Spring 2011

JOHNS HOPKINS MEDICINE

RADIOLOGY report

a publication for friends and colleagues of the Russell H. Morgan Department of Radiology and Radiological Science

Teaching Goes Global

"Smile" says the sign just under the camera, as a member of the radiology faculty gives a lecture that will be seen around the world—live. The camera and all the accessories of a film or recording studio reside in a room crowded with all kinds of screens, recorders and sound equipment in the Turner building.

"We are fortunate to have studio facilities that yield high production value, so our product has more of a network look as opposed to a web cam look," said Rena Geckle, the Manager of Radiology programming.

Studio set-up for e-learning broadcasts in Turner.

Ms. Geckle produces and moderates these live lectures that are broadcast via the web, with the help of the Turner 65 production staff, Leonard Frankford, Gail Kapsambelis, and Senior Producer, Dale Levitz, all members of Marketing and Communications at Johns Hopkins University. Although it can be an anxiety-producing thought to lecture live in front of a camera—and take questions—"we've made the process very user-friendly, and strive to ensure a seamless operation for faculty," said Ms. Geckle.

In fact, Dr. Jonathan Lewin, Chair of the department, said that "this e-learning initiative fits perfectly with the strategic goals of the department when I first arrived, in which we proposed increasing the international stature of Johns Hopkins' Radiology through educational teleconferences." He went on to explain that his vision has been to take the expertise we have here at Hopkins and make it available around the world. How that vision became reality he attributes to the passion and hard work of Drs. Nagi Khouri, Dave Yousem, and Karen Horton. "We also hired an educational consultant, Mr. Kenneth Karpay, to help us with the operational plan, marketing and technology," he said.

Rena Geckle, Manager of Radiology programming.

Ms. Geckle, who already worked in the Department of Radiology, had an interest in broadcast media when she was in school at Drexel. "I wanted to get involved in this project, where the goal was to blend video and a newsroom feel with educational content," she said. When discussions began about the e-learning project, Ms. Geckle knew she wanted to be involved.

"We had our first pilot of this platform last summer (2010), which comprised a ten-week lecture series. Then, in October of 2010, we launched a full 45-week series," she explained. A typical session begins at 7:55 a.m. on the morning of the broadcast, usually Tuesdays. Ms. Geckle starts each broadcast a slide show containing general information that allows the viewers to establish their connection, and then follows with general announcements and the introduction of the speaker. "We switch

(continued on page 2)

Chairman's Corner

Within our Department of Radiology, some things never change. Evidence of the tradition of excellence in clinical radiological diagnosis and image-guided treatment, dedication to discovery and innovation, and commitment to excellence in our teaching programs are evident in every hallway. However, if you haven't been down these halls recently, there are some things that have changed, particularly from the patient's perspective. Over the last several years, there has been a large effort to improve the service excellence at the Johns Hopkins Hospital in order to create a more patient-centered clinical experience, and Radiology is leading the pack. On the main Johns Hopkins Hospital School of Medicine campus, approximately half of Radiology's nearly 1,100 employees are hospital staff providing direct patient services and supporting our clinical mission. We are currently performing an average of 33,000 exams per month, with about 60% of these examinations performed on outpatients.

While the level of clinical care has always been second to none, the "customer service" experience has not always been optimal for patients who require radiological studies. Over the last several years, we have made a real effort to change this, and, in doing so, we have become a model for the rest of the institution. Under the leadership of Administrative Director Marty Bledsoe and Hospital Administrator Peg Cooper, our highly dedicated and creative managers, supervisors, chief techs, and front-line staff have enthusiastically embraced the task of improving the patient experience. The first step was to truly engage the hospital staff in the mission of the department to provide outstanding clinical care and service. We did this in a number of ways, including creating leadership opportunities and training for staff members so that all members of the department would have input into these improvements.

Gallup, the same organization that performs many other sorts of polls, surveys the staff of every department yearly to determine staff engagement. After instituting these new programs, the Department of Radiology stood out from the rest of the Hospital. Not only did we have a 94% survey participation rate, but we also had several areas, including our clinical management team, that scored in the top quartile. Our CT area had such high scores that Gallup came to interview Manager Bea Mudge to determine how they did it. Another area with extremely high scores was our Outpatient Center registration desk employees, also among the leaders in the Institution. A lot of management literature suggests that the key to customer service is having an employed staff that is truly engaged in the mission of the organization. Clearly, that has been our experience in Radiology.

