

Oral presentation

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Non invasive quantification of coronary endothelial function using 3 T MRI

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from 13th Annual SCMR Scientific Sessions
Phoenix, AZ, USA. 21-24 January 2010

Published: 21 January 2010

Journal of Cardiovascular Magnetic Resonance 2010, **12**(Suppl 1):O75 doi:10.1186/1532-429X-12-S1-O75

This abstract is available from: <http://jcmr-online.com/content/12/S1/O75>

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Introduction

Endothelial dysfunction (ED) plays a key role in the development of cardiovascular disease; a non invasive MRI method of quantification of coronary ED would be relevant for risk stratification, treatment, monitoring and prognosis evaluation in several diseases involving ED.

Purpose

To evaluate the feasibility of assessing coronary endothelial function by myocardial blood flow (MBF) measurement using coronary sinus flow quantification [1,2] at rest and during cold pressor test (CPT), which is used in nuclear medicine to assess endothelium-dependent coronary vasomotor function.

Materials and methods

Thirteen healthy volunteers (ten men, three women) without any coronary risk factors underwent magnetic resonance imaging in a 3 T scanner (Verio, Siemens, Erlangen, Germany). CPT was performed by immersing the right ankle in ice-water during four minutes. Heart rate and blood pressure were monitored throughout the protocol using a Maglife system (Schiller). Coronary sinus flow was measured at rest and during CPT using non breath-hold velocity encoded phase contrast cine MRI (repetition time/echo time: 45 ms/2 ms, slice thickness: 5.5 mm, field of view: 250 × 250 mm², averages: 11, matrix: 256 × 256, flow encoding: 70 cm/sec, flip angle: 25°, acquisition time: 4 minutes, GRAPPA k-space reduc-

tion factor: 4). Myocardial function and morphology were evaluated using SSFP sequence. MBF was calculated combining coronary sinus flow quantification and morphologic data using Argus software (flow and 2D). Coronary endothelial function was assessed by comparing MBF at rest and during CPT. Coronary vascular resistance (CVR) and endothelium-dependent vasodilation index (EDVI) were calculated.

Results

Each volunteer tolerated CPT. CPT significantly increased heart rate by 32% ($p < 0.0001$), systolic blood pressure by 20% ($p < 0.0001$) and significantly decreased CVR by 18% ($p = 0.021$). At baseline, coronary blood flow per gram of myocardial mass was 0.61 ± 0.18 ml/min/g (mean \pm SD). After CPT, coronary blood flow was 1.01 ± 0.41 ml/min/g. MBF significantly increased by $65 \pm 43\%$ during CPT compared to the rest examination ($p < 0.0011$). EDVI was 1.65. Figure 1.

Conclusion

MRI coronary sinus flow quantification as a measure of the myocardial blood flow without contrast agent allows to detect significant changes in response to CPT in healthy volunteers. This non invasive measure may help to detect changes in endothelial function which occur early in a variety of cardiovascular diseases.

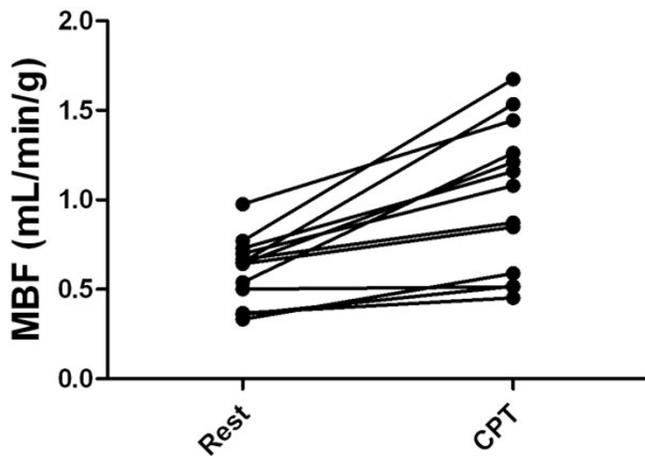


Figure 1
MBF values at rest and after CPT in each healthy volunteer.

References

1. van Rossum, et al.: *Radiology* 1992, **182**:685-691.
2. Lund GK, et al.: *Radiology* 2003, **227**:209-215.

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