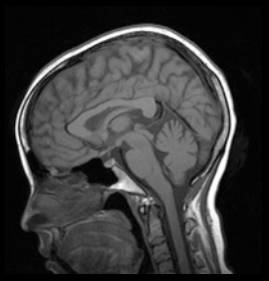
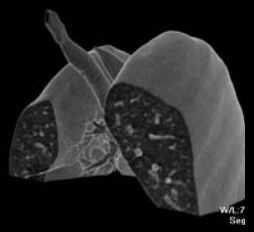
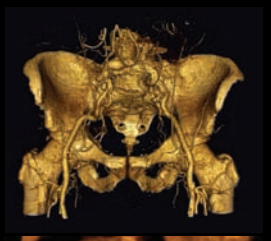
Beth Israel Deaconess Medical Center

A teaching hospital of Harvard Medical School

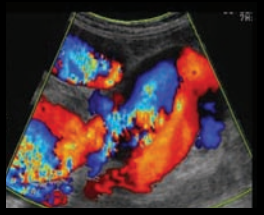




BIDMC *Radiology*



Jonathan B. Kruskal, MD, PhD
Chairman



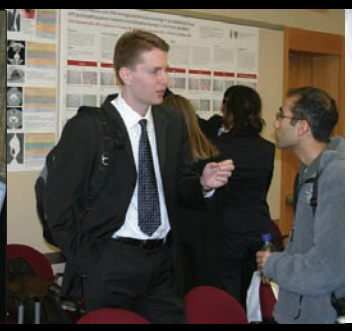


Table of Contents

On-line version of this report is available at:

http://www.bidmc.org/CentersandDepartments/Departments/Radiology.aspx

BIDMC Radiology

Mission Statement

Our department is committed to leadership in the delivery of patient care through

- technical and clinical expertise in medical imaging
- development and dissemination of new knowledge
- excellence in teaching and a dedication to lifelong learning
- a compassionate practice of medicine

Our patients are treated with respect and a concern for their comfort. We are committed to understanding their needs, informing them about their care, and upholding their right to participate in treatment decisions.

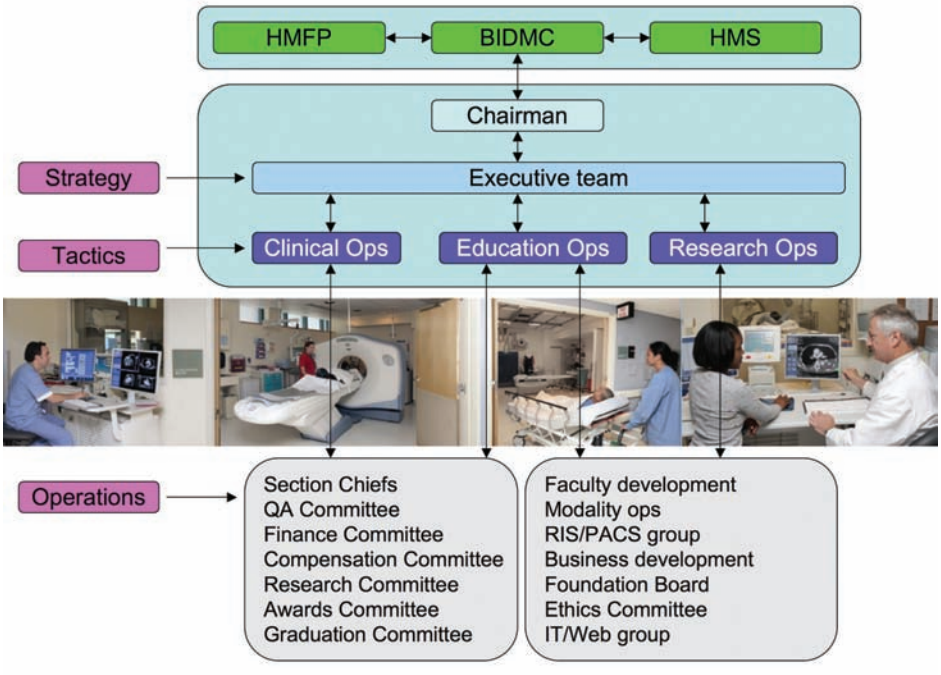
Patient care is enhanced by our commitment to both clinical teaching and research. Each employee is a teacher and lifelong learner, with an obligation to pursue continuous improvement in the quality of our patient services. As a department, we strive to acquire new knowledge through research in a continuous effort to provide the highest quality of care to our patients. Excellence in teaching ensures the effective dissemination of our knowledge to others. As individuals, we are dedicated to the ongoing, systematic evaluation and refinement of our practice.

Our work environment fosters a spirit of inquiry, innovation and collaboration. We value the multi-disciplinary organization of our staff. We actively collaborate with other departments both within and outside our institution in research and teaching capacities.

From the Chairman

"Our mission in the Department of Radiology is first to provide extraordinary care to our patients, and to support this care with world class education and research. We serve our patients compassionately and effectively, in order to create a healthy future for them and their families. Our mission is supported by our commitment to personalized, excellent care for our patients; a workforce committed to individual accountability, mutual respect and collaboration; and a commitment to maintaining our financial health"

Our Department has shown continued growth during this past year. With a total of 639 FTE's now working in our department, this year we expanded our services onto the outer Cape (Provincetown and Wellfleet), westward to Hubbard and Charlton and have built a close and complementary relationship with our colleagues at Atrius. We look forward to continued expansion as we build our community imaging division. This year we successfully achieved our stated goals of developing and implementing clinical, education and research Annual Operating Plans (AOP's) that are fully aligned with those of the hospital, deploying lean training and technology department-wide, development and introduction of a new radiology web portal (http://www.bidmc.org/CentersandDepartments/Departments/Radiology.aspx), upgrading our MRI and ultrasound fleets, achieving faculty compliance with our peer review process, and of course we deployed this very popular Radical Views newsletter. I am indebted to the many staff who contributed their time and expertise to getting all of these done.



The imaging world is changing – an appropriate awareness of the inherent risks of radiation, incentive programs limiting unnecessary imaging and anticipated reimbursement reductions are very real threats that we are actively responding to. This has involved changing our department's governance structure; your Executive Committee now functions as a strategic planning group, we established clinical, educational and research operations groups to define the tactics and ensure that we stay on target with our AOP's, and a series of task forces, workgroups and committees have been created to develop and implement policies and to operationize the tactics defined by each ops group. In addition, we have worked hard to ensure that we are ably represented at every strategy and policy-defining committee in this hospital. It is important that we are seen as active and essential members of every care-giving team and I will work as hard as I can to continue to earn the respect of our non-radiology colleagues that every member of our department deserves. I am confident that along with this new structure, we have the best staff available to ensure that we remain successful and continue on our mission of providing extraordinary care to our patients.

Clinical Operations

The departmental operations are overseen by the Radiology Operations Director, **Donna Hallett, RT**, who is responsible for supervision of the technical services, support services, and informatics; and **Allen Reedy**, Business Director, who is responsible for budgeting, equipment, space, contracting, negotiation with vendors, and managing new projects within the department. **Peter Cousins** is responsible for support services, including reception and scheduling functions, and for transcription within the department; this includes interfacing with Escription-- our voice recognition/editor for radiology results reporting. He is also responsible for image archive functions, including the file room. **Jim Brophy**, PACS/ Informatics Manager, reports both to Information Systems and to Ms. Hallett and Mr. Reedy, and is responsible for the PACS operations in the department. Also reporting to Ms. Hallett are technical directors for each of the technical modality sections and the Director of Radiologic Nursing. The technical managers are organized by modality and work closely with the appropriate organ-system and modality section chiefs.

The department mission statement has guided our development and focus on high-quality, personalized, patient-centered care. The development of the community-based network and the mobile ultrasound service reflect a commitment to provide a high level of radiologic services in community-based locations with respect to patient needs and convenience. All staff are encouraged to understand communication issues and to assume a service-oriented, patient-centered approach to care.

The Medical Center has historically made great efforts to maintain state-of-the-art technical imaging capabilities. The recruitment of innovative investigative faculty has allowed us to offer a broad range of cutting-edge services and to develop innovative new clinical programs. The research program in the department has been largely translational, focusing on melding technical research capabilities and clinical know-how to advance the development and implementation of a variety of new applications in imaging and image-guided therapeutics.

The department has a pluralistic approach to faculty and faculty development. This includes primarily clinically oriented faculty, faculty who are primarily research-oriented, and faculty who are primarily educationally focused. However, we do also encourage "triple-threats" and variants. A strength of the program is that clinically active radiologists support large and productive research programs. Our faculty are also active in a variety of multi-disciplinary efforts including multi-disciplinary clinics, grants, and educational efforts.




Clinical Volume for the period 1/1/2009 - 12/31/2009

Modality	Section	Exam Volume
Radiographic	Abdominal	9940
Radiographic	Chest	68885
Radiographic	Musculoskeletal	51855
Radiographic	Other	2735
	Total	133415

Modality	Section	Exam Volume
Interventional	Interv Rad	1874
Interventional	Interv Neuro Rad	1181
	Total	3055

Modality	Section	Exam Volume
Nuclear	Nuclear Medicine *(incl. PET, SPECT)*	8495
	Total	8495

Modality	Section	Exam Volume
Ultrasound	Ob Ultrasound	20555
Ultrasound	Ultrasound	19634
Ultrasound	Vasc Ultrasound	9474
	Total	49668

Modality	Section	Exam Volume
CT	Abdominal	35208
CT	Chest	10752
CT	CT Cardiovascular	3265
CT	Musculoskeletal	1016
CT	Neuro	20562
CT	Other	406
	Total	71209

Modality	Section	Exam Volume
MRI	Abdominal MRI	5430
MRI	Breast	857
MRI	Musculoskeletal	3292
MRI	Neuro	14554
MRI	Other	168
	Total	24301

Modality	Section	Exam Volume
Mammography	Breast *(incl. Breast Ultrasound)*	26060
	Total	26060

2009-2010 Highlights in Leadership

Dr. Jim Wu (center) being toasted (and hoisted) by the graduating 2010 residents, MFA Boston, June 2010

Jim Wu, New Director, Radiology Residency Program

In June 2009, **Jim Wu, MD**, was appointed as the new **Director of our Radiology Residency Program**. Jim received his undergraduate training at MIT in 1994 and received his MD at Baylor College of Medicine in 1999. He completed his diagnostic radiology residency at Yale-New Haven Hospital where he was Chief Resident in 2004 and remained at Yale to complete a fellowship in Musculoskeletal Imaging, for which he won the Fellow of the Year Award. Jim joined the Yale faculty prior to becoming a staff radiologist here at BIDMC in 2005. It didn't take long for our residents to recognize and show their appreciation for Jim's outstanding dedication to teaching; he was awarded the Faculty Teacher of the Year Award in 2006, his first year on our staff. Jim has become recognized as a devoted and dedicated teacher and mentor and again received the Faculty Teacher of the Year Award in 2009! As a member of our 2009 Section of the Year, Jim is Co-Director of the Musculoskeletal Fellowship Program where he contributes to the outstanding teaching and clinical training provided to our residents and fellows. We are extremely fortunate to have such an enthusiastic and outstanding physician agree to take over the reigns of our wonderful Residency Program. Please join me in congratulating Jim on this deserved promotion – we all look forward to watching the program become even stronger under Jim's leadership.

Dr. Bettina Siewert (Left) and her graduating Abdominal Imaging Fellows, MFA Boston, June 2010

I would also like to take this opportunity to acknowledge the outstanding job that **Bettina Siewert** has performed as Program Director over the past five years. As Bettina now takes over leadership of the Abdominal Imaging Section and Fellowship Program, Jim is fortunate to be inheriting a strong, organized, popular and cohesive program that will continue to attract the best and brightest residents from around the country. Please join me in congratulating Jim and thanking Bettina for her truly outstanding service.

Bettina Siewert, New Chief of Abdominal Imaging

It is my great pleasure to announce that **Bettina Siewert, MD**, Assistant Professor of Radiology at Harvard Medical School, has been promoted to **Section Chief of our Abdominal Imaging Division**. Bettina completed her medical training and a radiology residency at the Hospital of the Rheinische Friedrich Wilhelm University, in Bonn, Germany in 1992 and has been a member of our Department since 1993, when she first joined as an MR research fellow working with Bob Edelman and Paul Finn. Bettina completed a CT/MRI fellowship at Beth Israel Hospital in 1997 and completed her radiology residency at BIDMC in 2002, serving as Chief Resident in 2001. Since joining our faculty, Bettina has worked in the abdominal imaging section where she has served in various roles including QA officer and leader of the virtual colonography program. Bettina is

an outstanding and dedicated teacher and will continue to focus her research on imaging in the evaluation of the acute abdomen. Bettina has also served as Radiology Residency Program Director here at BIDMC since 2005. In her capacity as abdominal imaging section chief, Bettina will not only be responsible for the research, teaching and clinical services provided by the abdominal imaging division, but will also be Director of the ACGME-accredited Abdominal Imaging Fellowship Program. I am truly thrilled to hand over the reigns of the abdominal imaging section to such an outstanding physician and leader. Please join me in congratulating Bettina on this well deserved promotion.

At the 2010 Fleischner Graduation Ceremony, ***Bettina Siewert*** *was recognized with the Robert E. Lenkinski Excellence in Academic Mentoring Award and* ***Jim Wu*** *with the Triple Threat Award for Excellence in Clinical Research and Educational Achievement!*

Dr. Barry Sacks

Barry Sacks, New Chief of Interventional Radiology

I am delighted to announce that **Dr. Barry Sacks** will be our new **Section Chief for Interventional Radiology**, starting July 1, 2010. Barry received his training in Johannesburg, South Africa where he trained at Baragwanath Hospital, now the largest hospital in the world. After immigrating to the United States, Barry came to Boston and did his residency at Beth Israel Hospital, was appointed Chief Resident in 1977 and became Chief of Vascular Radiology in 1982. Barry left BI to become Chief of Radiology at Metrowest Medical Center, a position he held until 2004. Many of you know Barry through his weekly work here in IR, his passion for innovation and tireless patient-directed care, as well as his expertise in adrenal vein sampling, thyroid and parathyroid diseases. Few of you may know that he holds over 20 patents relating to catheter and probe development for laser ablation of vessels, and for developing laser endoscopes for spectroscopic imaging.

Members of the IR section have gone above and beyond to provide clinical coverage these past few months, and this is deeply appreciated by all of us. So too, is all the work Sal Faintuch has done maintaining the schedule, taking additional call and stepping up for all administrative duties. Mel Clouse also deserves a huge thank you for so ably running the IR Fellowship Program, and Felipe Collares, Laura Perry and Muneeb Ahmed have continued to provide excellent and dedicated clinical service as well. Even Rob Sheiman took call and thanks also to Steve Reddy for filling in as needed!! I also want to recognise the Herculean efforts of our IR nurses, NP's, PA's and all of the IR technologists during this time. Thanks to all of you.

It truly is my pleasure to welcome Barry back "home", and to share in his vision for an expanded and integrated Division of Interventional Radiology.

Donna Hallett, Radiology Executive Committee

Donna Hallett

Please welcome **Donna Hallett** as our Newest Executive Member. Donna graduated from Bunker Hill Community College as a Radiology Technologist in 1977. She obtained her B.Sc. in Health Management from Northeastern University in 1986.

Donna began her career at Beth Israel Hospital as a Radiographer in 1977. Through the years, she was promoted to Supervisor of Diagnostic Radiology in 1986, then Chief Technologist of Diagnostic Radiology in 1988. She became the Technical Director of the Radiology Department in 1989 and ultimately Director of Operations, Radiology Department, at Beth Israel Deaconess Medical Center in August 2000, directing and coordinating radiology operations for all imaging services provided within the department. She is directly responsible for performance improvement, billing, RIS management, budget management, as well as personnel management of approximately 400 FTEs, performing and supporting 330,000 exams annually.

Farewell to Neil Rofsky

In July 2010, we bid farewell to **Dr. Neil Rofsky**, Chief of MRI, who will be taking on a new post as Chairman of Radiology at the University of Texas, Southwestern (UTSW), in Dallas. It was only in July 2009 that we applauded his promotion to Professor of Radiology at Harvard Medical School.

We will be sad to see him go but plans are being made to fill the leadership gap here in the department. Neil has graciously agreed to continue in a collaborative research and mentoring role. Stay tuned!

Radiology Nurses Step Outside the Box

Maryann Humphrys, RN

In June 2009 , **Maryann Humphrys** and **Jeanne Carbone** became the first nurses in our Department to be formally certified as Radiology Nurses by ARIN, the Association for Radiologic and Imaging Nurses. This is an arduous process that involves significant education and coursework, as well as passing a national exam. This on top of the rigors of their daily toil. We are so fortunate to have such an outstanding group of dedicated nurses in our department, and this achievement recognizes this excellence. Congratulations Maryann and Jeanne!

Jeanne Carbone, RN

Diana Litmanovich, Director of Cardiac CT - a new subspecialty of Thoracic Imaging

Congratulations to Diana Litmanovich on her appointment as **Director of Cardiac CT.** Please see page 43 for more details.

Corrie Yablon

Corrie Yablon, Director of MSK US - a new subspecialty & Co-Director, MSK Fellowship

Congratulations to Corrie Yablon on her appointment as **Director of Musculoskeletal Ultrasound**. Dr. Yablon has been working vigorously to develop a cutting-edge dedicated diagnostic and therapeutic musculoskeletal ultrasound service, with considerable success. Over the past year, she has done a terrific job, taking the lead in developing our department's ability to provide superior clinical service in this area. As Director of Musculoskeletal Ultrasound, she will be working to develop and grow this exciting new opportunity for our department.

Corrie has also accepted the position of **Co-Director of the Musculoskeletal Imaging Fellowship Program**. She has been an ardent advocate for the quality and rigor of our fellowship training program and for the well-being and development of our fellows. She has worked together with our current and incoming fellows, with great success, on a number of different of publications. She has been building an MSK Fellowship curriculum for use here, with an eye toward fellowship curriculum development at the national level. Most recently, she has submitted an application to the Rabkin fellowship program here at Harvard, based on a project related to curriculum development for an MSK Fellowship program. We look forward to all the positives she will be bringing to our program.

- Mary Hochman, MD
Chief, MSK

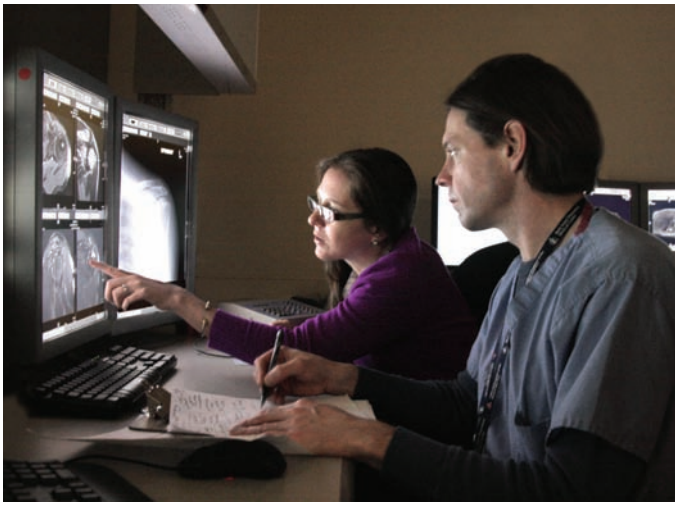
LEAN Video in Interventional Radiology

Beth MacQuilken, Linda Powers and Patty MacDonald recycle "the Book" in favor of the KANBAN.

For the past year, the staff in Interventional Radiology have been working to improve the ordering, stocking, and inventory management process for their multitude of supplies. Recently, Marge Guthrie and her technologists, with expert assistance from Michael Larson and Donna Wolfe, produced a video that describes this "LEAN" project. Using real-life examples of their work along with a fair amount of humor, they succeeded in making a complicated project very understandable. The video was shown at the November BIDMC Leadership meeting to hundreds of senior staff, and was a hit. Many other modality and support areas in Radiology are now using the video to introduce their staff to LEAN and kick-off their own projects. Copies of the video can be borrowed from the Business Transformation office on Stoneman 217.

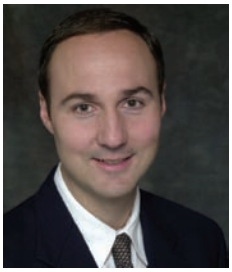
- Allen Reedy, BIDMC Radiology Business Director

2009-2010 Highlights in Academia



Corrie Yablon Receives Rabkin Fellowship Award

I am delighted to announce that Corrie Yablon has been awarded the **Rabkin Fellowship in Medical Education** at the Shapiro Institute for Education and Research for 2011. Corrie is spearheading our MSK ultrasound division and this fellowship experience will provide her with a unique opportunity to develop innovative teaching modules focused on MSK ultrasound. As the field of MSK ultrasound expands, our department is very fortunate to have Corrie leading these efforts and this award reflects the Institution's confidence in her skills and enthusiasm. We all look forward to continued growth in this modality and to sharing in Corrie's success.



Phillip Boiselle Inducted into the Fleischner Society

Congratulations to Dr. Phillip Boiselle on being elected into the Fleischner Society. This a wonderful and much-deserved achievement. The Fleischner Society is an international, multidisciplinary medical society for thoracic radiology, dedicated to the diagnosis and treatment of diseases of the chest. "Founded in 1969 by eight radiologists whose predominant professional interests were imaging of chest diseases, the Society was named in memory of Felix Fleischner, an inspiring educator, clinician, and researcher who made many contributions to the field of chest radiology." Our department is quite unique in that we now have two Fleischner Society members, Dr. Boiselle and Dr. Alex Bankier.

Whitley Award Goes to Priscilla Slanetz

Dr. Slanetz (and BU Colleague Johanne Dillon) received the AUR 2010 Whitley award in March, 2010 for their educational curriculum on evidence-based imaging (medical student radiology clerkship at BUSM). The Joseph E. and Nancy O. Whitley Award is a national annual award given by the Association of University Radiologists for the best medical education manuscript submitted to Academic Radiology. The project assessed the impact of teaching evidence-based imaging using the ACR Appropriateness Criteria to teach cost-effective utilization of technology. At BIDMC, Dr. Slanetz has modified the curriculum and teaches evidence-based imaging to the medical students in Dr. Lieberman's clerkship using some of the materials she created at Boston University.

Additionally, Dr. Slanetz has been inducted as a member of the HMS Academy of Medical Educators. Her appointment runs from January 2010 through December 2012 (see below).

BIDMC Academy Inductees in Radiology

"We received an enthusiastic response to our request for applications for the BIDMC Academy of Medical Educators and have recently confirmed membership of 115 faculty, fellows, and senior residents. The applicants' teaching experiences and letters of interest were impressive, and we feel fortunate to have so many dedicated and talented teachers and educators here at the Medical Center. Listed below are the members of your Department who have joined the Academy. We extended a hearty welcome to all new Academy members at the BIDMC Teaching Award Ceremony this June in the Shapiro Atrium."

- David Roberts, MD, Director and Lori Newman, MEd, Associate Director, Academy of Medical Educators at BIDMC

Congratulations to Senior Academy Member - **Priscilla Slanetz, MD;** Academy Members - **Ronald Eisenberg, MD, Gul Moonis, MD, Corrie Yablon, MD**; Associate Academy Members - **Mai-Lan Ho, MD, Jay Pahade, MD, Aarti Sekhar, MD**.

Adam Jeffers, Aarti Sekhar and Sachin Pandey Receive Outstanding Teaching awards

On behalf of the Center for Education, Richard M. Schwartzstein, M.D. is pleased to inform us that Adam Jeffers, Aarti Sekhar and Sachin Pandey are recipients of the "2009-2010 PCE Outstanding Resident Teaching Award." They were selected to win these awards by the '09-10 HMS third year Principal Clinical Experience (PCE) class that spent the past 12 months doing their core clinical clerkships at BIDMC; they are being designated as outstanding teachers of the year.

Girish Tyagi wins Cum Laude at AUR

Congratulations to **Dr. Girish Tyagi** for his presentation of "Segmental Accuracy of an Automated Analyzer of Coronary CT Angiography (CCTA) in ED Patients" which was awarded a Cum Laude Citation at the 20th Annual Scientific meeting of the American Society of Emergency Radiology (ASER) in Orlando, FL.

Promotions and First Appointments at HMS:

Alex Bankier, MD - Associate Professor of Radiology, April 2009

Neil Rofsky, MD - Professor of Radiology, July 2009

Ronald Eisenberg, MD, JD - Associate Professor of Radiology, September 2009.

Priscilla Slanetz, MD, MPH - Associate Professor of Radiology, October 2009

Muneeb Ahmed, MD - Assistant Professor of Radiology, April 2010.

RSNA Awards and Honors

BIDMC Radiology was well-represented at this year's **95th Annual RSNA** in Chicago with Faculty, Staff and Trainees presenting 15 education exhibits, 2 scientific posters, 28 scientific papers, 1 plenary session, 1 keynote speech, 10 refresher courses, and 5 multi-session courses. Of 15 Educational Exhibits eligible for awards, 6 received Certificates of Merit (CM) and 4 were selected for publication in RadioGraphics (RG).

RG

Lynn Darrah, **Yolanda Milliman-Richard**, **Donna Hallett**, **Laurie Pascal**, **Max Rosen**, **Jonathan Kruskal**. An Interventional Procedure-specific Scripted Preprocedure Timeout Ensures Compliance with Participation by Minimizing Variation in Performance.

Jonathan Kruskal, **Lynn Darrah**, **Yolanda Milliman-Richard**, Gethin Williams, **Chun-Shan Yam**, **Jacob Sosna**. Dangers and Occupational Hazards in a Radiology Department: An Audit of Patient and Staff Safety in a Radiology Department.

Jonathan Kruskal, **Donna Hallett**. Failure Mode and Effects Analysis: A Tool for Proactively Predicting System Failures in a Radiology Department.

CM

Neely Hines, **Priscilla Slanetz**, **Shambhavi Venkataraman**. Multimodality Review of Breast Augmentation.

Colm McMahon, Jim Wu, Mary Hochman, Ronald Eisenberg. Measuring Up: A Guide to Essential Measurements in Musculoskeletal Imaging.

Shayna Roberts-Klein, Priscilla Slanetz, Elaine Iuanow. Minimizing Risk: A Pictorial Review Identifying Pitfalls in Breast Imaging Interpretation.

Rola Shaheen, Priscilla Slanetz, Tejas Mehta, Maryann Chorlton, **Julie Armada**, Richard Behrman. Artifacts on Digital Mammography: Optimizing Image Quality

Chun-Shan Yam, Jonathan Kruskal, Lynn Darrah. Implementation of an Automated Computer System for Tracking Follow-up Studies Recommended by Radiologists

CM RG

Monica Marra, **Deborah Burstein**, Frank Roemer, Ali Guermazi, Michel Daoud Crema, Felix Eckstein. An Update on MRI Assessment of Articular Cartilage in the Knee: Current Techniques and Their Applications in Clinical Practice and Clinical Research.

Congratulations also to **Salomao Faintuch**, who has been named a **Research and Education Foundation Scholar** for his presentation, "Prostatic Artery Embolization as a Primary Treatment for Benign Prostatic Hyperplasia". Also this year, two of our trainees have been awarded 2009 RSNA Trainee Research Prizes: 4th Yr Medical Student **Danielle Pier** for "MR Indices of Fetal Ventriculomegaly Correlated to Postnatal Outcome" (Debbie Levine, Mentor); and Research Fellow **Wei Yang** for "RF Ablation: Increased Tumor Destruction in Heat Shock Protein Deficient Tumor in Rat Animal Model" and "IV Liposomal Apoptotic Enhancers Increases Endpoint Survival of Percutaneous RF Tumor Ablation in a Rat Breast Tumor Model" (Nahum Goldberg, Mentor).

BIDMC Radiology - Editorial Leadership

At BIDMC Radiology, we are pleased to have on staff, the expertise and mentorship of the following leaders in academic radiology journals:

David C. Alsop, PhD - Associate Editor, *Magnetic Resonance in Medicine*
Alexander Bankier, MD - Deputy Editor, *Radiology*;
Editorial Board, *European Radiology* and *European Respiratory Journal*
Phillip M. Boiselle, MD - Editor, *Journal of Thoracic Imaging*
Herbert Y. Kressel, MD - Editor, Radiology
Jonathan B. Kruskal, MD, PhD - Deputy Editor/Editorial Board, *RadioGraphics*
Deborah Levine, MD - Senior Deputy Editor, *Radiology*; Associate Editor, *Journal of Ultrasound in Medicine*
Neil M. Rofsky, MD - Editorial Board, *Journal of Magentic Resonance Imaging*
Max Rosen, MD, MPH - Consultant to the Editor, *Radiology*
Robert Sheiman, MD - Deputy Editor, *Radiology*

BIDMC Radiology: A Leader in Improving Ergonomics in Radiology

Since 1999, our radiology department has been at the forefront of the new "digital era" of our specialty, in which hardcopy films have been replaced by a film-less workstation environment. Although a PACS-based environment has clearly enhanced the efficiency and quality of patient care, it is associated with an increased risk of repetitive stress symptoms and injuries in our radiologists and technologists.

Beginning in 2005, our department has worked closely with Occupational Health personnel to undertake several initiatives in order to identify the prevalence of repetitive stress symptoms and injuries, to enhance awareness of ergonomic issues, and to improve the ergonomic environment of our workplace. Because it is known that work-related musculoskeletal complaints can be related to workstation set up, chair design and settings, monitor placement and other issues related to the computer workstation, new adjustable tables and chairs have been installed in several reading rooms. Additionally, because an individual's posture and positioning may contribute to repetitive stress symptoms and injuries, several training sessions and 2 educational Grand Rounds lecture were offered by Occupational Health personnel and Harvard School of Public Health faculty. A recent survey shows that these initiatives have had positive benefits. For example, for radiologists who received ergonomic chairs, tables, or training, a perceived reduction in repetitive stress symptoms was reported by 80%, 70%, and 80% of respondents, respectively, for each of these initiatives. These findings were shared with the radiology community at the 2007 RSNA meeting and were published in the Journal of the American College of Radiology. We also presented data regarding the prevalence of repetitive stress symptoms among technologists at the 2009 American Roentgen Ray Society meeting.

Our departmental Ergonomics Team is led by **Dr. Phil Boiselle** and comprised of the following members: **Dieter Affeln** (Occupational Health), **Ron Eisenberg** (Radiology faculty), **Dana Lagrotta** (US technologist), **Deb Levine** (Radiology faculty), **Phil Purvis** (PACS), **Kathleen Shillue** (Occupational Health), **Dan Siegal** (Radiology resident), **Bettina Siewert** (Radiology faculty) and **Nancy Williams** (administrative assistant).

Our goals are to further improve the safety of our workplace environment by ensuring that all of our work areas are ergonomically designed and by educating our staff regarding ergonomic principles. We are also currently working closely with specialists from the Harvard School of Public Health to redesign the way in which radiologists interact with computers in order to further enhance the safety of our workplace.

– Phillip Boiselle, MD

MENTORING PROGRAM - Deborah Levine, MD

When we meet to discuss academic advancement at Harvard Medical School, one important criteria for faculty is the building of a national reputation. Involvement in Radiology Societies gives faculty members the opportunity to become leaders not only in their field of expertise, but also to become better known on the national stage. You can choose a subspecialty society or a national radiology society such as ACR or RSNA, but the important point is to become involved.

It is gratifying how much you learn and gain by contributing time and effort at the national level. A great example from our department is our involvement in the American College of Radiology (ACR). We asked **Jay Pahade** to write about his experience with ACR as a resident and **Sanjay Shetty**, as a resident and junior faculty; and I will discuss how I came to be active on the Board of Chancellors.

Jay Pahade, MD, 4th yr Resident

The DRA, capitation/bundled payments, utilization criteria/rates, technical/professional fees, the new "oral" board exam, self referral… Feel a bit clueless? So did I, until I started to get involved with the Resident and Fellow section of the American College of Radiology (ACR) and the Massachusetts Radiologic Society (MRS). These societies kept me aware of the issues facing our field and opened opportunities for even one person (radiology resident or fellow, etc) to help shape its future. Not only does resident ACR involvement allow us to expand our knowledge about radiology beyond basic image interpretation, but it is also a great way to meet colleagues from across the country, network with established practicing radiologists and enjoy some quality time in DC and on Capitol Hill. Remember, public awareness of radiology is less than that of most other medical specialties: no other physician groups or patient advocacy groups regularly stand up for Radiologists and the role we play in healthcare. Without involvement, educating policy makers and the public on issues that will affect the future of our profession is not possible.

Deborah Levine, MD, Associate Chief, Academic Affairs/Co-Chief of Ultrasound, Chief, OB/GYN US

"It is an honor to serve" – How often have you heard that and wondered if the person truly felt that way? When I think of my ACR activities, that is exactly how I feel. I have been active in the ACR since I started my academic career. An appointment to the Ultrasound Human Resources committee (thank you, Bob Kane!) led to involvement in the Joint Review Committee on Diagnostic Medical Sonography (the group that gives recommendations for accreditation of schools that train sonogramers) which led to involvement in, and ultimately, Chair of the Economics Committee of the Commission on Ultrasound. This, among other activities in sonography education and accreditation, led to my election as Chair of the Ultrasound Commission and an appointment to the ACR Board of Chancellors. Throughout this process, I have traveled the country, discussed issues that effect radiology both in private practice and in academia, and learned about politics on a national scale. The Board of Chancellors is a group of leaders in the field of Radiology. Their time is volunteered, and their effort on behalf of the ACR is remarkable. The discussions that we have via email and at our meetings are fascinating in their depth and breadth. The work that we do directly impacts the practice of Radiology across the country. It is truly amazing to hear how much work goes on "behind the scenes" in healthcare. Given the current healthcare debate going on in Congress, you can imagine how important this kind of work is to the future of Radiology. As with any issue worth fighting for, getting involved is the key.

Sanjay Shetty, MD, MBA,
Adjunct Faculty (MSK)

When discussing involvement in organized medicine, i.e., professional societies, the leaders in our field cite a common thread: that the initial step is usually a small one; a small committee assignment, raising your hand, or even informally offering to help a colleague. But what starts out as a very small step can quickly become a passion. My case is no different: at one meeting that I attended as a resident – the American Alliance of Academic Chief Residents in Radiology (A3CR2) – I drew a playing card that allowed me to choose an opportunity to represent the group, and, when my turn came up, I chose to be a liaison to the American College of Radiology Resident and Fellows Section. It was a decision that quite literally changed my professional life. At my first ACR meeting, I was amazed at the passion of the participants and the importance of the issues being discussed; and I decided to get more involved in the ACR itself. Three years later, I was presenting to the ACR Council as the Chair of the National Residents and Fellows Section. As I transitioned into life as an attending, maintaining this involvement was very important to me. I am currently active at both the state level (now as Secretary of the Massachusetts Radiological Society) and also at the national level (through committee assignments in membership and economics). Each of these experiences has been fantastic. They have given me a much broader perspective on the governmental and economic forces that shape our specialty and introduced me to a network of committed radiologists who have now become very good friends over the six years of my involvement. The ACR, in particular, is very committed to making sure that young physicians become active in shaping the specialty, since decisions being made now will impact us for many years to come. So my advice is to put up your hand and ask to get involved – before you know it, you may find that a role in organized medicine is one of the most exciting aspects of your career.

A Sample of Dr. Shetty's Committee Assignments

Massachusetts Radiological Society

2006-	Executive Committee
2006-	Subcommittee on Residents and Fellows
2006-	Legislative and Grassroots Liaison

American College of Radiology (ACR)

2003-2004	Secretary, National Resident and Fellow Section Executive Committee
2003-2004	Task Force on Continuous Coverage
2004-2005	Vice Chair, National Resident and Fellow Section Executive Committee
2004-2006	Neuroradiology and Body MRI Guidelines and Standards Committee
2005-2006	Chair and Councilor, National Resident & Fellow Section Executive Committee
2005-2006	Council Steering Committee
2006-2008	Alternate Councilor from Massachusetts
2005-	Coding and Nomenclature Committee, Commission on Economics
2005-	Committee on Young Physicians, Commission on Membership
2007-	Commission on Government Relations
2007-	Web Advisory Committee

Dr. Scott of HHI and Yolette Thelusma

Upon returning from Haiti, Yolette was presented with a special shirt from the Beacon St. crew that was purchased locally and all the proceeds go to Haiti. Special thanks to Jane Corey, Manager, HMFP Radiology Outpatient Practices, for making us aware of this tremendous effort!

