

Society for Magnetic
Resonance Angiography
smrangio.com



28th Annual International Conference

Rising to New Heights

Chicago 2016



September 21st — 23rd
Northwestern Memorial Hospital
Chicago, Illinois, USA

President: Charles (Chuck) Dumoulin
Organizers: James Carr and Michael Markl

Program at a Glance

TUESDAY SEPTEMBER 20th

- 18:00 to 20:00 Welcome Reception
- The Harris Atrium
 - Prentice Women's Hospital (3rd floor)
 - 250 E. Superior St.

WEDNESDAY SEPTEMBER 21st

- 08:30 Welcome and Introduction
- 08:45 Plenary Talk
- 09:10 **Session 1:** Cardio-thoracic MRA | Plenary Talk
- 10:20 Break
- 11:00 **Session 2:** Flow
- 12:30 Lunch and Poster Viewing
- 13:45 **Session 3:** Power Pitch!
- 14:45 Break
- 15:15 **Session 4:** Cardiac Structure and Function
- 17:00 Announcements
- 18:30 Evening Event: Adler Planetarium

THURSDAY SEPTEMBER 22nd

- 08:30 Announcements
- 08:45 Plenary Talk
- 09:10 **Session 5:** Neuro MRA
- 10:20 Break
- 11:00 **Session 6:** Non-Contrast MRA
- 12:30 Lunch and Poster Viewing
- 13:45 **Session 7:** Contrast Agent / Ferumoxytol
- 15:10 Break
- 15:45 **Session 8:** Contrast Enhanced MRA | Plenary Talk
- 17:15 Announcements
- 18:30 Evening Event: House of Blues Chicago

FRIDAY SEPTEMBER 23rd

- 08:30 Announcements
- 08:45 Plenary Talk
- 09:10 **Session 9:** Peripheral MRA
- 10:20 Break
- 11:00 **Session 10:** New MRA Techniques
- 12:30 Lunch and Poster Viewing
- 13:45 **Session 11:** Vessel Wall MRI
- 15:15 Break
- 15:45 **Session 12:** Future Directions
- 16:35 Award Announcements and Closing Ceremony
- 18:30 Evening Event: FTW Chicago



Welcome to Chicago and the 28th annual MR Angiography meeting! For those of you attending the MRA meeting for the first time, I'd like to extend a special welcome. I hope that you will find this meeting as exciting and energizing as we old-timers do.

For almost three decades our annual meeting has brought together students, clinicians, basic scientists, and vendors for a unique scientific exchange that flows seamlessly from the conference hall to meal breaks and social events. This year is no different. Michael Markl, James Carr, and their team have organized a fantastic meeting, and I

am sure that by the end of the week all of us will have gained new insights and made many new friends. Of course, the core of the meeting will be the presentations given by many of you. It is clear from the program that the pace and quality of innovation in our field remain very high, especially from talented young investigators who will again be competing for the Potchen Award for best oral presentation and the Passariello Award for best poster.

Each year we are very fortunate to receive generous support from our sponsors, and I hope you will join me in thanking them for all that they do. Please take a moment to visit their booths during the meeting. Also, for the third time in four years we have received funding from the NIH to provide travel awards for the 20 student and trainees submitting the strongest abstracts. Be sure to give the travel award winners a "pat on the back" when you meet them.

The social program is always a highlight of the meeting, and the Chicago organizing team has over-delivered this year! After the educational sessions on Tuesday, we will enjoy an opening reception just a few steps from the conference venue and the Water Tower on Michigan Avenue. On Wednesday, we'll be bused over to the Adler Planetarium for a private banquet and the best views that the Chicago skyline has to offer. On Thursday, we're off to the House of Blues and a private event featuring the Howard and the White Boys. Finally, on Friday we'll be going to FTW Chicago for a unique blend of games, fun and food. There is no doubt that the city of Chicago will offer many temptations outside of the meeting, but the events planned by the organizing team shouldn't be missed!

Twenty eight years ago we started out as the "MR Angio Club" with an informal charter, and a commitment to create a forum to exchange ideas and forge new friendships. A while back we grew into a working group, and for the past several years we have been considering a more formal structure. Last year in Cincinnati we took the leap to incorporate as a non-profit organization, primarily to ensure that we could preserve the unique culture of our meeting and membership. Although we are now officially known as the Society for Magnetic Resonance Angiography, we remain a club in spirit. Our annual meeting is unlike any other scientific conference I know of, and I'm sure that by the end of this year's meeting you will come away with new energy and ideas. I hope you have a most enjoyable week here in Chicago, and I look forward to seeing you again next year in South Africa!

A handwritten signature in black ink, appearing to read "Chuck Dumoulin". The signature is fluid and cursive, with a large, stylized "C" and "D".

Charles (Chuck) Dumoulin, PhD
President, Society for Magnetic Resonance Angiography

Scientific Sessions

WEDNESDAY SEPTEMBER 21st

Registration hours: 07:30 to 16:00 | Exhibit hours: 07:30 to 17:30

Welcome and Plenary Talk

- 08:30 to 08:45 Introduction and Welcome
Chuck Dumoulin, James Carr, and Michael Markl
- 08:45 to 09:10 Plenary Talk — Quantitative 4D DSA and 4D Fluoroscopy
Chuck Mistretta (University of Wisconsin — Madison)

Session 1: Cardio-thoracic MRA

Moderators: *Jeanette Schulz-Menger and Kai Lin*

- 09:10 to 09:30 Plenary Talk — The Role of 4DMR in Surgery of the Thoracic Aorta
Chris Malaisrie (Northwestern University)
- 09:30 to 09:40 4-Dimensional Multiphase Steady State Imaging of Contrast Enhancement (MUSIC): Dynamic MR Assessment of Neonates with Congenital Heart Disease
Kim-Lien Nguyen (UCLA)
- 09:40 to 09:50 Circulating Levels of P and E-selectin Relate to Magnetic Resonance Imaging Derived Aortic Characteristics and Cardiovascular Risk Factors in a General Population Based Sample of Healthy, Young Adults: The AMBITON Study
Tim Leiner (Utrecht University Medical Center)
- 09:50 to 10:00 Aortic 3D Wall Shear Stress in Aortopathy in Patients with Bicuspid Aortic Valves Compared to Tri-leaflet Aortic Valve: A 4D flow MRI Study in 618 Subjects
 - *Pim van Ooij (Academic Medical Center — Amsterdam)*
- 10:00 to 10:10 TBD
- 10:10 to 10:20 Cost Effectiveness Analysis of Monitoring Strategies in the First Year after Cardiac Transplantation
Matthew Pilecki (Northwestern University)
- 10:20 to 11:00 Break

