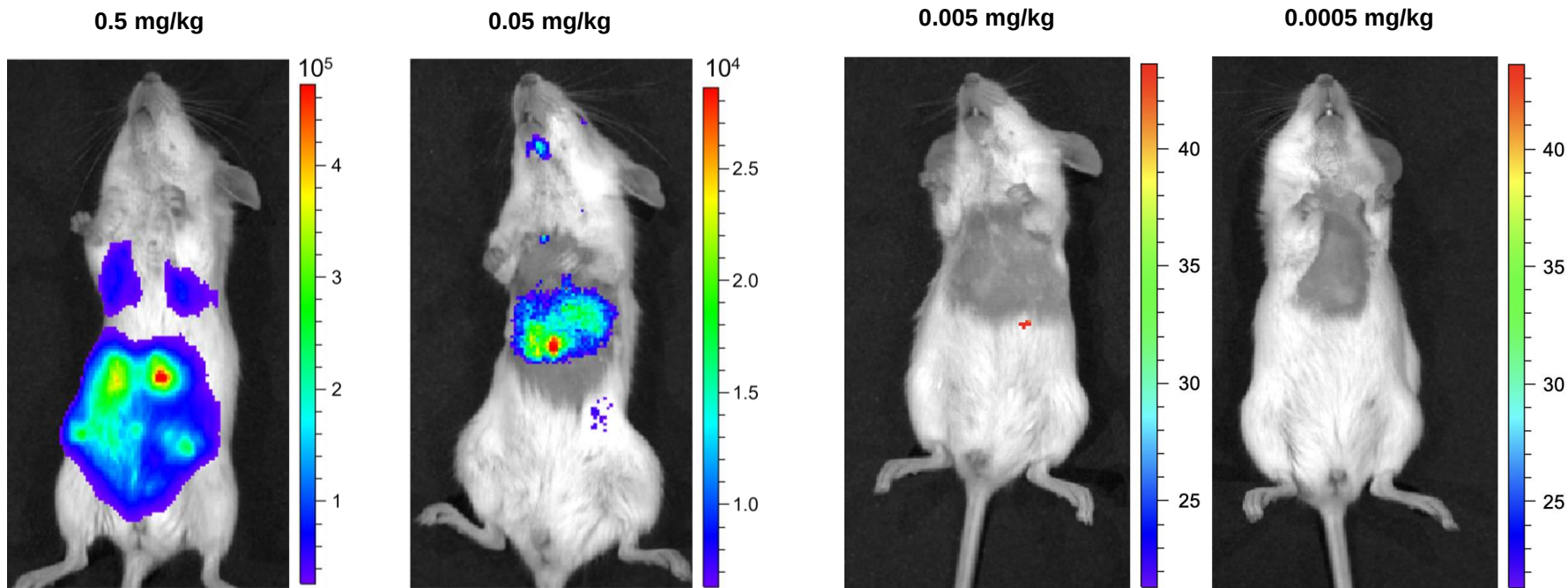


A DNA-Guided Lipid Nanoparticle Platform for Targeted Drug Delivery Beyond the Liver

