# FOCAL SPOT

**WINTER 2024** Doubling Down on Data: Investing in AI Expertise and Infrastructure MALLINCKRODT INSTITUTE OF RADIOLOGY // WASHINGTON UNIVERSITY // ST. LOUIS

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MIR faculty, trainees and staff joined radiology professionals from around the world at the RSNA annual meeting held November 26-30 in Chicago.



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**Cover Photo:** MIR researchers, clinicians and computational imaging experts are banding together to catapult the department's AI capabilities. Hallmarks of the new era include expanding processing capacity five-fold and access to robust training and support.



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## Leading Through Change

Mallinckrodt Institute of Radiology faculty and trainees convened in Chicago November 26–30 to share their clinical and scientific work, further their education and connect with other radiology professionals at the 109th Radiological Society of North America (RSNA) Scientific Assembly and Annual Meeting. Below are some highlights from the week.

#### Mellnick and Parihar Named Honored Educators

Vincent M. Mellnick, MD, professor of radiology and chief of abdominal imaging, received the Lifetime Honored Educator Award. Mellnick's work to expand radiology education has been well recognized with multiple awards from MIR, WashU Medicine and RSNA. Only RSNA members who earn three Honored Educator Awards are eligible for consideration to receive the Lifetime Honored Educator Award upon a fourth nomination; Mellnick received the award in 2016, 2018, 2021 and 2022.

Ashwin Singh Parihar, MD, a nuclear medicine resident, received the Honored Educator Award, which recognizes individuals who deliver high-quality educational content to further the radiology profession.

#### A Q&A for Would-Be Radiology Residents

MIR faculty members hosted a question-and-answer session designed for medical students interested in pursuing a radiology residency and career in radiology. After brief remarks from MIR Director Pamela K. Woodard, MD, Martin N. Reis, MD, diagnostic radiology residency program director, and Janice W. Semenkovich, MD, chair of the radiology resident selection committee, potential future radiology residents received advice on the match process from start to finish.

## RSNA Grants Empower Trainee Research Efforts

Andrew L. Chang, MD, PhD, and Junie Saint Clair were awarded grants to explore their scientific ideas while gaining research insights and training under senior investigators. Chang, a diagnostic radiology resident, received the Research Resident/Fellow Grant for his project titled "Interrogation of Glioblastoma Fatty Acid Metabolism With Deuterium Metabolic Imaging." Saint Clair, a Meharry Medical College student in WashU Medicine's Summer Research Program, received the Medical Student Research Grant for her project titled "Examining the Predictive Value of Synaptic Dysfunction and Neuronal Injury Measures on Imaging Markers of Disease Presentation and Progression in Alzheimer's Disease."

#### MIR Research Highlighted at RSNA 2023

Cyrus A. Raji, MD, PhD, associate professor of radiology, and Mahsa Dolatshahi, MD, a postdoc in Raji's lab, presented their study findings that link visceral fat in midlife to Alzheimer's disease development. Their research, which found that hidden abdominal fat is related to brain changes up to 15 years before the earliest memory loss symptoms occur, was also featured in RSNA 2023's press kit. "What makes our study unique is that we have gone beyond body mass index in using MRI to characterize this visceral fat and linking it to amyloid deposition in the earliest area affected by the disease process," said Raji. "And this is important for us to better refine our understanding of how to prevent Alzheimer's disease before it occurs.

#### Four Faculty Named Academy Distinguished Investigators

Adam Q. Bauer, PhD, associate professor of radiology, Richard Laforest, PhD, professor of radiology, Kooresh I. Shoghi, PhD, professor of radiology, and Monica Shokeen, PhD, associate professor of radiology and vice chair for diversity, equity, inclusion and justice, were all selected to join the Academy for Radiology & Biomedical Imaging Research's Council of Distinguished Investigators. This honor recognizes individuals from academic and industry institutions for their outstanding contributions to medical imaging. Council members are involved in various engagement opportunities, including advocacy and networking, to advance medical imaging research.















## SPOT NEWS



## A Welcoming Reception

Faculty, trainees and alumni came together at the Hyatt Regency Chicago for MIR's annual reception at RSNA. A delicious array of food and beverages accompanied an evening of connections and reunions that helped foster friendships new and old. The evening also included department updates from Vice Chair of Education Sanjeev Bhalla, MD, and Director Pamela K. Woodard, MD, who hosted her first reception as the department chair.















# Fighting the Odds

by Pam McGrath



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Lung cancer is a stealthy disease. By the time most people start experiencing symptoms – persistent coughing, weight loss, feeling tired and chest pain, among others — their cancer likely has progressed to stage 3 or 4. In these late stages, the cancer has spread to other parts of the body; treatment with surgery alone becomes impossible, and other treatment options are significantly more complex. Lung cancer is one of the deadliest cancers and, according to the American **Cancer Society, the leading** cause of cancer death in the U.S. Each year, more people die of lung cancer than of colon, breast and prostate cancers combined.

**Right:** David S. Gierada, MD, who works closely with the Lung Cancer Screening Program at Siteman Cancer Center, said their goal is to detect lung cancer at its earliest stage so patients have the best chance of successful treatment.

