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T1 and T2 Mapping in Cardiology: "Mapping the Obscure Object of Desire".

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Abstract

The increasing use of cardiovascular magnetic resonance (CMR) is based on its capability to perform biventricular function assessment and tissue characterization without radiation and with high reproducibility. The use of late gadolinium enhancement (LGE) gave the potential of non-invasive biopsy for fibrosis quantification. However, LGE is unable to detect diffuse myocardial disease. Native T1 mapping and extracellular volume fraction (ECV) provide knowledge about pathologies affecting both the myocardium and interstitium that is otherwise difficult to identify. Changes of myocardial native T1 reflect cardiac diseases (acute coronary syndromes, infarction, myocarditis, and diffuse fibrosis, all with high T1) and systemic diseases such as cardiac amyloid (high T1), Anderson-Fabry disease (low T1), and siderosis (low T1). The ECV, an index generated by native and post-contrast T1 mapping, measures the cellular and extracellular interstitial matrix (ECM) compartments. This myocyte-ECM dichotomy has important implications for identifying specific therapeutic targets of great value for heart failure treatment. On the other hand, T2 mapping is superior compared with myocardial T1 and ECM for assessing the activity of myocarditis in recent-onset heart failure. Although these indices can significantly affect the clinical decision making, multicentre studies and a community-wide approach (including MRI vendors, funding, software, contrast agent manufacturers, and clinicians) are still missing.