

A Technician-led Approach to Altering the Culture of Care Regarding Blood Sampling

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Abstract

This poster will describe the implementation by technicians and Named Persons of a well-published refined bleeding technique. Establishing the Crick from legacy institutes required a standardised approach for many techniques, including blood sampling, which is essential for good practice. The NVS taught the Saphenous vein method to technicians as an alternative to bleeding from the tail vein. This poster will cover how we moved from previous methods, the reasons why and how this was then introduced as part of a technician-led culture of care.

Why not continue to use tail bleeds as the standard?

The concept of the 3R's, and especially Refinement, give us a responsibility to constantly review existing techniques and assess if methods in use are still the most appropriate.

Using a scalpel/lance

Tail nicks were previously being carried out using a scalpel or lance and we found the following concerns when we were using that method:



Figure 1 - Tail bleed procedure

- Repeated sampling can cause scarring to the tail especially if a scalpel is being used.
- When performing the tail nick with a scalpel, it can be difficult to get the correct amount of pressure needed for the initial cut in order to get enough blood, without too much pressure as to result in damaging the tail and causing subsequent scarring
- Animals need to be warmed in a hot box prior to the procedure in order to dilate the blood vessel, resulting in an extended period of time before the flow of blood stops after sampling.

Using a Needle

We tried refining the tail bleeding technique by changing to using a needle to prick the vein instead of a scalpel but we still had the following concerns:

- In black or pigmented mice it can be more difficult to see the tail vein through the skin. This can lead to missing the vein and having to re-puncture the tail.
- The hot box was still required, This increases the length of the procedure, results in extra time for the animal outside of its home cage.
- Increased handling and pulling on the tail can potentially cause stress to the animal during the procedure.

What alternative methods are available?

Whilst bleeding from the tail vein is still a suitable option, there are a variety of different alternatives, although not all would be applicable as a standardised technique.

General anaesthesia not required	General anaesthesia required	General anaesthesia required (non recovery)
<ul style="list-style-type: none">• Saphenous vein• Tail Vein• Mandibular Vein• Tail Snip• Blood vessel cannulation	<ul style="list-style-type: none">• Sublingual vein• Saphenous vein• Retro-orbital	<ul style="list-style-type: none">• Cardiac puncture• Abdominal/thoracic blood vessel• Retro-orbital• Decapitation

Figure 3 - Blood collection techniques.

From the list of available techniques we wanted to use one that did not require the use of anaesthetic. Our NVS and a few technicians had previously used the Saphenous vein bleed so we decided to trial it for suitability as a standardised technique in our unit.

Advantages we found of using our chosen method of Saphenous vein bleeds

From performing the Saphenous bleeding technique we found that this method had a number of advantages.

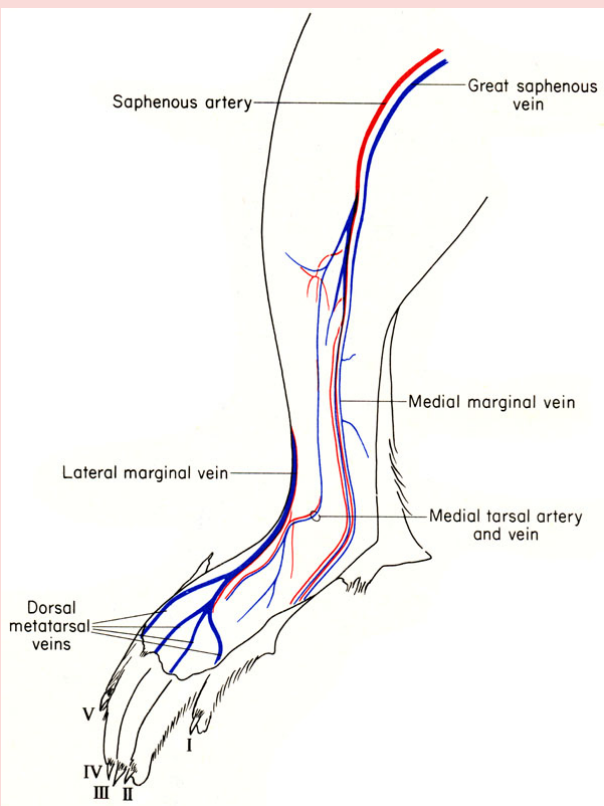


Figure 4 - Mouse leg circulatory system

- The saphenous vein is easy to see in all coat colours. This allows the PIL holder to be more confident performing the venous puncture required for sampling.



