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CARDIOVASCULAR
SCIENCES

Role of cardiac MRI in acute myocardial infarction

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19th Joint Meeting of Coronary Revascularization (JCR 2019), Busan, South Korea
Thurs 12th December 2019

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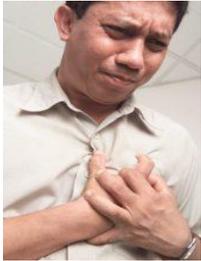


Polyclinics
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Bright Vision
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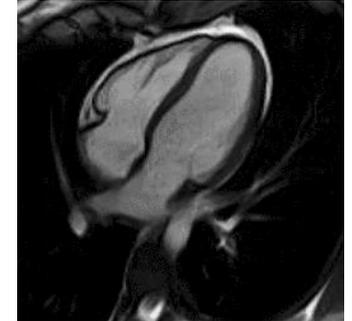
CMR in STEMI



Chest pain



PPCI



Cardioprotective intervention

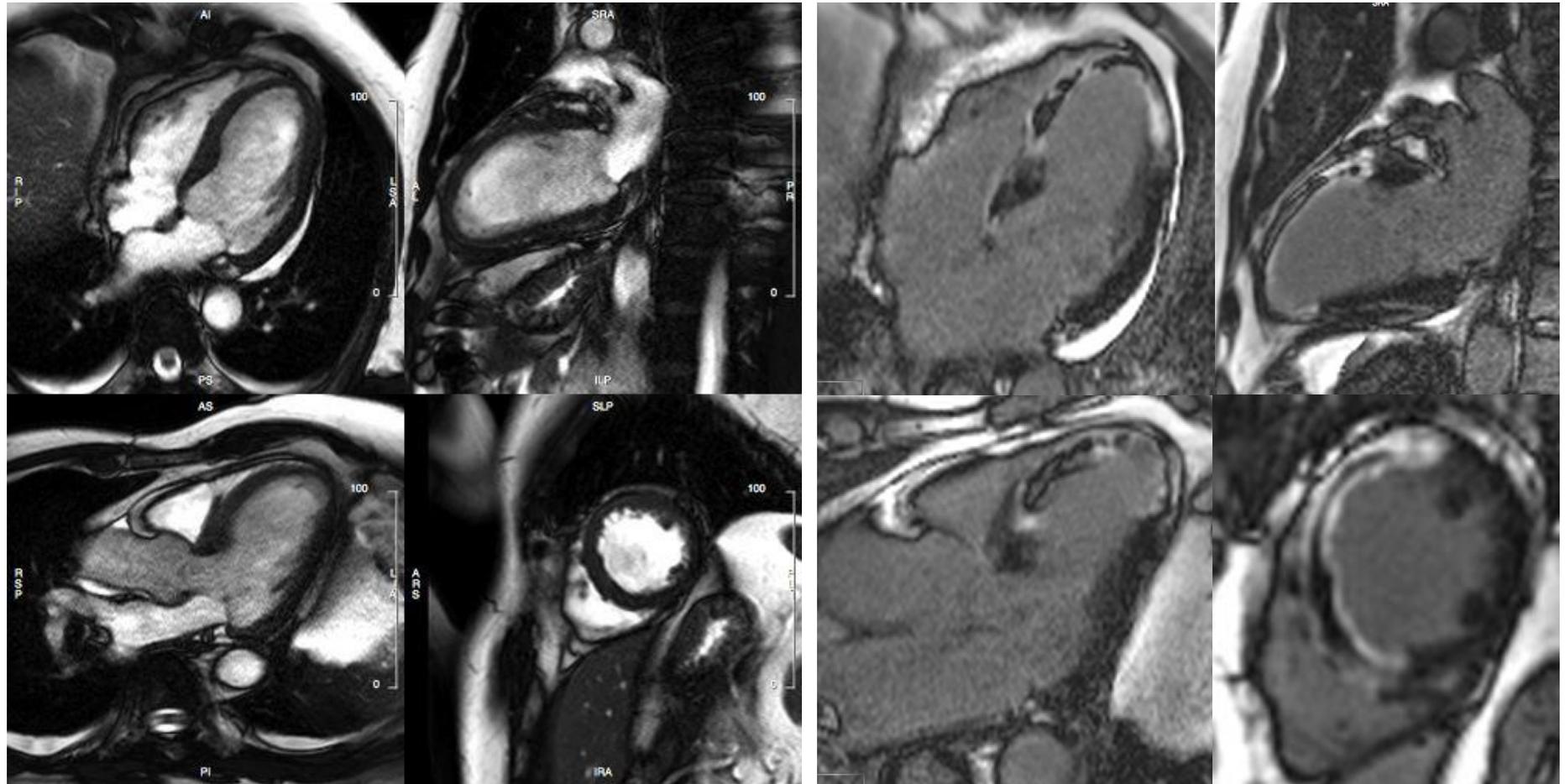


CMR (first week)



