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POSTER ABSTRACT PRESENTATIONS

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Abstract P-41: Contribution of Matrix-bound Vesicles Produced by Mesenchymal Stromal Cells in the Differentiation of Multipotent Stem Cells *in vitro*

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Background: According to the current view on the extracellular matrix (ECM) composition and functions, it includes not only structural proteins and components of cell adhesion, but also various deposited components, including enzymes involved in ECM remodeling, growth factors, and matrix-bound vesicles (MBV). MBV can presumably participate in the formation of a specific microenvironment for stem cells and regulate their differentiation. However, the contribution of MBV to these processes remains poorly understood. In our work, we evaluated the effects of MBV within native ECM produced by mesenchymal stromal cells (MSCs) cultured in cell sheet on multipotent stem cell differentiation.

Methods: We isolated MBV from decellularized MSC-produced ECM by treatment with the following enzymes: collagenase, hyaluronidase, or trypsin, and centrifugation on 1000 kDa filters. The nanostructure and relative size in each sample were observed using TEM. The particle size and concentration were also studied with NTA. In addition, the obtained MBV were examined for the presence of key exosome markers using Western blot. Then we investigated the effect of MBV on the formation of capillary-like structures by endothelial cells (in vitro model of angiogenesis) as well as on the differentiation of primary MSCs isolated from human adipose tissue in the adipogenic, osteogenic, and chondrogenic directions.

Results: As a result of comparative analysis of isolation protocols, it was shown that all MBV samples had the characteristics of extracellular vesicles (EV), but differed in size and representation of exosomal markers. The MBV isolated from ECM did not stimulate the formation of capillary-like structures by endothelial cells, in contrast to EV secreted by MSCs to the conditioned medium, but maintained the viability of the endothelium. Isolated MBV stimulated osteogenic and adipogenic differentiation of MSCs similar to secreted EV. On the other hand, preincubation of MSCs with MBV leads to reorganization of cell monolayer to spheroid-like structures during chondrogenic differentiation.
Conclusion: Here, we developed the protocol of isolation of MBV from ECM that have distinguished characteristics and functional activity.

Key Words: ECM • matrix-bound vesicles • differentiation • MSC

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