

Figure above: B6 background mouse presenting ulcerative dermatitis on back of neck and right shoulder. Photo courtesy of Dr. Finlay at City of Hope

Addressing Ulcerative Dermatitis in Laboratory Rodents: Insights from Animal Care Professionals

By Matt Kopyt, MBA

Introduction

Ulcerative Dermatitis (UD) has long been a concern within the laboratory animal science community, affecting the well-being and research potential of laboratory rodents. It is essential for research professionals to gain a deeper understanding of this complex condition, its potential causes, available treatments, and the challenges faced by animal care teams in its prevention and management.

ClearH2O (Westbrook, ME) conducted a comprehensive online survey of 163 experienced animal care professionals working in diverse laboratory settings. The survey aimed to explore their first-hand experiences with UD, ranging from incidence rates to potential causes, with treatment methods, and the pivotal role that nutrition may play in prevention and intervention. The insights contained will aid in understanding and addressing this critical issue to uncover solutions and improve the welfare of laboratory animals. Matt Kopyt, Brand & Digital Marketing Manager for ClearH2O, discussed the results of the survey with research laboratory animal expert, Dr. James

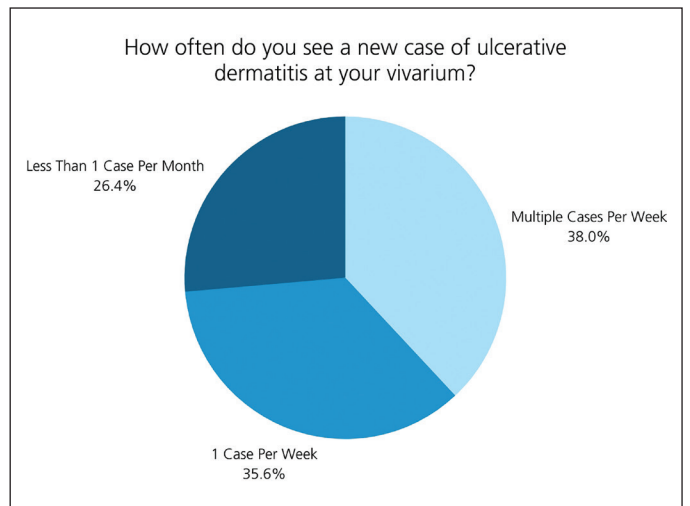


Figure 1

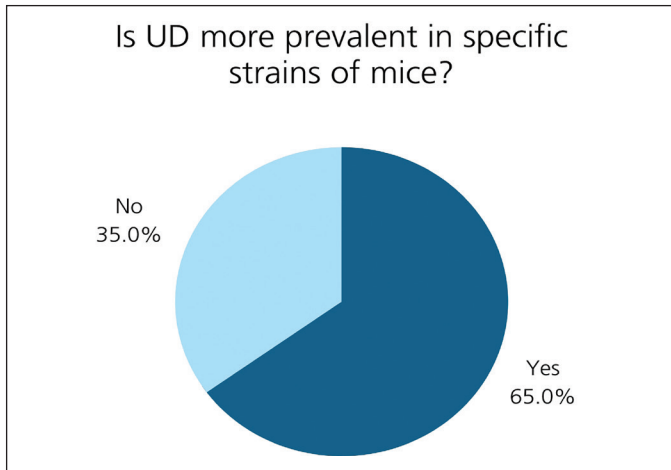


Figure 2.1

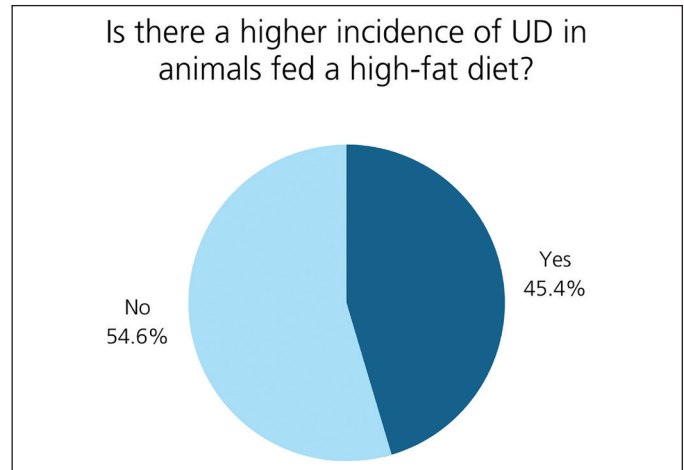


Figure 2.2

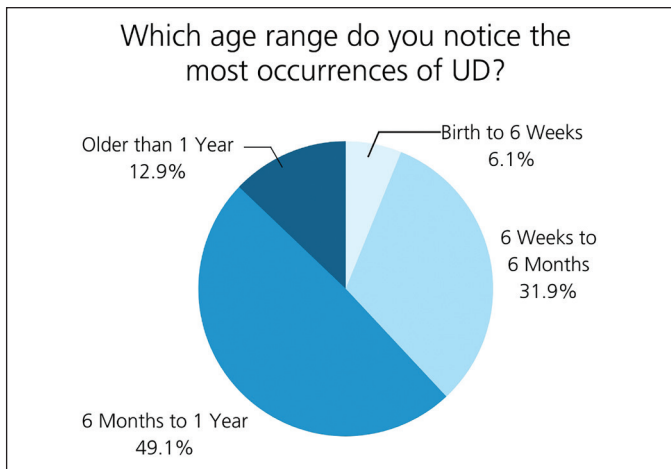


Figure 2.3

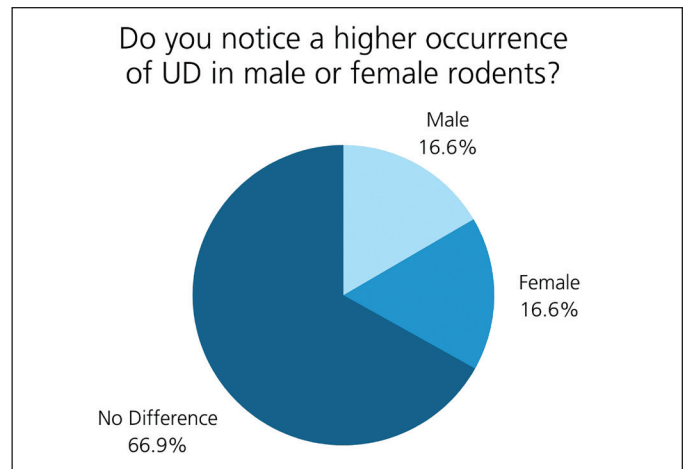


Figure 2.4

Finlay, DVM, PhD, DACLAM in the following interview. Dr. Finlay is an Associate Director of the Center for Comparative Medicine and an Associate Research Professor of the Beckman Research Institute at City of Hope (Duarte, CA).

MK: Can you provide a brief background of the work that you're doing and explain why it's important to you that we address ulcerative dermatitis as a community?

