

## Editorial



# Feature Tracking Analysis, the “Cherry-on-Top” of Cardiac Magnetic Resonance for Suspected Iron Overload Cardiomyopathy

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Patients with hematologic disorders such as beta-thalassemia major or myelodysplastic syndrome (MDS) suffer from multiple comorbidities. Of these, transfusion-related iron-overload cardiomyopathy (IOC) is a challenging complication related to prognosis. In cases with low-risk MDS, multiple transfusions are more likely to induce IOC because of the longer period of transfusion support required. So, in this group of patients, early detection of IOC is important to guide chelation therapy and to predict prognosis. Cardiac magnetic resonance (CMR) is an integrative imaging modality that can provide information on myocardial iron deposition, fibrosis, perfusion and chamber function. With regard to prognostication, not only IOC but also underlying risk factor-related cardiac dysfunction would affect prognosis.<sup>1)</sup> Feature tracking analysis can provide myocardial functional information such as longitudinal, circumferential and radial strain in both ventricular and atrial chambers.<sup>2)</sup> CMR-derived myocardial deformation analysis has been performed by grid or line tags on the myocardium in gradient echo sequence images. However, this method has several limitations due to the complex analysis methods, time required, inability to analyze longitudinal strain, lack of applicability to thin myocardium such as the right ventricle or atria, and inability to be analyzed in late diastolic phase due to tag decay phenomenon.<sup>3)</sup> Improvement in cine imaging using the steady-state free precession sequence can provide very clear cine images without missing any data throughout the cardiac cycle. Based on this improvement in cine imaging, introduction of a feature tracking algorithm could provide very clear and highly reproducible strain values, for not only circumferential and radial strains but also for longitudinal strain in all chambers.<sup>2)</sup> In addition, this method can provide very reproducible chamber size throughout the cardiac cycle. Thus, feature tracking analysis can provide very informative functional value in a short analysis period. In the near future, artificial intelligence-derived automatic analysis will further shorten analysis time.<sup>4)</sup> Advantages over echocardiography-derived speckle tracking analysis are the better endo- and epicardial border delineation, independent of the acoustic window, vendor independency and automatic quantification due to the inherently similar positional information to other sequences such late gadolinium enhancement and T1/T2/T2\* mapping on CMR.

In this regard, the study by Alonso-Fernandez-Gatta et al.<sup>5)</sup> showed the clinical usefulness of feature tracking CMR incorporating tissue characterization including T2\* mapping for

prognostication of suspected IOC in patients with low-risk MDS. The authors suggested the independent prognostic value of feature tracking CMR-derived global longitudinal strain of the left ventricle, because it reflects not only IOC but also cardiac dysfunction related to underlying disease and cardiac risk factors. I support their conclusion that feature tracking analysis should be included in CMR analysis in patients with suspected IOC or those who are at risk. Nevertheless, despite its many advantages, feature tracking CMR still has some limitations. First, the frame rate of cine images is still lower than echocardiography, so strain rate analysis and diastolic functional analysis are not satisfactory compared to echocardiography. Second, tracking algorithms are different between software. Third, and most importantly, CMR is costly and inconvenient in patients with difficulty breath-holding or who are claustrophobic. However, these limitations can be overcome by introducing a new image sequence which can be obtained during patients' free breathing, sharing analysis algorithms and shortening the image acquisition time using new techniques.<sup>6)</sup> Feature tracking analysis does indeed appear to be the “cherry-on-top” of CMR as a one-stop modality.

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