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<tr>
<th>TIME</th>
<th>Valley of the Sun DE</th>
<th>Deer Valley</th>
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<tbody>
<tr>
<td>8:00 AM - 6:00 PM</td>
<td>Physician Pre-Conference Course</td>
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**THURSDAY, JANUARY 21, 2010**

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<tr>
<th>TIME</th>
<th>Valley of the Sun DE</th>
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<tr>
<td>9:00 AM - 11:00 AM</td>
<td>Oral Abstract Session VIII - New Methods for Post-Processing of CMR Data Track: BSc</td>
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<tr>
<td>11:00 AM - 12:30 PM</td>
<td>Oral Abstract Session V - Myocardial Viability and Injury in Acute Coronary Syndromes Track: Gen/Cgen</td>
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<tr>
<td>12:30 PM - 2:00 PM</td>
<td>Lunch on Your Own - Exhibits/Poster Viewing Session (Authors not present)</td>
<td>Technologist Workshop 1:30 pm - 5:00 pm</td>
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<tr>
<td>2:00 PM - 3:30 PM</td>
<td>Oral Abstract Session X - Myocardial Viability and Injury in Acute Coronary Syndromes Track: Gen</td>
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<tr>
<td>3:30 PM - 5:00 PM</td>
<td>Oral Abstract Session XII - Correlation of CMR with In Vivo Imaging Track: Gen/Cgen</td>
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**FRIDAY, JANUARY 22, 2010**

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<th>TIME</th>
<th>Valley of the Sun C</th>
<th>Valley of the Sun DE</th>
<th>Paradise Valley</th>
<th>Cave Creek</th>
<th>Deer Valley</th>
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<tr>
<td>7:00 AM - 9:30 AM</td>
<td>Continental Breakfast - Opening of Exhibits and Posters (Authors not present)</td>
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<tr>
<td>8:00 AM - 9:30 AM</td>
<td>Refreshment Break/opening of Exhibits/Poster Viewing (Authors not present) - Spotlight Theatre</td>
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<td>9:30 AM - 11:00 AM</td>
<td>Parallel Session - Ischemic Heart Disease for Viability and Acute MI Track: Gen</td>
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<tr>
<td>11:00 AM - 12:30 PM</td>
<td>Oral Abstract Session III - Young Investigator Award Session - Experimental Track: BSc</td>
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<td>12:30 PM - 1:30 PM</td>
<td>Lunch on Your Own - Exhibits/Poster Viewing Session (Authors not Present)</td>
<td>Technologist Workshop 8:00 am - 6:00 pm</td>
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<tr>
<td>3:00 PM - 5:00 PM</td>
<td>Oral Abstract Session V - Myocardial Viability and Injury in Acute Coronary Syndromes Track: Gen/Cgen</td>
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**SATURDAY, JANUARY 23, 2010**

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<th>Valley of the Sun C</th>
<th>Valley of the Sun DE</th>
<th>Paradise Valley</th>
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<tr>
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<tr>
<td>10:00 AM - 12:00 PM</td>
<td>Oral Abstract Session X - Myocardial Viability and Injury in Acute Coronary Syndromes Track: Gen</td>
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<tr>
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<td>Lunch on Your Own - Exhibits/Poster Viewing Session (Authors not Present)</td>
<td>Technologist Workshop 1:30 pm - 5:00 pm</td>
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<tr>
<td>2:00 PM - 4:00 PM</td>
<td>Oral Abstract Session XII - Myocardial Viability and Injury in Acute Coronary Syndromes Track: Gen/Cgen</td>
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<tr>
<td>4:00 PM - 6:00 PM</td>
<td>Oral Abstract Session XIII - Coronary MR Imaging Track: Gen</td>
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**SUNDAY, JANUARY 24, 2010**

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<tr>
<th>TIME</th>
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<tbody>
<tr>
<td>7:00 AM - 8:00 AM</td>
<td>Continental Breakfast</td>
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<tr>
<td>8:00 AM - 9:30 AM</td>
<td>Cases: Parallel Session Challenges in Clinical Routine Track: Gen/Cgen</td>
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<tr>
<td>9:30 AM - 10:00 AM</td>
<td>Refreshment Break</td>
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<tr>
<td>10:00 AM - 11:00 AM</td>
<td>Cases: Parallel Session Challenges in Clinical Routine Track: Gen/BSc</td>
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<tr>
<td>11:00 AM - 12:00 PM</td>
<td>Closing Plenary Track: Gen/Cgen/BSc</td>
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<tr>
<td>12:00 PM - 1:00 PM</td>
<td>Closing Remarks</td>
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**Program-at-a-Glance**

**13th Annual Scientific Sessions • January 21 – 24, 2010**

**Sheraton Phoenix Downtown Hotel • Phoenix, AZ USA**

**TIME**

**THURSDAY, JANUARY 21, 2010**

10:30 AM - 11:00 AM Refreshment Break/Exhibits/Poster Viewing (Authors not present) - Spotlight Theatre

**TIME**

**FRIDAY, JANUARY 22, 2010**

10:30 AM - 12:00 PM Parallel Session - Economics, Cost-effectiveness, Medicolegal

**TIME**

**SATURDAY, JANUARY 23, 2010**

10:30 AM - 12:00 PM Parallel Session - Ischemic Heart Disease for Viability and Acute MI Track: Gen

**TIME**

**SUNDAY, JANUARY 24, 2010**

10:30 AM - 12:00 PM Parallel Session - Ischemic Heart Disease for Viability and Acute MI Track: Gen

**Three Tracks:**

- Gen = General
- Cgen = Congenital
- BSc = Basic Science

**Cover and Inside Photo Credits:** Image courtesy of Dr. Andrew Arai, National Heart, Lung and Blood Institute, Bethesda, MD
Welcome

Dear colleagues and friends,

Welcome to Phoenix and the 13th Annual Scientific Sessions of the Society for Cardiovascular Magnetic Resonance! The Board of Trustees shares a strong commitment to advancing the science and practice of CMR and your attendance supports this goal and the vision of SCMR.

I personally want to thank the 2010 Program Committee chaired by Dr. Andrew Arai and Dr. Sven Plein for the time, expertise and dedication they gave to designing a program that is very robust, state of the art, and thought-provoking.

In light of economic concerns that have dominated discussions worldwide, this year’s Opening Plenary will discuss Outcomes and Cost Effectiveness as they relate to cardiac imaging and CMR in particular. We are honored that Dr. Leslee Shaw, a world recognized research scientist in cardiovascular cost-effectiveness, has accepted our invitation to present in the opening plenary.

The scientific program has been developed to emphasize learning in three targeted tracks: General CMR, Congenital/Pediatric, Basic Science. This will provide attendees the opportunity to focus on their own specialized needs. A new program, Cases with the Experts, held concurrently with the parallel sessions, is designed to provide small session "read with the expert" case presentations.

In the Pre-Conference Courses, Technologist Workshop, and the many sessions of the Scientific Program an outstanding group of experts has been assembled to discuss a wide range of interesting topics and provide an overview of CMR and its promising future.

Again, I extend a warm welcome to each of you and feel confident you will value the knowledge, contacts and insights gained at the 2010 SCMR Scientific Sessions.

Sincerely,

Christopher Kramer, MD
President, SCMR
SCMR Vision Statement

The Society for Cardiovascular Magnetic Resonance (SCMR) aims to be the recognized representative and advocate for physicians, scientists, and technologists who work in the field of cardiovascular magnetic resonance (CMR). It endeavors to be the principal international, independent organization committed to the further development of CMR through education, quality control, research, and training.

The Mission of SCMR is to:

- Foster optimal clinical effectiveness of CMR through professional education, establishment of standards for quality assurance and professional training, continued medical education, and development of evidence-based guidelines to enhance patient care and improve the quality of cardiovascular medical practice.
- Support coordinated research efforts to promote further development and applications of CMR, and to investigate accuracy, effectiveness, and cost-effectiveness in cardiovascular diagnosis.
- Provide a forum for scientific exchange and information on CMR, through organization of an annual international scientific session and of additional smaller meetings, through on-line open access publication of the Journal of Cardiovascular Magnetic Resonance, and through establishing close working relationships with societies in related fields.
- Build a strong national and international membership body of physicians, scientists, technologists, administrators and other individuals with interest in clinical applications or research in CMR.
- Develop relevant member services, resources and assistance to enhance the development of the field of CMR.
The Goals of the Conference are to:

- Deliver state of the art information on the science of CMR imaging and spectroscopy.
- Provide a forum for the presentation of new information on CMR.
- Compare and contrast CMR methods with other cardiovascular imaging approaches.

At the conclusion of the Scientific Sessions, participants should be better able to:

1. Discuss applications where CMR helps in the diagnosis or management of adult cardiovascular disease.
2. Discuss issues how and when to perform CMR in pediatric subjects with cardiovascular and congenital heart disease.
3. Provide a framework for the regulatory and economic factors that influence clinical CMR.
5. Present and discuss contrast enhanced and non-contrast enhanced strategies of vascular MRI.
6. Discuss new approaches and methodologies for CMR image acquisition in patients with cardiovascular disease.
7. Present and discuss new approaches of molecular and interventional CMR.

Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the Society for Cardiovascular Magnetic Resonance and the University of Minnesota. The University of Minnesota is accredited by the ACCME to provide continuing medical education for physicians.

The University of Minnesota designates the educational activities listed below for the maximum of AMA PRA Category 1 Credits™:

- Physician Pre-conference Course – 7.5 AMA PRA Category 1 Credits™
- High Field/Basic Science Pre-conference Course – 5.75 AMA PRA Category 1 Credits™
- 2010 Scientific Sessions – 20.75 AMA PRA Category 1 Credits™

Physicians should only claim credit commensurate with the extent of their participation in the activity.

Other Healthcare Professionals who participate in this CME activity may submit their Statements of Attendance to their appropriate accrediting organizations or state boards for consideration of credit. The participant is responsible for determining whether this activity meets the requirements for acceptable continuing education.

Attendees should claim credit commensurate with the extent of their participation.

Technologist Workshop

This activity has been approved for credit by the American Society of Radiologic Technology (ASRT) for a maximum of 12 CE credits.

Each technologist should claim only those hours of credit actually spent in this activity.
General Information

Admission
Conference name badges are required for admission to all activities related to the 13th Annual Scientific Sessions, including the exhibit hall and social events.

If you have registered for the Technologist Workshop only, you will receive a Technologist badge that will only allow you access into the Technologist Workshop, not to the Scientific Sessions.

Registration Hours
The 2010 SCMR Registration Desk is located in the Valley of the Sun Ballroom Foyer. The Registration Desk will be open and staffed during the following hours:

Wednesday, January 20   2:00 PM – 6:30 PM
Thursday, January 21    7:00 AM – 6:00 PM
Friday, January 22      7:00 AM – 6:30 PM
Saturday, January 23    7:00 AM – 6:30 PM
Sunday, January 24      7:00 AM – 2:00 PM

Acknowledgements
The Society for Cardiovascular Magnetic Resonance gratefully acknowledges the support of these scientific sessions and SCMR's objectives from our industry supporters:

- Siemens Healthcare
- Philips Healthcare
- GE Healthcare
- Toshiba Medical Systems
- Medis medical imaging systems bv

Exhibits
Educational and informational exhibits will be available in Phoenix Ballroom CDE during the Scientific Sessions. Exhibiting company representatives will be available to answer your questions about their products and services. Please visit the exhibits and thank the representatives for their support. The complete list of exhibits can be found on pages 54-56.

Speaker Ready Room
The 2009 Program Committee is committed to providing attendees cutting edge technology and coordinated presentations at the Scientific Sessions. To be fully prepared for your session, each presenter is requested to visit the speaker ready room at least 24 hours prior to your presentation. The Speaker Ready Room is located in the Desert Sky Room and will be open the following days and times:

Wednesday, January 20   5:00 PM – 8:00 PM
Thursday, January 21    7:00 AM – 6:00 PM
Friday, January 22      7:00 AM – 6:00 PM
Saturday, January 23    7:00 AM – 6:00 PM
Sunday, January 24      7:00 AM – 12:00 PM

Disclosure Statement
It is the policy of the University of Minnesota - Office of Continuing Medical Education to insure balance, independence, objectivity and scientific rigor in all of its sponsored educational activities. All participating speakers, course directors, and planning committee members are required to disclose to the program audience any financial relationships related to the subject matter of this program. Relationships of spouse/partner with proprietary entities producing healthcare goods or services should be disclosed if they are of a nature that may influence the objectivity of the individual in a position to control the content of the CME activity. Disclosure information is reviewed in advance in order to manage and resolve any possible conflicts of interest. Specific faculty disclosure information for each speaker, course director, and planning committee member will be shared with the audience prior to the speaker's presentation.

A complete list of disclosures is available on pages 50-53.
**Physician Pre-Conference Course: Introduction to Cardiovascular MR**

**Thursday, January 21, 2010**

**8:00 AM – 6:00 PM** Valley of the Sun – DE

**Chairs:** Victor Ferrari, MD, University of Pennsylvania Medical Center
Raymond Kwong, MD, Brigham and Women’s Hospital

**Educational Objectives**

- Modify sequence parameters to enhance MR image quality and to identify common artifacts
- Plan, perform, and read cardiac MRI including stress test
- Recognize the current common pulse sequence techniques and their potential clinical applications

**Agenda**

**8:00 AM** **Welcome**
Moderators: Victor Ferrari, MD; Raymond Kwong, MD

**8:10 AM** **Basics: Spins and Hardware**
Reza Nezafat, PhD, Harvard Medical School

**Learning Objectives**

- Understand basics of MRI spin physics
- MRI hardware
- Imaging sequences

**8:30 AM** **Black-Blood Sequences**
Daniel Kim, PhD, New York University

**Learning Objectives**

- Understand the basis for signal nulling of the blood signal through the use of double inversion-recovery and diffusion preconditioning RF pulses
- Understand the limitations, as well as the artifacts, associated with each blood suppression technique
- Choose the appropriate "black-blood" preconditioning RF pulse given the application

**8:50 AM** **Bright-Blood Sequences**
Paul Finn, MD
University of California – Los Angeles

**Learning Objectives**

- Understand the mechanisms whereby the blood signal is high on bright blood sequences
- Be familiar with the main clinical applications of the major classes of bright blood sequences
- Recognize artifacts and limitations inherent to the major classes of bright blood sequences

**9:10 AM** **Let’s Go Faster: Parallel Acquisition Techniques**
Thoralf Niendorf, PhD, Max-Delbrück-Center for Molecular Medicine

**Learning Objectives**

- Understanding the critical role of parallel imaging in clinical CMR
- Understanding the clinical need for imaging speed and its use to advance clinical CMR including simplification of imaging paradigm, parametric imaging and novel applications
- Gaining an insight into solved and unsolved problems of parallel imaging and its clinical application
- Exploring emerging parallel imaging technology and its implications for future clinical CMR applications

**9:35 AM** **Contrast Material, NSF**
Martin Prince, MD, PhD, Cornell and Columbia Universities

**Learning Objectives**

- Recognize patients at risk of NSF because GFR is less than 30ml per minute or because of renal failure
- Understand how to minimize risk of NSF when gadolinium is necessary in an “at risk” patient
- Learn how NSF risk compares to other risks including anaphylaxis

**9:55 AM** **How to Set up your Study and Plan your Slice Positions**
Allison G. Hays, MD, Johns Hopkins University

**Learning Objectives**

- Set-up a basic cardiac MRI study
- Plan slice positions for a cardiac MRI study
- Adequately monitor patients during a cardiac MRI study

**10:15 AM** **Measure Regional and Global LV Function**
Daniel Ennis, PhD, University of California – Los Angeles

**Learning Objectives**

- Identify the key pulses sequences that should be used in daily clinical workflow for the assessment of right and left ventricular function
- Evaluate the benefits and drawbacks of different post-processing methods for evaluating right and left ventricular function
- Identify state-of-the-art techniques that are on the horizon for transitioning from research to clinical practice

*At the conclusion of this presentation, the attendee should be better able to:
**Physician Pre-Conference Course: Introduction to Cardiovascular MR (cont’d)**

10:35 AM  **Quantify Blood Flow**  
Mouaz Al-Mallah, MD, MSc, Wayne State University  

*Learning Objectives*  
- Review the role of phase contrast in assessment of blood flow  
- Compare between phase contrast and echo Doppler  
- Understand the limitations of phase contrast MRI

11:00 AM  **How to Perform High-Quality Late Enhancement Imaging**  
Afshin Farzaneh-Far, MD, PhD, Duke University Medical Center  

*Learning Objectives*  
- Understand the basic principles of the segmented inversion recovery fast gradient echo pulse sequence commonly used for delayed enhancement imaging  
- Know how to adjust the timing parameters and settings of the sequence for optimal imaging under different conditions  
- Be aware of some common pitfalls and artifacts as well as how to overcome them

11:25 AM  **Optimize MR Angiography**  
Martin Prince, MD, PhD, Cornell and Columbia Universities  

*Learning Objectives*  
- Understand a spectrum of MR angiography techniques  
- Optimize imaging of chest, abdomen and peripheral arteries  
- Recognize the importance of learning how to operate the MR scanner for optimizing MR angiography

12:00 PM – 1:00 PM  **Lunch (on own)**

1:00 PM  **Patient Comfort and Safety during Stress Tests**  
Scott E. Bingham, MD, Central Utah Imaging  

*Learning Objectives*  
- Define the indications and contraindications to stress testing by CMR  
- Define the diagnostic accuracy of various forms of CMR stress testing  
- Define patient selection criteria and monitoring required to optimize patient comfort and safety

1:20 PM  **Dealing with Breathing Artifacts and Arrhythmia**  
Julio Chirinos, MD, University of Pennsylvania School of Medicine  

*Learning Objectives*  
- Understand the principles behind cardiac gating during cardiac MRI  
- Understand the principles and practical aspects of breath holds and respiratory gating during cardiac MRI  
- Understand useful strategies to deal with cardiac arrhythmia and respiratory artifacts, including real time imaging

1:40 PM  **Setting up a Successful Cardiac Imaging Unit**  
John Heitner, MD, New York Methodist Hospital  

*Learning Objectives*  
- Understand the challenges of starting up a cardiovascular MR center  
- Learn the fundamentals of starting a CMR center: financial; contract negotiations  
- Inter-department collaboration

2:00 PM  **How to Assess Myocardial Iron Overload**  
Mark Westwood, MD, The London Chest Hospital  

*Learning Objectives*  
- Understand the principles of CMR T2* assessment of the myocardium  
- Understand the issues of validation and calibration of T2* CMR  
- Understand the clinical indications for T2* assessment of the myocardium

2:20 PM  **Optimizing the Efficiency of Your Protocols**  
Carlos Rochitte, MD, Heart Institute – InCor  

