The Windy City provides an illuminating backdrop for the annual “MIR at RSNA” reception.
2 SANTIAGO TO ST. LOUIS

MIR’s Fernando R. Gutierrez, MD, has helped train radiologists from Latin America for more than two decades.

4 RESEARCHERS ON THE RISE

Three different approaches with one common goal: finding new ways to improve lives.

8 MIR SHINES AT RSNA

MIR received 15 awards from over 80 presentations at the 104th RSNA scientific assembly and annual meeting.

Cover Photo: Not even a Chicago blizzard could keep attendees from the 2018 RSNA annual meeting in November.

17 PREDICTING DEMENTIA

FOCAL SPOT MAGAZINE WINTER 2019

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In the fall of 2018, from August to October, third-year radiology residents Antonio Peñailillo, MD, and Andrés Yoma, MD, were living the resident life at MIR: spending their mornings in lectures, observing and studying under the tutelage of internationally-recognized radiologists, and jogging around the Central West End in their limited spare time. But only a few months prior, the pair were a hemisphere away in their native Chile.

Peñailillo and Yoma are part of a global exchange program wherein two pairs of residents from Chile study at MIR each year for three months. “We have the opportunity in Chile to read books with authors from Mallinckrodt,” says Yoma. “We’ve studied their books, so we were so excited to have an opportunity to know them and learn from them.”

How It All Began

Chilean residents are shepherded into the MIR program by Alvaro Huete, MD, residency program director at the Catholic University Clinical Hospital in Santiago, Chile. Huete completed an abdominal and thoracic fellowship at MIR in 2001. Now he helps facilitate the exchange program from Chile, while Fernando R. Gutierrez, MD, professor of radiology, helps lead the effort at MIR.

Huete’s connection to Mallinckrodt Institute of Radiology runs deep. His father Isidro Huete, MD, also completed his fellowship at MIR, and he was instrumental in starting the exchange program after returning to his native Chile in the mid-90’s. Gutierrez and Alvaro Huete, along with many others, have since made the project a reality.

Initially, the program used an RSNA grant to send MIR professors to teach residents in Chile for two weeks at a time. Within two years, the trips evolved into a decades-long international effort with residents regularly traveling to St. Louis to learn from some of the world’s preeminent radiology subspecialists.

Paying It Forward

“Four residents per year for 20 years,” says Gutierrez, who moved to the U.S. from Cuba with his family in 1961. “That means there are probably close to 100 Chilean residents that have come through and are now in their native country, taking what they learned here and applying it there.” And that’s just the residents from Chile. Every year, about 20 residents from other Latin American countries — Colombia, Argentina, Ecuador, Peru and beyond — rotate through MIR.

“Do you realize how gratifying it is for me to see a resident who rotated here, and then you go back to their native country and find out that they are now the president of the radiological society of that country?” says Gutierrez.

A survey published in the Journal of the American College of Radiology in 2017 found that only 41% of the Latin American countries surveyed offered radiology subspecialty training, and most radiologists in the countries without this offering do not seek specialty training abroad. This statistic illuminates an immediate opportunity for radiological specialization through institutions like MIR, where residents or fellows can then return to their native countries with newfound knowledge.

In addition to Alvaro Huete, Gutierrez cites a host of exchange program alumni who continue to pour into the mission of exceptional radiologic care in their home countries: Giancarlo Schiappacasse, MD,
from Chile; Jordi Broncano, MD, from Spain; Ignacio Rossi, MD, from Argentina, and Carlos Torres, MD, from Colombia.

The Student Becomes the Teacher

Residency in Chile is only three years, which means both Yoma and Peñailillo are nearing a major transition once they complete their program in May 2019. When asked what aspect of their MIR experience they’re most excited to take home with them, echoing each other they say “the teaching.”

Gutierrez concurs. “In advanced programs like Chile’s [Universidad] Católica, it’s not just our technology that’s a plus, because they may have it,” he says. “It’s the teaching approach that’s different – the approach to the cases. Residents go back home and try to emulate that kind of style.”

Yoma and Peñailillo, who both specialize in abdominal imaging, rave about learning crucial mnemonic devices from Sanjeev Bhalla, MD, professor of radiology and MIR’s chief of cardiothoracic imaging, and preferential diagnosis approaches from Gutierrez. In addition to hands-on guidance from Vincent M. Mellnick, MD, associate professor and chief of abdominal imaging, Peñailillo was even given a rundown of the best vegan eateries in St. Louis.

Both residents light up when discussing their inclination towards teaching and hope to bring the same element of warmth and openness they received at MIR to the future generations they educate.

“This experience taught me how important it is to go away and return with fresh information,” says Peñailillo. “I can see myself even bringing my experience beyond Chile. We’ll see.”
Researchers on the Rise

Hongyu An, DSc, associate professor of radiology, uses PET/MR in her research. Adam Q. Bauer, assistant professor of radiology, employs optical techniques and tools. Yongjian Liu, PhD, associate professor of radiology, is breaking new ground with imaging agents. Three different approaches all working toward a single goal: finding new ways to improve a patient’s quality of life.

“The research these three are doing aligns with our long-term, bench-to-bedside mission of providing new methods to better human health,” says Robert J. Gropler, MD, senior vice chair and division director of radiological sciences for MIR.

“Hongyu’s research is bringing seminal insights to the function of the human brain,” says Gropler. Bauer’s research is similar to An’s, though he uses a different imaging approach. And Liu is developing PET tracers that provide a noninvasive method of looking at disease.

“They’re all answering questions only found by studying humans.”

Adam Q. Bauer, PhD

Bauer studies network functional connectivity in the mouse brain, particularly how those networks are affected after injury and the relationships between physiological and behavioral recovery. Based in MIR’s Optical Radiology Laboratory, Bauer’s team designs techniques and tools that use light for investigation, and unique analysis algorithms. Mice are used because they exhibit brain network activity and connections very similar to those seen in humans.

Bauer is interested not just in how the injured area is affected, but also how those lesions may affect distant neural connections. Over time, he says, the modality lost due to injury moves to healthy tissue. He hopes to show that by altering input to that region, neuronal connections can be saved. One way in which Bauer does this is with optogenetics, a technique that allows for controlling activity in genetically-defined cell populations with light stimulation.

