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Early gadolinium enhancement for the detection of myocardial oedema (EGE vs T2-STIR vs ACUT2E): a new method to assess the area at risk?

Elisa McAlindon[1*], Jessica Harris[2], Andreas Baumbach[1], Julian W Strange[1], Chiara Bucciarelli-Ducci[1]

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Background

The "gold standard" CMR sequence for assessing the myocardial oedema or area at risk following an acute coronary syndrome is controversial. Short Tau Inversion Recovery (T2-STIR) is in widespread clinical use. Steady state free precession oedema imaging (SSFP/ ACUT2E) has emerging data to support it as a more reproducible method for area at risk (AAR) assessment. More recently, early gadolinium (EGE) has been suggested as an alternative way of measuring AAR.

Methods

30 slices in 10 patients day 2-4 following acute myocardial infarction were analysed by 3 sequences (T2-STIR, ACUT2E, and EGE). The area of oedema was planimetered and expressed as a % of slice total area. The window setting was defined as the sum of the mean signal intensity (SI) of the unaffected area plus 2 standard deviation (SD) for this area. The level setting was set at the mean SI of the unaffected area (a method used in previous studies of this type). Inter-method and inter-observer variability was assessed using the Bland Altman method. Qualitative inter-observer, and inter-method variability was assessed: each slice split into segments according to the 17 segment model and oedema in each segment scored as present of absent.

Results

The Bland Altman plots for T2-STIR vs EGE, and ACUT2E vs EGE are shown in Figure 1, demonstrating a good agreement between methods.

On qualitative assessment, there is good agreement between T2-STIR and EGE (kappa 0.73, 87% segments agree) and ACUT2E and EGE (kappa 0.72, 87% segments agree). The two established methods of assessing AAR (T2-STIR and ACUT2E) also showed good agreement, kappa 0.78, with 89% segments agreed.

On assessing qualitative inter-observer reproducibility there is a good agreement between the two observers using all 3 sequences, although SSFP appears to have the strongest interobserver agreement (T2-STIR kappa 0.56, ACUT2E kappa 0.67, EGE kappa 0.60).

Conclusions

There is good agreement between EGE and the established methods of assessing AAR (T2-STIR and ACUT2E). EGE may offer a new method for assessing the area at risk but this needs to be further assessed in a larger patient population.

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Author details
[1]CMR Unit, NIHR BRU, Bristol Heart Institute, Bristol, UK. [2]Clinical Trials and Evaluation Unit, NIHR BRU, Bristol Heart Institute, Bristol, UK.

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[1]CMR Unit, NIHR BRU, Bristol Heart Institute, Bristol, UK
Full list of author information is available at the end of the article

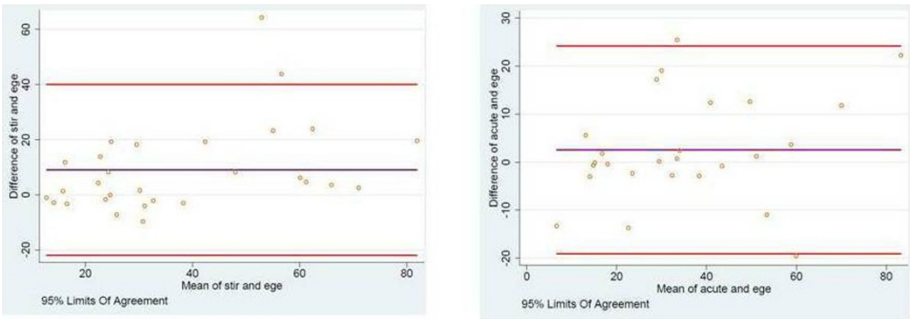

Figure 1 Bland Altman plots for AAR assessed by early gadolinium enhancement (ege) vs STIR (left panel) and SSFP (acute) (right panel).

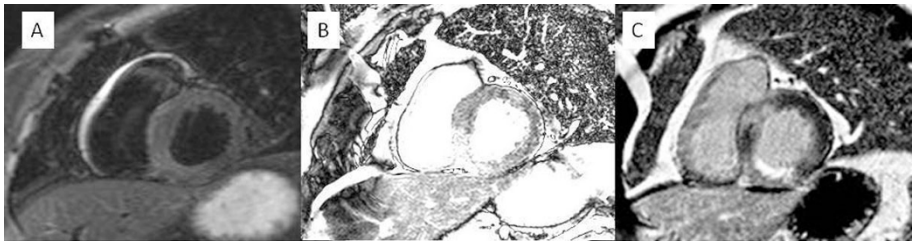

Figure 2 Image 2A) T2-STIR, B) ACUT2E and C) EGE.

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