Poster presentation

# Effect of contrast dosage on image quality of MR angiography and Late Gadolinium enhancement imaging of the left atrium

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## Introduction

MR angiography (MRA) of left atrium (LA) is performed to provide an anatomical map of the LA for use during RF ablation procedures. High-resolution Late Gadolinium enhancement (LGE) imaging of LA is used to assess the left atrial wall [1,2] in patients undergoing RF ablation [3] typically with full (0.1 mmol/kg) doses of contrast (Gd-BOPTA). It is of interest to determine if smaller doses (0.05 mmol/kg) give comparable image quality, especially to image patients with abnormal kidney function.

## Methods

MRA and LGE images of 12 patients (6-full, 6-half dose of MultiHance (Bracco Diagnostics, Inc.)) were assessed qualitatively and quantitatively to assess dependence of image quality on dosage. Two expert readers with 10 years of cardiac MRI experience, blinded to contrast dosage, independently scored the image quality from poor to excellent on a scale of 1-4. Quantitatively, MRA images of the 12 patients (pre, 24-hour, 3 and 6-months post ablation) were analyzed by estimating a Contrast Enhancement Ratio (CER - ratio of signal in LA measured at first pass to that of pre-contrast image). For LGE images, the 3 and 6-months post ablation images were analyzed with measurements of contrast to noise ratios (CNR). CNRs were estimated between scar and myocardium ($CNR_{sm}$) and scar and blood ($CNR_{sb}$), with the standard deviation in blood region used as noise. Figure 1 shows typical MRA and LGE images. Paired Student's t-test was performed to see whether image quality was significantly different between the two doses.

## Results

from the qualitative and quantitative analyses of the images are shown in Table 1. The quality of MRA and LGE images at full dose is 4.9% and 25.7% better respectively from blinded reviewer scoring. The measurements indicate that at full dose the CNRs - $CNR_{sb}$ and $CNR_{sm}$ are 16.5% and 33.5% better respectively.
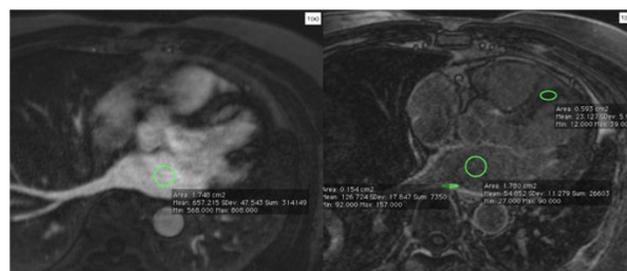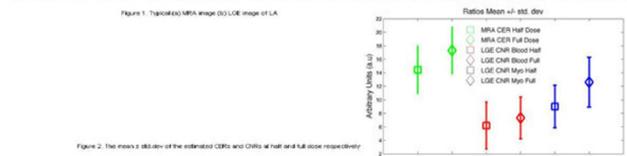


**Figure 1**

**Table 1: The average score of the image quality by blinded readers (mean ± std. dev)**

| Reader | Half Dose (MRA) | Full Dose (MRA) | Half Dose (LGE) | Full Dose (LGE) |
|---|---|---|---|---|
| 1 | 3.40 ± 0.58 | 3.50 ± 0.66 | 2.27 ± 0.99 | 3.18 ± 0.75 |
| 2 | 3.38 ± 0.65 | 3.65 ± 0.48 | 2.92 ± 0.79 | 3.50 ± 0.91 |

## Conclusion

Although MRA images at both doses are comparable, half and full dose do not give equivalent LGE image quality. From the Paired Students t-test, the difference in CER's from MRAs is not statistically significant ($p = 0.35$), but the difference in CNRs from LGE images ($CNR_{sb}$, $CNR_{sm}$) is statistically significant ($p = 0.01$, $p = 0.025$) respectively. From blinded reader scores, the difference in MRAs is not statistically significant while that of LGE is ($p = 0.6$, $p = 0.04$ respectively).

## References

1.  Peters DC, et al: Radiology 2007, **243(3):**690–5.
2.  McGann CJ, et al: JACC 2008, **52(15):**1263–71.
3.  Haissaguere M, et al: J Cardiovasc Electrophysiol 1994, **5(12):**1045–52.