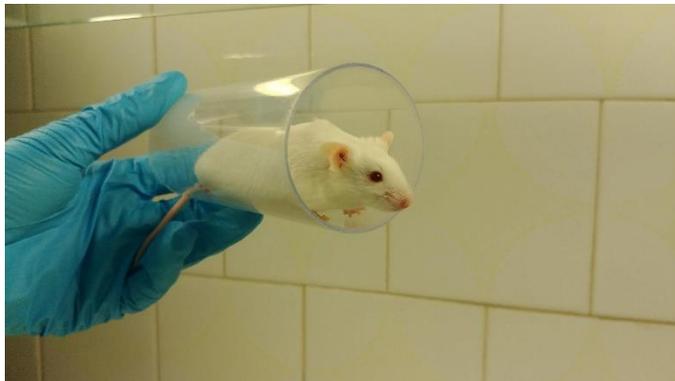


Čas za spremembe?

Namen in pomen novih metod rokovanja



Katja Skulj, DVM

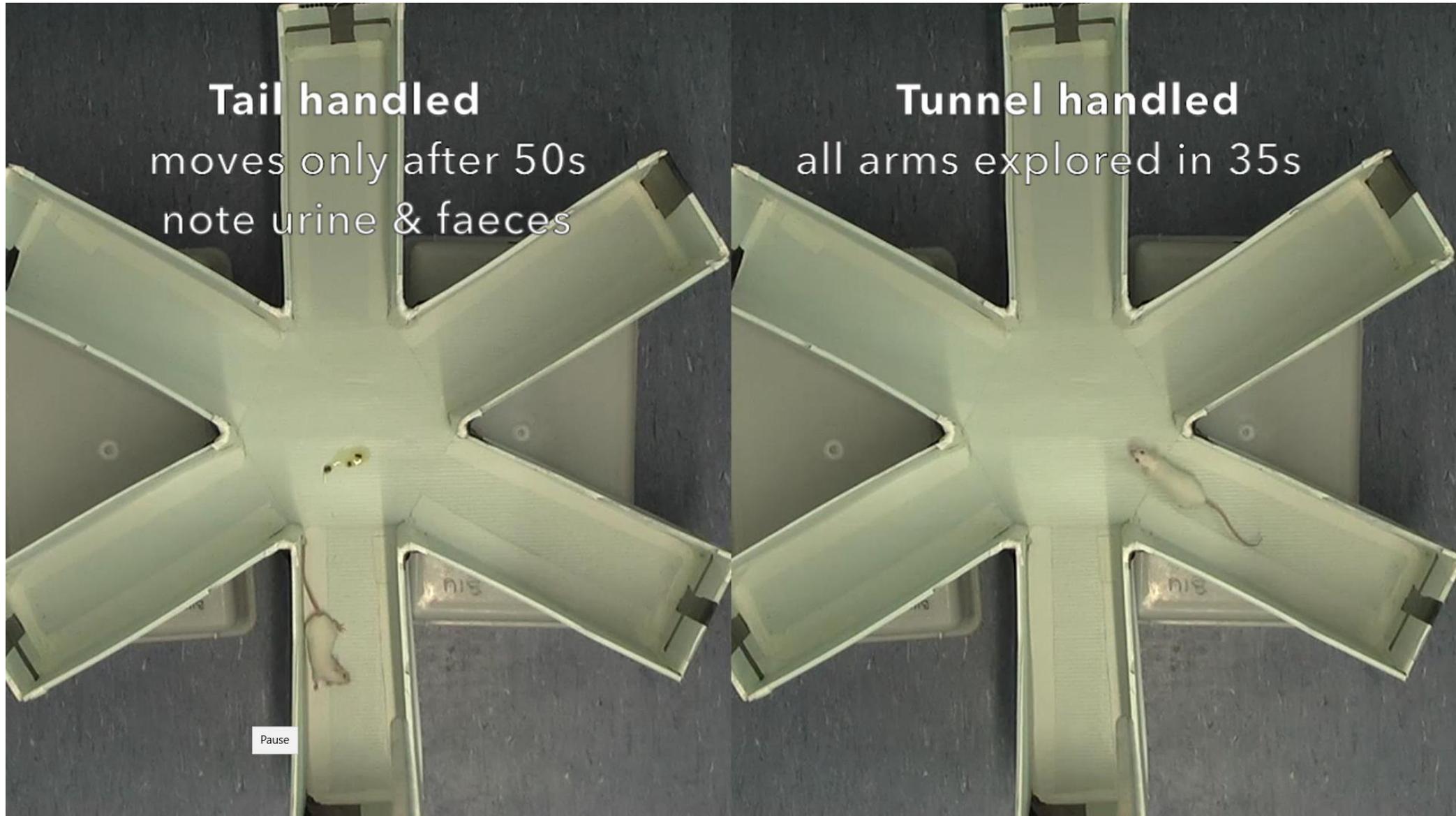
Katja.Skulj@bf.uni-lj.si

