Dominik Fleischmann, MD, Palo Alto, CA (Moderator) Research support, Siemens AG; 
Scott B. Reeder, MD, PhD, Madison, WI (Presenter) Institutional research support, General Electric Company Institutional research support, Bracco Group

**PURPOSE**

To evaluate the ability to depict anatomy and complications of renal vascular transplant with unenhanced magnetic resonance (MR) angiography with spatial labeling with multiple inversion pulses (SLEEK) and to compare the results with color Doppler (CD) ultrasonography (US), digital subtraction angiography (DSA), and intraoperative findings.

**METHOD AND MATERIALS**

This study was approved by the institutional review board, and written informed consent was received before examination. Seventy-five patients who underwent renal transplantation were examined with unenhanced MR angiography with SLEEK and CD US. DSA was performed in 15 patients. Surgery was performed in eight patients. The ability of SLEEK to show transplant renal vascular anatomy and complications was evaluated by two experienced radiologists who compared the results with CD US, DSA, and intraoperative findings.

**RESULTS**

Patients successfully underwent SLEEK MR angiography. Transplant renal vascular anatomy was assessed in 87 arteries and 78 veins. Renal vascular complications from transplantation were diagnosed in 23 patients, which included 14 with arterial stenosis, three with arterial kinking, two with arteriovenous fistulas, two with venous stenosis, one with pseudoaneurysms, and one with fibromuscular dysplasia. Three patients had two renal transplants and nine patients had nine accessory renal arteries. More accessory renal arteries were detected with SLEEK than with CD US. Correlation was excellent between the stenosis degree with SLEEK and DSA (r = 0.96; P < .05). For those with significant artery stenosis (.50% narrowing) proved with DSA (n = 7) or surgery (n = 3), positive predictive value was 91% (10 of 11).

**CONCLUSION**

Unenhanced MR angiography with SLEEK preliminarily proved to be a reliable diagnostic method for depiction of anatomy and complications of renal vascular transplant. It may be used for evaluation of patients with renal transplant, and in particular for those with renal insufficiency.

**CLINICAL RELEVANCE/APPLICATION**

Unenhanced MR angiography with SLEEK may be used for evaluation of patients with renal transplant, and in particular for those with renal insufficiency.

**RC312-03 Nonenhanced ECG-gated Quiescent-interval Single Shot (QISS) MRA of the Lower Extremity for Planning of Interventional Procedures: Results in 43 PAD Patients**

**Awards**

**RSNA Country Presents Travel Award**

Peter Liersch, Duesseldorf, Germany (Presenter) Nothing to Disclose

Patric Kroepfl, MD, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose

Christoph K. Thomas, MD, Duesseldorf, Germany (Abstract Co-Author) Speaker, Siemens AG

Joel Aissa, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose

Gerald Antoch, MD, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose

Rotem S. Lanzman, MD, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To assess the clinical value of nonenhanced ECG-gated Quiescent-Interval Single-Shot MR angiography (QISS-MRA) for planning of
interventional procedures in patients with peripheral artery disease (PAD).

METHOD AND MATERIALS

43 patients (mean age 68.5 ± 10.8 years) with peripheral artery disease were included in this study. Nonenhanced QISS-MRA of the distal aorta and the lower extremity were acquired at 1.5T with 3mm slice thickness, with 0.6 mm overlap and an inplane resolution of 1.0 x 1.0 mm, resulting in a total scan time of approx. 9 min. ECG-gating was applied for synchronization of the quiescent interval with the period of maximum systolic inflow. The degree of stenosis was assessed by using a 4-point scale (grade 1, normal appearing vessel; grade 2, vessel narrowing < 50%; grade 3, stenosis 50%-99%; grade 4, vessel occlusion) for 15 predefined anatomical segments. QISS-MRA was used to plan interventional procedures. Interventional digital subtraction angiography (DSA) served as the reference standard.

RESULTS

QISS-MRA was performed successfully in all patients. 434 of 645 segments visible on QISS-MRA were evaluated with DSA during interventional procedures and were considered for further analysis. With QISS-MRA the degree of stenosis was assessed correctly in 404 of 434 (93.1%) segments, overestimated in 26 of 434 (5.9%) segments and underestimated in 4 of 434 (0.9%) segments. As compared to DSA, QISS-MRA had a high sensitivity (99.3%), specificity (97.2%) as well as positive and negative predictive value (89.3% and 97.3%) for the detection of significant stenosis (grade 3 and 4). Based on QISS-MRA, an inappropriate arterial access was selected in all patients and the estimated length of stenosis or vessel occlusion was assessed correctly. 6 of 6 (100%) stented segments were not assessable.