- *Potchen Award Competitor*

Session 2: Flow

Moderators: Oliver Wieben and Kelly Jarvis

- 11:00 to 11:10 Distinct Aortic Wall Shear Stress Alteration in Bicuspid Aortic Valve Patients with Isolated Aortic Stenosis and Insufficiency
Yongshi Wang (Shanghai Institute of Medical Imaging)
- 11:10 to 11:20 4-Dimensional Flow MRI of Abdominal Blood Flow Patterns in Patients with Type B Aortic Dissection
Dongting Liu (Anzhen Hospital, Capital Medical University – Beijing)
- 11:20 to 11:30 Case-control Study Comparing Aortic Hemodynamics Following Aortic Root Replacement with Mechanical and Bioprosthetic Valved-Conduits
● *Eric Keller (Northwestern University)*
- 11:30 to 11:40 Patient Specific Virtual Surgery Modeling Using Meal Challenge Vessel Strain Values
● *David Rutkowski (University of Wisconsin – Madison)*
- 11:40 to 11:50 Utility of a Non-contrast MR Angiography Protocol with 4D flow MRI in the Pre-Transplant Evaluation of the Portal and Hepatic Vasculature
Jeremy Collins (Northwestern University)
- 11:50 to 12:00 Gold Sponsor Talk: Circle Cardiovascular Imaging Inc. –
New Developments for Efficient 4D Flow MRI Analysis
James Carr and Michael Markl (Northwestern University)
- 12:00 to 12:10 Bias in Velocity Estimates of Aque ductal Cerebrospinal Fluid Flow Obtained Using 2D PC-MRI
Sudarshan Ragunathan (Barrow Neurological Institute)
- 12:10 to 12:20 4D Flow and Cardiac MR imaging in Patients with Chronic Thromboembolic Pulmonary Hypertension treated by Balloon Pulmonary Angioplasty
Hideki Ota (Tohoku University Hospital)
- 12:20 to 12:30 More Accurate Velocimetry for High-moment Phase Contrast Using Weighted Non-convex Optimization
● *Michael Loecher (UCLA)*
- 12:30 to 13:45 Lunch and Poster Viewing

- *Potchen Award Competitor*

Scientific Sessions

Session 3: Power Pitch!

Moderators: Alex Barker and Pim van Ooij

- 13:45 to 13:50 Vascular Injuries in Elite Volleyball Players: Imaging Modalities and Findings
○ *R. Nils Planken (Academic Medical Center — Amsterdam)*
- 13:50 to 13:55 Initial Results with ASL-FAIR Perfusion MRI in the Rhesus Macaque Placenta
○ *Kai Ludwig (University of Wisconsin — Madison)*
- 13:55 to 14:00 Cardiac MRI Heart Deformation Analysis Demonstrates Differences in Circumferential Strain Between Amyloid and Non-amyloid Infiltrative Cardiomyopathy
○ *Bradley Allen (Northwestern University)*
- 14:00 to 14:05 Magnetic Resonance Imaging: Derived Coronary Fractional Flow Reserve: Preliminary Results
○ *Jackson Hair (Emory University)*
- 14:05 to 14:10 Pulmonary Embolus Workup in the Emergency Room: Can we Avoid Exposure to Radiation by Using a Dedicated Magnetic Resonance Imaging Strategy?
○ *Josephine Pressacco (University of Montreal)*
- 14:10 to 14:15 The Influence of Field Strength on High Resolution 4D-Flow Imaging
○ *Sarah Kefayati (University of California, San Francisco)*
- 14:15 to 14:20 Patient-Specific vs. Population-based Arterial Input Function in Perfusion Estimation for DCE-MRI of the Prostate
○ *Soudabeh Kargar (Mayo Clinic)*
- 14:20 to 14:25 Assessing Regionally Heterogeneous Aortic Wall Strain in Vivo Using DENSE MRI
○ *John Wilson (Emory University)*
- 14:25 to 14:30 Effect of Contrast Dilution and Bolus Length in Breathhold MRA Exams: The Longer the Bolus, the Better?
○ *Tilman Schubert (University of Wisconsin — Madison)*
- 14:30 to 14:35 Comparison Between Symptomatic and Asymptomatic Carotid Plaques in Patients with Bilateral Intraplaque Hemorrhage
○ *Xianling Wang (University of Washington)*
- 14:35 to 14:40 Aortic Hemodynamics in Patients with Repaired Aortic Coarctation: Serial Analysis by 4D Flow MRI
○ *Julia Geiger (Northwestern University)*
- 14:40 to 14:45 Comprehensive MRI Evaluation of Potential Renal Donors: Addition of Renal Functional Assessment to MRA. Clinical Pilot Study Assessing Comparative Performance of 1.5 T DCE-MRI Perfusion versus Nuclear Medicine
○ *Rosario Lopez-Gonzalez (NHS GG&C)*
- 14:45 to 15:15 Break

○ *Passariello Award Competitor*

Session 4: Cardiac Structure and Function

Moderators: *Chris Francois and Josh Robinson*

- 15:15 to 15:30 Announcements
- 15:30 to 15:40 Gold Sponsor Talk: Siemens — Advances in MR Angiography and Beyond
Gerhard Laub (Siemens Healthcare GmbH)
- 15:40 to 15:50 High Resolution Mapping of Myocardial Motion with Spiral SPIRIT Tissue Phase Mapping
Juergen Hennig (University Medical Center Freiburg)
- 15:50 to 16:00 Diagnosis of Chronic Allograft Vasculopathy using Semiquantitative Stress Perfusion CMR in Heart Transplant Patients
● *Madeline Schwid (Northwestern University)*
- 16:00 to 16:10 Low-Rank Tensor Imaging for Non-ECG Multidimensional Cardiovascular MRI
● *Anthony Christodoulou (Cedars-Sinai Medical Center)*
- 16:10 to 16:20 T1-refBlochi: High Resolution 3D Cardiac T1 Mapping Methods Based on 3D Late Gadolinium Enhancement, Bloch Equations, and a Reference T1
Dana Peters (Yale University)
- 16:20 to 16:30 Gold Sponsor Talk: Bayer — Pre-clinical Investigation of Potential Gadolinium Deposition in the Brain After Repeated Administrations of Linear and Macrocyclic GBCAs
Gregor Jost (Bayer Pharma AG)
- 16:30 to 16:40 K-t Accelerated 3D CINE bSSFP for Improved 4D Flow MRI Visualization
● *Kelly Jarvis (Northwestern University)*
- 16:40 to 16:50 High Precision Free-Breathing SASHA T1 Mapping Using High-Contrast Image Registration
Kelvin Chow (Siemens Healthineers)
- 16:50 to 17:00 REPAIR: Improving Late Gadolinium Enhancement Images Under Arrhythmia by RR Dependent Pre-saturation
Chenxi Hu (Yale University)
- 17:00 Announcements
- 18:00 Buses begin boarding for evening event: 251 E. Huron
- 19:00 Evening Event: Adler Planetarium

