

RadiologyUpdate

THE RUSSELL H. MORGAN DEPARTMENT OF RADIOLOGY AND RADIOLOGICAL SCIENCE

Residency Program Evolves with Exciting New Options

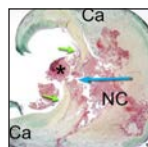
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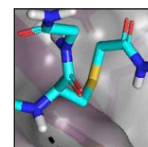
Lilja Solnes (foreground) is co-directing the new residency program in molecular imaging.



Investment in the Next Generation
Alumni give back.
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Illuminating Views of Plaque
MRI provides insights for stroke prevention. P. 8



A Better Measure for Immunotherapy
Improved imaging could help fine-tune treatment.
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CHAIR'S MESSAGE

A Year of Continued Accomplishments

It's amazing how quickly this year has flown by! In preparing to write this column, I reviewed my "Chair's Message" from last year's newsletter, written soon after I stepped into the role as interim director of the department. With the hope of making the most of my time in this role, I defined mission-related goals for FY 17, and I am thrilled with what we have accomplished as a team in our commitment to the tripartite mission:

Clinical

- Our department saw the biggest expansion in its history, as we purchased two new outpatient imaging centers in Columbia and Bethesda, and created a new community radiology division in the national capital region to provide radiology services at Sibley Memorial and Suburban hospitals. We are no longer just a radiology department: We are truly a radiology health system, providing integrated radiology services across four hospitals and four outpatient imaging centers. We could not do this without dedicated faculty and staff members. Marty Bledsoe, Peg Cooper and their talented team of managers worked unbelievably hard this year to deliver excellent radiology services across all of our venues.
- We successfully migrated to Carestream PACS and implemented Epic across the enterprise, thanks to the tireless work of our information technology division under the leadership of Charlene Tomaselli.
- To address challenges in MRI, Ihab Kamel, Peg Cooper and Cheryl Shoats expanded MRI hours at all sites, including implementing some 24-hour shifts. These changes will serve to expedite diagnoses and reduce length of stay for our inpatients.
- Sheila Sheth was appointed director of quality reporting and has already implemented a process to standardize our clinical report recommendations based on best practice and evidence-based research. Her initiatives will improve patient care quality and safety while reducing wasteful practice.
- Dave Yousem added to his current roles as vice chair of faculty development and assistant dean to spearhead a quality and

safety committee, with representatives from each division collaborating on this important work. In the coming year, I plan to appoint a vice chair of quality to ensure excellence in quality and safety in radiology.

- Sherrie Friedman and her team worked tirelessly to fix significant billing issues created by the Epic launch. She continues to work with faculty in each division to improve communication.

Research

- Zaver Bhujwala was appointed vice chair of research and has re-energized our research divisions. Zaver and I worked together to provide both bridge and gap funding for our talented scientists and physician-scientists.
- Under the skillful guidance of Alex Galea, we completely rebuilt the radiology research administration office. This was a massive effort, which resulted in increased research spending, decreased deficit balance and a decrease in unsupported salary. Alex also identified over \$1.3 million of research surpluses that were transferred back to faculty accounts.
- Elliot Fishman and I forged a new collaboration with the Emerson Collective foundation to fund cancer research across the school of medicine. This year, the Emerson Collective provided support to eight researchers, with funding totaling \$1.6 million. I am delighted that the foundation selected Zaver Bhujwala as one of those recipients. Research funding has become increasingly competitive, but we continue to be highly successful in procuring grant funding to support the important research being conducted in our department.



Dr. Karen M. Horton

- To help our new investigators succeed, Shadpour Demehri and George Sgouros established a new process for pre-submission review of their grants.
- In addition, we launched a deep learning initiative within the radiology department to explore the potential of artificial intelligence related to medical imaging.

Education

- Pam Johnson was appointed vice chair of education, and we launched our training program in molecular imaging this year. Kelvin Hong and Pam also created an interventional radiology training program to begin matching next cycle, under the direction of Doug Yim.
- Our nuclear medicine residency program held on to its #1 standing in the U.S. News rankings, under the leadership of Lilja Solnes. Radiology remains ranked in the top four, and Pam Johnson was recognized by Aunt Minnie as the Most Effective Educator.
- In the radiology residency, Pam launched a personalized education initiative by creating special distinction tracks in quality improvement, research, education, health policy, entrepreneurialism and high-value care. This ensures that each resident has a more individualized experience during training, in line with each resident's professional aspirations.
- Atif Zaheer, director of our global education eRadiology platform, advanced this resource beyond expectations and is providing a comprehensive education program to radiologists in Ethiopia.

Innovation

- Bringing transparency to the department has been a major priority and was achieved with a new compensation plan and bonus structure based on uniform metrics. It is important to me that our faculty members understand the business of radiology and that compensations are fair and equivalent across genders.
- Under the guidance of Monica Pearl, we launched an initiative to focus on the faculty experience to bring back the “joy of medicine.” With champions in each division, Monica has worked to set up a variety of faculty appreciation events and activities, and to organize several charity events to increase our contributions to the community.
- Radiology has emerged as the leader of high-value health care in the institution and on a national scale, with Pam Johnson co-chairing the health system’s high-value care committee, creating an alliance of 80-plus academic medical centers in the U.S. and Canada, and directing a national conference here at Johns Hopkins in October 2017.
- Tom Marshall and Lacey Sen have done fabulous work to market our talents to patients and providers, and highlight the exceptional quality of faculty, technologists and staff members.
- Development officer Christie Vera and I worked together to identify philanthropic sources that are critical to support our faculty and staff in their education and research missions.

I have learned so much in the role as interim director and remain committed to supporting our faculty and staff in their professional endeavors. This has been an incredible experience, and I am so proud of the department. I feel a new energy within the department and a real commitment to embrace the future.

—Karen M. Horton, M.D.
 Professor and Interim Director
 The Russell H. Morgan Department of Radiology
 and Radiological Science

Mr. Johns Hopkins changed the course of history with one bold stroke of his pen by signing a will that would create The Johns Hopkins University.



What Will Your Legacy Be?

Your support ensures the future of the Russell H. Morgan Department of Radiology and Radiological Science. Consider these opportunities to leave a meaningful legacy while taking into account your personal goals.

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Gifts that cost nothing in your lifetime.

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Receive annual income and an immediate tax deduction with a charitable gift annuity or charitable remainder trust.

To learn more about these and other creative ways to support the Department of Radiology and Radiological Science, contact:

Christie Vera
 Senior Associate Director of Development
 Russell H. Morgan Department of
 Radiology and Radiological Science
 443-287-7958 | cvera3@jhmi.edu
rising.jhu.edu/giftplanning



Seek advice from a tax professional before entering into a gift annuity agreement. Johns Hopkins gift annuities are not available in all states.

