

TEMS TLL External Monthly Seminar

16 JUL 25 WEDNESDAY 3PM
TLL AUDITORIUM LEVEL 1

Human extracellular vesicles as a new modality for cellular therapy

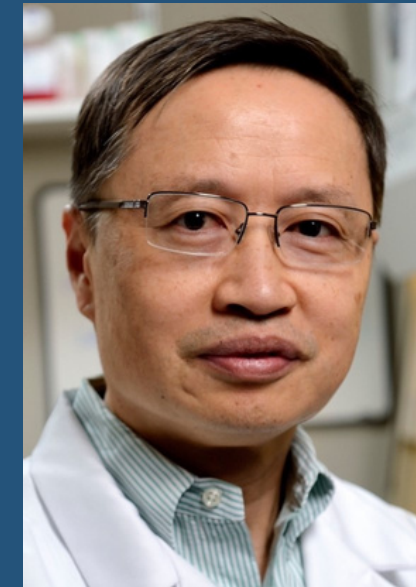
Extracellular vesicles (EVs) including exosomes and micro-vesicles are nano- or micro-meter sized, membrane-enclosed vesicles that are secreted by nearly all the cells and deliver biologic cargos into recipient cells over a long distance. It is widely believed that EVs that lack DNA but contain unique sets of proteins and RNAs produced by various types of producing cells exert unique biological functions in recipient cells, and provide a cell-free modality for certain types of cell therapy. We previously demonstrated that EVs produced by human iPSCs and MSCs ex vivo can reduce cellular ROS levels and aging phenotypes of senescent MSCs in 3 different aging models (2019). However, the unmodified EVs from stem cells only have moderate effects in vivo in several in vivo repair and regeneration models (2021), similar to many other studies. To enhance EV's biological functions and production efficacy, we used simple human cell lines that can be expanded in chemically defined media and produce a therapeutic protein by genetic engineering. We used human 293F cells to produce EVs that are loaded with a cell-surface protein (such as Wnt3a, 2023) or intracellular proteins (such as cGAS, 2024), and applied them for in vivo murine models. Efficient delivery of intracellular (nuclear or cytoplasmic) proteins has been challenging. Our IDEA (Intracellular Delivery via EV Approach) system will extend the possibility of delivering intracellular therapeutic proteins for cellular (including EV) therapy.

Recent Publications:

1. Liu S, Mahairaki V, Bai H, Ding Z, Li J, Witwer KW, Cheng L. Highly Purified Human Extracellular Vesicles Produced by Stem Cells Alleviate Aging Cellular Phenotypes of Senescent Human Cells. *Stem Cells*, 2019, 37(6):779-790. doi: 10.1002/stem.2996.
2. Gao L, Sun Y, Zhang X, Ma D, Xie A, Wang E, Cheng L†, Liu S†. Wnt3a-Loaded Extracellular Vesicles Promote Alveolar Epithelial Regeneration after Lung Injury. *Adv Sci*. 2023 Apr 18:e2206606. doi: 10.1002/advs.202206606. PMID: 37072558.
3. Ma D, Xie A, Lv J, Min X, Zhang X, Zhou Q, Gao D, Wang E, Gao L, Cheng L†, Liu S†. Engineered extracellular vesicles enable efficient delivery of intracellular therapeutic proteins. *Protein & Cell*. 2024 Oct 1;15(10):724-743.

Hosted by Dr Yu Fengwei

Speaker



Chair professor and Director in Division of Life Sciences and Medicine in University of Science and Technology of China (USTC) since 2019. He was Lucas & Lynn chair professor in the Johns Hopkins University, School of Medicine. Dr. Cheng was elected as a Fellow of AAAS in 2012, and of American Institute for Medical and Biological Engineering (AIMBE) in 2020.

Prof Linzhao Cheng
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