



Mirror Image Delivery Systems

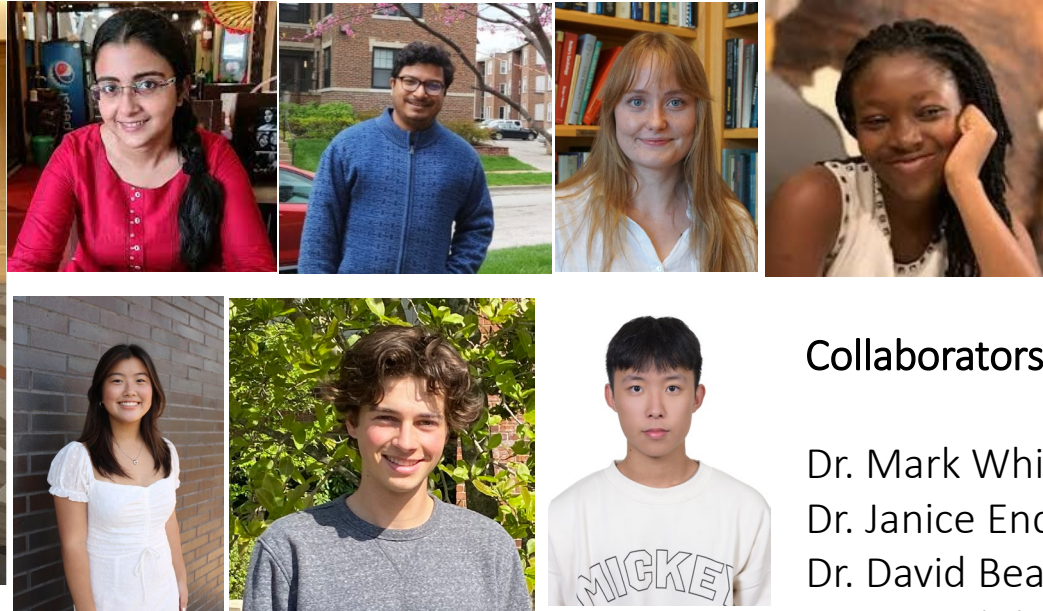
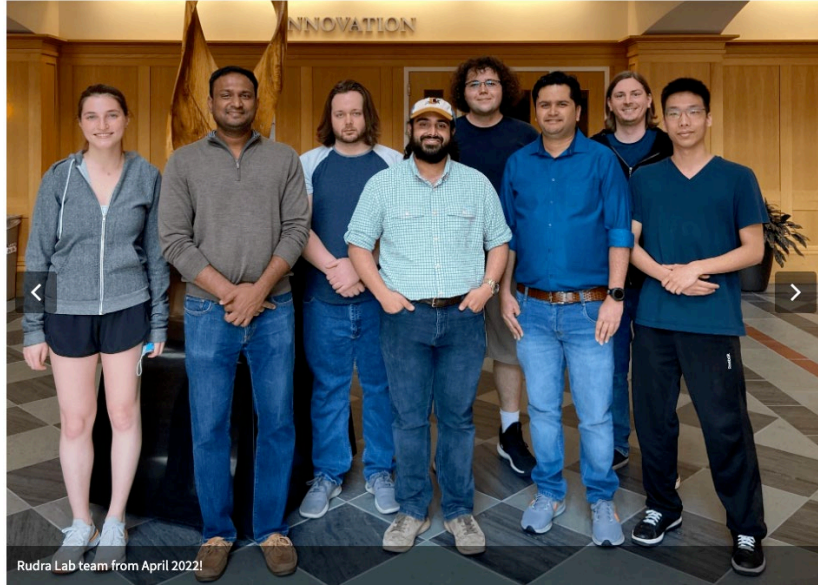
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30 September 2025

NASEM

Acknowledgements



Active Funding

NIH R01 AG089122

NIH R01 AI168918



NSF CAREER Award 2047517



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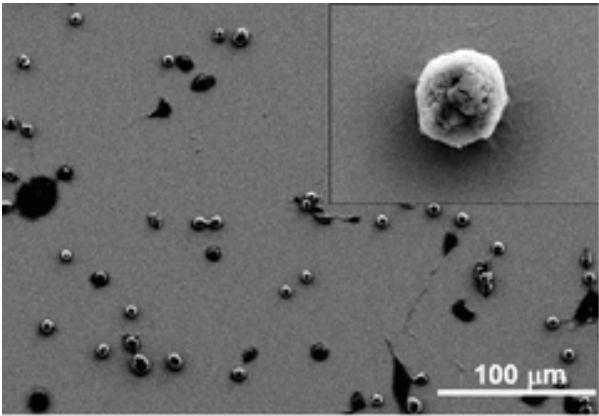
Dr. Kelly Olino –Yale University

