



# Glyco-gold nanoparticles as smart tools in nanomedicine: synthesis and biodistribution in healthy mice

**ACS Spring 2021**

**SCITEC-CNR**

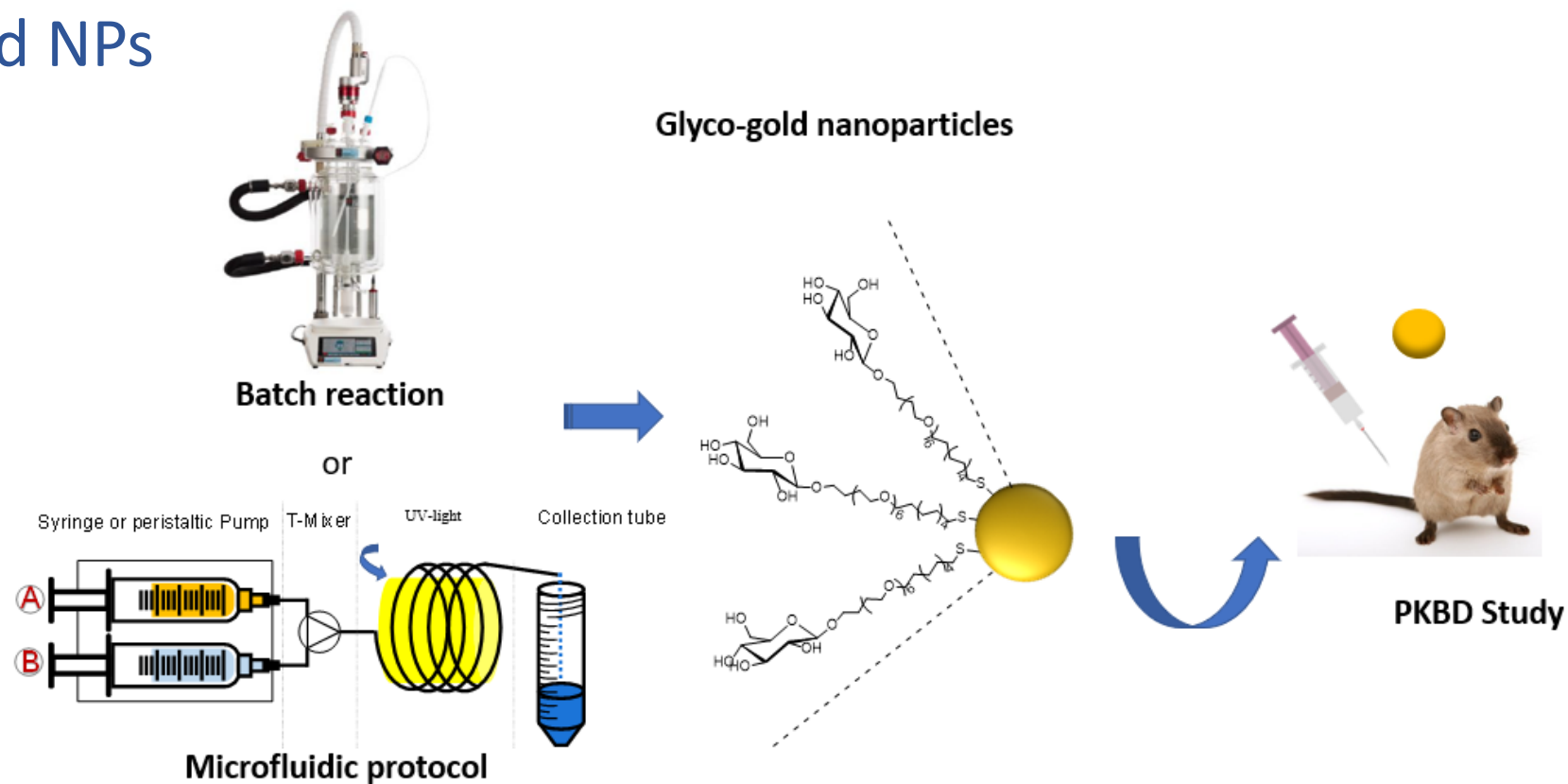
**08.04.2021**

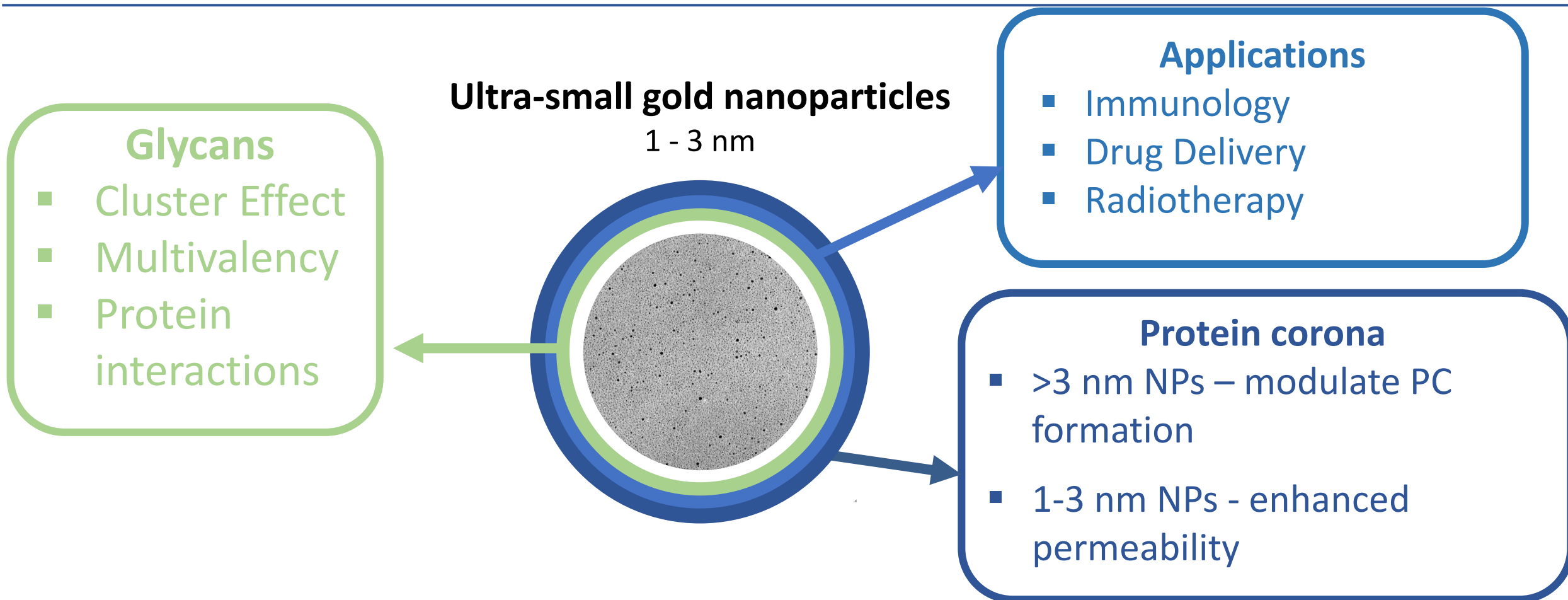
Patricia Pérez Schmidt

PhD student