Our leadership and staff created a Customer Service Committee to develop a new strategy for improving our patients' experience. The committee included representatives from all of the different imaging modalities, as well as, physician leaders. This group took their task to heart, creating a new service excellence vision, engaging the leadership of the department, and working to create a cultural shift in the frontline staff by getting them involved in planning

(continued on page 6)

Global Teaching —continued from page 1

to the faculty member's PowerPoint file, and at 8:00 a.m., we broadcast live," she said. There are usually multiple choice questions embedded in the lecture, and the audience responses are loaded into an administrative site. Then, the responses are tabulated and the lecturer can see the responses. When the lecturer is finishing, and thanking the participants, Ms. Geckle flips back to her slide show and there is a two-minute pause that allows participants to formulate and e-mail questions to the lecturer. All this must fit into a one-hour time frame, so any questions that cannot be answered live, will be answered by e-mail.

Dr. Huisman giving his lecture in the e-learning series.

Topics for the lectures include basic radiology as well as more sophisticated radiological problems. "This allows radiology residents from all over the world to benefit from Hopkins Radiology faculty expertise, and provides an opportunity to learn from the best, an opportunity that they wouldn't otherwise have," said Ms. Geckle. She cites Brazil, Poland, Bahamas, and Lebanon among the 20 sites on four continents who are tuning in currently.

Indeed, Dr. Thierry Huisman, Chief of Pediatric Radiology, and a recent lecturer, says, "This will be the wave of the future—a classroom without walls, where everyone can learn, regardless of culture, ethnicity or geography." He went on to say that "we're global, our interests are global and our colleagues are global. This allows people to watch whenever and wherever they want, and we are one of the first to offer this."

Dr. Lewin agrees, saying that "this will increase our impact globally, as well as build a learning community." He explained that Johns Hopkins International is excited about this project, because it will work synergistically with their office and may, perhaps, lead to clinical referrals. In addition, this e-learning initiative will generate income, as participants pay fees for the 45-lecture series. "We hope to offer the program free of charge to developing countries," he said. In the meantime, the program has received philanthropic and industry support, and seems to be a big success already. Ms. Geckle cites plans to evaluate a more formal marketing program, and has also launched a Facebook page. "We were so fortunate to have a studio right here on campus to ensure reproducible production values and all the things that go into a live broadcast like this," she said, and added that "it's been a grand adventure."

Remaining Close to the Hopkins Family

For more than half a century, Adelheid 'Heidi' Donner has maintained an active interest in the life of the Russell H. Morgan Department of Radiology and Radiological Science at Johns Hopkins. She and her husband, Martin Donner, M.D., came to Baltimore in 1957 when Dr. Donner joined the Department of Radiology, first serving as a resident and then joining the faculty. As Chair of the Department from 1972 to 1987, he led the Department of Radiology through three successive waves of technological advances in the imaging field—ultrasound, computerized tomography, and magnetic resonance imaging. His research, over three decades, focused on the radiological aspects of understanding gastrointestinal functions. In 1980, he formed a multidisciplinary research and clinical facility at Hopkins, the first center of its kind in the nation, to study and treat swallowing disorders. From his retirement as Chair, Dr. Donner worked full time at the swallowing center until his death in 1992.

When Dr. Donner was Chair of the Department, Mrs. Donner fondly remembers hosting faculty and residents in their home. She continues to remain close to the Department of Radiology and Johns Hopkins University, maintaining friendships with faculty members, providing generous support, and attending events.

Both Heidi and Martin Donner were born and raised in East Germany, and lived through the Nazi Regime and challenging times during World War II, when their families had to deal with the effects of the Russian occupancy after 1945.