Radiology Technologist Yolette Thelusma returns from Relief Work in Haiti

We are proud to welcome back Yolette Thelusma, a technologist at our 1101 Beacon St. office, who embodies the compassion and volunteerism for which Beth Israel Deaconess Medical Center has become known.

"My name is **Yolette Thelusma** and I'm a Haitian x-ray tech who's been living in the US for 13 years and never been to Haiti since. The earthquake hit Haiti last month, and when I saw images of the devastation, the pain and the suffering of my fellow brothers and sisters coming from the reports on TV, I immediately felt the need to do something to help, however small it might be. As the days passed, this growing feeling of helplessness had become more and more unbearable. When I heard that BIDMC was looking for volunteers to send to Haiti, I jumped at the opportunity and signed up on their website. I e-mailed Dr. Molloy, the head of the ER, who referred me to Dr. Scott who's been traveling to different parts of the world with the Harvard Humanitarian Initiative (HHI) to provide relief to those in desperate need.

So Dr. Scott, who believed that my skills were greatly needed after she got to Haiti, put some colleagues and friends in charge of raising the funds to sponsor my trip. Sure enough, the generous people of the South End were more than happy to help out and actually raised the funds in less than a week. For that I will always be grateful. Then the HHI with the help of their coordinator made sure that we made it safely to Haiti by arranging a one night stay at a hotel in the Dominican Republic, and ground transportation. So I made it to Haiti on February 8th and was there until the 20th. We stayed at the Fond Parisien Disaster Recovery Center put together by the HHI. Fond Parisien is on the Haitian side of the border with the Dominican Republic. The center is staffed by a large group of highly dedicated international volunteers and Haitien teams including doctors, nurses, support staff and administrators.

When I got there, I really got a sense of how much my skills were needed after I was introduced and got a star-like welcome of cheers and claps. Needless to say I was very busy everyday that I was there. I saw more broken limbs, shattered pelvises, and amputations than I've ever seen in my five years in x-ray. But I

am really glad I had the opportunity to help out a little and got to spend some time with my family. I am so proud to have been part of such an amazing humanitarian initiative and that I was able to see first hand how people from different parts of the world and with different backgrounds manage to work together from the goodness of their hearts for the good of the poor. I must say that I was really impressed by how well the HHI organized the deployment of a large group of medical and health care personnel and delivered huge loads of donated supplies. For every team that leaves, another team was already there to replace it.

For me this trip was very rewarding, healing and at times frustrating. Frustrating only because we had to work with what we had and yet what we had wasn't good enough and you wish you could do more but one can only do so much. The x-ray machine we used was the frustrating part, we had to use a small handheld x-ray machine normally used by the veterinarian. There is no light coming out to indicate where you are shooting the x-ray and you end up doing a lot of repeats because 30% of the time you miss the target. My second week there I had the chance to use a regular portable machine donated by Philips but I could not use the CR because the generator blew out. I had to continue to use the smallest size of cassettes and image parts by section because the CR that came with the veterinary machine could only fit 8 x 10. All of this was going on under a very hot tent that was designated as the radiology tent. I just found out on March 7 that the portable x-ray machine is out of order. The people of Haiti can use just about anything right now; but when it comes to radiology, either equipment or technologists, that would be a plus for all the volunteers already there that are trying to help.

I tried not to take too many sad stories with me like this ten-year-old boy who lost every member of his family in the quake and now lives in an orphanage. Or this 14-year-old boy who is the only injured member of the family, who lost his mother and recalled her final plea to his father to not let the children suffer and make sure that they get a good life. All of these stories, however, didn't take away the fact that there is still hope. When I think of all the people working on the ground, and the people like the ones in the South End and around the world, who are doing their part behind the scene to ease the pain of my brothers and sisters, it gives me great expectations for a better tomorrow."

– Yolette

Fleischner Graduation Ceremony goes Baroque (and High Renaissance)

This year's Fleischner Graduation ceremony was held at the Museum of Fine Arts where guests dined in a 100-foot hall among masterpieces by Tintoretto, El Greco, Velazquez, Poussin, Rubens, and van Dyke in the Koch Gallery. This year's resident video, crafted by **Cathy Wells** and **Rich Rana**, was able to hold its own against the other works of art in the room (DVD copies are available from the Media Lab). Congratulations to the 2010 graduating class and the recipients of our departmental awards!

Radiology Resident Program Directors and the Class of 2010

Dr. Kruskal congratulates Gethin Williams on wining both the Fleischner Young Investigator and the RSNA Resident Research Awards. Gethin will remain at BIDMC as a Fellow in Interventional Radiology beginning July 1, 2010.

Section of the Year: Interventional Radiology

From L to R: Dr. Kruskal and 2010 Chief Residents, Maria Barile and James Kang; Teacher of the Year: Karen Lee; Fellow of the Year: Dennis Boparai (Body MR).

Dr. Kruskal awards Teacher of the Year: Paul Spirn (and Gillian Lieberman, not shown), Resident of the Year: Sachin Pandey; Norman Joffee Award: Rob Sheiman

*This year also saw the introduction of two new awards. Dr. Kruskal was proud to bestow the **Robert E. Lenkinski Excellence in Academic Mentoring Award** to S. Nahum Goldberg (in absentia, but he still had many kind words to say about his being the first recipient), Neil Rofsky, Phillip Boiselle, and Bettina Siewert! Secondly, the Department's new **Triple Threat Award for Excellence in Clinical Research and Educational Achievement** was presented to Jim Wu and as you can see below, his "supporters" agree!*

Congratulations to Aarti Sekhar (3rd from the left), the 2010 winner of the Andy Berezin Award for excellence in clinical mentoring of her fellow residents.

Radiology Nursing

Bridget O'Bryan, RN
Radiology Nurse
Manager

As the digital revolution in imaging techniques continues so does the ability to perform more complex, life saving procedures in the radiology arena. Nurses in Radiology have seen an expansion of their role to include more areas within the department. Their presence is now seen in the Shapiro outpatient setting, facilitating Cardiac CTA's, PET Scan sedation, and triage of more clinically complicated patients. Nursing presence has improved patient flow and wait times by assisting in difficult IV starts and managing clinical issues in a more clinically demanding setting. Nursing has been challenged to integrate new procedures within different sections, establishing safe practice for spine injections on Rabb 3, CCK infusions in Nuclear Medicine, and additional volume form the Atrius population.
This year the name changed for our procedural care area to The Radiology Care Unit. The Radiology Nurses in this area continue to face daily challenges of patient flow, caring for a wide variety of patient populations with multidisciplinary medical issues. Throughout the department, Radiology Nursing continues to adapt their roles to facilitate the ever changing needs of the department, while continuing to provide quality and safe patient care for complex patient populations.

Nurse Practitioners & Physician's Assistants

The utilization and integration of the NP and PA roles continues to be widely successful for patients, radiologists, and referring physicians. Enhanced patient safety, increased patient satisfaction, and throughput improvement facilitated by these individuals within Radiology, speaks highly to their valuable roles and integral part of the team.

In Interventional Radiology (IR), **Jonathan Underhill, PA-C** evaluates all outpatients for appropriateness for the intended procedure. He enhances throughput by assuring that all patients are prepped and ready for their scheduled intervention, and provides a buffer for patients with his comprehensive knowledge and ability to effectively triage. He acts as a liaison to referring physicians and their staff, coordinating patient care and providing comprehensive communication and education.

In Mammography, **Nancy Littlehale, NP** works in breast procedures. She assists in biopsies, wire localizations and other invasion exams. Her role has provided a consistent and accessible form for physician referrals, and she regularly advises them regarding patient management post procedure. She is responsible for the coordination of weekly radiology/pathology conferences, and instructs residents and fellow in the care of the Mammography patient. Her presence has increased continuity and quality of care resulting in increased patient satisfaction.

Meghan Fashjian, NP coordinates pre, post and intra-procedural care for the Abdominal Imaging / CT department. She manages a database for patient follow up and coordinates physician referrals for procedures both in the outpatient and inpatient settings. She is a primary contact for Radiofrequency Ablation and Transarterial Chemoembolization patients seeing patients in the IR outpatient clinic and serving as the point person for multidisciplinary liver tumor conference.

Diane DiNobile, NP is the primary communication for patients being consulted to Interventional Neurology (INR). She sees patients in clinic, evaluates patients for procedures, and mentors the neuro diagnostic residents and fellows. She performs many INR procedures and unique to her position, is routinely on call for emergency cases. She triages inpatient and out patient neuro related issues and continues to develop her procedural scope of practice.

In the MRI Section**, Cheryl Bunting, NP** provides oral sedation for claustrophobic and anxious patients resulting in an increase in productivity and a decrease in repeat scans. Her scope is multifaceted providing pre-procedure care for all prostrate coiling patients, and allergic reaction management from contrast mediums. She is consistently available in the department for administration of a variety of medications and patient care issues that may present at any time.

New this past year, the NP role in Abdominal/Ultrasound area strongly solidified a value added position in this section. With effective triage and coordination of scheduling issues within the department, procedural volume increased over 30 percent. A comprehensive study and standardization of liver biopsy pain management provided evidence based practice to this population increasing patient satisfaction and improved outcomes. We are actively recruiting for this position after the relocation of **Faith Hsu, NP** this past July.

As the challenges in our health care delivery system redirect and change our approaches to deliver quality patient care, these roles and the ability to re-address scope of practice within the guidelines of the institution and the state, will no doubt continue to be instrumental in the Radiology Department, in our mission to provide excellent patient care services.

Registered Nurses


Ann Marie Cathcart
Radiology Care Resource Nurse


Maryann Humphrys*
Radiology Resource Nurse


Dorothy Amrose


Michelle Barr-Daley


Janet Boris


Susan Bryson
Radiology Care Unit


Jeanne Carbone*


Ed Carroll


Diana Daley


Kim Downes


Kevin Flinn


Martha Foote
Radiology Care Unit


Melanie Gallagher
Radiology Care Unit


Michelle Geraghty
Radiology Care Unit


Cindy Gwozdz
Radiology Care Unit


Maryellen Johnson


Kristin Lundy


Lorraine Mac Isaac


MaryBeth Malolepszy


Chris McCusker
Radiology Care Unit


Michelle Perkins


Mary Ryan


Judith Senier


Marivic Tolete


Misti Mullins
Radiology Quality RN

** ARIN certified nurses, the first in our department*

Nursing Assistants


Acelia Pluvoise
Pager# 31218


Thao Bui
Pager# 92084


Lorena Butcher
Radiology Care Unit


Loretta Jackson
Practice Assistant

The clinical service is organized by sections, which report through the Associate Chief of Clinical Services to the Chairman. Sections in our department are matrixed and include both modality-based (magnetic resonance imaging, ultrasound, nuclear medicine, interventional radiology) as well as organ-based (abdominal imaging, thoracic imaging, neuroradiology, musculoskeletal imaging, breast imaging) sections.

The Department provides the entire spectrum of diagnostic and interventional services as pertain to adult imaging services. (As Beth Israel Deaconess Medical Center is not a pediatric hospital, all pediatric imaging is obtained and read by physicians from Children's Hospital, adjacent to BIDMC.) From a diagnostic perspective, we have state-of-the-art CT, MRI, nuclear medicine, ultrasound, and fluoroscopic equipment and provide imaging on a 24/7 basis. The overnight and after-hours work is obtained and interpreted by residents, fellows, and attendings working in our Emergency Department Radiology Suite. From an interventional perspective, the Department offers the entire spectrum of interventional procedures, subdivided into vascular interventional, abdominal, breast, musculoskeletal, and neurointerventional services. These are all complimented by a large group of nurse practitioners, physician assistants, and radiology assistants that support the physicians for all procedures.

Section Summaries

Bettine Siewert

Abdominal Imaging *(CT, MRI, & US)*
- Bettina Siewert, MD, Chief

The abdominal Imaging section, comprising 14 full- and part-time staff and 6 fellows, continues to experience growth in our diagnostic and interventional services, performing and interpreting approximately 95,000 cases per year, the largest number of cases for any section or site in our Department. Members of the section also provide services at the ambulatory centers, including BeWell Body Scan and Chestnut Hill, Harrington Memorial Hospital and BID Needham Campus. The abdominal interventional section continues to thrive under the leadership of **Rob Sheiman**.

Teaching: Our teaching responsibilities extend beyond medical students, residents, fellows and technologists; the section also runs a radiology Assistant Training program and we are thrilled that our first student, **Stacey McKinnon**, has graduated with a masters degree and has joined our staff. Stacey has proven to be an essential cog in the abdominal section's wheel, having obtained the necessary interventional skills that allow her to perform a spectrum of procedures.

Our fellowship program is ACGME accredited which allows us to train six fellows per year. Our fellows are involved in all aspects of abdominal radiology and have the opportunity to contribute to the research mission of the section under dedicated mentorship. Every year we attract a great group of trainees who make it a pleasure to work in academic medicine.

Research: The abdominal section has had a very productive research year. Studies have focused on radio-frequency ablation of adrenal tumors including postoperative imaging findings and its value in treating hormone producing adrenal tumors. We investigated the safety of fiducial seed placement for cyberknife therapy and the complication rate of concomitant lung biopsy. Several review articles were published online for educational use by residents and fellows.

Clinical activities: As clinical abdominal practice has shifted towards cross-sectional imaging and endoscopy, the fluoroscopy volume continues to decrease and we are now staffing Shapiro 3 outpatient fluoro for 3 days each week. This shift has also resulted in an increase in our abdominal ultrasound volume, matched by a relative decrease in MR and CT driven in part by primary care incentive programs.

Computed Tomography - Vassilios Raptopoulos, MD, Chief

Vassilios Raptopoulos

Tim Parritt, CT Mgr

Meghan Fashjian, NP

Ivan Pedrosa

Robert Sheiman

Bettina Siewert

Marty Smith

Maryellen Sun

Girish Tyagi

Jesse Wei

The CT section is flourishing under the enthusiastic leadership of **Dr. Vassilios Raptopoulos**. Additional staff members include **Dr. Robert Sheiman**, Chief of CT-guided interventions, **Drs. Bettina Siewert, Girish Tyagi, Martin Smith, Ivan Pedrosa, Jesse Wei,** and **Maryellen Sun**.

Under the leadership of **Tim Parritt**, CT manager and supervisor, the abdominal section has started a department wide initiative to substantially reduce radiation for patients undergoing CT imaging. The goal of this campaign is to provide optimal diagnostic imaging while following the principles of ALARA. All CT examinations are tailored towards the individual patient and with improvements in equipment and software dose reductions between 30-50% are obtainable. Continuing education of our staff ensures the success of this project.

CT-guided interventions are growing under the leadership of **Robert Sheiman**. Image guided interventions include biopsies and fine-needle aspirations, drainages with catheter placements, radio-frequency ablations, seed placement for cyberknife therapy. The use of CT fluoroscopy aides in the safety and efficiency with which these procedures are performed. Our nurse practitioner, **Meghan Fashjian**, has proven an invaluable new member of the CT team. Meghan provides continuity of care for our interventional CT patients and is particularly important in guaranteeing a positive experience for our outpatients in the daycare unit and beyond.

Beth Israel Deaconess Medical Center

IMAGE*lightly*

Making Great Strides in Radiation Reduction

- Advances in CT technology allow us to use 30-50% less radiation while still providing the highest quality CT scan.
- Every CT is personalized for every patient.
- Our highly-skilled and licensed technologists and physicians consistently undergo radiation safety training and education.
- Our CT equipment goes through rigorous quality assurance testing daily, quarterly and yearly to maintain our American College of Radiology accreditation.

"*We pledge . . .*

. . . you'll receive the optimal diagnostic CT study while receiving less radiation as we practice the ALARA principles:

AS LOW AS REASONABLY ACHIEVABLE

. . . to image lightly while providing high quality diagnostic CT imaging studies to enhance your care at BIDMC."

Beth Israel Deaconess Medical Center in Boston Massachusetts has been awarded a three-year term of accreditation in CT as the result of a recent survey by the American College of Radiology (ACR).


Neil Rofsky


Herbert Kressel


Karen Lee


Ivan Pedrosa


Marty Smith


Maryellen Sun


Jesse Wei

Magnetic Resonance Imaging - Neil M. Rofsky, MD, Chief

The **Body MRI section** is comprised of 7 full- and part-time staff and 3 fellows. All staff members of the section are fellowship-trained in Body MRI and offer timely expert interpretations of a variety of thoracic, abdominal, pelvic, and MR angiographic studies. Additional expertise in other diagnostic techniques and interventional procedures related to body imaging among the MRI staff provides the foundation for a dynamic section with a broad and comprehensive approach to diseases. Overall leadership for MRI services and translation is spearheaded by **Dr. Neil Rofsky** as Chief of MRI and **Dr. Ivan Pedrosa** provides leadership as Director of the Body MRI section. **Dr. Martin Smith**, in his role as Director of Community MRI, coordinates the clinical activities of the section in the community while he brings his expertise in MR imaging of the GI tract and bowel to the entire enterprise. **Dr. Jesse Wei** contributes to resident teaching and offers his computer programming skills to close the gap between physicists and physicians, facilitating the implementation of new MR techniques for non-contrast MR angiography and novel hepatobiliary agents. **Dr. Karen Lee** has a leadership role in the fellowship candidate selection, coordinates the education in the section during the weekly journal clubs, and strengthens the use of MRI in the acutely ill. **Dr. Maryellen Sun** is a key participant in resident education and brings a broad expertise to the section based on her knowledge and skills in MRI and sonography. **Dr. Herbert Kressel** offers unique pearls and insights to the clinical service that stem from his wealth of experience, enhancing the training of residents and fellows both at the workstation and particularly at our journal club meetings. The MRI fellows provide an essential role coordinating all clinical activities, monitoring cases to insure a level of care that provides differentiation from all other sites in Boston and supplementing the residents' education. **Claire Odom** facilitates the activities in the section by providing outstanding administrative support.

The mission of the Body MRI section is to offer the highest standard in diagnostic evaluations of the body with expert interpretations and continuous development of new MRI techniques that are implemented into clinical practice in a safe and timely manner. The section has received regional, national, and international recognition for its contribution to the care of men with prostate cancer, pregnant women with abdominal pain, patients with renal cancer, patients with vascular disease and young patients with inflammatory bowel disease. The international reputation of the Body MRI section is bolstered by our open door policy, welcoming many residents and fellows from other programs in the country and abroad to learn with us.

The translational success of the section derives from the strong relationship with the remarkable team of MR scientists at BIDMC. The interplay between technical development and clinical relevance occurs daily on Ansin 2 where MDs and PhDs share programmatic space, and biweekly, at the MR research meetings. Meaningful results of the collaborations can be found in manuscripts that are recently published and in press, including carotid artery angiography with arterial spin labeling, increased positive biopsy yield in patients with previously occult prostate cancer and early determination of response to anti-angiogenesis therapies for renal cell cancer.

Translational successes:
As a national leader in developing and promoting the use of MR in the diagnosis of acute appendicitis in pregnancy the MR team was one of the first institutions to not only describe an MR protocol to image the appendix in pregnancy, but also demonstrate the excellent diagnostic performance of this exam in pregnant individuals. Currently, our team is investigating the utility of diffusion-weighted sequences in the diagnosis of acute appendicitis. Based on the success we have had at our institution in using MR to diagnose acute appendicitis in pregnancy, MR has virtually supplanted CT to become the primary imaging modality in the evaluating pregnant patients with acute abdominal pain, thereby avoiding the risk of ionizing radiation (see pg. 47 *Bench to Practice*).

Ultrasound -

Robert A. Kane, MD
Deborah Levine, MD
Robert Sheiman, MD


Robert Kane


Deborah Levine


Robert Sheiman


Colin McArdle


Tejas Mehta


Janneth Romero


Jonathan Kruskal


Maryellen Sun


Bettine Siewert


Jesse Wei

Overview: The Ultrasound Section is a large and steadily growing section within the Department of Radiology, led by Co-Chiefs, **Dr. Deborah Levine**, Chief of OB/GYN Ultrasound and **Dr. Robert Kane**, Chief of Abdominal and General Ultrasound, and **Dr. Robert Sheiman**, Co-Director of the Non-invasive Vascular Laboratory. We have seven additional staff members who are primarily involved in day-to-day ultrasound activities, including **Drs. Colin McArdle**, **Janneth Romero**, and **Tejas Mehta** in the OB/GYN side, and **Drs. Maryellen Sun**, **Bettina Siewert**, **Jesse Wei**, and our own Department Chair, Dr. **Jonathan Kruskal,** on the General/Abdominal side. The Ultrasound Section has shown steady and continuous growth, and in the year 2009 performed and interpreted 49,663 ultrasound examinations, which represents a nearly 20% increase when compared to FY 2007. There were over 2,000 ultrasound-guided procedures performed in 2009, ranging from amniocenteses and saline-infused hysterosonography exams to liver and kidney biopsies, FNAs of thyroid, lymph node and salivary gland lesions, and percutaneous cholecystostomies, and other drainage procedures. We read nearly 18,000 remote scans from the 1101 Beacon Street, Lexington and Chelsea office sites, and the mobile US network. We also performed over 250 intraoperative ultrasound examinations to help facilitate surgical procedures involving the liver, gallbladder and biliary tree, pancreas, and kidneys, and gynecological surgical procedures.

This extremely busy clinical service is ably led by our Ultrasound Manager, **Bernadette Kennedy**, our Ultrasound Supervisor, **Juanita Cook**, and **Deborah Barnhill**, Senior Vascular Technologist. Our increased clinical productivity has been accomplished without adding additional physician staff, in large part due to the extremely valuable contributions of our Sonographic Practitioners, **Gail Birch** and **Laurie Sammons**, who are an invaluable resource in helping expedite the busy clinical load, as well as serving as outstanding educational resources for our many trainees and junior technologists. The sonography staff of 35 consistently demonstrate an outstanding commitment to excellence in patient care, high quality imaging, and a conscientious work ethic. In the past year, we have added a Nurse Practitioner, **Faith Hsu**, who has proved to be an extraordinary resource in helping to manage our rather chaotic interventional schedule on the West Campus. Since April 2009, we have increased our average daily interventional procedure rate from 4.2/day to 7.4/day, and typically 20-35% of these daily cases are same day add-ons from the inpatient wards, Emergency Department, or outpatient physician offices. The entire ultrasound team consistently functions as a cohesive, highly productive unit and is deserving of our compliments and gratitude for their excellent efforts.

The OB/GYN Ultrasound Service is primarily located in the Shapiro Clinical Center and has six ultrasound rooms with state-of-the-art equipment including 3-D and 4-D imaging. This is of particular importance for fetal imaging, including evaluation of complex fetal anomalies, as well as for assessment of uterine anomalies. We have several certified techs to offer nuchal translucency screening, as well as routine and high risk obstetrical ultrasound, amniocentesis, and the full range of GYN ultrasound, including sonohysterography. **Dr. Levine** serves as Chair of the Ultrasound Commission for the American College of Radiology and is a member of the ACR Board of Chancellors. She also serves as Senior Deputy Editor of Radiology.

The Abdominal/General Ultrasound Service is principally sited at the West Campus, and is also active in the East Campus on Rabb 3. Major activities include serving as the principal screening modality for several thousand patients with chronic liver disease, who are imaged every 6-12 months in an effort to detect possible early development of hepatocellular carcinoma, as well as to assess for

Ultrasound ACR Accreditation

The Ultrasound Section of the BIDMC Radiology Department has successfully been re-accredited by the American College of Radiology in OG-GYN, Abdominal, General and Small Parts US, as well as Vascular US/Doppler for peripheral vascular, deep abdominal and retroperitoneal vascular studies.

The ACR US Accreditation program is a rigorous assessment of the quality of performance at an US facility by board-certified physicians and medical physicists who are experts in the field, with strict Credentialing and Maintenance of Competence requirements for all physicians and technologists working at the facility, assessment of the quality of the scanning equipment (including routine maintenance records and phantom studies), as well as a requirement for submission of actual scans in all accreditation categories, both normal and abnormal, which are judged for technical and clinical competency, including the physician's reports. Accreditation provides a high level of confidence for patients, referring physicians and health care organizations that the highest quality care is being provided by the accredited facility.

The US Section at BIDMC was deeply involved in the development and promulgation of the accreditation process for US facilities, helping to define the methodologies and improve and refine the operations of this effort. We are proud to have been one of the first US facilities to be accredited in the United States some 10+ years ago, and have successfully undergone the accreditation process 3 additional times. The accreditation period is for three years, and then must be renewed in order to assure adherence to the highest quality US practice.

The Non-invasive Vascular Lab, which shares practice with US on the West Campus, is also accredited by the Intersocietal Commission for the Accreditation of Vascular Laboratories (ICAVL) for the full complement of non-invasive vascular assessment.

- Robert A. Kane, MD, FACR

further deterioration of liver function. This is particularly important in patients with chronic hepatitis B and C who are enrolled at BIDMC in an antiviral therapeutic regimen. Other unique activities in the Abdominal/General Ultrasound Section include intraoperative and laparoscopic ultrasound assessment of patients with liver, biliary tract, and pancreatic diseases. The hepatobiliary and pancreatic surgeons have come to rely on IOUS information to make on-the-spot decisions regarding extent of surgical therapeutic approach, to perform intraoperative biopsies and other interventional procedures, and, in some cases, to significantly shorten the length of surgical procedures, such as Puestow pancreatic drainages. Transrectal assessment of local staging for rectal tumors and transanal ultrasound of the anal sphincters and H202 ultrasound perianal fistulograms are other areas of unique application of ultrasound technology. The Vascular Ultrasound Service performs the full spectrum of ultrasound assessments for peripheral arterial and venous diseases. **Dr. Sheiman** was one of the early users of thrombin injection for treatment of pseudoaneurysms, and has a remarkable success rate in this regard, thereby shortening patient stays and avoiding surgery in nearly all cases.

In the realm of research, the Section has continued to be very active. On the OB/GYN side, research has focused on the utility of MR as an additional aid in care of the pregnant patient, with projects focusing on assessment of ultrasound, MR and outcomes in fetuses with ventriculomegaly. On the Abdominal/General Ultrasound side, there are several papers in press or in preparation, including a long-term clinical and sonographic analysis of gallbladder polyps over an 8-10 year follow-up, an analysis of the efficacy of color and pulsed Doppler assessment for portal vein stenosis in liver transplant patients, a collaborative work with the hepatologists regarding the performance of ultrasound in prediction of the presence of fatty liver in a group of patients suspected for non-alcoholic steatohepatitis with correlation to liver biopsy results, and a requested manuscript which is submitted to RadioGraphics detailing the spectrum of uses of intraoperative ultrasound in pancreatic surgery. In the past year, there were 11 peer-reviewed publications from the Ultrasound Section (see below).

An exciting, new research development is being overseen by **Dr. Maryellen Sun**, who is the Site Principal Investigator for a Multicenter Trial to Assess the Performance of Contrast-Enhanced Ultrasound in Characterization of Liver Lesions, under the sponsorship of Bracco. This study is in its formative stages and will get underway in the next month or two. Hopefully, the results will help convince the FDA to approve the use of contrast-enhanced ultrasound for diagnostic uses in radiology. If so, Dr. Sun has other research projects in mind to continue the investigations into effective uses of contrast-enhanced ultrasound.

The Section continues its successful efforts in education. Under **Dr. Levine's** leadership, there are over 4900 cases entered into the Ultrasound Digital Teaching File, which are accessible through the Intranet and include interesting pathologic cases, as well as ultrasound demonstrations of normal anatomy. This is an invaluable educational resource. We are well known and relatively unique in Radiology for our insistence on hands-on learning in Ultrasound by the radiology residents, all of whom are expected to achieve a measurable level of competence in performing ultrasound scans as well as interpreting ultrasound studies. Our residents are responsible for after-hours ultrasounds on the East Campus, a task which they perform quite well. We would like to make special note of our School of Diagnostic Medical Sonography at BIDMC, which has been established and ably led by **Cory Finn**, the Program Director. The Certificate Program in Diagnostic Medical Sonography was launched at BIDMC in 2008. This is an 18-month program which has been accredited by CAAHEP and includes 40 hours/week of clinical and didactic training within the BIDMC network. There is a rigorous curriculum consisting of ultrasound physics, anatomy, and the full spectrum of general, abdominal, OB/GYN and vascular sonography. We have had two outstanding graduating classes from this program, and many of the graduates have entered our select group of sonography staff. We look forward to the continued success of the sonography school.

It is indeed a pleasure to work amongst such a cadre of talented and dedicated individuals and we look forward to the continuing success of the Ultrasound Section in the coming years.

Quality Improvements in Ultrasound

Faith Hsu, NP

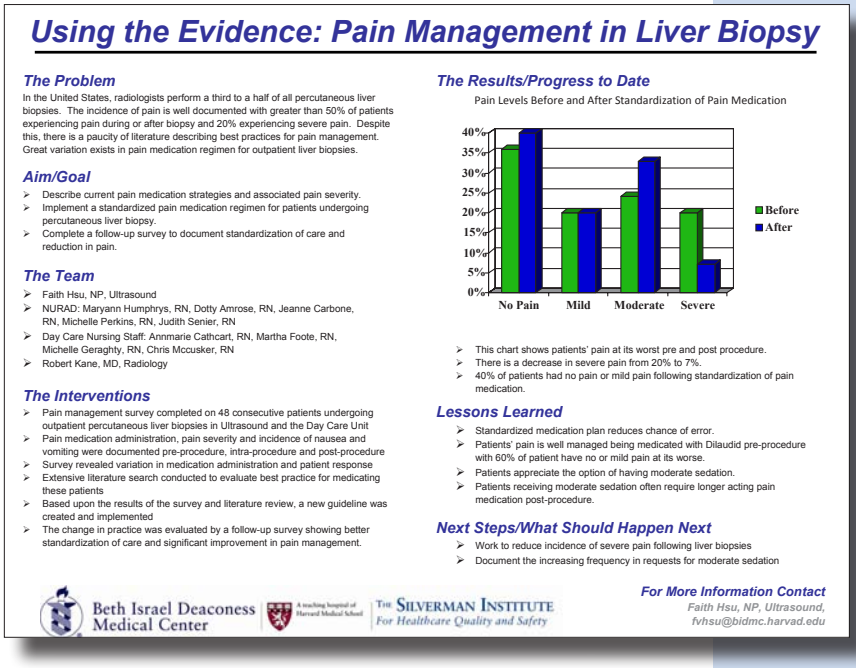
Faith Hsu, nurse practitioner in ultrasound from November 2008 to June 2010, enhanced the patient experience for ultrasound guided procedures while increasing procedural volume for the West Campus Ultrasound Department.

Faith, along with the nursing and ultrasound staff, spearheaded a quality improvement project on pain control during liver biopsies. Based upon a review of the literature and survey, an evidence based algorithm of pain medication management for pre and post liver biopsy pain management was implemented. A follow up survey was completed and documented significant improvements in pain control.

The results of this project were presented at the Association for Radiologic & Imaging Nursing in Tampa, FL on March 15, 2010. They were also displayed at the Silverman Institute on Health Care Quality and Safety at BIDMC March 23, 2010.

Also, procedure volume more than doubled and patient satisfaction/safety improved by providing continuity of care for this patient population. The ultrasound department continues to provide excellent care using this model.

(Sadly, Faith relocated with her family out of state but we look forward to continuing process and quality improvements sparked by innovations such as hers.)



Using the Evidence: Pain Management in Liver Biopsy

The Problem

In the United States, radiologists perform a third to a half of all percutaneous liver biopsies. The incidence of pain is well documented with greater than 50% of patients experiencing pain during or after biopsy and 20% experiencing severe pain. Despite this, there is a paucity of literature describing best practices for pain management. Great variation exists in pain medication regimen for outpatient liver biopsies.

Aim/Goal

- Describe current pain medication strategies and associated pain severity.
- Implement a standardized pain medication regimen for patients undergoing percutaneous liver biopsy.
- Complete a follow-up survey to document standardization of care and reduction in pain.

The Team

- Faith Hsu, NP, Ultrasound
- NURAD: Maryann Humphrys, RN, Dotty Amrose, RN, Jeanne Carbone, RN, Michelle Perkins, RN, Judith Senier, RN
- Day Care Nursing Staff: Annmarie Cathcart, RN, Martha Foote, RN, Michelle Geraghty, RN, Chris Mccusker, RN
- Robert Kane, MD, Radiology

The Interventions

- Pain management survey completed on 48 consecutive patients undergoing outpatient percutaneous liver biopsies in Ultrasound and the Day Care Unit
- Pain medication administration, pain severity and incidence of nausea and vomiting were documented pre-procedure, intra-procedure and post-procedure
- Survey revealed variation in medication administration and patient response
- Extensive literature search conducted to evaluate best practice for medicating these patients
- Based upon the results of the survey and literature review, a new guideline was created and implemented
- The change in practice was evaluated by a follow-up survey showing better standardization of care and significant improvement in pain management.

The Results/Progress to Date

Pain Levels Before and After Standardization of Pain Medication

- This chart shows patients' pain at its worst pre and post procedure.
- There is a decrease in severe pain from 20% to 7%.
- 40% of patients had no pain or mild pain following standardization of pain medication.

Lessons Learned

- Standardized medication plan reduces chance of error.
- Patients' pain is well managed being medicated with Dilaudid pre-procedure with 60% of patient have no or mild pain at its worse.
- Patients appreciate the option of having moderate sedation.
- Patients receiving moderate sedation often require longer acting pain medication post-procedure.

Next Steps/What Should Happen Next

- Work to reduce incidence of severe pain following liver biopsies
- Document the increasing frequency in requests for moderate sedation

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For More Information Contact
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fvhsu@bidmc.harvad.edu

Breast Imaging

- Max P. Rosen, MD, MPH, Chief
- David Magaram, MD, Clinical Director


Max Rosen


David Magaram

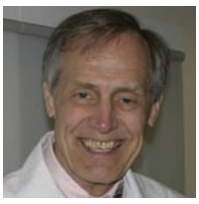

Julie Armada


Douglas Bober


Vandana Dialani


Valerie Fein-Zachary


Peter Gross


Ferris Hall


Elaine Iuanow


Kenny Lai


Tejas Mehta


Rola Shaheen


Priscilla Slanetz


Shambhavi Venkataraman

The past year has been one of evolution for the breast imaging section, with many changes driven both by internal growth and response to external factors.

We now perform breast imaging at 8 sites: BIDMC, Lexington, Chelsea, 1101 Beacon, 25 Boylston Street, BID-Needham, Harrington Memorial Hospital and Harrington Hospital's Webster, MA campus. Average weekly volume is approximately 685 screening mammograms, 325 diagnostic mammograms, and 245 breast ultrasounds. Breast MRI volume has increased to 15 per week.

This January, we welcome **Dr. David Magaram** as the new clinical director of breast imaging. Dr. Magaram went to medical school and did his Radiology residency at UCSF. David has been involved in developing and managing community breast imaging programs for over 30 years, having organized and directed mobile mammography screening program serving 17 community health centers in Los Angeles, served as the director of a comprehensive breast care clinics in State College, PA, Seattle, Washington, and most recently in Bellevue, Washington. In his new role at BIDMC, David will help run the clinical operations of the breast imaging section both at BIDMC, as well as at our community sites.

In order to help facilitate better coordinate of our community sites, **Ms. Olga Augustus** recently transitioned from her position as BIDMC modality manager for breast imaging to a newly created position as the manager of our community breast imaging division. In her new role, Olga will work with each of the site managers (**Nancy Whitman** at 1101 Beacon, **Marian Howes** at 25 Boylston, **Judy Farina** at Lexington and Chelsea, and **Don Holmes** at BIDN) to help standardize and coordinate our breast imaging practices across all of our community sites.

Although we will all miss Olga at BIDMC, we are fortunate to have just hired **Ms. Leanne Linscott** to join the management team for Breast Imaging. Leanne comes to us from Bar Harbor, Maine where she was the director of Medical Imaging at MDI hospital. Leanne is a registered Radiographer, Nuclear Medicine Technologist and Mammographer.

This past year we also welcomed **Dr. Doug Bober** as a member of our community breast imaging group. Doug did his undergraduate work at MIT, and competed his medical school training at Dartmouth and George Washington University. After completing his Radiology residency and fellowship training at SUNY Upstate Medical Center, Doug has been in private practice in Connecticut for the past 25 years. Doug will be working primarily at Hubbard and Harrington Hospitals 3 days per week, but has graciously offered to help us at BIDMC and the other offices within route 128 when needed.

In late May / early June, our community practice in Central Massachusetts will welcome a third breast imaging site when the new Charlton, MA outpatient imaging center opens.

This July we will have two more transitions in the breast imaging section. We will unfortunately say "goodbye" to **Dr. Shayna Roberts** who has helped us greatly by staying on for an extra year following her fellowship. Shayna will be joining her husband who is completing his post-graduate training. In July, we will also "re-welcome" **Dr. Kenny Lai** back to BIDMC. As many of you know, Kenny finished his residency with us last year, and after 12 months near the old Charles Street jail, will be returning "home" to join the breast imaging section.

