2017 SCMR/ISMRM Co-Provided Workshop
FINAL PROGRAM

CMR for Probing Mechanisms of Heart Disease: Micro to Macro to Model

February 1-2, 2017
Maryland C | Gaylord National Resort | Washington, DC USA
Dear Colleagues,

On behalf of the organizing committee, we welcome you to the 2016 Co-Provided SCMR/ISMRM Workshop entitled: “CMR for Probing Mechanisms of Heart Disease: Micro to Macro to Model”.

This single track one-and-a-half-day workshop will provide an in-depth look at structure and physiology of the heart, and will provide a platform to discuss how CMR may best be used to assess pathological changes. The program contains eight sessions with a mix of plenary, invited, and proffered talks. The central sessions are organized around three topics “Tissue Microstructure”, “Tissue Vitality and Mechanisms of Transport”, and “Cardiac Global and Regional Function”. The tissue of focus is human myocardium, however each session will also draw on technologies and major findings from other areas, for example the study of brain microstructure, and the study of cardiomyocyte development in animal models. The sessions include eminent speakers from within and from outside of our CMR community, to both challenge and broaden our perspectives.

This workshop is the 6th Co-Provided SCMR/ISMRM Workshop that is timed immediately before the SCMR annual scientific sessions. Past workshops in this series have been well attended, and have been successful at enhancing the research and education agendas of both societies. We hope this meeting continues the trend, and look forward to your participation.

Regards,

Sonia Nielles-Vallespin, National Institutes of Health
Krishna S. Nayak, University of Southern California
Co-Chairs
Organizing and Scientific Program Committee:

Co-chairs:
Sonia Nielles-Vallespin
(National Institutes of Health)

Krishna Nayak
(University of Southern California)

Committee Members:
Daniel Messroghli
(Deutsches Herzzentrum Berlin)

Juliano Fernandes
(Jose Michel Kalaf Research Institute — Radiologia Clinica de Campinas)

Table of Contents

Welcome ........................................ 2

General Information ........................ 4

Agenda ........................................... 5

Disclosure Statement ..................... 7

Posters ......................................... 8

Notes ........................................... 10

Hotel Floor Plan ............................. 11
General Information Overview

How are micro and macro structures related to cardiac function? How does this relation change in the presence of disease? And how can MRI help to uncover these changes?

The central theme of this Workshop program seeks to provide attendees with an in-depth look at structure and physiology of the heart, and a platform to discuss how CMR may best be used to assess pathological changes thereof.

To reach these goals, the program has been organized as a 1½ day Workshop on February 1 and 2 (Wednesday and Thursday) preceding the main meeting. It features keynote opening and closing sessions where a general outlook and the future of the field will be portrayed, interposed with oral abstracts and poster sessions. Each scientific session will focus on a theme linked to a particular mechanism of heart disease. Leaders in the field will introduce the general topic and will be followed by oral abstract presenters. These themes include CMR diffusion, extra-cellular and multi-compartment properties of the myocardium, tissue vitality and cardiac function.

The workshop’s dedicated abstract sessions were planned to allow emerging and young scientists to present their work separate from the main meeting and to a more intimate and focused group. This also provides an opportunity to closely interact with the leading authorities in the field. Simultaneously, “rapid fire” poster sessions will provide the presenters with the opportunity to highlight important aspects of their work to a larger audience. This year’s topics for abstract submissions include: tissue microstructure (cardiac DTI/DWI), tissue microstructure – others, extra-cellular volume, multi-compartment perfusion, tissue vitality and mechanisms of transport, cardiac function (cine, strain and others) and novel technologies for probing mechanisms of heart disease.

The program is meant to foster in-depth interactions among attendees, not only during the scientific presentations but also during the six breaks in between sessions as well as during the reception and poster viewing hour that is scheduled at the end of Day 1.

Target Audience

The workshop targets professionals seeking an in-depth view of basic cardiac microstructure, compartments and function and its characterization by CMR. This includes basic researchers in imaging methods and cardiac translational sciences, PhD students and postdocs, clinicians (cardiologists, radiologists), CMR technologists and members of different ISMRM Study Groups (Cardiac MR, Diffusion, Electromagnetic Tissue Properties (SWI), MR Elastography (MRE), MR Flow and Motion Quantitation, and Perfusion).