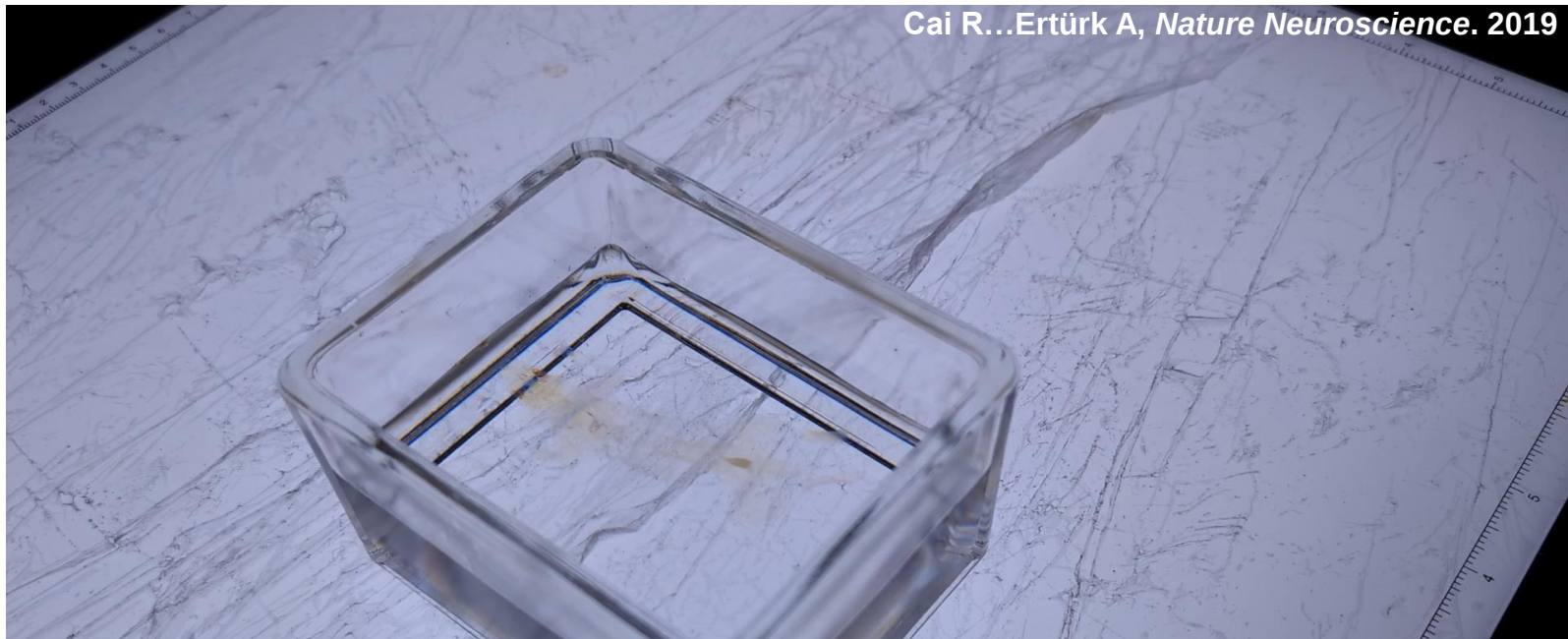
Karoline Kadletz, PhD student
Ertürk Lab
Helmholtz Zentrum Munich

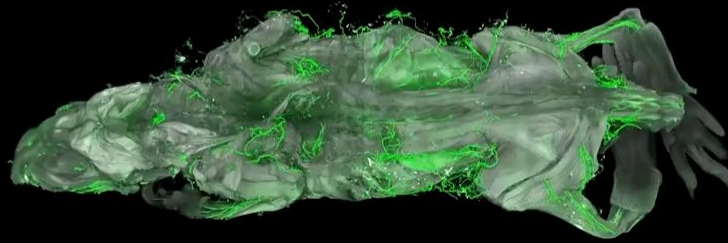
No current method can assess nanocarrier tropism organism-wide at cellular resolution



We use **optical transparency** to enable high resolution fluorescent imaging

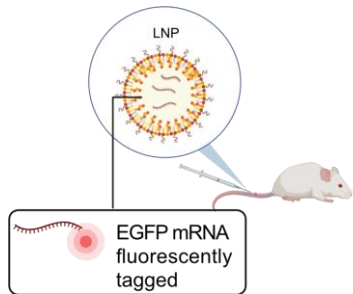
Cai R...Ertürk A, *Nature Neuroscience*. 2019





Imaging nanocarriers on a whole body scale: SCP-nano

① Nanoparticle administration

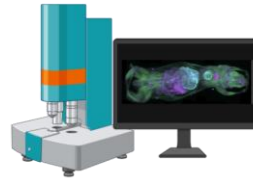


② Whole mouse tissue clearing



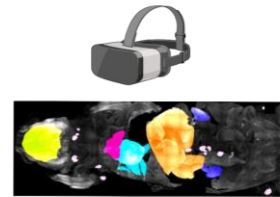
- Decolorization, Decalcification
- Dehydration, Delipidation
- RI matching

③ LSFM Imaging + Image Reconstruction



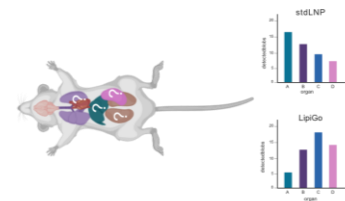
- Whole body fluorescence Imaging
- reconstruction of a 3d image