- *Potchen Award Competitor*

Scientific Sessions

THURSDAY SEPTEMBER 22nd

Registration hours: 07:30 to 16:00 | Exhibit hours: 07:30 to 17:30

Welcome and Plenary Talk

- 08:30 to 08:45 Announcements
James Carr and Michael Markl
- 08:45 to 09:10 Plenary Talk — MR Angiography: Current Challenges and Expanding Opportunities
Winfried Willinek (Krankenhaus der Barmherzigen Brüder Trier)

Session 5: Neuro MRA

Moderators: *Dennis Parker and Susanne Schnell*

- 09:10 to 09:20 Flow Quantification in Cerebral Aneurysms: CFD, 4D Flow MRI, and DSA
Alireza Vali (Medical College of Wisconsin)
- 09:20 to 09:30 Super-Resolution Quiescent-Interval Slice-Selective Magnetic Resonance Angiography of the Intracranial Circulation
Ioannis Koktzoglou (NorthShore University HealthSystem)
- 09:30 to 09:40 Intracranial Venous Blood Flow and Pulsatility in Alzheimer's Disease with 4D Flow MRI
Leonardo Rivera-Rivera (University of Wisconsin — Madison)
- 09:40 to 09:50 Accelerated Intracranial Vessel Wall Imaging using Compressed Sensing
Chengcheng Zhu (University of California, San Francisco)
- 09:50 to 10:00 Vascular TTP Map of the Brain Acquired from Time-resolved Contrast-enhanced MR Angiography: Comparison with Brain SPECT
Bum-soo Kim (The Catholic University of Korea)
- 10:00 to 10:10 Gold Sponsor Talk: GE — Advances in Vascular MRI
Ty Cashen (GE Healthcare)
- 10:10 to 10:20 Longitudinal Surveillance of Intracranial Aneurysms with Contrast-Enhanced MRA: Estimation of Volumetric Measurement Error at 1.5 and 3T
 - *Farshid Faraji (University of California, San Francisco)*
- 10:20 to 11:00 Break

- *Potchen Award Competitor*

Session 6: Non-contrast MRA

Moderators: Debiao Li and Julia Geiger

- 11:00 to 11:10 Selective Pulmonary MR Venography Using Radial QISS
Robert Edelman (NorthShore University HealthSystem)
- 11:10 to 11:20 MR Imaging for Aortic Annular Sizing
Marcos Ferreira Botelho (Northwestern University)
- 11:20 to 11:30 Accuracy of Carotid Lumen Measurements by Non-contrast SNAP MRA
Haining Liu (University of Washington)
- 11:30 to 11:40 Cardiac and Respiratory Motion-Resolved Free-Running Whole-Heart Coronary MRA of Patients Using 5D XD-GRASP Reconstruction
Giulia Ginami (University Hospital of Lausanne (CHUV))
- 11:40 to 11:50 Image Quality of Lower Extremity QISS MRA in Patients with Peripheral Artery Disease: Comparison with CTA
Akos Varga-Szemes (MUSC)
- 11:50 to 12:00 Gold Sponsor Talk 5: Philips — Advances in Dixon Cardiovascular MR
Markl Kouwenhoven (Philips)
- 12:00 to 12:10 Non-contrast Compressed Sensing Whole-heart Coronary MRA at 3T: First Results in Twenty Healthy Volunteers
Masashi Nakamura (Ehime University)
- 12:10 to 12:20 Evaluating Peripheral Artery Disease with ECG Gated Flow Spoiled Fresh Blood Imaging Non Contrast-MRA
Benjamin Cooper (Pocono Medical Center)
- 12:20 to 12:30 Initial Experience Using Accelerated Velocity Selective ASL for Non-Contrast Volumetric MRA in Complex Geometries
James Holmes (University of Wisconsin Madison)
- 12:30 to 13:45 Lunch and Poster Viewing

- *Potchen Award Competitor*

Scientific Sessions

Session 7: Contrast Agent / Ferumoxytol

Moderators: Paul Finn and Brad Allen

- 13:45 to 14:10 Plenary Talk — Evidence and Cardiovascular Guidelines:
Opportunities and Challenges for Imaging
Robert Bonow (Northwestern University)
- 14:10 to 14:20 Ferumoxytol MRA and Non-Contrast CT Fusion in TAVR Patients with
Implantable Cardiac Device
● *Takegawa Yoshida (UCLA)*
- 14:20 to 14:30 MRI with Ferumoxytol Across the Age Spectrum: Acute and Short-term
Single Center Safety Experience
Kim-Lien Nguyen (UCLA)
- 14:30 to 14:40 Experience with Ferumoxytol-enhanced Magnetic Resonance Angiography
(FeMRA) Using Standard MRA Sequences in Patients with Advanced Renal
Failure - A Case Series of 31 Patients
Martin Hennessy (Queen Elizabeth University Hospital)
- 14:40 to 14:50 Improved Image Quality of Ferumoxytol-enhanced 4D Flow MRI
Compared to Gadofosveset Trisodium
Nicholas Burris (University of Michigan)
- 14:50 to 15:00 TBD
- 15:00 to 15:10 Susceptibility Weighted Imaging of Arteries and Veins with using Ferumoxytol
Mark Haacke (Wayne State University)
- 15:10 to 15:45 Break

- *Potchen Award Competitor*

Session 8: Contrast Enhanced MRA

Moderators: Martin Prince and Cindy Rigsby

- 15:45 to 15:55 Evaluation of Four Injection Strategies for High Spatial Resolution Gadobenate Dimeglumine-Enhanced MR Angiography
Gregory Wilson (University of Washington)
- 15:55 to 16:05 The Impact of Injector Based Contrast Agent Administration in Time-resolved MRA
Gregor Jost (Bayer Pharma AG)
- 16:05 to 16:15 Injection Rate Optimization for CE-MRA: Predictions using Modulation Transfer Function Analysis
Jeffrey Maki (University of Washington)
- 16:15 to 16:25 Basic Consideration of Contrast Bolus Dispersion and Pre-clinical MRA Investigation of Dependencies on Cardiac Output Parameters and on Injection Rates
Martin Rohrer (Bayer AG)
- 16:25 to 16:35 Gold Sponsor Talk; Bracco — Contrast-Enhanced MR angiography of the renal and peripheral vasculature with gadobenate dimeglumine (MultiHance): a meta-analysis of diagnostic performance
Gianpaolo Pirovano (Bracco)
- 16:35 to 16:45 MASE : Model-Based Angiogram Separation for Highly Accelerated, Motion-Resistant Dynamic Contrast Enhanced Magnetic Resonance Angiography
Eun Ji Lim (Sungkyunkwan University)
- 16:45 to 16:55 Indirect Findings of Pulmonary Embolism Found at Contrast Enhanced Magnetic Resonance Angiography: Preliminary Results
Mark Schiebler (UW Madison School of Medicine and Public Health)
- 16:55 to 17:05 High Efficiency Coronary Magnetic Resonance Angiography with Non-Rigid Cardiac Motion Correction
Jianing Pang (Siemens)
- 17:05 to 17:15 Intravascular Agents for MR Venography in Children: a Comparison of Gadofosveset and Ferumoxylol
Sarah Khan (UCLA)
- 17:15 to 17:25 Gold Sponsor Talk; Guerbet — Stratification of cardiovascular disease using whole-body MR angiography
Jonathan Weir-McCall (Guerbet)
- 17:25 Announcements
- 18:30 Evening Event: House of Blues

