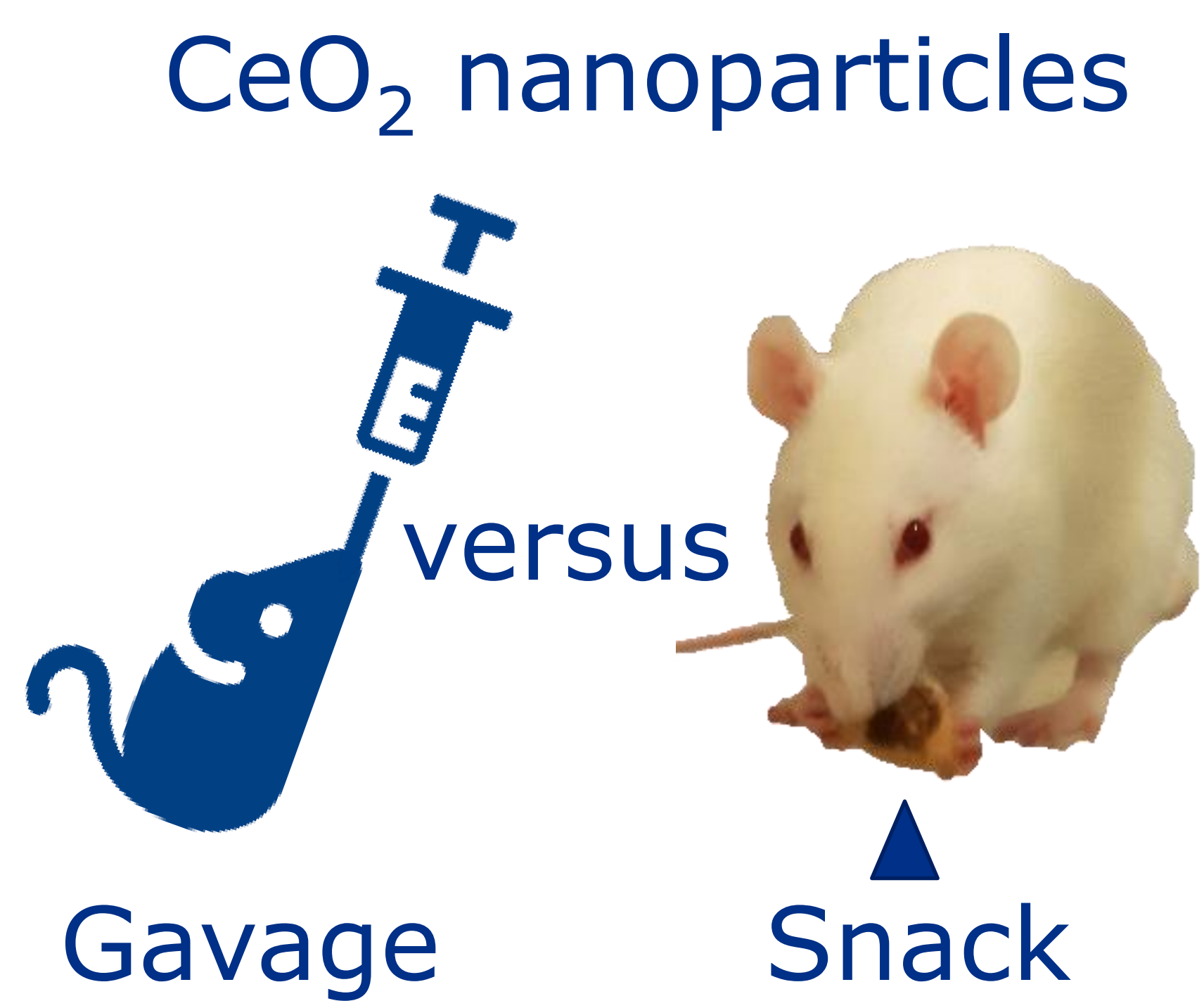


# Daily oral dosing of nanoparticles in rats – gavage versus snack

Trine Berthing<sup>1</sup> ([trb@nfa.dk](mailto:trb@nfa.dk)), Else Holmfred<sup>1,2</sup>, Janja Vidmar<sup>2</sup>, Niels Hadrup<sup>1</sup>,  
Alicja Mortensen<sup>1</sup>, Katrin Löschner<sup>2</sup>, Ulla Vogel<sup>1,2</sup>

1: National Research Centre for the Working Environment, Denmark; 2: DTU, Denmark