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- Introduction - Glyco-Gold NPs
- Biodistribution study
- Synthesis Glyco-Gold Nanoparticles



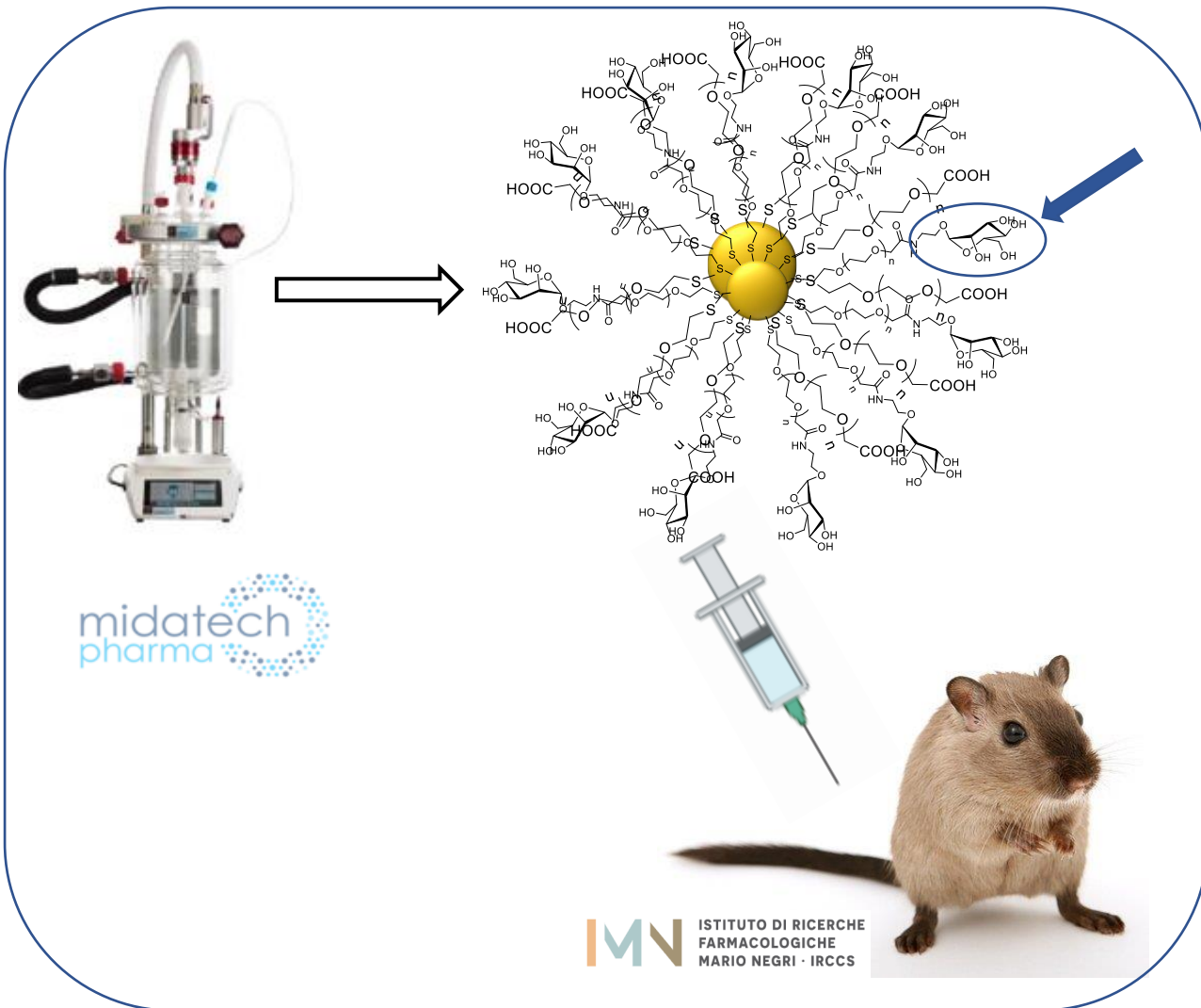


Boselli, L.; Polo, E.; Castagnola, V.; Dawson, K. A. Regimes of Biomolecular Ultrasmall Nanoparticle Interactions. *Angew. Chem. Int. Ed.* **2017**, *56* (15), 4215–4218.

