

# *CURRICULUM VITAE*

*Diego R. Martin, MD, PhD, FRCPC*

*December 30, 2016*

## **BIOGRAPHICAL**

**Office Address:** Department of Medical Imaging  
University of Arizona  
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**Citizenship:** United States and Canada

**Origin:** Argentina

**Marital Status:** Married with one son

## **APPOINTMENTS AND POSITIONS**

### **CURRENT TITLES AND AFFILIATIONS**

#### **1. Academic Appointments**

The Cosden Endowed Tenured Professor of Radiology, Biomedical Engineering and Physiology, Chair, Department of Medical Imaging	University of Arizona College of Medicine Tucson, Arizona	<b>9.1.2011 -Present</b>
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#### **2. Other Appointments**

Arizona Cancer Center Faculty Member	University of Arizona Cancer Center Tucson, Arizona	<b>10.1.2011-Present</b>
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#### **3. Clinical Appointments**

Attending Physician	Banner University Medical Group-Tucson (Formerly UA Health Network) University Medical Center and South Campus Hospital Tucson, Arizona	<b>9.1.2011 -Present</b>
Attending Physician	Banner University Medical Group-Pheonix (Formerly Banner Good Samaritan) Pheonix Campus Pheonix, Arizona	<b>9.1.2016 -Present</b>

**CURRENT ADMINISTRATIVE AND LEADERSHIP APPOINTMENTS**

Chair, Banner University Medical Group Finance Committee	<b>10.1.2015 -Present</b>
Capital Planning Committee	<b>12.1.2015 -Present</b>
UA-Banner Council on Innovation	<b>8.1.2016 -Present</b>
Medical Executive Council	<b>9.1.2011 -Present</b>
Faculty Practice Committee	<b>12.1.2011 -Present</b>
Dean's Council of Chairs and Center Directors	<b>9.1.2011 -Present</b>
Dean's Clinical Council of Chairs	<b>9.1.2011 -Present</b>

**PREVIOUS ACADEMIC AND PROFESSIONAL APPOINTMENTS****1. Academic Appointments**

Professor of Radiology	Emory University School of Medicine Atlanta, Georgia	<b>1.12.2004 -8.31.2011</b>
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**2. Clinical Appointments**

Attending Physician	Emory Healthcare Atlanta, Georgia	<b>1.12.2004 -8.31.2011</b>
Attending Physician	Grady Memorial Hospital, Atlanta, Georgia	<b>1.12.2004 -8.31.2011</b>
Attending Physician	Children's Healthcare of Atlanta, Eggleston Hospital, Atlanta, Georgia	<b>1.6.2006 -8.31.2011</b>

**PRIOR ADMINISTRATIVE AND LEADERSHIP APPOINTMENTS**

Board of Directors (BoD) Voting Member	University of Arizona Health Network	<b>1.4.2012 -2.27.2015</b>
BoD Finance Committee	University of Arizona Health Network	<b>1.4.2012 -2.27.2015</b>
BoD Strategic Planning Committee	University of Arizona Health Network	<b>1.4.2012 -2.27.2015</b>
Practice Plan Oversight	University of Arizona Health Network	<b>6.1.2012 -2.27.2015</b>

## Committee

Director of MRI	Emory University School of Medicine Atlanta, Georgia	<b>1.12.2004</b>	<b>-8.31.2011</b>
Founding Chair MRI Quality and Safety Committee	Emory University School of Medicine Atlanta, Georgia	<b>1.12.2006</b>	<b>-8.31.2011</b>
Founding Director of the Clinically Applied Body MRI Research Program	Emory University School of Medicine Atlanta, Georgia	<b>1.5.2007</b>	<b>-8.31.2011</b>
Faculty Member	Winship Cancer Institute Emory University Atlanta, Georgia	<b>2.1.2011</b>	<b>-8.31.2011</b>
Associate Professor	Department of Radiology West Virginia University School of Medicine Morgantown, West Virginia	<b>5.1.2000</b>	<b>-12.19.2003</b>
Director of MRI	West Virginia University Medical Center Morgantown, West Virginia	<b>5.1.2000</b>	<b>-12.19.2003</b>
Director of the Abdominal Imaging Division	West Virginia University Medical Center Morgantown, West Virginia	<b>5.1.2000</b>	<b>-12.19.2003</b>
Clinical Director of Medical Informatics	West Virginia University Medical Center Morgantown, West Virginia	<b>3.1.2001</b>	<b>-12.19.2003</b>
Instructor	Department of Radiology University of Toronto School of Medicine Sunnybrook Hospital Toronto, Ontario	<b>7.1.1999</b> <b>2.1.2000</b>	<b>-7.31.1999</b> <b>-4.30.2000</b>
Visiting Scientist- Fellowship	University of North Carolina School of Medicine Chapel Hill, North Carolina	<b>8.1.1999</b>	<b>-1.31.2000</b>
Instructor	Department of Physiology University of Toronto Toronto, Ontario	<b>9.4.1982</b>	<b>-5.20.1984</b>

**CERTIFICATION AND LICENSURE****MEDICAL OR OTHER PROFESSIONAL LICENSURE:**

Ontario Medical License #66470 (current status: expired)	<b>6.6.1994</b>	<b>-7.1.2011</b>
North Carolina Medical License #84438 (current status: active)	<b>8.1.1999</b>	<b>-Present</b>
West Virginia Medical License #20151 (current status: inactive)	<b>5.1.2000</b>	<b>-5.13.2005</b>
Georgia Medical License #054320 (current status: active)	<b>4.1.2004</b>	<b>-Present</b>
Arizona Medical License #45085 (current status: active)	<b>8.10.2011</b>	<b>-Present</b>

**SPECIALTY CERTIFICATION:**

Diplomate, Canadian Board of Radiology	<b>6.30.1998</b>	<b>-Present</b>
Diplomate, American Board of Radiology	<b>6.3.1998</b>	<b>-Present</b>

**EDUCATION AND TRAINING****UNDERGRADUATE:**

B.Sc. Neurosciences	University of Toronto Toronto, Canada	<b>9.5.1978</b>	<b>-5.21.1982</b>
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**GRADUATE:**

M.Sc.	University of Toronto Department of Physiology Banting and Best Institute Toronto, Canada Supervisor: John Logothetopoulos M.D.	<b>5.31.1982</b>	<b>-12.21.1984</b>
Ph.D.	University of Toronto Department of Immunology and Department of Medical Biophysics Princess Margaret Hospital University of Toronto Toronto, Canada Supervisor: Richard Miller Ph.D.	<b>7.1.1985</b>	<b>-20.12.1991</b>
M.D.	University of Toronto School of Medicine Toronto, Canada	<b>4.1.1989</b>	<b>-14.5.1993</b>

**POSTGRADUATE:**

Internal Medicine Internship	University of Toronto School of Medicine Toronto, Canada	<b>1.7.1993</b>	<b>-6.30.1994</b>
Diagnostic Radiology Residency	University of Toronto School of Medicine Toronto, Canada Chair: Walter Kutcharczyk, M.D.	<b>7.1.1994</b>	<b>-6.30.1998</b>
Diagnostic Radiology Fellowship, Abdominal	University of Toronto School of Medicine Toronto, Canada Director: Paul Hamilton, M.D.	<b>7.1.1998</b>	<b>-6.30.1999</b>

**TRAINING IN LEADERSHIP, ORGANIZATION AND MANAGEMENT:**

Learning to Lead Healthcare management Six Sigma Projects Organization behavior 360 Leadership review Healthcare marketing	Emory University DMI, Atlanta	<b>2006</b>	<b>-2011</b>
Leadership Development Institute	University of Arizona Health Network	<b>1.1.2012</b>	<b>-12.1.2014</b>
Executive Leadership Academy	University of California, Berkeley	<b>3.24.2014</b>	<b>-3.28.2014</b>

***SERVICE*****LEADERSHIP POSITIONS AND COMMITTEE MEMBERSHIPS****1. National/International****American College of Radiology (ACR) Chair and Director of Education**

Annual Review Course Chair and Director – MRI	<b>2008</b>	<b>-Present</b>
Body MRI Education Center Course Author and Director	<b>2009</b>	<b>-Present</b>
Continued Professional Improvement – MRI	<b>2010</b>	<b>-Present</b>

**International Society of Magnetic Resonance in Medicine**

Special Committee on Safety	<b>2007-2009</b>
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**United Network of Organ Sharing (UNOS)**

Diagnostic Protocol Standardization Committee	<b>2009-2010</b>
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**RSNA Research and Education Foundation****2011--2015**

