

1. PURPOSE

The intent of this Standard Operating Procedure (SOP) is to describe common treatments used in the Rodent Veterinary Care Program and provides a support tool for the veterinary care staff when treating the most frequent rodent medical conditions.

2. RESPONSIBILITY

Veterinary care staff.

3. MATERIALS

3.1. Veterinary Care Kit

4. GENERAL CONSIDERATIONS

- 4.1. Prior to establishing any treatment plan, the principal investigator's (PI) approval must be given.
 - 4.1.1. Common treatments can be pre-approved with the Veterinary Care Information Sheet.
 - 4.1.2. If a treatment is not listed in the Veterinary Care Information Sheet or if emergency euthanasia is required, the PI staff must be contacted before starting the treatment or performing euthanasia. If no PI staff is available, seek veterinarian approval.
- 4.2. Each medical case can be subject to individual differences. This SOP should not replace the veterinarian evaluation and should only be used as a general overview of the most common treatments. All medical conditions that differ from the ones described below or fail to improve after treatment should be discussed with the veterinarian.
- 4.3. Always evaluate the possible pain that can accompany the clinical condition. Refer to Rodent Analgesia SOP for Pain Grimace Scale.
- 4.4. In cases where the PI or their research staff are in disagreement with the veterinarian, the veterinarian has the authority and the responsibility to make determinations concerning animal wellbeing. This includes removing an animal from a study, test, or teaching activity, and using appropriate treatment or control measures, including euthanasia if indicated, following diagnosis of an animal disease or injury.

5. FREQUENT RODENT MEDICAL CONDITIONS AND TREATMENTS

Diagnosis	Clinical Signs	Treatment	Clinical Endpoint
Abdominal Distention	Marked abdominal distension present in an animal that is not pregnant.	If the animal is doing otherwise well with no other clinical signs, monitor 1-2x/week.	If animal is showing any signs of distress (lethargy, hunched, weight loss, BCS < 2, dehydration), if an abdominal mass is palpable, euthanasia is recommended.
Conjunctivitis	Closed or partially closed eyelid(s), redness of the ocular or the periocular tissues and/or presence of ocular discharge.	<ul style="list-style-type: none"> • Cut front and hind nails 1x week. • Can be treated with application of antibiotic ophthalmic ointment to the affected eye once a day for 5-7 days. • If no improvement after a week, daily treatment can be changed to an antibiotic ophthalmic ointment containing a corticosteroid, for 5-7 days. • If condition does not resolve, consider isolating agent with culture swab. • For strains with chronic conjunctivitis, consider not treating. 	If corneal ulceration is present, enucleation or euthanasia is recommended.
Dehydration	Animal often less active, hunched, and will have a persistent skin fold lasting > 2 seconds.	<ul style="list-style-type: none"> • Verify the water bottle or water valve. • Administer saline subcutaneously. • Provide wet food daily. • Monitor animal daily until condition has resolved. 	If animal does not improve despite treatment, BCS < 2, or shows signs of lethargy, euthanasia is recommended.
Dystocia	Normally, pups are delivered every 30 minutes. If retained pups are present and no pups have been delivered within 1 hour, the animal is in dystocia. The animal will usually be hunched and/or in poor general condition.	<ul style="list-style-type: none"> • If pups are more valuable than female, the female can be euthanized for a caesarean section and pups can be fostered to another available lactating female. Note that in most cases, pup survival is poor. • If female is in good condition following dystocia but still has retained pups, systemic antibiotics can be administered. • If female recovers and no more retained pups are palpable, female can be bred again in 3-4 weeks. 	If animal is hunched and weak, and has been in dystocia for an unknown amount of time, euthanasia is recommended.
Ear Tag Ulceration	Skin ulceration on the ear caused by the presence of an ear tag.	<ul style="list-style-type: none"> • Cut nails of hind paws • Consider removing the tag with hemostatic forceps or pliers, if possible. • If not possible, apply 1-2 drops of local anesthetic around ear tag and wait a few minutes. • Incise the ear as little as possible in order to remove ear tag. • Clean with disinfectant solution, e.g., chlorhexidine 0.2%. • Consider administering systemic anti-inflammatory to help reduce the associated inflammation and pain. • Monitor a few days later to evaluate the progression of the condition 	

