THE UNIVERSITY of MISSISSIPPI
CHEMISTRY

73 Ta Tantalum 180.95
7 N Nitrogen 14.01
7 N Nitrogen 14.01
68 Er Erbium 167.26
57 La Lanthanum 138.91
5 B Boron 10.81

Selective Blood Cell Hitchhiking in Whole Blood with Ionic Liquid-Coated PLGA Nanoparticles to Redirect Biodistribution After Intravenous Injection

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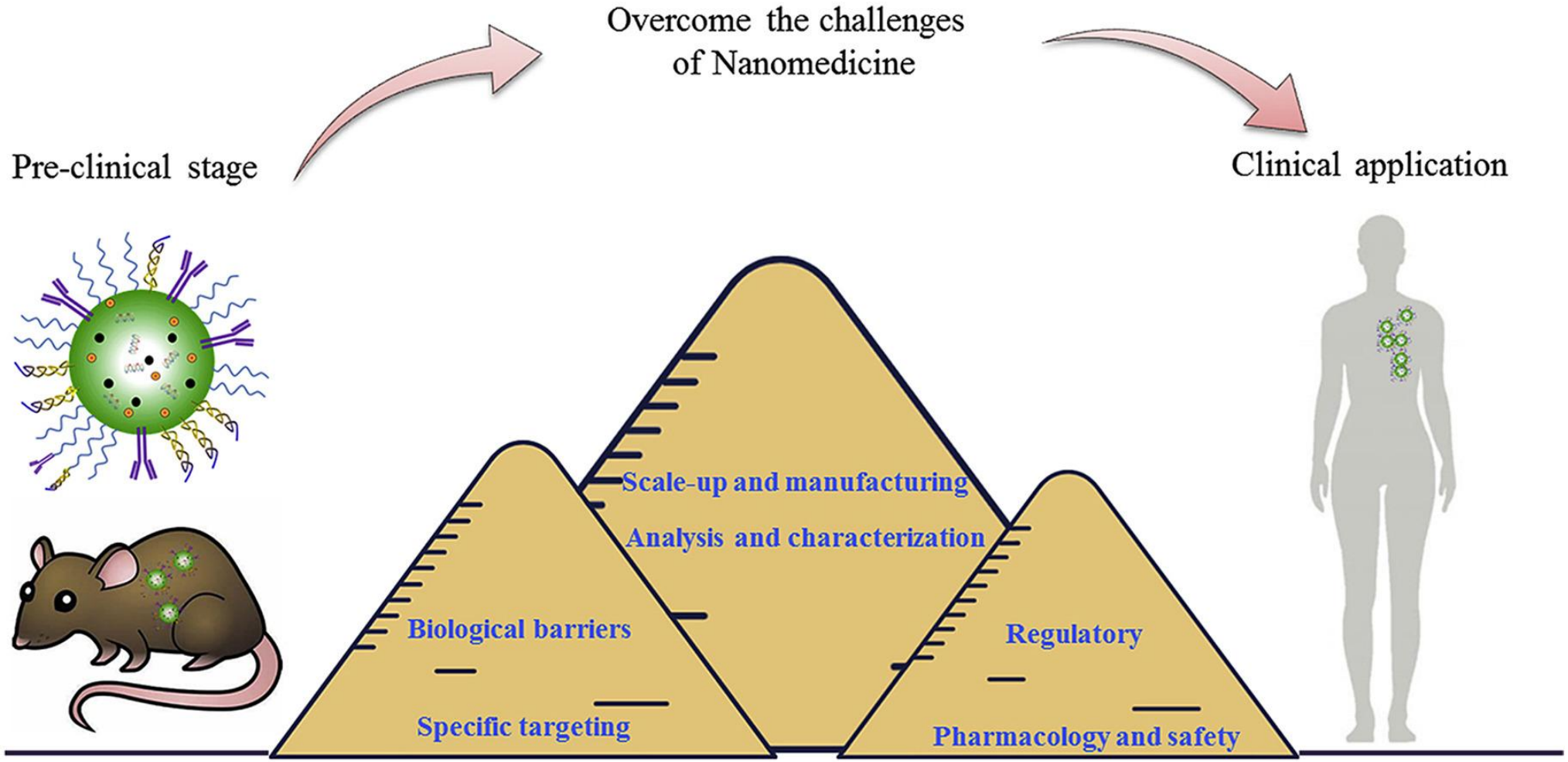
THE UNIVERSITY OF MISSISSIPPI

