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Poster presentation

Improved MRI T2 relaxometry for myocardial tissue characterisation

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Introduction

T2-weighted magnetic resonance imaging of the myocardium has provided useful incremental information in cardiac diseases [1]. However, myocardial T2 relaxometry is still limited because of technical challenges. We have developed an novel breath-hold T2 technique which has good reproducibility and measurements [2]. This T2 technique, however, has relatively low resolution to enable a breath-hold acquisition, which may in consequence degrade the T2 measurement due to partial volume effect. One potential advantage of T2 over T2* is to perform robust multi-segmental analysis to explore the regional variations since the latter is currently limited to the septum to avoid susceptibility effects. There is, however, currently little data on segmental T2 analysis of myocardium.

In this study therefore, we were aiming at improving the T2 relaxometry by exploiting several measures including parallel imaging, asymmetric echo, and partial Fourier techniques. Consequently, segmental T2 variations across the myocardium were evaluated.

Methods

10 human subjects (age 49 ± 27 years) were studied on a 1.5 T MRI scanner (Siemens Avanto). All subjects were scanned using the developed T2 sequence within a breath-hold. A single mid-ventricular short axis slice was imaged with T2 measured in 6 segments (Figure 1). Multiple segmental T2 analysis was done using CMRTOOLS and compared by the analysis of variance (ANOVA). A p value of < 0.05 was considered statistically significant.

Results

The echo-spacing was reduced to 3.6 ms. The length of the echo train was 166 ms with turbo factor of 5. The image resolution was increased by twofold with a matrix of 256 × 128 acquired within a breath-hold. The images were of good quality acquired and the curves were well fitted ($R^2 > 0.995$). Figure 1 demonstrates an exemplary T2 segmentation (left) and the relaxation decay of the high-lighted segment (right). For segmental T2 analysis, ANOVA showed no significant difference ($p = 0.15$).

Conclusion

Our results have shown that good quality T2 images can be acquired with improved resolution. There appear no significant segmental T2 variations across the myocardium in normal subjects. This study suggests T2 relaxometry may potentially be used for assessing regional variations across the myocardium, which is particular useful for but not limited to measuring tissue iron overload in the whole myocardium for transfusion dependent patients.

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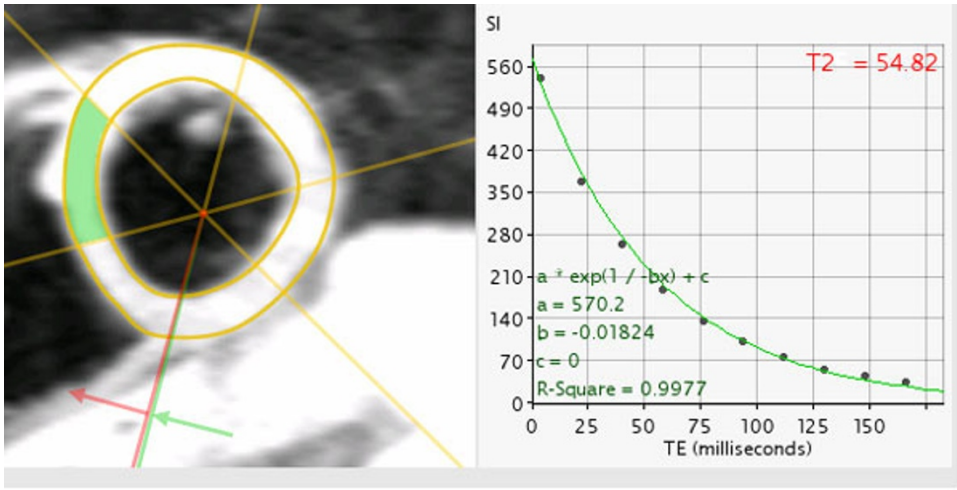

Figure 1
Left: Segmentation across the left ventricular. Right: T2 relaxation curve and measurement from the high-lighted segment in the left.

References

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