Abdominal Applications of Intravenous Ultrasound (US) Contrast

by Monzer M. Abu-Yousef, MD, Professor & Director of Ultrasound

INTRODUCTION
Grayscale ultrasound (US) is excellent for characterizing lesions. Contrast enhancement routinely used in CT and MR is necessary to improve microvascular blood flow imaging for optimal US tissue characterization, however. US contrast utilization started over 23 years ago and has been FDA approved for cardiac use for > 7 years. Despite improvement in equipment technology and contrast agents’ safety and efficacy, the FDA has not approved its use for abdominal applications.

Indications
The principal role of US contrast is to improve characterization of liver lesions. It can also improve detection of hepatic lesions as well, although CT and MR perform better in detection. Contrast US is especially helpful in finding lesions that may not be detectable by routine US during US-guided biopsies. Contrast US can also be very effective in the differential diagnosis of pancreatic masses, detection of renal and splenic perfusion defects and leaks from ruptured AAA and AA grafts.

Contraindications
Contrast US examination is contraindicated in patients with uncompensated COPD, heart failure and known coronary artery disease due to the reduction in microvascular bed and caliber and increased risk of embolization. Patients with known active right to left shunt are also at increased risk for brain embolism and infarction.

Procedure
Set Mechanical Index (MI): 0.2 watts, and select harmonic imaging. Optimize transmit focus to the lesion’s depth and adjust the TGC curve and gain. Minimize near-field gain and use and modify contrast presets.

Inject 0.2 ml contrast, flush w 3 ml of saline over 4 seconds, then start realtime imaging and clip recording.

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Abdominal Applications, continued from previous page

Potential complications & side effects

Cardiac and respiratory arrest, which may be fatal, are serious but rare potential complications for US contrast exams. Less serious complications include hypersensitivity reactions, such as skin rash, but can be serious when patients develop anaphylactic reaction. Side effects are more common and include headache and back pain.

Patient monitoring

As with CT, patients undergoing contrast US exams are given a contrast explanation sheet. In addition, the vital signs should be monitored before, during and after US contrast exam and should be evaluated for all potential complications and side effects.

US contrast nature, properties & common agents

US contrast agents are made of microbubbles that are a size smaller than the RBCs (2-8 µm) to enable them to pass through the capillary circulation. They are administered intravenously so they should be typically nontoxic, easily eliminated, physically stable and acoustically responsive.

Each bubble is made of a shell composed of either protein, lipid or polymer, and a gas that is either air or heavy gas. The components of these bubbles determine its degree of stability, acoustic responsiveness and safety. While air is more safe, it is less stable and less responsive compared to heavy gas. Similarly, albumen shell is less stable than a shell made of lipid or polymer. The list of US contrast agents is long, but the most commonly used ones include Optison made of albumin, air and PFP (Mallinckrodt); Definity made of lipid, air and PFP (Dupont); Sonovu made of surfactant, powder, air and SF6 (Bracco); Leovist made of Galactose, Palmitate and air (Schering/Berlex); and Echogen made of surfactant and PFC (Sonus).

US contrast physics

The purpose of US contrast agents is to enhance small blood vessel visualization. Using agents decreases tissue/vascular contrast, however. Different techniques have been used to enhance contrast detection including harmonic imaging, filtration and pulse inversion.

There are 3 different ways by which microbubbles interact with US. Linear resonance results in fundamental enhancement, and nonlinear resonance results in harmonic enhancement. Both occur at low US intensity. Transient scattering results from bubble disruption at higher US intensity levels.

Harmonic resonance results from the particle oscillating or reflecting US waves at multiples of the frequencies of the incoming US waves. Tissue and blood reflect US waves at the fundamental frequency, while microbubbles reflect at both fundamental and harmonic frequencies. When the equipment is put in the CPS mode during the ultrasound contrast exam, the reflected waves undergo a filtration process that selectively affects the waves at the fundamental frequency. Alternatively, the equipment may send in waves at the same fundamental frequency but at the opposite phase to cancel the waves reflected at this frequency in a process called pulse inversion. Either of these processes leads to prompt enhancement of the harmonic signals coming from the contrast microbubbles.

Liver lesions contrast enhancing characteristics

On US contrast exams, the various liver lesions demonstrate similar, though slightly different enhancement characteristics compared to that seen on CT and MR contrast exams. Three phases of enhancement are demonstrated by US contrast: arterial (early), portal venous (delayed) and sinusoidal (late) phases. Hemangiomas show peripheral arterial enhancement with delayed centripetal filling (Fig. 1). Focal nodular hyperplasia shows centrifugal hyperintense arterial enhancement with continued portal venous and sinusoidal enhancement (Fig. 2). Adenomas show centripetal arterial hyperintense arterial enhancement with portal venous and sinusoidal enhancement during the venous phase (Fig. 3). Hepatocellular carcinoma shows hyperintense arterial enhancement with centripetal filling (Fig. 4).
Welcome to the latest issue “Radiology Update”. On behalf of the faculty and staff of the University of Iowa, Department of Radiology, I am pleased to highlight recent events and activities within our department.

