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Fat water gadolinium enhancement imaging in myocarditis: shifting the goalpost

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BACKGROUND: Conventional bright blood late gadolinium enhancement (bright blood LGE) imaging is a routine cardiovascular magnetic resonance (CMR) technique offering excellent contrast between areas of LGE and normal myocardium. However, contrast between LGE and epicardial fat is frequently poor making the detection of subepicardial late gadolinium enhancement difficult. Subepicardial LGE is a sensitive and specific pattern of LGE classically described in myocarditis. However, in clinical practice, patients with a clinical picture in keeping with myocarditis have often no evidence of LGE.

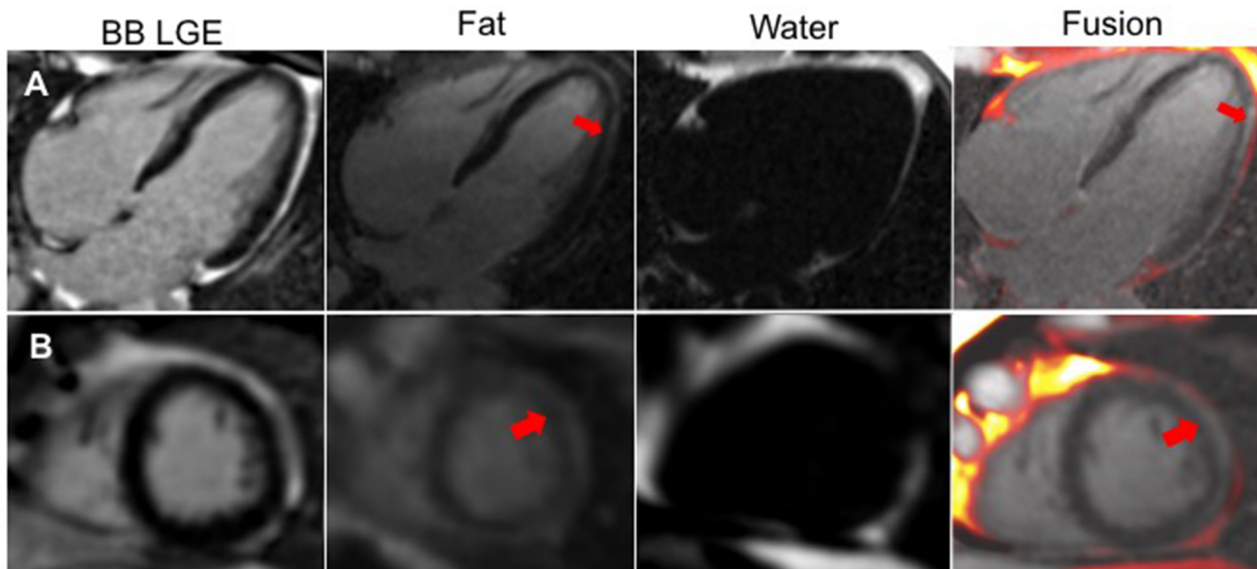
PURPOSE: The objective of this study is to compare the diagnostic utility of a novel fat water phase sensitive inversion recovery (PSIR) late gadolinium enhancement CMR sequence to standard bright blood PSIR LGE in patients with suspected myocarditis.

METHODS: Twenty-eight patients referred for clinical CMR were scanned. A full left ventricle short axis stack was performed using both techniques. Two experienced observers analyzed all bright blood LGE and FW PSIR LGE stacks. A scoring system was devised to quantify the presence and extent of gadolinium enhancement.

RESULTS: All patients presented with chest pain, a raised troponin (Troponin T median 583ng/L, interquartile range 98-1247ng/L) and a normal coronary angiogram or very low probability of coronary artery disease. A total of 448 LV segments were analysed. FW PSIR LGE analysis found 140% more segments that exhibited subepicardial enhancement in comparison to bright blood LGE (116/448 FW PSIR LGE positive segments vs 45/448 BB LGE positive segments; $p < 0.05$). FW LGE also allowed observers to be more confident when diagnosing LGE ($p < 0.05$). Nine patients (32%) with no bright blood LGE (who were therefore classified as normal on bright blood LGE) were found to have subepicardial LGE on FW PSIR LGE.

CONCLUSIONS: FW PSIR LGE significantly increases subepicardial LGE detection in patients with suspected myocarditis compared to standard bright blood LGE and changes the diagnosis in 32% of patients, which has important clinical implications.

Abstract P176 Figure. Fat water imaging vs conventional LGE



Conventional bright blood late gadolinium enhancement images (left panels) and corresponding separated fat water PSIR LGE and fusion imaging (left panels) of 2 different patients showing no definite evidence of subepicardial enhancement in conventional imaging and evidence of subepicardial LGE in separated fat water LGE (red arrows).