Mrs. "Heidi" Donner

They met in 1949 at the wedding of Martin's best friend and Heidi's cousin. Dr. Donner was a fourth-year resident in internal medicine at the University of Leipzig. Mrs. Donner had graduated from the School of Foreign Languages in Leipzing with an interpreter's diploma in English. She had a job waiting for her in the American-occupied city of Frankfurt and planned to cross the then-existing border to the west. Three days after meeting at the wedding, Heidi promised Martin that she would return to Leipzing and turned down the position. Martin then helped her get employment in a pediatrician's office until they both decided to flee to the west. They were married in Bonn in 1951. Dr. Donner, who had completed five years in internal medicine in Leipzig, then completed four years of residency in radiology in Bonn and Cologne.

When Dr. Donner was offered an opportunity to be a radiology fellow at City Hospital in St. Petersburg, Florida, the couple and their oldest daughter Cornelia came to the United States. After his first year, Dr. Donner remained at City Hospital to complete a one-year fellowship in general medicine and served another year as chief resident. Their second daughter Stephanie was born in St. Petersburg, and is now a pastry chef in Baltimore.

Dr. Donner wanted a career in academic medicine and was pleased to move to Johns Hopkins. In order to get his American credentialing, he was required to repeat his residency training at Hopkins. Mrs. Donner reflects happily on their experiences at the institution, commenting that "Martin loved Johns Hopkins and knew that he did not want to return to Germany." She remembers accompanying her husband on interesting trips abroad, including to Iran in 1972, to London in 1974, and to Oxford in 1988, where Dr. Donner advised other institutions on their radiology programs.

Their third child Tom was born in Baltimore. Mrs. Donner spent most of her time raising their three children. In addition, she served as a docent for the Maryland Historical Society for more than 25 years where she enjoyed leading school tours.

Two of the Donners' children have Johns Hopkins connections. Daughter Cornelia is married to Stephen McClain, Ph.D., who served as vice provost for academic planning and budget for Johns Hopkins. Cornelia and Steve moved to Germany in 2000 when he started the University's European Office in Berlin. The program concluded after five years, but they remained in Berlin and Cornelia ran an international school.

In fall 2010, Heidi and Martin's son, Dr.

(continued on page 6)

The Design of Biomarkers

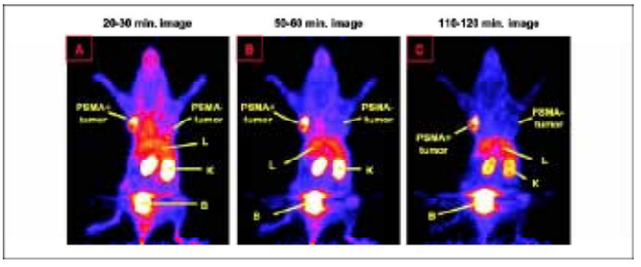
You might wonder how imaging biomarkers are developed. What is the process? What is the target?

Dr. Steve Cho, Assistant Professor of Radiology, can tell you all about it. "There is a huge unmet need for an imaging biomarker for prostate cancer, and I am glad to be involved in developing something that could work," explained Dr. Cho. "What was needed was a biomarker that could differentiate indolent from aggressive prostate cancer phenotypes." Working with Dr. Martin Pomper, Dr. Cho is clinically translating a novel small molecule prostate specific membrane antigen (PSMA)-based positron emission tomography (PET) imaging biomarker, developed in Dr. Pomper's laboratory, called N-[N-[(S)-1,3 dicarboxypropyl]carbamoyl]-4-[18F] fluorobenzyl-L-cysteine, or DCFBC PET. "DCFBC PET will optimize functional PSMA prostate cancer imaging because, as a small molecule, it enables greater tumor penetration and rapid blood clearance, it targets the more accessible external binding domain of PSMA, and PET imaging allows for quantitative higher resolution imaging. It is also clinically practical because it has a half-life of two hours," said Dr. Cho. He explained that PSMA is present in low levels in the brain, in kidney cells, and in the normal prostate. But, when prostate cancer is present, the levels of PMSA rise dramatically, and these levels are a strong indication of outcome. In addition, PMSA reports on androgen signaling, and that is the most important target.

DCFBC team members, from left to right: Akimosa Jeffrey-Kwanisai, study coordinator; Dr. Steve Cho; Jeannie Peters, PET technologist; and Corina Voicu, Head PET technologist.

