

Advanced Pulse Sequences for 3 Tesla CMR

Krishna S. Nayak, PhD, email: knayak@usc.edu

Associate Professor of Electrical Engineering, University of Southern California

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Several groups have demonstrated improved image quality and diagnostic performance of CMR at 3T compared to 1.5T. This includes late gadolinium enhancement imaging, first-pass perfusion imaging, and coronary artery imaging. Much of the improvement at higher field strengths directly relates to the increased polarization, increased chemical shift, elongation of T1 relaxation times, and improved performance of parallel imaging. High-field CMR methods must also carefully manage potential artifacts due to off-resonance and radiofrequency inhomogeneity. This talk will review several advanced pulse sequences and pulse sequence elements that capitalize on the advantages of high-field imaging, while mitigating these two important sources of artifact.

The talk will cover:

- ◆ **Pulse sequences that are insensitive or less sensitive to off-resonance.** This includes short-TR steady-state free precession (SSFP), wideband SSFP, and gradient echo (GRE).
- ◆ **Radiofrequency excitation pulses that are less sensitive to RF inhomogeneity.** Including adiabatic inversion and saturation pulses, and tailored pulses.

Examples will be drawn from 3T CMR methods that are used clinically or are works-in-progress. These, for instance, include high-resolution LV function imaging, 3D first-pass perfusion imaging and arterial spin labeled perfusion imaging.