④ automated organ segmentation



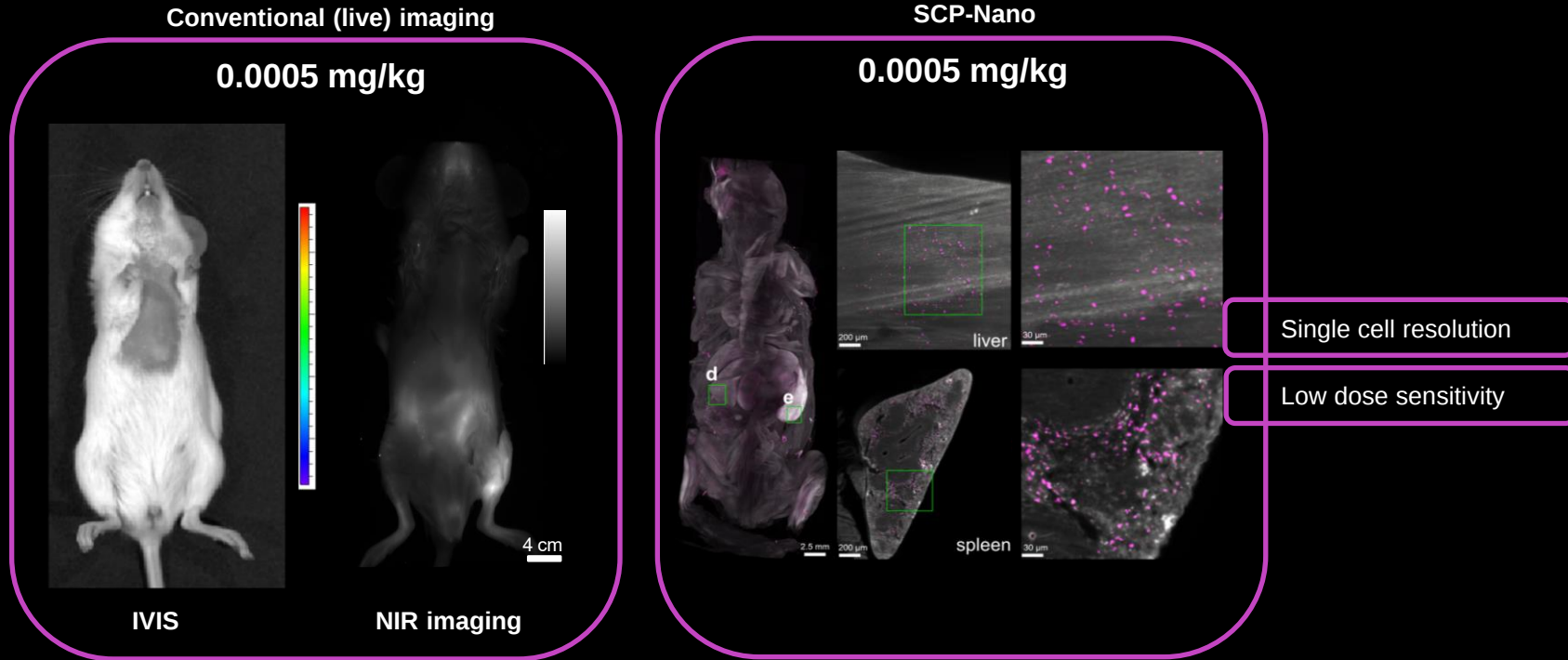
- automated 3D organ segmentation
- VR-based correction of segmentation