We are excited to let you know about our efforts to be a leader in biomedical imaging research and biomedical imaging informatics, radiological education, and exceptional patient care. In this edition, you will read about new areas of research development and new research grants, a new University of Iowa research institute for biomedical imaging, and the latest accomplishments and kudos of our dedicated faculty and staff.

New 2008 grants and contracts for research include:

- A Mergin Multi-scale Model for Simulations of Crystallization/Solidification of Nano-structured Materials on Large-scale Parallel Computing Systems; National Science Foundation, Emerging Models and Technologies; $240,000; PI: Ni, Jun
- Abnormality Manipulation for Tomographic Imaging Perception Research; US Department of Health & Human Services, National Institutes of Health; $1,010,915.00; PI: Madsen, Mark T
- Carotid Revascularization with ev3 Arterial Technology Evolution Post Approval Study (CREAT PAS); ev3 Endovascular, Inc.; $51,000.00; PI: Chaloupka, John
- Data Collection for Development and Testing of a Mammography CAD System; VuCOMP, Inc.; 7,500.00; PI: Fajardo, Laurie L
- Development for RSNA Personal Learning Portfolio; Radiological Society of North America; $20,000.00; PI: D’Alessandro, Michael
- Diffusion MRI of the Human Brain; University of Wisconsin-Madison; $30,000.00; PI: Kim, Jinsuh
- Excised Lung Project VPR; VIDA Diagnostics, Inc.; $10,121.00; PI: Hoffman, Eric
- Genetic Epidemiology of COPD; National Jewish Medical & Research Center; $137,090.00; PI: Hoffman, Eric
- Genotype-Phenotype Interactions in Severe Asthma Health Study; Wake Forest University; $20,114.00; PI: Hoffman, Eric
- Imaging Effecter Cell Trafficking in Rituximab Therapy of Follicular Lymphoma; Dana Foundation; $100,000.00; PI: Juweid, Malik
- Inflammation, Myofibroblasts and Distal Lung Disease in Severe Asthma; Washington University in St. Louis; $55,908.00; PI: Hoffman, Eric
- IPA for Vincent Magnotta; US Department of Veterans Affairs, Iowa City Veterans Affairs Medical Center; $11,000.00; PI: Magnotta, Vincent
- Large-Scale Computing and Visualization for Cardiopulmonary Imaging; US Department of Health & Human Services, National Institutes of Health; $473,636.00; PI: Lin, Ching-long
- Multicenter Retrospective Chart Review of the Wingspan Stent System with Gateway PTA Balloon Catheter; Boston Scientific Corporation; $15,000.00; PI: Chaloupka, John
- Phase 2, Multicenter, Open-Label, Two-Stage Study to Evaluate the Safety and Efficacy of Intra-Arterial Catheter-directed Alflimeprase for Restoration of Neurologic Function and Rapid Opening of Arteries in Stroke (CARNEROS-1); Nuvelo, Inc.; $435,000.00; PI: Chaloupka, John
- Stenting and Angioplasty with Protection in Patients at High Risk for Endarterectomy (SAPPHIRE WW); Cordis Corporation; $48,205.00; PI: Chaloupka, John
- The NexStent Carotid Stent System: A Post Market Approval Evaluation Study in Conjunction with the FilterWire EZ Embolic Protection System; Boston Scientific Corporation; $25,625.00; PI: Chaloupka, John
- Vertical Low Tesla Broadband MRI; US Department of Health & Human Services, National Institutes of Health; $500,000.00; PI: Hoffman, Eric

Congratulations to these individuals on their many successes with research!

It is a distinct pleasure to recognize our “best doctors” for 2008. The “best doctors” database (http://www.bestdoctors.com) included the following UI radiologists in its latest release: Monzer M. Abu Yousef, Thomas Barloon, Bruce P. Brown, John C. Chaloupka, Georges Y. El-Khoury, Laurie Fajardo, Edmund A. Franken, Jr., Minako Hayakawa, David Kuehn, Yutaka Sato, Wendy Smoker, Alan Stolpen, David Bushnell, Michael Graham, Daniel Kahn, and Yusef Menda. These individuals comprise over 1/3 of our physician faculty.

It is also a pleasure to inform you of a new research institute at the University of Iowa that will lead advances in medical imaging. The UI Carver College of Medicine and the College of Engineering established the Iowa Institute for Biomedical Imaging (IIBI) in October 2007. Biomedical imaging and image analysis play critical roles in modern medicine, both in the diagnosis and the treatment of disease. The IIBI aims to foster multi-disciplinary and cross-college research and discovery in biomedical imaging and to improve training and education. A primary objective of the institute is to translate the advances in imaging research to the clinic, improving healthcare for patients. The collaborative nature of the institute ensures that insight from the “bedside” informs and helps direct fundamental imaging research at the “bench”. The institute will reside in the Iowa Institute of Biomedical Discovery building, to be completed in 2011. Nearly 20,000 square feet will be devoted to biomedical imaging and image analysis activities. Radiological research projects will find dedicated space for image acquisition, testing of innovative small animal and human imaging technology, and quantitative imaging analysis.

