

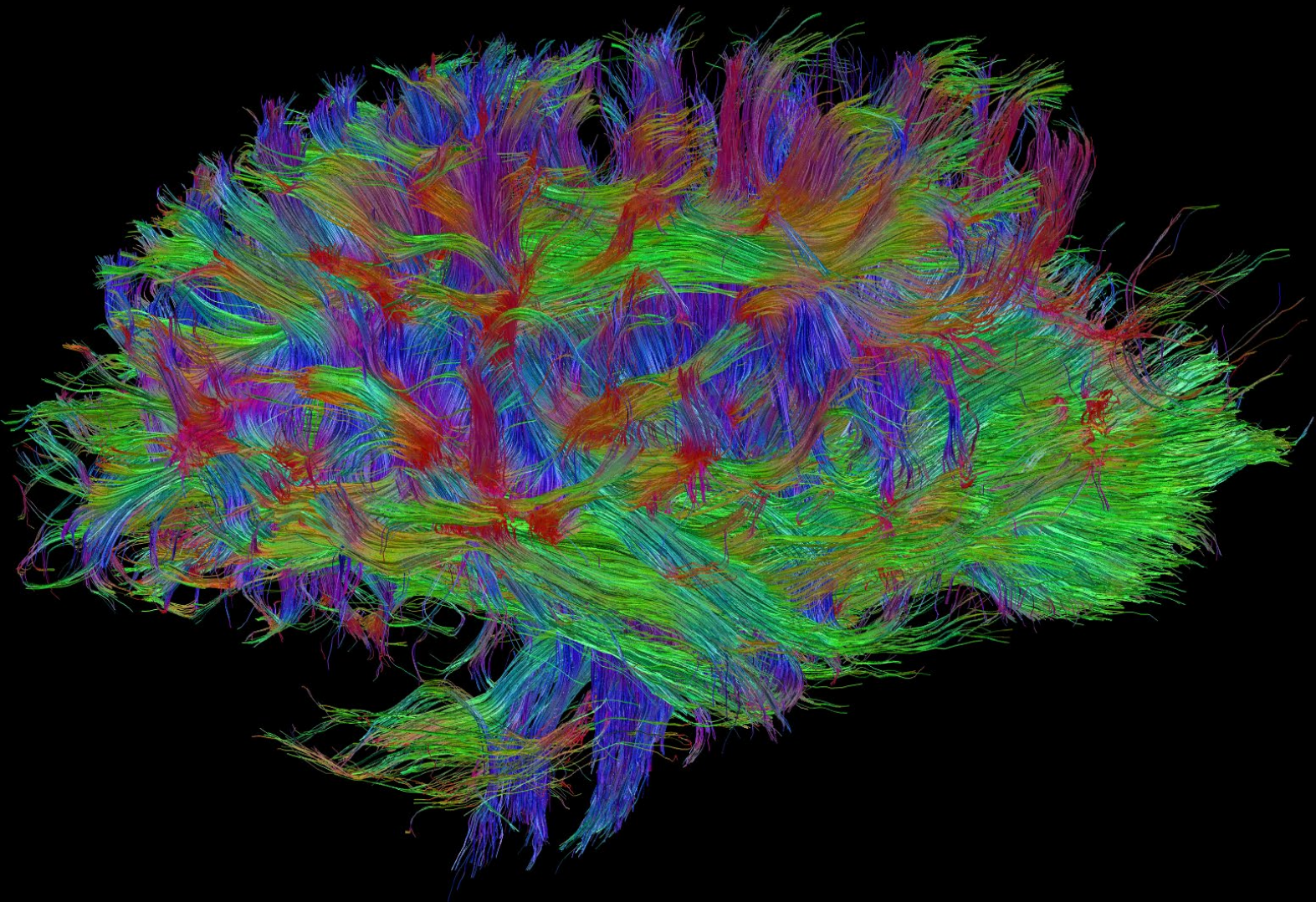
UNIVERSITY OF CHICAGO
**DEPARTMENT OF
RADIOLOGY**

