

# Exposure to micro- and nanoplastics in *Schmidtea mediterranea* causes impaired (neuro)regeneration

## Citation for published version (APA):

Tytgat, J., Leynen, N., Van Belleghem, F. G. A. J., Bijmens, K., Saenen, N., & Smeets, K. (2022). *Exposure to micro- and nanoplastics in Schmidtea mediterranea causes impaired (neuro)regeneration*. Poster session presented at 5th European Meeting on Planarian Biology, Sant Feliu de Guixols, Spain.

## Document status and date:

Published: 03/10/2022

## Document Version:

Publisher's PDF, also known as Version of record

## Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

## General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

<https://www.ou.nl/taverne-agreement>

## Take down policy

If you believe that this document breaches copyright please contact us at:

[pure-support@ou.nl](mailto:pure-support@ou.nl)

providing details and we will investigate your claim.

Downloaded from <https://research.ou.nl/> on date: 19 Nov. 2022

Open Universiteit  
[www.ou.nl](http://www.ou.nl)



# Exposure to micro- and nanoplastics in *Schmidtea mediterranea* causes impaired (neuro)regeneration

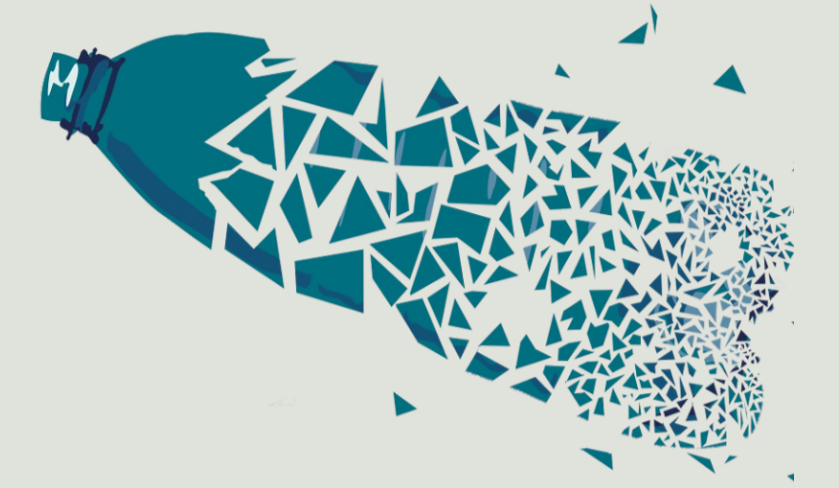
Tytgat Julie<sup>1</sup>; Leynen Nathalie<sup>1</sup>; Van Belleghem Frank<sup>1, 2</sup>; Saenen Nelly<sup>1</sup>; Bijmens Karolien<sup>1</sup>; Smeets Karen<sup>1</sup>

1: Centre for Environmental Sciences, Zoology, Biodiversity and Toxicology; Hasselt University; Hasselt; Belgium.

2: Department of Environmental Sciences; Faculty of Science; Open Universiteit; Heerlen; the Netherlands.

## Background

- Due to the lack of proper waste management and disposal, plastic degrades to **micro- and nanoplastics (MNPs)** and ends up in the **aquatic environment**.
- MNPs are plastic fragments smaller than **5 mm** and **100 nm** respectively.
- Studies showed that MNPs are potentially harmful but detailed knowledge on **developing organisms** and the link between the **physicochemical properties** is missing, which is needed for **sufficient risk assessment strategies**.
- We focused on **particle characterization** since knowledge of the physicochemical characteristics is necessary to gain insights into the mechanisms of particle toxicity
- ***Schmidtea mediterranea*** is used as a proxy to study developmental toxicity and is exposed to carboxylated polystyrene MNPs of 49 nm (PS49), 215 nm (PS215), 1 µm (PS01) and 2 µm (PS02) in diameter. This creates an *in vivo* model system in line with the 3R guidelines to study particle toxicity.