- *Potchen Award Competitor*

Scientific Sessions

FRIDAY SEPTEMBER 23rd

Registration hours: 07:30 to 10:00 | Exhibit hours: 07:30 to 15:30

Welcome and Plenary Talk

- 08:30 to 08:45 Announcements
 James Carr and Michael Markl
- 08:45 to 09:10 Plenary Talk — Angiography and Intervention: Past to Present
 Robert Vogelzang (Northwestern University)

Session 9: Peripheral MRA

Mitsue Miyazaki and Ioannis Koktzoglou

- 09:10 to 09:20 Time-Resolved Subtractionless Contrast Enhanced Dixon MRA of the Lower Legs on 1.5T
 Marc Kouwenhoven (Philips Healthcare)
- 09:20 to 09:30 Accurate Path Length Measurement in Pulse Wave Velocity Calculations Improves Inter-technique Agreement
 Jonathan Weir-McCall (University of Dundee)
- 09:30 to 09:40 A Physiological Model for Arterial Spin Labeling Reactive Hyperemia in Calf Muscles: Assessing Microvascular Dysfunction in the Presence of Arterial Stenoses
 ● *Hou-Jen Chen (University of Toronto)*
- 09:40 to 09:50 Comparing DARC to Conventional MR Lymphangiography: Evaluating Venous Suppression and Quantifying Lymphatic Signal Loss
 ● *Beth Ripley (University of Washington)*
- 09:50 to 10:00 Feasibility of Time-Resolved 3D Contrast-Enhanced MR Angiography with Single-Echo Dixon Background Suppression at 3.0T
 ● *Eric Stinson (Mayo Clinic)*
- 10:00 to 10:10 Toshiba Cardiac and Cardiovascular Update
 Erin Kelly (Toshiba)
- 10:10 to 10:20 Dual-echo, Dual-Bandwidth QISS FLASH with Enhanced Background Suppression for Peripheral Artery MRA at 3 Tesla
 Robert Edelman (NorthShore University HealthSystem)
- 10:20 to 11:00 Break

- *Potchen Award Competitor*

Session 10: New MRA Techniques

Moderators: Graham Wright and Ruud van Heeswijk

- 11:00 to 11:10 Automatic Bolus Detection for Dynamic Contrast Enhanced Imaging with Sparse Sampling
Marc Lebel (GE Healthcare)
- 11:10 to 11:20 A Customizable Numerical K-space Simulation of Dynamical MRAs Using Physiologic Biofeedback and an Analytical Fourier Transformation Model
Keigo Kawaji (The University of Chicago)
- 11:20 to 11:30 Comprehensive Wideband Cardiovascular MRI for Imaging Patients with an Implantable Defibrillator
● *KyungPyo Hong (Northwestern University)*
- 11:30 to 11:40 Beyond the Gadolinium-based Contrast Agents Injection: Long-term Biodistribution and Excretion
Jean-Sebastien Raynaud (GUERBET)
- 11:40 to 11:50 Statistical Approach to Derive Angiograms from Multi-contrast MR Images
Dahan Kim (University of Wisconsin — Madison)
- 11:50 to 12:00 Acceleration in Simultaneous Acquisition of TOF MRA and BOLD MRV
Won-Joon Do (KAIST)
- 12:00 to 12:10 Derivation and Validation of Synthetic ECV Calculation from Blood Pool T1 values at 3T MRI
Ozair Rahman (Northwestern University)
- 12:10 to 12:20 A Proper Orthogonal Decomposition Approach Towards Merging Computational Fluid Dynamic and Time Resolved Phase Contrast Magnetic Resonance Flow Data
Ali Bakhshinejad (University of Wisconsin — Milwaukee)
- 12:20 to 12:30 Black-blood Ultra Short Echo Time (UTE) Imaging of the Thoracic Vessels
Jean Delacoste (CIBM/CHUV/UNIL)
- 12:30 to 13:45 Lunch and Poster Viewing

- *Potchen Award Competitor*

Scientific Sessions

Session 11: Vessel Wall MRI

Moderators: Niranjan Balu and Sameer Ansari

- 13:45 to 13:55 Quantification of Abdominal Aortic Aneurysm Wall Thickness Using Registration-based Level Set Segmentation of 3D Black-blood MR Images
 - *Yan Wang (University of California, San Francisco)*
- 13:55 to 14:05 Multi-contrast Acquisition in a Single Sequence (MASS) for Carotid Atherosclerosis Evaluation and Quantitative T1 Mapping
 - *Huijun Chen (Tsinghua University, China)*
- 14:05 to 14:15 Post-Contrast Black-blood HASTE Imaging: Initial Results with Ferumoxytol
 - *Eunah Park (UCLA)*
- 14:15 to 14:25 Scan-Rescan Reproducibility of Intraplaque Hemorrhage Volume Measured Using a Semi-Automatic Method with SNAP MRI
 - Jin Liu (University of Washington)*
- 14:25 to 14:35 Relating MRI Characteristics of Peripheral Arterial Lesions to Guidewire Puncture Forces
 - Trisha Roy (University of Toronto)*
- 14:35 to 14:45 Hemodynamic Vascular Biomarkers at the Site at which Sidewall Intracranial Aneurysms Occur at the Paraclinoid Internal Carotid Artery Determined Using Patient-specific Computational Fluid dynamic Simulation Based on MR Imaging
 - Haruo Isoda (Nagoya University)*
- 14:45 to 14:55 Vessel Wall Analysis of Dissecting Aneurysm of Vertebral Artery Using 3T MRI
 - Keiji Igase (Washokai Sadamoto Hospital)*
- 14:55 to 15:05 ADC Measurement of Carotid Atherosclerotic Plaque Using Motion Insensitive 3D Diffusion Weighted Stack of Stars Technique
 - Seong-Eun Kim (University of Utah)*
- 15:05 to 15:15 Non-contrast 3D Black Blood MRI for Abdominal Aortic Aneurysm Surveillance: Comparison with CT Angiography
 - Chengcheng Zhu (University of California, San Francisco)*
- 15:15 to 15:45 Break