Corporate Giving Subcommittee

**2. Regional****Georgia Institute of Technology, Biomedical Engineering and Emory University**

Leading Member of the President's Education and Research Integration Initiative

**2010-2011****3. Institutional****University of Toronto**

Radiology Leadership Committee

**1997- 1998****West Virginia University**

Physicians' Health Committee

**2001- 2002**

Internal Review Board

**2001- 2003**

Informatics Committee, Medical Director

**2000- 2003****Emory University*****Department of Radiology:***

Operations Committee

**2005- 2011**

Leadership Committee

**2006- 2011**

Promotion and Tenure Committee

**2006- 2009**

Faculty Advisor

**2006- 2011**

Chair, MRI Quality and Safety Committee

**2006- 2011**

Resident Selection Committee

**2009**

Quality and Safety Committee

**2009 - 2011**

Radiation Protection Committee

**2006- 2007****University of Arizona and University of Arizona Health Network / Banner Health Network**

Informatics Technology Oversight Committee

**9.1.2011 - 1.3.2015**

Task Force on System Leakage (Founding Member)

**1.15.2012 - 1.3.2015**

Practice Plan Oversight Committee

**3.1.2012 - 1.3.2015**

Search for the UAHN President and CEO	<b>1.6.2012 - 1.12.2014</b>
Search Committee for the UA Cancer Center Director	<b>1.12.2012 - 1.6.2014</b>
Department of Surgery Chair Search Committee	<b>1.8.2013 - 1.6.2014</b>
Chair, Search Committee for the Chair of Family&Community Medicine	<b>1.9.2014 - 1.4.2015</b>

***Department of Medical Imaging:***

Founding Chair, Finance Committee	<b>9.1.2011 - Present</b>
Founding Chair, Operations Committee	<b>9.1.2011 - Present</b>
Founding Chair, Leadership Committee	<b>9.1.2011 - Present</b>
Founding Member, Quality and Safety Committee	<b>9.1.2011 - Present</b>
Founding Member, Space Committee	<b>10.1.2011- Present</b>

**Arizona Cancer Center**

Cancer Imaging Program Faculty Member	<b>12.1.2011- Present</b>
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**CONSULTANTSHIPS**

Global Advisory Council Member on Picture Archival and Computer Systems and Medical Informatics, General Electric	<b>2000-2002</b>
Consultant for Berlex on MR Cardiovascular and Body Imaging	<b>2000-2003</b>
Global Medical Advisory Council Member on Magnetic Resonance Imaging, General Electric	<b>2001-2003</b>
Consultant for Siemens Medical Solutions on Body MRI	<b>2001</b>
External Reviewer for MRI Department of Radiology Medical University of South Carolina	<b>2005</b>
Advisory Special Board on Imaging for the United Network of Organ Sharing	<b>2007-2008</b>
Advisory Council and Author for Web-based CME on MR Protocols Activity: Optimizing the Use of New Technologies in Magnetic Resonance Imaging - Rxperience.com and Enhancedcme.com	<b>2008</b>

**EDITORIAL ACTIVITIES****1. Manuscript Reviewer:**

Acta Radiologica	<b>2010- ad hoc</b>
American Journal of Kidney Disease	<b>2009- ad hoc</b>
American Journal of Nephrology	<b>2011- ad hoc</b>
American Journal of Radiology	<b>2003-Present</b>
Canadian Association of Radiology Journal	<b>2000-2002</b>
Cancer	<b>2008- ad hoc</b>
European Journal of Radiology	<b>2008-Present</b>
European Radiology	<b>2008-Present</b>
Hepatology	<b>2009- ad hoc</b>
Journal of Magnetic Resonance Imaging	<b>2003-Present</b>
Kidney International	<b>2007- ad hoc</b>
Lancet	<b>2003-ad hoc</b>
Magnetic Resonance in Medicine	<b>2007-Present</b>
RadioGraphics	<b>2008-Present</b>
Veterinary Radiology and Ultrasound	<b>2006- ad hoc</b>

**2. Other Reviewer Activities:**

Abstract Reviewer: International Society of Magnetic Resonance in Medicine	<b>2004, 2006</b>
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**3. Editorial Boards:**

Guest Editor Magnetic Resonance Clinics North America	<b>2006</b>
Guest Editor Topics in Magnetic Resonance Imaging	<b>2016</b>
Editorial Board Journal of Magnetic Resonance Imaging Associate Editor for Book Reviews	<b>2009-Present</b>



**4. Scientific Review**

Scientific Reviewer (ad hoc) National Institutes of Health (NIH) Small Business Innovation Research (SBIR) National Institute of Biomedical Imaging and Bioengineering (NIBIB) National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)	<b>2009 -Present</b>
Scientific Reviewer (ad hoc) Canadian Research Council	<b>June 2009</b>
Scientific Reviewer (ad hoc) Qatar National Research Foundation	<b>2009-2014</b>

**5. Scientific Think Tanks, Panels and/or Workshops**

Invited Participant Workshop on Nephrogenic Systemic Fibrosis International Society of Magnetic Resonance in Medicine Berlin, Germany	<b>May 2007</b>
Invited Participant Workshop on Nephrogenic Systemic Fibrosis Radiological Society of North America Meeting Chicago, Illinois	<b>Nov 2007</b>
Invited Participant Workshop on Nephrogenic Systemic Fibrosis International Society of Magnetic Resonance in Imaging Toronto, Canada	<b>Jun 2008</b>
Invited Participant Speaker and Author Workshop on Consensus MRI Protocols Rxperience, Washington University Sponsor New York, New York	<b>Oct 2008</b>
Invited Participant Workshop on Nephrogenic Systemic Fibrosis International Society of Magnetic Resonance in Imaging Honolulu, Hawaii	<b>Apr 2009</b>
Invited Participant Workshop on Hepatocellular Carcinoma Diagnosis and Management United Network of Organ Sharing Resulted in publication co-authorship of new guidelines for reporting on MRI and CT. Currently undergoing open review for final steps towards full committee review	<b>June 2009</b>

Invited Participant and Speaker  
Workshop on Nephrogenic Systemic Fibrosis  
Yale University

**May 2011**

### ***HONORS AND AWARDS***

Summer Student Research Program Award Banting and Best Institute, University of Toronto	<b>1981</b>
Ontario Graduate Scholarship Banting and Best Institute, University of Toronto	<b>1982, 1983</b>
Medical Research Council of Canada Award	<b>1984, 1985, 1986</b>
University of Toronto Medical School Student Achievement Award for Academic Excellence	<b>1990, 1991, 1992</b>
M.D. Graduate with Honors	<b>1993</b>
Fellow of the Royal College of Physicians and Surgeons of Canada	<b>1998</b>
Keynote Speaker, University of Toronto, Annual Organ Imaging Review Meeting	<b>2002</b>
Elected Member, Society of Computed Body Tomography and Magnetic Resonance Imaging	<b>2006</b>
Nomination finalist, Teacher of the Year Department of Radiology, Emory University	<b>2009, 2010</b>
Keynote Speaker, International Society of Magnetic Resonance In Imaging – Functional Renal Imaging	<b>2012</b>
CT/MRI Society Keynote Address American College of Veterinary Radiology	<b>2013</b>

### ***OTHER ACTIVITIES IN PROFESSIONAL AND SCIENTIFIC SOCIETIES***

#### **MEMBERSHIP**

##### **1. National/International**

American Medical Association	<b>1986</b>	<b>-Present</b>
Radiological Society of North America	<b>1994</b>	<b>-Present</b>
American Roentgen Ray Society	<b>1994</b>	<b>-Present</b>
International Society of Magnetic Resonance	<b>1998</b>	<b>-Present</b>

## Imaging in Medicine

American College of Radiology	<b>1999</b>	<b>-Present</b>
Society of Computed Body Tomography and Magnetic Resonance Imaging	<b>2005</b>	<b>-Present</b>

**ORGANIZATION OF NATIONAL/INTERNATIONAL CONFERENCES**

Session Chair, International Society of Magnetic Resonance In Medicine	<b>2003, 2009, 2011, 2012</b>
Session Chair, Radiological Society of North America	<b>2009</b>
Director, American College of Radiology, Annual Body MRI Review Course	<b>2006</b> <b>-Present</b>
Author and Director, American College of Radiology, Level II Practical Body MRI Case Review Course and Credentialing	<b>2008</b> <b>-Present</b>
Chair, American College of Radiology, Continued Professional Improvement (CPI) Continued Medical Education (CME) on Body MRI	<b>2009</b> <b>-Present</b>
Primary Author and Director for the American College of Radiology Best Practice Guidelines Appropriateness Criteria: MRI of the GI Tract	<b>2014</b>