Biotehniška fakulteta, Oddelek za zootehniko

Link na video Radial Maze Exploration:

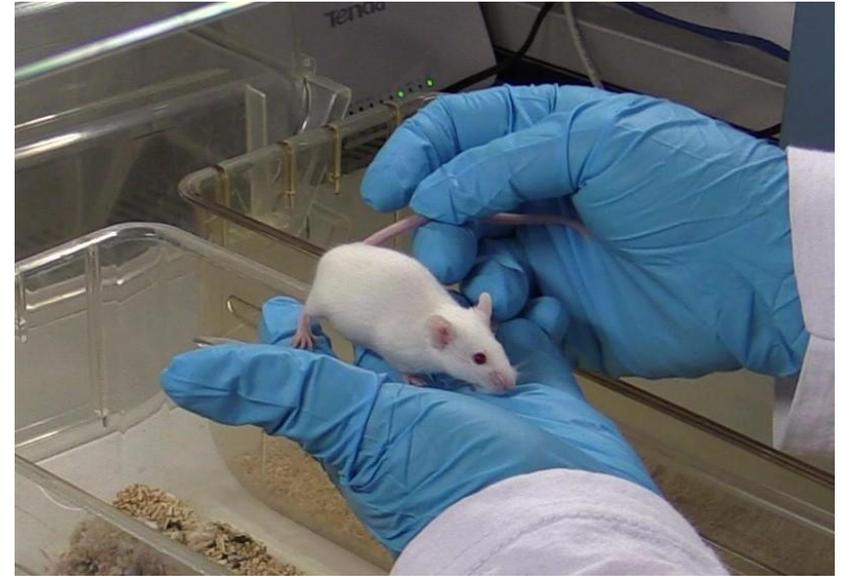
<https://vimeo.com/236716672>

Kakšne občutke vam vzbudi film?

