

**In vivo MRI of injected mesenchymal stem cells in myocardial infarction;
Simultaneous tracking and functional measurement**김영진¹⁾, 허용민¹⁾, 최병욱¹⁾, 최은정²⁾, 서진석¹⁾연세대학교 의과대학 영상의학과¹⁾, 고려대학교 의과대학 진단방사선과²⁾

Purpose: The purpose of this study was to determine if magnetically labeled mesenchymal stem cells could be imaged *in vivo* in a rat model of myocardial infarction and cardiac function could be simultaneously evaluated using MRI.

Methods and Materials: Myocardial infarction was induced in rat myocardium (male, SD rat) by cryoinjury. Human mesenchymal stem cells (MSC) were labeled with superparamagnetic iron oxide particle (SPIO, Feridex®) and injected into the infarcted myocardium three weeks after the injury. In control group, cell-free media was injected three weeks after cryoinjury. *In vivo* MRI was serially performed before and after cell injection during three months using 47mm microcoil and 1.5 T clinical scanner. For *in vivo* cell tracking, gradient echo sequence with EKG gating was used. For evaluation of cardiac function, left ventricular ejection fraction (LVEF) was measured using cine MRI.

Results: Feridex-labeled mesenchymal stem cells were visualized as a signal void on *in vivo* MRI until 10 weeks after injection. On serial follow-up MRI, ejection fraction was significantly higher in MSC injection group (EF=54.5± 4.5%) than in control group (EF=34.0± 2.2%).

Conclusion: These results support the ability of MRI to track injected cells *in vivo* as well as evaluate long term therapeutic potential of mesenchymal stem cell in the setting of myocardial infarction.