***CLINICAL SERVICE AND RELATED CONTRIBUTIONS***

Current Career Focus and Accomplishments as Department Chair **9.2011 – Present**

- I have focused on developing and demonstrating quadripartite core leadership competencies in academics, education, health care and administration, working to integrate vision and missions crossing the university **academic** and health network **corporate** interests
  - Clinical Practice and Hospital Administration
    - Oversee and manage as a service line a department with 58 faculty (18 PhD's) and 36 residents with a top line revenue of over \$500M, 350,000 studies, inpatient and outpatient services that includes a ~400 bed university medical center, regional level 1 trauma center, NCI-designated cancer center, transplantation, with emphasis on quality, safety and growth through introduction of cutting edge, innovative technologies driving improved precision, accuracy and outcomes – Currently at 25<sup>th</sup> percentile compared to UHC imaging costs per case-mix-index-corrected patient discharge.
    - Over 4-fold increase of net service line profit within 5 years, now at ~\$3M / Radiologist FTE, with productivity competitive to market.
    - Compensation planning to achieve equity across members and parity against AAARAD national 50<sup>th</sup>ile standards of reference
    - Hiring processes to ensure both diversity and meritocracy with DMI now meeting national metrics for diversity referencing UHC data

- Sustainable renovations, upgrading and acquisition of state-of-the-art imaging systems and informatics leading-edge initiatives
  - Marked year-over-year operational efficiency improvements in patient progression and revenue cycle (scheduling, pre-authorization, imaging turnaround times, reporting turnaround times, coding and editing, pro/tech compliance, revenue capture)
  - New integrated organizational structure of financial, administrative, technical and research arms of DMI improving alignment of strategy, mission, vision, goals and objectives with planning and operations and with oversight and accountability
- Healthcare delivery driven by innovation
  - Quality metrics, oversight and performance improvements
  - Direct to PCP and patient reporting and consultation initiatives
  - Informatics systems initiatives promoting efficient and accurate communications with key stakeholders: Emergency; level 1 Trauma Center; clinics
  - Imaging informatics initiatives facilitating access within and outside of network
  - Transformative care now providing 24x7 subspecialty uniform care across the organization
  - Operational integration of DMI MD, PhD, technical, and nursing members
- Translational Research and Innovation
  - Formulation of the Clinical Imaging Translational Sciences Initiative (CITSI)
  - Numerous programmatic interdisciplinary disease-focused stimulus initiatives
  - Engineering imaging acquisition and informatics systems to reduce variability in results and to drive up value of imaging technologies do provide consistent high yield diagnostic results from MRI/MRS (and other) modalities.
    - Adaptive imaging systems and automated scanning
  - Constructing and redeveloping research facilities, including a dedicated animal and human MRI research lab with preclinical 7T Bruker and 3T clinical MRI systems
    - Developed the funding through organizing a cross-institutional coalition
    - Currently these core research facilities are self-supporting with >18 NIH funded studies
  - Conversion of clinical imaging instruments into translational systems with new master research agreements with multiple manufacturers/vendors and pre-clinical system testing and implementation
  - DMI-wide IRB, technical staff training in informed consent and research study participation, and all staff CITI certified
  - System support initiatives including study coordinators, clinical translation physicists
- Education
  - Faculty development program with several initiatives
    - Seed funding through an NIH-style internal program promoting education of MD's in grant writing and interdisciplinary team-building
    - Building a multifaceted mentorship team
    - Promotion and tenure initiatives with significantly improved track record of promotions with improved P&T organization and process
  - Medical School curriculum and training development initiatives
  - Residency and fellowship has been expanded from 28 to 36 positions, has become increasingly competitive and programmatic with increased emphasis on acquiring additional skills in research, education or administration
  - Initiated a new IR residency program
  - Initiated and expanded several accredited fellowship programs

## Contributions History Related to Prior Appointments

Director of MRI  
West Virginia School of Medicine

**2000-2003**

- As Director of MRI at WVU from 5/2000, established an advanced MRI center. Imaging cases increased from 5,400 in 2000, to 12,600 cases in 2002, with shorter examination times, increased diagnostic yield, and new applications
- Established novel applications including whole body tumor staging strategies, bowel MRI screening examinations and functional renal imaging
- Established an advanced cardiovascular MRI practice
- Established a body MRI fellowship and research training
- Introduced industry partnerships translating to clinical applications

Chief of Body Imaging Division  
West Virginia School of Medicine

**2000-2003**

- As head of abdominal imaging at WVU from 5/2000, introduced and established state-of-the-art diagnostic thoracic and abdominal-pelvic imaging techniques. First-of-kind in-house built automated MRI tools, including automated patient instructions, fast multi-station exams, signal averaging coil element implementation for large multi-field imaging, semi-automated cardiac 20 min. exam. These are impactful technologies now entering the commercial realm.
- Established a regional first-of-kind cardiac MRI practice and training program, collaborating with Cardiology with an innovative organizational coalition driving patient care, research and education.
- Introduced safe practice and optimized diagnostic yield protocols to minimize dose from CT scans in children and adults. Amongst first-of-kind “Image Gently” institutional initiatives; such as dose-by-weight/size adaptive CT.

Director of MRI  
Emory University School of Medicine

**2004-2011**

Founding Director, Clinically Applied Research Body MRI Program  
Emory University School of Medicine

**2004-2011**

- Overseeing clinical research programmatic development with translation of research techniques into clinical applications, development of state-of-the-art MRI uniform technology platform across all campuses, development of an integrated engineering industry collaboration and research effort
- Over first 5 years of appointment as director of MRI there has been average growth double digit growth per year in MRI with ~50,000 scans in FY2011, increased from ~16,000 in FY2004.
- Extensive technologist training, in-service system developed and state-of-the-art techniques implemented: e.g. abdominal scan times reduced to 20min/study from 60 min; head scans to 30min/study from 45 min.
- MRI clinical-research fellowship initiated
- MRI infrastructure support personnel expanded including 2 MRI clinical physicists, engineering students, graduate students and post-docs
- Established quality control and safety organization and measures, as chair of the quality and safety committee for uniform patient care across all installations and becoming a world-leading center on patient safety related to contrast, radiation reduction, and non-invasive diagnostics

## **RESEARCH FOCUS**

*Clinical translational research related to metabolic and functional MRI and MRS – the “Virtual MRI Biopsy” concept; technology innovation decreasing variability in results to improve healthcare value and outcomes; improving safety.*

I have approached research innovation and research through team science and I have worked to support and develop other faculty member’s careers, interweaving science with mentorship as overarching responsibilities.

My research aims include the development of technologies and discoveries that are system and disease focused prioritizing projects that have the largest possible impact on patients through the process of improvements in MRI technology. A major objective is to reduce variability in system utilization and results to drive up health care value (outcomes/cost). The approach, developing now over 15 years of effort, involves adaptive “smart” technologies where the imaging system adapts to the individual patient and can perform most of the scanning optimization and acquisition tasks with minimized human operator input (the automated MRI scanner). Our team has spearheaded developments that have impacted multi-coil design, operator software interface, automated image acquisitions, automated image and extracted data post-processing and display, acceleration and motion-correction or adaptation techniques, overall impacting introduction of numerous currently available commercial products. Industry partnerships are vital and I have negotiated numerous institutional industry research agreements. This has led to extensive research systems hardware, software and personnel support.

Projects have focused on MRI, combined with other modalities, for characterization of pathology and pathophysiological processes with emphasis on the development of non-invasive, safe diagnostic clinically practical methods for early disease detection or screening, including quantitative disease biomarkers. Current projects include:

- MRI and US diagnosis and staging of active and chronic liver disease and quantitative risk biomarkers for NAFLD-NASH progression and for HCC
- Oncological biomarkers for differentiating solid tumor types, predict growth behavior or therapy response, and for early biomarkers of response to therapy
- Inflammatory biomarkers of disease, applied to solid and hollow viscous intra-abdominal organ systems
- Renal functional imaging
- Pulmonary functional-biomechanical imaging analysis applied to interstitial and airways disorders and for assessing pulmonary vascular disease
- Prostate MRI-Ultrasound fusion for cancer diagnosis and non-surgical ablation of early disease

## **GRANT SUPPORT**

### **1. Federally/State Funded**

Grant Title:	MRI of Non-Alcoholic Steatohepatitis (NASH) Biomarkers
Funding Agency:	Arizona Board of Regents
Role:	Principle Investigator (0.60 calendar months)
Dates:	January 2015 – January 2018
Total Costs:	\$750,000
Description:	We have assembled a coalition of researchers who are leaders in the fields of adult/pediatric NAFLD/NASH across disciplines and institutions across the state with access to at risk populations (Mexican and Native Americans). This unique group of

investigators bridges the basic and clinical sciences with expertise in imaging biomarkers, bile acid metabolomics and gut microbiome; we will be able to examine the roots of the NAFLD/NASH epidemic. Our proposal will establish the tools and framework for a definitive prospective study of the prevalence and onset of NAFLD/NASH, identifying disease biomarkers to facilitate prevention and therapy.