⑤ DL-based blob detection and quantification



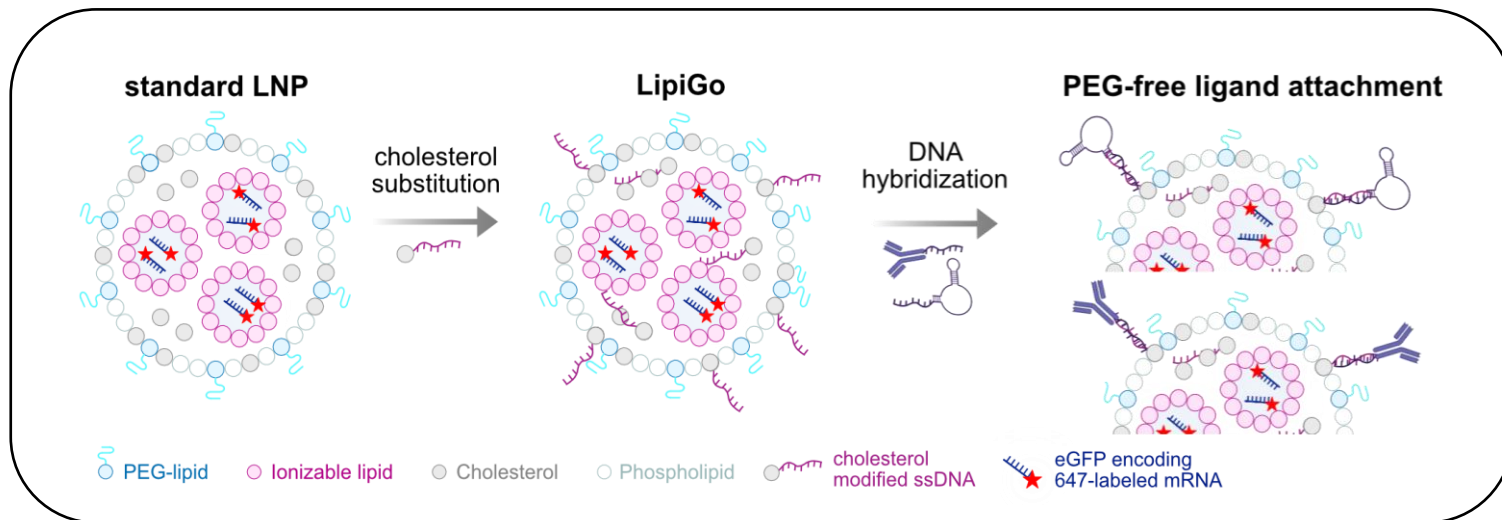
- DL-based blob detection, trained on nanocarrier data
- organ by organ quantification of nanocarrier signal

SCP-nano allows imaging nanocarriers with high sensitivity

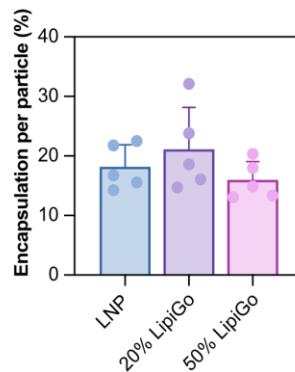
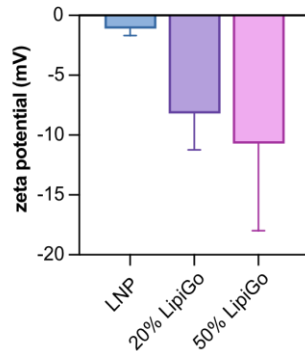
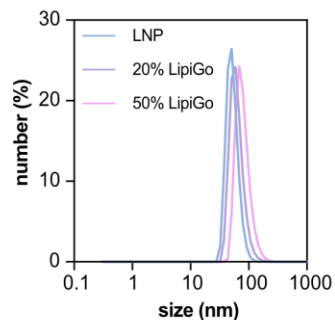


Can we utilize SCP-nano to help develop a novel particle?

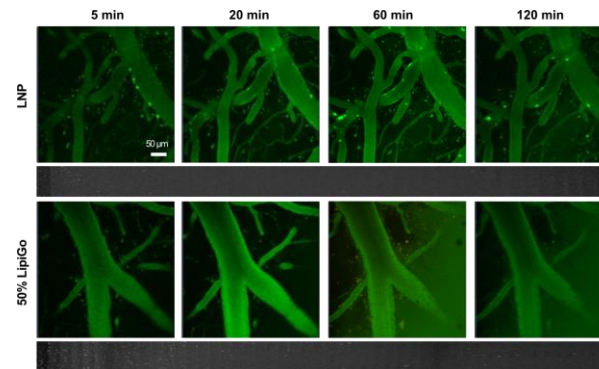
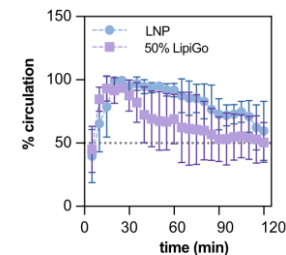
LipiGo: A DNA-Guided LNP for Programmable Delivery



