

Are the preferential patterns of myocardial iron overload preserved at the CMR follow-up?

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Introduction. T2* multislice multiecho cardiac magnetic resonance (CMR) allows quantification of the segmental distribution of myocardial iron overload (MIO) [1]. This study aimed to determine if a preferential pattern of MIO was preserved between two CMR scans in thalassemia major (TM) patients.

Materials and methods. Among the 812 TM patients with a CMR follow-up (FU) study at 18±3 months, we selected 259 patients with significant MIO at baseline (global heart T2* <26 ms). Three parallel short-axis views (basal, medium, and apical) of the left ventricle (LV) were obtained by a T2* gradient-echo multiecho sequence. The images were analyzed using a previously validated, custom-written software (HIPPO-MIOT®) [2]. The myocardium was segmented into a 16-segment standardized LV model [3] and the T2* value on each segment was calculated. The global T2* value averaged over all 16 segmental T2* values was automatically provided. Four different main circumferential regions were defined by averaging the corresponding segmental T2* values: anterior (segments 1,7,13), septal (segments 2,3,8,9,14), inferior (segments 4,10,15) and lateral (segments 5,6,11,12,16).

Results. The selected patient population was divided into two groups: severe (N=80, global T2* < 10 ms) and mild-moderate MIO (N=179, global T2* 10-26 ms).

For each group, there was a significant improvement in the global heart as well as in regional T2* values (P<0.0001 for all the pairwise comparisons) (Tables 1 and 2).

For the whole patient population as well as for both two groups, at basal the mean T2* value over the anterior region was significantly lower than the mean T2* values over the other regions and the mean T2* over the inferior region was significantly lower than the T2* values over the septal and the lateral regions. The same pattern was present at the FU, with a little difference for patients with mild-moderate MIO (Figure 1).

Table 1. Comparison between basal and FU T2* values for patients with basal global heart T2*<10 ms.

T2* (ms)	Basal	FU	P (paired)
Global	7.3±1.7	10.7±5.9	<0.0001
Anterior	6.0±1.6	8.9±5.6	<0.0001
Septal	7.9±2.0	11.5±6.8	<0.0001
Inferior	6.7±1.9	9.7±5.7	<0.0001
Lateral	7.8±1.9	11.6±6.0	<0.0001

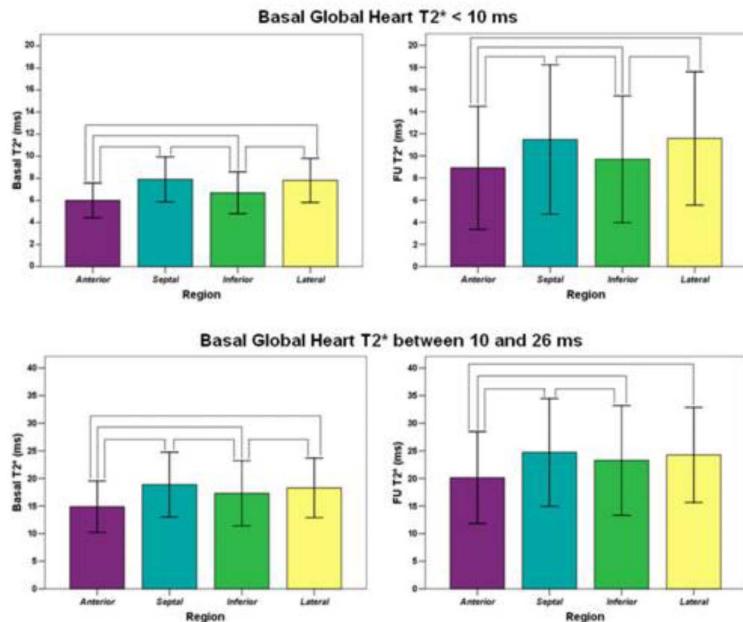


Table 2. Comparison between basal and FU T2* values for patients with basal global heart T2* between 10 and 26 ms.

T2* (ms)	Basal	FU	P (paired)
Global	17.7±4.9	23.5±8.6	<0.0001
Anterior	14.9±4.7	20.2±8.3	<0.0001
Septal	18.9±5.9	24.7±9.8	<0.0001
Inferior	17.3±5.9	23.3±9.9	<0.0001
Lateral	18.3±5.4	24.3±8.6	<0.0001

Figure 1. Regional T2* variability at basal and FU CMRs.

Conclusion. A preferential pattern of iron store in anterior and inferior regions was present at both basal and FU CMRs, with an increment of T2* values at FU due to a basal CMR-guided chelation therapy. The anterior region seems to be the region in which the iron accumulates first and is removed later. Our data confirm the segmental T2* cardiac MR approach useful for identifying early iron deposit and for tailoring chelation therapy.

References. [1] Pepe A et al. JMRI 2006;23(5):662-668. [2] Positano V et al. NMR Biomed 2007;20(6):578-90. [3] Cerqueira MD et al. Circulation 2002 ;105:539-542.