

Meeting abstract

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## 2076 Comparison between black and bright blood T2\* measurements in thalassemia

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### Purpose

To assess the reproducibility between the developed breath-hold black blood and bright blood T2\* sequences for myocardial iron measurement.

### Introduction

Early iron detection using myocardial T2\* values derived from Cardiovascular Magnetic Resonance (CMR) has been reported in significant sized populations [1,2], and validated [3-6]. Nevertheless, the current bright blood technique does not provide high contrast between the signal from the blood pool and that from the myocardium, and some images appear to have blood signal artifacts and partial volume effects affecting the myocardium that would most likely reduce the accuracy of the T2\* measurement. The recent development of a T2\* sequence with black blood preparation provides more clearly defined endocardial borders and reduces artifacts from blood which affects the myocardial signal measurement and this has been shown to have improved reproducibility [7]. Although it was demonstrated on 10 patients [7] that the T2\* measurements from both sequences were comparable, it is of clinical interest to compare them on a large population of patients.

### Methods

112 thalassemia patients were studied on a 1.5 T MRI scanner (Siemens Sonata) using a cardiac phased array coil and with ECG gating. The study was approved by the

local ethics committee and all patients gave informed consent.

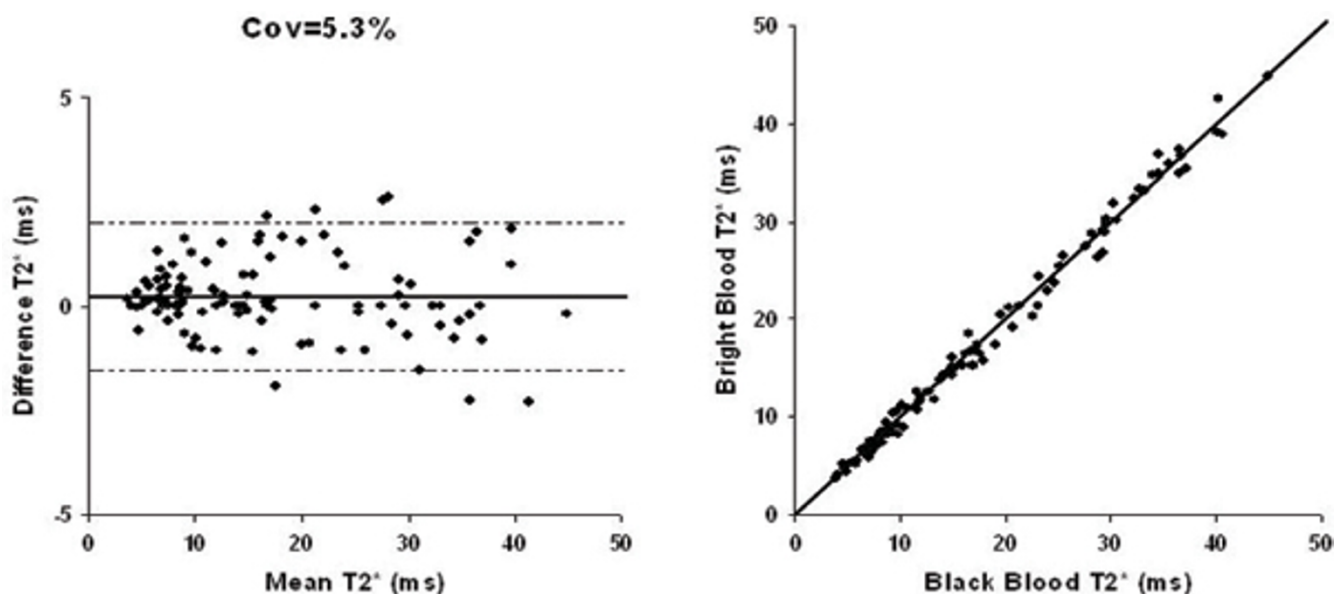
All patients were scanned using the bright blood [3] and the black blood [7] T2\* sequence subsequently, each within a breath-hold. A single mid-ventricular short axis slice was imaged with T2\* measured in the left ventricular septum. The black blood data was analysed by the first author using the mono-exponential model. The bright blood data was analysed independently by another experienced observer using the truncation model [8,9]. The nonlinear curve fitting algorithm was employed for all the data analysis (CMRtools, Imperial College London).

### Results

Myocardial T2\* values ranged from 3 ms to 45 ms ( $17 \pm 11$  ms). The mean difference between the bright blood and black blood T2 values was 0.2 ms indicating no bias. The coefficient of variation for reproducibility was 5.3% (Figure 1).

### Conclusion

This study demonstrated the good reproducibility between the breath-hold black blood and the validated bright blood T2\* techniques on a large population of thalassemia patients. Also, no bias between these two measurements was found. It indicates that the black blood T2\* measurement is clinically relevant. Hence, the black blood T2\* measurement is recommended because of its improved reproducibility. These findings further suggest



**Figure 1**

Reproducibility between the black blood and the bright blood  $T2^*$  measurements for 112 thalassemia patients. Left: Bland-Altman plot with the line of mean difference and dotted lines as the 95% confidence intervals. Right: scatter plot with the line of identity.

that the  $T2^*$  technique is reliable for myocardial iron quantification in patients with iron overload conditions such as thalassemia.

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### References

- Anderson LJ, Holden S, Davies B, et al.: *Eur Heart J* 2001, **22**:2171-2179.
- Tanner MA, Galanello R, Dessi C, et al.: 2006, **8**:543-547.
- Westwood M, Anderson LJ, Firmin DN, et al.: *J Magn Reson Imaging* 2003, **18**:33-39.
- Westwood MA, Anderson LJ, Firmin DN, et al.: *J Magn Reson Imaging* 2003, **18**:616-620.
- Wood JC, Tyszka JM, Carson S, et al.: *Blood* 2004, **103**:1934-1936.
- Wood JC, Otto-Duessel M, Aguilar M, et al.: *Circulation* 2005, **112**:535-543.
- He T, Gatehouse PD, Kirk P, et al.: 2007, **25**:1205-1209.
- He T, Gatehouse PD, Keegan J, et al.: *ISMRM 15th Scientific Meeting. May 2006, Berlin, Germany*.
- He T, Smith GC, Kirk P, et al.: *ISMRM 15th Scientific Meeting. May 2006, Berlin, Germany*.

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