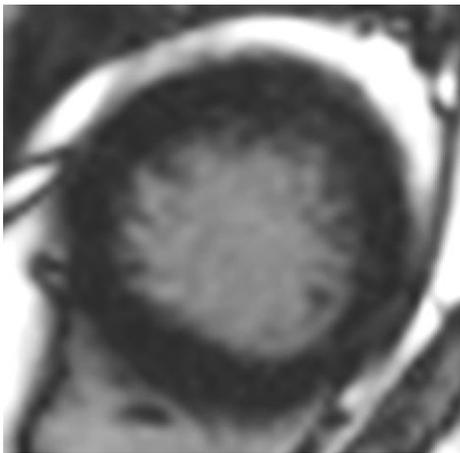
CMR (3-6 mths)

Acute LAD STEMI patient

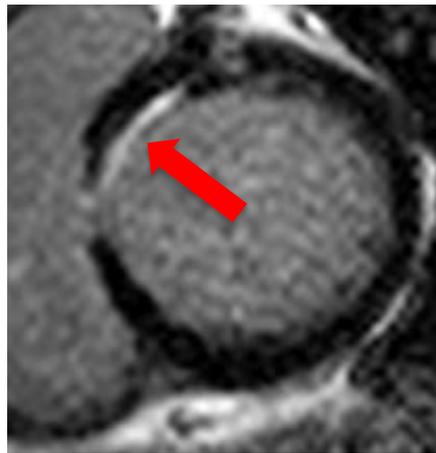


Measuring myocardial infarct size

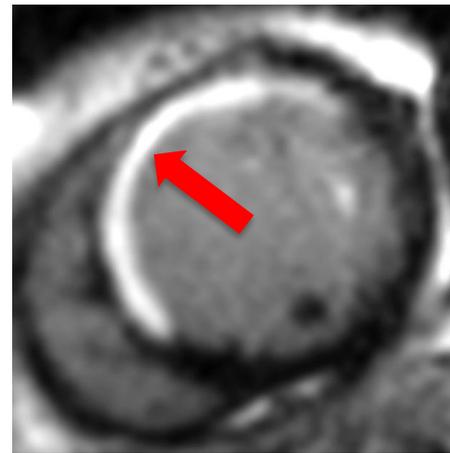
*Delayed washout of gadolinium contrast (Late Gadolinium Enhancement or LGE) gold standard for quantifying MI size
– strong predictor of remodelling, heart failure and survival*