Dr. Pomper added that he had the idea to use low molecular weight agents to image PSMA in 1996. Since that time his group has developed a library of agents that utilize a variety of modalities, focusing on radiopharmaceuticals and optical agents. "Most recently, in collaboration with Dr. Zaver Bhujwalla, we developed a PSMA-targeted theranostic agent. We have also collaborated with the PET center, as well as with chemists who were dedicated to the idea of PSMA imaging. Dr. Ronnie Mease led the effort to develop a synthesis that would enable us to image human subjects. Drs. Mario Eisenberger and Michael Carducci in oncology, and Ron Rodriguez in urology, also helped with the initial PET studies by finding eligible patients. With Dr. Alan Kozikowski, then at Georgetown University, we patented the urea-based series of PSMA imaging agents in 2003," he said. He added that, "we expect to develop further optical and dual modality agents in the near future. However, those compounds may prove more difficult to translate than the radiopharmaceuticals with which we are working now.

Dr. Cho said that, "the multidisciplinary and translational aspects mean that there are many steps from bench to bedside for these compounds, which requires expertise and collaboration on many levels. There is the radiolabeling, the radiotracer development, the pre-clinical testing in animals, conducted by Drs. Ronnie Mease and Catherine Foss and pre-clinical toxicology, which NIH does not generally fund. However, in this case, we received a grant from a special NIH program that paid for the considerable cost of the pre-clinical toxicity studies." The next step was adaptation of the synthesis originally performed for animals to current Good Manufacturing Practice (cGMP), which is the standard needed for human studies. The Johns Hopkins PET Center, under the direction of Dr. Robert Dannals, has developed many radiopharmaceuticals according to cGMP and his oversight, along with that of Senior PET Chemist Daniel Holt, proved critical to the successful clinical translation of DCFBC. To meet cGMP requirements one must address a set of regulations promulgated by the U.S. Food and Drug Administration, and require that manufacturers, processors, and packagers of drugs, medical devices, and blood take proactive steps to ensure that their products are safe, pure, and effective. There are many, many regulatory issues involved, but once that hurdle is overcome, there is the FDA approval. Dr. Cho said that, "We needed help at several points in the process, and we got it from various people in the department, including the crucial support and encouragement from Dr. Lewin and Dr. Richard Wahl, as well as from a few outside sources."



Mouse prostate tumor model demonstrates 18F-DCFBC radiotracer uptake in a PSMA-expressing left flank prostate tumor.

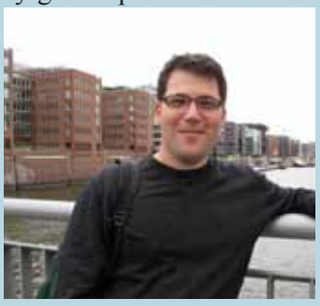
Some funding came from RSNA, when Dr. Cho, with Dr. Pomper's support, applied for and received a Research Scholar Award that provided salary support. There was also support from the Prostate Cancer Foundation.

"All of these organizations were incredibly

(continued on page 8)

A New Use for MRI

Dr. Clifford Weiss is pioneering a new way to treat low-flow vascular malformations using MRI. A low-flow vascular malformation is a growth that consists of large veins, which can result in bleeding, pain, or disfigurement. He explained that, "venous and lymphatic malformations are congenital lesions that are usually treated by the interventional radiologist with ultrasound and x-ray fluoroscopically-guided percutaneous sclero-



Dr. Clifford Weiss

therapy." But, this combination doesn't work for every patient. Lesions that are deep in the body, covered by scar tissue, or under bone are not easily seen with ultrasound, and there is the issue of radiation exposure because of the need for multiple treatments.

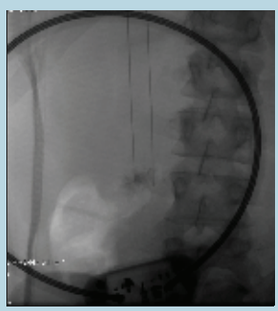
"With MRI, low-flow vascular malformations can be seen easily, at any depth, regardless of overlying scar tissue," said Dr. Weiss. He went on to say that, "MRI enables accurate, real-time needle targeting with simultaneous visualization of surrounding critical structures. For patients with lymphatic malformations, this means that we can treat them on the table with doxycycline, without moving them to fluoroscopy. We can do it all in the MRI suite."