**Opposite:** Lung cancer is stealthy and one of the deadliest cancers, but using low-dose computed tomography (CT) helps detect and track changes in lung nodules as small as 1-2 millimeters.

"For all patients with lung cancer, the average five-year survival rate is around 25%," said David S. Gierada, MD, professor of radiology at Mallinckrodt Institute of Radiology (MIR). Gierada works closely with the Lung Cancer Screening Program at Siteman Cancer Center. "For patients with advanced-stage cancer, that percentage drops to about 5%. But when patients are diagnosed while in stage 1, their five-year survival rate is 65% and above. These statistics make our goal obvious: detect lung cancer at its earliest stage so that patients have their best chance of undergoing successful treatment."

#### A Breakthrough in Screening

Research focused on detecting early-stage lung cancer dates to the 1970s, when studies were conducted to test the efficacy of chest X-ray combined with sputum cytology. None of the trials proved to reduce deaths from lung cancer.

The breakthrough in lung cancer screening came when researchers began considering the use of computed tomography (CT) scans as a means of detecting the disease. "It was long known that CT could identify smaller lung nodules than those seen on chest X-rays, but it came with a significantly higher dose of radiation, as well as with a considerably higher cost," said Gierada. "Then in the mid-to-late 1990s, researchers began investigating the use of low-dose CT as a more acceptable way to find lung cancer early in persons at high risk due to their smoking history and age."





Since its start in 2016, the Siteman Lung Cancer Screening Program has diagnosed 291 cases of lung cancer; 71% of those cases were caught in the disease's early stages.

The promising results of these initial studies led to several impactful studies including the National Lung Screening Trial (NLST), funded by the National Cancer Institute (NCI). The eight-year, randomizedcontrol trial, launched in 2002, enrolled more than 50,000 current or former heavy smokers between the ages of 55–74, who were divided into an X-ray group and a low-dose CT group. Participants committed to receiving annual screenings for three years.

According to the NCI, the results comparing the two imaging methods were clear: lung cancer deaths in the CT group were 20% lower than those in the X-ray group. The positive and encouraging findings resulted in an earlier end to the study than originally planned.

"A subsequent large study in Europe similarly found fewer lung cancer deaths in those screened with lowdose CT," said Gierada, who served as lead radiology investigator for the NLST site at WashU Medicine. "In 2014, low-dose CT screening for lung cancer became the recommended clinical practice, and it serves as the foundation for the Siteman Lung Cancer Screening Program."

## Screening Early and Improving Patient Outcomes

The Siteman Lung Cancer Screening Program offers screenings at seven sites: Washington University Medical Campus, Center for Advanced Medicine - South County, Barnes-Jewish West County Hospital, Christian Hospital, Northwest HealthCare, Barnes-Jewish St. Peters Hospital and Progress West Hospital. Since its start in 2016, the program has diagnosed 291 cases of lung cancer. And a 2021 update to national screening guidelines — including lowering the minimum screening age — enabled more high-risk people to get screened. "Of the 291 cases, 71% were early stage, which is exactly the point of screening," said Anne Stilinovic, RN, supervisor of the screening program. "To be most effective, screenings should be done annually for at least three years, but ideally for every year a person is eligible to have one. The screening is noninvasive, doesn't require any type of special preparation and takes just a few minutes."

CT scans at all screening locations are evaluated by MIR radiologists within 24 hours. A nurse navigator mails negative results to patients and their physicians; if a nodule or advanced cancer is found, patients and their physicians are called immediately. From that point, the navigators act as intermediaries to facilitate communication between patients and the physicians involved in their care. A follow-up plan can range from "watchful waiting" — scheduling additional scans in three to six months when relatively small nodules show potential for being a lung cancer — to discussions about surgery or other advanced treatment.

The recommendation for annual screenings stems from the CT technology's capacity for detecting lung nodules as small as 1-2 millimeters and clinical trial data showing that new nodules on annual screening are more likely to be malignant than nodules present on the initial screening. "When nodules are small, we are unable to determine whether they are cancerous. Consecutive scans allow us to note any changes that may occur," said Gierada. "This helps to avoid overtreatment of the small nodules that are benign, which is most of them, while still catching those that are malignant far earlier and when they are more treatable than if they weren't found until they caused symptoms."

Patient Randy Blanc's experience illustrates the worth of annual lung screenings. Blanc, 70, began smoking at age 20 and at one point smoked a pack to a pack-and-a-half a day. Over the past dozen years, he has cut back to two to four cigarettes daily. At the recommendation of his physician, three years ago Blanc had his first lung cancer screening at Barnes-Jewish West County Hospital. A small nodule was detected.

"My follow-up scans have shown there's been no change in the nodule, and that's been good news each year," said Blanc. "The screening is such a quick and easy procedure. I'd recommend it to anyone who is or was a heavy smoker to see if the health of their lungs has been affected."

About 15 of every 100 patients screened for the first time have a nodule requiring further evaluation. Although these can cause worry, most people simply need another scan to determine if what was detected is stable or if it changes. Because the CT scan begins at the base of the neck and ends at the upper abdomen, it also may show incidental findings, such as problems with the thyroid or coronary artery disease, that could need follow-up evaluation.

