

Membrane dynamics modulate the functional activity of biomimetic nanoparticles

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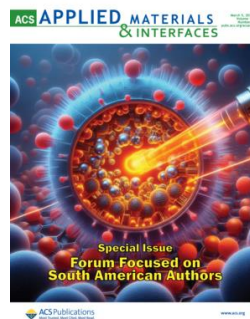
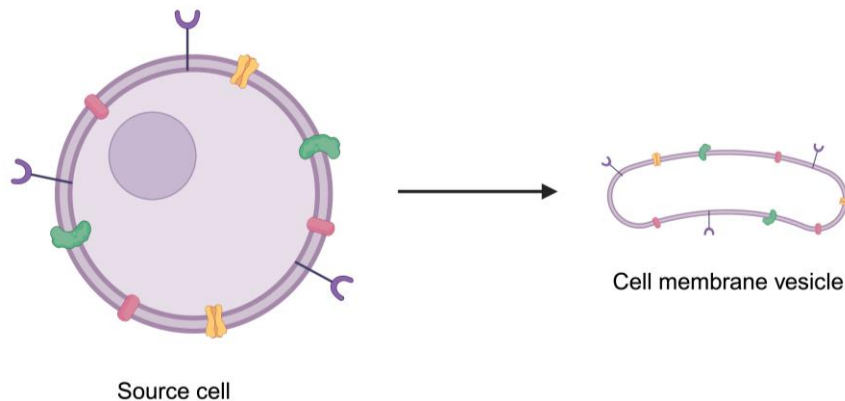
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**NEXT-GENERATION
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- Incorporate cell membrane components into nanoparticles
- Replicate cellular functions
- Target specific tissues and cells
- Applications for various diseases



ACS APPLIED MATERIALS
& INTERFACES

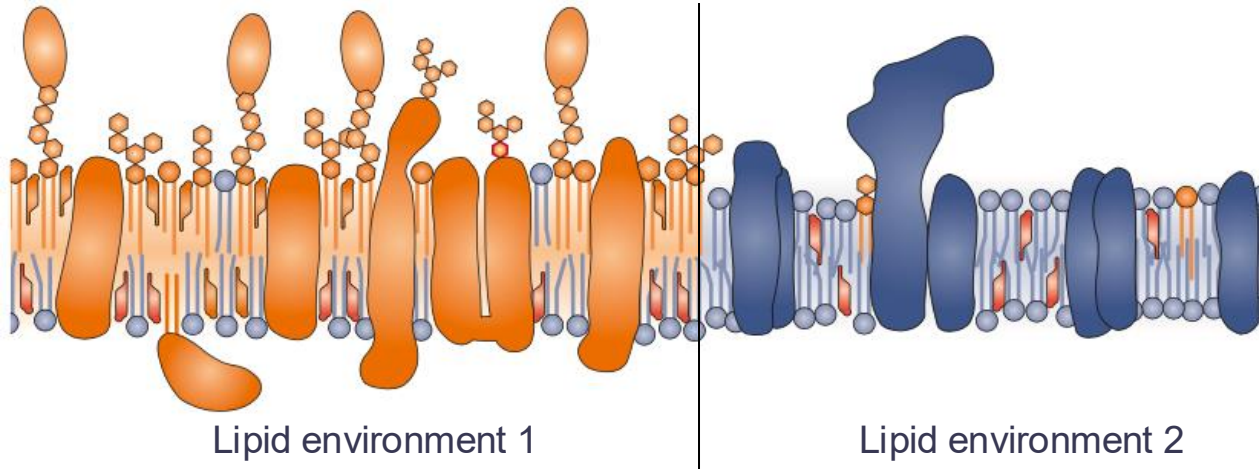
Nose-to-Brain Delivery of Biomimetic Nanoparticles for Glioblastoma Targeted Therapy

Natália Noronha Ferreira,* Celina Maria Moraes Leite, Natália Sanchez Moreno, Renata Rank Miranda, Paula Maria Pinheiro Lima, Camilla Fernanda Rodero, Edilson de Oliveira Junior, Eliana Martins Lima, Rui M. Reis, and Valencio Zucchetto*