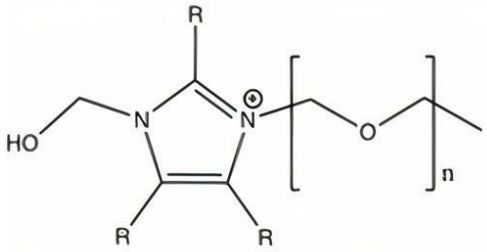
CRS 2022 Annual Meeting & Expo
July 11 – 15, 2022 | Montreal Congress Center, Montreal Canada
Advanced Delivery Science

Nanoparticle Systems Struggle to Reach the Clinic

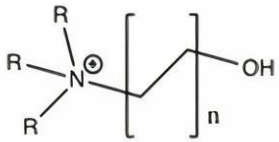


Lin-Ping Wu, Danyang Wang, Zibiao Li, Grand challenges in nanomedicine, Materials Science and Engineering: C, Volume 106. https://doi.org/10.1016/j.msec.2019.110302.

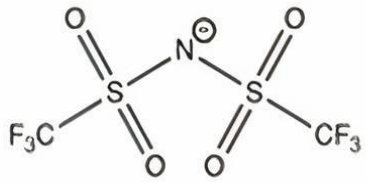
Ionic Liquids (IL) Can Overcome NP Barriers in the Bloodstream