The major "external" factors shaping the future of the breast imaging section is the departure of Dr. Susan Troyan as the director of the BIDMC's breast care center. I have been actively involved on the search committee charged with finding Dr. Troyan's replacement, and am confident that BIDMC will soon find a superb replacement for Dr. Troyan. While Dr. Troyan's departure has left several gaps in the breast care center, it has also served as an opportunity to re-look at many of our processes and seek out opportunities for improvement. Donna, David, myself, Dr. Valerie Staradub, and the administrators of the breast center have started a monthly operations improvement meeting to seek ways to provide improved and more coordinated care between Radiology and Breast Surgery.

During the past year both David and I completed LEAN training. After working with the other Radiologists in the section, we have identified 5 targets which we will work to achieve in the next 12-24 months.

These targets are:

- Maximize Radiologist's productivity
- Improve Quality / Eliminate Harm
- Provide "just-in-time" service
- Improve patient experience
- Achieve financial sustainability

Some of the first initiatives will be re-configuring the Radiologist's daily work schedule for diagnostic mammography at BIDMC, re-writing patient letters, and conducting an audit of both short and long term space and equipment needs in Shapiro.

Beyond the confines of Longwood and Brookline Avenues, **Dr. Rola Shaheen** has been active in developing innovative outreach programs to increase awareness of breast cancer and the benefits of screening and early detection among Palestinian women. She was awarded two grants for these efforts and she has edited / authored two publications:

Breast cancer awareness booklet for Palestinian Women, a joint effort with United States Middle East Partnership www.bcpartnership.org

Breast Cancer Screening Kit - (Editors: Slanetz P, Raza S. and Rosen M) An educational booklet for women and health care providers in Gaza. The booklet is distributed in Gaza through partnership with CARE International in Gaza.

Grants:
$3,500 US from the Canadian Association for Medical Relief for Educational/research project of breast cancer awareness in Gaza. Co-investigators: Max Rosen, Priscilla Slanetz and Sughra Raza.

$4,500 US $ from CARE international WBG to print booklet of "Breast cancer screening kit" in Gaza.

On the academic front the section the section has celebrated several publications and academic accomplishments:

BREAST IMAGING PUBLICATIONS 2009-2010

Teaching Evidence-Based Imaging in the Radiology Clerkship Using the ACR Appropriateness Criteria. Dillon JE, **Slanetz PJ**. Acad Radiol. 2010 Apr 21.

Cystic masses of the breast. Hines N, **Slanetz PJ**, Eisenberg RL. AJR Am J Roentgenol. 2010 Feb;194(2):W122-33. Review.

Breast density, hormones, and screening mammography: should women be less concerned? Sayegh RA, **Slanetz PJ**. Menopause. 2009 Nov-Dec;16(6):1085-6.

An increase in medical student knowledge of radiation oncology: a pre-post examination analysis of the oncology education initiative. Hirsch AE, Mulleady Bishop P, Dad L, Singh D, **Slanetz PJ**. Int J Radiat Oncol Biol Phys. 2009 Mar 15;73(4):1003-8; quiz 1008.e1-1008.e2.

Sonographic features of gynecomastia. **Dialani V**, Baum J, **Mehta TS**. J Ultrasound Med. 2010 Apr;29(4):539-47.

More mammography muddle: emotions, politics, science, costs, and polarization. Berlin L, **Hall FM**. Radiology. 2010 May;255(2):311-6.

Mammographic screening: a well-recognized medical advance. **Hall FM**. Radiology. 2010 Apr;255(1):307.

Identification, biopsy, and treatment of poorly understood premalignant, in situ, and indolent low-grade cancers: are we becoming victims of our own success? **Hall FM**. Radiology. 2010 Mar;254(3):655-9. Review.

Mammographic screening in younger women at high risk. **Hall FM**. AJR Am J Roentgenol. 2009 Oct;193(4):1188; author reply.

Frequency of diagnosis of atypical ductal hyperplasia on breast biopsy. **Hall FM**. AJR Am J Roentgenol. 2009 Sep;193(3):W253; author reply W254.

Computer-aided mammography screening. **Hall FM**. N Engl J Med. 2009 Feb 19;360(8):836.

Combined screening with ultrasound and mammography vs mammography alone in women at elevated risk of breast cancer. Berg WA, Blume JD, Cormack JB, Mendelson EB, Lehrer D, Böhm-Vélez M, Pisano ED, Jong RA, Evans WP, Morton MJ, Mahoney MC, Larsen LH, Barr RG, Farria DM, Marques HS, Boparai K; ACRIN 6666 Investigators. **(Fein-Zachary VJ, collaborator)** JAMA. 2008 May 14;299(18):2151-63.

Awards:

Dr. Priscilla Slanetz:

- AUR Whitley Award for manuscript on teaching evidence-based imaging using the ACR Appropriateness Criteria in the radiology core clerkship.
- Appointed to the HMS Academy and the BIDMC Academy of Medical Educators.

3 Certificate of Merit awards - RSNA 2009 posters, Chicago

Shaheen Rola, Chorlton M, Behrerman R, **Armada Julie**, **Mehta Tejas**, **Slanetz Priscilla**.
Artifacts on Digital Mammography: Optimizing Image Quality.

Shayna Roberts-Klein, **Priscilla Slanetz**, **Elaine Iuanow**. Minimizing Risk: A Pictorial Review Identifying Pitfalls in Breast Imaging Interpretation.

Neely Hines, **Priscilla Slanetz**, **Shambhavi Venkataraman**. Multimodality Review of Breast Augmentation.

Invited Presentations:

Dr. Rola Shahen: *Barriers to mammography for Gaza women*. Presented at Breast Cancer in Developing Countries: meeting the unforeseen challenge to women, health and equity, Harvard University, Nov 2nd 2009.

Dr. Valerie Fein-Zachary:

- "Breast MRI 1.5 & 3 T" NERR Breast Conference, 3/6/10.
- "The Tipping Point in LGBT Healthcare: When Social Justice and Social Policy Meet the Scientific Method" Brandeis University, The Heller School for Social Policy and Management 3/2/10.
- "Doctors are Activists: the LGBTQ Political Update." 1st Annual LGBTQ Medical Student Symposium. 5/8/10.

Posters:

Valerie Fein-Zachary, **Priscilla Slanetz**, **Ferris Hall**. Missed Breast Cancers - Learning from the Mistakes of Others. RSNA 2009, Chicago, IL

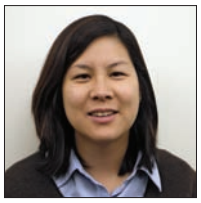
Rola Shaheen, Faisal Khosa, L. Stoddart, **Max Rosen**, **Priscilla Slanetz**. Multimodality Breast Imaging Evaluation of Architectural Distortion with Emphasis on Utilization of Breast MRI and Pathological Correlation. 5th International congress on breast MRI, Jena Germany. [Abstract published in European Radiology September 2009]

Rola Shaheen, **Priscilla Slanetz**, Sughra Raza, D. Muradali D, **Max Rosen**. Barriers and opportunities for early detection of breast cancer in Gaza. Global Summit on Breast Health, Chicago, IL June 2010.

Emergency Radiology - Marc Camacho, MD, Chief


Marc Camacho


Sejal Shah


Karen Lee


Robin Levenson

Overview:
The Emergency Radiology section, established in July 2007, is staffed with 4 full-time faculty members: **Dr. Marc Camacho** (section chief), **Dr. Sejal Shah**, **Dr. Karen Lee**, our newest addition **Dr. Robin Levenson**; and our administrative assistant, Ms. Sheila Blalock. **Dr. Amina Saghir** also joined us as a volunteer research assistant in June 2009.

Leadership is shared with the section members providing administrative functions within the section, department, and medical center:

- Emergency Medicine Morbidity & Mortality Conference (MC, KL, RL)
- Trauma Patient Care Committee/Trauma Case Conference (MC)
- Emergency Radiology QA (MC)
- Emergency Radiology resident education (SS)
- Radiation Safety Task Force (KL, RL)
- Radiology Residency Selection Committee (KL)

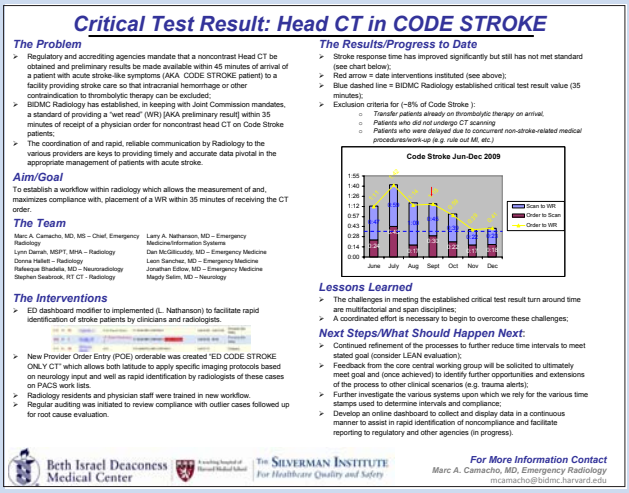
Clinical:
The section faculty provide clinical coverage of the BIDMC emergency department from 8 am to 11 pm weekdays, and weekends & holidays from 3 pm to 11 pm, working closely with, and supervising, BIDMC radiology residents in multi-modality, multi-organ system imaging. Of course, as the only radiology attendings in-house during evening hours, we are frequently called upon to assist in the protocoling and interpretation of any-modality, any-organ system imaging on any patient in the medical center.

A number of new initiatives have been started recently either from, or in tight collaboration with, the section including coronary CT angiography (CoCTA) for chest pain in the ED, the emergent upload and re-interpretation of outside hospital imaging on transfer patients, the reduction in oral contrast use in abdominopelvic CT scanning in the ED and new procedures aimed at reducing response time in Code Stroke presentations.

Section members regularly provide onsite coverage of the body MRI section at BIDMC and at BIDMC Radiology community facilities, namely Harrington at Hubbard Regional Medical Center and the Beth Israel Deaconess at Needham. An important component of the clinical responsibilities of the emergency radiology section is teleradiology coverage of after-hours imaging (principally 2 EDs) from the department's newly-acquired facilities at Harrington Memorial Hospital and Harrington at Hubbard Regional Medical Center.

We wish to recognize the important contributions of technologists acquiring imaging in a challenging environment, subspecialty colleagues in the department assisting with off-hours readouts, and overnight assistance from nighthawk radiologists from Israel. However, the largest share of gratitude goes to our hard-working residents who staff the front lines every night, night after night. Their commitment and dedication to excellent patient care represent the department in the highest manner.

QA in the ED



Critical Test Result: Head CT in CODE STROKE

The Problem

- Regulatory and accrediting agencies mandate that a noncontrast Head CT be obtained and preliminary results be made available within 45 minutes of arrival of a patient with acute stroke-like symptoms (AKA CODE STROKE patient) to a facility providing stroke care so that intracranial hemorrhage or other contraindication to thrombolytic therapy can be excluded;
- BIDMC Radiology has established, in keeping with Joint Commission mandates, a standard of providing a "wet read" (WR) [AKA preliminary result] within 35 minutes of receipt of a physician order for noncontrast head CT on Code Stroke patients;
- The coordination of and rapid, reliable communication by Radiology to the various providers are keys to providing timely and accurate data pivotal in the appropriate management of patients with acute stroke.

Aim/Goal

To establish a workflow within radiology which allows the measurement of and, maximizes compliance with, placement of a WR within 35 minutes of receiving the CT order.

The Team

Marc A. Camacho, MD, MS – Chief, Emergency Radiology
Lynn Darrah, MSPT, MHA – Radiology
Donna Hallett – Radiology
Refeeque Bhadelia, MD – Neuroradiology
Stephen Seabrook, RT CT - Radiology
Larry A. Nathanson, MD – Emergency Medicine/Information Systems
Dan McGillicuddy, MD – Emergency Medicine
Leon Sanchez, MD – Emergency Medicine
Jonathan Edlow, MD – Emergency Medicine
Magdy Selim, MD – Neurology

The Interventions

- ED dashboard modifier to implemented (L. Nathanson) to facilitate rapid identification of stroke patients by clinicians and radiologists.
- New Provider Order Entry (POE) orderable was created "ED CODE STROKE ONLY CT" which allows both latitude to apply specific imaging protocols based on neurology input and well as rapid identification by radiologists of these cases on PACS work lists.
- Radiology residents and physician staff were trained in new workflow.
- Regular auditing was initiated to review compliance with outlier cases followed up for root cause evaluation.

The Results/Progress to Date

- Stroke response time has improved significantly but still has not met standard (see chart below);
- Red arrow = date interventions instituted (see above);
- Blue dashed line = BIDMC Radiology established critical test result value (35 minutes);
- Exclusion criteria for (~8% of Code Stroke):
  - *Transfer patients already on thrombolytic therapy on arrival,*
  - *Patients who did not undergo CT scanning*
  - *Patients who were delayed due to concurrent non-stroke-related medical procedures/work-up (e.g. rule out MI, etc.)*

Lessons Learned

- The challenges in meeting the established critical test result turn around time are multifactorial and span disciplines;
- A coordinated effort is necessary to begin to overcome these challenges;

Next Steps/What Should Happen Next:

- Continued refinement of the processes to further reduce time intervals to meet stated goal (consider LEAN evaluation);
- Feedback from the core central working group will be solicited to ultimately meet goal and (once achieved) to identify further opportunities and extensions of the process to other clinical scenarios (e.g. trauma alerts);
- Further investigate the various systems upon which we rely for the various time stamps used to determine intervals and compliance;
- Develop an online dashboard to collect and display data in a continuous manner to assist in rapid identification of noncompliance and facilitate reporting to regulatory and other agencies (in progress).

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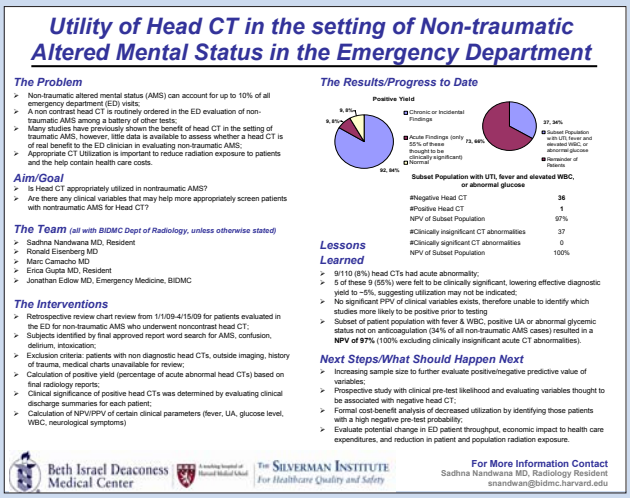

Utility of Head CT in the setting of Non-traumatic Altered Mental Status in the Emergency Department

The Problem

- Non-traumatic altered mental status (AMS) can account for up to 10% of all emergency department (ED) visits;
- A non contrast head CT is routinely ordered in the ED evaluation of non-traumatic AMS among a battery of other tests;
- Many studies have previously shown the benefit of head CT in the setting of traumatic AMS, however, little data is available to assess whether a head CT is of real benefit to the ED clinician in evaluating non-traumatic AMS;
- Appropriate CT Utilization is important to reduce radiation exposure to patients and the help contain health care costs.

Aim/Goal

- Is Head CT appropriately utilized in nontraumatic AMS?
- Are there any clinical variables that may help more appropriately screen patients with nontraumatic AMS for Head CT?

The Team *(all with BIDMC Dept of Radiology, unless otherwise stated)*

- Sadhna Nandwana MD, Resident
- Ronald Eisenberg MD
- Marc Camacho MD
- Erica Gupta MD, Resident
- Jonathan Edlow MD, Emergency Medicine, BIDMC

The Interventions

- Retrospective review chart review from 1/1/09-4/15/09 for patients evaluated in the ED for non-traumatic AMS who underwent noncontrast head CT;
- Subjects identified by final approved report word search for AMS, confusion, delirium, intoxication;
- Exclusion criteria: patients with non diagnostic head CTs, outside imaging, history of trauma, medical charts unavailable for review;
- Calculation of positive yield (percentage of acute abnormal head CTs) based on final radiology reports;
- Clinical significance of positive head CTs was determined by evaluating clinical discharge summaries for each patient;
- Calculation of NPV/PPV of certain clinical parameters (fever, UA, glucose level, WBC, neurological symptoms)

The Results/Progress to Date

Subset Population with UTI, fever and elevated WBC, or abnormal glucose

#Negative Head CT	36
#Positive Head CT	1
NPV of Subset Population	97%
#Clinically insignificant CT abnormalities	37
#Clinically significant CT abnormalities	0
NPV of Subset Population	100%

Lessons Learned

- 9/110 (8%) head CTs had acute abnormality;
- 5 of these 9 (55%) were felt to be clinically significant, lowering effective diagnostic yield to ~5%, suggesting utilization may not be indicated;
- No significant PPV of clinical variables exists, therefore unable to identify which studies more likely to be positive prior to testing
- Subset of patient population with fever & WBC, positive UA or abnormal glycemic status not on anticoagulation (34% of all non-traumatic AMS cases) resulted in a **NPV of 97%** (100% excluding clinically insignificant acute CT abnormalities).

Next Steps/What Should Happen Next

- Increasing sample size to further evaluate positive/negative predictive value of variables;
- Prospective study with clinical pre-test likelihood and evaluating variables thought to be associated with negative head CT;
- Formal cost-benefit analysis of decreased utilization by identifying those patients with a high negative pre-test probability;
- Evaluate potential change in ED patient throughput, economic impact to health care expenditures, and reduction in patient and population radiation exposure.

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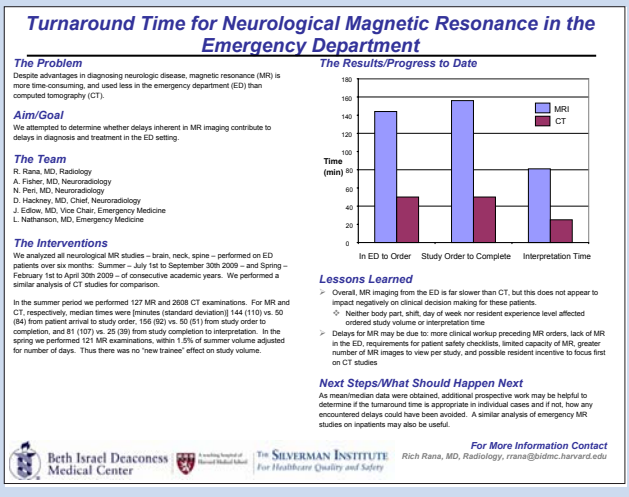

Turnaround Time for Neurological Magnetic Resonance in the Emergency Department

The Problem

Despite advantages in diagnosing neurologic disease, magnetic resonance (MR) is more time-consuming, and used less in the emergency department (ED) than computed tomography (CT).

Aim/Goal

We attempted to determine whether delays inherent in MR imaging contribute to delays in diagnosis and treatment in the ED setting.

The Team

R. Rana, MD, Radiology
A. Fisher, MD, Neuroradiology
N. Peri, MD, Neuroradiology
D. Hackney, MD, Chief, Neuroradiology
J. Edlow, MD, Vice Chair, Emergency Medicine
L. Nathanson, MD, Emergency Medicine

The Interventions

We analyzed all neurological MR studies – brain, neck, spine – performed on ED patients over six months: Summer – July 1st to September 30th 2009 – and Spring – February 1st to April 30th 2009 – of consecutive academic years. We performed a similar analysis of CT studies for comparison.

In the summer period we performed 127 MR and 2608 CT examinations. For MR and CT, respectively, median times were [minutes (standard deviation)] 144 (110) vs. 50 (84) from patient arrival to study order, 156 (92) vs. 50 (51) from study order to completion, and 81 (107) vs. 25 (39) from study completion to interpretation. In the spring we performed 121 MR examinations, within 1.5% of summer volume adjusted for number of days. Thus there was no "new trainee" effect on study volume.

The Results/Progress to Date

Lessons Learned

- Overall, MR imaging from the ED is far slower than CT, but this does not appear to impact negatively on clinical decision making for these patients.
  - Neither body part, shift, day of week nor resident experience level affected ordered study volume or interpretation time
- Delays for MR may be due to: more clinical workup preceding MR orders, lack of MR in the ED, requirements for patient safety checklists, limited capacity of MR, greater number of MR images to view per study, and possible resident incentive to focus first on CT studies

Next Steps/What Should Happen Next

As mean/median data were obtained, additional prospective work may be helpful to determine if the turnaround time is appropriate in individual cases and if not, how any encountered delays could have been avoided. A similar analysis of emergency MR studies on inpatients may also be useful.

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For More Information Contact
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Sponsored annually by the Silverman Institute for Health Care Quality and Safety, the **Silverman Symposium** celebrates BIDMC's on-going efforts to improve quality & safety throughout the medical center every day. In 2010, approximately 95 Project Teams participated;13 were from Radiology and 3 from Emergency Radiology.

Research:

The section has numerous projects under way, including but not limited to:

- Radiography utilization in nontraumatic abdominal pain
- Use of imaging in altered mental status evaluations
- Impact of re-interpreting outside hospital imaging on transfer patients
- Frequency and follow up on recommended MR imaging from C-Spine CT for trauma
- Diagnostic yield of multi-phasic imaging in chest pain
- Impact of reducing oral contrast use on patient throughput in the ED
- Measuring chest wall width from CT scans to optimize needle thoracostomy in tension pneumothorax
- Evaluation of a commercial software package that automatically analyzes coronary CTA data for critical stenoses

We will also be collaborating on 2 multicenter studies on renal colic imaging and cerebrovascular CTA in C-spine fractures. Finally, a paper authored by former section member, Dr. Suvranu (Shoey) Ganguli, and three other staff members, on the 5 year experience with the call proficiency exam was published in AJR in February 2009. Section members also regularly review for internationally recognized journals such as *Radiology, Emergency Radiology,* and the *Journal of Thoracic Imaging*, among others.

Education:

The section spearheads the organization and delivery of the emergency radiology core lecture series to the radiology residents every January. While delivering a number of the talks, this is also a large collaborative effort and we wish, at this point, to thank all of our subspecialty colleagues for their help in completing the core curriculum requisite lectures. With the lecture series just wrapped up, the section members are working with Dr. Sam Yam to produce this year's ED case-based call-proficiency exam.

Section members also actively participate in the core medical student radiology clerkship headed by Dr. Gillian Lieberman, and regularly lecture to emergency medicine and trauma surgery residents. Section members also recently collaborated with our Emergency Medicine counterparts co-authoring numerous chapters in a textbook on emergency imaging.

Summary:

We look forward to building on a solid foundation based on the three-pronged mission of the department and strengthening the various collaborations within and external to the department.

Interventional Radiology - Barry Sacks, MD, Chief

Barry Sacks

Clinical update

Clinical activities at the main campus include vascular and non-vascular procedures, including arteriography and venography, balloon angioplasty and stent placement, chemical thrombolysis and mechanical thrombectomy, IVC filtration, venous access (ports, tunneled and non-tunneled catheters), embolization (GI, bronchial or trauma bleeding, uterine fibroids, tumors, AV malformations/fistulae), biliary procedures (drainage, cholangioplasty, stent placement, stone retrieval), renal procedures (nephrostomy, nephroureteral stents, balloon dilation, stone retrieval), foreign body retrieval, and percutaneous tumor ablation.

Muneeb Ahmed

Aside from the interventional procedures, the full-time IR radiologists (**Drs. Faintuch, Collares and Ahmed**) are also responsible for reading the US Vascular Lab, together with **Dr. Sheiman.**

Our 2 off-site outpatient clinics have seen continued growth in referrals and patient satisfaction:

1. Mass Vein Care: Located at Chestnut Hill, provides comprehensive care for patients with varicose veins, reticular/spider veins and teleangiectasias. Services include Doppler US scanning, US-guided endovenous laser ablation and sclerotherapy. Staffed by **Felipe Collares, MD** and **Linda Paul, NP**.
2. Advanced Vascular Care Center: State-of-the-art outpatient facility located in Brighton, which provides comprehensive vascular access care for patients on hemodialysis. Services include Doppler US scanning of fistulae / venous mapping, AV fistulograms (including angioplasty, thrombectomy, stenting), placement of tunneled hemodialysis catheters, and ligation of collateral veins. Staffed by **Yael Vin, MD** and **Salomao Faintuch, M**D.

Melvin Clouse

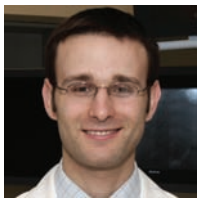
New clinical services starting in 2010-11:

1. Chemoembolization of liver tumors with drug-eluting beads
2. Embolization/sclerotherapy of peripheral venous malformations
3. Radioembolization of liver tumors

Felipe Collares

Staffing update

Staffing changes occurred during the past year, but did not affect the quality of patient care provided, and the growth of our services. The most recent update was the hiring of **Dr. Barry Sacks** as Section Chief, which will be effective July 1st. Dr. Sacks will spearhead further integration of interventional services within the Department, as well as growth outside our boundaries. **Dr. Melvin Clouse** has borne the enormous responsibility for the IR Clinical Fellowship Program, including our latest ACGME compliance reviews and updates.



Salomao Faintuch

Dr. Felipe Collares joined the IR section as staff radiologist last July, after completing his fellowship with us. Felipe is currently leading the efforts at our outpatient varicose vein clinic (Mass Vein Care).

Dr. Muneeb Ahmed returned to BIDMC to join the IR section as a staff radiologist, as well as Associate Director of the Minimally Invasive Tumor Therapy lab, after completing an IR fellowship at Johns Hopkins.

Laura Perry

Drs. Melvin Clouse, **Barry Sacks**, **Laura Perry** and **Steve Reddy** continue to provide part-time coverage of the IR clinical services at the main campus, as well as teaching for residents and fellows.

Meghan Fashjian, NP

Meghan Fashjian, NP joined the Cross-sectional / IR services last November, after obtaining her Masters from Yale. She has been instrumental in the integration of our Interventional Oncology services.

John Underhill, PA

INTERVENTIONAL PUBLICATIONS 2009-present:

Brodoefel H, Burgstahler C, Heuschmid M, Reimann A, Khosa F, Kopp A, Schroeder S, Claussen CD, **Clouse ME**. Accuracy of dual-source CT in the characterisation of non-calcified plaque: use of a colour-coded analysis compared with virtual histology intravascular ultrasound. Br J Radiol. 2009 Oct;82(982):805-12. Epub 2009 Mar 30.

Brodoefel H, Burgstahler D, Sabir A, Khosa F, Claussen CD, **Clouse ME**. Coronary Plaque Quantification by Voxel Analysis: Dual-Source MDCTA angiography Versus Intravascular Sonography. AJR 2009; 192:W84-89.

Collares FB, **Faintuch S**, Kim SK, Rabkin DJ. Reinsertion of Accidentally Dislodged Catheters through the Original Track: What is the Likelihood of Success? J Vasc Interv Radiol. 2010 Jun;21(6):861-4. Epub 2010 Apr 22.

Dewey M, Vavere AL, Arbab-Zadeh A, Miller JM, Sara L, Cox C, Gottlieb I, Yoshioka K, Paul N, Hoe J, de Roos A, Lardo AC, Lima JA, **Clouse ME**. Patient characteristics as predictors of image quality and diagnostic accuracy of MDCT compared with conventional coronary angiography for detecting coronary artery stenoses: CORE-64 Multicenter International Trial. AJR Am J Roentgenol. 2010 Jan;194(1):93-102.

Fridman R, Bar-David T, Dayal R, **Faintuch S**, Goldin D, Hamdan A, Landsman A, Markinson B, Sperling D, Wyers M. Multidisciplinary peripheral arterial disease. Foot Ankle Spec. 2010 Feb;3(1):35-9.

Gottlieb I, Miller JM, Arbab-Zadeh A, Dewey M, **Clouse ME**, Sara L, Niinuma H, Bush DE, Paul N, Vavere AL, Texter J, Brinker J, Lima JA, Rochitte CE. The Absence of Coronary Calcification Does Not Exclude Obstructive Coronary Artery Disease or the Need for Revascularization in Patients Referred for Conventional Coronary Angiography. J Am Coll Cardiol. 2010 Feb 16;55(7):627-634.

Khan AN, Nasir K, Khosa F, Saghir A, **Clouse ME**. Effect of Volume Scan Length on Radiation Dose Using Prospective Gating with 320 MDCTA. (submitted to AJR). (Quality Assurance Initiative)

Nikolic B, **Faintuch S**, **Goldberg SN**, Kuo MD, Cardella JF. Stem cell therapy: a primer for interventionalists and imagers. J Vasc Interv Radiol. 2009 Aug;20(8):999-1012.

Mendiratta-Lala M, Brook OR, Midkiff BD, Brennan DD, Thornton E, **Faintuch S**, **Sheiman RG**, **Goldberg SN**. Quality Initiatives: Strategies for Anticipating and Reducing Complications and Treatment Failures in Hepatic Radiofrequency Ablation. Radiographics. 2010 May 12.

Madan Reddy

Jeff Velez

Brian Callahan

Regarding our current fellows, we'll be fortunate to keep **Dr. Madan Reddy** for a second year of fellowship with us. Also, **Dr. Jeff Velez** will still work part-time with us in the upcoming year. We wish **Dr. Brian Callahan** very good luck in the Air Force.

Research Update

Active Prospective Clinical Trials:

1. Use of PercuNav US System Guidance for Improving TIPS.
   PI: Melvin Clouse, MD, Co-investigators: Felipe Collares, MD, Laura Perry, MD, Barry Sacks, MD, Salomao Faintuch, MD

2. Randomized, Double-Blind, Placebo-Controlled, Phase II Trial of Short Course Sorafenib Therapy Prior to Radiofrequency Ablation for Intermediate-sized (3.5 to 7cm) Hepatocellular Cancer.
   Co-PI: Salomao Faintuch, MD, Co-investigator: Muneeb Ahmed, MD

3. Effects of Bariatric Surgery on Patients with Cirrhosis from Nonalcoholic Steatosis (NASH).
   Co-investigator: Salomao Faintuch, MD

4. The Physiology of Human Brown Adipose Tissue.
   Co-investigator: Salomao Faintuch, MD

Research Grants:

1. Embolization techniques for prostate disease - Salomao Faintuch, MD
   RSNA Research Scholar Grant ($150,000)
   Biosphere Medical Research Grant ($35,000)
2. TINSAL-CV, ROMICAT II & CORE-320 MDCT
   Melvin Clouse, MD

Awards:

Felipe Collares, MD - Distinguished Reviewer Award 2009 – Journal of Vascular and Interventional Radiology

A. Suresh Reddy

Interventional Neuroradiology
- Arra Suresh Reddy, MD, Chief

Interventional neuroradiology, a relatively young specialty bridging the gap between radiology and neurosurgery, celebrates its 10th year anniversary at Beth Israel Deaconess Medical Center. Also known as Neurointerventional Radiology or endovascular neurosurgery, it allows for treatment of vascular lesions of the brain, head, neck, and spine without standard surgical techniques. The lesions are approached using needles and microcatheters threaded through existing blood vessels. An array of materials including particulate emboli, sclerosing agents such as alcohol, chemotherapeutics, microscopic coils, glue, and balloons are then used to actually obstruct blood supply to the relevant site. The overall perspective for Interventional Neuroradiology is for the patient to be able to achieve a more rapid recovery with minimal discomfort and decreased risk.

Diane DiNobile, NP

Staffed by interventional neuroradiologists / neurosurgeons, radiologists, a nurse practitioner, clinical coordinator and a technologist, the Neurointervention/Endovascular Neurosurgery Center offers a wide variety of minimally invasive procedures and innovative techniques. In addition to a dedicated fellowship program in interventional neuroradiology, we also have diagnostic neuroradiology fellows and interventional radiology fellows rotating through our section. 4th year residents may also choose 'elective rotation' through our service.

The Medical Center now has a regional and national reputation for performing neurointerventional procedures. With neurosurgeon **Dr. Ajith Thomas** joining the INR team, this center performs a full variety of minimally invasive CNS-based vascular and musculoskeletal procedures. Vascular procedures include emergency stroke therapy, intracranial angioplasty, carotid and vertebral artery stenting, aneurysm coil occlusion, embolization for bleedings, treatment of vasospasm, embolization of tumors or vascular lesions, intra-arterial chemotherapy for brain, head and neck tumors, temporary test occlusion of vessels, permanent vascular occlusion, and baseline carotid/cerebral angiogram.

Our sections also works closely with the 'Spine Center' at BIDMC. Spinal procedures include vertebroplasty/balloon assisted kyphoplasty for compression fractures, and intradiscal nucleoplasty for herniated discs. Ours is one of the leading programs in the New England area. We perform the most advanced techniques using the Merci retrieval device and Penumbra thrombectomy device for acute strokes. We are also one of the accredited sites for 'wingspan' stents for treatment of atherosclerotic intracranial stenosis and 'neuroform stents' for stent-assisted coiling of intracranial aneurysms.

INTERVENTIONAL PUBLICATIONS 2009-present: *(cont'd)*

Nikolic B, Khosa F, **Lin PP**, Khan A, Sarwar S, **Yam CS**, Court L, **Raptopoulos V**, **Clouse ME**. Absorbed Radiation Dose in Radiosensitive Organs during MDCTAUsing 320 Row Detector CT: Effect of Maximum Tube Voltage (kVp) and Heart Rate Variations. AJR accepted 2010. (Quality Assurance Initative)

Naser A, **Clouse ME**: Aortic Valve Calcification and Subclinical Coronary Atherosclerosis. Journal of Cardiovascular Computed Tomography. 2009 [Editorial]

Powell MF, **DiNobile D**, **Reddy AS**. C-arm fluoroscopic cone beam CT for guidance of minimally invasive spine interventions. Pain Physician. 2010 Jan;13(1):51-9.

Salazar GM, **Faintuch S**, Gladstone SR, Lang EV. In vitro analysis of downstream particulates with mechanical thrombectomy devices: comparison of 20-kHz sonothrombolytic and rotating dispersion wire systems.
J Vasc Interv Radiol. 2009 May;20(5):634-9.

Solazzo SA, **Ahmed M**, Schor-Bardach R, Yang W, Girnun GD, Rahmanuddin S, Levchenko T, Signoretti S, Spitz DR, Torchilin V, **Goldberg SN**. Liposomal Doxorubicin Increases Radiofrequency Ablation-induced Tumor Destruction by Increasing Cellular Oxidative and Nitrative Stress and Accelerating Apoptotic Pathways. Radiology. 2010 Feb 16. [Epub ahead of print]

Wykrzykowska JJ, Arbab-Zadeh A, Godoy G, Miller JM, Lin S, Vavere A, Paul N, Niinuma H, Hoe J, Brinker J, Khosa F, Sarwar S, Lima J, **Clouse ME**. Assessment of in-stent restenosis using 64-MDCT: analysis of the CORE-64 Multicenter International Trial. AJR Am J Roentgenol. 2010 Jan;194(1):85-92.

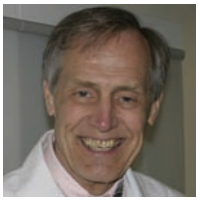
Mary Hochman

Musculoskeletal Imaging

- Mary G. Hochman, MD, Chief

Manjiri Didolkar

Ronald Eisenberg



Ferris Hall

Justin Kung

Colm McMahon

Sven Paulin

Jim Wu

Corrie Yablon

Overview: The Musculoskeletal Imaging Section is comprised of four full-time and four part-time staff and two fellows (not shown). The section continues to experience growth in both diagnostic and interventional volume. Members of the section interpret specialty studies and provide services not only for the Medical Center, but also for the ambulatory offices (1101, Chestnut Hill, Chelsea, and Lexington) and for the BID Needham and Harrington Memorial sites. Services include plain film, CT, MRI, and US, as well as joint interventions (aspiration, arthrogram, therapeutic injection) and musculoskeletal biopsies.

Teaching: Our teaching activities involve medical students, residents, and fellows in the radiology department, as well as interdisciplinary teaching responsibilities related to the podiatry, orthopedic, plastic surgery, and trauma departments and participation in the new Radiology Assistant training program. We participate in 2 weekly and 1 monthly multidisciplinary conferences and run additional case-conference teaching sessions within the section.