He also affects mouse brain activity by enriching a subject’s environment. For mice, that means rather than living in empty shoebox-sized cages, they would instead be in a much larger home with other mice. In addition, the environment is equipped with things for the mice to do: toy ladders, staircases, running wheels. Bauer thinks that exposing the mice — and in theory, human patients — to enriched, multi-sensory environments will accelerate recovery.

Bauer often collaborates with clinicians to discuss how findings in mice may relate to patient recovery in the clinic. But the process works both ways — symptoms and patterns the clinicians note in patients can also be taken back to the lab and studied in the mouse model. The overall goal is to quickly translate any findings into new therapy and treatment for improving a patient’s quality of life.
Yongjian Liu, PhD
Work being done in MIR’s Radiological Chemistry and Imaging Laboratory by Liu is the very essence of the “bench” in the “bench-to-bedside” model of translational research. And the diseases he studies — pulmonary fibrosis, myocardial infarction and pancreatic cancer — are among the most lethal and difficult to diagnose and treat. But Liu hopes to change that.

He and his team have developed a tracer named 64Cu-DOTA-ECL1i that targets a CCR2 receptor, a protein expressed by specific types of cell disease. Delivered using PET, Liu hopes the novel molecular probe eventually will be used to phenotype patients for individualized treatment.

Pulmonary fibrosis is a common lung disease associated with high mortality rates. Liu’s new PET tracer has been used in a mouse study to characterize, monitor and treat the disease. If successfully translated into humans, the tracer would provide a noninvasive way to determine whether a particular patient will respond to molecular drug therapy.

In another project, Liu is using the tracer to study the injured heart after myocardial infarction. By determining the size of the infarction, he hopes to develop a better understanding of how the heart remodels itself after trauma and develop a therapy that will help to improve heart function.

In a third project, Liu and collaborators will participate in a clinical trial, funded by the National Cancer Institute and slated to begin January 2019. Preclinical studies support the use of the new agent in conjunction with chemotherapy or immunotherapy in treating pancreatic cancer, with the ultimate goal of prolonging patient life and quality.

Hongyu An, DSc
Using combined PET/MR, An, who also is associate director of the Center for Clinical Imaging Research, examines the so-called “watershed region” of the brain to determine whether select regions of the brain are more likely than others to be affected by cerebral small vessel disease, leading to vascular dementia.

By studying cerebral oxygenation and neuroinflammation, An and collaborators on the project — including Tammie L.S. Benzinger, MD, PhD, professor of radiology, Andria L. Ford, MD, associate professor of neurology, and Jin-Moo Lee, MD, PhD, the Norman J. Stupp Professor of Neurology — hope to determine the pathogenic mechanisms of cerebral small vessel disease. Looking ahead, they want to develop in vivo imaging biomarkers to predict lesion progression and identify modifiable risk factors so their work can have a direct benefit for patients with vascular-related dementia.

In another project, An is again using combined PET/MR, but in this case to look at the treatment response of colorectal liver metastases to neoadjuvant chemotherapy. The challenge was to develop an imaging approach that is both respiratory motion- and artifact-free. An’s group developed an MR technique called CAPTURE, which stands for Consistently Acquired Projections for Tuned and Robust Estimation. CAPTURE allows individuals being scanned to breathe freely during the PET/MR procedure, producing clearer images. The goal of the research is to look at lesions’ response to treatment and then use that data to provide the best possible care and further treatment for patients. Although CAPTURE was developed during a colorectal cancer study, its use in live patients will be universal across many diseases.
Researchers at Mallinckrodt Institute of Radiology (MIR) have received a five-year, $3 million grant to study Wolfram syndrome, a rare genetic disorder that causes neurologic problems, insulin-dependent diabetes and other serious conditions.

The new grant, from the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health, will help fund the continuation of a Wolfram clinic at Washington University for patients from around North America and the world. It also will allow Washington University investigators to strengthen their ties to researchers in the United Kingdom who have launched a clinical trial evaluating a potential treatment for the disorder.

Wolfram syndrome, which affects about one in every 500,000 people, is caused by mutations in a single gene. The disorder has been regarded mainly as a very severe form of type 1 diabetes, with hearing loss, vision loss and neurologic problems developing as the disease advances. Wolfram syndrome patients are at risk for a limited lifespan, often due to complications related to brain degeneration.

By following young children and adolescents for several years since the launch of the Wolfram clinic — conducted during the summer at the School of Medicine and St. Louis Children’s Hospital — the researchers have learned that some of the neurologic problems associated with Wolfram syndrome begin very early and that some patients don’t develop diabetes until much later in the course of the illness.

“From our brain-imaging studies, it appears Wolfram syndrome fits into a category of disorders called hypo-myelinating developmental diseases,” says the study’s principal investigator, Tamara G. Hershey, PhD, the James S. McDonnell Professor of Cognitive Neuroscience and a professor of radiology and psychiatry. “The pattern we see suggests that in certain key areas, the brain doesn’t make enough of a substance called myelin, which insulates axons that carry signals to and from nerve cells. This deficit in insulation may leave cells vulnerable to dysfunction and degeneration over time.”

Although insulin-dependent diabetes almost always is a component of Wolfram syndrome, Hershey says her research involving the Wolfram clinic suggests it may be easier to identify some of the earliest signs of the syndrome with neurologic testing.

“The neurologic symptoms appear early,” says Hershey, who also is chief of the Neuroimaging Laboratory at MIR. “Sensory functions — such as smell, balance and gait — all are abnormal at a really early stage of the game. In addition, using brain scans we can detect structural effects in the brain very early and follow them over time.”

In funding the clinic and strengthening ties to researchers in the United Kingdom, Hershey says the new grant will help researchers learn how the disorder develops and progresses in most patients.

“There is thought to be a classic set of symptoms, but actually not everybody has them,” she says. “There are many different mutations in the Wolfram gene, and unless we combine data across a large number of patients, we can’t understand how this genetic variation predicts the type and rate of change of symptoms over time that individuals experience. Our goal is to move forward, linking symptoms to various mutations in the gene and linking those findings to imaging data to understand the underlying neurobiology.”
Learning more about what causes symptoms in a rare disease such as Wolfram syndrome also might help researchers better understand more common disorders, such as type 1 diabetes, neurodegenerative conditions and multiple sclerosis.