#### **Breaking Down Barriers**

In addition to the specific eligibility requirements (see inset box), unlike screenings for breast and colon cancers, an order from a provider is required. "Whether or not a lung cancer screening is appropriate for patients is a shared decision between themselves and their health-care providers," said Gierada. "For instance, the conversation should inform patients of the potential benefits of lung cancer screening, describe the risks associated with the procedure, and ensure patients' values and preferences are taken into consideration."

Despite the proven effectiveness of lung cancer screening, only about 5% of those eligible in the U.S. are screened per year. Several barriers exist that contribute to this low percentage. Some patients are unable to get an order for a screening because they don't have a doctor, or they don't have insurance and can't afford to pay for the screening. Others may be in denial of the risks associated with smoking. And providers may not be familiar with nodule management guidelines or aware of the positive outcomes associated with the use of low-dose CT scans for lung cancer screening.

Although some barriers require systemic changes to health-care availability, there are efforts to improve communication within the health-care community. For example, WashU Medicine researchers at Siteman participated in I-STEP (Increasing Screening Through Engaging Primary Care Providers), a clinical trial with the goal of improving primary care physicians' awareness of the benefits of lung cancer screening.

#### Quitting: A Judgment-Free, Holistic Approach

The Siteman Lung Cancer Screening Program provides various resources to patients, including contact information for a Tobacco Quitline, an Online Quit Plan and the American Cancer Society Quit for Life Program. A point-of-care tobacco treatment program developed by university researchers offers strategies such as free, text-based counseling; recommendations for free phone apps to NCI smoking cessation platforms; FDAapproved medications to stop or reduce smoking; and referrals to a free smoking cessation program.

"In addition, Siteman psychologists recently developed a virtual smoking cessation course called the Tobacco Use Treatment Program. It offers participants the flexibility of meeting remotely once a week for four weeks," said Stilinovic. "And an in-person smoking cessation group is under development by our nurse navigator at Christian Hospital."

Gierada said research into alternative methods of lung cancer screening that may complement CT screening, particularly blood biomarkers, are ongoing. But for now, "Screening with low-dose CT scans is effective, safe and convenient. And it is saving lives." *III* 

## Lung Screening Eligibility Requirements

Medicare, Medicaid and most private insurance companies cover the cost of annual lung cancer screenings, but there are specific eligibility requirements:

- Patients must be age 50-80 years old (Medicare covers age 50-77).
- They must have smoked at least one pack a day for 20 years, 3/4 pack for 30 years, or 1/2 pack for 40 years.
- They are current smokers or quit within the past 15 years.

# Doubling Down on Data Enabling Bigger Science with Al

by Kristi Luther

Radiology has served as a backbone of patient care since the dawn of X-rays in 1895. More than a century later, we've witnessed groundbreaking progress toward the realization of precision medicine: the digitization of health records, development of multimodal imaging, DNA sequencing, the explosion of wearable technology, and the advent of artificial intelligence (AI). Radiology has especially become a prominent testing ground for AI applications that could leverage these advancing technologies - and a wealth of imaging data - to create a new frontier in patient-centered, personalized health care.

AI applications are rich across the Mallinckrodt Institute of Radiology (MIR) research enterprise. Aimilia Gastounioti, PhD, is utilizing AI to assess longterm breast cancer risk and address racial disparities in breast cancer screening. Aristeidis Sotiras, PhD, is characterizing Alzheimer's disease heterogeneity and working to improve follow-up for patients with incidental findings. Abhinav Jha, PhD, develops and rigorously assesses AI algorithms to determine their viability for enhancing, reconstructing and evaluating medical imaging. Debbie L. Bennett, MD, is evaluating the clinical impact of computer-assisted breast cancer detection. And Vamsi R. Narra, MD, has helped scale AI applications across MIR's clinical operations, from computed tomography (CT) to magnetic resonance imaging (MRI).

"With AI, it applies to everything and everywhere," said Robert J. Gropler, MD, professor of radiology and senior vice chair and division director of radiological sciences. "We've invested heavily in the intellectual expertise — our faculty — and now we're doubling down on the infrastructure piece."

Enter the Research Computing and Informatics Facility (RCIF).

**Opposite, Top:** Aimilia Gastounioti, PhD, is exploring Al's breast imaging applications in efforts to optimize patient care — from improving cancer risk assessment to addressing racial disparities in screening.

**Opposite, Bottom:** As a computational imaging researcher, Aristeidis Sotiras, PhD, looks forward to utilizing MIR's expanded data resources that will supercharge AI research.



#### There's a New Facility in Town

The RCIF provides a breadth of services covering hardware, software, training, support and data. More specifically, the new facility provides users with access to a high-performance computing cluster, high-speed and bulk storage, robust systems for management of imaging and related project data, access to a deep well of anonymized clinical data for research purposes, and training sessions and workshops. All in all, the RCIF has the resources and expertise to support any computationally intense research project, according to co-directors Mike R. Hodge and Scott M. Johnson, PhD.

## "With AI, it applies to everything and everywhere."

For example, Gastounioti, an assistant professor of radiology and investigator in MIR's Computational Imaging Research Center (CIRC), is focused on a variety of mammography projects. Until now, research capabilities were often limited to 2.5D at most. But the RCIF enables computational analysis of 3D mammograms, with AI algorithms able to consider the full structure rather than settling for quasi-3D data. "Simply put, it enables bigger science," said Johnson.