Clinical Activities: MSK performs approximately 100 biopsies per year and several hundred arthrograms/joint interventions per year. Over the past year we have worked to expand our joint intervention service at the Medical Center and – aided by able support from the schedulers, diagnostic radiology and MR technologists, and administrative staff – have seen an increase of approximately 27% in the number of joint interventions over the last fiscal year. Over the coming year, we look forward to expanding diagnostic and joint intervention services at our Needham and Harrington/Charlton sites. Addressing MR leakage issues from the Medical Center is also a key goal for the coming year.

In 2010, the department instituted the new sub-speciality of **Musculoskeletal Ultrasound** under the direction of Dr. Corrie Yablon. Dr. Yablon has been working vigorously to develop a cutting-edge dedicated diagnostic and therapeutic musculoskeletal ultrasound service. Over the past year, she has done a terrific job, taking the lead in developing our department's ability to provide superior clinical service in this area. As Director of Musculoskeletal Ultrasound, she will be working to develop and grow this exciting new opportunity for our department.

Musculoskeletal ultrasound (MSK US)

is an exciting versatile modality that can be used to image any patient presenting with a complaint arising within the soft tissues of the musculoskeletal system. It is a completely safe, versatile technique that uses sound waves to create an image. No radiation is involved. Any patient can have an MSK US: those who are wheelchair bound or too large to fit into an MRI; patients who have trouble breathing and cannot lie flat or still for an MRI; those who are claustrophobic or just uncomfortable being imaged within the confines of an MRI machine; those patients who are pacemaker dependent and those who have implantable devices or retained metallic foreign bodies that would be incompatible with the magnetic field of the MRI.

The past decade has seen tremendous advances in probe and scanner design, allowing us to image parts of the body that previously were the domain of only MRI. For instance, MSK US may be the first line modality to image tendon and ligament tears about the fingers and hands because the inherent resolution now exceeds MRI to the point where we can delineate tendon and ligament fibrillary structure and identify the pulleys of the finger. MSK US is excellent at locating all types of foreign bodies in the soft tissues that can be difficult to detect with x-rays and MRI.

In Europe and Canada, MSK US, rather than MRI, has become the first line test to diagnose rotator cuff tears in the shoulder. Studies have shown that ultrasound can be as sensitive as MR arthrography for diagnosing rotator cuff tears and abnormalities of the biceps tendon, and it is non-invasive, much faster and cost effective to perform. With improved probe design, the internal architecture of the tendons are better seen on US than on MRI. In addition, subtle calcific tendinopathy is much better seen on US than on MRI and US guided aspiration can be performed at the same time the diagnosis is made.

MSK US provides the additional benefit of dynamic imaging. During the examination we can ask the patient to perform the maneuvers that reproduce pain and document that during the examination. We can show dynamic impingement during the rotator cuff examination or show subluxation of the ulnar nerve on elbow flexion or of the peroneal tendons on ankle plantarflexion and dorsiflexion, something that cannot be achieved on MRI.

MSK US is also an excellent modality for guiding therapeutic procedures. Under direct US guidance, we can directly guide a needle into a joint, bursa or tendon sheath to aspirate fluid or inject therapeutic medication exactly where it needs to go, with image documentation.

As with any modality, MSK US is not a panacea and does have inherent limitations and should be ordered judiciously. It is not appropriate for evaluating the labrum of the hip or the shoulder because the sound beam is attenuated by the overlying bony structures. For this same reason, MSK US is not the first-line modality to evaluate menisci and the cruciate ligaments of the knee. MSK US should not be used to work up bone tumors as US cannot penetrate the cortex of the bone to characterize an osseous abnormality. It cannot characterize soft tissue tumors with the precision of MRI.

MSK US shows a large hyperechoic fluid collection in the achilles paratenon. This was aspirated and steroids were injected into the area around the achilles.

Aspiration of Olecranon bursitis - fluid collection around the elbow aspirated under US guidance.

Partial bursal surface tear of the supraspinatus tendon (rotator cuff), a common finding in an ultrasound of the shoulder.

Plantar fascial injection

Used as a complement to MRI, MSK US offers an exciting new diagnostic modality to the musculoskeletal imaging service.

Neuroradiology - David Hackney, MD, Chief

David Hackney

Manjiri Didolkar

Ronald Eisenberg

Ferris Hall

Justin Kung

Colm McMahon

Sven Paulin

Jim Wu

Overview: The neuroradiology section, comprising 8 full- and part-time staff and 4 fellows in an ACGME-accredited program, continues to experience growth in our diagnostic services, interpreting approximately 65,000 RVU's per year. We also interpret neuroradiology studies from Chestnut Hill, Harrington Memorial Hospital and BID Needham Campus. The most recent additions to our diagnostic armamentarium have included expanding our image analysis for tumor volumetrics, CT perfusion and permeability studies, and **Rafael Rojas** has increased our clinical and research fMRI. We have a growing presence at the major national meetings, and **David Hackney** has been nominated for Vice President of the ASNR.

Teaching: Our teaching activities include the usual medical students, residents, and fellows. Our fellowship is jointly sponsored with Tufts, so we share fellow teaching with weekly conferences alternating at the two institutions. We are currently applying to the ACGME for two additional training positions so that we will have 6 fellows total in the program, with 4 at BI at any one time. At graduation in June 2008, the Neuroradiology section was named "Section of the Year" by the residents and **Gul Moonis** won the departmental teaching award. Gul has also taken over from **Rafeeque Bhadelia** as fellowship program director. Perhaps noting all of this, we had a great fellow recruiting year, filling one slot internally (welcome Kalpana) and going to 4 on our rank list to fill the other 3.

Clinical activities: In spite of the reductions in high tech imaging stimulated by incentives to primary care practitioners, and varying utilization from the Emergency Department, the neuroradiology volumes remain fractionally above budget and up about 8.5% year-to-date over last year. Since MR tends to be far more useful for most neurologic imaging, we do a larger volume of MR than CT. Image analysis, mainly tumor volumetrics and CTA and CTP processing, are growing parts of our practice. Thanks to **Dave Alsop**, we have long had state-of-the-art perfusion imaging, but due to upgrades to the 3T clinical scanner, we cannot process online our multivoxel MRS studies. Therefore, we are generally limited to single voxel MRS. We are expanding perfusion imaging for seizure and cognitive impairment patients, and introducing dynamic contrast enhancement for tumor patients.

Gerald Kolodny

Nuclear Medicine - Gerald Kolodny, MD, Chief

Clinical:

We have four nuclear medicine physicians, one Harvard Medical School Joint Program in Nuclear Medicine resident, and 14 staff technologists. In 2008, we performed about 9,200 nuclear medicine studies. Over the past year we have experienced a decline in the number of myocardial perfusion and PET/CT studies due to the referring physician incentives put in place by BIDPO/HMFP specifically for those studies. This has led to a decrease in four staff technologists during the past year. However, there has been a significant increase in the number of gastric emptying studies, due to the work of **Dr. Kevin Donohoe** on the national scene, in conjunction with the American Society of Gastroenterology, to standardize and publicize this procedure.

Kevin Donohoe

Thomas C. Hill

We will shortly be replacing our end of life nuclear medicine gamma cameras on Shapiro 4, which were devoted to cardiac nuclear medicine studies, with a new state of the art camera allowing the cardiac patients to be scanned in a more comfortable semirecumbent position. Our cardiac nuclear medicine studies will then vacate Shapiro 4 and be centralized with our other East Campus non PET/CT studies on the first floor of the hospital building.

Dr. Donohoe is chair (and **Dr. Tony Parker** is a member) of the ***Society of Nuclear Medicine Procedure Guidelines Committee***, which is responsible for standardizing nuclear medicine clinical procedures worldwide. Dr. Donohoe is also a member of the Society of Nuclear Medicine House of Delegates and of the SNM Health Care Policy Committee as well as the SNM representative to the National Quality Forum, a national government committee that is establishing guidelines for medical imaging to use in pay-for-performance measures. Dr. Parker was the Sub-chair for InfoSNM (Computer Presentations) of the SNM Scientific Program Committee.

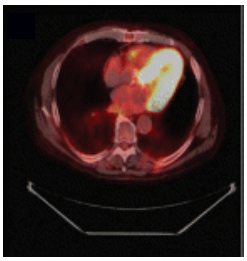
J. Anthony Parker

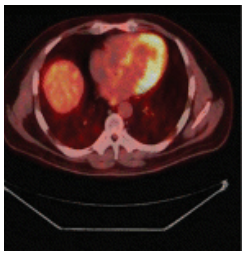
Dean Rodman

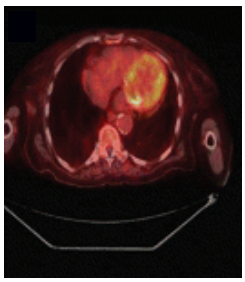
Training:

We are members of the Harvard Medical School Joint Program in Nuclear Medicine, and participate actively in their teaching program as well as our BIDMC Radiology Department residency training program. Dr. Donohoe is the Associate Director of our BIDMC Radiology Residency Program and Dr. Parker is the associate director of the JPNM residency training program. Dr. Parker is a member of the American Board of Nuclear Medicine and of the Nuclear Medicine Residency Review Committee of the Accreditation Council for Graduate Medical Education. Our one hour daily section morning teaching conference and daily teaching and research conferences within the JPNM provide a broad range of educational activities for our resident trainees.

We have an accredited 13-month post-baccalaureate certificate nuclear medicine technology school within the section, with 6-8 students per year. Students in that program have been the recipients of several honors during the year which include one Paul Cole Scholarship Award, sponsored by the Society of Nuclear Medicine (SNM). All 6 students had their research abstracts accepted as oral presentations at the annual SNM meeting in Toronto. Additionally, all 6 students received SNM travel grant awards which are given out to the top 25 scored abstracts. We have a 100% first time pass rate on the national certification boards and are currently ranked number 4 in the country on the basis of our scores on the examinations for certification.







Research:

We have a very active research program chiefly centered on ground breaking research in applications of PET/CT. The following is a list of current ongoing research studies:

1) BIDPO has put in place monetary incentives for referring physicians to reduce three high tech diagnostic studies. Two of those three are nuclear medicine myocardial perfusion studies and PET/CT studies. Examining the data on the number of myocardial perfusion studies ordered in 2005 and 2008 reveals that, while cardiologists ordered the same number of myocardial perfusion studies in both years, APG and HCA physicians ordered half the number of myocardial perfusion studies in 2005 as in 2008. Although this appears to represent a huge savings in health care dollars, we are interested in whether there has or has not been an increase in other health care expenses as a result of this shift. For example, has this resulted in more cardiac ultrasound, cardiac cath, or CTA studies? Has there been an increase in ED or hospitalizations for cardiac disease? Can we document that there has been a reduction in the percentage of normal myocardial perfusion studies? A radiology resident, as part of the new requirement to do a Q/A study during our residency training program, is currently working on this project.
2) In conjunction with studies above, we want to demonstrate the predictive power of a myocardial perfusion study interpreted as normal in our department. As part of a resident Q/A study, we are following a cohort of patients with normal myocardial perfusion studies. Our strong assumption, based on experience with these patients, is that they have a very low incidence of cardiac events in the 2-3 year period following the study. Presenting such data to our referring physicians could be helpful in reducing the need for further diagnostic tests of patients with normal myocardial perfusion studies and guide referring physicians in using myocardial perfusion as the first step in diagnosing myocardial ischemia.
3) We have pioneered a method to reduce background myocardial and brown fat FDG activity on PET/CT studies. This has enabled us to visualize nodal disease in the mediastinum, neck and supraclavicular areas which otherwise would be obscured. This has led to a BIDMC patent application, royalty payments to BIDMC and several publications.
4) By suppressing the normal myocardial background uptake of FDG, we were then in a position to identify foci of FDG uptake in the inflammatory cells which accompany coronary plaque. Our published studies showed a high association of foci of FDG activity in association with calcified plaques within the coronary arteries. This study was followed by another, recently published in conjunction with an editorial noting our work, and which was done in collaboration with BIDMC cardiologists, which described an association between coronary foci of FDG activity and angiographically demonstrated plaque. [Wykrzykowska, 2009;Werner, 2009]
5) In examining foci of FDG uptake within coronary arteries on repeat studies we noted a waxing and waning of activity in different plaques, raising the possibility that coronary plaque development was similar to an autoimmune process. Patients with rheumatoid arthritis are known to have a high incidence of coronary disease. We approached and our now working with our BIDMC rheumatology colleagues preparing an IRB protocol to study the relationship between the intensity of FDG uptake in coronary foci and the course of rheumatoid arthritis in the same patients. We have also enlisted a BIDMC cardiology fellow in this project.
6) As a result of our work with brown fat (BAT) we approached the endocrinologists at Joslin Clinic, who have a specific interest in BAT, about several research projects. Using a program designed by our nuclear medicine PACS software support, we were able to show definitively that FDG could be used to identify and monitor BAT activity, and to define factors influencing BAT activity. This work was recently published in the New England Journal of Medicine. [Cypess, 2009]
7) In collaboration with our endocrinology partners at the Joslin Clinic we have recently received a Harvard University catalyst grant to explore activity of BAT, as measured by FDG PET/CT, in patients receiving bone morphogenic protein (BMP) for spine surgery. BMP is a transcription factor that our colleagues have found will stimulate conversion of preadipocytes into BAT cells. BAT cells burn calories, thus helping to maintain a lower body weight. We intend to determine whether BMP will also increase the activity of BAT in humans.

8) PET/CT scans normally show large and small bowel activity. This normal activity can often mask, or be confused with nodal uptake or primary bowel inflammatory disease or bowel tumors. In order to reduce this bowel activity, it is first necessary to show where it is located. Current thinking is that the normal activity is in the smooth muscle of the bowel wall, since gastrointestinal physiology teaching is that glucose (for which FDG is an analog) passes from the gut into the circulation and not in the other direction. This has led to several unsuccessful attempts to reduce this activity by slowing bowel motility. However, simple observation of this activity on PET/CT studies appears to show that the unwanted activity is in the bowel contents. We have approached our GI colleagues interested in inflammatory bowel disease and enlisted a collaborative IRB approved study to compare the location of the bowel activity at the time of their clinically indicated PET/CT scan and two hours later, after they have had two donuts and a cup of coffee. If the activity has moved it will confirm that the activity is in the bowel contents and permit us to employ methods to reduce intestinal bacterial uptake of FDG. This study is being supported with a small in kind grant from Dunkin' Donuts.

9) The BIDMC Division of Nuclear Medicine has pioneered the use of computers in radiology. We had the first all digital RTAS, the first department wide PACS, the first to use teleradiology on a routine clinical basis and the first to use the internet and cable modems on a routine clinical basis. Over the years, we have written several ground breaking publications for this work, including one for which we were honored as the first publication of a clinical department wide PACS. For several years, we have made our nuclear medicine PACS software available freely from our website. Over 1,500 downloads have been registered for the third version of our software. We are now rewriting our software in Java, so that it will become shareware and others can freely modify or add to it. It will then run under multiple operating systems including Linux, to which platform the BIDMC IS department is slowly converting.

10) Patients are frequently referred to us for myocardial perfusion scans because of abdominal symptoms thought to be related to myocardial ischemia. Other patients are referred for hepatobiliary scans with symptoms thought to be related to gallbladder disease. In some of these patients, the radiopharmaceutical is seen to reflux into the stomach and possibly the esophagus, after it is excreted into the small bowel. This raises the possibility that the patients' symptoms are not the result of myocardial ischemia or gallbladder disease, but actually the result of gastric reflux. To further investigate this possibility, we are doing a retrospective study, in collaboration with the Division of Gastroenterology, of patients with reflux and normal myocardial perfusion or normal gallbladder function, to determine whether reflux was the cause of their symptoms. There is currently no good method to quantify the degree of gastric reflux and the use of gallbladder or myocardial radiopharmaceuticals may permit quantitative determination of reflux to monitor the effect of therapy to reduce reflux.

11) In association with our colleagues in gynecology, we are investigating an experimental radiopharmaceutical that tracks folate metabolism, which may help direct chemotherapy for ovarian cancer.

12) We are collaborating with a group at the University of Massachusetts Medical School that is working on digital restoration of SPECT images for tumor detection.

13) In collaboration with our colleagues at the B&W Hospital, we have just finished a study on post-operative renal function in patients that have had a pyeloplasty.

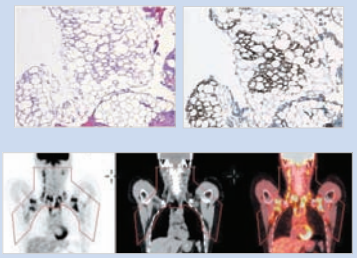
14) In collaboration with our Renal Section Radiology Department colleagues, we are engaged on a project to predict post-operative function of native kidneys after liver-renal transplant.

15) In conjunction with the Frangioni Laboratory, we are examining the use of fluorescent tracers for lymphoscintigraphy.

Gethin Williams

Gethin Williams, MD, PhD is the 2010 recipient of the department's most prestigious research award, the Fleischner Young Investigator's Award as well as The RSNA Roentgen Resident Research Award *for outstanding research performed as a resident in radiology* which were awarded at this year's graduation ceremony.

Prior to joining the Radiology Residency Program in 2007, Gethin had completed two years of training in the Joint Program in Nuclear Medicine, Harvard Medical School, during which he rotated into our department. To date, his work with Drs. Kolodny, Parker, and Palmer in Nuclear Medicine has resulted in 8 publications on SPECT and FDG-PET/CT imaging for coronary artery disease, brown adipose fat and splenic defects. He and Dr. Kolodny also developed a patent on a method for reducing interferences in positron emmission tomography. Currently, Gethin is completing a fellowship in Vascular and Interventional Radiology at BIDMC.



Immunohistochemical Analysis of Brown Adipose Tissue

Phillip M. Boiselle

Alex Bankier

Ronald Eisenberg

Diana Litmanovich

Sven Paulin

Janneth Romero

Paul Spirn

Thoracic Imaging - Phillip M. Boiselle, MD, Chief

Section Overview and Clinical Activities:

The Thoracic Imaging section is comprised of 7 full- and part-time staff and 1 fellow. Under the direction of **Dr. Phil Boiselle**, Section Chief, members of the division contribute collaboratively to its clinical, teaching, and research missions. Leadership within the section is shared and includes the following roles: **Dr. Alex Bankier**, Director of Respiratory Functional Imaging, leads the research activities of the section; **Dr. Paul Spirn** is the QA officer of the section; **Dr. Ron Eisenberg** serves as the liaison for resident QA projects; and **Dr. Diana Litmanovich** oversees resident education. Effective July, 2010, **Dr. Ron Eisenberg** is the new educational liaison for the section, and **Dr. Diana Litmanovich** is the new Director of Cardiac Imaging. **Drs. Sven Paulin** and **Janneth Romero** also contribute to these important functions, and Nancy Williams and Meredith Cunningham provide outstanding administrative support. The section interprets more than 80,000 exams per year and is recognized for providing timely and expert interpretation of thoracic imaging studies with a service-oriented approach to referring clinicians, as evidenced by its participation in a variety of multidisciplinary conferences. Several of our faculty members also interpret studies for our community sites and/or for other sections.

Teaching:

The section takes pride in its educational activities, which span from local to international. The section holds a variety of teaching conferences for residents and fellows. Several faculty members are recipients of awards for teaching and mentoring. Most recently, Dr. Paul Spirn was recognized by the department's 2010 Award for Excellence in Teaching Medical Students and Dr. Phil Boiselle was awarded the Robert E. Lenkinski Excellence in Academic Mentoring Award. Faculty members also have several educational leadership roles. Dr. Alex Bankier is Director of the Resident Scholar's Track Program and Dr. Boiselle is Co-Director of the Resident Mentoring Program. Regionally, Dr. Bankier served as Educational Co-Chair for the New England Roentgen Ray Society (NERRS) during this academic year and Dr. Boiselle serves as a member of the Executive Committee for this educational organization. Nationally, Dr. Boiselle is the Director of the Chest Refresher Course at RSNA. In recent years, the section has also been increasing its international educational mission through visiting international fellowships and professorships. Section members have also lectured at Harvard CME courses and meetings of the ARRS, RSNA, STR, NASCI and ECR, among others. Section members have also served as lead authors or editors for several recently published and forthcoming textbooks, including Case Review: Thoracic Imaging, 2nd Ed (Boiselle), Clinical Imaging: An Atlas of Differential Diagnosis, 5th Ed (Eisenberg), Imaging of Diseases of the Chest, 5th Ed (Bankier), Medical Imaging: What You Need to Know (Eisenberg), and Thoracic Imaging: The Requisites, 2nd Ed. (Boiselle). The section has also been recognized for its mentoring of residents and fellows in educational and research projects. Drs. Ron Eisenberg and Alex Bankier have mentored numerous residents and fellows in authoring publications in the popular "Pattern of the Month" series in the Resident's Section of AJR. At the 2010 STR meeting, an exhibit devoted to imaging of bronchiectasis by our former fellow Dr. Luce Cantin received a Cum Laude award, and our fellow Dr. David O'Donnell presented an oral abstract devoted to MDCT imaging of forced expiratory tracheal collapse in healthy volunteers.

Research:

The section has a very active research division that is directed by Dr. Bankier, who runs a successful weekly research meeting that includes both didactic sessions and work-in-progress presentations. The section is currently involved in 3 grant-funded studies, including the NCI/ACRIN-sponsored National Lung Screening Trial, the NIH-sponsored "CT Diagnosis of Tracheomalacia in COPD" trial, and a NIOSH-Liberty Mutual sponsored ergonomic study. Mary Millett Pollock, RN, plays an important

role in the successful running of grant-funded research studies. An industry-supported computer aided detection study is also underway. The section is a recognized leader in several areas of investigation, including: airway imaging, emphysema, functional imaging, radiation dose reduction, imaging of pregnant patients, and outcome/utilization studies. Section members have published numerous articles in highly regarded peer-reviewed journals in the past year and have presented abstracts at the RSNA, ARRS, ECR, and STR meetings. Several faculty members also play important editorial roles for several radiology journals, including Dr. Bankier as Deputy Editor of Radiology, Dr. Boiselle as Editor-in-Chief of the Journal of Thoracic Imaging, and Dr. Eisenberg as Special Consulting Editor for AJR. Dr. Diana Litmanovich serves as an ad-hoc reviewer for the Journal of Thoracic Imaging and was recognized by the journal's Editor's Recognition Award for her scholarly reviews.

Cardiac CT - Diana Litmanovich, Dir.

New in 2009-10: Low dose prospective Coronary CT Angiography

Cardiac computed tomography angiography (CCTA) has shown itself over the years as a reliable non-invasive modality for evaluation of coronary arteries with accuracy approaching that of invasive coronary catheterization (as shown by many studies comparing these two modalities). However, initial high radiation exposure reports raised great concerns. The new technology of prospective ECG gating now allows imaging of the coronary arteries at a fraction of the dose levels used in catheter coronary angiography or CT pulmonary angiography. The technique is now available at BIDMC in all three campuses and the Emergency Department, and CCTA can be performed on an outpatient, inpatient or emergency basis depending on the indications for the study. Our department is equipped with top-of-the-line multidetector scanners including 64- and 320-row Toshiba scanners and 64-row GE scanners, along with reconstruction equipment and a dedicated post-processing imaging lab.

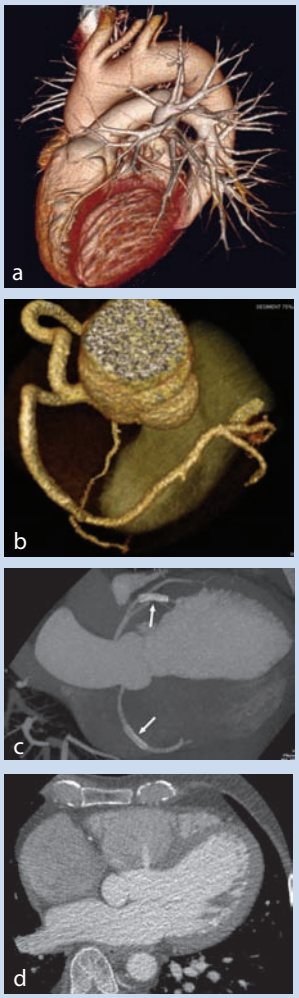
The synchronization of the CT image acquisition with heart beats using ECG gating allows cardiac anatomy to be imaged without interfering motion artifacts. The fast speed of the scanners makes this technique suitable for patients with breath holding problems and the amount of intravenous contrast used for this study is equal to a regular chest CT. The major requirement is the need for beta-blocking to reduce the heart rate to below 65 beats per minute.

The main indication for cardiac CT is evaluation of coronary calcifications and atherosclerosis. CCTA provides an anatomic image of the coronary arteries and reliably depicts lumen narrowing due to stenosis. Recent studies have shown that CCTA can also assess the status of myocardial blood supply. Current indications for CCTA are chest pain in patients with intermediate probability of coronary artery disease, complex congenital heart diseases, coronary artery anomalies, cardiac masses, pericardial abnormalities, coronary vein mapping before biventricular pacing, and evaluation of pulmonary vein anatomy.

CCTA has become the first line test for pre-surgical planning for coronary artery bypass in patients who have already had prior cardiac surgery and sternotomy for better depiction of post-surgical cardiac anatomy as well as the anatomy of coronary artery bypasses to avoid any damage to those structures during subsequent surgery.

In addition to clinical practice, our section remains in the forefront of Cardiac CTA research with work published by Dr. Clouse (a pioneer in CCTA), Dr. Raptopoulos, and Dr. Litmanovich. Today there are several national and international multicenter research studies ongoing in Radiology in collaboration with Cardiology and Emergency Medicine at BIDMC (e.g., TINSAL-CV, CORE320, ROMICAT).

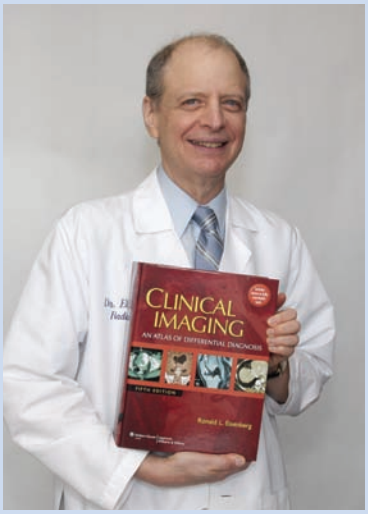
Used in conjunction with SPECT imaging and Cardiac MRI, CCTA is an excellent modality for non-invasive imaging of cardiac morphology and physiology.



Volume rendering 3D, Maximum Intensity Projection images (MIPs) reconstructions and axial images of ECG gated coronary CT angiography demonstrate comprehensive picture of cardiac anatomy (a), anomalous origin of right coronary artery (b), coronary stents (c) and ventricular septal defect (d).

Currently, cardiac CT studies are read by Radiology staff **Drs. Diana Litmanovich, Marc Camacho, Melvin Clouse, Karen Lee, Robin Levenson, Vassilios Raptopoulos, Sejal Shah, Girish Tyagi,** and Cardiology staff, **Thomas Hauser**.

Thoracic Imaging - Books in Print

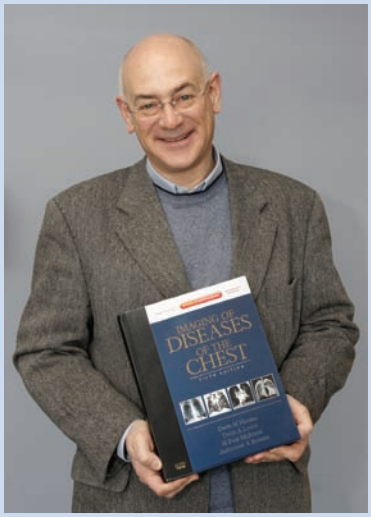


Ronald L. Eisenberg, MD
Associate Professor of Radiology, HMS
Section member, Thoracic Imaging/MSK
Scientific Review Officer (SRO), BIDMC Institutional Review Board (IRB)
Liaison for Resident QA and Research Projects in Chest and MSK

Clinical Imaging: An Atlas of Differential Diagnosis

5th edition, Lippincott Williams & Wilkins, 2009, over 3700 illustrations

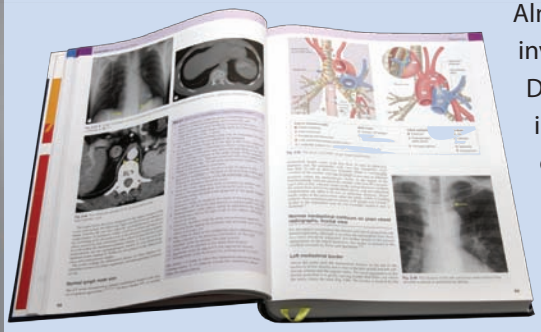
"Pattern recognition leading to differential diagnoses is the essence of radiology." Building on his previous book, *Gastrointestinal Imaging: A Pattern Approach*, **Dr. Ronald Eisenberg** applied the same pattern concept to teach clinical imaging of all organ systems in a 3-column format: Differential Diagnosis, Imaging Findings, and Comments (clinical correlation and distinguishing features). This was so successful that his book, ***Clinical Imaging: An Atlas of Differential Diagnosis*** has now come out in a 5th edition which introduces new patterns in cross-sectional imaging, particularly in CT and MRI. At 1,458 pages, this book is designed to provide a handy reference for practicing radiologists and residents to arrive at a precise diagnosis; and in keeping with the digital age and our filmless environment, the book also provides a link for on-line access to the contents of the entire book in a fully-searchable format.



Alex Bankier, MD, Associate Professor of Radiology at HMS, is a member of the Thoracic Imaging section and Director of Respiratory Functional Imaging, Director of the Resident's Scholar Track Program, Educational Co-Chair of the New England Roentgen Ray Society, and a Deputy Editor for Radiology

Imaging of Diseases of the Chest

5th edition, Elsevier, 2010, over 3000 illustrations



Almost four years ago, I received the invitation to join David M. Hansell, David A. Lynch, and Page McAdams in co-authoring the 5th edition of "Imaging of Diseases of the Chest". Now that I hold the freshly published book in hand, the difficult work and quite a number of sleepless nights are (almost) forgotten. Originally created by the legendary Peter Armstrong, ***Imaging of Diseases of the Chest*** is designed as a single volume, comprehensive reference text to provide all the information about chest radiology that both generalists and junior chest radiologists need to know. The text provides a multimodality coverage throughout all chapters and groups of diseases, with the new edition including functional imaging and other upcoming technologies. Numerous summary tables and graphs facilitate navigation through the text. The text is complemented by over 3000 radiographic images. Novel features of the new edition include color graphs and labeling, practical tips and pitfalls, and bulleted summaries of key features. Emphasis is put on cost-effective image and modality selection.This addresses the hugely important issue of cost-containment by underlining which imaging modality is helpful and which is not, in any given clinical context. The new edition also provides access to the full text online, with the option to download images from the internet. Finally, the book gives access to the latest version of the Fleischner Society's Glossary of Terms for Thoracic Imaging. – *Alex Bankier*

Max P. Rosen

Community Radiology

- Max P. Rosen, MD, MPH, Chief

M. Julie Armada

Andrew Bennett

Douglas Bober

Per Eldh

Alice Fisher

Thornton Kell

Justin Kung

Dean J. Rodman

Rola Shaheen

Douglas Teich

During the past year, our community Radiology practice continued to grow, from approximately 82,500 exams in FY '05 to over 190,000 exams in FY '09. The community practices now account for 34% of the department's total volume. While all sites have all experienced double digit growth, the incorporation of Harrington Hospital in Southbridge, MA, has added over 50,000 exams to or community network this year.

New developments in the last year have included: implementation of a second digital mammography unit at 1101 Beacon Street, the upgrade of the ONI extremity magnet at Lexington, and the addition of the former Hubbard Hospital (now Harrington Health Care at Hubbard Hospital) to the Harrington system. In addition, in June 2009 we successfully opened a new MRI in Charlton, MA, which is a joint venture of Harrington Hospital and the Beth Israel Radiologic Foundation. In May 2010 the remainder of the Charlton site, a 20,000 square foot medical office building, celebrated it's grand opening. In addition to MRI, Charlton site provides ultrasound, x-ray, bone density, and digital mammography.

In June we welcomed Outer Cape Health Services (OCHS) to our Community Practice. OCHS has sites in Provincetown and Wellfleet. We currently read X-rays for the OCHS site in Provincetown to support the OCHS health care providers as well as the BIDMC emergency medicine group which provides urgent care at OCHS during the summer months. Future pans may include offering ultrasound and/or breast imaging services at OCHS.

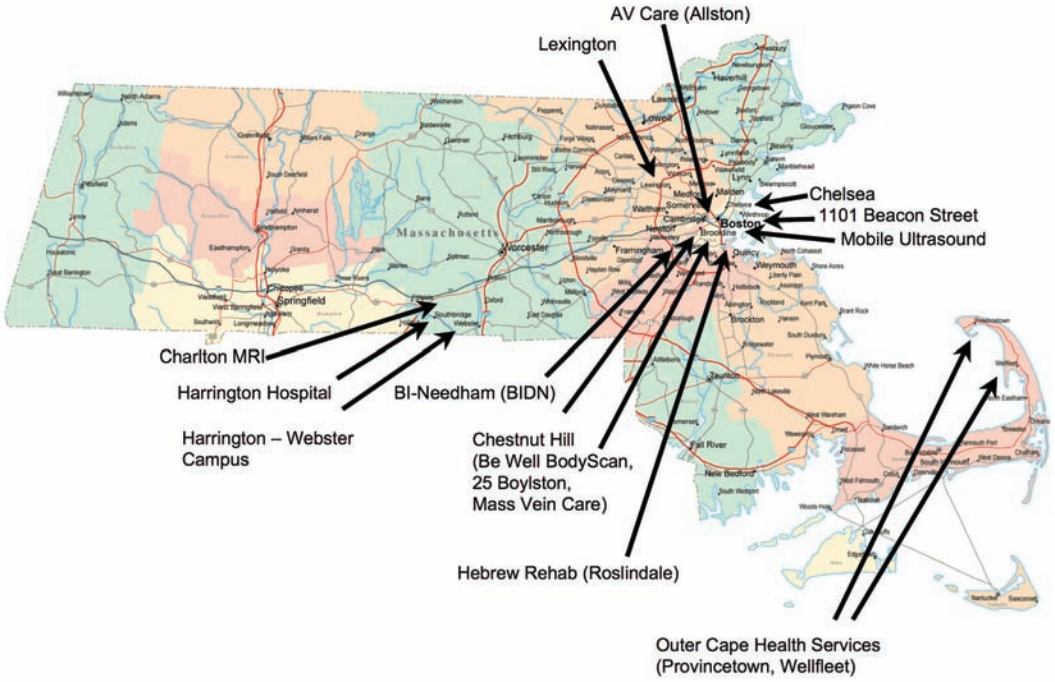
The key to our successful community expansion at Harrington and BI-Needham (BIDN) has been our ability to provide the necessary on-site services, supported by sub-specialty remote interpretation of neuro, musculoskeletal, body MRI and nuclear medicine studies. Our report turn-around-time has been greatly improved since the implementation of RadWhere voice-recognition reporting software for the Harrington practices. In addition, we have provided ongoing training for the Harrington technologists at BIDMC in CT, MRI and ultrasound.

None of our expansion would have been possible without the dedication and commitment of our community radiologists and community managers and technologists. Our model of having community based radiologists work at least one day a week at BIDMC and having our BIDMC-based radiologists spend time at the community sites facilitates an understanding of the special skill set needed to work at the community sites, while bringing sub-specialty expertise on-site for procedures, conferences, and technologist training.

Community Sites:

Chelsea
Harrington Hospital
- Hubbard Campus
- Charlton

Lexington
BID-Needham
Outer Cape Health Services
25 Boylston Street
1101 Beacon
Mobile Ultrasound



During the past year we have welcomed **Dr. Andrew Bennett** to Harrington and BIDN, and Dr. Douglas Bober as our primary mammographer and general Radiologist at Harrington's "Hubbard" campus. In July, **Dr. Justin Kung** joined our community section 2 days per week, in order to expand our musculoskeletal services at HMH and BIDN. **Dr. Marty Smith** has assumed a leadership position as Director of Community MRI, and is now responsible for protocols, management and QA for the HMH, BIDN and Lexington magnets. He is greatly helped by **Richard Farago**, our Chief Technologist for Community MRI.

We are extremely fortunate to have a superb group of managers, technologists, and support staff at each site, including **Jane Corey** who oversees the HMFP (1101 Beacon, 25 Boylston, mobile ultrasound and the Mass Vein Care practices), **Judy Farina** and **Janet Carpenter** at Lexington (Judy also manages Chelsea), **Nancy Whitman** at 1101 Beacon and **Don Holmes** at BIDN. **Jeff Bernard** continues to keep everything together as the Director of Community Radiology. **Dr. Dean Rodman** at BIDN and **Dr. Rola Shaheen** at HMH continue to provide patient-focused, customer service oriented leadership.
Other developments this year have included the implementation of an electronic QA database, for Harrington Hospital and a quarterly QA conference to review all relevant Harrington cases. The new BIDN emergency department which opened last month should help us continue to grow our volume at BIDN.