The mission of the Department of Radiology at The University of Iowa is to provide the highest quality, accessible and patient-friendly radiological care while contributing to national efforts to advance training and research in medical imaging. Throughout our various missions, we remain dedicated to progress in medical imaging and patient-centered care.
Research Update
Department Researchers Prepare to Study Eyestrain in Radiologists

by Kevin S. Berbaum, PhD, Professor, Perceptual Research

Radiologists now read more studies, each containing more images placing greater demands on their vision. Although certain levels of visual fatigue existed with film-viewing, our preliminary data suggests that it is worse with digital displays because they do not provide the same stimulus for oculomotor control as film. Eyestrain, which is known clinically as asthenopia (Ebenholtz, 2001; MacKenzie, 1843), is a consequence of increased image volume and display conditions.

With non-medical computer displays, just four hours of near viewing is sufficient to produce asthenopia (Sanchez-Roman, et al., 1996) and prolonged computer use may induce myopia (Komiushina, 2000; Mutti & Zadnik, 1996). Oculomotor fatigue caused by close work with digital displays may add to the effects of extended workdays and aging eyes (Heron, Charman & Gray, 1999).

With our colleague Elizabeth Krupinski, a professor in the Radiology Department at the University of Arizona, our Perception Lab will soon be studying the affect of visual fatigue on image interpretation (Eyestrain in Radiologists, NIH Grant R01 EB004987, principal investigator: Elizabeth Krupinski). Preliminary studies suggest that radiologists report increasingly severe symptoms of eyestrain, including blurred vision and difficulty focusing, as they read more imaging studies. Our goal in this research project is to determine whether the detrimental effects of extended inspection of digital displays in radiology go beyond tired eyes and slower reading.

We will attempt to assess eyestrain by measuring the changes in accommodation. The lens of the eye is used to alter the refractive index of light entering the eye to focus images on the retina. It is covered by an elastic capsule whose function is to mold the shape of the lens — varying its flatness and therefore its optical power. This variation in optical power is known as accommodation.

We will be measuring accommodation using an autorefractor (ours is the so-called WAM-5500 Auto Refkeratometer from Grand Seiko). The device will measure accommodation as the observer looks through a window at an x-ray image presented at a typical viewing distance. The autorefractor will capture the observer’s focus on the screen many times a second for a few seconds. We expect focus to wander in front of and beyond the display screen when the observer’s eyes are tired. We will study how this affects the time needed to interpret images and whether it causes subtle lesions to

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Education Update
Diagnostic Radiology Residency Program

by Joan Maley, MD, Clinical Associate Professor, Director, Diagnostic Radiology Residency Program

The Diagnostic Radiology Residency Program at The University of Iowa Hospitals and Clinics continues to move forward and adapt to the ever-changing, post-graduate training requirements. The core competencies (professionalism, patient care, medical knowledge, systems-based practice, practice based learning and communication) have now been with us for seven years. We have completed the first two phases of their implementation, teaching and assessment, and are entering phase three, outcome measurements. In January 2008, the site visitor from the Accreditation Council for Graduate Medical Education reviewed our program and we received notice of reaccreditation for four additional years.

We constantly evaluate the curriculum and program to keep pace with the evolving landscape of graduate medical education. A Technology/Systems rotation has been added. This allows the residents the opportunity to shadow the technologists in the individual areas of radiology. The residents will gain a better understanding of the requirements necessary to obtain a diagnostic exam and gain an appreciation of the patients’ experience. Additional rotations in Body MRI will help the residents gain experience in this ever-expanding discipline and increased resident elective time allows the residents to tailor their residency to their educational needs. Currently, the ethics curriculum is being redesigned.

Radiology research has always been a cornerstone of our residency and the residents continue to spend dedicated time on research projects. Last year nine different residents presented their research at four different national meetings; the American Society of Head and Neck Radiology (ASHNR), the American Society of Neuroradiology (ASNR), the Radiological Society of North America (RSNA) and the American Institute of Ultrasound in Medicine (AIUM). Dr. Bao Do won the resident research training prize at RSNA for his research on Feedback Natural Language Processing of Fractures in Unstructured Reports of Emergency Department Studies.