- *Potchen Award Competitor*

Session 12: Future Directions

Moderators: David Saloner and Juergen Hennig

- 15:45 to 15:55 Can Signal Averaging Combined with Undersampling and Compressed Sensing Improve Sensitivity? A fluorine-19 Study
● *Ruud van Heeswijk (University Hospital of Lausanne)*
- 15:55 to 16:05 A Calibration-free Method to Estimate Blood Oxygen Saturation
● *Juliet Varghese (OSU)*
- 16:05 to 16:15 Three-Dimensional Hemodynamics in Dilated Ascending Aorta With and Without Aortic Valve Stenosis and Regurgitation in Tricuspid Aortic Valve
Kenichiro Suwa (Northwestern University)
- 16:15 to 16:25 4D Flow Imaging of the Placenta and Umbilical Cord in the Rhesus Macaque – Initial Experience
Jacob Macdonald (University of Wisconsin – Madison)
- 16:25 to 16:35 TWIST Sequence for Evaluation of the Inferior Epigastric Artery Prior to Deep Inferior Epigastric Perforator (DIEP) Flap Breast Reconstruction
Manuela Aschauer (Medical University of Graz, Austria)
- 16:35 to 17:20 Meeting wrap up:
— Closing Remarks
— Announcement of the Potchen Award and runners up
— Announcement of the Passariello Award and runners up
— An invitation to attend the 29th annual meeting in Stellenbosch, ZA
— Thanks and recognition
James Carr, Michael Markl, Chuck Domoulin, and David Saloner
- 18:30 Evening Event: FTW Chicago

- *Potchen Award Competitor*

Poster Exhibition

WEDNESDAY THROUGH FRIDAY

Poster Viewing 12:30 to 13:45

- Can We do Without IV Contrast? Role of Advanced Non-contrast Imaging Techniques to Evaluate Complex Vascular Anatomy
Kathan Amin (John H Stroger Hospital of Cook)
- Towards Acquisition of Aortic K-t Accelerated 4D Flow MRI Under 2 Minutes
Emilie Bollache (Northwestern University)
- Evaluation of Myocardial Edema in Patients Affected by Acute Myocardial Infarction (AMI) and Acute Myocarditis (AM) Using Surface Coils
Federica Ciolina (Sapienza University of Rome)
- Noninvasive Venous Pressure Measurement of Dural Arteriovenous Fistulas using 4D Flow MRI (Phase Contrast VIPR MRA)
Zachary Clark (University of Wisconsin of Hospital and Clinics)
- 3D analysis of Vessel Morphology Imaged with ECG Gated Flow Spoiled-Fresh Blood Imaging Non Contrast-MRA
Benjamin Cooper (Pocono Medical Center)
- QISS Non-contrast MRA for Assessment of the Iliofemoral Arteries in TAVR Candidates
○ *Marcos Ferreira Botelho (Northwestern University)*
- Summary of Strategies for Reduction of Susceptibility Artifacts in Periphera Non-enhanced MRA
Shivraman Giri (Siemens Medical Solutions)
- Secure Study: Observational Post-marketing Study on the Safety Profile of Gadoterate Meglumine — Final Results in 35,499 Patients
Andreas Gottschalk (Krankenhaus Nordwest Frankfurt)
- Improving Signal-to-Noise Ratio in Carotid MRI
○ *Rock Hadley (University of Utah)*
- Assessment of Velocity, Reynolds Stress Tensor, and Pressure Loss using Phase-Contrast MRI with Extended Velocity Encoding
Henrik Haraldsson (University of California, San Francisco)
- Finding Optimal Dose for Ferumoxytol-enhanced Magnetic Resonance Angiography (FeMRA)
○ *Martin Hennessy (Queen Elizabeth University Hospital)*
- 4D Flow Analysis of Renal Flow Changes due to Kidney Cancer
Carson Hoffman (University of Wisconsin Madison — Medical Physics)
- Non-Contrast Dynamic MR Angiography with Arterial Spin Labeling in Children
Houchun Hu (Phoenix Children's Hospital)

○ *Passariello Award Competitor*

WEDNESDAY THROUGH FRIDAY

Poster Viewing 12:30 to 13:45

- Non-Contrast, Flow-Independent, Relaxation-Enhanced MR Angiography with an Inversion Recovery and T2-Prepared 3D mDIXON Gradient-Echo Sequence: Preliminary Experience in Children
Houchun Hu (Phoenix Children's Hospital)
- Comparison of Flow Measurements Derived from 2D and 4D-MR Velocimetry in a Jugular Vein Phantom
Evan Kao (UCSF)
- Comparison of Biventricular Strain Derived from Heart Deformation Analysis and Speckle Tracking Echocardiography: A Working Definition of Normal for a Novel Technique
○ *Eric Keller (Northwestern University, Feinberg School of Medicine)*
- Post-Contrast Black-blood HASTE Imaging: Initial Results with Ferumoxytol
Sarah Khan (UCLA)
- Usefulness of Ultra-short Echo Time Imaging for Assessment of MR Property of Metallic Stent: An In-vitro Phantom Study
○ *Bum-soo Kim (Catholic University of Korea)*
- Fused Source and Subtraction Arterial Spin Labeled MRA of the Extracranial Carotid Arteries
Ioannis Koktzoglou (NorthShore University HealthSystem)
- Contrast Enhanced Pelvic Venography in the Workup of Cryptogenic Stroke
Larry Kramer (UTHSC — Houston)
- Endogenous Assessment of Diffuse Myocardial Fibrosis in Patients with T1ρ-Mapping
Tim Leiner (Utrecht University Medical Center)
- Assessment of Intraplaque Hemorrhage Signal Changes on MRI
Jin Liu (University of Washington)
- 4D Flow MRI of the Spinal Canal: First Results
Ute Ludwig (University Medical Center Freiburg)
- Beyond High Resolution: Prospectively Motion Corrected Time of Flight Angiography with 150μm Isotropic Resolution at 7T Under SAR Constraints
Hendrik Mattern (Otto-von-Guericke — University Magdeburg)
- Comparison of In Vitro 4D Flow MRI and CFD to Stereoscopic Particle Image Velocimetry
Rafael Medero (University of Wisconsin — Madison)
- Optimization and Comparison of a Sliding Slab MRA Technique with Conventional MRA Protocols
Jason Mendes (University of Utah)
- The Use of Cardiac Magnetic Resonance Imaging in Diagnosing and Characterizing Hypertrophic Cardiomyopathy
Emmanuel Ogele (Northwestern Feinberg)

