Harvard Medical School
Curriculum Vitae

Date Prepared:	May 20th, 2020
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Place of Birth:	Hong Kong

Education

1988	B.Sc.	Biochemistry (2 years of a 3-year program completed due to acceptance to Medical School)	University of Toronto, Toronto, Ontario, Canada
1992	M.D.	Medicine	University of Toronto
2006	M.P.H.	Clinical Effectiveness	Harvard School of Public Health (HSPH), Boston, MA

Postdoctoral Training

07/92-06/93	Rotating Intern	Medicine/Surgery	Saint Joseph Health Center, University of Toronto, Toronto, Ontario
07/93-06/97	Resident	Internal Medicine	Vancouver General Hospital, University of British Columbia, Vancouver, British Columbia
07/97-06/00	Fellow	Cardiovascular Diseases, Cardiovascular Medicine	George Washington University Medical Center, Washington, DC
07/99-08/01	Research Fellow	Cardiovascular Magnetic Resonance Imaging	National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH), Bethesda, MD

Faculty Academic Appointments

07/2001-12/2007	Instructor	Medicine	Harvard Medical School (HMS), Boston, MA
01/2008-04/2013	Assistant Professor	Medicine	HMS
05/2013-02/2020	Associate Professor	Medicine	HMS
02/2020-present	Professor	Medicine	HMS

Appointments at Hospitals/Affiliated Institutions

09/01-04/13	Associate Physician	Cardiovascular Medicine	Brigham and Women's Hospital (BWH), Boston, MA
05/13-present	Physician	Cardiovascular Medicine	BWH
09/01-present	Associate Radiologist	Radiology	BWH

Other Professional Positions

2011	Scientific Advisory Board	Lantheus Medical Imaging, Inc., N. Billerica, MA
2011-present	Magnetic Resonance Imaging Steering Committee (2 days per year)	St. Jude Medical, St. Paul, MN
2013-2017	Special Government Employee	United States Food and Drug Administration (FDA)
2017	Scientific Advisory Board	Heart Failure Scientific Advisory Board Meeting, Amgen Inc., Washington DC
2017-2021	Special Government Employee (1 day per year)	United States Food and Drug Administration (FDA) Medical Imaging Drugs Advisory Committee

Major Administrative Leadership Positions

Local

2001-2007	Co-Director, Cardiac Magnetic Resonance Imaging/Computed Tomography	BWH
2007-present	Director, Cardiac Magnetic Resonance Imaging	BWH

Committee Service

Local

2002-2004	Member, Emerging Clinical Leaders	BWH
2004-present	Joint Cardiology/Radiology Advanced Cardiovascular Imaging Committee	BWH
2006-present	Clinical Magnetic Resonance Service Committee	BWH
2007-present	Member, Non-invasive Cardiovascular Imaging Section	BWH

National

2009-2014	Data Safety Monitoring Board (DSMB), Protocol: Vascular impairment in type II diabetes mellitus with co-morbid obstructive sleep apnea, NIH (NHLBI) Protocol Number: R01 HL110350, PI: Atul Malhotra, M.D.	NIH
2016-Present	Study Outcomes Assessment Committee member, Pulmonary Embolism Prevention after Hip and Knee Replacement (PEPPER)	NIH

Professional Societies

1999-present Society for Cardiovascular Magnetic Resonance (SCMR)

2003-present	Abstract Grader for the SCMR Annual Scientific Meetings
2006-2007	Member, SCMR Finance Committee
2008/2009	Representative for SCMR 2009 appropriate use criteria for cardiac radionuclide imaging: a report of the American College of Cardiology (ACC) Foundation Appropriate Use Criteria Task Force
2008-2010	Member, SCMR Annual Scientific Meeting Program Planning Committee
2010-2011	Co-Chair, SCMR Annual Scientific Meeting Program Planning Committee
2010-2013	Member, Board of Trustees and Executive Committee
2011-2012	Chair, SCMR Annual Scientific Meeting Program Planning Committee
2011-present	Member, SCMR United States Advisory Committee
2011-present	Mentor, SCMR Mentorship Program for Fellows
2012-2016	Member, SCMR Gold Medalist Award Committee
2013-2016	Co-Chair, SCMR International Outreach Committee
2013-2018	Chair, SCMR Global Registry Committee
2019-2022	Member, SCMR Global Registry Committee
2019-2022	Chair, SCMR Clinical Trial Committee
2019-2020	Member, SCMR Nominating Committee

1999-present American Heart Association (AHA)

2004-present	Abstract Grader for the AHA Annual Scientific Meetings
2017-2019	Member, Cardiovascular Imaging Council
2019-2020	Co-Chair, AHA Writing Group: State of the Art: Imaging for Myocardial Viability

2000-2004 International Society of Magnetic Resonance in Medicine (ISMRM)

2004-present American College of Cardiology (ACC)

2004-present	Abstract Grader for the ACC Annual Scientific Meetings

	2006-2007	Member, Integrated Imaging Spotlight Program Planning Committee
	2012-present	ACC Foundation (ACCF)/AHA Task Force on Clinical Data Standards, Writing Group for Standards Related to Ischemia and Risk
	2018-2019	Writing Group Member as the representative appointed by SCMR, 2018 Appropriate Use Criteria for Stable Ischemic Heart Disease: a report of the American College of Cardiology (ACC) Foundation Appropriate Use Criteria Task Force
2005-2008	Society of Cardiac Computed Tomography (SCCT), Member	
2017-2019	American Society of Nuclear Cardiology (ASNC) Writing group member, Multimodality Imaging of Cardiac Amyloidosis, as the representative appointed by SCMR	

Grant Review Activities

2010; 2012	Clinical Innovation Grant Selection Committee, Department of Medicine	BWH *Ad hoc* member
2010; 2013	Grant Review	Medical Research Council (MRC), United Kingdom *Ad hoc* reviewer
2011	R41/42/43/44 Study Section, Special Emphasis Panel/Scientific Review Group 2012/01 (Meeting Code: ZRG1 CVRS-B 10), Small Business: Cardiovascular Sciences	NIH *Ad hoc* member
2011	RO1 Study Section, Epidemiology 2012/01 (Meeting Code: ZRG1 PSE-K 03)	NIH *Ad hoc* member
2012	RO1 Study Section, Request for Application "Pulmonary Vascular-Right Ventricular Axis Research Program" (Meeting Code: RFA HL-12-021)	NIH *Ad hoc* member
2012	Advanced Imaging Pilot Research Grants and Concept Development Awards Program	Harvard Catalyst *Ad hoc* member
2013; 2014	Grant-in-Aid	Heart and Stroke Foundation of Canada *Ad hoc* member
2014	Special Emphasis Panel Study Section (Cardiovascular and Respiratory Sciences ZRG1 CVRS-B 02)	NIH *Ad hoc* member
2014-2020	Clinical Integrated Cardiovascular Science (CICS) Study Section 2016	NIH Permanent member Vice-Chair, Oct 2016 Study Section

2019	Brigham Research Institute Pilot Grants Program	BWH *Ad hoc* reviewer

Editorial Activities

Ad Hoc Reviewer

American Journal of Cardiology (AJC)
Circulation
Circulation Cardiovascular Imaging
Circulation, Electrophysiology
Circulation Research
European Heart Journal (EHJ)
European Journal of Clinical Investigation
International Journal of Cardiovascular Imaging
Journal of Cardiovascular Magnetic Resonance (JCMR)
Journal of the American College of Cardiology (JACC)
JACC Cardiovascular Imaging
Journal of the American Heart Association (JAHA)
Journal of American Medical Association (JAMA) Cardiology
The Lancet
Magnetic Resonance in Medicine (MRM)
New England Journal of Medicine (NEJM)

Other Editorial Roles

2004-2008	Editorial Board Member	*Circulation*
2006-2015	Co-Editor, Images in Cardiovascular Medicine (Special Section)	*Circulation*
2018-present	Guest Editor	*Circulation*
2007-present	Editorial Board Member	*JACC*
2017-present	Guest Editor	*JACC*
2007-present	Editorial Board Member	*JCMR*
2017-present	Guest Editor	*JCMR*
2019-present	Clinical Moderating Chair, Monthly Journal Club	*JCMR*
2007-2015	Editor, Diagnostic and Therapeutic Intervention Section	*Circulation*
2008-present	Editorial Board Member	*Circulation Cardiovascular Imaging*
2008-present	Editorial Board Member	*JACC Cardiovascular Imaging*
2012-2015	Senior Guest Editor	*JACC Cardiovascular Imaging*
2016-present	Associate Editor	*JACC Cardiovascular Imaging*

Honors and Prizes

1985	Chias Knowlton Scholarship	University of Toronto, Canada
2008	Fellow	American College of Cardiology (FACC)

2008	Mentor, Early Career Award in Clinical Translational Research	SCMR
2010	Mentor, Early Career Award in Clinical Translational Research	SCMR
2011	Co-Mentor, Early Career Award in Basic Research	SCMR
2012	Mentor, Finalist to Early Career Award in Clinical Research	SCMR
2013	HMS Leadership Development for Physicians and Scientists	HMS
2019	Society for Cardiovascular Magnetic Resonance (SCMR)	Presidential Award (An Award Bestowed for Dedication and Sustained Service to SCMR in Advancing CMR towards Patient Care)
2020	Mentor, Finalist to Early Career Award in Clinical Research (2 abstracts)	SCMR
2020	Mentor, Finalist to Young Investigator Award in Clinical Research	(ACC Annual Scientific Meeting)

Report of Funded and Unfunded Projects

Funding Information

Past

2004-2007 Competent/Amadeus Trial, Cardiac Multi-detector Computed Tomography Core Laboratory
Cardiac Dimensions®
Director of Cardiac MRI core laboratory (PI: Scott Solomon)
The major goal of this study was to perform core laboratory analyses of cardiac multi-detector computed-tomography regarding appropriateness and safety of percutaneous mitral annuloplasty for patients with symptomatic moderate to severe mitral regurgitation.

2007-2010 Characterizing Carotid Plaque Inflammation and Neovascularization by Macrophage-Targeted 3D High Field MRI and Contrast Enhanced Ultrasound in Patients and Compare to Histological Quantitative Analyses
Donald W. Reynolds Foundation Grant
Investigator (PI: Peter Libby)
The major goal of this study was to quantify the region and extent of carotid plaque inflammation in patients using a novel MRI contrast enhanced dynamic technique and compare against histology and PET Fluorodeoxyglucose (FDG) imaging.

2007-2010 Aliskiren on the Prevention of Left Ventricular Remodeling in High Risk Post-acute Myocardial Infarction (ASPIRE): Cardiac Magnetic Resonance Core Laboratory
Novartis Pharmaceuticals Corporation
Director of Cardiac MRI core laboratory (PI: Scott Solomon)

The major goal of this multicenter multinational study was to perform core laboratory analyses of cardiac MRI regarding cardiac remodeling and any modification from Aliskiren in patients who had experienced a high-risk myocardial infarction (MI).

2008-2013 Adjustable and Measurable Ventricular Restraint for Heart Failure
NIH/NHLBI R01 HL090862-01
Co-Investigator (PI: Frederick Chen)
The major goal of this study was to assess the feasibility and benefits of a cardiac constraint device against post-MI ventricular expansion. I was responsible for proper data acquisition, post-processing, and measurements from all cardiac MRI images.

2008-2013 Role of Mineralocorticoid Receptor in Diabetic Cardiovascular Disease
NIH/NHLBI R01HL 087060-01
Investigator (PI: Gail Adler)
The major goal of this study was to use a novel MRI technique we developed in quantifying myocardial fibrosis due to diabetes and assessing for any beneficial role of mineralocorticoid receptor inhibition in reversing myocardial fibrosis in patients.