We had 33 radiology residents in training as of July 1, 2008. Our residents come to train with us from all over the country and we are always looking to add diversity to the classes. In the match just completed March 20, 2008, we matched four women and we are always looking to add diversity to the classes. In the match just completed March 20, 2008, we matched four women into the eight positions to begin training July 2009. Last year all of our graduating residents successfully completed the oral board exam.
Sectional Update
Body Imaging Section

by David Kuehn, MD, Clinical Associate Professor,
Interim Director of Body Imaging

As with the rest of the department, the Body Imaging section has been experiencing a continual evolution of the technology and workflow in radiology. With the number of detector rows in the workhorse CT scanners growing to ever larger multiples of 4, the downstream interpretation technology has also had to adapt. Evolving into a department that is filmless, paperless, using voice transcription, and distributing images widely on the desktop information system, we have also noticed a decrease in our encounters with clinicians. Not only do we see fewer clinical teams dropping by to review images in consultation, we also have fewer telephone interactions with clinicians.

An unfortunate byproduct of this ‘de-personalization’ of radiology, both here at the university and in the broader practice of radiology throughout the country, is the risk of becoming just a commodity. Once the end point of a radiology exam—the report—has been reduced in the minds of referring clinicians to a product that is just as easily obtained from Sidney, Minneapolis or Hawaii, it becomes difficult to justify the utility of maintaining your viewbox here in Iowa. Simple numbers such as price and time become the measure of the value of a report. The body imaging section has addressed this trend by remaining very active in participating in multidisciplinary conferences and tumor boards to develop and maintain the relationships that demonstrate the added value of having a discussion with a radiologist. It seems more than coincidence that the clinicians that demonstrate the added value of having a discussion with a radiologist are the same ones who consult us most frequently for an informal image review or consult.

The Body section has been adjusting to the retirement of Dr. Bruce Brown last year after 31 years as a physician at The University of Iowa. Board certified in internal medicine before becoming a radiologist, Dr. Brown was involved in the early introduction of ERCP at Iowa and most recently has been instrumental in developing a CT colonography program. He will be greatly missed for the enthusiasm and energy he brings to teaching and we wish him well.

There have been four additions to the section in the past year. Former residents and fellows who have joined us include Dr. Maheen Rajput, Dr. Eve Clark, and Dr. Wei Fang. Dr. Fang is taking over for Dr. Brown in coordinating our CTC program. Dr. Rajput is also staffing in breast imaging. Trained outside of Iowa, Dr. Brooke Breen is a graduate of Tufts with a fellowship in MR, who is directing the body fellowship.

There has been a long tradition of visiting professors in the Department of Radiology at the University of Iowa, allowing us to interact closely with and learn from experienced radiologists who train and teach in systems that are half a world away from ours. Over the past three years the body section has hosted four visiting professors. Drs. Akihiro Nishie and Yoshiki Asayama, were from Kyushu University, Fukuoka, Japan. Drs. Jae Young Lee and Jeong Min Lee were both from Seoul National University College of Medicine in Seoul, South Korea. Dr. Jung Hoon Kim has recently begun a year’s sabbatical with us from Soonchunhyang University Hospital, Seoul, South Korea.

Dr. Tom Barloon is the primary teacher of fluoroscopy, passing on the knowledge of classic radiology to the digital generation. Dr. Monzer Abu-Yousef continues to head up the ultrasound division, most recently working to introduce the use of ultrasound contrast agents to our clinical practice. The Body MRI division remains under the direction of Dr. Alan Stolpen who has been helping to guide an ongoing update of those facilities and scanners. When that is completed by early spring, the center will host one 3T and four 1.5T scanners. Dr. Stolpen has also headed up the development of our breast and cardiac MR services.

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sinusoidal enhancement. Hepatocellular carcinoma typically shows hyperintense arterial enhancement with portal venous and sinusoidal washout (Fig. 3). Metastases show delayed peripheral hypo-enhancement (Fig. 4). Focal fatty infiltration shows early and late iso-enhancement. Other masses may show heterogenous early enhancement with irregular vascularity. Infarcts in kidneys and spleens show perfusion defects.

**Conclusions**

US contrast consists of tiny microbubbles that enhance US visualization of microcirculation using harmonic resonance, selective beam filtration, pulse inversion and bubble bursting techniques. US contrast in the liver assists in making a specific diagnosis, confirming a diagnosis, or narrowing the differential diagnosis of the various lesions. Correlation with patient history and laboratory and US findings is important. Although approved for cardiac use, US contrast is still awaiting FDA approval for its abdominal use. Patients’ vital signs should be closely monitored before, during and after the procedure. There should also be careful patient selection, excluding those with known active heart or pulmonary disease, especially coronary artery disease, arrhythmias, COPD and right to left cardiac shunts.

**References**

I first met Jason when he was a medical student. There he stood in my doorway with a wide grin. He sat and listened to an idea I had for demonstrating liver anatomy with three-dimensional reconstructions. Each of us only had a few minutes, but as the conversation went on, Jason flooded me with questions, most of which I couldn’t answer. So the minutes turned into an hour or so, a research plan, and in less than a month he had answered most of his own questions, completed a literature review, as well as the project that he deftly presented at RSNA that year.