Diagnosis	Clinical Signs	Treatment	Clinical Endpoint
Fighting Lesions	Seen mostly in male mice. Usually fighting wounds are seen on the rump, base of tail, tail, penis, and sometimes on the limbs.	Minor: <ul style="list-style-type: none"> • If fresh lesions are seen, separate dominant animal. • If needed, treat wounds with green clay or Aluspray (1x or daily). • Add extra environmental enrichment, e.g., Envirodri®, extra hut, extra Neslet, etc.) • Monitor for the next few days for new lesions. • Once lesions are dry and healing, monitor as needed until wounds have completely healed. 	
		Severe: <ul style="list-style-type: none"> • Separate dominant animal if easily identifiable (animal with no wounds) or most wounded animals. • Treat wounds with disinfectant, e.g., chlorhexidine 0.2%, and green clay or Aluspray (1x or daily) • Consider administering systemic anti-inflammatory to help reduce the associated inflammation and pain. • Add extra environmental enrichment, e.g., Envirodri®, extra hut, extra Neslet, etc... • Monitor for the next few days for new lesions and readminister analgesia as needed. Once lesions are dry and healing, monitor as needed until wounds have completely healed	If wounds have exposed the muscle or have penetrated a body cavity or if there is presence of serious hemorrhage, infection, lameness, loss of limb function, severe lesions to the penis and/or enlarged bladder, euthanasia is recommended.
Flooded Cage	Animals are wet from leaky water bottle or malfunctioning valve.	<ul style="list-style-type: none"> • Place animals into a clean and dry cage and provide extra nesting material and environmental enrichment. • Assess the animal's general condition (hydration, mobility, etc.) • If animals are wet or dirty from the flood, clean with sterile water, sterile paper towels, and soap, e.g., Dawn dishwashing liquid or Prevail® spray. • Place half the cage on a heating pad or under heat lamp • Monitor for a few hours • Recheck the next day 	If animals are dehydrated, weak, and hypothermic, euthanasia is recommended.
Head Tilt	Head is tilted to one side. If severe, animal can spin in circles in the cage or when picked up by the tail.	<ul style="list-style-type: none"> • If minor, can monitor progression and general condition of the animal. • Wet food or dry food pellets in the cage can be provided. • Consider administering systemic antibiotics and analgesics. 	If animal is spinning and normal behavior is compromised, euthanasia is recommended.

Diagnosis	Clinical Signs	Treatment	Clinical Endpoint
Hydrocephaly	Dome-shaped head with possible ataxia and lethargy.	<ul style="list-style-type: none"> This condition cannot be treated, and results in a rapid decline and death. If widespread in particular colony, may be transferred through the breeders: if of concern to the lab, recommend changing breeders. 	In all cases, prompt euthanasia is recommended.
Malocclusion	Misaligned incisor teeth that do not wear down normally and overgrow.	<ul style="list-style-type: none"> Contact the lab to recommend not using animal as breeder and ask if they wish for animals to be treated. Cut teeth weekly or bi-monthly If needed, give wet food daily until BCS = 3 and saline subcutaneously. 	If teeth have penetrated soft tissues and BCS < 2, euthanasia is recommended.
Mass	Mass on various parts of the body. Can be spontaneous, strain-related, or induced experimentally.	<ul style="list-style-type: none"> Asses the animal's general condition: (hydration, mobility, etc.) Measure mass with caliper Inspect mass for ulceration, infection, necrosis. Monitor tumor size on a regular basis (1x/week). 	<p>If mass is ulcerated, infected, necrotic, or impairs normal functions (eating, moving) or if the mass exceeds guidelines, euthanasia is recommended.</p> <p>Refer to SOP 415 and Tumor Volume Chart for mass dimensions</p>
Microphthalmia or Anophthalmia	An animal with a missing eye or with an eye smaller than normal. Can be unilateral or bilateral.	<ul style="list-style-type: none"> This is a congenital condition related to some strains, e.g., C57Bl/6. Treatment is not necessary. 	
Ocular Opacity	White, opaque spot on eye (corneal opacity) or in eye (lens opacity or cataracts).	<ul style="list-style-type: none"> If eye/eyelids are not swollen and there is no discharge, monitor 1x/month for conjunctivitis, skin ulcerations around affected eye or corneal ulcerations. 	If corneal ulceration is present, euthanasia or enucleation is recommended
Pododermatitis	The animal's hindpaws are red, can be swollen and ulcerated. The treatment will only decrease the rate of pododermatitis progression.	<p>When the condition has just started and the paw is not ulcerated:</p> <ul style="list-style-type: none"> Change the bedding from corncob to cotton bedding Change the bedding 2x a week Apply a protective balm (such as Dermoscent Bio-Balm ®) to lesions daily Consider administering systemic anti-inflammatory to help reduce the associated inflammation and pain. 	When lesion(s) progresses to an ulceration and bleed, euthanasia is recommended.

