A / PROF ANDREW TAYLOR

IMAGING

Our group is recognised nationally as a centre of excellence in clinical cardiac magnetic resonance (CMR) imaging, and has a strong record in clinical CMR research. Our team has developed novel CMR techniques for the characterisation of cardiac fibrosis, and evaluated the relationship between cardiac fibrosis and cardiovascular disease.

Research Brief

Through novel CMR T1 mapping techniques, our group was the first in the world to non-invasively assess diffuse myocardial fibrosis with CMR imaging. This has led to the widespread international uptake of CMR T1 mapping as an investigational tool in a wide variety of cardiac disease. Follow up studies by our group have utilised CMR T1 mapping to investigate the mechanism of adverse cardiac remodeling that may occur following myocardial infarction, or as a consequence of cardiac arrhythmia such as atrial fibrillation. Ongoing studies will extend these findings into understanding the mechanisms by which diffuse myocardial fibrosis contribute to cardiac stiffness, which is a hallmark of many forms of cardiomyopathy.

We have also applied conventional CMR techniques that identify regional myocardial fibrosis to identify patients with heart failure who are at high risk of future life threatening cardiac arrhythmia, in whom the need for prophylactic implantable cardioverter defibrillators (ICD) may be most critical. These findings have now been reproduced by multiple research groups.

Findings from our research will not only further our understanding of the underlying mechanisms of heart failure; they could also have direct clinical impact, such as assistance in the selection of patients for prophylactic ICD implantation.

Methodologies

- Imaging of myocardial fibrosis, including post-contrast T1 mapping for diffuse fibrosis and conventional delayed enhancement imaging for regional fibrosis
- Gold standard assessment of cardiac structure and function with CMR
- Invasive assessment of cardiac diastolic function with pressure-volume loop measurement

Selected Publications

Through a research agreement with G.E. Healthcare, A. Prof. Taylor and his team developed a novel T1 mapping sequence that can quantify diffuse myocardial fibrosis.


Regional fibrosis on CMR imaging relates to a high rate of malignant ventricular arrhythmia in patients who undergo implantable cardioverter defibrillator (ICD) insertion.


These findings have been reproduced in multiple studies and may form the basis for future changes in clinical selection for prophylactic ICD insertion.

In the remote myocardium of patients with acute infarction, expansion of the extracellular matrix and systolic dysfunction occurs within a few days. This process is related to macrophage migration inhibitory factor (MIF) and suggests coupling of infarct healing with adverse cardiac remodeling.