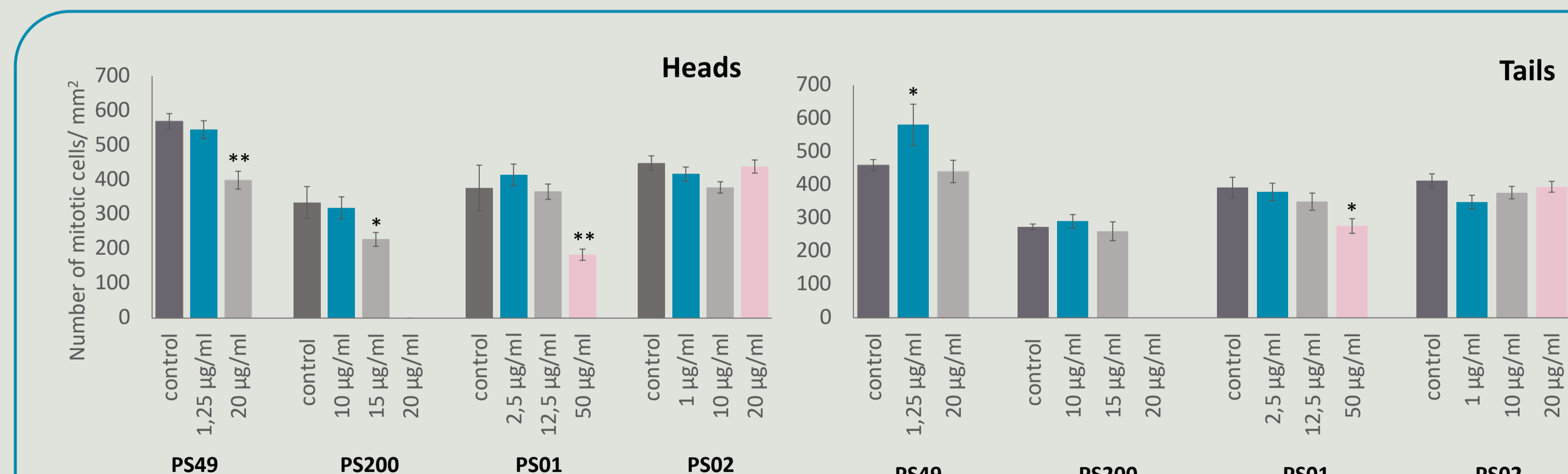