Species	Female Sprague Dawley rats, N=4
Dose	0, 1.4 or 13 mg/rat/day of CeO <sub>2</sub> NM-212
Exposure	5 days/week for 1 or 2 weeks +2 weeks recovery

## Animal welfare

- ✓ reduce restrain-associated stress
- ✓ voluntary versus force feeding
- ✓ no risk of oesophageal injury or misdosing in airways

## Preferred by animal caretakers

- ✓ less time consuming than gavage
- ✓ better ergonomics
- ✓ higher work satisfaction to give snacks

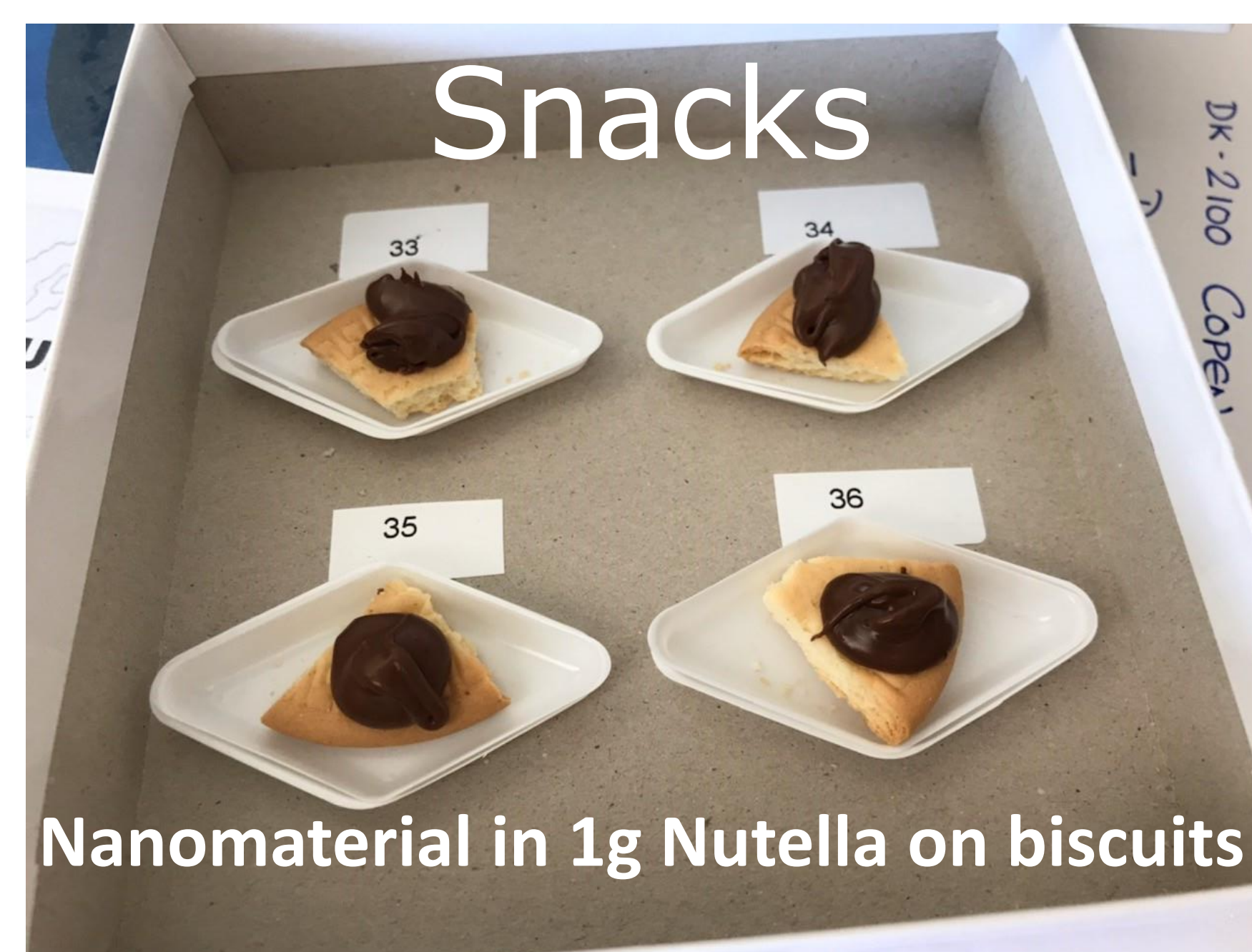
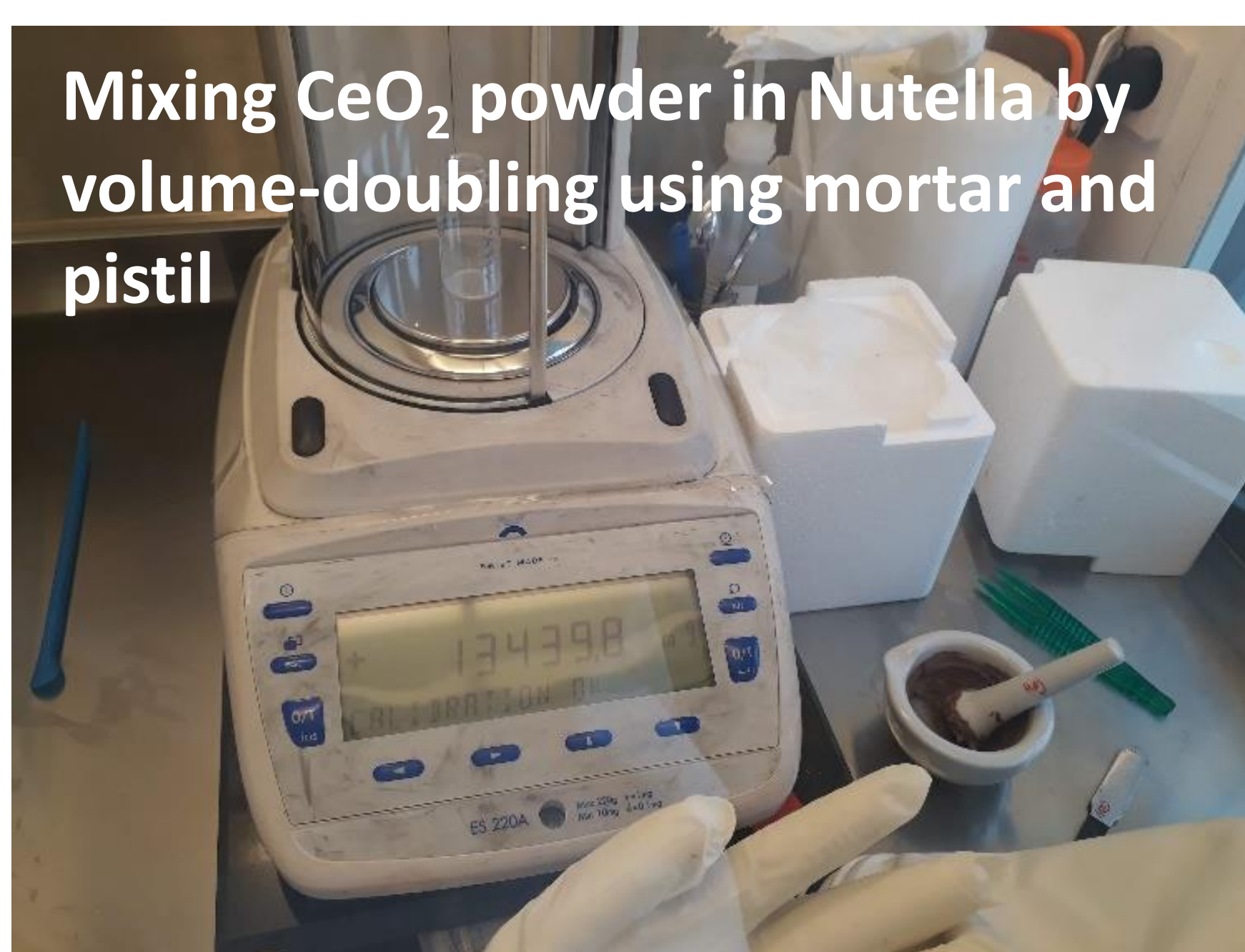
## Nanomaterial in daily snack