## 2. Industry

Grant Title: Detection and measurement of hepatic fine structure related to fibrosis  
 Funding Agency: Aquitas  
 Role: Principal Investigator (0.12 calendar months) (Shared PI-Lars Furenlid, PhD)  
 Dates: July 2013-2015  
 Total Costs: \$250,000  
 Description: The objective is to use a one-dimensional MR spectroscopic highly spatially sample acquisition technique to subsequently derive spectral wavelength amplitude analysis through slices of liver tissue that represents fine structural detail. The overarching objective is to develop and validate this technique to provide a fast, safe, simple, non-invasive, single breath hold acquisition and analysis for liver fibrosis related to chronic liver disease.

## 3. Pending

Grant Title: Advancing MRI technology for early diagnosis of liver metastases  
 Funding Agency: NIH – Academic Industry Partnership – PAR-15-075  
 Role: Shared PIs (1.2 calendar months) and Maria Altbach, PhD  
 Dates: April 2017- 2022  
 Total Costs: \$4,002,628  
 Description: This is an academic industrial partnership to translate novel radial MRI methods for the detection and characterization of early metastatic lesions. Early detection of metastatic disease is known to improve therapeutic outcomes in cancer patients, in particular for gastrointestinal cancers. The proposed work is based on a radial turbo spin-echo technique pioneered by the team at the University of Arizona for abdominal imaging and a radial stack-of-stars technique with continuous acquisition for DCE imaging that, combined with signal processing we have developed, yields images of higher resolution and insensitivity to motion. Our proposal is based on a collaborative integrated team of university scientists, clinician-scientists and industry engineers to develop and clinically trial new MRI technology that overcomes limitations related to imaging small liver tumors in patients. We expect our proposal will yield technology improvements that will increase precision of care and outcomes in patients with metastatic malignancies, in particular those with upper or lower gastrointestinal tumors.

Grant Title: MRI Non-Alcoholic Steatohepatitis (NASH) Biomarkers  
 Funding Agency: NIH - NIDDK  
 Role: Principle Investigator (1.8 calendar months) (Shared PI- Maria Altbach, PhD)  
 Dates: April 2018-2023  
 Total Costs: \$2,986,030  
 Description: This proposal will lead to the innovation and validation of new MRI quantitative biomarker technology for early changes of liver disease in NASH, including fibrosis and inflammation. The overarching goal is to improve diagnosis, therapy and outcomes related to NASH.

Grant Title: Risk biomarkers for NASH progression project – Az Cancer  
 Funding Agency: NCI-NIH – Specialized Programs of Research Excellence (SPORE)  
 Role: Principle Investigator (1.8 calendar months) (Shared PI- Maria Altbach, PhD)  
 Dates: Under resubmission as a new R01 – April 2018-2023  
 Total Costs: \$3,000,000  
 Description: This proposal uses novel non-invasive MRI classification biomarkers of NASH severity for sensitive detection of liver disease progression and hepatocellular carcinoma risk to evaluate correlations with gut microbiome and bile acid profile. It is hypothesized that NASH progression and HCC results from elevated levels of toxic bile acid absorption in relation to specific changes in the large bowel microbiome community. It is expected that this study will lay the foundation for understanding etiology, developing therapy and reducing HCC incidence. (Note: The Cancer Center SPORE was unfunded, but our study was recommended by the review panel for resubmission as a separate R01).

## PREVIOUS SUPPORT

### 3. As Principal Investigator

Grant Title: Semi-Automated Liver Feature Analysis MRI of Chronic Liver Disease  
 Funding Agency: Atlanta Clinical and Translational Sciences Institute  
 Role: Principal Investigator (0.6 calendar months)  
 Dates: 1/5/11 – 4/30/12  
 Total Costs: \$150,000  
 Description: This study will develop methodology for semi-automated quantification of liver fibrosis extracted from image post-processing feature analysis software we have formulated that analyzes gadolinium contrast redistribution patterns within the liver. Validation will be performed with spatial mapping to surgical biopsy liver specimens taken from photographed explant specimens obtained from transplant patients.

Grant Title: Virtual MRI Biopsy of Diffuse Liver Disease  
 Funding Agency: Bayer Pharmaceuticals  
 Role: Principal Investigator (0.12 calendar months)  
 Dates: 11/4/09 – 11/3/13  
 Total Costs: \$23,077  
 Description: This study will examine the potential use of a liver uptake gadolinium-based contrast agent for quantifiable and reproducible measurement of a marker of hepatocyte metabolic activity and dysfunction in relation to chronic, chronic active and acute hepatitis.

Grant Title: Body MRI Training Grant  
 Funding Agency: Emory-Bracco Educational MRI Fellowship Fund  
 Role: Principal Investigator  
 Dates: July 2007-2012  
 Total Costs: \$325,000  
 Description: This fund is directed towards training the next generation clinician-scientists with specific expertise in body MRI physics, image acquisition methods, interpretation, experimental design and study execution.



Grant Title: Biomechanical MRI of chronic lung disease  
Funding Agency: RSNA  
Role: Supervisor/Mentor (0.12 calendar months) (PI: Jimmy Costello - Fellow)  
Dates: July 2010 – 2011  
Total Costs: \$50,000  
Description: The project goal is to develop non-invasive safe and fast MRI acquisition techniques combined with image post-processing algorithms to achieve a detailed biomechanical analysis of lung motion during respiration in order to achieve new diagnostics for the evaluation of chronic lung disease, including pulmonary fibrosis and chronic obstructive lung disease.

Grant Title: Multiparametric Non-Invasive Evaluation of Liver Disease: Hepatic lipid quantification using combined Magnetic Resonance Spectroscopy and Imaging  
Funding Agency: Coulter Award  
Role: Principal Investigator (0.60 calendar months)  
Dates: 1/7/09 – 6/30/11  
Total Costs: \$200,000  
Description: The overarching aim for this study is the development of a non-invasive MR imaging technique using high-speed magnetic resonance spectroscopy and automated acquisition and postprocessing to significantly improve diagnostics and treatment of fatty liver disease and hepatitis through accurate disease detection and quantification.

Grant Title: Investigation of the Environmental and Genetic Basis of Non-Alcoholic Fatty Liver Disease through the Emory NAFLD Research Group: A multidisciplinary project uniting liver experts.  
Funding Agency: Woodruff Fund Grant  
Role: Principle Investigator (0.60 calendar months)  
Dates: 9/1/07 – 12/31/09  
Total Costs: \$200,000  
Description: The overarching aim of this study is to initiate the development of an interdisciplinary and interinstitutional group with expertise that can collectively support innovative advances in diagnostics and therapeutics for non-alcoholic fatty liver disease in children and adults.

Grant Title: MR Colonography – Phantom development and technical optimization.  
Funding Agency: West Virginia Research Corporation  
Role: Principle Investigator (0.12 calendar months)  
Dates: 7/02 – 6/03  
Total Costs: \$40,000  
Description: An in vitro model for bowel MRI is developed to evaluate the technical optimization factors to detect bowel wall polyps for application for colon pre-cancer lesion detection or screening

Grant Title: Functional MRI of the Kidney – Measures of flow, filtration and metabolism.  
Funding Agency: West Virginia Research Corporation  
Role: Principle Investigator (0.12 calendar months)  
Dates: 1/03 – 12/03  
Total Costs: \$40,000  
Description: This study is to further develop a non-invasive MRI evaluation of individual kidney structure and function

Grant Title: Liver tumor perfusion characteristics related to therapy response.  
Funding Agency: GE Medical Systems  
Role: Principle Investigator (0.06 calendar months)  
Dates: 1/05 – 10/08  
Total Costs: \$72,500  
Description: It is proposed that MRI can detect changes in liver tumors shortly, within days, after chemotherapy for the purpose of therapy monitoring. HCC serves as a prototype tumor for this investigation.