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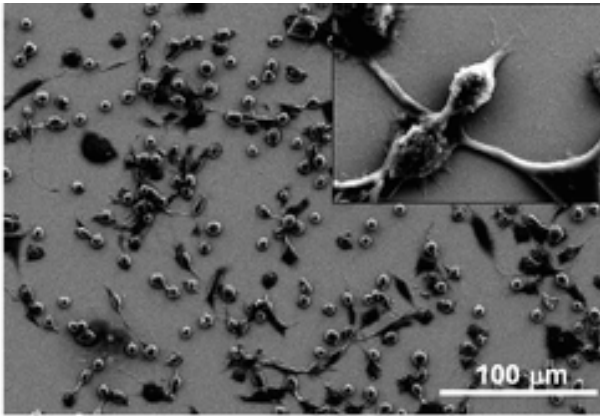
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Dr. Andrew Zloza – Rush University

Chirality Impacts Immune Cell Behavior

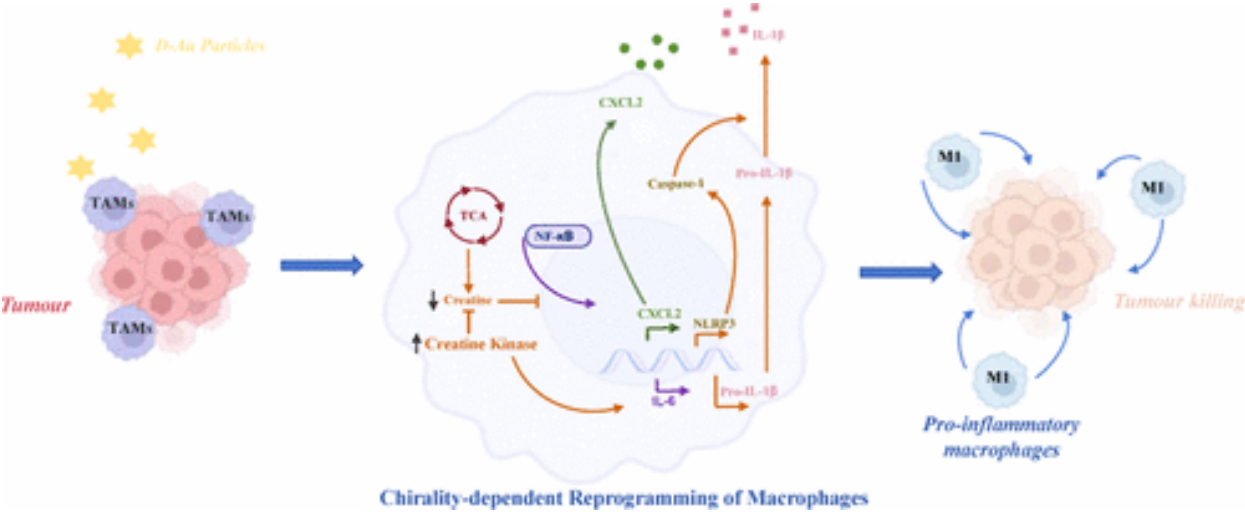


D surface

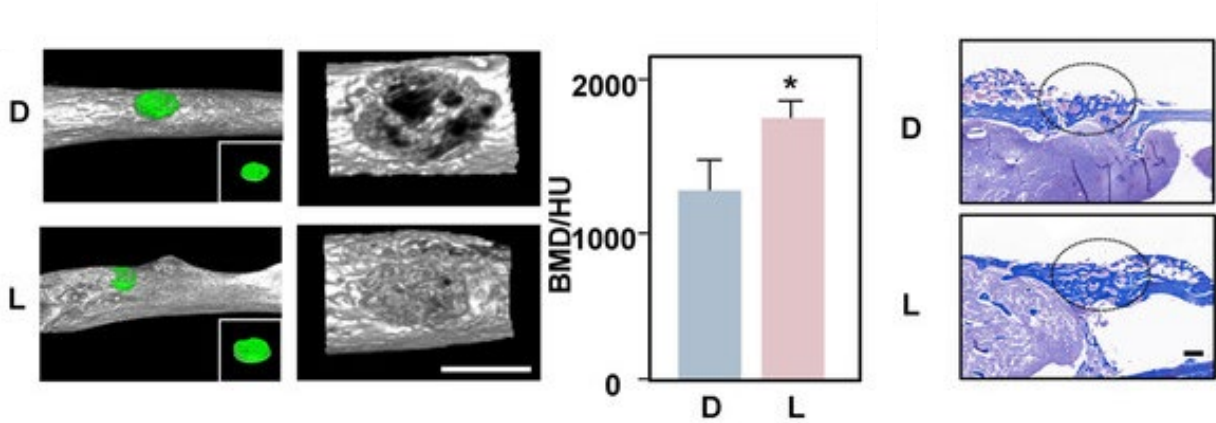


L surface