Diagnosis	Clinical Signs	Treatment	Clinical Endpoint
Preputial gland swelling or abscess	Preputial glands are accessory glands of the reproductive system of the male mouse and play a role in reproduction and dominance behavior Inflammation and infection of these glands can lead to abscess formation.	<ul style="list-style-type: none"> • If abscess is small monitor 1x/week. May remain small after having being lanced (fibrosis/scar tissue). • If abscess is mature and ready to be lanced: <ul style="list-style-type: none"> · Clean area with disinfectant (chlorhexidine 0.2%) · Pierce abscess with needle (18-21G) and extract as much exudate as possible · Flush abscess pocket and surrounding area with disinfectant (chlorhexidine 0.2%) · If possible, fill abscess pocket with triple antibiotic ophthalmic ointment using 1ml syringe 	
Prolapsed penis	Swelling and redness of the prepuce (balanoposthitis) and prolapse of the penis (paraphimosis). The exteriorized penis will be red and swollen.	<ul style="list-style-type: none"> • Examine the area for preputial gland abscesses, bite wounds, and entrapped debris in prepuce. • Simple inflammation can often be treated with daily application of triple antibiotic ointment with corticosteroid for 5-7days • Consider administering systemic anti-inflammatory to help reduce the associated inflammation and pain. • Breeding males should be separated from females until the condition is resolved. 	<p>Animals that are unable to urinate with enlarged bladder should be monitored daily and bladder expressed manually daily, or euthanasia is recommended.</p> <p>If the bladder is not able to be expressed, urethral obstruction is likely and the animal must be euthanized.</p>
Rectal Prolapse	The distal portion of the rectum is prolapsed exterior to the body presenting as a small red mass at the anus. The rectal tissue may bleed or become dry and necrotic.	<ul style="list-style-type: none"> • Small rectal prolapses may be treated with application of triple antibiotic ointment with corticosteroid. for 5-7days • The rectum can be reduced manually with a probe and a small amount of tissue glue can be applied to temporarily maintain the rectum in place and prevent further prolapsing when passing feces. • If unable to reduce, monitor for signs of lesions and tissue necrosis. • Consider administering systemic anti-inflammatory to help reduce the associated inflammation and pain. 	If prolapse is large, bleeding and/or necrotic, euthanasia is recommended.
Sebaceous Cyst		<ul style="list-style-type: none"> • If cyst is small, monitor. • If cyst is mature and ready to be lanced: <ul style="list-style-type: none"> · Clean area with disinfectant (chlorhexidine 0.2%). · Pierce abscess with needle (18-21G) and extract as much exudate as possible. · Flush abscess pocket and surrounding area with disinfectant (chlorhexidine 0.2%). · If possible, fill abscess pocket with triple antibiotic ophthalmic ointment using 1ml syringe 	
Seizures	Often induced by cage or animal manipulation. The animals can freeze, fall over and lie on their sides while paddling the legs.	<ul style="list-style-type: none"> • Handle with care and as little as possible • Place cages in a low-traffic areas in the room. • Monitor general health of the animal (1-2x/month or as needed) 	If animal's general condition is deteriorating, euthanasia is recommended.

