

## Time for a change: New methods to handle mice

Dr. med. vet. Mattea Durst, Center for Surgical Research, Zurich University Hospital

The 3R principles seek to keep the suffering of laboratory animals to an indispensable minimum: by reducing the number of animals used (reduction), using alternative methods (replacement) and improving experiments (refinement). In the daily lives of laboratory animals, refinement is achieved in a number of ways, including proper design of cages, training, and husbandry in social groups. In the most widely-used laboratory animals – mice – handling has become a potential starting point for refinement efforts for some years now and a focus of researchers, vets and animal welfare officers. In laboratory animal science, mice are routinely picked up by the base of the tail to be lifted or moved. This can either be done by hand or using forceps.

The working group led by Professor Hurst at the University of Liverpool has shed light on various aspects of laboratory mouse handling since 2010. It started with the study ‘Taming anxiety in laboratory mice’ in which Hurst was able to demonstrate that picking mice up by the tail induced aversion and anxiety towards the hand being extended into the cage.<sup>1</sup> Mice do not habituate to being picked up in this way. Stress and anxiety were minimised through the use of a cupped hand or a tunnel for handling and mice handled in this way voluntarily sought human interaction. Subsequent studies have shown that tunnel handling leads to better results in behavioural testing and involves less variation of results.<sup>2,3</sup> These findings indicate that tunnel handling is in fact a refinement for mice.

Inspired by Professor Hurst’s published results, we introduced tunnel handling in our experiments at Zurich University Hospital. Following a training period during the acclimatisation phase, C57Bl/6 mice of both sexes were successfully handled in various testing models exclusively using the tunnel. In our presentation, we will describe the approach we took and encourage people who work with mice in laboratory animal science to integrate tunnel handling into their work. The transition to new handling methods both improves animal welfare and has the potential to ensure more robust research findings.

### References:

1. Hurst, J. L. & West, R. S. Taming anxiety in laboratory mice. *Nat. Methods* **7**, 825–826 (2010).
2. Gouveia, K. & Hurst, J. L. Optimising reliability of mouse performance in behavioural testing: the major role of non-aversive handling. *Sci. Rep.* **7**, 44999 (2017).
3. Nakamura, Y. & Suzuki, K. Tunnel use facilitates handling of ICR mice and decreases experimental variation. *J. Vet. Med. Sci.* **80**, 886–892 (2018).

## Time for a change: New methods to handle mice

Hannes Sigrüst, Laboratory technician, University of Zurich

I started my training as a biology lab technician at the Swiss Federal Institute of Technology (ETH) Zurich and have now worked at the University of Zurich for over 10 years. I have therefore been working for over 15 years as a laboratory technician handling test animals with a focus on mouse behaviour.

The handling of laboratory rodents differs depending on the species and is often based on outdated methods. The two main species in research –rats and mice – have been assigned different traits. Rats are handled and accustomed to the researcher before tests are conducted on the animals. In mice, on the other hand, there is still a perception that it is not necessary to get them used to the researcher, that they cannot habituate to handling, that they are difficult to train and that they bite. For this reason, mice are still picked up directly by the base of the tail.



The first article about cup and tunnel handling was published by Hurst and West (1) in 2010. This and subsequent articles have demonstrated that lifting mice using the cup and tunnel methods leads to lower anxiety and stress. In these methods, mice are not picked up by the tail, but instead in transparent plastic tunnels (tunnel handling) or in the palm of the hand (cup handling).



Using these two methods, it is possible to handle mice in a stress-free manner with minimum effort. It is important, however, to consider a few key aspects of a mouse's biology. If staff are well trained in handling mice and use the tunnel handling or cup handling method correctly, the mice are less anxious and stressed. This results in more reliable and reproducible research findings. In addition, if the mice experience less anxiety and stress, it is also more pleasant for researchers – a win-win situation for man and mouse.

### References:

Reference 1: Hurst, J.L. & West, R.S. (2010). Taming anxiety in laboratory mice. *Nature Methods* 7(10), 825-826.

Reference Image 1: [https://theodora.com/rodent\\_laboratory/restraint.html](https://theodora.com/rodent_laboratory/restraint.html)

Reference Image 2: <https://www.thermofisher.com/blog/proteomics/whole-body-imaging-of-drugs-and-metabolites-in-mice/>