Figure 5 - Saphenous vein puncture

- Either leg can be used, allowing repeat sampling alternating between legs, providing time for each leg to fully heal
- No heating of the animal is required, eliminating the need for a heat chamber.
- The bleeding stops quickly as the vein is not dilated by heating.
- Large volumes of blood can be taken from the leg continuously with little coagulation.



- Reduced handling of the animal from the tail may lead to a reduction the stress to the animal during the procedure.

Figure 6 - Mouse restrained for Saphenous bleed procedure.

- Wounds on the legs heal quickly with little to no scarring compared to what has occasionally been seen when using the tail.

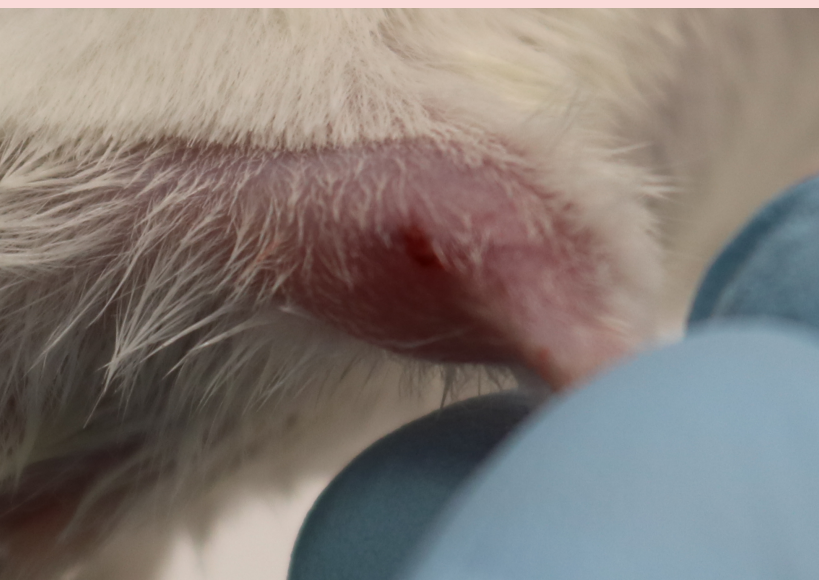


Figure 7 - Wound just after procedure has finished and the bleeding has stopped.

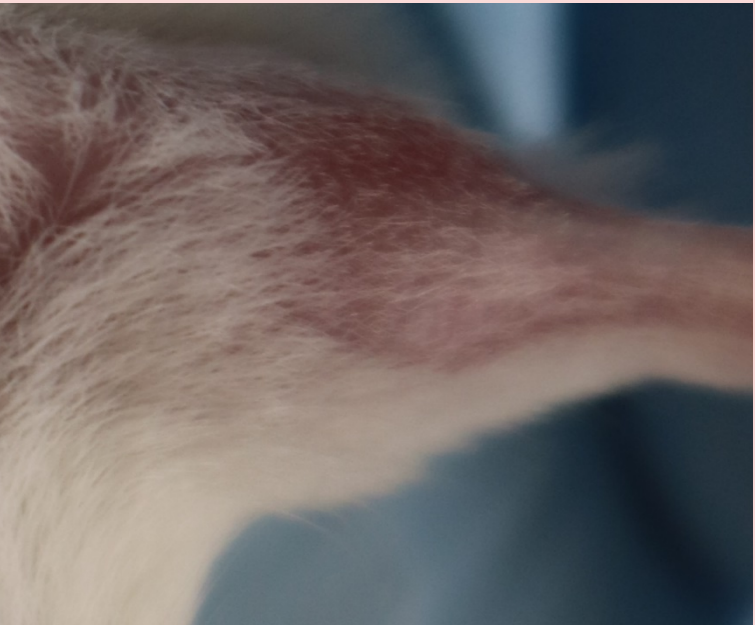


Figure 8 - Healed wound 24 hours post procedure.

Refinements within the procedure

From doing this procedure we have made further refinements.

This has included using higher or smaller gauge needles depending on the volume of blood required.

We also use different sized restraining tubes depending on the size of the mouse so that it is not too tight or too loose. We found that the technician can easily and quickly restrain the animal.



Figure 9 - Different sized restrainers used.