LipiGo shows **altered** physicochemical properties



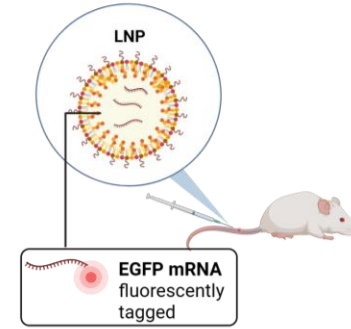
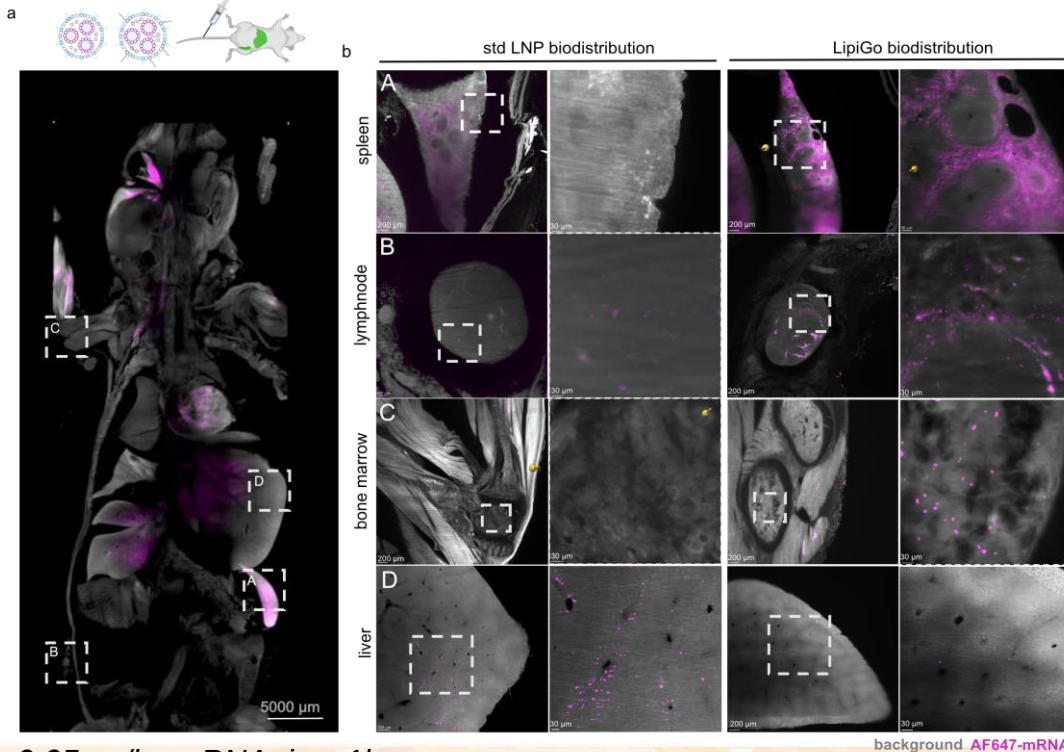
	Half life (min)
Standard LNP	>120
50% LipiGo	120
DNA Origami Rod	< 10



2-photon imaging

SCP-nano pipeline reveals LipiGo accumulation in the spleen

unpublished/confidential



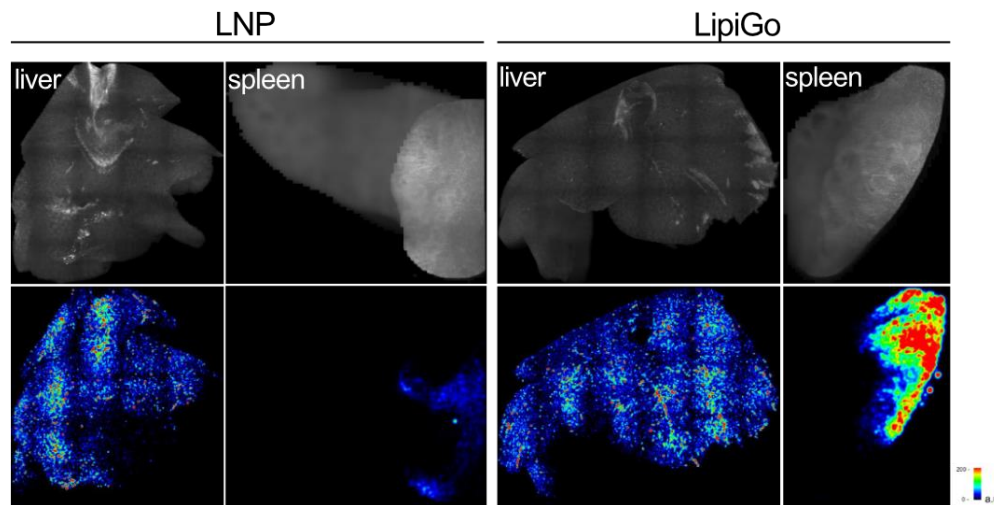
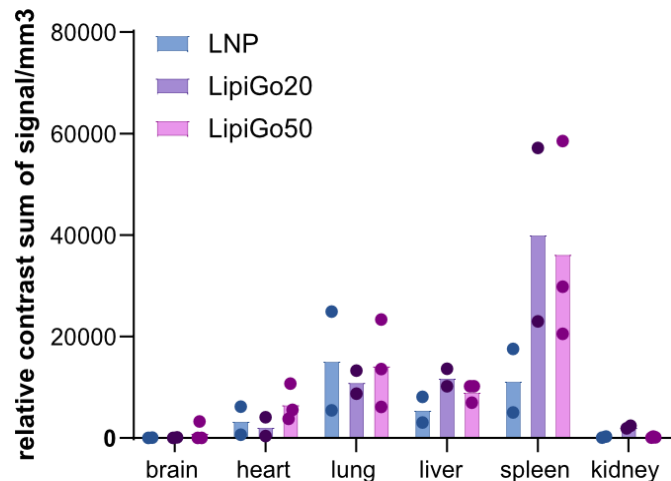
0.05mg/kg mRNA, i.v., 1h

