

# Preliminary feedback data on the use of 3D-printed mouse tail models for i.v. injection training and future developments

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## 1. Abstract

Intravenous (i.v.) injections are a commonplace experimental procedure to deliver substances in laboratory mice. A limited number of easily accessible veins and the technical difficulty of injecting into these small blood vessels necessitates ample training for the operator to succeed. We developed a 3D-printed mouse tail model on which these i.v. injections can be trained without the need of live animals. To prove their efficacy for training, several mouse tail models were sent out internationally and evaluated in an online feedback survey. Preliminary results indicate a high level of satisfaction in terms of anatomical accuracy, usefulness for training and increase in confidence to inject live animals afterwards. However, criticism was also expressed towards the size and material color of the tail model. Encouraged by the positive feedback as well as the respondents' suggestions for optimization, we developed updated model versions, ready to be tested in a follow-up project to improve on the training experience and outcome. In our assessment, 3D-printing modalities have great potential to complement existing training protocols with realistic animal models and prospectively reduce the number of live animals needed.

## 2. Methods

- Distribution of mouse tail model test-kits (containing one model) free of charge
- Online / Paper print survey (25 questions) to be filled out in return
- Feedback incorporated into new developments, followed by internal testing cycles of new tail model iterations



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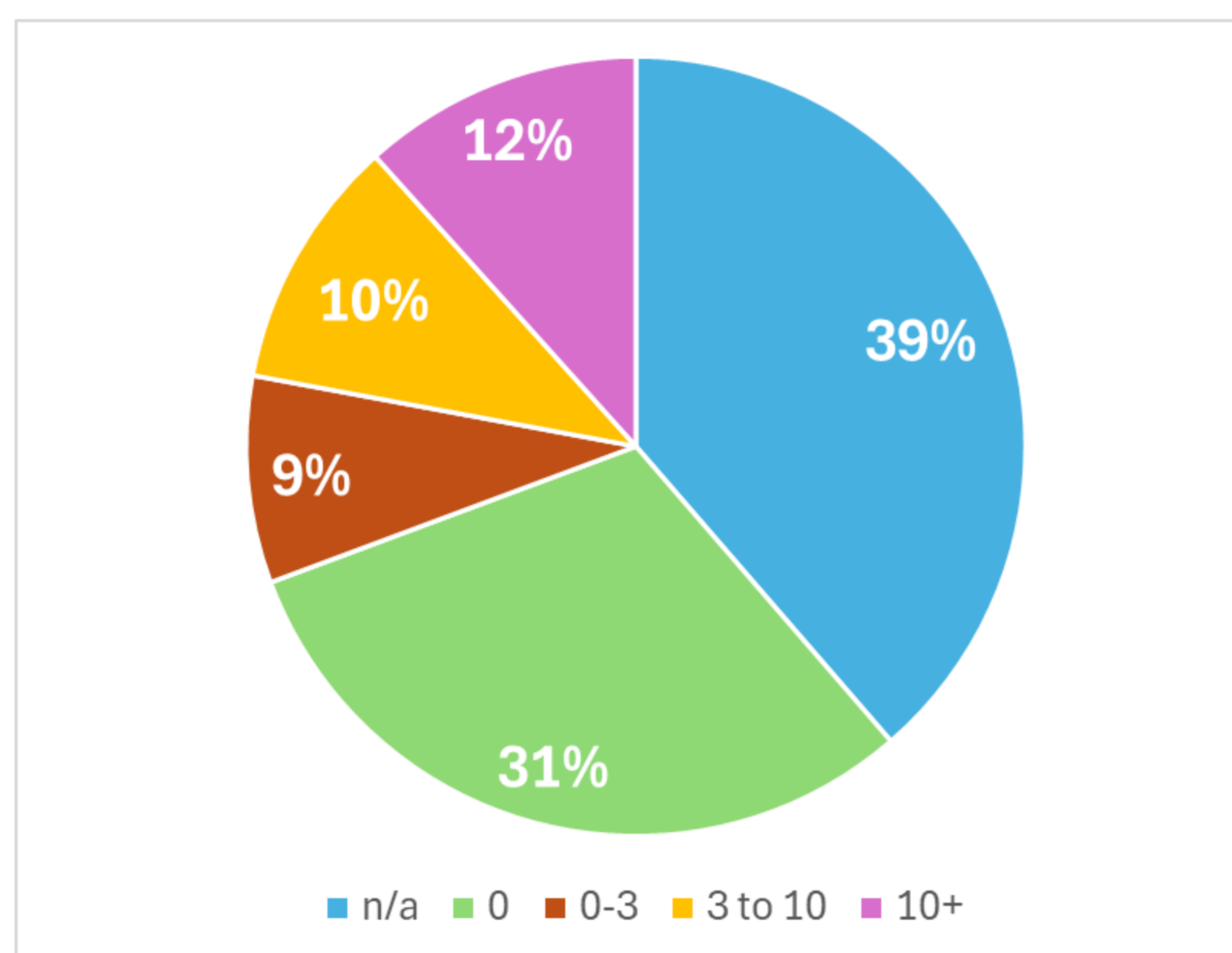