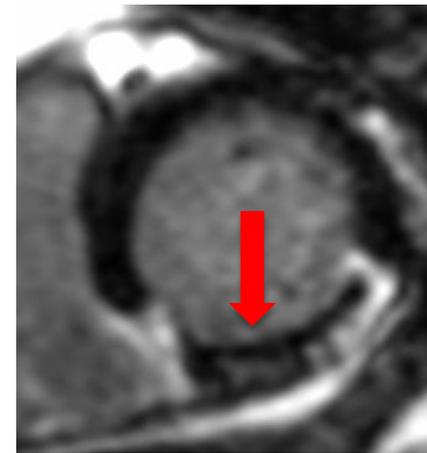
No MI



Small subendocardial
MI



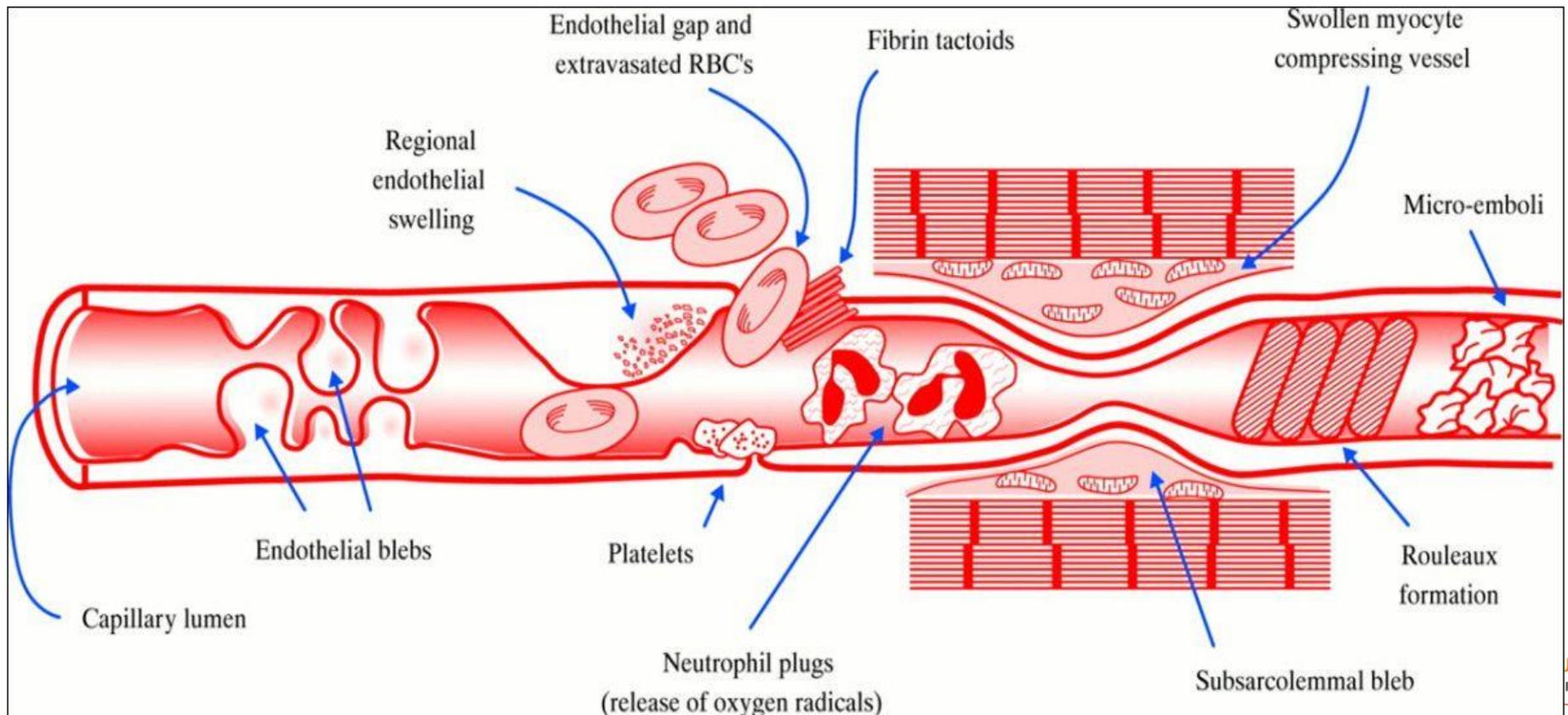
Near transmural
MI



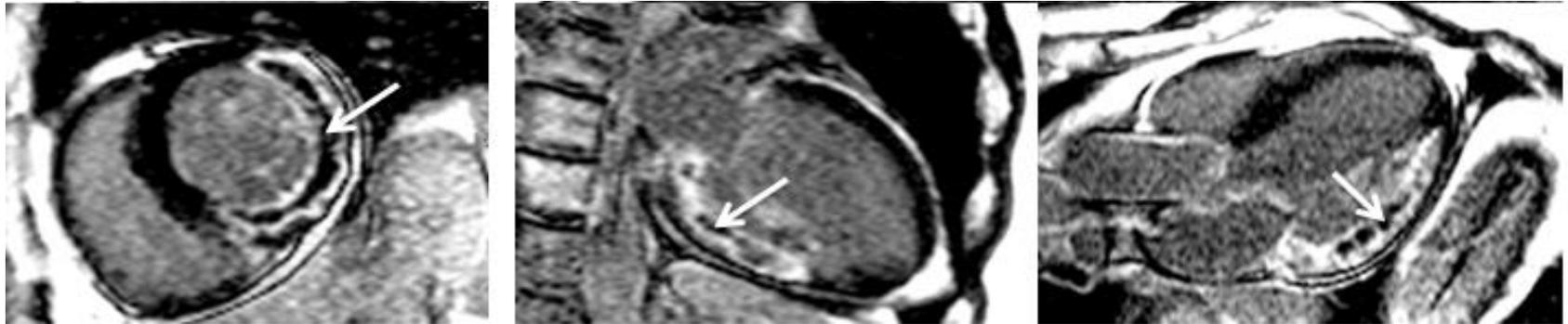
Transmural
MI with MVO

Microvascular obstruction and intramyocardial haemorrhage in AMI

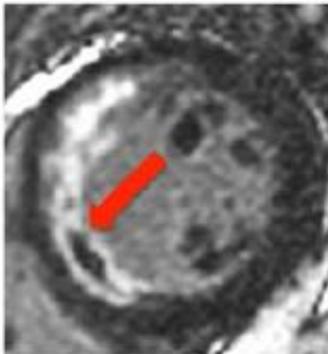
Damage to coronary microvasculature during AMI can cause microvascular obstruction (60%) and intramyocardial haemorrhage (40%), both predictors of poor outcome



