Comparing Topical Treatment Outcomes in Mice with Idiopathic Ulcerative Dermatitis

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Introduction

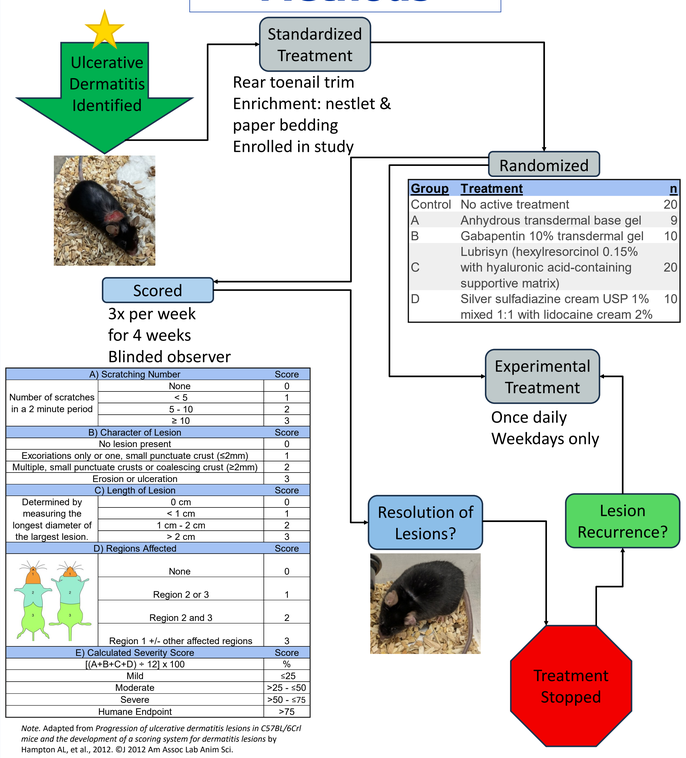
Idiopathic Ulcerative Dermatitis (UD) is a prevalent condition in laboratory mice marked by pruritus, erythema, and progressive self-mutilation.

The Problem: UD is frequently refractory to standard interventions (nail trimming, systemic analgesics, antibiotics, and anti-inflammatories), leading to premature euthanasia and compromised data integrity.

Study Objective: We evaluated four topical therapies: anhydrous transdermal base (group A), gabapentin (group B), Lubrisyn (hexylresorcinol 0.15% with hyaluronic acid-containing supportive matrix) (group C), and silver sulfadiazine with lidocaine (group D) against a control in 69 mice with naturally occurring UD.

Clinical Response: Quantified by scratching behavior, lesion character, lesion length, and anatomical location.

Methods



Group	Treatment	n
Control	No active treatment	20
A	Anhydrous transdermal base gel	9
B	Gabapentin 10% transdermal gel	10
C	Lubrisyn (hexylresorcinol 0.15% with hyaluronic acid-containing supportive matrix)	20
D	Silver sulfadiazine cream USP 1% mixed 1:1 with lidocaine cream 2%	10

A) Scratching Number		Score
Number of scratches in a 2 minute period	None	0
	< 5	1
	5 - 10	2
	≥ 10	3
B) Character of Lesion		Score
No lesion present		0
Excoriations only or one, small punctuate crust (≤2mm)		1
Multiple, small punctuate crusts or coalescing crust (≥2mm)		2
Erosion or ulceration		3
C) Length of Lesion		Score
Determined by measuring the longest diameter of the largest lesion.	0 cm	0
	< 1 cm	1
	1 cm - 2 cm	2
	> 2 cm	3
D) Regions Affected		Score
	None	0
	Region 2 or 3	1
	Region 2 and 3	2
	Region 1 +/- other affected regions	3
E) Calculated Severity Score		Score
[(A+B+C+D) ÷ 12] x 100		%
Mild		≤25
Moderate		>25 - ≤50
Severe		>50 - ≤75
Humane Endpoint		>75

Note. Adapted from *Progression of ulcerative dermatitis lesions in C57BL/6Crl mice and the development of a scoring system for dermatitis lesions* by Hampton AL, et al., 2012. ©) 2012 Am Assoc Lab Anim Sci.

Results

Change (%) in Ulcerative Dermatitis Score by Treatment Group

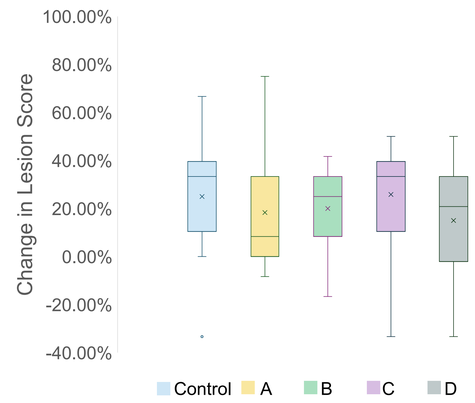


Figure 1. Lubrisyn (C) exhibited the highest mean percent improvement, though results were not statistically significant vs. control (two-tailed t-test, df=19, p=0.15–0.20). Boxplots represent the distribution of Percent Change in UD scores over the study period. **Groups:** Control (n=20); anhydrous transdermal base (A)(n=9); gabapentin (B)(n=10); Lubrisyn (C)(n=20); silver sulfadiazine/lidocaine (D)(n=10). **Key:** Median (line), Mean (point), IQR (box), 1.5 x IQR (whiskers).