10.1021/acsami.4c03434

10.1021/acsami.4c16837

Lipid rigidity modulates cell membrane properties

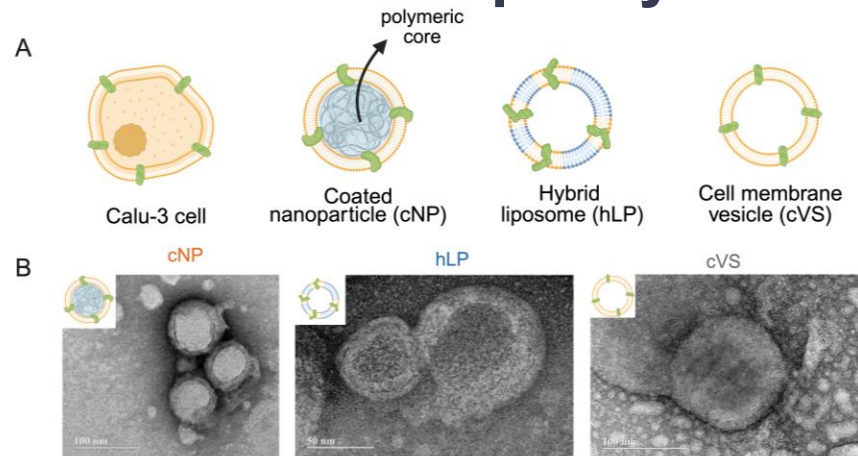


- Membrane protein dynamics are modulated by lipid composition and rigidity

10.1038/nrm2977

Three biomimetic nanoparticles were characterized and evaluated their viral neutralization capacity

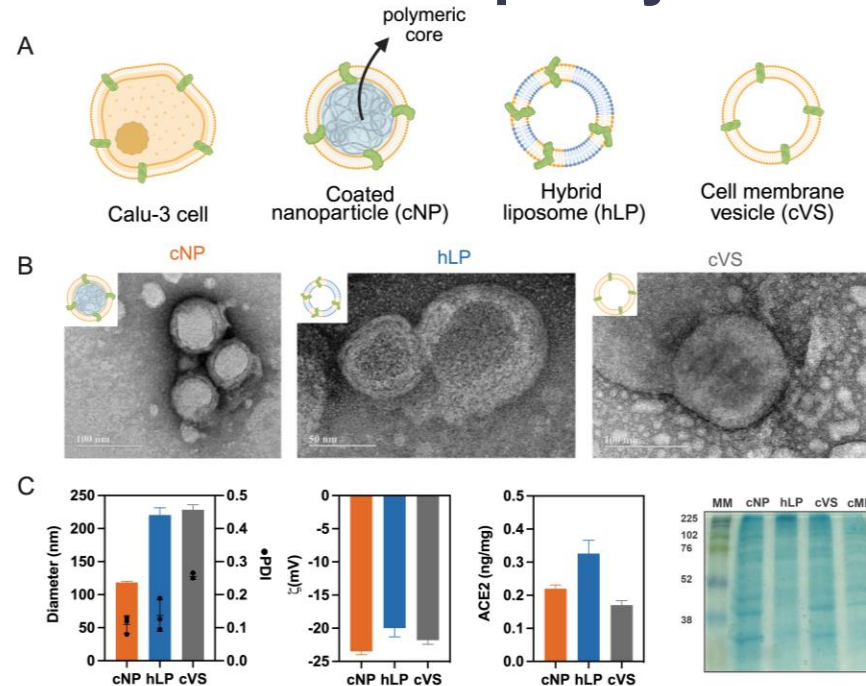
- All formulations were derived from the same source cell



Data under review for publication. Please do not share.