Educational Objectives

At the conclusion of this workshop, participants will be better able to:

1. Summarize the microstructure of the myocardium, its relation to cardiac function, and its changes in the presence of disease.
2. Examine the basic principles and technical challenges of cardiac diffusion magnetic resonance imaging.
3. Describe recent studies in cardiac Diffusion MRI and evaluate the potential of this technique as a diagnostic tool.
4. Define compartment models of the heart and how CMR can assess the correlations among them using perfusion, ECV, 13C imaging, CEST and BOLD.
5. Examine global and regional myocardial function mechanics and the application of stiffness imaging, elastography, and tissue tracking.

Continuing Medical Education Credits

The Society for Cardiovascular Magnetic Resonance is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. Detailed information can be found on the 2017 SCMR meeting website at www.scmr2017.org.
### Wednesday, February 1, 2017
Maryland C

#### Opening Session
8:00 am – 9:15 am

**Moderators:**
Sonia Niellles-Vallespin, PhD, MSc (National Institute of Health) and Krishna Nayak, PhD (University of Southern California)

- **8:00 am** Welcome/Introduction
  Sonia Niellles-Vallespin, PhD, MSc (National Institute of Health)
  Krishna Nayak, PhD (University of Southern California)

- **8:10 am** Characterizing the spectrum of heart failure
  Sean Pinney, MD (Mount Sinai Hospital)

- **8:40 am** Probing Microstructure of the Brain
  Carlo Pierpaoli, MD, PhD (NIBIB/NIH)

- **9:15 am** BREAK

#### Cardiac Microstructure #1
9:30 am – 10:45 am

**Moderators:**
Pedro Ferreira, PhD (The Royal Brompton Hospital) and David Sosnovik, MD (Harvard Medical School — Massachusetts General Hospital)

- **9:30 am** Microstructural organization of the Heart
  Dudley Pennell, MD (Royal Brompton Hospital)

- **9:50 am** CMR Diffusion Pulse Sequences
  Christian Stoeck, PhD (University and ETH Zurich)

- **10:10 am** CMR Diffusion Analysis and Interpretation
  Daniel Ennis, PhD (University of California, Los Angeles)

- **10:30 am** W001 Validation of DTI in Whole Myocardium with Structure Tensor Synchrotron Radiation Imaging
  Irvin Teh, PhD (University of Oxford)

- **10:38 am** W002 An in-vivo comparison of STEAM and motion compensated spin-echo imaging in cardiac DTI
  Andrew Scott, PhD (The Royal Brompton Hospital)

- **10:45 am** BREAK

#### Cardiac Microstructure #2
11:15 am – 12:30 pm

**Moderators:**
Daniel Ennis, PhD (University of California, Los Angeles) and Martin Froeling (UMC Utrecht)

- **11:15 am** CMR Diffusion Models
  Andrew Scott, PhD (The Royal Brompton Hospital)

- **11:35 am** CMR Diffusion Clinical Translation
  Christopher Nguyen, PhD (Cedars-Sinai Medical Center)

- **11:55 am** W003 Cardiac Diffusion Tensor Imaging — Comparison of In Vivo Systolic and Diastolic Cardiomyocyte Orientations
  Patrick Magrath, M.S. (University of California, Los Angeles)

- **12:05 pm** W004 Automatic detection of corrupted frames in cardiac DTI with machine learning
  Pedro Ferreira, PhD (Cardiovascular Biomedical Research Unit, The Royal Brompton Hospital, Sydney Street, London, SW3 6NP, UK)

#### Tissue Vitality & Mechanisms of Transport #1
1:30 pm – 2:45 pm

**Moderators:**
Edward DiBella, PhD (University of Utah) and Martin Ugander, MD, PhD (Karolinska Institutet)

- **1:30 pm** The Cardiomyocyte and Its local Environment
  David Sosnovik, MD (Massachusetts General Hospital)

- **1:50 pm** ECV (technique and translation)
  Peter Kellman, Ph.D. (National Heart, Lung, and Blood Institute)

- **2:10 pm** Multi-compartment Perfusion Modeling
  Michael Jerosch-Herold, PhD (Department of Radiology, Brigham and Women’s Hospital)
### Tissue Vitality & Mechanisms of Transport #2