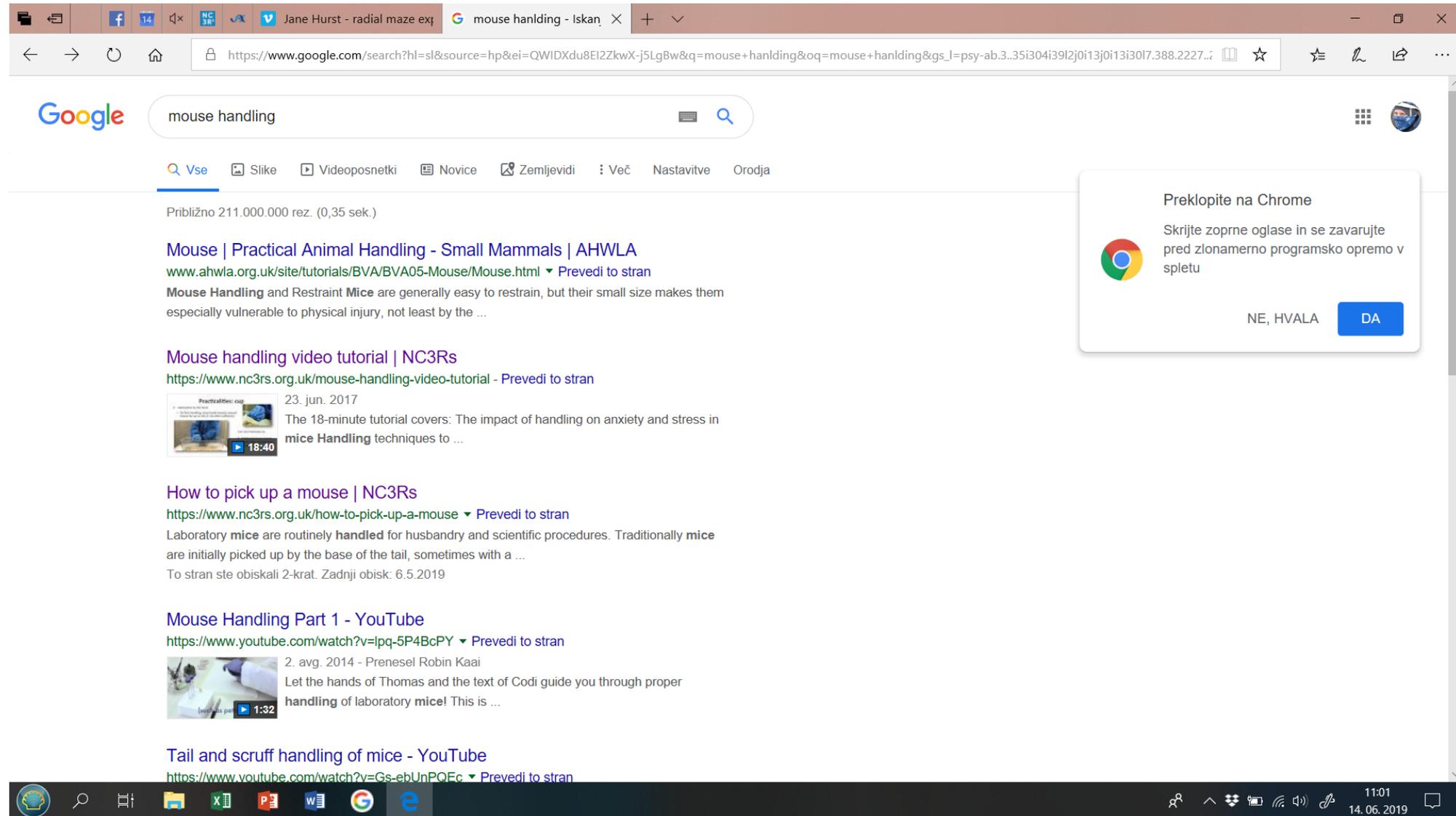


Kakšno je pravilno rokovanje z mišmi?

- Klasičen prijem za rep
- Učimo se ga na izobraževanjih
- Moja opažanja ob prijemu za rep
 - Miši bežijo, tečejo ob robu kletke
 - Se skrivajo v kotu, skrijejo rep
 - Zadnjo v kletki je težko ujeti
 - Cvilijo
 - Kažejo znake nelagodja (priprte oči, uhlji položeni, ...)



Mouse handling – rokovanje z mišmi



The image shows a screenshot of a web browser displaying a Google search for "mouse handling". The search results are listed below the search bar. A notification box from Chrome is overlaid on the right side of the page, asking the user to switch to Chrome to hide ads and protect against malicious software.

Browser tabs: Jane Hurst - radial maze exp, mouse handling - Iskanj

Search bar: mouse handling

Search filters: Vse, Slike, Videoposnetki, Novice, Zemljevidi, Več, Nastavitve, Orodja

Results:

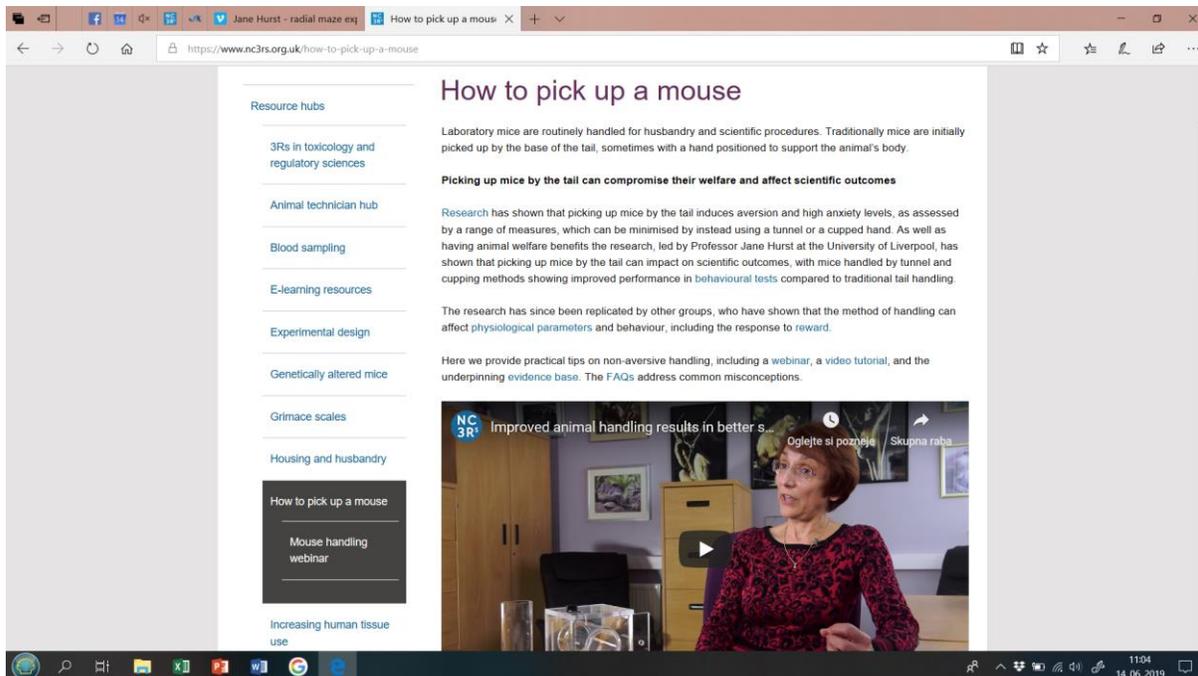
- Mouse | Practical Animal Handling - Small Mammals | AHWLA**
www.ahwla.org.uk/site/tutorials/BVA/BVA05-Mouse/Mouse.html ▾ Prevedi to stran
Mouse Handling and Restraint Mice are generally easy to restrain, but their small size makes them especially vulnerable to physical injury, not least by the ...
- Mouse handling video tutorial | NC3Rs**
<https://www.nc3rs.org.uk/mouse-handling-video-tutorial> - Prevedi to stran
23. jun. 2017
The 18-minute tutorial covers: The impact of handling on anxiety and stress in mice Handling techniques to ...
- How to pick up a mouse | NC3Rs**
<https://www.nc3rs.org.uk/how-to-pick-up-a-mouse> ▾ Prevedi to stran
Laboratory mice are routinely handled for husbandry and scientific procedures. Traditionally mice are initially picked up by the base of the tail, sometimes with a ...
To stran ste obiskali 2-krat. Zadnji obisk: 6.5.2019
- Mouse Handling Part 1 - YouTube**
<https://www.youtube.com/watch?v=lpq-5P4BcPY> ▾ Prevedi to stran
2. avg. 2014 - Prenesel Robin Kaai
Let the hands of Thomas and the text of Codi guide you through proper handling of laboratory micel This is ...
- Tail and scruff handling of mice - YouTube**
<https://www.youtube.com/watch?v=Gse-ebUnPQFc> ▾ Prevedi to stran

Notification: Preklopite na Chrome. Skrijte zoprne oglase in se zavarujte pred zlonamerno programsko opremo v spletu. NE, HVALA DA

System tray: 11:01, 14. 06. 2019

Nova „obzorja“, ideje, prakse

- Našla stran NC3R: <https://www.nc3rs.org.uk/how-to-pick-up-a-mouse>
- Študijo prof. Hurst: <https://www.nature.com/articles/nmeth.1500>



The screenshot shows a web browser window with the URL <https://www.nc3rs.org.uk/how-to-pick-up-a-mouse>. The page title is "How to pick up a mouse". The main content area contains the following text:

Laboratory mice are routinely handled for husbandry and scientific procedures. Traditionally mice are initially picked up by the base of the tail, sometimes with a hand positioned to support the animal's body.

Picking up mice by the tail can compromise their welfare and affect scientific outcomes

Research has shown that picking up mice by the tail induces aversion and high anxiety levels, as assessed by a range of measures, which can be minimised by instead using a tunnel or a cupped hand. As well as having animal welfare benefits the research, led by Professor Jane Hurst at the University of Liverpool, has shown that picking up mice by the tail can impact on scientific outcomes, with mice handled by tunnel and cupping methods showing improved performance in *behavioural tests* compared to traditional tail handling.