2008-2014 Prognostic Impact and Arrhythmic Potential of Peri-infarct Zone by Cardiac MRI
NIH/NHLBI R01 HL091157-01
PI
This 5-year study extended our previous work that infarct tissue characteristics and remodeling changes quantified by cardiac MRI predict arrhythmia and major cardiac events. This double-blind randomized study assessed infarct characteristics and effects from fish oil supplements in 414 MI patients through a new collaboration between BWH, Massachusetts General Hospital (MGH), and the Beth Israel Deaconess Medical Center (BIDMC).

2009-2012 Recovery Act Supplement Award, Prognostic Impact and Arrhythmic Potential of Peri-infarct Zone by Cardiac MRI
NIH/NHLBI R01 HL091157-02S1
PI
The major goal of this study was to provide administrative support and develop evidence of high-risk biomarkers in parents enrolled in the parent grant R01 HL091157-01.

2010-2014 Novel Magnetic Resonance Imaging of Myocardial Fibrosis
NIH R01HL090634
Co-Investigator (PI: Michael Jerosch-Herold)
The major goal of this study was to quantify myocardial fibrosis developed as a result of pressure loading of the left ventricle in patients with severe aortic stenosis. The results also provided new insights in future surgical planning of aortic stenosis.

2011-2013 Diagnostic and prognostic values of Regadenoson stress cardiac magnetic resonance (CMR) perfusion imaging in patients with suspected coronary artery disease (REGA-11F04)
Astellas Pharmaceuticals

PI
The major goal of this Phase 4 drug trial was to assess if the widespread use of regadenoson vasodilating stress is providing similar or better risk assessment of patients who have symptoms suspected of myocardial ischemia.

2011-2016 Blood Pressure in Dialysis Patients
NIH/NIDDK 1RO1DK083424-01A1
Co-Investigator, Cardiac MRI core laboratory Director (PI: Philip Zager)
The major goal of this multicenter study was to perform core laboratory analyses of cardiac MRI in patients with end-stage renal failure, to determine if tight blood pressure control will result in beneficial regression of left ventricular hypertrophy.

2012-2016 Improved Arrhythmia Imaging with MR Compatible 12-lead Electrocardiography (ECG)
NIH R03 EB013873-01A1
Co-Investigator (PI: Ehud Jeruham Schmidt)
The major goal of this study was to investigate the clinical effectiveness of an ECG filtering system our group developed, that eliminate the gating mis-triggering caused by the magnetohydrodynamic effects from aortic blood flow.

2013-2017 ALN-TTRSC-002 (A Phase 2, Open-Label Trial to Evaluate the Safety, Pharmacokinetics, Pharmacodynamics and Exploratory Clinical Activity of ALN-TTRSC in Patients with Transthyretin (TTR) Cardiac Amyloidosis.
Alnylam Pharmaceuticals
Co-PI and Director of Cardiac MRI Core Laboratory (Co-PI: Scott Solomon)
The major goal of this multicenter study was to use cardiac MRI to assess for any therapeutic effects from ALN-TTRSC, by quantifying changes in myocardial extracellular volume fraction.

2014-2016 Small Business Innovation Research (SBIR) EXACT-COST Trial (Ohio State University)
EXCMR, Ltd.
Site PI (Overall PI: Orlando Simonetti)
The major goals of this study were to investigate the clinical effectiveness of a MRI compatible exercise stress treadmill testing in the detection of myocardial ischemia and the cost effectiveness of this approach in guiding the utilization of downstream invasive catheterization.

2015-2017 ALN-TTRSC-004 (A Phase 3, Open-Label Randomized Control Multicenter Trial to Evaluate the Safety, Pharmacokinetics, Pharmacodynamics and Exploratory Clinical Activity of ALN-TTRSC in Patients with Transthyretin (TTR) Cardiac Amyloidosis.
Alnylam Pharmaceuticals
Co-PI and Director of Cardiac MRI Core Laboratory (Co-PI: Scott Solomon)
The major goal of this multicenter study was to use cardiac MRI to assess for any therapeutic effects from ALN-TTRSC, by quantifying changes in myocardial extracellular volume fraction.

2014-2019 SCMR Global Registry

Society for Cardiovascular Magnetic Resonance (SCMR)
PI and Chair of Registry Steering Committee
Total Direct Budget $140,045
This is an effort provided to build the infrastructures of an international data and imaging registry in CMR.

2013-2019 Novel Markers of Prognosis in Hypertrophy Cardiomyopathy (HCMR)
NIH/NHLBI 5U01HL117006-05
Executive Committee Member, Director of Cardiac MRI Core Laboratory (Co-Pis: Chris Kramer, Stefan Neubauer)
Cardiac MRI Core lab budget $505,000
The main goal of this multicenter study is to characterize the structural cardiac changes in risk stratification of 2,750 HCM patients over a period of 4 years.

2013-2019 Plasma miRNA predictors of adverse mechanical and electrical remodeling after MI.
NIH/NHLBI 1UH2 TR000901.
Co-PI (Co-PIs: Saumya Das, Anthony Rosenzweig, Marc Sabatine)
Total direct costs: $238,002
The major goals of this multicenter collaborative study were to develop and validate micro-RNA biomarkers for left ventricular mechanical failure and sudden cardiac death after acute myocardial infarction. This project extends the knowledge gained from the NIH-funded study RO1 HL091157-01 which I am the PI.

2013-2019 International Study of Comparative Health Effectiveness With Medical and Invasive Approaches (ISCHEMIA Trial).
NIH/NHLBI 4U01HL105561-06
Investigator and Director of Cardiac MRI Core Laboratory (PI: Leslee Shaw)
The major goal of this multicenter multinational study is to assess if any or all of 3 major imaging strategies that guide subsequent invasive coronary intervention will lead to an improved patient outcome. I am conducting the cardiac MRI core laboratory in conjunction with the Montreal Heart Institute.

2016-2019 The Clinical Impact of Stress CMR Perfusion Imaging in the United States (SPINS): A SCMR Global Registry Multicenter Study.
SCMR (Sponsors: Siemens Medical Systems and Bayer Pharmaceuticals)
PI
Total Direct Budget
This is a 13-center multicenter study with a target enrollment of 2,200 patients that tests the hypothesis that stress CMR performed in real-world setting provides cost-effective noninvasive assessment of patients with chest pain syndromes. Funding Source:

Current

2016-2020 Women's Heart Attack Research Program (HARP): Multicenter Study
American Heart Association/New York University School of Medicine
Co-Investigator and Director of Cardiac MRI Core Laboratory (PI: Harmony Reynolds)
Total Direct Budget $118,384

This is an observation study evaluating the various causes of patients who experienced an MI without obstructive coronary artery disease (MINOCA).

2016-2020 Treating Ventricle and Valve: New Synergies For Ischemic LV Remodeling With MR
NIH 1R01HL128099
Co-Investigator (PI: Robert Levine, Roger Hajjar)
This is an animal study evaluating morphological changes of mitral valve with or without the effects of leaflet fibrosis.

2016-2020 Mineralocorticoid Receptor Antagonism for Cardiovascular Health in HIV. The MIRACLE HIV Study.
NIH R01DK049302
Co-Investigator (PI: Steven Grinspoon, Gail Adler)
This is a 12-month randomized, placebo-controlled study enrolling HIV-infected individuals to characterize the change in cardiovascular physiology as assessed by CMR to treatment with Eplerenone

2016-2020 Molecular Imaging of Primary Amyloid Cardiomyopathy
NIH/NHLBI R01HL130563
Co-Investigator (PI: Sharmila Dorbala)
This study (NCT02641145) serially image patients with primary light chain amyloidosis (AL) with MRI and PET before and after chemotherapy with the goal of improving our current understanding of AL amyloid cardiomyopathy. The results of these studies may form the foundation for drug discovery programs to prevent and cure this condition.

2017-2021 STOP-CA: Statins to Prevent Cardiotoxicity from Anthracyclines
NIH 5R01HL130539-02
Co-Investigator (Co-Pis: Tomas Neilan, Marielle Scherrer-Crosbie)
This study evaluates the extent and severity of myocardial inflammation as a result of anthracyclines cardiac toxicities and its progression to diffuse myocardial fibrosis

2017-2022 Open-Label Multicenter Trial GSK 201464
GlaxoSmithKline
PI and Director of Cardiac MRI Core Laboratory
A phase 2 clinical study of GSK2398852 administered following and together with GSK2315698 in cohorts of patients with cardiac amyloidosis.

2017-2022 MYK-461-005 (EXPLORER-HCM)
MyoKardia Inc.
PI and Director of Cardiac MRI Core Laboratory
A Randomized, Double-blind, Placebo-controlled Clinical Study to Evaluate Mavacamten (MYK-461) in Adults with Symptomatic Obstructive Hypertrophic Cardiomyopathy.

2018-2021 MYK-461-007 (EXTENSION-HCM)
MyoKardia Inc.
PI and Director of Cardiac MRI Core Laboratory
A Follow-up Study using Cardiac MRI to Assess the Therapeutic Responses of Mavacamten in Adults with Symptomatic Obstructive Hypertrophic Cardiomyopathy.

2019-2022 ALN-TTR02-011 APOLLO-B Study
Alnylam, Inc.
Director of Cardiac MRI Core Laboratory
A Phase 3 Global, Open-label Study to Evaluate the Efficacy and Safety of ALN-TTRSC02 in Patients with Hereditary Transthyretin Amyloidosis (hATTR Amyloidosis).

Report of Local Teaching and Training

Teaching of Students in Courses

HMS

2002-2003	Introduction to Clinical Methods Second Year Medical Students Taught 6 medical students and assessed their skills in obtaining medical history and performing physical examination	HMS 4 hours/year for 1 year
2002-2003	Human Systems Module I: Respiratory/Cardiovascular Section First Year Medical Students Taught 25 medical students in 2-hour session on cardiopulmonary physiology	HMS 2 hours/year for 1 year

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

2001-present	Cardiac magnetic resonance imaging 4-5 Fellows in Cardiology or Radiology, 1-2 Residents in Radiology, and occasionally 1 Medical Student	BWH 8-10 hours per year
2017-present	CMR Jeopardy and Journal Club 6 fellows in Cardiology or Radiology	8 hours per year
2009-2010	Didactic teaching session in Cardiovascular Imaging to Medical Students of HMS (course RD500M.23)	HMS 2 hours per year

Clinical Supervisory and Training Responsibilities

2001-2006	Attending reader, Clinical echocardiography/BWH Supervision of fellows in performance and interpretation of transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), and stress echocardiographic studies; reviewed echocardiographic findings in detail of 5-10 TTE studies, and 2-5 TEE, with 1 or 2 fellows in each session.	4-8 sessions per month
2001-present	Supervision of all clinical activities of CMR fellows in training and clinical studies interpretation/BWH	15-25 hours per week
2003-2008	Radiology, Cardiac Computed Tomography (CT)/BWH Supervision of fellows in performance and interpretation of all clinical cardiac CT cases	1 day per week
2003-2011	Radiology, Nuclear Cardiology/BWH Supervision of fellows in performance and interpretation of all clinical stress nuclear single-photon emission computed tomography (SPECT) and Positron Emission Tomography (PET) imaging	1 day per week
2007- 2008	Supervision of medical student as part of HMS mentoring program/BWH	30 hours per year
2008-present	Supervision of 3 faculty (1 from Cardiology and 2 from Radiology) in clinical performance of CMR	1-2 hours per week

Laboratory and Other Research Supervisory and Training Responsibilities

(Selected Major Activities Only)

2001-present	Supervision of 18 clinical or research fellows in Cardiology conducting cardiac MRI related research projects. This includes 3 cardiology fellows supported by the T-32 training grant. My supervisory roles with these fellows last from 1-3 years. I provide various levels of mentorship (from daily to weekly) on many issues related to their career development, including support in grant writing, job search, and providing informal advice.
2001-present	Supervision of 4 clinical or research fellows in Radiology conducting cardiac MRI related research projects. My supervisory roles with these fellows are in general 1 year. I provide mentorship to these fellows on issues related to their career development including manuscript writing, formulation of research ideas, and job search. I also advise the fellows as they embark on starting their own cardiac MRI programs after receiving training from me.