Detection of MVO and IMH

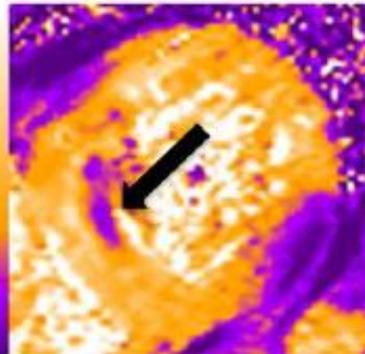


LGE

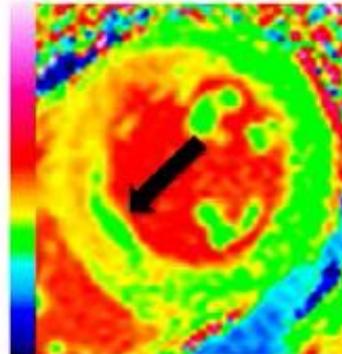


Microvascular obstruction

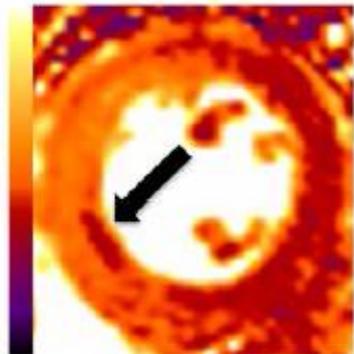
T2* map



T1 map



T2 map

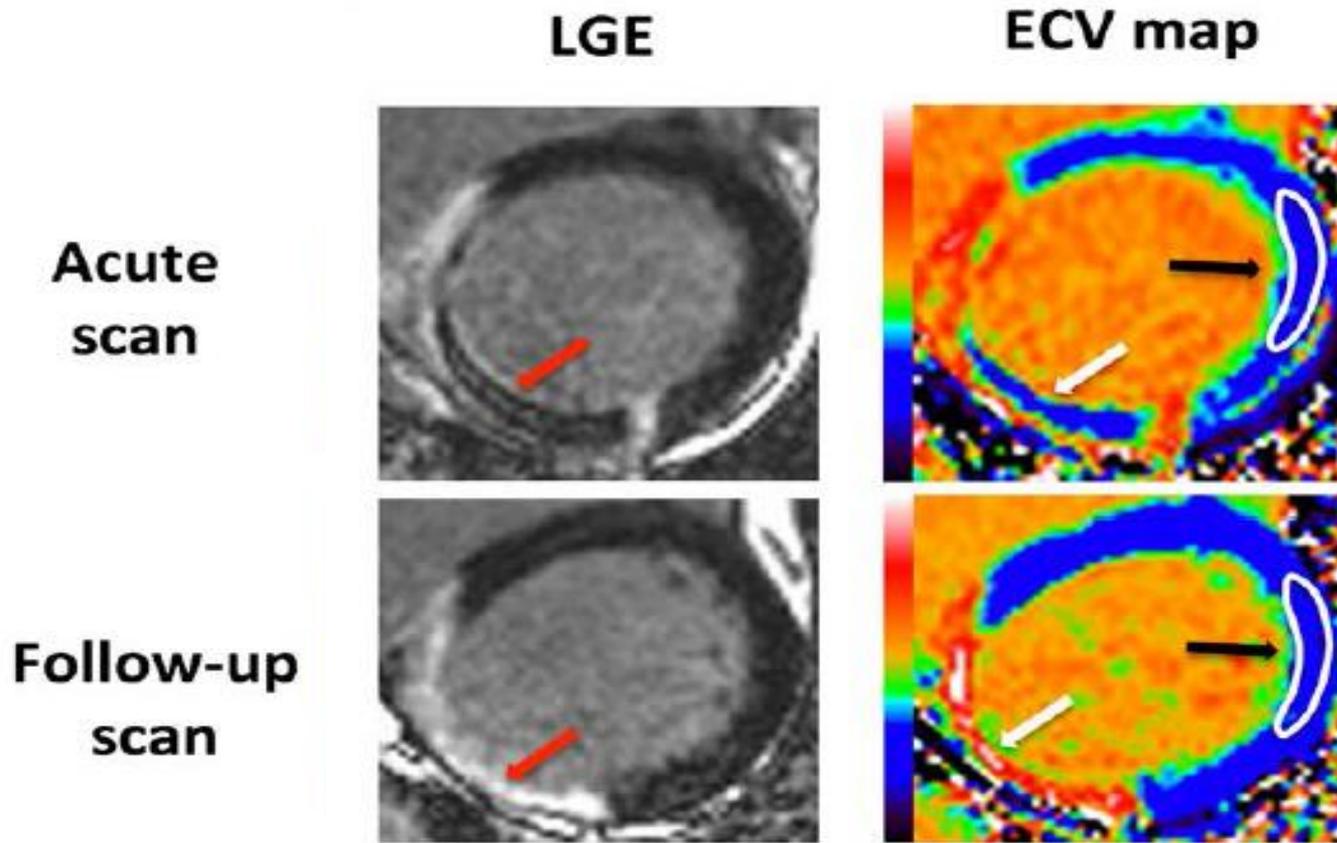


Intramyocardial hemorrhage

White... Hausenloy JACC Cardiovasc Imaging 2015
Bulluck..., Hausenloy 2018 Circulation

