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## Can we revert the loss of cardiomyocytes in heart failure?

Despite revascularization and improved drug therapy, some patients with post myocardial infarction experience a critical loss of functional myocardium leading to remodeling and progression towards heart failure. As the heart is a terminally differentiated organ, renewal and replacement of dead myocardial cells occurs through the intrinsic regenerative potential situated in every organ. As recent research has revealed, the regenerative power of pluripotent stem cells is located throughout the body in small vessels, these cells are able to differentiate into all of the three germ layers. In addition, in every organ we find so-called progenitor cells, which in the heart also constitute the reserve army to replace dying myocardial cells. In light of heart failure with increased ischemia and the survival rate of myocardial cells is significantly reduced, representing an increased turnover and challenge to the stem cells located within the heart. As the ability for stem cells to divide is limited to about 50 to 70 divisions by the telomeres, the regenerative potential in a heart can be exhausted and the functional consequence is a replacement of parenchyma (cardiomyocyte) by fibrous tissue (mesenchyme). Up to now the global understanding why and how cardio myocytes can be replaced is controversial and by most physicians, scientists, and patients obscured. However, the principal of universal stem cells within the body allows obtaining stem cells from one organ, which is not critical such as adipose tissue, to isolate those stem cells and to apply them to the organ in need. The local microenvironment guides the new stem cells through a differentiation program and enables cells to obtain the properties of new cardiomyocytes that completely integrate and synchronize with existing myocardium. The mechanisms of differentiation follow exactly the embryonic differentiation pass way. Hence, it is possible to renew cardiomyocytes by autologous, early stem cells such as the ones that can be retrieved from the stroma of adipose tissue. The mechanism and epigenetic steps of differentiation including results on myocardial regeneration will be presented.

### Biography

Eckhard U Alt is a Professor at Technical University of Munich, Germany, Tulane University New Orleans LA, and Chair at Sanford University SD. He completed his Medical Degree as Valedictorian at Heidelberg Medical School. From 2001 to 2007, he was President of International Cardiac and Electrophysiology Society. He has authored more than 500 publications. His innovative spirit is demonstrated by more than 700 patents, primarily in the fields of Stem Cells, Electrophysiology and Interventional Cardiology. He introduced several new therapies to clinical practice, such as Rate-adaptive Pacing, Defibrillators, Treatment of Atrial Fibrillation and Stem Cell Treatment that have substantially influenced the practice of medicine. He won Hahn Research Award from European Society of Thoracic Surgery.

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