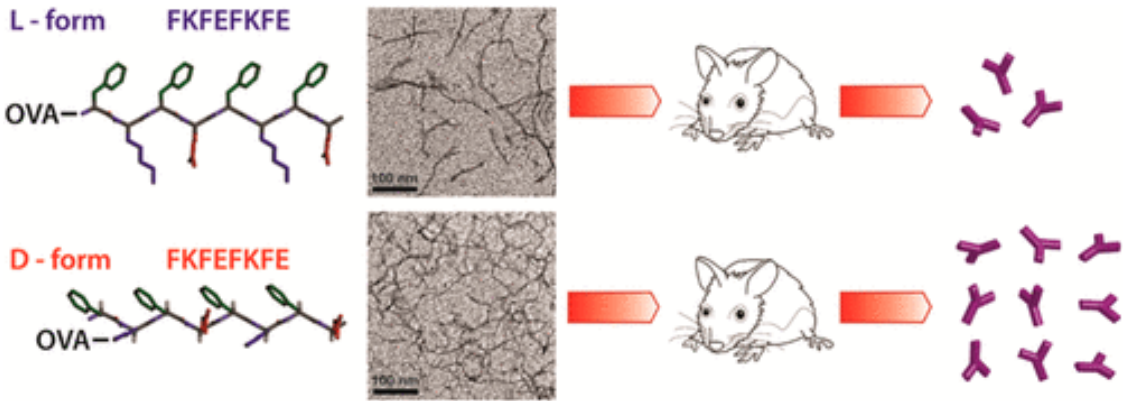
Sun T. et al. 2007 JACS



Han J. et al. 2024 ACS Nano

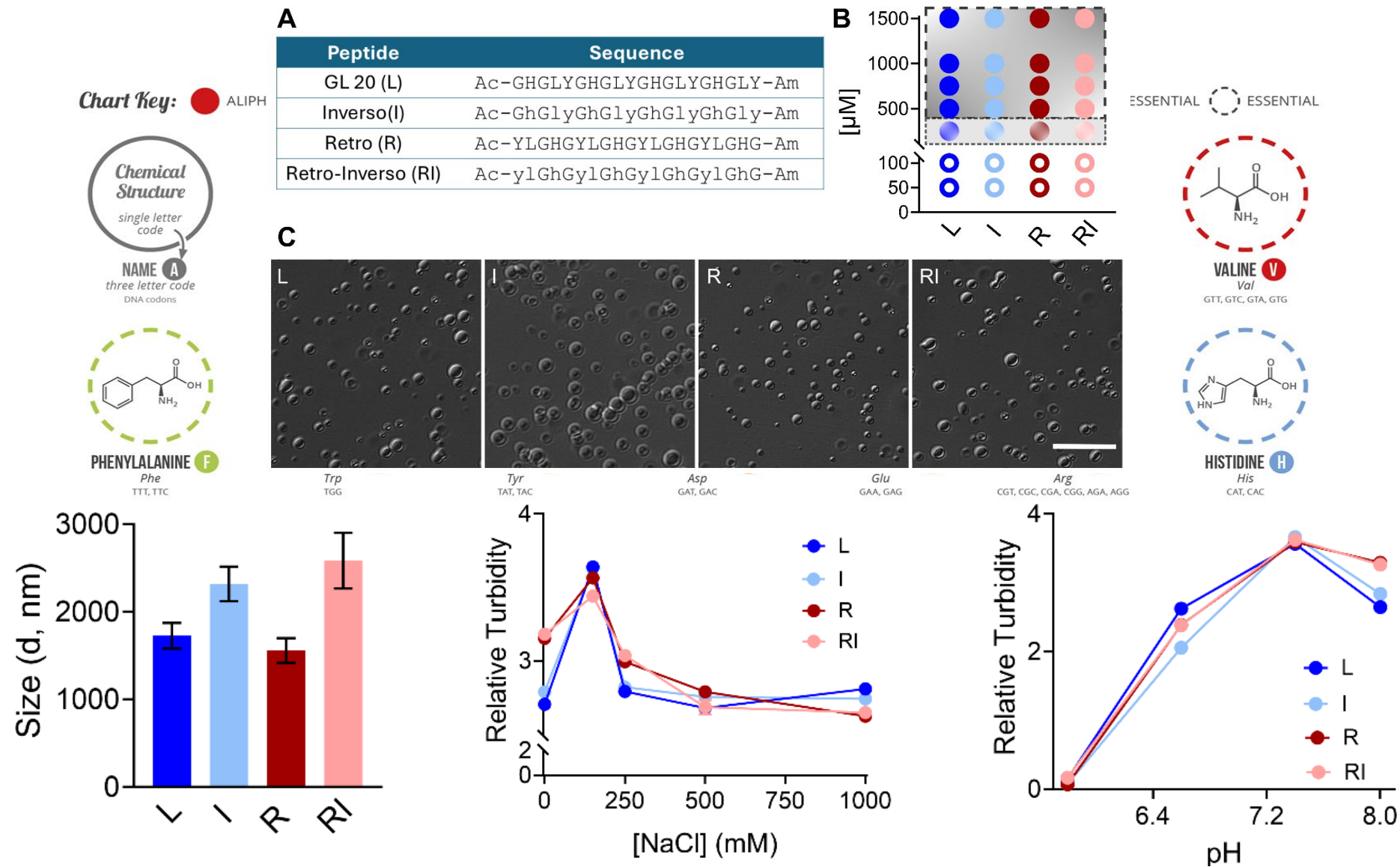


Yang Y. et al. 2024 Small

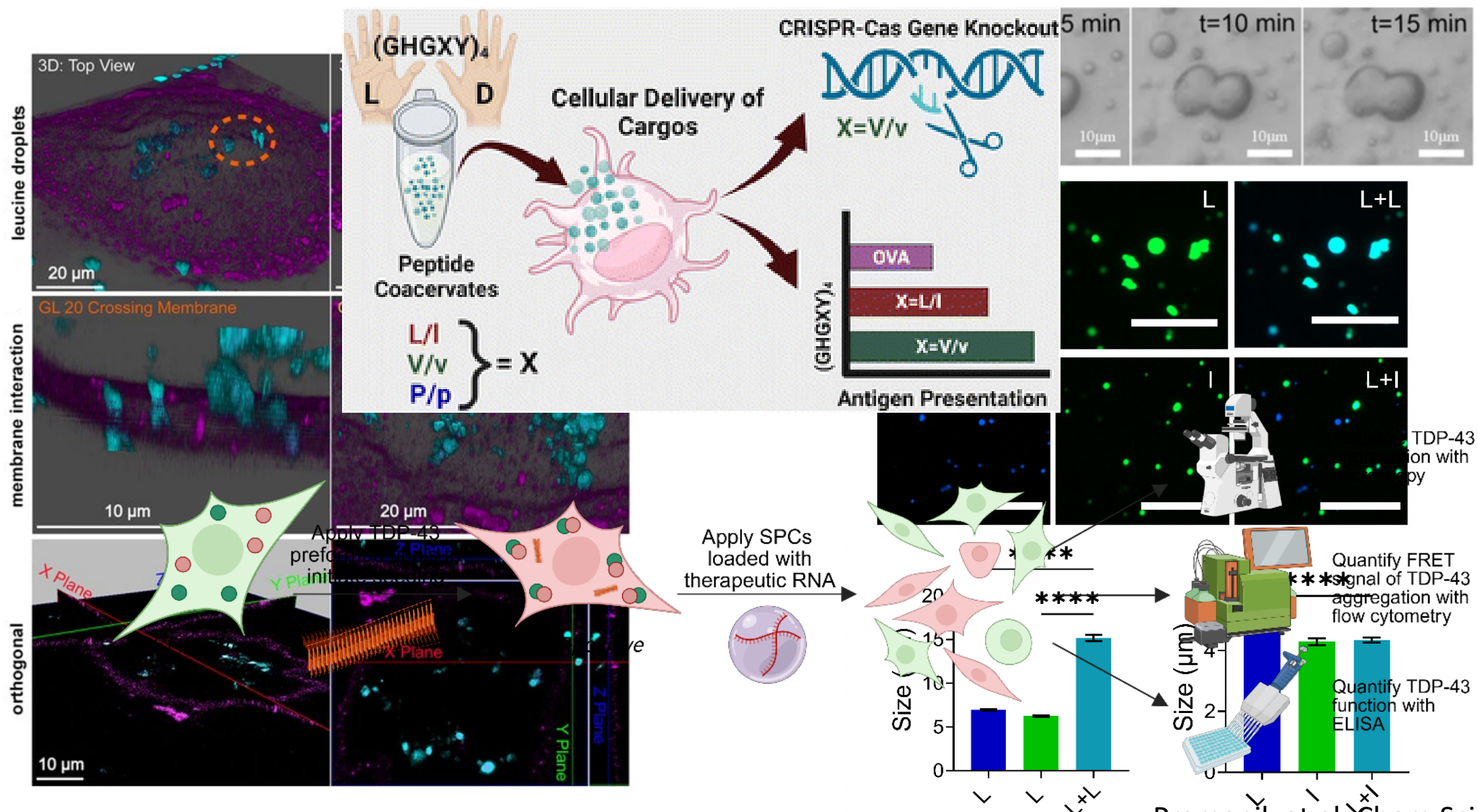


