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Therapeutic potential of activated mesenchymal stem cells in chronic myocardial infarction – as novel strategic cell therapy

Akifumi Matsuyama and Hanayuki Okura
Fujita Health University, Japan

Introduction: Cell therapy is promising for cardiac diseases and lots of trials have been challenged. Many reported showed their efficacy in the investigational trials, but few showed dropout in the large pivotal ones. Here, we supposed that MSCs-activation could overcome them. In this study, we propose the novel strategy to identify the bio-active protein which could activate MSCs and show the activated MSCs could improve the cardiac dysfunction.

Methods & Results: hADMPCs, as the representatives of MSCs, were challenged to 160 kinds of bio-actives, and the cells were applied for DNA microarray analysis. Principal component analysis showed seven bio-actives could prime hADMPCs. IL-1 β was selected as the activating reagent for them, because IL-1 β -activated ones could show augmented probes. To confirm the activated hADMPCs could improve cardiac dysfunction, the cells were applied for the chronic myocardial infarction swine models. The animals were injected with hADMPCs, IL-1 β -activated ones (3x10⁵ cells/kg body) or placebo via the coronary artery. Cardiac function was assessed by MRI at 0 and 12-week post-transplantation. IL-1 β -activated hADMPC-administration showed significant improvement than those of hADMPCs and controls (Δ EF% of controls were -1.0%, hADMPCs, 4.5% and IL-1 β -activated hADMPCs 9.0%, respectively). Histological analysis showed significant reduction of fibrotic area of the cardiac tissues, the number of cardiomyocytes were increased, and the vascular network has been reconstructed in IL-1 β -activated ones-treated animals.

Conclusion: We showed the novel strategy to identify IL-1 β as MSCs-activating reagents and show the IL-1 β -activated MSCs could be applicable for therapeutics to chronic myocardial infarction.

Biography

Hanayuki Okura has completed her PhD degree from Osaka University Graduate School of Medicine. She has received Research Fellowship for Young Scientists of Japan Society for the promotion of science in her graduate school student years. She has performed her researches in The Center for Rare Diseases Research, National Institutes of Biomedical Innovation, Health and Nutrition, Japan as the Deputy Director of the center. She is now a Professor at Fujita Health University, Aichi, Japan.

haokura-circ@umin.ac.jp

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