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**Figures:** 1 Newly developed, half-pigmented mouse tail model, 2 Visibility of artificial blood inside the «vein» under the pigmented «skin» portion and, 3 under the unpigmented portion

## 3. Results

- A total of n = 163 feedbacks received
- Overall positive feedback on the various anatomical features of the mouse tail model
- More artificial animal models for training requested
- The use of artificial animal models is generally supported
- Increase in confidence to perform i.v. injections on live animals after use of the mouse tail model in training



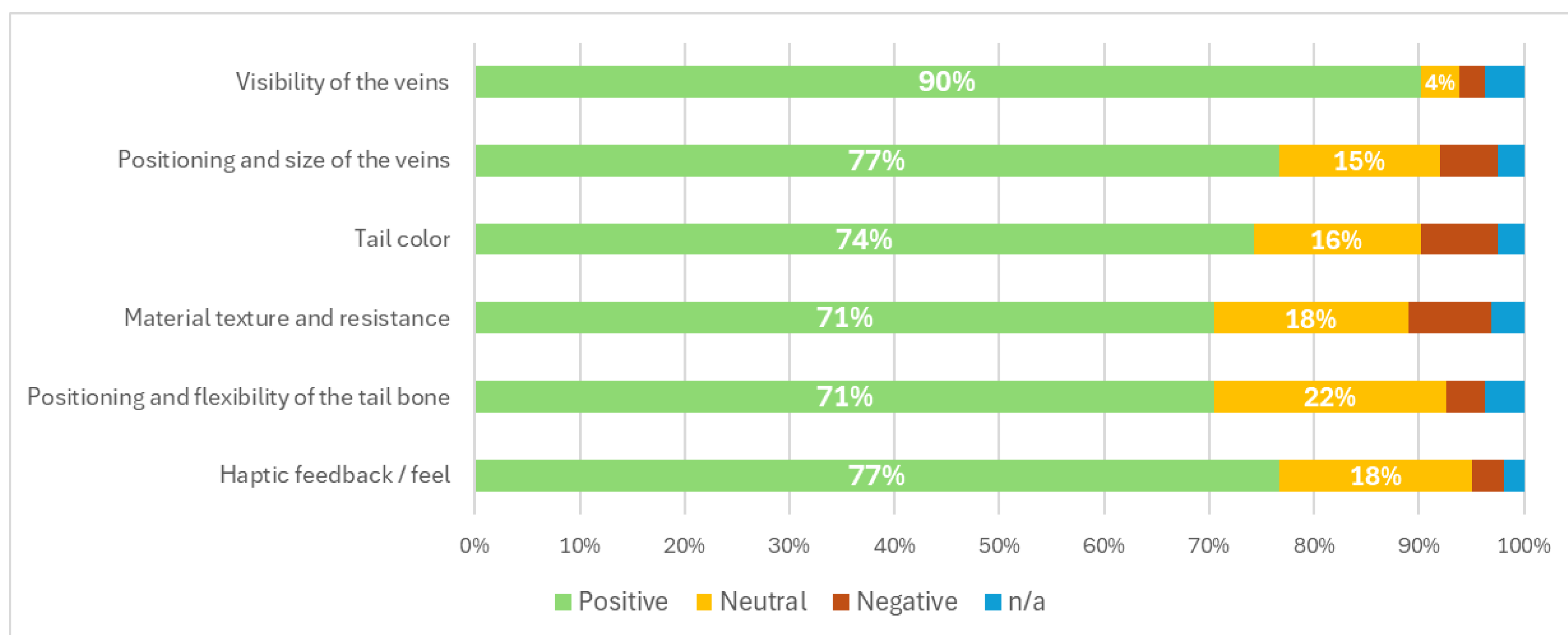
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## Conclusion

