

Advanced CMR of Cardiac Mechanics and Hemodynamics: towards Individualized Evaluation of Cardiovascular Disease

February 18, 2021

Organizing and Scientific Program Committee

- Dan Kim, PhD, Chicago, USA (Co-Chair)
- Susanne Schnell, PhD, Greifswald, Germany (Co-Chair)
- Teodora Chitiboi, PhD, Siemens Princeton, USA
- Albert Hsiao, MD-PhD, San Diego, USA
- Daniel Messroghli, MD, Berlin, Germany
- Claudia Prieto, PhD, London, GB
- Julio Sotelo, PhD, Valparaíso, Chile
- Jadranka Stojanovca, MD, Michigan, USA
- Daniel Ennis, PhD, Stanford, California, USA

Session 1 – Keynote Speakers

- 8:00 am – 8:05 am Welcome and Introduction (Dan Kim, Susanne Schnell)
- 8:05 am – 8:35 am Keynote Lecture 1: Data Sought From Cardiac Imaging: the Heart Failure Example (Anthony DeMaria)
- 8:35 am – 9:05 am Keynote Lecture 2: Assessing cardiac mechanics and hemodynamics in congenital heart disease by CMR: can we have it all in under an hour by 2030? (Beth Printz)
- 9:05 am – 9:35 am Keynote Lecture 3: CMR Imaging Physics to Assess Mechanics and Hemodynamics (Elliot McVeigh)
- 9:35 am – 10:00 am Roundtable discussion (live) (Discussion facilitators: Matthias Friedrich, Cynthia Rigsby, Sebastian Kozerke)

10:00 am - 10:15 am Coffee Break

10:15 am – 12:00 pm Session 2 – State-of-the-art methods

Moderators: Tino Ebbers and Thekla Oechtering

- 10:15 am 4D Flow MRI – Translation of Technology to Clinical Practice (Albert Hsiao, invited talk)
- 10:30 am 4D Flow MRI – state-of-the-art and future directions (Pim van Ooij, invited talk)
- 10:45 am MRI of cardiac mechanics: state-of-the-art methods and influences of hemodynamics (Fred Epstein, invited talk)
- 11:00 am Cardiac Flow-Mechanics Markers: Into the coupling (Mohammed Elbaz, invited talk)
- 11:15 am Computational image-based modeling for personalized treatment planning in cardiovascular disease (Alison Marsden, invited talk)
- 11:30 am Roundtable Discussion (live) (Discussion facilitators: Daniel Ennis, Jadranka Stojanovska)

12:00 pm – 1:00 pm Lunch

1:00 pm – 1:45 pm Session 3 – Valvular/Vascular disease

Moderators: Ruth Lim and Evangeline Warmerdam

- 1:00 pm The Effect of Curved vs. Straight Graft Configurations on Aortic Hemodynamics in Bicuspid Aortic Valve Patients Undergoing Thoracic Aortic Aneurysm Repair (Elizabeth Weiss)

- 1:08 pm Structural and Functional Reverse Myocardial Remodeling following Transcatheter Aortic Valve Replacement (Torben Lange)
- 1:16 pm Elevated Regional Wall Shear Stress is Associated with Progressive Ascending Aorta Dilation: A 5-Year Follow-Up Study (Gilles Soulat)
- 1:24 pm 4D flow MRI-based WSS improves the prediction of adverse ascending aorta biomechanics in surgically resected aortic tissue (Alex Barker)
- 1:32 pm Q & A and Discussion (live)

1:45 pm – 2:00 pm Coffee Break

2:00 pm – 2:45 pm Session 4 – Myocardial disease

Moderators: Daniel Messrhogli and Deborah Kwon

- 2:00 pm Diagnostic and Prognostic Significance of Combined PET/MRI in Cardiac Sarcoidosis (Kate Hanneman)
- 2:08 pm Cardiac function adaptation in obese and hypertensive young adults (Gert Snel)
- 2:09 pm CMR Tissue Based Manifestations of Adverse Left Ventricular Remodeling in Friedreich's Ataxia – Echocardiographic, Genotypic, and Effort-Based Sequelae of Late Gadolinium Enhancement (Jonathan Weinsaft)
- 2:17 pm Relationship between myocardial perfusion reserve and Left Ventricular Size and Function in non-ischemic cardiomyopathy (Shuo Wang)
- 2:25 pm ACE Inhibitor Treatment Normalizes Apparent Diffusion Coefficient in Spontaneously Hypertensive Rats (Alexander Wilson)
- 2:33 pm Q & A and Discussion (live)

2:45 pm – 3:00 pm Coffee Break

3:00 pm – 3:45 pm Session 5 – AI and workflow

Moderators: Claudia Prieto and Mehmet Akcakaya

- 3:00 pm Deep Learning-based Synthetic Data Generation Improves the Robustness of Automatic Cardiac Function Estimation (Bogdan Gheorghita)
- 3:08 pm Using Synthetic Grid Tagged Images to Train a Neural Network for Tag Tracking (Michael Loecher)
- 3:16 pm Deep learning for classification of cine CMR images: the first step for a fully automated CMR analysis (Vittoria Vergani)
- 3:24 pm Using machine-learning for fully automatic LGE scar quantification in the large multi-national Derivate Registry (Juerg Schwitter)
- 3:24 pm Q & A and Discussion (live)

3:45 pm – 4:00 pm Coffee Break

4:00 pm – 5:00 pm Session 6 – Open-Source Demo's

Moderators: Teodora Chitiboi and Julio Sotelo

- 4:05 pm Using Synthetic Grid Tagged Images to Train a Neural Network for Tag Tracking (Michael Loecher)
- 4:10 pm Automated Myocardial Segmentation with Deep Learning for Quantitative Analysis of Perfusion CMR (Angel Jimenez-Molina)
- 4:15 pm Prototyping Image Reconstruction and Analysis with FIRE (Kelvin Chow)

- 4:20 pm GlasgowHeart: A Magnetic Resonance Imaging-derived 'virtual twin' cardiac mechanics platform (Hao Gao)
- 4:25 pm Playing with FIRE: a framework for on-scanner, in-line fully automated 4D Flow MRI reconstruction, pre-processing and flow visualization (Justin Baraboo)
- 4:30 pm The Vascular Model Repository and SimVascular (Martin Pfaller)
- 4:35 pm Q & A and Discussion (live), Discussion facilitators: Oliver Wieben, Alistair Young
- 5:00 pm Closing remarks (Dan Kim, Susanne Schnell)**
- 5:05 pm End of Workshop**