**2021
—
2022**

ANNUAL REPORT



THE UNIVERSITY OF
CHICAGO



Cover photo by: Sean Foxley

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LETTER FROM THE CHAIR



Dear Colleagues and Friends,

The University of Chicago Department of Radiology continues to thrive in a rapidly changing healthcare environment and focus on excellence in its tripartite mission. In 2022, we consolidated all of our outpatient CT scanners in Mitchell Hospital and renovated the reception and patient waiting areas. We have also opened a new Dialysis Access Center with two additional IR suites to better serve our dialysis patients. Our clinical growth continues with a new imaging center planned to open downtown in early 2023 and expansion of our imaging center in Orland Park with addition of a new MRI and PET/CT in mid-2023. One of the remarkable achievements of last year was to bring our department back to top 15 NIH funded Radiology Departments in the nation. I would like to recognize Dr. Maryellen Giger and our research faculty's efforts to make this happen.

Our tradition in innovation and entrepreneurship remains to stay strong. Our faculty has been involved in the invention of several diagnostic, educational and therapeutic tools. I am proud to say that more than 10% of our faculty has led entrepreneurial ventures stemming from their research or educational activities. Our commitment to education continues to be strong with our DR, IR/DR and clinical physics residency programs. Working together, we have strengthened our commitment to diversity and inclusion. All of the great progress in our department I attribute to the commitment of our highly dedicated faculty, staff, and trainees. I am grateful to our Vice Chairs, Section Chiefs, Residency Program Directors and all of our faculty for their wisdom, enthusiasm and support. I would like to thank them for their invaluable efforts and professionalism. In this annual report, we have highlighted a sample of our accomplishments in all three parts of our tripartite mission of research, education and patient care. We are extremely proud of our department's accomplishments, and we look forward to another outstanding and exciting year.

Sincerely,

Aytekin Oto, MD

Chair, Department of Radiology

MISSION VISION VALUE STATEMENT

MISSION

Our mission is to be at the forefront of radiological diagnosis, treatment, training, and research. The three key elements of our patient-focused efforts are to:

Develop and apply tools and knowledge to compassionately care for our patients, in a fair, just, and inclusive community;

Advance the field of radiology through innovative research that translates into breakthrough diagnostic and treatment methods;

Train and educate radiologists, technologists, and staff to be effective partners with the rest of the care team, experts in the application of imaging sciences, and leaders in the field of radiology.

VALUES

We apply these values to all our work and interactions:

We focus on our patients, first and foremost, and care for them with compassion, respect and dignity.

We are an innovative, curious and diverse community, relentlessly pursuing novel insights and efficiencies and applying them as we embrace new technology and approaches.

We hold ourselves accountable for the integrity, quality, accuracy and value of our work.

VISION

Our vision is to lead the world in radiology, defying the status quo, in a collaborative work environment that promotes team wellness and diversity. We provide compassionate, equitable care, deliver the most impactful training, and advance patient care and imaging sciences with ground-breaking research.

We collaborate openly, effectively and inclusively, valuing transparent and proactive communication, ensuring that the whole team knows about actions, ideas and evolving priorities.

We value all our team members and their contributions, to build a welcoming, diverse and equitable work environment that supports wellness.

We are committed to continuous development, learning and improvement, disseminating knowledge to our own students and trainees and to the medical community.

RADIOLOGY FACULTY

The clinical Faculty of the University of Chicago Medical Center within the Department of Radiology work in concert with the administrative and technical staff to provide excellence in patient care, teaching, and research. The subspecialized training and practice of these radiologists focus a wealth of expertise in diagnostic imaging and intervention. The Sections represent the administrative structure of the professional staff, with the Section Chiefs responsible for all aspects of patient care, quality assurance, teaching, and academics within their subspecialties. The Section Chiefs work in conjunction with Dr. Aytekin Oto, Chairman, Dr. Steve Montner, Executive Vice Chair of Operations, Dr. Thuong Van Ha, Associate Vice Chair for Operations, and other Vice Chairs of the Department. Together, they provide visionary leadership, help in planning and execution of various initiatives and work towards improving the quality of the clinical, educational, and research programs.