CRS 2025
ANNUAL MEETING
& EXPOSITION

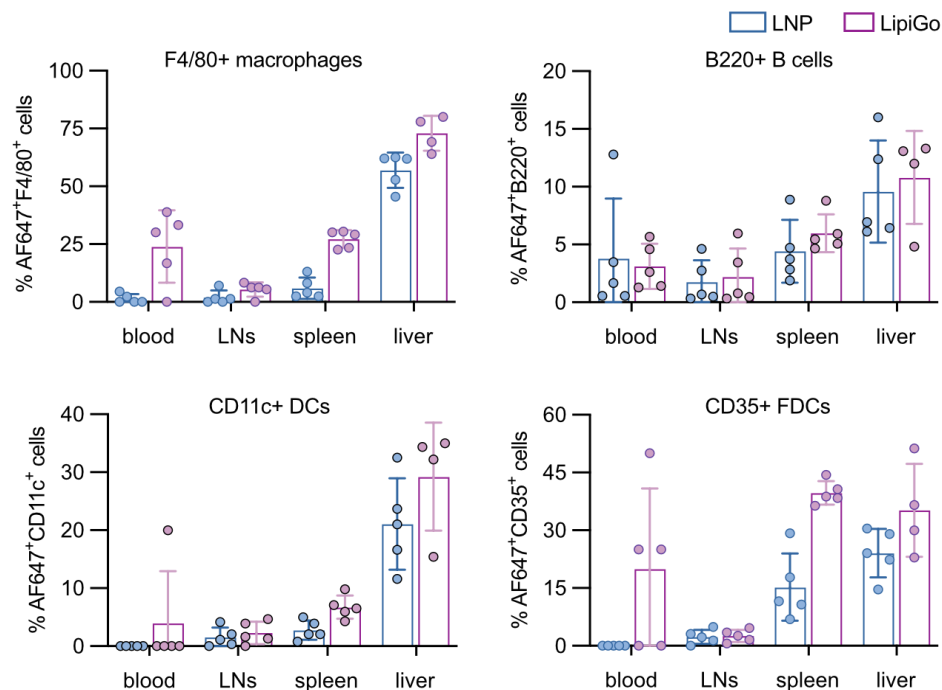
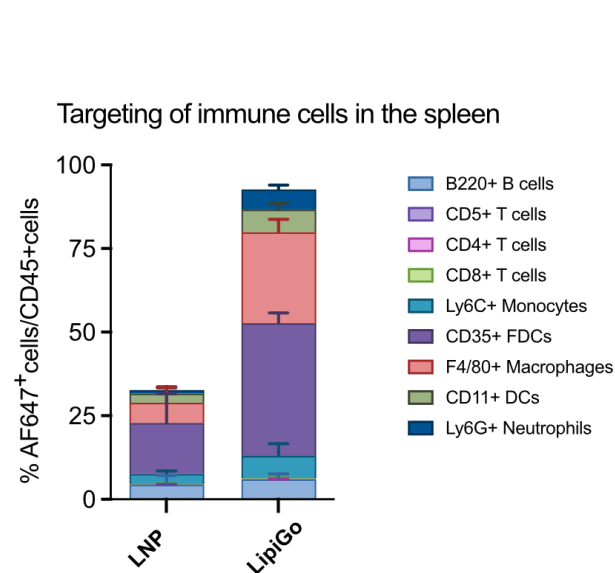
PHILADELPHIA, PA
JULY 13-18, 2025