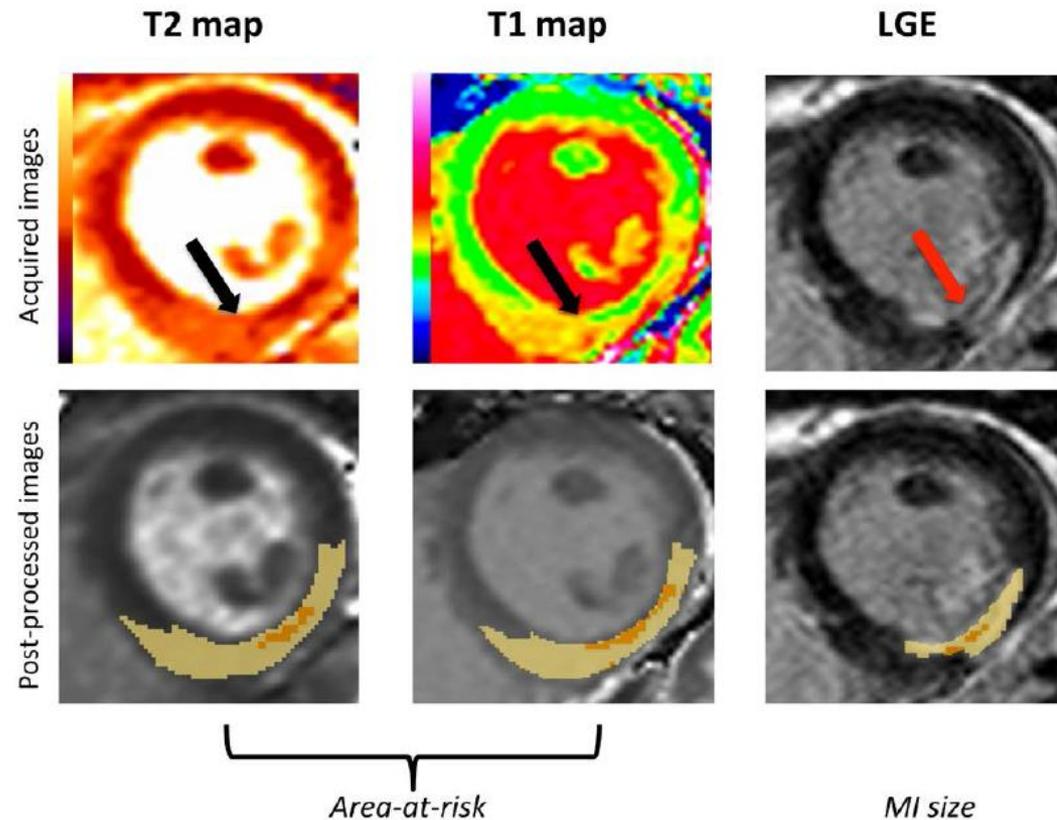
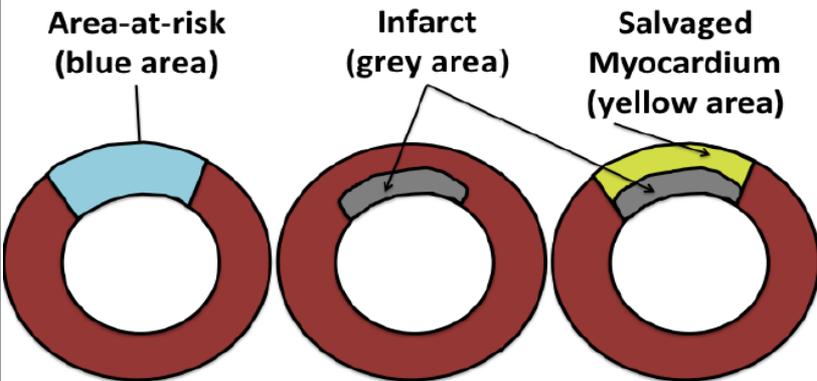
ECV mapping of infarct zone and remote myocardium

CMR can image ECV in infarct zone and remote myocardium (interstitial fibrosis)- insights into post-AMI remodelling



Myocardial salvage

Myocardial salvage has increased sensitivity for assessing efficacy of novel cardioprotective therapies



MI size

LV thrombus post-STEMI



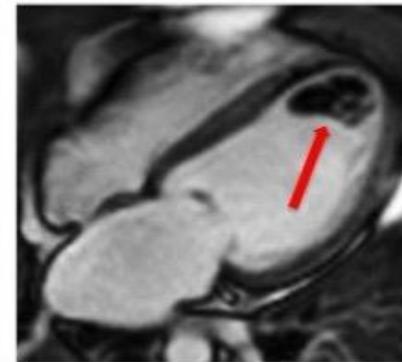
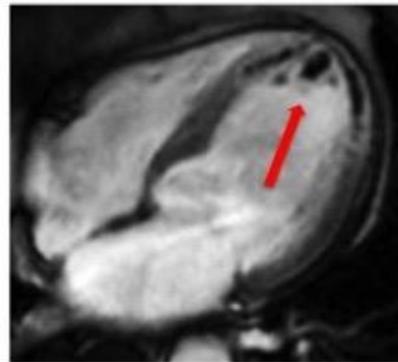
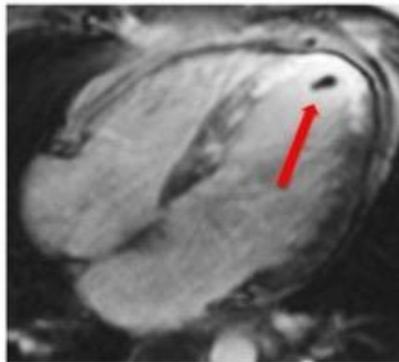
Patient 1