Sotiras, an assistant professor of radiology, previously ran into similar roadblocks when it came to capacity. Also a CIRC investigator, he develops supervised and semi-supervised machine learning algorithms to better understand how Alzheimer's disease (AD) pathology affects certain regions in the brain. The work he is doing to summarize highdimensional data — often multimodal scans that show anatomy, structure and pathology in the brain — could have potential applications in diagnosing earlier and with higher accuracy which AD patients will decline and which will not.

"Ultimately, the more resources you have, the more ambitious you become with your models," said Sotiras. "Some of our decisions were dictated by what hardware we had access to. Previously, if our models were too big, we would design smaller models to circumvent some of our resource challenges."



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Debbie L. Bennett, MD, chief of breast imaging, is testing AI solutions in clinical settings in hopes of improving breast cancer detection and recall rates.

Beyond expanded processing capacity — fivefold to be exact — the RCIF's offerings will save researchers valuable time tackling thorny projects. "For a lot of people, they can get 90% of what they need to get done pretty quickly," said Johnson. "But it's that 10% that is hard stuff to crunch through. And we can get rid of that and get them to a useful product in record speed."

In addition to multiple direct support channels, the RCIF offers monthly introductory training sessions — even for those with little to no high-performance computing experience.

#### **Data Is King**

AI applications are endless but ultimately powerless unless researchers have access to ample data to advance their work. Fortunately, data isn't a problem at MIR.

Building on a legacy of innovation in the computational space, the RCIF will leverage the thousands of studies available through the revolutionary Central Neuroimaging Data Archive (CNDA) and the anonymized clinical imaging sessions available through Flywheel (a biomedical research data platform). Both CNDA and Flywheel are built on XNAT, a widely used open-source imaging informatics platform developed at MIR by Daniel S. Marcus, PhD, professor of radiology and director of the CIRC.

In addition to both in-house and multisite studies, researchers have access to data gleaned from decades of collaboration with BJC HealthCare and Siteman Cancer Center. Gastounioti's work to reduce racial disparities in breast cancer screening emphasizes the importance of not only an abundance of data, but also diversity of data. "Ultimately, we want to develop models that generalize well across racial subgroups, so we need access to diverse patient data," she said. For example, breast density in Black women is sometimes downgraded despite being an important risk factor when it comes to cancer risk assessment, scheduling supplemental imaging and planning treatment. "In some cases, preventive interventions or supplemental imaging may not be eligible for insurance coverage if a woman doesn't fit into a highrisk density category."

Sotiras is also working to keep patients from falling through the cracks of the health-care system. Using existing radiology reports and AI, he aims to enhance MIR's incidental findings program to identify whether a report should be flagged for follow-up.

"In our clinical work at MIR, we have very good resources including nurse coordinators doing followups," said Sotiras. "But imagine now that this could translate somewhere where they don't have enough radiologists or coordinators."

#### "Imagine now that this [technology] could translate somewhere where they don't have enough radiologists or coordinators."

In other efforts to streamline workflows and advance imaging science, Jha, assistant professor of radiology, has a vast portfolio of AI research that includes rigorous evaluation of AI algorithms and how they perform on clinical tasks. When his team evaluated a common approach to denoise cardiac SPECT images, they found the denoised and original images to be visually similar. But ultimately the denoising technique either had no significant impact or even degraded performance when it came to detecting heart defects.

Jha, also an assistant professor of engineering, said in an article from the McKelvey School of Engineering, "This emphasizes the important need for performing evaluation of AI algorithms on clinical tasks and not just relying on visual similarity as a measure of performance."

#### Making a Clinical Impact

AI applications exist not only within the research space but are readily used every day in clinical practice. "There are AI applications available in the market for multiple modalities," said Narra, professor of radiology and vice chair for clinical imaging informatics and new business development. "We currently are piloting three of them in our clinical environment."

#### "We want to educate our faculty about what's possible now and how we can do it."

The key element, and perhaps the trickiest, of effectively integrating AI into clinical practice is connectivity between systems. Previously, there were 11 different PACS (picture archiving and communication system that is used to review and interpret radiology images) with no way to integrate AI into the workflow. Now with a single enterprise radiology PACS, it is easier to deploy AI applications across multiple sites.

MIR has been the first in North America to utilize the Sectra AI Amplifier Service — an all-in-one service streamlining the selection, activation and use of AI applications on the enterprise PACS — which is designed to support homegrown AI applications as well.

Bennett, associate professor of radiology and chief of breast imaging, has been studying several breast cancer AI applications in hopes of improving cancer detection and recall rates through the technology's improved specificity and sensitivity. "We're excited to incorporate AI into clinical practice to help us find cancers as early as possible," Bennett said.

Mike R. Hodge and Scott M. Johnson, PhD, lead the Research Computing and Informatics Facility, which will empower researchers with the necessary resources for any computationally intense project. While there are a myriad of examples of AI projects already making waves across the WashU Medicine campus, "one of the most important aspects of our AI infrastructure expansion is education," said Gropler. "We want to educate our faculty about what's possible now and how we can do it."

