Ultra High Field (7T) MRI captures new microstructural details including cortical fiber patterns and the geometry of tissue compartments.

Acknowledgements: Christoph W. Leuze, Qiyuan Tian, Grant K. Yang, Jennifer A. McNab

Cover

“This three year old child with repaired congenital heart disease travelled from the east coast to Stanford specifically to have a cardiac MRI. We have developed and validated an unprecedented fast method to comprehensively assess anatomy, blood flow and heart function in under 10 minutes. This Stanford Radiology method permitted determination of blood flows to various regions of the lungs, which is not otherwise possible by MRI. The exam confirmed a good surgical result, with open blood vessels and flow to all portions of the lungs. The fast technique allowed us to redesign the entire imaging pipeline, from data acquisition to image reconstruction and image post-processing.”

-Shreyas Vasanawala, MD, PhD

Contents

Letter from the Chair 2
Associate Chairs and Section Chiefs 6
Faculty Roster 8
New Faculty Appointments 12
  Retirements 24
  Departures 25
  Faculty Leadership Announcement 26
  Faculty Honors and Awards 26
  Radiology Family Photo Album 28
  Radiology Babies 32
New Major Equipment 34
Stanford Medicine Expansion 36
Performance Improvement 37
Translational Research 38
  Chronic Fatigue Syndrome 40
  MR guided-Focused Ultrasound (MRgFUS) 42
  Transforming Cardiac MRI 44
  Point-of-Care Diagnostics 46
Training Programs 48
  Radiology Residency Graduates 50
  Graduating Fellows 51
  Graduating PhDs 56
  Incoming Residents - Class of 2016 58
  Radiology Residents 2015-16 58
  Clinical Fellows 2015-16 59
  Radiology Training Programs 60
  Trainees and Visiting Scholars 62
  Trainee Honors and Awards 64
Clinical Sections 66
Research Sections 74
  Canary Center at Stanford 76
  Integrative Biomedical Imaging Informatics at Stanford 80
  Molecular Imaging Program at Stanford 84
  Radiological Sciences Laboratory 92
Sponsored Research 100
Radiology Summary Statistics 108

This Page

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From the Chairman

“ We continue to expand both clinically and academically with enormous potential for making a great impact in precision health.”

SANJIV SAM GAMBHIR, MD, PHD

IT IS NOW 4 YEARS since I began my role as Chair of the Department of Radiology and I continue to remain blessed with the support of so many faculty, staff, and trainees both in our Department and at Stanford University as a whole. In my last message to you through the previous Annual Report, we shared examples of the Department of Radiology’s successes and growth in multiple new areas of clinical and research expansion. Since that time, the continued growth and expansion of our work has fully exceeded our most optimistic expectations.

With a truly outstanding group of faculty, staff, and trainees, we continue to push the boundaries of what the field of Radiology will become in the years ahead. “Science without Borders” will continue to be a key theme during my chairmanship. Over the past four years, we have made tremendous strides in this direction by creating significant bridges to scientific and clinical activities throughout the medical school, affiliated hospitals, and across the Stanford campus.

We continue to pursue some key research areas that we believe will be important to health care in the long-term. These include: 1) Early disease detection as one of our strategies for moving from precision medicine towards precision health e.g., lung cancer early screening, wearable sensors for continuous monitoring, 2) Theranostics through the use of technologies such as MR-high intensity focused ultrasound (MR-HIFU) as well as through radiochemistry with imaging agents that serve both as diagnostics and therapeutics. 3) Multimodality imaging through strategies that combine the best of what each modality has to offer e.g., MR + PET, ultrasound + photoacoustics. 4) Bringing together in vitro diagnostics with in vivo diagnostics for improved patient care (e.g., lung cancer detection and management through the use of CT, PET-CT, and circulating tumor cells). 5) Expansion of clinical trials to bring new instrumentation and new imaging agents to the clinic. 6) Digital breast tomosynthesis or 3D mammography for more accurate breast imaging. 7) Improved strategies for pediatric oncologic imaging including PET-MR that may reduce radiation relative to PET-CT while still providing similar accuracy. 8) Novel strategies for improving cardiovascular imaging including 4D visualization and 3D presentation for better patient care. 9) Imaging informatics for extracting more useful information from medical images as well as combining information from different disciplines e.g., genomics, pathology, and radiology. 10) Planning for upgrading our RIS and PACS in 2016 so that we can keep our clinical imaging informatics state-of-the-art. 11) Efforts to improve delivery of care through process re-engineering to improve quality of care in our imaging centers. 12) Nurturing of start-up companies to help push academic discoveries and research to the private sector creating jobs and eventually allowing strategies pioneered at Stanford to be made available worldwide.

With the opening of many new clinical and research facilities, we have increased our footprint significantly. For clinical space, faculty and staff are working hard on readying both the children’s and adult hospitals to open in 2017 and 2018 respectively. A significant amount of planning for staffing and new equipment has already taken place. 1) In October 2015, we opened a patient-centric radiology facility in the new Stanford Cancer Center South Bay, part of the Cancer Center expansion; 2) In November 2015, we will open a new Neuroradiology Imaging Center in the Stanford Neuroscience Health Center, Hoover 2, to complement the expansion in clinical neurology/neurosurgery; 3) The Breast Imaging Clinic in the Cancer Center will also undergo a much needed expansion; and 4) We are actively planning for staffing centers and placing imaging equipment in the East Bay including a multi-specialty office building in Emeryville and Valley Care Hospital. In research space, we recently completed renovations in the Lucas Center to make way for the first time-of-flight PET-MR system anywhere in the world. In addition to the PET-MR system, we recently installed a new clinical hyperpolarizer system to allow for high-sensitivity imaging with MR using hyperpolarized molecular imaging agents. Renovation of the SHC Film Library is complete and now provides the much needed workspace for clinical faculty and administrative staff. We recently completed renovation of the Grant Building basement that has long been home to many faculty and administrative staff. A ribbon cutting ceremony will celebrate the new Grant and Library spaces in late 2015.

Regarding research space, in July 2013 we completed construction of new facilities on Porter Avenue as part of the Technology & Innovation (TNI) Park where we have ~40,000 net square feet of dry and wet research space. This facility includes state-of-the-art chemistry space and a small animal imaging facility. We received an 11.7T small animal MR as a gift from Agilent that will soon be installed at the TNI. This growth is the largest research space expansion in the history of our Department. The Department of Genetics is also housed there and this co-habitation is resulting in many new exciting opportunities combining the best of genomics and imaging.
2014-15

The growth in our faculty has brought in spectacular recent recruits. We are pleased to welcome twenty-four new faculty, twelve adjunct or affiliated faculty, two courtesy appointments, and one consulting faculty. Each one of our new faculty additions not only fills a critical gap in a specific area in the department, but also brings fresh energy and excitement to the team. Please see pages 12-23 for information about the new hires—keep an eye out for them and welcome them to our Radiology family.

Several new leadership transitions have occurred: (i) Drs. Greg Zaharchuk and Andrei Iagaru have done a terrific job helping to launch the new PET-MR research program. Dr. Garry Gold, in addition to continuing his critical role as the Associate Chair for Research, will join Dr. Andrei Iagaru to co-lead the PET-MR program as Dr. Zaharchuk transitions out of this role. (ii) Dr. Max Wintermark was appointed Section Chief of Neuroradiology and has done a terrific job expanding the Neuroradiology footprint. (iii) Dr. Payam Massaband, who has been acting Chief of the Palo Alto VA Radiology Department, was recently named as the new Radiology Residency Program Director following the successful leadership of Dr. Terry Dessert since 2004. Several new Associate Directors will join him soon to help our Radiology Residency training program continue to evolve. (iv) We also have begun to combine the Nuclear Medicine and Radiology residencies through a unique track to train the next generation of academic leaders. (v) Regarding our research successes, and according to the most recent data published by the Academy of Radiology Research in 2014, we continue to be among the top NIH-funded Radiology Departments in the country, and the highest NIH-funded per capita of all Radiology Departments in the USA. Overall research funding is strong with an increase in total funding from 2013-15 of 16%. New NIH projects for 2015 include: eight R01s, four R21s, one T32, one U54 and one P41 as of August 15, 2015. Industrial collaborations also continue to grow and have resulted in more than 20 new awards during 2015, many of which have brought in funding for our clinical trials research program that is significantly bolstered by the introduction of focused ultrasound and PET-MR capabilities. In addition, our success with non-profit and foundation sponsors remains strong with more than 10 new projects funded during 2015.

The Stanford Department of Radiology reflects new and broader interests that are underscored by our successes and collaborations in multiple areas, including physics, chemistry, molecular biology, mathematics, materials science, engineering, genetics, bioinformatics, epidemiology, structural biology, and neuroscience. The original notion of a Radiology department as an “x-ray department” still exists but no longer represents a complete picture of today’s ever-changing imaging department. The broad reach of imaging sciences in health care has given new meaning, new career paths, and new excitement to the field of Radiology.

Through our efforts with the Canary Foundation, we continue to build bridges with the local community, including the annual Canary Challenge bike ride, a prime example of our success in community engagement. This annual event, now in its 5th year, was again tremendously successful with about 1000 riders who raised more than $1M in support of cancer research and early detection.

All of the great progress in our Department is due to the commitment of our highly dedicated faculty and staff. I especially want to thank all of our Section Chiefs and Vice/Associate Chairs for their tremendous efforts and their continued support. It is my pleasure to learn from them each day and to benefit from their great collective wisdom, enthusiasm, and support.

Sanjiv Sam Gambhir M.D., Ph.D.
Virginia and D. K. Ludwig Professor of Cancer Research Chair, Department of Radiology
### Associate Chairs and Section Chiefs

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Sanjiv Sam Gambhir, MD, PhD</td>
<td>Chair, Department of Radiology Director, Molecular Imaging Program at Stanford Director, Canary Center at Stanford for Cancer Early Detection</td>
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<tr>
<td>Curtis Langlotz, MD, PhD</td>
<td>Associate Chair, Information Systems</td>
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<tr>
<td>R. Brooke Jeffrey, MD</td>
<td>Vice Chairman, Associate Chair, Academic Affairs</td>
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<tr>
<td>Richard Barth, MD</td>
<td>Associate Chair, Radiology Radiologist-in-Chief, LPCH Section Chief, Pediatric Imaging</td>
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<tr>
<td>Michael Federle, MD</td>
<td>Associate Chair, Education</td>
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<tr>
<td>Garry Gold, MD</td>
<td>Associate Chair, Research</td>
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<tr>
<td>Robert Herfkens, MD</td>
<td>Associate Chair, Clinical Technology</td>
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<tr>
<td>Lawrence “Rusty” Hofmann, MD</td>
<td>Section Chief, Interventional Radiology</td>
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<tr>
<td>Andrei Iagaru, MD</td>
<td>Co-Section Chief, Nuclear Medicine and Molecular Imaging Nuclear Medicine Residency Program Director</td>
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<tr>
<td>Debra Ikeda, MD</td>
<td>Section Chief, Breast Imaging</td>
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<tr>
<td>Payam Massaband, MD</td>
<td>Acting Section Chief, VA Palo Alto Radiology Residency Program Director</td>
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<td>Max Wintermark, MD, MAS, MBA</td>
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<td>Juergen Wilmann, MD</td>
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Radiology Annual Report 2014-15
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- Sandip Rowal, MD, Associate Professor
- Bryan Chan, MD, Adjunct Clinical Instructor
- Wilson M. Chang, MD, PhD, Adjunct Clinical Instructor
- Bao Do, MD, Adjunct Clinical Assistant Professor
- Gary Gold, MD, Professor

### Neuroimaging & Neurointervention
- Patrick Barnes, MD, Professor
- Michael Brant-Zawadzki, MD, Adjunct Clinical Professor
- Jenny Hu, Xia Chen, MD, Adjunct Clinical Instructor
- Huy Do, MD, MBA, Professor

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- Halwel Henry Guo, MD, PhD, Clinical Assistant Professor
- Andrei Iagaru, MD, Associate Professor
- John Jordan, MD, Adjunct Clinical Professor
- Christine Kim, MD, Clinical Instructor
- Shinha Komukula, MBBS, Adjunct Clinical Assistant Professor
- Edward Lebowitz, MD, Clinical Professor
- Conway Lien, MD, Adjunct Clinical Instructor
- Michael Marks, MD, Professor
- Tasik Massoud, MD, PhD, Professor
- Lex Mitchell, MD, Adjunct Clinical Instructor
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- Zina Payman, MD, Clinical Assistant Professor
- Sophia Simko, MD, Adjunct Clinical Assistant Professor
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- Eric Tranvith, MD, Clinical Instructor

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- Richard Barth, MD, Professor
- Francis Blankenberg, MD, Associate Professor
- Frankics Chan, MD, PhD, Associate Professor
- Jeremy Dahl, MD, Assistant Professor
- Bo Yoon Ha, MD, Clinical Assistant Professor
- Heike Daldrup-Link, MD, Associate Professor
- Peter Kane, MD, Clinical Professor
- Ralph Lachman, MD, Clinical Professor
- David B. Larson, MD, Associate Professor
- Andrew Quon, MD, Associate Professor
- Matthew Lungen, MD, Assistant Professor
- Peter Moskwitz, MD, Emeritus
- Beverley Newman, MB, BCh, Consulting Professor
- Aaron Potrick, MD, Adjunct Clinical Instructor
- Hari Ringertz, MD, PhD, Consulting Professor
- Enli Rubasova, MD, Clinical Associate Professor
- Matthew Schmitz, MD, Adjunct Clinical Instructor

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- Roland Bammer, PhD, Associate Professor
- Jeremy Dahl, MD, Assistant Professor
- Anandhulli Ganguly, PhD, Consulting Assistant Professor
- Gary Glover, PhD, Professor
- Brian Hargreaves, PhD, Associate Professor
- Shao-ying Lee, PhD, Consulting Assistant Professor
- Jennifer McNab, PhD, Assistant Professor
- Karen Mueller, PhD, Instructor
- Michael Moseley, PhD, Professor
- Kim Butts Pauly, PhD, Professor
- Norbert Pelc, ScD, Professor
- Alan Reiss, MD, Professor
- Brian Rutt, PhD, Professor
- Daniel Spielman, PhD, Professor

### VA Radiology
- Bao Do, MD, Clinical Assistant Professor (Affiliated)
- Lewis Shin, MD, Assistant Professor
- Ali Tahvildari, MD, Clinical Instructor
- Eric Tranvith, MD, Clinical Instructor
- Katherine To’a, MD, Clinical Assistant Professor
- Ashwini Zenooz, MD, Clinical Assistant Professor

### VA Nuclear Medicine
- Christine A. Keeling, MBBS, Clinical Associate Professor
- George Segall, MD, Professor
- Daniel Spielman, PhD, Professor
- Ashwini Zenooz, MD, Clinical Assistant Professor

### Thoracic Imaging
- Anne Chin, MD, Adjunct Clinical Assistant Professor
- Halwel Henry Guo, MD, PhD, Clinical Assistant Professor
- Charles T. Lou, MD, MBA, Clinical Assistant Professor
- Kristin Yeom, MD, Assistant Professor
New Faculty Appointments

Hans-Christoph Becker, MD | Cardiovascular Imaging 2014

Dr. Hans-Christoph Becker (“Christoph”) joined our department as Professor of Radiology (2014). Dr. Becker was previously Professor of Radiology and Section Chief of Body CT and PET in the Department of Clinical Radiology at University Hospital of Grosshadern, Ludwig-Maximilians-University Munich, Germany. He is a world-renowned expert and pioneer of cardiac CT with a specific focus on noninvasive cardiac imaging. He managed the CT radiology research facility with more than 90 active clinical trials. His primary research is focused on cardiac CT (including perfusion), rotating C-arm CT for intervention, phase IV clinical contrast media studies and radiation protection. Dr. Becker is a great fit for our needs in the CV Imaging Section. His additional expertise in clinical trials and oncologic imaging is an added benefit to our department.

Jeremy Dahl, PhD | Pediatric Imaging and RSL 2014

Dr. Jeremy Dahl joined our department as Assistant Professor of Radiology August 1, 2014. Dr. Dahl was most recently an Assistant Research Professor in the Department of Biomedical Engineering at Duke University. He received his undergraduate degree in Electrical Engineering from University of Cincinnati in 1999 and his PhD in Biomedical Engineering at Duke in 2004. Dr. Dahl’s research interest is in diagnostic ultrasound imaging. He is PI on two active NIH R01 grants and was Co-PI on a Coulter Foundation grant and PI on an NH R21. He will be applying his unique knowledge to build bridges between the basic sciences and clinical pediatric imaging, as well as other areas of biomedical imaging (e.g., body imaging, molecular imaging, interventional radiology).

Utkan Demirci, PhD | Canary Center 2014

Dr. Utkan Demirci joined our department as an Associate Professor of Radiology with tenure at the Canary Center in 2014. Prior to his Stanford appointment, he was an Associate Professor of Medicine at Brigham and Women’s Hospital, Harvard Medical School, Harvard-MIT Division of Health Sciences and Technology. He leads a group of 20+ researchers focusing on micro- and nano-scale technologies. He received his BS degree in Electrical Engineering in 1999 as a James B. Angell Scholar (summa cum laude) from University of Michigan, Ann Arbor. He received his masters in Electrical Engineering (2001), his masters in Management Science and Engineering (2005), and his PhD in Electrical Engineering (2005), all from Stanford University.

Curtis Langlotz, MD, PhD | IBIIS and BMIR 2014

Dr. Curtis Langlotz joined our department in 2014 as Professor of Radiology and Associate Chair for Information Systems. In addition to his Radiology appointment, Dr. Langlotz has a secondary appointment with the Stanford Center for Biomedical Informatics Research in the Department of Medicine. Dr. Langlotz has led many national and international efforts to improve the quality of radiology reports, including the RadLex terminology standard, the RadLex Playbook of radiology exam codes, and the report template library of the Radiological Society of North America. He was previously Professor and Vice Chair of Informatics in the Department of Radiology at the University of Pennsylvania. He received his undergraduate degree (1981) in Human Biology, masters in Computer Science (1983), MD (1989), and PhD in Medical Information Science (1989), all from Stanford University.
New Faculty Appointments

David Larson, MD, MBA | Pediatric Imaging 2013

Dr. David Larson joined our department as Associate Professor of Radiology and Associate Chair of Performance Improvement (2013). Dr. Larson previously was Assistant Professor and the Janet L. Stittle Chair for Quality Improvement and Safety in Radiology at Cincinnati Children’s Hospital, Cincinnati, Ohio. Dr. Larson completed his undergraduate degree in Mechanical Engineering at Brigham Young University (1997) and joint MD/MBA degrees at Yale (2002). He completed his residency in diagnostic radiology (2007) and pediatric radiology fellowship (2008) at the University of Colorado. At Cincinnati Children’s, he developed an automated system for CT radiation dose monitoring and optimization. Dr. Larson works closely with faculty, staff, and administration to improve performance at SHC and LPCH and co-directs the Clinical Effectiveness Leadership Training course at Stanford School of Medicine.