The WSF-1 gene linked to Wolfram syndrome first was identified in 1998 by M. Alan Permutt, MD, a former faculty member at the School of Medicine. He later developed an animal model of the disorder and set up an international patient registry.

In 2010, the university organized the world’s first multidisciplinary clinic for patients with Wolfram syndrome, funded in part by MIR and the Snow Foundation, an organization dedicated to raising funds for Wolfram syndrome research. Children worldwide now come to St. Louis for annual testing and evaluation.

Preclinical Imaging Facility Finds New (and Improved) Home

After months of preparation, MIR’s preclinical imaging facility has successfully relocated to the first floor of the East Building. The newly remodeled facility, previously located on the lower level of Mallinckrodt Institute of Radiology, supports translational imaging research ranging in applications from oncologic, cardiovascular and thoracic surgery projects, to metabolic syndrome diseases, among others.

The newest addition to the facility’s suite of imaging equipment and a centerpiece of the new location is a simultaneous PET/MR scanner. “We are one of the few sites in the world to have this scanner,” says Richard Laforest, PhD, professor of radiology and co-director of the facility along with Kooresh Shoghi, PhD, professor of radiology.

“The field as a whole is moving towards multi-modality approaches, and the facility is responsive to that trend,” says Shoghi. “The facility was PET-focused at its inception, but having multiple modalities in one place enables researchers to better interrogate the biology of disease, detect disease, and assess and predict response to therapy.” In addition, with combined PET/MR, imaging time decreases while the quality of translation for scientific and imaging research increases.

Laforest says the all-inclusive services of the facility are distinct and a major benefit to investigators. If the facility receives a request, the preclinical team will coordinate with all parties involved to complete the studies and send back results.

The facility is already up and running, with an array of projects underway. A few highlights with imminent clinical applications include the following: a co-clinical imaging project centered on transplantable, patient-derived cancer tissue xenografts used to optimize therapy and imaging methods, and to assess and predict responses to therapy in triple negative breast cancer; a program to develop and assess the efficacy of nano-therapeutics in treating multiple myeloma; and a program that images chemokine receptors for cardiovascular and pulmonary applications that is already translating compounds for clinical usage.

Laforest says the GE SPINlab™ hyperpolarizer, expected to arrive by spring of 2019. The C-13 hyperpolarizer program will be used in conjunction with PET/MR to study tissue metabolism with far reaching applications in cancer, metabolic diseases such as diabetes and obesity, and neurological diseases, says Shoghi.
MIR at RSNA 2018

Not even a November blizzard could keep more than 50,000 attendees from the 2018 Radiological Society of North America’s annual meeting in Chicago. And once again, Mallinckrodt Institute of Radiology was no exception.

MIR faculty, researchers and residents (in purple) received a total of 15 awards (right) and contributed to over 80 presentations (beginning on page 10) at the scientific assembly themed “Tomorrow’s Radiology Today.”
Magna Cum Laude

Imaging of Abdominal Wall Masses and Mass-like Lesions: What Radiologists Need to Know David H. Ballard, MD; Parisa Mazaheri, MD; Daniel C. Oppenheimer, MD; Meghan G. Lubner, MD; Perry J. Pickhardt, MD; Christine O. Menias, MD; Vincent M. Mellnick, MD

Certificate of Merit

68Ga-DOTATATE PET Neuroimaging: A Case-Based Pictorial Review Fang M. Zhu, MD, PhD; Maria R. Ponisio, MD

Advanced Imaging of Non-Tumoral Chest Diseases Jordi Broncano, MD; Antonio Luna, MD; Daniel Vargas, MD; Jeremy J. Erasmus, MD; Constantine A. Raptis, MD; Sanjeev Bhalla, MD

Abdominal Manifestations of Neurofibromatosis Type 1 Maria Zulfiqar, MD; Kristy Ratkowski, MD; Brandon Mason, MD; Michael F. Lin, MD; Christine O. Menias, MD; Cary L. Siegel, MD

68Ga-DOTATATE PET Neuroimaging: A Case-Based Pictorial Review Fang M. Zhu, MD, PhD; Maria R. Ponisio, MD

Amyloidosis: Multisystem Spectrum of Disease with Pathologic Correlation Mark D. Sugi, MD; Christine O. Menias, MD; Sudhakar K. Venkatesh, MD, FRCR; Venkata S. Katabathina, MD; Khaled M. Elsayes, MD; Meghan G. Lubner, MD; Akram M. Shaaban, MBBCch; Perry J. Pickhardt, MD; Marcela Salomao, MD; Sanjeev Bhalla, MD

Advanced Imaging of Non-Tumoral Chest Diseases Jordi Broncano, MD; Antonio Luna, MD; Daniel Vargas, MD; Jeremy J. Erasmus, MD; Constantine A. Raptis, MD; Sanjeev Bhalla, MD

Between a Rock and a Hard Place: Benign and Malignant Calcifications in the Abdomen Maria Zulfiqar, MD; Marie-Helene Gagnon, MD; Richard Tsai, MD; Anup S. Shetty, MD; Dennis M. Balfe, MD; Vincent M. Mellnick, MD

Hematopoietic and Connective Tissue Diseases of the Breast Katerina Konstantinoff, MD; Shani Aharon, BS; Christine O. Menias, MD; Catherine M. Appleton, MD; Michelle V. Lee, MD

Case-Based Approach to Image-Guided Musculoskeletal Biopsies: A Primer for Residents Muhammad Naeem, MBBS; Jack W. Jennings, MD; Travis J. Hillen, MD; Jonathan C. Baker, MD

Hematologic Malignancies of the Gastrointestinal Luminal Tract Abdelrahman Hanafy; Khaled M. Elsayes, MD; Ajaykumar C. Morani, MD; Perry J. Pickhardt, MD; Vincent M. Mellnick, MD; Akram M. Shaaban, MBBCch; Christine O. Menias, MD

Penile Emergencies: A Comprehensive Multi-Modality Imaging Review Gayatri Joshi, MD; Alexander Castilho, MD; Carrie N. Hoff, MD; Christine O. Menias, MD; Cary L. Siegel, MD

