Washington State University
Institutional Animal Care and Use Committee

Standard Operating Procedure #11
Title: Management of ulcerative dermatitis in mice

Purpose:
This SOP authorizes and provides direction for the evaluation and treatment of mice with ulcerative dermatitis by faculty, students, research staff and animal care technicians and provides criteria for determining euthanasia in severe intractable cases of ulcerative dermatitis.

Responsibility:
1. Investigators, research staff and students and animal care staff responsible for identification and treatment of mice with ulcerative dermatitis.
2. OCV remains responsible for veterinary medical care at WSU and must still be notified about ill or injured animals. All ill or injured animals should be entered into the OCV Animal Health database for case tracking. All assessments and treatments must be recorded in a medical record.

Background Information on Ulcerative Dermatitis Syndrome in Mice

Etiology: The cause of ulcerative dermatitis syndrome is unknown but is likely multifactorial with an epigenetic component. Risk factors include high fat diet and certain genotypes such as E or P selectin and inducible nitric oxide synthase knockouts. Ulcerative dermatitis may be spontaneous or may occur secondary to a break in the skin. There is no definitive cure for ulcerative dermatitis but mild cases can be managed with long-term therapeutic intervention.

Incidence: Ulcerative dermatitis is common in C57BL/6 mice or strains with C57BL/6 background. Most genetically modified mice have C57BL/6 as part of their genetic background.

Clinical signs: C57BL/6 mice are prone to developing dermatitis with redness and alopecia which progresses to epidermal ulceration due to excessive scratching. Mice will repeatedly scratch along the head, ears, neck, shoulders and axillary regions. Epidermal lesions are colonized by opportunistic bacteria which can enhance irritation and cause an ongoing cycle of irritation and infection. With chronic conditions, the ulcerated areas can scar, causing contracture of skin and restriction of movement. Ulcerative dermatitis is a poorly treatable, chronic progressive condition that typically does not ever fully resolve so has to be managed for the life of the animal. Severe cases should be euthanized as they are unlikely to improve and the resulting inflammation and life-long treatment requirements can have a significant impact on research data.

Potential impact on Research: Mice with ulcerative dermatitis develop focal dermal ulcers with a mixed inflammatory cell infiltrate consisting of neutrophils, macrophages, mast cells, and occasional lymphocytes. [1,2]. Acute and chronic dermal inflammation and secondary bacterial infections directly alter immune system parameters and behavior and indirectly alter mobility, reproductive capacity, food intake, and multiple other...
physiological indices. Long-term treatment with antibiotics, steroids and dietary alterations can also change physiological indices and research results.

Procedures:

When a mouse is noted as having ulcerative dermatitis, the person noting the animal’s condition must do the following:

- **Notification:** The principle investigator (or his/her designee) must be informed prior to initiating treatment.
  
  All ill or injured animals should be entered into the OCV Animal Health database for case tracking.

- **Flagging of Cage:** The cage should be flagged to indicate that there is an animal receiving medical treatment.

- **Documenting:** The medical record should document the animal’s ulcerative dermatitis score (see chart below), treatments and case resolution (if applicable). All entries must be marked with the date and initials of the person(s) providing the care.

Treatments:

All treatments are most effective with mild cases caught at the early onset of UD. Some animals will not improve with treatment and some will require continual life-long treatment to prevent reoccurrence of symptoms. Nail trimming can be highly effective.

1. Trimming of rear toenails every 10-14 days
2. Topical treatment
   a. Triple antibiotic ointment ± pramoxine - apply once a day for 1-3 days then 2-3 x per week. If lesions are near the eye then triple antibiotic ophthalmic ointment may be used
      AND/OR
   b. Silver sulfadiazine ointment- apply once a day for 1-3 days then 2-3 x per week
      AND/OR
   c. Dilute chlorhexidine solution or chlorhexidine ointment- apply once a day for 1-3 days then 2-3 x per week
      AND/OR
   d. Green clay (montmorillonite) [3]-
      i. Mix clay with water until it forms a thick paste-let stand for 1 hour
      ii. Clean the skin with dilute chlorhexidine & let dry
      iii. Apply clay poultice to a thickness of 5 mm every 3-4 days

**Housing:** separating affected animals does prevent aggression from cage mates.

**Diet:** increase Omega-3 fatty acids in the diet with the following:

  a. Fish oil/vitamin A,D3, E supplement (Derma-3, AllerG-3 or similar product) 1-3 mls sprinkled
on food once or twice a week to increase Omega 3 fatty acids OR
b. Whole flax seeds or flaxseed meal - add teaspoon to cage twice a week

Scoring Ulcerative Dermatitis Cases*

<table>
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<th>Level</th>
<th>Description</th>
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| Mild  | Excoriations and/or punctuate crust(s) (≤ 2 mm**)
|       | Any ulcerative lesion ≤ 5 mm** in diameter on the body but not on face or extremities.
|       | Lesion is not characterized by scratching. |
|       | Mild cases are the most likely to respond to treatment and may resolve naturally |
| Moderate | A single ulcerative lesion from 0.5 to 1.5cm** in diameter. |
|         | Any lesion < 3 mm** involving the face or extremities. |
|         | Any lesion that is continually scratched. |
|         | This type of ulcerative dermatitis seldom resolves naturally and requires treatment or euthanasia. |
| Severe | Any ulcerative lesion > 1.5cm** in diameter. |
|        | Multiple ulcerative lesions that add up to > 1.5 cm** in length |
|        | Ulcerative lesion > 3mm** on face |
|        | Animals with such lesions are usually unresponsive to treatment. Hence, they will be recommended for euthanasia. |

* Animal has at least one of the criteria in each category. The animal does not have to meet all the criteria.

**Measure the longest diameter of the largest lesion identified

Criteria for Euthanasia:

The following criteria are used to determine a humane endpoint. The criteria apply to animals that are treated but fail to improve as well as animals that cannot be treated due to interference with the research project.

1. Severe ulcerative dermatitis (score of 3 on scoring chart) that has not resolved or improved after 10 days with treatment. If treatment is not possible than immediate euthanasia.
2. Presence of lesions on the face or head which impair normal functions (eating and drinking).
3. Presence of wounds, scar tissue or contractures that impede the animal's locomotion.
4. Depression, lethargy, loss of body condition and/or anorexia indicating the wounds have resulted in generalized infection.
5. Severe ulceration with self-mutilation, amputation or bodily deformity.

Contact OCV:

Animals that do not improve with treatment should be euthanized or evaluated by the OCV
Veterinary Staff. Systemic oral or injectable treatment may include steroids or antibiotics as advised by a veterinarian. Severe cases should be euthanized as described above. Dermatitis and excess scratching may also be a symptom of a fur mite infestation so increased incidence of dermatitis in a rat or mouse colony should be reported to and investigated by the OCV Veterinary Staff.

References:

2. Kastenmayer RJ, Fain MA, Perdue KA. 2006. A retrospective study of idiopathic ulcerative dermatitis in mice with a C57BL/6 background. JAALAS. 45:8-12.

Office of the Campus Veterinarian Contact Information: 509-335-6246

Emergency and after-hours veterinary care: 509-330-1871 http://www.campusvet.wsu.edu/

Approved by WSU IACUC on: 8.28. 2015