2013-present Mentorship of approximately 20 HMS medical students at Asian Pacific Medical Student Association Mentorship Annual Dinner. 3 hours per year.

Mentored Trainees and Faculty

2003-2004 Servet Tatli, MD / Private practice, Allentown, PA.
Career stage: attending Radiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Published 2 first-authored manuscripts.

2003-2004 Anna K. Y. Chan, MBBS / Associate Physician, Division of Cardiology, Department of Medicine. Associate Professor of Medicine, The Chinese University of Hong Kong.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Published 1 peer-reviewed paper in *Circulation*.

2004-2005 Carmen W. S. Chan, MBBS / Associate Physician, Division of Cardiology, Department of Medicine, Associate Professor of Medicine, Hong Kong University.
Career stage: Section Director, attending cardiologist. *Mentoring role*: fellowship mentor. *Accomplishments*: Published 2 peer-reviewed papers in *Circulation*.

2004-2006 Andrew T. Yan, MD, FRCPC / Associate Professor, Division of Cardiology, Department of Medicine, University of Toronto, Canada.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Received a 2-year training grant from the Canadian Institutes of Health Research (CIHR); published 2 manuscripts, including first-authored peer-reviewed papers in *Circulation* and the *JCMR*.

2005-2006 Eric Larose, MD, FRCPC / Associate Professor, Laval University Medical School, Quebec City, Canada.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Published 2 manuscripts, including 1 first-authored and peer-reviewed in *JACC*.

2005-2007 Maung Khin, MD / Assistant Professor, University of South Florida, Tampa, FL.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Published 2 manuscripts, including 1 first-authored.

2006-2007 Afshin Farzaneh-Far, MD / Director of Cardiovascular MRI, Associate Professor of Clinical Medicine & Radiology, University of Illinois at Chicago.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: Published 4 manuscripts including 1 peer-review in *JACC Cardiovascular Imaging*.

2006-2007 Kevin Steel, DO / Associate Professor, Uniformed Services University of the Health Sciences, San Antonio, Texas.
Career stage: attending cardiologist, Director of Cardiovascular Imaging. *Mentoring role*: fellowship mentor. *Accomplishments*: Published 4 first-authored manuscripts, including 1 peer-reviewed original research paper in *Circulation*.

2006-2007 Hamid Sattar, MD / Assistant Professor of Medicine, Wayne State University School of Medicine, Detroit, MI.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Published 1 manuscript in *Circulation*; recipient of the Clinical Early Career Award of the Society of Cardiovascular Magnetic Resonance (SCMR).

2006-2007 Mouaz Al-Mallah, MD / Associate Professor of Medicine, Wayne State University, Detroit, MI; Consultant Cardiologist and Division Head, Cardiac Imaging, King Abdul-Aziz Cardiac Center, King Abdul-Aziz Medical City complex (Riyadh), Saudi Arabia.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Published 2 first-authored manuscripts.

2007-2008 Nicolao Tzemos, MD / Professor of Medicine, University of Western Ontario, Ontario, Canada.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: Published 1 first-authored manuscript.

2007-2008 Henry Wu, MD / Assistant Professor in Medicine, Mount Sinai Hospital/School of Medicine, New York, NY.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: Published 2 manuscripts, 1 of them first-authored.

2008 Caroline Daly, MD / Assistant Professor of Medicine, St. James's Hospital, University of Dublin Trinity College, Ireland.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: Published 2 first-authored manuscripts.

2008-2009 Sanjeev Francis, MD / Associate Professor in Medicine, Director of Education, Cardiovascular Institute, Director, Cardiovascular Disease Fellowship Program, Maine Medical Center
Career stage: attending cardiologist, Director of Medical Education. *Mentoring role*: research mentor. *Accomplishments*: Published 1 first-authored manuscript; finalist for Clinical Science Early Career Award during the Annual Scientific Meeting of the SCMR 2012.

2008-2009 Judith L. Meadows, MD / Assistant Professor of Medicine, Yale University School of Medicine, New Haven, Connecticut.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: Published 2 manuscripts, 1 first-authored.

2008-2009 Edward Hsiao, MD / Associate Professor of Radiology, Case Western Reserve University School of Medicine, University Hospitals Cleveland Medical Center, Cleveland OH.

Career stage: attending cardiologist. *Mentoring role*: fellowship mentor. *Accomplishments*: Finalist for Early Career Award during the 2010 Society for Cardiovascular Magnetic Resonance (SCMR) Annual Scientific Meeting.

2008-2009 Krishna Nallamshetty, MD / Associate Professor of Radiology, University of South Florida, Tampa, FL.
Career stage: attending radiologist, Director of Cardiovascular Imaging. *Mentoring role*: fellowship mentor. *Accomplishments*: Published 1 manuscript in *Heart Failure Clinic of North America*.

2008-2010 Shuaib M. Abdullah, MD / Associate Professor of Medicine, University of Texas Southwestern Medical Center, Dallas.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor. *Accomplishments*: Published 3 manuscripts including 2 in Circulation and 1 in JACC Cardiovascular Imaging

2009-2011 Otavio Coelho-Filho, MD / Associate Professor of Medicine, Faculty of Medical Sciences, State University of Campinas (Unicamp), Campinas, Brazil.
Career stage: attending cardiologist. *Mentoring role*: research mentor. *Accomplishments*: Published 6 manuscripts, 4 first-authored, including 1 in *JACC Cardiovascular Imaging*; recipient of 2011 Clinical Early Career Award of the SCMR; 11 abstract presentations; recipient of the 2012 Basic Science Early Career Award during the SCMR Annual Scientific Meeting.

2009-2011 Eri Watanabe, MD, PhD / Associate Professor of Medicine, Tokyo Women's Medical University, Japan
Career stage: attending cardiologist. *Mentoring role*: research mentor. *Accomplishments*: 2 abstract presentations; Finalist for SCMR Early Career Award 2011.

2010-2011 Francois-Pierre Mongeon, MD / Associate Professor of Medicine, Université de Montréal, Montreal Heart Institute, Canada.
Career stage: attending cardiologist. *Mentoring role*: research mentor. *Accomplishments*: One first-authored manuscript in *JACC Cardiovascular Imaging*; 3 abstract presentations.

2010-2011 Damien Mandry, MD / Associate Professor of Radiology, Nancy University Hospital, Nancy, France.
Career stage: attending radiologist. *Mentoring role*: research mentor. *Accomplishments*: 2 abstract presentations.

2010-2011 Yu-Cheng Chen, MD / Associate Professor, West China Hospital, Sichuan University, Chengdu, Sichuan Province, China.

Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: 1 abstract presentation.

2010-2013 Tomas Neilan, MD / Associate Professor of Medicine, HMS. Faculty of Department of Cardiology at Massachusetts General Hospital.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: 3 abstract presentations; received a 5-year AHA National Fellow-to-Faculty Transition Award. 8 first-authored manuscripts in *JAHA, AJC, JACC, and JACC Cardiovascular Imaging*. Award recipient of the NIH/NHLBI K-23 Mentored Patient-Oriented Research Career Development Award in 2013.

2010-2014 Bobak Heydari, MD, MPH / Assistant Professor of Medicine, University of Calgary, Canada.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: Received training award from The Alberta Foundation for Health Research (a Canadian non-profit charitable funding agency that supports selected health research); published 4 manuscripts, including 1 in *JACC Cardiovascular Imaging*; MPH at HSPH. Provided 2 oral abstract presentations at international meetings. Junior faculty position at University of Calgary 2014.

2011-2013 Ravi Shah, MD / Assistant Professor of Medicine, HMS. Faculty of Department of Cardiology at Massachusetts General Hospital.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: Post-Doctoral Fellowship Training Award of the American Heart Association 2011-2013; 6 first-authored manuscripts in *Radiology, Circulation, JAHA, JACC, and JACC Cardiovascular Imaging*; finalist for Clinical Science Early Career Award, 2012 SCMR Annual Scientific Meeting.

2011-2014 Siddique Abbasi, MD / Assistant Professor of Medicine, Brown University. Faculty of Department of Cardiology at University Rhode Island Health Service.
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: 1 abstract presentation; best abstract award at the Massachusetts Chapter of the American College of Cardiology 2012 Annual Meeting.

2013-2014 Hui Liu, MD / Assistant Professor, Department of Radiology, Guangdong General Hospital, Guangzhou, China.
Career stage: attending radiologist. *Mentoring role*: research mentor.
Accomplishments: 1 manuscript in Circulation CV imaging and 2 case reports

2013-2014 Jonathan Yuan-Hsiang Juan, MD / Assistant Professor, Department of Medical Imaging and Intervention, Chang Gung Memorial Hospital, Linkou and Healthy Aging Research Center, Chang Gung University, Taoyuan, Taiwan
Career stage: attending radiologist. *Mentoring role*: research mentor.
Accomplishments: first-authored a manuscript in Circulation CV Imaging

2014-2017 Tomas Vita, MD, MPH / Departamento de Resonancia Cardíaca-ELAS
Career stage: attending cardiologist. *Mentoring role*: fellowship mentor.
Accomplishments: first-authored 1 manuscript in Circulation CV Imaging and another in JACC CV Imaging; MPH from HSPH

2015-2016 Loïc Bière, MD / Assistant Professor, Cardiovascular Section, Department of Medicine, Angers Centre Hospitalier Universitaire, Angers, France
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: first-authored 1 manuscript in JACC CV imaging and co-authored 1 manuscript in *JACC*

2015-2016 Gokturk Ipek, MD / Assistant Professor, Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Center, Internal Medicine, Istanbul, Turkey
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: 1 manuscript in review.

2015-2017 Antonildes Nascimento Assunção Junior, MD / Assistant Professor, University of São Paulo, Internal Medicine, São Paulo, Brazil.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: 1 manuscript in review.

2016-2017 Christoph Gräeni, MD / Assistant Professor of Medicine, Department of Medicine, University Hospital Bern and University Hospital Zurich, Zurich, Switzerland.
Career stage: attending cardiologist. *Mentoring role*: research mentor.
Accomplishments: first-authored 1 peer-reviewed manuscript in *JACC*; 2 other first-authored manuscripts in review.

2016-2018 Kana Fujikura, MD, MPH / Clinical Fellow on T32 training grant, Radiology, BWH. Staff Physician Scientist, Laboratory of Cardiac Energetics, NHLBI/NIH, Bethesda, MD
Career stage: staff physician scientist. *Mentoring role*: fellowship mentor.
Accomplishments: MPH from HSPH, multiple manuscripts in review

2016-2018 Kyoichi Kaneko, MD / Research Fellow, Cardiovascular Division, BWH
Career stage: fellow. *Mentoring role*: research mentor. *Accomplishments*: co-authored 1 peer-reviewed manuscript in JACC, 1 peer-reviewed manuscript in JACC CV Imaging, and several other manuscripts in review including 1 first-authored

Formal Teaching of Peers (e.g., CME and other continuing education courses)

No presentations below were sponsored by outside entities.

2002	Update on Cardiac Magnetic Resonance Imaging, Radiology Chest Course, BWH	Single presentation Maui, HI

2003-present (every other year)	Cardiovascular Medicine: Review and Update for the Practitioner Breakout Session, Magnetic Resonance Imaging, BWH	Single presentation Boston, MA
2015-2018 (every other year)	Clinical Applications of Cardiac Magnetic Resonance Imaging Brigham Board Review in Cardiology, BWH	Single presentation Boston, MA

Local Invited Presentations

No presentations below were sponsored by outside entities.