Patient 2



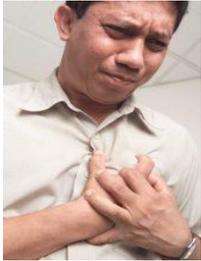
Patient 3



LV thrombus post- STEMI: Meta-analysis

- All STEMI: 6% (vs 2.7% echo)
- Anterior STEMI: 12% (vs 9.1% echo)
- Anterior STEMI with reduced LVEF: 19%.
- 88% of thrombi treated by 3-6 mths.
- Triple therapy with warfarin+dual anti-platelet therapy has higher bleeding complications.
- Therefore, a repeat MRI scan at 3 months to guide duration of anticoagulation might help to minimise unnecessary bleeding risk to patients.

CMR in NSTEMI



Chest pain



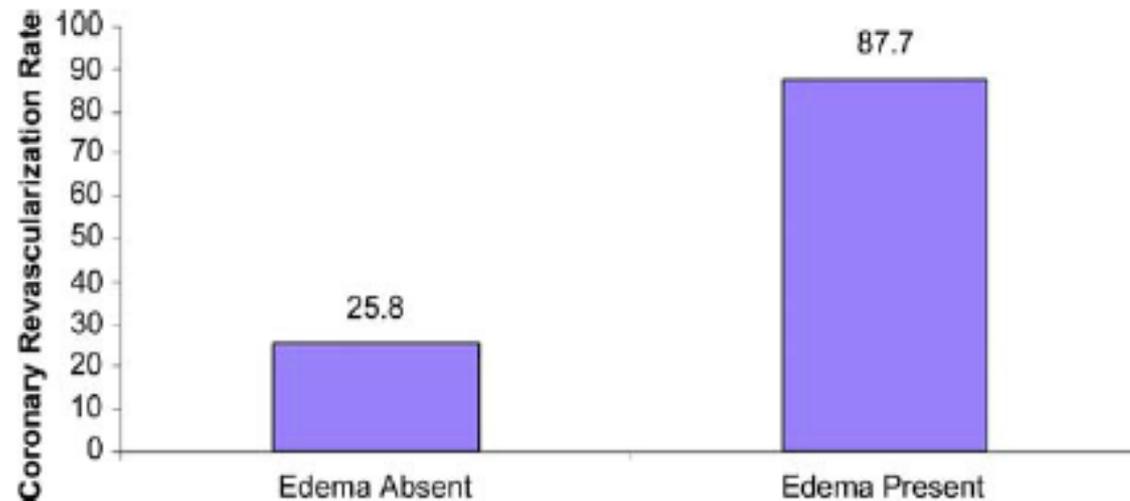
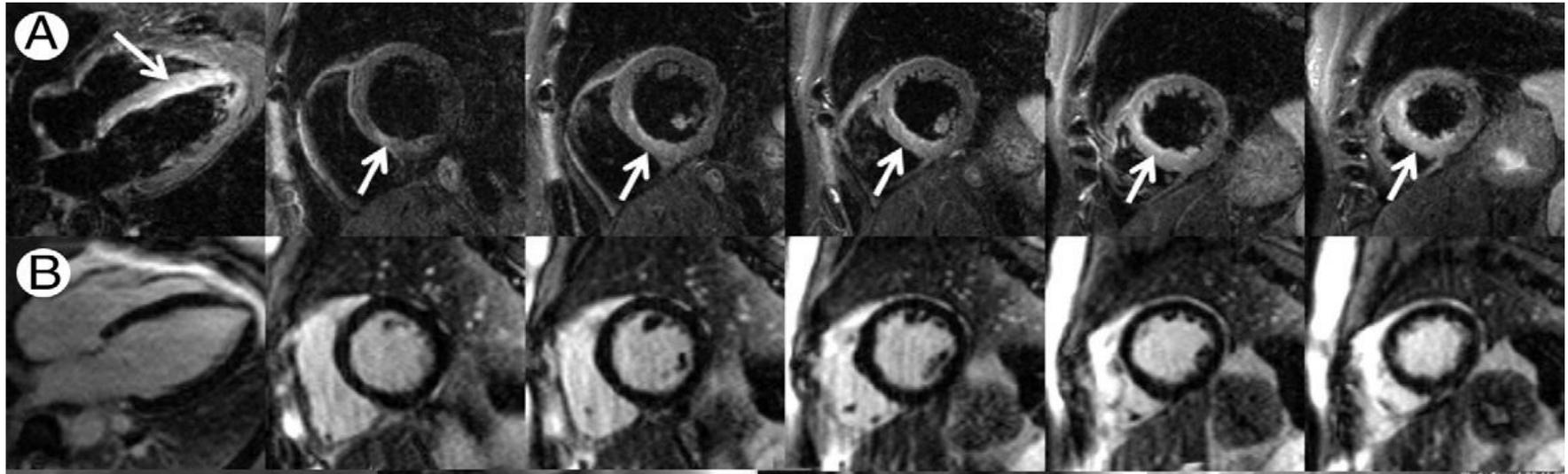
In-patient PCI



