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Angiogenic, Cytoprotective, and Immunosuppressive Properties of Human Amnion and Chorion-Derived Mesenchymal Stem Cells

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Abstract : We have previously reported the therapeutic potential of rat fetal membrane(FM)-derived mesenchymal stem cells (MSCs) using various rat models including hindlimb ischemia, autoimmune myocarditis, glomerulonephritis, renal ischemia-reperfusion injury, and myocardial infarction. In this study, 1) we isolated and characterized MSCs from human amnion and chorion; 2) we examined their differences in the expression profile of growth factors and cytokines; and 3) we investigated the therapeutic potential and difference of these MSCs using murine hindlimb ischemia and acute graft-versus-host disease (GVHD) models. Isolated MSCs from both amnion and chorion layers of FM showed similar morphological appearance, multipotency, and cell-surface antigen expression. Conditioned media obtained from amnion- and chorion-derived MSCs inhibited cell death caused by serum starvation or hypoxia in endothelial cells and cardiomyocytes. Amnion and chorion MSCs secreted significant amounts of angiogenic factors including HGF, IGF-1, VEGF, and bFGF, although differences in the cellular expression profile of these soluble factors were observed. Transplantation of human amnion or chorion MSCs significantly increased blood flow and capillary density in a murine hindlimb ischemia model. In addition, compared to human chorion MSCs, human amnion MSCs markedly reduced T-lymphocyte proliferation with the enhanced secretion of PGE2, and improved the pathological situation of a mouse model of GVHD disease. Our results highlight that human amnionand chorion-derived MSCs, which showed differences in their soluble factor secretion and angiogenic/immuno-suppressive function, could be ideal cell sources for regenerative medicine.

Keywords : amnion, chorion, fetal membrane, mesenchymal stem cells
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