Gropler highlights an integrative approach that includes: 1. clinicians and/or basic researchers 2. computational scientists 3. entrepreneurial tech transfer resources 4. commercialization and democratization and 5. regulation. These components fuel the full lifecycle of an effective AI application that can be incorporated into clinical workflows. "Considering all of these parts is how we make a major impact."



## THE EVENS SOCIETY

## Alumni Spotlight

We recently caught up with three members of MIR's 2013 residency class: Ignacio R. Lopez-Costa, MD, a partner at Clinical Radiologists in Glen Carbon, Illinois; Robin R. Quazi, MD, vice chair of radiology at Scripps Clinic in San Diego, California; and Ting Y. Tao, MD, assistant professor of radiology and chief of pediatric radiology at MIR. We talked about why they chose MIR, the impact it had on their careers and what they're up to now.

## Why did you choose MIR for your residency training?

**Lopez-Costa**: When I first visited MIR as a medical student from Chile, I was awed by the size of the program, the world-renowned faculty and the incredible range of cases — not only at the work stations, but also at the multiple conferences. It became clear to me that it would be an amazing opportunity to train here.

**Quazi**: I had a very enthusiastic adviser in medical school who insisted it was the best specialty to pursue. I didn't know much about radiology when I applied and, unsurprisingly, I started my residency with two lead eyes. It's a real testament to MIR that its training program turned me into what I am today.

**Tao**: I chose MIR for residency training for the incredible, patient-centered training in all subspecialties of radiology.

Lopez-Costa (left), who enjoys traveling in his free time, explores the Atacama Desert in his native Chile.





Quazi (right), his brother and some college friends in front of a seaplane during a nine-day trip exploring North Cascades National Park.

#### How would you describe your time at MIR?

**Quazi**: Almost all rotations are resident-run, meaning you're expected to carry the workload. All cases are read out face-to-face with an attending in small batches throughout the day before signing off. You try your best to make the diagnosis but then learn from the experts in the field right there.

**Tao**: A memorable four years of learning from and working with some of the most talented radiologists in the world.

## Did any faculty members leave a particularly strong impression on you?

**Lopez-Costa**: Stuart Sagel, Sanjeev Bhalla, Fernando Gutierrez, Cooky Menias, Bill Middleton, Cary Siegel and Barbara Monsees to name a few. Their passion for teaching was impressive, and they were generous with their knowledge. I try to carry their dedication to patient care and clinical excellence with me. **Quazi**: Sanjeev and Cooky bear the brunt of my pleas for help with cases (without complaint), and I know I am fortunate to keep on learning from the best. Sometimes I wish I could take a break and go back, sit in those reading rooms and go to noon conferences. But next time, I should probably be the one shelling out cases!

## What were some highlights about your specific residency class (Class of 2013)?

**Quazi**: So many great characters. Chris Norbet: never had a dull moment and a great guy. Michael Yu was unflappable, and I heard he became a shining star at Duke for fellowship. I work with Robbie Honey now, I'm still in touch with that genius Colin Thompson, and I have met up with Nacho at conferences and went to his wedding.

**Tao**: We were the last residency class to take oral boards and got to bond over this experience. One of the unique aspects of MIR is that you make lasting friendships both within and outside your residency class.

## In what way did your training at MIR prepare you for your career path?

**Lopez-Costa**: It was very well-rounded, a fact I didn't fully appreciate until my first job. I took a position in a small hospital in southeast Missouri, and I was the only radiologist on site. I had to do everything — the whole spectrum of diagnostic imaging plus interventional procedures. My time at MIR gave me the skills and confidence to succeed.

Tao, who practices taekwondo when not in the reading room, breaks a board with a kick.





Quazi and his wife, Janice, enjoyed a family vacation in Mexico that included seaside activities such as surfing and quality beach time.

**Quazi**: MIR taught me to try to make the most likely diagnosis, keeping reports short and differentials relevant, and to always follow up.

## What are some of your interests beyond radiology?

**Lopez-Costa**: I'm lucky to have the chance to travel to many different countries and experience their cultures and cuisines. I always try to bring back a cookbook from my trips and then recreate some of the dishes for my friends.

Tao: Taekwondo, traveling and trying different cuisines.

#### **Become a Benefactor**

If you'd like to make a gift to support the Department of Radiology or are interested in discussing philanthropy for your area of research, please reach out to Kristen Burger. Kristen, our liaison in the Office of Medical Advancement, helps connect private philanthropy with the work and research of MIR's faculty.

You can contact her directly at **314-935-2877** (office) or **314-922-6811** (cell) or email her at **kburger@wustl.edu**.

## **Miller-Thomas and Shokeen Named Vice Chairs**





Michelle M. Miller-Thomas, MD, and Monica Shokeen, PhD, have been appointed to two new vice chair positions for Mallinckrodt Institute of Radiology. Miller-Thomas (left, top) was named vice chair for faculty development, and Shokeen will serve as vice chair for diversity, equity, inclusion and justice (DEIJ).

Miller-Thomas, professor of radiology, is responsible for creating programs to support mentorship and provide meaningful guidance in academic achievement, particularly for junior and mid-career faculty. Shokeen, associate professor of radiology, leads efforts to build a community and culture of respect, belonging, empathy and excellence in the department.