CONCLUSION

ECG-gated QISS-MRA is a solid nonenhanced imaging technique for assessment of stenosis of the lower extremities and provides a reliable basis for interventional procedures. A limitation of QISS-MRA is the evaluation of stented segments.

CLINICAL RELEVANCE/APPLICATION

QISS-MRA is a reliable and precise nonenhanced imaging technique for assessment of peripheral arterial disease and can be applied safely in patients with contraindications for contrast material.

RC312-04 Qualitative and Quantitative Image Quality of Lower Extremity Angiography Using Non-Contrast-Enhanced Quiescent Interval Single-Shot (QISS) MRA: Comparison with CTA

Tuesday, Dec. 1 9:15AM - 9:25AM Location: S102AB

Akos Varga-Szemes, MD, PhD, Charleston, SC (Presenter) Nothing to Disclose
Giuseppe Muscogiuri, MD, Charleston, SC (Abstract Co-Author) Nothing to Disclose
Carlo N. De Cecco, MD,PhD, Charleston, SC (Abstract Co-Author) Nothing to Disclose
PaI Suranyi, MD, PhD, Charleston, SC (Abstract Co-Author) Nothing to Disclose
Julian L. Wichmann, MD, Charleston, SC (Abstract Co-Author) Nothing to Disclose
U. Joseph Schoepf, MD, Charleston, SC (Abstract Co-Author) Research Grant, Bracco Group; Research Grant, Bayer AG; Research Grant, General Electric Company; Research Grant, Siemens AG; Research support, Bayer AG; ; ;
Stefanie Mangold, MD, Charleston, SC (Abstract Co-Author) Nothing to Disclose
Paola Maria Cannao, MD, San Donato Milanese, Italy (Abstract Co-Author) Nothing to Disclose
Shivraman Giri, PhD, Chicago, IL (Abstract Co-Author) Employee, Siemens AG
Thomas M. Todoran, MD, Charleston, SC (Abstract Co-Author) Nothing to Disclose

PURPOSE

To evaluate the qualitative and quantitative image quality of non-contrast quiescent interval single-shot (QISS) MRA in patients with peripheral artery disease (PAD).

METHOD AND MATERIALS

Twenty patients (67±16 years, 11 male) with PAD referred for a clinically indicated lower extremity CTA were consented for a non-contrast enhanced lower extremity MRA on a 1.5 clinical scanner (MAGNETOM Avanto, Siemens AG, Erlangen, Germany) using an investigational prototype QISS sequence (FOV 400x260mm², TR/TE 3.5/1.4ms, flip angle 90°, acquisition length 144mm). Contrast to noise ratio (CNR) based on the vascular and peri-vascular signal was measured according to an 18-segment model. The segmental vascular enhancement and the image noise were rated on five-point scales (1-poor/non-diagnostic, 5-excellent) by two readers. Additionally, the number of non-diagnostic segments were counted and compared between CTA and QISS-MRA.

RESULTS

A total of 360 segments were evaluated. The average CNR measured in QISS-MRA images was 63.4±17.5. QISS-MRA vascular enhancement ratings by the two readers were 3.7±0.5 and 3.8±0.4, respectively, while the CTA ratings were 4.0±0.4 and 4.1±0.5, respectively, resulting in no significant difference between the two modalities. QISS-MRA image noise ratings were 3.4±0.7 and 3.6±0.5, respectively, while those for CTA were 4.0±0.5 and 4.2±0.5, respectively. Excellent inter-reader agreement was found in image quality ratings (κ>0.8). Thirty-one segments (8.6%) were excluded from the CTA analysis due to stent artifacts (11), total occlusion (14), or heavy calcification (6) and 26 segments (7.2%) were non-diagnostic at MRA due to major image artifacts (12) or total occlusion (14). Five out of the six heavily calcified segments were diagnostic at QISS MRA.

CONCLUSION

In this study, image quality of non-contrast QISS-MRA was comparable to that of contrast enhanced CTA. In certain circumstances, such as in heavily calcified segments, QISS-MRA provides superior lumen visibility compared to CTA. Such a non-contrast technique may have potential advantage in patients with severe renal disease or with other risk factors that prohibit the use of iodinated or gadolinium-based contrast material.