○ *Passariello Award Competitor*

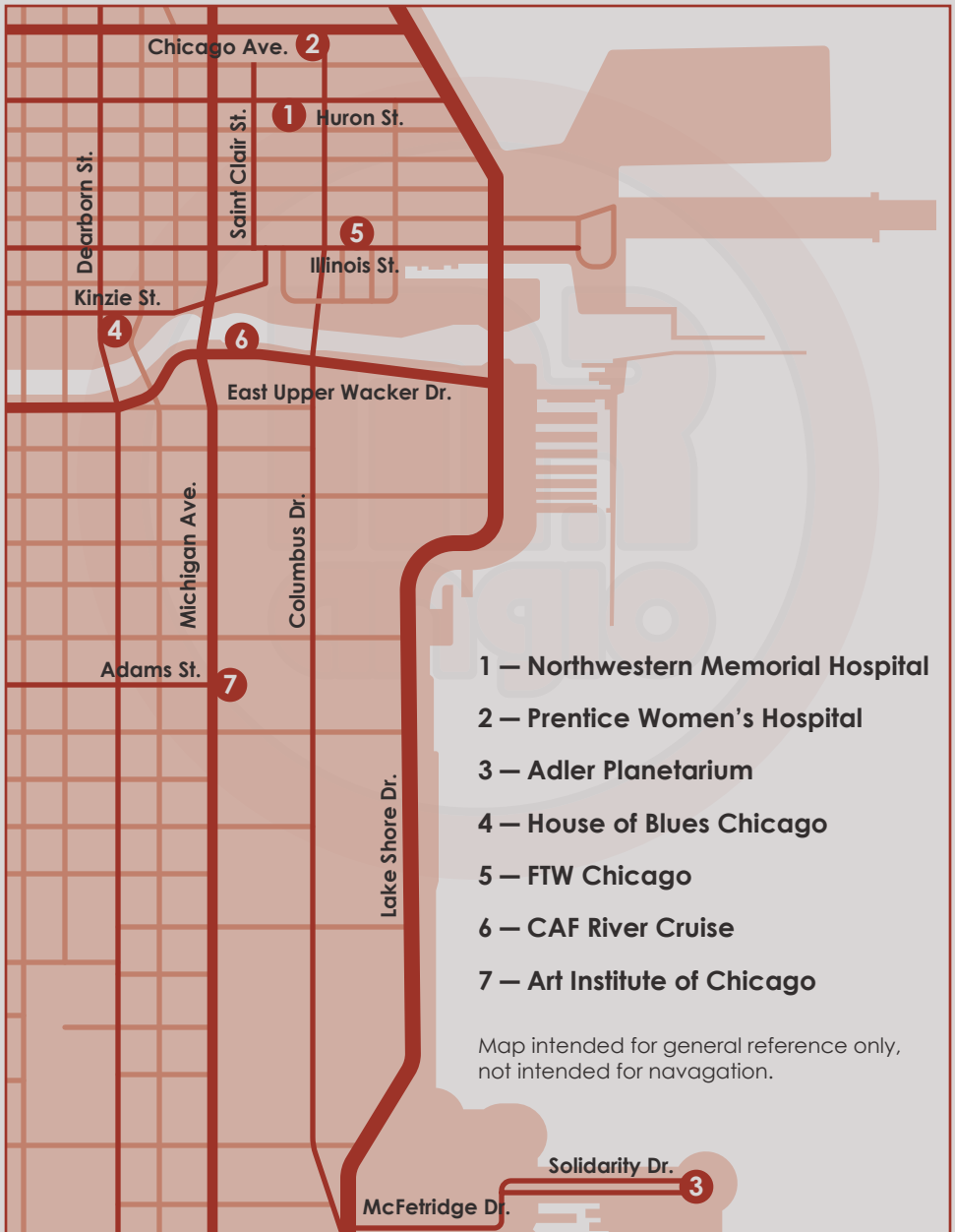
Poster Exhibition

WEDNESDAY THROUGH FRIDAY

Poster Viewing 12:30 to 13:45

- 4D Flow MRI of Stented Versus Stentless Aortic valve Bioprotheses
R. Nils (Planken Academic Medical Center)
- LVNC — Are we Overdiagnosing this Entity?
Jana Polakova mistinova (Commenius University)
- T1 and T1* Comparison in Calculating Synthetic Hematocrit
Across Multiple Cardiac Areas
○ *Ozair Rahman (Northwestern University)*
- Reproducibility and Observer Variability of Myocardial T2 Mapping
Kenichiro Suwa (Northwestern University Feinberg School of Medicine)
- High-Resolution Breath-Held Cardiac T2 Mapping with SKRATCH: A Quantitative
Comparison of Four Techniques in Healthy Volunteers
○ *Ruud van Heeswijk (University Hospital of Lausanne — CHUV)*
- Comprehensive Blood Flow Measurements in Ex Vivo Pig Heart Models Using 4D Flow MRI
○ *Pim van Ooij (Academic Medical Center — Amsterdam)*
- A Template of Intra-cardiac Blood Velocity in Ex Vivo Pig Heart Models
Using 4D Flow MRI
Pim van Ooij (Academic Medical Center — Amsterdam)
- Functional Measurements with Accelerated Self-gated Free-breathing 3D Cardiac
CINE MRI
Yan Wang (University of California — San Francisco)
- Does Correction of Carotid Femoral Pulse Wave Velocity Distance Measurements
Improve Disease Discrimination?
Jonathan Weir-McCall (University of Dundee)

○ *Passariello Award Competitor*



Visit Chicago

Northwestern Memorial Hospital nm.org

As one of the country's premier academic medical center hospitals, Northwestern Memorial Hospital serves as the primary teaching hospital for Northwestern University Feinberg School of Medicine. Together committed to the advancement of healthcare through clinical innovation, medical education, and scientific research.

Session Location

- Conference Center
- Feinberg Pavilion (3rd floor)
- 251 E. Huron

Streeterville and the Magnificent Mile themagnificentmile.com

Originally known as the "Sands", a squatter and vice district, brassy Streeterville has grown over the years to become a historically rich neighborhood now home to premier hotels, restaurants, professional office centers, residential high rises, cultural venues, universities, and medical facilities.

Defining Streeterville's western border is Chicago's chic shopping district the "Magnificent (Mag) Mile". Spanning along Michigan Avenue from the Chicago River to Oak Street Beach, the Magnificent Mile offers visitors a landmark boulevard of luxury comparable to Fifth Avenue in New York and Rodeo Drive in Beverly Hills.