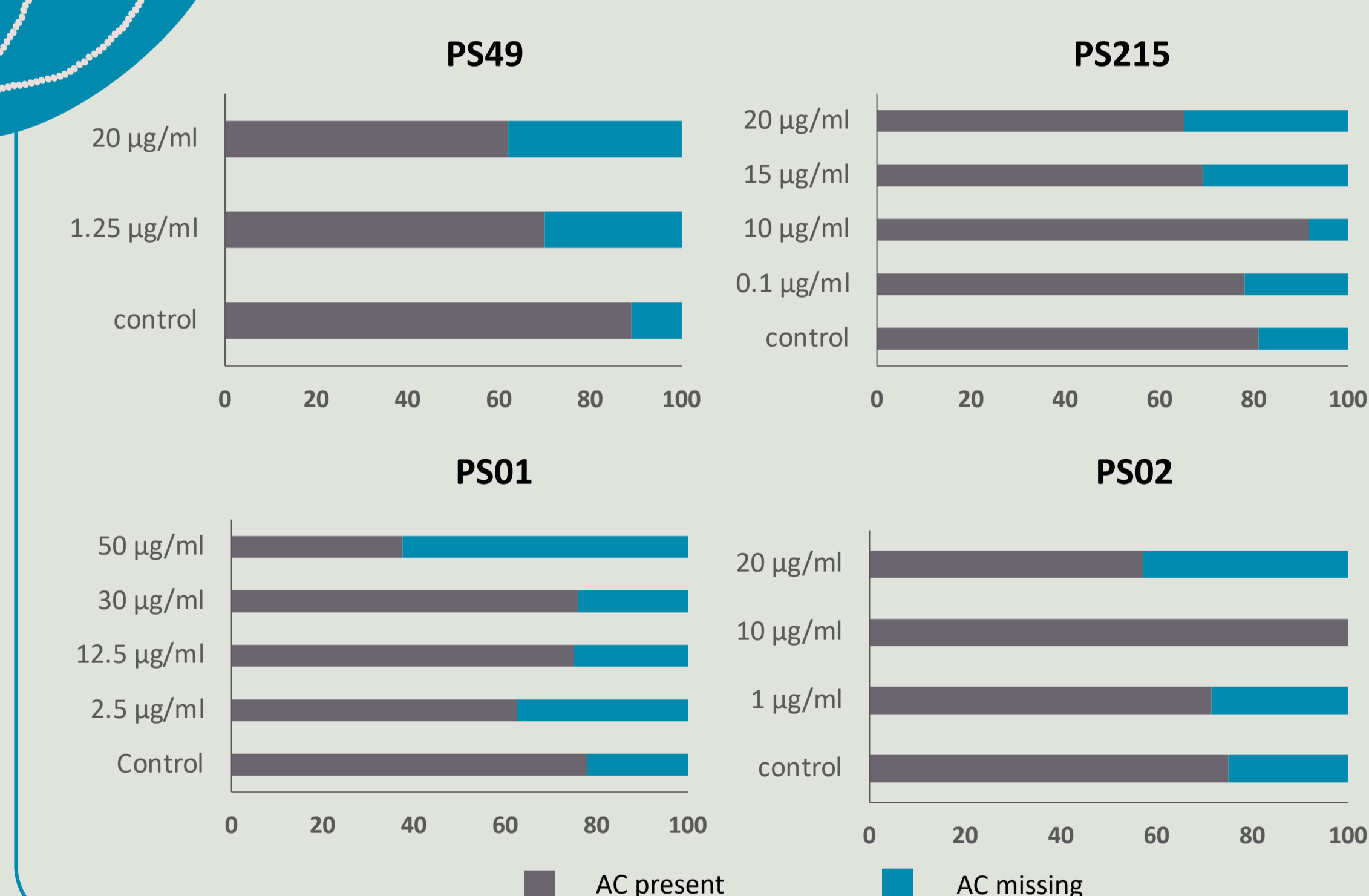
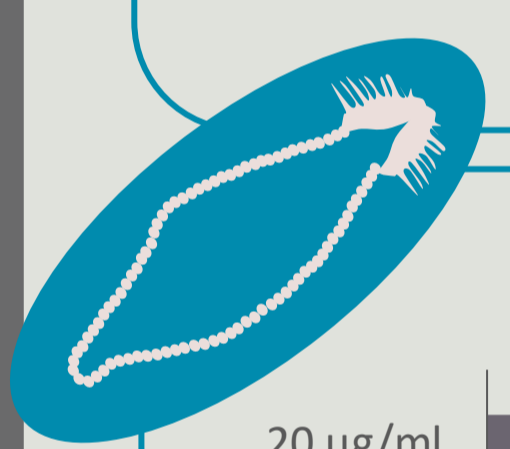