CLINICAL RELEVANCE/APPLICATION

QISS-MRA enables non-contrast evaluation of the lower extremity arteries with comparable image quality to CTA, and is potentially beneficial for patients with severe renal disease.

RC312-05 Role of Preoperative Dynamic Time Resolved MRA (DTR MRA) for Detection and Localization of Perforators in Patients Undergoing Free Fibula Flap (FFF) for Head and Neck Reconstruction
One-stop-shop Preoperative Evaluation for Living Liver Donors with Gd-EOB-DTPA-enhanced MRI: Can it be More Cost-effective and Convenient?

Tuesday, Dec. 1 9:25AM - 9:35AM Location: S102AB

Manohar Kuruva, MBBS, MD, Little Rock, AR (Presenter) Nothing to Disclose
Mauricio A. Moreno, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose
Tarun Pandey, MD, FRCR, Little Rock, AR (Abstract Co-Author) Nothing to Disclose
Roopa Ram, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose
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Lihua Tao, Tianjin, China (Abstract Co-Author) Nothing to Disclose
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Shuangshuang Xie, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Wen Shen, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Chenhao Liu SR, PhD, PhD, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Tao Ren, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Lihua Chen, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Lixiang Huang, MD, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Yue Cheng, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Qian Ji, PhD, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Jianzhong Yin, MD, Tianjin, China (Abstract Co-Author) Nothing to Disclose

Purpose

This study aimed at evaluating the accuracy of preoperative DTR MRA for the detection and localization of lower extremity septocutaneous perforators in patients undergoing free fibula flap (FFF) for head and neck reconstruction.

Method and Materials

Retrospective chart review of 43 patients who underwent pre-operative DTR MRA prior to FFF in a tertiary academic setting from 2009-2015. DTR MRA scans were evaluated for presence of perforators and their location relative to fibular head, and subsequently correlated with intra-operative findings. We considered location of perforator to be in concordance if the vessel was within 3cm based on DTR MRA and surgical findings, and hypothesized that differences within this range could represent distal perforator branches presenting radiologically as separate vessels.

Results

DTR MRA and surgery identified at least one perforator in 42/43, and 41/43 patients respectively. The technique appropriately detected the presence of perforators in 40/41 patients and ruled out perforators in 1/2 patients, yielding a sensitivity, specificity and accuracy of 97.5%, 50% and 95.3%. Collectively, DTR-MRA accurately predicted the location of the perforators in 75% of the cases (48/64). On a patient-based analysis, DTR MRA correctly predicted the location of at least one perforator in 37/41 patients yielding an accuracy of 90% for this purpose.

Conclusion

DTR MRA accurately predicts the presence and location of cutaneous perforators in patients undergoing FFF reconstruction.

Clinical Relevance/Application

To our knowledge, this is one of the largest study validating the role of MRA for this purpose. Preoperative localization of the vessels significantly impacts surgical planning and may prevent unnecessary surgical explorations in a percentage of patients.
Contrast enhanced MR angiography (CEMRA) with gadolinium based contrast agents (GBCA) is well established as a reliable clinical tool for a variety of applications. Within the past decade, concerns about the risk of nephrogenic systemic fibrosis (NSF) has impacted the utilization of CEMRA and has stimulated the search for safer GBCA and alternatives to gadolinium agents. High stability and high relaxivity GBCA are now recommended for CEMRA to minimize risk of NSF in patients with renal failure, and dose reduction strategies have become standard. Also, early results with non-gadolinium CEMRA, specifically with ferumoxytol, are becoming available and suggest that in many cases, ferumoxytol may be a powerful alternative to GBCA for CEMRA. In this talk, we will review techniques and applications for CEMRA both with GBCA and ferumoxytol in adults and children over a spectrum of disease states.

Majorities of physiological evidences indicate that the increase of Oscillatory Shear Index (OSI) produces an expression of proatherogenic genes. In patients with arteriosclerosis, reflected flow appears within the lower abdominal aorta during early diastolic phase. 3D cine PC MRI (4D-Flow) has enabled the coverage of full spatial and cardiac phase resolved data of the velocity vectors of the flowing blood within the whole abdominal aorta, thereby allow OSI mapping and flow volume analysis. The purpose of our study was to test if 4D Flow can depict reflected flow in the lower abdominal aorta, to quantitate the retrograde flow volume, and to verify their association with atherosclerosis, in the non-dilated lower abdominal aorta.

