Institute of Molecular and Cell Biology
IMCB

## SEMINAR ANNOUNCEMENT

We would like to invite you to attend this seminar hosted by the Institute of Molecular and Cell Biology:

**Date:** 25 March 2022
**Time:** 11.00AM – 12.00NN

**Please register for the seminar here:**
https://zoom.us/webinar/register/WN_YTkuL4vRTC-Sgtlxftw9xw

# Targeted delivery of therapeutic RNAs using antibody conjugated extracellular vesicles



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**Abstract**

RNA-based therapeutics have become one of the most promising new classes of medicine in recent years. However, the delivery of RNA drugs is still challenging. We have shown that red blood cell extracellular vesicles (RBCEVs) are the ideal carriers for therapeutic RNAs because RNAs can be loaded readily into the EVs and delivered to cancer cells at high efficiency (Usman et al, Nature Communications, 2018). RBCEVs are nontoxic, nonimmunogenic and devoid of DNA hence there is no risk of horizontal gene transfer. RBCEVs can be produced in a large quantity from donated blood. Moreover, RBCEVs can undergo many cycles of freezing and thawing without affecting their integrity and efficacy, suggesting that they can be developed into stable pharmaceutical products. Here, we describe new modifications to the RBCEV platform to establish targeted delivery to specific tumor types. RBCEVs are covalently conjugated with peptides or nanobodies targeting EGFR, facilitating accumulation of RBCEVs in EGFR-positive cancer cells including lung cancer and breast cancer. EGFR-targeting RBCEVs deliver therapeutic molecules including siRNAs, ASOs and mRNAs specifically to tumor cells for cancer treatments with increased efficacy and reduced side effects. We also use RBCEVs coated with CXCR4-targeting peptide or CD33-targeting monoclonal antibodies to deliver therapeutic peptides and ASOs to leukemia cells specifically. Hence, the targeted RBCEVs platform can be customized for different cancer types to enhance the specificity and efficiency of RNA therapy.

**Biography**

Dr Le graduated from the National University of Singapore (NUS) with a Bachelor's degree in Life Sciences and a Ph.D. degree in Computational and Systems Biology, under the guidance of Prof. Bing Lim and Prof. Harvey Lodish. She was trained as a postdoctoral fellow with Prof. Judy Lieberman at Boston Children's Hospital for 5 years and worked at City University of Hong Kong (CityU) as an Assistant Professor for 4 years before returning to NUS. Dr Le is well recognised for her contributions to the field of microRNAs, extracellular vesicles and cancer biology. She was the first to identify the function of miR-125b in regulating the p53 pathway and demonstrate its important roles in development and in cancer. Her group has recently developed a strategy to harness extracellular vesicles from red blood cells for delivery of RNA drugs. This drug delivery platform is the foundation for her start-up company, Carmine Therapeutics, which is recognized among the top 15 biotech company by Fierce in 2020.