Compostella, F.; Pitirollo, O.; Silvestri, A.; Polito, L. Glyco-Gold Nanoparticles: Synthesis and Applications. *Beilstein J. Org. Chem.* **2017**, *13*, 1008–1021.

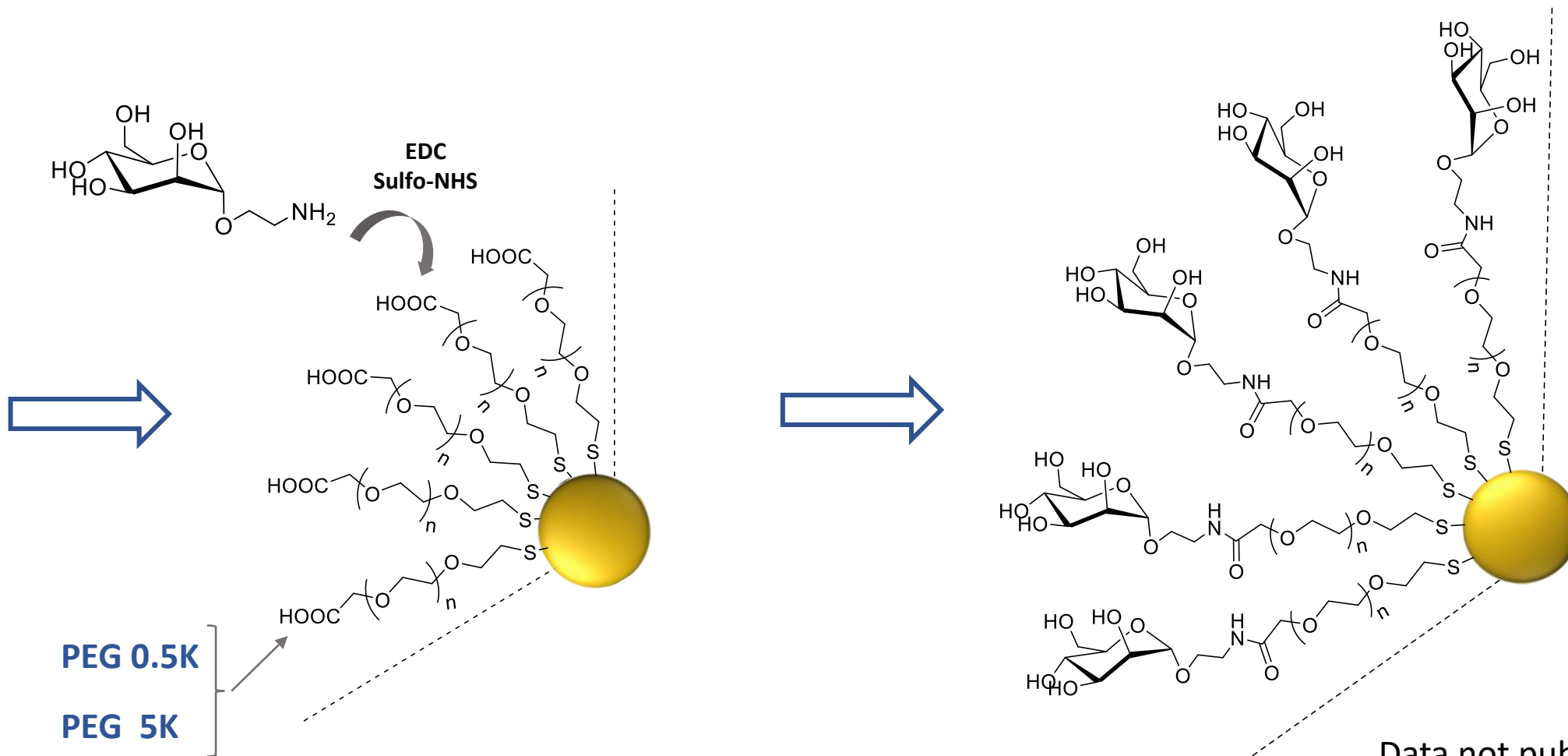
Lundquist, J. J.; Toone, E. J. The Cluster Glycoside Effect. *Chem. Rev.* **2002**, *102* (2), 555–578

# Design Biodistribution study



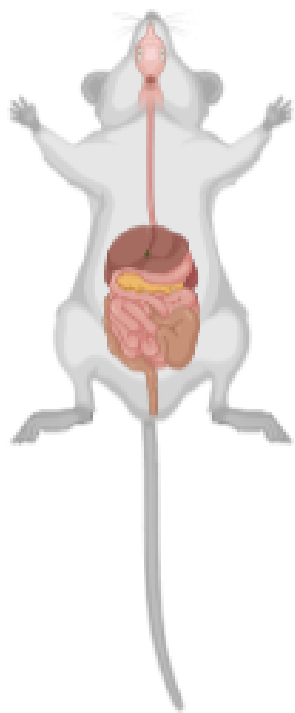
- 4 nm AuNPs
  - PEG 0.5 K
  - PEG 5K
  - PEG 0.5K –  $\alpha$ -Mannose
  - PEG 5K –  $\alpha$ -Mannose
- 52 mice
- 3 time points (1h, 4h and 24h)
- All organs collected
- Dose: 300  $\mu$ g/kg

