MRI for Patient Selection and Lead Planning in Cardiac Resynchronization Therapy

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Using current patient selection criteria, >30% of patients undergoing cardiac resynchronization therapy (CRT) with a biventricular pacemaker do not respond positively to the treatment. The high non-response rate to CRT as well as the high cost of the treatment has motivated investigators to seek new imaging methods to better identify patients who will respond to CRT. Cardiac magnetic resonance imaging is the only non-invasive modality that can determine the three factors most often associated with response to CRT: the presence of mechanical dyssynchrony in the ventricle, the amount and location of myocardial scar, and the anatomy of the coronary venous structures. Combing an imaging assessment of all of the factors could better select patients who will positively respond to CRT, elucidate the underlying electro-mechanical coupling involved in determining patient response to CRT, and guide treatment options such as lead placement. Currently, the major stumbling block toward clinical implementation of the technique to help guide treatment is the time required for analysis and processing of the large amount of MRI data into a useful form for clinicians.