



Upcoming Webinar - March 6, 2020 11:30 AM EST

Nature inspired nanomaterials enable adoptive macrophage therapy of sepsis

Vitamins are natural compounds for numerous cell functions. Chemically, they possess unique and diverse functional moieties such as hydrophobic chains, hydroxyl groups, and positive charges, which may be incorporated into nanoparticle components. Inspired by vitamin structures, we designed a series of vitamin-derived lipid nanomaterials to deliver the mRNA into macrophages. Then, we identified vitamin C lipid nanoparticles (VcLNPs) with efficient delivery of mRNA in both RAW264.7 cells and bone-marrow-derived macrophages (BMDMs). We also designed the antimicrobial peptides/cathepsin B (AMP-CatB) mRNA. The VcLNPs enabled specific accumulation of AMP-CatB in the macrophage lysosomes, the key location for antibacterial activities. Our results demonstrate that adoptive macrophages (MACs) transfer leads to the elimination of multidrug resistant (MDR) bacteria, including *S. aureus* and *E. coli*.

Overall, this study provides a promising strategy for overcoming MDR bacteria-induced sepsis and opens up possibilities for the development of nanoparticle-enabled cell therapy for infectious diseases.



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Yizhou Dong is an Associate Professor at the College of Pharmacy, The Ohio State University. His research focuses on the design and development of nanotechnology platforms for the treatment of infectious diseases, genetic disorders, and cancers. Dr. Dong has published over seventy papers and patents. Several of his inventions have been licensed and are currently under development as drug candidates for clinical trials. He is the recipient of numerous honors, such as NIGMS Maximizing Investigators' Research Award and Ohio State Early Career Innovator of the Year.