High-Value Care: **Upcoming Events**

Over the last few years, Johns Hopkins clinicians and researchers have taken the lead nationally to promote high-value care—a movement to improve quality and safety by reducing unnecessary practice while simultaneously reducing costs.

In March 2017, Johns Hopkins was one of eight institutions recognized by the Leapfrog Group for its “tireless journey of improvement, with one project after another leading [Hopkins] to even greater achievements in quality and efficiency.” And in 2016, faculty from more than 80 academic medical centers joined the High Value Practice Academic Alliance (HVPAA), a new national organization led by radiologist Pamela Johnson, hospitalists Lenny Feldman and Amit Pahwa, and Vice Dean for Education Roy Ziegelstein. The mission of the HVPAA is to advance high-value health care through collaborative quality improvement, research and education.

October 8, 2017: “Ordering Wisely”/ Continuing Medical Education Course

The Department of Radiology will host “Ordering Wisely” in Baltimore for nonradiology providers. This continuing medical education course will focus on best practice imaging selection and will feature Johns Hopkins radiology experts discussing appropriate image ordering for:

- Screening (coronary artery, aortic aneurysm, lung cancer, colon cancer)
- Breast imaging
- Joint and extremity pain
- Abdominal imaging (incidental findings on CT, abdominal pain, pelvic pain in women)
- Neuroradiology (headache, low back pain, dizziness, TIA)

Find out more information and register online at: hopkinsmedicine.org/radiology/news-events/order-wisely.html.

October 9, 2017: High Value Practice Academic Alliance/National Research and Education Symposium

The inaugural symposium will be held in Baltimore. The HVPAA symposium will feature the innovative work of 50-plus academic medical centers, and include 100-plus poster and podium presentations of projects that have safely reduced unnecessary health care practice. Learn more and register at bit.ly/hvpaa17.

Rapid Growth Extends to Washington, D.C., Metro Area

WITH THE PURCHASE in February 2017 of a community radiology center in Bethesda, Johns Hopkins Medical Imaging has continued on its trajectory of rapid growth.

The full-modality outpatient imaging center is staffed by 14 newly hired radiologists who have joined the Johns Hopkins medical faculty as clinical associates, says Marty Bledsoe, administrator for the Department of Radiology and Radiological Science and president of Johns Hopkins Medical Imaging.

In addition to adding the Bethesda location, in spring 2016, the group acquired and opened an outpatient radiology center in Columbia, next to Howard County General Hospital. “That center has already grown by more than 60 percent since we opened,” says Bledsoe.

He notes that Johns Hopkins Medical Imaging now provides integrated radiology services across four hospitals (The Johns Hopkins Hospital, Johns Hopkins Bayview Medical Center, Sibley Memorial Hospital and Suburban Hospital) and four community outpatient centers (White Marsh, Green Spring Station, Columbia and Bethesda).

“They all operate on a single IT platform, which means an image captured at one site can also be read by radiologists at any other site,” says Bledsoe. “For complex cases, this gives radiologists at the community outpatient centers and hospitals access to the academic radiologists at the hospitals in Baltimore.”

He adds, “Bringing on the new center in the Washington, D.C., metro area means we will now be reading a total of more than 1 million exams each year.”

Karen Horton, interim director of the Johns Hopkins Department of Radiology and Radiological Science, is excited by the growth. “We are no longer just a radiology department,” she says. “We are truly a radiology health system providing integrated radiology services across Baltimore and Washington, D.C.” ■



Bethesda



White Marsh



Columbia



Green Spring Station

Johns Hopkins Wins 4 Minnie Awards

THE DEPARTMENT OF RADIOLOGY is the winner of four prestigious industry awards—the Minnies—which recognize excellence in radiology. The department received 2016 Minnies honoring administrative leadership, effective educational programs, technologist training and cutting-edge mobile technology development.

AuntMinnie.com is the premiere online news, information and education website for the medical imaging industry. Candidates for the Minnies are selected from nominations submitted by members of AuntMinnie.com, and winners are chosen through two rounds of voting by expert panelists. AuntMinnie.com has awarded the Minnies every year since 2000.

“The Minnies are like the Oscars of radiology,” says Karen Horton, interim director of the Department of Radiology. “It is an amazing honor having our department receive four Minnie awards this year. This certainly highlights the incredible work and dedication of our faculty and staff.”



2016 Minnies for the Johns Hopkins Department of Radiology:

- Most Effective Radiology Administrator/Manager—Marty Bledsoe
- Most Effective Radiology Educator—Pamela Johnson
- Best Radiologic Technologist Training Program—Schools of Medical Imaging at Johns Hopkins
- Best Radiology Mobile App—CTisus Critical Diagnostic Measurements in CT, Elliot Fishman

Read more about the award recipients,
visit: bit.ly/HopkinsAuntMinnie

CONVERSATION SERIES 2016–2017

Leading Change: Perspectives from Outside of Medicine

It's been a tremendous opportunity for us to learn from people who work in completely different areas but who are on the same page with us in wanting to deliver the best to our customers.

—Elliot Fishman, M.D.

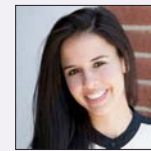
THE RUSSELL H. MORGAN DEPARTMENT OF RADIOLOGY AND RADIOLOGICAL SCIENCE presented the fourth installment of the series “Leading Change: Perspectives from Outside of Medicine.” The series invites business leaders to speak to the Johns Hopkins community about their expertise offering high-quality services and experiences to customers, and how that can be translated to medicine.

Over the past four years, the series has brought speakers from diverse backgrounds to Johns Hopkins, including Jen-Hsun Huang (CEO and co-founder, Nvidia), Dr. William Brody (president, Salk Institute, and former president, The Johns Hopkins University), Ed Catmull (president of Walt Disney Animation Studios and Pixar), Anna Griffin (senior vice president of corporate marketing, CA Technologies), Horst Schulz (former CEO, Ritz-Carlton, and current CEO, Capella Group), Marla Kaplowitz (CEO of MEC Inc.) and Keith Grossman (publisher at Bloomberg Media). The speakers in the 2016–2017 series who represented a wide range of professional experience are listed at right.

We welcome your attendance at future lectures. **For more information, please contact Kia Harris at 410-955-5173 or kiaharris@jhmi.edu.** ■

All lectures are held in Chevy Chase Bank Auditorium located in the Sheikh Zayed Tower, 1800 Orleans St., Baltimore, Maryland 21287. The conversations start promptly at 5 p.m. and are followed by a question-and-answer session.

