

Meeting abstract

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1073 Short term safety and efficacy of manganese chloride cardiovascular magnetic resonance imaging in humans

Juliano L Fernandes*¹, Pippa Storey², Antonio A da Silva³, Gabriel S de Figueiredo³, Jose M Kalaf³ and Otavio R Coelho¹

Address: ¹University of Campinas (Unicamp), Campinas, Brazil, ²Evanston Northwestern Healthcare Chicago, Chicago, IL, USA and ³Radiologia Clinica de Campinas, Campinas, Brazil

* Corresponding author

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Introduction

Manganese chloride (MnCl₂) rapidly releases free Mn²⁺ in the blood allowing for its active intracellular uptake by myocytes thus making it a potentially ideal candidate for perfusion and viability studies of the myocardium. However, MnCl₂ toxicity might reduce the clinical effectiveness of the substance as a contrast agent. Therefore, we designed this study to investigate for the first time in humans the safety and efficacy of a rapid infusion of MnCl₂ for cardiovascular magnetic resonance (CMR) imaging.

Methods

Fifteen normal volunteers underwent a CMR exam on a commercial 1.5 T scanner. Before the infusion, evaluation of cardiac function was performed with a short axis mid-ventricular slice being chosen for the signal intensity stud-

ies. Images of this slice were obtained using a 2D and 3D gradient-echo inversion recovery (GRE-IR) sequence, a phase-sensitive IR sequence and a single breath-hold segmented IR prepared steady-state precession acquisition for T₁ calculations. MnCl₂ was infused in three minutes at a total dose of 5 μMol/kg. Immediately after the infusion, at 15 and 30 minutes new images were obtained and cardiac function was re-evaluated.

Results

There was a significant decrease in T₁ values compared to baseline, sustained up to 30 minutes after the MnCl₂ infusion (Table 1). The 2D GRE-IR sequence showed the greatest relative increase in signal intensity compared to the other sequences (Figure 1). There was a slight increase in systolic pressure and heart rate after three and four minutes of the infusion with normalization of these param-

Table 1:

Variable	Pre	0 min	15 min	30 min	P
GRE-IR 2D		71 ± 11	57 ± 12	49 ± 14	< 0.0001
GRE-IR 3D		39 ± 15	59 ± 27	22 ± 8	0.02
IR-SSFP		48 ± 7	33 ± 5	42 ± 6	<0.0001
Phase Sensitive IR		10 ± 1.3	11 ± 1.6	7 ± 1.8	<0.0001
T ₁ (ms)	773 ± 168	653 ± 125	654 ± 125	647 ± 120	0.005
R1 (Hz)	1.35 ± 0.31	1.56 ± 0.23	1.59 ± 0.35	1.61 ± 0.37	0.03
Ejection Fraction (%)	65.7 ± 1.7	67.1 ± 1.6	66.9.0 ± 1.7	67.0 ± 1.9	0.22

Values are means ± SD.

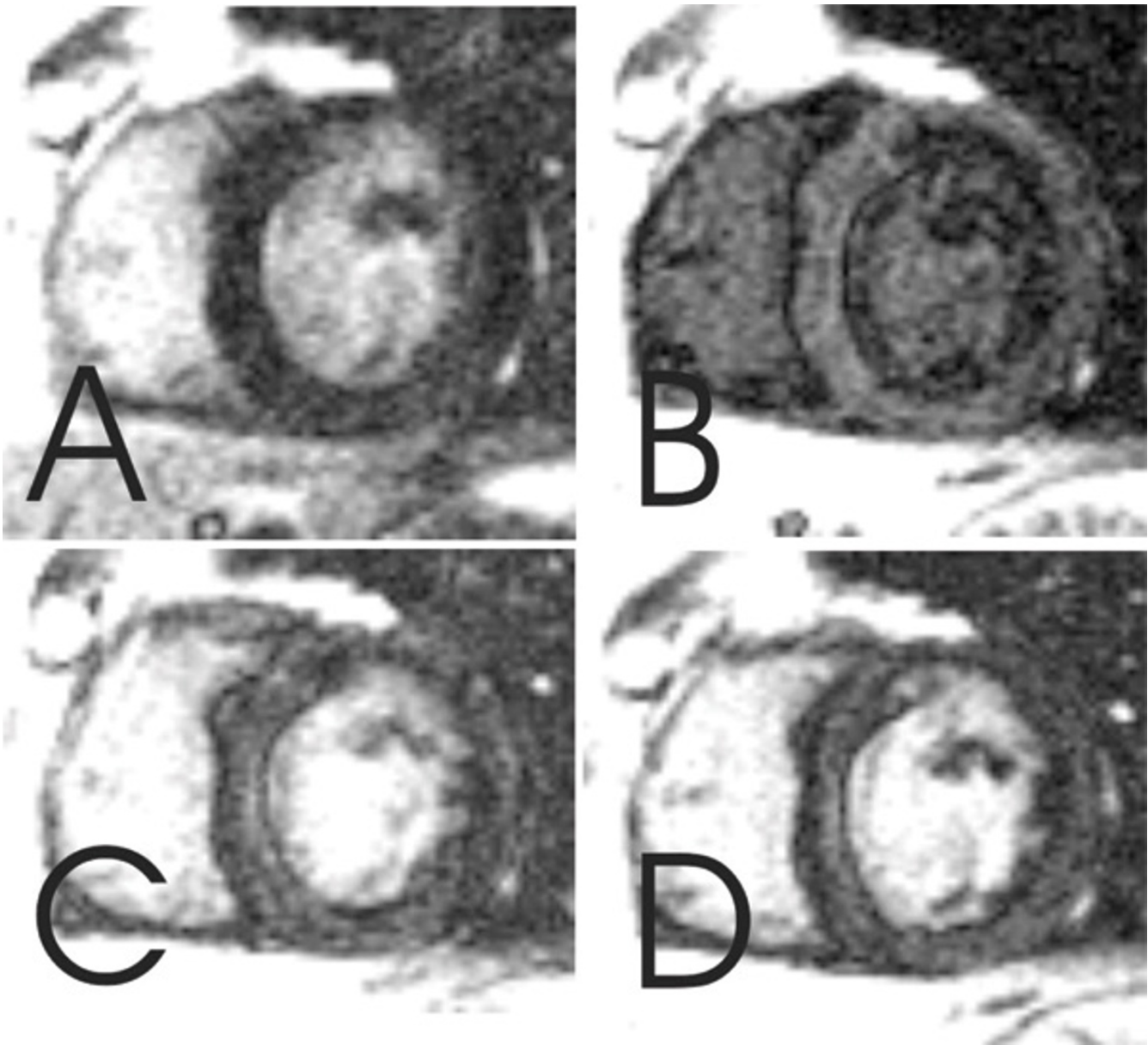


Figure 1
2D GRE-IR image at pre-injection (A), 0 minutes after (B), 15 minutes (C) and 30 minutes (D).

ters thereafter. Patients showed good tolerance to $MnCl_2$ with no major adverse events, despite all patients reporting transient facial flush.

Conclusion

In the short term, $MnCl_2$ appears safe for human use. It effectively decreases myocardium T_1 , maintaining this effect for a relatively long period of time and allowing for the development of new imaging strategies in CMR.

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