HMFP Radiology provides clinical Radiology services at 3 Community Hospitals, 5 outpatient imaging centers, and supports a mobile ultrasound services, CT Screening business (BeWell Body Scan LLC (www.bewellbodyscan.com) and a laser vein treatment center (Mass. Vein Care (www.massveincare.com). All sites are inter-connected and connected to BIDMC via high seed optical fiber, allowing for viewing anywhere of any image obtained at any site across the network. The 3 community hospital sites are staffed with an on-site general Radiologist and a dedicated Breast Radiologist 8 am to 5 pm. Emergency Radiologists at BIDMC provide coverage for the 3 community hospital Emergency Departments from 5 pm to 11 am on weekdays, and from 3 pm to 11 pm on weekends and Holidays. A group of Radiologists in Israel provide ìnight-hawkî coverage for 2 of the community hospitals from 11pm to 8 am. Senior Residents in the BIDMC cover the third community hospital from 11pm to 8 am, and from 8 am to 3 pm on weekends. Weekend on-site staffing is provided from 8 am to 3 pm at the community hospitals.

During the past 5 years volume at the community sites has increased significantly from 82,515 exams in FY'05 to 191,696 in FY '09.

HMFP Radiology provides clinical Radiology services at 3 Community Hospitals, 5 outpatient imaging centers, and supports a mobile ultrasound services, CT Screening business (BeWell Body Scan LLC (www.bewellbodyscan.com) and a laser vein treatment center (Mass. Vein Care (www.massveincare.com). All sites are inter-connected and connected to BIDMC via high seed optical fiber, allowing for viewing anywhere of any image obtained at any site across the network. The 3 community hospital sites are staffed with an on-site general Radiologist and a dedicated Breast Radiologist 8 am to 5 pm. Emergency Radiologists at BIDMC provide coverage for the 3 community hospital Emergency Departments from 5 pm to 11 am on weekdays, and from 3 pm to 11 pm on weekends and Holidays. A group of Radiologists in Israel provide "night-hawk" coverage for 2 of the community hospitals from 11pm to 8 am. Senior Residents in the BIDMC cover the third community hospital from 11pm to 8 am, and from 8 am to 3 pm on weekends. Weekend on-site staffing is provided from 8 am to 3 pm at the community hospitals.

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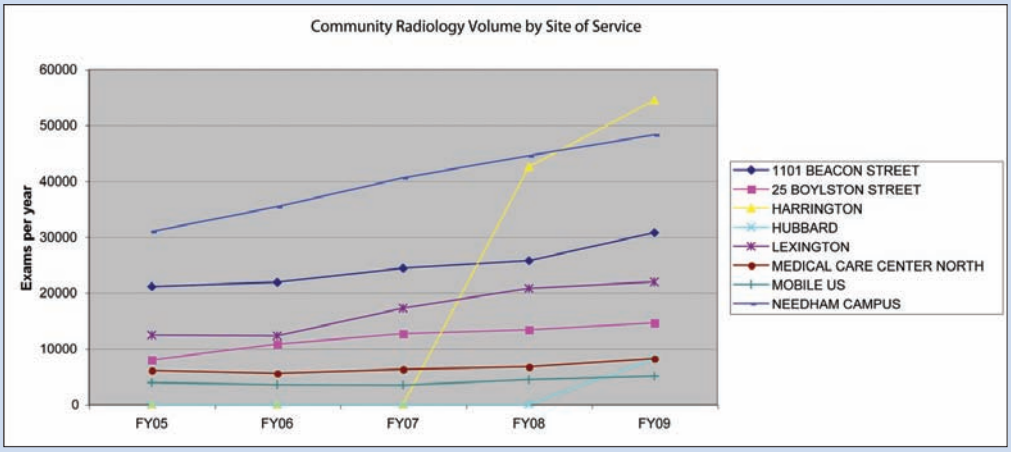
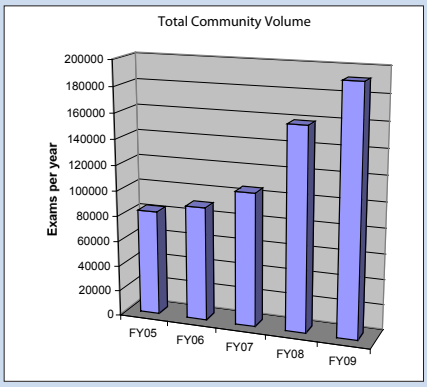
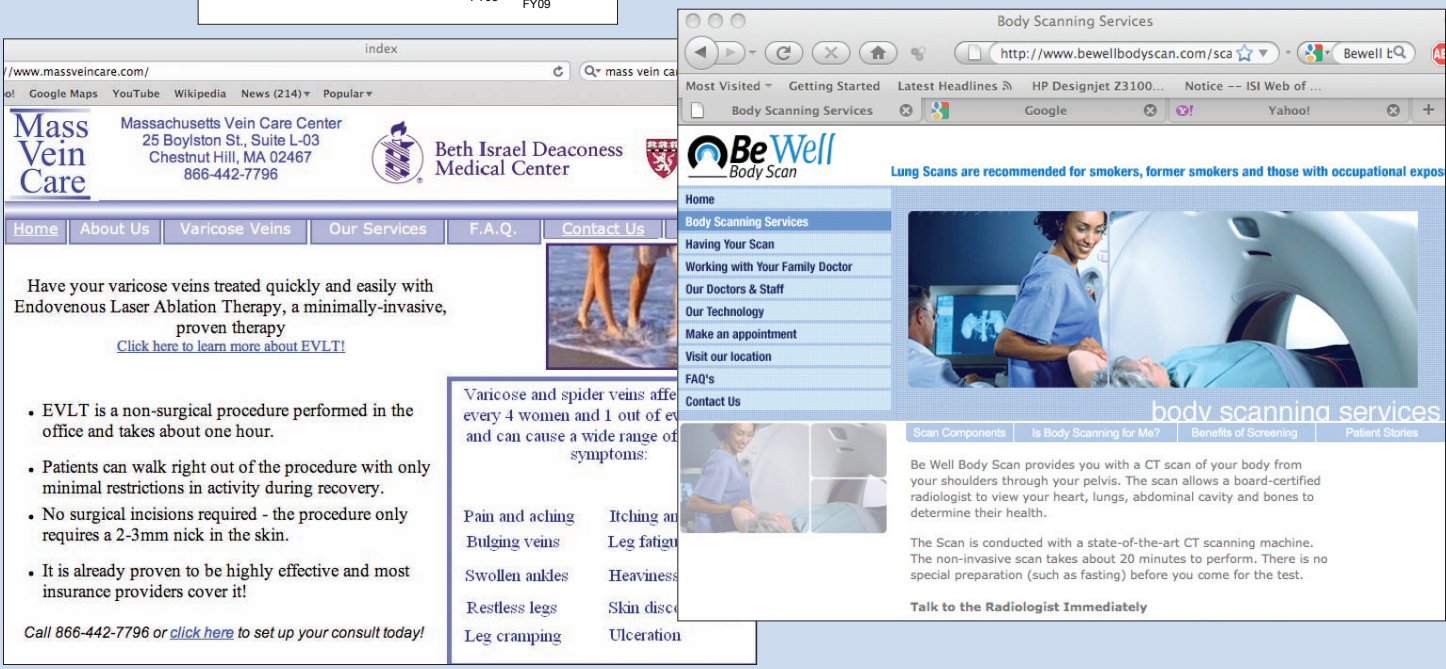




The growth in the community practices has been fueled by the ability of teleradiology to facilitate centralized specialized interpretation while allowing for delivery of imaging services in a local, community setting.



Lenkinski Laboratory at the Beth Israel Deaconess Medical Center

http://www.lenkinskilab.org/lenkinski/new_present.html

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Lenkinski Laboratory
at the Beth Israel Deaconess Medical Center

Presentations

- About us
  - Overview
  - Facilities
  - Current personnel
  - Lenkinski biography
  - Contact us
- Projects & Technology
  - Overview
- Collaborators
- Publications & Presentations
  - Publications
  - Presentations
- Support

The following presentations are available for download, but you will need Adobe Acrobat Reader to do so.

Chemical Considerations About NSF, Robert E. Lenkinski, Ph.D.

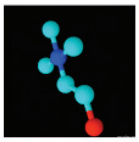
PARACEST Agents: Optimization for Human MR Imaging, Robert E. Lenkinski, Ph.D.

MRS of the Breast, Robert E. Lenkinski, Ph.D.

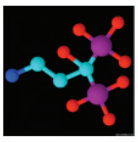
MRS of Fat, Robert E. Lenkinski, Ph.D.

In Vivo Multinuclear MR, Robert E. Lenkinski, Ph.D.

Moving from Anatomy to Metabolism, Robert E. Lenkinski, Ph.D.



Choline



Pamidronate

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Frangioni Laboratory: Seeing is Curing™

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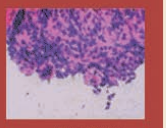
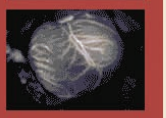
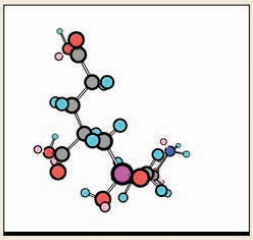




Welcome to the Frangioni Laboratory at the Beth Israel Deaconess Medical Center (BIDMC) and Harvard Medical School, Boston, Massachusetts.

Our mission is to solve important clinical problems by applying first principles from chemistry and engineering. The major focus of the laboratory is on the development of imaging technology and contrast agents to see cancer at its smallest possible manifestation. We believe that Seeing is Curing—that is, if we can see cancer at an earlier stage than we now can (currently about 1 billion cells) we will have a greater likelihood of curing it.



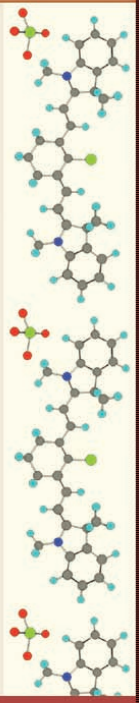
Small molecule targeting ligand to the active site of prostate-specific membrane antigen. Single nucleophile (blue) permits conjugation to diagnostic and therapeutic molecules. (Humblet et al. Mol Imag 2005; 4:448-62.)

Our laboratory is addressing the cancer detection problem in three ways.

- First, we are developing novel imaging technology (such as our intraoperative near-infrared fluorescence imaging system) to improve cancer detection where it is needed most.
- Second, we are developing low molecular weight ligands (i.e., peptides and small molecules) that are able to "home" to cancer wherever it is located in the body.
- Finally, we are developing robust chemical methods for contrast agent generation using low molecular weight ligands.

By combining engineering and chemistry, we believe that much smaller numbers of cancer cells can be detected, thus giving the patient the benefit of an earlier and more clear-cut diagnosis. With these advances, we someday hope to improve the probability of cure.

Our goal is to make this site fully ADA compliant. Please contact us if you are unable to use this site fully.



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Beth Israel Deaconess Medical Center

A teaching hospital of Harvard Medical School

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Research

Robert E. Lenkinski, PhD
Vice Chair for Research

The Department of Radiology collaborates with many investigators in a large number of other departments at the BIDMC. These include: Medicine (Hematology/Oncology, Nephrology, GI, GU, Cardiology, ID), Surgery, Neurology, Ob/Gyn and others). All of the collaborative investigators have access to state-of-the-art imaging equipment as well as radiologic expertise through these collaborations. In general, the collaborators outside of radiology are asked to request funds in their grant submissions for performing the studies in radiology (at the appropriate rates) and where appropriate, salary support for the Radiology Faculty involved in the collaborative studies. For imaging studies, the rates for Radiology services include routine technical support such as Technologist time, providing personnel for contrast agent injections etc.

The MR research division of the BIDMC integrates clinical expertise with innovative scientific research. One of our major research areas is in clinical applications of *in vivo* magnetic resonance spectroscopy. We are also developing *in vivo* multinuclear MR imaging methods, primarily Na-23, and currently, we are focusing on molecular imaging, including the development of novel MR and optical-based imaging contrast agents.

Working with one of our major collaborators, the Frangioni laboratory, we formed the discovery engine for the BIDMC Center for Molecular Imaging. Our two laboratories are developing new contrast agents and imaging technologies. To perform proof of principle for the new discoveries and working closely with the Frangioni laboratory, we created the Longwood Small Animal Imaging Facility (Longwood SAIF). This facility also serves as a resource for the BIDMC and the research community of the Longwood Medical Area of Harvard Medical School and the greater Boston medical community. The Lenkinski laboratory, in conjunction with the Longwood SAIF, is pushing the boundaries of what is possible in MR and molecular imaging.
Please visit our lab at:
http://www.lenkinskilab.org/lenkinski/new_present.html

Dr. John Frangioni holds a dual appointment in Medicine (Hematology/Oncology) and Radiology and works in collaboration with our research staff. Dr. Frangioni's research is aimed at solving important clinical problems by applying first-principles from engineering and chemistry. He is uniquely qualified to do this based on his formal training in engineering, tumor biology, and clinical medicine. Dr. Frangioni's vision is to improve cancer diagnosis and treatment by providing clinicians with novel medical devices and contrast agents. He has been executing this vision over the last decade, and has become an authority on near-infrared (NIR) fluorescence imaging and its applications in image-guided surgery. In parallel, his laboratory has made major advances in medical device instrumentation, disease-specific targeting ligands, contrast agent development, and clinical translation.
Please visit his website at: **http://www.frangionilab.org/**

Congratulations to our Harvard Catalyst Pilot Grant award winners:

1) Ivan Pedrosa, David Alsop and their team for "Magnetic Resonance Imaging as a Genomic/Proteomic Expression Correlate to Characterize Renal Cell Carcinoma"

2) Gerry Kolodny and his multi-disciplinary team for "Method of Inducing Brown Adipogenesis by BMP-7 as an Anti-obesity Therapy"

3) Aaron Grant and Pankaj Seth (Co-PIs) and co-investigators Elena Vinogradov, David Alsop, Robert Lenkinski, and Vikas Sukhatme for "Non-invasive real-time metabolic imaging using hyperpolarized pyruvate to assess the Warburg effect in tumors."

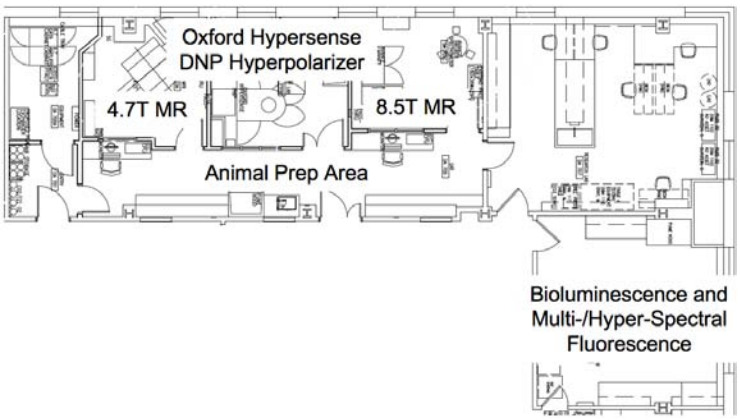
Catalyst grants carry an award of $50,000 and began February 15, 2009

David Alsop	Merck (To start in Jan 2010) - A Randomized, Double Blind, Placebo-Controlled, 3-Treatment, 3-Period, Balanded Crossover Study to Evaluate the Effects of a Single Dose of Aliskiren on RBF Measurements
Phil Boiselle Deb Burstein	R01 Supplement (ARRA Money) - CT Diagnosis of Tracheomalacia in Patients with COPD NIH Summer Student Grant (ARRA Money) - Multiparametric MRI of Cartilage S10 Equipment Grant (ARRA money)
Aaron Grant	Harvard Catalyst Grant - Non-Invasive real-time metabolic imaging using hyperpolarized pyruvate to assess the Warburg effect in tumors
Robert Greenman	R01 subcontract from VP Diagnostics - Performance of SmartRisk Prediction of Stroke and Stroke related events in carotid Atherosclerosis
Gerald Kolodny	Harvard Catalyst Grant - Method of Including Brown Adipogenesis by BMP-7 as an Anti-Obesity Therapy
Ivan Pedrosa	1) Bayer Clinical Trial - Prospective non-randomized observational cohort study to assess the magnitude of potential risk with the administration of Magnevista Injection in patients with moderate to severe renal impairment 2) GlaxoSmithKline Clinical Trial - Arterial spin labeling blood flow magnetic resonance imaging for the evaluation of response to therapy with the combination of Sunitinib 3) Guerbet Clinical Trial - Evaluation of Dotarem-enhanced MRA compared to time-of-flight MRA in the diagnosis of renal arterial disease 4) Harvard Catalyst Grant - Magnetic Resonance Imaging as a Genomic/Proteomic Expression Correlate to Characterize Renal Cell Carcinoma
Neil Rofsky	Bracco Clinical Trials - 1) A Prospective cohort study evaluating the incidence of nephrogenic systemic fibrosis in patients with stages 3 to 5 chronic kidney disease undergoing MRI with the injection of ProHance. 2) A Prospective cohort study evaluating the incidence of nephrogenic systemic fibrosis in patients with stages 3 to 5 chronic kidney disease undergoing MRI with the injection of MultiHance
Elena Vinogradov	NIH R21- Optimization of the DIACEST and PARACEST methodology for quantitative in-vivo imaging
Robert Lenkinski	NIH R01 (Pending NOGA) - PARACEST Agents: Optimization for Human MR Imaging

During the past few months we successfully consolidated our research space on Dana 7. This effort was made because the BIDMC did not renew its lease for space in the HIM building. The animal MRI scanners that were housed in the Center for Basic MR research (http://www.bidmc.org/Research/Departments/Radiology/CenterforBasicMRResearch.aspx) have now been relocated in newly renovated space on Dana 7. The new floor plan is shown below.

New Radiology MR Animal Imaging Facilities on the 7th Floor of the BIDMC Main Hospital:

The 4.7T and 8.5 T animal MR scanners, Oxford Hyperpolarizer. These facilities are immediate adjacent to bioluminescence, and hyper-/multi-spectral fluorescence. The newly funded 9.4 T system will replace the current 8.5 T magnet.



Deborah Burstein, who heads this facility, was recently award a High End Shared Instrumentation Grant ($2.4 Million dollars) to purchase a 9.4 T horizontal bore animal MR scanner. This scanner will probably be installed in the middle of 2010.

The MR Research division headed by **Dave Alsop**, recently renewed its MR research agreement with GE Healthcare Technologies. As part of this new agreement, the 3T whole body scanner will be upgraded in early 2010.

Jim Wu & Aaron Grant

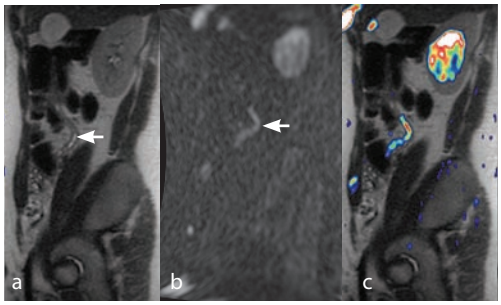
Research Day 2010, held on March 5th, was a day-long event at the Sherman Auditorium celebrated some of the important research being done by talented young investigators at BIDMC, including two from Radiology:

"Hyperpolarization: Increasing the Sensitivity of MRI for Functional and Metabolic Imaging" – **Aaron Grant, PhD**

"Evaluation of Statin-Associated Myopathy with 31P-MR Spectroscopy" – ***Jim Wu, MD***

Bench to Practice

Based on the success we have had at our institution in using MR to diagnose acute appendicitis in pregnancy, MR has virtually supplanted CT to become the primary imaging modality in the evaluating pregnant patients with acute abdominal pain, thereby avoiding the risk of ionizing radiation.

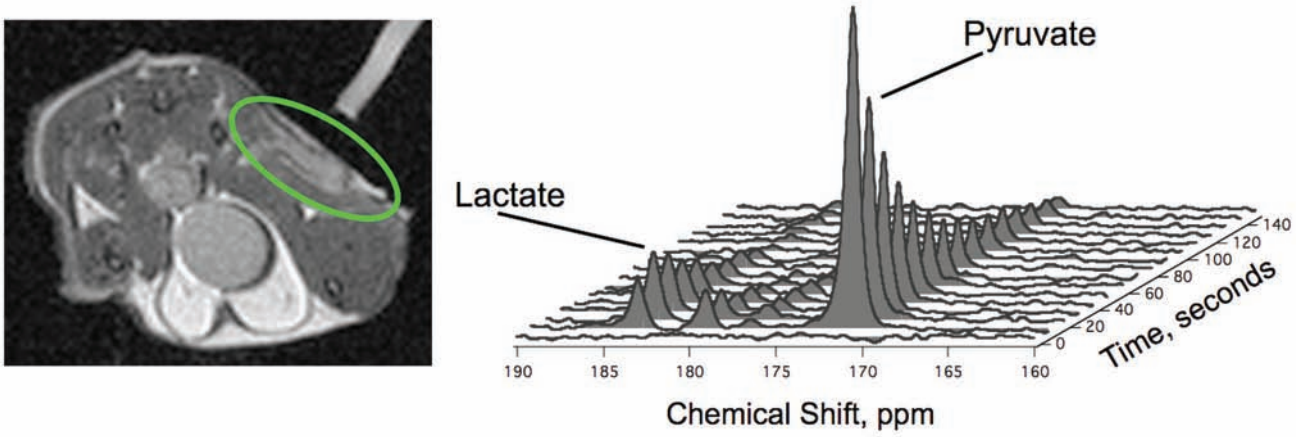


Sagittal T2-W SSFSE image (a) of a pregnant patient with right lower quandrant pain shows a distended, fluid-filled appendix (arrow). Diffusion weighted image (DWI) (b) at the same level shows restricted diffussion along the entire appendix (arrow). Fused image (T2W and DWI image) (c)facilitates the demonstration of restricted diffusion in the appendix. Appendicitis was confirmed at pathology after surgical appendectomy.

Magnetic Resonance on Steroids: Increasing the Sensitivity of MRI by a Factor of 10,000 with Hyperpolarization

New technology in the Department of Radiology is changing the way we think about MRI. Last October, a new piece of equipment called a hyperpolarizer was installed at our animal MR imaging facility located in the Harvard Institutes of Medicine. This new device prepares molecules in a state of very high nuclear magnetization, which enhances the sensitivity of MRI by a factor of 10,000 or more. Traditionally, the low sensitivity of MRI has severely limited its range of applications. With hyperpolarization, however, MRI can be used to image the transport, uptake, and metabolism of tracer molecules such as pyruvate, glutamine, and choline, opening up a new frontier for real-time pathway-specific metabolic imaging.

In collaboration with Drs. Vikas Sukhatme and Pankaj Seth in the Department of Medicine, researchers are studying new cancer therapies that seek to reduce the rate of lactate formation in tumors. These therapies have been shown to slow, and in some cases reverse, the growth of certain types of cancer. Hyperpolarized pyruvate provides an ideal tool for studying these techniques. In normal cells, pyruvate is converted into Acetyl-CoA, which is the fuel for the Krebs cycle. In many cancers, however, pyruvate is metabolized into lactate instead. The spectroscopic capabilities of MRI make it possible to image the conversion of pyruvate into lactate and other compounds in real time. This is illustrated the accompanying figure. The left panel shows a conventional MR image of a xenograft tumor in a mouse. The right panel shows a series of dynamic spectra acquired in this tumor following injection of hyperpolarized pyruvate. The spectra were acquired over a period of about 2 minutes, and each peak indicates the concentration of a different molecule in the tumor (in this case, pyruvate, lactate, alanine, and pyruvate hydrate). By comparing treated tumors with untreated tumors, these techniques can provide an early assessment of the tumors' response to therapy.



Left: Axial T2 weighted image of a xenograft tumor in a mouse. The diagonal line at upper right is a fiducial marker. Right: A temporal series of carbon-13 spectra acquired every 5 seconds following administration of hyperpolarized pyruvate. The peaks indicate different metabolites, in particular pyruvate and lactate. The lactate signal can be used as a marker of tumor response to therapy.

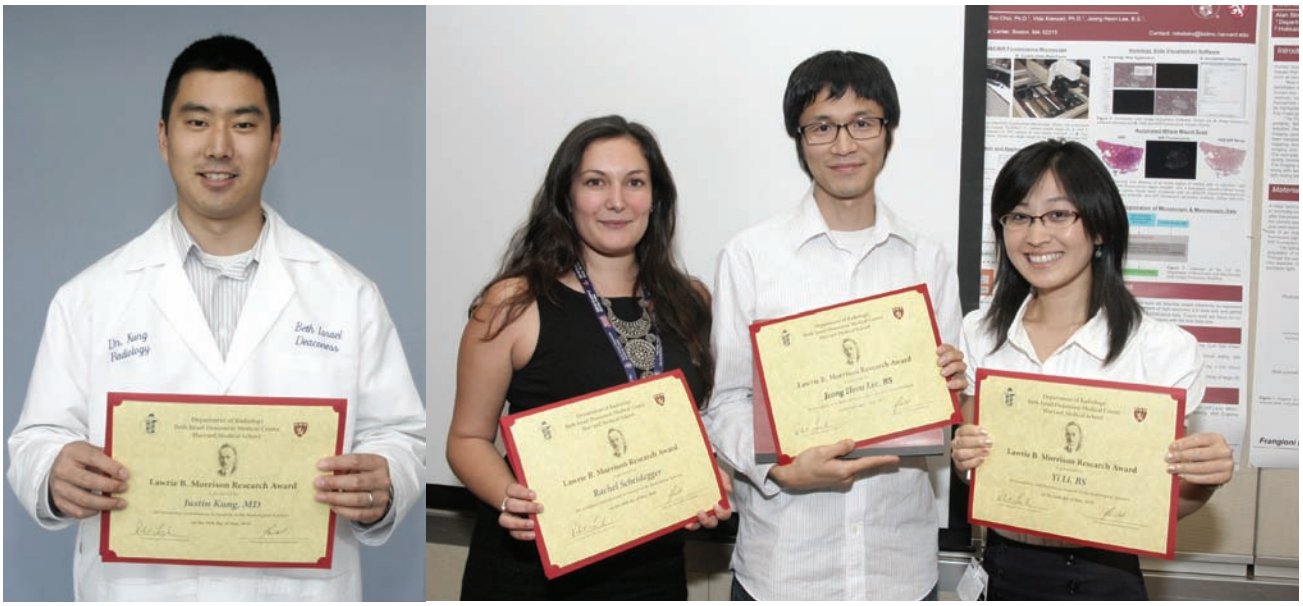
Thanks to Drs. Aaron Grant and Elena Vinogradov, MRI Reserach

Morrison Research Day 2010

This year's Morrison Research Day featured the best of an unprecedented 42 submissions. Director of Research, Dr. Bob Lenkinski chose 14 talks representative of clinical, bench and educational research initiatives from a wide range of clinical and research fellows, medical and HST students and bench scientists. The remainder were invited to present their work in an alternative poster format which brought the total number of posters to 20. Special thanks to Phil Robson and Lori Moffat for their help in hanging them!

Morrison Research Awards were given to MSK Fellow **Justin Kung**, 3rd year Medical Student **Yi Li**, HST PhD candidate **Rachel Scheidegger** and Research Assistant **Jeong Huen Lee**. The judges, **Drs. Deborah Levine, Deborah Burstein, Aaron Grant** and **Jim Wu** based their decisions on the best science in terms of independence, innovation/impact and execution. The 15th Annual Morrison Lecture, ***Advances in Imaging: How Do Innovations Happen?***, was eloquently and humorously delivered by **Dr. Tom** *(not-the-quarterback)* **Brady**, the Vice Chair of Radiology Research and L.L. Robbins Professor of Radiology at HMS. Afterwards, the day was capped with a catered buffet on Shapiro 10.

Drs. Thomas Brady and Robert Lenkinski sign off on yet another successful Morrison Research Day Event



2010 Morrison Research Award winners (L to R): Justin Kung, Rachel Scheidegger, Jeong Heon Lee and Yi Li.

Education

Residency Programs Directors, Jim Wu, Priscilla Slanetz and Kevin Donohoe, and the graduating residents of 2010, Museum of Fine Arts, Boston

Radiology educational programs are supervised by the Chairman and the Associate Chief for Academic Affairs, **Deborah Levine, MD.** In January, 2009, **Jim Wu, MD**, replaced **Bettina Siewert, MD** as Residency Program Director and Director of Residency Education when Dr. Siewert was named Chief of Abdominal Imaging. **Phillip Boiselle, MD**, is Associate Director for Resident Career Development and **Kevin Donohoe, MD**, is Associate Director for Resident Selection process. The fellowship programs are directed by the section chiefs. **Dr. Levine** is also the fellowship liaison for department-wide issues relating to fellowship programs. **Alexander Bankier, MD** is leading the effort to create the new Scholar Track Program.

The **BIDMC diagnostic radiology residency program** is a competitive, Harvard university affiliated training program consisting of 40 residents rotating through 13 radiological sections, as well as a more personalized elective-time related to more in-depth section or research study. Every year, a group of 10 incoming residents are chosen via the ERAS Match System, out of a group of 100 interviewees (carefully chosen through an intensive review process by our selection committee) out of an annual average of about 700 total applicants from the US & all over the world.

Our residents are supported in their clinical and academic learning via a multi-layered system including double session morning didactic conferences, section-based training that is specified by resident year (including learning guideposts and reading lists), one on one mentoring, as well as other additional resources. Our residents are further supported via in-depth evaluations and feedback, including biannual one on one reviews and rotation performance feedback, all within the guidelines of the BIDMC Graduate Medical Education office and ACGME (Accreditation Council for Graduate Medical Education), which is responsible for all post-MD medical training programs in the United States.

Our residents consistently perform above or within national averages on the ACR (American College of Radiology) In-Service Exam as well the current 3 ABR (American Board of Radiology) based exams, and the program is poising itself for the major changes to these exams and the related program-based required changes that are expected.

Quality and Safety Rotation:

In accordance with the ACGME requirement for successful completion of an outcomes project, all of our radiology residents now participate in a quality, safety and performance improvement rotation. Initially developed by Katy Krajewski during her QA elective (and published in Academic Radiology 2009), this was the first such educational experience to be developed in the country and has undergone much improvement since its initial description. The focus has shifted away from a 4 week didactic experience (focussing on patient safety, quality assurance, risk management and methodology of QI) to a more clinically-oriented experience. Residents now identify an outcomes project in their area of clinical interest and are mentored through the steps from project conception, development, planning, data collection and analysis, to presentation/publication. In this way the rotation is spread out over their residency and when specific time is assigned to the rotation, educational materials including powerpoint lectures, web sites, and a host of relevant articles are made available for online study. This unique experience exposes the resident to the tools and methodologies of performance improvement, highlights important aspects of risk management for radiologists, prepares our residents for their ABR Maintenance of Certification once they graduate from our program (specifically the mandatory Practice Quality Improvement Project), and satisfies ACGME training requirements. We believe that this first-in-the-nation rotation exemplifies our commitment to quality improvement, to education and to training our residents to be leaders in this essential and rapidly expanding field of radiology.

Resident Life

Location, location, location

Boston, Massachusetts is a fascinating place to spend your residency. As an international "university town", Boston's population is a rich mix of native Bostonians and scholars hailing from around the country and around the globe. The result is a vibrant and diverse city that is welcoming to many different lifestyles. Boston is rich in cultural and historic landmarks

for weekend exploration, and is a short drive from the ski slopes and hiking trails of New Hampshire and the beaches of Cape Cod and Rhode Island. Our many historic neighborhoods provide wonderful places to live, where you can go for a run in a riverside park, browse an eclectic bookstore, and pick up some first class Thai food, all in an afternoon. Residents at the BIDMC live in many corners of the Boston area, from the stylish flats of the South End, to the fireplaced Victorian homes of Brookline, and the backyards and gardens of Newton. Cambridge, Massachusetts, located just across the river, is the home of Harvard University and the Massachusetts Institute of Technology. Cambridge offers a sophisticated and liberal community that is fun to visit or live in.

The Beth Israel Deaconess Medical Center is located within the Longwood Medical area, home to some of the east coast's most prominent academic hospitals. We are just blocks from the Dana Farber Cancer Institute, Joslin Diabetes Center, Children's Hospital of Boston, and the Brigham and Women's Hospital. Harvard Medical School is just down the street.

In your free time:

BIDMC residents have many interests outside of radiology. A sampling of our current residents' hobbies and activities include:

- Sailing on the Charles and in Boston Harbor
- Cycling and triathlons
- Running (including marathons)
- Hiking in New Hampshire's White Mountains
- Fishing, windsurfing, scuba diving
- Woodworking and old home restoration
- Salsa dancing
- Traveling
- Skiing/snowboarding

There are plenty of things that we tend to do in groups, including get-togethers at each others' homes, barbecuing in the summertime, evenings out at various area Irish pubs, ski trips, Museum of Fine Arts exhibits, concerts on the Esplanade, and - of course - Red Sox games at Fenway Park. Then, of course, there is our Radiology softball team where residents and techs battle side by side against other local teams.

http://www.bidmc.org/MedicalEducation/Departments/Radiology/Residency/ResidentLife.aspx

Harnessing New Technology

I am delighted to share a new radiology learning tool with you:

1. "Lieberman's iRadiology" iPhone Application: At present, The Classics Collection is available. This valuable learning tool may be downloaded free of charge on your iPhone via the App Store.

2. It is also available via iTunes by clicking on the link below: http://itunes.apple.com/us/app/iradiology/id346440355?mt=8 <http://itunes.apple.com/us/app/iradiology/id346440355?mt=8>

3. It is still available on the web at http://eradiology.bidmc.harvard.edu <http://eradiology.bidmc.harvard.edu/> in the Classics Collection

The iRadiology Classics App allows for quick review of classic radiology cases on the fly, during rounds, at no cost, with no internet connection.

FEATURES:

- Over 500 unique cases
- Browse unlabeled and labeled images by organ system and pathology
- Find relevant cases by keyword search
- Test your knowledge by finding the abnormality on unlabeled images
- Toggle image labels on and off
- Each case has a detailed description and discussion of the findings
- Images can be zoomed, panned, and rotated with standard iPhone gestures
- No mobile phone reception or wi-fi internet connection required

We are currently working on further iApps such as "Primary Care Radiology Series" and "Interactive Tutorial Series".

Hope you find these useful,
- Gillian

Gillian Lieberman, MD, is Director for Harvard Medical School Radiologic Education. She is responsible for the curriculum, and develops and oversees the efforts of faculty and students in our department. She also serves on numerous Medical School committees, and is active in our residency selection process. At BIDMC, we offer 3 different courses to the approximately 80 Medical students who spend one month each in our radiology department per year:

- Core Radiology Clerkship RD 500M.1
- Advanced Radiology Clerkship RD 501M.1
- Primary Care Radiology Elective RD 502M.J

Under the esteemed direction of Dr. Lieberman, who developed and implemented an entirely new curriculum for the Core rotation, our program has consistently received top evaluations and Dr. Lieberman herself has been awarded numerous teaching awards.

"Our Medical Student Teaching Program transitioned seamlessly into the PCE. A huge thank you to all of you for your wonderful teaching efforts. We continue to receive rave reviews from students across the board. They feel welcomed, are amazed at the generosity of spirit our staff and residents show in giving them time and personal attention and are impressed by our teaching.

As usual this year, we are giving out some teaching awards, which have been solely awarded on the basis of student vote and evaluations, without input from me, Maria or other staff.

The Resident Award:
The resident award is accompanied by a certificate and a well deserved check for $250. Our recipients were tireless in their efforts to support students for their case presentations and teach them during practicals. They received rave reviews from all at exit interviews and seemed to be every student's big brother and big sister. We are delighted to give this year's resident teaching award, with a huge thank you for their marvelous contributions, to **Drs. Aarti Sekhar** & **Ken Lai** (2009) and **Dr. Sachin Pandey** (2010).

The Staff Awards:
There are a number of staff this year that excelled in teaching students and students evaluated them accordingly. As in past years, the quality of the formal tutorial presentation is the major part of the student's evaluation and therefore only those participating in formal lecturing, who showed up and gave all lectures were eligible. Again, the winners were chosen by student rankings with no input from me, Maria or other staff.

