

## Postoperative Analgesic and Care Recommendations for Mice

Procedure	Analgesic Recommendation
<b>Laparotomy</b>	Bupivacaine + Buprenorphine (1-2 doses) <b>OR</b> Bupivacaine + Buprenorphine (1-2 doses) + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets for at least 24 hours post-surgically] <b>OR</b> Bupivacaine + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets <b>or</b> meloxicam-treated drinking water for at least 24 hours post-surgically]
<b>Thoracotomy</b>	Bupivacaine + Buprenorphine (1-4 doses) <b>OR</b> Bupivacaine + Buprenorphine (1-2 doses) + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets for at least 48 hours post-surgically] <b>OR</b> Bupivacaine + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets <b>or</b> meloxicam-treated drinking water for at least 48 hours post-surgically]
<b>Orthopedic/ Amputation</b>	Bupivacaine + Buprenorphine (2.0 mg/kg body weight dosage) at 3-5 hour intervals for 24-48 hours as needed for pain <b>OR</b> Bupivacaine + Buprenorphine (2.0 mg/kg body weight dosage) + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets]. Use analgesics for 3-5 days post-surgically.
<b>Skin Incision Only</b> ( <i>skin biopsy, Alzet pump, etc.</i> )	Bupivacaine applied at incision site <b>OR</b> Bupivacaine + Buprenorphine (1-2 doses) <b>OR</b> Bupivacaine + Buprenorphine (1-2 doses) + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets for at least 24 hours post-surgically] <b>OR</b> Bupivacaine + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets <b>or</b> meloxicam-treated drinking water for at least 24 hours post-surgically]
<b>Craniotomy</b>	3% Lidocaine jelly on ear bars + Bupivacaine applied at craniotomy site <b>OR</b> 3% Lidocaine jelly on ear bars + Bupivacaine + Buprenorphine (1-2 doses) <b>OR</b> 3% Lidocaine jelly on ear bars + Buprenorphine (1-2 doses)
<b>Tumor Excision</b>	Bupivacaine at tumor excision site (recommended for small, non-invasive tumors $\leq 0.3$ cm size) <b>OR</b> Buprenorphine (1-2 doses) <b>OR</b> Bupivacaine + Buprenorphine (1-2 doses) <b>OR</b> Bupivacaine + Buprenorphine (1-2 doses) + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets for at least 24 hours post-surgically] <b>OR</b> Bupivacaine + [acetaminophen-treated drinking water <b>or</b> Carprofen tablets <b>or</b> Meloxicam-treated drinking water for at least 24 hours post-surgically]

## Analgesic Description

Analgesic	Summary
<b>Bupivacaine</b>	Bupivacaine is applied topically at the incision site or may be injected subcutaneously (0.1-0.2 ml of .25% maximum) and may provide 2-3 hours of post surgical local anesthesia on skin. Purchase 0.25% Bupivacaine and use in <b>undiluted form</b> . Apply 1-3 drops at the incision site topically prior to placement of wound clips or skin sutures.
<b>Carprofen</b> <i>(selective for cyclooxygenase 2)</i>	Carprofen is supplied as 2 mg bacon flavored nutritionally-complete treats that are usually highly palatable to mice. A trial feeding will help determine if the strain of mice in question will consume them. Begin administration of Carprofen at least 24 hours in advance of surgical procedure. Provide ¼ of 2 mg tablet (0.5 mg per mouse per day) on the bottom of the cage each day. Tablets may be fed ad libitum in cage hopper to treat multiple animals in place of rodent chow. Do not administer ad libitum Carprofen tablets for more than 5 days continuously without consulting the facility veterinarian.
<b>Buprenorphine</b>	Administer Buprenorphine at least 30 minutes prior to the end of the surgical procedure as it takes time for the drug to go into effect. Buprenorphine is typically supplied as a 0.3 mg/ml solution and should be diluted to 0.03 mg/ml with sterile 0.9% saline. Administer either via the intraperitoneal (IP) or subcutaneous (SC) route. Buprenorphine typically provides 3-5 hours of analgesia depending on the dose and the intensity of the noxious stimulus. Store in a dark, cool, locked cabinet and discard diluted solution after 1 month.
<b>Acetaminophen</b>	Provide Acetaminophen-treated drinking water (1.6 – 3.2 mg/ml) at least 24 hours in advance of surgical procedure. Used in conjunction with Buprenorphine enhances pain relief. Prepare 1.6 mg/ml solution by adding 12.5 ml Children's Tylenol Elixir (32 mg/ml Acetaminophen) to 237.5 ml of drinking water. Mix bottle thoroughly and use "Special Treatment" cage card to indicate drinking water treatment. Fresh solution should be prepared and added to clean bottles every 3-4 days for maximum efficacy.
<b>Meloxicam</b> <i>(primarily selective for cyclooxygenase 2)</i>	Meloxicam may be used in drinking water in place of Acetaminophen or as an NSAID alternative to Carprofen tablet administration. The recommended dosage for mice is 1.64 mg/ml of drinking water. Add 82 microliters of 5.0 mg/ml injectable form of Meloxicam per 250 ml of drinking water. Use injectable form as it has superior solubility in water compared to the 1.5 mg/ml oral suspension form of Meloxicam. Prepare fresh solution and replace in clean water bottles every 7 days. <i>Use of Meloxicam in conjunction with Buprenorphine in mice has not been published at this time (April 2009).</i>

## Post-Operative Recovery and Care

Following all procedures, animals should be directly and continuously observed and monitored in a warm environment until they are fully recovered from anesthesia. Animals are considered recovered from anesthesia when they can maintain themselves upright in sternal recumbency and are attempting to move purposefully. 1-2 cc of warm sterile 0.9% saline or lactated Ringer's saline (LRS) administered subcutaneously (SC) or via the intraperitoneal (IP) cavity will speed recovery and may help reduce/prevent postoperative complications. At a minimum, mice should be observed at 3-6 hours postoperatively and again at 18-24 hours post-operatively for signs of pain, infection or dehiscence (opening up of the incision). Animals should be observed once daily for the first 7 days after surgery. The surgery and the date should be noted on the cage card. Dates, and times, and findings of each post-operative observation and the dates, dosages, and times of each analgesic administration should be maintained on the cage card in a form clearly legible for the Facility Veterinarian. Wound clips and non-absorbable skin sutures should be removed at 7-10 days post-surgically.