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Modification of mesenchymal stem cells for clinical application

Under proper stimulation, mesenchymal stem cells (MSCs) can be induced to differentiate into myocytes, adipocytes, osteoblasts, chondrocytes, tenocytes and hematopoietic-supporting stroma. With recent reports that MSCs derived from bone marrow can differentiate into cardiac muscle *in vitro* and *in vivo*, MSCs autologous transplantation is a promising, new therapeutic modality for the repair of myocardial infarctions and prevention of post-infarct congestive heart failure. However, in experimental models, poor viability of the transplanted cells is a major limiting factor of cell therapy. The survival rate of transplanted cells into an uninjured mouse heart was very low, 4 days post transplantation. This may require pro-survival strategies to improve stem cell survival/number in the infarcted heart. Although pro-survival strategies have been proven to be successful *in vitro*, they actually may not solve the problems of poor adhesion of MSCs. However, the major obstacle in the clinical application of MSC-based therapy is the poor viability of the transplanted cells due to harsh microenvironments like ischemia, inflammation and/or anoikis in the infarcted myocardium. Mesenchymal stem cells (MSCs) are multipotent,

self-renewing cells harboring multi-lineage differentiation potential and immunosuppressive properties that make them an attractive candidate for biological cell-based regenerative medicine. In addition to its undoubted clinical interest, controlling the fate and behaviors of MSCs is a crucial prerequisite for their therapeutic applications in regenerative medicine. Stem cell differentiation and modulation of functional activities are generally controlled by “cocktails” of growth factors, signaling molecules and/or genetic manipulations.

Speaker Biography

Ki-Chul Hwang is vice-president and Professor of College of Medicine, Catholic Kwandong University and Director, Institute for Bio-Medical Convergence, International St. Mary's Hospital of Korea. He received his doctor of philosophy degree from the Korea University in Republic of Korea and completed his Postdoctoral Fellowship at the Cleveland Clinic Foundation, Cleveland, OH, USA and the Victor Chang Cardiac Research, NSW University, Sydney, Australia. He has consecutively filled (Senior) Editorial Board at the World Journal of Stem Cells, American Journal of Stem Cells and Journal of Geriatric Cardiology. Much of his research career has focused on the adult stem cells and he is recognized to be at the forefront of the emerging field about functional enhancement in stem cells and its therapeutic role associated with many diseases.

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