PURPOSE: To compare 3 different flow targeted magnetization preparation strategies for coronary MR angiography (cMRA), which allow selective visualization of the vessel lumen. MATERIAL AND METHODS: The right coronary artery of 10 healthy subjects was investigated on a 1.5 Tesla MR system (Gyroscan ACS-NT, Philips Healthcare, Best, NL). A navigator-gated and ECG-triggered 3D radial steady-state free-precession (SSFP) cMRA sequence with 3 different magnetization preparation schemes was performed referred to as projection SSFP (selective labeling of the aorta, subtraction of 2 data sets), LoReIn SSFP (double-inversion preparation, selective labeling of the aorta, 1 data set), and inflow SSFP (inversion preparation, selective labeling of the coronary artery, 1 data set). Signal-to-noise ratio (SNR) of the coronary artery and aorta, contrast-to-noise ratio (CNR) between the coronary artery and epicardial fat, vessel length and vessel sharpness were analyzed. RESULTS: All cMRA sequences were successfully obtained in all subjects. Both projection SSFP and LoReIn SSFP allowed for selective visualization of the coronary arteries with excellent background suppression. Scan time was doubled in projection SSFP because of the need for subtraction of 2 data sets. In inflow SSFP, background suppression was limited to the tissue included in the inversion volume. Projection SSFP
(SNR(coro): 25.6 +/- 12.1; SNR(ao): 26.1 +/- 16.8; CNR(coro-fat): 22.0 +/- 11.7) and inflow SSFP (SNR(coro): 27.9 +/- 5.4; SNR(ao): 37.4 +/- 9.2; CNR(coro-fat): 24.9 +/- 4.8) yielded significantly increased SNR and CNR compared with LoReIn SSFP (SNR(coro): 12.3 +/- 5.4; SNR(ao): 11.8 +/- 5.8; CNR(coro-fat): 9.8 +/- 5.5; P< 0.05 for both). Longest visible vessel length was found with projection SSFP (79.5 mm +/- 18.9; P< 0.05 vs. LoReIn) whereas vessel sharpness was best in inflow SSFP (68.2% +/- 4.5%; P< 0.05 vs. LoReIn). Consistently good image quality was achieved using inflow SSFP likely because of the simple planning procedure and short scanning time. CONCLUSION: Three flow targeted cMRA approaches are presented, which provide selective visualization of the coronary vessel lumen and in addition blood flow information without the need of contrast agent administration. Inflow SSFP yielded highest SNR, CNR and vessel sharpness and may prove useful as a fast and efficient approach for assessing proximal and mid vessel coronary blood flow, whereas requiring less planning skills than projection SSFP or LoReIn SSFP.