Method of Preconditioning Mesenchymal Stem Cells for Use in the Treatment of Myocardial Infarction

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Technology description

Ischemic heart disease is the leading cause of heart failure and death. Conventional therapeutic approaches for the treatment of myocardial infarction are limited to preventing the progression of ventricular remodeling and congestive heart failure. Recently, different approaches in cell therapies have gained enthusiasm as alternative treatments for repair of infarcted myocardium. Stem cell transplantation may represent a realistic strategy for reversing the deleterious effects of what has been considered irreversible damage to the heart.

Invention:

Investigators at the University of Cincinnati have developed a novel method for preconditioning mesenchymal stem cells (MSCs) that enhances their proliferation, migration, engraftment, differentiation into endothelial cells, and blood vessel formation.

In vivo , in a rat model of myocardial infarction, the method of preconditioning MSCs resulted in angiogenesis, reduced fibrosis and infarction size. Preconditioned MSCs also enhanced their angiomyogenic potential. Importantly, reconditioned MSCs induced cardiomyocyte cell- cycle reentry, which associated with improved ventricular remodeling and myocardial function.

In vitro , this preconditioning method led to increased cell migration and proliferation and promoted capillary tube formation. Additionally, preconditioned MSCs release some cytokine, chemokine and adhesion molecule, such as SDF-1a, FGF, VEGF cyclin D1, etc, which are extremely important for cell growth and repair of myocardial infarction.

Advantages

Novel method and compounds to promote stem cell growth and differentiation.

Novel approach in promoting MSCs based repair of myocardial infarction.

The medium from preconditioned MSCs may be useful for stimulating cell growth or proliferation.

Institution

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