*Learning Objectives*  
- Understand how to optimize a CMR protocol to obtain the critical information (in an efficient way) to answer a specific clinical question  
- Recognize what is the most important information that needs to be provided in a CMR study directed to several clinical settings  
- Optimize the timing of a CMR protocol to obtain efficiently all the mandatory data needed in a specific clinical case

2:40 PM  **How to Perform CMR to Assess the Etiology of Cardiomyopathy**  
Subha V. Raman, MD, The Ohio State University  

*Learning Objectives*  
- Design and implement a CMR protocol for patients presenting for evaluation of cardiomyopathy of unknown etiology  
- Recognize the implications of CMR findings in patients with ischemic vs. non-ischemic cardiomyopathies  
- Educate clinicians referring patients for imaging studies on the value of CMR in the comprehensive assessment of cardiomyopathy etiology compared to other modalities

*At the conclusion of this presentation, the attendee should be better able to:
**Physician Pre-Conference Course: Introduction to Cardiovascular MR (cont’d)**

3:05 PM  
**How to Image Suspected Acute Myocarditis**  
Ron Blankstein, MD, Brigham and Women’s Hospital  
*Learning Objectives*  
- Describe a comprehensive MRI protocol used in the evaluation of suspected myocarditis  
- Identify the diagnostic accuracy of different components used in the MRI based evaluation of myocarditis  
- Understand the strengths and limitations of the use of cardiac MRI in the evaluation of myocarditis

3:25 PM  
**Update on CMR of Suspected ARVD/C**  
Harikrishna Tandri, MD, Johns Hopkins University  
*Learning Objectives*  
- Understand the role of MR imaging in the diagnosis of ARVD including the knowledge of MR imaging abnormalities in ARVD  
- Understand how to deal with the challenges with performing MR imaging in patients with arrhythmias  
- Understand the utility of delayed enhanced MR imaging in differential diagnosis of ARVD

3:50 PM  
**Imaging Myocardial Ischemia**  
Timothy F. Christian, MD, University of Vermont School of Medicine  
*Learning Objectives*  
- Understand the methods available to detect ischemic heart disease by MRI  
- Conceptualize how MR techniques compare with other imaging modalities for the detection of ischemic heart disease  
- Understand the framework whereby MR detection of ischemic heart disease can be streamlined and become more cost-effective

4:10 PM  
**How to Image Myocardial Viability?**  
Caroline Daly, MB, PhD, St. James Hospital  
*Learning Objectives*  
- Understand the indications for viability assessment, and how CMR can be used to assess viability  
- Use different CMR techniques to gather information on viability and modify protocols to patient specific questions  
- Optimize image quality in viability protocols

4:30 PM  
**Valvular Disease**  
Nikolaos Tzemos, MD, MRCP, BHF Glasgow Cardiovascular Research Centre  
*Learning Objectives*  
- Understand the need for a better diagnostic imaging test in the assessment of patients with VHD  
- Understand the role of CMR in the assessment of common cases of VHD  
- Choose the most appropriate CMR sequence for the assessment of most common VHD

4:55 PM  
**Pericardial Diseases**  
Amit Patel, MD, University of Chicago  
*Learning Objectives*  
- To learn which pulse sequences may be helpful in the evaluation of pericardial diseases  
- To learn the role of cardiac magnetic resonance in the evaluation of pericardial diseases  
- To learn the differential diagnoses of pericardial diseases

5:15 PM  
**Specific Aspects of Pediatric Imaging**  
Matthew A. Harris, MD, Children’s Hospital of Philadelphia  
*Learning Objectives*  
- Acquire better images of pediatric patients through manipulating image acquisition parameters and sequence selection  
- Overcome the challenges of artifacts due to motion, implantable devices, and ECG gating  
- Identify imaging planes and physiologic data essential for assessment prior to congenital heart surgery

5:35 PM  
**Congenital Heart Disease**  
Rachel Wald, MD, Toronto General Hospital  
*Learning Objectives*  
- Understand the strengths of and indications for CMR in the study of congenital heart disease  
- Appreciate how emerging CMR techniques can be used in the evaluation of congenital heart disease  
- Apply CMR techniques for the examination of common congenital heart lesions.

5:55 PM  
**Closing Remarks**

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*At the conclusion of this presentation, the attendee should be better able to:*
Thursday, January 21, 2010

**High-Field Cardiovascular Imaging/Basic Science**

**Pre-Conference Course - This session is endorsed by the ISMRM.**

Thursday, January 21, 2010

**9:00 AM – 5:00 PM  Deer Valley Room**

Chairs: Frederick H. Epstein, PhD, University of Virginia
Krishna S. Nayak, PhD, University of Southern California

**Educational Objectives**

• Understand the technical aspects of CMR
• Discuss barriers to implementation of High-Field 3T CMR imaging
• Understand issues related to high field MRI (3Tesla and beyond) as well as technical and basic science issues applicable to cardiac MRI at all currently used field strengths

**9:00 AM  Introduction to Morning Session on CMR at High-Field**

Krishna S. Nayak, PhD, University of Southern California

**9:05 AM  Technical Challenges and Solutions for CMR at 3T**

Krishna S. Nayak, PhD, University of Southern California

**Learning Objectives**

• List at least three technical challenges for CMR at 3T and higher
• Describe methods for reducing off-resonance artifacts in 3T CMR
• Describe methods for reducing RF shading artifacts in 3T CMR

**9:30 AM  Non-Cartesian CMR at 3T**

Craig Meyer, PhD, University of Virginia

**Learning Objectives**

• Describe some potential advantages of non-Cartesian methods for CMR at 3T
• Describe some challenges in performing non-Cartesian studies at 3T
• List some promising applications of non-Cartesian techniques at 3T

**9:55 AM  Highly Accelerated CMR**

Ricardo Otazo, PhD, New York University School of Medicine

**Learning Objectives**

• Describe the basic operation and recent developments in highly accelerated CMR techniques
• Identify CMR imaging modalities adequate for the application of compressed sensing
• Explain the current limits of performance of highly accelerated CMR technique

**10:20 AM  Coffee Break**

**10:40 AM  Introduction to Clinical CMR at High-Field**

Gerald M. Pohost, MD, University of Southern California

**10:45 AM  Clinical CMR at 3T**

Daniel Thomas, MD, PhD, University of Bonn

**Learning Objectives**

• To learn about the potential, but also the challenges and possible solutions of clinical CMR at 3T
• To be updated about the past and current literature in the field
• To get an idea of the practical value of 3T CMR in the daily clinical routine

**11:10 AM  Initial CMR Experience at 7T**

J. Thomas Vaughan, PhD, University of Minnesota

**Learning Objectives**

• Understand the problems unique to 7T CMR
• Know the technological and methodological solutions required for successful 7T CMR
• Be aware of the promise, benefits, and clinical future of 7T CMR

**11:35 AM  Panel Discussion**

**12:00 PM  Lunch (on own)**

**1:30 PM  Introduction to Afternoon Session on Fluorine in CMR**

Frederick H. Epstein, PhD, University of Virginia

**1:35 PM  Basic Chemistry/MRST**

Ralph Mason, PhD, University of Texas Southwestern Medical School

**Learning Objectives**

• Understand diversity of 19 F NMR reporter molecules
• Understand strengths and weaknesses of 19F NMR
• Understand design considerations in developing 19F NMR reporters

**2:00 PM  Hardware and Methods**

Jochen Keupp, PhD, Philips Research Hamburg

**Learning Objectives**

• Understand hardware requirements for fluorine MRI and benefits of dual-tuned spectrometers and RF coils
• Understand the potential of interleaved or simultaneous F-19/H-1 sequences
• Describe merits and challenges of F-19 MRI based on imaging agents (specificity, sensitivity)

*At the conclusion of this presentation, the attendee should be better able to:
High-Field Cardiovascular Imaging/Basic Science Pre-Conference Course - This session is endorsed by the ISMRM.

2:25 PM  Molecular Imaging Applications
Samuel Wickline, MD, Washington University School of Medicine

Learning Objectives*
• Understand the role of fluorine nanoparticles for magnetic resonance molecular images
• Understand the clinical applications of fluorine molecular imaging with MRI
• Understand the hardware and extreme needs for fluorine molecular MR imaging

2:50 PM  Coffee Break

3:20 PM  MR Tracking Using a Fluorine-Filled Catheter
Sebastian Kozerke, PhD, Institute for Biomedical Engineering University and ETH

Learning Objectives*
• Summarize fundamental principles of device visualization
• Identify suitable compounds and imaging requirements
• Outline a basic setup for fluorine based device tracking

3:45 PM  Use of Perfluorocarbon-based MRI Agents for Tracking Therapeutic Cells Post-transfer and Inflammation Detection
Eric T. Ahrens, PhD, Carnegie Mellon University

Learning Objectives*
• Become familiar with "ex vivo" and "in situ" cell labeling methods using perfluorocarbon-based MRI cell tracer reagents
• The use of perfluorocarbon-based reagents for preclinical research as a rapid, quantitative assay to access therapeutic cell biodistribution and inflammation in animal models in vivo or in fixed tissue
• Become familiar with perfluorocarbon-based cell labeling as a potential surrogate biomarker for cell tracking in clinical trials

4:10 PM  Angiography and Signal Quantification
Anne M. Neubauer, PhD, University of Colorado – Denver

Learning Objectives*
• Understand the use of 19F as a contrast agent for quantitative spectroscopy and imaging
• Explain the potential benefits of 19F imaging for MR angiography
• Discuss the use of perfluorocarbon nanoparticles for 19F angiography and quantitative imaging

4:35 PM  Panel Discussion

*At the conclusion of this presentation, the attendee should be better able to:

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Trainee Member  Physicians in training, doctoral candidates and post-doctoral fellows who are receiving training, experience or competence in cardiovascular magnetic resonance. Trainee members are eligible for up to 4 years and must provide a letter of verification of active training from their institution yearly. Trainee members may vote and serve on committees.

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Emeritus Member  Emeritus member status is available to a member in good standing for the previous five years who is retired from active practice, teaching and research, and is at least 65 years of age. Applications are reviewed and approved by the Executive Committee. Emeritus members cannot hold elected office or serve as committee chairs, but do receive member discounts to meetings, may vote and serve on committees.
**Scientific Sessions Agenda**

**Friday, January 22, 2010**

7:00 AM - 8:00 AM  
**Continental Breakfast**  
Valley of the Sun Foyer

8:00 AM - 8:15 AM  
**Welcome**  
Christopher M. Kramer, MD, President of SCMR

8:15 AM – 10:00 AM  
**Opening Plenary**

Moderators: Andrew Arai, MD, Program Chair, NHLBI-National Institutes of Health  
Sven Plein, MD, PhD, Program Co-Chair, University of Leeds

8:25 AM  
**Why Outcomes Data and Cost-effectiveness Research Is Critical to Cardiac Imaging**  
Leslee Shaw, PhD, Emory University

*Learning Objectives*  
- Understand the need for high quality outcomes research to guide healthcare coverage and medical necessity decisions  
- Comprehend the principles of cost effectiveness analysis  
- Understand the current health policy climate for CV imaging

8:45 AM  
**Thalassemia - An Example Where CMR Has Changed Patient Management and Outcomes**  
Dudley J. Pennell, MD, Royal Brompton Hospital

*Learning Objectives*  
- Understand the role of t2* CMR in determining prognosis in thalassemia  
- Understand the relative value of t2* CMR serum ferritin and liver iron for prognosis  
- Understand how tailored iron dilation for the heart reduces mortality

9:05 AM  
**Coronary Disease - A Challenge to the CMR Community to Produce Outcomes and Cost Effectiveness Data**  
Christopher M. Kramer, MD, University of Virginia Health System

*Learning Objectives*  
- Know about past CMR studies of outcomes and cost-effectiveness in ischemic heart disease.  
- Understand why we need additional CMR studies of outcomes and cost-effectiveness in ischemic heart disease  
- Recognize the goals and design of the SCMR-AMI study

9:25 AM  
**A Challenge to the CMR Community to Produce Outcomes Data for Congenital Heart Disease**  
Mark Fogel, MD, Children’s Hospital of Philadelphia

*Learning Objectives*  
- Understand the need for imaging and outcomes trials  
- Know the reason why imaging based outcomes trials are important in congenital heart disease  
- Know the history of imaging based outcomes trials in congenital heart disease and how to organize one

9:45 AM  
**Panel Discussion**

10:00 AM - 10:30 AM  
**Refreshment Break/Opening of Exhibits/ Poster Viewing – Not accredited for CME**  
(authors not present)

10:30 AM - 12:00 PM  
**Concurrent Sessions**

10:30 AM - 12:00 PM  
**Parallel Session – Economics, Cost-effectiveness, Medicolegal**

Moderators: Scott Flamm, MD, Cleveland Clinic  
Edward T. Martin, MD, Oklahoma Heart Institute

10:35 AM  
**History of CMR Reimbursement**  
Edward T. Martin, MD, Oklahoma Heart Institute

*Learning Objectives*  
- Explain the differences between the old CMR CPT codes and the new  
- Be able to identify which ancillary billing codes can and cannot be used with the new CPT codes  
- Know the differences between the hospital and outpatient CMR reimbursement

10:50 AM  
**Cost-Effectiveness with a focus on CMR**  
Rory Hachamovitch, MD, MSc, University of Southern California

*Learning Objectives*  
- Understand the limitations of current techniques of evaluating non-invasive testing  
- Understand the methods and limitations of cost analyses  
- Understand the future constructs and expectations of validating technology

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*At the conclusion of this presentation, the attendee should be better able to:
11:05 AM  Cost-effectiveness Research and Outcomes Related to Cardiovascular Imaging
Rita F. Redberg, MD, MSc, University of California – San Francisco

Learning Objectives*
• To understand the data on risks and benefits needed for cost-effectiveness of cardiovascular imaging
• To understand what endpoints are clinically useful outcomes for cardiovascular imaging
• To understand the special challenges of evaluating cost-effectiveness for diagnostic testing compared to therapies

11:20 AM  Impact of CMR on Patient Management - European Multicenter Registry Results
Oliver Bruder, Elizabeth Hospital Essen

Learning Objectives*
• Understand the major indications of CMR in clinical practice
• Know about the safety and diagnostic quality of CMR in clinical practice
• Acknowledge that CMR has a strong impact on patient management

11:35 AM  The Scientific Background behind Medicolegal Aspects of Gadolinium and NSF
Martin R. Prince, MD, PhD, Cornell and Columbia Universities

Learning Objectives*
• Understand what factors contribute to risk of Nephrogenic systemic fibrosis
• Use gadolinium in renal failure and dialysis patients with a minimum of risk
• Understand the relative risks of NSF versus anaphylaxis and how to balance risk versus benefit in MRI patients

11:50 AM  Panel Discussion

10:30 AM - 12:00 PM  Valley of the Sun – DE

Oral Abstract Session I - Young Investigators Award – Clinical
Moderators: Andrew Arai, MD, NHLBI-National Institutes of Health;
Sven Plein, MD, PhD, University of Leeds

10:35 AM  O1  Late gadolinium enhancement in cardiac sarcoidosis predicts ICD implantation and appropriate discharge
Joyce L. Wong, MRCP, PhD, Royal Brompton and Harefield Foundation Trust

Retrospective analysis of the outcome of 85 consecutive patients with proven sarcoidosis referred for CMR, over a mean 3.5 year period, demonstrated that late gadolinium enhancement in this cohort was not associated with an adverse outcome.

10:47 AM  O2  Prognostic significance and determinants of myocardial salvage assessed by cardiovascular magnetic resonance in acute reperfused myocardial infarction
Ingo Eitel, MD, University of Zeipzig Heart Center

This study demonstrates that myocardial salvage assessed by CMR predicts outcome in acute reperfused STEMI. Therefore, myocardial salvage assessment has important implications for patient prognosis, and for the design of future trials intended to test new reperfusion therapy efficacy.

10:59 AM  O3  Detection of hemodynamically significant coronary stenoses with k-t SENSE-accelerated Myocardial Perfusion MR Imaging at 3.0 Tesla - a comparison with fractional flow reserve
Tim Lockie, MBChB, Rayne Institute, St. Thomas Hospital
k-t SENSE accelerated perfusion MR at 3T accurately detects flow-limiting coronary disease as defined by FFR, with good inter-observer agreement. The high specificity may be the result of the high spatial resolution at which endocardial dark rim artifacts are reduced.

11:11 AM  O4  Additional impact of microvascular obstruction assessed by magnetic resonance imaging on long-term outcome after st-elevation myocardial infarction - a comparison to traditional prognostic markers
Suzanne de Waha, MD, University of Zeipzig Heart Center

The presence and extent of MO is a strong independent predictor for the occurrence of death, non-fatal myocardial reinfarction and congestive heart failure after STEMI even in the setting of traditional prognostic markers and scores.

11:23 AM  O5  Fragmented QRS complex and late gadolinium enhancement characterization of unrecognized myocardial scar provided complementary prognosis of cardiac death in patients with suspected coronary artery disease
Edward Hsiao, MD, Brigham and Women's Hospital

Fragmented QRS complex on ECG and unrecognized myocardial scar detected by LGE are robust and complementary prognostic factors for cardiac death in patients with clinical suspicion and risk factors for coronary artery disease.

11:35 AM  O6  Prognostic CMR predictors of adverse outcomes in patients with suspected ARVC
Monica Deac, MD, Royal Brompton and Harefield Foundation Trust

In a patient population with suspected ARVC, several CMR imaging parameters tend to predict worse clinical outcomes. However, decreased RVEF was the only variable in our study significantly associated with an increased risk of major adverse cardiovascular events.

*At the conclusion of this presentation, the attendee should be better able to:
11:47 AM  Discussion

10:30 AM - 12:00 PM  Paradise Valley Room

Oral Abstract Session II – Electrophysiology and Intervention
Moderators: Frederick Epstein, PhD, University of Virginia
Michael Hansen, PhD, NHLBI-National Institutes of Health

10:35 AM  O20  Rapid right ventricular pacing with mr-compatible pacemaker lead for magnetic resonance-guided aortic balloon valvuloplasty in swine
Mirja Neizel, MD, University Hospital Duesseldorf
The study demonstrates that rapid right ventricular pacing with MR-compatible pacemaker lead during MR-guided aortic valvuloplasty is feasible and effective. These findings may help to translate MR-guided valvuloplasty in men.

10:47 AM  O21  Whole-heart magnetic resonance imaging for visualization of venous anatomy and myocardial scar using slow infusion of Gd-BOPTA in single exam
Simon G. Duckett, MRCP, King's College London
Assessment of coronary venous anatomy and myocardial scar in heart failure patients using a slow infusion of Gd-BOPTA. We demonstrated in twelve heart failure patients the coronary venous anatomy and scar in a single MRI examination.