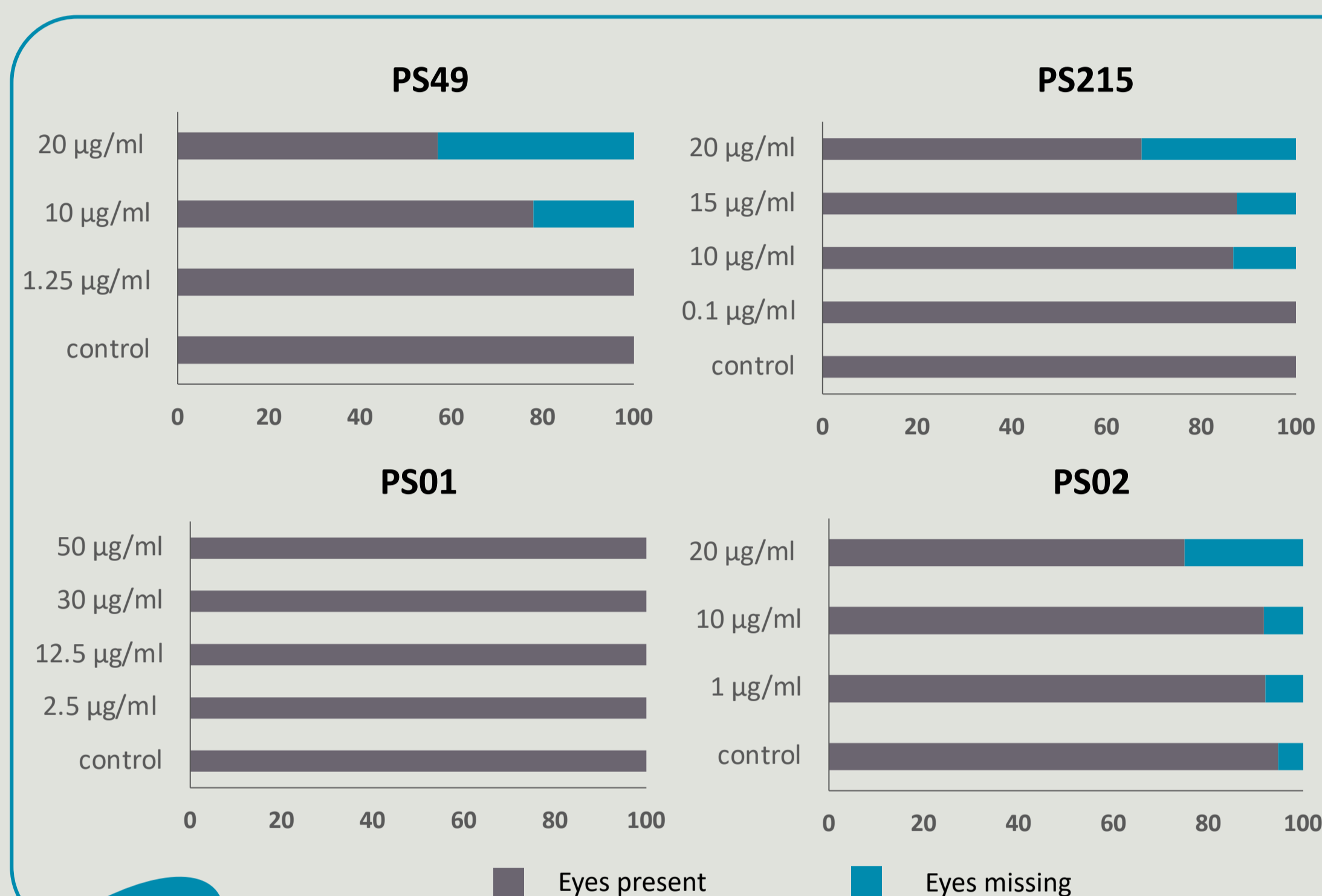