Complete Resolution (%) at Study Endpoint

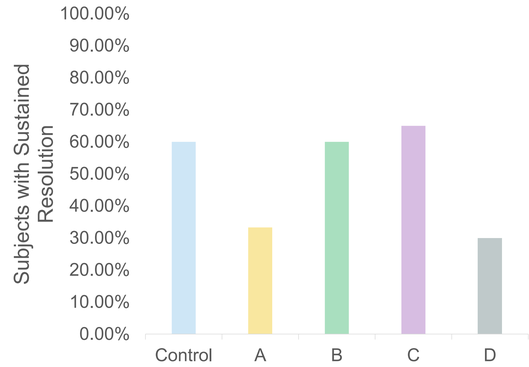


Figure 2. Sustained resolution rates were comparable across the Control, gabapentin (B), and Lubrisyn (C) groups, though all three notably outperformed the anhydrous transdermal base (A) and silver sulfadiazine/lidocaine (D) groups. Bars represent the proportion of animals with a score of zero at the study conclusion (initial resolution with no subsequent recurrence). **Groups:** Control (n=20); anhydrous transdermal base (A)(n=9); gabapentin (B)(n=10); Lubrisyn (C)(n=20); silver sulfadiazine/lidocaine (D)(n=10).

Lesion Recurrence (%) by Treatment Group

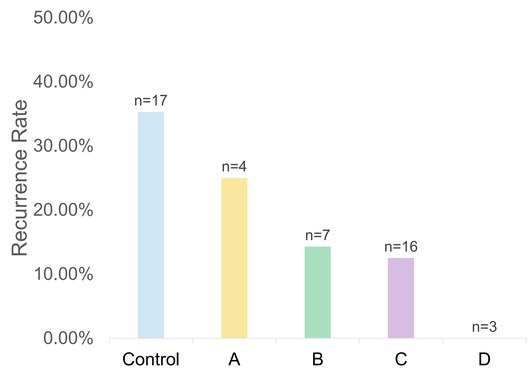


Figure 3. The Control group showed superior initial resolution but the highest recurrence rate. Analysis is limited to animals achieving primary resolution (n indicated above bars). One animal was removed for humane endpoints. **Note:** Smaller n in A and D groups reflects lower initial efficacy, not study attrition. **Groups:** Control; anhydrous transdermal base (A); gabapentin (B); Lubrisyn (C); silver sulfadiazine/lidocaine (D).

Timeline of Clinical Healing Following Topical Treatment

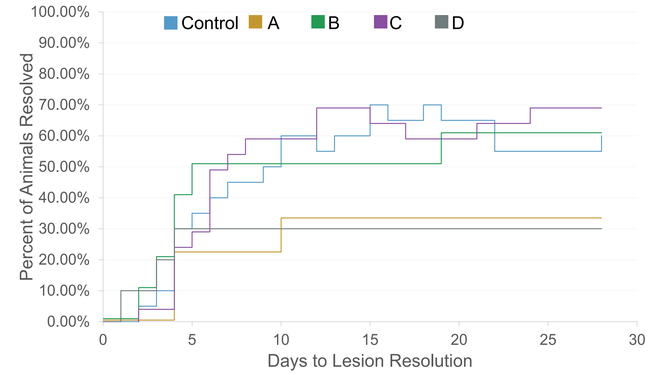


Figure 4. Time to clinical healing of ulcerative dermatitis. Healing rates were similar across control, gabapentin (B), and Lubrisyn (C) groups, with slight trends toward earlier resolution in B and C. Lines show the cumulative percentage of animals reaching lesion score 0 (complete lesion resolution, excluding transient scratching). **Groups:** Control (n=20); anhydrous transdermal base (A)(n=9); gabapentin (B)(n=10); Lubrisyn (C)(n=20); silver sulfadiazine/lidocaine (D)(n=10). Curves are offset for visual clarity: A +0.005, B +0.01, C −0.01, D −0.005.

Conclusions

The Challenge of Sustained Resolution: Idiopathic ulcerative dermatitis remains difficult to manage, as initial lesion healing does not guarantee long-term resolution. **Nail trimming alone** produced the highest initial response but also the highest recurrence, indicating that addressing trauma alone is insufficient. **Lubrisyn** showed modest improvements in healing speed and reduced recurrence, suggesting more stable outcomes, while **gabapentin** showed mildly accelerated healing without increasing sustained resolution. **Silver sulfadiazine/lidocaine** had no recurrences among healed animals; however, this is likely influenced by a high initial failure rate, leaving a small, potentially non-representative cohort (n=3) for recurrence analysis.

Clinical Implications: No topical therapy alone provided a cure, highlighting the need for a multimodal approach. Effective UD management likely requires combining targeted topical treatments with regular nail maintenance and environmental enrichment to address both the physical wound and the underlying pruritic behavior. Larger studies are needed to confirm these trends and refine combination therapy for long-term outcomes.

Acknowledgments

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References

Hampton AL, Hish GA, Aslam MN, et al. Progression of ulcerative dermatitis lesions in C57BL/6Crl mice and the development of a scoring system for dermatitis lesions. *J Am Assoc Lab Anim Sci.* 2012;51(5):586-593.

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