10:59 AM  O22  Does MRI lend insight into septal enhancement patterns? The significance of conduction defects on EKG
Ketheswaram Caruppannan, MD, Allegheny General Hospital
The conduction system appears to be relatively ‘immune’ to disorders typically depicted by resolved infarct imaging. We show for the first time that infarct presence or absence does not materially predict either presence, absence or even type of conduction disorder.

11:11 AM  O23  Magnetic Resonance (MR) Imaging of the cardiac venous system and MR-guided intubation of the coronary sinus in swine: a feasibility-study
Mirja Neizel, MD, University Hospital Duesseldorf
The aim of this study was to visualize the cardiac venous system (CVS) using magnetic resonance and to demonstrate the feasibility of MR-guided intubation of the CVS in swine. We showed that MR-visualization and MR-guided intubation of the CVS is feasible.

11:23 AM  O24  Closed chest transthoracic perventricular ventricular septal defect closure under real-time MRI
Kanishka Ratnayaka, MD, NHLBI – NIH
We describe a novel, non-surgical alternative to open-chest perventricular device closure of ventricular septal defect using real-time MRI. We establish proof-of-concept in a novel swine model of muscular ventricular septal defect.

11:35 AM  O25  Visualization of ablation lesions by dynamic contrast-enhanced (DynCE) MRI
Andriy Shmatukha, PhD, General Electric Healthcare
We report a novel method for analyzing MRI-apparent contrast uptake dynamics, which allows robust and quick visualization of RF lesions (non-perfused lesion core, hyper-enhanced lesion border and normal tissue) during contrast enhancement onset, which conventional methods are not suited to.

11:47 AM  O26  MR cine DENSE imaging demonstrates more effective identification of dyssynchrony in heart failure with circumferential and longitudinal strain versus radial strain
Adam Helms, MD, University of Michigan
MR DENSE-based measures of circumferential dyssynchrony best distinguished between heart failure with and without left bundle branch block, while longitudinal dyssynchrony appeared more effective than radial dyssynchrony for this purpose.

10:30 AM – 12:00 PM  Cave Creek Room

Cases with the Experts – Congenital Heart Disease
Panel of Experts: Beth J. Printz, MD, PhD, Rady Children's Hospital San Diego
Andrew J. Powell, MD, Children's Hospital Boston
David J. Sahn, MD, Oregon Health and Science University
Carsten Rickers, MD, University Hospital Schleswig-Holstein

12:00 PM - 12:30 PM  Valley of the Sun – C

SCMR Business Meeting

12:30 PM - 1:30 PM  Lunch on own/Exhibits/Poster Viewing – Not accredited for CME (authors not present)

Legend:  Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
## Scientific Sessions Agenda

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<td>Bernhard Gerber, MD, University of Brussels; Sven Plein, MD, PhD, University of Leeds</td>
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<td>CMR for Assessment of Chest Pain Syndromes in the ER - The Quadruple Rule-out</td>
<td>Stefan Neubauer, MD, John Radcliffe Hospital</td>
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<td>MDCT for Assessment of Chest Pain Syndromes in the ER</td>
<td>Kavitha Chinnaiyan, MD, William Beaumont Hospital</td>
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<td>CMR Evaluation of Stem Cell Treatment in IHD</td>
<td>Dara Kraitchman, VMD, PhD, Johns Hopkins University – School of Medicine</td>
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<td>Is the Grey Zone Partial Volume or Partial Infarction and Does It Matter?</td>
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<td>Oral Abstract Session III - Young Investigators Award – Experimental</td>
<td>O14 MRI and CT tracking of mesenchymal stem cells with novel perfluorinated alginate microcapsules</td>
<td>Yingli Fu, PhD, Johns Hopkins University</td>
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<td>1:35 PM</td>
<td>O15 Cardiac imaging at 7.0T: Comparison of pulse oximetry, electrocardiogram and phonocardiogram triggered 2D-CINE for LV-function assessment</td>
<td>Tobias Frauenrath, Dipl.-Ing, Max Delbrück Center for Molecular Medicine (MDC)</td>
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<td>1:47 PM</td>
<td>O16 Equilibrium contrast CMR for the measurement of diffuse myocardial fibrosis</td>
<td>Andrew S. Flett, MBBS BSc, The Heart Hospital</td>
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*At the conclusion of this presentation, the attendee should be better able to:*
Scientific Sessions Agenda

2:11 PM  O17  An isolated pig heart for the development, validation and translation of novel magnetic resonance techniques
Andreas Schuster, MD, King's College London
We are introducing a novel MR-compatible, explanted, blood-perfused and free-beating pig heart model that allows excellent control of physiological parameters, validation against gold standards, and easy translation of novel methods to patients using identical equipment and imaging sequences.

2:23 PM  O18  Normobaric hypoxia elevates free fatty acids and impairs cardiac energetics and diastolic function in normal human volunteers
Cameron J. Holloway, MBBS(hons1), MRCP, FRACP, University of Oxford
After hypoxic exposure, LV dysfunction is consistently observed in human heart. We found short term hypoxia led to rapid changes in free fatty acids and cardiac PCr/ATP. Hypoxia may elevate FFAs and lead to impaired cardiac metabolism and dysfunction.

2:35 PM  O19  On the mechanism of myocardial edema contrast in T2-STIR images
Xiangzhi Zhou, PhD, Northwestern University
In addition to T2-weighting, edema detection in acute myocardial infarcts with T2-STIR imaging has substantial weighting from proton density changes. Approaches that combine both PD and T2 contrast are expected to be the most sensitive for detecting myocardial edema.

2:47 PM  Discussion

1:30 PM - 3:00 PM  Paradise Valley Room

Oral Abstract Session IV – CMR as a Predictor of Outcome
Moderators: Gregory M. Lanza, MD, PhD, Washington University
Michael McConnell, MD, Stanford University School of Medicine

1:35 PM  O7  Prognostic importance of left ventricular hypertrophy in patients undergoing dobutamine stress testing
Charaslak Charoenpanichkit, MD, Wake Forest University
The results of this study demonstrate that left ventricular hypertrophy (LVH) is associated with an adverse cardiac prognosis even if there are no inducible wall motion abnormalities during dobutamine stress.

1:47 PM  O8  Long-term prognostic significance of late gadolinium enhancement in non-ischemic dilated cardiomyopathy: further evidence from 184 patients
Stephanie Lehrke, MD, Medizinische Universitätsklinik Heidelberg
This study supports earlier reports regarding the prognostic significance of LGE in patients with DCM. LGE is associated with a more pronounced remodeling and a worse long-term prognosis in these patients.

1:59 PM  O9  Long-term prognostic value of dobutamine cardiovascular magnetic resonance in 1466 patients and its value for clinical decision making
Sebastian Kelle, MD, German Heart Institute Berlin
DCMR has an added value for predicting late cardiac events during long-term follow-up. Patients with inducible WMA and following early revascularization, demonstrate lower cardiac event rates than patients with medical therapy alone.

2:11 PM  O10  Weight reduction surgery is associated with substantial long term reduction in left ventricular mass
Rajarshi Banerjee, MRCP DipPH, University of Oxford
Over 3 years, weight reduction surgery is associated with a significant progressive reduction in LV mass (25.5 ± 8.3%), which continues even after BMI has stabilized after 1 year.

2:23 PM  O11  The predictive value of normal CMR scans in patients with suspected ARVC - an outcomes study
Monica Deac, MD, Royal Brompton & Harefield Foundation Trust
A normal CMR scan in patients with suspected ARVC reliably predicts long term major cardiovascular event-free outcomes.

2:35 PM  O12  Combined stress myocardial perfusion and late gadolinium enhancement imaging by cardiac magnetic resonance provides robust prognostic data to cardiac events
Otavio R. Coelho-Filho, MD, Brigham and Women's Hospital
We hypothesize that RevPD provides incremental prognostic information beyond LVFE/LGE. We studied 473 patients. Presence of RevPD and LGE portended to >6 and >2.6-fold increase in MACE. RevPD provides strong incremental prognostic information.

Legend:  Gen = General, Cgen = Congenital, Bsci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
Prognostic value of dobutamine cardiovascular magnetic resonance in patients with peripheral arterial disease

Sebastian Kelle, MD, German Heart Institute Berlin

In patients with peripheral arterial disease, dobutamine stress cardiovascular magnetic resonance has an added value for predicting cardiac events during long-term follow-up.

1:30 PM – 3:00 PM

Cases with the Experts - Cases from the London CMR

Panel of Experts:
Chiara Bucciarelli-Ducci, MD, Royal Brompton Hospital
Tom Burchell, MD, London Chest Hospital
Amedeo Chiribiri, MD, King's College London
Derek Hausenloy, MD, University College of London
Anna M. Herrey, MD, The Heart Hospital
Christian Jansen, MD, King's College London
Saidi Mohiddin, MBchB, London Chest Hospital
Rory O'Hanlon, MD, Royal Brompton Hospital
Mark Westwood, MD, London Chest Hospital

Learning Objectives*

- Understand the clinical utility of CMR
- Understand the role of CMR as part of advanced cardiac imaging
- Consolidate the clinical indications for and subsequent management based on CMR

3:30 PM - 5:00 PM

Parallel Session - Molecular Imaging

Moderators: Brent A. French, PhD, University of Virginia
Gregory M. Lanza, MD, PhD, Washington University

3:50 PM T1w Molecular Imaging with Non-gadolinium Nanoparticles

Shelton D. Caruthers, PhD, Washington University

Learning Objectives*

- Familiar with the physics behind creation of T1 and T2 contrast enhancement in images
- Appreciate the use of metals other than gadolinium as contrast agents
- Have an understanding of the different requirements for molecular imaging, (i.e. site-targeted contrast) agents vs. "standard” blood pool agents

4:05 PM Molecular MR Imaging of Myocardial Infarction

David E. Sosnovik, MD, Harvard Medical School

Learning Objectives*

- Be familiar with the key molecular and cellular events in the myocardium in ischemic heart disease
- Be familiar with the various imaging agent platforms used for molecular imaging in the myocardium, and their respective strengths and limitations
- Have a broad idea of the experience to date with molecular MRI of the myocardium in vivo

4:20 PM Prospects for Clinical Translation of MR Molecular Imaging: Hype or Hope?

Samuel A. Wickline, MD, Washington University – School of Medicine

Learning Objectives*

- Understand the potential role of MRI molecular imaging in early diagnosis of atherosclerosis and unstable lesions
- Understand the sensitivity, specificity, and quantitative potential for new nano scale MR contrast agents
- Identify appropriate uses of new molecular imaging agents for clinical diagnosis and as adjunctive agents in therapeutics

4:50 PM Panel Discussion

Utility of Cardiac MRS in Diabetes/Metabolic Syndrome

Hildo J. Lamb, MD, PhD, Leiden University Medical Center

Learning Objectives*

- Understand technical principles of human cardiac double triggered 1H-MRS
- Understand physiological aspects of myocardial triglyceride metabolism
- Understand and apply knowledge of myocardial triglyceride metabolism to patients with the metabolic syndrome, including diabetes type 2
3:30 PM – 5:00 PM  Oral Abstract Session V – Congenital Heart Disease  
Moderators: Gerald F. Greil, MD, King’s College London  
Andrew M. Taylor, MD, UCL Institute of Child Health

3:35 PM  O27  Dilation of ascending aorta in Turner syndrome - short-term follow-up  
Kristian H. Mortensen, MD, Aarhus University Hospital  
The first prospective MRI follow-up study of aortopathy in adult Turner syndrome, assessing the entire thoracic aorta with a mean follow-up time of 2.4 years.

3:47 PM  O28  Optimizing the accuracy and reproducibility of aortic root measurements from cardiac MRI data  
Marina L. Hughes, MD, UCL Institute of Child Health & Great Ormond Street Hospital for Children  
Cardiac MRI is an ideal modality for monitoring aortopathy but reliable only with specific and consistent measurements. The aortic root of 20 aortopathic pediatric patients was measured by a single observer. Optimal methodology is demonstrated, but notable intra-observer variability persists.

3:59 PM  O30  Lack of relationship between right ventricular volume, degree of pulmonic regurgitation (PR) and left ventricular function in repaired Tetralogy of Fallot (TOF)  
Harold Litt, MD, PhD, University of Pennsylvania School of Medicine  
There is no significant relationship between LV function and RV size or degree of PR in adults with repaired TOF.

4:11 PM  O31  Free breathing high temporal resolution time resolved contrast enhanced MRA (4D MRA) at high heart rates using keyhole SENSE CENTRA in congenital heart disease  
Rajesh Krishnamurthy, MD, Texas Children's Hospital  
Respiratory synchronized CEMRA technique using a combination of SENSE, keyhole, and centric data acquisition provides good quality 4D MRA images capable of temporally resolving contrast bolus passage in neonates, infants and children with high heart rates during free breathing.

4:23 PM  O32  Development and validation of 3 Tesla functional cardiac magnetic resonance imaging in preterm and term newborns  
Alan Groves, MD, Imperial College London  
Methods for optimization and validation of quantitative CMR in preterm and term newborn infants are presented. Cine and phase contrast measurements of cardiac output and systemic perfusion in the newborn are accurate and repeatable.

4:35 PM  O33  Quantitative myocardial blood flow in children with normal and abnormal coronary arteries using adenosine infusion magnetic resonance imaging  
Erin J. Madriago, MD, Oregon Health and Science University  
Adenosine infusion magnetic resonance imaging is a useful method for quantifying myocardial blood flow in children with and without congenital heart disease. This is the first study to establish normative pediatric data.

4:45 PM  Discussion

3:30 PM - 5:00 PM  Oral Abstract Session VI – CMR in Ischemic Heart Disease  
Moderators: Patricia Bandettini, MD, National Institutes of Health  
Jane H. McCrohon, PhD, St. Vincent’s Hospital

3:35 PM  O34  Blood oxygen level-dependent Magnetic Resonance Imaging at 3 Tesla in coronary artery disease: validation using quantitative coronary angiography and Cardiovascular Magnetic Resonance perfusion imaging  
Jayanth R. Arnold, BMBCh, MA, MRCP, John Radcliffe Hospital  
Blood Oxygen Level-Dependent Magnetic Resonance Imaging at 3 Tesla is comparable with first-pass perfusion imaging, and yields favorable diagnostic accuracy in the detection of significant coronary artery disease.

3:47 PM  O35  Fused 3-dimensional whole-heart coronary artery, coronary vein and myocardial scar imaging at 3T: feasibility in patients with ischemic and non-ischemic cardiomyopathy  
James A. White, MD, London Health Sciences Centre  
Simultaneous imaging of myocardial scar and vascular targets may assist planning of cardiac resynchronization and coronary revascularization. Feasibility is demonstrated using a 3T whole-heart approach. Image quality was excellent for proximal-mid vessels and image fusion with volumetric display is demonstrated.

3:59 PM  O36  Negative predictive value of normal adenosine-stress cardiac magnetic resonance imaging in the assessment of coronary artery disease  
Guenter Pilz, MD, FESC, University of Munich  
The CMR exam’s very high negative predictive value for CAD supports CMR-based decision making in CAD work-up to reduce the rate of superfluous diagnostic coronary angiographies.

Legend: Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
4:11 PM O37 Degree of mitral regurgitation and left ventricular scarring are more powerful predictors of long-term outcomes than volumes and sphericity: a multi-modality imaging study in patients with severe ischemic cardiomyopathy

Deborah Kwon, MD, Cleveland Clinic Foundation

In ICM patients with severe LV dysfunction, degree MR and myocardial scarring (particularly inferior scar) are better predictors of long-term outcomes, as compared to LV volumes, EF or sphericity.

4:23 PM O38 Recanalization of coronary chronic total occlusion guided by cardiovascular magnetic resonance imaging and its relation with health outcome measures

Chiara Bucciarelli-Ducci, MD, Royal Brompton Hospital

Recanalization of CTO guided by CMR reduced ischemic burden and improved left ventricular function. In a cohort of patients with limited angina, these imaging hallmarks of successful revascularization are related with improved health outcome measures.

4:35 PM O39 Pre-operative ischemia on CMR stress perfusion is a marker for prolonged post-operative stay after coronary artery bypass grafting

Joyce Wong, MRCP, PhD, London Chest Hospital

We assessed the prognostic role of CMR stress perfusion on early post-CABG outcomes over a mean of 6 months. 6 or more ischemic segments or 3 or more non-viable segments detected by LGE are associated with a longer post-operative stay.

4:47 PM O40 Effect of improving spatial or temporal resolution with k-t SENSE acceleration in first pass CMR myocardial perfusion imaging

Neil Maredia, MB ChB, University of Leeds

A comparison of different implementations of k-t SENSE acceleration to optimize spatial and/or temporal resolution in first pass CMR myocardial perfusion imaging.

3:30 PM – 5:00 PM Cases with the Experts

Panel of Experts:
W. Gregory Hundley, MD, Wake Forest University - Stress Tests and Cardiomyopathy
Mouaz Al-Mallah, MD, MSc, Wayne State University - Cardiomyopathy/Connective Tissue Disease

Learning Objectives*
- Identify the characteristics of cardiac sarcoidosis on MRI
- Identify the characteristics of cardiac amyloidosis on MRI
- Identify the characteristics of cardiac dilated cardiomyopathy on MRI

Legend: Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
Abnormal pulse wave velocity in bicuspid aortic valve: comparison to trileaflet aortic valve and the impact of aortic regurgitation
Prabhakar Rajiah, MBBS, MD, FRCR, Cleveland Clinic Foundation

There are minor differences in aortic stiffness between grades of AR in BAV and trileaflet valves. However, controlling for aortic size there is no statistically significant difference between the groups, making uncertain the etiology for abnormal aortic stiffness.

Myocardial trajectory estimation for 2D cine DENSE MRI using thin plate splines
Andrew D. Gilliam, PhD, University of Virginia

A critical stage in the quantification of myocardial displacement and strain from raw cine DENSE images, the transformation of directly measured Eulerian displacement vectors into easily interpreted Lagrangian tissue trajectories, is improved using thin plate approximating splines.

Feasibility of automated frame-by-frame myocardial segmentation as a basis for quantification of first-pass perfusion images
Victor Mor-Avi, PhD, University of Bologna

We developed a technique for endo-epicardial border detection as a basis for automated quantification of myocardial perfusion. We tested it on a set of 24 first-pass image sequences and found that it yields contrast enhancement curves with excellent noise levels.

Feasibility and validation of estimating Global LV functional indices from limited projections using a Modified Simpson's Algorithm
Ramkumar Krishnamurthy, MS, Rice University

We successfully validated a modified Simpson's algorithm to measure global LV functional indices (EDV, ESV and EF) from three short-axis slices acquired at basal, mid and apical locations. The results from 20 normal volunteers were comparable to expert's manual measurements.

