Indications and purpose of the scan

- The detection of presence and extent of myocardial ischemia is important to guide clinical care. Cardiovascular magnetic resonance is an established non-invasive imaging technique to evaluate myocardial ischemia.

Why CMR (specific advantages)

- High spatial and temporal resolution enabling visualization of sub-endocardial ischemia.
- Good image quality independent of body habitus.
- CMR can identify ischemia by assessing perfusion and wall motion with stress.
- CMR has high accuracy and excellent prognostic data in the evaluation of ischemia.
- No ionizing radiation exposure.

Evidence examples from the literature

- MR-IMPACT II Trial, a multicenter study of 533 patients comparing the accuracy of perfusion CMR, SPECT against the gold standard coronary angiography. Perfusion CMR was non-inferior compared to SPECT. [1]
- CE-MARC Trial, a single center study of 752 patients showed the perfusion CMR has higher sensitivity, positive predictive value and diagnostic accuracy when compared with SPECT. [2]
- Jaarsma et al. in a meta-analysis of 37 studies showed that perfusion CMR has a sensitivity of 89% and specificity of 76%, similar to PET and superior to SPECT. [3]
- De Jong et al. in a meta-analysis of 28 studies comparing perfusion CMR to SPECT and stress echocardiography, perfusion CMR had superior accuracy. [4]
- Most recently, Danad et al. in a meta-analysis of 23 studies comparing perfusion CMR, SPECT, stress echocardiography, invasive coronary angiography, coronary computed tomography angiography, fractional flow reserve (FFR) derived from CCTA (FFRCT) to an invasive FFR reference standard found that perfusion CMR had the highest performance for the diagnosis of ischemia-causing CAD. [5]

Contraindications

- Any implanted device that is not MRI conditional
- Inability to lie flat
- Inability to tolerate the scan
- Altered mental status/ inability to follow verbal commands in scanner
- Severe arrhythmias
- Patients renal disease and GFR<30 mL/min or patients with selected metallic implants or prostheses non-compatible to MRI. [6]

Appropriateness

- Ischemic evaluation by CMR is appropriate in symptomatic patients with intermediate pre-test probability of CAD if ECG is uninterpretable or unable to exercise. [7]
- Current guidelines have a Class I or Class IIa recommendation for evaluation of ischemia in intermediate risk patients prior to invasive coronary angiography. [8, 9]