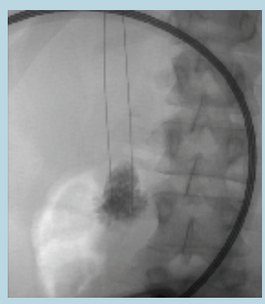
For venous malformations, which were difficult to treat with ultrasound, this method offers another option. "These types of malformations can now be targeted and treated under MR. We first target the lesions using real-time MRI guidance, then inject the lesions through the access needle with dilute gadolinium contrast under MR to assess for draining veins. Then, we transfer the patient to the in-room X-ray angiographic system using a Miyabi table, where we inject angiographic contrast to confirm the MR findings. The patients can then be treated on the angiographic table under fluoroscopic control. So far, we've had an 80-85% success rate," said Dr. Weiss.

The idea for this method of treating vascular malformations originated with Dr. Lewin when he was working at Case Western Reserve University in Ohio, in 1997. He published two papers detailing this technique in 1999, 2004, and 2005, which generated much interest in the community. And, in fact, when he first took over here as Chairman, *USA Today* and a number of other news publications ran stories based on their 2004 manuscript. Dr. Lewin explained, "Patients come from far and wide for this procedure, because it most benefits the toughest patients, those who have had failed treatments previously, or those with other issues that make treatment difficult or impossible with ultrasound." He added that "marrying the unique advantages of interventional MR and minimally invasive therapy has proven its potential in a wide array of procedures." He also said that he wanted someone to manage this program at Hopkins to "run with it, as well as expand it," and Cliff Weiss has done just that. "I worked with Cliff to shorten the learning curve on this technique to streamline the workflow for MR-guided procedures. Cliff has done a wonderful job of taking this treatment to the next level."

The Miyabi suite.

"Basically, we used equipment that was already here, with the help of a great team that included Wes Gilson and Aaron Flammang from Siemens, as well as our nurses, technologists, and all the people required to set up a clinical program," said Dr. Weiss. In the future, he hopes to develop better pulse sequences for different stages of malformations and, eventually eliminate the use of fluoroscopy. He praised the fact that with this method, "MRI lets me see—in real time—the vascular anatomy, as well as giving me a more detailed picture of surrounding structures." And, pictures tell the story, especially in radiology.



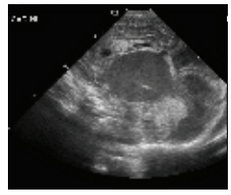


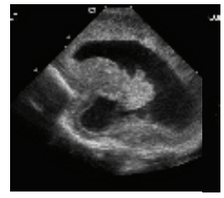
After Miyabi transfer to Artis angiographic system, contrast injection through the inserted needles confirms the multiloculated nature of the venous malformation.

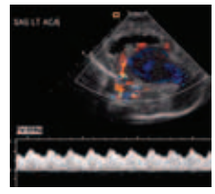
Case of the Quarter

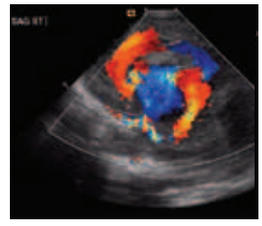
Clinical presentation:

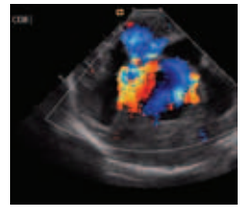
- Newborn with high-output cardiac failure
- Twin gestation born at 34 weeks
- Hydrops fetalis
- Hemangiomas in chest, abdomen, arms, and legs











Six images from transcranial ultrasound

What is the diagnosis?

See page 6 for the answer...

