

Poster presentation

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Effect of low-dose dobutamine on myocardial uptake of manganese - a possible viability marker in cardiac MRI

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Introduction

The MRI contrast media manganese-dipyridoxyl-diphosphate (MnDPDP) has been shown to be a marker of viability in patients with myocardial infarction, as manganese-ions follow the calcium-pathways and accumulate in viable myocardial cells. However, the contrast-to-noise ratio is presently too low for clinical use. In a previous study in rats given manganese-chloride (MnCl₂), dobutamine increased the myocardial uptake of Mn significantly.

Purpose

To study if a dobutamine-induced increase in contractility, giving increased calcium-cycling, would increase the uptake of Mn in healthy human myocardium.

Methods

Twelve healthy subjects were randomized into two groups. Both groups were given a 5-min infusion of 5 μmol/kg MnDPDP. In addition, one of the groups (n = 6) also got at 10-min infusion of low-dose dobutamine (10 mikrog/kg/min), starting at the onset of the MnDPDP-infusion. Myocardial Mn-uptake was quantified by R1-measurements by MRI (1.5 T) before and 50 min after start of the infusions. Heart rate and blood pressure were monitored during the experiments.

Results

There were no adverse events. The double product (HR × blood pressure) increased in the Dobutamine group only (p < 0.05), indicating increased contractility. Delta R1-values showed no significant difference in the myocardial uptake of Mn in the two groups (Dobutamine vs. Control: 0.33 ± 0.04 vs. 0.37 ± 0.02, p = 0.078. Higher values indicate higher uptake).

Conclusion

Differences in calcium-cycling in humans and rodents, and possibly limited availability of free manganese-ions in vivo, might explain the lack of increase in myocardial contrast uptake after dobutamine seen in this study. Further pharmacokinetic studies are needed to develop the method.