2001	Detecting Acute Coronary Syndrome in the Emergency Department with Cardiac Magnetic Resonance Imaging / Cardiac MRI Seminar Beth Israel Deaconess Medical Center (BIDMC), Boston, MA.
2002	Detecting Acute Coronary Syndrome in the Emergency Department with Cardiac MRI / Grand Rounds in Cardiology BIDMC (West)
2002	Detecting Acute Coronary Syndrome in the Emergency Department with Cardiac MRI/ Invited lecture Joint Program in Nuclear Medicine, BIDMC (East)
2002	Myocardial Viability by Cardiac Magnetic Resonance Imaging / Grand Rounds in Radiology MGH
2003	Myocardial Viability / Children's Hospital Cardiac MRI Seminar BWH
2003	Cardiac MRI Stress Testing / Children's Hospital Cardiac MRI Seminar BWH
2005	Use of Cardiac MRI for Evaluation of ACS Patients / Invited lecture TIMI Study Group, BWH
2005	Hybrid PET/CT Technology in Detecting Coronary Artery Disease / Moderating Chair Center for Integration of Medicine and Innovation (CIMIT) Meeting, MGH
2005	Assessment of Myocardial Ischemia and Viability by Cardiac Contrast Enhanced MRI Techniques, CIMIT Meeting Group, Massachusetts General Hospital, Boston, MA.
2005-present	Review and Update of the Clinical Applications of Cardiovascular MRI / Grand Rounds Faulkner Hospital, Boston, MA.

2006	Prognostic Role of Delayed Hyperenhancement Imaging in Coronary Artery Disease, MGH Grand Rounds in Cardiology, Massachusetts General Hospital, Boston, MA.
2006	Peri-infarct Zone Characterized by Contrast-Enhanced Cardiac MRI Strongly Predicts Post-MI Mortality, BIDMC Cardiac MRI Seminar, Beth Israel Deaconess Medical Center (West), Boston, MA.
2006	Prognostic Role of Contrast Enhanced Cardiac MRI in Patients Suspected of Coronary Artery Disease (CAD), Beth Israel Deaconess Medical Center (East), Boston, MA
2007	Clinical Updates, New Techniques, and Patient Safety of Cardiac MRI, BWH Grand Rounds in Cardiology, Brigham and Women's Hospital, Boston, MA.
2007	Characterization of Hazards to Post-MI Mortality with Contrast Enhanced MRI / Invited lecture Brigham Research Institute Seminar Series, BWH
2007-present	Technical Magnetic Resonance Education Series: BWH Department of Radiology, Brigham and Women's Hospital, Boston, MA.
2007-present	BIDMC Cardiac MRI Seminar: Stress Cardiac MRI and Clinical Application, Beth Israel Deaconess Medical Center (West), Boston, MA.
2007-present	Brigham Research Institute Research Retreat Session, Brigham and Women's Hospital, Boston, MA.
2010-present	Role of Cardiac MRI in Clinical Trials and Novel Therapy Assessment, V.A. Medical Center, West Roxbury, MA
2011	Shaping the Future of Cardiac Magnetic Resonance Imaging in an Era of Cost Containment, Faulkner Hospital Grand Rounds in Cardiology, Faulkner Hospital, Boston, MA.
2011-present	Presenter and Co-Moderator, First Semi-Annual Research Retreat of Non-Invasive Cardiovascular Imaging. Department of Radiology and Department of Medicine, BWH.
2012	Diagnosing Cardiac Sarcoidosis: A Mini Debate. Cardiovascular Imaging Grand Rounds, Department of Radiology and Department of Medicine, BWH.
2013	How to properly interpret stress CMR Imaging of Patients with CAD. Cardiovascular Imaging Grand Rounds, Department of Radiology and Department of Medicine, BWH.
2014	Harvard Catalyst Imaging in Clinical Translational Cardiovascular Research
2015	Research in Progress Seminar: The Trial Design and Preliminary Results of the Omega-Remodel Study. Department of Radiology and Department of Medicine, BWH.

2015	Clinical-Pathology Conference: Department of Medicine: A case report of a patient with deafness and heart failure. Department of Medicine, BWH.
2016	Fellowship Teaching Rounds: A Review of Clinical Applications Cardiovascular Medicine Division, Department of Medicine, BWH
2017	How to Find Funding Sources: The Art and Anatomy of Writing a Career Development Grant. Research Education Program, BWH. *[Invited Lecture]*
2018	How CMR Improves Heart Failure Management: A Clinical Update. Heart Failure Section, Massachusetts General Hospital, Boston [*Invited Lecture]*
2018	Creation of the SCMR Registry and the Multicenter Stress Perfusion Imaging in the United States (SPINS) Study. Noninvasive Cardiovascular Imaging Section, Brigham and Women's Hospital
2019	The Role of Noninvasive Imaging for Chest Pain Syndromes after the ISCHEMIA trial. What we can learn from the Stress CMR Perfusion Imaging in the United States (SPINS) Study of the Society for Cardiovascular Magnetic Resonance (SCMR) Registry. Noninvasive Cardiovascular Imaging Section, Brigham and Women's Hospital
2020	Third Annual 5-day Cardiology Seminar at BWH for Israeli Cardiologists

Report of Regional, National and International Invited Teaching and Presentations

Invited Presentations and Courses

No presentations below were sponsored by outside entities

Regional

2001-present (every other year)	Clinical Applications of Cardiac Magnetic Resonance Imaging, Leonard Morse Hospital, Natick, MA *[Grand Rounds in Cardiology]*
2009	Advanced Cardiac Imaging as a Tool in Clinical Research, The 23rd Northeast Region Conference and Exhibition (NERCE) meeting, Boxborough, MA. *[Invited Lecture]*
2009	Cardiac Prognostication by Contrast-enhanced Cardiac Magnetic Resonance Imaging, Brown University Medical School/Rhode Island Hospital, Providence, RI *[Rhode Island Medical Center Visiting Professorship]*
2010	Planning of the Future of Cardiac Magnetic Resonance Imaging, Grand Rounds in Cardiology, Tufts Medical Center, Boston, MA. *[Invited Lecture]*

2013 Clinical Applications of Cardiac Magnetic Resonance Imaging: South Shore Medical Center
Attending: 30 participants, 2 hours contact time

2014 Current Clinical Applications of Cardiac MRI Cape Cod Hospital *[Grand Rounds in Cardiology]*

2015 Cardiology Grand Rounds: The Clinical role and Impact of Stress CMR Myocardial Perfusion Imaging: What it is practical and clinically relevant. Boston University Medical Center, Boston, MA *[Invited Lecture]*

2019 Keynote Presentation: Northeast Ohio Medical University, Harvey Lecture: Cardiology: The Next Thirty Years. Kent, Ohio *[Invited Lecture]*

National

2001 Current Clinical Applications of Cardiac Magnetic Resonance Imaging, Grand Rounds in Radiology, George Washington University Medical Center, Washington, DC. *[Invited Lecture]*

2001 Grand Rounds in Cardiology: Current Cardiac MRI Assessment of Ischemia Heart Disease, George Washington University Medical Center, Washington, DC. *[Invited Lecture]*

2003 Dobutamine Stress Function and Perfusion Imaging, Fourth International Workshop on Coronary MR and CT Angiography, The North American Society for Cardiac Imaging (NASCI), Dallas, TX. *[Invited Lecture]*

2003 Magnetic Resonance Myocardial Perfusion, The 5th Annual Cardiovascular Magnetic Resonance Imaging Summit, Oklahoma Heart Institute, Tulsa, OK. *[Invited Lecture]*

2004 Characterization of Cardiac Inflammation in Cardiac Transplantation, University of Minnesota, Minneapolis, MN. *[Visiting Professorship]*

2004 Characterization of Cardiac Inflammation in Allograft Rejection, Carnegie Mellon University/Pittsburgh NMR Center for Biomedical Research, Pittsburgh, PA. *[Research Grand Rounds]*

2005 How to Set Up an Efficient Clinical Cardiac MRI Service? George Washington University Medical Center, Washington, DC. *[Grand Rounds in Cardiology]*

2005 Managing Chest Pain in the ER with Cardiac MRI, AHA Annual Scientific Sessions, Dallas, Texas *[Invited Lecture]*

2005 How to Combine Diagnostic Information from Cine, Perfusion, and Delayed Imaging, SCMR Annual Scientific Sessions, San Francisco, CA.*[Plenary Presentation]*

2006 Peri-infarct Characterization by Cardiac MRI and Post-Myocardial Infarction Mortality, New York Presbyterian Hospital/Cornell University, New York, NY. *[Grand Rounds in Cardiology]*

2006 Characterizing Patient Risk from Coronary Artery Disease (CAD) with Contrast Enhanced Cardiac MRI, Wake Forest School of Medicine, Winston Salem, NC. *[Grand Rounds in Cardiology]*

2006 Current Applications of Cardiac MRI and CT, 12th Annual Interventional Cardiology Fellow Course, Cardiovascular Research Foundation, San Jose, CA. *[Invited Lecture]*

2006 Cardiac MRI Case Symposium: ACC 2006 Scientific Sessions, Atlanta, GA. *[Invited Lecture]*

2006 Dobutamine Stress Cardiac Magnetic Resonance Imaging, AHA Annual Scientific Sessions, Chicago, IL. *[Invited Lecture]*

2006 Prognostic Implication of Late Gadolinium-Enhanced Cardiac MRI, AHA Annual Scientific Sessions, Chicago, IL. *[Invited Lecture]*

2007 When is Cardiac MRI the Imaging Test of Choice? ACC Annual Scientific Meeting, New Orleans, LA. *[Invited Lecture]*

2007 Role of Cardiac MRI in Heart Failure. ACC Annual Scientific Meeting, New Orleans, LA. *[Invited Lecture]*

2007 Current Clinical Roles of Cardiac MRI and CT Imaging, University of Rochester Medical Center, Rochester, NY. *[Cardiology Division Grand Rounds]*

2007 Toshiba 256 Detector Cardiac Computed Tomography User Meeting, Toshiba Medical Imaging, Washington, DC. *[Other] (Sponsored by Toshiba but I did not receive any honorarium for participating in this meeting.)*

2007 MRI Stress Testing and Viability. Review of the Current Medical Literature and Clinical Cases, Scripps Clinic Medical Center Continuing Medical Educational Program in Cardiac MRI, Scripps Clinic Medical Center, La Jolla, CA. *[Invited Lecture]*

2007 Role of Advanced Cardiac Imaging in Management of Diabetic Patients, American Diabetes Association Annual Scientific Meeting, Chicago, IL. *[Invited Lecture]*

2007 Viability Assessment in Clinical Practice, ACC Annual Scientific Meeting, New Orleans, LA *[Invited Lecture]*

2007 What is the best test in evaluating acute coronary syndromes? An evidence based debate, Transcatheter Cardiovascular Therapeutics (TCT) Annual Scientific Meeting, Washington, DC *[Invited Lecture]*

2007 MR workstation demonstration: Cardiac MRI Perfusion, TCT Annual Scientific Meeting, Washington, DC.*[Invited Lecture]*

2007 Cardiac MRI myocardial perfusion: techniques and interpretation—a current review, TCT Annual Scientific Meeting, Washington, DC.*[Invited Lecture]*

2007 Clinical cases of MRI assessment of chest pain patients, TCT Annual Scientific Meeting, Washington, DC.*[Invited Lecture]*

2007 How to Integrate Radiology and Cardiology in Cardiac MRI/CT, AHA Annual Scientific Sessions, Orlando, FL.*[Invited Lecture and Moderating Chair]*

2008 Technical Panel Participant as the SCMR Representative: Appropriateness Criteria for Cardiac Radionuclide Imaging. SCMR/ACC meeting, Chicago. IL. *[Seminar]*