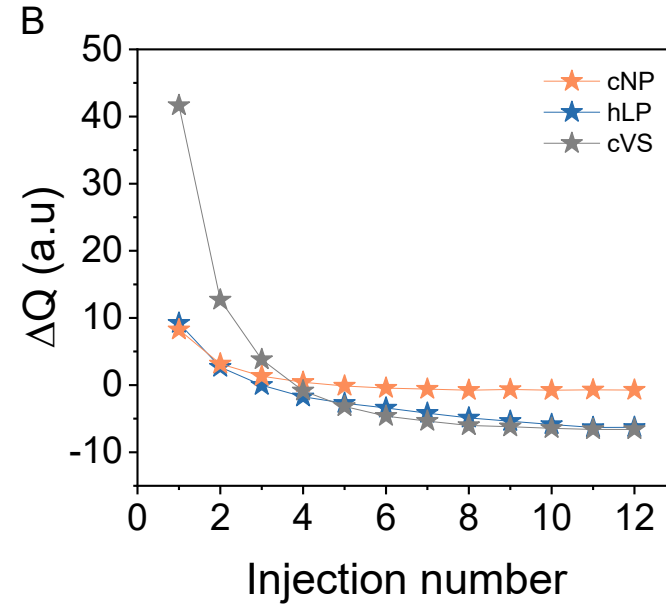
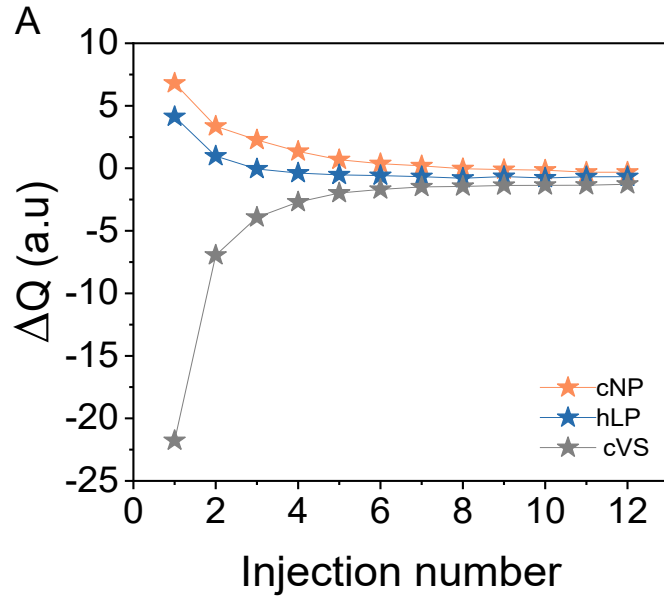
Three biomimetic nanoparticles were characterized and evaluated their viral neutralization capacity

- All formulations derived from the same source cell
- Presence of ACE2 protein was confirmed
- Protein profile preserved across formulations



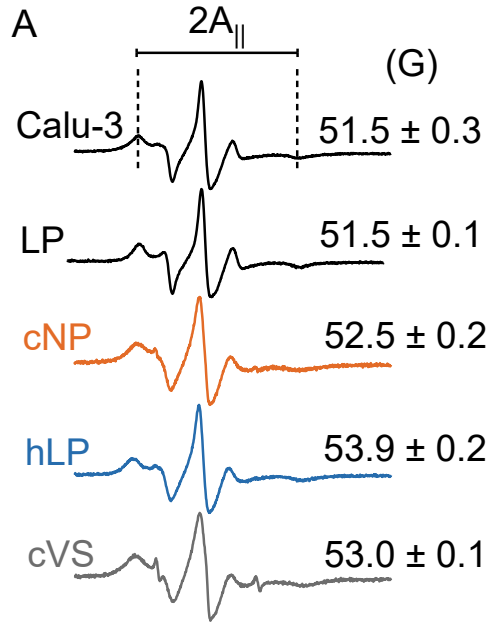
Data under review for publication. Please do not share.