2016–2017 Lecture Series:



Trina Spear

President & Co-Founder of FIGS
“Transforming the Healthcare Experience: Doctors, Nurses, Patients and Beyond”



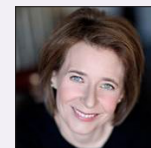
Jenny Abramson

Founder & Managing Partner of Rethink Impact
“Cost of Unconscious Bias & Pattern Recognition”



Marissa Freeman

Vice President of Global Brand & Advertising at Hewlett Packard Enterprise
“What’s in a Name? Understanding the Brand Experience”



Christy Tanner

Senior Vice President & General Manager at CBS News Digital
“How Technology Is Changing News and Our Culture”



Dr. Elias Zerhouni

President, Global Research and Development at Sanofi; former director of NIH; and former director of the Johns Hopkins Department of Radiology
“From Academia to Government to Industry: Lessons I Have Learned”



Dr. Steven Gipstein

Worldwide Healthcare Marketing and Market Development, Apple
“Apple in Healthcare: Empowering Patients”

Illuminating New Views of Plaque

MOST ARE FAMILIAR with atherosclerosis from heart disease, but it is also a primary cause of strokes and neurological conditions like dementia and Alzheimer's. Regardless of where atherosclerosis happens in the body, however, it is defined as a buildup of fatty, cholesterol-based plaque on the interior walls of blood vessels.

For decades, the radiological technique for analyzing atherosclerosis has relied on luminal narrowing, often by angiography. Johns Hopkins radiologist Bruce Wasserman explains that angiography is helpful, but it has limitations. "Blood vessels can experience plaque buildup long before there is narrowing. Furthermore, angiograms tell us the degree of narrowing but not a lot about the plaque's rupture risk," he says.

So Wasserman has been honing new MRI techniques that are, for the first time, offering an unparalleled view into the arteries and intricate vessels supplying the brain.

His methods are illuminating the very composition of the plaque itself. This is particularly helpful for stroke prevention, since strokes are often caused when plaque grows brittle and ruptures, not simply by narrowing that cuts off blood flow. These vulnerable features of plaque, Wasserman says, are not detectable by traditional imaging. "Low-grade carotid plaque is often unrecognized as a cause for stroke,"

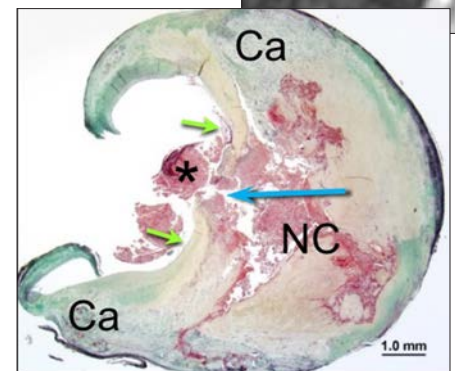
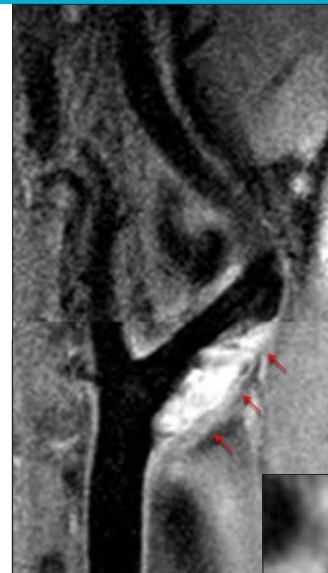
he says, "but its risk is not trivial when considering its very high prevalence in the United States."

The impact of Wasserman's work has been felt most profoundly in decisions to treat plaques causing low-grade narrowing. Previously, vascular surgeons made a decision to treat based on broad standards, such as the 70 percent occlusion cutoff for surgery of the carotid artery. Wasserman's MRI techniques offer more precise guidance for managing plaque for stroke prevention, even for lesions not identified by angiography.

Of course, the carotid artery is large and relatively easy to image. With the intricate, twisted vessels deeper in the brain, the challenge is greater still. Wasserman has nonetheless found ways to peer into these areas as well.

"We can acquire three-dimensional scans of intracranial vessels with very high resolution," Wasserman explains. "This has been enthusiastically received by clinicians, since it offers an unprecedented view to see areas of concern and guide management. Inflammation of the brain's blood vessels, known as vasculitis, for example, can sometimes look like atherosclerosis on angiography, but the treatments are very different."

Wasserman's MRI techniques are also being incorporated into large, population-based studies that are yielding great insights into the risk factors and racial distributions of vascular disease. He has shown, for instance, that the prevalence of intracranial plaque is highest in black men, with approximately half over age 65 in the U.S. estimated to have the disease.



The figure demonstrates the ability to identify a high-risk feature in a carotid plaque, and the pathologic specimen shows a small clot (asterisk) along the surface of this vulnerable plaque.

One factor Wasserman is certain not to overlook is the role Johns Hopkins clinicians play in his research. "Hopkins has this remarkable community of neurologists and surgeons who are excited for our work," he says. "The stroke neurology team has especially helped drive our research to new heights."

Those "new heights" hold the potential to transform the treatment of stroke and other illnesses caused by atherosclerosis, thanks to the work of Wasserman and his colleagues. ■

We can acquire
three-dimensional
scans...this has been
enthusiastically
received by clinicians.

— Bruce Wasserman

A Better Measure for Immunotherapy

AMONG THE HOTTEST FIELDS in cancer treatment today is the burgeoning discipline of immunotherapy. It harnesses the vast power of the body's own immune system to recognize and kill tumor cells to rid the body of cancer. Some promising immunotherapies have raised the hopes of the cancer-fighting community and patients worldwide.

Of course, immunotherapy is not a cure-all. Currently, just 30 percent of cancer patients respond to these cutting-edge therapies. But Johns Hopkins radiology researcher Sridhar Nimmagadda is working hard to improve these odds.

"We are developing better imaging techniques that can tell us much about a patient's likelihood of a positive response to immunotherapies," Nimmagadda says. "We've developed a couple of imaging techniques that can give us that sort of answer in just 60 minutes."

One target has been the protein known as programmed death-ligand 1—or PD-L1—which is present in many tumors. Likewise, the over-expression of PD-L1 is a mechanism by which tumors manipulate the immune system—which should hunt down and kill cancer cells—into inaction.

"We know that patients with high levels of PD-L1 protein expression in the tumors respond well to immunotherapies, so we're working on ways to quickly and more accurately identify who those patients are to get them into treatment," Nimmagadda says.