2008 GE Healthcare Cardiac MRI Medical Advisory Board Meeting. GE Healthcare, Milwaukee, WI. *[Invited Lecture] (Sponsored by GE Healthcare but I did not receive any honorarium for participating in this meeting.)*

2008 Assessment of Myocardial Viability by Cardiac MRI, ACC Annual Scientific Sessions Integrated Imaging Sessions, Chicago, IL. *[Invited Lecture]*

2008 Potential Utility of Newer Imaging Modalities, ACC Annual Scientific Sessions Integrated Imaging Session, Chicago, IL. *[Invited Lecture]*

2008 Cardiac MRI Case Review Session, Transcatheter Cardiovascular Therapeutics (TCT) Annual Scientific Meeting, Washington, DC. *[Invited Lecture]*

2008 Cardiac MRI to Access Acute Chest Pain: Advantages and Limitations, Transcatheter Cardiovascular Therapeutics (TCT) Annual Scientific Meeting: Washington, DC. *[Invited Lecture]*

2008 Role of Cardiac Magnetic Resonance in Determining the Risk of Diabetic Patients, AHA Annual Scientific Sessions, New Orleans, LA. *[Invited Lecture]*

2008 Outcomes in Acute Myocardial Infarction, AHA Annual Scientific Sessions, New Orleans, LA. *[Moderating Chair]*

2008 Late Gadolinium Enhancement, an Update in its Prognostic Implication, SCMR Annual Scientific Sessions, Los Angeles, CA. *[Invited Lecture and Moderating Chair]*

2009 Myocardial Ischemia, SCMR Annual Scientific Sessions, Orlando, FL. *[Plenary Presentation]*

2009 NHLBI Scientific Working Group: Role of Imaging in Risk Stratification of Sudden Cardiac Death, NHLBI/NIH, Washington, DC. *[Invited Lecture]*

2009 NHLBI/NIH Mark F. Weinstein Memorial Lecture: 10 Years of NIH Translational Research—Cardiac/Stroke Imaging and Therapy (Cardiovascular MRI Outcomes Research—A Powerful Prognosticator), NHLBI/Suburban Hospital, Bethesda, MD. *[Invited Lecture]*

2009 Sudden Cardiac Death: Grey Zone is the Best Index, SCMR Annual Scientific Sessions, Orlando, FL. *[Plenary Presentation]*

2010 Cardiac MRI myocardial perfusion and patient prognosis, SCMR Annual Scientific Sessions, Phoenix, AZ. *[Invited Lecture]*

2010 Cardiac MRI as endpoints for clinical trials, Society of Cardiovascular Magnetic Resonance, SCMR Annual Scientific Session, Phoenix, AZ. *[Invited Lecture]*

2010 Updates in Cardiac MRI 2010: Advanced Cardiovascular Imaging, New York, NY. *[Invited Lecture]*

2010 The Future of Cardiovascular Magnetic Resonance Imaging in the Current Economic Environment, Departments of Radiology/Cardiology, University of South Florida, Tampa General Hospital, Tampa, FL. *[Visiting Professorship]*

2010 CMR in acute coronary syndromes: Abstract summary presentation, ACC Annual Scientific Sessions, Atlanta, Georgia. *[Invited Lecture]*

2010 Cardiac MRI in Patients with Heart Failure: Risk Stratification for Therapy and Prognosis, ACC Annual Scientific Sessions, Atlanta, Georgia. *[Invited Lecture]*

2010 Cardiac MRI: Insights for Clinical Practice II, Annual Scientific Sessions of the AHA, Chicago, IL. *[Moderator for Oral Abstract Session]*

2010 Imaging of Heart Failure, Late Gadolinium Enhancement Imaging (LGE) and Strain Imaging (Cardiac MRI/Echo), Annual Scientific Sessions of the AHA, Chicago, IL. *[Invited Lecture]*

2011 Shaping the Future of Cardiac MRI: What We Have Learned in the Last 10 Years of Cardiovascular Imaging, Northwestern University Feinberg School of Medicine, Chicago, IL.*[Grand Rounds in Cardiology]*

2011 ACC Meet the Experts: Outcomes and Cost-Effectiveness of CV Imaging, ACC Annual Scientific Sessions, New Orleans, LA. *[Invited Lecture]*

2011 Myocardial Characterization in CAD: Ventricular Morphology and Delayed Hyper/Hypoenhancement and Heterogeneity, ACC Annual Scientific Sessions, New Orleans, LA. *[Invited Lecture]*

2011 Appropriate Use of Cardiac MR: How to Apply in Daily Practice, ACC Annual Scientific Sessions, New Orleans, LA.*[Invited Lecture]*

2011 Ischemia and Beyond Ischemia: CARDIAC MRI Indices of Prognosis, ACC Annual Scientific Sessions, New Orleans, LA *[Invited Lecture]*

2012 The Fun and Challenges of Building Cardiac MRI: Our Experience from the First 10 Years, University of Pennsylvania Hospital System, Philadelphia, Pennsylvania *[Grand Rounds in Cardiology]*

2012 Prognostic Impact and Arrhythmic Potential of Peri-infarct Zone by Cardiac Magnetic Resonance Imaging (NHLBI PROSPECT-CMR Study), Health Diagnostic Laboratories, Richmond, Virginia *[Invited Lecture]*

2012 Plenary session, SCMR Annual Scientific Sessions, Program Orlando, FL.*[Program Chair and Moderator of the Opening Plenary Session]*

2012 How to Perform Cost-Effectiveness Analyses in Imaging Research, SCMR Annual Scientific Sessions, Orlando, FL *[Invited Lecture]*

2012 Best Narrated Poster Session, SCMR Annual Scientific Sessions, Orlando, FL *[Moderating Chair]*

2013 Stress Cardiac Magnetic Resonance Imaging for Ischemic Heart Disease: Why it is an Important Tool Amongst other Noninvasive Tools? New York University Medical Center, New York, NY *[Grand Rounds in Cardiology]*

2013 Myocardial Scar: In Some Or All? Prognostic Value? Integrated Imaging of Heart Failure for Clinical Decision-Making, ACC Annual Scientific Meeting, San Francisco, CA.*[Invited Lecture]*

2013 CMR Stress Perfusion: State of the Art. Prognostic Utility. ACC Annual Scientific Meeting, San Francisco, CA.*[Invited Lecture]*

2013 In Search of the Culprit Lesion: Utility of Imaging: Is there a Role for MRI? AHA Annual Scientific Sessions, Dallas, Texas *[Invited Lecture]*

2013 Cardiac MRI 2013: Putting Your Best Spin On It: Late Gadolinium Enhancement: Ten Shades of Grey? AHA Annual Scientific Sessions, Dallas, Texas *[Invited Lecture]*

2013 Risk Stratification in Ischemic and Non-ischemic Cardiomyopathies: From Flow Reserve to Contrast Enhancement, SCMR Annual Scientific Sessions, San Francisco. *[Invited Lecture]*

2013 Non-ischemic Heart and Multiorgan Diseases, SCMR Annual Scientific Sessions, San Francisco. *[Invited Lecture]*

2014 The Multicenter Omega-Remodel Randomized Control Trial, University of Minnesota Medical Center, Minneapolis, MN *[Grand Rounds in Cardiology]*

2014 Cardiac MR and Identification of Mechanisms in ACS Without Obstructive CAD. AHA Annual Scientific Sessions, Chicago, IL *[Invited Lecture]*

2014 Name that CMR Perfusion Defect. AHA Annual Scientific Sessions, Chicago, IL *[Invited Lecture]*

2014 Imaging Cardiomyopathy, AHA Annual Scientific Sessions, Chicago, IL. [Moderator for Oral Abstract Session]

2014 Global Cardiac Magnetic Resonance Registry (GCMR): Its concepts and planning. SCMR Annual Scientific Sessions, New Orleans, Louisiana. *[Invited Lecture]*

2014 Challenges of Conducting Imaging-Based Outcome Research. SCMR Annual Scientific Sessions, New Orleans, Louisiana. *[Invited Lecture]*

2015 Role of CMR in Outcomes of Diabetic Patients, Annual Scientific Sessions of the ACC 2015, San Diego, CA *[Invited Lecture]*

2015 Imaging Cardiomyopathy, AHA Annual Scientific Sessions, San Diego, CA. [Moderator for Oral Abstract Session]

2015 Stress Cardiac Magnetic Resonance Imaging for Ischemic Heart Disease: why it is a relevant and practical tool? Boston University Medical Center. *[Grand Rounds in Cardiology]*

2015 Can Fish Oil Heal a Broken Heart? The OMEGA-REMODEL Study. Yale University Medical Center. *[Grand Rounds in Cardiology 2015]*

2015 Cardiac MRI and the Development of Its Global Registry. University of Maryland Medical Center. *[Grand Rounds in Cardiolog]*

2016 Can Fish Oil Heal a Broken Heart? The OMEGA-REMODEL Study. Molecular Imaging Program at Stanford (MIPS) Seminar Series. Stanford University Medical Center. *[Grand Rounds in Cardiology]*

2016 Conference in Heart Failure Management. CMR and Congestive Heart Failure: Current and Future. Stanford University Medical Center. *[Invited Lecture]*

2016 CMR Quantification in Clinical Research & Diagnosis. 19th SCMR Annual Scientific Meeting, Los Angeles, CA. *[Invited Lecture]*

2016 Can Fish Oil Heal a Broken Heart? The OMEGA-REMODEL Study. University of Utah Medical Center. *[Grand Rounds in Cardiology]*

2016 Can Fish Oil Heal a Broken Heart: A randomized control trial of Omega-3 Fatty Acids in Patients with a Recent Myocardial Infarction. Stanford University Conference in Heart Failure. Stanford, California *[Invited Lecture]*

2016 Global CMR Registry (GCMR) of SCMR. ACC Annual Scientific Sessions, Chicago, IL *[Invited Lecture]*

2016 All You Need is Cardiac MRI. Controversies and Advances in the Treatment of Cardiovascular Disease. The Sixteenth in the Series. Beverly Hills, CA *[Invited Lecture]*

2017 Cardiovascular Magnetic Resonance In the Guidelines: United States. ACC Annual Scientific Session *[Invited Lecture]*

2017 Can Fish Oil Heal a Broken Heart: A randomized control trial of Omega-3 Fatty Acids in Patients with a Recent Myocardial Infarction. Ohio State University Nutritional Science Section [Invited Lecture]

2017 How Omega-3 Fatty Acid Treatment Affect Post-MI Cardiac Remodeling. Why the Discrepancy Between Outcome Trials? Organized by Wiley Finest Incorporation *[Invited Lecture]*

2017 A Blinded Core-Lab Imaging Analysis is NOT Essential in Multicenter Clinical Trials. 20th SCMR Annual Scientific Meeting, Washington, DC. *[Invited Lecture]*

2017 How Can Cardiac MRI Survive in a Multimodality Environment of Cardiac Imaging? 20th Annual SCMR Level I Course. Washington, DC *[Invited Lecture]*

2017 Personalized Drug Discovery Towards Better Infarct Healing. Saint Francis Hospital Cardiology Grand Rounds. Long Island, New York *[Invited Lecture]*

2018 The Role of Genotype Polymorphism and Systemic Inflammation Towards Promotion of Infarct Healing with Omega-3 Fatty Acids. Iowa University, Iowa City *[Cardiology Grand Rounds]*

2018 Personalized Medicine to Improve Infarct Healing: Lessons from the OMEGA-REMODEL Trial. New York University, New York *[Cardiology Grand Rounds]*

2019 The SCMR Registry and the SPINS Study. The 21st SCMR Annual Scientific Meeting, Seattle, Washington. *[Opening Plenary]*

2019 What are the CMR Indications in the Real-world, Lessons Learned from the SCMR Registry. The 21st SCMR Annual Scientific Meeting, Seattle, Washington. *[Invited Lecture]*