The medical students were particularly delighted to recognize the tireless efforts of: **Dr. Colin McArdle and Dr. Gillian Lieberman** in 2009 and **Dr. Paul Spirn** and **Dr. Gillian Lieberman** in 2010."

- Gillian

Fellowships in Radiology

Our Department prides itself on being supportive of its fellows and places strong emphasis on the quality of teaching on a person-to-person basis. Please see our website:
http://www.bidmc.org/MedicalEducation/Departments/Radiology/Fellowships.aspx

Daily didactic morning conferences are held for the residents. The fellows are welcomed to attend these conferences as their schedule permits. Department faculty, residents and fellows provide most didactic lectures, with frequent lectures from outside HMS faculty, past residents, as well as guest lecturers from around the world. Visiting professors from other major teaching centers in the United States and abroad spend varying periods of time in the Department. Some have taken sabbatical leave at the Beth Israel Deaconess Medical Center.

Radiology also has a close working relationship with a number of clinical services outside our department, which allows Radiology to participate in a number of management conferences. They include: Medical Management conference, Chest conference, Melanoma Management conference, urology management conference, Medical Grand Rounds, Surgical Grand Rounds, and others.

As befits a great medical city, there are many great medical conferences sponsored not only by Harvard-affiliated programs, but also by a number of other medical centers. The monthly New England Roentgen Ray Society meeting is one of the more popular Radiology meetings that also includes a special program for residents and fellows. Seminars and lectures in radiology are also held at adjacent Harvard-affiliated hospitals which include the Brigham and Women's Hospital, and Boston Children's Hospital.

Current Radiology Fellowships:

- Abdominal Imaging
- Breast Imaging
- MRI
- Musculoskeletal
- Neuroradiology
- Thoracic Imaging
- Vascular and Interventional
- Women's Imaging

Staff Roster

2010 New Staff

Justin Kung, MD -
Musculoskeletal Imaging/Community Radiology
MD, University of Pennsylvania School of Medicine, Phil. , PA
Internship, Transitional, Albert Einstein / Jefferson Medical School, Phil., PA; Residency, Radiology, BIDMC, Boston, MA
Fellowship, Musculoskeletal Imaging (Chief Fellow), BIDMC, Boston, MA; NCI pre-IRTA Fellow, Bethesda, MD

Kenny C. Lai, MD, MBA -
Breast Imaging
MD, Duke University School of Medicine
MBA, Fuqua School of Business, Duke University, Durham, NC
Internship, Transitional, Caritas Carney Hospital, Boston, MA
Residency, Radiology, BIDMC, Boston, MA
Fellowship, Breast Imaging, Massachusetts General Hospital, Boston, MA

Manjiri M. Didolkar, MD -
Musculoskeletal Imaging
MD, Virginia Commonwealth University School of Medicine, Richmond, VA
Internship, Orthopedic Surgery, General Surgery, and Residency, Orthopedic Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA;
Residency, Radiology and Fellowship, Musculoskeletal Radiology, Duke University Medical Center

2010 Clinical Faculty

Muneeb Ahmed, MD
Interventional Radiology
35326

M. Julie Armada, MD
Breast Imaging
Community Radiology
BID-Needham
30552

Alexander A. Bankier, MD
Thoracic Imaging
30753

Andrew E. Bennett, MD, PhD
Community Radiology
BI-Needham/Harrington
31905

Rafeeque A. Bhadelia, MD
Neuroradiology
31875

Douglas Bober, MD
Breast Imaging/Community Radiology
39661

Phillip M. Boiselle, MD
Chief, Thoracic Imaging
33402

Marc A. Camacho, MD
Chief, Emergency Radiology
34105

Melvin E. Clouse, MD
Interventional Radiology
4-2529

Felipe B. Collares, MD
Interventional Radiology
39676

Vandana M. Dialani, MD
Breast Imaging
32381

Manjiri Didolkar, MD
Musculoskeletal Imaging
39326

Kevin J. Donohoe, MD
Nuclear Medicine
Assoc. Dir., Residency Program
32407

Ronald L. Eisenberg, MD
Thoracic Imaging/MSK
30801

Per Eld, MD
Community Radiology
BID-Needham

Salomao Faintuch, MD
Interventional Radiology
38931

Valerie Fein-Zachary, MD
Breast Imaging
32841

Alice Fisher, MD - 7/08
Neuroradiology/Community Radiology -BID-Needham
91611

Peter D. Gross, MD
Breast Imaging/Ambulatory
35191

David B. Hackney, MD
Chief, Neuroradiology
33505

Ferris M. Hall , MD
Musculoskeletal/Breast Imaging
31614

Thomas C. Hill, MD
Nuclear Medicine
92054

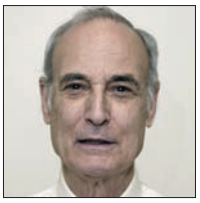
Mary G. Hochman, MD
Chief, Musculoskeletal Imaging
33060

Elaine Iuanow, MD
Breast Imaging
35221

Robert A. Kane, MD
Co-Chief, Ultrasound
Chief, Abd Ultrasound
92055

Thornton Kell, MD
Community Radiology - Needham
34006

Jonathan Kleefield, MD
Neuroradiology
4-2009



Gerald M. Kolodny, MD
Chief, Nuclear Medicine
31971

Herbert Y. Kressel, MD
Magnetic Resonance Imaging
7-2506

Jonathan B. Kruskal, MD, PhD
Abdominal Imaging
91408

Justin Kung, MD
Musculoskeletal Imaging/ Community Radiology
91203

Kenny Lai, MD, MBA
Breast Imaging
32352

Karen S. Lee, MD
Emergency Radiology/MRI
91642

Gillian Lieberman, MD
Dir., Harvard Medical Student Radiological Education
4-2597

Deborah Levine, MD
Co-Chief, Ultrasound
Chief, OB/GYN Ultrasound
7-8901

Robin Levenson, MD
Emergency Radiology
32858

2010 Clinical Faculty

Diana Litmanovich, MD
Thoracic Imaging
Dir., Cardiac CT
94016

David Magaram, MD
Clinical Dir., Breast Imaging
39597

Colin McArdle, MD
Ultrasound
31968

Colm McMahon, MD
Musculoskeletal Imaging
30719

Tejas S. Mehta, MD, MPH
Breast Imaging/Ultrasound
33053

Gul Moonis, MD,
Neuroradiology
34224

J. Anthony Parker, MD, PhD
Nuclear Medicine
31978

Sven Paulin, MD, PhD
Thoracic Imaging/MSK

Ivan Pedrosa, MD
MRI/Abd Imaging
Dir., Body MR
39016

Nagamani Peri, MD
Neuroradiology
91214

Laura Perry, MD
Interventional Radiology
32836

Vassilios Raptopoulos, MD
Chief, Computed Tomography
32653

Arra Suresh Reddy, MD
Chief, Interventional
Neuroradiology (INR)
33589

Alan H. Robbins, MD
Abdominal Imaging/GI Rad
33003

Dean J. Rodman, MD
Community Radiology
Chief of Radiology,
BID-Needham
35130

Rafael Rojas, MD
Neuroradiology
34676

Janneth Y. Romero
Thoracic Imaging/Ob/Gyn
91216

Max P. Rosen, MD, MPH
Abdominal Imaging
Med. Dir., Be Well BodyScan/
Community Radiology
33121

Barry A. Sacks, MD
Interventional Radiology
91052

Sejal Shah, MD
Emergency Radiology
94164

Rola Shaheen, MD
Community Radiology
Chief of Radiology
Harrington Memorial Hosp.
30721

Robert Sheiman, MD
Abdominal Imaging
Co-Dir., Vascular Lab
33097

Bettina Siewert, MD
Chief, Abdominal Imaging
35791

Priscilla Slanetz, MD, MPH
Dir., Breast MRI
Assoc. Director, Residency
Program
90767

Marty P. Smith, MD
MRI/Abd Imaging
Dir., Community MRI
91218

Paul W. Spirn, MD
Thoracic Imaging
33484

Maryellen R. Sun, MD
Abd Imaging/MRI
91701

Douglas Teich, MD
Community Radiology
94023

Girish Tyagi, MD
Abdominal Imaging
33538

Shambhavi
Venkataraman, MD
Breast Imagimg
94023

Jesse L. Wei, MD
MRI/Abd Imaging
39014

Jim S. Wu, MD
Musculoskeletal Imaging
Director, Residency Program
38932

Corrie M. Yablon, MD
Musculoskeletal Imaging
Dir., MSK Ultrasound
94180

2010 Research & Support Faculty

David C. Alsop, PhD
Dir., MR Research

Deborah Burstein, PhD
MR Research

John V. Frangioni, MD, PhD
Molecular Imaging

S. Nahum Goldberg, MD
Abdominal Imaging Research

Aaron K. Grant, PhD
MR Research

Robert L. Greenman, PhD
MR Research

Robert E. Lenkinski, PhD
MR Research

Pei-Jan Paul Lin, PhD
Medical Imaging Physics
32214

Warren J. Manning, MD
Cardiac MR
31144

Matthew R. Palmer, PhD
Nuclear Medicine
38077

Oleg Pianykh, PhD
Image Processing Laboratory

Neil Rofsky, MD
MRI

Jacob Sosna, MD
Abdominal Imaging Research

Elena Vinogradov, PhD
MR Research

Chun-Shan Yam, PhD
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The Gallery

In winter 2010, we unveiled **The Gallery** on the West Campus 3rd Floor. The Gallery is a conference room with a large screen flat panel monitor and state-of-the-art PACS access. However, in keeping with HMS (Office of Human Resources) initiatives to promote creative well-being in the workplace and food for thought on our own time, we decided to designate The Gallery as a space to display the sizeable and diverse artistic talents of our staff and faculty on a rotating basis. Initial guidelines include a selection committee composed of our Media Lab staff, Michael Larson, MFA (Sculpture) and Donna Wolfe, MFA (Writing, Literature, and Publishing) and artwork would rotate in for a 3-4-month period. 3D pieces are also encouraged, space permitting. To date, The Gallery has hosted the ballerinas of **Dr. Kevin Donohoe** (Nuclear Medicine) and the nature photography of **Julia Swanson** (Abdominal Imaging).

Trainee Rosters

1st year Residents

Monica Agarwal, MD
MD, *magna cum laude* - Boston University School of Medicine
Internship, Internal Medicine, Beth Israel Deaconess Medical Center

Elizabeth Asch, MD
MD, Harvard Medical School, Boston, MA
Internship, Pediatrics, New York University
Fellowship, Clinical Research Training, NIH, Bethesda, MD

Mark Ashkan, MD
MD *with Distinction in research in radiology*, Albert Einstein College of Medicine, Bronx, NY
Internship, Medicine, Beth Israel Medical Center, NY, NY
Fellowships, Neuroradiology Research, Albert Einstein College of Medicine, Bronx, NY

Seth Berkowitz, MD
MD, Johns Hopkins School of Medicine, Baltimore, MD
Internship, Medicine, Mount Auburn Hospital, Cambridge, MA

Pauline Bishop, MD
MD, *cum laude* - Boston University School of Medicine
Internship, Tufts Transitional, Lemuel Shattuck, Jamaica Plain, MA

Tamuna Chadashvili, MD, PhD
MD, PhD (Neuroscience), Rosalind Franklin University of Medicine and Science, North Chicago, IL
Internship, Medicine, St. Mary's Medical Center, Long Beach, CA

Verônica Fernandes, MD, PhD
MD, Federal University of Pará, Brazil
PhD, Cardiovascular Imaging, Johns Hopkins/Fed. University of São Paulo, Brazil
Internship, Internal Medicine, Federal University of São Paulo Hospital;Residency, Cardiology, U. São Paulo, Ribeirao Preto, Brazil

David Glazier, MD
MD, Tufts University School of Medicine, Boston, MA
Internship, Medicine, St. Elizabeth's Medical Center, Brighton, MA

Gunjan Senapati, MD
MD, Tufts University School of Medicine (Research Concentration Program), Boston, MA
Internship, Transitional, North Shore University Health System, Evanston, IL

Samir H. Shah, MD
MD, Washington University School of Medicine, St. Louis, MO
Internship, Tufts Transitional, Signature Healthcare, Brockton Hospital, Brockton, MA

Scott Zimmer, MD
MD, *cum laude*, Boston University School of Medicine, Boston
Internship, Tufts Transitional, Signature Healthcare, Brockton Hospital, Brockton, MA

2nd year Residents

Yiming Gao MD
MD, *cum laude*, University of Maryland School of Medicine, Baltimore, MD
Internship, Transitional, Lehigh Valley Hospital, Allentown, PA

Mai-Lan Ho, MD
MD, Washington University School of Medicine, St. Louis, MO
Internship, Internal Medicine, St. Luke's Hospital, Chesterfield, MO

Krithica Kaliannan, MD
MD, Tirunelveli Medical College, India
Internship, Tirunelveli Government Hospital
Residency, Radiology (DMRD), Chennai Medical College, Channai, India

James Knutson, MD
MD, Wake Forest University School of Medicine, Winston-Salem, NC
Internship, Transitional, Signature Healthcare-Brockton Hospital, Brockton, MA

Johannes Roedl, MD
MD, University of Erlangen, Erlangen, Germany
Internship, IM, Surgery, Dx Radiology, University Hospitals Erlangen, Germany

Ammar Sarwar, MD
MBBS, King Edward Medical College, Lahore, Pakistan
Internship, Transitional, Metrowest Medical Center, Framingham, MA
Fellowship, Cardiac MR PET CT, Massachusetts General Hospital, Boston, MA

Nicholas Telischak, MD, MS - new 2nd yr resident
MD, Dartmouth Medical School, Hanover, NH
MS, Medical Imaging/Device Development, Stanford University School of Engineering. Internship, Medicine, Dartmouth-Hitchcock Medical Center, Lebanon, NH

Leo Tsai, MD, PhD, MSc
MD, Harvard Medical School/MIT (HST); PhD, Biophysics, Harvard University School of Arts & Sciences, Boston, MA.
MSc, Medical Imaging, Emmanuel College, Cambridge University, Great Britain
Internship, Surgery, Brigham & Women's Hospital, Boston, MA

Behroze Vachha, MD, PhD
MBBS, BJ Medical College and Sassoon General Hospitals, Pune, India;
PhD, Human Development, Cognition and Neuroscience, University of Texas at Dallas.
Internship, Internal Medicine, University of Texas Southwestern Medical Center

Omar Zurkiya, MD, PhD
MD, PhD, Bioengineering, Emory University Medical School & Georgia Institute of Technology, Atlanta, GA (NIH Medical Scientist Program Fellowship for joint MD-PhD).

3rd year Residents

Jean-Marc Gauguet, MD, PhD
MD, Harvard Medical School, Boston, MA
PhD, Biological Sciences, Harvard University, Cambridge, MA
Internship, Transitional, Cambridge Hospital, Cambridge, MA

Erica Gupta, MD
MD, Emory University School of Medicine, Atlanta, GA
Internship, Medicine, Beth Israel Deaconess Medical Center, Boston, MA

Adam Jeffers, MD
MD, Medical College of Wisconsin, Milwaukee, WI
Internship, Transitional, Penn Presbyterian Medical Center, Philadelphia, PA

David Li, MD, PhD
MD and PhD, Physiology & Biophysics, Albert Einstein College of Medicine, Bronx, NY
Internship, Preliminary Medicine, North Shore University Hospital, Manhasset, Long Island, NY

Sachin Pandey, MD
MD, Boston University School of Medicine, Boston, MA
Internship, Transitional, Tufts University, Boston, MA

Iva Petkovska, MD
MD, University Ss. Cyril and Methodius, Skopje, Macedonia
Clinical internship, University Hospital, Clinical Center University Ss. Cyril and Methodius, Skopje
Research Fellow, Thoracic Imaging, David Geffen School of Medicine, UCLA, Los Angeles;
Research Fellow, Neurology Stroke Service, Massachusetts General Hospital; Boston, MA

Jennifer Son, MD
MD, Harvard Medical School, Boston, MA
Internship, Transitional, Caritas Carney Hospital, Boston, MA
Clinical Research Fellow, Doris Duke Charitable Foundation, Children's Hospital, Boston, MA

Ernest Yeh, MD, PhD
MD, Harvard Medical School, Boston, MA
PhD, Medical Engineering/Medical Physics, Harvard-MIT (Health Sciences and Technology), Cambridge, MA
Internship, General Surgery, Brigham and Women's Hospital, Boston, MA
Internship, Engineering (Digital Signal Processing) Hughes Electronics, El Segundo, CA

4th year Residents

Maria Barile, MD
MD, University of Connecticut School of Medicine, Farmington, CT
Internship, BIDMC
Radiology Residency (Yr 1-2), Brown Radiology Residency, Providence, RI

Prachi Dubey, MD, MPH
MBBS, Lady Hardinge Medical College, Dehli University
MPH, Johns Hopkins School of Public Health, Baltimore, MD

James Kang, MD
MD, Johns Hopkins University School of Medicine, Baltimore, MD
BS, Animal Physiology and Neuroscience, University of California, San Diego

Saman Hazany, MD
MD, University of California San Diego (USCD) School of Medicine, La Jolla, CA
Internship, Internal Medicine, Martin Luther King/ UCLA Hospital, Los Angeles, CA
Radiology Residency (Yr1-2), Staten Island University Hospital (SIUH), Staten Island, NY

Alice Lee, MD
MD, AOA, University of Hawaii John A. Burns School of Medicine, Honolulu, Hawaii
BA, (cum laude) Physics and Chinese Studies, Wellesley College, Wellesley, MA

Sadhna Nandwana, MD
MD, Rush Medical College, Chicago, IL
BA, Religion, Boston University, Boston, MA

Rich Rana, MD
MD, University of Chicago Pritzker School of Medicine, Chicago, IL
BS, (magna cum laude) Chemical Engineering, Northwestern University, Evanston/Chicago, IL

Julia G. Rissmiller, MD
MD, University of Massachusetts Medical School, Worcester, MA
Internship, Pediatrics, Massachusetts General Hospital for Children, Boston, MA
Radiology Residency (Yr 1) , Maine Medical Center, Portland, OR

Catherine Wells, MD, PhD
MD, Brown University Medical School, Providence, RI
PhD, Neuroscience, Brown University
BA, (High honors) Neuroscience, Oberlin College, Oberlin, OH

2010 Clinical Fellows

Peter Beddy, MD - MRI
MD (*MB BCh BAO with honors)*, Trinity College Foundation Scholar) Trinity College Medical School; Internship & Residency (Internal Medicine), Adelaide and Meath Hospital; Radiology Residency, St. James Hospital, Dublin. Fellowship, Radiology, Addenbrooke's and Papworth Hospital, Cambridge, UK

Ian Brennan, MD - Interventional (IR)
MD (*MB BCh BAO, BMedSc*), University College, Dublin, IR
Internship, Internal Medicine/Surgery, St. Vincent's University Hospital, Dublin; Residency, Surgery, Cork University Hospital
Radiology Residency, St. James Hospital, Dublin

Edward (Ted) Brewer, MD - Neuroradiology
MD, Boston University School of Medicine
Internship, Transitional, Naval Medical Center, Portsmouth, VA; Residency, Diagnostic Radiology, Lahey Clinic, Burlington, MA
General/Undersea Medical Officer/Primary Care Physician, US Navy (IL, VA, FL, CT, NH)

Olga Brook, MD - MRI
MD *cum laude*, Bruce Rappaport Faculty of Medicine, Technion Israel Institute of Technology, Haifa, Israel
Internship & Radiology Residency, Rambam Medical Center, Haifa, Israel

Daniel B. Case, MD - Neuroradiology
MD, Johns Hopkins University School of Medicine, Baltimore; Internship, General Surgery, UC San Francisco Medical Center; Residency, Radiology, Baystate Medical Center (Tufts), Springfield, MA
Sergeant, US Army, 75th Airborne Ranger Battalion

Corey A. Couto, MD - Abdominal Imaging
MD, Dartmouth Medical School, Hanover, NH
Internship, Internal Medicine & Radiology Residency, Rhode Island Hospital, Warren Alpert School of Medicine, Providence, RI

Catherine Dewhurst, MD - Abdominal Imaging
MD (*MB BCh BAO BMedSc with Honours*), University College, Cork, IR. Internship, Medicine and Surgery, Cork University Hospital; Residencies in Surgery and Radiology,
Mercy University Hospital/Cork University Hospital

Diana M. Ferris (James), MD, PhD, MSc - Br Imaging
MD, Brown University, Providence, RI
MSc, University of Glasgow, Scotland
Internship, Internal Medicine, Baystate Medical Center (Tufts), Springfield, MA
Residency, Diagnostic Radiology, BIDMC, Boston, MA

Erica Ghosh, MD - Women's Imaging
MD, Case Western Reserve University School of Medicine, Cleveland, OH
Internship, Internal Medicine, Roger Williams Medical Center, Providence, RI; Residency, Radiology, Baystate Medical Center (Tufts), Springfield, MA

Jaskiran (Jackie) Grewal, MD - Women's Imaging
MD, New York Medical College, Valhalla, NY
Internship, Internal Medicine, Cabrini Medical center, NY, NY
Residency, Radiology, Westchester Medical Center, Valhalla, NY

Gaurav Jindal, MD - Interventional (IR)
MD (*MBBS*), Maulana Azad Medical College, New Delhi, India
Internship, Lok Nayak Hospital, New Delhi, India
Residency, Radiology, Sardar Patel Medical Center, Bikaner, Rajasthan

Faisal Khosa, MD - Neuroradiology
MD (*MBBS*), Allama Iqbal Medical School, Pakistan
Internship, General Rotating, Services Hospital, Lahore, Pakistan; Residencies: Radiology, Jinnah Hospital, Lahore, Pakistan; Radiology, Saint James's Hospital, Dublin, IR
Clinical Fellowships - Dublin, Boston

Kalpana Mani, MD, MEd - Neuroradiology
(through 1/2011)
MD, Harvard Medical School
MEd, Harvard Graduate School of Education, , Boston, MA; Residency, Radiology, BIDMC, Boston, MA

Yulia Melenevsky, MD - Musculoskeletal
MD, St. Petersburg State Pediatric Medical Academy, St. Petersburg, Russia. Internship, Transitional, Metrowest Medical center, Framingham, MA. Residency, Radiology, BIDMC, Boston
Fellowship, Radiology/Nuclear Medicine Research, Dana Farber Cancer Institute, Boston, MA

Jennifer Ní Mhuircheartaigh, MD, M Med Sci - Abd Imaging
MD (*MB BCh BAO, M Med Sci*), College of Medicine, National University of Ireland, Galway, IR. Internship, Medicine/Surgery; Residencies in General Surgery and Radiology, University College Hospital and Mayo General Hospital, Galway.

Jay Pahade, MD - Abdominal Imaging
MD (*summa cum laude)*, University at Buffalo, School of Medicine, Buffalo, NY
Internship, Internal Medicine, Mount Sinai School of Medicine-Cabrini Medical Center, NY, NY
Residency, Diagnostic Radiology, BIDMC, Boston

2010 Clinical Fellows

Payal Patel, MD - Abdominal Imaging
MD, UMASS Medical School, Worcester, MA.
Internship, Internal Medicine, St. Vincent Hospital, Worcester
Residency, Lahey Clinic, Burlington, MA

Khashayar Rafat-Zand, MD - Body MRI
MD, Tehran University of Medical Sciences, Iran
Radiology Residency and Radiology Research Fellowship, McGill University, Montreal, Quebec, Canada

Ramesh Ramachandran, MD - Neuroradiology
MD (*MBBS*) and Internship, Stanley Medical College and Hospital (First Class Honors), The Tamilnadu Dr M.G.R. Medical University, Chennai, India.
Radiology Residency, Hammersmith and Charing Cross Hospitals, Imperial College Healthcare NHS Trust, London

Madan Reddy, MD - Interventional (IR), 2nd yr
MD (*MBBS* - Kakatiya Medical College, India, *MS*, *Master of Surgery* - Osmania Medical College).
Internship, MGM Hospital, Warangal, India
Residency, Radiology, Osmania General Hospital, Hyderabad, India. Fellowship, Vascular and Interventional Radiology, BIDMC, Boston, MA

Carole Ridge, MD - Thoracic Imaging
MD (*MB BCh BAO with Honors)*, University College, Dublin; Internship, General Surgery/Internal Medicine, and Residency, Radiology, St. Vincent's University Hospital, Dublin; Residency, Internal Medicine, Beaumont Hospital, Dublin

Aarti Sekhar, MD - Abdominal Imaging
MD, UMASS Medical School, Worcester, MA
Internship, Transitional, University of Hawaii
Residency, Radiology, BIDMC, Boston, MA
Chief Fellow

Raja Shaikh, MD - Interventional (IR)
MD *(MBBS)*, Karnatak University, Dharwad, India
Residency, Radiology, Rajiv Ghandi University
Fellowship - Neuroradiology, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Kerala, India; Body MRI, University of Arkansas, Little Rock, AR

Daniel Siegal, MD - Musculoskeletal (MSK)
MD, SUNY, Stony Brook School of Medicine, Stony Brook, NY; Internship, Internal Medicine, Mount Auburn Hospital, Cambridge, MA
Residency, Radiology, BIDMC, Boston, MA
Chief Fellow

Gethin Williams, MD, PhD - Interventional (IR)
MD *(First Class Honors)*, University of Tasmania, Australia
Residency - Internal Medicine, Kaiser Permanente, San Francisco; Nuclear Medicine, Brigham & Women's Hospital; Radiology, BIDMC, Boston, MA

2010 Research Fellows

Sofia Gourtsoyianni, MD - CT Research
MD, University of Medical Sciences of Pecs, Medical School (English Language Program) Pecs, Hungary
Residency, Radiology, University Hospital of Heraklion, Crete, Greece & Institute of Clinical Radiology, Ludwig Maximilian University, Munich, Germany

Atif Khan, MD - Cardiovascular CT
MD (*MBBS*), Allama Iqbal Medical School, Pakistan
Research Fellowship, Cancer Radiology, BIDMC, Boston, MA

Paula Kuzontkoski, PhD - NCI Cancer Radiology
PhD, Genetics, Dartmouth Colllege, Hanover, NH
BS (*cum laude*), Microbiology, UMASS Amherst, Amherst, MA

Marwan Moussa, MD - Minimally Invasive Tumor Therapy Lab
MBBCH, Faculty of Medicine, Alexandria University, Alexandria, Egypt

Beenish Tasawwar, MD - NCI Cancer Radiology
MD, Allama Iqbal Medical College, Lahore, Pakistan

Gopal Varma, PhD, MSci - MRI Research
PhD, Imaging Sciences, Kings College, London
MSci, Physics, Imperial College, London

2009 was a productive year for our department with a year end total of **192** publications consisting of original research, reviews, editorials, and society guidelines. Current* trainees were co-authors on **26** papers.

**Current = within one year of graduation*

*The number of papers published with former trainees (within 5 years of graduation) is **29** for a total of **54** trainee-authored papers in 2009.*

Akram K, **Parker JA**, **Donohoe K**, **Kolodny G**. Role of single photon emission computed tomography/computed tomography in localization of ectopic parathyroid adenoma: a pictorial case series and review of the current literature. Clin Nucl Med. 2009 Aug;34(8):500-2.

Anderson SW, **Kruskal JB**, **Kane RA**. Benign hepatic tumors and iatrogenic pseudotumors. Radiographics 2009; 29:211-229.

Appelbaum E, Abraham JM, Pride YB, Harrigan CJ, Peters DC, Biller LH, **Manning WJ**, Gibson CM. Association of Thrombolysis in Myocardial Infarction Myocardial Perfusion Grade with cardiovascular magnetic resonance measures of infarct architecture after primary percutaneous coronary intervention for ST-segment elevation myocardial infarction. Am Heart J. 2009 Jul;158(1):84-91.

Appelbaum E, Kirtane AJ, Clark A, Pride YB, Gelfand EV, Harrigan CJ, Kissinger KV, **Manning WJ**, Gibson CM. Association of TIMI Myocardial Perfusion Grade and ST-segment resolution with cardiovascular magnetic resonance measures of microvascular obstruction and infarct size following ST-segment elevation myocardial infarction. J Thromb Thrombolysis 2009; 27:123-129.

Appelbaum E, **Manning WJ**. Science to practice: can the combination of resting first-pass myocardial perfusion and late gadolinium-enhanced cardiovascular MR imaging help identify myocardial infarction resulting from coronary microembolization? Radiology 2009; 250:609-611.

Appelbaum L, **Kane RA**, **Kruskal JB**, **Romero J**, Sosna J. Focal hepatic lesions: US-guided biopsy--lessons from review of cytologic and pathologic examination results. Radiology 2009; 250:453-458

Asch E, **Levine D**, **Pedrosa I**, Hecht JL, **Kruskal J**. Patterns of Misinterpretation of Adnexal Masses on CT and MR in an Academic Radiology Department(1). Acad Radiol. 2009 Aug;16(8):969-80. Epub 2009 Apr 19.

Atkins MB, Bukowski RM, Escudier BJ, Figlin RA, Hudes GH, Kaelin WG Jr, Linehan WM, McDermott DF, Mier JW, **Pedrosa I**, Rini BI, Signoretti S, Sosman JA, Teh BT, Wood CG, Zurita AJ, King L. Innovations and challenges in renal cancer: summary statement from the Third Cambridge Conference. Cancer. 2009 May 15;115(10 Suppl):2247-51.

Bastos M, Lee EY, Strauss KJ, Zurakowski D, Tracy DA, **Boiselle PM**. Motion artifact on high-resolution CT images of pediatric patients: comparison of volumetric and axial CT methods. AJR Am J Roentgenol. 2009 Nov;193(5):1414-8.

Berg WA, Blume JD, Cormack JB, Mendelson EB, Lehrer D, Böhm-Vélez M, Pisano ED, Jong RA, Evans WP, Morton MJ, Mahoney MC, Larsen LH, Barr RG, Farria DM, Marques HS, Boparai K; ACRIN 6666 Investigators. **[Fein-Zachary V, Collaborator]**. Combined screening with ultrasound and mammography vs mammography alone in women at elevated risk of breast cancer. JAMA. 2008 May 14;299(18):2151-63.

Bhadelia RA, Price LL, Tedesco KL, Scott T, Qiu WQ, Patz S, Folstein M, Rosenberg I, Caplan LR, Bergethon P. Diffusion tensor imaging, white matter lesions, the corpus callosum, and gait in the elderly. Stroke. 2009 Dec;40(12):3816-20. Epub 2009 Oct 1.

Blaha M, Budoff MJ, Shaw LJ, Khosa F, Rumberger JA, Berman D, Callister T, Raggi P, Blumenthal RS, Nasir K. Absence of coronary artery calcification and all-cause mortality. JACC Cardiovasc Imaging. 2009 Jun;2(6):692-700.

Boiselle PM, O'Donnell CR, **Bankier AA**, Ernst A, Millet ME, Potemkin A, Loring SH. Tracheal collapsibility in healthy volunteers during forced expiration: assessment with multidetector CT. Radiology. 2009 Jul;252(1):255-62. Epub 2009 May 6.

Boiselle PM. Second World Congress of Thoracic Imaging: congratulations and a challenge for abstract authors. J Thorac Imaging. 2009 Aug;24(3):161.

Boiselle PM. Looking back (and) to the future. J Thorac Imaging. 2009 Nov;24(4):249.

Brodoefel H, Burgstahler C, Heuschmid M, Reimann A, Khosa F, Kopp A, Schroeder S, Claussen CD, **Clouse ME**. Accuracy of dual-source CT in the characterisation of non-calcified plaque: use of a colour-coded analysis compared with virtual histology intravascular ultrasound. Br J Radiol. 2009 Oct;82(982):805-12. Epub 2009 Mar 30.

Brodoefel H, Burgstahler C, Sabir A, **Yam CS**, Khosa F, Claussen CD, **Clouse ME**. Coronary plaque quantification by voxel analysis: dual-source MDCT angiography versus intravascular sonography. AJR Am J Roentgenol 2009; 192:W84-89.

Brook OR, Beck-Razi N, Abadi S, Filatov J, Ilivitzki A, **Litmanovich D**, Gaitini D. Sonographic detection of pneumothorax by radiology residents as part of extended focused assessment with sonography for trauma. J Ultrasound Med. 2009 Jun;28(6):749-55.

Brown DB, Cardella JF, Sacks D, **Goldberg SN**, et al. Millward SF, Quality improvement guidelines for transhepatic arterial chemoembolization, embolization, and chemotherapeutic infusion for hepatic malignancy. J Vasc Interv Radiol. 2009 Jul;20(7 Suppl): S219-S226, S226.e1-10.

Brown DB, Gould JE, Gervais DA, **Goldberg SN**, Murthy R, Millward SF, Rilling WS, Geschwind JF, Salem R, Vedantham S, Cardella JF, Soulen MC; Society of Interventional Radiology Technology Assessment Committee and the International Working Group on Image-Guided Tumor Ablation. Transcatheter therapy for hepatic malignancy: standardization of terminology and reporting criteria. J Vasc Interv Radiol. 2009 Jul;20(7 Suppl):S425-34.

Burstein D. Tracking longitudinal changes in knee degeneration and repair. J Bone Joint Surg Am 2009; 91 Suppl 1:51-53.

Burstein D, Gray M, Mosher T, Dardzinski B. Measures of molecular composition and structure in osteoarthritis. Radiol Clin North Am. 2009 Jul;47(4):675-86. Review.

Burstein D, Hunter DJ. "Why aren't we there yet?" Re-examining standard paradigms in imaging of OA Summary of the 2nd annual workshop on imaging based measures of osteoarthritis. Osteoarthritis Cartilage. 2009 May;17(5):571-8. Epub 2009 Feb 9.

Callstrom MR, York JD, Gaba RC, Gemmete JJ, Gervais DA, Millward SF, Brown DB, Dupuy D, **Goldberg SN**, Kundu S, Rose SC, Thomas JJ, Cardella JF; Technology Assessment Committee of the Society of Interventional Radiology. Research Reporting Standards for Image-guided Ablation of Bone and Soft Tissue Tumors. J Vasc Interv Radiol. 2009 Dec;20(12):1527-40. Epub 2009 Oct 27.

Cantin L, **Bankier AA**, **Eisenberg RL**. Bronchiectasis. AJR Am J Roentgenol. 2009 Sep;193(3):W158-71.

Chan PG, **Smith MP**, Hauser TH, Yeon SB, Appelbaum E, **Rofsky NM**, **Manning WJ**. Noncardiac pathology on clinical cardiac magnetic resonance imaging. JACC Cardiovasc Imaging. 2009 Aug;2(8):980-6.

Chan J, **Manning WJ**, Appelbaum E, Smith P, Rice K. Large hiatal hernia mimicking left atrial mass: a multimodality diagnosis. J Am Coll Cardiol. 2009 Aug 4;54(6):569.

Choi HS, Ipe BI, Misra P, Lee JH, Bawendi MG, **Frangioni JV**. Tissue- and organ-selective biodistribution of NIR fluorescent quantum dots. Nano Lett. 2009 Jun;9(6):2354-9.

Choi HS, Liu W, Liu F, Nasr K, Misra P, Bawendi MG, **Frangioni JV**. Design considerations for tumour-targeted nanoparticles. Nat Nanotechnol. 2010 Jan;5(1):42-7. Epub 2009 Nov 1.

Chuang ML, **Manning WJ**. Left ventricular hypertrophy and excess cardiovascular mortality is late gadolinium enhancement the imaging link? J Am Coll Cardiol 2009; 53:292-294.

Ciocan R, **Lenkinski RE**, Bernstein J, Bancu M, **Marquis R**, **Ivanishev A**, **Kourtelidis F**, Matsui A, Borenstein J, **Frangioni JV**. MRI contrast using solid-state, B(1)-distorting, microelectromechanical systems (MEMS) microresonant devices (MRDs). Magn Reson Med 2009; 61 (4): 860-866 APR 2009

Clark TW, Millward SF, Gervais DA, **Goldberg SN**, Grassi CJ, Kinney TB, Phillips DA, Sacks D, Cardella JF; Technology Assessment Committee of the Society of Interventional Radiology. Reporting standards for percutaneous thermal ablation of renal cell carcinoma. J Vasc Interv Radiol. 2009 Jul;20(7 Suppl):S409-16.

Clouse ME. Coronary plaque quantification: is there a "gold standard?" J Cardiovasc Comput Tomogr 2009; 3:32-34.

Cypess AM, Lehman S, Williams G, Tal I, **Rodman D**, Goldfine AB, Kuo FC, **Palmer EL**, Tseng YH, Doria A, **Kolodny GM**, Kahn CR. Identification and importance of brown adipose tissue in adult humans. N Engl J Med. 2009 Apr 9;360(15):1509-17. PMCID: PMC2859951.