Standard biopsies, which take a relatively small sample of tissue, have proved limited in this regard. PD-L1 expression varies throughout a tumor: Some regions have high PD-L1, others less. A small sample is not robust enough to truly predict a patient response for this protein.

"A biopsy, therefore, is an incomplete picture and generally gives information on only one lesion. We want to understand PD-L1 expression in all the tumors throughout the entire body, and we want answers quickly and noninvasively multiple times during a

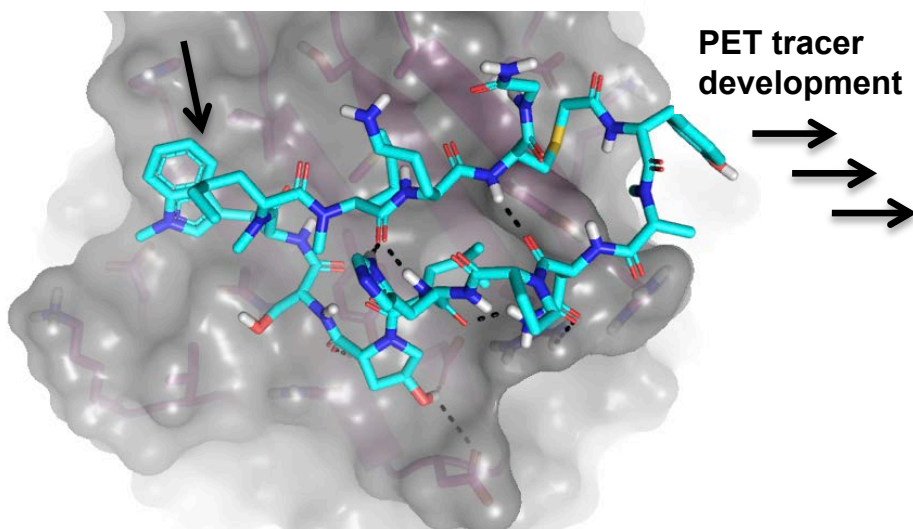
patient's therapy to understand what's working and what's not," Nimmagadda says.

One technique under investigation, which drew considerable attention at the recent annual conference of the American Association for Cancer Research, involves a small-molecule radioactive peptide that can be injected into the bloodstream. The peptides seek out and attach to PD-L1 protein, which can then be picked up in PET scans, providing a clear, whole-body picture of PD-L1 expression in all the tumors. The second technique used a human antibody, a larger molecule, which similarly targets PD-L1, that can be seen in a PET/CT scan.

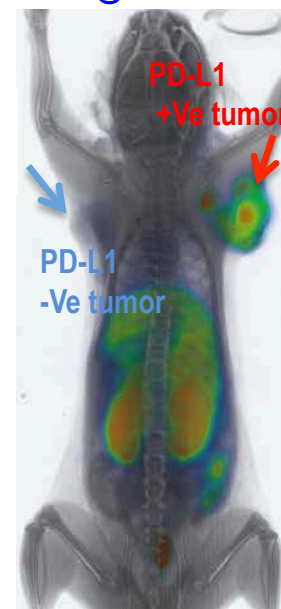
While the techniques have so far been tested only in lab mice, Nimmagadda is optimistic about the future for both. He believes they hold considerable potential for clinical translation to humans, and he is actively seeking funding to support the next steps toward this goal.

"It's very satisfying to offer some hope to these patients," he says, "and possibly save lives through better imaging." ■

Simulation studies show that small peptides bind to PD-L1



PD-L1 detection
@ 60 min



PD-L1 specific PET tracer WL12 provides highly specific PD-L1 PET images within 60 minutes of radiotracer administration.

The Felix Project: ‘This Is Our Moment’

A PANCREATIC CANCER DIAGNOSIS is among the toughest in all of medicine, both for patient and doctor. It is the third most deadly form of cancer. It has a high mortality rate, and most patients receive their diagnoses too late for curative surgery.

“Often, the patient presented with vague symptoms six or nine months earlier, but the tumor wasn’t detected. By the time they receive a diagnosis, 80 percent of pancreatic cancers aren’t resectable,” says Elliot Fishman. That’s why he is helping to head up The Felix Project, an effort to use sophisticated computer programs that teach themselves to read CT scans to look for early signs of pancreatic cancer. The algorithms belong to a branch of artificial intelligence known as machine learning, or deep learning, as it is sometimes called.

Not surprisingly, the work is far from easy. The programs must first be trained to distinguish the pancreas from the other organs of the abdomen. Eventually they will be trained to look for any slight abnormality within the pancreas—a minuscule enlargement, a minor change

in surface texture, a bump where no bump should be—to spot cancers far sooner than humans alone can do.

“We’re not looking to replace radiologists. It’s more like a second reader,” Fishman says. “Our goal is early detection, which means better outcomes for our patients.”

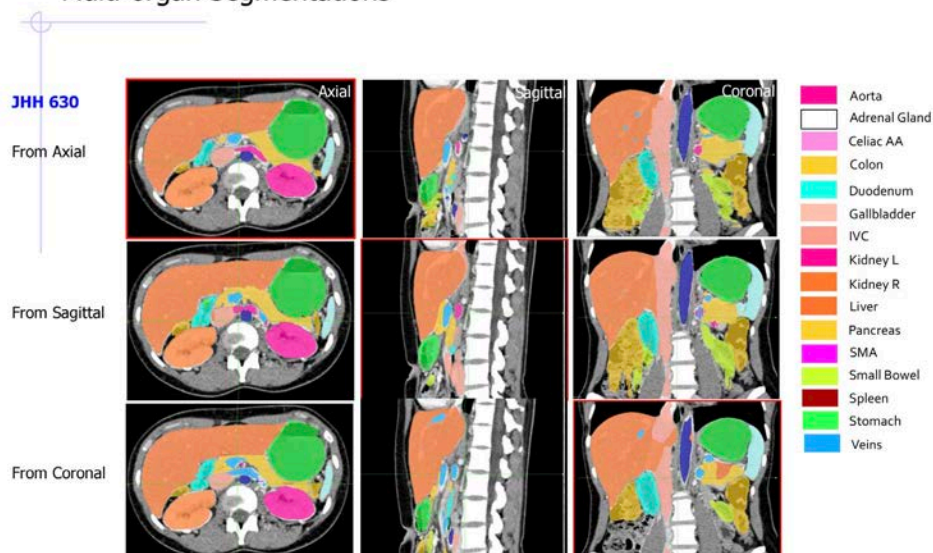
Fishman is not doing it alone. He is part of a group of the best Johns Hopkins has to offer: molecular oncologist Bert Vogelstein, molecular geneticist Ken Kinzler, radiologists Karen Horton and Linda Chu, pathologist Ralph Hruban, and machine learning expert Alan Yuille, who holds a joint appointment in cognitive science and computer science. The team has also tapped into the expertise of leading visual imaging and machine learning companies like Nvidia and Pixar.