2020 SCMR Registry - What We Have Learned and Accomplished So Far. The 22nd SCMR Annual Scientific Meeting, Orlando, FL *[Invited Lecture]*

2020 Quantitative Myocardial Perfusion: SCMR Task Force Think Tank. The 22nd SCMR Annual Scientific Meeting, Orlando, FL

2020 Personalizing Cardiac MRI Protocols Using Big Data. The 22nd SCMR Annual Scientific Meeting, Orlando, FL *[Invited Lecture]*

2020 Advocacy in Times of Various Reimbursement of CMR – or None. The 22nd SCMR Annual Scientific Meeting, Orlando, FL *[Invited Lecture]*

2020 Stress Cardiac Magnetic Resonance, A 20-year (and Counting) Journey. The Washington University School of Medicine, St. Louis, Missouri *[Cardiology Grand Rounds]*

2020 Stress CMR Perfusion Imaging in the United States (SPINS) Study of the Society for Cardiovascular Magnetic Resonance (SCMR) Registry. Boston University Medical Center, Department of Cardiology *[Cardiology Grand Rounds]*

International

2004 SCMR Invited Panel Discussion: Clinical case reports in cardiac MRI, Society of Cardiovascular Magnetic Resonance, Barcelona, Spain *[Invited Lecture]*

2004 Stress Cardiac Magnetic Resonance, ISMRM 12th Scientific Meeting Weekend Educational Program, Kyoto, Japan *[Invited Lecture]*

2004 CV MRI Study Group: Controversy in Myocardial Viability, ISMRM 12th Scientific Meeting Weekend Educational Program, Kyoto, Japan *[Invited Lecture]*

2005 Status of Clinical MRI Perfusion Compared to Nuclear Imaging: Experience from a Tertiary Care Center, Multicenter MRI Perfusion Study Meeting Group, General Electric Healthcare, London, England *[Invited Lecture]*

2006 Cardiac MRI is Better for Assessing Patients with Congestive Heart Failure, Severance Cardiovascular Imaging Symposium, Yonsei University College of Medicine, Seoul, South Korea *[Invited Lecture]*

2006 Cardiac MRI Delayed Hyperenhancement Imaging for Myocardial Viability, Severance Cardiovascular Imaging Symposium, Yonsei University College of Medicine, Seoul, South Korea. *[Invited Lecture]*

2007 Small Foci of Late Enhancement Without Known MI, Society of Cardiovascular Magnetic Resonance, Rome, Italy. *[Plenary Presentation]*

2007 Cardiac MRI in Suspected Acute Coronary Syndrome, Society of Cardiovascular Magnetic Resonance, Rome, Italy. *[Plenary Presentation]*

2007 Fusion of Imaging Technology: 3D, 4D Echo, Cardiac CT and MRI, University of Toronto Fourth Annual Great Debates and Innovations, Mount Sinai Hospital/Toronto General Hospital, Toronto, Ontario, Canada. *[Invited Lecture]*

2007 Beyond Cardiac Morphology by Echocardiography: The Growing and Complementary Role of Cardiac Magnetic Resonance Imaging, Queen Mary Hospital, Hong Kong University, Hong Kong, China. *[Visiting Professorship]*

2008 Applications of Myocardial Viability Assessment by Cardiac MRI, International Society of Magnetic Resonance in Medicine meeting, Toronto, Ontario, Canada. *[Invited Lecture]*

2008 Novartis SPP100A2340 (ASPIRE Study) Investigator Meeting, Novartis, Sao Paulo, Brazil. *[Invited Lecture] (Sponsored by Novartis, but I did not receive any honorarium for participating in this meeting.)*

2010 Myocardial Late Enhancement: Description, Application, and Current Update, Canadian Cardiovascular Society, The 19th Interventional Cardiology Symposium, Montreal, Quebec, Canada *[Invited Lecture]*

2010 Visiting Professorship, Planning the Future of Cardiovascular Magnetic Resonance: Lessons Learned from the Past Decade, British Heart Foundation/Glasgow Cardiovascular Research Center, University of Glasgow, Scotland. *[Visiting Professorship]*

2010 Visiting Professorship, Why Cardiac Magnetic Resonance Imaging Is a Practical Tool to Assess Novel Cardiovascular Therapies, Golden Jubilee National Hospital/ Glasgow Medical School, Clydebank, Scotland. *[Visiting Professorship]*

2010 Visiting Professorship, Departments of Cardiology: How Far Have We Gone in Cardiac Magnetic Resonance in the Past 10 Years? Saint James's Hospital, Trinity College, Dublin, Ireland. *[Visiting Professorship]*

2011 Visiting Professorship, Shaping the Future of Cardiac MRI: What We Have Learned in the Last 10 Years of Cardiovascular Imaging, Montreal Heart Institute, Montreal, Quebec, Canada. *[Visiting Professorship]*

2011 What Are the Basic Steps in Assessing Cost Effectiveness of Cardiac MRI? SCMR/EuroCMR Joint Scientific Sessions, Nice, France. *[Invited Lecture]*

2011 Controversies in Cardiac MRI, SCMR/EuroCMR Joint Scientific Sessions, Nice, France. *[Moderator: Closing Plenary Session]*

2011 Why Cardiac MRI Should Be Our Noninvasive Modality of Choice for Cardiomyopathy of Unknown Etiology, São Paulo Radiology Meeting/Brazil-Chile Congress of Radiology, São Paulo, Brazil. *[Invited Lecture]*

2011 Ischemic Heart Disease Assessment by Cardiac MRI, São Paulo Radiology Meeting 2011/Brazil-Chile Congress of Radiology, São Paulo, Brazil. *[Invited Lecture]*

2011 Beyond Delayed Hyperenhancement: The Role of Tissue Characterization, São Paulo Radiology Meeting/Brazil-Chile Congress of Radiology, São Paulo, Brazil. *[Invited Lecture]*

2011 Why Cardiac MRI Should be Utilized in Clinical Trials of Novel Therapy, São Paulo Radiology Meeting/Brazil-Chile Congress of Radiology, São Paulo, Brazil. *[Invited Lecture]*

2011 A Workshop on Cardiac Magnetic Resonance Imaging Endorsed by the Society for Cardiovascular Magnetic Resonance (SCMR), 5th Congress of the Asian Society of Cardiovascular Imaging (ASCI) 2011, Hong Kong, China. *[Course Director]*

2011 Perspectives on the Use of Magnetic Resonance Imaging for Coronary Disease, 13th Brazilian Congress of Atherosclerosis, Florianopolis, Santa Catarina. *[Invited Lecture] (I could not attend in person due to the unexpected need to have surgery, but I provided my presentation using narrated PowerPoint slides.)*

2012 Use of Cardiac MRI in Imaging Myocardial Viability in Patients with Coronary Artery Disease, Medical Imaging of Beijing, First Scientific Session, Symposium in Cardiovascular Medical Resonance Imaging, Beijing, China. *[Invited Web Lecture]*

2012 Clinical Applications, Novel Therapeutic Trials, and the Future Outlook of Cardiac Magnetic Resonance Imaging In the United States, Chinese Society of Magnetic Resonance in Medicine 2012 Annual Scientific Meeting, Xiamen, China *[Invited Speaker and Session Moderator]*

2012 Myocardial Applications Using Cardiac Magnetic Resonance Imaging, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China. *[Visiting Professor and Speaker]*

2012 Stress Cardiac Magnetic Resonance Imaging: Diagnostic Utility, Cost Effectiveness, and Risk Reclassification Improvement in Coronary Artery Disease, Queen Mary Hospital, Hong Kong University, Hong Kong, China *[Visiting Professorship]*

2013 Cardiac Magnetic Resonance Imaging Review Course Endorsed by the Society for Cardiovascular Magnetic Resonance (SCMR), Great Wall International Cardiology Convention 2013, Beijing, China. *[Course Director]*

2013 Why Stress Cardiac MRI Should be Used in Assessing Patients with Suspected Ischemia in the Era of Cost Containment. Irish Cardiac Society Annual Scientific Meeting, Kerry Co, Ireland. *[Invited Plenary Speaker]*

2014 Imaging of Patients with Arrhythmia and Assisting Radiofrequency Ablation Imaging of cardiomyopathy, Cardiovascular Imaging Symposium Joint HHCC/HHCR/SCMR, Hong Kong, China *[Invited Lecture]*

2014 Imaging of cardiomyopathy, Cardiovascular Imaging Symposium Joint HHCC/HHCR/SCMR, Hong Kong, China *[Invited Lecture]*

2014 3-day imaging symposium SCMR-Chinese Academic of Science. Shenzhen, Guangzhou, China [*Course Organizer and Speaker]*

2014 Clinical Frontiers of Cardiac Imaging, International STACOM Boston 2014: Massachusetts Institute of Technology, Boston 2014 *[Invited Lecture]*

2014 Can Fish Oil Heal a Broken Heart, London CMR Lecture, London Heart Center and St. Bartholomew's Hospital, London, UK *[Visiting Professorship]*

2014 Can Fish Oil Heal a Broken Heart, the OMEGA-REMODEL Study. Grand Rounds in Cardiology, Oxford University Medical Center *[Visiting Professorship]*

2014 Joint Symposium in CMR Review, Joint SCMR/Asian Society of Cardiovascular Imaging (ASCI) Annual Scientific Meeting, Jeju, South Korea

2014 Current Status of Heart Failure Imaging, Asian Society of Cardiovascular Imaging (ASCI) Annual Scientific Meeting, Jeju, South Korea *[Invited Lecture]*

2014 Can Stress CMR Perfusion Imaging Meet the Demands Compared to Other Imaging Options? Asian Society of Cardiovascular Imaging (ASCI) Annual Scientific Meeting, Jeju, South Korea *[Invited Lecture]*

2014 Can Stress CMR Perfusion Imaging be Cost Effective? Asian Society of Cardiovascular Imaging (ASCI) Annual Scientific Meeting, Jeju, South Korea *[Invited Lecture]*

2014 Why You Should Develop CMR for Patient Care in China. Guangzhou Province Hospital, Guangzhou, China *[Radiology Grand Rounds]*

2015 Translating Imaging Technology to Improved Global Outcomes, 18th Annual SCMR/EuroCMR Joint Scientific Meeting, 2015, Nice, France. *[Closing Plenary Session Presentation]*

2015 How Does Cardiac MRI Survive in a Multimodality Environment: 18th Annual SCMR/EuroCMR Joint Conference Level 1 Course. Nice, France. *[Pre-Conference Clinical Course Lecture 1]*

2015 CMR for Management of Ischemic Heart Disease. 18th Annual SCMR/EuroCMR Joint Conference Level 1 Course. Nice, France. *[Pre-Conference Clinical Course Lecture 2]*

2015 Case Review Session. 18th Annual SCMR/EuroCMR Joint Conference Level 1 Course. Nice, France. *[Pre-Conference Clinical Course Lecture 3]*

2015 Global CMR Registry: An Update, its Successes and Challenges Ahead, 18th Annual SCMR/EuroCMR Joint Scientific Meeting, 2015, Nice, France. *[Clinical Trial Workshop,]*

2015 How to perform Dobutamine Stress CMR, 18th Annual SCMR/EuroCMR Joint Scientific Meeting, 2015, Nice, France. *[Technologist Workshop,]*

2016 How Cardiac MRI Can Shape Cardiac Care. The 75th Annual Meeting of the Japan Radiological Society, Yokohama, Japan [*Plenary Presentation*]

2017 The OMEGA-REMODEL Trial: Rationale and Clinical Impact. The Inaugural Symposium of the International Society of Omega-3 Research, Boston, MA *[Invited Lecture]*