CMR (in patient)

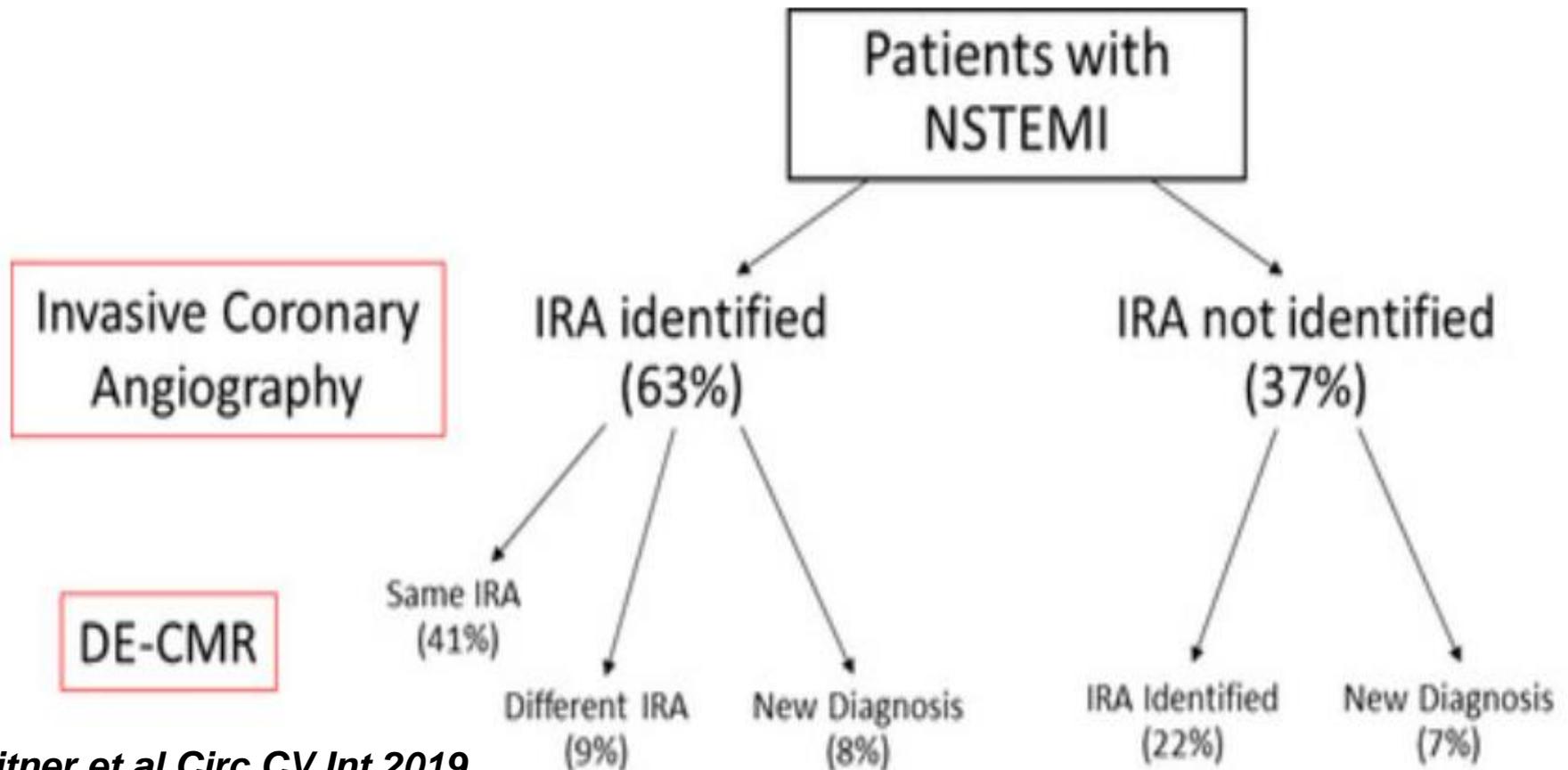
CMR can detect myocardial edema in NSTEMI

In 88 NSTEMI patients, edema by T2-weighted CMR present in 60% of patients and predictive of obstructive CAD and worse outcomes.