Department of Radiology clinical and basic science faculty.

DEPARTMENT LEADERSHIP

OFFICE OF THE CHAIR

Aytekin Oto

CHAIR AND PROFESSOR OF RADIOLOGY

Steven Montner

EXECUTIVE VICE CHAIR OF OPERATIONS, PROFESSOR OF RADIOLOGY

Thuong Van Ha

ASSOCIATE VICE CHAIR OF OPERATIONS, PROFESSOR OF RADIOLOGY

Paula Martinez

EXECUTIVE ASSISTANT

Kim Lenner

EXECUTIVE DIRECTOR OF RADIOLOGY

Allison Lange

BSD EXECUTIVE ADMINISTRATOR

Carmela Gonzalez

DIRECTOR OF RADIOLOGY

Kris Johnson

ASSISTANT DIRECTOR OF RADIOLOGY

Nicholas Younkin

ASSISTANT DIRECTOR OF RADIOLOGY

Diep Truong

FINANCE MANAGER

Patricia Reyes

ANALYTICS PROJECT MANAGER

Mandy Velligan

BUSINESS ADMINISTRATOR

Monique Shelton

SENIOR ACADEMIC AFFAIRS PROFESSIONAL

Sonia Willingham

HUMAN RESOURCES ADMINISTRATOR

Jasmine Fields

GRANTS & CONTRACT ADMINISTRATOR

Junaid Rahman

BUDGET & FINANCE ANALYST

Judi Schauer

CLINICAL REVENUE MANAGER CODING

Anjanette Jones

MANAGER OF CT

Pennie Stivan

MANAGER OF ULTRASOUND AND MAMMOGRAPHY

Jennifer Spano-Rzepecki

MANAGER OF ADULT GENERAL PROCEDURES

Angela Camacho

MANAGER OF ADULT GENERAL PROCEDURES 2ND SHIFT

Alan Balinao

MANAGER OF NUCLEAR MEDICINE, PET, AND PEDIATRIC GENERAL PROCEDURES

Michelle Sacramento

MANAGER OF VASCULAR/INTERVENTIONAL

ADMINISTRATIVE SUPPORT

Alanna Bell

ABDOMINAL IMAGING & THORACIC IMAGING, DIVERSITY, AND INCLUSION COORDINATOR

Mary Green

BREAST IMAGING & NEURORADIOLOGY, HODGES ALUMNI SOCIETY

Julie Hlavaty

BASIC SCIENCE

Vernita Burns

INTERVENTIONAL RADIOLOGY, CLINICAL PHYSICS, RADIOLOGY EDUCATION

Sheila Mitchell

MUSCULOSKELETAL IMAGING, NUCLEAR MEDICINE, PEDIATRIC IMAGING, TRAUMA RADIOLOGY

Pamela Carroll

RESEARCH NURSE ASSOCIATE/STUDY COORDINATOR



Top row (L to R) Julie Hlavaty, Allison Lange, Mandy Velligan, Patricia Reyes, Carmela Gonzalez; Bottom row (L to R) Mary Green, Ambereen Yousef, Lee Brauer, Paula Martinez, Monica Rubio.