Hepatocellular Adenomas: Understanding the Pathomolecular Lexicon, Imaging Features, Terminology, and Pitfalls to Inform a Standardized Approach (LI-RADS Benign Lesion Algorithm) Maria Zulfiqar, MD; Marie-Helene Gagnon, MD; Norihide Yoneda; Claude B. Sirlin, MD; Thomas A. Hope, MD; Elizabeth M. Hecht, MD; Maxime Ronot, MD; Osamu Matsu, MD; Nina Bastati, MD; Victoria Chernyak, MD; Ahmed Ba-Ssalamah, MD; Mustafa R. Bashir, MD; Kathryn J. Fowler, MD

Signs and Artifacts in Amyloid PET Imaging Tamara Lundeen, MD; Phillip Kuo, MD, PhD; Matthew Covington, MD; Naghmehossadat Eshghi, MD, PhD; John Seibyl, MD

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Education Exhibits, Scientific Posters, Case of the Day

3D Printing Applications for Abdominal and Genitourinary Imaging: Anatomic Models and Beyond
David H. Ballard, MD; Nicole Wake, PhD; Beth A. Ripley, MD, PhD; Leonid Chepelev, MD, PhD; Waleed M. Althobaity, MD; Uday Jammalamadaka, PhD; Karthik Tappa, PhD; Muhammad Naeem, MBBS; Joseph E. Ippolito, MD, PhD; Frank J. Rybicki III, MD, PhD; Adnan M. Sheikh, MD

Augmented Reality Systems for Surgical and Image Guided Interventions
Jimmy L. Xu, MD; Gretchen M. Foltz, MD

Breast Cancer and Breast Imaging Malpractice Litigation: A 10-Year Analysis and Update in Trends
Katerina Konstantinoff, MD; Catherine M. Appleton, MD; Alison R. Gegios, MD; Katie M. Miles; Dawn Hui, MD; Michelle V. Lee, MD

Breast Sunday-Thursday Case of the Day
Jessica H. Porembka, MD; Amy M. Fowler, MD, PhD; Susan O. Holley, MD, PhD; Alexander B. Sevrukov, MD; Chandni Bhumani, DO; Catherine A. Young, MD, JD; Cheryl R. Herman, MD; Michelle V. Lee, MD; Mai A. Elezaby, MD; Lonie R. Salkowski, MD, PhD; Roberta M. Strigel, MD; Ryan W. Woods, MD, MPH; Urvi A. Tailor, MD; Lindsay Compton, MD; Ramapriya Ganti, MD

CT Pulmonary Angiography and Portal Venous Phase Abdomen and Pelvis CT Protocol Experience in the Emergency Department
Robert E. Stone, MD; Caroline Robb; Constantine A. Raptis, MD; Michael N. Patlas, MD, FRCPC; Vincent M. Mellnick, MD

Emergency Radiology Monday Case of the Day
Manickam Kumaravel, MD, FRCR; Douglas S. Katz, MD; Benjamin Benson, MD; Michael N. Patlas, MD, FRCPC; Oseogie Okojie; Sirisha Koneru, DO; Prasaanthan Gopee-Raman, MD; Vincent M. Mellnick, MD; Nicholas M. Beckmann, MD; Thiru A. Sudarshan, DMRD, FRCR; Anu Kamalasanan, MBBS; Richard D. White, MBA, FRCR; Sook Cheng Chin, MD; Joel Wolf, MD; Nima Tishbi, MD; Cyril Rosenfeld, MD; Justin S. Shafa, MD; Jay G. Hochstein, MD; Michael B. Gottesman, MD; Kobi Fogel, MD

Free Breathing Abdominal MRI: Preliminary Experience with In-Table Respiratory Gating
Daniel R. Ludwig, MD; Uday Krishnamurathy, PhD; Pamela K. Woodard, MD; Glenn Foster, RT; Scott Love, RT; Hongyu An, DSc

Gastrointestinal Sunday to Thursday Case of the Day
Anup S. Shetty, MD; Richard Tsai, MD; Maria Zulfikar, MD; Christine O. Menias, MD; Laura Parra, MD, MPH; Kristina T. Flicek, MD; Amy K. Hara, MD; Rex A. Parker III, MD; Joseph H. Kang, MD; Emilie T. Nguyen, MD; Joseph W. Owen, MD; Mauro M. Hanaoka, MD; Andres R. Ayoob, MD; James T. Lee, MD; Laura L. Magnelli, MD; Joseph R. Grajo, MD

Imaging of Asthma and Asthma Related Conditions
Felipe Aluja, MD; Fernando R. Gutierrez, MD; Sanjeev Bhatta, MD; Alvaro Huete Garin, MD

Integration of Patient and Tumor Metabolic Imaging to Predict Outcomes in Cervical Cancer Patients Using CT-Based Visceral Fat Measurements and FDG-PET
Jonathan H. Stein, MD; John M. Floberg, MD, PhD; Julie K. Schwarz, MD, PhD; Joseph E. Ippolito, MD, PhD
Interval Breast Cancers in the Era of Precision Medicine: A Multimodality Approach
Sarah G. Mizuguchi, MD; Lane M. Roland, MD; Stacey M. Crawford, MD; Elizabeth Riley, MD; Mary Ann Sanders, MD, PhD; Jason D. Messinger, MD

Neuroradiology Sunday to Thursday Case of the Day
Matthew S. Parsons, MD; Bruno A. Policeni, MD; Hilary L. Orlowski, MD; Alireza Radmanesh, MD; Joanne Rispoli, MD; Noushin Yahyavi-Firooz-abadi, MD; Joel Dennhardt, MD; Matthew P. Kiczek, DO; Varun Sethi, MD

Non-Traumatic Head and Neck Emergencies and Their Mimics: A Review of CT and MRI Findings and Differential Diagnostic Considerations
Parisa Mazaheri, MD; David H. Ballard, MD; Arash Nazeri, MD; Hilary L. Orlowski, MD; Matthew S. Parsons, MD; Michelle M. Miller-Thomas, MD

Tale of the Sacred Bone: The Sacrum
Muhammad Naeem, MBBS; Travis J. Hillen, MD; Jeremiah R. Long, MD; Jennifer L. Demertzis, MD; Michael V. Friedman, MD; Jonathan C. Baker, MD; Jack W. Jennings, MD

