Summary:

Positive prognostic effect of myocardial revascularization is limited to individuals with significant amount of dysfunctional, yet viable myocardial tissue. New method in the diagnosis of myocardial viability is contrast-enhanced magnetic resonance imaging using paramagnetic, gadolinium based contrast agent (Gd MRI). Paramagnetic contrast agent increasingly accumulates in areas of acute necrosis as well as in chronic scar tissue which allows differentiation between viable and non-viable myocardium.

The aim of the study was to verify feasibility of Gd MRI on routine 1.0-Tesla MR system using late enhancenment technique and to compare Gd MRI with single photon emission tomography using thallium chloride (Tl SPECT), routinely used at our institution.

Fourty patients (37 men, 3 women) with chronic coronary artery disease, left ventricular dysfunction and planned revascularization procedure were enrolled in the study. Systolic dysfunction was defined by ejection fraction ≤ 45 %. Myocardial viability was assessed by both methods. Left ventricular function was measured by radionuclide ventriculography. Functional capacity of left ventricular segments was assessed by cine MR imaging.

ECG gated, Inversion Recovery Turbo FLASH (Fast Low-Angle SHot) MR sequence with segmented k-space sampling was used for viability assessment. Data from each slice were acquired within a single breath hold. Contrast enhanced MRI was started 10-15 minutes after the administration of a gadolinium based contrast agent. Four hours rest redistribution protocol was used for Tl SPECT.

We achieved 100% technical feasibility of Gd MRI, all examinations were completed within 60 minutes or less. Semiquantitative evaluation of myocardial viability was performed in 1360 segments. Agreement between Gd MRI and Tl SPECT was noted in 1065 (78.3 %) segments (coefficient kappa = 0.336). Discrepancies were observed in 96 Tl SPECT viable segments which were reported as non-viable according to Gd MRI and in 199 Tl SPECT non-viable segments which were viable on Gd MRI study. Better agreement was observed when assessing septal and anterior segments in comparison to segments localized in inferior and lateral left ventricular wall.

In conclusion, assessment of myocardial viability is technically feasible on a routine 1.0-Tesla MR system. Due to numerous physiological, pharmacological, and technological differences only moderate agreement exists between Gd MRI and Tl SPECT when evaluating myocardial viability.