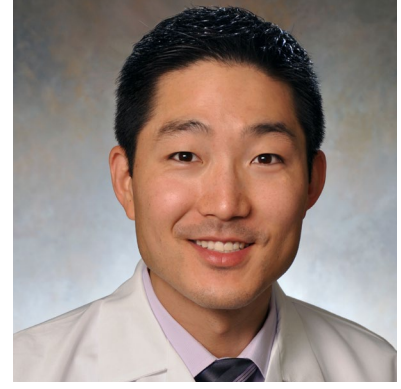
VICE CHAIRS



Osman Ahmed, MD
VICE CHAIR OF WELLNESS



Paul Chang, MD
VICE CHAIR OF INFORMATICS



Jonathan Chung, MD
VICE CHAIR OF QUALITY
IMPROVEMENT



Kate Feinstein, MD
VICE CHAIR FOR ACADEMIC
AFFAIRS



Maryellen Giger, PhD
VICE CHAIR FOR BASIC SCIENCE
RESEARCH

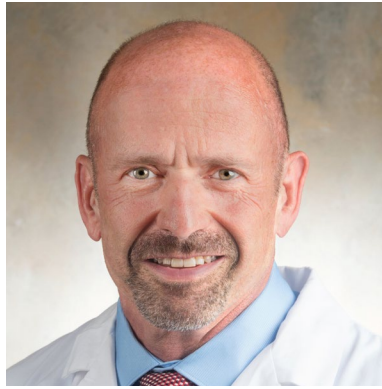


Patrick La Riviere, PhD
ASSOCIATE VICE CHAIR FOR BASIC
SCIENCE RESEARCH

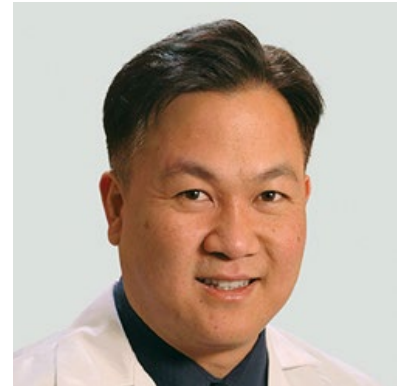
VICE CHAIRS



Kirti Kulkarni, MD
VICE CHAIR OF COMMUNICATIONS



Steve Montner, MD
EXECUTIVE VICE CHAIR OF
OPERATIONS



Thuong Van Ha, MD
ASSOCIATE VICE CHAIR OF
OPERATIONS



Carina Yang, MD
VICE CHAIR OF DIVERSITY &
INCLUSION

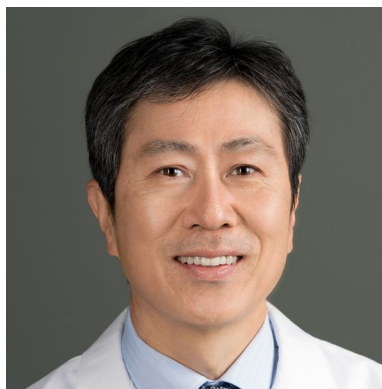


Steve Zangan, MD
VICE CHAIR FOR BUSINESS
DEVELOPMENT

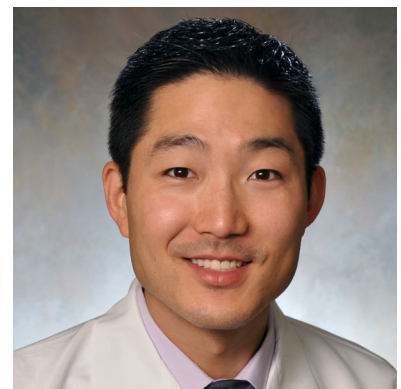
SECTION CHIEFS



Carla Harmath, MD
ABDOMINAL IMAGING

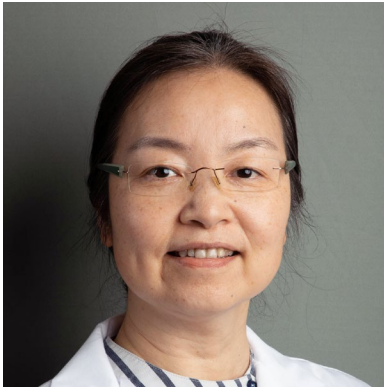


Hiroyuki Abe, MD, PhD
BREAST IMAGING



Jonathan Chung, MD
THORACIC IMAGING

SECTION CHIEFS



Zheng Feng Lu, PhD
CLINICAL PHYSICS



Brian Funaki, MD
INTERVENTIONAL RADIOLOGY



Scott Stacy, MD
MUSCULOSKELETAL IMAGING



Michael Hurley, MD
NEURORADIOLOGY



Daniel Appelbaum, MD
NUCLEAR MEDICINE



Kate Feinstein, MD
PEDIATRIC RADIOLOGY



Monther Gandeel, MD
TRAUMA RADIOLOGY

CLINICAL RADIOLOGY FACULTY

Hiroyuki Abe, MD, PhD
Osman Ahmed, MD
Saad S. Ali, MD
Daniel Appelbaum, MD
Paul J. Chang, MD
Lydia Chelala, MD
Jonathan Chung, MD
John M. Collins, MD, PhD
Abraham H. Dachman, MD
Scott E. Eggener, MD
Kate Feinstein, MD
Brian Funaki, MD
Daniel T. Ginat, MD, MS
Carla Harmath, MD
Kirti Kulkarni, MD
Divya Kumari, MD
Luis Landeras, MD
Grace Lee, MD
Jeffrey A. Leef, MD
Jonathan M. Lorenz, MD
Melvy Mathew, MD
Steven Montner, MD
Rakesh Navuluri, MD
Seng Ong, MD
Nisa Cem Oren, MD
Aytekin Oto, MD, MBA
Olga Pasternak-Wise, MD, MS
David Paushter, MD
Amit R. Patel, MD
Pritesh Patel, MD
Yonglin Pu, MD, PhD