“For us, this is the highest priority,” Fishman says. “It’s our Manhattan Project. We meet weekly to chart our progress and make certain we are moving ahead.”

One of the biggest challenges is simply getting the computer to “recognize normal”—a healthy pancreas. “Each ‘normal’ takes three hours to complete, and we need many of them to establish the baseline. So far, we have about 90 percent accuracy in our programs spotting the pancreas on a CT scan,” Fishman says. “That’s good, but we need better.”

For Fishman, the most important lesson in the multiyear, multimillion-dollar Felix Project so far has been perseverance—to press on, regardless. Noting that the project is named after the “felix felicis” potion in the Harry Potter books, which gives drinkers success in everything they do, Fishman says: “This is our moment. It’s a mission to make a difference in people’s lives.” ■

Multi-organ Segmentations



Deep learning is able to recognize critical structures after being trained on 120 normal cases, notes Fishman. “There are a lot of challenges ahead but the work looks very promising,” he says.



Far left: A group of diagnostic radiology residents with Dr. Pam Johnson atop the Dome. Left: A group of diagnostic radiology residents at the Maryland State House.

Residency Program Evolves

TO SUCCEED TOMORROW, today's radiologists must be trained with a remarkable breadth of clinical and leadership skills.

Pamela Johnson, vice chair of education in the Department of Radiology, is the person responsible for leading this critical mission. "We have to keep evolving the program to ensure our residents get the education they deserve," she says.

Johnson points to recent changes in the residency program that are making good on that promise. For example, there is a new interventional radiology residency that provides training in imaging technologies and cutting-edge clinical treatments—stent implantation, percutaneous ablation of tumors, chemotherapy delivery directly into the liver and lifesaving interventions to stop internal bleeding.

"It's a five-year ACGME-accredited program—instead

of the usual four-year residency—where the resident exits with competency in lifesaving interventional vascular and oncologic procedures, as well as cutting-edge interventions used only at the most experienced medical centers," she says.

Another addition to the program in 2017 is the residency in molecular imaging, which provides one new resident each year with dual board certification in radiology and nuclear medicine. Molecular imaging allows radiologists to target specific tissue types as never before. "New molecular imaging agents enable the specialist to spot prostate cancer metastases in a 2-millimeter lymph node," says Johnson, with a measure of pride.

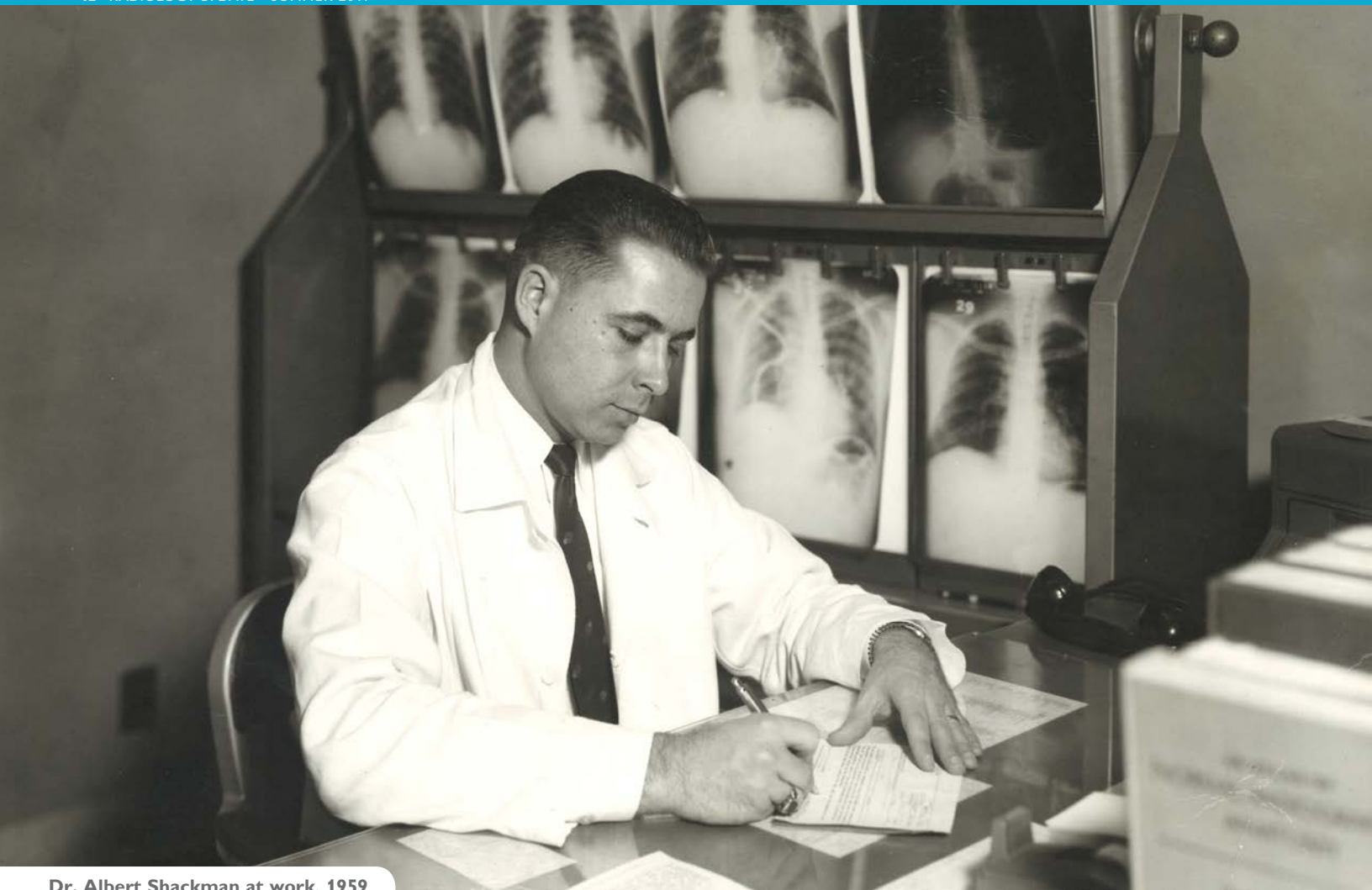
The new program is offered under the direction of Martin Pomper, director of the Division of Nuclear Medicine and Molecular Imaging, and Lilja Solnes, assistant professor. The first resident to match in spring 2016, Roberto Fragomeni, is currently completing his first year of residency. His training includes participation in molecular imaging research throughout the five-year program.