The research has since been replicated by other groups, who have shown that the method of handling can affect *physiological parameters* and behaviour, including the response to reward.

Here we provide practical tips on non-aversive handling, including a webinar, a video tutorial, and the underpinning evidence base. The FAQs address common misconceptions.

Below the text is a video player showing a woman speaking, with the title "Improved animal handling results in better s..." and a play button.

On the left side, there is a "Resource hubs" sidebar with links to: 3Rs in toxicology and regulatory sciences, Animal technician hub, Blood sampling, E-learning resources, Experimental design, Genetically altered mice, Grmace scales, Housing and husbandry, How to pick up a mouse (highlighted), Mouse handling webinar, and Increasing human tissue use.



The screenshot shows a web browser window with the URL <https://www.nature.com/articles/nmeth.1500>. The page is from the journal "nature methods" and is titled "Taming anxiety in laboratory mice". The article is a Brief Communication published on 12 September 2010 by Jane L Hurst and Rebecca S West. The article is cited in Nature Methods 7, 825-826 (2010).

The article title is "Taming anxiety in laboratory mice". The authors are Jane L Hurst and Rebecca S West. The article is published in Nature Methods 7, 825-826 (2010).

The abstract text reads: "Routine laboratory animal handling has profound effects on their anxiety and stress responses, but little is known about the impact of handling method. We found that picking up mice by the tail induced aversion and high anxiety, whereas use of tunnels or open hand led to voluntary approach, low anxiety and acceptance of physical restraint. Using the latter methods, one can minimize a widespread source of anxiety in laboratory mice."

On the right side, there are navigation options: Search, E-alert, Submit, and Login. Below that, there are statistics: 174 Citations, 81 Altmetric, and Article metrics. There are also tabs for Sections, Figures, and References. A list of links is provided: Abstract, References, Acknowledgements, Author information, Supplementary information, Rights and permissions, About this article, and Further reading.

Rokovanje s tunelom

Link na video Tunnel handling:

<https://vimeo.com/236716093>

Rokovanje z odprto dlanjo

Link na video Cup handling:

<https://vimeo.com/236715432>

Moji pomisleki in rešitve pred 2017

- „Nenaravno“ da primeš žival - miš za rep?!
 - Nobeno drugo živali ne obvladujemo s prijemom za rep
 - Rep je zelo občutljiv in za živali pomemben del telesa
-
- breje samice in težje živali že pred prestavljala z odprto dlanjo
 - prijela za rep in takoj podstavila dlan iste roke, da se je miš „vsedla“

Študije

- 2018 je bilo 5 študij o novih metodah rokovanja, sedaj jih je 11
- <https://nc3rs.org.uk/sites/default/files/documents/NC3Rs%20-%20mouse%20handling%20research%20papers%20table.pdf>
→ Tatjana
- Delili informacije na FB SDLŽ

Mouse handling research papers

Below are links to the original research papers that provide the evidence-base for improved welfare and scientific outcomes with the tunnel handling and cupping methods of picking up mice. We also provide access to papers which validate or use the refined mouse handling techniques.

In each case, a short summary of the key findings is provided, along with notes. We recommend reading the papers in full.

We update this document as new research is published. To alert the NC3Rs to further papers on mouse handling, please email enquiries@nc3rs.org.uk.