Scott Stacy, MD
Christopher M. Straus, MD
Thuong Van Ha, MD
R. Parker Ward, MD
Carina W. Yang, MD
Steven M. Zangan, MD
Mario Zaritzky, MD

CLINICAL ASSOCIATES

Noemi Brunner, MD
Alexandra Funaki, MD
Ariyan Javadi, MD
Omar Metwally, MBBCh
Monther Qandeel, MD
Ravi Rajpoot, MD

BASIC SCIENCE FACULTY

Samuel G. Armato, PhD
Kenneth Bader, PhD
Timothy J. Carroll, PhD
Chin-Tu Chen, PhD
Kunio Doi, PhD
Maryellen L. Giger, PhD
Yulei Jiang, PhD
Chien-Min Kao, PhD
Gregory Karczmar, PhD
Patrick J. La Riviere, PhD
Kevin Little, PhD
Zheng Feng Lu, PhD
Emily L. Marshall, PhD
Xiaochuan Pan, PhD
Ingrid Reiser, PhD
Steffen Sammet, MD, PhD

NEW FACULTY APPOINTMENTS

Nicholas Feinberg, MD
Aiyah Jandali, MD
Irfan Hussain, MD
Lawrence Lo, MD
Mikin Patel, MD
Elain Tanhehco, MD, PhD

FACULTY RETIREMENT: LARRY B. DIXON, MD

After 35 years of exemplary service to the Department of Radiology and the University of Chicago, Dr. Larry Dixon, highly respected physician amongst his peers and favorite educator amongst his trainees, announced his retirement.

Dr. Dixon received his medical degree from the Medical College of Virginia in Richmond, and subsequently completed his radiology residency at the Medical College of Pennsylvania in Philadelphia, where he was Chief Resident. He stayed in Philadelphia for his fellowship in musculoskeletal imaging at the University of Pennsylvania. In 1985, he joined the radiology faculty at the University of Chicago and became the Chief of the Section of Musculoskeletal Radiology in 1993. In addition to overseeing a rotation that was a favorite among residents, Dr. Dixon helped to develop a successful Musculoskeletal Imaging Fellowship at the University in 1999 and was its Program Director for 20 years. During his career at the University, Dr. Dixon also served as Chair of the Radiology Residency Selection Committee and as a member of the Medical Student Selection Committee for the Pritzker School of Medicine.