Ultrafast in-line computation of ejection fraction from cardiac cine steady-state free precession (SSFP) images
Amol Pednekar, PhD, Philips Healthcare

We successfully integrated the real-time computation of global LV functional indices (EDV, ESV, and EF) as a part of the acquisition on the scanner console. The results on 12 patients are comparable to that of the typical inter-observer variability.

Myocardial fibrosis by delayed enhancement cardiovascular magnetic resonance and HCV infection in thalassemia major patients
Massimo Lombardi, MD, "G Monasterio" Foundation and Institute of Clinical Physiology

HCV infection can be involved in the pathogenesis of myocardial fibrosis in the multi-transfused Thalassemia Major patients, who could therefore benefit from therapeutic interventions directed towards the eradication of HCV.

Dilated cardiomyopathy risk stratification; the vital role of CMR
Jose V. Venero, MD, Allegheny General Hospital

Using standard CMR, the presence of a mid-wall stripe is remarkably predictive in non-ischemic CMX patients for LVAD and/or Transplantation need over the ensuing 6 months. No other clinical metric by multivariate analysis predicted LVAD/transplantation need.

Prognostic significance of myocardial fibrosis in hypertrophic cardiomyopathy using cardiovascular magnetic resonance
Rory O’Hanlon, MRCPI, Royal Brompton Hospital

We sought to investigate the prognostic significance of fibrosis detection by cardiovascular magnetic resonance (CMR) to predict major clinical events in HCM using the late gadolinium-enhanced (LGE) technique.

Myocardial scar in pulmonary hypertension: relationship to pulmonary hemodynamics, right ventricular function and remodeling
Monda L. Shehata, MD, Johns Hopkins University

Our study shows that total scar burden at the right ventricle (RV) septal insertions is predicted by measures of RV remodeling. Additionally, local scar mass at the basal anterior septal insertion is associated with reduced regional longitudinal contractility.

Late gadolinium enhancement patterns on cardiac magnetic resonance images in heart transplant patients
Patrizia Pedrotti, MD, Niguarda-Ca’ Granda Hospital

At a late post-heart transplant evaluation by CMR, myocardial late Gadolinium enhancement is highly prevalent and is more frequently observed with non ischemic-related patterns of distribution.
### Scientific Sessions Agenda

**6:05 PM**  **O53**  **Quantitative assessment of late gadolinium-enhancement in cardiac magnetic resonance predicts left ventricular remodeling in acute myocarditis**  
Julien Jeanneteau, MD, Centre Hospitalo-Universitaire  
The aim of our study was to assess the value of late gadolinium-enhancement quantification to predict left ventricular remodeling.

**6:17 PM**  **O54**  **Cardiac fibrosis and microvascular damage detected by cardiac MR are a hallmark of systemic sclerosis heart involvement**  
Martha Morelos, MD, Instituto Nacional de Ciencias Médicas y Nutrición  
Patients with systemic sclerosis show preserved systolic function, high frequency of cardiac fibrosis, diastolic dysfunction and subendocardic concentric perfusion defects, related to microvascular damage. Cardiac MRI is a sensitive, noninvasive, useful method to detect heart involvement in SSc.

**6:30 PM - 8:00 PM**  **Phoenix Ballroom – CDE**  
**Poster Session 1 – Not accredited for CME (authors present)/Wine/Cheese Reception**

**6:45 PM - 7:45 PM**  **Moderated Poster Session 1 – Clinical – Not accredited for CME**  
Moderators: Jörg Barkhausen, MD, University Hospital Lübeck  
Jürg Schwitter, MD, University Hospital Lausanne

**6:45 PM**  **M1**  **Acute injury immediately post atrial fibrillation ablation defined by MRI**  
Christopher J. McGann, MD, University of Utah  
Acute left atrial injury assessed by MRI in patients immediately post AF ablation

**6:55 PM**  **M2**  **Reperfusion hemorrhage is a marker for the severity of tissue injury in patients with acute ST-elevation myocardial infarction**  
Andreas Kumar, MD, MSc, University of Calgary  
We investigated the role of reperfusion hemorrhage in a patient study of acute myocardial infarction. Hemorrhage was associated with larger infarct size, more microvascular obstruction, and worse functional parameters of the left ventricle.

**7:05 PM**  **M3**  **Whole chest MRA and velocimetry for congenital heart disease in less than 10 minutes with 3D radial phase contrast**  
Christopher J. Francois, MD, University of Wisconsin  
Whole chest MRA and velocimetry can be reliably performed in patients with congenital heart disease in less than 10 minutes using 3D radially undersampled phase contrast. This technique allows assessment of vascular anatomy and quantification of various hemodynamic parameters.

**7:15 PM**  **M4**  **Correlation among aortic stiffness, LV scar volume, and diastolic dysfunction in hypertrophic cardiomyopathy: a cardiac MRI study**  
Prabhakar Rajiah, MBBS, MD, Cleveland Clinic Foundation  
Increased aortic stiffness, as indicated by increased PWV is evident in HCM patients, more pronounced in those with severe fibrosis than those with mild or no fibrosis, and in patients with diastolic dysfunction as compared to those absent diastolic dysfunction.

**7:25 PM**  **M5**  **Right ventricular function differs in idiopathic dilated versus ischemic cardiomyopathy**  
Olaf Grebe, MD, EVK - Duesseldorf  
Right ventricular function as measured by MRI is significantly better in patients with ischemic cardiomyopathy as compared to patients with idiopathic cardiomyopathy. This was not true for patients with additional pulmonary hypertension.

**7:35 PM**  **M6**  **Relationship of myocardial scar with cardiovascular disease risk factors in the diabetes control and complications trial (DCCT)/epidemiology of diabetes interventions and complications (EDIC) study**  
Evrim B. Turkley, MD, National Institutes of Health  
The DCCT/EDIC cohort evaluated type 1 diabetic patients by MRI for myocardial scar. Prevalence of myocardial scar was 4.3%. Age, gender and hypertension, abnormal LV mass and function, weighted HbA1c levels and macroalbuminuria were risk factors for myocardial scar.

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**Legend:**  
Gen = General, Cgen = Congenital, BSci = Basic Science
SCMR invites you to meet the poster presenters of posters P1-P148 on Friday evening during the Wine and Cheese Reception. Please note that posters will be available to view on Friday, January 22 from 10:00 am – 7:00 pm. On Saturday, January 23 posters, P149-P311, will open at 9:00 am and conclude at 3:45 pm. SCMR cannot be responsible for removing and/or returning posters. All posters not removed will be discarded.

FRIDAY CATEGORIES AND POSTER NUMBERS:

**Congenital Heart Disease:** P1 - P31
**Coronary MR:** P32 - P54
**Electrophysiology and Intervention:** P55 - P66
**New Methods in Cine and Function CMR:** P67 - P94
**New Methods in Contrast Enhanced and Morphological CMR:** P95 - P119
**Physiology and Metabolism:** P120 – P128
**Vascular MR –** P129 – P148

- **Agarwal, Harsh**  P49  |  Navigator techniques for coronary MRA at 7T
- **Akcakaya, Mehmet**  P36  |  Accelerated coronary mri using compressed sensing with transform domain dependencies: a feasibility study
- **Amundsen, Brage**  P113  |  Effect of low-dose dobutamine on myocardial uptake of manganese - a possible viability marker in cardiac MRI
- **Anand, Reena**  P69  |  Quantitative assessment of atrioventricular plane displacement in normal and diastolic heart failure-a cine MRI study
- **Arief, Zainal**  P48  |  Development of automated and semi-automated analysis software for coronary rest period
- **Bahl, Manisha**  P95  |  Cardiac magnetic resonance whole-heart two-dimensional single-breathhold and navigator-guided three-dimensional free-breathing quantification of infarct size are accurate alternative techniques to standard two-dimensional late gadolinium enhancement imaging
- **Bakhos, Lara**  P56  |  Ejection fraction is not sensitive for the identification of high infarct mass
- **Bhat, Himanshu**  P32  |  Contrast-enhanced whole-heart coronary magnetic resonance angiography (MRA) in less than 5 minutes using radial EPI
- **Biasiolli, Luca**  P138  |  SE_MC sequence improves image quality of carotid arteries and atherosclerotic plaques
- **Biederman, Robert**  P140  |  Can 3D-CMR solve the apparent disassociation between carotid artery plaque and outcomes?
- **Bolen, Michael**  P141  |  Impact of sequence choice on flow measurement by phase contrast in the ascending aorta: breath hold and non breath hold
- **Bönn, Florian**  P80  |  Patient selection and definition of transcatheter prosthesis size using magnetic resonance imaging: initial experience
- **Buchholz, Stefan**  P114  |  Cocaine-induced myocardial injury identified as multiple mid-wall foci of enhancement by contrast-enhanced cardiac MRI and large troponin rise
- **Cao, Jie**  P96  |  Prolonged pulmonary transit time by cardiac MRI is a marker of hemodynamic derangement in patients with congestive heart failure
- **Cao, Jie**  P105  |  The effects of respiratory cycle and body position on quantitative pulmonary perfusion by Magnetic Resonance Imaging
- **Cao, Jie**  P108  |  Impaired lung perfusion in patients with congestive heart failure by quantitative MRI perfusion
- **Carlhol, Carl Johan**  P70  |  Quantification of 4D left ventricular blood flow organization in normal and failing hearts
- **Chan, Cheuk**  P135  |  The conundrum of ECG-gated carotid arterial imaging with navigator corrected respiratory motion
- **Chang, Tsun-Hou**  P22  |  Lack of relationship between right ventricular volume, degree of pulmonic regurgitation \( \text{(PR)} \) and left ventricular function in repaired Tetralogy of Fallot (TOF)
- **Chaturvedi, Abhishek**  P78  |  Efficiency and reproducibility of the right ventricular long axis imaging plane for the evaluation of right ventricle
- **Chen, Yu-Po**  P23  |  Diagnosis of coarctation with MR using carotid-subclavian artery index
- **Chen, Liyong**  P148  |  Undersampled phase-contrast imaging of the carotid arteries
- **Chughtai, Haroon**  P126  |  Visceral fat is associated with an adverse increase in the thickness of the wall of the ascending thoracic aorta
- **Chung, Yu-Chu**  P94  |  Centric reordered echo planar imaging (EPI) for phase contrast MRI
- **Clarke, Christopher**  P21  |  Assessment of the accuracy and reproducibility of right ventricular volume measurements in patients with congenital heart disease
- **Codreanu, Ion**  P127  |  New details of reflected pressure wave propagation on left ventricular segments
- **Crean, Andrew**  P18  |  3D echo systematically underestimates right ventricular volume compared to cardiac magnetic resonance in a population with adult congenital heart disease
- **Crussell, Carl**  P81  |  Intracardiac cardiovascular magnetic resonance velocity mapping: comparison of k-t BLAST and SENSE accelerated 4D acquisitions with 2D-flow at 1.5T and 3T
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Saturday, January 23, 2010

Scientific Sessions Agenda

7:00 AM – 8:00 AM  Cave Creek Room  Cases with the Experts - Cases from Clinical Practice - Acquired and Basic Congenital Heart Disease  
Panel of Experts:  John Greenwood, MBChB, PhD, University of Leeds  
Adam Mather, MD, University of Leeds  
Neil Maredia, MBChB, University of Leeds  
Sven Plein, MD, PhD, University of Leeds

8:00 AM - 9:00 AM  Valley of the Sun – DE  CMR Technology Updates/CMR Questionnaire/Continental Breakfast – Not accredited for CME

9:00 AM - 10:30 AM  Concurrent Sessions

9:00 AM - 10:30 AM  Valley of the Sun – C  Parallel Session – Perfusion  
Moderators: Edward DiBella, PhD, University of Utah  
Michael Jerosch-Herold, PhD, Brigham and Women's Hospital

9:05 AM  Technical Aspects of Perfusion that Affect Quality and Quantification  
Michael Jerosch-Herold, PhD, Brigham and Women's Hospital  
Learning Objectives*  
• Be aware of the main factors that determine the quality of myocardial perfusion studies, both for visual interpretation, and for quantitative analysis  
• Understand the criteria for distinguishing true perfusion defects from artifacts  
• Understand the prerequisites for quantification of perfusion, including the role of the arterial input of contrast, and the pitfalls from applying quantification when imaging protocols do not meet the necessary criteria

9:20 AM  Perfusion Quantification Approaching a Pixel Resolution  
Li-Yueh Hsu, PhD, LCE/NHLBI/NIH  
Learning Objectives*  
• Understand quantitative myocardial perfusion analysis of Gadolinium-enhanced first-pass perfusion CMR images  
• Learn myocardial blood flow can be quantified at the pixel level from first-pass CMR perfusion images  
• Learn how myocardial perfusion pixel maps may assist the diagnosis of coronary artery disease

9:35 AM  Predicting Prognosis with Perfusion CMR  
Raymond Kwong, MD, Brigham and Women's Hospital  
Learning Objectives*  
• Recognize the current evidence that support CMR perfusion in risk stratifying patients with suspected or known coronary artery disease  
• Identify the sequence of interpreting perfusion, late enhancement imaging, and cine function, in characterizing the burden of ischemia from coronary artery disease  
• Future direction in clinical research that will advance the knowledge of the prognostic implication of CMR perfusion imaging

9:50 AM  What Next after MR-IMPACT  
Jürg Schwitter, MD, University Hospital Lausanne  
Learning Objectives*  
• Understand the mechanisms of ischemia and viability assessment by CMR  
• Understand the indications for perfusion-CMR as evidenced from the MR-IMPACT trial  
• Understand the need of outcome data in the field of management of ischemic heart disease and should know the main features of the European CMR registry

10:05 AM  Perfusion CMR in Non-Atherosclerotic Ischemic Syndromes  
Ali Yilmaz, MD, Robert-Bosch-Krankenhaus  
Learning Objectives*  
• Gain insight into the pathophysiology of non-atherosclerotic ischemic diseases such as coronary vasospasm and syndrome X  
• Gain insight into the clinical implementation and value of perfusion-CMR in the work-up of patients with non-atherosclerotic ischemic diseases such as coronary vasospasm and syndrome X  
• Assess the diagnostic performance and practicability of perfusion-CMR in the work-up of these diseases in consideration of current literature data

10:20 AM  Panel Discussion

10:00 AM - 10:30 AM  Valley of the Sun – DE  Parallel Session - Special Topics in CMR of Congenital Heart Disease  
Moderators: Mark Fogel, MD, Children's Hospital Philadelphia  
Shi-Joon Yoo, MD, Hospital for Sick Children

9:05 AM  The Complementary Role of CT to CMR  
Stephen Cook, MD, The Ohio State University  
Learning Objectives*  
• Understand the complementary role of non-invasive imaging in the adult with complex congenital heart disease  
• Identify indications for cardiovascular CT in the adult congenital population  
• Describe conditions where information obtained by cardiovascular CT may complement the diagnostic information acquired with CMR

Legend:  Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
**Scientific Sessions Agenda**

**9:20 AM  Radiation in Cardiac Imaging**
Mark Fogel, MD, Children's Hospital Philadelphia

*Learning Objectives*  
- Understand the risks involved in radiation based imaging procedures in congenital heart disease  
- Know the indications for radiation based imaging procedures  
- Know the alternatives to radiation based imaging procedures

**9:35 AM  Challenges of CMR in Infants**
Ashwin Prakash, MD, Children's Hospital Boston

*Learning Objectives*  
- Understand the indications for CMR in infants  
- Understand the technical modifications necessary for successful CMR imaging in infants with congenital heart disease  
- Understand the limitations of CMR in infants

**9:50 AM  Kawasaki's Disease**
Gerald Greil, MD, King's College London

*Learning Objectives*  
- What is Kawasaki disease  
- Current imaging technology available and its clinical use in patients with Kawasaki disease  
- What information can cardiac MRI currently provide

**10:05 AM  CMR of Coronary Arteries in Congenital Heart Disease**
Taylor Chung, MD, Children's Hospital & Research Center Oakland

*Learning Objectives*  
- To understand current available MR techniques in pediatric coronary MRA  
- To discuss the clinical indications for pediatric coronary MRA  
- To discuss the clinical use of coronary MRA vs. coronary CTA in children

**10:20 AM  Panel Discussion**

**9:00 AM - 10:30 AM  Paradise Valley Room**

**BSci**

**Oral Abstract Session IX - New CMR Methods Studied in Animal Models and Phantoms**
Moderators: Brent A. French, PhD, University of Virginia  
Stefan Neubauer, MD, John Radcliffe Hospital

**9:05 AM  Detection of in vivo atherosclerotic plaque progression with a fibrin-targeted MR contrast agent**
Andrea J. Wiethoff, PhD, King's College London

This study aimed to investigate the feasibility of in vivo plaque fibrin detection throughout the development of atherosclerotic plaque with EP-2104R, a fibrin targeted contrast agent using an in vivo mouse model of progressive atherosclerosis.

**9:17 AM  Multi-resolution simultaneous 19F/1H 3D radial imaging for self-navigated respiratory motion-corrected and quantitative imaging**
Sheldon D. Caruthers, PhD, Washington University

Truly-simultaneous 19F/1H imaging allows correcting anatomical motion in the background-free signal of 19F imaging agents via 1H-data. 3D-radial imaging with golden-section profile ordering affords optimization of temporal, spatial resolution and SNR - individually for 1H-based motion correction and 19F-agent detection.

**9:29 AM  CION v2.0: a better way to T1 enhancement with iron oxides**
Sheldon D. Caruthers, PhD, Washington University

Rather than using T2* techniques and "typical" iron oxides, we have shown colloidal iron oxide nanoparticles (CION) as a novel T1w agent. This work presents an improved formulation for CION as a targeted T1w contrast agent and therapeutic delivery platform.

**9:41 AM  Spin-spoiler: a novel arterial spin labeling technique without the need of subtraction**
Marcelo E. Andia, MD, MSc, King's College London

We propose a novel technique to do arterial Spin labeling Angiogram without the need for subtraction. Spin-Spoiler is based on the application of a spatially-selective pulse followed by a non-selective refocusing and a tip-up pulse resulting in localized spin tagging.

**9:53 AM  Simultaneous acquisition of MRI and PET cardiac cine 3D images at 9.4 Tesla**
S David Smith, PhD, Brookhaven National Laboratory

A Positron Emission Tomography device was constructed for operation within the bore of a functioning 9.4 Tesla MicroMRI system. Three dimensional, ECG synchronized, in-vivo PET and MR images were simultaneously acquired and presented in a fully coregistered overlay cine format.

**10:05 AM  Thrombin inhibitor perfluorocarbon nanoparticles for treatment and 19F tracking of acute thrombosis**
Jacob W. Myerson, SB, Washington University

Perfluorocarbon nanoparticles functionalized with the direct thrombin inhibitor PPACK outperformed heparin in stopping acute thrombosis in mice. Retention of the nanoparticles in forming clots was assessed via 19F MR spectroscopy and imaging.