Grant Title: Functional-Molecular MR imaging of renal pathophysiology.  
Funding Agency: General Electric Collaborative Grant Award  
Role: Principle Investigator (0.06 calendar months)  
Dates: 6/06 – 6/08  
Total Costs: \$50,000  
Description: This study is directed towards developing MRI renal functional imaging tools.

Grant Title: Molecular and Functional MR Imaging of Abdominal Soft Tissue  
Funding Agency: Bracco Diagnostics  
Role: Principle Investigator (0.06 calendar months)  
Dates: 8/15/06 – 6/30/09  
Total Costs: \$45,550  
Description: Viscosity and relaxivity of gadolinium-based contrast agents should effect the contrast distribution and signal characteristics detected on MRI. This study evaluates these variables in phantom experiments.

Grant Title: Rapid MRS quantification of hepatic lipid and iron.  
Funding Agency: Georgia Tech – Imaging Sciences Collaborative Grant  
Role: Principle Investigator (0.06 calendar months)  
Dates: 8/07 – 8/09  
Total Costs: \$49,500  
Description: A clinically useful fast scanning MR spectroscopy tool for hepatic lipid measurement will be developed

Grant Title: In vitro and in vivo evaluation of R-1 dynamic range and renal filtration characteristics as a function of gadolinium plasma protein binding affinity.  
Funding Agency: Bracco Investigator Sponsored Research Grant  
Role: Principle Investigator (0.06 calendar months)  
Dates: 1/06 – 1/07  
Total Costs: \$71,550  
Description: In vitro characteristics of gadolinium-based chelates will be assessed for relaxivity effects in the setting of phantoms and human subjects to determine susceptibility effects

and the capacity to measure concentration from signal

#### 4. As Co-Investigator

Grant Title: The Early Collaborative Clinical Studies in PKD: The Consortium for Radiologic Imaging Studies of PKD (CRISP) Extended Cohort Institute)  
 Funding Agency: NIH/NIDDK U01 DK62408  
 Role: Co-Investigator (0.60 calendar months) (PI: Arlene Chapman)  
 Dates: August 2002 – January 2014  
 Total Costs: \$768,048  
 Description: An interventional study aimed at testing the hypothesis that rigorous blood pressure control blocks the renin-angiotensin-aldosterone system is more effective than rigorous blood pressure control alone in slowing progression to renal failure in ADPKD.

Grant Title: Core A Imaging Core - Emory Molecular and Translational Imaging Research Center  
 Funding Agency: NIH P 50 CA 128301-01A1  
 Role: Co-investigator (0.60 calendar months) (PI: Carolyn Meltzer)  
 Dates: September 2008 – 2013  
 Total Costs: \$967,742  
 Description: The major goals of the project will focus on biomarker development and validation in humans and animal tumor models using multiple imaging technologies including positron emission tomography (PET), magnetic resonance imaging (MRI), and optical imaging.

Grant Title: The Early Collaborative Clinical Studies in PKD: The Consortium for Radiologic Imaging Studies of PKD (CRISP) Extended Cohort  
 Funding Agency: NIH/NIDDK U01 DK56956  
 Role: Co-investigator (0.60 calendar months) (PI: Arlene Chapman)  
 Dates: February 2000 – December 2011  
 Total Costs: \$261,147  
 Description: The goals of CRISPII are to extend the observations of CRISPI in order to: 1) draw unequivocal linkage between the rate of kidney/cyst enlargement and qualitative and quantitative end-points; 2) to provide a marker of disease progression (kidney volume) sensitive and accurate enough to be used as a primary outcome marker in clinical trials aiming to forestall disease progression; 3) to develop and test other biomarkers of disease progression in ADPKD.

Grant Title: Occupational exposure to inhaled toxins effects on brain and liver assessed by fMRI and multi-sequence MRI.  
 Funding Agency: NIOSH OH03646-02  
 Role: Co-Investigator (0.06 calendar months)  
 Dates: 9/01 – 9/04  
 Total Costs: \$858,000  
 Description: To determine cognitive effects objective changes on brain and liver using fMRI and liver MRI techniques

**PATENTS**

1. HISTO: High speed T2-corrected multiple echo proton spectroscopy **10.2008**  
This is an efficient magnetic resonance spectroscopy acquisition for fast and accurate measurement of hepatic lipid fraction.  
Patent No. 12/248,508  
Authors in order of issue: **Diego R. Martin**, Xiaoping Hu, Nashiely Pineda, Puneet Sharma
  
2. Image-guided focused microwave therapy (FMT) **3.2015 (Disclosure)**  
A new antenna array for non-invasive extracorporeal delivery of microwaves and active 3D thermoacoustic imaging with sub-mm resolution for mapping tissue dielectric properties for solid cancer non-invasive ablation therapy.  
Under review  
Authors in order of submission: Russel Witte, Hao Xin, **Diego Martin**

**TEACHING****FORMAL TEACHING****1. Coursework***Undergraduate Teaching:*

Course Name: Physiology, 3<sup>rd</sup> Year  
 Description: Human Physiology  
 Year(s): 1992, 1993, 1994, 1  
 To Whom/#: Undergraduates sciences / approx. 25  
 Where: University of Toronto  
 Toronto, Canada

Course Name: Physiology, 2nd Year Nursing  
 Description: Human Physiology  
 Year(s): 1993, 1994  
 To Whom/#: Undergraduate nursing/ approx. 25  
 Where: University of Toronto  
 Toronto, Canada

Course Name: Biomedical Engineering, 4<sup>th</sup> Year, Imaging Sciences  
 Description: Magnetic Resonance Imaging  
 Year(s): 2006, 2008, 2010  
 To Whom/#: Undergraduate engineering/ approx. 40  
 Where: Georgia Institute of Technology  
 Atlanta, Georgia

***Medical Student Teaching:***

Course Name: Physiology  
Description: Human Physiology Laboratory  
Year(s): 1989, 1990  
To Whom/#: Medical Students / approx. 25  
Where: University of Toronto  
Toronto, Canada

Course Name: Research Elective  
Description: Magnetic Resonance Imaging  
Year(s): 2009 - 2011  
To Whom/#: 4th-year medical students, 1per year  
Where: Emory University School of Medicine  
Atlanta, GA

Course Name: Gastroenterology  
Description: Interdisciplinary lecture on Inflammatory Bowel Disease  
Year(s): 20012, 2013, 2014  
To Whom/#: 4th-year medical students, 1per year  
Where: University of Arizona College of Medicine  
Tucson, Az

***Graduate/Resident/Fellow Teaching:***

Course Name: Biomedical Engineering  
Description: Magnetic Resonance Imaging  
Year(s): 2009, 2010  
To Whom/#: Graduate students /approx. 10  
Where: Georgia Institute of Technology  
Atlanta, Georgia

***Postgraduate/Other Teaching:***

Course Name: Annual Body MRI Review Course  
Description: Magnetic Resonance Imaging Lectures  
Year(s): 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014  
To Whom/#: Diagnostic Radiologists / approx. 50-220  
Where: San Antonio, Pheonix, Washington D.C, Atlanta, Orlando, San Francisco, Reston

Course Name: Body MRI Case-Review Practicum  
Description: Magnetic Resonance Imaging Case Review and Lectures  
Year(s): 4-5 Courses /Year; 2009, 2010, 2011, 2012, 2013, 2014  
To Whom/#: Diagnostic Radiologists / approx. 45 per course  
Where: American College of Radiology Learning Center, Reston, VA

Course Name: RSNA Refresher Course: Cardiac MRI  
Description: The fundamental methods for clinical applications  
Year(s): 2002, 2003, 2004  
To Whom/#: Attendees of Radiological Society of North America conference/150

Where: Chicago, Illinois

Course Name: RSNA Refresher Course: Advances in Body MRI  
Description: State-of-the-Art and Developing Technologies and Applications for Body MRI  
Year(s): 2004, 2005, 2006,2007,2008,2009  
To Whom/#: Attendees of Radiological Society of North America conference/150  
Where: Chicago, Illinois

Course Name: International Society of Magnetic Resonance in Medicine (ISMRM)  
Description: Different MRI Contrast Agents Use and Safety  
Year(s): 2011  
To Whom/#: Attendees of ISMRM conference/150  
Where: Montreal, Canada

Course Name: International Society of Magnetic Resonance Technologist  
Description: New Techniques and Applications  
Year(s): 2011  
To Whom/#: Attendees of Radiological Society of North America conference/150  
Where: Montreal, Canada

Course Name: Radiological Society of North America (RSNA) Refresher Course: Advances in Body MRI  
Description: State-of-the-Art and Developing Technologies and Applications for Body MRI  
Year(s): 2011 – Pros and Cons of Liver-Specific Contrast Agents  
To Whom/#: Attendees of Radiological Society of North America conference/150  
Where: Chicago, Illinois