Nanoparticles exhibited distinct binding profiles to aACE2 and Spike-RBD



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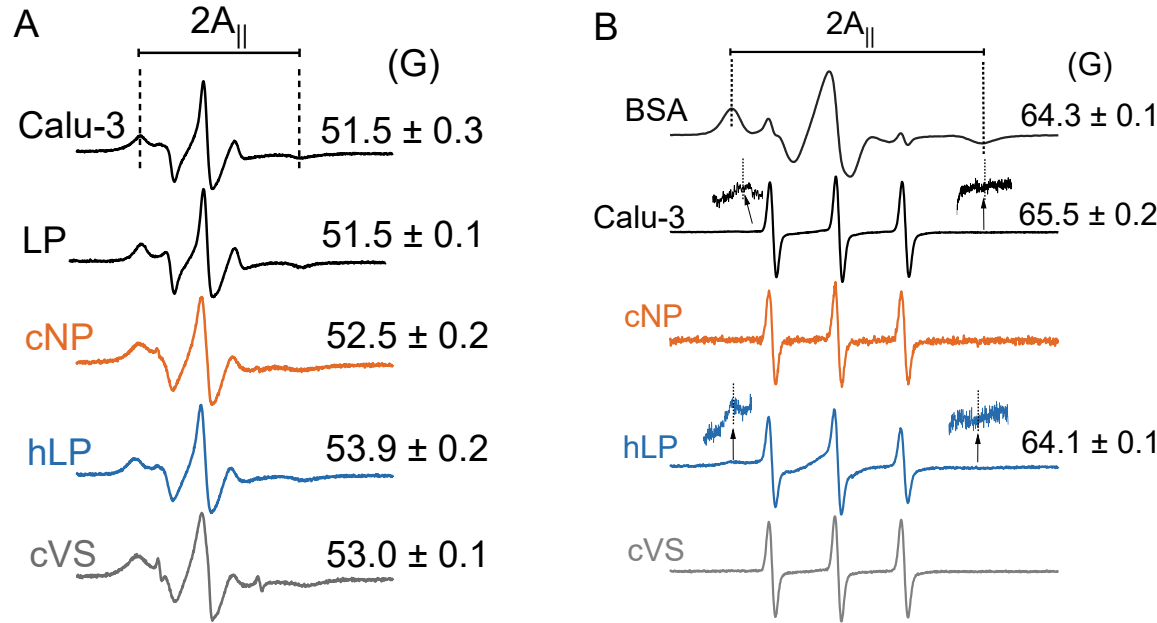
Different lipid and protein dynamics were observed across the three formulations



- Electron paramagnetic resonance (EPR) was used to evaluate membrane rigidity and dynamics
- Differences in structural organization modulate membrane properties

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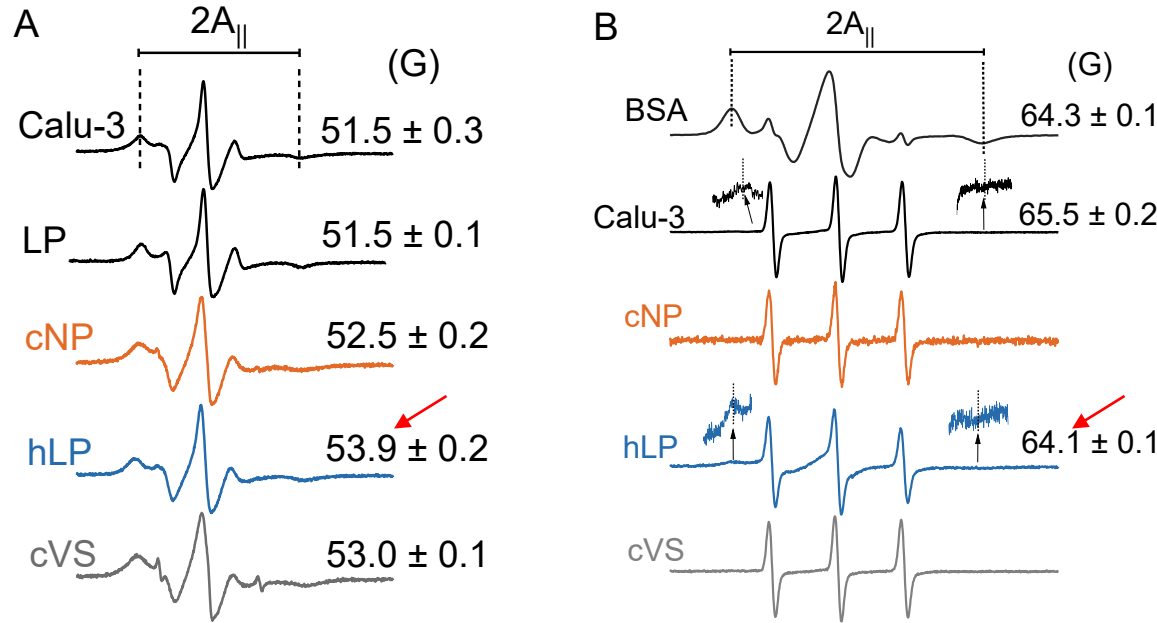
Different lipid and protein dynamics were observed across the three formulations



