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Cardiac MRI in Cardiomyopathy: A Pathological Interpretation of Delayed Enhancement

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Late gadolinium enhancement (LGE) on cardiac magnetic resonance (CMR) imaging is used to detect and evaluate myocardial damage in various cardiomyopathies. Gadolinium-based contrast agents accumulate in the expanded interstitial space of the myocardium. High intensity areas on LGE correspond to conditions that cause a focal increase in the interstitial space, such as replacement fibrosis, fibro-fatty change, epithelioid granulomas, inflammatory cell infiltration, cardiomyocyte necrosis, and amyloid deposition.
Conversely, areas without LGE correspond to conditions that cause a diffuse the interstitial space expansion, such as interstitial or plexiform fibrosis, mildly degenerated cardiomyocytes, inflammatory cell infiltration, and interstitial amyloid deposition. LGE MRI cannot depict these diffuse interstitial changes, and this increase in interstitial space cannot be quantitatively assessed with inversion recovery MRI images where the inversion time is adjusted to null the signal of normal or least-enhanced myocardium. Therefore, the absence of LGE does not necessarily mean normal myocardial tissue.

Current T1 mapping techniques can overcome the limitations of LGE imaging by detecting widespread myocardial abnormalities and providing a quantitative analysis of the interstitial space. In this presentation, we will report on our evaluation of the histopathological findings and corresponding LGE CMR images from explanted or postmortem whole heart specimens of patients with hypertrophic cardiomyopathy, arrhythmogenic cardiomyopathy, cardiac sarcoidosis, and cardiac amyloidosis. This will help us to understand the underlying mechanisms of LGE imaging.

Keywords: *Cardiac MRI, Late gadolinium enhancement, Pathology*