2017 Is Personalized Reversal of adverse Post MI Remodeling Possible? Department of Clinical Sciences, Lund University, Sweden *[Invited Lecture]*

2017 Faculty Opponent to PhD Dissertation of Dr. David Nordlund, Department of Clinical Sciences, Lund University, Sweden *[Visiting Professorship]*

2018 How Imaging Can Become a Key Player in the Future of Clinical Trial and Drug Development. 21st Annual SCMR/EuroCMR Joint Scientific Meeting, Barcelona, Spain. *[Invited Lecture]*

2018 Personalized Medicine with Omega-3 Fatty Acid Genotype and Metabolomics to Improve Infarct Remodeling: Lessons from the OMEGA-REMODEL Trial. Montreal Heart Institute, Montreal, Quebec, Canada *[Cardiology Grand Rounds]*

2018 Cardiovascular Imaging: from Structure to Function, Tissue Characterization in the Human Heart. International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France. *[Plenary Session]*

2018 The Clinical Impact of Stress CMR Perfusion Imaging in the United States (SPINS): A SCMR Registry Study. European Society of Cardiology Congress, Munich, Germany *[Late-Breaking Science in Imaging Session]*

2018 The Clinical Impact of Stress CMR Perfusion Imaging in the United States (SPINS): A SCMR Registry Study. American Heart Association Annual Scientific Meeting, Chicago, Illinois

2019 CMR Journal Club Live Webinar. Cardiac Magnetic Resonance Stress Perfusion Imaging for Evaluation of Patients With Chest Pain. Host: Matthias G. Friedrich, MD

Report of Clinical Activities and Innovations

Current Licensure and Certification

1992 Ontario Medical License, Canada
1992 Licentiate of Medical Council of Canada
1993 Medical License of British Columbia, Canada
1997 Diplomate, American Board of Internal Medicine–Internal Medicine
1997 Medical License of the District of Columbia
1998 Diplomate, American Board of Internal Medicine–Cardiovascular Diseases
1999 Maryland Medical License
2001 Massachusetts Medical License
2002 Course Certificate, Nuclear Cardiology Health and Radiological Seminars, Nuclear Regulatory Commission (NRC)

Practice Activities

2001-2007	Performance and interpretation of transthoracic and transesophageal studies	Echocardiography Service, BWH	2 half-day sessions per week
2002-2010	Inpatient consult	Cardiac Surgery, BWH	2 weeks per year
2007-2012	Performance and interpretation of cardiac nuclear scintigraphy and exercise stress testing studies	Exercise Laboratory and Nuclear Cardiology Service, BWH	2 half-day sessions per week
2001-2017	Outpatient clinic	Cardiology, BWH	6 hours per week
2001-present	Performance and interpretation of clinical CMRI studies	Cardiology/Radiology, BWH	3 days per week

2001-present	Interpretation of clinical electrocardiography studies	Cardiology, BWH	4 sessions per month
2002-present	Inpatient attending	Cardiology, BWH	4 weeks per year
2016-present	Inpatient cardiac and vascular medicine consult	Cardiology, BWH	2 weeks per year

Clinical Innovations

Bridging Novel CMR Technique to Management of Patients with Coronary Artery Disease (2006-present)	Using clinical data from BWH, I described the prognostic utility and management implication of CMR late gadolinium enhancement (LGE) imaging of myocardial infarction in patients with suspected CAD, patients with diabetes, and in survivors of cardiac arrests. This established that CMR imaging provided unique prediction of adverse cardiac events incremental to clinical tools and offered guidance to clinicians to use CMR in the appropriate clinical settings. The publications resulting from this work remain relevant supporting the appropriate use of CMR in clinical management of cardiac patients and continue to be cited by other groups.
Discovery of Novel Treatment to Acute Myocardial Infarction: The Multicenter OMEGA-REMODEL Randomized Controlled Clinical Trial (2008-2013)	Our trial supported the notion that suppression of systemic and myocardial inflammation using omega-3 fatty acids provides a safe and unique treatment promoting inflammatory resolution and myocardial healing after an acute myocardial infarction. These results were published in Circulation in Aug 2016. We further discovered that genetic polymorphism exists in the response to omega-3 fatty acids. These results may have implication in reducing the high burden of post-MI heart failure and personalized treatment using patients' genotypes and biomarker profiles. A patent has been filed by BWH using these results.
Novel CMR Method of Fibrosis and Determining its Clinical Impact (2008-present)	I collaborated with Michael Jerosch-Herold, Ph.D. in developing a novel quantitative method of myocardial fibrosis using serial T1-mapping imaging. I then evaluated its clinical impact in a wide array of cardiac diseases in patients. This effort had resulted in 13 peer-reviewed publications illustrating the clinical impact of T1 mapping method in the diagnosis of causes of cardiomyopathy and prognosticating patients' risks. This effort had also helped establish the role of CMR imaging as a unique method of tissue characterization and in testing the therapeutic effects of novel drug treatments before planning of large-scale outcome trials. Our efforts had led to establishment of a CMR core laboratory at BWH. Clinical outcome studies by my team assessing the clinical diagnostic and prognostic impact of T1 mapping had contributed to the now widespread application of T1 mapping in clinical diagnosis and research by CMR in a wide array of cardiac conditions. In addition, my work represents a proof-of-concept foundation of myocardial tissue characterization by CMR and it has inspired the development of several other T1-mapping methods by other CMR centers.

Development of ACC/AHA Practice and Training Guidelines (2009-present)	I was a member the writing groups of 4 major ACC/AHA Task Force Panels. These established current appropriate-use criteria of advance CV imaging techniques, practice guidelines of stable ischemic heart disease or prevention of sudden cardiac deaths, and COCATS training criteria in cardiovascular imaging. These efforts established the role of CMR imaging as evidenced by current literature, incremental to conventional non-imaging-based risk stratifying methods. The COCATS training criteria set the metrics and goals that are required for imaging training in CMR. I am currently working on 3 other practice guidelines in imaging for various governing societies.
CMR Imaging Core Laboratory Towards an Innovative Platform for Rapid Therapeutic Discoveries (2012-present)	With its high quantitative reproducibility, tomographic coverage, and tissue characterizing features, CMR is a remarkable surrogate marker that can expedite the pace of therapeutic discoveries. I established the BWH CMR imaging core laboratory (https://cmrcore.bwh.harvard.edu) and standardized all core lab procedures for the purposes of using CMR in testing novel treatments for cardiac disorders. The BWH CMR imaging core laboratory currently has supported 12 clinical trials and generated a total direct funding of $3.9 million sponsored by NIH or pharmaceutical industries, focuses on testing of novel therapies or management strategies.
Creation and Expansion of a Global CMR Registry (2013-present)	Given the complexities of CMR imaging, evaluation the clinical impact of this technology requires a guideline-supported standardized data collection infrastructure. I created a web-based de-identified international collaborative group promoting multicenter outcome research of CMR and cardiac CT (https://cmrcoop.partners.org). Since 2013, I have been appointed and served as the Chair of the SCMR global registry committee (http://www.scmr.org) and continue to oversee all aspects of its growth and development. This international registry has currently more than 40 participating centers and collected more than 65,000 CMR studies. This registry will provide evidence of real-world impact that will shape the proper and cost-effective adaptation of this novel imaging technology in patient care. Between 2014-2019, I led the registry to secure funding and completed a multicenter study to examine the current prognostic implications and cost-effectiveness of stress CMR imaging of stable chest pain patients in the United States (SPINS study of the SCMR registry).

Report of Teaching and Education Innovations

Founding of Non-Invasive Cardiovascular Imaging (NCVI) program and NIH T32 Training	As a founding member of the NCVI program under the leadership of Dr. Marcelo Di Carli, I have developed and provided advanced clinical imaging training of more than 60 fellows, many of whom have become successful imaging experts in leading institutions. In 2013 we secured funding of a NIH T32 training grant in cardiovascular imaging towards imaging training of future academically and research-focused cardiovascular investigators.

(2008-present)

Report of Technological and Other Scientific Innovations

Genotype Guided Treatment Using Omega-3 Fatty Acids in Improving Survival of Patients with Acute Myocardial Infarction	US Patent Application (Appl no.: 62582608, EFS ID: 30879814) Inventor: Raymond Y. Kwong In this patent application, my research team described the genotyping of RS-1535 polymorphism as an effect modifier to cardiac remodeling response to oral omega-3 fatty acids treatment, with implications to patient mortality, in patients who suffered an acute myocardial infarction.

Report of Education of Patients and Service to the Community

Educational Material for Patients and the Lay Community

No materials below were sponsored by outside entities.

1. **Kwong RY**, Yucel EK. Cardiology patient pages. Computed tomography scan and magnetic resonance imaging. Circulation. 2003;108(15): e104-6.
   This article serves as an introductory level educational material for patients and primary care physicians at the time when advanced cardiac imaging techniques like cardiac MRI and CT were being introduced into patient care.

Recognition

Selected examples of related media coverage:

Study published as Research Investigation 80, Neilan T et al. JACC Imaging 2015			
2015	LGE Brings Clarity to the Cause of Sudden Cardiac Arrest. https://www.youtube.com/watch?v=Zqv5Siv8Fd8	ACC	CardioSource WorldNews
Study published as Research Investigation 100, Heydari B et al. Circulation 2016			
2016	Omega-3 fatty acids from fish oil, may aid healing after heart attack. https://newsroom.heart.org/news/omega-3-fatty-acids-from-fish-oil-may-aid-healing-after-heart-attack	American Heart Association Rapid Access Journal Report	Karen Astle. Omega-3 fatty acids from fish oil, may aid healing after heart attack. August 01, 2016

2016	High Doses of Fish Oil Might Help Healing After Heart Attack https://www.webmd.com/heart-disease/news/20160801/high-doses-of-fish-oil-might-help-healing-after-heart-attack#1	WebMD	James Bernstein. High Doses of Fish Oil Might Help Healing After Heart Attack. August 01, 2016
2016	Omega-3 Fatty Acids May Aid Heart Attack Healing https://www.reuters.com/article/us-health-heartattack-healing-idUSKCN10C34F	Reuters Health Information Thomson Reuters - UK	Kathryn Doyle. Omega-3 Fatty Acids May Aid Heart Attack Healing. August 02, 2016
2016	High Doses of Fish Oil Might Help Healing After Heart Attack	Drugs.com	https://www.drugs.com/news/doses-fish-oil-might-help-healing-after-heart-attack-62170.html
2016	Omega-3 Fatty Acids May Help Heart Attack Survivors Heal https://boston.cbslocal.com/2016/08/01/omega-3-heart-attack-patients-health-brigham-and-womens-hospital-dr-mallika-marshall/	CBS Boston Channel 4 WBZ	Mallika Marshall, MD. Omega-3 Fatty Acids May Help Heart Attack Survivors Heal. TV Interview.
2016	Fish Oil Has Benefits After a Heart Attack https://time.com/4430780/fish-oil-benefits-heart-attack/	Time	Alice Park. Fish Oil Has Benefits After a Heart Attack. August 01, 2016
SPINS Study was presented at the European Society of Cardiology Congress in 2018. Study published as Research Investigation 121, Kwong RY et al. JACC 2019			
2018	The Clinical Impact of Stress CMR Perfusion Imaging in the United States (SPINS): A SCMR Registry Study. https://markets.businessinsider.com/news/stocks/cardiovascular-imaging-society-presents-late-breaking-science-session-focusing-on-patients-suspected-with-ischemia-1027491219	Talley Management Group on Behalf of the Society for Cardiovascular Magnetic Resonance	Lauren Schoener-Gaynor. Stress CMR Impacts Patient Care in the US.
2018	The Clinical Impact of Stress CMR Perfusion Imaging in the United States (SPINS): A SCMR Registry Study. https://www.radcliffecardiology.com/gallery/esc-2018-spins-raymond-kwong	Radcliffe Cardiology on site in Munich, European Society of Cardiology	Mirjam Boros