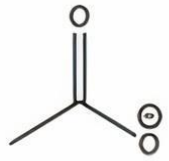
Imidazolium



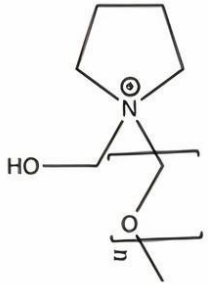
Ammonium



Bis(trifluoromethylsulfonyl)imide

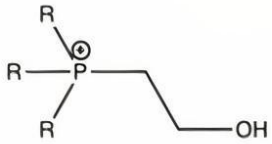


Acetate

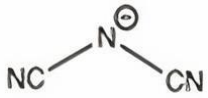


Pyrrolidinium

+

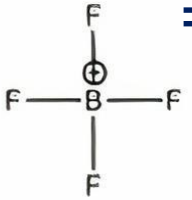


Phosphonium



Dicyanamide

Halogens

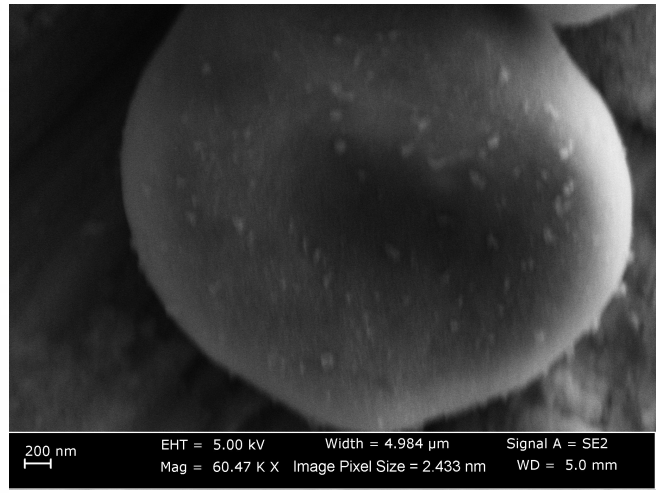


Tetrafluoroborate

CATIONS
R = H, Me

ANIONS

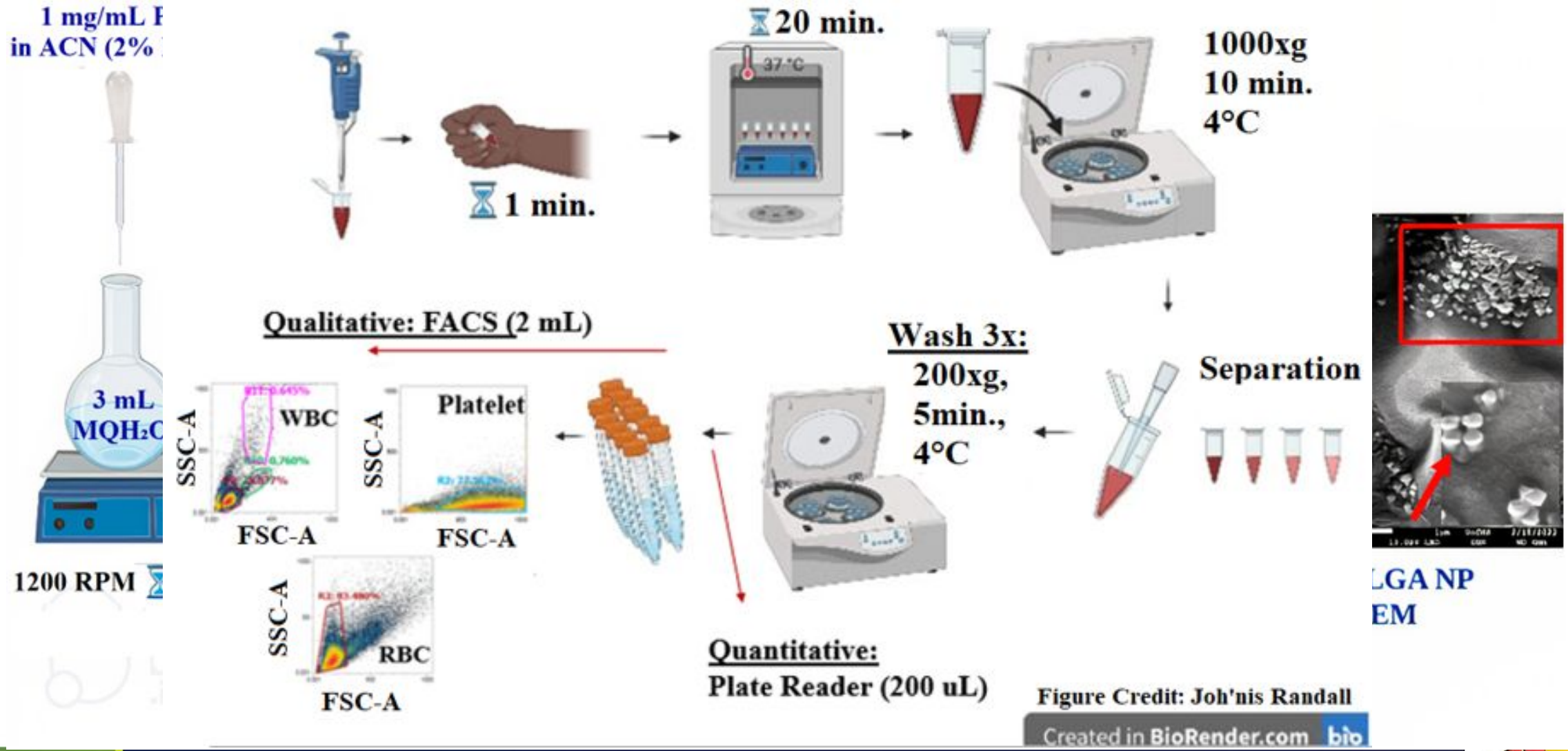
=



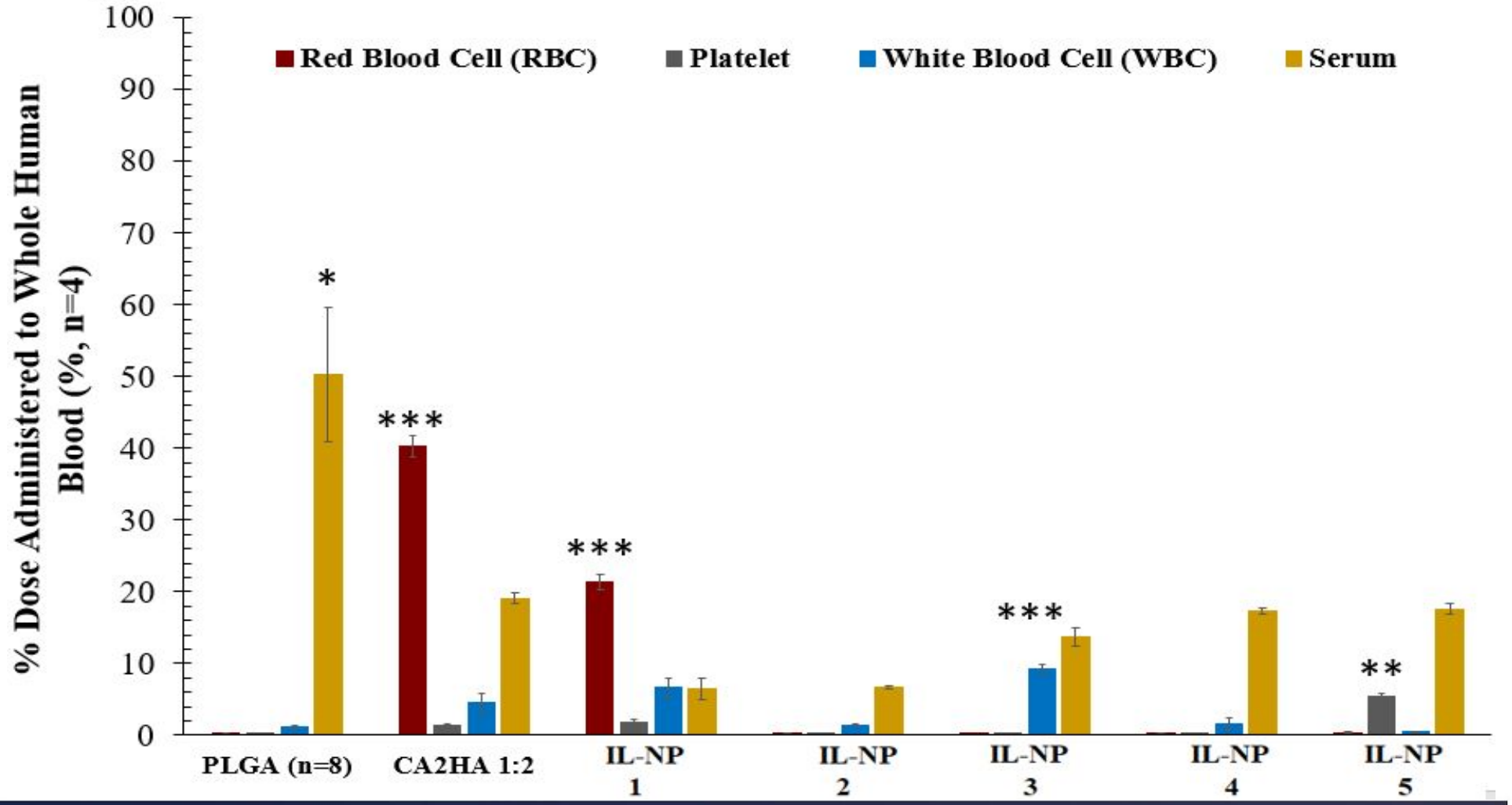
choline trans-2-hexenoic acid [CA2HA 1:2]

Can We Tune ILs to Hitchhike Selectively onto Different Cell Subtypes in Whole blood?

