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ISEV2020 Abstract Book

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The International Society for Extracellular Vesicles is the leading professional society for researchers and scientists involved in the study of microvesicles and exosomes. With nearly 1,000 members, ISEV continues to be the leader in advancing the study of extracellular vesicles. Founded in 2012 in Sweden, ISEV has since moved its Headquarters to the United States. Through its programs and services, ISEV provides essential training and research opportunities for those involved in exosome and microvesicle research.

Mission Statement

Advancing extracellular vesicle research globally.

Vision

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The International Society for Extracellular Vesicles is the is the premier international conference of extracellular vesicle research, covering the latest in exosomes, microvesicles and more. With an anticipated 1,000 attendees, ISEV2020 will feature presentations from the top researchers in the field, as well as providing opportunities for talks from students and early career researchers.

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OS24

Symposium Session 24: Advances in Separation and Concentration II

Chair: Lei Zheng – Department of Laboratory Medicine, Nanfang Hospital, Southern Medical University

OS24.1

Scaling-up the manufacturing of well-characterized mesenchymal stromal cell-derived extracellular vesicles for biomedical applications

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Introduction: It is anticipated that stem/progenitor cells-derived extracellular vesicles (SPC-EVs) will rapidly progress towards clinical studies, and the development of reproducible, efficient, scalable and cost-effective process for their production is expected to boost the therapeutic applications of EVs-based products. In addition, the use of defined serum-/xenogeneic(xeno)-free culture medium formulations could result in substantial improvements for SPC-EVs production in terms of reproducibility, stability and quality, while ensuring the approval of regulatory agencies. The main goal of this work is to develop a full-controlled manufacturing platform for the SPC-EVs production.

Methods: Human mesenchymal stromal cells (MSC) were expanded in a xeno-free microcarrier-based bioreactor culture system operating in fed-batch feeding mode and after 10 days the conditioned medium was collected. Different methods for SPC-EV isolation/purification from the MSC-derived conditioned medium, including chromatography were compared and the the quality of the final product obtained was characterized by different methods according to MISEV, including nanoparticle tracking analysis, lipidomics and Western blot. Moreover Fourier-Transform InfraRed (FTIR) spectroscopy was evaluated in terms of its implementation as a standard technique for the identification and characterization of EVs.

Results: After 10 days of MSC expansion under dynamic conditions, we collected 1.3 L of conditioned medium with approximately 0.5 million EVs/MSC. A combination of a pretreatment with a nuclease for the digestion of DNA/chromatin with a purification using strong anion exchange chromatography led to the best results so far in terms of EVs isolation. Of notice, by FTIR spectroscopy, it was possible to define ratios of spectral bands, that can be used as biomarkers, enabling the discrimination of EVs chemical fingerprint in function of the culture conditions tested.

Summary/Conclusion: The platform established herein could be applied to the production of well-characterized SPC-EVs targeting their biomedical use in different settings (e.g. as drug delivery systems), as well as EVs from other parental cells lines (i.e. dendritic cells) in therapeutic settings as cancer.

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OS24.2

Ultrasensitive protein detection for quantification of extracellular vesicles in human biofluids enables comparison of isolation techniques

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Introduction: Extracellular vesicles (EVs) are released by all cells into biofluids and hold great promise as reservoirs of disease biomarkers. One of the main challenges in studying EVs and using them in diagnostics is a lack of suitable methods to quantify EVs that are sensitive enough and can differentiate EVs from similarly sized lipoproteins and protein aggregates. We propose using ultrasensitive single molecule array (Simoa) assays to quantify EVs by immunoisolating and detecting EV transmembrane proteins in microwell arrays.