Among flow dynamic parameters R/A ratio (p=0.019), and OSI (p=0.0364) were the determinant factors for the presence of atheroma. Prominent back flow collided with antegrade flow was also visually observed at early diastole in atherosclerotic patients and was considered to have induced instable shear stress directions, which resulted in higher OSI. The prominent retrograde flow represents reflected flow from the iliac arteries, which may be due to the lack of compliance of the atherosclerotic aorta and peripheral arteries.

4D flow can depict and quantify the prominent retrograde flow during early diastole, which is closely related to the presence of atheroma in the lower abdominal aorta.

**CONCLUSION**

4DFlow could be an indicator of a loss of arterial volumetric compliance and increased OSI in the lower abdominal aorta, which might be the initiation factors of atherosclerotic degradation that leads to various fatal aortic diseases.
Jan Rudolph, Munich, Germany (Abstract Co-Author) Nothing to Disclose
Christian Maegerlein, Munich, Germany (Abstract Co-Author) Nothing to Disclose
Bettina M. Gramer, MD, Munich, Germany (Abstract Co-Author) Nothing to Disclose
Marcus Settles, PhD, Munich, Germany (Abstract Co-Author) Nothing to Disclose
Christian Reeps, MD, Muenchen, Germany (Abstract Co-Author) Nothing to Disclose
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**PURPOSE**

To determine whether patients with aortic aneurysms and penetrating aortic ulcers have an increased or reduced peak average wall shear stress magnitude compared to patients without aortic disease.

**METHOD AND MATERIALS**

26 patients (10 patients without aortic disease, 8 patients with aortic aneurysms (AA) and 8 patients with penetrating aortic ulcers (PAU)) underwent velocity encoded time resolved 3D MRI (4D PC MRI) of the aorta after contrast material (0.15 mmol/kg gadobenate dimeglumine) application during high resolution contrast-enhanced MR angiography of the aorta. 4D PC MRI was performed using ECG Gating and navigator echo based respiratory gating. Data acquisition was accelerated by SENSE in two directions (AF 1.5 x 2.5). The spatial resolution was 1.5 x 1.5 x 1.5 mm³. The temporal resolution was 40 ms. The peak velocity and the peak average wall shear stress magnitude were determined using the software GT-Flow (Version 2.0.10, Gyrotools, Switzerland).

**RESULTS**

The peak velocity was 71.6 ± 6.8 cm/s in patients without aortic disease, 35.6 cm/s ± 3.2 cm/s in patients with penetrating aortic ulcer and 18.2 ± 2.7 cm/s in patients with aortic aneurysms. The peak average wall shear stress magnitude was 0.35 ± 0.09 N/m² in patients without aortic disease, 0.13 ± 0.004 N/m² in patients PAU and 0.07 ± 0.018 N/m² in AA patients. Both patients with aortic ulcers and patients with aortic aneurysms showed lower mean values for peak velocity (p < 0.001 and p < 0.00001) and peak average wall shear stress magnitude (p < 0.01 and p < 0.004) compared to patients without aortic disease. Patients with AA had significantly lower wall shear stress magnitude values than PAU patients.

**CONCLUSION**

Compared to patients without aortic disease, peak velocity and wall shear stress were significantly reduced in patients with penetrating aortic ulcers and patients with aortic aneurysms.

**CLINICAL RELEVANCE/APPLICATION**

Aortic segmental wall shear stress and flow velocity can reliably be determined with velocity encoded 4D MRI. Reduced wall shear stress is associated with aneurysms growth and might therefore help to identify patients at risk.

**RC312-11 A Speeding Ticket for Perfusion MRI? Acceleration Techniques and Their Effect on Arterial Input Function Sampling: Non-accelerated versus View-sharing and Compressed Sensing Sequences**

Tuesday, Dec. 1 11:05AM - 11:15AM Location: S102AB

Matthias Benz, MD, Basel, Switzerland (Presenter) Nothing to Disclose
Georg M. Borgartz, MD, Basel, Switzerland (Abstract Co-Author) Research Grant, Bayer AG; Research Grant, Siemens AG; Research Grant, Guerbet SA
Sebastian T. Schindera, MD, Basel, Switzerland (Abstract Co-Author) Research Grant, Siemens AG; Research Grant, Ulrich GmbH & Co KG; Research Grant, Bayer AG
Johannes M. Froehlich, PhD, Bern, Switzerland (Abstract Co-Author) Consultant, Guerbet SA
Tobias Heye, MD, Basel, Switzerland (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

Initiatives such as the Quantitative Imaging Biomarkers Alliance and the American College of Radiology Imaging Network seek to identify sources of variation that may contribute to the overall measurement error in dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI). The aim of this study was to determine the ability of various DCE-MRI sequences to image the arterial input function (AIF) of an arterial bolus in comparison to a reference standard in a flow-phantom.