# Biodistribution



Data not published  
 confidential

# Biodistribution



## Organs

Kidneys    Liver  
Blood      Spleen  
Lungs      Brain

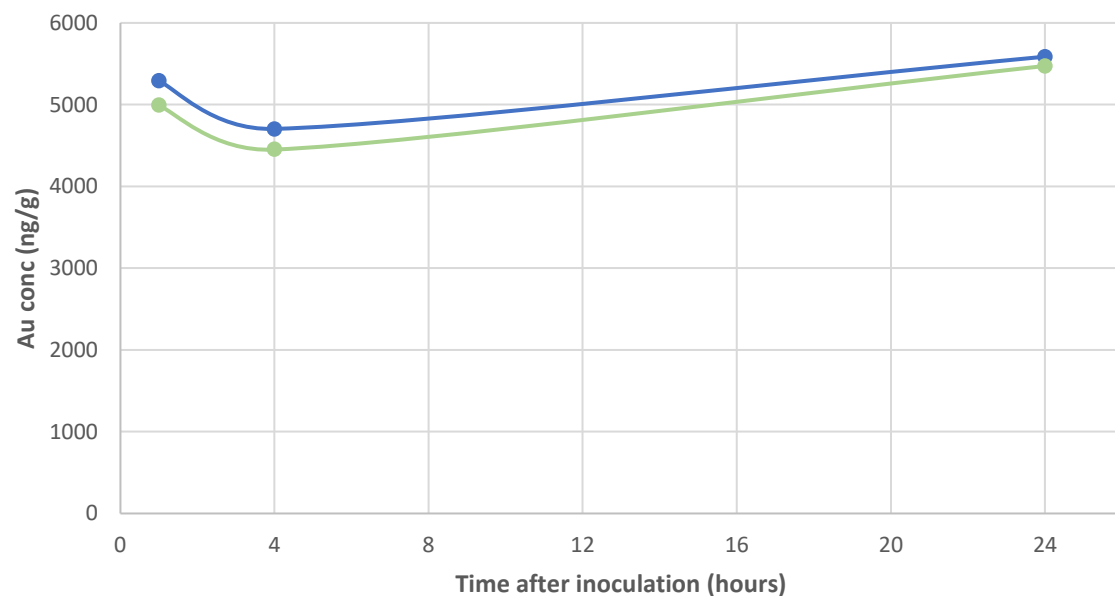
## Digestion

**2x** HNO<sub>3</sub>:H<sub>2</sub>O<sub>2</sub>(3:1)  
**2x** HCl: HNO<sub>3</sub> (3:1)

## Analysis by ICP-OES

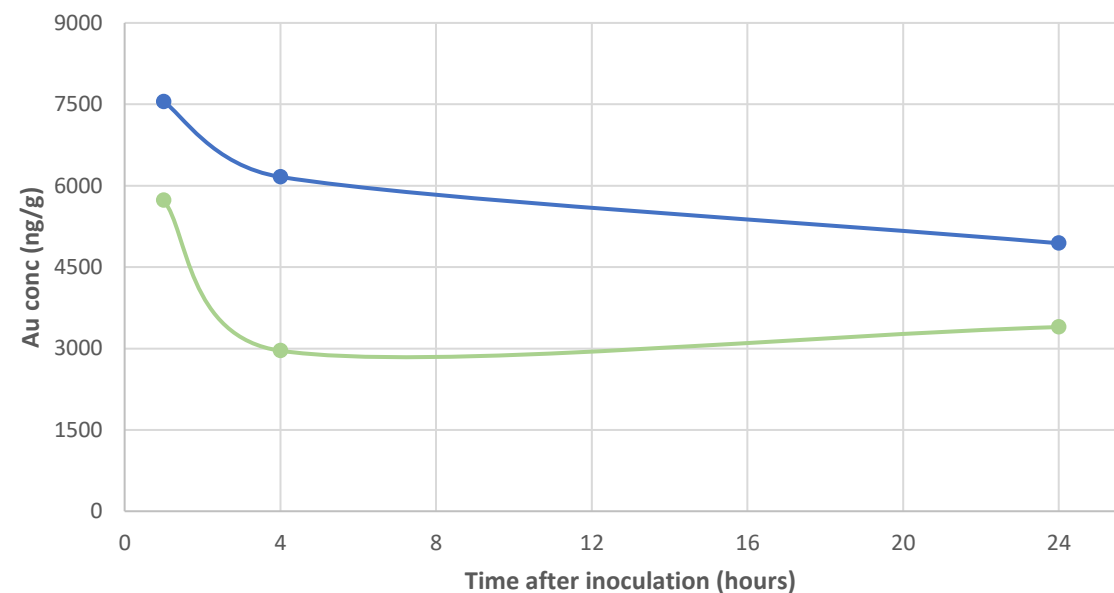