Matthew Lungren, MD, MPH | Pediatric IR Imaging 2014

Dr. Matthew Lungren received his BA degree, magna cum laude, in English Literature and BS degree in Biology from Arizona State University in 2002. He went on to University of Michigan Medical School where he graduated cum laude and AOA in 2007, also receiving the University’s radiology outstanding scholar award. He completed a transitional internship at Oakwood Hospital, Dearborn MI, 2007-2008, and completed his radiology residency at Duke University 2008-12 where he was chief resident. He completed a one year adult IR fellowship at Duke University in 2012-2013 and received his MPH from the University of North Carolina Gillings School of Global Public Health in 2014. Dr. Lungren joined our faculty following a one year fellowship in pediatric radiology and pediatric interventional radiology at Cincinnati Children’s Hospital.

Andreas Loening, MD, PhD | Body Imaging/Body MRI 2015

Dr. Andreas Loening joined our department in 2015 as an Assistant Professor. He was previously a Clinical Instructor in our Body MRI and Body Imaging sections, a position he held for almost a year. Dr. Loening received his BS degree (1998) and M. Eng. degree (1999) from MIT in Electrical Engineering. He enrolled in the UCLA Medical Scientist Training Program in 1999, and transferred to Stanford in 2003 where he completed his PhD in Bioengineering (2006) and his MD (2008). He completed a transitional internship at the University of Hawaii from 2008 to 2009, followed by radiology residency and then Body MRI fellowship, both at Stanford, from 2009 to 2014.

H. Tom Soh, PhD | Canary Center 2015

Dr. H. Tom Soh joined our department as Professor of Radiology and Electrical Engineering (dual appointments). Previously, he was the Ruth Garland Endowed Chair of Materials and Mechanical Engineering at UCSC. Dr. Soh received his BS with a double major in Mechanical Engineering and Materials Science with distinction from Cornell University (1992), and his MS & PhD (1997) degrees in Electrical Engineering from Stanford. Among many honors, he is a John Simon Guggenheim Fellow (2010), Alexander von Humboldt Fellow (2012) and a Fellow of the American Institute for Medical and Biological Engineering (2015).
Max Wintermark MD, MAS, MBA  |  Neuroimaging & Neurointervention 2014

Dr. Max Wintermark joined our department as Professor of Radiology and section chief of Neuroimaging & Neurointervention, effective August 1, 2014. He was previously Associate Professor of Radiology at the University of Virginia where he also served as the section chief of Neuroradiology. Dr. Wintermark is the chair of the research committees of the American Society of Neuroradiology (ASNR) and of the American Society of Functional Neuroradiology (ASFNR). Dr. Wintermark also serves as the chair of the ACRIN neuro committee, the chair of the imaging core of the NINDS-funded StrokeNet clinical trial network and the co-chair of the Stroke Imaging Research (STIR) group. Dr. Wintermark has a specific interest and expertise in stroke, traumatic brain injury, epilepsy, movement disorders and psychiatric disorders.

Avnesh Thakor, MD, PhD  |  Pediatric/Adult Interventional 2015

Dr. Avnesh Thakor joined our department in 2015 as Assistant Professor of Radiology. Prior to joining, he completed both a Pediatric Interventional Radiology fellowship at SickKids Hospital, Canada (2014-2015) and an Adult Interventional Radiology Fellowship at Vancouver General Hospital, Canada (2013-2014). Dr. Thakor received his BA (2001) and a combined MBBSCh, PhD degree (2006), all from Cambridge University, UK. Following training, Dr. Thakor completed an internship in general medicine/surgery, a radiology residency, and an Interventional Radiology Fellowship at Cambridge University (2006-2013). He also earned a MA, an MSc degree in Cancer Therapeutics from the University of London (2010) and a research MD degree (2013) from Cambridge University which was combined with post-doctoral research at MIFS, Stanford University.

Audra Brunelle, MD  |  Breast Imaging 2015

Dr. Audra Brunelle joined the department as a Clinical Instructor of Breast Imaging effective July 1, 2015. She received her MD from Indiana University School of Medicine in 2009 where she also completed her residency in 2014. She completed her fellowship from the University of California San Francisco.

Joan Cheng, MD  |  Body Imaging 2015

Dr. Joan Cheng joined the department in 2015 as a Clinical Instructor within the Body Imaging Section. In 2006, she received her MD from the University of Michigan Medical School and went to New York Medical College for her Internship (2007). In 2012 Dr. Cheng completed her residency at Columbia University Medical Center followed by fellowships at the Dana Farber Cancer Institute in 2013 and the Boston Medical Center in 2014.

Safwan Halabi, MD  |  Pediatric Imaging 2015

Dr. Safwan Halabi joined the department as a Clinical Assistant Professor of Pediatric Imaging in 2015. He was also named the Pediatric Radiology Informatics Director at Lucile Packard Children’s Hospital. Dr. Halabi received his MD from the University of Toledo, College of Medicine in 2001; completed an internship and residency at the Henry Ford Health System in Michigan; and completed a pediatric imaging fellowship in 2007 at the Cincinnati Children’s Hospital and Medical Center. With a clinical focus in fetal and perinatal Imaging, Dr. Halabi also joins the fetal imaging group at the Perinatal Diagnostic Center. His research interests in data mining, outcomes, patient-centric care, and clinical decision support will fill a significant need in the department and at LPCH.
New CE and Instructor Appointments

Jeremy Heit, MD, PhD | Neuroimaging & Neurointervention 2015

Dr. Jeremy Heit joined the department in 2015 as a Clinical Instructor of Neuroimaging & Neurointervention. He specializes in treating stroke, brain aneurysms, brain arteriovenous malformations, brain and spinal dural arteriovenous fistulae, carotid artery stenosis, vertebral body compression fractures, and congenital vascular malformations. Dr. Heit received his PhD in Developmental Biology from Stanford in 2007 and his MD in 2008. He completed residency training at Massachusetts General Hospital before returning to Stanford where he completed his fellowship in neurointerventional radiology.

Michael Iv, MD | Neuroimaging & Neurointervention 2013

Dr. Michael Iv joined the department in 2013 as a Clinical Instructor and was promoted in 2015 to Clinical Assistant Professor of Neuroimaging & Neurointervention. He specializes in advanced diagnostic imaging of the brain, spine, and head and neck with clinical and research interests in vascular and brain tumor imaging. Dr. Iv received his MD from UCLA in 2006. He then completed residency training at Santa Clara Valley Medical Center in 2011 and subsequent neuroimaging fellowship at Stanford in 2013.

Michelle James, PhD | Molecular Imaging Program 2013

In 2013, Dr. Michelle James joined the department as an Instructor within the Molecular Imaging Program at Stanford. Prior to coming to Stanford she attended the University of Sydney receiving her BS in Pharmacology/Medicinal Chemistry (2004) and her PhD in Pharmacology/Radiochemistry.

Christine Kim, MD | Neuroimaging & Neurointervention 2015

Dr. Christine Kim joined the department in 2015 as a Clinical Instructor of Neuroimaging & Neurointervention. She received her MD in 2007 and completed residency training at the University of Connecticut in 2009. Following residency training, Dr. Kim completed a fellowship in interventional radiology at the University of Washington Medical Center (2013), followed by a neuroradiology fellowship at Stanford (2015).

Sri-Rajasekhar Kothapalli, PhD | Molecular Imaging Program 2014

Dr. Sri-Rajasekhar (Raj) Kothapalli joined the department in March 2014 as an Instructor in the Molecular Imaging Program at Stanford. Dr. Kothapalli completed his masters in applied physics at the University of Massachusetts followed by graduate work at Washington University in St. Louis where he received his PhD in 2009. As a postdoc at Stanford, mentored by Dr. Sanjiv Gambhir, he developed and translated a novel transrectal ultrasound and photoacoustic imaging system for prostate cancer screening, collaborating with Dr. Khur-Yakub (Electrical Engineering) and Drs. James Brooks and Joe Liao (Urology). His current research work focuses on dual modality ultrasound and photoacoustic imaging systems for other clinical and pre-clinical applications.

Kerstin Müeller, PhD | Radiological Sciences Laboratory 2015

Dr. Kerstin Müeller joined the department in 2015 as an Instructor in the Radiological Sciences Lab. She received her diploma degree in Electrical-Electronic Communication Engineering in 2010 and her doctoral degree in medical imaging in 2014 from the Friedrich-Alexander-Universität Erlangen-Nürnberg. Dr. Müeller’s PhD project focused on motion estimation and compensation of cardiac chambers in interventional radiology, which provided strong collaboration opportunities with the Siemens Healthcare GmbH, Forchheim.
New CE and Instructor Appointments

Viswam Nair, MD, MS | Molecular Imaging Program 2014

Dr. Viswam Nair joined the department in 2014 as an Instructor within the Molecular Imaging Program at Stanford. He is Co-Director of the Lung Stanford Nodule Assessment Program (2013) and Assistant Director for the Lung Cancer Screening Program (2014). Dr. Nair received his BA in Chemistry from the University of Pennsylvania and his MD from The Ohio State University (2004). He completed his fellowship in Pulmonary & Critical Care Medicine (2010) at Stanford Hospital and a Master’s degree in Epidemiology at Stanford University (2011).

Seung-min Park, PhD | Molecular Imaging Program 2014

Dr. Seung-min Park joined the department in 2014 as an Instructor within the Molecular Imaging Program at Stanford. He received his PhD in Applied Physics at Cornell University (2008), completed his postdoctoral training in Bioengineering at UC Berkeley (2014), and served as a Visiting Scholar in MIPS (2013-14). Dr. Park’s research focuses on cancer diagnostics via liquid biopsy and single circulating tumor cell analysis, as a part of the Center for Cancer Nanotechnology Excellence and Translational Diagnostics (CCNE-TD).

Bryan Smith, PhD | Molecular Imaging Program 2015

Dr. Bryan Smith joined the department in 2015 as an Instructor in the Molecular Imaging Program at Stanford. He received his PhD in Biomedical Engineering as an NSF Fellow from The Ohio State University, Columbus, Ohio in 2006. He then joined the MIPS group as a postdoctoral scholar in the Stanford Molecular Imaging Scholars (SMIS) program. Dr. Smith was awarded a Stanford Dean’s Fellowship, and then an NIH K99 Pathway to Independence Award for his work in nanomedicine.

Russell Stewart, MD, MBA | Body Imaging 2015

In 2015, Dr. Russell Stewart joined the department as a Clinical Instructor in Body Imaging. He attended Stanford University as an undergraduate and University of Chicago for his MD and his MBA (2009). Dr. Stewart returned to Stanford in 2010 where he completed his residency and followed up with a fellowship in musculoskeletal radiology.

Eric Tranvinh, MD | Neuroimaging & Neurointervention 2015

Dr. Eric Tranvinh joined the department in 2015 as a Clinical Instructor in Neuroimaging & Neurointervention. He received his MD from the University of Texas Southwestern Medical Center in 2008, completed his residency at University of Texas Health Science Center (2013) and his fellowship at Stanford (2015).
New Courtesy and Consulting Faculty Appointments

Carolyn Bertozzi, PhD | 2015

Dr. Bertozzi recently (April, 2015) joined the Stanford Faculty as the Anne T. and Robert M. Bass Professor in the School of Humanities and Sciences and the new Stanford CHEM-H (Chemistry, Engineering & Medicine for Human Health), the new interdisciplinary institute that brings together chemists, engineers, biologists and clinicians to understand life at a chemical level and apply that knowledge to improving human health. In addition to her role as Professor in the CHEM-H Institute, Dr. Bertozzi also holds a courtesy appointment in the Department of Radiology. Dr. Bertozzi was elected to the National Academy of Sciences in 2005 and named a Fellow of the American Academy of Arts and Sciences in 2010.

Geoffrey Sonn, MD | Molecular Imaging Program 2015

Dr. Geoff Sonn is a urologic oncologist whose clinical practice focuses on patients with prostate and kidney cancer. Dr. Sonn completed his medical training at the David Geffen School of Medicine at UCLA. After medical school, Dr. Sonn completed a six-year urology residency at Stanford followed by two years at UCLA as a urologic oncology fellow. In 2013, Dr. Sonn returned to Stanford as Assistant Professor of Urology. Dr. Sonn’s primary research interest is developing and applying novel imaging techniques to improve the care of patients with urologic cancers. In 2015, Dr. Sonn was appointed Assistant Professor of Radiology (courtesy appointment) and is working primarily with our MIPS and Canary faculty to translate our advanced early detection, treatment, and monitoring approaches into clinical practice.

Vikram S. Bajaj, PhD | Molecular Imaging Program 2014

Dr. Bajaj earned his PhD in physical chemistry at MIT and was a principal investigator at UC Berkeley and the Lawrence Berkeley National Laboratory (LBNL), where he remains an affiliated scientist and advisory board member. He recently joined the Department of Radiology as a Consulting Associate Professor of Radiology (2015). As its lead scientist, Dr. Bajaj directs translational science research teams and programs at Google Life Sciences and works closely with team members here at Stanford and at Duke University. Dr. Bajaj’s research interests in academia, startups, and industry bridge multiple disciplines and include, for example, biomaterials, molecular imaging, nanotechnology, nanoscale NMR and MRI, microfluidic NMR, dynamic nuclear polarization and structural biology.

New Adjunct/Affiliated Appointments

Breast Imaging
Long Ngoc Trinh, MD
Clinical Instructor (Affiliated), 2014

Interventional Radiology
Christopher Takehana, MD
Clinical Instructor (Affiliated), 2015

Musculoskeletal Imaging
Patrick Lee, MD
Veterans Affairs
Adjunct Clinical Assistant Professor, 2015

Michelle M. Nguyen, MD
Veterans Affairs
Clinical Assistant Professor (Affiliated), 2014

David Sandman, MD
Veterans Affairs
Adjunct Clinical Assistant Professor, 2015

Sabrina Ward, MD
Adjunct Clinical Instructor, 2015

Evan Zucker, MD
Adjunct Clinical Instructor, 2015

Neuroimaging and Neurointervention
Mircea C. Dobre, MD
Adjunct Clinical Instructor, 2015

Cam Tran, MD
Adjunct Clinical Instructor, 2015

Pediatric Imaging
Aaron Potnick, MD
Adjunct Clinical Instructor, 2015

Matthew Schmitz, MD
Adjunct Clinical Instructor, 2015

Evan Zucker, MD
Adjunct Clinical Instructor, 2015

Thoracic Imaging
Charles T. Lau, MD, MBA
Veterans Affairs
Clinical Assistant Professor (Affiliated), 2015
Faculty Retirements

Philip Kivitz, MD | Years of Service 1986 - 2014

Dr. Philip Kivitz (October 24, 2014) received his MD from Hahnemann University in Philadelphia and served in the US Navy for 3 years before completing his radiology residency at Mount Zion Hospital & Medical Center in San Francisco. He joined Stanford Radiology in 1986. During his career, Dr. Kivitz founded and served as Medical Director of the Breast Evaluation Center in San Francisco from 1980-1992. He also served on the boards of the Northern California Cancer Center and the Susan G. Komen for the Cure - San Francisco Chapter and has been a senior reviewer and site inspecyor for the American College of Radiology (ACR), which administers the Mammography Quality Standards Act (MQSA) for the FDA.

Robert Mindelzun, MD | Years of Service 1990 - 2014

Dr. Robert E. Mindelzun (April 30, 2014) completed his radiology residency at Albert Einstein College. He was appointed Chief of the Department of Radiology of the Naval Hospital in Yokosuka, Japan (1969-72). He arrived in California in 1972 to work as a radiologist at Menlo Clinic and eventually became chief of radiology at Santa Clara Valley Medical Center (1974-1990). He joined Stanford in 1990 and was promoted to Full Professor in 2000. Dr. Mindelzun has been recalled for clinical service on many occasions since 2006 and confirmed retirement in 2014. During his career, Dr. Mindelzun has been honored as the Teacher of the Year 4 times (1977, 1984, 1991, and 1998).

William Northway, MD | Years of Service 1964 - 2014

Dr. William W. Northway (January 31, 2014) joined Stanford in 1964 as an Instructor, and was promoted to full Professor in 1977. He served as chief of Pediatric Radiology from 1994-1998 and “retired” in 1998. He has been recalled every year since 1999 and finally completely retired in January, 2014. We are truly grateful to Dr. Northway, whose research has changed the way premature babies with lung disease are treated worldwide. In recognition of his service and ability to weave research, patient care, and teaching together, the Stanford Medical Center Alumni Association honored Dr. Northway with the prestigious J.E. Wallace Sterling “Muleshoe” Lifetime Achievement Award in May, 2005.

Faculty Departures

Keren Baron, MD
Adjunct Clinical Instructor
Breast/Body 2014
Now at Madison AVE
Women’s Hospital, New York

Rebecca Fahrig, PhD
Professor, RSL 2015
Now Head of Innovations, Angiography X-ray Division, Siemens Healthcare

Klaus Hambuechen, Dipl. Ing.
Consulting Professor, 2014, Now Retired

Albert Hsiao, MD, PhD
Clinical Instructor
CV Imaging 2014
Now an Asst Professor of Radiology at UCSD

Jesse Jokerst, PhD
Instructor, MIPS 2015
Now an Asst Professor of NanoEngineering at UCSD

Kendra Kiang, MD
Clinical Instructor (Affiliated)
VAPAHCS 2014

David Park, PhD
Assistant Professor 2014
Now Director Imaging Science at Bellwether Imaging, Inc.