Finally, Johnson highlights the impressive array of programmatic tracks available to new residents. Where once they were forced into a binary choice between research and clinical tracks, today's students now select among several "special distinction" tracks that include quality improvement, research, education, health policy, entrepreneurialism and high-value care.

"Similarly, we recently added a slate of leadership

roles for the residents, designed to advance research, education, quality improvement, innovation and wellness programs within the residency. These opportunities are really important to our residents because they allow them professional development in a range of areas important to the future of radiology while still in training, long before becoming faculty," Johnson explains. "That's central to Johns Hopkins' ability to attract and train the very best talent."

Fortunately, Johns Hopkins' role as a referral center for radiology ensures a continual high volume of complex cases, providing residents with valuable hands-on training in rare cases they would not see anywhere else. "Our program," says Johnson, "is built on a core faculty who are rigorous in their discipline and who just love to teach." ■



Dr. Albert Shackman at work, 1959

Repaying a ‘Deep Debt of Gratitude’

ON AN OTHERWISE-nondescript spring morning, Albert B. Shackman, M.D., F.A.C.R., is dressed for business. Wearing a suit and tie, he saunters the halls of the retirement community he and his wife, Riva, have adopted as their home for the last six years, pointing and waving to staff and neighbors as if mayor of the place.

The strength and balance he maintains through a regimen of yoga and tai chi is on full display. Dr. Shackman’s wit is sharp at 92 years of age, an acuity he attributes, in part, to the clarinet, which he returned to after resigning from his medical practice in 1996. He plays in a 20-piece Big Band, entertaining senior citizens throughout the metropolitan area. He is fond of quoting Plato on music: “Rhythm and harmony find their way into the inner places of the soul.”

When the Shackmans are not busy with their many commitments, they enjoy spending time with their two

daughters, Leslie Fields and Penny Merican, who both live locally.

Dr. Shackman continued to teach at Hopkins until 2015. Officially retired, Dr. Shackman does still, on occasion, provide private consultations to longtime patients. “They tell me they don’t trust those young doctors,” he says with a smile.

As one might expect of an eminent doctor who served at Johns Hopkins since 1950, Dr. Shackman has seen a lot since the days when radiology was a subspecialty of surgery and X-ray film had to be developed by hand in a darkroom.

Those formative experiences and the remarkable technological progress in radiology over the ensuing decades—mammography, ultrasound, angiograms, MRI, CAT and PET/CAT scans—are all reasons he and Riva recently endowed The Riva and Albert B. Shackman, M.D. Fund for Resident Education and Research. Their goal is to ensure that future residents enjoy similar opportunities as he did and will carry on a legacy of inquisitiveness and exploration.

It's also about ideas... ideas that haven't been explored; it takes the brilliance of young people who have the luxury to think, to learn and to experiment.

— Albert Shackman, M.D.

“This fund represents a deep debt of gratitude to Johns Hopkins University, the Johns Hopkins Medical School and Russell H. Morgan, M.D.,” Dr. Shackman says. “But it’s also about ideas. We can’t advance without new ideas, and to dream up ideas that haven’t been explored, it takes the brilliance of young people who have the luxury to think, to learn and to experiment.”

In establishing this fund, the Shackmans say it was important to them to provide radiology residents with the freedom to research, study, publish and travel without financial concerns.

Those are the sorts of opportunities that Dr. Shackman enjoyed over his many years at Hopkins and in private practice. In 1961, he co-founded Drs. Copeland, Hyman and Shackman, which has slowly grown to more than 90 radiologists in 26 locations in and around Baltimore. This radiology practice is now called Advanced Radiology.

He attributes his love of teaching to the guiding hand of Dr. Morgan, the man who became the first full-time chair of the Department of Radiology in 1946, and who recruited Dr. Shackman to Johns Hopkins 67 years ago and served as his mentor throughout Dr. Shackman’s career.

Dr. Morgan also served as dean of the Johns Hopkins School of Medicine from 1971 to 1975.

“Dr. Morgan was universally beloved and a genius who was expert in medicine, physics, engineering, mathematics

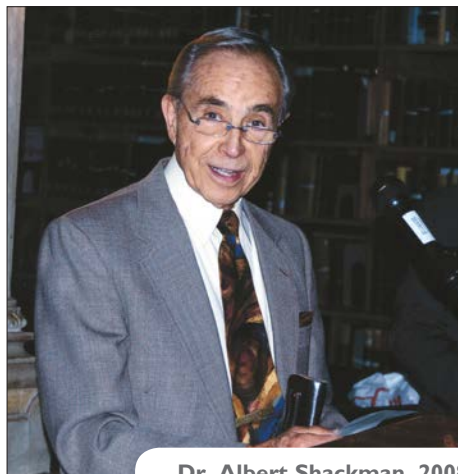
and even music,” says Dr. Shackman. In 1978, Dr. Shackman took it upon himself to approach every chair of the various departments within the Johns Hopkins School of Medicine to get their approval to name the Department of Radiology after Dr. Morgan. When they all agreed, it was Dr. Shackman who convinced Steven Muller, then president of The Johns Hopkins University and The Johns Hopkins Hospital, to come on board. It was the first and only time a department at Johns Hopkins was named for a living individual, and so was born The Russell H. Morgan Department of Radiology and Radiological Science. “I’m very proud of that name. It will live forever,” Dr. Shackman says.

When asked what advice Dr. Shackman would pass on to a young resident just starting a career, he counsels: “Find yourself a good mentor, as I did with Dr. Morgan. Follow his or her advice, explore his or her recommendations, and you will succeed.”

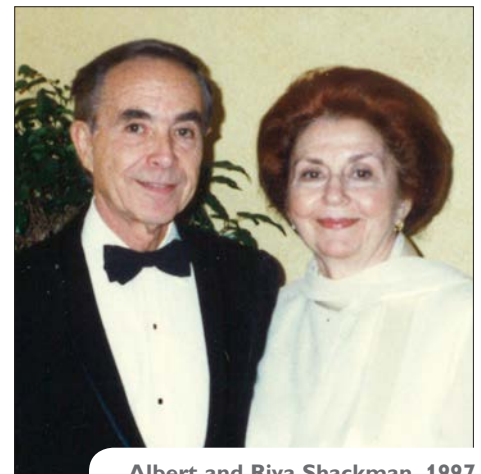
Radiology Interim Director Karen M. Horton, M.D., is deeply grateful to the Shackmans for their generous endowment, which will benefit the department now and in the future. Says Dr. Horton, “Al has been a tremendous mentor throughout his career, and understands firsthand how an investment like his and Riva’s will help to launch the next generation of specialists in our field.” ■



Albert and Riva Shackman, 1992



Dr. Albert Shackman, 2008



Albert and Riva Shackman, 1997

Gift Aims to Attract More Residents to Pediatric Radiology

Dr. Benson holding a portrait of her mentor, Dr. John Dorst



TWO YEARS AGO, pediatric radiologist Jane Benson, M.D., was attending a meeting of the Society for Pediatric Radiology when she was struck by a staggering statistic. One in five of her colleagues in a recent poll was, like her, on the verge of retirement. The figure made her both worried and determined.