Dib MJ, Ferrada P, Challies T, Nasser I, **Brennan DD**, **Goldberg SN**, Chudzinski R, Karp SJ, Johnson SR, Hanto DW, Curry, MP. Tumor Burden as Determined by Radiological Volumetry Is an Accurate Predictor of Recurrence after Liver Transplantation for HCC Utilizing RFA as a Bridging Therapy AM J Transplant, 9: 445-445 Suppl. 2 2009

Dinh T, Doupis J, Lyons TE, Kuchibhotla S, Julliard W, Gnardellis C, Rosenblum BI, Wang X, Giurini JM, **Greenman RL**, Veves A. Foot Muscle Energy Reserves In Diabetic Patients Without And With Clinical Peripheral Neuropathy. Diabetes Care. 2009 Aug;32(8):1521-4. Epub 2009 Jun 9.

Donohoe KJ, Maurer AH, Ziessman HA, Urbain JL, Royal HD, Martin-Comin J. Procedure Guideline for Adult Solid-Meal Gastric-Emptying Study 3.0. J Nucl Med Technol. 2009 Sep;37(3):196-200. Epub 2009 Aug 19.

Dugar A, Farley ML, Wang AL, Goldring MB, Goldring SR, Swaim BH, Bierbaum BE, **Burstein D**, Gray ML. The effect of paraformaldehyde fixation on the delayed gadolinium-enhanced MRI of cartilage (dGEMRIC) measurement. J Orthop Res 2009; 27:536-539.

Eckstein F, Wyman BT, Buck RJ, Wirth W, Maschek S, Hudelmaier M, Le Graverand MP; 9001140 Study Group [**Burstein D**]. Longitudinal quantitative MR imaging of cartilage morphology in the presence of gadopentetate dimeglumine (Gd-DTPA). Magn Reson Med. 2009 Apr;61(4):975-80. PubMed PMID: 19215048.

Eisenberg RL, **Romero J**, **Litmanovich D**, **Boiselle PM**, **Bankier AA**. Tuberculosis: Value of Lateral Chest Radiography in Pre-employment Screening of Patients with Positive Purified Protein Derivative Skin Test Results. Radiology. 2009 Sep;252(3):882-7. Epub 2009 Jun 9.

Eisenberg RL. Thickening of small bowel folds. AJR Am J Roentgenol. 2009 Jul;193(1):W1-6. Review.

Eisenberg RL. Bubbly lesions of bone. AJR Am J Roentgenol. 2009 Aug;193(2):W79-94.

Elliott R, **Bloch NB**, Dewolf W, Fu Y, Sanda M, Tomaszewski J, Wagner A, **Rofsky N**, Genega EM. Seminal Vesicle Invasion at Radical Prostatectomy: Correlation with Magnetic Reasonance [sic] Images. Modern Pathology. 2009; 22:167A-167A 753 Suppl. 1 Jan 2009.

Elliott R, **Bloch NB**, Dewolf W, Fu Y, Sanda M, Tomaszewski J, Wagner A, **Rofsky N**, Genega EM. Seminal Vesicle Invasion at Radical Prostatectomy: Correlation with Magnetic Reasonance [sic] Images. Laboratory Investigation. 2009; 89:167A-167A 753 Suppl. 1 Jan 2009

Ernst A, Rafeq S, **Boiselle P**, Sung A, Reddy C, Michaud G, Majid A, Herth FJ, Trentham D. Relapsing polychondritis and airway involvement. Chest 2009; 135:1024-1030.

Fox CS, Gona P, Hoffmann U, Porter SA, Salton CJ, Massaro JM, Levy D, Larson MG, D'Agostino RB, Sr., O'Donnell CJ, **Manning WJ**. Pericardial Fat, Intrathoracic Fat, and Measures of Left Ventricular Structure and Function. The Framingham Heart Study. Circulation. 2009 Mar 31;119(12):1586-91. Epub 2009 Mar 16.

Frangioni JV. The problem is background, not signal. Mol Imaging. 2009 Dec;8(6):303-4.

Ganguli S, **Camacho M**, **Yam CS**, **Pedrosa I**. Preparing first-year radiology residents and assessing their readiness for on-call responsibilities: results over 5 years. AJR Am J Roentgenol 2009; 192:539-544.

Gansler DA, McLaughlin NC, Iguchi L, Jerram M, Moore DW, **Bhadelia R**, Fulwiler C. A multivariate approach to aggression and the orbital frontal cortex in psychiatric patients. Psychiatry Res 2009; 171:145-154.

Genega EM, **Bloch NB**, Dewolf W, Elliot R, Fu Y, Sanda M, Tomaszewski J, **Rofsky N**. Correlation of Gleason Score and Tumor Size with Magnetic Reasonance [sic] Image-Detected Prostate Cancer. Modern Pathology. 2009; 22: 170A-170A 767 Suppl. 1 Jan 2009

Genega EM, **Bloch NB**, Dewolf W, Elliot R, Fu Y, Sanda M, Tomaszewski J, **Rofsky N**. Correlation of Gleason Score and Tumor Size with Magnetic Reasonance [sic] Image-Detected Prostate Cancer. Laboratory Investigation. 2009; 89: 170A-170A 767 Suppl. 1 Jan 2009

Gervais DA, **Goldberg SN**, Brown DB, Soulen MC, Millward SF, Rajan DK. Society of Interventional Radiology position statement on percutaneous radiofrequency ablation for the treatment of liver tumors. J Vasc Interv Radiol 2009; 20:3-8.

Gervais DA, **Goldberg SN**, Brown DB, Soulen MC, Millward SF, Rajan DK. Society of Interventional Radiology position statement on percutaneous radiofrequency ablation for the treatment of liver tumors. J Vasc Interv Radiol. 2009 Jul;20(7 Suppl):S342-7.

Gioux S, Ashitate Y, Hutteman M, **Frangioni JV**. Motion-gated acquisition for in vivo optical imaging. J Biomed Opt. 2009 Nov-Dec;14(6):064038.

Gioux S, Kianzad V, Ciocan R, Gupta S, Oketokoun R, **Frangioni JV**. High-power, computer-controlled, light-emitting diode-based light sources for fluorescence imaging and image-guided surgery. Mol Imaging. 2009 May-Jun;8(3):156-65.

Gioux S, Mazhar A, Cuccia DJ, Durkin AJ, Tromberg BJ, **Frangioni JV**. Three-dimensional surface profile intensity correction for spatially modulated imaging. J Biomed Opt. 2009 May-Jun;14(3):034045.

Goldberg SN, Grassi CJ, Cardella JF, Charboneau JW, Dodd GD 3rd, Dupuy DE, Gervais DA, Gillams AR, **Kane RA**, Lee FT Jr, Livraghi T, McGahan J, Phillips DA, Rhim H, Silverman SG, Solbiati L, Vogl TJ, Wood BJ, Vedantham S, Sacks D; Society of Interventional Radiology Technology Assessment Committee and the International Working Group on Image-guided Tumor Ablation. Image-guided tumor ablation: standardization of terminology and reporting criteria. J Vasc Interv Radiol. 2009 Jul;20(7 Suppl):S377-90.

Gosset N, **Bankier AA**, **Eisenberg RL**. Tree-in-bud pattern. AJR Am J Roentgenol. 2009 Dec;193(6):W472-7.

Gourtsoyianni S, Zamboni GA, **Romero JY**, **Raptopoulos VD**. Routine use of modified CT Enterography in patients with acute abdominal pain. Eur J Radiol 2009; 69:388-392.

Guermazi A, Eckstein F, Hellio Le Graverand-Gastineau MP, Conaghan PG, **Burstein D**, Keen H, Roemer FW. Osteoarthritis: current role of imaging. Med Clin North Am 2009; 93:101-126, xi.

Hackney DB. Forget the diffusion--do we need T2-weighted MR images to detect early central nervous system injury? Radiology 2009; 250:303-304.

Hall FM. Computer-aided mammography screening. N Engl J Med. 2009 Feb 19;360(8):836.

Hall FM. Quantity counts: industrial-academic relationships and disclosures. Radiology. 2009 May;251(2):612; author reply 612.

Hall FM. The radiology report of the future. Radiology. 2009 May;251:313-6.

Hall FM. Single-pass continuous whole-body CT for polytrauma. AJR Am J Roentgenol. 2009 Aug;193(2):594; author reply 594.

Hall FM. Frequency of diagnosis of atypical ductal hyperplasia on breast biopsy. AJR Am J Roentgenol. 2009 Sep;193(3):W253; author reply W254.

Hall FM. Mammographic screening in younger women at high risk. AJR Am J Roentgenol. 2009 Oct;193(4):1188; author reply.

Han Y, Osborn EA, Maron MS, **Manning WJ**, Yeon SB. Impact of papillary and trabecular muscles on quantitative analyses of cardiac function in hypertrophic cardiomyopathy. J Magn Reson Imaging. 2009 Oct 23;30(5):1197-1202. [Epub ahead of print]

Han Y, Peters DC, Dokhan B, **Manning WJ**. Shorter difference between myocardium and blood optimal inversion time suggests diffuse fibrosis in dilated cardiomyopathy. J Magn Reson Imaging. 2009 Oct 23;30(5):967-972. [Epub ahead of print]

Hines N, **Mehta T**, **Romero J**, **Levine D**. What is the clinical importance of echogenic material in the fetal frontal horns? J Ultrasound Med. 2009 Dec;28(12):1629-37.

Hirsch AE, Mulleady Bishop P, Dad L, Singh D, **Slanetz PJ**. An increase in medical student knowledge of radiation oncology: a pre-post examination analysis of the oncology education initiative. Int J Radiat Oncol Biol Phys 2009; 73:1003-1008; quiz 1008 e1001-1008 e1002.

House M, **Bhadelia RA**, Myers K, Socrate S. Magnetic resonance imaging of three-dimensional cervical anatomy in the second and third trimester. Eur J Obstet Gynecol Reprod Biol. 2009 May;144 Suppl 1:S65-9. Epub 2009 Mar 17.

Humblet V, Misra P, Bhushan KR, Nasr K, Ko YS, Tsukamoto T, Pannier N, **Frangioni JV**, Maison W. Multivalent scaffolds for affinity maturation of small molecule cell surface binders and their application to prostate tumor targeting. J Med Chem 2009; 52:544-550.

Ibrahim T, Makowski MR, Jankauskas A, Maintz D, Karch M, Schachoff S, **Manning WJ**, Schömig A, Schwaiger M, Botnar RM. Serial contrast-enhanced cardiac magnetic resonance imaging demonstrates regression of hyperenhancement within the coronary artery wall in patients after acute myocardial infarction. JACC Cardiovasc Imaging. 2009 May;2(5):580-8.

Jessel RH, Zurakowski D, Zilkens C, **Burstein D**, Gray ML, Kim YJ. Radiographic and patient factors associated with pre-radiographic osteoarthritis in hip dysplasia. J Bone Joint Surg Am. 2009 May;91(5):1120-9.

Jhaveri RR, Pond KK, Hauser TH, Kissinger KV, Goepfert L, Schneider B, Jones DB, **Manning WJ**. Cardiac remodeling after substantial weight loss: a prospective cardiac magnetic resonance study after bariatric surgery. Surg Obes Relat Dis. 2009 Nov-Dec;5(6):648-52. Epub 2009 Feb 25

Kajimura S, Seale P, Kubota K, Lunsford E, **Frangioni JV**, Gygi SP, Spiegelman BM. Initiation of myoblast to brown fat switch by a PRDM16-C/EBP-beta transcriptional complex. Nature. 2009 Aug 27;460(7259):1154-8. Epub 2009 Jul 29.

Katoh M, Spuentrup E, Stuber M, Buecker A, **Manning WJ**, Günther RW, Botnar RM. Flow Targeted 3D Steady-State Free-Precession Coronary MR Angiography: Comparison of Three Different Imaging Approaches. Invest Radiol. 2009 Dec;44(12):757-62.

Khaodhiar L, Brennan AM, Lima C, Chan JL, Mantzoros CS, **Manning WJ**, Danias PG, Veves A. Effect of valsartan on left ventricular anatomy and systolic function and aortic elasticity. Metabolism 2009; 58:682-688.

Kothavale AA, Yeon SB, **Manning WJ**. A systematic approach to performing a comprehensive transesophageal echocardiogram. A call to order. BMC Cardiovasc Disord. 2009 May 13;9(1):18. [Epub ahead of print]

Krajewski K, **Siewert B**, **Eisenberg RL**. Colonic dilation. AJR Am J Roentgenol. 2009 Nov;193(5):W363-72.

Kressel HY. Expression of concern from the editor. Radiology. 2009 Jul;252(1):318.

Kressel HY. Comment from the editor on Lambertz et al in the September 2008 issue. Radiology. 2009 Jun;251(3):950.

Kressel HY. Diagnosis please certificates of recognition awarded to three individuals and to International and North American Radiology Resident Groups. Radiology. 2009 Oct;253(1):6-8.

Kritsaneepaiboon S, Lee EY, Zurakowski D, Strauss KJ, **Boiselle PM**. MDCT pulmonary angiography Evaluation of pulmonary embolism in children. AJR Am J Roentgenol 2009; 192:1246-1252.

Kruskal JB, Anderson S, **Yam CS**, Sosna J. Strategies for Establishing a Comprehensive Quality and Performance Improvement Program in a Radiology Department. Radiographics. 2009 Mar-Apr;29(2):315-29. Epub 2009 Jan 23.

Lattanzi R, Sodickson DK, **Grant AK**, Zhu Y. Electrodynamic constraints on homogeneity and radiofrequency power deposition in multiple coil excitations. Magn Reson Med 2009; 61:315-334.

Lee BT, Matsui A, Hutteman M, Lin SJ, Winer JH, Laurence RG, **Frangioni JV**. Intraoperative Near-infrared Fluorescence Imaging in Perforator Flap Reconstruction: Current Research and Early Clinical Experience. J Reconstr Microsurg. 2009 Dec 21. [Epub ahead of print]

Lee EY, **Boiselle PM**. Tracheobronchomalacia in infants and children: multidetector CT evaluation. Radiology. 2009 Jul;252(1):7-22. Review.

Lee EY, Kritsaneepaiboon S, Zurakowski D, Arellano CM, Strauss KJ, **Boiselle PM**. Beyond the Pulmonary Arteries: Alternative Diagnoses in Children With MDCT Pulmonary Angiography Negative for Pulmonary Embolism. AJR Am J Roentgenol. 2009 Sep;193(3):888-94.

Lee EY, **Litmanovich D**, **Boiselle PM**. Multidetector CT Evaluation of Tracheobronchomalacia. Radiol Clin North Am 2009; 47:261-269.

Lee EY, McAdam AJ, Chaudry G, Fishman MP, Zurakowski D, **Boiselle PM**. Swine-Origin Influenza A (H1N1) Viral Infection in Children: Initial Chest Radiographic Findings. Radiology. 2009 Dec 23. [Epub ahead of print]

Lee EY, Zurakowski D, Diperna S, d'Almeida Bastos M, Strauss KJ, **Boiselle PM**. Parenchymal and pleural abnormalities in children with and without pulmonary embolism at MDCT pulmonary angiography. Pediatr Radiol. 2009 Oct 22. [Epub ahead]

Lenkinski RE, Wang X, Elian M, **Goldberg SN**. Interaction of gadolinium-based MR contrast agents with choline: Implications for MR spectroscopy (MRS) of the breast. Magn Reson Med 2009; 61 (6): 1286-1292 JUN 2009.

Lin PJ. Operational Logic and Functionality of Automatic Dose Rate and Image Quality Control of Conventional Fluoroscopy. Med. Phys 2009; 36 (5): 1486-1493.

Litmanovich D, **Bankier AA**, Cantin L, **Raptopoulos V**, **Boiselle PM**. CT and MRI in diseases of the aorta. AJR Am J Roentgenol. 2009 Oct;193(4):928-40.

Litmanovich D, **Boiselle PM**, **Bankier AA**. CT of pulmonary emphysema--current status, challenges, and future directions. Eur Radiol 2009; 19:537-551.

Litmanovich D, **Boiselle PM**, **Bankier AA**, Kataoka ML, **Pianykh O**, **Raptopoulos V**. Dose reduction in computed tomographic angiography of pregnant patients with suspected acute pulmonary embolism. J Comput Assist Tomogr. 2009 Nov-Dec;33(6):961-6.

Litmanovich D, Gourevich K, Israel O, Gallimidi Z. Unexpected foci of (18)F-FDG uptake in the breast detected by PET/CT: incidence and clinical significance. Eur J Nucl Med Mol Imaging. 2009 Oct;36(10):1558-64. Epub 2009 May 1.

Loui P, **Alsop D**, Schlaug G. Tone deafness: a new disconnection syndrome? J Neurosci. 2009 Aug 19;29(33):10215-20.

Ly HQ, Hoshino K, Pomerantseva I, Kawase Y, Yoneyama R, Takewa Y, Fortier A, Gibbs-Strauss SL, Vooght C, **Frangioni JV**, Hajjar RJ. In vivo myocardial distribution of multipotent progenitor cells following intracoronary delivery in a swine model of myocardial infarction. Eur Heart J. 2009 Dec;30(23):2861-8. Epub 2009 Aug 17.

MacMahon PJ, Taylor DH, Duke D, **Brennan DD**, Eustace SJ. Disc displacement patterns in lumbar anterior spondylolisthesis: contribution to foraminal stenosis. Eur J Radiol. 2009 Apr;70(1):149-54. Epub 2008 Feb 19.

Mahgerefteh S, **Kruskal JB**, **Yam CS**, Blachar A, Sosna J. Peer Review in Diagnostic Radiology: Current State and a Vision for the Future. Radiographics. 2009 Sep-Oct;29(5):1221-31. Epub 2009 Jun 29. Review.

Malloy PC, Grassi CJ, Kundu S, Gervais DA, Miller DL, Osnis RB, Postoak DW, Rajan DK, Sacks D, Schwartzberg MS, Zuckerman DA, Cardella JF; Standards of Practice Committee with Cardiovascular and Interventional Radiological Society of Europe (CIRSE) Endorsement [**Goldberg SN**, Contributor]. Consensus guidelines for periprocedural management of coagulation status and hemostasis risk in percutaneous image-guided interventions. J Vasc Interv Radiol. 2009 Jul;20(7 Suppl):S240-9. Epub 2009 Apr 25.

Maron MS, Maron BJ, Harrigan C, Buros J, Gibson CM, Olivotto I, Biller L, Lesser JR, Udelson JE, **Manning WJ**, Appelbaum E. Hypertrophic cardiomyopathy phenotype revisited after 50 years with cardiovascular magnetic resonance. J Am Coll Cardiol. 2009 Jul 14;54(3):220-8.

Maron MS, Appelbaum E, Harrigan CJ, Buros J, Gibson CM, Hanna C, Lesser JR, Udelson JE, **Manning WJ**, Maron BJ. Clinical profile and significance of delayed enhancement in hypertrophic cardiomyopathy. Circ Heart Fail. 2008 Sep;1(3):184-91. Epub 2008 Jun 23.

Matsui A, Lee BT, Winer JH, Kianzad V, **Frangioni JV**. Image-guided perforator flap design using invisible near-infrared light and validation with x-ray angiography. Ann Plast Surg. 2009 Sep;63(2):327-30.

Matsui A, Lee BT, Winer JH, Laurence RG, **Frangioni JV**. Quantitative assessment of perfusion and vascular compromise in perforator flaps using a near-infrared fluorescence-guided imaging system. Plast Reconstr Surg. 2009 Aug;124(2):451-60.

Matsui A, Lee BT, Winer JH, Laurence RG, **Frangioni JV**. Submental Perforator Flap Design with a Near-Infrared Fluorescence Imaging System: The Relationship among Number of Perforators, Flap Perfusion, and Venous Drainage. Plast Reconstr Surg. 2009 Oct;124(4):1098-104.

Matsui A, Lee BT, Winer JH, Vooght CS, Laurence RG, **Frangioni JV**. Real-time intraoperative near-infrared fluorescence angiography for perforator identification and flap design. Plast Reconstr Surg 2009; 123:125e-127e.

Matsui A, Lomnes SJ, **Frangioni JV**. Optical clearing of the skin for near-infrared fluorescence image-guided surgery. J Biomed Opt. 2009 Mar-Apr;14(2):024019.

McMahon CJ, **Bloch BN**, **Lenkinski RE**, **Rofsky NM**. Dynamic contrast-enhanced MR imaging in the evaluation of patients with prostate cancer. Magn Reson Imaging Clin N Am. 2009 May;17(2):363-83.

McMahon CJ, **Shetty SK**, Anderson ME, **Hochman MG**. Case report: Longitudinal stress fracture of the humerus: imaging features and pitfalls. Clin Orthop Relat Res. 2009 Dec;467(12):3351-5. Epub 2009 Jul 9.

MacMahon PJ, Taylor DH, Duke D, **Brennan DD**, Eustace SJ. Disc displacement patterns in lumbar anterior spondylolisthesis: contribution to foraminal stenosis. Eur J Radiol. 2009 Apr;70(1):149-54. Epub 2008 Feb 19.

Mertyna P, Goldberg W, Yang W, **Goldberg SN**. Thermal Ablation A Comparison of Thermal Dose Required for Radiofrequency-, Microwave-, and Laser-Induced Coagulation in an Ex Vivo Bovine Liver Model(1). Acad Radiol. 2009 Dec;16(12):1539-48.

Miksad RA, Lai KC, Stein MC, Healy ME, **Rojas R**, Krajewski KM, Zhu AX. Imbalance and Gait Disturbance from Tyrosine Kinase Inhibition in Hepatocellular Cancer. J Gastrointest Cancer. 2009;40(3-4):119-22.

Miller JM, Dewey M, Vavere AL, Rochitte CE, Niinuma H, Arbab-Zadeh A, Paul N, Hoe J, de Roos A, Yoshioka K, Lemos PA, Bush DE, Lardo AC, Texter J, Brinker J, Cox C, **Clouse ME**, Lima JA. Coronary CT angiography using 64 detector rows: methods and design of the multi-centre trial CORE-64. Eur Radiol 2009; 19:816-828.

Moore DW, **Bhadelia RA**, Billings RL, Fulwiler C, Heilman KM, Rood KM, Gansler DA. Hemispheric connectivity and the visual-spatial divergent-thinking component of creativity. Brain Cogn. 2009 Aug;70(3):267-72. Epub 2009 Apr 7

Neema M, Goldberg-Zimring D, Guss ZD, Healy BC, Guttmann CR, Houtchens MK, Weiner HL, Horsfield MA, **Hackney DB**, **Alsop DC**, Bakshi R. 3 T MRI relaxometry detects T2 prolongation in the cerebral normal-appearing white matter in multiple sclerosis. Neuroimage. 2009 Jul 1;46(3):633-41. Epub 2009 Mar 10.

Nezafat R, **Manning WJ**. Coronary artery disease: High field strength coronary MRA--ready for prime time? Nat Rev Cardiol. 2009 Nov;6(11):676-8.

Nikolic B, Elian M, Mertyna P, **Yam S**, **Goldberg SN**. The effect of hepatic radiofrequency ablation on stem cell trafficking in the rat model. J Vasc Interv Radiol. 2009 May;20(5):640-7; quiz 571.

Nikolic B, **Faintuch S**, **Goldberg SN**, Kuo MD, Cardella JF. Stem cell therapy: a primer for interventionalists and imagers. J Vasc Interv Radiol. 2009 Aug;20(8):999-1012.

Novak V, Haertle M, Zhao P, Hu K, Munshi M, Novak P, Abduljalil A, **Alsop D**. White matter hyperintensities and dynamics of postural control. Magn Reson Imaging 2009 Jul;27(6):752-9. Epub 2009 Feb 28.

Pahade JK, **Litmanovich D**, **Pedrosa I**, **Romero J**, **Bankier AA**, **Boiselle PM**. Quality Initiatives: Imaging Pregnant Patients with Suspected Pulmonary Embolism: What the Radiologist Needs to Know. Radiographics. 2009 May-Jun;29(3):639-54.

Pannier N, Humblet V, Misra P, **Frangioni JV**, Maison W. Multivalent peptidomimetics for tumor targeting. Adv Exp Med Biol. 2009;611:403-4.

Pannier N, **Frangioni JV**, Maison W. Mimicking natural globular structures with rigid scaffolds based on adamantane. Adv Exp Med Biol. 2009;611:99-100.

Parker JA. Improving Lung Scintigraphy.
J Nucl Med. 2009 Dec;50(12):1919-20. Epub 2009 Nov 12.

Paulin S. Coronary angiography by 64-row CT. N Engl J Med. 2009 May 7;360(19):2027-8; author reply 2029-30.

Pedrosa I, Lafornara M, Pandharipande PV, Goldsmith JD, **Rofsky NM**. Pregnant patients suspected of having acute appendicitis: effect of MR imaging on negative laparotomy rate and appendiceal perforation rate. Radiology 2009; 250:749-757.

Pedrosa I, **Alsop DC**, **Rofsky NM**. Magnetic resonance imaging as a biomarker in renal cell carcinoma. Cancer. 2009 May 15;115(10 Suppl):2334-45.

Pedrosa I, Ngo L, **Wei J**, Schuster M, Mahallati H, **Smith M**, **Rofsky NM**. Dynamic half-Fourier single-shot turbo spin echo for assessment of deep venous thrombosis: initial observations. Magn Reson Imaging. 2009 Jun;27(5):617-24. Epub 2008 Dec 23.

Peters DC, Wylie JV, Hauser TH, Nezafat R, Han Y, Woo JJ, Taclas J, Kissinger KV, Goddu B, Josephson ME, **Manning WJ**. Recurrence of atrial fibrillation correlates with the extent of post-procedural late gadolinium enhancement: a pilot study. JACC Cardiovasc Imaging 2009; 2:308-316.

Peters DC, Appelbaum EA, Nezafat R, Dokhan B, Han Y, Kissinger KV, Goddu B, **Manning WJ**. Left ventricular infarct size, peri-infarct zone, and papillary scar measurements: A comparison of high-resolution 3D and conventional 2D late gadolinium enhancement cardiac MR. J Magn Reson Imaging. 2009 Oct;30(4):794-800.

Prasad V, Sacks BA, Kraus S, **Clouse ME**. Embolotherapy for lower urinary tract hemorrhage. J Vasc Interv Radiol. 2009 Jul;20(7):965-70. Epub 2009 Jun 5.

Rana RS, **Wu JS**, **Eisenberg RL**. Periosteal reaction. AJR Am J Roentgenol. 2009 Oct;193(4):W259-72.

Reddy AS, **Dinobile D**, Orgeta JE, **Peri N**. Transoral approach to CT-guided C2 interventions. Pain Physician 2009; 12:253-258.

Rempp H, Voigtländer M, Clasen S, Kempf S, Neugebauer A, Schraml C, Schmidt D, Claussen CD, Enderle MD, **Goldberg SN**, Pereira PL. Increased Ablation Zones Using a Cryo-Based Internally Cooled Bipolar RF Applicator in Ex Vivo Bovine Liver. Invest Radiol. 2009 Dec;44(12):763-8.

Robson PM, Madhuranthakam AJ, Dai W, **Pedrosa I**, **Rofsky NM**, **Alsop DC**. Strategies for reducing respiratory motion artifacts in renal perfusion imaging with arterial spin labeling. Magn Reson Med. 2009 Jun;61(6):1374-87.

Romney BP, Khosa F, Costa DN, Chan P, **Rofsky NM**, **Manning WJ**. Non-Cardiac Findings on Cardiovascular Magnetic Resonance Imaging Are Common: Impact of Imaging Sequences and Reading Session Format. Circulation 2008;118(18):S784-S785.

Rosen Y, **Lenkinski RE**. Sodium MRI of a human transplanted kidney. Acad Radiol. 2009 Jul;16(7):886-9. Epub 2009 Apr 17.

Ruberg FL, Appelbaum E, Davidoff R, Ozonoff A, Kissinger KV, Harrigan C, Skinner M, **Manning WJ**. Diagnostic and prognostic utility of cardiovascular magnetic resonance imaging in light-chain cardiac amyloidosis. Am J Cardiol 2009; 103:544-549.

Salazar GM, **Faintuch S**, Gladstone SR, Lang EV. In vitro Analysis of Downstream Particulates with Mechanical Thrombectomy Devices: Comparison of 20-kHz Sonothrombolytic and Rotating Dispersion Wire Systems. J Vasc Interv Radiol. 2009 May;20(5):634-9. Epub 2009 Mar 25.

Sayegh RA, **Slanetz PJ**. Breast density, hormones, and screening mammography: should women be less concerned? Menopause. 2009 Nov-Dec;16(6):1085-6.

Schor-Bardach R, **Alsop DC**, **Pedrosa I**, Solazzo SA, Wang X, **Marquis RP**, Atkins MB, Regan M, Signoretti S, **Lenkinski RE**, **Goldberg SN**. Does Arterial Spin-labeling MR Imaging-measured Tumor Perfusion Correlate with Renal Cell Cancer Response to Antiangiogenic Therapy in a Mouse Model? Radiology. 2009 Jun;251(3):731-742.

Schulman JM, Christison-Lagay ER, Kozakewich HP, **Boiselle PM**, Burrows PE, Fox VL, Fishman SJ. Macrocystic lymphatic malformation in the pulmonary parenchyma. Ann Thorac Surg 2009; 87:1607-1609.

Sherry AD, Caravan P, **Lenkinski RE**. Primer on gadolinium chemistry. J Magn Reson Imaging. 2009 Dec;30(6):1240-8.

Siegal DS, **Wu JS**, Newman JS, Del Cura JL, **Hochman MG**. Calcific tendinitis: a pictorial review. Can Assoc Radiol J. 2009 Dec;60(5):263-72.

Solomon SD, Appelbaum E, **Manning WJ**, Verma A, Berglund T, Lukashevich V, Cherif Papst C, Smith BA, Dahlof B. Effect of the direct Renin inhibitor aliskiren, the Angiotensin receptor blocker losartan, or both on left ventricular mass in patients with hypertension and left ventricular hypertrophy. Circulation 2009; 119:530-537.

Stankiewicz JM, Neema M, **Alsop DC**, Healy BC, Arora A, Buckle GJ, Chitnis T, Guttmann CR, Hackney D, Bakshi R. Spinal cord lesions and clinical status in multiple sclerosis: A 1.5 T and 3 T MRI study. J Neurol Sci 2009; 279:99-105.

Stoeck CT, Han Y, Peters DC, Hu P, Yeon SB, Kissinger KV, Goddu B, Goepfert L, **Manning WJ**, Kozerke S, Nezafat R. Whole heart magnetization-prepared steady-state free precession coronary vein MRI. J Magn Reson Imaging. 2009 May 26;29(6):1293-1299.

Sun MR, Ngo L, Genega EM, Atkins MB, Finn ME, **Rofsky NM**, **Pedrosa I**. Renal cell carcinoma: dynamic contrast-enhanced MR imaging for differentiation of tumor subtypes--correlation with pathologic findings. Radiology 2009; 250:793-802.

Sun MR, **Pedrosa I**. Magnetic resonance imaging of renal masses. Semin Ultrasound CT MR. 2009 Aug;30(4):326-51.

Tanaka E, Chen FY, Flaumenhaft R, Graham GJ, Laurence RG, **Frangioni JV**. Real-time assessment of cardiac perfusion, coronary angiography, and acute intravascular thrombi using dual-channel near-infrared fluorescence imaging. J Thorac Cardiovasc Surg. 2009 Jul;138(1):133-40.

Thibert RL, Burns JD, **Bhadelia R**, Takeoka M. Reversible uncal herniation in a neonate with a large MCA infarct. Brain Dev. 2009 Nov;31(10):763-5. Epub 2008 Dec 18.

Thomas JD, Zoghbi WA, Beller GA, Bonow RO, Budoff MJ, Cerqueira MD, Creager MA, Douglas PS, Fuster V, Garcia MJ, Holmes DR, Jr., **Manning WJ**, Pohost GM, Ryan TJ, Van Decker WA, Wiegers SE. ACCF 2008 Training Statement on Multimodality Noninvasive Cardiovascular Imaging A Report of the American College of Cardiology Foundation/American Heart Association/American College of Physicians Task Force on Clinical Competence and Training Developed in Collaboration With the American Society of Echocardiography, the American Society of Nuclear Cardiology, the Society of Cardiovascular Computed Tomography, the Society for Cardiovascular Magnetic Resonance, and the Society for Vascular Medicine. J Am Coll Cardiol 2009; 53:125-146.

Tognolini A, Schor-Bardach R, **Pianykh OS**, **Wilcox CJ**, **Raptopoulos V**, **Goldberg SN**. Body Tumor CT Perfusion Protocols: Optimization of Acquisition Scan Parameters in a Rat Tumor Model. Radiology. 2009 Jun;251(3):712-20. Epub 2009 Mar 20.

Trattnig S, **Burstein D**, Szomolanyi P, Pinker K, Welsch GH, Mamisch TC. T1(Gd) gives comparable information as Delta T1 relaxation rate in dGEMRIC evaluation of cartilage repair tissue. Invest Radiol. 2009 Sep;44(9):598-602.

Troyan SL, Kianzad V, Gibbs-Strauss SL, Gioux S, Matsui A, Oketokoun R, Ngo L, Khamene A, Azar F, **Frangioni JV**. The FLARE Intraoperative Near-Infrared Fluorescence Imaging System: A First-in-Human Clinical Trial in Breast Cancer Sentinel Lymph Node Mapping. Ann Surg Oncol. 2009 Oct;16(10):2943-52.

Vadnais M, Awtrey C, **Pedrosa I**. Breaking point: magnetic resonance imaging evaluation of an obstetric emergency. Am J Obstet Gynecol 2009; 200:344 e341-343.

Van Boven RW, Harrington GS, **Hackney DB**, Ebel A, Gauger G, Bremner JD, D'Esposito M, Detre JA, Haacke EM, Jack CR Jr, Jagust WJ, Le Bihan D, Mathis CA, Mueller S, Mukherjee P, Schuff N, Chen A, Weiner MW. Advances in neuroimaging of traumatic brain injury and posttraumatic stress disorder. J Rehabil Res Dev.2009;46(6):717-57.

Vedantham S, Thorpe PE, Cardella JF, Grassi CJ, Patel NH, Ferral H, Hofmann LV, Janne d'Othée BM, Antonaci VP, Brountzos EN, Brown DB, Martin LG, Matsumoto AH, Meranze SG, Miller DL, Millward SF, Min RJ, Neithamer CD Jr, Rajan DK, Rholl KS, Schwartzberg MS, Swan TL, Towbin RB, Wiechmann BN, Sacks D; CIRSE and SIR Standards of Practice Committees [**Goldberg SN**, contributor]. Quality improvement guidelines for the treatment of lower extremity deep vein thrombosis with use of endovascular thrombus removal. J Vasc Interv Radiol. 2009 Jul;20(7 Suppl):S227-39.

Walker LM, Katzir T, Liu T, Ly J, Corriveau K, Barzillai M, Chu F, O'Connor MG, **Hackney DB**, Chang BS. Gray matter volumes and cognitive ability in the epileptogenic brain malformation of periventricular nodular heterotopia. Epilepsy Behav. 2009 Aug;15(4):456-60. Epub 2009 Jun 21.

Werner MK, **Parker JA**, **Kolodny GM**, English JR, **Palmer MR**. Respiratory gating enhances imaging of pulmonary nodules and measurement of tracer-uptake in FDG-PET/CT. Am J Roentgenol Dec 2009; 193: 1640 - 1645.

Williams G, **Kolodny GM**. Retrospective study of coronary uptake of 18F-fluorodeoxyglucose in association with calcification and coronary artery disease: a preliminary study. Nucl Med Commun. 2009 Apr;30(4):287-91.

Wolff AB, Pesce LL, **Wu JS**, Smart LR, Medvecky MJ, Haims AH. Comparison of spin echo T1-weighted sequences versus fast spin-echo proton density-weighted sequences for evaluation of meniscal tears at 1.5 T. Skeletal Radiol. 2009 Jan;38(1):21-9. Epub 2008 Aug 12.

Wu JS, **Hochman MG**. Soft-tissue tumors and tumorlike lesions: a systematic imaging approach. Radiology. 2009 Nov;253(2):297-316.

Wykrzykowska J, Lehman S, Williams G, **Parker JA**, **Palmer MR**, Varkey S, **Kolodny G**, Laham R. Imaging of Inflamed and Vulnerable Plaque in Coronary Arteries with 18F-FDG PET/CT in Patients with Suppression of Myocardial Uptake Using a Low-Carbohydrate, High-Fat Preparation. J Nucl Med. 2009 Apr;50(4):563-8. Epub 2009 Mar 16.