Dorcas Yao, MD
Clinical Associate Professor (Affiliated)
VAPAHCS 2014
Now Chief, Purchased Care; Deputy Associate Chief of Staff, Administrative Medicine Service, Phoenix VA Health Care System, AZ
Faculty Honors and Awards (continued)

Sanjiv Gambhir, MD, PhD 2014 Named Fellow of American Association for the Advancement of Science (AAAS)
2015 J. Allyn Taylor International Prize in Medicine
2015 Stanford Biodesign Leadership Award of the Innovation Fellowship Program
2015 SNMMI Peter E. Volk, MD, Memorial Lectureship Award (PET Center of Excellence Award)
2015 Named President-Elect of WMIS for 2017

Gary Gleave, PhD 2014 Academy of Radiology Research Distinguished Investigator

Gary Gold, MD 2015 Stanford Biodesign Leadership Award of the Innovation Fellowship Program
2015 Elected Vice President of ISMRM

H. Henry Guo, MD, PhD 2014 Department Junior Faculty Teaching Award

Brian Hargreaves, PhD 2015 Stanford Biodesign Mentorship Award of the Innovation Fellowship Program

Andrei Iagaru, MD 2015 Elected to Membership on Board of American Board of Nuclear Medicine

Michelle James, PhD 2014 First Prize at INMiND TSPO Symposium
2015 SNMMI Alavi Mandell Award for “Evaluation of Sigma-1 Receptor Radioligand [18F]FTC-146 in Rats and Squirrel Monkeys using Positron Emission Tomography”

R. Brooke Jeffrey, MD 2015 Received Society of Abdominal Radiology Lifetime Achievement Award

David Larson, MD, MBA 2014 Received RSNA Honored Educator Award

Charles Lou, MD, MBA 2015 Department Junior Faculty Teaching Award

Iain Ross McDougall, MD, PhD 2014 Received the Light of Life Award

Michael Mosesley, PhD 2015 Distinguished Investigator Award (Academy of Radiology Research)

Norbert Pec, ScD 2014 Elected as AIMBE Director At-Large
2014 Academy of Radiology Research Distinguished Investigator
2014 Named Ram and Yugi Shriram Chair of Bioengineering
2015 Named Outstanding Inventor by Stanford University

Sylvia Plevritis, PhD 2014 Elected to the AIMBE College of Fellows

Rajesh Shah, MD 2015 Stanford Biodesign Mentorship Award of the Innovation Fellowship Program

Sheyam Vasavada, MD, PhD 2015 Stanford Biodesign Mentorship Award of the Innovation Fellowship Program

Joseph Wu, MD, PhD 2014 Academy of Radiology Research Distinguished Investigator
2014 Elected as Council Member for American Society Clinical Investigation (ASCI)
2015 Elected to American Association of Physicians (AAP)
2015 Associate Editor of Circulation Research

Kristen Yeom, MD 2015 “MRI Surrogates for Molecular Subgroups of Medulloblastoma” nominated for Lucien Levy Best Research Article Award of the American Journal of Neuroradiology
Radiology Family Photo Album

2015 Annual Welcome Party
2014 WMIC
2014 CMC
2014 New Year Party
2013 RSNA
2015 SNMMI
2014 RSNA
2015 Radiology Graduation
Urvi Vyas, PhD shares her work with Vice President Joe Biden
2015 Radiology Graduation
2014 RSNA
2015 Welcome Party
2014 RSNA
2015 Radiology Graduation
2014-15 Radiology Babies

Andrew Quon, MD
Associate Professor
Casey
7-27-2015

Bradford Harrold
MRI Technologist
Makerae Mae Harrold
4-30-2015

David Russell’s Granddaughter
Facilities Manager
Halley Kipnis
2-13-2015

Michele & Jason Smith
Both MRI Technologists
Madison Avery
12-23-2014

Meng Gu, PhD
Research Associate, Spielman Group
Albert Gu
7-11-2015

Andrea Tichy, PhD
Industry Collaborations Manager
Lauren
2-14-2015

Michele & Jason Smith
Both MRI Technologists
Madison Avery
12-23-2014

Andrea Tichy, PhD
Industry Collaborations Manager
Lauren
2-14-2015

H. Henry Guo, MD, PhD
Clinical Assistant Professor
Mark Yen Guo
4-18-2014

Kim Duong
MRI Technologist
Sophie Duong Tran
12-26-2014

Justin Beck
MRI Technologist
Macle Christie
1-29-2014

Halley Kipnis
2-13-2015

Radiology Annual Report 2014-15

Radiology Babies
New Major Equipment

Clinical Equipment

2014  CT scanner (CT1) replaced in Stanford Hospital

2014-15  Mammography converted to Tomosynthesis Mammography in Blake Wilbur and Advanced Medicine Center

2015  CT scanner replaced in Blake Wilbur

2015  CT scanner replaced in Stanford Medicine Imaging Center, Palo Alto

2015  CT Scanner upgrade in Redwood City Outpatient Imaging

2015  South Bay Cancer Center: New CT, 3T MRI, PET-CT, Mammography, Ultrasound, Diagnostic Radiology, Portable Nuclear Medicine Camera

2015  New Portable X-ray Units in Stanford Hospital and Lucile Packard Children’s Hospital bringing advanced digital imaging to patients (digital detectors)

2016  Hoover 2 Stanford Neurosciences Health Center: CT, 3T MR, PET-MR, Ultrasound, Diagnostic Radiology/Fluoroscopy

2016  Stanford Hospital: 3T MR replacement, Hybrid Angio Operating Room Suite

Advanced Medical Center: New 3T Wide Bore MR to be shared by Radiation Oncology and Radiology

Blake Wilbur: 3T MR Replacement and 1.5T MR Upgrade

Stanford Medicine Outpatient Clinic Redwood City: New 3T Wide Bore MR

SPECT Camera Replacement in Nuclear Medicine

Research Equipment

2015  PET-MR upgrade to FDA approval configuration

2015  New Hyperpolarizer Installed

2015  7T Small Animal MR system upgrade (Clark Center)

2016  New 3T Small Animal MR system (Porter site)

2016  New 11.7T Small Animal MR Imaging system (A Generous Gift from Agilent for the Porter site)

2016  Small Animal PET System for Molecular Imaging (Porter site)
Medical School Expansion

July 13, 2015

Stanford Cancer Center South Bay opens with a Radiology presence that includes Diagnostic Radiology, Mammography, Ultrasound, CT, 3T MRI, and PET-CT.

November, 2015

Stanford Neuroscience Center - Hoover Campus to open and includes Diagnostic Radiology, Fluoroscopy, Ultrasound, CT, 3T MRI, and PET-MRI.

New Stanford Hospital construction underway – a major undertaking to include significant resources for an advanced Imaging department.

Opening in 2017

Emeryville location is ideally suited to support an SHC regional health center incorporating Stanford faculty practices and University Healthcare Alliance physicians. Development of this health center will serve the growing needs of physicians in this East Bay region. Radiology will provide imaging services that include CT, PET-CT, MRI, Bone Density, Ultrasound, and Mammography.

Lucile Packard Children’s Hospital Stanford: The expansion, which will include a new main building, adds 521,000 square-feet to the approximately 300,000 square-foot existing hospital. The new facility will optimize the hospital’s services and infrastructure, adding more beds, private rooms, state-of-the-art operating suites, family-friendly amenities and the flexible floor space the hospital needs to adapt to new technologies and streamline services.

Opening in 2018

The New Stanford Hospital: An 824,000 square-foot facility will feature amenities and services focused on the health and well-being of patients, as well as the most advanced diagnostic, therapeutic and surgical technologies. It will house an additional 388 beds, bringing the total to 600 on site, and the new Emergency Department will have twice the floor space of the current facility.

Performance Improvement

The RITE Program:
Use of a Team-Based, Project-Based Multidisciplinary Performance Improvement Course to Facilitate Improvement

A 10-session, 20-week course (Radiology Improvement Team Education, or RITE) was developed and implemented in the radiology department, with strong support from both the hospital and medical school leadership. Eight projects were commissioned for the course based on projected costs and benefits of each project. Teams were assembled for each project; each team included a team leader, 3-7 project participants, a sponsor, and a quality improvement (QI) coach.

This multidisciplinary program was effective in simultaneously facilitating the execution of multiple departmental improvement projects and improving participants’ self-assessed skills in QI methodology. Total time spent in class was 20 hours, with half of that time occurring during the lunch hour. The program now occurs twice annually facilitating the completion of 12-15 major projects and educating 60-80 individuals including technologists, nurses, doctors, fellows, residents, hospital administrative staff, and even patients every year.

Jake Mickelsen
Performance Improvement Education Manager

Kandice Garcia, MS, BSN, RN
Performance Improvement Manager

David Larson, MD
Associate Chair, Performance Improvement

Lauren Sederberg
Performance Improvement Project Coordinator

Sergio Sousa
Administrative Associate
What comes to mind when you think of “Radiology”? Do you envision chest x-rays, bone x-rays, mammograms, and maybe even an ultrasound for your soon-to-arrive new child? While the Stanford Department of Radiology provides all of these imaging services with the most advanced and sophisticated equipment, advanced radiology departments such as ours offer so much more.

Here at Stanford, we purposely focus on translational research to create and improve diagnostic imaging tools that span from molecular to whole body imaging. Our scientists and clinicians are committed to working together and creating a truly Translational Research environment to improve health care for their patients here at Stanford as well as patients all over the world.

In the following few pages, we highlight four Translational Research programs, three of which are already having significant impact on patients who visit our clinics, and a fourth area that is currently in pilot phase with great promise to improve care for patients in low resource areas.

I. Chronic Fatigue Syndrome
II. MR Guided Focused Ultrasound (MRgFUS)
III. Transforming Cardiac MRI
IV. Point-of-Care Diagnostics

These contributions to patient well-being represent only a small number of radiologic advances in health care that you can expect from Today’s Radiology Department.
The record of Chronic Fatigue Syndrome (CFS) is a sorry one from the patients’ perspective for they have suffered not only from debilitating symptoms and their ramifications, but also the indignity that their disease “did not exist.” That they were “malingerers and hypochondriacs” came not only from peers and lay persons, but some physicians as well harbored the conviction that this entity was, fundamentally, a psychological aberration with no physical cause. This additional burden was then added to the suffering from the symptoms of the disease itself. In broad terms, these are exhaustion and overwhelming fatigue for more than six months, and may also include muscle and joint pain, incapacitating headaches, sleep disorders, food intolerance, gastrointestinal problems, hypersensitivity to light, and short-term memory loss. The extent of disability can range from mild to extremely severe, from six months to thirty plus years.

CFS is known for devastating the quality of life of patients, not only exerting severe limitations on their own activities, but also disrupting or destroying the fabric of their lives, for example, relationships with friends, family, employers, loss of jobs, income, and many other aspects of life. While not directly life threatening, the condition is so hopeless that suicide sometimes ensues.

But there is good news and on two fronts: the disease—and it IS a disease—has now been shown to have a physical basis, and this new understanding of the mechanism is a firm, first step toward a remedy for CFS patients.

These exciting new results, published in the journal, Radiology, February 2015 by Michael Zeineh, MD, PhD, Assistant Professor of Radiology, and his colleagues would not have been possible on an earlier generation of MRI machines. Employing new imaging technology and sequences that are only available on the latest machines, the researchers were able to show with the goal to advance neuroradiology to gain insight into diseases with the goal to advance neuroradiology to gain insight into diseases.

These promising new results, the Stanford scientists are planning a substantially larger project. These results, published in the journal, Radiology, February 2015 by Michael Zeineh, MD, PhD, Assistant Professor of Radiology, and his colleagues would not have been possible on an earlier generation of MRI machines.
While Stanford Radiology has a long history of success in transforming benchtop work into the clinic, it is rare to witness such a tremendous impact as has been experienced with MR guided high intensity focused ultrasound (MRgFUS). MRgFUS allows the physician to localize harmful tissue, precisely apply therapy to ablate the targeted tissue, and monitor results in real-time, yielding rapid improvement for the patient. MRgFUS accomplishes this without surgical incision, radiation exposure, or significant long-term morbidity for the patient.

In the early 2000s, Kim Butts Pauly, PhD, well known for her work in MRI for monitoring minimally invasive procedures, began to explore the promise of using MR to monitor thermal therapy. Her work at this time was centered on making MRgFUS more accurate in the presence of motion. Around the same time that Dr. Butts Pauly and colleagues began to present and publish their MR guided focused ultrasound research, Intuitive gained FDA approval in the United States to place their systems for clinical use. Stanford soon received such a system, and the physician to localize harmful tissue, precisely apply therapy to ablate the targeted tissue, and monitor results in real-time, yielding rapid improvement for the patient. MRgFUS accomplishes this without surgical incision, radiation exposure, or significant long-term morbidity for the patient.

SELECTED PUBLICATIONS


MR Guided Focused Ultrasound (MRgFUS)

Stanford Leading MR Guided Focused Ultrasound Innovation in Research and Clinical Treatment
Transforming MRI for Children and Beyond

Imaging can play a major role in the care of children, as younger children cannot easily express their symptoms. Ultrasound and MRI, which are radiation-free, are uniquely suited to imaging children whose young bodies are particularly sensitive to ionizing radiation, and are always the first choice for children, young adults, and expectant mothers. MRI in particular is a powerful diagnostic tool, but exam times often exceed an hour. Getting a small child to remain still for beyond a few minutes often requires anesthesia, introducing cost and risks that many families and physicians try to avoid. Thus, we have become creative, pushing the traditional boundaries of MRI.

Congenital heart disease, with its complex anatomical and physiological abnormalities, is an area that needs a new approach. MRI for these conditions is not only lengthy, but also require intense direct oversight from highly subspecialized radiologists, who are often only located in large children’s hospitals. Thus, Dr. Shreyas Vasanawala, MD, PhD, Associate Professor of Radiology at Stanford, and Dr. Michael Lustig, Associate Professor of Electrical Engineering at Berkeley, sought a better way. These two experts reasoned a cardiac MRI study should not be performed in the conventional way, with sequential acquisition of two-dimensional images, and sequential assessment of anatomy, blood flow, and heart chamber function. They redesigned the whole imaging process to encode anatomic and physiologic information over the whole chest and across the entirety of the heart beating cycle all at once, and had the fortune of working with Marcus Alley, PhD, an expert at the Lucas Center. Working with post-doctoral scholars Tao Zhang and Joseph Cheng, they found that MRI data could indeed be encoded in an abstract way all at once, and by doing so, the exam could not only be shortened from over an hour to under 10 minutes, but that also the image resolution could be improved. However, there were two challenges to this approach. First, decoding high-fidelity images from such abstract data using a computer that comes with MRI scan-ners took weeks, which is clinically impractical. However, they found that graphics cards designed for teenagers’ video games could be used, with new algorithms, to generate very high quality images in minutes. But a second problem remained. The reconstructed data was still an abstract combination of anatomy and physiology in the form of a time-varying vector field of blood flow. This is not traditionally what radiologists are used to interpreting to make diagnoses, and the team, working with a Radiology resident and fellow Albert Hsiao MD, PhD, developed new methods of rendering the data to intuitively present the anatomy and physiology. These included color overlays of blood speed and arrows to show blood flow direction.

Currently at Lucile Packard Children’s Hospital at Stanford, as a result of rethinking the whole imaging chain from image data acquisition and image reconstruction to image display, an MRI has been con-densed from over an hour to minutes, reducing the frequency, depth, and duration of anesthesia that chil-dren need in order to get an MRI. Furthermore, data from any MRI scanner can now be fed to a cloud-based computational infrastructure for even greater speed, effectively connecting imaging hardware anywhere in the world to supercomput-ing power. The techniques developed here are now deployed at major hos-pitals in the US and in Europe. With this highly sophisticated approach, we efficiently code all cardiovascular anatomy and physiology simultaneously. A radiologist can very quickly analyze anatomical variations and quantify problems with blood flow, heart valves, and the pumping function of the heart. This yields an improved comprehensive diagnosis quickly and economically, with less anesthesia.
Containing HIV.

When patient samples trodes send an electrical signal to the chip, the lysate is added to the flexible chip, the lysate contains the virus-specific antibodies and in so doing, the electrical signal when patient samples contain HIV.

The BAMM lab develops assays for the simple and rapid detection of HIV-1, various bacteria, and CD4+ T lymphocytes. The assays for pathogens and cells were used as proof of concept to demonstrate the utility of several new detection and sensing technologies. For instance, a flexible microchip with electrodes sends an electrical signal when patient samples contain a virus, such as HIV. Similarly, flexible chips are designed to capture and image CD4+ cells to monitor an individual’s health status.

Overall, Dr. Demirci and his team continue to develop platforms and sensing devices that are easy to make, easy to use and that can be safely disposed of after use - characteristics necessary for developing affordable tools with broad applications in both developed and developing countries.

This platform is being used in detection of HIV in acute stage and bringing much-needed treatment to individuals, who are HIV-positive. This particular test consists of a disposable flexible polyester chip with implanted electrodes. HIV-1 antibody-coated magnetic particles are added to whole blood or plasma, where they capture viruses creating, and followed by lysing viruses to obtain an electrolyte solution. When added to the flexible chip, the lyase changes the electrical conductivity of the chip, which gives a simple electrical readout that when reading using a cell phone app, is capable of indicating whether or not the sample contains HIV-1.

The disposable microchip platform yields results from “on the spot” testing that is unlike standard laboratory techniques, which need time to grow antibodies and in so doing, delay treatment that provides opportunity for the disease to become more firmly established. This bioengineering approach to disease early detection is one example of an emerging point-of-care technology with tremendous potential impact on healthcare, especially in remote areas with limited resources.

“The goal of our work,” says Utkan Demirci, PhD, of the Demirci Bio-Acoustic-MEMS in Medicine Laboratory at Stanford School of Medicine, “is to simplify the technology with tremendous potential impact on healthcare, especially in remote areas with limited resources. The BAMM lab develops assays for the simple and rapid detection of HIV-1, various bacteria, and CD4+ T lymphocytes. The assays for pathogens and cells were used as proof of concept to demonstrate the utility of several new detection and sensing technologies. For instance, a flexible microchip with electrodes sends an electrical signal when patient samples contain a virus, such as HIV. Similarly, flexible chips are designed to capture and image CD4+ cells to monitor an individual’s health status. Overall, Dr. Demirci and his team continue to develop platforms and sensing devices that are easy to make, easy to use and that can be safely disposed of after use - characteristics necessary for developing affordable tools with broad applications in both developed and developing countries. This platform is being used in detection of HIV in acute stage and bringing much-needed treatment to individuals, who are HIV-positive. This particular test consists of a disposable flexible polyester chip with implanted electrodes. HIV-1 antibody-coated magnetic particles are added to whole blood or plasma, where they capture viruses creating, and followed by lysing viruses to obtain an electrolyte solution. When added to the flexible chip, the lyase changes the electrical conductivity of the chip, which gives a simple electrical readout that when reading using a cell phone app, is capable of indicating whether or not the sample contains HIV-1. In addition to detecting early stage infection, the electrical readout is much simpler and less expensive than current assays. The disposable microchip platform yields results from “on the spot” testing that is unlike standard laboratory techniques, which need time to grow antibodies and in so doing, delay treatment that provides opportunity for the disease to become more firmly established. This bioengineering approach to disease early detection is one example of an emerging point-of-care technology with tremendous potential impact on healthcare, especially in remote areas with limited resources.

“The goal of our work,” says Utkan Demirci, PhD, of the Demirci Bio-Acoustic-MEMS in Medicine Laboratory at Stanford School of Medicine, “is to simplify the technology with tremendous potential impact on healthcare, especially in remote areas with limited resources.
The Department of Radiology offers training in all radiology subspecialties and is made up of 14 sections (10 clinical and 4 research), available to all trainees, including residents, fellows, graduate students, and visiting scholars.

Radiology Residency Program. We provide a supportive yet rigorous environment for trainees to learn from an internationally acclaimed faculty, known for superb teaching and world-class research. Trainees work with these individuals to preview and help develop the imaging of tomorrow while mastering the techniques of today.

July 1, 2015 brings a change in Leadership for our Residency Training Program, which continues to rank among the top 10 in the country. Dr. Terry Desser, who has successfully led our program for 11 years, is stepping down to return to clinical and academic interests. Among her many accomplishments, Dr. Desser has developed lasting relationships with and trained more than 100 residents. We are deeply indebted to her for years of service.

Dr. Payam Massaband was appointed the new Residency Program Director on July 1, 2015, having recently served as Acting Chief of Radiology at the Palo Alto VA. He is joined by associate directors Dr. Gloria Hwang, Dr. Peter Poulos, and Dr. Erika Rubesova. The new leadership team is honored and committed to training the next generation of radiologists.

Clinical Fellowship Training. Radiology offers many one and two year fellowships. In 2015 we have 43 fellows across ten clinical sections.

