of body weight (BW) daily

**Mouse Average Dose:** ¼ of a 5 gm Tablet needed for up to 4 mice daily

## 2) Carprofen Injectable:

Drug concentration in bottle: 50 mg/ml

Store at 4° C

Drug is viscous and needs to be diluted in sterile water 1:10 or more.

Administer injectable solution subcutaneously in the scruff (loose skin on dorsal neck) using a 25 or 27g needle.

Dosages:

**Rats:** 5 mg/kg IP or SC every 6-8 hours \*\*

**Mice:** 5 mg/kg IP or SC every 6-8 hours \*\*

\*\*or 8-12 hours if supplemented with chewable NSAID

## **Meloxicam (Metacam®)**

Non-steroidal anti-inflammatory (NSAID)

There are 4 formulations for dosing by different routes.

### 1. Meloxicam Oral (chewable tab): available from [\\_Bio-Serv](#)

Flavored chewable 5 gram tablet –nutritionally complete

Dosages:

**Mouse Dose:** One 5 gm tablet/mouse/day (0.05 mg meloxicam/tablet)

**Rat Dose:** One 5 gm tablet/rat/day (0.25 mg meloxicam/tablet)

Placebo tab (no meloxicam) can be used 3 days prior to surgery to acclimate the animal

Leave on the cage floor for easy access

Nutritionally complete

### 2. Meloxicam Oral Solution (for oral dosing): drug concentration is 1.5 mg/ml

Dilute 1:10 before use

Dosing procedure (obtain training before attempting): While gently restraining mouse or rat, administer oral suspension directly into mouth one drop at a time until animal ingests fluid. Do not attempt to forcefully inject entire dose at once as animal may aspirate liquid and die.

Dosages:

**Rats:** 0.5 mg/kg PO every 12 hours up to 3 days

**Mice:** 2.5 - 5 mg/kg PO every 12 hours up to 3 days

### 3. Meloxicam Injectable: (5 mg/ml)

Administer injectable solution subcutaneously in the scruff (loose skin on dorsal neck/shoulder area) using a 25 or 27g needle.

Dosages:

**Rats:** 1 mg/kg once daily up to 3 days

**Mice:** 5-10 mg/kg once daily up to 2 days

### 4. Meloxicam SR (sustained release) injectable: (2mg/ml)

**Rats and Mice:** Administer 4 mg/kg [in one 72-hour SC injection]

See FAQs at [SR Veterinary Technologies](#)

## **2. Local anesthetics that provide analgesia**

Can be used in conjunction with systemic analgesia (NSAIDs or opioids)

Provide local pain relief. Especially indicated in certain types of surgery (e.g., thoracotomy)

Use pre-operatively (before the incision is made)

Inject into SC space below planned incision site

### **Bupivacaine (Marcaine®) 0.5% (= 5 mg/ml) – sold in 50 ml vial**

Dilute (1:2) in sterile water to 2.5mg/ml (0.25%)

Do not exceed dose of 8 mg/kg total based on animal body weight

Can be used in addition to systemic analgesia (NSAIDs or opioids)

Provides local pain relief; inject into SC space below planned incision site

Use pre-operatively (before the first incision)

Duration of action: slower onset than lidocaine, but longer duration (approx. 4-8 hours)

### **Lidocaine (Xylocaine®) 2% (= 20 mg/ml) – sold in 50 ml vial**

Some formulations of lidocaine include epinephrine to promote vasoconstriction (to keep anesthetic agent in area longer). Beware if epinephrine is not desired.

Dilute (1:4) with sterile water to final concentration of 5 mg/ml (0.5%)

Do not exceed 7 mg/kg total based on animal body weight

Duration of action: faster onset than bupivacaine, but short (<1 hour) duration

