DEPARTMENT OF BIOMEDICAL SCIENCES
PRESENTS A SEMINAR

CityU 香港城市大學 City University of Hong Kong

ENGINEERING EXTRACELLULAR VESICLES FOR THERAPEUTIC DELIVERY

PROF. MINH LE

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DATE: 6 June 2024 (Thursday)

TIME: 10:00 a.m.- 11:00 a.m.

VENUE: G5-314, Yeung Kin Man Acad Building

Abstract

Extracellular vesicles (EVs) are an emerging class of drug carriers that are biocompatible and effective in therapeutic delivery. Studies from our group have shown that EVs derived from red blood cells (RBCs) are ideal carriers for therapeutic nucleic acid in several disease models. RBCEVs are taken up readily by various cell types, delivering drugs to efficiently modulate gene expression in the target cells. Moreover, we found that RBCEVs have their own therapeutic potential based on their anti-inflammation and anti-viral properties. We recently demonstrated that the delivery of immunomodulatory RNA (immRNA) acting as a RIG-I agonist significantly suppresses tumor growth and induces immune cell infiltration in various types of cancer, transforming 'cold' tumors into 'hot' tumors. Additionally, immRNA synergizes with antisense oligonucleotides that inhibit mutant KRAS and mutant EGFR, stimulating potent anti-tumor immune responses. We have also developed a method for surface modification of RBCEVs to improve the specificity of delivery. Furthermore, we found that the display on EV surface enhances the signaling efficacy of immunomodulatory ligands, while simultaneously mitigating their systemic toxicity. Display of immunomodulatory ligands such as agonistic CD137 and CD40 antibodies on the EV surface significantly enhanced their therapeutic efficacy over equivalent doses of free ligands by inducing ligand multimerization, efficient receptor crosslinking and the formation of immune synapses. Hence, we have developed an EV-based delivery approach that enables the utilization of potent cancer immunotherapy combinations, achieving enhanced anti-tumor responses at potentially lower doses and with fewer side effects than traditional administration methods for cancer immunotherapy. The EV engineering approach we developed can be easily applied to various therapeutic nucleic acid and proteins, allowing for the creation of EVs with a predetermined therapeutic composition that is effective, safe, and scalable in complementary combinations.

Biography

Minh Le received a Ph.D. degree in Computational and Systems Biology from the Singapore-MIT Alliance and further trained as a postdoctoral fellow at Boston Children's Hospital. She started her lab at City University of Hong Kong in 2015 and moved to the National University of Singapore in 2019. Her group has developed strategies to harness EVs from red blood cells and engineer EVs for targeted delivery (Usman et al Nat Com 2018, Pham et al JEV 2021, Jayasinghe et al Theranostics 2022, Peng et al JEV 2022, Peng et al Mol Ther 2022, Pham et al JEV 2023, Jayasinghe et al ACS Nano 2023). Minh is a recipient of the L'Oreal Singapore for Women in Science Fellowship, the Graduate Mentor of the Year Award as well as multiple national grants from the Singapore government. She currently serves a deputy editor of the Journal of Extracellular Biology and an associate editor of the Journal of Extracellular Vesicles. Besides, she is also a scientific cofounder of Carmine Therapeutics, and the leader of the EVANTICA industry alignment program in Singapore.

All are Welcome!

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