Dr. Dixon is a three-time recipient of the Mark Tetalman Award for Outstanding Teaching in the department – a feat yet unmatched by any other faculty member. A beloved educator by residents, fellows, medical students and faculty, Dr. Dixon’s enthusiasm for teaching was unsurpassed within the department. In addition to supervising countless radiology trainees, he was a constant and active participant in the Physical Diagnosis Course for the Pritzker Medical Students and gave popular lectures to the anthropology and medical physics graduate students at the University. He also hosted students from the William M. Scholl College of Podiatric Medicine and would routinely visit the College to teach. Even the participants of weekly interdepartmental multidisciplinary conferences would benefit from Dr. Dixon’s many pearls of wisdom during the course of patient care. He was a popular lecturer at various CME courses sponsored by the Department, including the annual Radiology Review



Course, and was a Visiting Professor at the University of Wisconsin and Michigan State University. He also taught a radiology “bootcamp” for members of the American College of Rheumatology.

Dr. Dixon was a co-author on multiple peer-reviewed publications and abstracts, and on several scientific and educational presentations, many of which were award-winning. He also received grant support for the investigation of computerized radiographic analysis of bone structure and CT analysis of sternal healing following thoracic surgery.

Dr. Dixon was well-known for his laughter, light-hearted humor, loyalty to his profession, and love of travel; he was both serious about work and serious about enjoying life. We will miss his presence in the Department dearly and wish him all the best during his retirement!



FACULTY HONORS AND AWARDS 2022

OSMAN AHMED, MD

- GSIF Award winner through Polsky Center

DANIEL APPELBAUM, MD

- “Chicago’s Top Doctor” (Nuclear Medicine, 1 of 2 MDs); Chicago Magazine, 2021
- “America’s Top Doctor”, Castle Connolly, 2021

PAUL J. CHANG, MD

- “2021 Top Doctors: Chicago.” Chicago Magazine, Oct, 2021
- “2022 Top Doctors in Cancer: Chicago.” Chicago Magazine, June, 2022

JONATHAN CHUNG, MD

- Editor’s Recognition Award (with Special Distinction) Radiology - For high-quality of their prompt, detailed, and scholarly reviews

ABRAHAM DACHMAN, MD

- Illinois Radiological Society “Distinguished Service Award” (aka ‘Gold Medal’)
- Abdominal Radiology (journal). Distinguished Reviewer
- Castle Connolly Medical, TD. “Top Doctors”
- Chicago Magazine. Top Doctors: One of 20 listed in Diagnostic Radiology

BRIAN FUNAKI, MD

- University of Chicago Biological Sciences Distinguished Senior Faculty Award (2022)
- Chicago Magazine’s Best Vascular and Interventional Radiologists (2013-present)
- Castle Connolly Best Doctors (2009-present)

CARLA HARMATH, MD

- Radiology Editor’s Recognition Award, 2021: Presented to a highly select group of reviewers for the quality, number and timeliness of reviews
- Distinguished reviewer Abdominal Radiology, May 2022: Presented to the most dedicated and enthusiastic reviewers upon completion of 5 reviews for the journal in 2021

LUIS LANDERAS, MD

- Certificate of Merit - CMR Evaluation of Valvular Heart Disease - Basics to Advanced. Lloyd James, Landeras Luis, Broncano Jordi, Francois Christopher, Rajiah Prabhakar. RSNA 2021.