Donner—continued from page 3

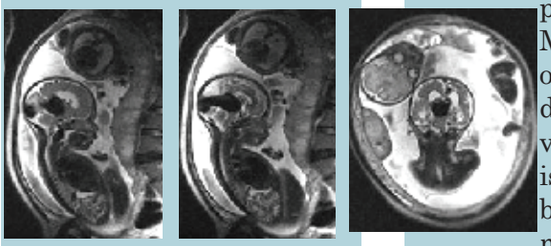
Tom Donner, became an associate professor in the Johns Hopkins Department of Medicine and the acting director of the Johns Hopkins Comprehensive Diabetes Center. Dr. Jon Lewin commented, "We are delighted that the next generation of Donner physicians has joined the Johns Hopkins family." Prior to coming to Hopkins, Tom was the Director of the Joslin Diabetes Center affiliate at the University of Maryland Medical Center and a member of their faculty for 24 years. Tom's wife Danielle is the daughter of George P. Saba II, M.D., who trained in radiology at Johns Hopkins and served as a member of the radiology faculty and as acting chairman. Danielle is an artist specializing in children's portraits.

Dr. Lewin commented, "I am pleased that Heidi Donner remains close to the Department and am truly grateful for her continued generous philanthropic support of our mission. She and Dr. Donner have played significant roles in the success of our Department, and I am honored to build on her husband's legacy by serving as the Martin W. Donner Professor of Radiology."

Case of the Quarter—continued from page 5

Answer: Vein of Galen malformation

Ultrasound Findings: Midline, vascular "mass," compressing the 3rd ventricle, leading to hydrocephalus. Mass shows low resistance wave-form pattern on color Doppler imaging.



In Utero MR Imaging

MRI Findings: SSFSE sagittal and coronal images in utero show a large intracranial midline signal void from the malformation. Note twin gestation, and hydrops and cardiomegaly of the affected twin.

The vein of Galen malformation develops during weeks 6-11 of fetal development as a persistent embryonic prosencephalic vein of Markowski (vein of Markowski drains into the vein of Galen). It is characterized by aneurysmal malformation with an arteriovenous shunting of blood, and causes high-output heart failure, which results from decreased resistance and high blood flow in the lesion.

Chairman's Corner—continued from page 2

the initiative. They created a campaign in which over 350 Radiology employees were trained on staff engagement and service standards, including interactive workshops, self-assessment tests, and a highly acclaimed homemade video showing one patient's experience in Radiology in a very humorous worst-case scenario and in a much more satisfying best-case scenario. The managers involved their entire teams in determining how customer service could be improved. The group also recognized outstanding service through awards and public recognition.

In addition to spreading best practices, the Customer Service Committee began handing out Radiology thank-you cards to each patient after an outpatient encounter, including the signature of each healthcare provider who "touched" the patient during their visit. The group created lapel pins reminding the staff to ask, "Is there anything else we can do for you today?" and physician and management leaders began "environmental rounds," periodically interviewing patients to identify ways to improve their experience. These discussions led to improvements that included removing clutter and improving signage, training staff on actions to take when there are problems, developing scripts for the staff to improve patients' first and last impressions, and creating more accountability with one-on-one education and personalized performance plans for anyone whose service performance was below our newly increased expectations.

What are our outcomes? Not only are our objective measures of patient satisfaction that the hospital collects continually increasing, but more importantly, the number of specific compliments that I receive has skyrocketed over the past two years. The thank-you notes with each care provider's name makes it easier for patients to acknowledge excellent service, and I now get letters weekly that specifically name front desk patient care coordinators, technologists, nurses, and physicians who have made a patient's visit a satisfying experience. I also hear about our significant transformation from other physicians and Hospital management who have passed through our department as patients. In fact, I have almost entirely replaced my old complaint file with a rapidly-growing file of compliments.

It is said that imitation is the sincerest form of flattery. Many of the innovations that our Radiology staff developed have now been disseminated to the rest of the institution, with thank-you notes, pins, and other Radiology Department innovations now seen throughout the Outpatient Center. No longer do patients have to experience poor customer service in order to benefit from the outstanding clinical care of Johns Hopkins Hospital. I am proud to have been involved in this program, and I believe that all of our radiologists can appreciate the value of this change in our departmental culture. I hope that you don't find yourself a patient in our department. However, if you do need to make an imaging visit, I am confident that you will be impressed with the changes we have made. Have a wonderful summer, and I look forward to our next opportunity to meet.

