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Cardiac MRI in Myocarditis: Clinical Applications, Guidelines, and Emerging Directions

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In 2023, the Japanese Circulation Society released its revised diagnostic and treatment guidelines for myocarditis. I was responsible for the section on cardiac magnetic resonance imaging (CMR). Notably, an official English version has also been published, representing the world's first dedicated clinical guideline for myocarditis. This lecture introduces the updated CMR-based diagnostic criteria, including advanced tissue mapping techniques such as T1, T2, and extracellular volume quantification.
CMR has become an indispensable tool in the clinical management of myocarditis, not only for diagnosing acute inflammation but also for monitoring chronic disease progression and therapeutic response. Through illustrative case examples, we will explore how CMR is being applied in real-world practice for individualized diagnosis and follow-up.

This presentation will highlight the spectrum of myocardial inflammation, including acute lymphocytic myocarditis and cardiac sarcoidosis. We will discuss the diagnostic value of late gadolinium enhancement and the complementary role of FDG-PET in characterizing myocardial inflammation and fibrosis. The combined use of these modalities enables more accurate staging and risk stratification, particularly in ambiguous or subclinical cases.
In addition, emerging challenges posed by novel therapies—such as immune checkpoint inhibitor-associated myocarditis—have placed new demands on imaging strategies. CMR is increasingly utilized for early detection and longitudinal monitoring of these treatment-related toxicities. We will present recent data supporting the clinical utility of CMR in this context.
Looking ahead, the refinement of mapping-based quantification is expected to provide more reproducible cut-off values for inflammation and fibrosis, contributing to more consistent diagnostic criteria. Advances in vendor-agnostic software platforms will enhance cross-institutional comparability and expand clinical utility. The standardization of CMR protocols for myocarditis will play a pivotal role in optimizing patient care and treatment planning.

This presentation will provide a comprehensive overview of the current state and future perspectives of CMR in myocarditis, incorporating clinical insights, guideline-based updates, and translational research.

Keywords: *T1/T2 mapping, Myocarditis, Inflammation*