The Esophagus 2.0: The Missing Spot for Chest Radiologist
Jordi Broncano, MD; Antonio Luna, MD; Jeremy J. Erasmus, MD; Sanjeev Bhalla, MD; Roberto Garcia Figueiras, MD, PhD; Christine O. Menias, MD

The Signet Ring Effect: Pathophysiology and Imaging Features of Krukenberg Tumors
Maria Zulfiqar, MD; Christine O. Menias, MD; Cary L. Siegel, MD; Stephanie Nougaret, MD; Wendaline M. VanBuren, MD; Candice W. Bolan, MD; Melissa J. McGettigan, MD

Thoracic Manifestations of Vascular Malformation Disorders
Borna Dabiri, MD, PhD; Mirelys Barrios, MD; Constantine A. Raptis, MD; Ting Y. Tao, MD, PhD; Travis S. Henry, MD; Christine O. Menias, MD; Sanjeev Bhalla, MD; Mark M. Hammer, MD

Thrombosis and Hypercoagulability: Spectrum of Causes and Multimodality Imaging Findings
Michael Olson, MD; Meghan G. Lubner, MD; Christine O. Menias, MD; Vincent M. Mellnick, MD; Lori Mankowski Gettle, MD; David H. Kim, MD; Khaled M. Elsayes, MD; Perry J. Pickhardt, MD

Tracheal Abnormalities on CT: A Pictorial Review
Felipe Aluja, MD; Fernando R. Gutierrez, MD; Sanjeev Bhalla, MD; Santiago E. Rossi, MD

Workshops, Multisession and Refresher Courses
A 2018 International Survey to Assess Use of Intraluminal Contrast in CT Protocols for Penetrating Torso Trauma
Cory J. Ozimok, BSC, MD; Vincent M. Mellnick, MD; Michael N. Patlas, MD

Ablative Techniques
Travis J. Hillen, MD

Appendicitis in Pregnancy
Vincent M. Mellnick, MD

Blunt + Penetrating Thoracic Trauma
Sanjeev Bhalla, MD

Cáncer de Pulmón / Lung Cancer
Fernando R. Gutierrez, MD

Carotid and Renal Doppler (Hands-on)
Gowthaman Gunabushanam, MD; Shweta Bhatt, MD, MBBS; Wui K. Chong, MD; Corrine Deurdulian, MD; Vikram S. Dogra, MD; Ulrike M. Hamper, MD, MBA; David Jones-Manns; Mark E. Lockhart, MD; Margarita V. Rezvin, MD; Michelle L. Robbin, MD; Leslie M. Scourt, MD; Ravinder Sidhu, MD; Sadhna Verma, MD; William D. Middleton, MD
A Warm Welcome on a Chilly Night

Current and former MIR residents, fellows and faculty who braved the below freezing temperatures received a warm welcome at the 2018 “MIR at RSNA” reception.

The annual event, held at the Hyatt Regency of Chicago’s Crystal Ballroom, included remarks from MIR director Richard L. Wahl, MD, and Barry A. Siegel, MD, former senior vice chair and division director for nuclear medicine.
Development of a Liver Tumor Diagnosis Tool with Deep Neural Networks: Radiologist-Level Performance with Artificial Intelligence
Charlie Hamm; Clinton Wang; Lynn J. Savic; Marc Ferrante, MD; Isabel T. Schober; Todd Schlachter, MD; Ming De Lin, PhD; James S. Duncan, MD, PhD; Jeffrey C. Weinreb, MD; Julius Chapiro, MD; Brian S. Letzen, MD

Effects of Idarubicin-Eluting Oncozene Microspheres on Pre-Clinical Tumor Microenvironment in Liver Cancer
Tabea Borde; Johanna M. van Breugel; Tsa Shelton; Lynn J. Savic; Ming De Lin, PhD; Fabian Laage-Gaupp, MD; Lucas C. Adam; Dana C. Peters, PhD; Daniel Coman; Milena A. Miszczuk; Irvin Rexha; Quirina d. Ruiter; Steffen Huber, MD; Fahmmed Hyde; James S. Duncan, MD, PhD; Jean-Francois H. Geschwind, MD; Todd Schlachter, MD; Julius Chapiro, MD

Evaluation of the Axilla
Steven P. Poplack, MD

Lobar versus Selective Conventional Transarterial Chemoembolization: An Interim Report of a Prospective Pharmacokinetic Study
Lynn J. Savic; Julius Chapiro, MD; Teresa White; Elliot Funai, BS; Edvin Isufi, MD; Sophie Stark, BS; Evan Chen; Ping He; Michelle A. Rudek, PharmD, PhD; James S. Duncan, MD, PhD; Hyun S. Kim, MD; Rajasekhar A. Ayyagari, MD; Jeffrey S. Pollak, MD; Todd Schlachter, MD

Infections and Inflammatory Cardiac Disorders
Pamela K. Woodard, MD

Inflammation: A Generalized Process in Many Diseases: Needs for Specific Imaging
Richard L. Wahl, MD

Integrating Contrast Enhanced 2D Imaging into Your Practice to Optimize Patient Care: Hologic Vendor Workshop
Matthew Covington, MD

Pediatric Abdominal MRI: Understanding Signal Intensity Patterns
Geetika Khanna, MD

Pediatric Cardiac Masses
Demetrios A. Raptis, MD

Pediatric Series: Pediatric Radiology
Brian D. Coley, MD; Geetika Khanna, MD; Mary-Louise C. Greer, FRANZCR, MBBS; Christopher I. Cassady, MD

Pediatric Series: Pediatric Chest/Cardiovascular Imaging
Edward Y. Lee, MD; Ladonna J. Malone, MD; David M. Biko, MD; Randolph K. Otto, MD; Demetrios A. Raptis, MD

Performance Characteristics of ACR TI-RADS with Illustrative Cases
William D. Middleton, MD

PET/MRI Update 2018: Clinical Applications - Cardiac
Pamela K. Woodard, MD

Prophylactic Embolization Pre-Y90
Naganathan B. Mani, MD

Read with the Experts (Cardiac Radiology) (Interactive Session)
Jill E. Jacobs, MD; Cylen Javidan-Nejad, MD; Smita Patel, MBBS, FRCR; Sanjeev Bhalla, MD; Amar B. Shah, MD

Small Parts Ultrasound
William D. Middleton, MD

Thoracic Emergencies
Sanjeev Bhalla, MD
Uncommon Acute Conditions of the Small Bowel  
Vincent M. Mellnick, MD