JEFFREY A. LEEF, MD

- Castle Connolly Top Doctors: Chicago Magazine Top Doctors

JONATHAN M. LORENZ, MD

- Regional Top Doctor 2021-22 Castle Connolly
- America’s Most Honored Doctor 2021-22 American Registry
- Chicago Magazine Top Doctor in Interventional Radiology January 2022 issue

ZHENG FENG LU, PHD

- American Board of Radiology, Volunteer Service Award, 2021

MELVY MATHEWS, MD

- Interviewed for RSNA News article entitled “[Imaging of Testicular Germ Cell Tumors: Diagnosis, staging, treatment and surveillance can be driven by imaging](#)”

NISA CEM OREN, MD

- The Mark Ronald Tetelman Memorial Award for Outstanding Teaching, June 2022

DAVID PAUSHTER, MD

- Distinguished Reviewer Award American Journal of Roentgenology 2021
- Advanced Level Quality Certificate, the Radiological Society of North America, 2022

STEFFEN SAMMET, MD, PHD

- Chair of the Assessment Committee, Point-of-Care Ultrasound Certification Academy (PCA), Rockville, MD
- Appointment as Vice Chair of the Point-of-Care Ultrasound Certification Academy (PCA) Council, Rockville, MD

CHRISTOPHER STRAUS, MD

- Inducted as a Fellow of the ACR
- Inducted as a Fellow of the ACR (inaugural class)

THUONG VAN HA, MD

- Chicago Magazine Top Doctor 2022

CARINA YANG, MD

- Elected Member, University of Chicago, Faculty Advisory Committee to the Deans, Patient Care and Training slate
- Appointed Member, Steering Council of the University of Chicago Medicine and Biological Sciences Division Simulation Center
- Appointed Board Member, University of Chicago Laboratory Schools
- Appointed Member, Search Committee for Associate Dean for Graduate Medical Education/Designated Institutional Official (DIO)

TRAINING PROGRAMS

The Department of Radiology is dedicated to excellence in Graduate Medical Education. Our GME programs are designed to cultivate caring, compassionate radiology physicians who become lifelong learners always capable of providing the highest level of medical care.

Our department offers residency programs in Diagnostic Radiology, Interventional Radiology-Integrated, Clinical Imaging Medical Physics, and our faculty prominently participate in the Graduate Program in Medical Physics.



Diagnostic Radiology residents and program leadership.

RADIOLOGY RESIDENCY PROGRAMS

The Diagnostic Radiology Residency Training Program at the University of Chicago is dedicated to training the next generation of leaders in radiology healthcare.

We provide exemplary training that combines both inpatient and outpatient experiences, caring for some of the country's most medically complex and challenging patients.

DIAGNOSTIC RADIOLOGY RESIDENCY

PROGRAM LEADERSHIP



Seng Ong, MD
PROGRAM DIRECTOR



Olga Pasternak-Wise, MD, MS
ASSISTANT PROGRAM DIRECTOR



Nisa Cem Oren, MD
ASSISTANT PROGRAM DIRECTOR

The Department of Radiology's teaching programs are strongly influenced by the mission of the University of Chicago to pursue academic excellence in all fields of study. Our trainees are given the structure to strengthen clinical and academic acumen while also serving the vibrant population of Chicago's Southside. Graduates of the University of Chicago go on to become leaders in the field of radiology.

The residency program emphasizes a rigorous yet supportive educational environment. Trainees rotate through 10+ subspecialty tracks, each staffed by dedicated faculty members who have either fellowship training or many years of experience in their field. The training program is also well-balanced and offers a broad variety of career pathways, including the practice of general radiology and its subspecialties. Furthermore, the University of Chicago's academic affiliation with NorthShore University HealthSystem allows our residents to complement their training with additional experience at one of the nation's leading community-based teaching hospitals.

Although our primary goal is to train outstanding clinical radiologists, the University of Chicago is a world-class academic institution. Teaching and research are fundamental components of our program. Throughout the residency, trainees are encouraged to participate in research activities. Motivated residents are provided dedicated time and funding for this purpose. Thus, a broad range of research activities is underway in the department. As a result, we are particularly proud of the large number of trainees who choose to continue their careers in academic medicine.