# Biodistribution - Results

## KIDNEYS



—●— AuNPs PEG 0.5K    —●— AuNPs PEG 5K

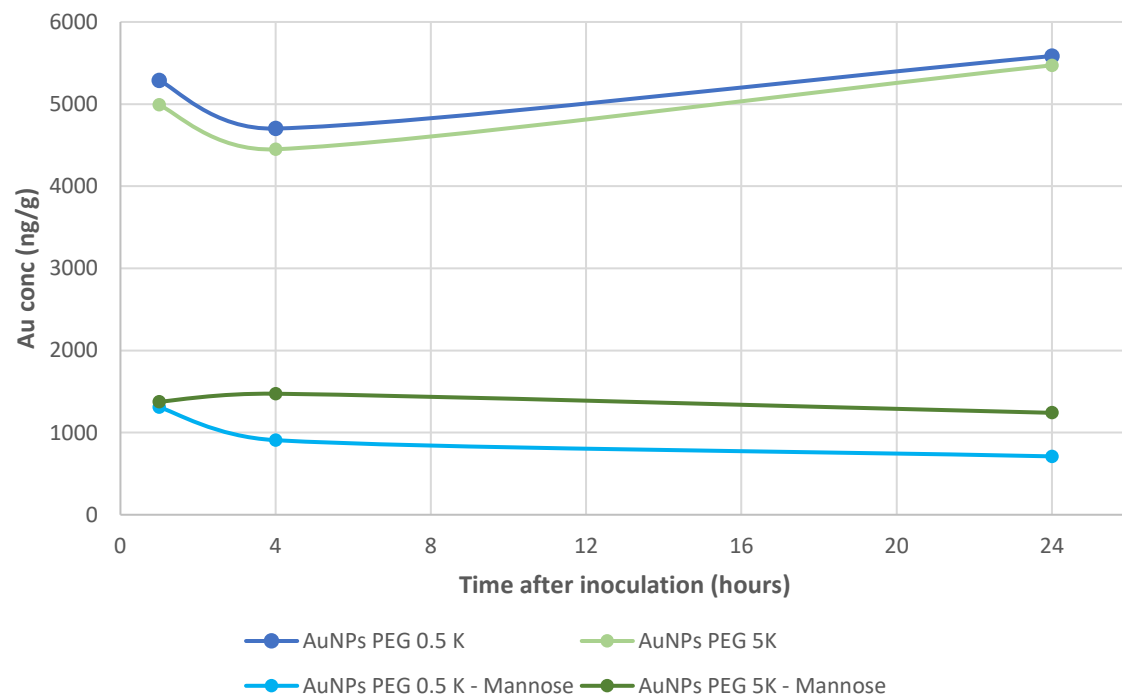
## LIVER



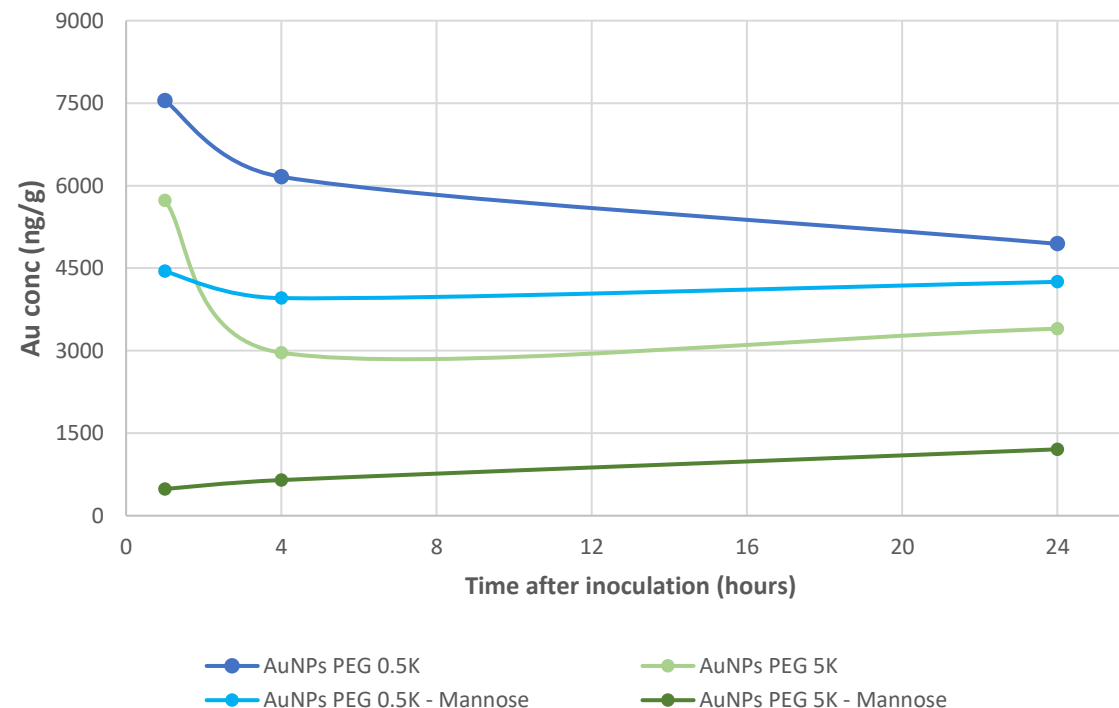
—●— AuNPs PEG 0.5K    —●— AuNPs PEG 5K

# Biodistribution - Results

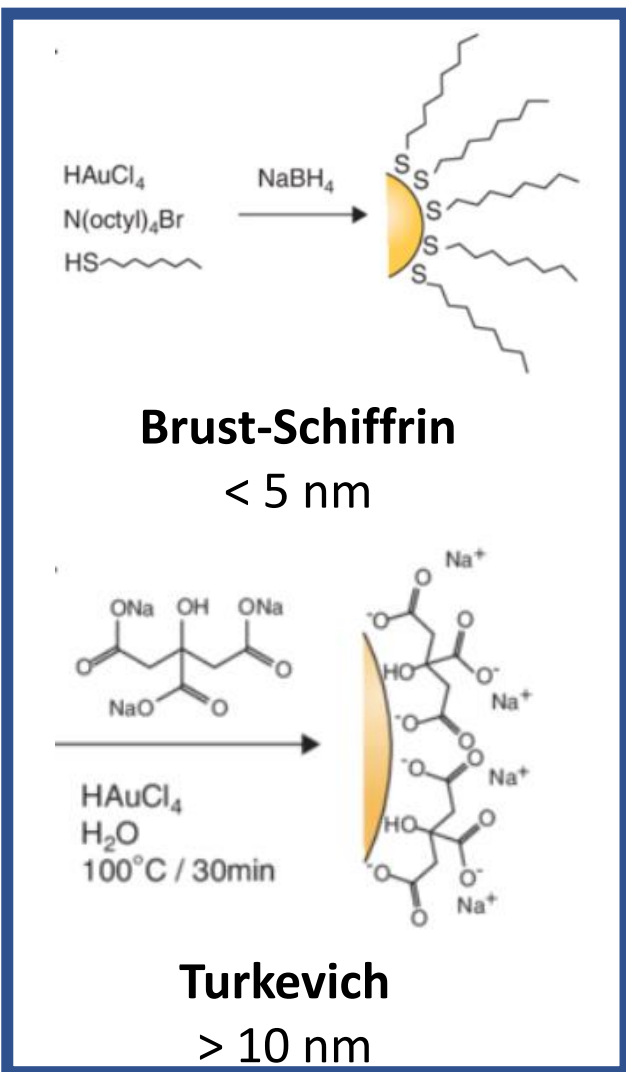