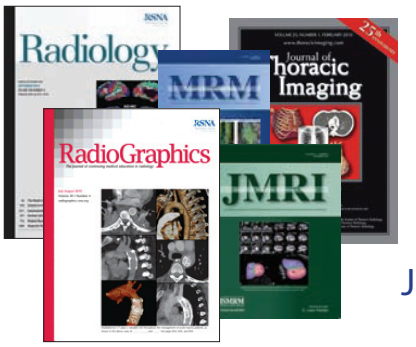
Yao DF, DeWolf WC, Sanda MG, **Bloch BN**, Genega EM, Berry AM, Ngo L, **Rofsky NM**.Increased Positive Yield of Clinically Significant Prostate Cancer with Mri Prompted Biopsies. Journal of Urology 2009;181(4):2157.

Young BC, Hamar BD, **Levine D**, Roqué H. Medical management of ruptured appendicitis in pregnancy. Obstet Gynecol. 2009 Aug;114(2 Pt 2):453-6.

Zaharchuk G, Bammer R, Straka M, Shankaranarayan A, **Alsop DC**, Fischbein NJ, Atlas SW, Moseley ME. Arterial spin-label imaging in patients with normal bolus perfusion-weighted MR imaging findings: pilot identification of the borderzone sign. Radiology. 2009 Sep;252(3):797-807. Epub 2009 Jul 31.

Zamboni GA, Gourtsoyianni S, Sourlas E, **Raptopoulos VD**. Value of customized scan timing determined by tracking liver enhancement in oncology patients. J Comput Assist Tomogr 2009; 33:253-258.

Zhao P, **Alsop DC**, Abduljalil A, Selim M, Lipsitz L, Novak P, Caplan L, Hu K, Novak V. Vasoreactivity and peri-infarct hyperintensities in stroke. Neurology. 2009 Feb 17;72(7):643-9. **PMCID: PMC2677535.**



Publishing Jan-Aug 2010

Alazemi S, Majid A, Ruiz AI, **Litmanovich D**, Feller-Kopman D, Ernst A. An elderly woman with chronic dyspnea and endobronchial lesion. Chest. 2010 Feb;137(2):460-6.

Alsop DC, **Dai W**, Grossman M, Detre JA. Arterial Spin Labeling Blood Flow MRI: Its Role in the Early Characterization of Alzheimer's Disease. J Alzheimers Dis. 2010 Apr 22. [Epub ahead of print]

American College of Cardiology Foundation Task Force on Expert Consensus Documents, Hundley WG, Bluemke DA, Finn JP, Flamm SD, Fogel MA, Friedrich MG, Ho VB, Jerosch-Herold M, Kramer CM, **Manning WJ**, Patel M, Pohost GM, Stillman AE, White RD, Woodard PK. ACCF/ACR/AHA/NASCI/SCMR 2010 expert consensus document on cardiovascular magnetic resonance: a report of the American College of Cardiology Foundation Task Force on Expert Consensus Documents. J Am Coll Cardiol. 2010 Jun 8;55(23):2614-62.

Appelbaum L, **Sosna J**, Pearson R, Perez S, Nissenbaum Y, Mertyna P, Libson E, **Goldberg SN**. Algorithm optimization for multitined radiofrequency ablation: comparative study in ex vivo and in vivo bovine liver. Radiology. 2010 Feb;254(2):430-40.

Atalay B, Riesenburger RI, Schirmer CM, **Bhadelia RA**, Weller SJ. Vertebral reconstruction using the telescopic plate spacer-thoracolumbar (TPS-TL) device. J Spinal Disord Tech. 2010 Jul;23(5):338-46.

Bankier AA, Estenne M, Kienzl D, Müller-Mang C, Muylem AV, Gevenois PA. Gravitational Gradients in Expiratory Computed Tomography Examinations of Patients With Small Airways Disease: Effect of Body Position on Extent of Air Trapping. J Thorac Imaging. 2010 Apr 14. [Epub ahead of print]

Beeghly M, Ware J, Soul J, Plessis AD, Khwaja O, Senapati GM, Robson CD, Robertson RL, Poussaint TY, Barnewolt CE, Feldman HA, Estroff JA, **Levine D**. Neurodevelopmental outcomes of fetuses referred for ventriculomegaly. Ultrasound Obstet Gynecol. 2010 Jan 12. [Epub ahead of print]

Bergquist ER, **Wu JS**, Goldsmith JD, Anderson ME. Orthopaedic Case of the Month: Ankle Pain and Swelling in a 23-year-old Man. Clin Orthop Relat Res. 2010 Jun 29. [Epub ahead of print]

Berlin L, **Hall FM**. More mammography muddle: emotions, politics, science,costs, and polarization. Radiology. 2010 May;255(2):311-6.

Boiselle PM. Celebrating 25 years of the journal of thoracic imaging. J Thorac Imaging. 2010 Feb;25(1):1.

Boiselle PM. Celebrating our successes and reflecting upon disappointments. J Thorac Imaging. 2010 May;25(2):87.

Boiselle PM, Aberle DR, **Bankier AA**, de Roos A, Gefter WB, Goodman L, Grenier P, Hansell DM, Herold CJ, Im JG, Johkoh T, Kauczor HU, Kazerooni E, Kono M, Levin DC, MacMahon H, McLoud TC, Miller SW, Müller NL, Naidich DP, Prince MR, Rémy-Jardin MR, Schoepf UJ, Stillman AE, Webb WR, White CS. 25-on-25: twenty-five perspectives on twenty-five years of cardiopulmonary imaging. J Thorac Imaging. 2010 Feb;25(1):3-7.

Boiselle PM, O'Donnell CR, Loring SH, **Bankier AA**. Reproducibility of Forced Expiratory Tracheal Collapse: Assessment with MDCT in Healthy Volunteers. Acad Radiol. 2010 Jun 29. [Epub ahead of print]

Boiselle PM, Reddy GP. Reviewer awards and acknowledgments: editors' recognition awards for distinction in reviewing in 2009. J Thorac Imaging. 2010 Feb;25(1):2.

Boitsios G, **Bankier AA**, **Eisenberg RL**. Diffuse pulmonary nodules. AJR Am J Roentgenol. 2010 May;194(5):W354-66.

Brook OR, O'Connell AM, Thornton E, **Eisenberg RL**, Mendiratta-Lala M, **Kruskal JB**. Anatomy and Pathophysiology of Errors Occurring in Clinical Radiology Practice. Radiographics. 2010 Jul 9. [Epub ahead of print]

Buell JS, Dawson-Hughes B, Scott TM, Weiner DE, Dallal GE, Qui WQ, Bergethon P, Rosenberg IH, Folstein MF, Patz S, **Bhadelia RA**, Tucker KL. 25-Hydroxyvitamin D, dementia, and cerebrovascular pathology in elders receiving home services. Neurology. 2010 Jan 5;74(1):18-26. Epub 2009 Nov 25.

Cantin L, **Bankier AA**, **Eisenberg RL**. Multiple cystlike lung lesions in the adult. AJR Am J Roentgenol. 2010 Jan;194(1):W1-W11.

Cassidy FH, Ishioka KM, **McMahon CJ**, Chu P, Sakamoto K, **Lee KS**, Aganovic L. MR imaging of scrotal tumors and pseudotumors. Radiographics. 2010 May-Jun;30(3):665-83.

Collares FB, **Faintuch S**, Kim SK, Rabkin DJ. Reinsertion of Accidentally Dislodged Catheters through the Original Track: What is the Likelihood of Success? J Vasc Interv Radiol. 2010 Jun;21(6):861-4. Epub 2010 Apr 22.

Dai W, **Robson PM**, Shankaranarayanan A, **Alsop DC**. Modified pulsed continuous arterial spin labeling for labeling of a single artery. Magn Reson Med. 2010 Jul 27. [Epub ahead of print]

Dialani V, Baum J, **Mehta TS**. Sonographic features of gynecomastia. J Ultrasound Med. 2010 Apr;29(4):539-47.

Dewey M, Vavere AL, Arbab-Zadeh A, Miller JM, Sara L, Cox C, Gottlieb I, Yoshioka K, Paul N, Hoe J, de Roos A, Lardo AC, Lima JA, **Clouse ME**. Patient characteristics as predictors of image quality and diagnostic accuracy of MDCT compared with conventional coronary angiography for detecting coronary artery stenoses: CORE-64 Multicenter International Trial. AJR Am J Roentgenol. 2010 Jan;194(1):93-102.

Dillon JE, **Slanetz PJ**. Teaching Evidence-Based Imaging in the Radiology Clerkship Using the ACR Appropriateness Criteria. Acad Radiol. 2010 Apr 21. [Epub ahead of print]

Dixon WT, Ren J, Lubag AJ, Ratnakar J, **Vinogradov E**, Hancu I, **Lenkinski RE**, Sherry AD. A concentration-independent method to measure exchange rates in PARACEST agents. Magn Reson Med. 2010 MAR;63(3):625-632. [Epub ahead of print]

Dixon WT, Hancu I, Ratnakar SJ, Sherry AD, **Lenkinski RE**, **Alsop DC** A Multislice Gradient Echo Pulse Sequence for CEST Imaging. Magn Reson Med. 2010 JAN; 63 (1): 253-256.

Do-Dai DD, Brooks MK, Goldkamp A, Erbay S, **Bhadelia RA**. Magnetic resonance imaging of intramedullary spinal cord lesions: a pictorial review. Curr Probl Diagn Radiol. 2010 Jul-Aug;39(4):160-85.

Eisenberg RL, **Bankier AA**, **Boiselle PM**. Compliance with Fleischner Society guidelines for management of small lung nodules: a survey of 834 radiologists. Radiology. 2010 Apr;255(1):218-24.

Eyal E, Bloch BN, **Rofsky NM**, Furman-Haran E, Genega EM, **Lenkinski RE**, Degani H. Principal Component Analysis of Dynamic Contrast Enhanced MRI in Human Prostate Cancer. Invest Radiol. 2010 Apr;45(4):174-181. [Epub ahead of print]

Fletcher JG, Chen MH, Herman BA, Johnson CD, Toledano A, Dachman AH, Hara AK, Fidler JL, Menias CO, Coakley KJ, Kuo M, Horton KM, Cheema J, Iyer R, **Siewert B**, Yee J, Obregon R, Zimmerman P, Halvorsen R, Casola G, Morrin M. Can radiologist training and testing ensure high performance in CT colonography? Lessons From the National CT Colonography Trial. AJR Am J Roentgenol. 2010 Jul;195(1):117-25.

Fridman R, Bar-David T, Dayal R, **Faintuch S**, Goldin D, Hamdan A, Landsman A, Markinson B, Sperling D, Wyers M. Multidisciplinary peripheral arterial disease. Foot Ankle Spec. 2010 Feb;3(1):35-9.

Gelfand EV, Haffajee JA, Hauser TH, Yeon SB, Goepfert L, Kissinger KV, Delatorre R, **Manning WJ**. Predictors of preserved left ventricular systolic function after surgery for chronic organic mitral regurgitation: a prospective study. J Heart Valve Dis. 2010 Jan;19(1):43-50.

Gibbs-Strauss SL, Vooght C, Fish KM, Nasr KA, Siclovan TM, Barnhardt NE, Tan Hehir CA, **Frangioni JV**. Molecular imaging agents specific for the annulus fibrosus of the intervertebral disk. Mol Imaging. 2010 Jun;9(3):128-40.

Gioux S, Lomnes SJ, Choi HS, **Frangioni JV**. Low-frequency wide-field fluorescence lifetime imaging using a high-power near-infrared light-emitting diode light source. J Biomed Opt. 2010 Mar-Apr;15(2):026005. **PMCID: PMC2859085**.

Goddeau RP Jr, Caplan LR, **Hackney DB**, Alhazzani AA, Searls DE. A very small but very symptomatic vertebral artery dissection. Arch Neurol. 2010 Feb;67(2):248-9.

Gottlieb I, Miller JM, Arbab-Zadeh A, Dewey M, **Clouse ME**, Sara L, Niinuma H, Bush DE, Paul N, Vavere AL, Texter J, Brinker J, Lima JA, Rochitte CE. The Absence of Coronary Calcification Does Not Exclude Obstructive Coronary Artery Disease or the Need for Revascularization in Patients Referred for Conventional Coronary Angiography. J Am Coll Cardiol. 2010 Feb 16;55(7):627-634.

Hajjar I, Zhao P, **Alsop D**, Abduljalil A, Selim M, Novak P, Novak V. Association of blood pressure elevation and nocturnal dipping with brain atrophy, perfusion and functional measures in stroke and nonstroke individuals. Am J Hypertens. 2010 Jan;23(1):17-23. Epub 2009 Oct 1. PMCID: PMC2810719.

Hall FM. E-mail alert for important imaging findings. Radiology. 2010 Feb;254(2):635; author reply 635-6.

Hall FM. Identification, biopsy, and treatment of poorly understood premalignant, in situ, and indolent low-grade cancers: are we becoming victims of our own success? Radiology. 2010 Mar;254(3):655-9.

Hall FM. Mammographic Screening: A Well-recognized Medical Advance. Radiology. 2010 Apr;255(1):307.

Hall FM. Biopsy of thyroid nodules. AJR Am J Roentgenol. 2010 May;194(5):1403; author reply 1403.

Hall FM. Cisplatin plus gemcitabine for biliary tract cancer. N Engl J Med. 2010 Jul 8;363(2):192; author reply 192-3.

Hall FM. Follow-up, biopsy, or surgical excision of palpable probably benign breast lesions. AJR Am J Roentgenol. 2010 Aug;195(2):529; author reply 530.

Han Y, Chan J, Haber I, Peters DC, Zimetbaum PJ, **Manning WJ**, Yeon SB. Circumferential myocardial strain in cardiomyopathy with and without left bundle branch block. J Cardiovasc Magn Reson. 2010 Jan 5;12(1):2.

Han Y, Peters DC, Kissinger KV, Goddu B, Yeon SB, **Manning WJ**, Nezafat R. Evaluation of Papillary Muscle Function Using Cardiovascular Magnetic Resonance Imaging in Mitral Valve Prolapse. Am J Cardiol. 2010 Jul 15;106(2):243-248.

Hansell DM, **Boiselle PM**, Goldin J, Kauczor HU, Lynch DA, Mayo JR, Patz Jr EF. Thoracic imaging. Respirology. 2010 Jan 28. [Epub ahead of print]

Hines N, **Slanetz PJ**, **Eisenberg RL**. Cystic masses of the breast. AJR Am J Roentgenol. 2010 Feb;194(2):W122-33.

Hong SN, Rahimi A, Kissinger KV, **Pedrosa I**, **Manning WJ**, O'Halloran TD. Cardiac magnetic resonance imaging and the WATCHMAN device. J Am Coll Cardiol. 2010 Jun 15;55(24):2785.

Hu P, Chuang ML, Kissinger KV, Goddu B, Goepfert LA, **Rofsky NM**, **Manning WJ**, Nezafat R. Non-contrast-enhanced pulmonary vein MRI with a spatially selective slab inversion preparation sequence. Magn Reson Med. 2010 Jan 23;63(2):530-536. [Epub ahead of print]

Hu P, Chuang ML, Ngo LH, Stoeck CT, Peters DC, Kissinger KV, Goddu B, Goepfert LA, **Manning WJ**, Nezafat R. Coronary MR imaging: effect of timing and dose of isosorbide dinitrate administration. Radiology. 2010 Feb;254(2):401-9.

Hundley WG, Bluemke DA, Finn JP, Flamm SD, Fogel MA, Friedrich MG, Ho VB, Jerosch-Herold M, Kramer CM, **Manning WJ**, Patel M, Pohost GM, Stillman AE, White RD, Woodard PK. ACCF/ACR/AHA/NASCI/SCMR 2010 Expert Consensus Document on Cardiovascular Magnetic Resonance. A Report of the American College of Cardiology Foundation Task Force on Expert Consensus Documents. Circulation. 2010 Jun 8;121(22):2462-508. Epub 2010 May 17.

Hwang SW, Abozed MM, Hale A, **Eisenberg RL**, Dvorak T, Yao K, Pfannl R, Mignano J, Zhu JJ, Price LL, Strauss GM, Wu JK. Adjuvant Gamma Knife radiosurgery following surgical resection of brain metastases: a 9-year retrospective cohort study. J Neurooncol. 2010 May;98(1):77-82. Epub 2009 Nov 12.

Jafri NF, Nadgir R, **Slanetz PJ**. Student-facilitated radiology-pathology correlation conferences: an experiential educational tool to teach multidisciplinary patient care. J Am Coll Radiol. 2010 Jul;7(7):512-6.

Järnum H, Steffensen EG, Knutsson L, Fründ ET, Simonsen CW, Lundbye-Christensen S, Shankaranarayanan A, **Alsop DC**, Jensen FT, Larsson EM. Perfusion MRI of brain tumours: a comparative study of pseudo-continuous arterial spin labelling and dynamic susceptibility contrast imaging. Neuroradiology. 2010 Apr;52(4):307-17. Epub 2009 Oct 20.

Jefferson AL, Himali JJ, Beiser AS, Au R, Massaro JM, Seshadri S, Gona P, Salton CJ, Decarli C, O'Donnell CJ, Benjamin EJ, Wolf PA, **Manning WJ**. Cardiac Index Is Associated With Brain Aging. The Framingham Heart Study. Circulation. 2010 Aug 2. [Epub ahead of print]

Jones RN, Fong TG, Metzger E, Tulebaev S, Yang FM, **Alsop DC**, Marcantonio ER, Cupples LA, Gottlieb G, Inouye SK. Aging, brain disease, and reserve: implications for delirium. Am J Geriatr Psychiatry. 2010 Feb;18(2):117-27.

Kataoka ML, **Hochman MG**, Rodriguez EK, **Lin PJ**, Kubo S, **Raptopolous VD**. A review of factors that affect artifact from metallic hardware on multi-row detector computed tomography. Curr Probl Diagn Radiol. 2010 Jul-Aug;39(4):125-36.

Kent TS, **Raptopoulos V**, Callery MP, Gautam S, Vollmer CM. Escalating computed tomography angiogram (CTA) grade predicts unresectability and margin status for pancreaticobiliary neoplasms. HPB (Oxford). 2010 Mar;12(2):115-22. **PMCID: PMC2826669**.

Kesavan K, Ratliff J, Johnson E, Dahlberg W, Asara JM, Misra P, **Frangioni JV**, Jacoby DB. Annexin A2 is a molecular target for TM601, a peptide with tumor-targeting and anti-angiogenic effects.J Biol Chem. 2010 Feb 12;285(7):4366-74. Epub 2009 Dec 15.

Khosa F, Otero HJ, Prevedello LM, Rybicki FJ, Di Salvo DN. Imaging presentation of venous thrombosis in patients with cancer. AJR Am J Roentgenol. 2010 Apr;194(4):1099-108. Review

Kircher MF, Hines-Peralta A, **Boiselle PM**, **Donohoe K**, **Siewert B**. Implementation of Screen-Capture Video Recordings of Resident Conferences in an Academic Radiology Department: Pilot Experience. Acad Radiol. 2010 Feb;17(2):255-63. Epub 2009 Nov 14.

Kircher MF, Lee E, Alomari A. MRI Findings of Persistent Sciatic Artery Associated with Pelvic Infantile Hemangioma. Clin Radiol. 2010 Feb;65(2):172-5.

Kressel HY. Radiology online: a new look. Radiology. 2010 Jan;254(1):4-6.

Kressel HY, Olmsted WW. Conflict of interest disclosure in RSNA journals: adoption of the International Council of Medical Journal Editors Uniform Format. Radiology. 2010 Jul;256(1):4-7.

Kressel HY, Olmsted WW. Conflict of interest disclosure in RSNA journals: adoption of the International Council of Medical Journal Editors uniform format. Radiographics. 2010 Jul-Aug;30(4):845-8.

Kruskal JB, Reedy A. Invited commentary. Radiographics. 2010 May-Jun;30(3):580-2.

Kung JW, Brown A, **Kruskal JB**, Goldsmith JD, **Pedrosa I**. Heterotopic pancreas: typical and atypical imaging findings. Clin Radiol. 2010 May;65(5):403-7. Epub 2010 Mar 11.

Lee EY, **Boiselle PM**, Shamberger RC. Multidetector computed tomography and 3-dimensional imaging: preoperative evaluation of thoracic vascular and tracheobronchial anomalies and abnormalities in pediatric patients. J Pediatr Surg. 2010 Apr;45(4):811-21.

Lee KS, **Boiselle PM**. Update on multidetector computed tomography imaging of the airways. J Thorac Imaging. 2010 May;25(2):112-24.

Lee EY, Kritsaneepaiboon S, Arellano CM, Grace RF, Zurakowski D, **Boiselle PM**. Unsuspected pulmonary emboli in pediatric oncology patients: detection with MDCT. AJR Am J Roentgenol. 2010 May;194(5):1216-22.

Lee EY, Strauss KJ, Tracy DA, Bastos M, Zurakowski D, **Boiselle PM**. Comparison of standard-dose and reduced-dose expiratory MDCT techniques for assessment of tracheomalacia in children. Acad Radiol. 2010 Apr;17(4):504-10.

Lee EY, Tracy DA, Bastos M, Casey AM, Zurakowski D, **Boiselle PM**. Expiratory volumetric MDCT evaluation of air trapping in pediatric patients with and without tracheomalacia. AJR Am J Roentgenol. 2010 May;194(5):1210-5.

Lee KS, Sekhar A, **Rofsky NM**, **Pedrosa I**. Prevalence of Incidental Pancreatic Cysts in the Adult Population on MR Imaging. Am J Gastroenterol. 2010 Mar 30. [Epub ahead of print]

Lee KS, Zeikus E, DeWolf WC, **Rofsky NM**, **Pedrosa I**. MR urography versus retrograde pyelography/ureteroscopy for the exclusion of upper urinary tract malignancy. Clin Radiol. 2010 Mar;65(3):185-92. Epub 2009 Dec 14.

Levine D, Brown DL, Andreotti RF, Benacerraf B, Benson CB, Brewster WR, Coleman B, Depriest P, Doubilet PM, Goldstein SR, Hamper UM, Hecht JL, Horrow M, Hur HC, Marnach M, Patel MD, Platt LD, Puscheck E, Smith-Bindman R. Management of Asymptomatic Ovarian and Other Adnexal Cysts Imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement. Radiology. 2010 May 26. [Epub ahead of print]

Lewis EI, Ozonoff A, Nguyen CP, Kim M, **Slanetz PJ**. Breast Cancer Close to the Nipple: Does This Increase the Risk of Nodal Metastasis at Diagnosis? Can Assoc Radiol J. 2010 May 26. [Epub ahead of print]

Li W, Scheidegger R, Wu Y, Edelman RR, Farley M, Krishnan N, **Burstein D**, Prasad PV. Delayed contrast-enhanced MRI of cartilage: Comparison of nonionic and ionic contrast agents. Magn Reson Med. 2010 Jul 20. [Epub ahead of print]

Lin PJ, Herrnsdorf L. Pseudohelical scan for the dose profile measurements of 160-mm-wide cone-beam MDCT. AJR Am J Roentgenol. 2010 Apr;194(4):897-902.

Lin PP, Kubo T, **Krishnapillai R**. Extraction of tube current values from DICOM CT images for patient dose estimation. Med Phys. 2010 June; 37(6): 2951-2955.

Lin PP, Watanabe M. Technical Advances of Fluoroscopic Imaging Chain; A Review of Technical Innovations and Radiation Saving Devices. US Radiology, Vol. 2, Issue 1, pp 77~82, April, 2010.

Lindenberg R, Renga V, Zhu LL, Betzler F, **Alsop D**, Schlaug G. Structural integrity of corticospinal motor fibers predicts motor impairment in chronic stroke. Neurology. 2010 Jan 26;74(4):280-7.

Liu F, Misra P, Lunsford EP, Vannah JT, Liu Y, **Lenkinski RE**, **Frangioni JV**. A dose- and time-controllable syngeneic animal model of breast cancer microcalcification. Breast Cancer Res Treat. 2010 Jul;122(1):87-94. Epub 2009 Sep 17.

Long SS, **Yablon CM**, **Eisenberg RL**. Bone marrow signal alteration in the spine and sacrum. AJR Am J Roentgenol. 2010 Sep;195(3):W178-200.

Ma Y, Huang C, Dyke JP, Pan H, **Alsop D**, Feigin A, Eidelberg D. Parkinson's disease spatial covariance pattern: noninvasive quantification with perfusion MRI. J Cereb Blood Flow Metab. 2010 Jan 6. [Epub ahead of print]

Manor B, Hu K, Zhao P, Selim M, **Alsop D**, Novak P, Lipsitz L, Novak V. Altered control of postural sway following cerebral infarction: a cross-sectional analysis. Neurology. 2010 Feb 9;74(6):458-64.

Matsui A, Tanaka E, Choi HS, Kianzad V, Gioux S, Lomnes SJ, **Frangioni JV**. Real-time, near-infrared, fluorescence-guided identification of the ureters using methylene blue. Surgery. 2010 Jan 29. [Epub ahead of print]

Matsui A, Tanaka E, Choi HS, Winer JH, Kianzad V, Gioux S, Laurence RG, **Frangioni JV**. Real-time intra-operative near-infrared fluorescence identification of the extrahepatic bile ducts using clinically available contrast agents. Surgery. 2010 Jan 29. [Epub ahead of print]

Mazhar A, Cuccia DJ, Gioux S, Durkin AJ, **Frangioni JV**, Tromberg BJ. Structured illumination enhances resolution and contrast in thick tissue fluorescence imaging. J Biomed Opt. 2010 Jan-Feb;15(1):010506.

McMahon CJ, Crowley V, McCarroll N, Dunne R, Keogan MT. Elevated tumour marker: an indication for imaging? Ann Clin Biochem. 2010 May 28. [Epub ahead of print]

McMahon CJ, **Rofsky NM**, **Pedrosa I**. Lymphatic metastases from pelvic tumors: anatomic classification, characterization, and staging. Radiology. 2010 Jan;254(1):31-46.

McMahon CJ, Vollmer CM Jr, Goldsmith J, Brown A, Pleskow D, **Pedrosa I**. An unusual variant of anomalous pancreaticobiliary junction in a patient with pancreas divisum diagnosed with secretin-magnetic resonance cholangiopancreatography. Pancreas. 2010 Jan;39(1):101-4.

McMahon CJ, **Wu JS**, **Eisenberg RL**. Muscle edema. AJR Am J Roentgenol. 2010 Apr;194(4):W284-92.

Melenevsky Y, **Yablon CM**, Ramappa A, **Hochman MG**. Clavicle and acromioclavicular joint injuries: a review of imaging, treatment, and complications. Skeletal Radiol. 2010 Jun 6. [Epub ahead of print]

Meng J, Peters DC, Hsing JM, Chuang ML, Chan J, Fish A, Josephson ME, **Manning WJ**. Late Gadolinium Enhancement of the Esophagus is Common on Cardiac MR Several Months after Pulmonary Vein Isolation: Preliminary Observations. Pacing Clin Electrophysiol. 2010 Jan 4. [Epub ahead of print]

Mendiratta-Lala M, Brook OR, Midkiff BD, Brennan DD, Thornton E, **Faintuch S**, **Sheiman RG**, **Goldberg SN**. Quality Initiatives: Strategies for Anticipating and Reducing Complications and Treatment Failures in Hepatic Radiofrequency Ablation. Radiographics. 2010 May 12. [Epub ahead of print]

Nadgir R, **Slanetz PJ**. Integrating evidence-based imaging into the radiology core clerkship: a proposed teaching tool of imaging strategies. J Am Coll Radiol. 2010 Jul;7(7):517-21.

Nasir K, Gopal A, Blankstein R, Ahmadi N, Pal R, Khosa F, Shaw LJ, Blumenthal RS, Budoff MJ. Noninvasive assessment of gender differences in coronary plaque composition with multidetector computed tomographic angiography. Am J Cardiol. 2010 Feb 15;105(4):453-8. Epub 2010 Jan 5

Nishino M, **Lee KS**, Hatabu H. The spectrum of pulmonary sarcoidosis: Variations of high-resolution CT findings and clues for specific diagnosis. Eur J Radiol. 2010 Jan;73(1):66-73. Epub 2009 Feb 5. Review.

Nour SG, **Goldberg SN**, Wacker FK, Rafie S, Paul S, Heidenreich JO, Rodgers M, Abdul-Karim FW, Duerk JL, Lewin JS. MR monitoring of NaCl-enhanced radiofrequency ablations: observations on low- and high-field-strength MR images with pathologic correlation. Radiology. 2010 Feb;254(2):449-59. Epub 2010 Jan 20.

O'Donnell CR, **Bankier AA**, Stiebellehner L, Reilly JJ, Brown R, Loring SH. Comparison of Plethysmographic and Helium Dilution Lung Volumes: Which is Best in COPD? Chest. 2010 May;137(5):1108-15. Epub 2009 Dec 18.

O'Gorman RL, Siddiqui A, **Alsop DC**, Jarosz JM. Perfusion MRI demonstrates crossed-cerebellar diaschisis in sickle cell disease. Pediatr Neurol. 2010 Jun;42(6):437-40.

Olivotto I, Maron BJ, Appelbaum E, Harrigan CJ, Salton C, Gibson CM, Udelson JE, O'Donnell C, Lesser JR, **Manning WJ**, Maron MS. Spectrum and Clinical Significance of Systolic Function and Myocardial Fibrosis Assessed by Cardiovascular Magnetic Resonance in Hypertrophic Cardiomyopathy. Am J Cardiol. 2010 Jul 15;106(2):261-267.

Orcutt KD, Ackerman ME, Cieslewicz M, Quiroz E, Slusarczyk AL, **Frangioni JV**, Wittrup KD. A modular IgG-scFv bispecific antibody topology. Protein Eng Des Sel. 2010 Apr;23(4):221-8. Epub 2009 Dec 17.

Orcutt KD, Nasr KA, Whitehead DG, **Frangioni JV**, Wittrup KD. Biodistribution and Clearance of Small Molecule Hapten Chelates for Pretargeted Radioimmunotherapy. Mol Imaging Biol. 2010 Jun 9. [Epub ahead of print]

Pfefferbaum A, Chanraud S, Pitel AL, Müller-Oehring E, Shankaranarayanan A, **Alsop DC**, Rohlfing T, Sullivan EV. Cerebral Blood Flow in Posterior Cortical Nodes of the Default Mode Network Decreases with Task Engagement but Remains Higher than in Most Brain Regions. Cereb Cortex. 2010 May 19. [Epub ahead of print]

Pfefferbaum A, Chanraud S, Pitel AL, Shankaranarayanan A, **Alsop DC**, Rohlfing T, Sullivan EV. Volumetric cerebral perfusion imaging in healthy adults: Regional distribution, laterality, and repeatability of pulsed continuous arterial spin labeling (PCASL). Psychiatry Res. 2010 May 18. [Epub ahead of print]

Powell MF, **DiNobile D**, **Reddy AS**. C-arm fluoroscopic cone beam CT for guidance of minimally invasive spine interventions. Pain Physician. 2010 Jan;13(1):51-9.

Robich MP, Chu LM, Chaudray M, Nezafat R, Han Y, Clements RT, Laham RJ, **Manning WJ**, Coady MA, Sellke FW. Anti-angiogenic effect of high-dose resveratrol in a swine model of metabolic syndrome. Surgery. 2010 Jun 4. [Epub ahead of print]

Schulz MD, Khullar O, **Frangioni JV**, Grinstaff MW, Colson YL. Nanotechnology in thoracic surgery. Ann Thorac Surg. 2010 Jun;89(6):S2188-90.

Sena BF, Stern JP, Pandharipande PV, **Klemm B**, Bulman J, **Pedrosa I**, **Rofsky NM**. Screening patients to assess renal function before administering gadolinium chelates: assessment of the choyke questionnaire. AJR Am J Roentgenol. 2010 Aug;195(2):424-8.

Siewert B, **Kruskal JB**, **Eisenberg R**, **Hall F**, **Sosna J**. Quality Improvement Grand Rounds at Beth Israel Deaconess Medical Center: CT Colonography Performance Review after an Adverse Event. Radiographics. 2010 Jan-Feb;30(1):23-31. Epub 2009 Nov 9.

Slanetz PJ, Wu SP, Mendel JB. Percutaneous Excision: A Viable Alternative to Manage Benign Breast Lesions. Can Assoc Radiol J. 2010 Jul 7. [Epub ahead of print]

Solazzo SA, **Ahmed M**, Schor-Bardach R, Yang W, Girnun GD, Rahmanuddin S, Levchenko T, Signoretti S, Spitz DR, Torchilin V, **Goldberg SN**. Liposomal Doxorubicin Increases Radiofrequency Ablation-induced Tumor Destruction by Increasing Cellular Oxidative and Nitrative Stress and Accelerating Apoptotic Pathways. Radiology. 2010 Feb 16. [Epub ahead of print]

Taclas JE, Nezafat R, Wylie JV, Josephson ME, Hsing J, **Manning WJ**, Peters DC. Relationship between intended sites of RF ablation and post-procedural scar in AF patients, using late gadolinium enhancement cardiovascular magnetic resonance. Heart Rhythm. 2010 Apr;7(4):489-96. Epub 2009 Dec 13. **PMCID: PMC2843771.**

Tsukada H, Ernst A, Gangadharan S, Ashiku S, Garland R, **Litmanovich D**, DeCamp M. Tracheal replacement with a silicone-stented, fresh aortic allograft in sheep. Ann Thorac Surg. 2010 Jan;89(1):253-8.

Velagaleti RS, Gona P, Chuang ML, Salton CJ, Fox CS, Blease SJ, Yeon SB, **Manning WJ**, O'Donnell CJ. Relations of Insulin Resistance and Glycemic Abnormalities to Cardiovascular Magnetic Resonance Measures of Cardiac Structure and Function: the Framingham Heart Study. Circ Cardiovasc Imaging. 2010 Mar 5.[Epub ahead of print]

Winer JH, Choi HS, Gibbs-Strauss SL, Ashitate Y, Colson YL, **Frangioni JV**. Intraoperative Localization of Insulinoma and Normal Pancreas Using Invisible Near-Infrared Fluorescent Light. Ann Surg Oncol. 2010 Apr;17(4):1094-100. Epub 2009 Dec 22.

Wu JS, **Siewert B**, **Boiselle PM**. Resident Evaluation and Remediation: A Comprehensive Approach. J Graduate Medical Education. 2010 June; 2(2): 242-245.

Wykrzykowska JJ, Arbab-Zadeh A, Godoy G, Miller JM, Lin S, Vavere A, Paul N, Niinuma H, Hoe J, Brinker J, Khosa F, Sarwar S, Lima J, **Clouse ME**. Assessment of in-stent restenosis using 64-MDCT: analysis of the CORE-64 Multicenter International Trial. AJR Am J Roentgenol. 2010 Jan;194(1):85-92.

Xu G, Rowley HA, Wu G, **Alsop DC**, Shankaranarayanan A, Dowling M, Christian BT, Oakes TR, Johnson SC. Reliability and precision of pseudo-continuous arterial spin labeling perfusion MRI on 3.0 T and comparison with (15)O-water PET in elderly subjects at risk for Alzheimer's disease. NMR Biomed. 2010 Apr;23(3):286-93. [Epub 2009 Dec 1]

Yablon CM, Duggal N, **Wu JS**, **Shetty SK**, Dawson F, **Hochman MG**. A Review of Charcot Neuroarthropathy of the Midfoot and Hindfoot: What Every Radiologist Needs to Know. Curr Probl Diagn Radiol. 2010 September - October;39(5):187-199.

Zamboni GA, **Romero JY**, **Raptopoulos VD**. Combined vascular-excretory phase MDCT angiography in the preoperative evaluation of renal donors. AJR Am J Roentgenol. 2010 Jan;194(1):145-50.

Zamboni GA, **Raptopoulos V**. CT enterography. Gastrointest Endosc Clin N Am. 2010 Apr;20(2):347-66.

Zhu X, **Palmer MR**, Makrigiorgos GM, Kassis AI. Solid-tumor radionuclide therapy dosimetry: new paradigms in view of tumor microenvironment and angiogenesis. Med Phys. 2010 Jun;37(6):2974-84. PMCID: PMC2892529.

Zubris KA, Khullar OV, Griset AP, Gibbs-Strauss S, **Frangioni JV**, Colson YL, Grinstaff MW. Ease of Synthesis, Controllable Sizes, and In Vivo Large-Animal-Lymph Migration of Polymeric Nanoparticles. ChemMedChem. 2010 Jun 30. [Epub ahead of print]