Update on Imaging in Dementia  
Cyrus Raji, MD, PhD; Jody L. Tanabe, MD

Scientific, Special Interest and Plenary Sessions

68Ga-Galmydar: A PET Imaging Tracer for Noninvasive Detection of Doxorubicin-Induced Cardiotoxicity  
Jothilingam Sivapackiam; Shivesh Kabra; Sylvia Speidel; Richard Laforest, PhD; Michael P. Retting; Vijay Sharma, PhD

Accuracy of Preoperative MDCT in Patients with Penetrating Abdominal and Pelvic Trauma  
Zonia Ghuman, MD; Vincent M. Mellnick, MD; Angela Coates, MEd; Sandra Monteiro, PhD; Paul Engels, MD; Michael N. Patlas, MD

Accurate Localization and Grading of Prostate Cancer with Diffusion Histology Imaging  
Zezhong Ye; Sheng-Kwei Song, PhD; Qingsong Yang; Joshua Lin; Jianping Lu, MD; Chunyu Song; Joseph E. Ippolito, MD, PhD

Cardiac (MRI: General Topics)  
Jadranka Stojanovska, MD; Pamela K. Woodard, MD; Harold I. Litt, MD, PhD

Controversy Session: CT or MRI after Equivocal Appendix Visualization on Pediatric Ultrasound?  
Geetika Khanna, MD

Developing a Sex-Specific Stratification System for Renal Cell Carcinoma Patients Using CT-Based Abdominal Fat and Muscle Quantification and Tumor Molecular Phenotyping  
Muhammad Naeem, MBBS; Gerard K. Nguyen, MD; Vincent M. Mellnick, MD; Joseph E. Ippolito, MD, PhD

Detecting and Grading Solid Tumor Using ADC as a Marker of Cellularity: Fact or Fiction?  
Zezhong Ye; Joshua Lin; Sheng-Kwei Song, PhD; Qingsong Yang

Diffusion Basis Spectrum Imaging (DBSI) Quantitatively Assesses Axonal Protection of FTY720 in Mice with Optic Neuritis  
Ruimeng Yang, MD, PhD; Tsen-Hsuan Lin; Jie Zhan; Chunyu Song; Zezhong Ye; Peng Sun, PhD; Sheng-Kwei Song, PhD

Evaluation of 18F-FDG-PET/CT for Response Assessment in Patients with Advanced Melanoma Treated with Immune Checkpoint Inhibitors  
Dominique Fuser, MD; Leonel Hernandez-Aya; Joyce C. Mhlanga, MBCh; John Crandall; Lauren Ash; Richard L. Wahl, MD; Delphine L. Chen, MD

Image Interpretation Session  
Donald P. Frush, MD; John Eng, MD; Laura W. Bancroft, MD; Matthew S. Davenport, MD; Tomas C. Franquet, MD; R. Paul Guillerman, MD; Christopher P. Hess, MD, PhD; Andrea Laghi, MD; Elizabeth A. Morris, MD; Pamela K. Woodard, MD

In Vivo Tissue Marker of Neuro-Inflammation is Associated with WMH Burden: A Multimodal PET-MR study  
Hongyu An, DSc; Chunwei Ying; Yasheng Chen; Jon J. Christensen; Qing Wang, PhD; Lisa Cash; Jin-Moo Lee, MD, PhD; Andria Ford; Tammie S. Benzinger, MD, PhD

Gastrointestinal (Liver Diffuse Disease, Steatosis)  
Cynthia S. Santillan, MD; Jason A. Pietryga, MD; Richard Tsai, MD
Arash Nazeri, MD; Habib Ganjgahi; Tina Roostaei; Jon Pipitone; Aristotle N. Voineskos

Neuroradiology (Movement Disorders: Moving Fast and Moving Slow)
Kei Yamada, MD; Joshua S. Shimony, MD, PhD

Pediatric Brain Imaging in Neurofibromatosis-1
Manu S. Goyal, MD

Pediatric Series: Neuroradiology
Manu S. Goyal, MD; Arastoo Vossough, MD, PhD

Performance Analysis and Optimization of ACR-TIRADS Using a Genetic Algorithm: An Opportunity for Improvement?
Benjamin Wildman-Tobriner, MD; Mateusz Buda; Maciej A. Mazurowski, PhD; Ryan G. Short, MD; David A. Thayer, MD, PhD; William D. Middleton, MD; Jenny K. Hoang, MBBS

Predicting Thyroid Nodule Malignancy with Efficient Convolutional Neural Networks
Ian Pan, MA; Matthew T. Stib, MD; William D. Middleton, MD; Derek Merck, PhD; Michael D. Beland, MD

Robust Pre-Operative Language Mapping in Patients with Brain Tumors: A Feasibility Study
Mohammad Fakhri, MD; Manu S. Goyal, MD; Joshua S. Shimony, MD, PhD; Carl Hacker; Amrita Hari-Raj; Abraham Z. Snyder, PhD

Safety and Tolerability of High-Specific-Activity I-131 MIBG (AZEDRA®) in Patients with Iobenguane Scan Positive Cancers: A Pooled Analysis Across AZEDRA Clinical Studies
Richard L. Wahl, MD; Miguel Pampaloni, MD; Daniel Pryma, MD; Bennett B. Chin, MD; Richard B. Noto, MD; Joseph S. Dillon; Stephanie M. Perkins, MD; Lilja B. Solnes, MD; Lale Kostakoglu, MD, MPH; Aldo N. Serafini, MD; Katherine K. Matthay, MD; Jessica Jensen; Tess Lin; Stuart Apfel; Theresa White; Nancy Stambler; Vincent DiPippo; Syed M. Mahmood, MD; Vivien Wong; Camilo Jimenez

Top Tips to Reduce Artifacts in MSK MRI
David A. Rubin, MD

Vascular Interventional (Portal Interventions)
Naganathan B. Mani, MD; Nael E. Saad, MBBCh

White Matter Cellularity Change Correlates with CSF β-Amyloid in Preclinical Alzheimer’s Disease
Qing Wang, PhD; Suzanne Achindler; Anne Fagan, PhD; John Morris; Yong Wang, PhD; Tammie L.S. Benzinger, MD, PhD
In a small study, MRI brain scans predicted with 89% accuracy who would go on to develop dementia within three years, according to research from Mallinckrodt Institute of Radiology and the University of California San Francisco. The findings, presented in November at the 2018 Radiological Society of North America meeting in Chicago, suggest that doctors may one day be able to use widely available tests to tell people their risk of developing dementia before symptoms arise.

