

Coronary MR Angiography

Qi Yang, M.D¹., Kuncheng Li, M.D¹., Debiao Li, Ph.D².

1. Department of Radiology, Xuanwu hospital, Beijing, China
2. Cedars-Sinai Medical Center, Los Angeles, CA, USA

Coronary MR angiography (CMRA) is a promising method for non-invasive, radiation-free detection and exclusion of obstructive coronary artery disease (CAD)¹. SSFP whole heart CMRA at 1.5T has been successfully introduced as a method of choice that can provide visualization of all three major coronary arteries in a single 3D volume². Single-center study proved that non-contrast whole heart CMRA at 1.5T was useful in ruling out significant CAD³. Very recently Sakuma has reported the first national multicenter trial with a 3-dimensional, navigator gated SSFP whole-heart CMRA sequence at 1.5-T⁴. In this trial, sensitivity was 88%, specificity was 72%, and positive predictive value and negative predictive value were 71% and 88%, respectively. They also observed there were no significant differences between patients with a BMI <25 and > 25 kg/m². These results are quite promising, but also indicate the need for additional technical development.

Contrast-enhanced whole-heart CMRA at 3.0-T has emerged as a means of improving the CNR compared with non contrast-enhanced 1.5-T whole-heart CMRA⁵. The diagnostic accuracy of 3.0-T contrast-enhanced whole-heart coronary MRA was evaluated in 69 patients with suspected CAD. The sensitivity, specificity, and accuracy of whole-heart CMRA for detecting significant stenoses were 94%, 82%, 89%, respectively, on a per-patient basis. The high negative predictive values represent an improvement over the SSFP technique and drive its potential clinical utility, particularly in permitting the exclusion of high-grade stenosis in young adults with a low pre-test likelihood. The results compare favorably with the performance of multicenter 64-slice MDCT⁶ and make this CMRA approach now representing the current state of the art. Combined with dedicated 32-channel cardiac coils, along with parallel imaging, allows improvements in imaging speed, study success rate and reduced dose of contrast agent when compared with conventional 12-channel coils⁷.

In conclusion, non-contrast-enhanced 1.5-T whole-heart CMRA and contrast-enhanced 3.0-T MRA are not competing techniques, they both allow for noninvasive detection of significant coronary artery stenoses. Although spatial resolution and robustness of these techniques need to be further improved, CMRA has the potential to be a valuable adjunct in cases where coronary calcification precludes adequate evaluation or iodinated contrast agents are contraindicated.

References

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