

# Toenail trim saves lab mice from common, life-threatening skin condition

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Credit: Martha Sexton/public domain

In a new study, Stanford University School of Medicine researchers report finding an easy method to cure laboratory mice of a common, life-threatening skin disease: A pedicure.

Millions of [laboratory mice](#) suffer from a skin condition known as

ulcerative dermatitis—a major scourge for these [animals](#) and the most common reason for unplanned euthanasia. Between 4 and 21 percent (depending on factors like age and genetics) of laboratory mice experience the condition, in which they develop deep, ulcerated lesions that become progressively worse with repeated scratching, said Sean Adams, DVM, PhD, a third-year resident in laboratory animal medicine at Stanford and lead author of the new study.

To address the problem, which has long bedeviled veterinarians, Adams and his colleagues designed a simple plastic device that briefly immobilizes the animals so that caregivers can quickly trim their daggerlike claws. Some 93 percent of the mice whose toenails were trimmed were permanently cured of the condition, as they were unable to continue self-traumatizing the affected area despite still scratching, the researchers found. And the results held up even after the animals' toenails had regrown, as mice with clipped nails lived more than three times longer than their counterparts who were treated with topical ointments.

"This is a simple, cheap, effective means of treating ulcerative dermatitis, which represents the single most preventable reason for euthanasia," Adams said. "I think it's a very surprising finding in how simple this technique is."

The study, the first to systematically look at the impact of toenail trims, will be published online Jan. 6 in *PLOS ONE*.

## **Saves mice, simplifies care**

Adams said the technique not only saves mice from suffering and having to be euthanized as a humane necessity, but also simplifies their care. The Stanford veterinarians were able to clip the animals' nails in two minutes or less, saving them the time and expense of applying daily anti-

inflammatory ointments, which were only minimally effective in curbing inflammation, he said.

The technique could also help preserve the integrity of mouse studies, avoiding the need for pharmacologic treatments that can compromise study results, Adams said. Most importantly, researchers need fewer mice for the same study, as they expect fewer losses, so it's an excellent example of how "good welfare is good science," he said.

At Stanford, "we don't euthanize many mice anymore due to ulcerative dermatitis because we use the toenail trim," he said.

Adams said the cause of ulcerative dermatitis in mice is unknown, with researchers speculating that it is related to genetics, diet, environment, behavior or a combination of these factors. The disease typically shows up on the nape of the animals' neck as a red, inflamed area. Because the lesions itch, animals begin scratching the area with their sharp hind claws as many as 20 to 25 times a minute, he said. With the repeated irritation, the condition spreads, often to the face, flank and back, with animals literally self-destructing over time.

"Now we have this mouse with just shreds of fur on the body. They rip themselves apart," he said.

Veterinarians have tried many approaches to treatment, typically involving application of a topical anti-inflammatory ointment. These have produced variable results, though studies have never shown them to be more than 65 percent effective, the researchers report. Moreover, these ointments have to be applied daily, causing a major burden for animal care providers.

## **Study methods and results**

In 2013, the researchers started giving veterinarians at Stanford the freedom to apply either the topical anti-inflammatory Tresaderm to mice with ulcerative dermatitis or to trim their toenails under anesthesia. The toe-trimmed mice also got an application of Vetericyn, a form of bleach that inhibits bacterial growth and helps calm inflammation. The mice were of different strains and were housed in five facilities.

After a year, Adams and his colleagues went back and examined the records for 137 animals, including 98 who had been treated with Tresaderm and 39 who had their toenails trimmed, to see how well they did. They found that animals with clipped nails did significantly better, with 93.3 percent healing within 14 days. Among mice receiving Tresaderm, 25.4 percent were cured during the same time period.

To determine whether the results held up over time, the researchers followed another 54 animals over a six-week period, both trimming their toenails and applying Vetericyn to soothe the affected area. Mice toenails begin to regrow within a few days, so the researchers wondered if the animals would begin the destructive scratching cycle again. But to their surprise, the animals refrained from scratching their wounds, which continued to heal.

"It's a curative treatment. It's not just palliative," Adams said. "This really does break the cycle to allow a cure to occur. It is completely different from the other treatments out there."

He said the toenail treatment was not effective in healing animals who had lesions on their flank, as the mice sought relief from their discomfort by chewing the wounds in this area.

Finally, to make sure that the topical treatments were not confounding the results, the research team tested three different ointments—Tresaderm, Vetericyn and the antibiotic

Bacitracin—together with toenail trimming, and found no difference in results between the three.

## Immobilizing mice

While toenail trimming was clearly the superior treatment, Adams said the veterinarians recognized it wasn't entirely practical when done under general anesthesia. So he devised a simple trimming device, modifying a plastic tube to create two small cutouts for the animals' feet. When the mice are fitted into the tube, they are temporarily immobilized with their feet outstretched, making nail trimming simple and relatively stress-free for both caregivers and animals, he said.

He said the mice don't struggle or resist, and after a day or two of practice, technicians could clip the nails in as little as 30 seconds. "You just give a little pedicure and it changes everything," Adams said.

"I think we'll start seeing more people in other labs pick up this technique because it's very easy to do," he added. "There is definitely interest in finding good techniques for the problem because this is an issue for every institution that employs [mice](#)."

He said it's especially important to laboratories that use unusual strains, such as transgenic models, that can be very valuable.

Some institutions, including Massachusetts General Hospital and the University of Colorado, also perform toenail trims, while veterinarians at UC-Davis and UCSF have shown an interest in the technique, he said.

Provided by Stanford University Medical Center

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