**NEXT-GENERATION
DELIVERY INNOVATIONS**

Unbiased quantification of the biodistribution

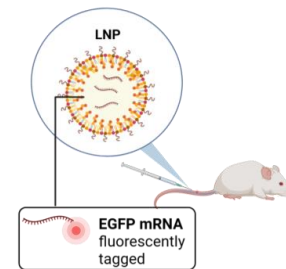


Immune cell targeting



FACS, 0.5mg/kg mRNA, i.v.

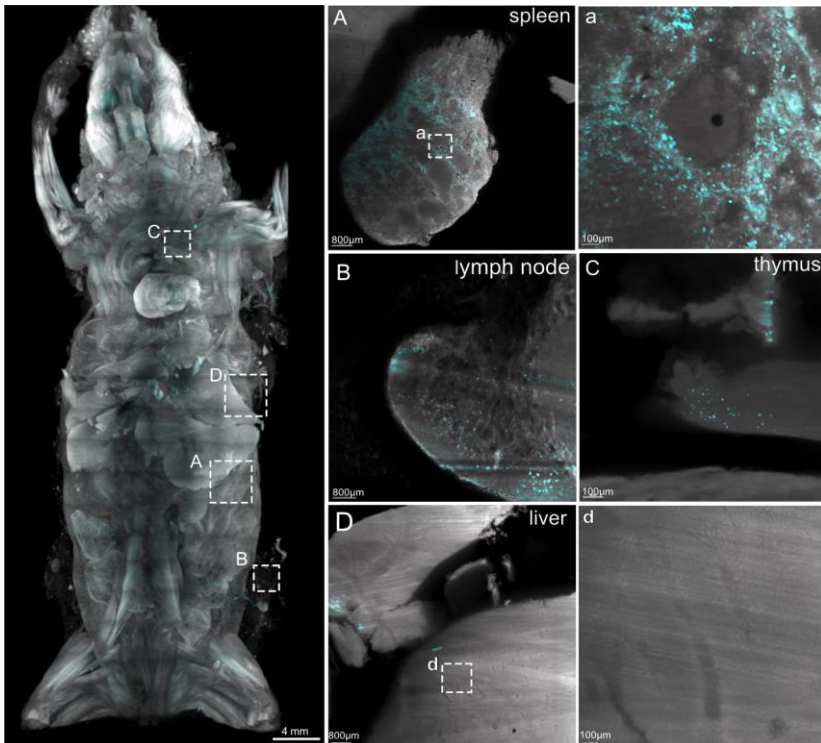
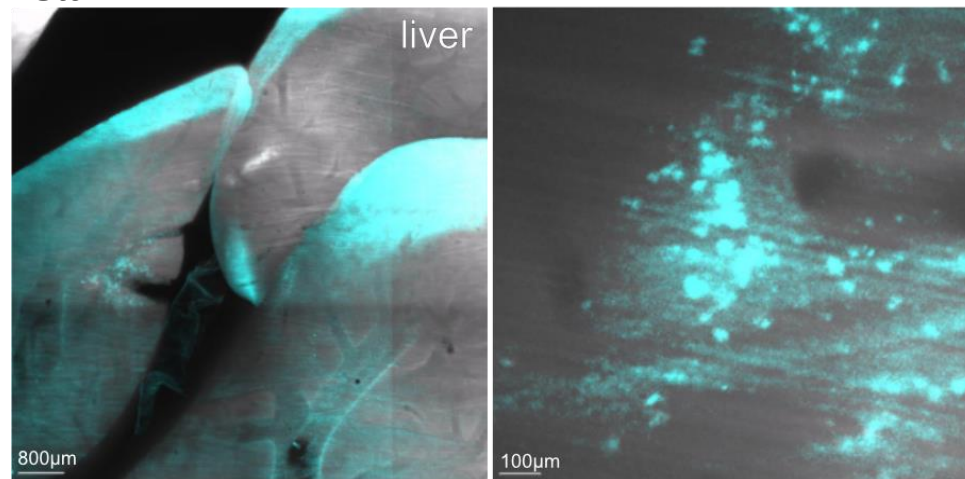
13 LipiGo cargo leads to robust protein expression