**10:17 AM  T2-mapping of ischemia/reperfusion-injury in the in vivo mouse heart**
Steffen Bohl, MD, University of Oxford

Myocardial T2-maps were used to identify the area-at-risk in a murine in vivo model of ischemia/reperfusion. Correlation with histology was good.

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*At the conclusion of this presentation, the attendee should be better able to:
Scientific Sessions Agenda

10:30 AM - 11:00 AM Phoenix Ballroom – CDE
Refreshment Break/Exhibits/Poster Viewing
- Not accredited for CME (authors not present)/Spotlight Theatre

11:00 AM - 12:30 PM Concurrent Sessions

11:00 AM - 12:30 PM Valley of the Sun – DE
Parallel Session - Atheroma and Plaque
Moderators: Paul Finn, MD, University of California – Los Angeles
Stefan Neubauer, MD, John Radcliffe Hospital

11:05 AM MRI of Coronary Plaques - Techniques and Clinical Applications
Rene Botnar, PhD, King’s College London
Learning Objectives*
• Understand the principles of native and contrast enhanced coronary vessel wall imaging
• Understand MR quantification of contrast agent uptake
• Understand the basic biological processes underlying atherosclerosis and the clinical potential and challenges of coronary plaque imaging

11:20 AM CT of Coronary Plaques - Techniques and Clinical Applications
Kavitha Chinnaian, MD, William Beaumont Hospital
Learning Objectives*
• Evaluate coronary plaque characteristics as assessed by coronary CT angiography
• Assess applicability of coronary CT angiography for evaluation of plaque morphology in various clinical syndromes
• Identify the spectrum of plaque morphologies on coronary CT angiographic images

11:35 AM Plaque Related Myocardial Injuries Detected by CMR
Jörg Barkhausen, MD, University Hospital Schleswig-Holstein
Learning Objectives*
• To perform a CMR examination in patients with suspected myocardial injuries
• To identify different types of reversible and irreversible myocardial injuries
• To assess the limitations of in-vivo MRI

11:50 AM Plaque Imaging Can Guide Treatment
Eike Nagel, MD, King’s College London
Learning Objectives*
• Understand the current concept of risk assessment
• Know the difference between disease progression and disease activity and the advantages of improving individual risk assessment, rather than risk scores based on large cohorts
• Know the current status of clinical plaque and vessel wall imaging with magnetic resonance

12:05 PM All Patients Need Statins
Joao A.C. Lima, MD, Johns Hopkins University
Learning Objectives*
• Learn the available data in the use of imaging to monitor plaque regression
• Discuss differences in imaging modulation for the purpose of guiding statin therapies
• Be informed of what to expect in terms of plaque regression from statin therapy

12:20 PM Panel Discussion

11:00 AM - 12:30 PM Valley of the Sun – C
Oral Abstract Session X – Vascular MR
Moderators: Gregory M. Lanza, MD, PhD, Washington University
Michael McConnell, MD, University of Stanford School of Medicine

11:05 AM O62 Eccentric flow jets and elevated wall shear stress with bicuspid aortic valves
Michael D. Hope, MD, University of California – San Francisco
4D Flow MR imaging demonstrates eccentric systolic flow jets in BAV patients that are associated with elevated AsAo wall shear stress. This abnormal flow may predispose to AsAo aneurysm in these patients.

11:17 AM O63 A MRI examination for evaluation of aortic dissection using a blood pool agent
Rachel Clough, MD, NIHR Comprehensive Biomedical Research Centre
False lumen thrombosis in aortic dissection is a primary endpoint in current clinical trials. Blood-pool and direct thrombus MRI can quantitatively assess thrombus volume and should be considered in preference to computed tomography as the imaging modality of choice.

11:29 AM O64 3D flow-insensitive vessel wall imaging using T2-prepared SSFP with PSIR
Jingsi Xie, BS, Northwestern University
Develop a T2-preparation PSIR sequence to achieve a 3D flow-insensitive vessel wall imaging

11:41 AM O65 3D nongadolinium-enhanced MRA using flow-sensitive dephasing (fsd) prepared balanced ssfp: identification of the optimal first-order gradient moment
Zhaoyang Fan, M.Sc, Northwestern University
3D FSD-based noncontrast MRA quality is improved by using a fast 2D imaging method to identify beforehand the optimal first-order gradient moment that is the determinant factor for flow-signal suppression. Its feasibility was validated in flow phantom and volunteer studies.

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Scientific Sessions Agenda

11:53 AM O66 Visualization of carotid plaque calcification - a novel approach using susceptibility weighted MR imaging
Qi Yang, MD, PhD, Xuanwu Hospital
SWI phase image offers a radiation-free approach to detect calcifications of the carotid artery and has a potential to separate the hemorrhage and calcification of carotid plaque within one scan.

12:05 PM O67 Assessing the hemodynamic response to exercise - a novel MR approach
Jennifer A. Steeden, MEng, UCL Department of Medical Physics & Bioengineering
A novel high temporal resolution, real-time MR flow sequence has been developed. Flow quantification has been carried out at rest and at two exercise levels, and combined with simultaneous blood pressure measurements to measure the hemodynamic response to exercise.

12:17 PM O68 Lipid modifying therapy and aortic wall thickness regression by magnetic resonance imaging (MRI): the plaque follow up study by the National Institute of Aging (NIA)
Gustavo K. Godoy, MD, Johns Hopkins University
MRI is a precise non-invasive tool to measure aortic plaque regression in response to lipid lowering therapy. Two groups of treatment, one receiving simvastatin and niacin and simvastatin alone were followed by MRI over a period of 18 months.

11:00 AM - 12:30 PM Paradise Valley Room

Oral Abstract Session XI – New CMR Methods Applied to Human Imaging
Moderators: Sebastian Kozerke, PhD, Institute for Biomedical Engineering University
Hildo J. Lamb, MD, PhD, Leiden University Medical Center

11:05 AM O69 A breath-hold R2 mapping pulse sequence detects a decrease in myocardial ferritin iron after one-week of iron chelation
Daniel Kim, PhD, New York University School of Medicine
Intracellular ferritin iron is evidently in equilibrium with the cytosolic iron pool that can change rapidly with iron chelation. This study demonstrates the feasibility of quantitatively detecting short-term changes in myocardial iron produced by iron-chelating therapy using RR2 measurement.

11:17 AM O70 Validation of the shortened modified look locker inversion recovery (SH-MOLLI) sequence for cardiac gated T1 mapping
Stefan K. Piechnik, MS, University of Oxford
For T1-mapping of the human myocardium, we propose the Sh-MOLLI sequence using very short recovery epochs and conditional nonlinear fitting. Robust quantitative single-breath-hold T1 maps can be obtained in less than 10 heart beats with high spatial resolution.

11:29 AM O71 Highly-accelerated first-pass cardiac perfusion MRI using compressed sensing and parallel imaging
Ricardo Otazo, New York University School of Medicine
Compressed sensing and parallel imaging are combined into a single joint reconstruction technique for highly accelerated first-pass cardiac perfusion MRI. We demonstrate feasibility of whole-heart coverage per heartbeat with high spatial (<2mm) and temporal (60ms/slice) resolution.

11:41 AM O72 Clinical CMR at 3.0 Tesla using parallel RF transmission with patient-adaptive B1 shimming: initial experience
Andreas Mueller, MD, University of Bonn

11:53 AM O73 Navigator guided high-resolution single-shot black-blood (BB) TSE images using zoom and sensitivity encoding (sense) on a 32 channel RF system
Raja Muthupillai, PhD, St. Luke’s Episcopal Hospital and Texas Heart Institute
We demonstrate that by using a judicious combination of reduced FOV imaging (ZOOM), SENSE, and half-scan, it is feasible to obtain high-resolution single-shot (SSH) BB TSE images with minimal image blurring.

12:05 PM O74 Highly accelerated high spatial resolution myocardial perfusion imaging
Robert Manka, MD, German Heart Institute Berlin
Evaluation of the severity of coronary artery disease is of great importance for therapy. Highly accelerated CMR perfusion imaging offers excellent diagnostic performance in the evaluation of patients with known or suspected coronary artery disease.

12:17 PM O75 Non invasive quantification of coronary endothelial function using 3T MRI
Pierre-Julien Moro, MD, Centre de Résonance Magnétique Biologique et Médicale
Endothelial dysfunction (ED) is a key element in the development of cardiovascular diseases. We propose here a non-invasive method to detect ED combining cold pressor test with measurement of myocardial blood flow at the venous coronary sinus site.

11:00 AM - 12:30 PM Cave Creek Room

Cases with the Experts
Panel of Experts:
Andrew Arai, MD, NHLBI-NIH - Artifacts in Cardiac MRI
Christopher M. Kramer, MD, University of Virginia Health System - Adult Congenital Heart Disease

Legend: Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
**Scientific Sessions Agenda**

12:30 PM - 1:30 PM  **Lunch on own/Exhibits**

12:30 PM - 1:30 PM  **Phoenix Ballroom – CDE**

**Poster Session 2 – Not accredited for CME (authors present)**

**Moderated Poster Session 2 – Experimental – Not accredited for CME**
Moderators: Debiao Li, MD, Northwestern University
Sven Plein, MD, PhD, University of Leeds

**12:30 PM M7 In vivo validation of a theory-based single-point T1 mapping pulse sequence for quantitative first-pass cardiac perfusion MRI**
Elodie Breton, PhD, New York University Langone Medical Center
Quantitative analysis of first-pass cardiac perfusion MRI requires conversion from signal to Gd-DTPA concentration. This study validates in vivo the accuracy of a theory-based single-point T1 measurement method against a multi-point T1 measurement method at 3T.

**12:40 PM M8 High resolution imaging of the right ventricle using ZOOM MRI**
Randolph M. Setser, D.Sc, Cleveland Clinic
ZOOM MRI is a turbo spin echo based technique with sub-millimeter spatial resolution. We have applied ZOOM to the right ventricle in patients with suspected ARVD. Image quality was good overall and results comparable to conventional turbo spin echo imaging.

**12:50 PM M9 Quantification of myocardial perfusion MRI using radial data acquisition: comparison of Ktrans from dual-bolus and T1 estimation methods**
Edward DiBella, PhD, University of Utah
A multiple saturation recovery time T1 estimation method using a radial k-space perfusion sequence is presented and shown to compare well to the dual-bolus method for quantifying myocardial perfusion in 12 subjects.

**1:00 PM M10 Quantitative first-pass perfusion MRI of the mouse heart**
Patrick F. Antkowiak, BS, University of Virginia
We developed and evaluated methods for quantitative first-pass perfusion MRI of the mouse heart. The methods were applied to normal mice and mice that underwent experimental myocardial infarction.

**1:10 PM M11 Whole-heart T2-weighted (T2w) sequence for imaging post-infarct edematous area at risk (AR) in mice**
Ronald J. Beyers, MSEE, University of Virginia
Whole-heart, multi-slice T2-weighted MRI sequence for imaging post-infarct cardiac edematous Area at Risk (AR) in mice. This T2prep approach tracked AR size as percent left ventricular mass during four days post-infarct and was compared to Late Gadolinium Enhanced infarct imaging.

**1:20 PM M12 Why do we see myocardial edema in acute myocardial infarcts with balanced SSFP imaging?**
Xiangzhi Zhou, PhD, Northwestern University
The mechanisms of b-SSFP edema contrast in acute myocardial infarctions imaging are not well understood. Results show that M0 effects, likely from proton density and/or magnetization transfer changes between healthy and edematous territories, have a substantial contribution to b-SSFP contrast.

**1:30 PM - 3:00 PM  Concurrent Sessions**

1:30 PM - 3:00 PM  **Valley of the Sun – C**

**Parallel Session - Interventional I**
Moderators: Ozgur Kocaturk, PhD, National Institutes of Health
Graham Wright, PhD, Sunnybrook Health Services Center

**1:30 PM EP Applications with Safe Devices and rtMRI**
Tobias Schaeffter, PhD, King's College London

Learning Objectives*
- To specify the technical challenges of MR-guided Electrophysiology procedures
- To describe the advantages of MRI for the guidance of EP procedures
- To describe the clinical benefits of MRI for the assessment of arrhythmia ablation procedures

**1:45 PM EP Pre-clinical Procedures using rtMRI**
Ehud Schmidt, PhD, Brigham and Women's Hospital

Learning Objectives*
- Understand MRI imaging sequence that can visualize ablation lesions
- Understand MRI-compatible interventional devices needed for MR-guided Electro-Physiology procedures
- Understand some of the challenges which must be overcome to make MRI-guided EP a clinical reality

**2:00 PM EP Ablation Procedures using rtMRI**
Nassir F. Marrouche, MD, University of Utah

Learning Objectives*
- Identify two reasons why current RT imaging techniques are insufficient for patient safety during catheter ablation procedures
- Identify two reasons why RT MRI imaging is the next step in improving safety protocols in catheter ablation
- Reference at least one published study that provides evidence of the promise of RT MR imaging for catheter ablation

*At the conclusion of this presentation, the attendee should be better able to:
Scientific Sessions Agenda

2:15 PM  EP Platform and Devices
Steffen Weiss, Philips Research Laboratories

Learning Objectives*
• Understand the problems of conventional EP interventions and the potential improvements by MR guidance
• Understand the different functional requirements of EP catheters and respective EP hardware, and learn about methods to implement such functionality safely in an MR environment
• Understand about the sources and mechanisms of artifacts generated mutually by MR and EP system components

2:30 PM  EP Applications with rtMRI
Aravindan Kolandaivelu, MD, Johns Hopkins University

Learning Objectives*
• Identify limitations of performing EP procedures using the current standard of care
• Identify the potential benefits of intra-procedure MRI guidance of electrophysiology procedures
• Describe the current state of intra-procedure MRI guidance of electrophysiology procedures and the remaining barriers to clinical application

2:45 PM  MRI Thermometry: Prospects for EP Ablation Monitoring
Kim Butts Pauly, PhD, Stanford University School of Medicine

Learning Objectives*
• Understand the basic physics of MR thermometry
• Understand the potential for improving EP procedures
• Understand current research to obtain MR temperature maps in the heart

1:30 PM - 3:00 PM Valley of the Sun – DE

1:35 PM  O76 Balanced steady-state free precession cardiovascular magnetic resonance imaging of edema in reperfused acute myocardial infarcts - a translational study in animals and men
Andreas Kumar, MD MSc, University of Calgary
We investigated a possible role of balanced steady-state free precession sequences (b-SSFP) for the detection of myocardial edema. In our study, b-SSFP detected myocardial edema with contrast similar to T2-STIR.

1:47 PM  O77 Predicting late myocardial recovery and outcomes in the early hours of ST-elevation myocardial infarction: traditional measures compared to microvascular perfusion, salvaged myocardium, and necrosis by cardiovascular magnetic resonance
Eric Larose, DVM, MD, Quebec Heart Institute at Laval Hospital
During very early STEMI (<12h) in 103 prospectively studied patients, LGE volume provides the strongest association and incremental predictive value for late systolic dysfunction and discerns poor late outcome, beyond microvascular obstruction, myocardial salvage, and traditional risk factors.

1:59 PM  O78 Erythropoietin doubles the incidence of microvascular obstruction in primary PCI - a randomized controlled trial in acute MI using CMR primary endpoints
Andrew J. Ludman, MRCP, University College of London
Erythropoietin (EPO) reduces myocardial infarct size when administered at reperfusion in animal studies. Using CMR endpoints we found that EPO doubled the incidence of microvascular obstruction and increased LV volumes acutely, when administered prior to primary PCI in STEMI patients.

2:11 PM  O79 Myocardium at risk in ST-elevation myocardial infarction: comparison of T2 edema imaging using magnetic resonance versus angiographic scoring
Georg F. Fuernau, University of Leipzig – Heart Center
Purpose of this trial was to assess the AAR and myocardial salvage by MRI and to compare it to the validated angiographic APPROACH-score in a large consecutive patient cohort. AAR measurement by MRI shows excellent correlation to the angiographic APPROACH-score.

2:23 PM  O80 Right ventricular involvement in acute myocardial infarction: evaluation of edema, delayed enhancement and RV function by cardiac MRI
Matthias Grothoff, Leipzig Heart Center
RV damage is present in more than 10% of pts. after acute MI and related to impairment of RV-function. Edema and DE can be visualized by cMRI and myocardial salvage can be calculated.

2:35 PM  O82 Microvascular obstruction following PCI is associated with reperfusion hemorrhage and chronic left ventricular impairment
Ariff Ben, MRCP FRCR PhD, Imperial College of London
Using T2*-mapping, 17/30 patients had reperfusion hemorrhage (RH) post PCI for acute STEMI. All cases of RH had microvascular obstruction in the same region suggesting a relationship. RH infarcts were associated with poor recovery of function at 1 year.

2:47 PM  Discussion

Legend:  Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
Oral Abstract Session XIII - Coronary MR Imaging

Moderators: Bernhard Gerber, MD, Cliniques St. Luc UCL
Richard D. White, University of Florida College of Medicine

1:35 PM O83 Multimodality CMR detection of coronary artery disease in patients with heart failure and depressed systolic function: superiority of coronary MRI compared to late gadolinium enhancement

Thomas H. Hauser, MD, Beth Israel Deaconess Medical Center

Heart failure with depressed systolic function is increasingly prevalent with CAD the most common cause. We evaluated coronary MRI and LGE in 106 subjects and found that coronary MRI was superior for the detection of CAD in heart failure patients.

1:47 PM O84 Sequential coronary artery endothelial function measurements differ in CAD patients and healthy subjects: a cardiac MRI study

Sebastian Kelle, MD, German Heart Institute Berlin

Although the coronary endothelial response to sequential isometric handgrip is similar in healthy adult subjects it significantly differs in CAD patients despite the return of pulse and blood pressure to pre-stress levels.

1:59 PM O86 Noninvasive evaluation of coronary endothelial function by using 3T phase contrast cine MRI

Shingo Kato, MD, Mie University Hospital

Cold pressor test by using 3T phase contrast cine MRI allows for an accurate and noninvasive evaluation of coronary endothelial function.

2:11 PM O87 Detection of intracoronary thrombus by magnetic resonance imaging in patients with acute coronary syndrome

Christian H. Jansen, MD, King's College London

Non-contrast enhanced magnetic resonance imaging allows visualization of persistent intracoronary thrombus following plaque rupture. This technique may be useful for direct coronary thrombus detection in patients with ACS or unstable angina.

2:23 PM O88 Coronary magnetic resonance angiography at 7 Tesla: a quantitative comparison with results at 3 Tesla

Saskia G.C. van Elderen, MD, Leiden University Medical Center

Using a quadrature transmit/receive coil at 7T, it was shown that 7T coronary MRA image quality has already begun to approach that at 3T while vessel sharpness is already significantly improved.

