Native T1 values discriminate between health and disease in acute and convalescent stage of disease in clinically suspected myocarditis

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BACKGROUND AND OBJECTIVES:

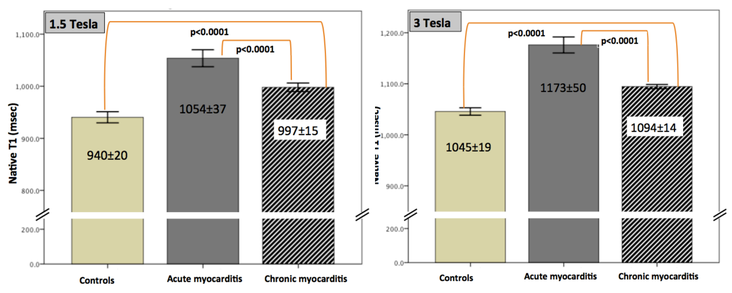
Myocardial late gadolinium enhancement (LGE) is a common finding in patients with viral myocarditis. The type and distribution of LGE varies considerably with respect to the severity of disease, type of viral infection, and time of presentation. Commonly, there is no LGE, despite convincing clinical picture. Because LGE marks extracellular space, it primarily corresponds to overspill of inflammation, including, extracellular oedema and inflammation and capillary leak, whereas visualisation of intracellular oedema goes commonly undetected. T1 mapping by cardiovascular magnetic resonance (CMR) provides tissue-dependent relaxation times in line with the underlying myocardial composition.

In this study, we examined the value of T1 derived indices in differentiation between acute viral myocarditis and chronic stages of healing.

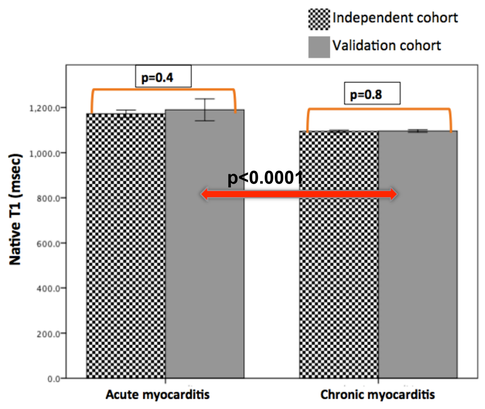
METHODS AND RESULTS:

Patients with clinical diagnosis of viral myocarditis (n=165) underwent CMR (1.5 and 3 Tesla) for T2 imaging, late gadolinium enhancement (LGE) and T1 mapping prior to and >20 minutes after administration of 0.2 mmol/kg of gadobutrol.

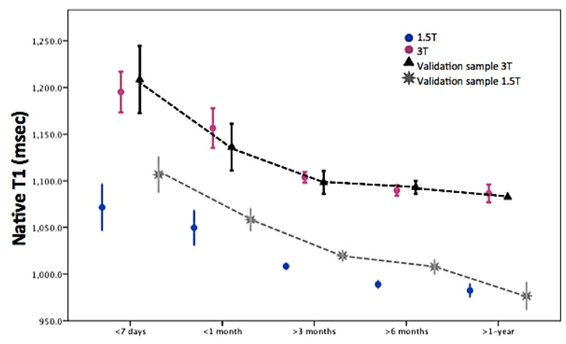
- Compared to controls (n=40), native T1 values were increased in both acute and chronic myocarditis at both field strengths
- Native T1 values were significantly higher in acute vs. chronic myocardium (p<0.001).



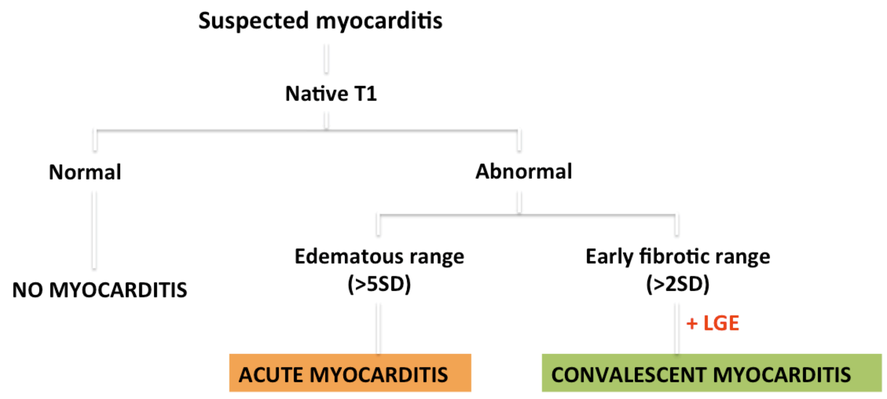
- A cohort of patients (n=37) underwent serial scans (acute presentation and convalescence) and showed similar values to the two groups of independent subjects at respective stages



- Native T1 was identified as the independent discriminator between health and disease, as well as acute and chronic myocarditis.
- Native T1 showed gradual reduction of values between acute and chronic stage of myocardial inflammation.



- **Diagnostic algorithm**:



*Caption: **Acute myocarditis** was independently discriminated by native T1. The **convalescent stage** was best defined by a combination of LGE and native T1.*
In the present dataset, acute myocarditis was identified using 5SD above normal range. The convalescent stage was identified by either positive native T1 (>2SD) and/or presence of LGE.

CONCLUSION:

We demonstrate that native T1 values can reliably discriminate between patients with acute myocarditis and those subjects in stages of chronic healing at both field strengths. Native T1 values provide a dynamic index of disease activity and progression from acute disease towards clinical resolution.

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