The original research

What was compared?	Schedule of acclimation to handling method	Replication or modification of Hurst & West 2010 handling methods?	Study reliability	Animal characteristics	Cage type	Funders
Hurst JL, West RS (2010) Taming anxiety in laboratory mice. <i>Nature Methods</i> 7: 825-826. doi:10.1038/nmeth.1500 (full text: bit.ly/2Jhg6Jb) Picking up mice by the tail induces aversion and high anxiety levels (i.e. avoidance of the human gloved hand, greater urination and defecation during handling, a higher frequency of protected stretch attend postures, fewer open arm entries and less time spent on the open arms of the elevated plus maze). These responses can be minimised by instead using a tunnel or cupped hands. The positive effects of tunnel handling and cupping generalise across strains, handlers, and the light/dark phase. Mice handled by their home cage tunnel or cupping are much more willing to approach the handler than those picked up by the tail, even after restraint by the scruff of the neck or lifting by the tail for abdominal inspection. Scruff restraint does not reverse the taming effects of tunnel handling or cupping. Mice picked up by the tail do not habituate to tail handling						
Tail, tunnel, cupping (Tunnel then cupping was used for one cohort of C57BL/6 mice, producing similar results to tunnel handling; Suppl. Fig. 4, Suppl. Tables 2 & 3) Tunnels were clear acrylic, familiar (home cage) tunnels and were present in all cages Measures: voluntary interaction with handling device; urination and defecation during handling; anxiety in elevated plus maze	Minimum nine daily handling sessions of 2x30s. Acclimation extended variably up to 16 sessions to address specific responses. EPM anxiety tested after seven or nine handling sessions For tail handling, the base of the tail was grasped between thumb and forefinger and the mouse gently lifted onto the opposite gloved hand or laboratory coat sleeve and held there by the tail for 30s before release back into the cage; after 90s handling was repeated Mice handled consistently by one of 11 handlers	N/A	Cages randomised into handling methods and balanced on the cage rack. Order of testing randomised but balanced across methods Blinding used, but not consistently No sample size justification N=47 cages per handling method (BALB/c N=23 cages x 3 methods; ICR N=8 cages x 3 methods; C57BL/6 N=16 cages x 3 methods; tunnel to cup method, N=8 cages of C57BL/6). 296 mice in total	BALB/c, ICR(CD-1), C57BL/6 Males and females 8-10 weeks old at start of testing; 11-15 weeks old at end Housed two per cage	Open (MB1)	ASAB, BBSRC, NC3Rs, Wellcome

Caveats: The voluntary interaction test assessed willingness to interact with the handling method, so mice in the tunnel group were tested with a hand holding a tunnel, tail and cupping

Nadaljnji koraki v našem Centru

- Naročili 20 tunelčkov
 - Dobavitelji
 - <https://www.braintreesci.com/prodinfo.asp?number=TRANS-TUBE>
 - <http://animalab.eu/products/mouse-tunnels>
 - <http://datesand.com/index.php/product/966/>
 - <https://www.ottoenvironmental.com/clear-mouse-tube>
 - Naredili zasnovo študije (podobno kot *Hurst JL, West RS (2010) Taming anxiety in laboratory mice*)
 - Aprila in maja potekal praktični del diplomske naloge (mentor Tatjana Prirman) → rezultati

Nadaljnji koraki v našem Centru

- 2018 rokovanje z odprto dlanjo
- Ko smo dobili tunelčke → rokovanje s tunelčki
- Julij 2018 → tunelčki v vse vzrejne kletke
- Opazili razlike pri linijah v rokovanju
 1. Hsd:ICR(CD-1)
 2. FLI (fat)
 3. DBA
 4. C57BL/6J
 5. FHI (lean)

