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High yield isolation of exosomes from cultivated postpartum human placenta

Qian Ye

Cellularity Inc, USA

Exosomes are nano-sized bi-lipid membrane vesicles secreted from living cells that play important functions in cell-cell communications. During human pregnancy, placenta plays central roles in regulating physiological homeostasis and supporting fetal development. It is known that extracellular vesicles and exosomes secreted by placenta contribute to the communication between placenta and maternal tissues to maintain maternal-fetal tolerance. Exosomes contain active biologics including lipids, cytokines, microRNA, mRNA and DNA. Exosomes from human placental explants have immune modulation activities. Placenta-tissue derived mesenchyme-like cells demonstrated pro-angiogenesis activities. These studies suggest the probability of therapeutic values of placenta derived exosomes. Exosomes isolated from placenta derived cells may not represent the full spectrum exosomes of an intact placenta and the yield could be limited. Here we report a novel method to isolate significant quantify of exosomes by cultivating an intact postpartum human placenta by cultivating saline perfused placenta bioreactor with serum free culture medium supplemented with anti-biotics for extended period upto to 4 days. Supernatant of the culture medium was processed by sequential centrifugation to pellet tissue, cell and micro-vesicles and exosomes are pelleted by ultra-centrifugation. ELISA assay demonstrated that the isolated exosomes are positive for CD63A protein, a specific protein marker for exosomes. It is estimated one placenta cultured in one liter of medium generated approximately 40mg of exosomes, or approximately 1×10^{13} CD63A positive exosome particles as determined in 24 hours. These placenta organ-derived exosomes could be of a novel source of therapeutic exosomes for in the areas of immune regulation and functional regeneration.

Biography

Qian Ye received his B.S degree from Xiamen University, China in 1986 and Ph.D. from Mount Sinai Medical Center (New York) in 1996. He conducted postcoar research in Columbia University and Memorial Sloan Kettering Cancer Center from 1996 to 2001. From 2001 to 2017, He worked as Senior Scientist and Principal Scientist at Celgene Cellular Therapeutics in New Jersey. Currently, He is the Director of Innovative Research. He is an expert in stem cells and cellular therapeutics, has published more than a dozen papers and abstracts and co-authored in multiple patents and patent applications.

qianye1@gmail.com

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