**LONG TERM FUNCTIONAL BENEFITS OF EPICARDIAL PATCHES AS CELL CARRIERS**

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Both enzymatic dissociation of cells prior to needle-based injections and the poor vascularization of myocardial infarct areas are two important contributors to cell death and, as such, impede the efficacy of cardiac cell therapy. Because these limitations could be overcome by scaffolds ensuring cell cohesiveness and co-delivery of angiogenic cells, we used a chronic rat model of myocardial infarction to assess the long term (6 months) effects of the epicardial delivery of a composite collagen-based patch harboring both cardiomyogenesis-targeted human embryonic stem cell-derived SSEA-1+ cardiovascular progenitors and autologous (rat) adipose tissue-derived angiogenesis-targeted stromal cells (n=27). Cell-free patches served as controls (n=28). Serial follow-up echocardiographic measurements of left ventricular ejection fraction (LVEF) showed that the composite patch group yielded a significantly better preservation of left ventricular function which was sustained over time as compared with controls and this pattern persisted when the assessment was restricted to the subgroup of rats with initial LVEFs below 50%. The composite patch group was also associated with significantly less fibrosis and more vessels in the infarct area. However, although human progenitors expressing cardiac markers were present in the patches before implantation, none of them could be subsequently identified in the grafted tissue. These data confirm the efficacy of epicardial scaffolds as cell carriers for ensuring long term functional benefits, suggest that these effects are likely related to paracrine effects and call for optimizing cross-talks between co-delivered cell populations to achieve the ultimate goal of myocardial regeneration.