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<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
<th>Institution/University</th>
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<tbody>
<tr>
<td>3:30 pm</td>
<td>Moderators:</td>
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<tr>
<td></td>
<td>Edward DiBella, PhD (University of Utah)</td>
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<td></td>
<td>Dara L. Kraitchman, DVM, PhD (Johns Hopkins University School of Medicine)</td>
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<td>3:30 pm</td>
<td>Targeted Probes</td>
<td>Zahi Fayad, PhD (Icahn School of Medicine at Mount Sinai)</td>
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<td>3:40 pm</td>
<td>13C</td>
<td>Damian Tyler, PhD (University of Oxford)</td>
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<td>3:50 pm</td>
<td>CEST</td>
<td>Sebastian Kozerke, PhD (ETH Zurich; King’s College London)</td>
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<td>4:00 pm</td>
<td>BOLD</td>
<td>Rohan Dharmakumar, PhD (Cedars-Sinai Medical)</td>
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<td>4:08 pm</td>
<td>W005 Vasodilator Response in Heart Transplant Recipients using T1-based Myocardial Blood Volume Mapping</td>
<td>Krishna Nayak, PhD (University of Southern California)</td>
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<td>4:16 pm</td>
<td>W006 Assessing The Repeatability of ECV Mapping Without Hematocrit Measurement at 3T</td>
<td>Michael Blatt, B.S. (University of Utah)</td>
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<td>4:24 pm</td>
<td>W007 Hemorrhage alters remote myocardial response following acute myocardial infarction: A T2-BOLD and T1-ECV study</td>
<td>Nilesh Ghugre, PhD (Sunnybrook Research Institute, University of Toronto)</td>
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<td>4:32 pm</td>
<td>W008 Myocardial T1 and T2 mapping in severe aortic stenosis: novel insights into the pathophysiology of myocardial remodeling?</td>
<td>Bettina Baessler, M.D. (University Hospital of Cologne, Department of Radiology)</td>
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### Thursday, February 2, 2017

#### Cardiac Global & Regional Function #1

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<th>Time</th>
<th>Topic</th>
<th>Moderator</th>
<th>Institution/University</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>From physiology to function; changes in the presence of disease</td>
<td>Alistair Young, PhD (The University of Auckland) and Pierre Croisille, MD, PhD (University Lyon, UJM-Saint-Etienne)</td>
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<td>8:25 am</td>
<td>Quantitative CMR of Regional Function</td>
<td>Frederick Epstein, PhD (University of Virginia)</td>
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<td>8:50 am</td>
<td>Mechanics and Stiffness (w/pressure) FEM</td>
<td>Martyn Nash, PhD (Auckland Bioengineering Institute, University of Auckland)</td>
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<tr>
<td>9:15 am</td>
<td>BREAK</td>
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#### Cardiac Global & Regional Function #2

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<th>Time</th>
<th>Topic</th>
<th>Moderator</th>
<th>Institution/University</th>
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<tr>
<td>9:30 am</td>
<td>Elastography</td>
<td>Arunak Kolipaka, PhD (The Ohio State University Wexner Medical Center)</td>
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<td>9:40 am</td>
<td>Feature Tracking</td>
<td>Andreas Schuster, MD PhD MBA FESC FACC (Department of Cardiology and Pneumology, University Medical Center Göttingen, Germany)</td>
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<td>9:50 am</td>
<td>Tissue Phase Mapping</td>
<td>Daniela Föll, MD (Cardiology and Angiology I, University Heart Center Freiburg- Bad Krozingen)</td>
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<td>10:00 am</td>
<td>Quantitative Cardiac Mechanics using In Vivo Cine DENSE, Cardiac Diffusion Tensor Imaging, and a Continuum Mechanics Model</td>
<td>Ilya Verzhbinsky (University of California, Los Angeles)</td>
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Disclosure Statement

The SCMR and ISMRM are committed to:

- Ensuring balance, independence, objectivity and scientific rigor in all Continuing Medical Education (CME) programs; and
- Presenting CME activities that promote improvements or quality in healthcare and are independent of commercial interests.

Therefore it is the policy of both societies that any person who has influence over the content of a program designated for AMA PRA Category 1 Credits™ must disclose any real or apparent financial interest or other relationship (i.e., grants, research support, consultant, honoraria) that the individual may have with the manufacturers, distributors or providers of any commercial products or services that may be discussed in the presentation.

Such financial interests or relationships must be identified in advance so that potential conflicts can be resolved before the program, and participants at the CME activity may have these facts fully disclosed at the outset.