CMR can detect IRA in NSTEMI

Identification of the IRA by angiography can be challenging in NSTEMI. 114 NSTEMI patients underwent CMR then angiography. In nearly half, LGE-CMR led to a new IRA diagnosis or elucidated a non-ischemic pathogenesis

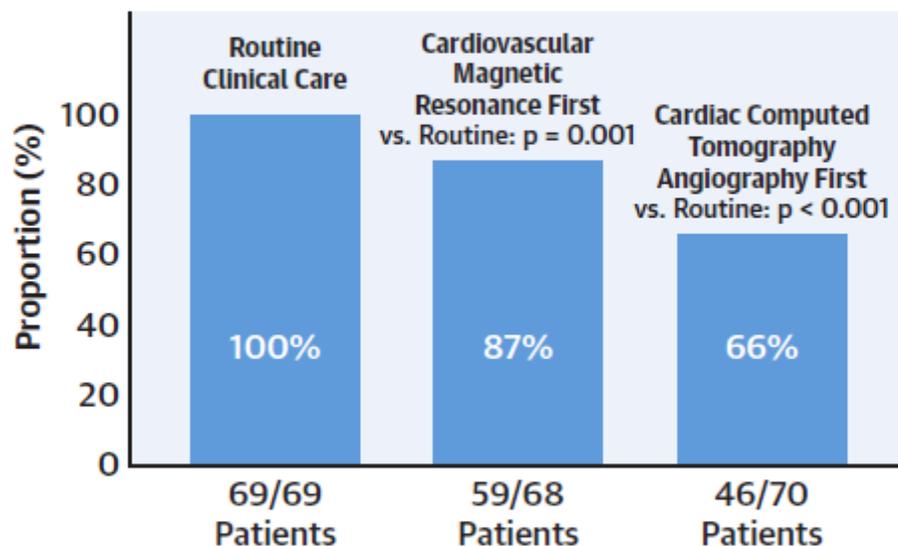


CMR/CTA as imaging-guided strategy for CA in NSTEMI

204 NSTEMI (chest pain, trop rise, inconclusive ECG) patients randomised to CMR, CTA or standard care reduced CA, and with no effect on MACE at one year. One third of patients in standard care did not have obstructive CAD.

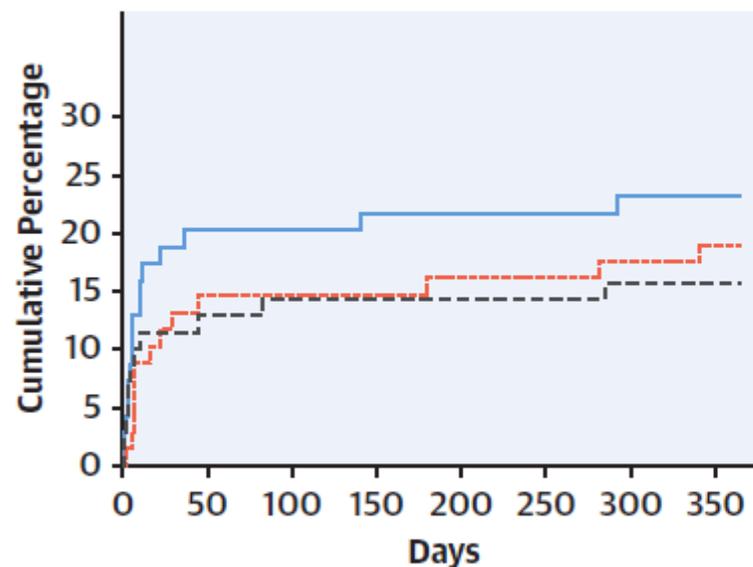
Primary Endpoint

Efficacy: Referral to Invasive Coronary Angiography



Secondary Endpoint

Safety: Major Adverse Cardiac Events or Complications



— Routine Clinical Care
- - - Cardiovascular Magnetic Resonance
- - - Cardiac Computed Tomography Angiography

Conclusions

- CMR can tissue characterise the infarct zone (MI, oedema, MVO, IMH, ECV) in STEMI patients.
- CMR can assess efficacy of novel therapies for preventing MVO, reducing MI size and preventing heart failure in STEMI.
- In NSTEMI, CMR can detect myocardial edema, the IRA, and diagnose non-CAD diseases - CMR or CTA performed before angio may reduce numbers of coronary angiography.

Acknowledgements

The Hatter Institute, UCL, UK

Heerajnarain Bulluck
Manish Ramlall
Steven White
Derek Yellon

UCLH/Barts Heart Centre, UK

James Moon
Anna Herrey
Charlotte Manisty

UCLH Nuclear Cardiology, UK

Ashley Groves
Leon Menezes
Simon Wan
Celia O'Meara

CIRC, Singapore

John Totman
Stephanie Marchesseau Le Prado
Mary Stephenson
Fatima Al Nasirallah

NHCS MRI unit, Singapore

All MRI staff
Stuart Cook
Tan Ru San
Calvin Chin
Narayan Lath
Adrian Shoen Low Choon Seng
Tang Hak Chia



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Thank you for your attention!

