

Magnetic resonance guidance of cardiac resynchronization therapy

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Target Audience: Researchers and clinicians interested in magnetic resonance guided interventional therapy and image fusion.

Purpose: To systematically review the potential of cardiac magnetic resonance (CMR) imaging for guidance of interventional cardiac resynchronization therapy (CRT).

Outline of content:

A substantial fraction of non-responders in cardiac resynchronization therapy (CRT) is attributed to non-optimal patient selection and non-optimal implantation sites of the left ventricular (LV) lead. From the current perspective, the use of preoperative imaging data will likely improve patient selection and procedure guidance, finally leading to an overall improvement of the procedure outcome. Identified relevant preoperative data comprise the detailed analysis and quantification of the global and regional left and right ventricular function, the assessment of myocardial scar burden and distribution, and the visualization of the coronary veins. Fusion of the retrieved information may likely improve triage heart failure patients for proper treatment.

CMR imaging appears to be the sole imaging modality capable of providing the required data in a single imaging session.

This educational e-poster will provide a comprehensive overview on CMR imaging techniques applied for providing the required functional and morphological data, its quantitative analysis, the fusion of the preoperative data for the identification of optimal LV lead position, and the inter-procedural fusion of the preoperative data with X-ray fluoroscopy for improved procedure guidance. A comparison between conventional cine imaging and advanced motion encoding techniques will be provided. Analysis methods for cine data as well as for motion encoded data will be reviewed. Scar imaging protocols comprising conventional and advanced contrast agents as well as recent developments in coronary vein imaging will be addressed. The technical considerations will be related to the clinical and preclinical work being published on the different topics. Conclusions will be drawn regarding promising preoperative imaging protocols and imaging recipes will be provided covering today's state-of-the-art. An outlook will be provided on the potential future use of CMR in that field.

Summary:

CMR guidance of CRT will likely optimize CRT, decrease the numbers of "CRT non-responders" and significantly improve patients' benefit of this complex and expensive interventional therapy.