Appavu. et al. 2015 ACS Biomat Sci Eng

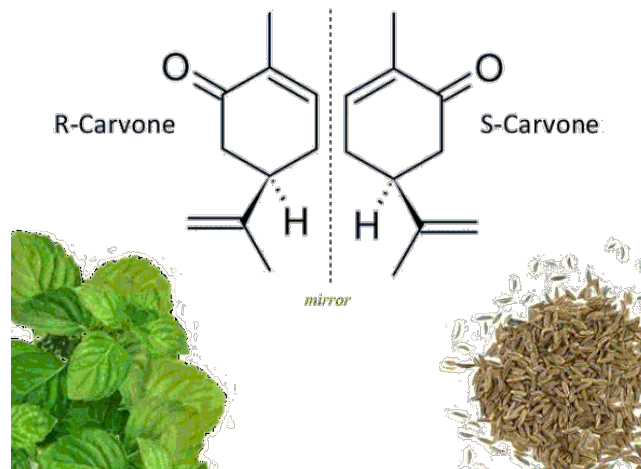
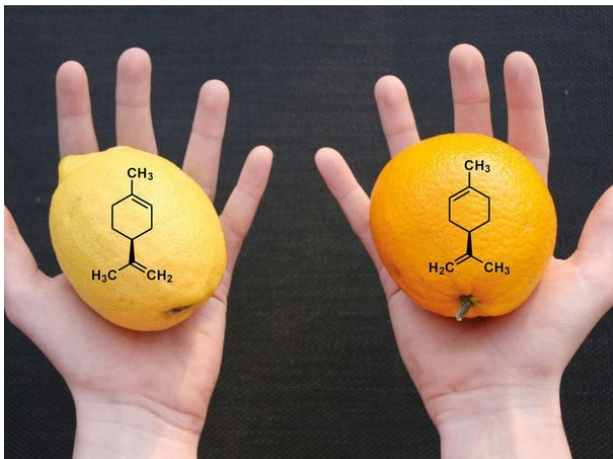
Mirror-image Delivery Vehicles



