Improved myocardial perfusion and cardiac function by controlled-release basic fibroblast growth factor using fibrin glue in a canine infarct model.

Authors: Nie S.-P., Wang X., Qiao S.-B., Zeng Q.-T., Jiang J.-Q., Liu X.-Q., Zhu X.-M., Cao G.-X., Ma C.-S.

Publication Date: 2010

Abstract:

Objective: Angiogenic therapy is emerging as a potential strategy for the treatment of ischemic heart disease but is limited by a relatively short half-life of growth factors. Fibrin glue (FG) provides a reservoir for controlledrelease of growth factors. The aim of this study was to evaluate the effects of basic fibroblast growth factor (bFGF) incorporating FG on angiogenesis and cardiac performance in a canine infarct model. Methods: Acute myocardial infarction was induced by ligation of the left anterior descending coronary artery (LAD). Group I (n=6) underwent ligation of LAD alone. In Group II, transmural channels were created in the infarct area (n=6). In Group III, nontransmural channels were created to locate FG cylinders containing bFGF (n=6). Eight weeks after operation, myocardial perfusion was assessed by single photon emission computed tomography, cardiac function by echocardiography, and vascular development by immunohistochemical staining. Results: Total vascular density and the number of large vessels (internal diameter >= 50 mum) were dramatically higher in Group III than in Groups I and II at eight weeks. Only the controlled-release group exhibited an improvement in regional myocardial perfusion associated with lower defect score. Animals in Group III presented improved cardiac regional systolic and diastolic functions as well as global systolic function in comparison with the other two groups. Conclusions: Enhanced and sustained angiogenic response can be achieved by controlled-release bFGF incorporating FG within transmyocardial laser channels, thus enabling improvement in myocardial perfusion and cardiac

function.