- ✓ effective and precise administration of target dose
- ✓ more realistic exposure than gavage
- ÷ Unknown agglomeration of nanomaterial

## SOP

[www.patrols-h2020.eu/publications/sops/](http://www.patrols-h2020.eu/publications/sops/)

Title: Preparation of snacks for repeated oral administration of nanomaterial to laboratory rats, ID: 2401



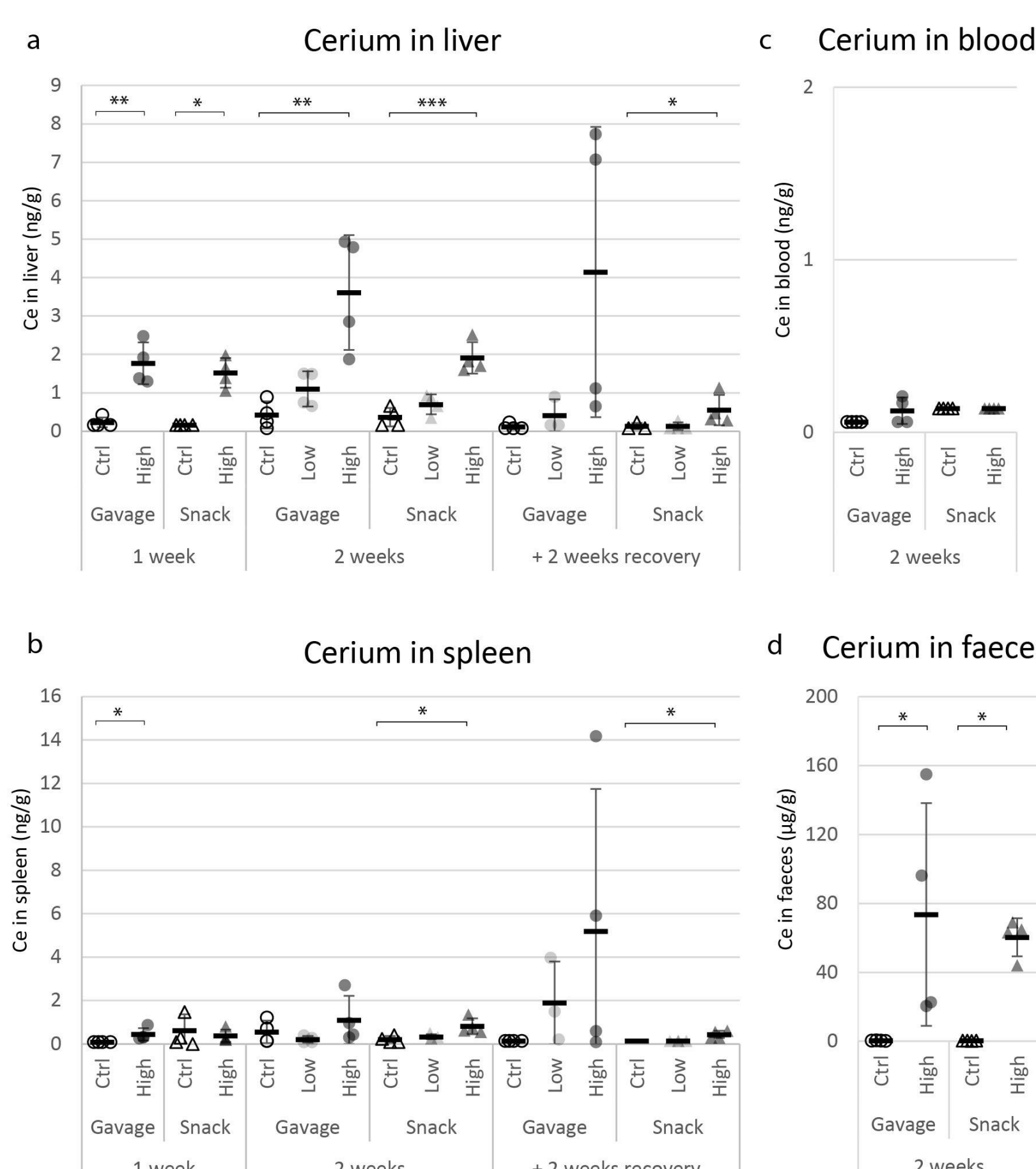
## Target dose achieved

	Target dose CeO <sub>2</sub> (mg/g)	Achieved dose <sup>A</sup> CeO <sub>2</sub> (mg/g)
Chocolate spread - control	0	0.004 ± 0.005
Chocolate spread - CeO <sub>2</sub> low	1.4	1.4 ± 0.2
Chocolate spread - CeO <sub>2</sub> high	13	14.5 ± 2.3
Feed		0.0005



Rats voluntarily ate the daily snack within minutes

## Cerium concentration in faeces, liver and spleen



Comparable to gavage

Less inter-individual variation

## Reference

Berthing, T., E. Holmfred, J. Vidmar, N. Hadrup, A. Mortensen, J. Szarek, K. Loeschner and U. Vogel (2022). "Comparison of biodistribution of cerium oxide nanoparticles after repeated oral administration by gavage or snack in Sprague Dawley rats." ETAP



Trine Berthing  
[trb@nfa.dk](mailto:trb@nfa.dk)