Mirror image peptide droplets are functional



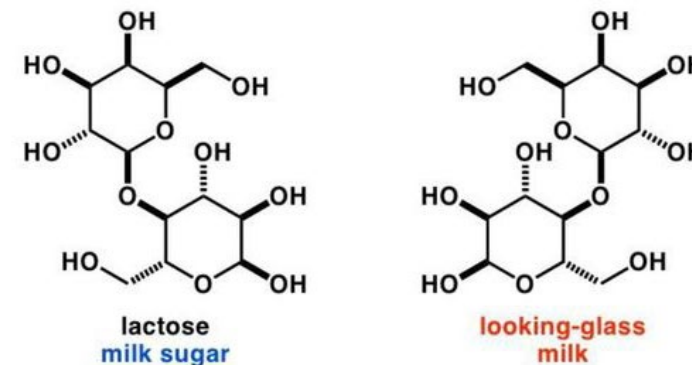
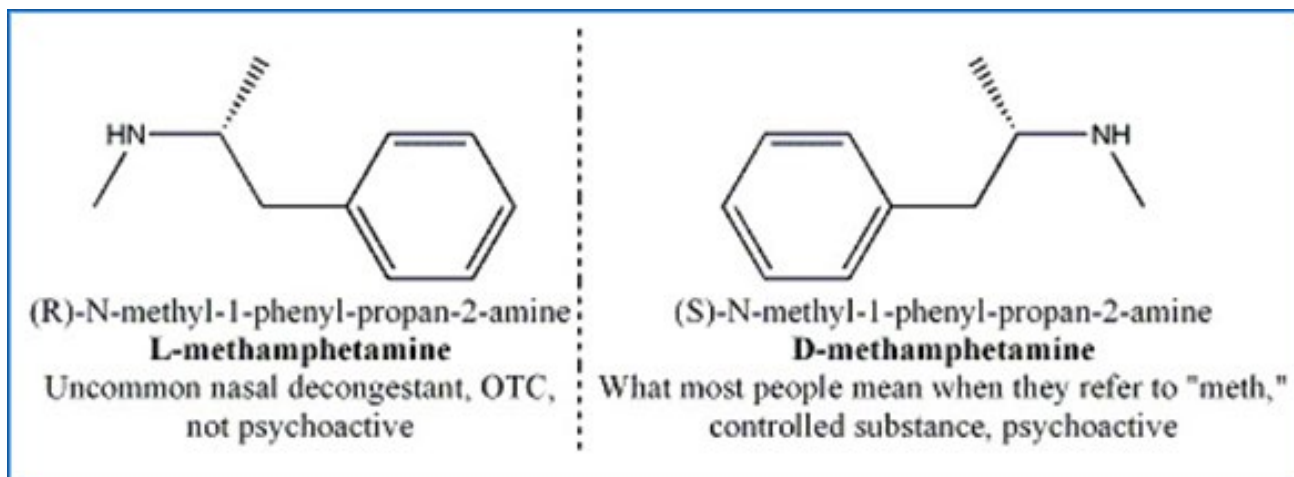
Mirror Image Molecules: Diverse Functions



Milk vs looking glass milk

"How would you like to live in a Looking-glass House, Kitty? I wonder if they'd give you milk, there? **Perhaps Looking-glass milk isn't good to drink**"

"Through the Looking Glass, and What Alice Found There", Lewis Carrol (1871)



The natural right handed milk sugar and its unnatural enantiomer

<https://chiralpedia.com/>

<https://www.aegislabs.com/clinical-update/methamphetamine/>

Summary



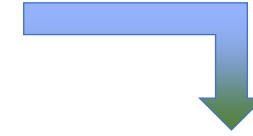
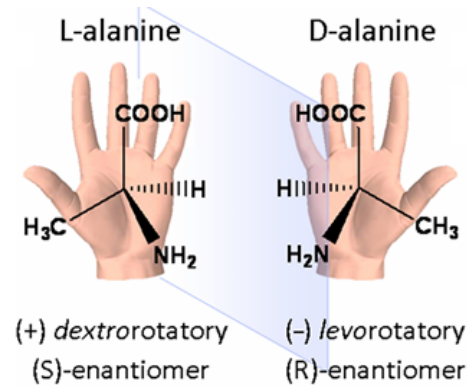
Preclinical to Clinical

Conduct GLP toxicology, PK/PD, and longer-term safety studies.

Develop regulatory-ready documentation, standardized assays, and quality controls.

Immunology and Long-term Safety in Repeated-Dosing Regimens.

Engage with regulators to define acceptance criteria for therapeutics.



Bench to Preclinical

Chemical synthesis (solid-phase peptide synthesis, native chemical ligation).

Enzymatic/biotechnological production is not straightforward, as many cellular enzymes are evolved for L-amino acids.

Feasible production for research, preclinical, and some early-stage therapeutics is a key challenge.

Refolding and structural validation for complex D-proteins