A117.E1091
JACC March 9, 2010
Volume 55, issue 10A

MYOCARDIAL ISCHEMIA AND INFARCTION

IMPROVEMENT OF BIODISTRIBUTION IN CARDIAC STEM CELL THERAPY USING FIBRINOGEN

ACC Poster Contributions
Georgia World Congress Center, Hall B5
Monday, March 15, 2010, 9:30 a.m.-10:30 a.m.

Session Title: Optimizing Stem Cell Therapy
Abstract Category: Myocardial Ischemia/Infarction--Basic
Presentation Number: 1160-307

Authors: *Andreas Martens, Sebastian V. Rojas, Robert Zweigerdt, Christian Rathert, Ulrich Martin, Axel Haverich, Ingo Kutschka, Clinic for Cardiac, Thoracic, Transplantation and Vascular Surgery; Hannover Medical School, Hannover, Germany, Leibniz Research Laboratories for Biotechnology and Artificial Organs, Hannover Medical School, Hannover, Germany*

Background: Successful stem cell delivery and biodistribution are pivotal factors for efficient stem cell therapy. We used fluorescent microsphere particles to simulate cell retention and biodistribution after cardiac regenerative therapy. Fibrinogen was evaluated to augment particle retention.

Methods: Fluorescent microspheres (5,0*10^5; d=10µm) were transplanted into 26 mice hearts in 5 groups (A=injection in PBS into explanted hearts, B-E= injection after LAD ligation in situ, B-C=PBS, D-E=fibrinogen). Hearts were explanted after 10min (groups B+D) or 3days (groups C+E), respectively. Direct macroscopic fluorescence bioimaging was performed using a Xenogen® IVIS Lumina-System.

Results: Compared to ex situ injection, the in situ delivery in PBS showed a 90% decline in particle retention (group A = 3,2*10^5 vs. group B = 0,3*105; p<0,01), indicating immediate loss during injection mainly through venous drainage into the lungs. Further particle loss into the lungs was observed until POD3 (p<0,05). Cardiac particle retention could be improved using fibrinogen as a carrier substance (group D = 1,1*10^5; D vs. B: p<0,05).

Conclusions: Beating heart application techniques are associated with a massive loss of fluorescent microspheres. We introduce a reliable tool to analyse retention and biodistribution of cell-like particles after injection into infarcted myocardium. Fibrinogen improves cardiac microsphere retention and should be considered the carrier of choice for intramyocardial stem cell delivery.