Chicago choosechicago.com

The third most populous city in the United States, located between the Great Lakes and the Mississippi River watershed in the heart of the Midwest, Chicago is an international hub for finance, commerce, industry, technology, telecommunications, and transportation. Known worldwide for its architecture, athletic teams, and notorious past, Chicago proudly lives up to its nickname the "Windy City" sharing its culture, cuisine, art, literature, and history with gusto.



Taxi Services

- Checker: 312.243.2537 | checkertaxichicago.com
- Yellow Cab: 312.829.4222 | yellowcabchicago.com
- Chicago Carriage Cab: 312.326.2221 | chicagocarriagecab.com
- American United Taxi: 773.248.7600 | americanunitedtaxiaffiliation.com
- Flash Cab: 773.561.4444 | flashcab.com

City of Chicago department of Business Affairs and Consumer Protection (BACP) fare rates as of January 1, 2016:

- | | |
|---|---------|
| — Flag Pull (Base Fare) | \$ 3.25 |
| — Each additional mile | \$ 2.25 |
| — Every 36 seconds of time elapsed | \$ 0.20 |
| — First additional passenger | \$ 1.00 |
| — Each additional passenger after first passenger; aged 13 through 64 | \$ 0.50 |
| — Illinois Airport Departure Tax; only on fares leaving the airports | \$ 4.00 |

cityofchicago.org/city/en/depts/bacp/supp_info/2012_passenger_information.html

Ridesharing Services

- Uber: uber.com
- Lyft: lyft.com

Android, Apple iOS, Windows Phone applications required.

Chicago Transit Authority (CTA) / Ventra (Payment system)

Provides direct access between downtown, O'Hare and Midway airports, as well as many of Chicago's neighborhoods. Cash accepted on busses only . Ventra Card recomened for efficient boarding and fair mangement. Visit website for fair information, and system maps.

- Chicago Transit Authority: transitchicago.com
- Ventra: ventrachicago.com

Bikesharing system

- DIVVY: divvybikes.com



Social Event

WEDNESDAY SEPTEMBER 21st

19:00 Adler Planetarium

adlerplanetarium.org

No age restrictions for event. Round trip shuttle service provided.

Our first evening event will feature a seated dinner at the Adler Planetarium. The Adler offers guests great exhibits and observation show rooms, as well as an unparalleled view of Chicago's grand skyline.

The mission of the Adler Planetarium is to inspire exploration and understanding of our Universe.

In April of 2015 the Adler celebrated the 45th anniversary of the Apollo 13 mission and re-opened Mission Moon, an interactive exhibition that tells the story of America's first steps to the Moon, featuring artifacts from Captain Jim Lovell's personal collection. NASA astronauts and flight directors joined Adler Trustees and donors in commemorating this historical moment.

Shuttle Service

Shuttle service will start at 18:00. Buses will leave at 18:15 and 18:30. Boarding location is at 251 E. Huron. Conference attendees should watch for announcements during the meeting for further information regarding boarding times. Return service from the Adler will start at 22:30.



THURSDAY SEPTEMBER 22nd

18:30 House of Blues Chicago

houseofblues.com/chicago

Due to venue restrictions, all guests must be 21 years of age or older to access this event.

A festive night of music and dance at House of Blues Chicago.

The House of Blues grew out of founder Isaac Tigrett's love for the unique American art form known as the "the Blues". Weaned on this music during his early childhood in Tennessee, one of Isaac's goals was to introduce the world to the music of the rural south, including the Blues, Rhythm and Blues, Gospel, Jazz and Roots-based Rock & Roll.

The very first House of Blues opened its doors in a converted historical house in Cambridge, Massachusetts in 1992 and is home to live music, original folk art, and delta-inspired cuisine.

The House of Blues is dedicated to educating and celebrating the history of Southern Culture and African American artistic contributions to music and art.

A note from Chicago history:

- Citation from Wikipedia: "The Chicago blues is a form of blues music indigenous to Chicago, Illinois. Chicago blues is a type of urban blues. Urban blues evolved from classic blues as a result of the great depression and developed in the first half of the twentieth century during the Great Migration, when Black workers moved from the Southern United States into the industrial cities of the Northern United States such as Chicago."



Social Event

FRIDAY SEPTEMBER 23rd

18:30 FTW Chicago

ftwchicago.com

Due to venue restrictions, all guests must be 21 years of age or older to access this event.

An evening of fun and games at FTW Chicago. Located at 322 E. Illinois Street in the River East Center, FTW brings together state-of-the-art gaming, chef-driven food and craft libations, and miniature golf in one innovative venue. Combining sleek sophistication with gut-bustling fun, FTW is a paradigm- shifting gaming mecca like no other emporium in the city or the country.

As well as carnival classics, the steampunk themed 20,000 square foot space offers never before seen games such as SEGA's Showdown, an unparalleled new race-car game which made its world premiere at FTW. FTW also introduces a whimsical six-hole interactive miniature golf course, where each hole is custom- designed to replicate some of Chicago's most historic landmarks.

FTW offers guests a complete food and beverage program featuring playful American-comfort cuisine, in which certain selections are served via a dim sum-style cart service, bringing ready-to-eat bites to the gamers. Entrees and shareable provisions are on the full menu available to diners at communal and high top table seating. A full bar completes the space with 32 craft beers on tap and a Victorian-inspired classic cocktail menu, offering a lavish nightlife appeal.

A modern emporium in every sense, FTW introduces a revolutionary new card swiping system called Embed to track balances and winnings, allowing gamers to exit and re-enter at any time eliminating the need to cash out or take home tokens and tickets. FTW is a place where gamers can truly play for the win.



WEDNESDAY SEPTEMBER 21st

Chicago Architecture Foundation (CAF) River Cruise architecture.org

- 09:00 Participants will meet at a central location on the Northwestern campus.
- 10:00 Participants will enjoy a 90 minute Chicago Architecture River Cruise aboard Chicago's First Lady Cruises. The CAF river cruise tour is widely recognized as "the best way to see Chicago" and its legendary architecture.
- 12:00 Guests will be treated to a fabulous meal at The Lobby, one of the restaurants located within The Peninsula Hotel.

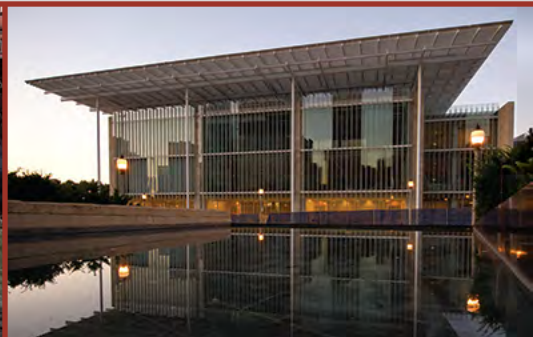
The Peninsula Hotel is located near the conference venue and hotels, thus making it easy to retreat back to your hotel for an afternoon break, or stay near the Mag Mile for further sightseeing or shopping on your own.