2:35 PM O89 3.0T contrast-enhanced whole-heart coronary magnetic resonance angiography for the evaluation of the cardiac venous anatomy

Heng Ma, MD, Xuanwu Hospital

Fifty-one subjects underwent contrast-enhanced whole-heart coronary magnetic resonance angiography at 3.0T. All major cardiac veins, except for the vein of Marshall, could be depicted successfully.

2:47 PM Discussion

Cases with the Experts - Unknowns from the NIH

Panel of Experts: Patricia Bandettini, MD, National Institutes of Health
Marcus Chen, MD, National Institutes of Health

Learning Objectives*
- Understand how to systematically approach a CMR study
- Be able to generate a differential diagnosis for various common CMR findings
- Recognize common CMR findings

3:00 PM - 3:30 PM Refreshment Break/Exhibits/Poster Viewing - Not Accredited for CME (authors not present)

3:30 PM - 5:00 PM Concurrent Sessions

Parallel Session - New Developments

Moderators: Peter Kellman, PhD, National Institutes of Health
Krishna S. Nayak, PhD, University of Southern California

3:30 PM New Developments in Perfusion

Leon Axel, MD, PhD, New York University Langone Medical Center

Learning Objectives*
- Describe basic approaches to study perfusion with CMR
- Describe limitations of CMR perfusion methods
- Describe relative advantages of different perfusion methods

Legend: Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
Scientific Sessions Agenda

3:45 PM  Update on Myocardial Perfusion Using ASL
Krishna S. Nayak, PhD, University of Southern California

Learning Objectives*
• Explain how arterial spin labeling is applied to the measurement of myocardial blood flow
• Explain the advantages of myocardial ASL compared to existing perfusion imaging techniques
• List the current limitations of myocardial ASL approaches

4:00 PM  New Developments on Physiological Signal Monitoring
Thoralf Niendorf, PhD, Max-Delbrück-Center for Molecular Medicine

Learning Objectives*
• Explain how arterial spin labeling is applied to the measurement of myocardial blood flow
• Explain the advantages of myocardial ASL compared to existing perfusion imaging techniques
• List the current limitations of myocardial ASL approaches

4:15 PM  Free Breathing Imaging
Peter Kellman, PhD, National Institutes of Health

Learning Objectives*
• Understand limitations of breath-held studies
• Understand new developments in free-breathing acquisitions
• Understand cardiac imaging applications which may be acquired during free-breathing

4:30 PM  Non-Cartesian Imaging
Mark Griswold, PhD, Case Western Reserve University

Learning Objectives*
• Describe the basic concepts of how non-Cartesian imaging methods work
• Understand how non-Cartesian imaging methods can be applied in the assessment of cardiac function, perfusion, and angiography
• Understand the limits of non-Cartesian imaging, especially those methods affecting the image quality, such as artifacts and signal to noise ratio

4:45 PM  Parametric Mapping
Daniel Messroghli, MD, Deutsches Herzzentrum Berlin

Learning Objectives*
• Explain the basic difference between parametric mapping techniques and conventional CMR techniques
• List the basic pros and cons of T1 vs. T2 mapping
• Name 3 potential clinical applications of parametric mapping techniques

3:30 PM - 5:00 PM  Valley of the Sun – DE
Parallel Session - CMR of Pediatric Aortic Disease
Moderators: Charles Higgins, MD, University of California – San Francisco Medical Center
Tifflanie Johnson, MD, Indiana University

Legend: Gen = General, Cgen = Congenital, BSci = Basic Science

3:35 PM  Congenital Aortic Diseases (e.g. Vascular Rings, Coarct, etc.)
Andrew Taylor, MD, UCL Institute of Child Health

Learning Objectives*
• Understand the indications and techniques for imaging the aorta in neonates and children
• Understand the various types of aortic vascular rings
• Understand the imaging assessment of native and repaired coarctation of the aorta

3:50 PM  Post-surgical Aortic Assessment (e.g. Ross, TGA after ASO, S/P Norwood, etc)
Heynric Grotenhuis, MD, Leiden University Medical Center

Learning Objectives*
• Aortic wall abnormalities are not only limited to prototypical extremes like Marfan syndrome and bicuspid aortic valve disease, but are also present in a wide range of other congenital heart disease entities, each with its own pathogenic substrate and clinical repercussions
• Aortic pulse wave velocity and distensibility MRI measurements provide valuable additional information on aortic wall condition
• Aortic flow patterns may be of value for the prediction of aortic vasculopathy

4:05 PM  The Aorta in Genetic Diseases and Syndromes (e.g. William, Turners, Marfans, etc)
Michael Taylor, MD, PhD, Baylor College of Medicine

Learning Objectives*
• Describe the common genetic syndromes responsible for aortopathy
• Plan a comprehensive cardiovascular MR exam to evaluate the aorta in patients with suspected or known aortopathy
• Correctly interpret the images and flow data from an exam of a patient with aortopathy

4:20 PM  Aortic Valve Disease (e.g. Bicuspid, AS, AR)
Kevin Whitehead, MD, PhD, Children’s Hospital Philadelphia

Learning Objectives*
• Assess aortic valve morphology using a combination of FLASH cine and PC-MRI velocity mapping
• Assess mechanism and degree of aortic stenosis using a combination of planimetry and in-plane and through-plane PC-MRI velocity mapping
• Assess mechanism and degree of aortic insufficiency using a combination of SSFP cine and through-plane velocity mapping

4:35 PM  Flow in the Diseased Aorta: What We Know and Why It Matters (e.g. 4D Flows, etc)
Alison K. Meadows, MD, PhD, University of California – San Francisco Medical Center

Learning Objectives*
• To choose the appropriate imaging sequences to evaluate different types of aortic disease
• To use MRI to evaluate the physiology of aortic disease
• To be familiar with new technologies on the horizon

*At the conclusion of this presentation, the attendee should be better able to:
3:35 PM  O90  Cocaine use as an independent predictor of cardiac steatosis; initial experience by 1H spectroscopy  
Chia-Ying Liu, PhD, Johns Hopkins Hospital  
The present study was to evaluate the myocardial fat in cocaine abusers. We applied 1H-MRS to quantify myocardial septal triglyceride content compared to the non-cocaine users to ascertain the prevalence and severity of cardiac steatosis among cocaine-use patients.

3:47 PM  O91  Evaluation of normal atrial contribution to left ventricular filling  
Tariq M. Alhogbani, MD, University of Calgary  
Left atrial contribution to left ventricular filling can be calculated by steady state free precession cardiac magnetic resonance. It is highly dependent on age.

3:59 PM  O92  Becker and Duchenne Muscular Dystrophy (BMD, DMD) are associated with myocardial fibrosis and abnormal cardiac energetics even in the presence of normal left ventricular ejection fraction  
Joseph J. Suttie, MBBS, Oxford University  
BMD and DMD are characterized by myocardial fibrosis and abnormal cardiac energetics even in the absence of left ventricular systolic dysfunction. These findings suggest incipient cardiomyopathy is more prevalent in this patient population than previously thought.

4:11 PM  O93  Differential effects of LDL lowering on CMR measures of calf muscle perfusion and cellular metabolism in peripheral arterial disease  
Amy M. West, MD, University of Virginia  
LDL lowering in patients with peripheral arterial disease treated with statins may improve calf muscle metabolism, but does not improve exercise performance or calf muscle perfusion as assessed by CMR.

4:23 PM  O94  Quantification of left ventricular kinetic energy using 4D flow MRI  
Thomas A. Wåxnäs, MD Student, Lund University Hospital  
A method was developed to calculate kinetic energy content of left ventricular blood using intracardiac flow measurements with 4D-velocity encoded phase contrast MRI. Kinetic energy was quantified in healthy volunteers in 2 scanners showing a low interstudy variability.

4:35 PM  O95  12-lead ECG in a 1.5 Tesla MRI: separation of real ECG and MHD voltages with adaptive filtering for gating and non-invasive cardiac output  
Zion Tsz Ho Tse, PhD, Brigham and Women's Hospital  
An adaptive filtering procedure is presented to separate between real ECG and magneto-hydrodynamic signals in 12-lead ECGs acquired within a 1.5T MRI, which improves MRI gating and preserves the S-T segment fidelity. The magneto-hydrodynamic signal allows non-invasive cardiac output estimations.

4:47 PM  O96  Stress P-31 MR spectroscopy for detection of myocardial microvascular disease in Latino type-1 diabetes mellitus patients  
Gerald Pohost, MD, University of Southern California  
The change of high energy phosphate in the myocardium during the stress was measured using P-31 MRS to identify impaired ventricular function associated with exercise-induced metabolite alteration among Latino Type-1 diabetes mellitus patients. Bioenergetic changes may suggest systemic microvascular disorder.
5:15 PM  New Techniques for Real-Time Interactive Image Reconstruction
Michael Hansen, PhD, National Institutes of Health

Learning Objectives*
- Identify some of the key computation hurdles in real-time image construction
- Identify some of the key advantages of new parallel computing resources such as GPUs
- Name examples of reconstruction techniques that are becoming more feasible in a real-time setting

5:30 PM  Pediatric Endovascular Applications
Reza Razavi, MD, King’s College London

Learning Objectives*
- Understand the technical and practical challenges involved in MR guided endovascular interventions for congenital heart disease
- To learn methods and practical experience of MR guided endovascular interventions for congenital heart disease in animal models
- To learn methods and initial practical experience of MR guided endovascular interventions for congenital heart disease in patients

5:45 PM  Surface and Intravascular Transmit or Receive Coils for Interventional Cardiovascular MRI
Krishna Kurpad, PhD, University of Wisconsin

Learning Objectives*
- Understand RF coil design concepts for cardiovascular applications
- Develop an understanding of existing state-of-the-art RF coil systems for MR guidance
- Develop a superficial understanding of the concepts of real time acquisition and reconstruction techniques for performing wholly MRI guided cardiovascular procedures

6:00 PM  Pediatric Endovascular Applications 2
Kanishka Ratnayaka, MD, NHLBI-National Institutes of Health

Learning Objectives*
- Discuss two key reasons why interventional cardiovascular MRI is ideal for minimally invasive therapy of congenital heart disease
- Be familiar with pre-clinical and clinical demonstrations of interventional cardiovascular MRI guided therapy of congenital heart disease
- Be able to discuss future potential of interventional cardiovascular MRI guided therapy of congenital heart disease

6:15 PM  iCMR Unplugged: Nanoflagellates, Nanorobots, and Marbles
Sylvain Martel, PhD, Ecole Polytechnique de Montreal

Learning Objectives*
- Have a good idea of the state-of-the-art in medical nanorobotics
- Identify the main challenges facing the development of nanorobots for medical applications
- Appreciate the advantages and potentials of such technology

5:00 PM - 6:30 PM Valley of the Sun – DE

5:05 PM  Parallel Session - Non-ischemic Cardiomyopathy/Myocarditis
Moderators: Sophie Mavrogeni, MD, Onassis Cardiac Surgery Center
Jeanette Schulz-Menger, MD, Charite Universitaetsmedizin Berlin

5:05 PM  Clinical Needs and Aspects in Non-Ischemic Disease
Matthias G. Friedrich, MD, Stephenson Cardiovascular MR Centre

Learning Objectives*
- List important challenges for clinicians to diagnose and classify non-ischemic cardiomyopathies
- Explain the importance of tissue characterization with regard to etiology and prognosis of non-ischemic cardiomyopathies
- Describe the most important contributions of comprehensive cardiovascular MRI protocols in non-ischemic cardiomyopathies

5:20 PM  Technical Challenges in Tissue Characterization Beyond LGE
Anthony Aletras, PhD, NHLBI-National Institutes of Health

Learning Objectives*
- Understand the basic physics of tissue characterization techniques
- Recognize potential difficulties in implementing these CMR methods in practice
- Recognize potential artifacts arising from improper implementation of these methods

5:35 PM  Inflammatory Disease
Jeanette Schulz-Menger, MD, Charite Universitaetsmedizin Berlin

Learning Objectives*
- Differentiate between ischemic and inflammatory disorders
- Detect reversible and irreversible injuries
- Diagnose myocardial tissue changes in patients with preserved ejection fraction

5:50 PM  Iron Overload
Sophie Mavrogeni, MD, Onassis Cardiac Surgery Center

Learning Objectives*
- Understand the pattern of iron deposition in different organs
- Understand the MRI evaluation of iron overload
- Understand the limitations of MRI measurements

Legend:  Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
6:05 PM  Left Ventricular Hypertrophy - Impact of CMR  
Andrew Arai, MD, NHLBI-National Institutes of Health

Learning Objectives*  
• Understand the advantages of CMR with respect to measuring myocardial mass and left ventricular hypertrophy  
• Recognize that CMR is a more reproducible measure of left ventricular mass than echocardiography  
• Review the relationship between left ventricular hypertrophy and cardiovascular disease/outcomes

6:20 PM  Panel Discussion

5:00 PM - 6:30 PM  Paradise Valley Room

Oral Abstract Session XV – Cardiac Function in Health and Disease  
Moderators: David N. Firmin, PhD, Royal Brompton Hospital  
Hildo J. Lamb, MD, PhD, Leiden University Medical Center

5:05 PM  O97 Obesity and right ventricular structure and function: the MESA-RV study  
Harjit Chahal, MD, MPH, Johns Hopkins University  
Obesity is independently associated with higher right ventricle mass, end-diastolic volume and a lower ejection fraction in a multi-ethnic cohort of cardiovascular disease free participants.

5:17 PM  O98 Usefulness of left ventricular peak filling rate measurement by cardiac MR imaging in heart transplant recipients with cardiac allograft vasculopathy  
Haruhiko Machida, MD, Tokyo Women’s Medical University Medical Center East  
We investigated the usefulness of left ventricular peak filling rate (PFR) measurement by CMR for detecting cardiac allograft vasculopathy (CAV). Noninvasive PFR measurement allowed more sensitive detection of CAV compared to the impairment of coronary flow reserve invasively assessed.

5:29 PM  O99 Right ventricular regional contraction patterns in normal subjects using cardiac magnetic resonance imaging - a five-year follow up study  
Ali Salah, MD, St. Francis Hospital  
RV focal outpouching is common in normal subjects. The characteristics of outpouchings did not change over a 5-year period and there were no cross-sectional or longitudinal differences in RV volume, EF and mass between groups with and without outpouching.

5:41 PM  O100 Diastolic function with 3D three-directional velocity encoded MRI in patients with ischemic cardiomyopathy  
Anne Brandts, MD, Leiden University Medical Center  
3D three-directional VE MRI adequately describes transmitral flow assessment for assessment of diastolic function in patients with ischemic cardiomyopathy.

5:53 PM  O101 Cardiovascular magnetic resonance in takotsubo cardiomyopathy: a series of 88 patients in Europe and North America  
Ingo Eitel, MD, Heart Center Leipzig  
This largest CMR series to date in Takotsubo (TTC) patients established main diagnostic CMR features for the diagnosis of TTC. The accuracy and clinical utility of these features as diagnostic criteria should be studied.

6:05 PM  O102 Right ventricular remodeling after pulmonary thrombendarterectomie (PEA) for chronic thrombembolic pulmonary hypertension by cardiac MRI  
Andreas Rolf, MD, Kerckhoff-Heart Center  
Cardiac MRI is an excellent tool to monitor changes of right ventricular volume and function before and after pulmonary thrombendarterectomy for chronic thrombembolic hypertension.

6:17 PM  O103 Feasibility to assess the orifice area of mitral bioprostheses using cardiovascular magnetic resonance  
Florian von Knobelsdorff-Brenkenhoff, MD, Medical University Berlin  
Imaging of mitral bioprostheses and assessment of their orifice area is feasible applying cardiovascular magnetic resonance with steady-state free-precession cine sequences despite mitral annular plane excursion and arrhythmias.

6:00 PM – 6:00 PM  Cave Creek Room

Trainees Hour

7:00 PM - 9:00 PM  Phoenix Ballroom – DE

Award Presentations and Reception

Legend:  Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
**Scientific Sessions Agenda**

**Poster Presentations – Session 2 – Not Accredited for CME**

**Phoenix Ballroom – CDE**

12:30 PM – 1:30 PM

**Saturday Categories and Poster Numbers:**

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- Cardiomyopathy: P181 – P202
- Ischemia Assessment by CMR: P203 – P228
- New Developments in Post-processing of CMR Data: P229 – P253
- Non-ischemic Cardiomyopathy: P254 – P292
- Prognosis, Outcomes, Cost-Effectiveness: P293 – P311

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<td>Slavin, Glenn</td>
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<td>Reproducibility of myocardial salvage index in acute myocardial infarction by cardiac magnetic resonance imaging - validation against an angiographic score</td>
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<td>Absence of late gadolinium enhancement does not exclude total coronary occlusion</td>
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<td>Ye, Dong Hye</td>
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<td>Zhou, Xiangzhi</td>
<td>Myocardial edema contrast in acute myocardial infarction: a comparative study of the sensitivity of different CMR methods</td>
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<td>Zun, Zungho</td>
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Scientific Sessions Agenda

Sunday, January 24, 2010

7:00 AM - 8:00 AM  Valley of the Sun Foyer
Continental Breakfast

8:00 AM - 9:30 AM  Concurrent Sessions

8:00 AM - 9:30 AM  Valley of the Sun – C

Parallel Session - Cases: Challenges in Clinical Routine
Moderators: Peter T. Buser, MD, University Hospital Basel
Edward T. Martin, MD, Oklahoma Heart Institute

8:05 AM  Hypertrophy
Florian von Knobelsdorff, PhD, Medical University Berlin

Learning Objectives*
- Know the most important CMR tools for myocardial tissue characterization
- Know the main tissue characteristics of various forms of myocardial hypertrophy
- Understand that left ventricular hypertrophy does not automatically imply the diagnosis of hypertrophic cardiomypathy

8:20 AM  Systemic Disease
Sophie Mavrogeni, MD, Onassis Cardiac Surgery Center

Learning Objectives*
- Understand the different types of vasculitis and their clinical manifestations
- Understand the role of CMR in the evaluation of vasculitis
- Understand the role of CMR in the evaluation of rheumatic diseases

8:35 AM  Masses
James Moon, MD, The Heart Hospital

Learning Objectives*
- Know the normal cardiac structures that can mimic masses and the limitations of MRI/echo
- Know the types of cardiac mass and what the clinicians want to know
- Know the role of defining a mass with intrinsic contrast (T1, T2, fatsat) and contrast (perfusions, early and late gad)

8:50 AM  CAD - Borderline Decision
Jürg Schwitter, MD, University Hospital Lausanne

Learning Objectives*
- Understand the mechanisms of ischemia assessment by CMR
- Understand the relationships between ischemic heart disease and CMP
- Interpret specific CMR findings and integrate them into the work-up and management of various cardiac diseases