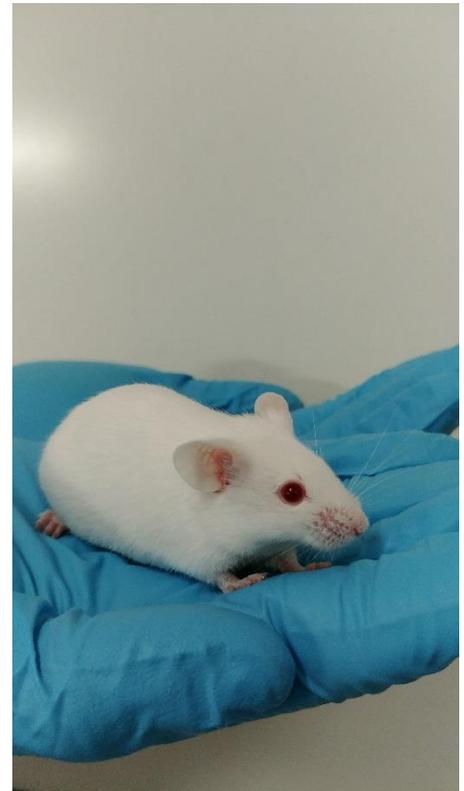
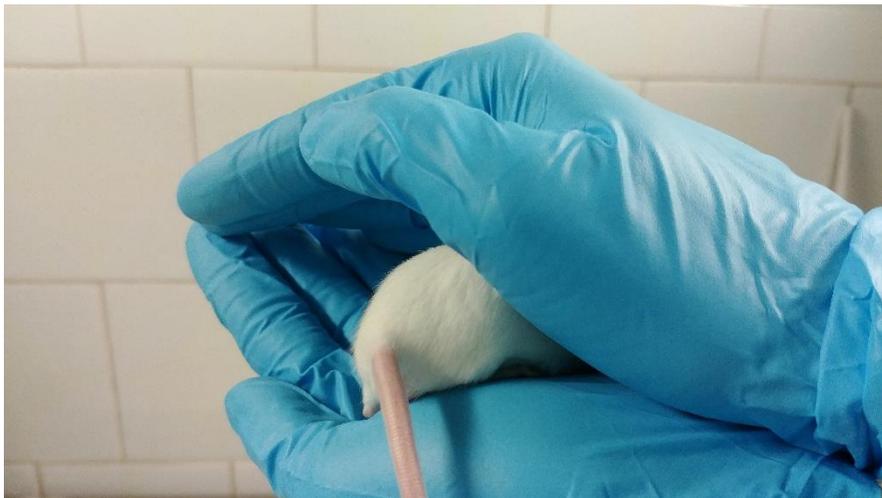
Poraba časa za rokovanje s tunelom

- Skrb, da novi načini rokovanja trajajo več časa je odveč
- Študija Gouveia & Hurst, 2017 je potrdila, da je dovolj, da se miš privadi na rokovanje s tunelom le tedensko prestavljanje (2 sekundi)
- Naše izkušnje to potrdile
- Tunelček v vzrejni kletki → mladički se do 3 tedna navadijo rokovanja



Poraba časa za rokovanje z odprto dlanjo

- Waters & Beeston neobjavljeno (povzeto po prof. Hurst)
- Več časa potrebujejo miši in tudi oskrbnik, da se navadita na rokovanje z odprto dlanjo
- Mladički do 5 tedna → nujno pokrita dlan, še boljše tunel
- Previdni na začetku – pokrita dlan



Rokovanje s tunelom ali odprto dlanjo

Vsakič, ko moramo miš vzeti iz kletke!

- Tehtanje
- Pregled zdravstvenega stanja
- Pregled na brejost
- Pregled vaginalnega čepa
- Označevanje živali
- Jemanje krvi
- Gavaža
- ...



Praksa v našem Centru

- **NI!!!** prijema za rep, da bi miš vzeli iz kletke
- Novi metodi razložimo in pokažemo študentom na vajah pri predmetu Reja laboratorijskih živali
- Študenti lahko poizkusijo
 - ni težav, kljub neizkušeni
- Vsi raziskovalci uporabljajo novi dve metodi
 - tunel in odprta dlan



Opažanja

- Mladički manj bežijo
- Roka je prijatelj
- Miši gredo same v tunel, ko odpremo kletko
- Večja gnezda pri FHI
- Krajši čas med kotitvama pri FHI, FLI
- Manj pogina mladičkov do odstavitve



Rezultati Tatjana

Opažanja

- Miši ne kažejo znakov nelagodja
- Ni lovljenja živali → saj se ne obnašamo več kot „predator“
- Tudi osebe, ki rokujejo z mišmi, so bolj sproščene!
- Enaka časovna poraba!