"The vice chair for faculty development and the vice chair for DEIJ are critical to support our people, to promote the academic and personal growth of our faculty, and to achieve an exceptional and inclusive departmental community of faculty, trainees and staff," said Pamela K. Woodard, MD, the Elizabeth E. Mallinckrodt Professor of Radiology and director of MIR.

## The Thirty-First Annual G. Leland Melson Memorial Lecture

Perry J. Pickhardt, MD, professor of radiology and chief of gastrointestinal imaging at University of Wisconsin School of Medicine and Public Health, presented "Opportunistic CT Screening: Adding Value Beyond the Clinical Indication" at the 31st annual G. Leland Melson Memorial Lecture in October. Pickhardt's clinical and research interests include CT colonography, colorectal cancer screening, machine learning and AI, and oncologic imaging. A prolific clinician-scientist, Pickhardt was recently named Most Influential Radiology Researcher by AuntMinnie. com for the second time. He also serves as medical director of cancer imaging at UW Carbone Cancer Center.



Lecture speaker Perry J. Pickhardt, MD, (left), with Vincent M. Mellnick, MD, chief of abdominal imaging.



## **CCIR Gets New Scanner**

Last spring, the Center for Clinical Imaging Research installed its second digital PET/CT. The new scanner, which is a Siemans Biograph Vision 600, increases research capacity in the facility.

## **Theranostics at MIR: A Strategy for Success**

In January 2022, Vikas Prasad, MD, PhD, was at the University Hospital of Ulm in Germany when he received an email from Richard L. Wahl, MD, then chair of MIR, asking him to take over the clinical theranostics program. Ten months later, Prasad joined the Division of Nuclear Medicine as an associate professor.

Theranostics, the combination of imaging and molecular radiotherapy, uses radiopharmaceutical therapies to treat cancer patients. According to Prasad (right), key components to a successful program include cuttingedge infrastructure, a comprehensive cancer center and innovative leadership. "I was mightily impressed by the pioneers in the field of nuclear medicine within MIR," said Prasad, referring to Wahl, Barry A. Siegel, MD, and Farrokh Dehdashti, MD. "There was no way I could have selected any other institution to start my 'new life' in the field of theranostics."

WashU Medicine's theranostics program, which is an SNMMI designated

Radiopharmarceutical Therapy Center of Excellence, is a joint venture between MIR's Division of Nuclear Medicine and the Department of Radiation Oncology. "I am extremely satisfied to see how quickly our residents and faculty have learned the basics of theranostics of neuroendocrine tumors, prostate cancer and more," said Prasad. He adds that the theranostics tumor board that has been running successfully since July of this year is a unique example of multidisciplinary care.

Prasad, whose research primarily focuses on neuroendocrine neoplasms and prostate cancer, said by unraveling the molecular makeup of the malignant tissue, theranostics is driving precision oncology to the next level. "No other branch offers this unique possibility to visualize the targets on cancer cells and quantify the right dose to achieve appropriate anticancer effect."

Looking to the future of cancer treatment, Prasad said conventional chemotherapy and blanket treatment

Grants

**Hongyu An, PhD**, professor of radiology, received a \$2 million S10 High-End Instrumentation Grant from the National Institutes of Health Office of the Director. This will partially fund the purchase of a Siemens whole-body human MAGNETOM-Terra scanner, the first 7-T MRI scanner at the university. This scanner will provide significant benefits for research-focused imaging of human subjects, especially for neurological applications.

Aimilia Gastounioti, PhD, assistant professor of radiology, was awarded a three-year, \$445,716 Career Catalyst Research Grant from Susan G. Komen to support her work using computational image analytics and artificial intelligence to identify risk markers and evaluate patterns seen in mammograms of Black women to better gauge their risk of developing breast cancer.

**Caroline Guglielmetti, PhD**, assistant professor of radiology, was presented with a \$249,000 grant from the National Institute of Allergy and Infectious Diseases to validate innovative noninvasive PET and MR methods and provide a new way to investigate the relationships between innate and adaptive immune responses and glutamate dynamics in preclinical multiple sclerosis models.

Tamara Hershey, PhD, director of the Neuroimaging Labs Research Center and the James S. McDonnell Professor of Cognitive Neuroscience, received



options will slowly pave the way for molecular characteristics-driven therapy. "Pathology and nuclear medicine will become integral to the tumor characterization, ultimately becoming central to all multidisciplinary tumor boards," he said. Within a decade, he expects theranostics to move forward in the sequencing of treatment. "We will be able to treat many more solid and hematological malignancies, not only in adults but also in pediatric patients in five to eight years."

a two-year, \$427,625 grant from the Eunice Kennedy Shriver National Institute of Child Health and Human Development. Her project aims to determine if a novel blood-based marker of neurodegeneration is elevated in Wolfram syndrome patients and is useful in tracking disease progression.

José Marcio Luna, PhD, assistant professor of radiology, was awarded a \$161,100 K22 Transition Career Development Award from the National Cancer Institute. This supports his project to combine established biomarkers and radiomic signatures from prostate MRIs, co-registered with imaging techniques, to select candidates for active surveillance in initial prostate cancer diagnosis. FYI

### **Joseph Ippolito Named Director of CCIR**



Joseph E. Ippolito, MD, PhD, associate professor of radiology, has been named the director of the Center for Clinical Imaging Research (CCIR), which provides a full range of biomedical imaging services to support basic and translational clinical research projects. Ippolito, who previously served as the CCIR's associate director, joined MIR in 2013 and holds a joint appointment in the Department of Biochemistry and Molecular Biophysics. He has held many leadership roles and currently serves as the director of the diagnostic radiology residency research track. An established expert in MRI and metabolism-driven cancer diagnostics, Ippolito leads a lab that merges metabolomics, imaging and new metabolically targeted cancer therapies.