Pre- and Postdoctoral Training Programs. We are home to five NIH-supported training programs for predoctoral and postdoctoral candidates. Our programs include training in cancer imaging (SCIT), physics/instrumentation (TBI2), molecular imaging (SMIS), systems biology (CCSB) and nanotechnology (Cancer-TNT).
Graduating Diagnostic Radiology Residents 2014-15

Stephanie Chang, MD  
Current Position: Fellowship, Body MRI  
Stanford University, CA

Jacob Harter, MD  
Current Position: Fellowship, Body MRI  
Stanford University, CA

Michael Chiou, MD  
Current Position: Fellowship, Musculoskeletal  
Stanford University, CA

Gabriel Howles-Banerji, MD, PhD  
Current Position: Fellowship, Interventional  
Stanford University, CA

Osamu Kaneko, MD  
Current Position: Fellowship, Musculoskeletal  
Stanford University, CA

Steven Deso, MD  
Current Position: Fellowship, Interventional  
Stanford University, CA

Mia Gorovoy, MD  
Current Position: Fellowship, Breast Imaging  
Stanford University, CA

Jason Oppenheimer, MD  
Current Position: Fellowship, Interventional  
Stanford University, CA

Tatiane Jackson, MD  
Nuclear Medicine Resident  
Current Position: Radiology Resident  
Boston Medical Center, MA

Holly Thompson, MD, MPH  
Nuclear Medicine Resident  
Current Position: Kaiser Permanente  
Santa Clara, CA

Asmaa Aamir, MBBS  
Jeffrey Goletz, MD  
Body Imaging  
Current Position: Associated Radiologists  
Phoenix, AZ

Graduating Fellows 2014-15

Lina Nayak, MD  
Current Position: Fellowship, Breast Imaging  
University of California, San Francisco, CA

Asmaa Aamir, MBBS  
Body Imaging  
Current Position: Associated Radiologists  
Phoenix, AZ

Jeffrey Goletz, MD  
Body Imaging  
Current Position: Bay Imaging Consultants
Graduating Fellows 2014-15 (continued)

Simon Abramson, MD  
Body Imaging  
Current Position:  
Vision Radiology, Fremont, CA

Michael Griffin, Jr, MD, PhD  
Body Imaging  
Current Position:  
Medical College of Wisconsin, Milwaukuee, WI

Quazi Al-Tariq, MD  
Body Imaging  
Current Position:  
Radiologist, Pomona Valley Medical Center, Pomona, CA

Michael Adam Heisler, MD  
Body Imaging  
Current Position:  
Kaiser Permanente Medical Group, Modesto, CA

Graham Bay, MD  
Body Imaging  
Current Position:  
Assistant Professor, Radiology, University of Manitoba, Canada

Alok B. Turakhia, MD  
Body Imaging  
Current Position:  
Bay Imaging Consultants, Walnut Creek, CA

Robert Jesinger, MD, MSE  
Body/Breast Imaging  
Current Position:  
Department of Radiology, David Grant USAF Medical Center, Travis Air Force Base, CA

Katherin Hanneman, MD  
Cardiovascular Imaging  
Current Position:  
Department of Radiology, Toronto General Hospital, Ontario, Canada

John R. Downey, MD  
Breast Imaging  
Current Position:  
Kaiser Permanente Medical Group, Walnut Creek, CA

Yueyi Irene Liu, MD, PhD  
Breast Imaging  
Current Position:  
Kaiser Permanente Medical Group, San Jose, CA

Sanjjoy N. Gupta, MD, MPH  
Cardiovascular Imaging  
Current Position:  
Interventional Radiology, Rush University, Chicago, IL

Gregory T. Havlena, MD  
Interventional Radiology  
Current Position:  
Interventional/Diagnostic Radiologist, Kaiser Permanente, Fontana, CA

Michael A. Kadow, MD  
Chest Imaging  
Current Position:  
Fellowship, Cardiovascular Imaging, Stanford University, Stanford, CA

Omaruddin Ahmed, MD  
Interventional Radiology  
Current Position:  
Kaiser Permanente Medical Group, Modesto, CA

Sanjay N. Gupta, MD, MPH  
Cardiovascular Imaging  
Current Position:  
Kaiser Permanente Medical Group, Walnut Creek, CA

Michael Ginsburg, MD  
Interventional Radiology  
Current Position:  
Kaiser Permanente Medical Group, San Jose, CA

Michael Adam Heisler, MD  
Body Imaging  
Current Position:  
Kaiser Permanente Medical Group, Modesto, CA

Omaruddin Ahmed, MD  
Interventional Radiology  
Current Position:  
Kaiser Permanente Medical Group, Walnut Creek, CA

Gregory T. Havlena, MD  
Interventional Radiology  
Current Position:  
Kaiser Permanente Medical Group, San Jose, CA

Russell Stewart, MD, MBA  
Musculoskeletal Imaging  
Current Position:  
Body Imaging, Radiology, Stanford University, Stanford, CA
Paul F. Laeseke, MD, PhD  
Interventional Radiology  
Current Position:  
University of Wisconsin, Madison, WI

Joshua M. Ng, MD  
Interventional Radiology  
Current Position:  
Hackensack University Medical Center, Hackensack, NJ

Thomas J. Ward, MD  
Interventional Radiology  
Current Position:  
Florida Hospital, Orlando, FL

Dustin K. Johnson, MD  
Musculoskeletal Imaging  
Current Position:  
MSK Radiologist, Kaiser Permanente Medical Center, Santa Clara, CA

Christine Kim, MD  
Neuroimaging & Neurointervention  
Current Position:  
Clinical Instructor, Neuroradiology, Stanford University, Stanford, CA

Ka-Wai Tung, MD  
Musculoskeletal Imaging  
Current Position:  
Salinas Valley Radiologists, Salinas, CA

David Douglas, MD  
Neuroimaging & Neurointervention  
Current Position:  
United States Air Force, Travis Air Force Base, CA

Woon Beikele, MD  
Neuroimaging & Neurointervention  
Current Position:  
Kaiser Permanente Medical Group, Vallejo, CA

Jeremy J. Helt, MD, PhD  
Neuroimaging & Neurointervention  
Current Position:  
Clinical Instructor, Radiology, Stanford University, Stanford, CA

Shanshan Bao, MD  
Pediatric Radiology  
Current Position:  
2nd Year Fellowship, Pediatric Radiology, Stanford University, Stanford, CA

Eric Tranvinh, MD  
Neuroimaging & Neurointervention  
Current Position:  
Clinical Instructor, Neuroradiology, Stanford University, Stanford, CA

Eugene Wilson, IV, DO  
Neuroimaging & Neurointervention  
Current Position:  
Chief of Diagnostic Imaging, Martin Army Hospital, Fort Benning, GA

Farshad Moradi, MD, PhD  
Nuclear Medicine & Molecular Imaging  
Current Position:  
Assistant Professor, Radiology, University of California San Diego, San Diego, CA

Guofan Xu, MD, PhD  
Nuclear Medicine & Molecular Imaging  
Current Position:  
Kaiser Permanente, San Jose, CA

Alex Lewis, MD, MBA  
Body MRI  
Current Position:  
Boca Radiology Group, Boca Raton, FL

Matthew Bernbeck, MD  
Pediatric Imaging  
Current Position:  
Advocate Children’s Hospital, Chicago, IL

Niloy Dasgupta, MD  
Pediatric Imaging  
Current Position:  
Fellowship, Vascular and Interventional Radiology, Mallinckrodt Institute of Radiology, St. Louis, MO

Christine Kassis, MD  
Pediatric Imaging  
Current Position:  
Pediatric Radiologist, Diversified Radiology, Denver, CO

Vanessa Starr, MD  
Pediatric Imaging  
Current Position:  
Attending, Santa Clara Valley Medical Center, San Jose, CA

Piotr Obara, MD  
Body MRI  
Current Position:  
Loyola University Medical Center, Maywood, IL
Graduating PhDs 2014-15

Paul Reynolds, PhD
Molecular Imaging Program at Stanford
Current Position: Intuity Medical, Inc., Sunnyvale, CA
Dissertation: Applications of Optics in PET: Fast Timing, Multiplexing, and PET-MR

Alexander Grant, PhD
Molecular Imaging Program at Stanford
Current Position: Research Assistant, Stanford University, Stanford, CA
Dissertation: Design and Development of Data Acquisition Electronics for a 1mm Resolution Clinical Positron Emission Tomography (PET) System

Sarah Sasportas, PhD
Molecular Imaging Program at Stanford
Current Position: Google Life Sciences, Mountain View, CA
Dissertation: Molecular Imaging and Mathematical Modeling Approaches to Interrogate the Liquid Phase of Cancer

Jocelyn Barker, PhD
Radiological Sciences Lab
Current Position: Post-doctoral Fellow, Rubin Lab, Stanford, CA
Dissertation: Image Processing in Pathology for the Discovery of Clinically Relevant Disease Subtypes

Jang-Hwan Choi, PhD
Radiological Sciences Lab
Current Position: Post-doctoral Fellow, Fahrig Lab, Gold/Levinston Lab, Stanford, CA
Dissertation: Acquisition of 3D knee morphology under weight-bearing conditions using a C-arm CT scanner for the assessment of knee disorders

Francisco Gimenez, PhD
Radiological Sciences Lab
Current Position: Consultant, Bay Area, CA

Tiffany Ting Liu, PhD
Radiological Sciences Lab
Current Position: Post-doctoral Fellow
Dissertation: Precision Medicine in Glioblastoma: Integrated analysis using molecular-scale and imaging-scale data to identify clinically-relevant glioblastoma subgroups

Mhye Shin, PhD
Radiological Sciences Lab
Current Position: Mechanical Engineer, Apple Inc., Cupertino, CA
Dissertation: Development and evaluation of two novel instruments for X-ray imaging

Yuan Yao, PhD
Radiological Sciences Lab
Current Position: Research Assistant, Pelc Lab, Stanford, CA
Dissertation: Optimizations in spectral CT measurements
### Incoming Diagnostic Radiology Residents 2015-16

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric Bultman, MD, PhD</td>
<td>MD/PhD Univ of Wisconsin, BA Univ of Arizona</td>
</tr>
<tr>
<td>Karen Kuhn, MD, DPT</td>
<td>MD George Washington Univ, DPT Duke Univ, BS Duke Univ</td>
</tr>
<tr>
<td>Adam Luce, MD</td>
<td>MD Boston Univ, MS Univ of California Berkeley, BS Univ of California Berkeley</td>
</tr>
<tr>
<td>Aleema Patel, MD</td>
<td>MD Brown Univ, BA Brown Univ</td>
</tr>
<tr>
<td>Vivek Patel, MD, PhD</td>
<td>MD Univ of Pittsburgh, PhD Univ of Pittsburgh, BA Univ of Delaware, Newark</td>
</tr>
<tr>
<td>Emri Sandhur, MD, MBA</td>
<td>MD Harvard University, MBA Harvard Univ, BA Univ of NC Chapel Hill</td>
</tr>
<tr>
<td>Alexander Shev, MD</td>
<td>MD Northwestern Univ, BS Northwestern Univ</td>
</tr>
<tr>
<td>Stephen Vossler, MD</td>
<td>MD Stanford Univ, BSE Arizona State</td>
</tr>
<tr>
<td>Krista Weiss, MD</td>
<td>MD Tufts Univ, BS Harvard College</td>
</tr>
<tr>
<td>Aleema Patel, MD</td>
<td>MD Brown Univ, BA Brown Univ</td>
</tr>
</tbody>
</table>

### Incoming Nuclear Medicine Residents 2015-16

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jason Lee, MD, MBA</td>
<td>MD American Univ of Antigua, MBA Plymouth State Univ, BS Univ of California Berkeley</td>
</tr>
<tr>
<td>Powen Tu, MD, PhD</td>
<td>MD/PhD Boston Univ, BS Cornell Univ</td>
</tr>
</tbody>
</table>

### Diagnostic Radiology Residents 2015-16

#### 2nd Year
- Michael Ang
- Angela Fast
- Roger Goldman
- Lewis Dek Hahn
- Wilson Lin
- Nathaniel Moradzadeh
- Aleema Patel
- Preet Sukirkar
- Yingting (Bryan) Xu
- Byung (Jason) Yoon

#### 3rd Year
- Henry Andash
- Christina Chen
- Christopher Denucl
- Zlatko Devic
- Aaron Elfar
- Stephanie Go
- Chrysal Obi
- Joshua Reicher
- Mark Sun

#### 4th Year
- Lauren Chan
- Alexis Crowley
- Ibrahim Idakov
- Benjamin Johnson
- Michael Llewellyn
- Michael Muehly
- Jessica Sin
- Tujj Techasith
- Neel Thakur

### Diagnostic Radiology Fellows 2015-16

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hans Bakken, MD</td>
<td>Louis Golden, MD</td>
</tr>
<tr>
<td>Osamu Kaneko, MD</td>
<td>Hannes Kroll, MD</td>
</tr>
<tr>
<td>Bryan Lanaman, MD</td>
<td>Amar Patel, MD</td>
</tr>
<tr>
<td>Brian Bolt, MD (Yr 2)</td>
<td>Wilson Chwang, MD (Yr 2)</td>
</tr>
<tr>
<td>Alekiards Kalnins, MD</td>
<td>Mrudula Penta, MD (Yr 2)</td>
</tr>
<tr>
<td>L. “Ram” Srinivasan, MD</td>
<td>Nicholas Telichak, MD, MS (Yr 2)</td>
</tr>
</tbody>
</table>

### Intervventional Radiology
- Steven Deso, MD
- Adam Fang, MD
- Luke Higgins, MD, PhD
- Gabriel Howles-Banerji, MD
- Maria Jepperson, MD
- Srith Kshores, MD

### Neuroimaging & Neurointervention
- Raphael Alford, MD
- Shanshan Bao, MD
- Tom Cullen, MD
- Praveen Anchala, MD
- Michael Chiou, MD

### Nuclear Medicine
- Leley Frint, MD
- Kaveh Vejdani, MD

### Pediatric Imaging
- Shanshan Bao, MD
- Tom Cullen, MD
- Lillian Lai, MD
Radiology Annual Report 2014-15

Radiology Training Programs

TBI2 Program
Training in Biomedical Imaging Instrumentation

NIH 5 T32 EB009653 05

PI: Norbert Pelijk, ScD
Program Manager: Mary LeSene

The TBI2 program offers unique multidisciplinary research in biomedical imaging technology spanning magnetic resonance, computed tomography and radiography, ultrasound, PET, and hybrid imaging such as X-ray/MR and PET-MR, as well as image processing and analysis for diagnosis, radiation therapy, and basic science. TBI2 is a two-year program.

CURRENT STUDENTS

Srivathsan Koundinya, PhD
Jessica Maxey
Aaron Mayer
Steffi Perkins

SCIT Program
Stanford Cancer Imaging Training

NIH 5 T32 CA009695 23

PI: Sandy Napel, PhD
Program Manager: Sofia Gonzales

The SCIT Program offers a unique research opportunity through our Advanced Techniques for Cancer Imaging and Detection Program, which began its 20th year of training in 2012. Initially designed and directed by Dr. Gary M. Glazer, the goal of this two year program is to provide MD and PhD research fellows training in cancer-related imaging research.

CURRENT STUDENTS

Erica Cherry, PhD
Mehmet Gunhan Ertosun, PhD
Ryan Spiller, PhD
Tzu-Yin Wang, PhD
Saeid Zanganeh, PhD

SMIS Program
Stanford Molecular Imaging Scholars

NIH 5 R25 CA118681 09

PI: Craig Levin, PhD
Program Manager: Sofia Gonzales

The SMIS Program is a two-year cross-disciplinary postdoctoral training program at Stanford University. The centerpiece of the SMIS program is the opportunity for trainees (MD or PhD) to conduct innovative molecular imaging research that is co-mentored by faculty in complementary disciplines.

CURRENT STUDENTS

Srivatsan Koundinya, PhD
Mehmet Gunhan Ertosun, PhD
Katheryne Wilson, PhD

CSIT Program
Cancer-Translational Nanotechnology Training

NIH 1 T32CA 196585-01

PI: Jianghong Rao, PhD
Program Manager: Bilie Robles

The Cancer-TNT postdoctoral training program is a diverse, synergistic three-year training program that brings together 25 faculty and nine departments from the Schools of Medicine, Engineering, and Humanities and Sciences. Trainees’ skill sets will bridge multiple disciplines such as chemistry, molecular biology, bioengineering, molecular imaging, nanotechnology, and clinical cancer medicine. The Cancer-TNT program will provide a unique training opportunity that expands the overarching goal of the NCI to eradicate cancer. Stanford University, with support from the NCI, is a major training center with significant expertise and resources in the rapidly growing field of cancer nanotechnology. Trainee recruitment will begin in late 2015 and early 2016 with an on-going recruitment cycle.

CURRENT STUDENTS

Erica Cherry, PhD
Mehmet Gunhan Ertosun, PhD
Ryan Spiller, PhD
Tzu-Yin Wang, PhD
Saeid Zanganeh, PhD

Canary Center at Stanford Summer Internship Program

The Canary Center at Stanford is a research center dedicated to early cancer detection research. As part of our efforts to train the next generation of scientists, we offer a paid and unpaid summer internship program. Canary Center interns will work in faculty labs for a 10-week internship in our state-of-the-art research facility. Each participant will be matched with a faculty, postdoctoral scholar, or senior scientist mentor who will help them craft a research project. The successful applicant can expect to work in a dynamic lab environment on challenging projects that involve a broad range of research techniques. The program also includes a series of weekly seminars on early cancer detection research, conducting scientific research, careers in science and the chance to interact with other interns. The program culminates with a research symposium, where students present individual talks or posters on their summer projects in front of their peers, faculty and lab mentors.

