Imaging in the clinic: Advances in tissue characterisation and oxygenation assessment

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Cardiovascular Magnetic Resonance Imaging (CMR) permits accurate phenotyping of many cardiac diseases. CMR's inherent advantages are its non-invasive nature, lack of ionizing radiation and high accuracy and reproducibility. Furthermore, it is able to assess many aspects of cardiac anatomy, structure and function. Specifically, it can characterize myocardial tissue, myocardial function, myocardial mass, myocardial blood flow/perfusion, irreversible and reversible injury, all with a high degree of accuracy and reproducibility. Hence, CMR is a powerful tool in clinical and pre-clinical research.

Over the last 5 years, there have been particular advances in CMR myocardial tissue characterisation. T1 and T2 mapping techniques permit assessment of myocardial oedema, myocardial fibrosis and scar in a variety of cardiac conditions. Late gadolinium enhancement imaging has the largest body of evidence in both ischaemic and non-ischaemic cardiomyopathies. These techniques have particular advantages for not only monitoring cardiac disease states but also responses to intervention, either mechanical or pharmaceutical.

Lastly normal oxygenation assessment techniques permit direct quantification of myocardial tissue oxygenation both at rest and during pharmacological stress.