

# Advanced Cardiac MRI: A Technical Overview

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**Figure 1** Motion-suppressed magnetic resonance image of a right coronary artery obtained with a spatial resolution of 350um in-plane

Magnetic resonance imaging (MRI) is a non-invasive technique that operates without ionizing radiation and offers a high soft-tissue contrast while the use of nephro-toxic contrast agents is not mandatory. As a result, MRI has tremendous potential not only for research and discovery but also for diagnosis and for monitoring and guiding therapy in patients. However, cardiovascular MRI is very challenging for different reasons. First, the heart moves quite considerably because of natural contraction, relaxation and respiration. Second, a high contrast between different tissue components such as blood and muscle or infarcted and non-infarcted tissue is required, and third, a relatively large volumetric coverage with high spatial and temporal resolution is mandatory. Nevertheless, many of these challenges have been successfully addressed. Simultaneously, rapid progress in scanner hardware and MR methodology moves the field forward. In this presentation, technical challenges for cardiovascular MRI are discussed and technical concepts and solutions will be introduced. This will include k-space segmentation, ECG triggering, respiratory motion suppression, pre-pulses, contrast generation, and the use of modular building blocks of an advanced cardiovascular MRI sequence.