## KIDNEYS



## LIVER







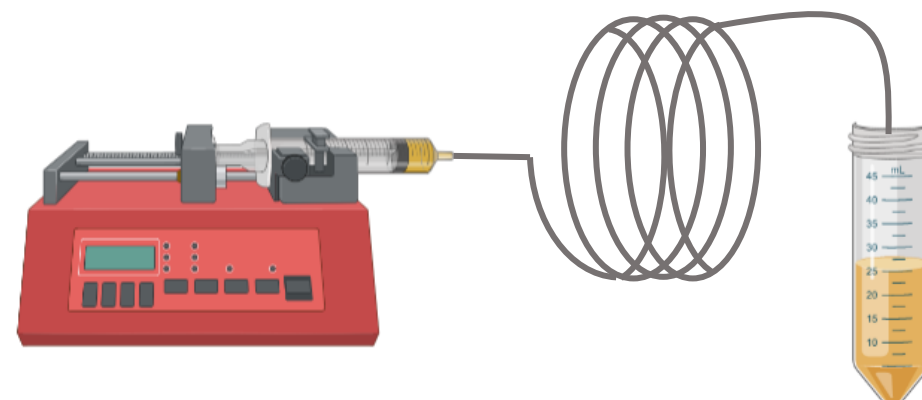
**Is it possible to produce one-pot Glyco-Gold NPs in a microfluidic system?**



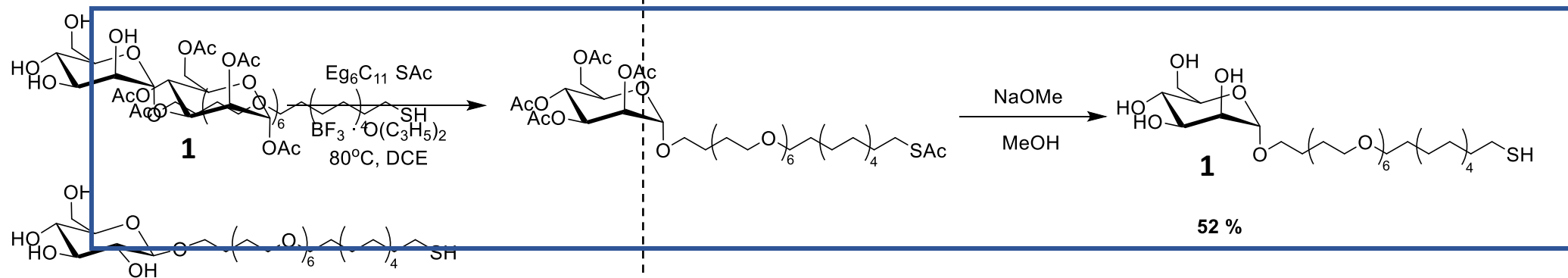
**Microfluidic system**

**Advantages**

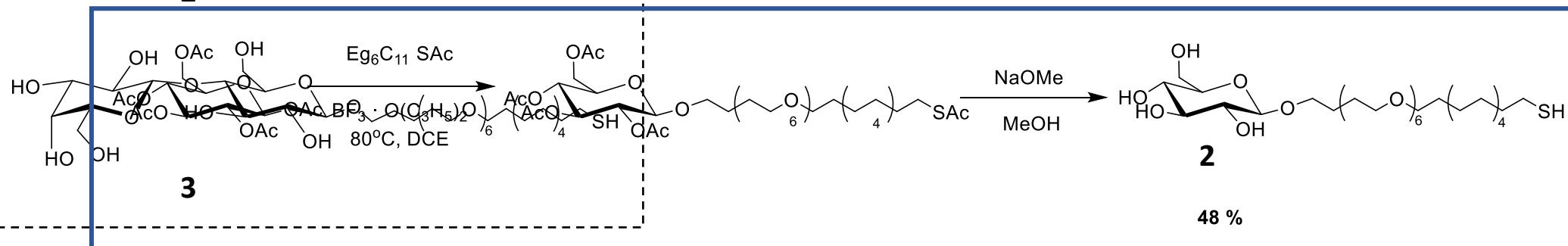
- Reproducibility
- Automation
- Scale-up
- Homogeneity
- Modular system