↑ Lymphatic tissues

↓ Liver

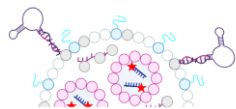
Std LNP



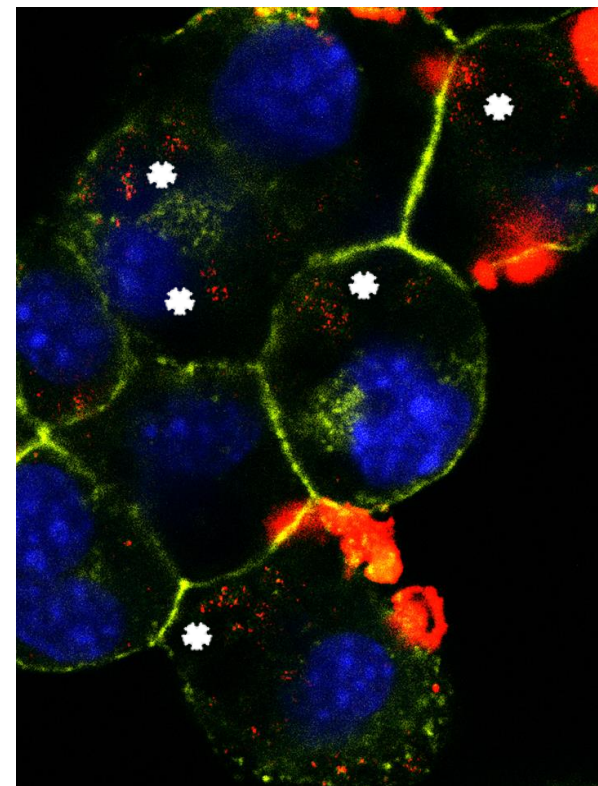
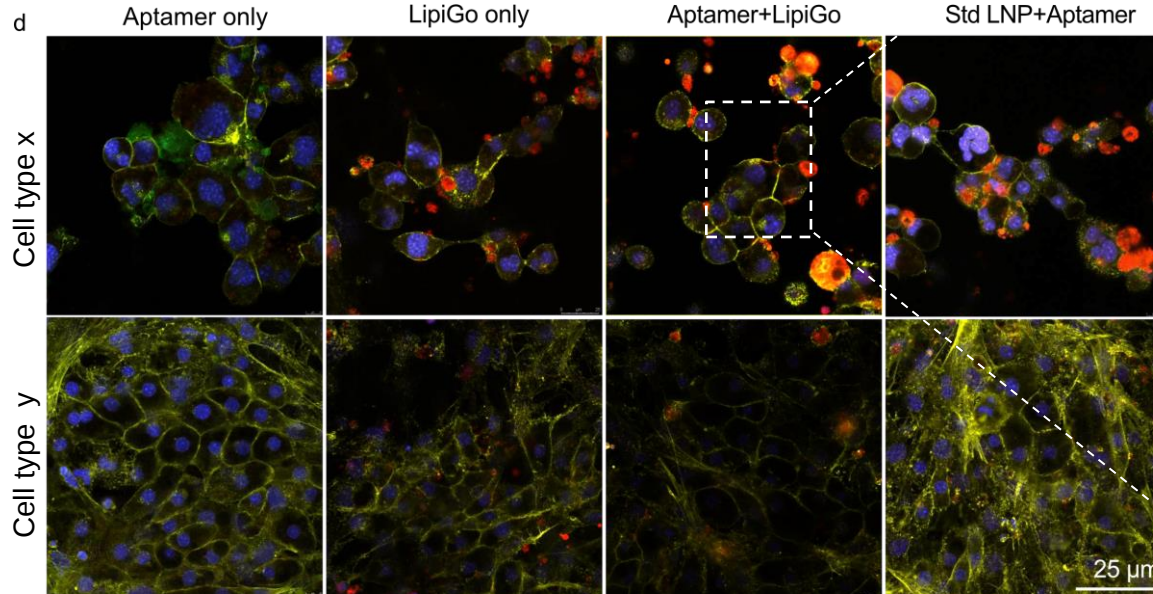
0.05mg/kg mRNA, i.v., 48h

Hybridization of targeting ligands

DNA
hybridization



aptamer (DNA-based) targeting a surface receptor on cell type x





→ summary

SCP-nano is a tissue clearing method developed to detect and quantify nanocarriers in whole mice

LipiGo is a modular nanocarrier, targeting lymphatic tissue

Acknowledgements

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Thank you!