

Study suggests different organ-derived stem cell injections improve heart function

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A study published in the current issue of *Cell Transplantation* (21:8), now freely available on-line, has found that when mesenchymal cells derived from skeletal muscle (SM-MSCs) or adipose tissue (ADSCs) were injected into the heart muscle (myocardium) of separate groups of laboratory rats that had suffered a myocardial infarction, rats in both groups experienced significantly improved left ventricle function and smaller infarct size after cell therapy.

The study, carried out by researchers at Oslo University Hospital and the Norwegian Center for Stem cell Research, Oslo University, sought to determine if MSCs from different organs would result in different functional outcomes.

"Despite advances in revascularization and medical therapy, [acute myocardial infarction](#) (AMI) and heart failure are still important causes of morbidity and mortality in industrialized countries," said study co-author Dr. Jan E. Brinchmann of the Norwegian center for Stem Cell Research at Oslo University Hospital, Oslo. "AMI leads to a permanent loss of contractile elements in the heart and the formation of fibrous scarring. Regeneration of contractile myocardium has been a target of cell therapy for more than a decade."

According to Dr. Brinchmann, MSCs tolerate hypoxia, secrete angiogenic factors and have been shown to improve vascularization; thus, they have properties suggesting that they may beneficially impact AMI, [chronic heart failure](#) and angina pectoris after [cell transplantation](#).

Following injection into the "border zone" and infarct area of immunodeficient rats one week after induced [myocardial infarction](#), the researchers used echocardiography to measure myocardial function and other analyses to measure the size of scarring, density of blood vessels in the scar, and the health of myocardial tissues.

"Our results showed that intramyocardial injection of both ADSCs and SM-MSCs one week after AMI led to a substantial decrease in infarct size and a significant improvement in [left ventricle](#) function when compared with injections of cell culture medium alone," concluded the authors. "There was a trend toward better functional improvement in the SM-MSC group when compared to the ADSC group, but this did not reach significance."

They concluded that many questions remain unanswered, including the question of whether MSCs isolated from different organisms could result in different functional outcomes. Other unanswered questions relate to the optimal time delay between the onset of myocardial infarction and injection of MSCs. These cells do, however, still appear to be "a potentially interesting adjuvant treatment modality for selected patients following acute myocardial infarction," they concluded.

More information: Beitnes, J. O.; Øie, E.; Shahdadfar, A.; Karlsen, T.; Müller, R. M. B.; Aakhus, S.; Reinholt, F. P.; Brinchmann, J. E. Intramyocardial Injections of Human Mesenchymal Stem Cells Following Acute Myocardial Infarction Modulate Scar Formation and Improve Left Ventricular Function. *Cell Transplant.* 21(8):1697-1709; 2012. <http://www.ingentaconnect.com/content/cog/ct/>

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