Lipid rigidity influences the protein environment dynamics in the formulations

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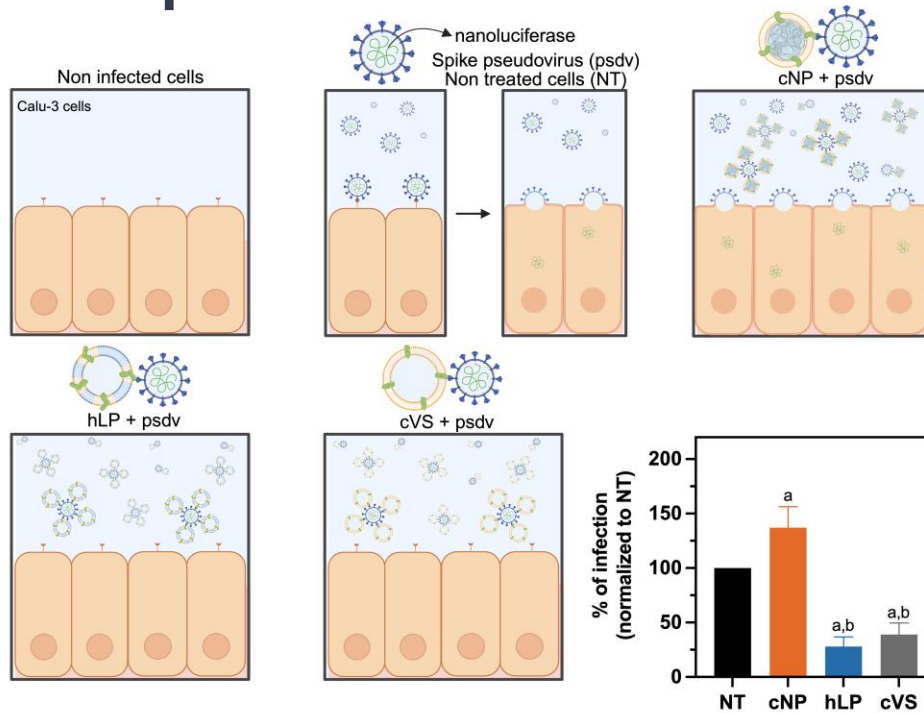
Different lipid and protein dynamics were observed across the three formulations



Lipid rigidity influences the protein environment dynamics in the formulations

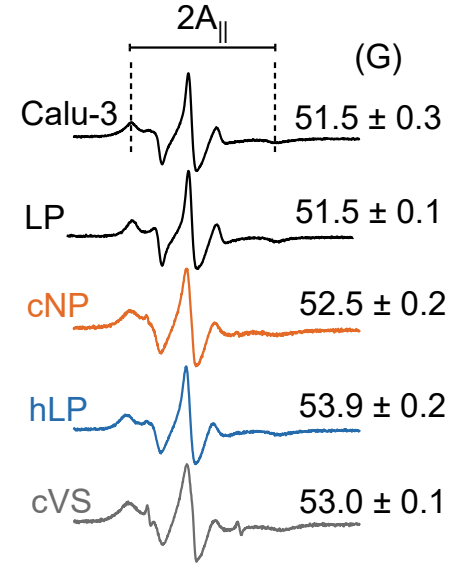
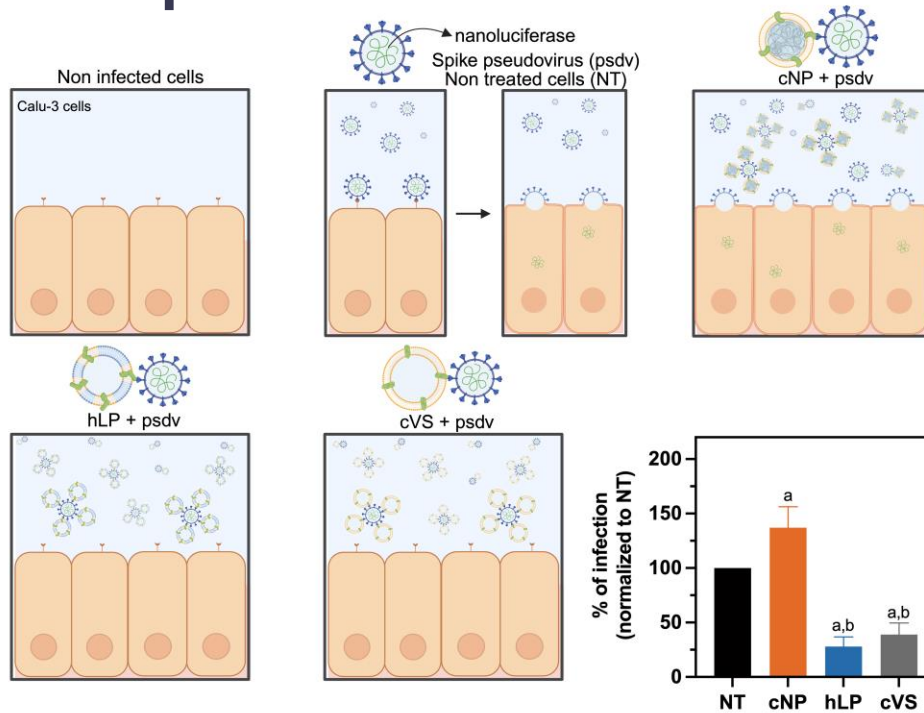
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Higher lipid rigidity is associated with enhanced pseudovirus neutralization capacity