JF: Ulcerative dermatitis is probably one of the more prevalent spontaneously occurring clinical presentations that we see in our facility at City of Hope. So, it is something that we want to try to find improved ways of addressing. I've found over the years that this is not something that's unique to City of Hope. When I was at an institution a couple of years prior, we saw the same thing. We see a lot of this in our mice, particularly those on a Black 6 (B6) background. So, it is something that we want to get to the bottom of, but the "why" is sort of a complex issue that hasn't been resolved completely.

MK: Before we jump into the specific survey questions, I am interested to hear if anything surprised you about the results. Did anything in the data stand out to you?

JF: I don't know if there's anything necessarily that surprised

me. It does seem to back up a lot of what people anecdotally say when we are at meetings or conferences. In that sense, it is good to see that this is a universal problem, because that could lend itself to finding a universal solution. There does seem to be some pattern to it, and so hopefully we can exploit that pattern and figure out some solutions.

UD Incidence in Vivaria

MK: The first question we asked on the survey helps uncover how often a new case of ulcerative dermatitis is reported in vivaria (Figure 1). Most respondents (73.6%) reported seeing a new case of ulcerative dermatitis once per week or more. Does that generally align with your experience?

JF: I would say that in my experience here and at a previous employer, we would definitely be part of the "multiple cases per week" group. This does depend on the size of your program as well as what strains of mice you're using. If you're not using anything on a B6 background, then you may see very little of this. If you're dealing with very young animals that don't get much more than a couple of months old, then you may see less of it. I think in general, and this is what is borne out in these data, this is not something that is just occasionally seen. This is something that we see often across the board across multiple facilities.