CSBS Program
Cancer Systems Biology Scholars

NIH 1 R25 CA 18099301

PI: Sylvia Plevritis, PhD
Program Manager: Holly Chung

The CSBS program is a 2-year postdoctoral training program at Stanford University focused on innovative, multidisciplinary cancer research education that seamlessly integrates experimental and computational biology to systematically unravel the complexity of cancer. We bring together 36 Stanford faculty mentors from 19 departments or divisions bridging the Schools of Medicine, Engineering and Humanities and Sciences. After one year of curriculum planning, candidate recruitment for our first cohort of trainees is underway.
<table>
<thead>
<tr>
<th>Name</th>
<th>Award/Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lotfi Abou-Elkacem, PhD</td>
<td>2015 Mildred Scheel Cancer Fellowship Award of the German Cancer Aid Foundation</td>
</tr>
<tr>
<td>Stephanie T. Chang, MD</td>
<td>2015 Roentgen Resident/Fellow Research Award</td>
</tr>
<tr>
<td>Aadel Chaudhuri, MD, PhD</td>
<td>2015 RSNA Research Resident Award</td>
</tr>
<tr>
<td>Joseph Cheng, PhD</td>
<td>2015 W.S. Moore ISMRM Young Investigator Award</td>
</tr>
<tr>
<td>Thomas Christen, PhD</td>
<td>2014 ISMRM W.S. Moore Young Investigator</td>
</tr>
<tr>
<td></td>
<td>2014 ISMRM Junior Fellow</td>
</tr>
<tr>
<td>Guido Davidson, MD</td>
<td>2015 SNMMI Future Leaders Academy</td>
</tr>
<tr>
<td>David Douglas, MD</td>
<td>2015 Received Henkin Government Relations Fellowship</td>
</tr>
<tr>
<td></td>
<td>2015 Roentgen Resident/Fellow Research Award</td>
</tr>
<tr>
<td>Audrey Fan, PhD</td>
<td>2015 Stanford Neurosciences Institute Interdisciplinary Scholar</td>
</tr>
<tr>
<td>Susan Hinkel, MD</td>
<td>2015 Roentgen Resident/Fellow Research Award</td>
</tr>
<tr>
<td>Tatjana Jackson, MD</td>
<td>2014 Elected to the board of the Nuclear Medicine Resident Organization (NMRO)</td>
</tr>
<tr>
<td>Osamu Kaneko, MD</td>
<td>2015 RSNA/AUR/APDR/SCARD Radiology Education Research Development</td>
</tr>
<tr>
<td>Feliks Kogan, PhD</td>
<td>Named a 2015 ISMRM Junior Fellow, Received summa cum laude merit award for work presented at the 2015 ISMRM</td>
</tr>
<tr>
<td>Paul Laeske, MD</td>
<td>2015 Roentgen Resident/Fellow Research Award</td>
</tr>
<tr>
<td>Aaron Mayer</td>
<td>2015 National Science Foundation full scholarship</td>
</tr>
<tr>
<td></td>
<td>2015 Bio-X Honorary Fellow</td>
</tr>
<tr>
<td>Emily McWalter</td>
<td>2014 Awarded a “New Researcher Advocacy Award” from CIBR [Coalition for Imaging &amp; Bioengineering Research]</td>
</tr>
<tr>
<td>Kanae Miyake, PhD</td>
<td>2015-2017 SNMMI Wagner-Toribuku Fellowship</td>
</tr>
<tr>
<td>Uche Momu</td>
<td>2014 Recipient of “Diversifying Academia, Recruiting Excellence (DARE)” Fellowship</td>
</tr>
<tr>
<td>Surya Murty</td>
<td>2015 National Science Foundation full scholarship</td>
</tr>
<tr>
<td>Hossein Nejadnik, MD, PhD</td>
<td>Received 2014 RSNA Trainee Research Prize</td>
</tr>
<tr>
<td>Joe Mo Park, PhD</td>
<td>2014 ISMRM Junior Fellow</td>
</tr>
<tr>
<td>Laura Sarah Sasportas, PhD</td>
<td>2014 Received France “Best Engineer of the Year” Award</td>
</tr>
<tr>
<td></td>
<td>Received the Young Investigator Award at 2014 SNMMI</td>
</tr>
<tr>
<td>Adam Shuhendler, PhD</td>
<td>2014 Young Investigator Award, World Molecular Imaging Congress (WMIC)</td>
</tr>
<tr>
<td></td>
<td>2015 Young Investigator Award, Society of Nuclear Medicine and Molecular Imaging (SNMMI)</td>
</tr>
<tr>
<td>Sali Soman, MD, MS</td>
<td>Accepted faculty position at Harvard Medical School [Instructor in Neuroradiology]</td>
</tr>
<tr>
<td></td>
<td>2014 ISMRM Junior Fellow</td>
</tr>
<tr>
<td>Bragi Sveinsson, PhD</td>
<td>Received magna cum laude merit award for work presented at 2015 ISMRM</td>
</tr>
<tr>
<td>Valentina Taviari, PhD</td>
<td>Named a 2015 ISMRM Junior Fellow</td>
</tr>
<tr>
<td>Holly Thompson, MD</td>
<td>2015 Received Alpeng Foundation Grant to Support Cancer Research</td>
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<tr>
<td></td>
<td>2015 SNMMI Future Leaders Academy</td>
</tr>
<tr>
<td>Ophir Varmesh, PhD</td>
<td>Awarded 2014 Dean’s Fellowship</td>
</tr>
<tr>
<td>Urvi Vyas, PhD</td>
<td>2014 Shared her work in MRgFUS with Vice President Joe Biden</td>
</tr>
<tr>
<td>Andrew Wentland, MD, PhD</td>
<td>2014 ISMRM Summa Cum Laude Merit Award</td>
</tr>
<tr>
<td>Tim Witney, PhD</td>
<td>2015 Received SNM Alavi Mandell Award for: “Preclinical Evaluation of 18F-Fluoropivalic Acid as a Novel Imaging Agent for Tumor Detection”</td>
</tr>
<tr>
<td>Yuan Yao, PhD</td>
<td>2015 Siebel Scholar</td>
</tr>
<tr>
<td>Ahu Arslan Yıldız, PhD</td>
<td>2014 Named among the top innovators under 35 in Turkey</td>
</tr>
</tbody>
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Radiology Annual Report 2014-15 Trainees Honors and Awards
PET-CT fusion image shows an early stage lung cancer initially detected in an asymptomatic individual by low dose screening CT.

PET-CT fusion image shows an early stage lung cancer initially detected in an asymptomatic individual by low dose screening CT.

Under the leadership of Dr. Sam Gambhir, the Department of Radiology continues with its strong history of clinical success in all imaging modalities, including Computed Tomography (CT), Nuclear Medicine, Magnetic Resonance Imaging (MRI), Magnetic Resonance Spectroscopy (MRS), Positron Emission Tomography (PET), Focused Ultrasound (FUS), Molecular Imaging and emerging hybrid imaging approaches such as PET-CT, PET-MR and MR-FUS. The influence of MRI and Molecular Imaging on clinical imaging departments has introduced lightning speed changes to the way we now do business in Radiology. Internationally, departments of radiology are no longer limited to describing the anatomy as depicted in an image or a set of images. With sophisticated instrumentation, unique biomarkers (both radioactive and non-radioactive), new technologies and interventional techniques, radiologists have moved onto the front lines of patient care, where we are often able to detect disease at earlier time points and frequently treating patients with minimally invasive radiologic approaches.

The reward for our clinical radiology teams is recognized through the expanding camaraderie with our colleagues in other disciplines, such as oncology, medicine, immunology, orthopedics, etc., and the growing opportunities for patient-doctor relationships.

In the next pages, please read about our outstanding clinical faculty, our advanced imaging offerings, including disease detection, treatment and monitoring offered by the Stanford University Department of Radiology and all affiliated Hospitals, Clinics and Our Patient Centers.
Body Imaging

Juergen Willmann, MD

The Body Imaging section consists of 12 nationally and internationally renowned faculty and 9 body fellows who are specialized in the interpretation of diseases of the abdomen and pelvis, as well as additional body parts such as the thyroid, carotid, and peripheral venous system. With experts in computed tomography, magnetic resonance imaging, ultrasound, molecular imaging, x-ray, and fluoroscopy, our section is committed to training the next generation of body radiologists while delivering cutting edge clinical care. The breadth of experience among the faculty is reflected in the wide range of academic pursuits enjoyed by the section, ranging from clinical assessment of low dose CT protocols, novel pulse sequences in MRI, and new contrast agents for ultrasound to photoacoustic imaging of the bladder and imaging-guided delivery of novel therapeutics such as microRNAs into liver cancer in preclinical animal models.

ACHIEVEMENTS
• Dr. Deser awarded 2014 Faculty of the Year. Dr. Jeffrey nominated for the Lifetime Achievement Award. Society of Abdominal Radiology. Dr. Kamaya nominated fellow of the Society of Radiologists in Ultrasound and Dr. Willmann elected fellow of the Society of Abdominal Radiology.
• Among the first nationwide and the only place in the Bay Area to introduce contrast-enhanced ultrasound imaging and ultrasound elastography for routine clinical care.
• We introduced novel low dose CT imaging protocols that are now used routinely for our patients.
• First in the USA to perform clinical trials using ultrasound molecular imaging for prostate cancer and first in the world to conduct clinical trials with ultrasound molecular imaging for breast and ovarian cancer.

Body MR Imaging

Shreyas Vasanawala, MD, PhD

The Body MR section aims to provide outstanding patient care, lead innovations in the practice of Body MRI, and train the next generation of clinical scientists, while developing a tight link between diagnosis and therapy for highly personalized care. We provide services that are personally tailored for each patient and delivered with state-of-the-art MRI technology and highly trained staff. Most exams use techniques developed and uniquely available here at Stanford. Faculty members are internationally recognized experts in body MRI, and have deep experience developing new methods to improve diagnostic precision.

Body MR research at Stanford is fostered by close collaborations and friendships between clinicians and research scientists in the Department of Radiology, the university, and throughout the Bay Area.

ACHIEVEMENTS
• Multicenter MRgFUS trial treating essential tremor.
• Clinical trial in MRgFUS treatment of uterine fibroids.
• NH sponsored non-invasive MRgFUS treatment of bone metastases around metal implants.
• Initiated clinical MRgFUS treatment of vascular malformations.
• Introduced whole body MR exams.
• Clinical deployment of ultra-fast pelvic MRI exams.
• Multi-parametric prostate MRI.

Breast Imaging

Debra Ikeda, MD, FACR

Stanford Breast Imaging began tomosynthesis (3D mammography) in 2013. Since then we are now all 3D in 2015 and see a decrease in false positives and an increase in cancer detection. Stanford formed the California Breast Density Information Group and the website “breastdensity.info” to help women understand breast density. Our research includes a focus on tumor imaging correlated with blood biomarkers or with cancer and stromal genetics. Other work includes non-contrast MRI imaging, a new method of marking positive lymph nodes for surgeons (published in the Annals of Surgical Oncology). Our work with Oncologists and Radiation Oncologists shows MRI helps in patient selection for chemotherapy or radiation therapy regimens. We will soon install new equipment to implement Contrast-enhanced mammography (CEM) a 10 minute “poor person’s” MRI that shows great promise of finding cancer in the dense breast.

ACHIEVEMENTS
• Stanford Breast Imaging and Mammography Section provides the highest standards of clinical excellence in a compassionate, caring environment.
• Stanford Breast Imaging offers Tomosynthesis for 3D mammography – demonstrating our commitment to state-of-the-art imaging for our patients decreasing false positives, increasing cancer detection.
• Contrast-agent-free detection of breast tumors with MRI imaging.
• We are devoted to providing personalized breast care in a holistic manner; to minimize patient discomfort and anxiety.

Cardiovascular Imaging

Dominik Fleischmann, MD

The Cardiovascular Imaging (CVI) Section uses dedicated image post-processing techniques to provide unprecedented 3- and 4-D visualization and quantification of cardiovascular anatomy and pathology to establish an accurate diagnosis and facilitate treatment planning for surgical or endovascular procedures, some of which are pioneered at and unique to Stanford. Our internationally renowned imaging experts in cardiovascular imaging have extensive clinical and research expertise in CT, MR, and Nuclear Medicine imaging technology applied to the clinical management of acquired and congenital cardiovascular diseases.

Also, with a deep understanding of radiation exposure, we are highly trained leaders in promoting the latest dose reduction techniques, thereby allowing us to provide the best quality images under the most advanced conditions for our patients, one at a time.

ACHIEVEMENTS
• Coronary calcium score screening to modify risk factors and stable current disease state.
• Coronary CTA (CCTA) allows coronary artery imaging without coronary catheterization.
• Working together as a team of radiologists, basic scientists, and technologists to reduce radiation exposure according to international safety principles of ALARA (As Low As Reasonably Achievable).
Interventional Radiology
Lawrence “Rusty” Hofmann, MD

Interventional Radiology (IR) offers the entire range of vascular and nonvascular image-guided procedures. We are experts in treating endovascular arterial disease, stenting (expanding) occluded blood vessels, endograft repair of aneurysms, deep vein thrombosis (DVT), and chronic venous occlusions. We also specialize in image-guided tumor treatments including chemoembolization, radiofrequency ablation, cryoablation, NanoKnife ablation, and radioembolization. Our group also provides services to alleviate pelvic pain due to symptomatic fibroids and gonadal vein embolization for pelvic congestion syndrome.

As pioneers of minimally invasive surgery, we employ advanced imaging techniques to eliminate the need for open surgery and allow shorter recovery times.

ACHIEVEMENTS
• IR is the first section in all of Stanford Hospital, to adopt a structured data reporting process for “Big Data” analytics.
• In 2014, the VA Palo Alto Hospital became the first and only VA health care facility nationwide to offer radioembolization to VA patients diagnosed with liver cancer.
• Section Chief, Dr. Rusty Hofmann, is the global-PI on the late Dr. Henry Jones bone tumor collection.
• Our Interventional team conducts clinical trials in the fields of cancer as well as non-cancer.
• IR will launch an Interventional Radiology residency training program in 2018.

Musculoskeletal Imaging
Christopher Beaulieu, MD, PhD

The musculoskeletal section provides state of the art imaging services and special interventions for patients with bone, joint, and soft tissue disorders. Over 65,000 examinations are performed annually including radiography, MRI, CT, US and injection/aspiration procedures. Six full time faculty at Stanford and two faculty at the Palo Alto VA oversee resident and fellow trainees. Research efforts include the development of efficient imaging methods for assessment of arthritis, imaging around metallic implants, imaging of peripheral pain, MR-neurography, and biomarker applications to bone tumor diagnosis.

ACHIEVEMENTS
• Established peripheral nerve imaging “MR neurography” service.
• Pre-clinical implementation of PET-MR for imaging of peripheral pain.
• Digitalization of over 2000 cases of historical studies from the late Dr. Henny Jones bone tumor collection.
• Design and operation of wireless, digital x-ray system of the San Francisco 49ers new Levi’s stadium.
• Multiple NIH grant awards.

Neuroimaging & Neurointervention
Max Wintermark, MD, MAS, MBA

Neuroimaging & Neurointervention consists of 12 world-renowned faculty and 12 fellows who specialize in interpreting imaging studies of the brain, spine, and head and neck. We offer minimally invasive treatment of cerebral aneurysms and other cerebral vascular malformations, stenting of carotid arteries, vertebral-osteopathy, and image-guided biopsy. We have unique expertise in advanced neuroimaging techniques including dual-energy CT, functional MRI, DTI and tractography, spectroscopy, and perfusion imaging.

We are the only Bay Area center to offer the brain “stress test”, advanced blood flow imaging to evaluate cerebrovascular reserve. We offer rapid, dedicated stroke MR and CT imaging to differentiate between completed stroke and “at-risk” tissue, with automated decision support software that has been validated in multicenter trial.

ACHIEVEMENTS
• Development of a new facility for integrated neurological imaging (CT, MRI, and PET-MR) and care, in collaboration with colleagues in Neurology and Neurosurgery.
• Implementation of Visualase combined neurosurgical/neuroradiological MRI procedure for minimally invasive brain surgery.
• Submission of an IND to the FDA to enable combined PET-MR imaging of cerebral blood flow using oxygen-15 water.
• Multiple NIH and industry-sponsored clinical trials, including dual-energy CT, functional MRI, DTI and tractography, spectroscopy, and perfusion imaging.
• Section work on chronic fatigue syndrome is featured in the New York Times as a landmark study pushing the boundaries of understanding this syndrome.
• Section work on traumatic brain injury.

Nuclear Medicine & Molecular Imaging
Andrei Iagaru, MD & Andrew Quon, MD

The Division of Nuclear Medicine and Molecular Imaging at Stanford University Medical Center is a robust imaging center offering a broad range of capabilities including SPECT-CT, PET-CT, PET-MR and radiotraherapy. With the ultimate goal of advancing patient care, our section actively participates in translational research as well as state-of-the-art clinical imaging. We make every effort to support collaborations across academia as well as with the industry. We are committed to improving health through excellence in image-based patient care, research and education.

ACHIEVEMENTS
• Opened a theranostic program for neuroendocrine tumors with 18F DOTATATE (diagnostic) and 177Lu Octreotate (therapy).
• Fully implementing 18F-fluorodeoxyglucose as a therapy option for patients with metastatic castrate resistant prostate cancer.
• Leading PET-MR research program in collaboration with GE Healthcare and other sections in the Department of Radiology.
• Initiated a collaboration with Palo Alto VA to perform amyloid PET to assess the effects of Traumatic Brain Injury (TBI) in Veterans.
• Actively supporting more than 20 novel clinical translational research programs such as 18F FPPRGD2, 18F FLT, 18F FSPG.
• Advocating for dual training in Nuclear Medicine and Diagnostic Radiology. Launched the first such combined residency track in the US.
Pediatric Imaging
Richard Barth, MD

The mission of the Pediatric Radiology Section is to improve the health of children via high resolution imaging for detection and treatment of disease. We are passionately committed to addressing imaging issues unique to children.

Pediatric Radiology at LPH offers a comprehensive program that works every day to improve the health of children through the application of state-of-the-art technology. Fellowship trained pediatric radiologists and a professional staff knowledgeable in delivering high quality pediatric care provide imaging services in a child-friendly environment. In addition to advanced imaging for our patients, we proudly feature a robust research program with projects ranging from basic science to bedside applications. All of our research follows a highly translational trajectory with a singular goal of moving into routine clinical use to improve care for children.

ACHIEVEMENTS

• Dr. Heike Daldrup-Link published results on applications of radiation-free MRI as an alternative to CT scanning.
• Dr. Shreyas Vasanawala introduced rapid acquisition of radiation-free MRI as an alternative to CT scanning.
• Dr. Ann Leung is an invited Member of the Fleischner Society, the Society for Thoracic Imaging and Diagnosis.
• Dr. Leung is also President-elect and Program Committee Chair for the Society of Thoracic Radiology (STR).
• Dr. H. Henry Guo voted 2014 Teacher of the Year.

Thoracic Imaging
Ann Leung, MD

The chest section continues to work toward implementation of clinical and research programs that focus on low-dose CT (LDCT) lung cancer screening. LDCT lung cancer screening, a test for early disease detection for individuals at high risk for lung cancer, is now covered for all privately insured and Medicare beneficiaries (as of February, 2015). In addition to a clinical trial, we are also collaborating with MD Anderson to develop and validate early lung cancer detection biomarker panels.

Additionally, Drs. Guo and Leung work with a multidisciplinary Radiology group that includes Lor Melvin, RT, MBA, Jia Wang, PhD-Physicist, Shannon Walters, RT, and Dominik Fleischmann, MD, Director of CT at Stanford Hospital. This group aims to develop new technology that will optimize imaging results while minimizing radiation dose for each individual who presents for low-dose CT screening at Stanford.

ACHIEVEMENTS

• Our team has achieved a 25% increase in productivity over the last 12 months, improving the timely imaging care of our veterans.
• Dr. Payam Massaband appointed Radiology Residency Program Director for the Department of Radiology.
• Expansion of services offered in Modesto.
• Expansion of services planned in the new Monterey Clinic, scheduled to open in 2016.

VA Radiology
Payam Massaband, MD

The Palo Alto Health Care System is a flagship of the VA for clinical care and maintains one of the top three research programs in the VA. It is a large multispecialty tertiary care center with a 900+ bed system, consisting of three inpatient facilities and seven outpatient clinics throughout northern California and the Bay Area. There are multiple ongoing expansion projects with over $1 billion dollars of capital projects within the next decade. As a major part of the expansion program, we have broken ground on a new radiology department, expected to open in 2017.

The Palo Alto VA serves more than 85,000 veterans including polytrauma, multi-organ system, as well as traumatic brain and spinal cord injury patients. It is these very real clinical needs that drive significant collaborations among faculty and staff at the Palo Alto VA, Stanford Hospital, and Stanford University.

ACHIEVEMENTS

• VA Nuclear Medicine provides a full range of diagnostic and therapeutic procedures using radioisotopes, including general nuclear medicine, PET-CT and SPECT-CT, and cardiac stress tests. Radioisotopic therapy includes sodium I-131 for thyroid disorders, and radium-223 chloride for prostate cancer metastases to the skeleton. In cooperation with Interventional Radiology, Y-90 microsphere therapy for ablation of liver tumors was offered for the first time in January 2015. The Nuclear Medicine Service is a tertiary referral center in VSN-21 for PET-CT and other advanced imaging procedures. Equipment includes 1 PET-CT camera, 3 SPECT-CT cameras, and 2 bone densitometry scanners, one in Palo Alto and one in Livermore.