—Jonathan Lewin, M.D.
Martin Donner Professor
and Chairman

Another New Use for MRI

In another expansion of the use of MRI, Dr. John Carrino, in musculoskeletal radiology, is performing cutting-edge musculoskeletal interventions. "We're extending the scope of practice for MSK, although MRI was firmly

Dr. Jan Fritz

entrenched for MSK imaging of bone, joint, and soft tissue processes," said Dr. Carrino. He and his team have developed a new system, called "Image Overlay," an augmented reality system for MRI-guided needle placement for biopsies. "This is a way to take the current install base of an MRI system and convert it so that it's suitable for interventional procedures, as opposed to some special navigation systems," he said.

Again, as in the article elsewhere in this newsletter about Dr. Cliff Weiss' vascular malformations work, this MSK methodology is an extension of Dr. Lewin's work prior to his arrival in our department. But it is also a continuation of Dr. Carrino's work that he began at Harvard.

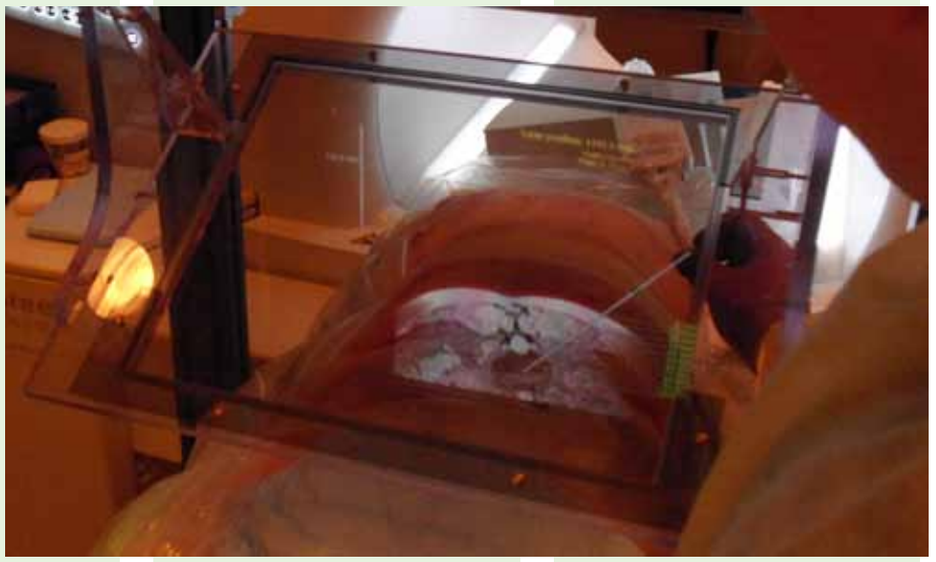
"I was working on MR interventional MSK before I came here, and when I met Dr. Lewin at an interventional MR meeting, he recruited me to Hopkins," explained Dr. Carrino. He went on to say that, clinically, this system can aid in depicting disease and in targeting therapy. "There was a paucity of MR-compatible needles for biopsy use, and now we have developed some and hope to partner with industry to develop bone and soft tissue needles. With this system, we can see exactly where we are in the body, and not only perform biopsies, but also directly monitor the therapeutic effects of treatment," he said. He cited the work of Dr. Jan Fritz, a third-year resident who performed the accuracy validation experiments on the system.

"This augmented reality system simplifies and increases the accuracy of multiple MR-guided procedures," said Dr. Fritz. "You can actually see where you are inside the patient because the images are projected in such a way that they appear to be inside the patient," he explained (see the accompanying picture with this article).