**METHOD AND MATERIALS**

The dynamic flow-phantom consists of three input ports representing the venous backflow and three mixing chambers simulating the cardiopulmonary circulation with 4L/min. A 25 mm diameter cylindrical outflow representing the aorta, a water- and a muscle-phantom were scanned on a 3T MRI (Magnetom Prisma, Siemens Healthcare, Erlangen, Germany) using fast low angle shot 2d (Fl2d; temporal resolution [tr] 0.6s; reference standard) and 3d (Fl3d; tr 2.4s [P2=parallel imaging factor 2] and 3.9s), time-resolved imaging with stochastic trajectories (TWIST; tr 2.2s), and golden-angle radial sparse parallel imaging (GRASP, tr 1.1s) GRE sequences. Each acquisition with administration of 10 ml contrast agent (Dotarem, Guerbet) via a power injector (2ml/s flow rate) was repeated three times. Essential sequence parameters were standardized: flip angle 15°; spatial resolution 2.3x2.3x3mm³. Signal and temporal resolution [tr] 0.6s; reference standard) and 3d (Fl3d; tr 2.4s [P2=parallel imaging factor 2] and 3.9s), time-resolved imaging with stochastic trajectories (TWIST; tr 2.2s), and golden-angle radial sparse parallel imaging (GRASP, tr 1.1s) GRE sequences. Each acquisition with administration of 10 ml contrast agent (Dotarem, Guerbet) via a power injector (2ml/s flow rate) was repeated three times. Essential sequence parameters were standardized: flip angle 15°; spatial resolution 2.3x2.3x3mm³. Signal over time curves were normalized and analyzed by full width half maximum (FWHM) measurements to assess within sequence (coefficient of variation [COV]) and between sequence variations (percentage difference).

**RESULTS**

Water and muscle signal COV ranged from 0.1-0.8%. Within sequence FWHM COV was 1.0% for Fl3d, 1.0% for Fl3dp, 9.1% for TWIST and 0.3% for GRASP. Percentage difference FWHM in comparison to Fl2d as reference standard was 2.2% for Fl3d, 0.3% for Fl3dp, 45.9% for TWIST, and 7.8% for GRASP.

**CONCLUSION**

MRI acceleration techniques vary in reproducibility and sampling of arterial input function. Incomplete coverage of the k-space with TWIST as representative of view-sharing techniques demonstrates incoherent data over time and thus limitations in the evaluation of AIF.

**CLINICAL RELEVANCE/APPLICATION**
In order to establish DCE-MRI as a reproducible quantitative imaging biomarker it is necessary to assess how various forms of accelerated sequences handle the dynamic signal over time.

**RC312-12 Clinical Impact of MRA in Site Selection in Patients Undergoing Free Fibular Flap Transfer (FFF)**

*Tuesday, Dec. 1 11:15AM - 11:25AM Location: S102AB*

Manohar Kuruva, MBBS, MD, Little Rock, AR (Presenter) Nothing to Disclose  
Roopa Ram, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose  
Kedar Jambhekar, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose  
Mauricio A. Moreno, MD, Little Rock, AR (Abstract Co-Author) Nothing to Disclose  
Tarun Pandey, MD, FRCR, Little Rock, AR (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To evaluate the role and clinical impact of Dynamic Time-Resolved Magnetic Resonance Angiography (DTR MRA) for selecting the site for free fibula flap (FFF) harvest.

**METHOD AND MATERIALS**

A retrospective review of medical records of 69 patients who underwent pre-operative lower extremity DTR MRA prior to head and neck reconstructive surgery was done. Clinical findings were compared with MRA in determining the appropriate site of graft harvest.