9:05 AM  Inflammatory Myocardial Disease
Peter T. Buser, MD, University Hospital, Basel

Learning Objectives*
- Diagnose cardiac involvement in systemic vasculitises based on CMR findings
- Differentiate normal myocardium, fibrosis, edema and thrombus with CMR
- Planning of CMR examination

9:20 AM  Panel Discussion

8:00 AM - 9:30 AM  Valley of the Sun – DE

Parallel Session - Physiology - Valvular Hemodynamics
Moderator: Håkan Arheden, MD, PhD

8:05 AM  MR Assessment of Velocities in Stenotic Jets
Sebastian Kozerke, PhD, University and ETH Zurich

Learning Objectives*
- Understand the MR velocity encoding principle and its limitations
- Optimize MR imaging protocols to minimize the error in jet velocity quantification
- Outline current and future development to improve the accuracy of jet velocity quantification

8:20 AM  MR Velocity Mapping in Clinical Work Up of Valvular Disease
Steven Wolff, MD, PhD, Advanced Cardiovascular Imaging

Learning Objectives*
- Describe the methodology for assessing patients with valvular heart disease with MRI
- List some of the pitfalls of MR velocity mapping in the assessment of patients with valvular disease
- Identify some of the effects of the different valvular diseases on cardiac structure and function

8:35 AM  4D Flow – Possible Clinical Utility
Steen Fjord Pedersen, MD, Beth Deaconess Israel Medical Center and Harvard Medical School

Learning Objectives*
- Understand the advantages and limitation of three dimensional, three directionally encoded velocity mapping in comparison to conventional 2D, through-plane velocity acquisitions
- Understand that three dimensional, three directionally encoded mapping offers a relatively operator independent but more time consuming method for deriving curves and volumes of flow through retrospectively chosen plans of measurement
- Understand how quantitative flow analysis is performed using three dimensional, three directionally encoded velocity mapping and conventional 2D, through-plane velocity acquisitions

Legend: Gen = General, Cgen = Congenital, BSci = Basic Science

*At the conclusion of this presentation, the attendee should be better able to:
### Scientific Sessions Agenda

**8:50 AM**  
**Physiological Determinants and Energy Aspects of Three Dimensional Intracardiac Blood Flow Studied with Phase Contrast MRI**  
Einar Heiberg, PhD, Lund University  

*Learning Objectives*  
- Understand the basis of the energy concept applied to cardiac pumping  
- Understand the basis of the concept stroke work and parameters needed to calculate stroke work  
- Understand the relative importance of flow versus pressure in cardiac pumping and cardiac physiology

**9:05 AM**  
**CMR Flow Measurement: Applications, Errors and Optimization**  
Mark B.M. Hofman, PhD, VU University Medical Center  

*Learning Objectives*  
- Recognize major sources of error in MR flow quantification in valvular heart disease  
- To check for MR system whether the offset error is of importance in flow quantification  
- Know solutions, how the offset error in flow quantification can be minimized

**9:20 AM**  
**Panel Discussion**

**9:30 AM - 10:00 AM**  
**Refreshment Break**  
Valley of the Sun Foyer

**10:00 AM - 10:30 AM**  
**Concurrent Sessions**  
Valley of the Sun – DE

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<td>Moderators: Jens Bremerich, MD, University Hospital Basel</td>
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<td>Victor A. Ferrari, MD, University of Pennsylvania Medical Center</td>
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**10:05 AM**  
**Inflammatory Disease**  
Sanjay Prasad, MD, Royal Brompton Hospital  

*Learning Objectives*  
- Identify role of CMR in cardiac inflammatory disease  
- Understand an application  
- Beware of potential limitations of the technique

**10:25 AM**  
**Rare and Interesting Diseases**  
Victor A. Ferrari, MD, University of Pennsylvania Medical Center  

*Learning Objectives*  
- To understand the role of CMR in the assessment of rare cardiovascular disorders  
- To describe the pulse sequences necessary to assess rare cardiovascular disorders with CMR

**10:45 AM**  
**Storage Disease**  
Ralf Wassmuth, MD, Franz Volhard Clinic  

*Learning Objectives*  
- Understand the capabilities of CMR in depicting cardiac involvement in storage diseases  
- Differentiate various CMR techniques for detecting tissue infiltration including their advantages and disadvantages  
- Differentiate various storage diseases from each other and other cardiomyopathies based on CMR findings

**11:05 AM**  
**The Unexpected Solution**  
Emmanuelle Vermes, MD, The Stephenson Cardiovascular MR Centre  

*Learning Objectives*  
- Understand the physiopathology of the constrictive pericarditis  
- Be able to know which sequences we use to diagnose constrictive pericarditis with CMR  
- Be able to diagnose constrictive pericarditis by CMR

**11:25 AM**  
**Panel Discussion**

**10:00 AM - 11:30 AM**  
**Parallel Session - CMR and Metabolism**  
Moderators: David Bluemke, MD, PhD, Johns Hopkins Hospital  
Sebastian Kozerke, PhD, University and ETH Zurich  
Valley of the Sun – C

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<td><strong>Metabolism and Obesity</strong></td>
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<td>Albert de Roos, MD, PhD, Leiden University Medical Center</td>
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*Learning Objectives*  
- To understand the role of lipotoxicity in obesity  
- To learn about proton spectroscopy for estimating triglycerides  
- To learn about multiple organ disease in obesity

*At the conclusion of this presentation, the attendee should be better able to:
10:20 AM  **CMR and Unrecognized Scar in Diabetes Type 2**  
Erik Schelbert, MD, MS, University of Pittsburgh  
*Learning Objectives*  
- Understand the prevalence of unrecognized scar in type 2 diabetes  
- Understand the prognosis of unrecognized scar in type 2 diabetes  
- Understand the association of unrecognized scar with coronary disease  

10:35 AM  **Diabetes Type 1 and the Heart**  
Joao A.C. Lima, MD, Johns Hopkins University  
*Learning Objectives*  
- Discuss LV structure and Function in Type I Diabetes  
- Understand the power of MRI as a phenotyping tool in patients with Type I Diabetes  
- Understand the rate of cardiac damage caused by Type I Diabetes  

10:50 AM  **CMR and Disorders of Iron Metabolism**  
Dudley J. Pennell, MD, Royal Brompton Hospital  
*Learning Objectives*  
- Understand the relation of T2* to iron concentration in the heart  
- Understand the distribution of iron overload on the heart in the world  
- Understand the range of conditions causing iron overload in the heart  

11:05 AM  **MRS and Insights into Metabolism**  
Robert G. Weiss, MD, Johns Hopkins University  
*Learning Objectives*  
- Understand the major technical approaches to performing MRS in the human heart  
- List the major metabolites and aspects of cardiac metabolism that can be measured with MRS in the human heart  
- Describe the changes in myocardial metabolism detected by MRS in diabetes, heart failure and other common cardiac conditions  

11:20 AM  **Risk Stratification Following Myocardial Infarction**  
Charles B. Higgins, MD, University of California – San Francisco  
*Learning Objectives*  
- Interpret delayed contrast enhanced CMR imaging studies  
- Know the consequence of signs of microvascular obstruction and a large peripheral zone on prediction of morbidity and mortality  
- Recognize differences in size of DE zone and perfusion deficit  

11:35 AM  **CMR as the Endpoint in Clinical Studies**  
Raymond Kwong, MD, Brigham and Women's Hospital  
*Learning Objectives*  
- Name the different cardiac physiological assessment CMR can potentially assess in clinical studies  
- List the potential advantages and disadvantages of using CMR in determining surrogate endpoints in outcome studies  
- Compare some of these applications to echocardiography and nuclear scintigraphy  

11:50 AM  **Coronary Artery Imaging - Beyond Lumenography**  
Rene Botnar, PhD, King's College London  
*Learning Objectives*  
- Understand the imaging principles of coronary lumen, vessel wall and molecular imaging including contrast agent quantification by MRI  
- Understand the different designs and properties of site specific MR contrast agents  
- Understand the basic biological processes underlying atherosclerosis and the clinical potential and challenges of coronary plaque imaging  

12:05 PM  **Assessment of Valvular Disease**  
Saul Myerson, MD, John Radcliffe Hospital  
*Learning Objectives*  
- Understand how to optimize the CMR assessment of patients with valvular heart disease  
- Understand what information is required from a CMR scan in valvular heart disease  
- Understand the limitations and common mistakes in CMR assessment  

12:20 PM  **Closing Plenary Session - The Five Best Indications for CMR 2010 and Beyond**  
Moderators: Andrew Arai, MD, NHLBI-National Institutes of Health  
Sven Plein, MD, PhD, University of Leeds  
*Learning Objectives*  
- Name the different cardiac physiological assessment CMR can potentially assess in clinical studies  
- List the potential advantages and disadvantages of using CMR in determining surrogate endpoints in outcome studies  
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12:35 PM  **Assessment of Valvular Disease**  
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12:50 PM  **Panel Discussion**  

1:00 PM - 1:15 PM  **Closing Remarks**  

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*At the conclusion of this presentation, the attendee should be better able to:*
**Technologist Workshop**

**Friday, January 22, 2010**

1:30 PM  
**Welcome and Opening Remarks**  
Deer Valley Room  
Moderator: Mercedes Pereyra, MBA, RT, SCMR  
Technologist Chair, Circle Cardiovascular Imaging

1:35 PM – 3:20 PM  
**Session 1: Back to Basics**  
Moderator: Mercedes Pereyra, MBA, RT, Circle Cardiovascular Imaging

1:35 PM  
**The Basic CVMR Exam**  
Ralph Gentry, RT, R, MR, CT, William Beaumont Hospital

**Learning Objectives**
- Independently acquire a CMR basic exam for LV function
- Recognize the normal cardiac anatomy and some abnormal cardiac anatomy
- Recognize the normal EKG pattern and how it relates to acquiring a CMRI exam and how each segment relates to the function of the heart

2:10 PM  
**Perfusion, Viability and Wall Motion**  
Rob van der Geest, MSC, Leiden University Medical Center

**Learning Objectives**
- Describe how MR imaging can be used to perform quantitative analysis of cardiac function, perfusion, and viability
- Understand the advantages and disadvantages of various approaches of quantifying global and regional ventricular function from CMR
- Describe the basic principles of the techniques available for automated image segmentation and registration in CMR

2:40 PM  
**Cardiac MR Sequences**  
Amol Pednekar, PhD, Philips Healthcare

**Learning Objectives**
- Perform basic (morphology, function, flow) and advanced (perfusion, delayed enhancement, coronary)
- Understand and utilize the physiology and MR sequence based contrast manipulation techniques
- Adapt the cardiac MR sequences to patient dependent (high heart rates, arrhythmias, inability to perform successive breath holds) challenges

3:15 PM – 3:45 PM  
**Refreshments**  
Phoenix Ballroom – CDE

3:45 PM – 5:30 PM  
**Session 2: Physics and Safety**  
Moderator: Kraig Kissinger, BS, RT, Beth Israel Deaconess Medical Center

**Saturday, January 23, 2010**

8:00 AM – 10:35 AM  
**Session 3: Cardiovascular MRA**  
Moderator: Susan Eder, RT, Emory Crawford Long Hospital

8:05 AM  
**Technical Considerations for Non-contrast & Contrast Applications**  
Cynthia R. Comeau, BS, RT, Advanced Cardiovascular Imaging

**Learning Objectives**
- Understand the advantages of using gadolinium contrast for cardiovascular studies
- Recognize potential pitfalls when performing contrast cardiovascular MRA studies
- Understand protocol changes when dealing with NSF issues

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*At the conclusion of this presentation, the attendee should be better able to:
Peripheral Vascular MRA
Edward T. Martin, MD, Oklahoma Heart Institute

**Learning Objectives**
- Understand the indications and applications of magnetic resonance angiography
- Understand the role of magnetic resonance angiography in the management of patients with suspected or known peripheral arterial disease according to ACC/AHA Guidelines
- Understand the safety issues regarding gadolinium contrast agents

Coronaries: MRA versus CTA
Hajime Sakuma, MD, Mie University Hospital

**Learning Objectives**
- To learn how to obtain high quality coronary MRA
- To know the advantages and limitations of coronary MRA in comparison with MDCT
- To understand the usefulness of coronary MRA in patients with suspected coronary artery disease, coronary artery anomalies and Kawasaki disease

Stress Perfusion Imaging: The Physician’s Perspective
Mark Westwood, MD, The London Chest Hospital

**Learning Objectives**
- Understand the principles of Adenosine Stress Perfusion CMR
- Understand the principles of image interpretation using Adenosine Stress Perfusion CMR
- Understand how the results of Adenosine Stress Perfusion CMR are used in clinical case management

Stress Perfusion Imaging: The Technologist’s Perspective
Walter Surrette, RT, Brigham and Women’s Hospital

**Learning Objectives**
- Understand why cardiac MRI stress perfusion imaging is indicated for some patients. Understand the indications, contraindications and physiological effects of common stress agents used for cardiac MRI stress perfusion imaging
- Understand the additional patient care considerations for those patients undergoing cardiac MRI stress perfusion imaging, including increased anxiety due to stressing agents, the need for larger gauge intravenous catheters and additional vital sign monitoring
- Understand the common sequences used for cardiac MRI stress perfusion imaging, how to choose imaging parameters to optimize image quality, how to evaluate the images, within the scope of the MRI technologist’s role, to recognize cardiac MRI stress perfusion defects

Viability and Imaging in Acute MI
Scott Flamm, MD, Cleveland Clinic

**Learning Objectives**
- Understand the distinct clinical advantages of viability imaging by cardiac MRI
- Recognize the acute clinical situations appropriate for cardiac MRI viability imaging
- Articulate the mechanisms responsible for the increased signal intensity in irreversibly damaged myocardium on both viability and T2 "edema* weighted imaging

The concordance rates between left ventricular hypertrophy and right ventricular hypertrophy in patients with hypertrophic cardiomyopathy as diagnosed by CMR with fibrosis imaging
Saundra B. Grant, RN, BSN, Allegheny General Hospital

While LVH and LV fibrosis have been well defined for HCM, little attention has been placed on the more global cardiac effects of HCM. We systematically assessed the biventricular pathology directed at RVH and RV fibrosis.
2:05 PM  Adult Congenital Heart Disease: The Imaging Challenge
Puja Banka, MD, Children’s Hospital Boston

Learning Objectives*
• Understand the typical indications and referral questions for cardiac MRI in adults
• Be familiar with the cardiac MRI techniques used in adults with congenital heart disease
• Identify the potential MRI safety issues in adults with congenital heart disease

2:55 PM  Surgical Correction of Transposition of Great Vessels – The Role of CMR
Gregory Kurio, MD, PCMGEB/CHRCO

Learning Objectives*
• Use the correct equipment to image a child of any age
• Properly care for a pediatric patient undergoing cardiac MR in the safest most efficient manner
• Properly image the smallest of pediatric anatomical structures with the least amount of motion

3:30 PM  Technical Considerations on Pediatric Cardiovascular MR
Reza Razavi, MD, King’s College London

Learning Objectives*
• Understand the use of various pulse sequences to perform a comprehensive MR evaluation of congenital heart disease
• Understand how the MR scan should be customized for commonly encountered clinical conditions in congenital heart disease
• Reinforce the relationships between imaging planes and diagnostic information important to congenital heart disease

4:00 PM – 4:30 PM  Deer Valley Room
Refreshments

4:30 PM – 6:00 PM  Session 6: Inherited Cardiomyopathies
Moderator: Petra Keilberg, RT, FGM IFC Pisa MRI Laboratory

4:30 PM  Abstract Presentations

4:30 PM  T11  Can a higher relativity contrast agent hinder subendocardial infarct detection in viability imaging?
June Yamrozik, BS, RT(R)(MR), Allegheny General Hospital
Paradoxically, despite a higher relativity, due to increased blood pool T1, the inherent contrast between chamber and endocardium may hinder infarct imaging using contrast agents with high relativity.

4:45 PM  T12  Distinguishing type I and type II hemorrhage by gradient echo based MR sequence in carotid atherosclerotic plaques
Rui Li, PhD, University of Washington
Gradient echo based sequence with T2* weighting enables distinguish type I and type II hemorrhage more notably than traditional spin echo based T1, T2 and PD weighted imaging for ex vivo plaque specimen.

5:00 PM  “Let’s Go Fishin” – for RVD, Non-Compaction, and Other Rarely Imaged Congenital Diseases
David Bluemke, MD, PhD, Johns Hopkins University

Learning Objectives*
• Describe the MRI findings in ARVD
• Describe the MRI findings in non-compaction
• Explain the relationship of ARVD to other cardiomyopathies

6:00 PM  Adjourn

Saturday, January 23, 2010

8:00 AM – 10:15 AM  Deer Valley Room
Session 7: Myocardial and Pericardial Disease and Cardiac Tumours
Moderator: Jane Francis, DCR,R,DNM, The John Radcliffe Hospital

8:05 AM  Imaging Myocarditis
Matthias G. Friedrich, MD, FESC, Stephenson Cardiovascular MR Centre

Learning Objectives*
• Describe the diagnostic targets for CMR in patients with myocarditis
• List the sequences used to assess patients with myocarditis
• List the diagnostic criteria for myocarditis

8:35 AM  Pericardial Disease
Robert Biederman, MD, Allegheny General Hospital

Learning Objectives*
• To learn which pulse sequences may be helpful in the evaluation of pericardial disease
• To learn the role of cardiac magnetic resonance in the evaluation of pericardial disease
• To learn the differential diagnoses of pericardial disease

*At the conclusion of this presentation, the attendee should be better able to:
Technologist Workshop

9:10 AM  Cardiac Tumors
James Moon, The Heart Hospital

Learning Objectives*
• Know the normal cardiac structures that can mimic masses and the limitations of MRI/Echo
• Know the types of cardiac mass and what the clinicians want to know
• Know the role of defining a mass with intrinsic contrast (T1, T2, fatsat) and contrast (perfluorocarbons, early and late gad)

9:45 AM  Abstract Presentations

9:45 AM  T13  Background offset error in pulmonary and aortic phase contrast flow imaging of 94 patients
Annette L. Dahl, BSc (Hons), Royal Brompton Hospital
The study assesses the frequency, severity and causes of background offset errors in stroke volume measurements by breath-hold phase contrast imaging in 94 patients.

10:00 AM  T14  Experimental approaches to cardiac imaging with hyperpolarized [1-13c] pyruvate: a feasibility study in rats with a 3T clinical scanner
Vincenzo Positano, MSc, “G. Monasterio” Foundation
The spatial localization of 13C metabolite in the rat heart can be achieved at 3T clinical scanner with a multiple voxel peak analysis. The feasibility of the same approach can be explored in larger compartments of small animal models (rat).