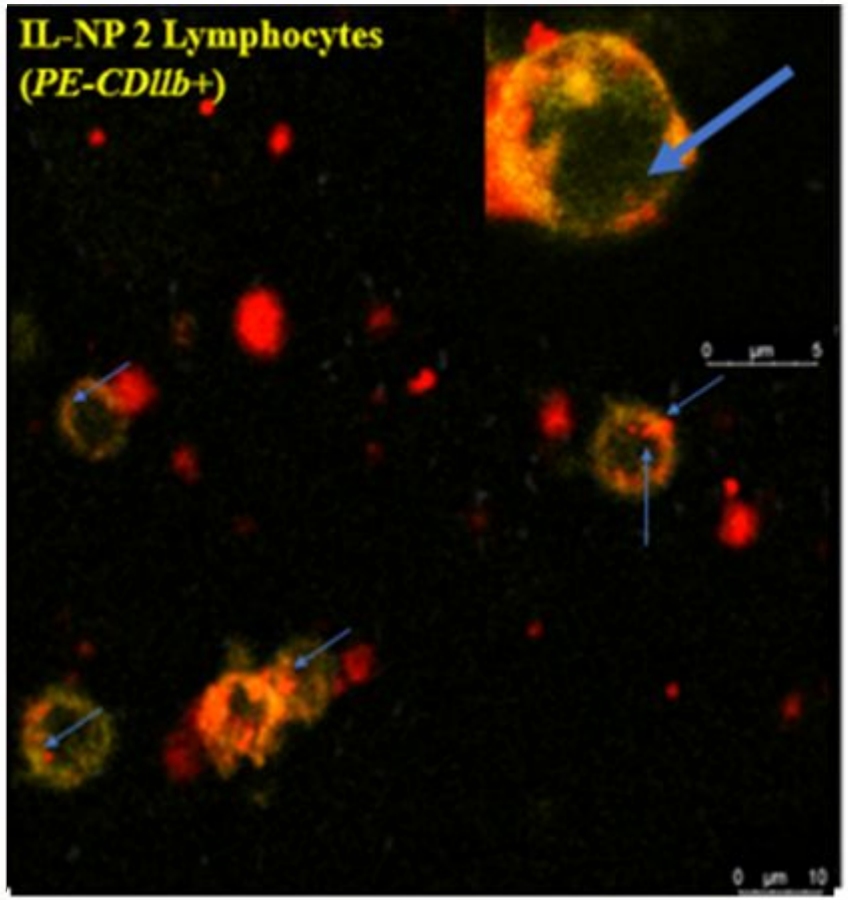
IL-PLGA NP Synthesis and Biological Methods