That was Jason: curious, respectful, hardworking, sometimes stubborn, but always smiling and on the go. So as well as being a new physician, he was also a licensed pilot and an award-winning photographer.

After becoming board-certified in radiology at the University of Nebraska, Jason spent time in private practice, but he wanted to know more about academic radiology and came to UIHC in 2006-7 for a body imaging fellowship.

Initially he had difficulty getting used to our dictation and reporting system. He and I had many long and frank discussions about this. At his age, with his past wide experience as a private practice radiologist, he could have simply disregarded our suggestions— but he didn’t. He took his additional training and our comments very seriously, staying after hours, working on weekends, asking questions, making suggestions for our own program. During his fellowship, under the direction of Dr. Monzer Abu-Yousef, Jason completed a second presentation on the safety of thyroid biopsies, which he presented at the 2007 RSNA.

So with this give-and-take process, through his hard work, we all learned something. It was an honor to present him his fellowship diploma. He had earned it.

Jason was fun to be around. He had a quirky sense of humor and was always willing to take a chance, try something new. My retirement party was near the time of Jason’s fellowship graduation. It was held out in the country around Iowa City; the green, growing rolling Iowa countryside in June—just about the closest to heaven anybody could imagine. Jason was kind enough to be there and shake my hand. That meant a lot to me. Later, as the party was winding down, I looked up trying to spot an airplane flying low over the hills, but I never saw the plane, and it passed.

There were still a few days left for me at work, and as I was cleaning out my office, Jason came in, plopped down in the only chair not full of files and boxes and showed me an aerial photo of green Iowa fields, a tent, some people far below. It was a picture he had taken of the retirement party from that low-flying plane we had heard.

One hand on the wheel, one hand over his shoulder, snapping a photo of my retirement party. That was Jason, taking a chance, flying low over the green fields to present us with a new view of things—going back to get more information in a new fellowship to better prepare for helping people.

I will never forget Jason. I’m sure he’s near us right now trying to find a new way of thinking about things. When he finds it you can be sure that somehow, while we’re trying to make sense of cleaning out our office of thirty years, putting up a grandchild’s swing, moving to a retirement home, he will walk into our lives, smile, and show us something we have never seen before.

Our deepest condolences go to his family at his death. We thank them for his life.

Bruce P. Brown, MD, Associate Professor Emeritus

Research Update, continued from page 4

be missed that were called when the oculomotor system was not fatigued. Preliminary before- and after-workday measurements on a few radiologists show significant degradation in the ability to focus on both near and far objects after a day of image interpretation, although the degradation is more severe for near vision.

References
Welcome New Faculty!

**Eve D. Clark, MD**, joined the Department of Radiology as a Clinical Assistant Professor. Dr. Clark received her medical training from the University of Iowa College of Medicine. She completed her residency in diagnostic radiology, as well as a fellowship in body imaging at University of Iowa Hospitals & Clinics. Dr. Clark joins the faculty of the Body Imaging section.

**Wei Fang, MD**, joined the Department of Radiology as a Clinical Assistant Professor. He received his medical training at the University of Iowa College of Medicine and later went on to complete his diagnostic radiology residency at University of Iowa Hospitals & Clinics. Dr. Fang also completed a fellowship in body imaging at UIHC and recently joined the faculty of the Body Imaging section.

**Jung Hoon Kim, MD**, Visiting Assistant Professor, joined the Body Imaging section of the Department of Radiology. Dr. Kim completed his medical education at College of Medicine, Hanyang University in Seoul, Korea. He completed his residency at Asan Medical Center, University of Ulsan College of Medicine in Seoul. Dr. Kim also completed two fellowships in abdominal radiology, one at Ulsan College of Medicine, and the other at Soonchunhyang University Hospital in Seoul, where he also currently serves as an Assistant Professor.

**Jun Ni, PhD**, joined the Department of Radiology as an Associate Professor. Dr. Ni also has secondary faculty appointments in the Departments of Mechanical & Industrial Engineering and Biomedical Engineering in the College of Engineering at the UI. Dr. Ni also serves as the director of ITS Research Services and is director for the following University of Iowa laboratories: Medical Imaging HPC and Informatics Research Lab (MIHPC Lab), Department of Radiology; Hawkeye Radiology Informatics, Department of Radiology; and the HPC Nanotechnology Research Lab (HPCNano Lab), Department of Mechanical Engineering. Dr. Ni is also Honorable Co-Director of the High-performance Computing Laboratory in the School of Biomedical Engineering & Sciences at Virginia Tech.