**RESULTS**

DTR MRA identified vascular abnormalities, which led to change in management plan in 18/67 (27%) patients. Clinical findings were abnormal only in 4/18 (22%) of these patients. The two most common abnormalities included atherosclerotic narrowing (12 patients) and anatomical variations (4 patients). DTR MRA had significantly higher sensitivity to detect vascular abnormalities with implications in management than clinical examination alone (p=0.002). Addition of venous phase of imaging led to clinically occult venous pathologies in 4 patients, including deep venous thrombosis (2), varicose veins (1) and arteriovenous malformation/fistula (1).

**CONCLUSION**

Preoperative DTR MRA detected significant vascular abnormalities in patients undergoing FFF for head and neck reconstructive surgeries when compared to clinical examination, with a change in management in 28% of patients.

**CLINICAL RELEVANCE/APPLICATION**

DTR MRA prior to FFF can identify vascular pathology and anatomic variations and can potentially reduce the rate of complications and morbidity post fibular transfer for head and neck reconstructive surgeries.

**RC312-13 Contrast-enhanced T1 Free-breathing Gradient Echo Sequences in the Assessment of Aortic Disease: Diagnostic Efficacy in Comparison with Standard T1 Breath-hold Gradient Echo Sequences**

*Tuesday, Dec. 1 11:25AM - 11:35AM Location: S102AB*

Camillo R. Talei Franzesi, Milan, Italy (Presenter) Nothing to Disclose  
Davide Ippolito, MD, Monza, Italy (Abstract Co-Author) Nothing to Disclose  
Pietro A. Bonaffini, MD, Monza, Italy (Abstract Co-Author) Nothing to Disclose  
Davide Fior, MD, Monza, Italy (Abstract Co-Author) Nothing to Disclose  
Giulia Querques, MD, Monza, Italy (Abstract Co-Author) Nothing to Disclose  
Sandro Sironi, MD, Monza, Italy (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To assess the diagnostic accuracy of contrast-enhanced T1 free-breathing gradient echo sequences in comparison with standard MR-angiographic sequences in the evaluation of aortic disease.

**METHOD AND MATERIALS**

From January 2012 to January 2015, 57 patients (35 men; mean age 62.1 years) with aortic disease were evaluated. All patients were examined with a 1.5T magnet (Achieva, Philips), using a phased array multi-coil, after the intravenous injection of 0.1 mL*Kg of gadobutrol. The standard thoracoabdominal MR angiography (MRA) protocol included 3D-angiographic T1 gradient-echo fat-suppressed (3D-HR) sequences and T1 breath-hold gradient-echo fat-suppressed sequences (THRIVE). Multiplanar T1 free-breathing gradient-echo fat-suppressed (THRIVE-FB) sequences were additionally performed in all the examinations. Two radiologists independently compared the diagnostic quality of the different angiographic sequences, in terms of visualization of aortic wall and lumen and main arterial branches. The vascular calipers at different aortic levels were calculated, compared and statistically analyzed among the different sequences. The interobserver agreement was then evaluated using the Intraclass Correlation Coefficient (ICC).

**RESULTS**

THRIVE-FB sequences showed high diagnostic accuracy in the assessment of vascular calipers and walls, with no significant differences in comparison with standard breath-hold sequences. They also demonstrated high sensitivity and specificity in the evaluation of vascular plaques, thrombus and adjacent structures. Not significant differences were obtained in terms of overall diagnostic quality between THRIVE-FB sequences and standard angiographic sequences (interobserver agreement ICC of 0.97).

**CONCLUSION**

Contrast-enhanced T1 free-breathing gradient-echo fat-suppressed sequences have shown higher diagnostic efficacy, with any significant differences, in comparison with standard breath-hold angiographic sequences, permitting to correctly visualize and evaluate the aorta and its major branches.

**CLINICAL RELEVANCE/APPLICATION**

Free-breathing angiographic protocol represents a useful tool, even in not-compliant patients, offering high diagnostic quality.
Role of MR in Cardiovascular Disease Research

Tim Leiner, MD, PhD, Utrecht, Netherlands, (t.leiner@umcutrecht.nl) (Presenter) Speakers Bureau, Koninklijke Philips NV; Research Grant, Bayer AG; Research Grant, Bracco Group

LEARNING OBJECTIVES

1) To identify how MRI can contribute to understanding the pathophysiology of non-cardiac vascular disease and to describe its merits and shortcomings in relation to other commonly used imaging modalities. 2) To describe different MR methods that can be used to study vascular disease such as vessel wall imaging, atherosclerotic plaque imaging and measurement of pulse wave velocity. 3) To explain which of the above MR methods can be used clinically, and which methods are primarily experimental.