The Nuclear Medicine Service trains Radiology residents, Nuclear Medicine residents, and Cardiology fellows. It is the only VA Nuclear Medicine Technologist Training Program, and is one of only 2 training programs in Northern California.

ACHIEVEMENTS

• Demonstrating myocardial perfusion of cardiac vessels, including normal wall motion.
• Experts in FDG PET-CT scanning, a critical approach for our patient populations at the Palo Alto Veterans Hospital.
• We continue to train Nuclear Medicine Technologists in the only VA-based training program in the United States.

VA Nuclear Medicine
George Segall, MD

VA Nuclear Medicine is the only VA facility to provide nuclear medicine services at both the Palo Alto VA and Stanford Hospital. It is the only VA-based training program in the United States.

ACHIEVEMENTS

• Demonstrating myocardial perfusion of cardiac vessels, including normal wall motion.
• Experts in FDG PET-CT scanning, a critical approach for our patient populations at the Palo Alto Veterans Hospital.
• We continue to train Nuclear Medicine Technologists in the only VA-based training program in the United States.
Under the leadership of Dr. Sam Gambhir, Chair of Radiology and Dr. Garry Gold, Associate Chair for Research, the Department of Radiology is pleased to provide an overview of the research that our faculty, trainees and staff are engaged in. Our faculty are internationally known for their expertise and lead multiple collaborative programs that embrace a wide range of disciplines within the School of Medicine, across the Stanford campus, and, indeed, throughout the world. Our scientists include experts in areas such as MRI, Ultrasound, CT, X-Ray, PET, SPECT, Spectroscopy, Chemistry, Molecular Imaging, Genomics/Proteomics, Bioinformatics and Computational sciences. Our Department is highly regarded and internationally well-known for its research in the imaging sciences. We have built on that long-established reputation and now present research led by faculty from disciplines that in the past seemed “far out” rather than key for radiology’s expanded interests, especially to our cancer/disease early detection goals. Areas that add significantly to our department include disciplines such as genetics, proteomics, bioinformatics, metabolics, nanosciences, and non-invasive therapeutics.

In this Annual Report Research Section we present highlights of thirty (30) separate research laboratories housed within the four research sections in the Department of Radiology.

I. Canary Center at Stanford for Cancer Early Detection

II. Integrative Biomedical Imaging Informatics at Stanford (IBIIS)

III. The Molecular Imaging Program at Stanford (MIPS)

IV. The Radiological Sciences Laboratory (RSL)
SECTION LEADERSHIP
Sanjiv Sam Gambhir, MD, PhD
Stephanie Van de Ven, MD, PhD

SELECTED FUNDING
The Canary Foundation
Center for Cancer Nanotechnology Excellence and Translation (CCNE-T) – NIH USA
Center for Cancer Nanotechnology Excellence Focused on Therapy Response (CCNE-TR) – NIH U54
Early Cancer Detection Research Network (EDRN) – NIH U01

SELECTED PUBLICATIONS

Canary Center at Stanford
The Canary Center at Stanford is a newly opened world-class facility dedicated to cancer early detection research programs. The mission of the center is to foster research leading to the development of blood tests and molecular imaging approaches to detect and localize early cancers. The center is the first in the world to integrate research on both in vivo and in vitro diagnostics to deliver these tests, by housing state-of-the-art core facilities and collaborative research programs in molecular imaging, proteomics, chemistry, and bioinformatics. These initiatives have extensive links to the Cancer Center at Stanford, forming a direct pipeline for the translation of early cancer detection research into clinical trials and practice.

ACHIEVEMENTS
• The Pre-Clinical Imaging core at the Canary Center opened this year (2015) adding animal imaging to the Proteomics, Chemistry and Cell and Molecular Biology facilities.
• Dr. Utkan Demirci joined the Canary Center Faculty in April of 2014. Dr. Demirci’s lab focuses on applying micro- and nanoscale technologies to problems in medicine.
• The Associate Faculty membership has expanded to over 20 faculty including clinicians, cancer biologists, and engineers.
• As part of our efforts to train the next generation of scientists, we offer a paid and unpaid summer internship program.
• Tom Soh recruited from UCSB. His research focuses on portable, rapid, and sensitive diagnostic platforms.
One of the greatest achievements in medicine is the remarkable progress that has been made in understanding, diagnosing, monitoring, and treating disease conditions. Our work focuses on creating innovative micro/nanoscale technologies to understand and target broad medical challenges. Our lab has a strong and scholarly track record of multiple creative innovations. We have developed tools for detecting cells, infections in patients on dialysis, and cancer biomarkers. We have also created microfluidic tools to mimic the cancer microenvironment investigating tumor metastatic behavior. Specifically, using these unique tools, we have created new approaches detecting oncogenic viral load using intact viruses as an alternative to nucleic acid amplification methods. Notably, many of the studies in our group are investigating fundamental physiological processes and thus are generally applicable to a range of cell-types and diseases.

**ACHIEVEMENTS**

- Differentiating cancer cells by utilizing levitation-based sorting system.
- Engineering nanoplasmonic surfaces to detect and quantify biotargets down to fg/mL levels.
- Integrating a cell phone with paper & flexible detection systems for point-of-need diagnostics.
- Developing microfluidic chips to monitor viral and bacterial infections in blood and produce supply.
- Generating 3-dimensional tissue construct using acoustic wave techniques.
- Cryopreserving distinct cell types.
- Portable holographic imaging system for biological objects.

**Demirci BAMM Lab**

Utkan Demirci, PhD

The Mallick lab focuses on translating multi-omic discovery into precision diagnostics. In particular, we use tightly integrated computational and experimental approaches to identify cancer biomarkers that can be used to detect cancers earlier and describe how they are likely to behave (i.e., aggressive vs indolent, drug sensitive vs resistant). We are specifically working in three focus areas: Cancer Systems Biology, Multi-scale Biomarker Biology and Technology Development. Notably, many of the studies in our group are investigating fundamental physiological processes and thus are generally applicable to a range of cell-types and diseases.

**ACHIEVEMENTS**

- Development of the ProteoWizard Software Toolkit, a set of open-source, cross-platform tools and software libraries that facilitate multi-omic data analysis.
- Statistical model that predicts the likelihood of detecting a putative protein biomarker in the blood.
- Micro-environment dependent mathematical model of tumor evolution predicting outgrowth of aggressive cells in nutrient starved tumor regions.
- Collection and analysis of the first multi-scale dataset spanning the molecular to organismic scales.

**Multi-scale Diagnostics Lab**

Parag Mallick, PhD

The Pitteri laboratory is focused on the discovery and validation of proteins and other molecules that can be used as indicators of cancer risk, diagnosis, progression, prognostication, and recurrence. Proteomic technologies, predominantly mass spectrometry, are used to identify proteins in the blood that are differentially regulated and/or post-translationally modified with disease state. A major goal of this research is to define novel molecular signatures for breast, prostate, and ovarian cancers, including particular sub-types of these diseases. We enjoy many collaborations with clinicians and other scientists to address challenges and opportunities in cancer early detection. Areas of particular interest and well established clinical interests include those with the breast imaging section, oncology groups and the Cancer Prevention Institute of California.

**ACHIEVEMENTS**

- Working with the breast imaging section, we have collected blood samples from 50 women with suspicious breast lesions to identify biomarkers of malignant versus benign lesions.
- Using state-of-the-art technologies we have measured levels of thousands of proteins in the blood to determine person-to-person and technical variation of protein levels in the blood.
- We are dedicated to discovering new blood-based diagnostic tests for breast and prostate cancers to improve early detection and prognostication.

**Cancer Molecular Diagnostics Lab**

Sharon Pitteri, PhD
SECTION LEADERSHIP
Sandy Napel, PhD
Sylvia Plevritis, PhD

SELECTED FUNDING
NIH R01CA160251-06: Tools for Linking and Mining Image and Genomic Data in Non-Small Cell Lung Cancer
NIH U01CA142555-05: Computerized Quantitative Imaging Assessment of Tumor Burden
NCI R01CA160251-05: Tools for Linking and Mining Image and Genomic Data in Non-Small Cell Lung Cancer

SELECTED PUBLICATIONS

Integrative Biomedical Imaging Informatics at Stanford (IBIIS)

The Integrative Biomedical Imaging Informatics at Stanford (IBIIS) section of the Department of Radiology focuses on pioneering, translating and disseminating methods utilizing the imaging information sciences to better understand health and disease, and to improve clinical care. Our research spans automated image interpretation, knowledge extraction from natural language radiological reports, radiological decision support, correlation of imaging appearance with molecular components of tissue, novel imaging-based biomarkers of disease and response to therapy, data-driven models of cancer progression, and evaluation of cancer screening programs.

ACHIEVEMENTS
• Databases linking images to molecular properties of tumor tissue for lung cancer, glioblastoma (brain cancer), and liver cancer
• New tools to extract semantic and quantitative information from images and narrative clinical documentation, including radiology reports
• New grants awarded for developing tools and databases for quantitative imaging, and for training the next generation of researchers in cancer systems biology
• Recruitment of a new senior faculty specializing in knowledge extraction from natural language medical reports
• Expansion of IBIIS laboratory space in the James H. Clark Center, home of Stanford’s flagship multidisciplinary Bio-X program
Our lab focuses on developing new techniques to determine diagnosis and to predict prognosis, response to treatment, and outcomes. This involves the development of algorithms to make image features (e.g., volumes, lengths, shapes, edge sharpness, curvatures, textures) computer-accessible, the building of integrated databases combining features of multidimensional radiological images and other clinical data, including molecular assays of biopsies and/or resected tissue, and machine learning algorithms to make inferences from the integrated data. Ultimately, we aim to translate these developments into clinical applications, including medical content-based image retrieval and decision support systems for radiologists. We primarily work with cross-sectional images, including CT, MR, and ultrasound, and specialize in cancer imaging, focusing mostly on lung, liver, and brain cancer.

Radiological Image & Information Processing

Sandy Napel, PhD

Our lab focuses on developing new techniques to determine diagnosis and to predict prognosis, response to treatment, and outcomes. This involves the development of algorithms to make image features (e.g., volumes, lengths, shapes, edge sharpness, curvatures, textures) computer-accessible, the building of integrated databases combining features of multidimensional radiological images and other clinical data, including molecular assays of biopsies and/or resected tissue, and machine learning algorithms to make inferences from the integrated data. Ultimately, we aim to translate these developments into clinical applications, including medical content-based image retrieval and decision support systems for radiologists. We primarily work with cross-sectional images, including CT, MR, and ultrasound, and specialize in cancer imaging, focusing mostly on lung, liver, and brain cancer.

Cancer Systems Biology Lab

Sylvia Plevritis, PhD

Our laboratory develops computational methods and tools to discover imaging biomarkers of disease that enable precision medicine. We translate our discoveries into practice through decision support applications to reduce variation in clinical care and to improve patient outcomes. Our work spans the spectrum from basic science discovery (discover image phenotypes to define subtypes of diseases and to understand their molecular characteristics) to clinical practice through translational research (decision support, disease profiling, treatment response assessment, and personalized treatment selection). Our vision is that computational approaches to mining large collections of images will reveal knowledge that drives scientific discovery and guides clinical practice. Our ultimate goal is to bring cutting-edge radiological data and knowledge into practice for precision care of patients.

Quantitative Imaging Laboratory

Daniel Rubin, MD, MS

Our laboratory views cancers, ophthalmology (predict progression of eye disease), and radiology (deep learning methods to automatically detect breast masses in mammograms).
Molecular Imaging Program at Stanford (MIPS)

Our continuing vision for the Molecular Imaging Program at Stanford (MIPS) has been to bring molecular imaging technologies to basic science cancer researchers – to create an environment in which non-invasive imaging technologies that permit longitudinal studies of tumor initiation, progression, metastasis and response to therapy would be adopted by basic scientists studying cancer. Within the MIPS program, we continue to develop animal models of cancer in which molecular imaging adds new dimensions to experimental design and allows investigators to acquire time-dependent data that could not be obtained in any other way. The MIPS program is supported by numerous funding sources, including the National Institutes of Health, multiple foundations, and strong industry partnerships. Since the inception of MIPS (2003), we have followed a clearly defined roadmap toward translating our work into clinical use to benefit patients.

In the following pages, our Radiology faculty describe their research, introduce their research teams, and share a few milestone achievements that they have made. A complete listing of sponsored research awards can be found beginning on page 100.
Molecular Imaging of Nociception and Inflammation Lab
Sandip Biswal, MD

Chronic pain sufferers are unfortunately limited by poor diagnostic tests and therapies. Our lab is interested in ‘imaging pain’ by using multimodality molecular imaging techniques to study nociception and neural inflammation as a means of improving objective, image-guided diagnosis and treatment of chronic pain disorders. We develop new molecular contrast agents for use in positron emission tomography (PET) and magnetic resonance imaging (MRI), working towards eventual clinical translation. The overarching goal of our efforts is to develop an imaging approach that will pinpoint the exact cause of one’s pain, improve outcomes of pain sufferers and to help develop new chronic pain treatments.

ACHIEVEMENTS
• Running 2 clinical imaging trials to better identify chronic pain generators which study the use of [18F]-FDG PET-MR and SPIO MRI in the diagnosis of increased nociceptive activity and neural inflammation in patients with Complex Regional Pain Syndrome (CRPS) and chronic sciatica.
• With collaborators Fred Chin and Chris McCurdy, we have received FDA approval for a Phase 0 exploratory IND trial studying the biodistribution of a novel nerve injury imaging agent; FTC-146, in healthy volunteers and an Investigational New Drug (IND) trial studying the biodistribution of a novel nerve injury imaging agent; FTC-146, in healthy volunteers and chronic pain patients using PET-MR.

Cancer Molecular Imaging Chemistry Laboratory
Zhen Cheng, PhD

The main research of the Cancer Molecular Imaging Chemistry Laboratory (CMIML) is to develop novel multimodality techniques and theranostic agents for early detection and treatment of cancer, cardiovascular and neurological diseases. Currently, we are actively working on several research projects in the field of molecular imaging: 1) Molecular probe development based on novel protein scaffolds and small molecules; 2) Novel optical imaging techniques such as Cerenkov luminescence imaging, and MRI-MRI imaging for detection and image guided surgery; 3) Theranostic nanoparticles such as new QDs, next generation IO nanoparticles (IONPs), dumbbell Au-IONPs, etc.

ACHIEVEMENTS
• Developed several clinical translatable PET probes for cancer, cardiac and neurological diseases imaging.
• Developed a new class of small molecule based dyes for in vitro and in vivo near infrared window II imaging.
• Establishing Cerenkov luminescence imaging (CLI) as a new approach for bioimaging and further developing new molecular probes for CLI.
• Developed new platforms such as melanin nanoparticles, gold-tripod nanoparticles, Au-Iron oxide heterostructures, Perylene-dimide-based nanoparticles for cancer multimodality imaging and theranostics.

TRACER for Molecular Imaging Laboratory
Frederick Chin, PhD

The Translational Radiopharmaceutical Sciences and Chemical Engineering Research (TRACER) for Molecular Imaging Laboratory’s specialized synthetic chemistry laboratory focuses on advancing radiopharmaceutical sciences for the expanding field of molecular imaging. We design and synthesize novel radioligands/radiotracers that bind to molecular targets related to specific nervous system (central and peripheral) disorders and cancer biology. In addition, new radiosynthesizing techniques and methodologies are created in our lab for emerging radiopharmaceutical development as well as for the general radiochemistry community. These radiochemistry approaches are coupled with innovative chemical engineering to further investigate new molecular imaging strategies. Successful imaging agents are also extended towards human clinical applications including disease detection and drug therapy.

ACHIEVEMENTS
• Two NIH awards: “Small Animal PET System (S10)” and “Cross-Species Multi-Modal Neuroimaging to Investigate GABA Physiology in Fragile X Syndrome.”
• FDA-approved New Drug Applications to translate PET radiotracers for human studies.
• Exploratory Investigational Drug 126459 for [18F]PETC-146-
• Investigational New Drug 126903 for [18F] Flumazenil.

Translational Tumor and Stem Cell Imaging Lab
Heike Daldrup-Link, MD

Our research program focuses on the interaction of cell biology, nanomedicine and medical imaging to develop novel platforms for understanding, diagnosis, and successfully treating diseases in pediatric patients. A number of these novel imaging technologies have been successfully translated from our basic science lab to clinical imaging applications, thereby creating direct value for our pediatric patients.

In addition to our achievements listed below, through collaborations with investigators from nine Departments at Stanford University, we recently launched a major initiative on the diagnosis and repair of cancer-therapy induced damage to the brain, heart and bones in pediatric cancer survivors.

ACHIEVEMENTS
• Nanoparticles for clinical oncology: MR imaging of tumor associated microvessels, image-guided cancer therapy without side effects.
• Radiation-free whole body staging of children with cancer.
• Immediately clinically applicable techniques for stem cell imaging (US14/161,315 and US14/210,752).
• Our team produced four books, over 100 publications, 5719 citations and 77 honors and awards.
Multimodality Molecular Imaging Laboratory
Sanjiv Sam Gambhir, MD, PhD

The Multimodality Molecular Imaging Lab focuses on developing novel imaging modalities including, for example, PET imaging, bioluminescence optical imaging, fluorescence optical imaging, Raman spectroscopy and photoacoustic imaging to understand the molecular mechanisms of various diseases particularly cancer. More recently the lab has been developing blood based diagnostics that would complement existing imaging strategies and aid in early cancer detection.

Our goals are to marry fundamental advances in molecular cell biology with those in biomedical imaging to advance the field of molecular imaging. We have a particular interest in cancer biology and gene cell therapy. Research in early cancer detection and pharmacological therapy assessment is also being performed.

ACHIEVEMENTS

- First photoacoustic imaging trial in humans for prostate cancer using transrectal combined ultrasound/photoacoustic instrumentation.
- Developed a new PET tracer for imaging activated T-cells for use in immunotherapy with proof of principle in Graft vs. Host disease.
- Developed several new photoacoustic imaging agents for prostate and thyroid cancers with testing in small animal models.
- Developed a new PET imaging agent for glioblastoma based on targeting PKM2.

Molecular Imaging Instrumentation Laboratory
Craig Levin, PhD

To create novel instrumentation and software algorithms for in vivo imaging of molecular signatures of disease in living subjects. These new cameras efficiently image emissions from molecular contrast agents to probe disease biology in tissues residing deep within the body using measurements made from outside the body. The technology goals are to advance the sensitivity and spatial, spectral, and/or temporal resolutions, to create new camera geometries for special biomedical applications, to understand the entire imaging process comprising the subject tissues, radiation transport, and imaging system, and to provide the best available image quality and quantitative accuracy. The ultimate goal is to introduce these new imaging tools into studies of molecular mechanism and treatments of disease in living subjects.

ACHIEVEMENTS

- Completed the world’s first radio frequency-penetrable positron emission tomography (PET) insert for simultaneous PET-MR; awarded a new NIH R01 grant to build a brain imaging PET insert employing this concept.
- Built a new section of the world’s first 1 mm resolution clinical PET system.
- Discovered a new method for detecting ionization created from 511 keV photons for PET.
- Developed a scalable technology to consistently achieve 200 psec coincidence time resolution for time-of-flight PET.

