Intra-individual comparison of 0.1 mmol/kg versus 0.2 mmol/kg Gadobutrol for magnetic resonance late enhancement imaging at 3 Tesla

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Purpose: Since commonly used contrast dosages at 1.5 T might not be ideal for late enhancement (LE) imaging at 3T, the purpose of this study was to qualitatively and quantitatively evaluate two dosage regimes of Gadobutrol in an intra-individual comparison.

Materials and methods: 15 patients (12 male, mean age 50±9 years) with history of myocardial infarction underwent LE imaging on separate days. Using a standard 2D Inversion Recovery Gradient Echo sequence patients randomly received a contrast bolus of either 0.1 mmol/kg or 0.2 mmol/kg Gadobutrol on their first visit. For their second scan on a different day the patients received the alternate dosage. Two blinded observers rated overall image quality, occurrence and severity of artifacts, noise and visibility of LE areas on a 4 point scale. Additionally quantitative signal intensity measurements and in 10 patients measurement of total infarct size from contiguous short axis planes of the entire left ventricle were performed.

Results: Overall image quality was rated slightly better with the higher contrast dosage (p=n.s.) with in tendency lower occurrence of artifacts and better delineation of LE areas (p=n.s.). Subjective noise was higher with the lower contrast dosage ($p<0.01$). Total infarct size measured higher with the higher contrast dosage (12.2±4.5 g versus 10.5±4.3 g; $p<0.05$) as did signal intensity (34.4±11.9 versus 23.8±9.0; $p<0.001$) and relative signal increase of LE areas compared to normal myocardium (473±192% versus 348±157%; $p<0.001$). Contrast-to-noise ratio between infarcted and normal myocardium was significantly higher with the 0.2 mmol/kg dosage (26.0±10.3 versus 16.4±8.1; $p<0.001$).

Conclusions: In an intra-individual comparison of LE imaging at 3T a 0.2 mmol/kg bolus of Gadobutrol resulted in an overall better subjective image quality, higher total infarct size and higher contrast-to-noise ratio between normal and infarcted myocardium and should therefore be preferred.