Course Name: Radiological Society of North America (RSNA) Refresher Course: Advances in Body MRI – The Liver Virtual Biopsy  
Description: State-of-the-Art and Developing Technologies and Applications for Body MRI  
Year(s): 2011, 2012  
To Whom/#: Attendees of Radiological Society of North America conference/150  
Where: Chicago, Illinois

Course Name: 29<sup>th</sup> Annual MRI 2012 National Symposium  
Description: New Techniques and Applications: Liver and HCC, Pancreas, Enterography  
Year(s): 2012  
To Whom/#: Symposium attendees/100  
Where: Las Vegas, Nevada

Course Name: International Society of Magnetic Resonance Technologists  
Description: Magnetic Resonance Enterography  
Year(s): 2012  
To Whom/#: Attendees of Radiological Society of North America conference/150  
Where: Melbourne, Australia

Course Name: International Society of Magnetic Resonance in Medicine (ISMRM)  
Description: 1. Functional Renal Imaging; 2. Mimizing Risk of Contrast Agents  
Year(s): 2013  
To Whom/#: Attendees of ISMRM conference/150  
Where: Salt Lake City, Utah

## **SUPERVISORY TEACHING:**

### **1. Research Fellows/Mentees**

Ming Yang, MD

Current position: Research Associate, Cleveland University, Department of Radiology

Karabulut, MD

Current position: Professor of Radiology, Chairman, Pamukkale University Hospital, Denizli, Turkey. Editor-in-Chief, Diagnostic and Interventional Radiology.

Khalil Salman, MD

Current position: Resident in Nuclear Medicine, Emory University

Thomas Lauenstein, MD

Current position: Professor of Radiology, University Hospital Essen, Germany

Marcel Santos, MD

Current position: Assistant Professor at Clinics Hospital of Ribeirao Preto, Sao Paulo, Brazil

Raman Danrad, MD

Current Position: Assistant Professor, Cardiovascular and Body Imaging, University of Louisiana

Unni Udayosankar, MD

Assistant Professor, Pediatric Radiology, University of Arizona

Daniel Karolyi, MD PhD

Current position: Associate Professor, Vice Chair, Department of Radiology, Virginia Technical University

Surya Chundru, MD

Current position: Assistant Professor, Body Imaging Division, University of Arizona

James Costello, MD PhD

Current position: Assistant Professor, Associate Residency Director, Body Imaging Division, University of Arizona

Hina Arif-Tiwari, MD

Current Position: Assistant Professor, Director of Ultrasound, Body Imaging Division, University of Arizona

Khalil Salman, MD

Current Position: Medical Imaging Resident, University of Arizona

Ion Codreanu, MD PhD

Current Position: MRI-Nuclear Molecular Imaging Fellowship, University of Arizona

## **Post-Doctoral Fellows**

### Xin Xu

2006-2008

Current position: Physicist, Siemens Medical Solutions, China

### Nashiely Pineda

2007-2009

Current position: Applications Development, Siemens Medical Solutions, France

## **2. Ph.D. Advisor/Committees**

### Omar Zurkiya, PhD

PhD co-supervisor, Biomedical Engineering Division, Georgia Institute of Technology

Completed 9/06

Current position: Medical Student

### Stephanie George, PhD

PhD co-supervisor, Biomedical Engineering Division, Georgia Institute of Technology

Completed 9/09

Current position: Assistant Professor of Engineering, College of Technology and Computer Science, East Carolina University

### Roger Nana, PhD

PhD co-supervisor

Completed 11/08

Current position: Industry MR Software Engineer

### Nader Metwalli, PhD

PhD co-supervisor

Current position: Research Scientist with Teledyne Scientific Company in the Research Triangle Park, Durham, NC.

### Steven Harris, MD, PhD

MD-PhD program co-supervisor

Completed 1/12

Current position: Medical Student, Emory University School of Medicine

### Jihun Oh, PhD

PhD co-supervisor, Electrical and Computer Engineering Division, Georgia Institute of Technology

Completed 5/13

Current position: Research & Development Engineer, Samsung Electronics, South Korea

### Benjamin Berman, PhD

PhD exam committee, Department of Electrical and Computer Science, College of Engineering, University of Arizona

Completed 11/15

Current position: Post-doc with the Department of Energy and the Food & Drug Administration.



Jonathan Brand, PhD

PhD co-supervisor and exam committee, College of Optical Sciences, University of Arizona

Completed 5/16

Current position: Engineer with Richoh Innovations, California.

**3. M.S. Advisor/Committees**

Senthil Ramamurthy, MS

Department of Engineering, WVU; completed 1/05.

Last known position: Senior Software Engineer - Research Informatics, Lead, Emory School of Medicine

**4. Post-Graduate Research Mentees**

Shengyong Wu, MD, PhD

2010-2011

Last known position: Molecular Imaging Fellow, Center of Systems Imaging, Emory University

**5. Post-Graduate Medical Mentees**

Pardeep Mittal, MD

2007 to present

Current position: Associate Professor, Abdominal Imaging Division, Department of Radiology, Emory University

Bobby Kalb, MD

Prior position: Assistant Professor, Body MRI Program, Department of Radiology, Emory University

Current position: Associate Professor, Vice Chair Quality and Safety, Director of MRI and Chief of Body Imaging, Department of Medical Imaging, University of Arizona

Douglas Yim MD

Jan. 2011 – Aug. 2011

Current Position: Assistant Professor, Interventional Radiology, Department of Radiology Emory University

**Visiting Fellowships**

Thais Nascimento, MD

September 14, 2009 - December 12, 2009

Current position: Radiologist, CDPI, Rio de Janeiro - Brazil

Elisa Pompeu Dias Coutinho, MD

March 18, 2009 - April 18, 2009

Current position: Radiologist, CDPI – Barra, Brazil

Roberta Carvalho, MD

March 18, 2009 - April 18, 2009

Current position: MRI Radiologist, CDPI, Rio de Janeiro - Brazil

Stephen Sabourin, MD

Feb. 1, 2011 – Feb 15, 2011

Current position: Staff Radiologist

Silvia Alves, MD

April 4, 2011 - April 30, 2011

Current position: Staff Radiologist, CDPI, Rio de Janeiro – Brazil

Carla Baltharejo, MD

April 4, 2011 - April 30, 2011

Current position: Staff Radiologist, CDPI, Rio de Janeiro – Brazil

Samantha Matz, MD

January 1, 2013 – May 31, 2013

Current position: Faculty Radiologist, St. Josephs Hospital, Phoenix, Az

## **6. Residency Mentees**

Wyndham Owens, MD

July 2006 – June 2010

Last known position: Fellowship training

## **7. Medical Student Mentees**

David Becker-Weidman, MD

July 2010 – June 2011

Current position: Radiology Residency 2011, Jefferson University, Philadelphia

Colyn Watkins, MD

Jan 2011 – June 2011

Current position: 4<sup>th</sup> year Medical Student, Emory University, Atlanta

## **LECTURESHIPS, SEMINAR INVITATIONS, AND VISITING PROFESSORSHIPS**

### **1. National/International**

1. **June 1983** Department of Physiology, University of Toronto. “A probable immune component involved in the manifestation of diabetes in the spontaneously diabetic BB rat”.
2. **September 1983** Endocrinology Conference, Hospital for Sick Children, Toronto. “Diabetes Mellitus: Possible immune mechanisms leading to the destruction of pancreatic islet cells”.

