UNIVERSITY OF CALGARY	Animal Health Unit University of Calgary	**R2: Rat Analgesia**
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R2: Rat Analgesia

PURPOSE: To outline indicators of pain and provide humane and effective methods of analgesia in laboratory rats (*Rattus norvegicus*).

RESPONSIBILITY: All students, staff, and researchers trained by qualified staff under veterinary supervision.

KEYWORDS: *Rat, analgesia, pain control*

KEY POINTS:

- **Unrelieved pain can lead to molecular and physiological changes which can alter research results.** [1]
- **Analgesics must be administered to all animals undergoing surgery and/or other painful procedures unless scientifically justified and approved within the Animal Use Protocol.**

- It is strongly recommended to contact University Veterinary staff when determining which analgesic is best for your Animal Use Protocol and when analgesics should be administered.
    - Analgesics are most effective when provided pre-emptively, that is prior to the start of any painful activity (e.g. surgery).
    - **Whenever possible, multimodal analgesia should be employed.** Multimodal analgesia is the practice of administering multiple analgesics belonging to different drug classes to maximize overall pain relief (e.g. the use of NSAIDs in combination with opioids).

- A comprehensive pain scoring system should be established specific to your research protocol. Refer to ROD10 Rodent Wellness and Pain Assessment for clinical and behavioural parameters that may be monitored to assess pain in rats.
    - Rats instinctively mask painful behaviours, making pain difficult to detect. **Invasive procedures are <u>always</u> assumed to induce pain, even if the animals do not seem overtly painful**.
    - Human beings are predators to rats, so they will mask pain far more in the presence of a human, especially a human male.

- Animals that are painful **despite analgesic administration** may require a change in analgesic regime. Contact the University Veterinarian at your facility to discuss.

MATERIALS:

- Injectable Systemic Analgesic
- 25-30G Needle
- 1mL Syringe

PROCEDURE:

- Common drugs for pain relief in adult rats are provided in Table 1. These drugs fall into two broad categories:
  - Analgesics (e.g. NSAIDs, opioids) provide systemic analgesia to the entire body; and
  - Local anesthetics are administered at the site of pain to block pain sensation to that specific region of the body.

Table 1: Common drugs for pain relief, dosages, and duration of effect for laboratory rats.

Drug	Drug Class	Dose	Route	Maximum Duration of Effect
Meloxicam	Analgesic, NSAID	1-2mg/kg[2,3,5,6,7,9]	SC	12-24 hrs[2,5,6,7,9]
Carprofen	Analgesic, NSAID	2.0-5.0mg/kg[5, 6] 1-5mg/kg[7] 5mg/kg[2]	SC	12-24 hrs[2,5, 6, 7]
Buprenorphine	Analgesic, Opioid	0.05 – 0.1mg/kg [2-9]	SC	6-12 hrs[2-9]
Lidocaine	Local anesthetic	1-10mg/kg (0.4mL/kg of 1% solution)[2,5,10]	SC or intra-incisional	1.5-2 hrs[2]
Bupivacaine	Local anesthetic	1– 2mg/kg (0.4 – 0.8mL/kg of a 0.25% solution)[2,5,6,10]	SC or intra-incisional	4-12 hrs[2]
Lidocaine 2.5% and Prilocaine 2.5% Cream	Local anesthetic	1g per 10 square centimeter area of skin	Topical	1 hr

Note: Buprenorphine is a controlled substance which requires a Health Canada Controlled Drug Exemption License to purchase and use for animal research. Application instructions can be found at Animal Health Unit - EXEMPTIONS

- It is recommended to dilute the stock drugs with pyrogen-free, sterile water to provide a larger injection volume and more accurate dosing.

- Administer the drug as per the dosing chart above and SOP R14: Rat Injections.

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