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**In addition to our new faculty, we would also like to welcome our new fellows:**

**Body Imaging**
Bradley King, MD, Fellow-Associate
Scott Greenley, MD, Fellow-Associate

**Breast Imaging**
Archana Laroia, MD, Fellow-Associate

**Chest**
Stephen Burke, MD, Fellow-Associate

**Musculoskeletal**
Glenda Holzman, MD, Fellow-Associate
Amol Katkar, MD, Fellow

**Neurointerventional**
R. Charles Callison, MD, Jr., Fellow-Associate
Wei Liu, MD, Fellow-Associate
John Terry, MD, Fellow-Associate

**Neuroradiology**
Aristides Capizzano, MD, Fellow
Sandep Laroia, MD, Fellow
Christopher McKinney, MD, Fellow
Aaron Settler, MD, Fellow

**Nuclear Medicine**
Ravi Sood, MD, Fellow-Associate

**Pediatric**
Achint Singh, MD, Fellow

**Vascular Interventional**
Anish Bansal, MD, Fellow
Lokesh Khanna, MD, Fellow
Maheen Rajput, MD, Clinical Assistant Professor, joined the Department of Radiology as member of the Body Imaging section. Dr. Rajput completed her medical training at the University of Illinois College of Medicine, Urbana and Peoria, IL. She later went on to complete her residency in diagnostic radiology at the University of Iowa Hospitals and Clinics. Prior to her appointment, Dr. Rajput completed fellowships in musculoskeletal radiology and body imaging at UIHC.

John Sunderland, PhD, MBA, joined the Nuclear Medicine/PET section as an Associate Professor. Prior to his appointment at UIHC, Dr. Sunderland was an instructor at Louisiana State University - Shreveport, LA, in the Department of Chemistry and Physics. He also served as Vice President of PET Operations at the Biomedical Research Foundation in Shreveport. Dr. Sunderland received his PhD in Medical Physics from the University of Wisconsin, Madison, WI, and an MBA from Centenary College, Frost School of Business, Shreveport, LA. He currently serves as the Technical Director for the PET Imaging Center at UIHC and PET Expert Consultant for Lawrence Livermore National Laboratory for the Establishment of a Cyclotron/PET Facility in the Urals region of Russia as part of the US Department of Energy Nuclear Cities Initiative.

New Residents

DIAGNOSTIC RADIOLOGY

Saad Ali, MBBS, Aga Khan University, Pakistan
David De Bruin, MD, University of Chicago
M. Cristian Dobre, MD, University of Minnesota
Tamer Ghosheh, MD, University of Iowa
Robert Hening, MD, University of North Dakota
Jeffrey Meier, MD, University of Pennsylvania
Mohammed Sarawan, MBBS, University of Jordan, Jordan
Warren Spencer, MD, Medical College of Wisconsin
James Stecher, MD, University of Iowa

NUCLEAR MEDICINE

Kamaljit Puri, MBBS, Indira Gandhi Medical College, Shimla, HP, India
Harnoor Singh, MD, Government Medical College, Punjab, India

Honors & Awards

D. Lee Bennett, MD
• Appointed Associate Diagnostic Radiology Residency Program Director

Michael M. Graham, MD
• Vice-President Elect, Society of Nuclear Medicine, 2008
• Appointed Examiner of the American Board of Radiology, June 2008

Geetika Khanna, MD, MS
• Certificate of Appreciation, Radiological Society of North America, 2007
Joan Maley, MD
- Selected as one of 30 candidates to participate in the 2008 AUR-Agfa Radiology Management Program during the AUR’s annual meeting

Toshio Moritani, MD
- Appointed to the Electronic Education and Internet Committee for the American Society of Neuroradiology, 2006-2010
- Reviewer for Postgraduate Medicine, European Neurology, Neurology India, Cancer Research, Journal of Neurotrauma

Brian Mullan, MD
- One of 3 radiologists chosen to participate in a 14-day trip to Uganda for an RSNA-sponsored International Visiting Professor Program to teach residents new skills using the resources available to them.

Jun Ni, PhD
- Recipient of one of 6 summer faculty fellowships at the University of Illinois at Urbana-Champaign’s National Center for Supercomputing and Applications, participating in a cyberinfrastructure-based project on petascale computing applications in multidisciplinary domains

Awards Received at National Meetings

Jeong D, Park JM, Adkins B, Menda Y, Franken EA, Fajardo LL. PET/CT Findings in Breast Cancer; Correlation with Mammography and Ultrasound. American Roentgen Ray Society, Washington DC, April, 2008. BRONZE MEDAL


Laurie L. Fajardo, MD, MBA, Receives 2008 AUR Gold Medal Award

Professor and Chair of the Department of Radiology, Laurie L. Fajardo, MD, MBA, was awarded the prestigious Gold Medal Award by the Association of University Radiologists. The Gold Medal is “awarded in recognition of unusually distinguished service or contributions to the Association of University Radiologists, academic radiology, or the field of radiology in general.”

Dr. Fajardo was honored with the award, along with David C. Levin, MD, at a recognition ceremony in March of 2008. Congratulations, Dr. Fajardo!