3. **November 1983** Banting and Best Department of Medical Research, University of Toronto. “Complement-fixing islet cell antibodies in the spontaneously diabetic BB rat”.
4. **June 1985** Banting and Best Department of Medical Research, University of Toronto. “Analysis of expression of MHC class II gene products in pancreatic islets using *in situ* hybridization”.
5. **April 1986** Banting and Best Department of Medical Research, University of Toronto. “The veto phenomenon”.
6. **October 1986** Department of Immunology, University of Toronto. “Immune responsiveness in the spontaneously diabetic BB rat”.
7. **May 1987** Department of Medical Biophysics, Ontario Cancer Institute. “Delineation of a defect in the activation of allo-reactive CTL precursors in the spontaneously diabetic BB rat”.
8. **March 1988** Department of Immunology, University of Toronto. “The veto phenomenon: In vivo relevance”.
9. **November 1988** Department of Medical Biophysics, Ontario Cancer Institute. “Administration of foreign lymphocytes can lead to functional deletion of reactive host cytotoxic T lymphocyte precursors”.
10. **August 1989** 7<sup>th</sup> International Congress of Immunology, West Berlin. “The veto phenomenon: Functionally deleting antigen presenting cells that operate in vivo”.
11. **July 1996** 4<sup>th</sup> International Conference on Head and Neck Cancer, Toronto. “Parathyroid localization with <sup>99m</sup>Tc-sestamibi: A review.”
12. **May 1999** American Roentgen Ray Society 99<sup>th</sup> Scientific Meeting, New Orleans. “MR imaging of aortic coarctation repairs and related complications: Methodology, application, and future implications”.
13. **January 2002** Symposium on MR imaging of the bowel. Siemens Medical Solutions. Erlangen, Germany. MR Colonography: Methodology development and feasibility.
14. **November 2002** Radiological Society of North America, Chicago, IL. Categorical Course on Abdominal MR Imaging – State of the art.
15. **March 2003** Educational Symposia. Snowmass, CO. MRI Review. Invited Faculty. Presentations on liver, pancreas, and bowel MR imaging.
16. **April 2003** Review of current and future applications of contrast enhanced MRI and molecular imaging. Berlex. Berlin, Germany. **June 2003** American Association of Radiology Technologists. Las Vegas. Comprehensive examination of the abdomen by MR
17. **September 2003** Magnetom World – MRI Current and Future Applications. Miami. MR Colonography: TFISP.
18. **May 2004** International Society of Magnetic Resonance in Medicine. Kyoto, Japan. Abdominal MRI Categorical Course: Gastrointestinal Imaging.

19. **September 2004** Symposium on Imaging of Gastrointestinal Diseases. La Sapienza, Medical University of Rome, Italy: Gastrointestinal MRI.
20. **November 2004** Radiological Society of North America, Chicago IL. Categorical Course on Cardiovascular MRI – How We Do It.
21. **September 2005** Magistrates Lectures: Panama Scientific Meeting on Future Developments. Newly developing magnetic resonance imaging techniques
22. **September 2005** Magistrates Lectures: Panama Scientific Meeting on Future Developments. Cardiac MRI
23. **September 2005** Magistrates Lectures: Panama Scientific Meeting on Future Developments. Gastrointestinal MRI
24. **October 2005** ACR accredited course. San Francisco. MRI of the Pancreas
25. **October 2005** ACR accredited course. San Francisco. Body imaging at 3Tesla: Opportunities and Challenges.
26. **October 2005** ACR accredited course. Amelia Island. MRI of Pancreatic masses
27. **October 2005** ACR accredited course. Amelia Island. Body MRI at 3 Tesla; opportunities and challenges.
28. **November 2005** RSNA Review Course. Cardiovascular MRI.
29. **November 2005** RSNA. Optimization of pulmonary non-gadolinium MR angiographic imaging technique
30. **April 2006** American Roentgen Ray Society. Vancouver. MR Imaging of the Liver: Challenging Cases
31. **April 2006** American Roentgen Ray Society. Vancouver. Body MRI: From morphology to function.
32. **April 2006** New York University CME accredited course. Bahamas. MRI of diffuse liver disease
33. **April 2006** New York University CME accredited course. Bahamas. MRI of focal liver disease.
34. **April 2006** New York University CME accredited course. Bahamas. MRI of the gastrointestinal system
35. **April 2006** New York University CME accredited course. Bahamas. MR angiography.
36. **April 2006** American Roentgen Ray Society. Vancouver. MR Imaging of the Liver: Challenging Cases
37. **May 2006** International Society of Magnetic Resonance in Medicine. Seattle. Developing techniques in body MRI.
38. **September 2006** University of Toronto Organ Imaging Course, Toronto. Keynote Speaker: Multiple Lecture Series on MRI of the Liver; Pancreas; Kidney; and Gastrointestinal Systems

39. **November 2006** International Society of Magnetic Resonance in Medicine: International Outreach Educational Program. Buenos Aires; Sao Paolo; and Rio de Janeiro. Multiple Lecture series on MRI of the Chest, Abdomen, and Pelvis
40. **November 2006** Radiological Society of North America. Refresher Course: Abdominal MRI at 3Tesla.
41. **November 2006** MRI of Liver Lesions: Review with the experts. Radiological Society of North America.
42. **February 2007** MR Nephro-urographic Evaluation of Renal Transplantation. Review of Nephrogenic Systemic Fibrosis. American College of Radiology. Pediatric workshop on MR imaging of urological diseases.
43. **May 2007** Pancreatic MRI: From morphology to function. ISMRM Berlin.
44. **May 2007** MR Nephrourography. ISMRM Berlin. April 2009. Co-moderator of scientific session 'NSF and Functional Renal'. ISMRM 17<sup>th</sup> Annual Meeting, Honolulu, Hawaii.
45. **January 2008** Participated in the "RSNA On-the-Air" radio program at the 93<sup>rd</sup> Scientific Assembly and Annual Meeting of the Radiological Society of North America.
46. **March 2008** Whole Body MRI: An evolving application for cancer imaging. SCBTMR 31<sup>st</sup> Annual Course.
47. **March 2008** Small Bowel MR Enterography: Virtual MRI Biopsy for Inflammatory Bowel Disease. SCBTMR 31<sup>st</sup> Annual Course.
48. **August 2008** Techniques for Abdominal Imaging: What's New? ISMRM Specialty Course on Advanced Body MRI.
49. **August 2008** Renal and Adrenal Imaging. ISMRM Specialty Course on Advanced Body MRI.
50. **August 2008** Measurement Precision of Gadolinium Enhanced Magnetic Resonance Nephrourography Using Rapid 3D Imaging and a Multi-Compartment Kinetic Model. ISMRM Specialty Course on Advanced Body MRI.
51. **October 2008** Poster #1549 "High Speed (T2)-Corrected Multi-Echo (HISTO) Magnetic Resonance Spectroscopy: A Fast, Reproducible, Non-invasive Technique for Accurate Hepatic Lipid Quantification". The Liver Meeting by the American Association for the Study of Liver Diseases, San Francisco, CA.
52. **November 2008** RSNA Refresher Course. Body MR Imaging: Current Role and New Ideas (How-To-Workshop), Chicago, Illinois.
53. **March 2009** Current Status of MR Spectroscopy. SBCT-MR 2009 Annual Course – Masters in Body Imaging, Miami, Florida.
54. **March 2009** New Horizons. Third Annual Body MRI Update. American College of Radiology, Washington, DC.
55. **March 2009** Clinical Practice Plan: The Current Business of MRI. Third Annual Body MRI Update. American College of Radiology, Washington, DC.

56. **March 2009** NSF Update. Third Annual Body MRI Update. American College of Radiology, Washington, DC.
57. **March 2009** Bowel: IBD. Third Annual Body MRI Update. American College of Radiology, Washington, DC.
58. **April 2009** Renal stone patients in the ER: Is MR an alternative? ISMRM 17<sup>th</sup> Annual Meeting, Honolulu, Hawaii.
59. **April 2009** Kidney Function and Failure. ISMRM 17<sup>th</sup> Annual Meeting, Honolulu, Hawaii.
60. **June 2009** Body MRI: Cost effective application of state-of-the-art MRI for common diseases. Invited Professor, ISMRM Outreach Program, Chinese Radiology Association Meeting, Huang Shan.
61. **September 2009** Abdominal MRI: How We Do It. ISMRM International Outreach Program, He Fei City, China.
62. **September 2009** MRI of Acute and Chronic Liver Disease. ISMRM International Outreach Program, He Fei City, China.
63. **September 2009** Imaging of Renal Structure and Function. ISMRM International Outreach Program, He Fei City, China.
64. **November 2009** Advanced Body MRI Techniques and Applications. RSNA, Chicago, IL.
65. **March 2010** Abdominal MRI: Methodological Approach. American College of Radiology 4<sup>th</sup> Annual Body MRI Update Program.
66. **March 2010** Kidney Advanced Applications: MR Nephrography. American College of Radiology 4<sup>th</sup> Annual Body MRI Update Program.
67. **March 2010** The Virtual Biopsy: Evolving Approach to Quantifying Disease. American College of Radiology 4<sup>th</sup> Annual Body MRI Update Program.
68. **March 2010** Pediatric MRI Evolving Applications: The Bowel and Inflammatory Bowel Disease. American College of Radiology 4<sup>th</sup> Annual Body MRI Update Program.
69. **March 2011** GPU-based motion correction of contrast-enhanced liver MRI scans: an open implementation. ISBI 2011. Chicago, IL.
70. **July 2010** The MRI Virtual Biopsy. City of Hope NCI Regional Cancer Center, Los Angeles.
71. **August 2010** One Stop Shop for Abdomen Imaging (Do We Really Need a GFR?). SMRT of Atlanta Seminar, 19<sup>th</sup> Anniversary, Atlanta, GA.
72. **May 2011** Optimal MR Body Imaging Diagnosis. SMRT 20<sup>th</sup> Annual Meeting, Montreal, Quebec, Canada.
73. **May 2011** The Deceasing Incidence of NSF at Emory University. The Fifth Annual Scientific Symposium on Nephrogenic Systemic Fibrosis and Allied Systemic Fibrosing Disorders. Yale University, New Haven CT.