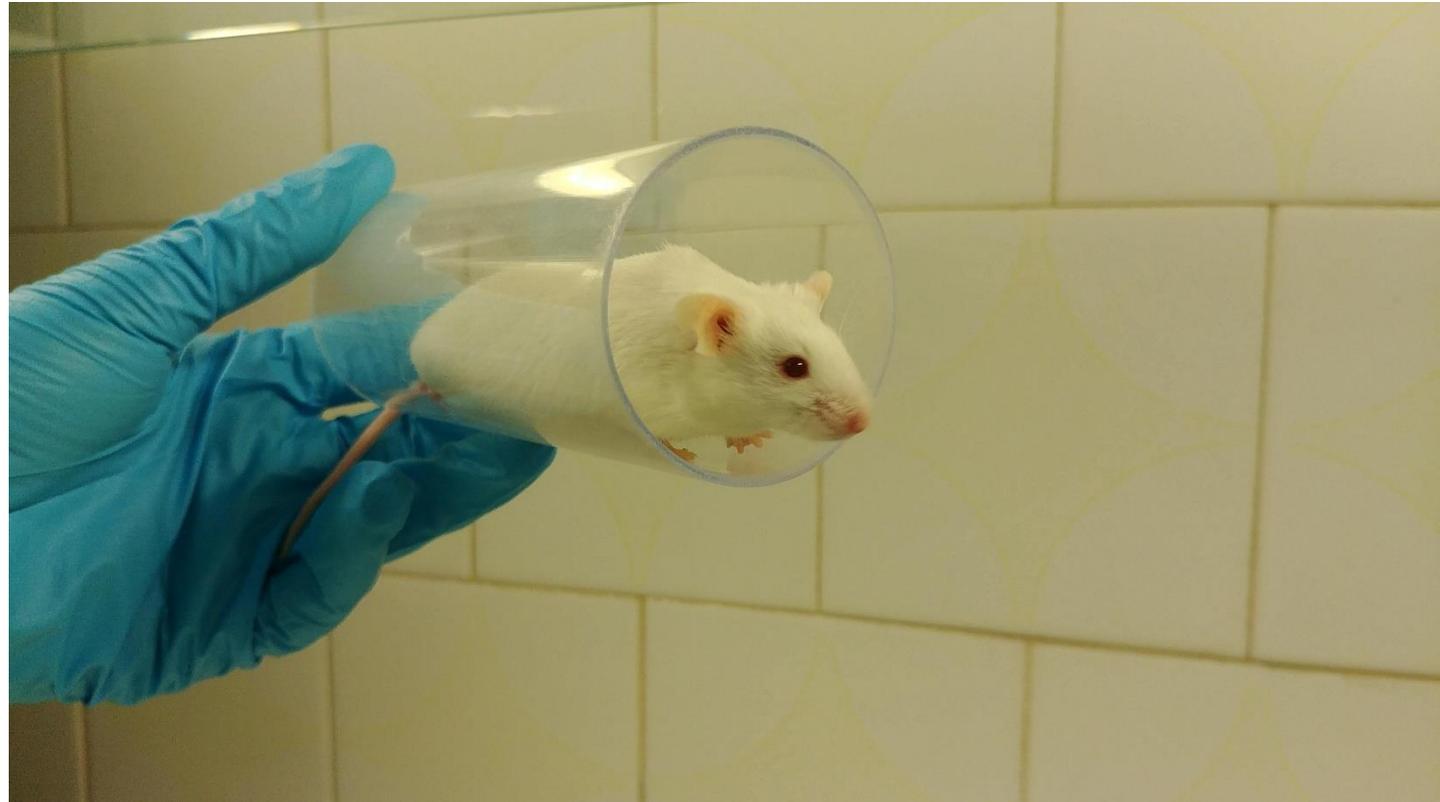
Pomembno

- Tunel v kletkah, če je le mogoče
- Čas za adaptacijo tako miši, kot oskrbovalca
- Odločnost pri vodenju miši v tunel
- Miši NE lovimo s tunelom!
- Tunel položimo ob rok kletke, ga ne zapremo



Več informacij

- NC3R - <https://www.nc3rs.org.uk/how-to-pick-up-a-mouse>
- Webinar prof. Hurst - <https://www.nc3rs.org.uk/mouse-handling-webinar> ali https://www.youtube.com/watch?v=uLPNHh_YNP4
- Poster „New methods to handle mice – time for a change“ - <https://www.nc3rs.org.uk/mouse-handling-poster>



Kot pravi prof. Hurst: „Čeprav miši nimajo besede, ko morajo zapustiti svojo domačo kletko, pa je za njih velika razlika, če gredo lahko samostojno »po svojih tačkah« v čakajoč tunel.“

HVALA

- NC3R
- Prof. Jane Hurst



National Centre
for the Replacement
Refinement & Reduction
of Animals in Research

- Prof. Peter Dovč
- Prof. Simon Horvat
- Izr. prof. Tatjana Pirman
- Ana Vengar



University of Ljubljana
Biotechnical Faculty

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