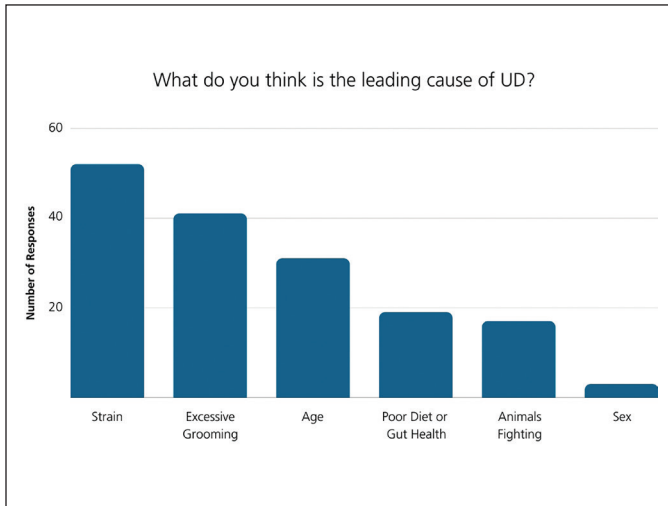


Figure 3

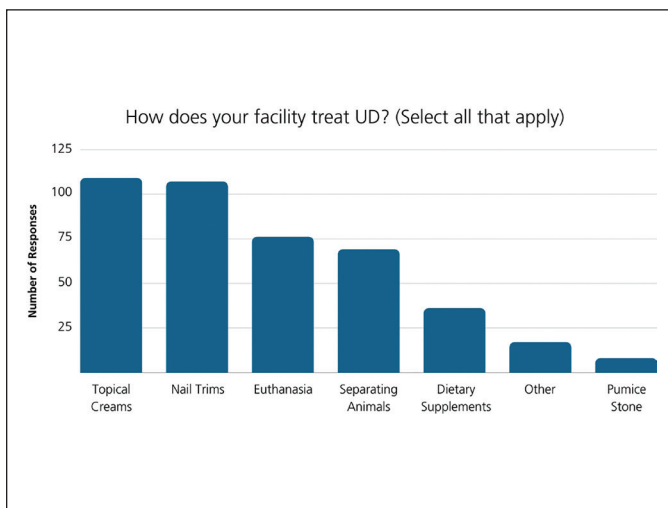


Figure 4

Factors that Contribute to UD

MK: In the next few survey questions, we asked respondents about the associations between age, strain, sex, and diet, with the development and progression of UD (Figure 2). Based on the responses, strain and age seem to be two of the most influential factors. Would you agree or disagree with that?

JF: I would agree with that 100% especially when it comes to the strain of mice and whether it's a B6 or B6 background, which is a very common background strain used in research. That's not to say that we haven't seen it in other non-B6 background animals. But it could be that the root cause of ulcerative dermatitis is different in other strains of animals when compared to B6 animals. When you get to age, it is generally more accepted that this happens in older animals, and I do think that these data bear that out. At six months, mice are getting to be middle-aged (like myself!), so that's getting up there in age (as my kids might say). You can see almost half of the respondents chose "6 months to 1 year" and those are probably going to be animals that are in longer term studies.

The thing that I did want to point out in regard to age is it sort of speaks to the misfortune that is associated with losing that animal. When you've invested so much time and resources into that animal and you have to euthanize that animal prematurely due to something like ulcerative dermatitis, it's a confounding factor that needs to be considered. There are some labs that just assume they are going to lose a certain number of animals because of ulcerative dermatitis or some other variable. Having to build that into your study is costly and can skew your data.

MK: We asked participants what they believe the leading cause of ulcerative dermatitis is and mouse strain was the most common response (Figure 3). 70.3% of survey respondents pointed out C57BL/6 as a strain that has increased susceptibility to UD. Is this consistent with your experience or are there other strains worth noting?

JF: I think that is the big one, it's sort of synonymous with it. With B6 mice, if I see a wound or lesion, ulcerative dermatitis is the first thing I think of. These responses definitely don't surprise me. It's one of the challenges with working with inbred animals, it just comes with the background of mouse that it is.

Treating Ulcerative Dermatitis

MK: Survey respondents were asked about how they treat ulcerative dermatitis. The majority indicated a combination of topical creams (66.9%) and nail trims (65.6%) or euthanasia if the condition worsens, or the model is no longer required for research (Figure 4). What are your thoughts on these treatment methods and their overall effectiveness?

JF: We've had a lot of success with a combination of nail trims and topical creams. The topical creams are used mostly to prevent a secondary infection or to relieve some of the pain that's associated with the UD. Mechanically, the most important treatment is the toenail trim so you can break that cycle of damage to the tissue. So, I would agree, at least from our facility, those top three items are probably the biggest methods of treating ulcerative dermatitis. I think separating animals too, but it depends on if this is a fight wound or something like that that has developed into ulcerative dermatitis.

MK: Deciding when to euthanize animals for welfare reasons while maintaining aged models for research was the most common challenge reported among participants (Figure 5). Do you have any tips for overcoming the challenges associated with treating ulcerative dermatitis?