74. **October 2011** Steps to achieve MRI optimization with sub-20-minute room turnaround times. 34<sup>th</sup> Annual Course SCBT-MR. Washington, DC.
75. **October 2011** Rationale for MRI over CT; You should be more concerned about biopsy. 34<sup>th</sup> Annual Course SCBT-MR. Washington, DC.
76. **October 2011** MRI of Crohns Disease: What only MRI shows and how to use it. 34<sup>th</sup> Annual Course SCBT-MR. Washington, DC.
77. **January 2012** American College of Radiology, Body MRI course (Level II): Course faculty.
78. **April 2012** American College of Radiology, Body MRI course (Level II): Course faculty.
79. **June 2012** Invited speaker: Sixth Annual Body MRI Update. American College of Radiology, Orlando, FL.
80. **September 2012** American College of Radiology, Body MRI course (Level II): Course faculty.
81. **December 2012** Grand Rounds, University of Arizona College of Medicine, Department of Obstetrics and Gynecology.
82. **January 2013** American College of Radiology, Body MRI course (Level II): Course faculty.
83. **April 2013** American College of Radiology, Body MRI course (Level II): Course faculty.
84. **June 2013** MRI From Head to Toe. HCC: Has MRI Replaced Biopsy? ACR Annual MRI Conference 2013.
85. **June 2013** MRI From Head to Toe. Contrast Agents for MRI: What Every Radiologist Needs to Know. ACR Annual MRI Conference 2013.
86. **June 2013** MRI From Head to Toe. MR Enterography: How We Do It. ACR Annual MRI Conference 2013.
87. **February 2014** MRIs Teach us about the Our Evolving Brains, Arizona Senior Academy, Tucson, AZ.
88. **February 2014** A Window into the Brain: Viewed through the Evolution of MRI Technology, The University of Arizona, College of Science, Evolving Brain.
89. **February 2014** How can Body Imaging Help in the Diagnosis of Chronic Pancreatitis, Kiawah Island, SC.
90. **September 2014** Adaptive Imaging and Impact on Value. Northwestern University, Chicago, IL, Resident lectures and Grand Rounds.
91. **May 2014** International Society for Magnetic Resonance in Medicine, Milan, Italy.
92. **May 2014** International Society for Magnetic Resonance in Medicine, ISMRM-SMRI Global Outreach Program, Mexico City.

93. **January 2015** Quantitative biomarkers and other developments improving value in health care delivery through advances in imaging technologies. Invited grand rounds speakerships and resident lectures. Brigham and Women's and MGH, Boston Massachusetts
94. **April 2015** Safe use of gadolinium-based contrast agents in patients with severe impairment of renal function: A review of theory, expectation and evidence. American Roentgen Ray Society, Toronto, Canada.
95. **May 2015** Abdominal and pelvic MRI: Advanced techniques for optimal, efficient, consistent high diagnostic yield. American College of Radiology Annual Meeting, Washington, DC.

## 2. Local/Regional

1. **November 1999** Department of Radiology, University of Florida. A pattern recognition approach to MR Imaging of the liver.
2. **January 2000** Department of Radiology, UC Davis. MR Imaging of focal liver lesions: A state-of-the-art review.
3. **April 2000** GE Medical Systems, Milwaukee. State of the art abdominal imaging techniques.
4. **Aug 2001** Global Advisory Council on MR Imaging of the Abdomen, GE Medical Systems, Milwaukee. Current and Future Vision.
5. **August 2001** West Virginia University. Abdominal MRI: Current and developing techniques.
6. **April 2003** Visiting Professor. Pennsylvania State University Medical Center. Body MRI: State of the art.
7. **May 2003** Univ. of Calif., San Diego. Abdominal MRI Review Lectures.
8. **January 2004** Emory University. Gastrointestinal MRI.
9. **April 2004** Categorical Surgical Course on Pelvic Reconstruction, Atlanta. MRI of female pelvic floor instability.
10. **September 2004** South East Regional American Urological Society Meeting. MR Imaging of Prostate Carcinoma.
11. **July 2005** Berlex Advisory Board. Asheville NC. Gastrointestinal MRI.
12. **August 2005** Philips Medical Systems. Vanderbilt University, TN. Newly evolving MRI techniques and application; and Gastrointestinal MRI.
13. **September 2005** University of Arizona. Advances in body MRI.
14. **December 2005** Emory University. Body MRI: From morphology to function.
15. **March 2007** Nephrogenic Systemic Fibrosis: Up-to-date review. Dept. of Medicine, Nephrology Division Grand Rounds, Emory University.



16. **May 2007** Role of MRI in Liver and Renal Transplantation; Review of Nephrogenic Systemic Fibrosis, Transplantation Program Grand Rounds, Emory University.
17. **June 2007** Up-to-date Review of Nephrogenic Systemic Fibrosis, Clinical Technologists MRI Review Series, Atlanta, Georgia.
18. **July 2008** Abdominal Imaging: Indications and Risks. Surgical Grand Rounds, Emory University.
19. **September 2008** Image Fusion Technique and Application for Body MRI. Research in Radiology Conference, Emory University.
20. **October 2008** Body MRI. VHA Georgia's Technology Forum, Atlanta, GA.
21. **November 2008** MR Imaging Sciences Applied to Transplantation: An Update. Emory Transplant Center's Noon Symposium, Emory University.
22. **November 2008** Abdominal MRI: State of the Art. CME Activity for Northeast Georgia Health System, Inc. Gainesville, Georgia.
23. **December 2008** Deleterious Effects of Radiation Exposure. Advances in Urology 2008, Emory University School of Medicine, Dept. of Urology, Atlanta, GA.
24. **March 2009** Radiology Research Conference. MRI Developments in Liver Imaging Related to Transplantation. Emory University.
25. **March 2009** Whole Body MRI: From bench to bedside. Undergraduate Lecturer for Biomedical Engineering Department, Georgia Tech, Atlanta, GA.
26. **May 2009** Hepatitis C – Liver Related Hepatocellular Carcinoma. CME Presentation for Northeast Georgia Health Systems, Gainesville, Georgia.
27. **May 2009** Siemens – Body MRI and MRA. MR Protocols Meeting and Content Development Meeting. Coral Gables, Florida.
28. **June 2009** Body MRI: Update on Technology and Evolving Applications. Invited Professor, University of Wisconsin.
29. **June 2009** MRI of the Bowel: Detection and Measurement of Inflammation. Invited Professor, University of Wisconsin.
30. **September 2009** Body MRI: Introduction to the techniques and approach to interpretation. Noon Conference, Emory University.
31. **September 2009** MRI Safety. Noon Conference, Emory University.
32. **October 2009** Update on Hepatic Markers of Disease: Lipogenesis Quantified on MRI/MRS. Research in Progress Seminar, Emory University.
33. **December 2009** Clinically important liver lesions commonly unrecognized: Specific diagnosis on MRI. University of California, San Diego.
34. **December 2009** Body MRI evolving technical developments and automation steps. California Medical Society, San Diego. CME.

35. **December 2009** Use of MRI for early detection of end-organ disease markers of the metabolic syndrome. Department of Cardiology, Emory University. CME.
36. **December 2009** Metabolic Syndrome: End-organ disease detected and measured on MRI. Clinical Cardiology conference. Emory University.
37. **January 2010** Liver Function Measured on MRI. Research In Progress Seminar, Emory University.
38. **March 2010** MR Imaging of the Transplant Kidney Structure and Function: An Update. Emory Transplant Center Noon Conference. Emory University.
39. **January 2011** Gastrointestinal MRI: An extension to the internal exam and the virtual biopsy. GI Grand Rounds. Emory University.
40. **February 2011** Strategies to Reduce Radiation Exposure from Medical Imaging. GUA 2011 Annual Spring Meeting, Greensboro, GA.
41. **March 2011** Dynamic MRI Imaging. Advances in the Diagnosis and Treatment of GERD and GI Motility Disorders. Atlanta, GA.

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