Neither the ISMRM nor the SCMR implies that such financial interests or relationships are inherently improper or that such interests or relationships would prevent the speaker or organizer from making an objective contribution. However, it is imperative that such financial interests or relationships be identified so that potential conflicts can be resolved before the program, and participants at the CME activity may have these facts fully disclosed in advance. It then remains for the audience to determine whether an individual’s outside interests may reflect a possible bias in either the exposition or the conclusions presented. 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 the SCMR 2017 meeting website.

www.scmr.org  www.ismrm.org
Poster Directory
SCMR/ISMRM Co-Provided Workshop - Posters

W013 Simulating the Effect of Motion Induced by Systolic Variability in cDTI using STEAM
Andrew Scott, PhD (NIHR Cardiovascular Biomedical Research Unit, The Royal Brompton Hospital, Sydney Street, London, SW3 6NP, UK)

W014 Nonlinear Fitting Improves Precision in Biexponential Joint T2 and Apparent Diffusion Coefficient Mapping in the Heart
Eric Aliotta, M.S. (UCLA)

W015 Bringing the T1 mapping sequences together: A study of the T2 and magnetization transfer effects in ex vivo pig hearts
Tarik Hafyane, MSC (Montreal Heart Institute)

W016 The Influence of the Analysis Technique on Myocardial T1 Measurement Using CMR
El-Sayed Ibrahim, PhD (University of Michigan)

W017 CMR Tissue Characterization for Identifying Obesity Phenotypes in Metabolic Syndrome
Jadranka Stojanouska, MD (University of Michigan)

W018 Bright-blood T2STIR-bSSFP has Higher Diagnostic Accuracy Than the Bright-blood T2 pre-bSSFP for Assessment of Area-at-risk in Acute Myocardial Infarction: A New Proposed Bright-blood T2-weighted MRI
Dan Yang, msci (West China Hospital, Sichuan University)

W019 Software-based evaluation algorithms for dynamic oxygenation-sensitive CMR studies
Thomas Bertrand, B.Sc. (Hons), M.Sc. Student (MUHC)

W020 Cardiac viability in the peri-infarct region quantified by T1 mapping following manganese-enhanced MRI (MEMRI) is associated with LV remodeling post-myocardial infarction (MI)
Yuko Tada, MD, PhD (Stanford University School of Medicine)

W021 3D Real-Time Cardiac MRI: Preliminary Results on Sheep
Jing Liu, Ph.D. (University of California, San Francisco)
W022  Displacement encoding with Stimulated echoes (DENSE) is superior to feature tracking and tagging to detect abnormal left ventricular wall function by analyzing circumferential strain. 
Johan Kihlberg, MSc (CMIV, Linkoping University)

W023  Tissue Tagging Reveals Maternal Nutrient Restriction Induced Alteration of Cardiac Mechanics in the Male Baboon Offspring, Paralleling Effects of Aging 
Anderson Kuo, MD (University of Texas Health Science Center at San Antonio)

W024  Accurate and rapid longitudinal strain imaging by cine DENSE using one-dimensional longitudinal displacement encoding 
Xiaoying Cai, BS (University of Virginia)

W025  MAPSE and TAPSE for the evaluation of left and right ventricular function in cardiac MR and functional cardiac CT. 
Asik Ali Mohamed Ali, MD (Vancouver General Hospital - University of British Columbia)

W026  Stress CMR using Fast-SENC CMR for Predicting Regional Function Abnormalities 
El-Sayed Ibrahim, PhD (University of Michigan)

W027  CMR tagging pattern for 3D tracking: Radial-zSPAMM 
Abbas Nasiraei Moghaddam, PhD (Amirkabir University of Technology)

W028  Anisotropic Myocardial Stiffness in HFpEF Porcine Hearts: Initial Feasibility 
Prateek Kalra, MS (Department of Radiology, The Ohio State University Wexner Medical Center)

W029  Measuring Left Ventricular Myocardial stiffness using transient intrinsic torsional shear wave propagation: Initial results from phantom study and volunteers 
Jessica Webb, BM BCh MRCP (King’s College London)

W030  A multi-scale investigation of structural and functional remodelling in heart failure 
Vicky Wang, PhD (Auckland Bioengineering Institute, University of Auckland)

W031  Feasibility of Cardiac Cine MRI at 0.35T 
Shams Rashid, Ph.D. (Department of Radiological Sciences, UCLA)

W032  Towards reducing the confounding effect of intra-myocardial blood volume on native T1: Purely-systolic T1 mapping using an ungated spoiled steady-state approach 
Behzad Sharif, PhD (Cedars-Sinai Medical Center, Los Angeles)