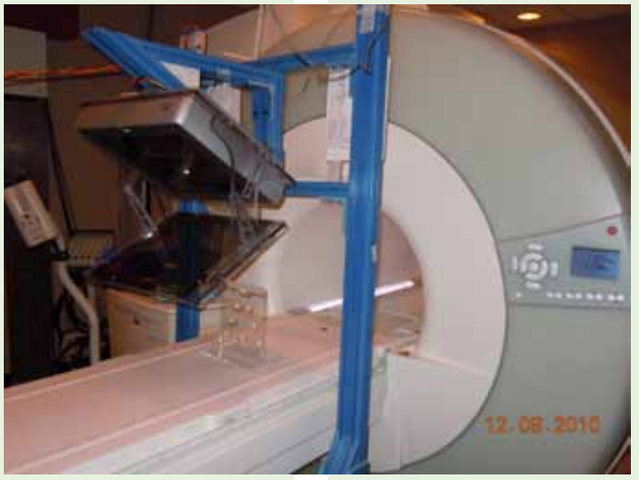
"We tested accuracy on a lumbar spine phantom with several simulated spine injections, and we placed needles in the spinal canal, the facet joints, and spinal nerves, and verified our position," he said. All anatomical targets were successfully punctured in each of these locations. And, with this system, any scanner can now be used for these interventional procedures.

Dr. Fritz, who began his medical training in Germany, wrote his thesis on MR-guided interventional procedures and has performed many such procedures over the course of his training. He has also published several original papers on this topic. His abstract about this system, submitted to the American Roentgen Ray Society (ARRS), won the Executive Council award in the Residents in Radiology category awards.

Dr. Carrino said that what their studies showed, in addition to the validation of accuracy, was that augmented reality systems have the potential to remove the barrier between patient access and high-quality imaging. "Image-Overlay can be used to stream line interventional procedures, and we plan to further expand the capability of this system by constructing a multidirectional Image-Overlay to perform interventions using oblique sections," he said. Watch for continuing innovation in these patient-focused endeavors.



Intra-procedural photograph of an augmented reality-guided cadaveric lumbar discography using the Image-Overlay system.



Frame-mounted Image-Overlay system prototype in conjunction with a clinical 1.5 T MR scanner (Magnetom Espree, Siemens Healthcare, Erlangen, Germany).

Biomarkers—continued from page 4

supportive, not just financially, but on a personal level as well. RSNA provided workshops in

Dr. Steve Cho with his family.

clinical trials methodology, and Jonathan Simons of the Prostate Cancer Foundation was unstinting in his encouragement. Dr. Pomper gave me free rein to do what needed to be done, and generously offered help and support when I needed it," said Dr. Cho. He also cited the dedicated work of his study coordinator, Akimosa Jeffrey-Kwanisai, who worked tirelessly to help obtain IRB and FDA approval.

Dr. Pomper said, "They will soon begin to develop new molecular imaging agents at the Center for Translational Molecular Imaging, a 4500-square foot facility under construction at the Johns Hopkins Bayview campus, and will continue to deal with the difficulties of obtaining the funding necessary for the translation of these agents. It's a long and tedious process, but worth it, especially when we see the results." The results of the trials of DCFBC PET seem to be extremely promising.

It's been a long road for Dr. Cho, who was born in Seoul, Korea, and came to Queens, New York, at the age of five. He was a Johns Hopkins University undergraduate student, studying biology, and then went to New York University for medical school. He began his medical life as a pediatrician, with residencies in hematology and oncology. Then, a clinical pharmacology fellowship at NIH in drug development for pediatric oncologic applications made him realize that that was what he wanted to do. He also recognized that molecular imaging would play a critical role in this field, so he became a nuclear medicine resident and fellow at Hopkins, and in 2007 joined the faculty. During his time in Baltimore, he says, "I met a Baltimore girl and stayed." He and his wife have two children, Jeremy and Natalie. Dr. Cho wants to continue his work because he believes strongly that "these agents work, and can make a real difference in the lives of patients."

Ways to Give...

For those interested in making a tax-deductible contribution in support of any program or research project in the Russell H. Morgan Department of Radiology and Radiological Science, please contact the Development Office at 410-516-8986 or jkeene1@jhmi.edu or visit www.hopkinsradiology.org.

RADIOLOGY *report*

is published twice a year by the Russell H. Morgan Department of Radiology and Radiological Science of the Johns Hopkins University

www.hopkinsradiology.org

Jonathan Lewin, M.D.
Martin Donner Professor and Chairman

JOHNS HOPKINS MEDICINE