2018	Stress Cardiac MRI Shows High Prognostic Value for Suspected Ischemia Patients.	Diagnostic and Interventional Cardiology	https://www.dicardiology.com/content/stress-cardiac-mri-shows-high-prognostic-value-suspected-ischemia-patients

Report of Scholarship

Peer reviewed publications in print or other media

Research Investigations

1. Freeman HJ, **Kwong RY**, Sacks SL. Granulomatous vaginal ulceration due to metastatic cutaneous Crohn's disease. Can J Gastroenterol. 1995;9(4):183-86.
2. **Kwong RY**, Carere RG, Thompson CR, Lichtenstein S. Ventricular rupture during coronary angioplasty for acute reinfarction. Cathet Cardiovasc Diagn. 1998;43(2):190-4.
3. **Kwong RY**, Schussheim AE, Rekhraj S, Aletras AH, Geller N, Davis J, Christian TF, Balaban RS, Arai AE. Detecting acute coronary syndrome in the emergency department with cardiac magnetic resonance imaging. Circulation. 2003;107(4):531-7.
4. Tatli S, O'Gara PT, Lambert J, **Kwong RY**, Byrne JG, Yucel EK. MRI of atypical lipomatous hypertrophy of the interatrial septum. Am J Roentgenol. 2004;182(3):598-600.
5. Tatli S, Zou KH, Fruitman M, Reynolds HG, Foo T, **Kwong R**, Yucel EK. Three-dimensional magnetic resonance imaging technique for myocardial-delayed hyperenhancement: a comparison with the two-dimensional technique. J Magn Reson Imaging. 2004;20(3):378-82.
6. Ingkanisorn WP, **Kwong RY**, Bohme NS, Geller NL, Rhoads KL, Dyke CK, Paterson DI, Syed MA, Aletras AH, Arai AE. Prognosis of negative adenosine stress magnetic resonance in patients presenting to an emergency department with chest pain. J Am Coll Cardiol. 2006;47(7):1427-32.
7. **Kwong RY**, Chan AK, Brown KA, Chan CW, Reynolds HG, Tsang S, Davis RB. Impact of Unrecognized Myocardial Scar Detected by Cardiac Magnetic Resonance Imaging on Event-Free Survival in Patients Presenting With Signs or Symptoms of Coronary Artery Disease. Circulation. 2006;113(23):2733-2743.
8. Yan AT, Shayne AJ, Brown KA, Gupta SN, Chan CWS, Luu TM, Di Carli MF, Reynolds HG, Stevenson WG, **Kwong RY**. Characterization of the Peri-Infarct Zone By Contrast-Enhanced Cardiac Magnetic Resonance Imaging Is a Powerful Predictor of Post-Myocardial Infarction Mortality. Circulation. 2006;114(1):32-39.
9. Madore B, Hoge WS, **Kwong R**. Extension of the UNFOLD method to include free breathing. Magn Reson Med. 2006;55(2):352-62.
10. Yan AT, Gibson CM, Larose E, Anavekar NS, Tsang S, Solomon SD, Reynolds HG, **Kwong RY**. Characterization of Microvascular Dysfunction After Acute Myocardial Infarction by Cardiac Magnetic Resonance First-pass Perfusion and Late Gadolinium Enhancement Imaging. J Cardiovasc Magn Reson. 2006;8(6):831-837.
11. Larose E, Ganz P, Reynolds HG, Dorbala S, Di Carli MF, Brown KA, **Kwong RY**. Right Ventricular Dysfunction Assessed by Cardiovascular Magnetic Resonance Imaging Predicts Poor Prognosis Late After Myocardial Infarction. J Am Coll Cardiol. 2007;49(8):855-862.

12. Dorbala S, Vangala D Sampson U, Limaye A, **Kwong RY**, Di Carli MF. Value of vasodilator left ventricular ejection fraction reserve in evaluating the magnitude of myocardium at risk and the extent of angiographic coronary artery disease: a 82Rb PET/CT study. J Nucl Med. 2007;48(3):349-58.
13. Sampson UK, Dorbala S, Limaye A, **Kwong RY**, Di Carli MF. Diagnostic Accuracy of Rubidium-82 Myocardial Perfusion Imaging With Hybrid Positron Emission Tomography/Computed Tomography (PET-CT) in the Detection of Coronary Artery Disease. J Am Coll Cardiol. 2007;49(10):1052-8.
14. Anavekar NS, Gerson D, Skali H, **Kwong RY**, Yucel EK, Solomon SD. Two-Dimensional Assessment of Right Ventricular Function: An Echocardiographic-MRI Correlative Study. Echocardiography. 2007;24(5):452-56.
15. Joffe HV, **Kwong RY**, Gerhard-Herman MD, Rice K, Feldman K, Adler GK. Beneficial Effects of Eplerenone Versus Hydrochlorothiazide on Coronary Circulatory Function in Patients with Diabetes Mellitus. J Clin Endocrinol Metab. 2007;92(7):2552-8.
16. Di Carli MF, Dorbala S, Curillova Z, **Kwong RY**, Goldhaber SZ, Rybicki FJ, Hachamovitch R. Relationship Between CT Coronary Angiography and Stress Perfusion Imaging in Patients with Suspected Ischemic Heart Disease Assessed by Integrated PET-CT Imaging. J Nucl Cardiol. 2007;14:799-809.
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18. Schenker M. Dorbala S, Rybicki FJ, **Kwong RY,** Di Carli MF. Interrelation of coronary calcification, myocardial ischemia, and outcomes in patients with intermediate likelihood of coronary artery disease: a combined positron emission tomography/computed tomography study. Circulation. 2008;117(13): 1693-700.
19. Folkesson J, Samset E, **Kwong RY**, Westin CF. Unifying statistical classification and geodesic active regions for segmentation of cardiac MRI. IEEE Trans Inf Technol Biomed. 2008; 12(3):328-34.
20. **Kwong RY**, Sattar H, Wu H, Vorobiof G, Gandla V, Steel K, Siu S, Brown KA. Incidence and prognostic implication of unrecognized myocardial scar characterized by cardiac magnetic resonance in diabetic patients without clinical evidence of myocardial infarction. Circulation. 2008;118(10):1011-20.
21. Curillova Z, Yaman BF, Dorbala S, **Kwong RY**, Sitek A, El Fakhri G, Anagnostopoulos C, Di Carli MF. Quantitative relationship between coronary calcium content and coronary flow reserve as assessed by integrated PET/CT imaging. Eur J Nucl Med Mol Imaging. 2009;36(10):1603-10.
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29. Coelho-Filho OR, Seabra L, Mongeon FP, Abdullah S, Francis S, Blankstein R, Di Carli M, Jerosch-Herold M, **Kwong RY**. Stress Myocardial Perfusion Imaging by Cardiac Magnetic Resonance Provides Strong Prognostic Value to Cardiac Events Regardless of Patient's Sex. JACC Cardiovasc Imaging. 2011;4(8): 850-861.

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Narrative Report

As a clinical cardiologist, I have dedicated my clinical skills to providing general cardiology care to patients across a full range of cardiac conditions. Since I joined faculty in 2001, I have enhanced clinical care at BWH by creating and growing the capabilities of the cardiovascular magnetic resonance (CMR) program to all caring clinicians. I was able to channel the anatomical and physiological knowledge gained by CMR to serve clinicians and patients in need, incremental to existing imaging methods such as echocardiography and nuclear scintigraphy. Our CMR program was the first and remains the only such program in New England that provides stress CMR assessment for risk stratifying patients with chest pain syndromes.

Combining my skills in clinical cardiology, CMR imaging, and software development, I created a web-based de-identified secure CMR and CT reporting system (https://cmrcoop.partners.org) that allows accurate quantitative imaging reporting that adheres to all governing guidelines. This effort had since then transformed into an international collaborative consortium promoting consistency of performance and reporting of CMR/CT imaging with an ongoing vision in shaping multicenter research assessing imaging cost-effectiveness, cardiovascular outcomes, and real-world impact in patient care. This effort has attracted the attention of the Society for Cardiovascular Magnetic Resonance (SCMR), which officially endorsed our consortium towards development of an international imaging registry. I have been appointed and served as the Chair of the SCMR global registry committee (https://gcmr.bwh.harvard.edu) and continue to oversee all aspects of its growth and directions, with currently 40 international tertiary centers actively participating. As a key effort of the SCMR registry, we initiated a multicenter study in 2016 assessing the clinical impact and cost-effectiveness of CMR imaging of patients with stable chest pain syndromes: The Clinical Impact of Stress CMR Perfusion Imaging in the United States (SPINS): A SCMR Registry Study. The results of this 13-center, 2,371 patient study demonstrated the real-world clinical impact and cost-effectiveness of stress CMR imaging in the United States. The results of the SPINS study were presented at the European Society of Cardiology Congress in Munich, Germany in August 2018 and the main results have been published in JACC 2019.

I have received international recognition in my work and have represented BWH in numerous capacities. I served as the Program Co-Chair and Program Chair of the Annual Scientific Meeting of the Society for Cardiovascular Magnetic Resonance (SCMR). I also served SCMR as a voting member of the Board of Trustees for a 3-year term as well as Chair or co-Chair of various international committees. I have represented BWH over the past 10 years in various NIH study sections, including the past 4 years as a permanent member of the Clinical Integrated Cardiovascular Science (CICS) Study Section. I had served for many years as an Editorial Board member for *Circulation*, *Circulation Cardiovascular*

Imaging, the *Journal of the American College of Cardiology* (*JACC*), and the *Journal of Cardiovascular Magnetic Resonance* (*JCMR*). In addition, I am currently an Associate Editor of *JACC Cardiovascular Imaging* and the *JCMR*.

My clinical research focuses on treatment and imaging approaches for coronary artery disease and other forms of cardiomyopathy. I led the BWH CMR program in investigating and publishing landmark manuscripts that informed the CMR imaging community regarding the prognostic utility and management implication of LGE imaging of myocardial infarction. As PI of a NIH R01 study, I aligned the efforts of 3 teaching centers (BWH, MGH, and BIDMC) and conducted a randomized control trial of survivors of acute myocardial infarction. We observed significant beneficial effects of high dose omega-3 fatty acids in attenuating adverse cardiac remodeling incremental to guideline-based optimized interventional and medical therapies. Our results supported the notion that suppression of systemic and myocardial inflammation using omega-3 fatty acids provides a safe and unique treatment promoting inflammatory resolution and myocardial healing after an acute myocardial infarction. These results were published in *Circulation* and were cited in > 162 news outlets (including Reuters Health, Times, WebMD, Drugs.com) and viewed by > 151 million viewers in the first 4 months of publication. We further discovered supporting evidence that genetic polymorphism exists in the response to omega-3 fatty acids, leading to a patent application. These results may have strong implication in reducing the high burden of post-MI heart failure and personalized treatment using patients' genotypes and biomarker profiles. Other investigations I had led include risk stratification of diabetic patients with respect to coronary artery disease and survivors of cardiac arrests. I have led efforts to develop an extensive CMR core laboratory at BWH, and we have been able to provide high-quality CMR analyses for 12 funded clinical trials towards discovery of novel drug therapies.

I was a founding member of the Noninvasive Cardiovascular Imaging (NCVI) program, a joint effort of the Division of Cardiovascular Medicine and the Department of Radiology at BWH. I provide not only imaging consultation to clinicians but also training of future imaging experts in both radiology and cardiology. The NCVI program has been recognized internationally as a fertile environment for innovative research, training, and patient care. My other teaching activities include clinical supervision of medical students, residents, fellows, and faculty in CMR and echocardiography. I have taught in BWH/HMS CME courses, and I have mentored numerous trainees who have published papers in high-impact journals and secured faculty positions at major academic institutions.