## Mitra Boodram Named Christian Hospital Chief



Mitra B. Boodram, MD, clinical instructor, has been named chief of radiology at Christian Hospital. Boodram, a neuroradiologist with more than three decades of experience, has served at Alton Memorial Hospital and Barnes-Jewish Hospital. He joined MIR as a physician at Christian Hospital in January 2020. He has received many honors and is a member of national medical honor society Alpha Omega Alpha. Boodram succeeds James G. Stewart, MD, who will continue to serve at Christian Hospital part time.

## P41 PET-RTRC Grant Renewal

Mallinckrodt Institute of Radiology secured a renewal of its P41 grant for the PET Radiotracer Translation and Resource Center (PET-RTRC), a global hub for novel PET radiotracer development. Funded by the National Institute of Biomedical Imaging and Bioengineering, the grant first awarded in 2018 — was the first of its kind to focus on this area and has provided crucial support to the center. With the renewed funding, the PET-RTRC aims to strengthen its role as a national resource, uniting experts in PET radiotracer design, development, production, training and dissemination to ultimately advance biomedical research and human health worldwide.

Jary 21-23, 2023

NIH

## In Memorium: Carlos A. Perez, MD



Carlos A. Perez, MD, professor emeritus of radiation oncology, died Aug. 21, 2023, at 88. An internationally renowned cancer researcher, he is recognized for his many contributions to radiation oncology as well as for emphasizing the human aspect of cancer care.

Perez came to MIR for training in 1960 and returned four years later to join the faculty, eventually becoming chief of radiation oncology. In 2001, he was named the first head of the new Department of Radiation Oncology at the School of Medicine. He also helped found the university's Cancer Information Center, one of the first resource facilities of its kind in the U.S., which served as a model for other institutions across the globe.

Throughout his 60-year career, Perez helped improve care for patients with gynecologic cancers and tumors of the breast, prostate and lung. He played a key role in treating breast tumors with radiation and lumpectomy as an alternative to mastectomy. He also performed pioneering work in brachytherapy, and his textbook, "Principles and Practice of Radiation Oncology," is considered by many as the bible of the specialty.

### **Honors/Awards**

Tyler J. Fraum, MD, Cylen Javidan, MD, and Mariam A. Malik, MD, were inducted into the Academy of Educators at WashU Medicine in St. Louis, an institutional collaboration that works to foster a culture of educational excellence and create a coalition of health science education community leaders.

Aimilia Gastounioti, PhD, assistant professor of radiology, was named to the Academy for Radiology & Biomedical Imaging Research's Council of Early Career Investigators in Imaging. This honor recognizes the achievements of researchers who are in the early phases of their careers and engages them in advocacy for research funding.

Mariam A. Malik, MD, assistant professor of radiology, was named a 2023-25 Carol B. and Jerome T. Loeb Teaching Fellow. The two-year fellowship allots time to implement innovative ideas to enhance medical trainee education. Her project aims to enhance trainees' anatomy knowledge through interactive radiologic clinical application exercises and interpretive imaging skills to improve performance on applied anatomy assessment questions in the Gateway Curriculum and enhance anatomical understanding and application in clinical care.

Michelle M. Miller-Thomas, MD, vice chair for faculty development and professor of radiology, was honored with the Exemplary Educator Award from the Academy of Educators. This award recognizes faculty members who are actively building a legacy as educators through their contributions in the domains of education and mentorship. She was also selected to participate in the Leadership Excellence and Development (LEAD) Program with the Institute for Leadership Excellence at WashU Medicine. This program helps seasoned leaders enhance their leadership skills, organizational acumen and collegial networks across the university.

Monica Shokeen, PhD, vice chair for diversity, equity, inclusion and justice (DEIJ) and associate professor of radiology, received the 2023 Mid-Career Award from the Women in Molecular Imaging Network (WIMIN), an interest group within the World Molecular Imaging Society. The award recognizes exceptional mid-career women scientists who demonstrate outstanding potential for their contributions to the molecular imaging field.

## Promotions/ Appointments

Jonathan C. Baker, MD Professor of Radiology

Heather V. Garrett, MD Associate Professor of Radiology

Malak Itani, MD Associate Professor of Radiology

Pavan K. Kavali, MD Associate Professor of Radiology

Michelle V. Lee, MD Professor of Radiology

Michelle M. Miller-Thomas, MD Professor of Radiology

**Cyrus A. Raji, MD, PhD** Associate Professor of Radiology

Nassir Rostambeigi, MD Associate Professor of Radiology *M* 

## Advancing the Power of Ultrasound

#### by Kristin Baird Rattini

From Washington University's medical campus in St. Louis to the rolling hills of Uganda, Sharlene A. Teefey, MD, has dedicated her career to advancing and sharing the power of ultrasound to make a tremendous difference in the care and lives of patients.