JF: We've had a lot of success with the nail trims, particularly the hind limb nail trim. But that is somewhat dependent on the anatomical location of the ulcer to begin with. If it's somewhere that the animal can reach with that hind limb, we have found that as little as one treatment with the toenail trim is enough to break that itching and scratching cycle. That's probably been our biggest tool to this point, but there is a definite labor cost associated with that. Sometimes, especially if that

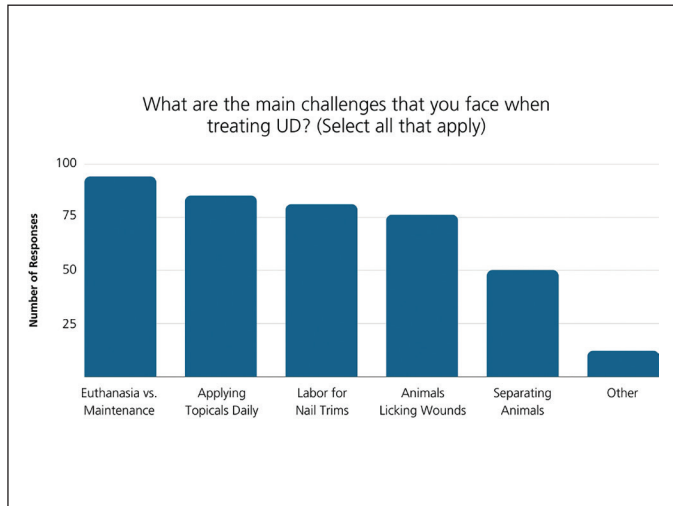


Figure 5

lesion is in a place where the animal can bite at it, it becomes more difficult to treat. You can get to a point where it is just not going to resolve, and you have to make the decision to go ahead and euthanize it now because the animal's welfare is a concern. That decision sometimes has to be made. It's not the favorite of the veterinary staff and it's not the favorite of the lab either. But when it comes down to it, we have to do what's in the animal's best interest.

The Impact of Nutrition on UD

MK: Nutrition plays a fundamental role in maintaining optimal health in laboratory animals. In the next question, respondents were asked about the role nutrition plays in the prevention and treatment of UD. Most respondents (86.5%) indicated that good nutrition is at least somewhat effective at preventing or treating UD (Figure 6). What would your response be to this question and why?

JF: I think there's an element of hope that's associated with this. You could ask a similar question: "what effect does nutrition have on my waistline?" The answer is a lot, but there's other things to think about like how much do I eat, do I go out and exercise; all these things play into it. I have no doubt that there is some part of nutrition that plays into ulcerative dermatitis. At the same time, I think people really hope that there is a nutritional component to this because that is something that can be more universally addressed.

MK: Of those 141 respondents, only 25.5% employ dietary supplements as a part of their UD treatment procedure. Do you think nutrition is an area that's worth paying closer attention to when it comes to addressing UD?

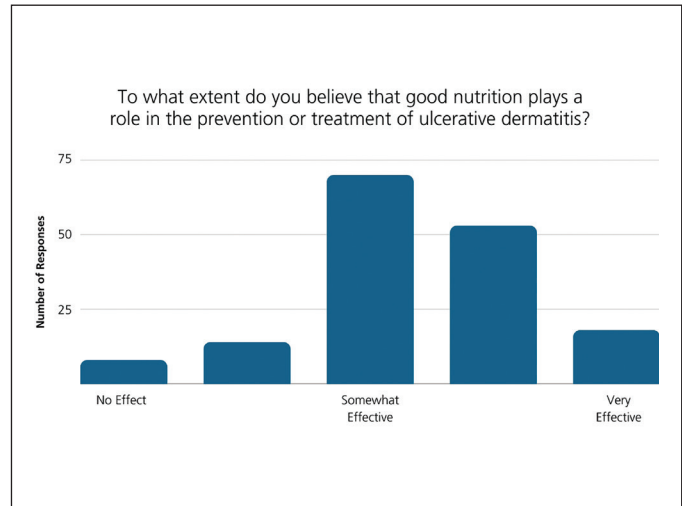


Figure 6

JF: I think it definitely is. The fact that there's a lower percentage of people that are employing some sort of nutritional supplement or nutritional change to try to combat this really speaks to this idea that we don't have a good solid foundation on what the root cause of UD. It's a lot like throwing spaghetti at the wall and seeing what sticks. But at some point, we hopefully are going to find out something a little more definitive and go with that.

Conclusion

MK: Do you have any final thoughts or takeaways for the laboratory animal science community on the topic of ulcerative dermatitis?

JF: The thing I would say is this: it's a big problem to be dealt with and the laboratory animal community as a whole has not shied away from big problems. We are generally a community that sees a big problem and doesn't just throw up our hands and say, "well that's the way it is." We're going to have to deal with it. We have a knack for looking at a big problem, getting together the proper data that can provide an explanation, and then finding solutions to the problem. I'm hopeful that we will be able to come to a good solution on this, it's going to be a tricky one. This isn't something that just popped up 10 years ago, it's been around for a while. But I have confidence that our community will rally together and figure out a solution to this.

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