Use of Cardioprotective Paracrine Factors Secreted by hgPSC-derived Cardiomyocytes to Prevent Fibroblast Activation and Scar Formation following Myocardial Infarction

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To combat the rise in heart disease and resulting heart attacks, researchers have been looking into the use of stem cells as a possible treatment for these major medical issues. Following myocardial infarction, activated cardiac fibroblasts secrete proteins into the extracellular matrix that lead to the formation of a mature scar in the infarct region. The use of hgPSC-derived cardiomyocytes may improve heart efficiency after myocardial infarction. These cardiomyocyte colonies secrete cardioprotective paracrine factors that have a beneficial effect on surrounding cardiac tissue by promoting migration of endogenous cardiac cells, cytoprotection, differentiation of resident stem cells, and neovascularization, while also limiting inflammatory and pro-fibrotic processes known to decrease heart efficiency. These cardiac colonies are also capable of fusing with the surrounding tissue via gap junctions. The results of Western Blot analysis and immunofluorescence microscopy have shown that paracrine factors can reduce cardiac fibroblast activation when tested in an in vitro model. This was seen in the downregulation of proteins indicating cardiac fibroblast activation and scar tissue formation in cardiac fibroblasts that were exposed to paracrine factors. In the future, hgPSC-derived cardiomyocytes may be used in a clinical setting to restore heart function in patients who have suffered from myocardial infarction, dramatically improving their quality of life and chances of survival.

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