Injectable fibrin scaffold improves cell transplant survival, reduces infarct expansion, and induces neovasculature formation in ischemic myocardium.

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Abstract:

OBJECTIVES: In this study, we determined whether fibrin glue improves cell transplant retention and survival, reduces infarct expansion, and induces neovasculature formation.

BACKGROUND: Current efforts in restoring the myocardium after myocardial infarction (MI) include the delivery of viable cells to replace necrotic cardiomyocytes. Cellular transplantation techniques are, however, limited by transplanted cell retention and survival within the ischemic tissue.

METHODS: The left coronary artery of rats was occluded for 17 min followed by reperfusion. One week later, bovine serum albumin (BSA), fibrin glue, skeletal myoblasts in BSA, or skeletal myoblasts in fibrin glue were injected into the infarcted area of the left ventricle. The animals were euthanized five weeks after injection, and their hearts were excised, fresh frozen, and sectioned for histology and immunohistochemistry.

RESULTS: After five weeks, the mean area covered by skeletal myoblasts in fibrin glue was significantly greater than the area covered by myoblasts injected in BSA. Myoblasts within the infarct were often concentrated around arterioles. The infarct scar size and myoblasts in the fibrin group were significantly smaller than those in the control and BSA groups. Fibrin glue also significantly increased the arteriole density in the infarct scar as compared with the control group.

CONCLUSIONS: This study indicates that fibrin glue increases cell transplant survival, decreases infarct size, and increases blood flow to ischemic myocardium. Therefore, fibrin glue may have potential as a biomaterial scaffold to improve cellular cardiomyoplasty treat and MIs.