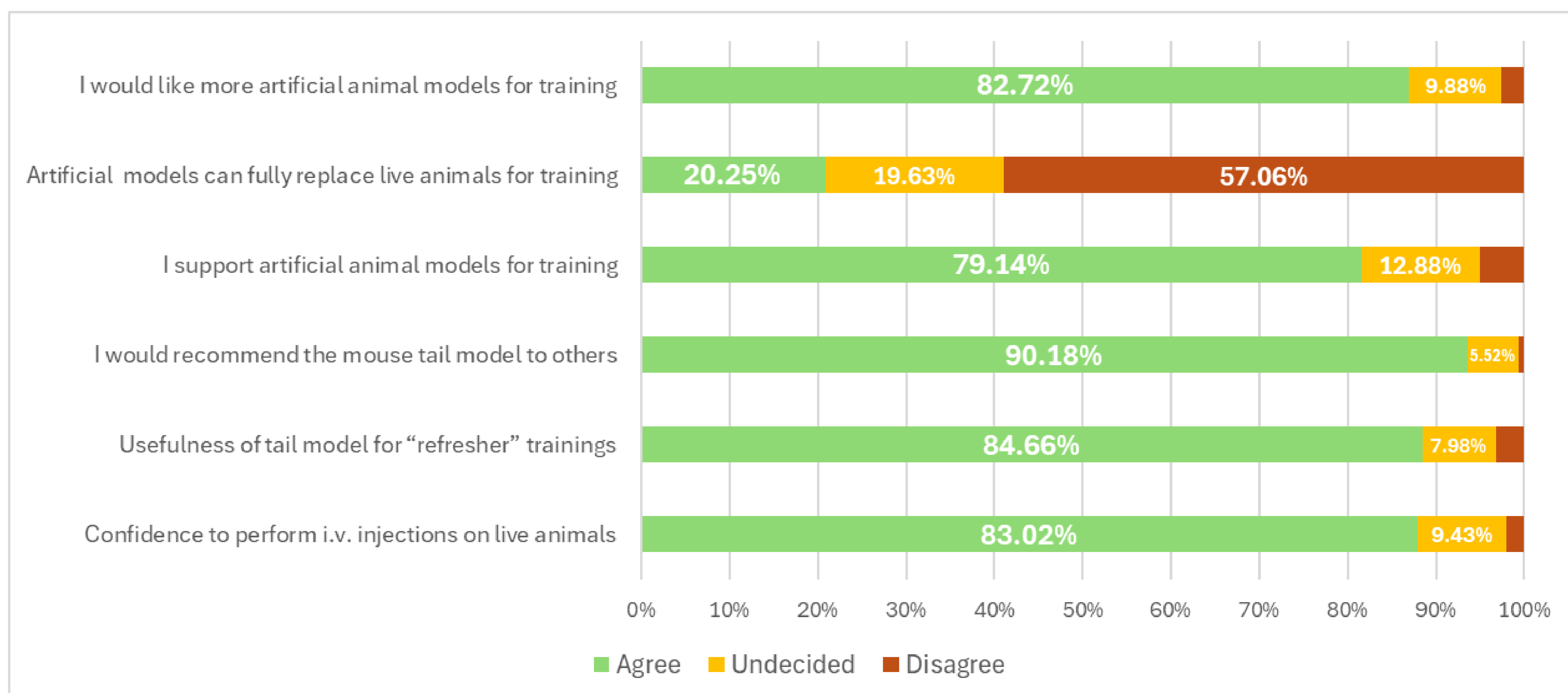
Preliminary results indicate a high level of acceptance of the mouse tail model as a training device. Anatomical features seem to resonate positively with most participants and the concept of training models as an alternative to the use of live animals is a welcome addition. However, the potential of artificial animal models to fully replace live animals for training is met with great scepticism. User suggestions for improvements are gradually implemented in further developments and lead to a continuation of the project. A refined, pigmented mouse tail model resembling the more commonly used C57Bl/6 mouse strain as well as a rat tail model are in development as a result of the user feedback.

## 4. Outlook

- Project continues with refined mouse tail model version(s); half-pigmented to resemble C57Bl/6 mouse tails
- Newly designed rat tail model planned
- Continued feedback survey
- Establishing an infrastructure for purchasable artificial tail models



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**Figures:** 4 Injection experience of the survey respondents in years (n = 163), 5 Rating of various anatomical features of the unpigmented mouse tail model (n = 163), 6 Levels of agreement on statements about the use of artificial models in general for training as well as the unpigmented mouse tail model specifically (n = 163)

## Useful links

[www.zirp.uzh.ch](http://www.zirp.uzh.ch)  
[www.amf.uzh.ch](http://www.amf.uzh.ch)



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