Diagnosis	Clinical Signs	Treatment	Clinical Endpoint
Skin Ulceration	Flaky, bloody, skin lesions typically start around the ears and between the shoulder blades.	<ul style="list-style-type: none"> • Cut nails of hindpaws once a week • Apply Green Clay to a thickness of 5mm once or daily (as needed) • Monitor 1x a week until condition has resolved <p>If skin ulceration is on the underside of the neck or on the face, the lesions usually do not heal as well:</p> <ul style="list-style-type: none"> • Cut nails of front paws and hind paws once a week • If lesion is moist, apply topical analgesic spray (such as Dermacool®), then dry green clay powder once or daily (as needed) • Monitor 1-2x a week until condition is improving 	If lesion is not improving or worsening, or if lesion is covering a large portion of the animal's body, euthanasia is recommended.
Small pups or runt	Small litter compared to age-matched animals of same strain, or one animal smaller than littermates (runt).	<ul style="list-style-type: none"> • Assess the general condition of the animal(s): malocclusion, hydrocephaly, dehydration, etc. • Assess the general condition of the mother • If otherwise active with no other observable conditions and if no other litters are present in the cage, keep the animal(s) with mother until 4 weeks of age • If animals are less than 3 weeks of age, start on daily puppy milk and wet food treatment • If animals are weaned, start on daily wet food treatment • Monitor progression 1-2x/week 	If poor general condition (weak, dehydrated), recommend euthanasia.
Thin		<ul style="list-style-type: none"> • Asses the animal's general condition: (BCS, presence of masses, malocclusion, hydration, mobility). • Start wet food daily. • Monitor animal weekly or more if needed • Measuring the weight can be used to objectively evaluate additional weight gain/loss 	If animal is severely debilitated, has a BCS < 2 and/or weight loss >20% original weight, euthanasia is recommended
Vaginal Prolapse	The vaginal or uterine mucosa wall protruding from vaginal area. The tissue may bleed or become dry and necrotic.	<ul style="list-style-type: none"> • Small prolapses may be treated with application of triple antibiotic ointment with corticosteroid for 2-3 days. • The mucosa can be reduced manually with a probe and a small amount of tissue glue can be applied to temporarily maintain it in place. • Consider administering systemic anti-inflammatory to help reduce the associated inflammation and pain. • If unable to reduce, monitor for signs of lesions and tissue necrosis. Surgical removal of the prolapse can also be performed to allow the female to complete lactation. Female will not breed again. • Female breeding mice with prolapses should not be bred again. 	If prolapse is large, bleeding and/or necrotic, euthanasia is recommended.

6. RODENT DRUG FORMULARY

6.1. For more information, please refer to other SOPs (Rodent Analgesia, Rodent Anesthesia).

LOCAL ANESTHETICS	DOSE (mg/kg)		ROUTE	FREQUENCY
	MOUSE	RAT		
Dermacool topical spray (Lidocaine 1.5%)	1-2 sprays	1-2 sprays	Topical	SID - BID
Lidocaine 2% - Bupivacaine (Marcaine) 0.5% ² 1:1 mixture	1-2 drops	1-2 drops	Topical	q 1-2 hours
Proparacaine (Alcaine) 0.5%	1 drop	1 drop	Topical (ocular)	SID

ANTIBIOTICS	DOSE (mg/kg)		ROUTE	FREQUENCY
	MOUSE	RAT		
Enrofloxacin (Baytril) 50 mg/ml	2.5 - 5	2.5 - 5	SC, IM	BID
Enrofloxacin (Baytril) 50mg/mL ³	0.5mg/mL H ₂ O	0.5mg/mL H ₂ O	Oral in drinking water	-
Trimethoprim 8mg /Sulfamethoxazole 40mg (Novo-Trimel oral suspension) ⁴	12mL/500mL H ₂ O	12mL/500mL H ₂ O	Oral in drinking water	-
Antibiotic ophthalmic ointment (ex: Erythromycin, Tobrex, Polysporin, Ciloxan)	1 dab (1mm)	1 dab (1mm)	Topical (e.g. ocular)	As needed
Antibiotic and corticosteroid ophthalmic ointment (ex: Tobradex, Maxitrol)	1 dab (1mm)	1 dab (1mm)	Topical (e.g. ocular)	As needed

Abbreviations:

SC = subcutaneous, IM = intramuscular, IP = intraperitoneal, IC=intracardiac
q= every, SID= every 24 hours, BID= every 12 hours, TID= every 8 hours

7. DRUG PREPARATION INSTRUCTIONS

Drug	Species	Diluted Concentration	Dilution			Final Dose and Quantity	Storage
			Drug (ml)	Sterile water or 0.9% saline (ml)	Total (ml)		
³ ENROFLOXACIN (Baytril) 50mg/ml	MOUSE	-	4	396	400	0.5mg/ml drinking water x 14 -21 days	Change water bottle weekly
⁴ Trimethoprim/ Sulfamethoxazole (TMS) 8mg + 40mg/ml	MOUSE	-	9.6	396	400	0.15+0.95mg/ml drinking water x 14 -21 days	Change water bottle weekly. Water bottle needs to be shaken daily to re-suspend.

8. REFERENCES

- 8.1. Canadian Council on Animal Care. CCAC guidelines on euthanasia of animals used in science (2010). www.ccac.ca/Documents/Standards/Guidelines/Euthanasia.pdf
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