Further refinements

The restrainer we currently use can be optimised further. We are looking into creating a restrainer that incorporates a thinner red plastic similar to a 50ml falcon tube and to have a variety of sizes so the most appropriate size can be used for each animal.

Technician driven culture of care

The differences and improvements of the Saphenous vein technique compared to previous methods led to it becoming the only method used in our unit, where appropriate.

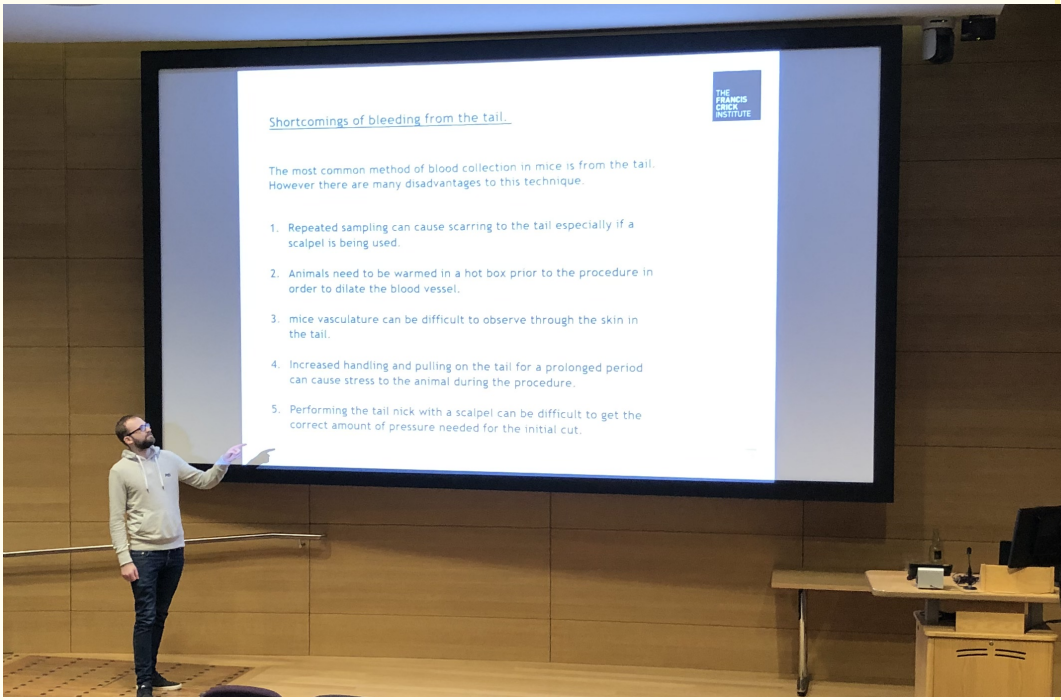


Figure 10 - Blood collection presentation.

Scientific Users were then encouraged to use this method over alternative techniques. The majority of Scientific Users who have been shown and taught this technique now prefer it to previous methods used, this is due to the advantages of the Saphenous vein bleeding technique listed in this poster.

Technicians and Scientific Users have introduced this method to visiting collaborators from partner institutes who are working on projects using blood collection; highlighting the benefits to research and animal welfare.

Technicians have given talks internally to the whole of the Biological Research Facility on blood collection via the Saphenous vein, explaining the benefits and encouraging others to take up the technique if suitable.

Future steps to take

We will to continue to highlight the benefits of using a different procedure for blood collection to the Scientific Users and Technicians who use our facilities and standardise the technique where possible. Looking forward, we would like to present at symposia and inspire others to adopt this method for use in their own institutes.

Conclusion

Although not a new technique, this method demonstrates how Animal Technicians play an essential role in implementing and demonstrating good practice whilst promoting a culture of care. Championing this technique at the Crick has highlighted the importance of Animal Technicians working closely with Scientific Users to promote methods of refinement and consistency of techniques, especially when different establishments and processes are involved.

References

- Figure 1 - www.nc3rs.org.uk/mouse-tail-vein-non-surgical
Figure 2 - www.researchgate.net/figure/Demonstration-of-mouse-restraint-location-of-blood-vessels-and-positioning-of-needle_fig1_320737499
Figure 3 - www.nc3rs.org.uk/mouse-decision-tree-blood-sampling
Figure 4 - www.informatics.jax.org/cookbook/figures/figure102.shtml

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