

# A collaborative effort to improve the welfare of SKH1 mice

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2024 ABTA Winner



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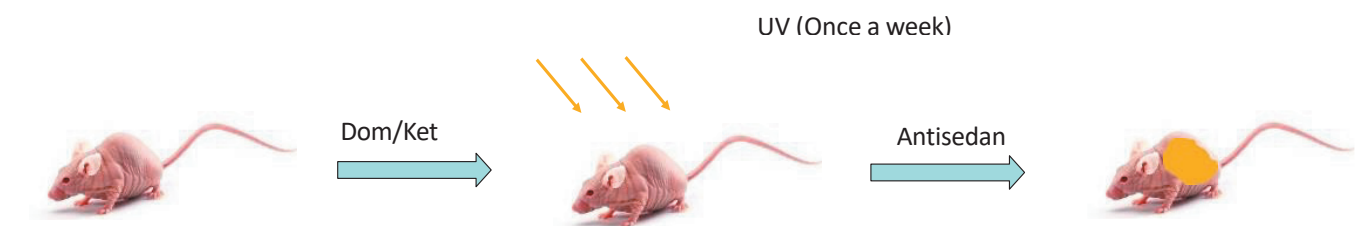
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## Background

Exposure to ultraviolet radiation (UV) has a profound effect on skin biology both macroscopically and physiologically. In order to study a more clinically relevant setting we have been closely involved with a project that is using

a mouse strain known to mimic UV damage in human skin. This mouse strain is very frail and requires a high Culture of Care. We have been employing the 3Rs to maintain this strain and set up a number of standard operating procedures to improve their welfare.

## The SKH1 mouse model: pros and cons



### Pros



- Immunocompetent mice.
- Mimics UV damage in human skin.
- C57/BL6 background (good for cell engraftment).
- Widely used for dermatology and cancer research studies.

### Cons





- Highly sensitive to anaesthetic (Ketamine).
- Highly sensitive skin.
- Abscess development.
- Dehydration and bodyweight loss.
- Homozygous females are sterile.

## Tackling the cons: anaesthetic

Anaesthetic dose used for C57/BL6 mice was too concentrated for SKH1 mice.



Anaesthetic optimisation:

1. Remove ketamine  Very weak sedation and did not stay still enough to cover with UV clothes
2. Reduce original ketamine dose to  $\frac{1}{2}$   Very deep sedation. A few mice lost due to high dose.

3. Reduce original ketamine dose to  $\frac{1}{3}$  and keep mice longer on heating mats



Injectable anaesthesia is sufficient to perform the procedure and mice quickly recover after Antisedan. No deaths reported due to UV procedure.

## Tackling the cons: abscess

Spontaneous abscesses.



Measure their growth (Figure 1)

- if not growing: keep mouse alive with additional monitoring
- if growing and impacting welfare (such as walking): cull mice



**Figure 1.** Mouse with a spontaneous abscess in the genital area. They usually appear on the genital or chest areas and don't usually grow.

## Tackling the cons: sensitive skin

Sore skin due to UV exposure.



Daily application of E45 cream.



**Figure 2.**

Sore skin due to UV exposure usually occurs 48 hours after UV exposure. All UV exposed mice are creamed daily with E45 cream and their backs are always checked prior to the next UV session. Mice that still show UV lesions will skip a week of UV to allow their backs to fully heal.

Sore skin due to skin to skin contact/scratching (Figure 3).



Application of green clay



Figure 3.

Sore skin around the neck is common and happened due to skin to skin contact/scratching. When these are seen, green clay is applied.

Green clay (Figure 4) has shown to greatly improve the sore areas. Large sore areas will fully heal after consistent application of clay.



Figure 4.

### Tackling the cons: dehydration and bodyweight loss

Dehydration signs:

- change in skin colour (from pink to grey)
- hunched and lethargic
- bodyweight loss



Weigh the mice on a daily basis.

Switch from water automatic system to water bottles.

Provide sugar free jelly.

Dehydrated mouse drinking from a water tray. We decided to use water bottles and trays of watery jelly (Figure 5).



Figure 5.

This has shown to greatly improve their welfare. The jelly has greatly encouraged them to put weight back on and fully recover from dehydration (Figure 6).



Figure 6.

### Tackling the cons: females are homozygous sterile

Homozygous SKH1 female mice are sterile and cannot lactate and the colony needs to be maintained as heterozygous males and females to ensure more robust data.

### Conclusions

The SKH1 is a great mouse model to study how UV damage changes the skin both macroscopically as well as molecularly however the strain is very frail.

During the project and in strong collaboration with the Skin Cancer and Ageing group and the Named Veterinary Surgeon (NVS), multiple standard operating procedures (SOPs) were put in place to ensure a better Culture of Care for these mice.

Thanks to this collaborative work, the mouse colony has thrived by refining various steps of the process including daily monitoring, E45 cream and green clay application as well as replacing mash for jelly.

These SOPs could be implemented for any other mouse strain showing the same welfare issues. We are currently testing the use of jelly instead of mash in another study using C57/BL6 mice.

