AbstractID: 11349 Title: Mircometer-sized Iron Oxide Particles (MPIO) Enhanced MRI with Granulocyte-Colony Stimulating Factor (GCSF) Modulation in Murine Myocardial Infarction Model

Purpose: To monitor the MPIO and enhanced green fluorescence protein (eGFP) labeled mesenchymal stem cells (MSCs) infiltration into the myocardial infarction (MI) site using T_2^*-weighted MRI; To monitor the MRI contrast around the MI site post-GCSF modulation. **Methods:** C57Bl/6 male mice (6-8 weeks old) were irradiated with an 8-Gy dose. The labeled MSCs ($3\text{-}7x10^5$) were transplanted into the tibial medullary space 2 days post-irradiation. The mice were divided into: 1) a sham-operated group (Sham, n=7); 2) a MI group without GCSF injection (MI-GCSF, n=7); and 3) a MI group with GCSF treatment (MI+GCSF, n=3). At 14 days post-labeled MSCs transplantation, the two MI groups underwent surgery via permanent ligation of the left anterior descending coronary artery while the Sham group underwent open-chest operation without perturbing the heart. The MI+GCSF group received subcutaneous GCSF injection 1 day post-MI to enhance MSC mobilization. T_2^*-weighted short-axis cardiac MRI was performed at baseline, 3, 7 and 14 days (D14) post-surgery. **Results:** The MRI signal at the MI site was temporally attenuated for both MI groups, with more attenuated for MI+GCSF group (SNR 18.17±6.06 vs 11.37±1.01 at D14, $p<0.05$), but not for Sham group (30.63±5.69). The MI+GCSF group showed a trend of cardiac function improvement relative to MI-GCSF group (left ventricular ejection function 45.55±7.52% vs 40.80±16.69% at D14), but it is insignificant possibly due to the small sample number. Dual-labeled cells were fluorescently detected around the infarction site. **Conclusions:** Migration of MPIO-labeled MSCs from bone marrow into the injured heart can be temporally monitored by MRI and additional signal attenuation caused by GCSF treatment can be differentiated. Results of this study suggest a potential approach in cell therapy to noninvasively monitor migration of labeled cells as well as the mobilization modulation produced by pharmaceuticals in the MI related events.