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2007-2008 RADIOLOGY TEACHING AWARDS

MEDICAL STUDENT TEACHING AWARDS

Resident Teacher of the Year
Todd Ebbert, MD

Outstanding Senior Faculty Teacher of the Year
Monzer Abu-Yousef, MD

Resident Educator of the Year
Ahmad Izard, MD

Outstanding Junior Faculty Teacher of the Year
Eve Clark, MD

Outstanding Resident Teachers
Dean McNaughton, MD
Paul Wheeler, MD

DEPARTMENTAL TEACHING AWARDS

Resident Research Award
Rakesh Patel, MD

Krabbenhoft Award for Excellence in Teaching
Monzer Abu-Yousef, MD

Resident Teacher of the Year
Mohammad Asif Dogar, MD

Faculty Teacher of the Year
Joong Mo Ahn, MD

Resident Award for Outstanding Clinical Service
Mohammad Asif Dogar, MD

Honors, continued from previous page

• Guest Editor/Associated Guest Editor, Journal of Computational and Theoretical Nanotechnology; Intl. Journal of Computational Science and Engineering

Wendy R. K. Smoker, MD

• Team Leader and First Place Award winner for Stump the Stars, Southeastern Neuroradiological Society Freeport, Bahamas, October 2007

• Selected as a 2008 Woman of Achievement by the American Biographical Institute

John Sunderland, PhD

• Appointed Technical Director, Positron Emission Tomography

Edwin R. J. van Beek, MD

• Reviewer for Academic Radiology; Critical Care Medicine; European Radiology, Investigative Radiology; Journal of Magnetic Resonance Imaging; Radiology European

Breast Imaging Center Receives National Recognition

Please join me in congratulating the Breast Imaging Clinic for their achievement of National recognition as a “BREAST IMAGING CENTER OF EXCELLENCE.” To gain recognition as a center of excellence, our center has achieved high standards for technologist and physician training and credentialing, imaging quality assurance and quality control, diagnostic accuracy, patient safety and follow-up, practice audit, and utilization review/appropriateness.

Thank you Dr. Jeong Mi Park and Deb Havel for your hard work, leadership and determination in reaching this goal!  --Dr. Laurie L. Fajardo, Professor & Head

Resonance Imaging; Radiology European

Society of Thoracic Imaging 2008

Paul D. Wheeler, MD

• Selected as one of 35 candidates to participate in the 2008 Siemens-SUR Radiology Resident Academic Development Program during the AUR’s annual meeting.
The print version of this section contains a listing of contributors to the Department of Radiology for the period of July 1, 2006 through June 30, 2007. If you wish to receive a print copy, please contact Nichole Jenkins at (319) 353-8690.

Publications

BOOKS/BOOK CHAPTERS


ARTICLES


(continued on next page)


• Reinhardt JM, Ding K, Cao K, Christensen GE, Hoffman EA, Bodas SV. Registration-based estimates of local lung tissue expansion compared to xenon CT measures of specific ventilation. Med Image Anal. 2008 Apr 12. [Epub ahead of print]


* Smoker WR, Khanna G. Imaging the craniocervical junction. Childs Nerv Syst. 2008 May 7. [Epub ahead of print]


Scientific Presentations


- Fuld MK, Simon BA, van Beek EJ, Hudson M, Sieren J, Hoffman EA. Transitioning from the laboratory to the clinic: adapting the Xe-CT method for human scanning. ATS 2008


- Jeong D, Park JM, Adkins B, Menda Y, Franken EA, Fajardo LL. PET/CT Findings in Breast Cancer; Correlation with Mammography and Ultrasound. 108th Annual Meeting of the American Roentgen Ray Society, April 13-18, 2008. (CME-assigned and Selected for a presentation for the “Power Hour” program)


- Laroia AT, Stanford W, Mullan BF, Thompson B, van Beek EJR. Unexpected findings on coronary CTA – worth the trouble?


• Parekh NN, Smoker WRK, Menezes AH. MR and CT imaging findings of calcium pyrophosphate dihydrate deposition disease at the cranio-vertebral junction. American Society of Neuroradiology annual meeting. New Orleans, LA, June 2008


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**Invited Speakers**

• Abu-Yousef, MM. 1) A primer in obstetrical ultrasound; 2) A primer in gynecologic ultrasound; 3) Mock Boards in abdominal ultrasound. University of Indiana, Indianapolis, IN, September 10, 2007. [Visiting Professor]


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Invited Speakers, continued from previous page