Lab of Experimental and Molecular Neuroimaging
Tarik Massoud, MD, PhD

In the LEMNI laboratory we focus on molecular and translational imaging of the brain especially in neuro-oncology. We are interested in developing novel experimental and molecular imaging techniques for theranostic applications in glioblastoma multiforme (GBM), to both interrogate fundamental cellular and molecular biological events, and to use in new anti-cancer therapeutic strategies. Generally, this includes the in vivo imaging of gene expression using reporter assays, protein-protein interactions, and signal transduction, as well as cellular and nano-imaging. Other emerging more specific research interests relate to animal modeling of gliomas, new glioma radiotracer development, studying the p53 transcriptional network in GBM, imaging protein folding and misfolding in cancer, and development of novel nanoparticle-based drug and microRNA formulations for ultra-targeted therapeutic strategies in endovascular neuro-oncology applications.

ACHIEVEMENTS

- Development of a novel molecular biosensor based on split reporter gene technology to image protein folding and misfolding in cancer, and development of novel nanoparticle-based drug and microRNA formulations for ultra-targeted therapeutic strategies in endovascular neuro-oncology applications.
- Developing in vivo imaging methods to study cellular histone methylation by reporter protein complementation and degron-protease blockade sensors.
- Developing FDA approved polymer nanoparticles to co-deliver tumor suppressor microRNAs and chemotherapeutic drugs to improve cancer chemotherapy and to prevent metastasis.
- Developing FDA approved polymer nanoparticles to co-deliver tumor suppressor microRNAs and chemotherapeutic drugs to improve cancer chemotherapy and prevent metastasis.
- Developing polymer nanoparticles to co-deliver tumor suppressor microRNAs and chemotherapeutic drugs to improve cancer chemotherapy and prevent metastasis.
Jianghong Rao, PhD

Research in the Rao lab focuses on developing novel molecular imaging techniques with chemical, physical and biological tools, to better understand fundamental biological events in living objects. We are interested in applying new chemistry to develop novel molecular probes for imaging the activity and functions of molecular targets, with a special interest in early disease diagnostic and therapeutic interventions. Some of the recent highlights from our lab include:

• Designed cheaper, faster, and more accurate test to identify gene defects in heart patients
• Developed an imaging-guided drug delivery approach for therapy of hepatocellular carcinoma (HCC)
• Initiation of the first-in-man clinical trial using these novel contrast agents in men with prostate cancer.

ACHIEVEMENTS

• Dr. Toshiyuki Kowada receives postdoctoral fellowship from the Naito Foundation.
• Dr. Adam Shuhendler received Young Investigator Award to the 2014 World Molecular Imaging conference in Seoul, and Young Investigator Award at 2015 SNMMI Annual meeting in Baltimore.
• Dr. Yunfeng Cheng developed new probes for real-time imaging of drug-induced hepatotoxicity, and the work has been highlighted in Science and also a patent has been filed by Stanford.

Translational Molecular Imaging Laboratory

Juergen Willmann, MD

The Willmann lab develops and tests ultrasound molecular imaging for identifying and monitoring diseases with the goal of translating this approach to clinical use. This novel imaging modality employs intravascular contrast microbubbles which are modified to bind to regions of the diseased vasculature expressing unique proteins. Using these microbubbles, we can detect small foci (<1mm) of pancreatic and breast cancer and can monitor regions of disease bowel undergoing active inflammation. We have also successfully explored their use as a drug delivery vehicle for cancer therapy. Finally, our lab has started the first-in-human clinical trial using these novel contrast agents in men with prostate cancer.

ACHIEVEMENTS

• Performed the first ever clinical KDR-targeted 3-D ultrasound molecular imaging trial in 14 patients with biopsy proven prostate cancer.
• Translated a selectin-targeted ultrasound molecular imaging trial to a large animal (pig) model of acute distal ileitis to assess disease activity in inflammatory bowel disease.
• Generated a dual-modality acoustic/photoacoustic & Tf-H3-targeted imaging approach for earlier breast cancer detection.
• Developed an imaging-guided drug delivery approach for therapy of hepatocellular carcinoma (HCC).
• Initiation of the first in the world clinical trial on 3D perfusion imaging of liver metastases in patients with colorectal cancer.

Cardiovascular Gene and Cell Therapy Laboratory

Joseph Wu, MD, PhD

The Wu lab studies the biological mechanisms of adult stem cells, embryonic stem cells, and induced pluripotent stem cells. We use a combination of next generation sequencing, tissue engineering, physiological testing, and molecular imaging technologies to better understand stem cell biology in vitro and in vivo. For adult stem cells, we are interested in monitoring stem cell survival, proliferation, and differentiation. For embryonic stem cells, we are currently studying their tumorigenicity, immunogenicity, and differentiation. For induced pluripotent stem cells, we are interested in cardiovascular disease modeling, drug screening, and cell therapy. We also develop novel vectors and therapeutic genes for cardiovascular gene therapy applications.

ACHIEVEMENTS

• Performed “clinical trial in a dish” using patient-specific iPSCs to understand drug cardiotoxicity
• Designed cheaper, faster, and more accurate test to identify gene defects in heart patients
• Evaluated DNA damage seen in patients undergoing CT scanning
• Used ethnic specific iPSC-heart cells for studying ALDH2 genetic polymorphisms
• Demonstrated modeling of familial hypertrophic cardiomyopathy with disease-specific iPSCs
SECTION LEADERSHIP
Gary Glover, PhD
Kim Butts Pauly, PhD

SELECTED FUNDING
NIH 1 P41EB15891: Center for Advanced Magnetic Resonance Technology at Stanford (CAMRT)
NIH 5 T32CA009692: Stanford Cancer Imaging Training (SCIT) Program
Multiple funding sources from Industry and Other Departments

SELECTED PUBLICATIONS
Featured cover paper.

Radiological Sciences Laboratory (RSL)

The RSL comprises 11 faculty and approximately 90 graduate and postdoctoral trainees research staff and others devoted to advancing imaging technology for diagnostic, basic science and therapeutic applications within the department and in collaborations across campus and beyond. Our research topics include MRI, CT, Digital X-ray, ultrasound and imaging-guided therapy. In addition to its basic research, the RSL administers the Lucas MRI Service Center, which is in its 22nd year offering scan capabilities to the local and extended community.

ACHIEVEMENTS
• Established a new Metabolic Imaging Center with MRI/PET scanner and 13C Spinlab hyperpolarizer, capable of concurrent acquisition of all three modalities. Initial study investigating Major Depression Disorder using radio-labeled 11C and fMRI to examine neural hyperactivity.
• Recruited new faculty member Jeremy Dahl, PhD and established ultrasound imaging lab at Porter Drive.
• The NIBIB-funded Center for Advanced MR Technology (PI Glover) was renewed for its 5th five year period by site visit in March 2015.
ACHIEVEMENTS


Functional Neuroimaging Laboratory
Gary Glover, PhD

The Functional Neuroimaging lab’s research is directed, in part, towards exploration of rapid magnetic resonance imaging methods using spiral and other non-Cartesian k-space trajectories for mapping cortical brain function (fMRI). One fMRI contrast utilizes the hemodynamic response to altered brain metabolism invoked by various stimuli or in the resting state, with applications in the basic neurosciences as well as for clinical biomarkers. Challenges in developing these techniques include optimizing trade-offs between sparse sampling, contrast to noise ratio, and temporal/spatial resolution, and in combining fMRI with other modalities, including positron emission tomography and electroencephalography. We are very interested in mitigating confounds such as cardiac and respiration effects, and are also exploring neuromodulation with transcranial magnetic stimulation, transcranial DC stimulation and optogenetics.

ACHIEVEMENTS

• Received a major NIH R01 award to study the development of Osteoarthritis
• Developed new software tools for assessment of tissue breakdown in the knee related to cartilage
• First direct measurement inertial forces in joints using phase contrast MRI
• First PET-MRI trials of imaging knee Osteoarthritis
• Studied cartilage material properties using T1p dispersion MRI
• Published consensus guidelines for use of imaging tools in the study of hip, knee, and hand Osteoarthritis

Joint and Osteoarthritis Imaging with Novel Techniques
Gary Gold, MD

The JointLab’s research is focused on improving imaging of musculoskeletal conditions including osteoarthritis. We would like to detect disorders at an early stage when intervention is more likely to be successful. Our work improves the accuracy of detection of musculoskeletal disease as well as functional imaging of bones, muscles, and joints under loaded conditions. Current projects include MRI imaging of osteoarthritis, improved imaging around metal, and new methods of imaging the joint using weight-bearing CT. We are also exploring the use of gait retraining to treat osteoarthritis as well as two-photon microscopy of cartilage.

ACHIEVEMENTS

• Received a major NIH R01 award to study the development of Osteoarthritis
• Developed new software tools for assessment of tissue breakdown in the knee related to cartilage
• First direct measurement inertial forces in joints using phase contrast MRI
• First PET-MRI trials of imaging knee Osteoarthritis
• Studied cartilage material properties using T1p dispersion MRI
• Published consensus guidelines for use of imaging tools in the study of hip, knee, and hand Osteoarthritis

Body MRI Research Group
Brian Hargreaves, PhD

Our research links basic science with clinical MRI and industry product development in an effort to provide improved techniques for patient care. One focus area is breast MRI, where high spatial-resolution imaging at high frame rates is needed to distinguish tumors based on perfusion differences. We also are developing high-resolution 3D methods to detect tumors based on limited water diffusion, in both breast and body imaging. Separately we work on novel rapid and quantitative knee imaging approaches to characterize and study early osteoarthritis.

ACHIEVEMENTS

• Developed non-invasive MRI guidance and temperature measurements for MR-guided Focused Ultrasound surgery in patients who have implanted metal devices.
• Awarded 2 major grants for MRI assessment of complications near total joint replacements and developed interactive MRI methods that work in the presence of metal devices.
• Implemented robust, high-resolution whole-body MRI methods for PET-MRI.
• Ongoing development and clinical utilization of high-resolution breast MRI techniques for earlier/more accurate detection of breast cancer.
• Continued development of new MRI methods to assess early osteoarthritis in knee tissues.

Inverse Geometry CT and Conventional CT
Norbert Pelc, ScD

The Pelc lab focuses on computed tomography. One major project currently underway is a multi-site project to demonstrate technology capable of achieving significant dose reduction. Our own focus is on the use of dynamic x-ray sources to personalize the x-ray illumination used for each study and on the design and performance requirements of photon counting x-ray detectors. We are also working on spectral CT and are studying the limits of iterative reconstruction. On the applications front, we are examining the accuracy and reproducibility of brain perfusion studies. At a high level, our goal is to improve the quality of CT images, reduce the radiation dose, and develop clinical applications.

ACHIEVEMENTS

• We received a major U01 award from NIH for research in High Dose-Efficiency Computed Tomography.
• Dynamic pre-patient attenuators can reduce CT dose and improve material characterization with photon counting detectors.
• We explored the performance requirements for photon counting detectors and evaluated utility of depth segmentation.

Radiology Annual Report 2014-15
Research Sections
Laboratory for Ultra-High-Field MRI of Human Brain Microstructure
Jennifer McNab, PhD

The central mission of the McNab Lab is to develop magnetic resonance imaging (MRI) techniques that probe the structural and functional architecture of the human brain. This requires new MRI contrast mechanisms, strategic encoding/reconstructions schemes, brain tissue modeling and validation. Our current research focuses on the development of MRI pulse sequences and analysis strategies that capitalize on the benefits of ultra high field (7T) MRI and stronger and faster magnetic gradient technology. Specific neurological targets include cerebral cortical fiber patterns, axon diameters and density and high-resolution maps of resting state connectivity.

ACHIEVEMENTS
- Established the impact of gradient strength on MRI estimates of axon diameter.
- Determined optimal q-space sampling for diffusion spectrum imaging.
- Demonstrated the contribution of lipids to MRI contrast mechanisms.
- Developed improved in vivo 1H MRS methods for glioma treated with Avastin.
- Identified in vivo liver metabolic changes in Nonalcoholic steatohepatitis (NASH) using hyperpolarized 13C MRS.

Ultra-High-Field Magnetic Resonance Imaging Research Laboratory
Brian Rutti, PhD

The overall goals of the Rutti Lab are to develop, optimize and exploit ultra high field (7T) whole body MRI in a variety of research applications, starting with the broad area of neuroimaging but progressing to other anatomical regions and applications. MRI imaging at such high magnetic fields faces a number of significant technical challenges that have slowed its widespread application. The objectives of the group are to conceive, implement and apply novel strategies that solve these technical challenges, and then to develop methods that will enable routine high quality MRI imaging at 7T. Our longer term aim is to employ these technical developments to study fundamental structural, physiological, metabolic and functional changes associated with important human diseases of the brain and eventually other anatomical regions.

ACHIEVEMENTS
- Developed new parallel transmit MRI methods for 7T MRI.
- Developed new “focused RF” methodology for targeted hyperthermia.
- Developed novel thermoacoustic methods for mapping absorbed power in MRI.
- Designed, analyzed and built high performance head gradient technology.
- Developed new sequences and post-processing methods that delineate thalamic nuclei and characterize T1 relaxation.
- Demonstrated benefits of 7T MRI in studying Alzheimer disease.

The Spielman Laboratory for MRS and Multinuclear Imaging
Daniel Spielman, PhD

Magnetic resonance imaging (MRI) and spectroscopy (MRS) provide a wealth of information spanning spatial scales ranging from gross anatomy to biochemical processes. The Spielman laboratory focuses on the acquisition of spectroscopic data providing an in vivo window into metabolism. Our current research efforts are on using 1H and 13C spectroscopy to measure neuroenergetics and neurotransmitter function in the human brain and metabolic imaging of small animal models using hyperpolarized 13C MRS. Applications of his work include diagnosis and understanding of neurodegenerative and psychiatric disorders, cancer detection and treatment monitoring, and metabolic studies of the brain, heart, and liver.

ACHIEVEMENTS
- Acquired the first simultaneous in vivo PET and hyperpolarized 13C MRS study of a prostate cancer model using GE Healthcare’s new 3T PET-MRI system.
- Developed a new approach for measuring neuroenergetics and neurotransmitter cycling throughout the human brain using 13C MRS.
- Identified in vivo liver metabolic changes in Nonalcoholic steatohepatitis (NASH) using hyperpolarized 13C MRS.
- Developed hyperpolarized 13C MR spectroscopic imaging method to detect early response to therapy for glioma treated with Avastin.
- Developed improved in vivo 1H MRS methods for measuring GABA, the primary inhibitory neurotransmitter in the human brain.

Clinical Center for Advanced Functional Neuroimaging (CAFN)
Michael Moseley, PhD

CAFN develops and implements powerful MRI tools to understand the basic foundations of the human brain, map neural anatomical and vascular microstructures via functional network connectivities, and thus diagnose and treat complex neurological diseases in individual patients. We do so by fostering many interdepartmental and international collaborations all focused on bringing cutting edge of MRI imaging to our patients. Our tools include high-resolution diffusion mapping of abnormal brain development and loss of function, rapid and non-contrast blood flow and oxygenation mapping, time-resolved connectivity of the brain’s many networks, and resolving the brain’s inherent CSF and flow dynamics for intracranial pressure mapping. In an era of brain research, our mission is to improve investigation and treatment of disorders of the nervous system.

ACHIEVEMENTS
- Refined arrays of novel non-contrast agent CBF blood flow methods for clinical diseases of the CNS.
- Created and applied a clinical time-resolved method to map the brain’s neural circuitry and metabolic oxygenation in patients with CNS disease.
- Collaborated with LPCH Children’s Hospital to use spectral image processing to map 8 different brain functions from a single scan.
- Clinical adoption of our high-resolution diffusion protocols all motion-corrected for advanced diffusion MRI.
- Implemented functional network mapping to perform a full personalized patient brain network analysis within 60 seconds.
## Sponsored Research
### New Awards 2014-15

<table>
<thead>
<tr>
<th>Year</th>
<th>Principal Investigator</th>
<th>Funding Agency</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>Bammer/Fleischmann</td>
<td>NIH</td>
<td>R21 (MPI) Cardiac Diffusion Imaging for Heart Transplant Surveillance</td>
</tr>
<tr>
<td>2014</td>
<td>Chin, Frederick T</td>
<td>NIH</td>
<td>S10 Small animal PET system for molecular imaging of rodent and primate</td>
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<tr>
<td>2015</td>
<td>Chin, Frederick T</td>
<td>NIH</td>
<td>R01 Cross-Species Multi-Modal Neuroimaging to Investigate GABA Physiology in Fragile X Syndrome</td>
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<tr>
<td>2015</td>
<td>Dahl, Jeremy</td>
<td>NIH</td>
<td>R01 Catechol Suppression in Echocardiography Using Short-Lag Spatial Coherence Imaging</td>
</tr>
<tr>
<td>2015</td>
<td>Dahl, Jeremy</td>
<td>NIH</td>
<td>R01 Improved Image Quality of Focal Liver Lesions Using the Coherence of Ultrasound</td>
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<tr>
<td>2015</td>
<td>Daldrup-Link, Heike E</td>
<td>NIH</td>
<td>R01 Personalized Whole Body Imaging for Children with Cancer: A Solution to the Conundrum of Long-Term Side Effects from CT and PET-CT Scans</td>
</tr>
<tr>
<td>2015</td>
<td>Daldrup-Link, Heike E</td>
<td>NIH</td>
<td>R21 Tracking Mesenchymal Stem Cells with MR Imaging: Clinical Translation</td>
</tr>
<tr>
<td>2015</td>
<td>Daldrup-Link/Rao</td>
<td>NIH</td>
<td>R21 Development of Novel Activatable Theranostic Nanoparticles for combined Cancer MR</td>
</tr>
<tr>
<td>2015</td>
<td>Dutta, Gajanan Keshava</td>
<td>NIH</td>
<td>F31 Improved metabolic imaging using hyperpolarized 13C MR Substrates</td>
</tr>
<tr>
<td>2014</td>
<td>Demirci, Utkan</td>
<td>NIH</td>
<td>R01 Minimizing the role of cytotoxicity for cryopreservation</td>
</tr>
<tr>
<td>2014</td>
<td>Demirci, Utkan</td>
<td>NIH</td>
<td>R01 Novel disposable microchips for HIV-1 viral load</td>
</tr>
<tr>
<td>2015</td>
<td>Fahrig, Rebecca</td>
<td>NIH</td>
<td>R01 Weight-Bearing Imaging of the Knee Using C-Arm CT</td>
</tr>
<tr>
<td>2014</td>
<td>Gambhir, Sanjit Sam</td>
<td>NIH</td>
<td>R01 Optimization of an actuarial photoacoustic agent to image thyroid cancer</td>
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<tr>
<td>2015</td>
<td>Gambhir/Fishker</td>
<td>NIH</td>
<td>R01 Modeling and Predicting Therapeutic Resistance of Cancer</td>
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<tr>
<td>2015</td>
<td>Gold, Gary Evan</td>
<td>NIH</td>
<td>R01 Osmoassay: Quantitative Evaluation of Whole Joint Disease with MRI</td>
</tr>
<tr>
<td>2014</td>
<td>Hargreaves, Brian Andrew</td>
<td>NIH</td>
<td>R01 Comprehensive MRI near Total Joint Replacements</td>
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<tr>
<td>2014</td>
<td>Hargreaves, Brian Andrew</td>
<td>NIH</td>
<td>R01 Quantitative 3D Diffusion and Relaxometry MRI of the Knee</td>
</tr>
<tr>
<td>2015</td>
<td>Ghanem/Ghoseva</td>
<td>NIH</td>
<td>R21 (MPI) MR Guided Focused Ultrasound Surgery near Metal Implants</td>
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<tr>
<td>2015</td>
<td>James, Michelle</td>
<td>NIH</td>
<td>R21 New PET imaging agent for monitoring treatment response in Alzheimer's disease</td>
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<tr>
<td>2014</td>
<td>Joukett, Lone</td>
<td>NIH</td>
<td>K99 A Therapeutic Tool for Ultrasound-Guided Stem Cell Therapy</td>
</tr>
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<td>2014</td>
<td>Korshunov, Sri Rajasekhar</td>
<td>NIH</td>
<td>K99 Transcranial Ultrasound and Photothermal Imaging of Prostate and Molecular Imaging Approach</td>
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<tr>
<td>2015</td>
<td>Pule, Nober A J</td>
<td>NIH</td>
<td>U01 High Dose Efficiency CT System</td>
</tr>
<tr>
<td>2015</td>
<td>Raai/Fishker</td>
<td>NIH</td>
<td>T32 (MPI) Cancer-Translational Nanotechnology Training Program (Cancer-TNT)</td>
</tr>
<tr>
<td>2015</td>
<td>Rubins, Daniel L</td>
<td>NIH</td>
<td>R01 Qualification and Deployment of Imaging Biomarkers of Cancer Treatment Response</td>
</tr>
<tr>
<td>2015</td>
<td>Spuldman, Daniel Mark</td>
<td>NIH</td>
<td>R01 Imaging Brain Metabolism Using MRIs of Hyperpolarized 13C-Pyruvate</td>
</tr>
<tr>
<td>2015</td>
<td>Spuldman, Daniel Mark</td>
<td>NIH</td>
<td>R21 Novel MRIs for measuring brain energetics and neurotransmitter cycling</td>
</tr>
<tr>
<td>2014</td>
<td>Spudlman/Recht</td>
<td>NIH</td>
<td>R01 (MPI) Metabolic Therapy of G6PD Guided by MRIs of Hyperpolarized 13C-Pyruvate</td>
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<tr>
<td>2014</td>
<td>Vasanawalej/Padly</td>
<td>NIH</td>
<td>R01 (MPI) Development and Translation of High Performance Receive Arrays for Pediatric MRI</td>
</tr>
<tr>
<td>2014</td>
<td>Vasanawalej, Shreyas</td>
<td>NIH</td>
<td>R01 Rapid Reboot Pediatric MRI</td>
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<tr>
<td>2014</td>
<td>Zaborhuck, Gerg</td>
<td>NIH</td>
<td>R01 Imaging Collaterals in Acute Stroke (iCAS)</td>
</tr>
<tr>
<td>2014</td>
<td>Zaborhuck, Gerg</td>
<td>NIH</td>
<td>R21 Oxygenation Fingerprinting with MRI for Ischemic Stroke</td>
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<tr>
<td>2014</td>
<td>Zavala, Cristina</td>
<td>NIH</td>
<td>K22 A New Strategy for Cancer Detection using Raman Spectroscopy with Nanoparticles</td>
</tr>
<tr>
<td>2015</td>
<td>Zavala, Cristina</td>
<td>NIH</td>
<td>R21 A New Raman-based Strategy to Identify Tumor Margins and Guide Surgical Resection</td>
</tr>
</tbody>
</table>

### SUBCONTRACTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Principal Investigator</th>
<th>Funding Agency</th>
<th>Title</th>
</tr>
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<tbody>
<tr>
<td>2014</td>
<td>Charles, Janal</td>
<td>U of Maryland</td>
<td>Characterization of Cardiomyocytes derived from Human Induced Pluripotent Cells by Single-Cell RNA-sequencing</td>
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<tr>
<td>2015</td>
<td>Charles, Janal</td>
<td>U of Maryland</td>
<td>Real-time PCR to assess induced pluripotent stem cell pluripotency and differentiation potential</td>
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<tr>
<td>2015</td>
<td>Demirci, Utkan</td>
<td>U of Maryland</td>
<td>Molecular screening in resource-poor settings using a simple, power-free, cell phone-friendly device</td>
</tr>
<tr>
<td>2014</td>
<td>Demirci, Utkan</td>
<td>Brigham &amp; Women's</td>
<td>A Novel Microfluidic HIV-1 Co-Culture Assay to Quantify Latent Reservoirs</td>
</tr>
<tr>
<td>2014</td>
<td>Demirci, Utkan</td>
<td>Brigham &amp; Women's</td>
<td>Microfluidic PCR Method to Identify and Characterize HIV-Infected Single Cells</td>
</tr>
</tbody>
</table>
2015 Demirci, Utkan
U of Illinois
Rapid Disease Diagnostics using Photonic Crystal Enhanced Antigen Biomarker

2015 Demirci, Utkan
U of Louisville
Magnetic Cellular Assembly and Microfluidic Conditioning for Generation of Functional Cardiac Tissue

2014 Gambhir, Sanjiv Sam
Fred Hutch Cancer Resh
Ovarian Cancer Early Detection Using Microbubble Contrast Enhanced Ultrasound (CEUS) Targeting Tumor Associated Angiogenesis

2014 Gambhir, Sanjiv Sam
Scripps Resh Institute
Clinical validation of the HD-CTC: Read Inspect for the early detection of lung cancer

2015 Malick, Parag
U of So. California
L2K2R2: Learn to Read to Know, Know to Learn to Read

2014 Mata, Elkins
U of Maryland
Single-cell droplet digital PCR to assess allele-specific knockdown of mutated mRNA in patient-specific hiPSC-cardiomyocytes carrying dilated and hypertrophic cardiomyopathy mutations

2015 Napel, Sandy
Mass Gen Hospital
Informatics Tools For Optimized Imaging Biomarkers For Cancer Research & Discovery

2014 Paulmurugan, Ramasamy
Mayo Clinic
Comparative Modeling of Lung Cancer Control Policies

2014 Paulmurugan, Ramasamy
Mayo Clinic
Non-Invasive Imaging of Progenitor Cell Fate in the Ischemic Myocardium

2014 Spielman, David L.
U of Maryland
Dynamic Metabolic Imaging of Hypertrophied Substrates

2014 Vanamala, Shreyas
U of Wisconsin
Development and validation of quantitative MRI biomarkers of iron overload

2015 Wismann, Max
Medical Univ. of So. Carolina
POSITVE trial

2015 Wismann, Max
Medical Univ. of So. Carolina
Stroke Trial Network National Data Management Center (NDMC)

2014 Wismann, Max
U of Cincinnati
NSTEMI National Clinical Coordinating Center

2015 Wismann, Max
UCSF
The vascular effects of infection in Pediatric Stroke (VIPS) Study

OTHER GOVERNMENT FUNDED PROJECTS

2015 Demirci, Utkan
NSF
Optimization of sperm sorting in microfluidic channels using coarse-grained modeling

2015 Demirci, Utkan
NSF
CAREER: Noninvasive fields for directed 3D microgel assembly for tissue engineering

2014 Fahrig, Rebecca
Dept of Army
A New Quantitative 3D Imaging Method for Characterizing Spray in the Near-field of Nozzle Exits

2015 Gambhir, Sanjiv Sam
Dept of Defense
Improved Ovarian Cancer Detection Using Combined Ultrasound and Photoacoustic Imaging

2015 Rao, Jianghong
Dept of Army
PET Imaging Heparanase Activity in Metastatic Prostate Cancer in Tumor Xenografts

INDUSTRY FUNDED PROJECTS

2015 Cheng, Zhen
GE Healthcare
A Novel PET Probe for PET-MR Early Detection of Parkinson’s Disease

2015 Chin, Frederik T
Piramal Imaging SA
\([^{68}Ga]RM2\) (\([^{68}Ga\]-Bombesin) Manufacturing Agreement

2015 Chin, Frederik T
Piramal Imaging SA
Implementation of Revised Clinical-grade \([^{18}F\]FSPG Radiochemistry for IND approval

2015 Daniel, Bruce Louis
Intelligent Fiber Optic Sys.
MRI Compatible Fiber Optically Sensitized Biopsy Needles for Oncological Applications

2015 Fahrig, Rebecca
Siemens Medical Solutions
Phase Contrast

2014 Fahrig, Rebecca
Siemens Medical Solutions USA, Inc.
Combined Investigations - Zepto flexibility and image quality improvement Phase II

2015 Flachmann, Dominik
GE Healthcare
PET-MR for Myocardial Tissue Characterization: Technical Development for the Prediction of Arrhythmia in Patients with Dilated Cardiomyopathy

2014 Flachmann, Dominik
Siemens Medical Solutions USA, Inc.
Siemens CT Project - Optimization of Injection Protocols

2014 Gambhir, Sanjiv Sam
Cabrera
Evaluation of FSPG as a biomarker in the prediction of response to CR-889-4glatimamide inhibitor in tissue cultures and in pre-clinical models

2014 Gnanouzi, Piyman
InSightec
A Post Approval Registry: ExAblate Treatment of Metastatic Bone Tumors for the Palliation of Pain
Listings include only new awards during 2014 and 2015 (YTD 8/1/15)

2015 Ghanouni, Pejman InSightec A Continued Access Study to Evaluate the Effectiveness and Safety of ExAblate Transcranial Stilletto Treatment of Medication Refractory Essential Tumor Subjects

2015 Ghanouni, Pejman InSightec A Phase IV Post Approved Clinical Study of ExAblate Treatment of Metastatic Bone Tumors for the Palliation of Pain

2014 Glover, Gary H GE Healthcare Development of Magnetic Resonance Imaging at 5T strength PET-MR magnets

2015 Gold, Gary Evan GE Med Systems Advanced MR Applications Development - Tiger Team Years 7 & 8

2014 Hargreaves, Brian Andrew GE Med Systems Magnetic Resonance Imaging near Metallic Implants

2015 Iagaru, Andrei Bayer Healthcare Pharma. Combined "One Stop Shop" NaF/FDG PET-MR Evaluation of Response to Xofigo in mCRPC Patients

2014 Iagaru, Andrei GE Healthcare Comparison of PET Image Reconstruction Protocols

2015 Iagaru, Andrei Iagaru, Andrei GE Healthcare Comparison of PET Image Reconstruction Protocols

2015 Iagaru, Andrei Genentech, Inc. Zr-89 PET Scans

2015 Iagaru, Andrei Piramal Imaging SA [68Ga]RM2 ([68Ga]-Bombesin) PET-MR Imaging of patients with biochemically nodel bone cancer and equivocal conventional imaging findings

2015 Kothary, Nishita N. Siemens Corporate Research Combined Investigations: zeego flexibility and image quality improvement

2014 Levin, Craig Siemens Corporate Research Integrated readout circuit for time-of-flight positron emission tomography

2014 Lipson, Jafi Alyssa Hologic, Inc. Contrast-Enhanced Digital Mammography (CEDM) vs Contrast-Enhanced Breast MRI (CE-MRI) in Patients with Known Breast Cancer (BI-RADS 6)

2015 Marks, Michael P MicroVention, Inc. HDE application for Low-Profile Visualized Intraluminal Support Device (LVIS and LVIS Jr.)

2014 Mittra, Erik S Piramal Imaging SA An Open-Label Study of the Efficacy of 18F-FSPG PET-CT in Subjects With Intracranial Cancers

2015 Paulmurugan, Ramasamy Sci-Engi-Medico Solutions Inc. Dual Targeted Human Biotin Derivatives for Improving Chemotherapy

2014 Rutt, Brian Bell Biosystems, Inc. Single Cell Spatiotemporal and Functional Reappraisal using Magneto-Endosymbionts

2014 Rutt, Brian GE Healthcare Development of an inserable head gradient coil with order-of-magnitude performance increase

2014 Rutt, Brian Siemens Corporate Research Development of an insertable head gradient coil with order-of-magnitude performance increase

2014 Spielman, Daniel Mark GE Healthcare The Imaging and Mitigation of Oxidative Stress

2014 Stolowitz, Mark L Labcyte Inc. High Throughput Biomarker Verification by MALDI-MS

2014 Vasanawala, Shreyan Bayer Healthcare Pharma. Wireless Receiver Coil Transponders for MRI

2015 Vasanawala, Shreyan GE Med Systems Wireless Receiver Coil Transponders for MRI

2014 Willmann, Juergen Karl Bracco Di, Inc. A Pilot Clinical Trial Using BR55 US Contrast Agent to Assess Prostate Cancer by Molecular Imaging of VEGFR2

2015 Willmann, Juergen Karl GE Healthcare Real-time Fused Hyperpolarized MR/PET/Molecular Ultrasound Imaging for Improved Diagnosis of Prostate Cancer

2015 Willmann, Juergen Karl Philips Healthcare, N.A. Clinical 3D Contrast-Enhanced Ultrasound for Treatment Monitoring in Oncology

2014 Willmann, Juergen Karl Siemens Medical Solutions USA, Inc. Introduction of Ultrasound Contrast Imaging and Quantitative Elastography into Clinic

2014 Wintermark, Max Siemens Corporate Research High Throughput Biomarker Verification by MALDI-MS

2015 Wintermark, Max Silk Road Medical Comparing DW-MRI imaging studies before and after treatment for carotid atherosclerotic disease

2014 Zaharchuk, Greg GE Healthcare Comparison of 18F FDG PET-CT to PET-MR

2015 Zaharchuk, Greg GE Healthcare PET-MR Advanced Research and Development Project

FOUNDATION AND PROFESSIONAL SOCIETY AWARDS

2015 Daldrup-Link, Heike E The MSK Transplant FD Imaging Immuno-Responses to Stem Cell mediated Bone Repair

2014 Demirci, Utkan Epilepsy FD Disposable Chips to Measure Antiepileptic Drug Serum Concentrations at POC

2015 Ghanouni, Pejman FUS Surgery FD Lumbar Back Pain

104 Radiology Annual Report 2014-15

Sponsored Research

105

*Listings include only new awards during 2014 and 2015 (YTD 8/1/15)
2014 Hanneman, Katherine
Alson RSNA Combined positron emission tomography-magnetic resonance imaging for the diagnosis of cardiac sarcoidosis

2015 Ho, Michael MasE FD Using ferumoxytol-enhanced MRI to assess tumor associated macrophages in human glioblastoma multiforme

2014 Lan, Feng AHA Improving risk assessment and disease management of familial hypertrophic cardiomyopathy using patient-specific iPSC

2015 Mosley, Michael E. ISMRM A 5 minute motion-corrected pediatric brain protocol

2015 Ong, Sang Geng AHA Modulating the Interaction of Exosomes from Host Myocardium to Transplanted Stem Cells in Ischemic Heart Disease

2015 Pauly, Kim Burns FUS Surgery FD FUS Global Internship

2015 Rubin, Daniel L ECOG R&E FD ECOG-ACRIN Network Group Operations Center

2014 Rubin, Daniel L RSNA NIBIB/DOD IAA RadLex Playbook “Expedited Development of Radiology Lexicon"

2015 Soh, Hyongsok Tom Morgridge Institute Midwest Progenitor Cell Consortium

2015 Sutton, Ram AHA A Brain-Machine Interface for Recovery of Reaching Movements Following Stroke

2014 Wang, David S. SIR FD Ultrasound and microbubble-mediated therapeutic microRNA modulation of hepatocellular carcinoma

2015 Zeinali, Michael Doris Duke Charitable Fd The role of iron and inflammation in Alzheimer’s disease: from ex vivo to in vivo

STANFORD INTERNAL AND OTHER FUNDING


2015 Fahrig, Rebecca Stanford - Coulter FD Charge-Cloud Tracker: A High-Rate Photon-Counting X-ray Detector


2014 Pirtle, Sharon UC Office of President Imaging, Genomics, and Glycoproteomics for Cancer Detection

2014 Rao, Jianghong Texas A&M Application of Imaging to development of tuberculosis interventions

2015 Spielman, Daniel Mark Stanford Bio-X In vivo Metabolic Imaging of Senescent Cells Using Hyperpolarized 13C MRS

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2014 Rao, Jianghong Texas A&M Application of Imaging to development of tuberculosis interventions

2015 Rubin, Daniel L Franco-Stanford Center iCBIR - Interactive Content-Based Image Retriever for real-time decision support in radiology

2015 Spielman, Daniel Mark Stanford Bio-X In vivo Metabolic Imaging of Senescent Cells Using Hyperpolarized 13C MRS
Radiology Annual Report 2014-15
Radiology Summary Statistics

187
Radiology Faculty
All inclusive

Top 10
Residency Training

NIH Rank #3
NIH rank according to Academy of Radiology Research, acadrad.org, FY14

208
Radiology trainees 2015
(Fellows, Residents, Postdocs, Students, Visitors)

211
Total Number of Active Sponsored Projects FY14

5
Distinguished Investigators Academy of Radiology Research, 2014-15

NIH Award Types

Patents (FY 10-15): 53

11 Issued
6 Provisional
36 Pending

Research Funding FY15*
$43,908,344 (directs and indirects)

Budgeted Revenue FY16
$102,300,000

NIH $28.5M
Industry $8.7M
Non-Profit $3M
NIH-Subs $1.5M
Other Fed $1.8M
Stanford & Other $0.5M

Sponsored Revenue
$35,800,000
Clinical Revenue
$40,400,000
Other Revenue
$26,100,000

* Total Sponsored Research awarded 2015 (9/1/14 - 8/1/15)

Trainees: 208

Faculty: 187

Radiology Annual Report 2014-15
Thank You For Your Generous Support

Stanford Department of Radiology thanks the following foundations for their generous support of our research in the imaging sciences including technology development and solutions for the early detection, monitoring, and treatment of disease.

The Canary Foundation
The Wallace Coulter Foundation
The Doris Duke Charitable Foundation
The Epilepsy Foundation
Focused Ultrasound Surgery Foundation
The Ben and Catherine Ivy Foundation
The Musculoskeletal Foundation
Sir Peter Michael Foundation

We also thank our generous Industry Partners for their ongoing support.

If You Would Like to Support Our Department...

If you would like to learn more about ways to support any area of research or training in the Stanford Department of Radiology, please feel free to contact any of the following members of the department.

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Garry Gold, MD
Professor and Associate Chair for Research
gold@stanford.edu

Yun-Ting Yeh, MBA
Director of Finance and Administration
ytyeh@stanford.edu
Ultrasound is a complementary imaging modality for detection of mammographically occult breast cancers, especially in patients with dense breast tissue. Diagnostic accuracy of ultrasound in these patients can be significantly improved using contrast agents targeted at molecular signatures on the tumor neovasculature. In a large scale immunohistochemical staining analysis of human tissues, it was found that B7-H3 is differentially expressed in breast cancer–associated vascular endothelial cells compared with normal, benign, and precursor lesions.

Breast Cancer Detection by B7-H3-Targeted Ultrasound Molecular Imaging.


PMID:25899053

The Annual Canary Challenge ride took place September 26, 2015. Thank you to everyone who joined family, friends and colleagues as a rider or volunteer for this event. This year, the Canary Challenge attracted about 1000 riders and volunteers who assembled bright and early Saturday morning to support the ride and raise funds for the early detection of cancer. The event, organized by the Canary Foundation, was by any measure a resounding success and raised $1,138,000 to support cancer research at the Stanford Cancer Institute and the Canary Center at Stanford.

Plan to meet your friends next September for the 2016 Canary Challenge, an amazing and extremely rewarding annual event.

See you in September for the 2016 Canary Challenge!