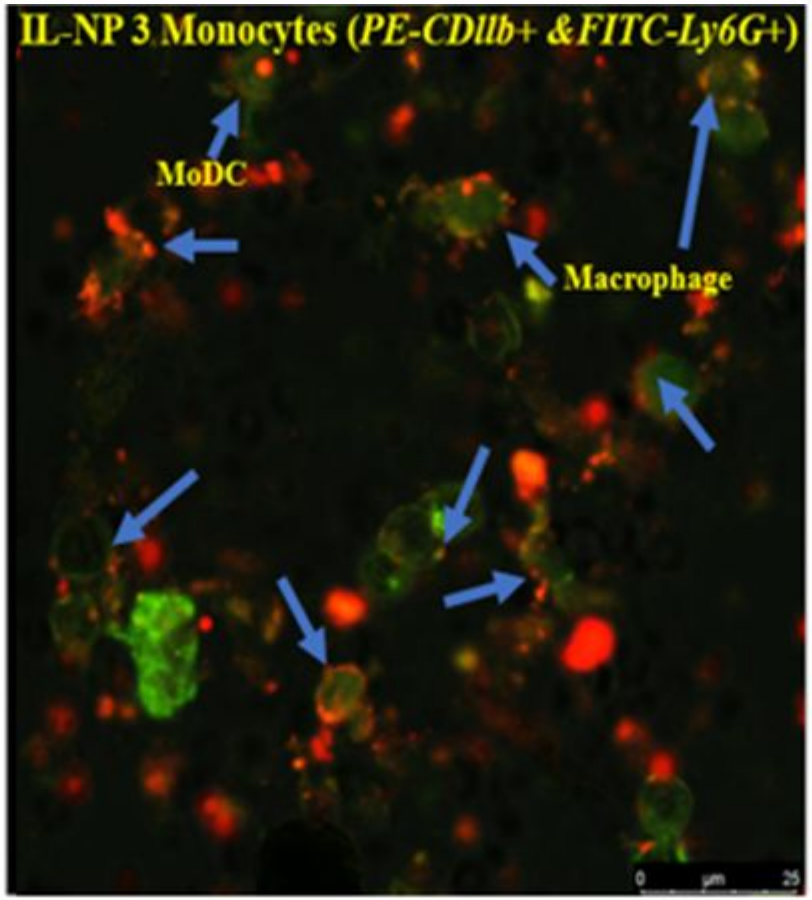


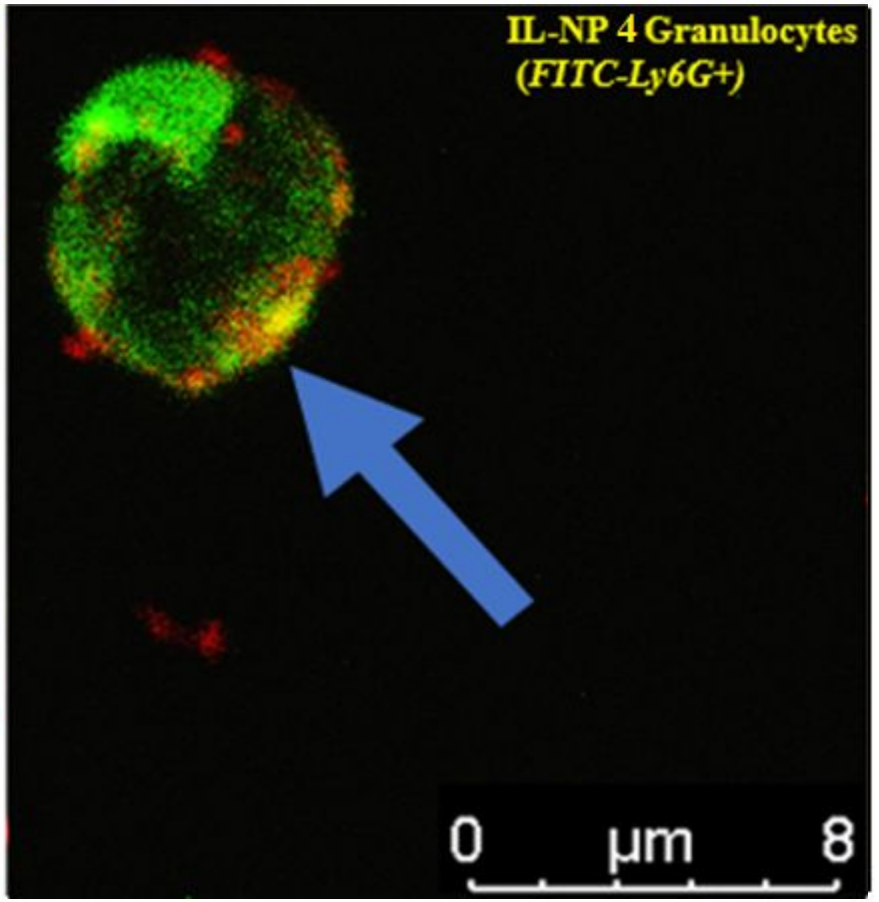
Structurally Tuning Choline Carboxylate ILs Engineers Translational NP Cellular Hitchhiking Selectivity in Whole Blood



