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Therapeutic application of MSC-derived exosome

Key words: mesenchymal stem cells, secretome, exosomes

Over the last decades, mesenchymal stem cells (MSCs) have been extensively studied with regard to their potential applications in regenerative medicine. MSCs possess the unique potential for use in cell-based therapy of heart diseases, especially in ischemic heart disease. The therapeutic potential of MSCs in myocardial regeneration is based on the ability of MSCs to directly differentiate into cardiac tissue and on the paracrine actions of factors released from MSCs. The predominant mechanism by which MSCs participate to tissue repair is through a paracrine activity. Via the production of a multitude of trophic factors with various properties, MSCs can reduce tissue injury, protect tissue from further degradation and/or enhance tissue repair. That is, the collected types of molecules released by the stem cells, called the secretome, or stem cell released molecules (SRM), number in the 100s, including proteins, microRNA, growth factors, antioxidants, proteasomes, and exosomes, and target a multitude of biological pathways through paracrine actions. Especially, exosomes have been identified as a new type of major paracrine factor released MSCs. They have been reported to be an important mediator of cell-to-cell communication. The diameter of exosomes ranges from 30 to 100 nm which contain an abundance of bioactive substances, such as mRNA, microRNA, and protein. In a myocardial infarction model, MSC-derived exosome had significantly better cardiomyocyte survival, enhanced capillary density, reduced cardiac fibrosis, and restored long-term cardiac function. These therapeutic effect of MSC-derived exosomes were mainly dependent on exosomal microRNAs. Taken together, MSC-derived exosome will be used for therapeutic delivery of miRNA targeted at cardiovascular disease

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