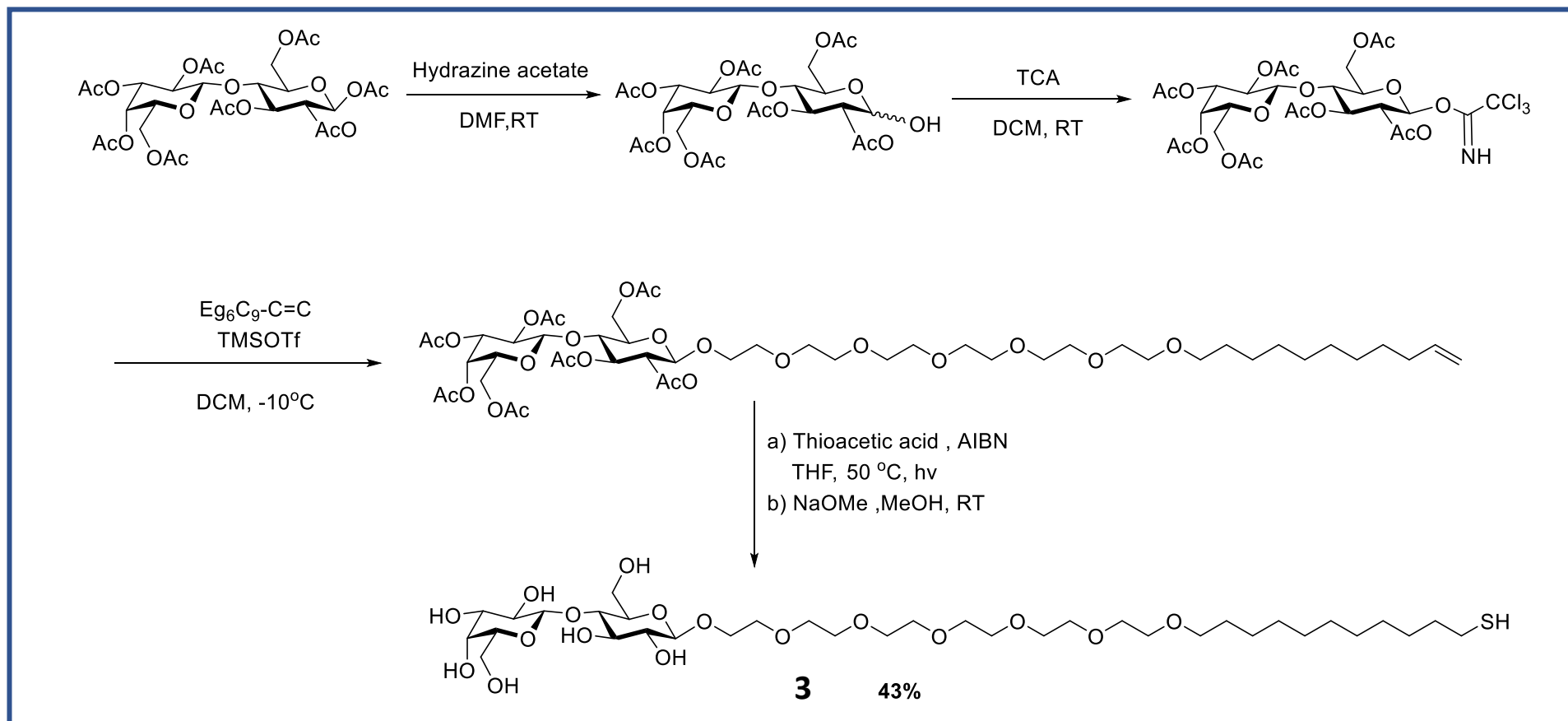


# Glyco-Gold NPs



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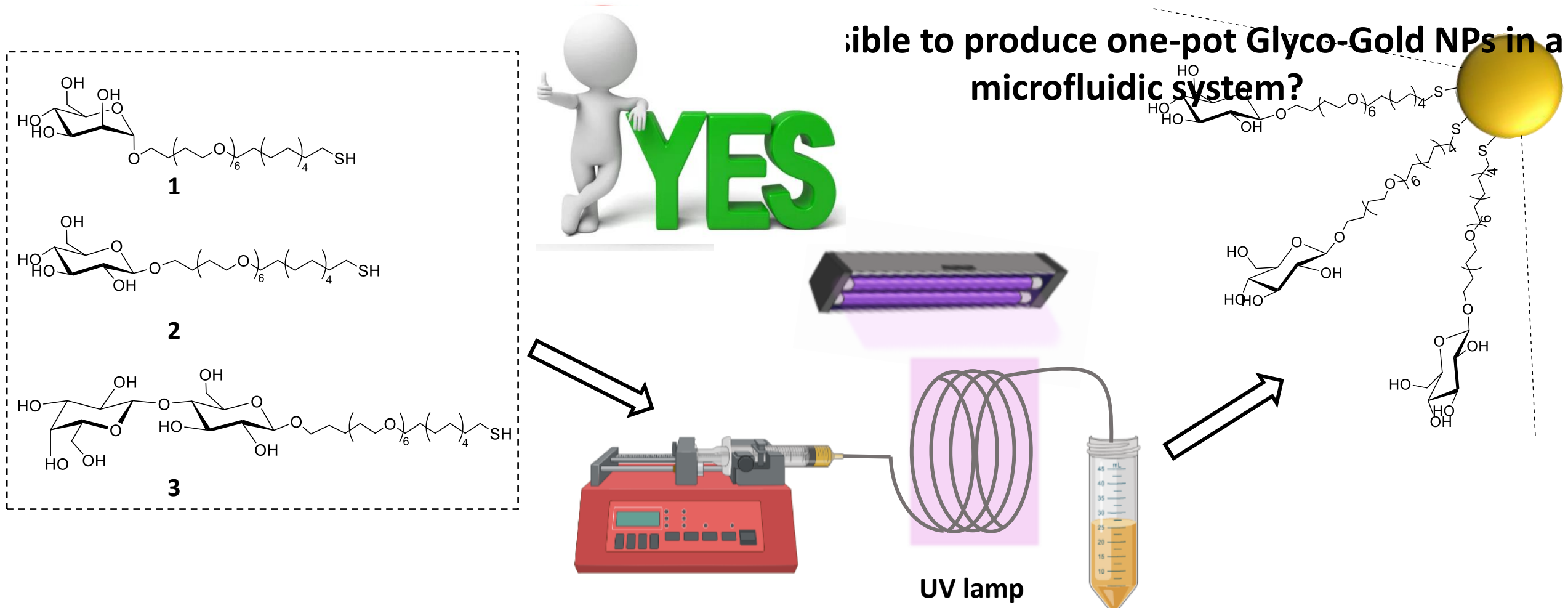




Barrientos, Á. G.; de la Fuente, J. M.; Rojas, T. C.; Fernández, A.; Penadés, S. Gold Glyconanoparticles: Synthetic Polyvalent Ligands Mimicking Glycocalyx-Like Surfaces as Tools for Glycobiological Studies. *Chem. Eur. J.* **2003**, 9 (9), 1909–1921.

