

Regenerative Medicine (Bernd K. Fleischmann)



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Mending the Broken Heart

Our primary interest is to explore different strategies to repair the heart after myocardial infarction (MI) either by using cell replacement approaches (exogenous repair) or by trying to redirect terminally differentiated cardiomyocytes (CMs) into cytokinesis (endogenous repair). We could show in mouse that embryonic- or ES cell-derived CMs engraft in infarcted hearts, improve function and lower the incidence of post-infarct arrhythmias. We have also demonstrated that engraftment is strongly enhanced by magnet-driven positioning of nanoparticle-loaded CMs. While the adult heart does not display repair upon MI, the neonatal mouse heart can partially regenerate due to remaining cell cycle activity and cytokinesis of some resident CMs. We have therefore generated transgenic systems to unequivocally identify CMs in cytokinesis and to screen molecules for their potential to bring adult CMs back into the cell cycle and make them divide. Thus, our long term goal is to at least partially repair the heart post-MI and to treat its long term sequelae such as heart failure and arrhythmias.