#### Life-Changing Opportunities

When she first started out, Teefey could not afford medical school, so she earned a nursing degree instead. She took a position in the intensive care unit at the Straub Clinic, a private clinic in Honolulu. "They were using nurses almost like interns, because they had no residents," she said.

At the encouragement of the clinic's physicians, Teefey started taking pre-med classes at the University of Hawaii. There, she met Ben Young, MD, a psychiatrist at the university's school of medicine and the mentor who changed the course of her life. Young had just launched a one-year pre-med training program called 'Imi Hoʻōla, Hawaiian for "those who seek to heal." 'Imi Hoʻōla provides aspiring physicians who are underrepresented in medicine, such as Pacific Islanders and women, with the preparation needed for medical school. Teefey and her colleagues in the program's third cohort became like family and, after nearly 50 years, remain very close.

While attending the University of Hawaii School of Medicine, Teefey spent two months in her fourth year of medical school at a hospital in the South Pacific on the island of Pohnpei, a U.S. trust territory at the time. "I had never seen such poverty," she said. "That's when I promised myself that I would circle back at some point to pay it forward and give others with the same opportunity I had: to improve the quality of their lives through education. She now supports four children and five young adults in school in Uganda (one is in medical school) and a kindergarten for Pygmy children in Congo.

#### An Ultrasound Pioneer

Teefey discovered her passion for radiology during her fourth year of medical school while participating in an exchange program at the University of Utah. "A radiologist took us under his wing and showed us what radiology could do," she said. "Fireworks were going off in my head and I thought, 'This is what I want to do." She had started an internal medicine residency at the Mayo Clinic in Rochester, Minn., but switched to radiology in her second year. "I thought about my experiences in Hawaii and Pohnpei and realized that ultrasound would be an ideal imaging tool for me to use my skills to give back to others."

In 1992, while working at the University of Washington in Seattle, Teefey was recruited by Dennis M. Balfe, MD, to join the faculty at MIR, making her the first woman in the abdominal imaging section. "The friendliness and camaraderie at Mallinckrodt reminded me of what I experienced in Hawaii," she said. "I just felt at home."

She was drawn to abdominal imaging because "it involved so many different organ systems," she said. "And ultrasound gave me the opportunity to talk directly to patients to better understand their symptoms and make the correct diagnosis."

Teefey continually honed her scanning skills and began to do research in partnership with her ultrasound colleague William D. Middleton, MD. They initially worked with the orthopedic shoulder surgeons and collaborated on several studies to show the pivotal role of ultrasound in evaluating rotator cuff tears. They also pursued research in thyroid ultrasound, working with a group of radiologists to develop a method for scoring thyroid nodules that has become widely adopted.

During the COVID-19 pandemic, Teefey and Middleton worked with immunologist Ali Ellebedy, PhD, to biopsy axillary lymph nodes to study their response to mRNA vaccines. That work was published in the journal Nature. All told, Teefey has contributed to more than 140 research publications. "Dr. Teefey has established a legacy as one of the pioneers of ultrasound research and ultrasound as a clinical subspecialty," said Vincent M. Mellnick, MD, chief of the abdominal imaging section.

#### Improving Maternal Health and Lives

In 2013, Teefey started working with a St. Louis-based nonprofit called Microfinancing Partners in Africa (MPA). MPA works in six countries in eastern and southern Africa. The organization empowers women to lift themselves out of poverty through microfinancing projects such as animal husbandry and small retail businesses.

While in Uganda in 2016, Teefey was asked to address the high incidence of obstetric fistula, which is caused by obstructed labor. Obstructed labor is a significant source of maternal and fetal mortality; if the mother survives, she leaks urine and stool and is shunned. MPA's Safe Birth Project, launched in 2017, joined ultrasound, obstetric fistula education and microfinancing to address this challenge. Portable ultrasound machines have been placed at 22 village health centers, and midwives have been trained to identify three high-risk obstetric conditions — placenta previa, transverse lie and twins that would mandate referral of the pregnant mother to a health facility with an obstetrician. Recent data shows a rise not only in the number of antenatal visits to the village health centers but also in deliveries because of the project.

According to Teefey, a village health center supervisor recently stated that the project is decreasing maternal and fetal mortality in the community. "Dr. Teefey's combination of pure philanthropy and using her expertise in her specialty area in an underserved part of the world is just incredible," said Mellnick.

Teefey, who received the 2020 Distinguished Community Service Award from the School of Medicine for her volunteer work in Africa, now devotes a significant amount of her time to the Safe Birth Project. She visits Uganda twice a year and plans to expand the project there and hopes to bring it to other countries. "What we've accomplished has fulfilled my dreams beyond expectation," she said. "I am humbled to be a part of this project and grateful to MPA for the opportunity to bring it to fruition."







**Right, Top:** At the 1996 Melson City Wide Lecture, Teefey stands with fellow abdominal imaging leaders William D. Middleton, MD (left), and J. William Charboneau, MD (center).

**Right, Middle:** Teefey trains Ugandan women in ultrasound to help enhance maternal health care in the community.

**Right, Bottom:** Fueled by her passion, Teefey shares the power of abdominal imaging with the new generation of radiologists.

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