Having served as director of the Pediatric Radiology Fellowship Program at Johns Hopkins for 18 years, Dr. Benson knew that those numbers did not bode well for the field. The pipeline was lacking an adequate number of new residents to meet the growing need for radiologists specializing in pediatric care.

So she took action and established The John Dorst and Jane Benson Fund for Clinical Pediatric Radiology Education. This permanent endowed fund will support resident and medical student training in the Division of Pediatric Radiology, especially with regard to patient care.

“You need a critical mass of practitioners for a specialty to stay viable,” says Dr. Benson, who recently retired from Johns Hopkins. “I had an eye toward attracting residents and medical students into pediatric radiology.”

The Fund satisfies two personal goals for Dr. Benson. The first is to honor her mentor, John Phillips Dorst, M.D., who served Johns Hopkins as the first director of pediatric radiology from 1966 to 1990. He was a giant in the field of pediatric radiology and sparked her interest in the specialty when she was a Hopkins medical student in 1980.

“He was the one who recruited me while I was in Cleveland in 1990, asking me to come to Johns Hopkins. Dr. Dorst guided me into my career. It was a small group at the time, just Dr. Dorst, Dr. George Taylor, M.D., and one other faculty member, a fellow, and me, but we grew,” she says.

Dr. Dorst mentored many fellows who went on to have distinguished academic careers. Following in his footsteps, Dr. Benson mentored 17 fellows herself, after achieving formal accreditation in 1998. Dr. Dorst’s educational legacy inspired her second goal of attracting more residents to Johns Hopkins and into the specialty.



Above: Dr. Benson at her workstation.
Left: Dr. Thierry Huisman, Mrs. Marcia Dorst (Dr. John Dorst's widow), Dr. Benson.



“Many residents in radiology think that choosing pediatrics means opting for academics over private practice, but things have changed,” says Dr. Benson. “There are many private children’s hospitals now, and the Affordable Care Act has broadened the reach of insurance coverage to more children than ever before, creating greater demand in new places.” That evolution has her hopeful for the future.

“I’ve always thought that the specialty was interesting and fun, and that colleagues in the field were especially warm and collegial. I want this new endowment to provide the opportunity for some of these radiologists to be invited to lecture at Hopkins, to discuss interesting cases and to socialize with our residents,” she says. “I also want the fund to provide travel stipends for trainees during radiology rotations to visit private or academic children’s hospitals. This way, the residents and medical students can experience a

With many congenital conditions, if you can find the structural problem, you can fix it. That is one of the most rewarding things in pediatric radiology.

—Dr. Jane Benson

variety of practice settings for pediatric radiologists, different from the Hopkins environment.”

The specialty itself has progressed and now affords technical and intellectual challenges that should inspire more people to join the field, Dr. Benson notes. One advance is the continual

improvement in imaging speed and quality, and the ever-shrinking scale of equipment. When Dr. Benson first began performing ultrasounds, “the machines were like Buicks. You had to drive them around. Now, they fit in your hand,” she says.

“Ultrasound is perfect for pediatrics, she says, “because it captures moving targets without using radiation, and it is portable.” Such advances have helped solve some of the more difficult challenges of pediatric radiology, namely getting children to hold still long enough to capture a good image. An MRI or a CAT scan used to require sedation, but now, thanks to rapid imaging and better techniques for preparing children for what to expect, sedation is no longer the norm.

Then, of course, there is the profound satisfaction of helping children in need. “A lot of people think children are just small adults, but they aren’t. Their problems often start with anatomy, not so much acquired illness, as in adults,” Dr. Benson explains. “With many congenital conditions, if you can find the structural problem, you can fix it. That is one of the most rewarding things in pediatric radiology.”

As a doctor, a colleague, a teacher and a friend, Dr. Benson has had a lasting and deep impact upon pediatric radiology at Johns Hopkins. Thierry Huisman, M.D., the current director of pediatric radiology and pediatric neuroradiology at Johns Hopkins, describes Dr. Benson as “both the daughter and the mother of the division.” Now, with the establishment of this educational fund, Dr. Benson will add “grandmother” to her growing, and glowing, list of accolades for her life in pediatric radiology. ■



Left to right:
Frank Leo; the
first EMI CT
scanner at Johns
Hopkins, with
technologist
Janet Minke and
neuroradiology
fellow Lee Bahr;
a 1975 head CT
scan.



Looking Back to the Early

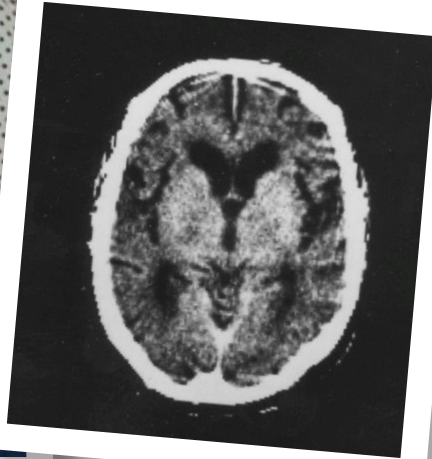
BY BOB GAYLER

MARTIN DONNER, LONGTIME DIRECTOR AND CHAIR of the Department of Radiology, recognized early the potential of computed tomography (CT) in imaging the brain. He negotiated for the third EMI CT scanner in the United States to be delivered in 1974. He obtained \$380,000 in funding for the unit by negotiating with Russell Nelson, president of The Johns Hopkins Hospital, and Russell Morgan, dean of the school of medicine. Space was assigned between the Blalock Building elevators and the corridor at the south end of Blalock, at the basement level. Computer space for operations was adjacent, in the Halsted Building.

Donner recruited Frank Leo, an engineer who was working for Fairchild Aerospace after a career in the U.S. Navy, to coordinate construction plans and to be responsible for operations maintenance. Based in England, EMI had no established U.S. presence, and it was impractical to expect service from their home location. So Leo went to England to work with Godfrey Hounsfield, the inventor of the EMI

scanner, for several months, returning to Johns Hopkins in time to oversee installation.