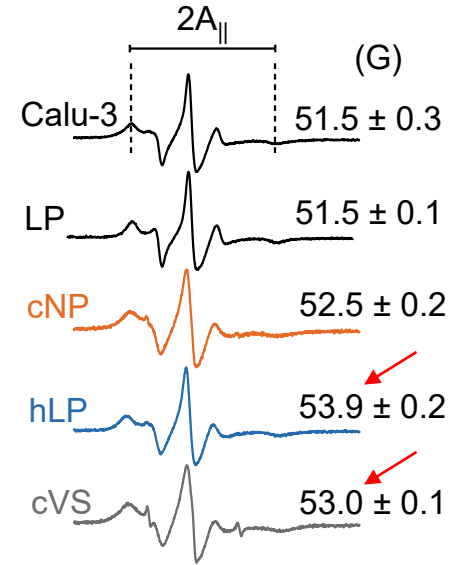
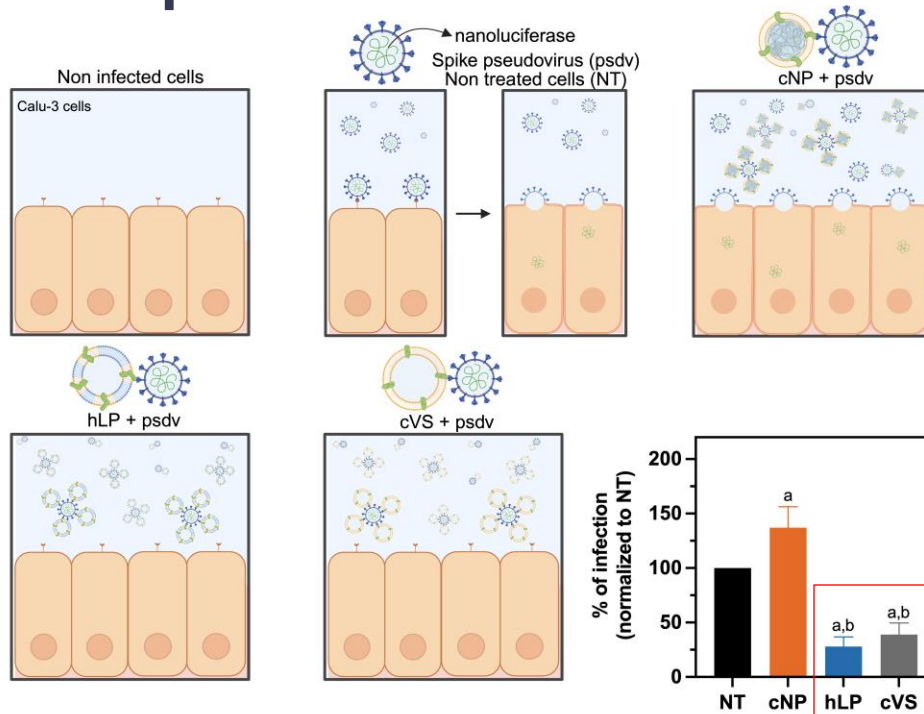
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Higher lipid rigidity is associated with enhanced pseudovirus neutralization capacity



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Higher lipid rigidity is associated with enhanced pseudovirus neutralization capacity



Data under review for publication. Please do not share.

- Biomimetic nanoparticles derived from the same source cell can exhibit distinct protein activity
- Higher membrane rigidity is associated with enhanced formulation functionality
- Our findings highlight the importance of understanding membrane properties when designing biomimetic nanoparticles
- These data suggest that hLP and cVS could function as cellular decoys – capturing viral particles and lowering the viral load available to invade host cells



Acknowledgments



Thank you for your attention!

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