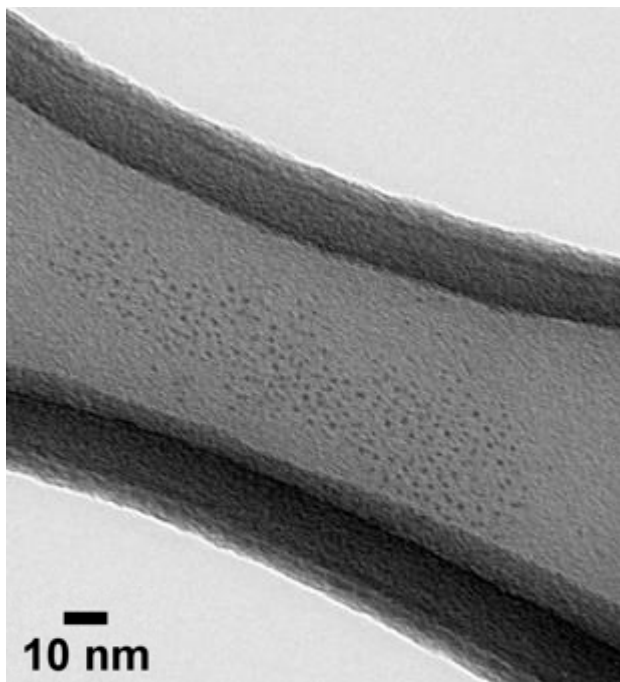
Synthesized during the period at Midatech Pharma España

# Glyco-Gold NPs

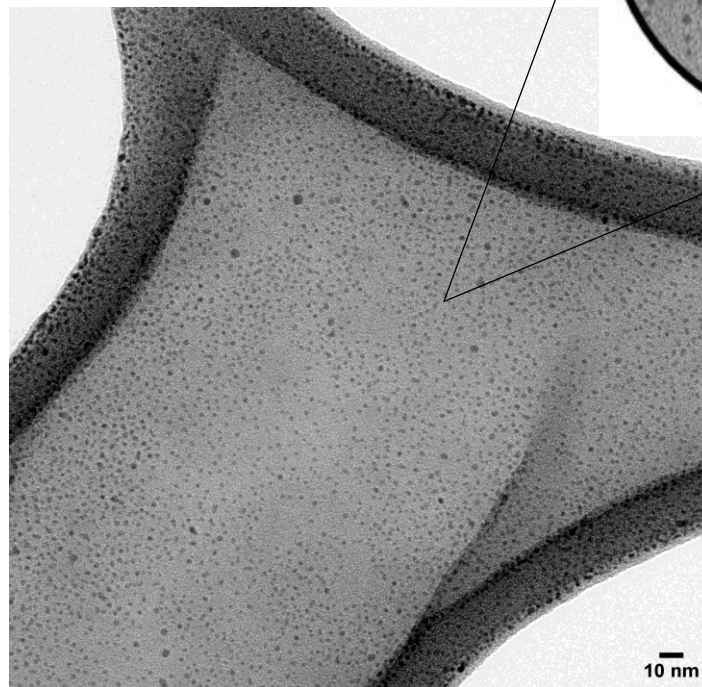


# TEM - Results

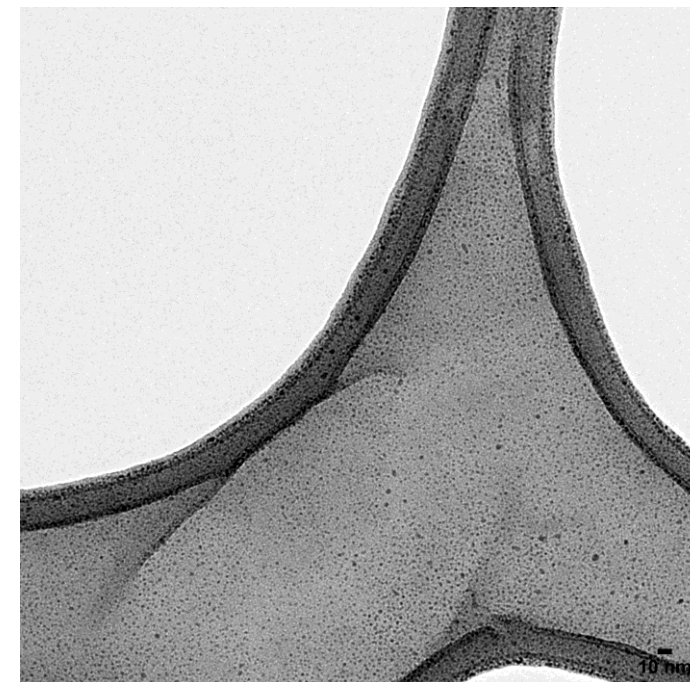
**Au NPs 1 - Mannose**  
 $1,97 \pm 0,2$  nm



**Au NPs 2 - Glucose**  
 $1,93 \pm 0,4$  nm



**Au NPs 3 - Lactose**  
 $1,87 \pm 0,3$  nm



Data not published - confidential

# Acknowledgements

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