“Right now, it’s hard to say whether an older person with normal cognition or mild cognitive impairment is likely to develop dementia,” says Cyrus A. Raji, MD, PhD, assistant professor of radiology and the study’s lead author. “We showed that a single MRI scan can predict dementia on average 2.6 years before memory loss is clinically detectable, which could help doctors advise and care for their patients.”

Raji and colleagues at MIR including Tammie L.S. Benzinger, MD, PhD, professor of radiology, Parinaz Massoumzadeh, PhD, and Adedamola Adedokun, as well as radiologist Pratik Mukherjee, MD, PhD, of the University of California San Francisco, analyzed MRI scans for physical signs of impending cognitive decline. They used a technique called diffusion tensor imaging to assess the health of the brain’s white matter, which encompasses the cables that enable different parts of the brain to talk to one another.

“Diffusion tensor imaging is a way of measuring the movement of water molecules along white matter tracts,” Raji says. “If water molecules are not moving normally it suggests underlying damage to white tracts that can underlie problems with cognition.”

Using information from the Alzheimer’s Disease Neuroimaging Initiative – a multisite collaboration that pools data, funding and expertise to improve clinical trials for Alzheimer’s disease – Raji and colleagues identified 10 people whose cognitive skills declined over a two-year period and matched them by age and sex with 10 people whose thinking skills held steady. The average age of people in both groups was 73. Then, the researchers analyzed diffusion tensor MRI scans taken just before the two-year period for all 20 people.

The researchers found that people who went on to experience cognitive decline had significantly more signs of damage to their white matter. The researchers repeated their analysis in a separate sample of 61 people, using a more refined measure of white matter integrity. With this new analysis, they were able to predict cognitive decline with 89% accuracy when looking at the whole brain. When the researchers focused on specific parts of the brain most likely to show damage, the accuracy rose to 95%.

“We could tell that the individuals who went on to develop dementia have these differences on diffusion MRI, compared with scans of cognitively normal people whose memory and thinking skills remained intact,” Raji says. “What we need now, before we can bring it into the clinic, is to get more control subjects and develop computerized tools that can more reliably compare individual patients’ scans to a baseline normal standard. With that, doctors might soon be able to tell people whether they are likely to have Alzheimer’s develop in the next few years.”
David Youmans, MD, is a diagnostic and interventional radiologist and former department chair with Princeton Radiology at Penn Medicine Princeton Health. After serving as a decorated officer in the U.S. Navy, he followed his dream of becoming a doctor. Youmans cites his diagnostic radiology residency at MIR as a catalyst for the strong work ethic and empathy that have guided his clinical work. He also serves as chairman of the Radiology Advocacy Network for the American College of Radiology, which he says is an especially rewarding part of his professional career.

You received a degree in economics then served in the Navy for four years before applying to medical school. What sparked your interest in medicine?

I had been interested in medicine, but it wasn’t in the cards financially. Then in 1985, I moved to Norfolk, Virginia, as a young Naval officer. It was there I met my future wife Ann, who was a physical therapist, on a blind date. And on my next birthday she said, “You keep talking about medical school, so why don’t you just do it?” Her gift to me was a stethoscope. That’s when I knew medicine was the right choice.

Were there any experiences from your time in the military that influenced your decision to pursue a career in medicine?

As a Naval officer I had divisions of men under my command, including the corpsmen for a period of time. They were the closest thing we had to doctors on board the ship, and watching them work and how they would serve our crew was inspiring.

And how did you find your way to radiology?

I went off to medical school and was sure I wanted to go into primary care. But every time I talked to people in that field, they mentioned that if I wanted to spend time with my family, I needed to think long and hard about going into primary care. Then I ran into some wonderful physicians in the radiology department at the University of California San Diego, which has a spectacular radiology program, and they got me super excited about radiology.

Why did you choose MIR for your residency training?

It’s funny how things work. When I told my mentor at UCSD that I had turned down an interview at Mallinckrodt to stay in San Diego, she said, “Are you crazy? You turned down an interview at Mallinckrodt?” So I called MIR back up — it was after hours — and asked if I could have my interview slot. They said the slot was filled, but I flew from San Diego anyway in case a slot opened up. I walked in the door wet to the ankles in a suit after missing my bus and sloshing through a late winter snow. Dr. Janice Semenkovich looked at me and said, “You’re the one who doesn’t have a slot? Come on in.” It was a fortunate moment for me.
Did anyone from MIR leave a particularly strong impression on you?

It’s probably always an excellent time at Mallinckrodt, but I feel like I was there at a golden time. I got to train with folks like Pam Woodard, who was a fellow then and is now a nationally recognized expert, and Jim Brink, now chairman at Mass General Hospital, who was a new attending when I started, among others. If I had to choose one primary influence, I would say it was Dr. Bill Middleton. He emphasized a super strong work ethic, excruciating attention to detail and such an empathetic clinical approach to radiology.

Any specific experiences or lessons that you carried with you beyond MIR?

At Mallinckrodt I found such a strong work ethic and real commitment to patient care, where people were willing to make sacrifices and difficult decisions to make sure patients were being well taken care of. These are fundamental qualities that have stayed with me and have made me good at what I do, and keep me passionate about it. And teamwork — people were very collaborative there. There was never a sense that I was on my own.

What are some of your outside interests?

My family and I absolutely love to travel to unusual places off the beaten path. We just got back from Sri Lanka, and we’ve been to Cambodia, Vietnam, and the jungles of Belize, where we kayaked down rivers and hiked. More recently, I’ve become very interested in international service opportunities to volunteer in outposts that are just beginning to develop radiologic care.

Top Right: Youmans visits with Sen. Cory Booker during an advocacy trip to Washington, D.C., in May 2018. Bottom: Youmans and his wife Ann celebrate son Nicholas’s graduation from Washington University in 2018. Nicholas is currently at the university working towards his doctorate of physical therapy.
Honors/Awards

Manu S. Goyal, MD, assistant professor of radiology, and Akash P. Kansagra, MD, assistant professor of radiology, neurological surgery and neurology, led a team that won the Barnes-Jewish Hospital Team Award for Quality Improvement for their implementation of CT perfusion imaging of the brain and installation of the RAPID software from iSchemaView.