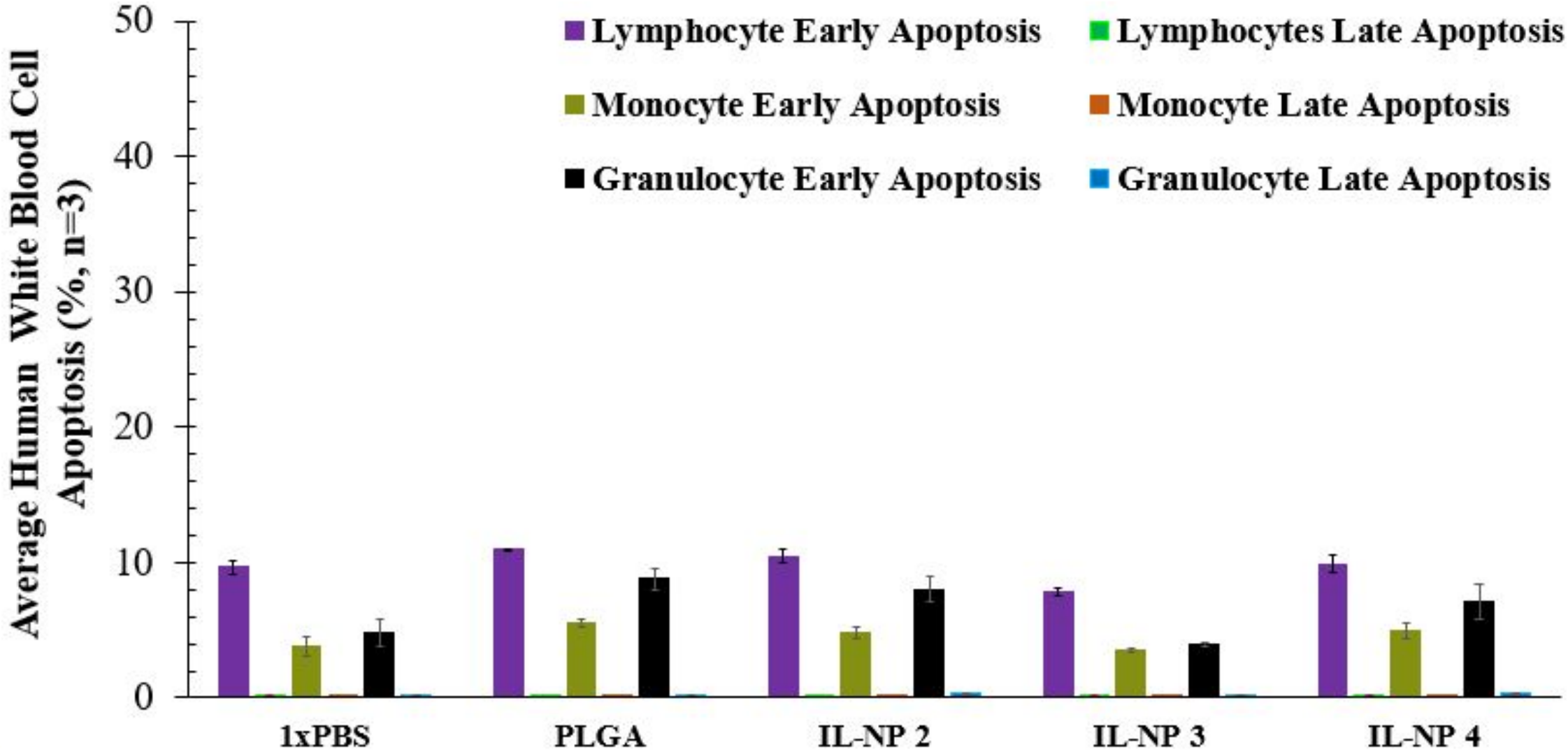
IL-PLGA NP Cellular Hitchhiking Selectivity in Whole Blood Is Observable by BALB/c Mouse Live-Cell Confocal Microscopy







IL-PLGA NP Cellular Hitchhiking Is Biocompatible and Non-Toxic



Conclusions

Choline Carboxylic-Acid based ILs:

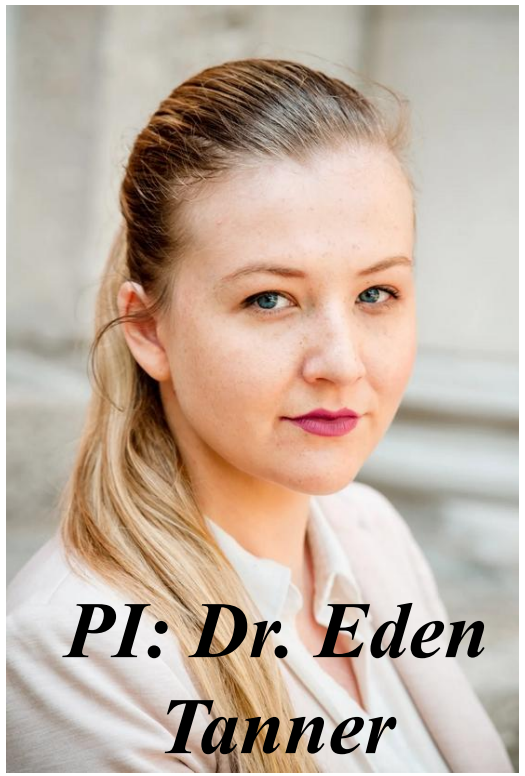
1) Electrostatically and biocompatibly coat PLGA NPs by nanoprecipitation

2) Can be structurally tuned in anion identity to confer selective RBC, Platelet, and WBC hitchhiking in ***both*** whole mouse and human blood relative to bare PLGA NPs

Key Takeaway:

By controlling the physical chemistry of blood cell-IL interactions, we can drive novel biological function for unprecedented intravenous drug delivery

Acknowledgements



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Blood Team