- Abu-Yousef, MM. Advances in renal duplex Doppler ultrasound imaging. Nephrology Division; Department of Internal Medicine, The University of Iowa, College of Medicine, Iowa City, IA, May 2008.
- Abu-Yousef, MM. Introduction to Liver duplex Doppler ultrasound imaging. Gastroenterology & Hepatology Division; Department of Internal Medicine, The University of Iowa, College of Medicine, Iowa City, IA, January, 2008.
- Fajardo LLF. Imaging Studies for Local-Regional and Systemic Assessment. 61st Annual Cancer Symposium, Chicago, IL, March 13, 2008.
- Graham MM. Demonstrating Value of PET/CT Imaging (moderator) at the 29th Annual High Country Nuclear Medicine Conference, Vail, CO, February 29-March 5, 2008.
- Graham MM. PET/CT – Head and Neck Cancer at the 53rd Annual Meeting of the Southwestern Chapter of the Society of Nuclear Medicine, Little Rock, AR, March 28-30, 2008.
- Graham MM. Update on IRAT (Imaging Response Assessment Team) at the 29th Annual High Country Nuclear Medicine Conference, Vail, CO, February 29-March 5, 2008.
- Jun Ni. Cyber-enabled HPC for Accelerating Medical Imaging & Informatics Research. National Center for Supercomputing Applications (NCSA), Summer Faculty Fellowship, Opening, June 5, 2008.
- Jun Ni. Parallel Monte Carlo Algorithm for Simulation of Photon Migration inside Biological Tissues. The Iowa Institute of Biomedical Imaging, Seminar, May 1, 2008.
- Juweid ME. Application of targeted imaging to cancer care. At the “Molecular and Translational Oncology Workshop,” organized by the Cancer Education Consortium (CEC), Reston, VA, April 2008.
- Juweid ME. Beyond FDG-PET: FLT-PET for assessment of lymphoma. Yale University School of Medicine, Department of Radiology, New Haven, CT, February 2008.
- Juweid ME. FDG-PET for Management of Lymphoma. Department of Nuclear Medicine Technische Universitat Munchen, Munchen, Germany, April 2008.
- Juweid ME. Proposed response criteria for interim PET/CT in lymphoma. 10th International Conference on Malignant Lymphoma, Lugano, Switzerland, June 2008.
- Kahn D. CTCA and coronary artery disease. Presentation to primary care providers at the VAMC, December 2007.
- Kahn D. CTCA: How to perform and in whom. UIH Division of Cardiovascular Diseases, Fellow Core Conference, March 2008.
• Moritani T. CNS infection. Showa University, School of Medicine, Tokyo, Japan, Jan 18, 2008.
• Moritani T. Imaging of Glioblastoma multiforme. St. Luke's International Hospital, Tokyo, Japan, Jan 18, 2008.
• Ruprecht A. CBCT What is it and what can it do for me? University District Dental Society, Iowa City, April 9, 2008.
• Smoker WRK. DJD and Infections of the Spine. 2007 Fall Meeting of the Iowa Radiological Society, Iowa City, IA, November 2, 2007.
• Smoker WRK. CT of Cervical Spine Trauma. Annual Meeting of the Iowa Society of Radiologic Technologists, Iowa City, Iowa, April 2008.
• Smoker WRK. CT of Cervical Spine Trauma. Annual Meeting of the Iowa Society of Radiologic Technologists, Iowa City, IA, November 2, 2007.

Invited / Refresher Course Faculty

• Jeong D, Park JM, Adkins B, Menda Y, Franken EA, Fajardo LL. PET/CT Findings in Breast Cancer; Correlation with Mammography and Ultrasound. American Roentgen Ray Society, Washington DC, April, 2008 (CME-assigned and Selected for a presentation for the “Power Hour” program)
• Ni J. Modeling of biotransport in biophysics systems using petascale computing and medical imaging. NSF invited workshop on Biological Communications and Molecular Communications, February 20-21, 2008.
• Ni J. Vision of Cyberinfrastructure for Biomedical Imaging. ECE Graduate Seminar and the Iowa Institute of Biomedical Imaging, February 7, 2008.
• Smoker WRK. 1) Spinal Neoplasms; 2) Degenerative Spine Disease and Spinal Infections; 3) Vascular and Miscellaneous Spinal Pathology; 4) Suprahyoid Neck I (SS, PPS, CS); 5) Suprahyoid Neck II (MS and P); 6) Suprahyoid Neck III (PMS and oral cavity). Lecturer in Neuroradiology. Armed Forces Institute of Pathology, Bethesda, MD, May 2008.
• Smoker WRK. CT of Cervical Spine Trauma. Annual Meeting of the Iowa Society of Radiologic Technologists, Iowa City, Iowa, April 2008.
• Smoker WRK. DJD and Infections of the Spine. 2007 Fall Meeting of the Iowa Radiological Society, Iowa City, IA, November 2, 2007.
• Smoker WRK. Long Island College Hospital, Brooklyn NY, May 2008. [Visiting professor]
• Smoker WRK. 1) Pharyngeal mucosal space and oral cavity pathology; 2) Parapharyngeal Space-the Crossroad; 3) The Craniovertebral Junction; 4) Masticator and parotid spaces. Allegheny General Hospital, Pittsburgh, PA, December 2007. [Visiting Professor]
Invited Course Faculty, continued from previous page

- Smoker WRK. Winthrop Hospital, Mineola, NY, May 2008. [Visiting professor]

Exhibits / Posters