## Aim

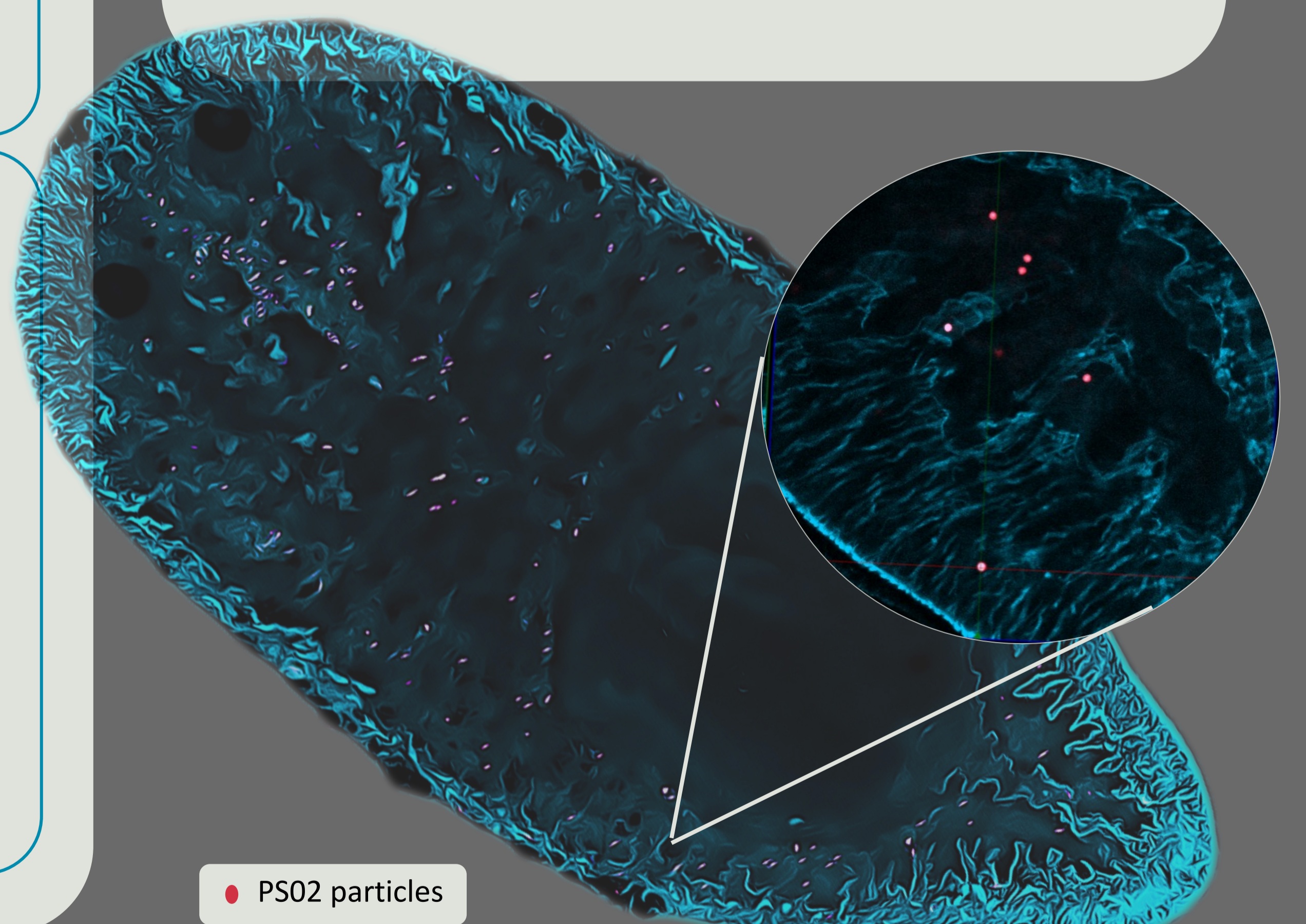
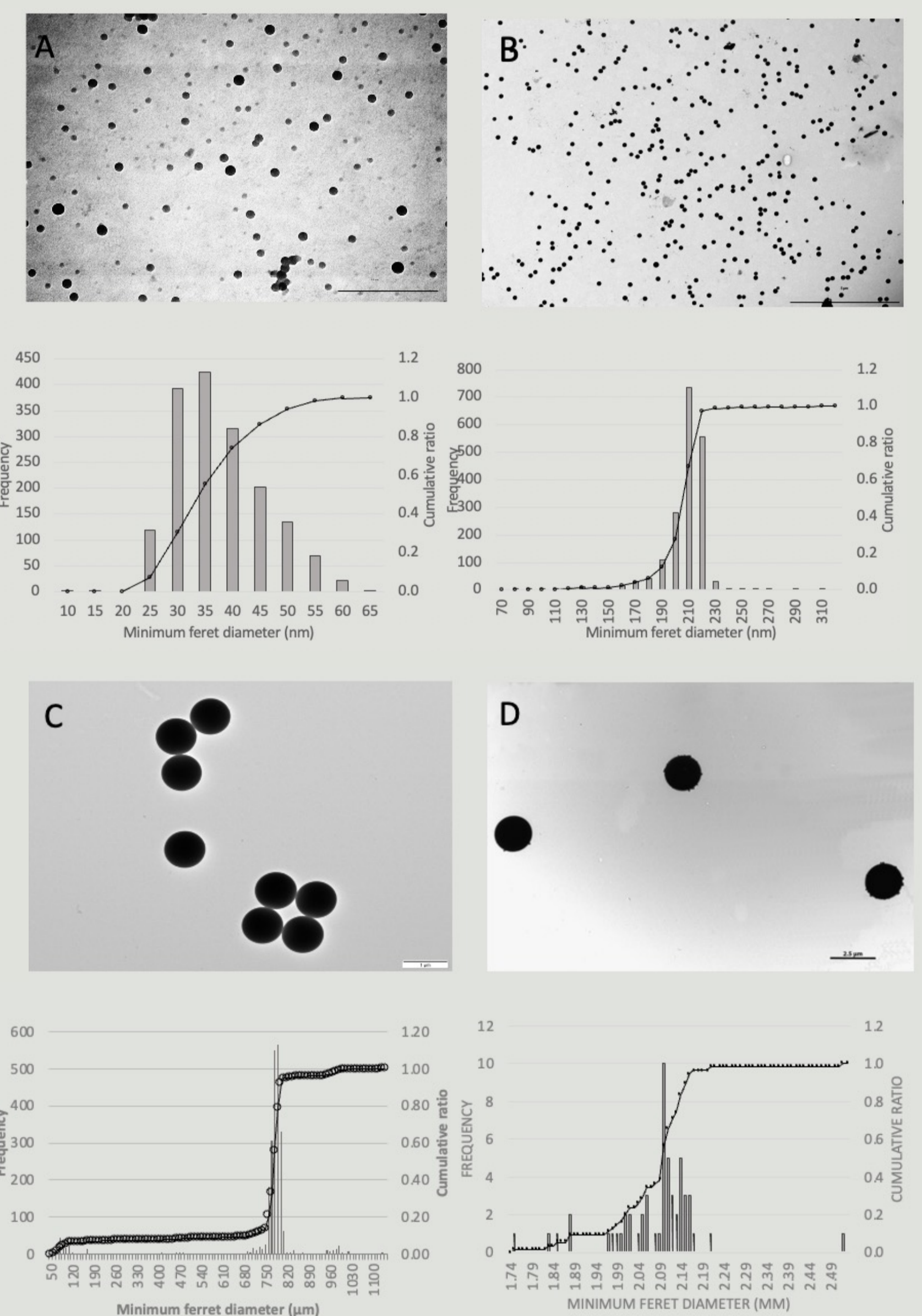


To link **physicochemical properties** with induced effects to properly define MNP-specific **adverse outcome pathways** in the function of **new risk assessment strategies** by focusing on developing tissues in the planarian model system.

## Impaired (neuro)regeneration



## Particle characterization



## Conclusions and future perspectives



- All particles caused **impaired (neuro)regeneration** and delayed eye and anterior commissure development in a **concentration and size-dependent** way.
- An affected **stem cell division** underlies these effects
- Because previous studies showed that nanoparticles are located nearby mitochondria, I hypothesize that disturbed **mitochondrial redox dynamics** can explain the toxic effects.
- By linking particle property changes within cells with the mechanistic effects, **more complete risk assessment strategies** can be established in the future.

Tytgat Julie

julie.tytgat@uhasselt.be

Julie Tytgat

**BiTE** Lab  
www.BiTElab.be

**CMK**  
CENTRE FOR ENVIRONMENTAL SCIENCES  
▶▶ **UHASSALT**