The EMI scanner was unlike current CT scanners, which use 360-degree rotation of the X-ray tube with a fan beam array of detector devices. The EMI scanner had a “translate-rotate” movement, in which the X-ray tube moved transversely about 3 feet, from the patient’s right to the patient’s left.



After each photo, the print was pulled from the back of the camera and coated with a preservative to prevent the image from fading. A radiologist then read the total of eight images.

Years of CT

Then the gantry assembly rotated a few degrees to the left, and the X-ray tube moved back to the patient's right. The gantry then rotated a few degrees again. This motion continued for either 30 minutes or 45 minutes. Each pass involved radiation detection by two detectors, so that two tomographic slices were acquired with each X-ray tube pass. The complete exam was four sets of the translate-rotate sequences, resulting in eight slices, each 1 centimeter apart.

The detectors sent the data to a computer, which calculated X-ray transmission into numbers. The numbers, called Hounsfield units, were transmission units in relation to water. The absolute numbers underwent some adjustment over time. The data printout was on a large sheet of paper produced on a noisy printer in the control room. The numerical data were converted into an image on a small cathode ray tube (CRT), which could be examined, and was recorded by photographing the CRT image with a Polaroid camera mounted to the CRT

housing. After each photo, the print was pulled from the back of the camera and coated with a preservative to prevent the image from fading. A radiologist then read the total of eight images.

Keeping the patient's head from moving during the lengthy exam was a challenge, requiring a neck and head holder. An essential component of the imaging and head stabilization was a water bag fitted around the patient's head. The water in the bag provided continuous reference to the zero absorption reference used by the computers.

Prior to each shift, there were calibrations done with a standard phantom. These calibrations remain an essential part of CT operations as well as other imaging equipment.

The translate-while-imaging part of the translate-rotate movement had a precursor in the standard nuclear medicine imaging movement, which used, throughout the late 1950s and 1960s, a translate and step down back translate movement in imaging body structures. ■



Chris Simmons



Radiology receptionists in 1965. Back row: M. Schwing, E. Paquet, C. Simmons, B. Dovel, M. Mossinella; Front row: E. Chapel, M. Forrest.



Chris Simmons, 1985

Golden Recollections

by Chris Simmons

Chris Simmons has served the Department of Radiology in department administration for more than six decades. A beloved figure for generations of faculty, residents, staff and alumni, she took the time recently to share some memories.

I CAME FROM WEST VIRGINIA when I was in my early teens and grew up in East Baltimore.

I began working at The Johns Hopkins Hospital in my early 20s, beginning in 1954. My first two years, I worked in the medical records division in the Harriet Lane Building (now torn down). After that, I began working in the radiology department's file room located in the sub-basement. Then, after two years, I began working in the department's first-floor reception area (now Radiology 103) and have been in that location ever since.

My duties were accepting outpatients and logging them in. Patient requisitions

were sent to the downstairs area via a tube system. Other duties included taking all appointments. Incidentally, there was a record player in a cabinet just behind where I sat. I was the department disc jockey, and I kept music playing all day.

Later, there was an opening for a transcriptionist job and receptionist. I enjoyed the transcriptionist job very much, except when I had a radiologist who in dictation would say, "Please go back to that second sentence and add ..." because back in those days we had old typewriters, and we used two sheets of paper with carbon in between them.

Times did get better with the arrival of computers. My duties now are to answer the phone, receive visitors and take reservations for radiology 103. I also keep the radiology alumni directory up to date.

Many years ago, Dr. Bill Scott had given a talk at the RSNA meeting in Chicago regarding the many changes at the Johns Hopkins radiology

department, and at the end of his talk, he said, "But there was something that has not changed," and he put my picture on the screen. I was told that there was a standing ovation. This made me feel good, as I thought of the many radiologists I knew who had passed through the department.

There is just too much to cover in these past 62 years, so I will leave it at this, except for one more favorite happy memory. When I was a teenager, I always had a dream of someday having some land in the Blue Ridge Mountains. In my late 20s, I was fortunate to find 3 acres not too far from Harpers Ferry that I could afford at monthly payments. It was near the Shenandoah River, and I could hear the ripple of water at night, as well as owls and deer. Together with some friends from Johns Hopkins, I often took hikes on the Appalachian Trail.

I enjoyed this property for about 25 years. So you see, some dreams do come true. ■

Honoring Jonathan S. Lewin

THE RUSSELL H. MORGAN DEPARTMENT of Radiology and Radiological Science will honor Jonathan S. Lewin for his outstanding career and service to Johns Hopkins by raising funds for an endowed professorship in his name and with a portrait, which will be dedicated on Friday, June 9, 2017, at the Johns Hopkins Biennial Meeting.

In February 2016, Lewin stepped down as the Martin W. Donner Professor and Director of the Department of Radiology and radiologist-in-chief to become the executive vice president for health affairs at Emory University and president and CEO of the Emory health system.



Dr. Jonathan S. Lewin

Under Lewin's direction, the radiology faculty, now 245 physicians and scientists, more than doubled in size, as did the department's clinical volumes and research funding. He presided over arguably the best diagnostic radiology residency program in the country, and served as a mentor and role model to countless faculty members, residents and fellows. The department boasted the highest level of staff engagement in the institution, and Lewin was highly respected for his strong core values and integrity

throughout the department and beyond.

We hope you will consider honoring Lewin's accomplishments and his legacy at Johns Hopkins by making a gift to the Jonathan S. Lewin Leadership Fund in his honor. To make your tax-deductible donation online, please visit the radiology

giving page: hopkinsmedicine.org/radiology/ways-to-give/ and choose Jonathan S. Lewin Leadership Fund. Your gift will ensure that his legacy continues for years to come.

If you prefer to send a check, please make it payable to the "Jonathan S. Lewin Leadership Fund" and mail it to:

The Fund for Johns Hopkins Medicine
The Russell H. Morgan Department of Radiology and Radiological Science
550 N. Broadway, Suite 701B
Baltimore, MD, 21205

**The Russell H. Morgan Department of
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601 N. Caroline St.
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Baltimore, MD 21287

Radiology Update is published by the
Russell H. Morgan Department of
Radiology and Radiological Science
of the Johns Hopkins University
School of Medicine.

www.hopkinsmedicine.org/radiology

Karen M. Horton, M.D.

*Professor and Interim Director
Department of Radiology and
Radiological Science*

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For more information or to schedule an appointment, call 443-997-RADS (7237).

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 443-287-7958 or cvera3@jhmi.edu, or visit www.hopkinsmedicine.org/radiology.

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