

一般演題抄録

I — 3 Ultrasound-Targeted Gene Delivery Induces Angiogenesis After a Myocardial Infarction in Mice

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Abstract

Background: Ultrasound-targeted microbubble destruction (UTMD) is a tool for gene delivery. There would be diversity of UTMD depending on selected genes. In this study, we challenged UTMD for angiogenesis to treat damaged heart after myocardial infarction. **Methods:** C57BL/6 female mice had undergone the left anterior descending artery ligation at Day (-7). The empty plasmid, green fluorescent protein (GFP) plasmid, vascular endothelial growth factor (VEGF) plasmid, or stem cell factor (SCF) plasmid was incubated with the lipid microbubble (DEFINITY®) solution. The microbubble solution with each plasmid was injected intravenously, and ultrasound was directed into the heart at Day 0. The protein expressions following gene transfection were evaluated by immunohistochemistry and biochemistry at Day 14. Myocardial perfusion and cardiac function were evaluated by myocardial contrast echocardiography (MCE) and echocardiography at Day 0 and Day 14. **Results:** GFP group showed GFP expression on the myocardium. In comparison with control, VEGF and SCF groups significantly increased VEGF ($p<0.05$) and SCF ($p<0.05$) in the heart. Capillary density by Factor VIII staining and arteriole density by α -SMA staining were significantly increased in VEGF ($p<0.001$; $p<0.001$) and SCF ($p<0.01$; $p<0.001$) groups compared with control, and the densities were also significantly higher in SCF group than those in VEGF group ($p<0.01$; $p<0.001$). Myocardial flow volume by MCE significantly improved in VEGF and SCF groups compared with control ($p<0.05$; $p<0.05$) and was higher in SCF than in VEGF group ($p<0.05$); myocardial flow velocity was significantly higher in SCF group than that in control and VEGF groups ($p<0.05$; $p<0.05$). In VEGF and SCF groups, the left ventricular contractility of %FAC and %EF significantly improved ($p<0.05$; $p<0.05$), and the infarct size became significantly smaller than that of control ($p<0.05$; $p<0.05$). **Conclusions:** It was demonstrated that UTMD with VEGF and SCF genes after MI induced angiogenesis to improve perfusion and cardiac function, and reduce infarct size, and that SCF induced angiogenesis of arteriole to improve not only flow volume but also flow velocity. UTMD might be a promising tool for cardiac repair following myocardial infarction.