Vamsi R. Narra, MD, professor of radiology and senior vice chair for clinical imaging informatics and new business development, was named associate chief medical information officer for imaging and informatics by BJCHealthCare and Washington University School of Medicine.

Daniel D. Picus, MD, professor of radiology and former senior vice chair and division director of diagnostic imaging for MIR, will receive the Society of Interventional Radiology’s Gold Medal on March 24.

Darryl A. Zuckerman, MD, assistant professor of radiology, was appointed chairman of the IR/DR oral exam committee by the American Board of Radiology.

Pamela K. Woodard, MD, professor of radiology and senior vice chair and division director of radiological research facilities, was named associate editor of Circulation Imaging.

Lectures

Robert C. McKinstry, MD, PhD, professor of radiology and senior vice chair and division director of diagnostic imaging, presented “Neuroimaging Findings in Cerebral Palsy” at the 1st Congress of Global Children Healthcare Network & Cerebral Palsy Alliance in Changsha, Hunan, China on September 15, 2018.

Pamela K. Woodard, MD, professor of radiology and senior vice chair and division director of radiological research facilities, presented “The Biology and Imaging of Atherosclerosis” at grand rounds at Emory University in Atlanta on October 17, 2018. Woodard also presented “Comprehensive Cardiac MR Imaging for Cardiac Safety” and “Plaque Characterization: MRI and Molecular Imaging” at the American Heart Association Scientific Sessions on November 10 and 11, 2018; and “Cardiac PET/MRI” at the SCBT-MR annual meeting in Washington, D.C., on October 6, 2018.

Dmitriy A. Yablonskiy, PhD, professor of radiology, presented “What We Can Learn About Human Brain Cellular Structure from Quantitative Gradient Echo MRI” at the second biannual i2i workshop 2018 at New York University.

Grants

Samuel I. Achilefu, PhD, the Michel M. Ter-Pogossian Professor of Radiology, together with Li Ding, PhD, associate professor of medicine, Ryan C. Fields, MD, associate professor of surgery, and William E. Gillanders, MD, professor of surgery, were awarded a $9 million grant to study the life histories of breast and pancreatic cancers as part of the NIH’s Human Tumor Atlas Network. The study is led by Ding, with Achilefu, Fields and Gillanders serving as co-principal investigators.

Adam Q. Bauer, PhD, assistant professor of radiology, received a $2.1 million award from the National Institute of Neurological Disorders

Pamela K. Woodard, MD, professor of radiology and senior vice chair and division director of radiology research facilities, has been named the inaugural Hugh Monroe Wilson Professor of Radiology.

Woodard was installed on January 31 and presented “Imaging the Biology of Atherosclerosis.” Hugh Monroe Wilson, MD, MIR’s second director, led radiology efforts for more than 14 years, beginning in 1948.
Katie D. Vo, MD, professor of radiology, has been named chief of neuroradiology after serving as the interim chief for the past year and a half. Vo came to MIR in 1999 as a neuroradiology fellow and then joined the faculty. She also is director of Advanced Stroke and Cerebrovascular Imaging.

“She successfully recruited three outstanding neuroradiology faculty while interim chief,” says Richard L. Wahl, MD, the Elizabeth E. Mallinckrodt Professor and director of MIR. “I am confident that Dr. Vo will be highly successful in this section chief role based on her great success as interim section chief.”

Vo also was the program director for MIR’s highly ranked diagnostic neuroradiology fellowship program for more than a decade. She has written extensively about acute ischemic stroke and is regularly invited to speak by the American Society of Neuroradiology, the International Society for Magnetic Resonance in Medicine and the American Roentgen Ray Society, among others.

“Dr. Vo is recognized among radiology residents, fellows, faculty and our referring physicians as an outstanding neuroradiologist and leader,” says Wahl.

Michael W. Penney, MD, associate professor of radiology, has been named vice chair for community radiology. Penney came to MIR in 2004 as an abdominal fellow and was appointed director and chief of radiology at Barnes-Jewish St. Peters Hospital two years later.

“He quickly established himself as an excellent radiologist and provided leadership during a time of transition and uncertainty,” says Richard L. Wahl, MD. Since Penney arrived at MIR, he has also been elected by his peers to serve as chief of staff and as a member of the board of directors at Barnes-Jewish St. Peters Hospital.

When MIR began offering services at Progress West Hospital in 2013, Penney spearheaded the effort. Furthermore, his team began the first interventional radiology practice at the hospital.

“Michael has introduced state-of-the-art applications and protocols to CT and MRI, and played a key role in establishing the interventional and mammography services at Progress West,” says Wahl.

Appointments/Promotions

Joseph E. Ippolito, MD, PhD
Assistant Professor of Radiology

Travis J. Hillen, MD
Associate Professor of Radiology

Matthew S. Parsons, MD
Associate Professor of Radiology

Andrei G. Vlassenko, MD, PhD
Associate Professor of Radiology

Mikhail Y. Berezin, PhD, associate professor of radiology, received a $300,000 grant from the National Cancer Institute for “Neuro-Muscular Junction Based Mechanism of Chemotherapy-Induced Cachexia.” Berezin also received a $200,000 grant from the National Science Foundation for “Interactive Software for Hyperspectral Image Analysis.”

Farrokh Dehdashti, MD, professor of radiology and senior vice chair and division director of nuclear medicine, along with Kian H. Lim, MD, PhD, assistant professor of medicine, and Yongjian Liu, PhD, associate professor of radiology, were awarded a five-year, $2.8 million grant from the National Cancer Institute for “Novel CCR2 PET for Pancreatic Cancer Imaging and Prediction of Response to Standard and CCR2-Targeted Therapy.”

Yuan-Chuan Tai, PhD, associate professor of radiology, received a five-year, $2.6 million award from the National Cancer Institute for “Translation of Virtual-Pinhole Magnifying PET Technology to Clinical Whole-Body Cancer Imaging.”
MIR attendees connected with peers and presented findings at the 2018 RSNA annual meeting.