10:15 AM – 10:45 AM  Valley of the Sun Foyer
Refreshments

10:45 AM – 1:00 PM  Session 8: Emerging Technologies and Back to the Future
Moderator:  Beth Goddu, RT, Beth Israel Deaconess Hospital

10:50 AM  [Un]solved Problems in Cardiovascular MR Imaging at (Ultra) High Fields
Thoralf Niendorf, PhD, Max-Delbrück-Center for Molecular Medicine

Learning Objectives*
• Explain the clinical relevance of (ultra)high field CVMR
• Recognize the technical and physical obstacles for (ultra)high field CVMR
• Survey the pros and cons of (ultra)high field CVMR
• Appreciate novel MR technology and imaging strategies driven by (ultra)high field MR
• Understand the extra added clinical value of (ultra)high field CVMR
• Consider practical implications for routine (ultra) high field CVMR

11:20 AM  CMR Post-Processing
Andreas Kumar, MD, MSc, University of Calgary

Learning Objectives*
• To understand the differences between qualitative, semi-quantitative and quantitative image analysis
• To understand the principles of different methods for left ventricular function assessment
• To understand the principles and application of CMR tissue characterization in ischemic and non-ischemic cardiomyopathy

11:55 AM  Cardiac Spectroscopy – Clinical Tool of the Future
Sebastian Kozerke, PhD, Institute of Biomedical Engineering University and ETH Zurich

Learning Objectives*
• Understand the fundamental limitations in cardiac spectroscopy including low available signal and accordingly limited spatiotemporal resolution, respiratory and cardiac motion, quantification issues
• Explain key method developments for collecting data at high resolution, motion compensation and signal enhancement
• Identify applications of cardiac spectroscopy for quantifying high energy phosphates, fatty acids, carbon compounds and pH

12:30 PM  Molecular Imaging
Shelton Caruthers, PhD, Washington University

Learning Objectives*
• Define the concept of “molecular imaging”
• Speak about specific examples of MR molecular imaging and what potential impact on diagnosis and therapy this may bring
• Have an introductory knowledge of the potential, but also the pitfalls, of translating MR molecular imaging into clinical applications

1:05 PM  Closing Remarks
**Technologist Workshop**

**Technologist Poster Presentations**

**T1** The case of the disappearing left ventricular apical thrombus  
Christine Mancini, Rt (R)(MR), National Institutes of Health/ Suburban Hospital  
The current case demonstrates that thromboembolic events may be subclinical. In our case, there is no reason to suspect that the MRI itself caused the thromboembolic event. Likely, the timing of the scan was coincidental in documenting the event.

**T2** Pediatric CMR evaluation of double outlet right ventricle using a hybrid suite  
Navjot Thind, BAppSc, RT(MR), Hospital for Sick Children  
The use of a combined conventional fluoroscopic cardiac catheterization and magnetic resonance imaging (XMR) suite in complex pediatric congenital heart disease to delineate cardiac morphology. A case involving a patient with a double outlet right ventricle will be discussed.

**T3** Spoiled Gradient Echo T2* iron-loading measurements of the liver and myocardium in 12 year old male with severely reduced cardiac function from Thalassemia Major  
Annette L. Dahl, BSc (Hons), Royal Brompton Hospital  
Successful measurements of hepatic and myocardial iron-loading in 12 year old male with Thalassemia Major using Spoiled Gradient Echo. CMR additionally demonstrates severely reduced cardiac function.

**T4** Imaging of vascular complications of Takayasu arteritis using Cardiovascular Magnetic Resonance  
Annette L. Dahl, BSc (Hons), Royal Brompton Hospital  
Case study of a 42 year old lady with Takayasu arteritis showing diffuse arterial disease and a focal stenosis in the distal thoracic aorta. Angiography, flow and spin-echo sequences give a comprehensive assessment of lumen, vessel wall and jet velocity.

**T5** Revealing the etiology of a left ventricular mass using cardiac magnetic resonance  
Tarek M. Mousa, MD, New York Hospital Medical Center of Queens  
Herein, we describe a rare case of an exceptionally large intracavitary thrombus overlying an apical infarct detected only by cardiac MRI in a patient with no history of coronary artery disease and a probable hypercoagulable state from ovarian CA.

**T6** Non contrast vascular imaging techniques from the perspective of the MR technologist  
Sara Powers, RT(R)(CT)(MR), Brigham and Women’s Hospital  
This presentation will review and illustrate non-contrast vascular imaging techniques from the perspective of the MR technologist. Cases will include renal arteries and the peripheral vascular system.

**T7** Cardiac metabolism with hyperpolarized [1-13c] pyruvate: a feasibility study in mini-pig with a large dose injection  
Vincenzo Positano, MSc, “G. Monasterio” Foundation  
The feasibility of studying cardiac metabolism with hyperpolarized 13C is demonstrated with this experimental approach: the methodology applied in the mid-sized animal is a first step toward cardiac metabolic imaging.

**T8** Is infarct location a prediction of valvular enhancement?  
Ronald B. Williams, BA,RT(R)(MR), Allegheny General Hospital  
Initially thought that the location of the infarct was a direct influence on valvular DHE signal. In view of our findings here, this enhancement is from a global distribution and not a localized one.

**T9** Comprehensive cmr imaging in patients with arrhythmia  
Ricardo Wage, MD, Royal Brompton Hospital  
Achieving high quality cine images in patients with supraventricular and ventricular arrhythmia continues to be a challenge. We present a comprehensive overview of how to achieve quality imaging in these difficult cases.

*At the conclusion of this presentation, the attendee should be better able to:
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Ratnayaka, Kanishka: Financial Disclosure: Nothing to disclose
Rayaro, Geetha: Financial Disclosure: Nothing to disclose
Redheuil, Alban: Financial Disclosure: Nothing to disclose
Restaino, Gennaro: Financial Disclosure: Nothing to disclose
Reyhan, Meral: Financial Disclosure: Nothing to disclose
Rickers, Carsten: Financial Disclosure: Nothing to disclose
Riche, Viola: Financial Disclosure: Nothing to disclose
Rochitte, Carlos: Financial Disclosure: Nothing to disclose
Rolf, Andreas: Financial Disclosure: Nothing to disclose
Rossi, Alexia: Financial Disclosure: Nothing to disclose
Rowin, Ethan: Financial Disclosure: Nothing to disclose
Salah, Ali: Financial Disclosure: Nothing to disclose
Santry, Stig: Financial Disclosure: Nothing to disclose
Sandner, Torleif: Financial Disclosure: Nothing to disclose
Sanatkar, Toma: Financial Disclosure: Nothing to disclose
Santer, Wolf: Financial Disclosure: Nothing to disclose
Saranathan, Manojkumar: Financial Disclosure: GE Healthcare
Sarehan, Mahdi: Financial Disclosure: Nothing to disclose
Sandelli Neto, Roberto: Financial Disclosure: Nothing to disclose
Sattur, Sudhakar: Financial Disclosure: Nothing to disclose
Saybasili, Haris: Financial Disclosure: Nothing to disclose
Schmidt, Johannes: Financial Disclosure: Nothing to disclose
Schmitt, Boris: Financial Disclosure: Nothing to disclose
Schuster, Andrea: Financial Disclosure: Nothing to disclose
Scott, Andrew: Financial Disclosure: Nothing to disclose
Sehri, Neha: Financial Disclosure: Nothing to disclose
Setser, Randolph: Financial Disclosure: Nothing to disclose
Shah, Saurabh: Financial Disclosure: Siemens Healthcare
Shah, Akshay: Financial Disclosure: Nothing to disclose
Shanbhag, Sujata: Financial Disclosure: Nothing to disclose
Shehata, Monda: Financial Disclosure: Nothing to disclose
Shmatukha, Andriy: Financial Disclosure: GE Healthcare
Siebley, Christopher: Financial Disclosure: Nothing to disclose
Singh, Bharat: Financial Disclosure: Nothing to disclose
Singh, Anil-Martin: Financial Disclosure: Nothing to disclose
Skröd, Jan: Financial Disclosure: Nothing to disclose
Slavin, Glenn: Financial Disclosure: GE Healthcare
Slesnick, Timothy: Financial Disclosure: Nothing to disclose
Smith, Gillian: Financial Disclosure: Nothing to disclose
Soleimani-Fard, Sahar: Financial Disclosure: Nothing to disclose
Sollman, Abraam: Financial Disclosure: Nothing to disclose
Song, Ting: Financial Disclosure: Nothing to disclose
Sorensen, Peder: Financial Disclosure: Nothing to disclose
Sujansky, Jeff: Financial Disclosure: GE Healthcare
Steen, Henning: Financial Disclosure: Nothing to disclose
Subramanian, Hariharan: Financial Disclosure: Nothing to disclose
Sutic, Joseph: Financial Disclosure: Nothing to disclose
Tao, Qian: Financial Disclosure: Nothing to disclose
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Third, Navjot: Financial Disclosure: Nothing to disclose
Tong, Felipe: Financial Disclosure: Nothing to disclose
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Turkhey, ervin: Financial Disclosure: Nothing to disclose
Ubachs, Joey: Financial Disclosure: Nothing to disclose
Uetre, Seth: Financial Disclosure: Nothing to disclose
Valverde, Iera: Financial Disclosure: Nothing to disclose
vand der Hulst, Annelies: Financial Disclosure: Nothing to disclose
van Elderen, Saska: Financial Disclosure: Nothing to disclose
Vardarajana, Padmini: Financial Disclosure: Nothing to disclose
Varm, Gopal: Financial Disclosure: Nothing to disclose
Venere, Jose: Financial Disclosure: Nothing to disclose
Vijayakumar, Sathy: Financial Disclosure: Nothing to disclose
Vitkis, Vito: Financial Disclosure: Nothing to disclose
Wassman, Ralf: Financial Disclosure: Nothing to disclose
Wex, Thomas: Financial Disclosure: Nothing to disclose
Weerackody, Roshan: Financial Disclosure: Nothing to disclose
Westenberg, Josa: Financial Disclosure: Nothing to disclose
Whal, Lee: Financial Disclosure: Nothing to disclose
White, James: Financial Disclosure: Bayer Canada, Inc., Siemens
Wiethoff, Andrea: Financial Disclosure: Philips Healthcare
Wilhelm, Joerg: Financial Disclosure: Nothing to disclose
Williams, Ronald: Financial Disclosure: Nothing to disclose
Wintersberger, Bernd: Financial Disclosure: Nothing to disclose
Wong, Joyce: Financial Disclosure: Nothing to disclose
Xie, Jingsi: Financial Disclosure: Nothing to disclose
Xu, Jian: Financial Disclosure: Siemens Medical Solutions
Yamashita, Kiyoshi: Financial Disclosure: Nothing to disclose
Yang, Qi: Financial Disclosure: Nothing to disclose
Yasawo, Taniguchi: Financial Disclosure: Nothing to disclose
Yasuyuki, Kobayashi: Financial Disclosure: Nothing to disclose
Ye, Dong Hye: Financial Disclosure: Nothing to disclose
Ye, Qing: Financial Disclosure: Nothing to disclose
Yip, Jialing: Financial Disclosure: Nothing to disclose
Yu, Jennifer: Financial Disclosure: Nothing to disclose
Zhang, Lei: Financial Disclosure: Nothing to disclose
Zhou, Xiangsheng: Financial Disclosure: Nothing to disclose
Zia, Mohammad: Financial Disclosure: Nothing to disclose
Zun, Zung: Financial Disclosure: Nothing to disclose
2010 Exhibitor Directory

2011 SCMR and Euro CMR Joint Scientific Sessions 111
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22885 Barsbüttel
Tel: +49 40 670 88 20
Fax: +49 40 670 32 83
sweerts@cpo-hanser.de
www.scmergeurocmr2011.org

Joint meeting of SCMR and ESC Working Group on Cardiovascular Magnetic Resonance to be held in Nice, France on 3 - 6 February 2011. For further information please visit the website: www.scmergeurocmr2011.org

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Tamarisk, Clifden Close
Arrington, Cambs, SG8 0BA
United Kingdom
Tel: +44 7771 888 886
Fax: +44 1223 207 004
sales@cmrtools.com
www.cmrtools.com

CMRtools is a versatile software package that allows interactive viewing and functional analysis of CMR images. It is built on years of clinical research in CMR, it allows state-of-the-art image analysis, quantification and visualization on a standard PC.

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Tel: 403-338-1870
Fax: 403-338-1895
info@circlecvi.com
www.CMR42.com

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The ICAMRL provides a voluntary accreditation process for providers of MR, enabling applicant facilities to evaluate and demonstrate the level of patient care they provide. The Standards, outlining the recommendations and requirements for a quality MR facility, will be displayed along with the corresponding Accreditation Application. You may visit www.icamrl.org for more information. Also, stop by our booth to learn more about ICAMRL’s webcast series Accreditation On Demand.

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Medis is the leading provider of software solutions for the quantification of cardiovascular MR images. At SCMR 2010, you can learn more about the latest version of Medis QMass® MR, which features automatic segmentation of scar tissue and peri-infarct region and provides a great user experience. Join us for the spotlight presentation in the exhibition area on Friday, January 22, 3:00 – 3:30 pm, or visit the Medis booth (#108).

At Philips, we simplify healthcare by focusing on the people in the care cycle—patients and care providers. We’re committed to developing tools that deliver value throughout the complete cycle of care—from disease prevention to screening & diagnosis, to treatment, health management & monitoring—in key areas including cardiology, oncology, critical care and women’s health.

LMT is the first company offering an MR-compatible incubator with integrated neonatal phased array coils for newborns. It facilitates safe and convenient transport from the NICU to the MRI department with an MR-compatible trolley, MR-compatible gas and power supply and necessary compatible accessories. A wide range of accessories enhances the optimum and efficient operation of this system, such as: neonatal body array coil, MR-compatible ventilation, integrated monitoring or trolley for ambulance transport.

Lippincott Williams & Wilkins has some of the best books in cardiovascular imaging.
# 2010 Exhibitor Directory

<table>
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<tr>
<th>Company</th>
<th>Booth</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
<th>Website</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pie Medical Imaging</strong></td>
<td>208</td>
<td>Becanusstraat 13d, Maastricht, 6216BX, The Netherlands</td>
<td>+31 43 329 1328</td>
<td>+31 43 328 1329</td>
<td><a href="mailto:pmi-exhibitor@pie.nl">pmi-exhibitor@pie.nl</a></td>
<td><a href="http://www.piemedicalimaging.com">www.piemedicalimaging.com</a></td>
<td>Pie Medical Imaging offers quantitative cardiovascular analysis software for cardiac MR. The CAAS MRV software allows for a Functional analysis of the ventricles, a Viability (DE) and First Pass Perfusion analysis and also is available for small animal research. The CAAS MR Flow software is designed to quantify flow and velocities in PCA MR images.</td>
</tr>
<tr>
<td><strong>SA Instruments, Inc.</strong></td>
<td>409</td>
<td>P.O. Box 740, Stony Brook, NY 11790</td>
<td>631-689-9408</td>
<td>631-689-9410</td>
<td><a href="mailto:jhiz@i4sa.com">jhiz@i4sa.com</a></td>
<td><a href="http://www.i4sa.com">www.i4sa.com</a></td>
<td>SA Instruments designs, manufactures and sells physiological monitoring and gating systems for animal research. Multi-parameter systems measure heart rates in excess of 900 beats per minute and are compatible with MR, CT, PET and SPECT. Parameters include ECG, temperature, respiration, blood pressure, oxygen saturation and auxiliary input channels. Waveform and trend data can be captured, stored and displayed. A heater allows the animal's temperature to be controlled. Systems are also available to accommodate monitoring and gating multiple animals simultaneously.</td>
</tr>
<tr>
<td><strong>Siemens Healthcare</strong></td>
<td>202</td>
<td>51 Valley Stream Parkway, Malvern, PA 19355</td>
<td>610-448-1525</td>
<td><a href="mailto:Heather.lewis@siemens.com">Heather.lewis@siemens.com</a></td>
<td><a href="http://www.siemens.com/healthcare">www.siemens.com/healthcare</a></td>
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<td></td>
</tr>
<tr>
<td><strong>Society for Cardiovascular Magnetic Resonance (SCMR)</strong></td>
<td>109</td>
<td>19 Mantua Road, Mt. Royal, NJ 08061</td>
<td>856-423-8955</td>
<td>856-423-3420</td>
<td><a href="mailto:scmrhq@talley.com">scmrhq@talley.com</a></td>
<td><a href="http://www.scmr.org">www.scmr.org</a></td>
<td>The Society for Cardiovascular Magnetic Resonance (SCMR) is a professional association whose vision is to be the recognized representative and advocate for physicians, scientists, and technologists who work in the field of cardiovascular magnetic resonance. It endeavors to be the principal international, independent organization committed to the further development of cardiovascular magnetic resonance through education, quality control, research, and training.</td>
</tr>
<tr>
<td><strong>Topspins Inc.</strong></td>
<td>313</td>
<td>403 Riverview Drive, Ann Arbor, NJ 48104</td>
<td>734-623-6400</td>
<td>734-623-6401</td>
<td><a href="mailto:rzubkovf@gmail.com">rzubkovf@gmail.com</a></td>
<td><a href="http://www.topspins.com">www.topspins.com</a></td>
<td>Topspins develops systems for enhancing dynamic MRI studies including the smartset for safe hand injection of Gadolinium, the smart tourniquet for improving peripheral and whole body MR Angiography image quality, and the smartpad for simplifying ECG gating.</td>
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<td><strong>Toshiba Medical Systems</strong></td>
<td>213</td>
<td>2441 Michelle Drive, Tustin, CA 92780</td>
<td>800-421-1968</td>
<td>714-505-3076</td>
<td><a href="http://www.medical.toshiba.com">www.medical.toshiba.com</a></td>
<td>An innovator in medical imaging technology, Toshiba Medical Systems markets, sells, distributes and services a full-line of MRI solutions maximizing patient comfort while delivering superior image quality, making Toshiba ideal for both hospitals and outpatient imaging centers. Situated at booth #213, why not stop by to learn more about our many imaging technologies.</td>
<td></td>
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</tbody>
</table>
Society for Cardiovascular Magnetic Resonance
January 21 - 24, 2010
Sheraton Downtown Phoenix - Phoenix Ballrooms C - E

Product Theater
20'x30'
Hotel Floor Plan

Sheraton Phoenix Downtown Hotel

Second Level

Pre-Function

(third level)

Valley of the Sun

A

B

C

D

E

Arcadia Boardroom

Ahwatukee

Lawson

South Mountain

A

B

A

B

A

B

A

B

Deer Valley

Paradise Valley

North Mountain

Encanto

Comeback

Alhambra

Estrella

Pre-Function

Pre-Function

Oculus

Third Level

Cave Creek

Desert Sky

Coronado Boardroom

Pre-Function

Phoenix

C

D

E

3rd Street Foyer

(windows)
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