THURSDAY SEPTEMBER 22nd

The Art Institute of Chicago artic.edu

- 10:00 Participants will meet at a central location on the Northwestern campus.
- 11:00 Participants will start their visit of the museum with a Gallery tour featuring the Highlights of the Modern Wing; Modern and New Contemporary Art. The tour will end in Terzo Piano where we will enjoy a seated lunch.
- 12:00 Lunch at Terzo Piano; Terzo Piano is located on the 3rd level of the Modern Wing and offers amazing panoramic views of Lake Michigan and the Chicago skyline.

After lunch, participants are free to enjoy more of the museum on their own, or stroll down to Millennium Park to enjoy all that it has to offer – the day will be yours!



Gold Sponsors

The Society for Magnetic Resonance Angiography would like to express its gratitude to all 2016 sponsors, without whom this years event would not be possible.

Gold Sponsor Talks

Wednesday

- 11:50 to 12:00 Circle Cardiovascular Imaging, Inc.
Presented by: James Carr and Michael Markl
- 15:30 to 15:40 Siemens Healthcare GmbH
Presented by: Gerhard Laub
- 16:20 to 16:30 Bayer
Presented by: Gregor Jost

Thursday

- 10:00 to 10:10 GE Healthcare U.S.
Presented by: Ty Cashen
- 11:50 to 12:00 Philips
Presented by: Markl Kouwenhoven
- 16:25 to 16:35 Bracco
Presented by: Gianpaolo Pirovano
- 17:15 to 17:25 Guerbet United States / France
Presented by: Jonathan Weir-McCall

Bayer

Bayer HealthCare's Radiology unit is a global leader in developing and manufacturing contrast agents used in X-ray, computed tomography (CT) and magnetic resonance imaging (MRI), as well as injection systems for diagnostic and therapeutic medical procedures in CT, MRI and cardiovascular and peripheral vascular disease.

radiology.bayer.com



Bracco

Bracco Imaging offers a product and solution portfolio for all key diagnostic imaging modalities: X-ray Imaging (including Computed Tomography-CT, Interventional Radiology, and Cardiac Catheterization), Magnetic Resonance Imaging (MRI), Contrast Enhanced Ultrasound (CEUS), and Nuclear Medicine through radioactive tracers. The diagnostic imaging portfolio is completed by a range of medical devices and advanced administration systems for contrast imaging products.

braccoimaging.com



LIFE FROM INSIDE

Circle Cardiovascular Imaging, Inc.

Circle Cardiovascular Imaging develops and markets cardiac post-processing software worldwide that allows for the evaluation and analysis of MR and CT images. Available for clinical and research use.

circlecvi.com



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GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance GE Healthcare U.S. solutions services help our customers to deliver better care to more people around the world at a lower cost.

gehealthcare.com



GE Healthcare

Guerbet United States / France

A pioneer in the field of contrast agents with more than 80 years of experience, Guerbet is the only pharmaceutical group fully dedicated to medical imaging worldwide. As such it has complete offering of contrast products for X-ray, MRI, Interventional Radiology, along with a range of injectors and medical equipment to improve diagnosis and treatment of patients.

guerbet.com

Guerbet



Contrast for Life

Philips

Philips is one of the world's leading healthcare technology companies. We are committed to understanding patients' and caregivers' needs and improving the experience of care.

usa.philips.com

PHILIPS

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Siemens Healthcare GmbH

Responsibility, excellence and innovation have been the basis for Siemens' success for over 160 years. Siemens Magnetic Resonance innovates to advance human health – in every hospital or practice or lab or university. Whether you are just beginning to work with MRI or you are at the forefront of research.

usa.healthcare.siemens.com

SIEMENS

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Arterys

Leveraging unique IP and the power of cloud computation, Arterys has created the first technology capable of visualizing anatomy and accurately quantifying blood flow with 4D Flow on MRI data acquired in less than 10 minutes.

arterys.com



Heart Imaging Technologies

Leveraging zero footprint technology to enhance clinical workflows and help facilitate research. Utilizing Precession and CloudCMR, colleagues at separate institutions can collaborate with a simple mouse click.

heartit.com



Medis Medical Imaging Systems

Medis medical imaging systems is leading provider of innovative software solutions that enable clinicians, technicians and researchers to accurately quantify medical images. Medis products are focused on the cardiovascular imaging market and cover the modalities MRI, CT, X-ray angiography and intravascular ultrasound.

medis.nl



Northwestern Radiology

Northwestern is committed to excellent teaching, innovative research and the personal and intellectual growth of its students in a diverse academic community.

radiology.northwestern.edu



Toshiba

Toshiba America Medical Systems understands today's healthcare business and delivers diagnostic imaging and interventional solutions that put customers first. Toshiba markets, sells, distributes and services these solutions throughout the U.S.

medical.toshiba.com

The Society for Magnetic Resonance Angiography (SMRA) was founded in 1989 as the MR Angio Club to bring together scientists, clinicians and industry with a common interest in MR Angiography (MRA). The society's annual conference is widely recognized as the premier international conference in MR Angiography. Each year, prominent researchers and clinicians come from all over the world to attend this event and present their most up to date research results and exchange ideas. MR-related vendors also showcase their state-of-the-art products, technical advances, and clinical applications in an engaging environment intended to foster new connections and collaborations

Executive Committee

smrangio.com

- Charles (Chuck) Dumoulin: President
- James Carr: President Elect
- Tim Leiner: Secretary
- Kevin DeMarco: Treasurer
- Jeffrey Maki
- Matthias Stuber
- Kozuhiko Sadmoto
- David Saloner
- Giles Roditi

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- Janette Wallace
- Johanne Langford
- Donna Lyons

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radiology.northwestern.edu

- James Carr
- Michael Markl
- Iliana Rodriguez
- Susanne Schnell
- Jeremy Collins
- Alex Barker
- Maria Carr
- Daniel Kim
- David Botos

Volunteers

We would like to gratefully acknowledge the Northwestern Department of Radiology staff and student volunteers for contributing their time and energy into making this event a success! It wouldn't have been possible without you — thank you!

Save the Date

October 4th — 6th

Spier 1692 | Hotel • Spa • Vineyard
Stellenbosch, Western Cape, ZA

29th Annual International Conference

MRA: New Perspectives

Stellenbosch 2017

President: James Carr

Organizer: David Saloner

Pre-Conference Educational Workshops
October 2nd and 3rd



Endorsed by:

Society for Cardiovascular Magnetic Resonance
Radiological Society of South Africa