Since 2012, the residency program has been led by Dr. Seng Ong, a fellowship-trained pediatric radiologist. The recipient of many consecutive Senior Class Teaching Awards, Dr. Ong is deeply committed to his trainees and their education. Dr. Ong is joined by assistant program directors Dr. Olga Pasternak-Wise, Dr. Nisa Cem Oren, and program administrator, Lee Brauer.

INTEGRATED INTERVENTIONAL RADIOLOGY

PROGRAM LEADERSHIP



Rakesh Navuluri, MD
PROGRAM DIRECTOR



Steve Zangan, MD
ASSOCIATE PROGRAM DIRECTOR

The Integrated Interventional Radiology-Diagnostic Radiology (IR-DR) residency program is a five-year ACGME-accredited program that integrates three years of diagnostic radiology (DR) with two years of interventional radiology (IR) training. The integrated training pathway is supported by faculty with a wealth of training and experience. The residency program is led by Dr. Rakesh Navuluri, who completed his own IR fellowship training at the University of Chicago. Highly accomplished in both clinical and academic radiology, Dr. Navuluri is also a dedicated educator. He is joined by the Associate Program Director and Vice Chair, Dr. Steven Zangan, and program administrator, Monica Rubio.

Our IR-DR program is unique in the diverse caseload we can offer our trainees. The University of Chicago division of Vascular and Interventional Radiology supports the hospital's Level 1 Adult Trauma Center and all pediatric procedures referred from Comer Children's Hospital. Residents participate in the treatment of complex vascular malformations, transplant complications, and trauma among others. There are also dedicated neuro-interventional rotations where residents are exposed to the full gamut of neuro procedures. Finally, residents will gain experience with endovascular treatment of peripheral vascular disease through rotations at NorthShore University Health System.

The program faculty strongly believe that trainees learn best by 'doing' rather than by 'watching'. Residents expect to complete over 3000 cases during their training, with over 98% as primary operators. The case volume and autonomy are important reasons that UC graduates can effortlessly transition to practice and are consequently highly recruited.





Clinical physics residents (L to R) Chikenzie Onyema, Cameron Kofler and Chao Guo.



Clinical Imaging Physics Residency Program.

CLINICAL IMAGING MEDICAL PHYSICS RESIDENCY PROGRAM

PROGRAM LEADERSHIP



Zheng Feng Lu, PhD
PROGRAM DIRECTOR



Steffen Sammet, MD, PhD
PROGRAM DIRECTOR

The Clinical Imaging Medical Physics Residency Program in the Department of Radiology at the University of Chicago is a two-year clinical training program accredited by the Commission on Accreditation of Medical Physics Education Programs (CAMPEP). It was established in 2013. The program has one junior and one senior resident in training each year. The residency program was a recipient of the RSNA/AAPM Imaging Physics Residency Grant from 2014 to 2017. It provides broad clinical training and experience in all diagnostic imaging modalities, as well as radiation safety and protection, and includes 20 weeks of rotations in nuclear medicine and PET. In 2022, the program successfully matched to enroll Dr. Chikezie Onyema as a junior physics resident. Dr. Cameron Kofler became the senior physics resident in July 2022. Also, Dr. Chao Guo is graduating in October 2022 to join the clinical physics group at the Cedar Sinai Medical Center in Los Angeles, CA.

Scholarly activities are strongly encouraged. Residents have published on a broad array of topics over the years. Dr. Chao Guo's work on the design of a display test pattern to assess ambient lighting conditions in the radiology reading environment was presented at the 2021 AAPM annual meeting as well as the 2021 RSNA annual meeting. Dr. Guo also gave an oral presentation at the 2022 AAPM annual meeting on task-based image quality evaluation of fluoroscopy systems. Dr. Cameron Kofler has been investigating the feasibility of imaging inhaled foreign objects in young pediatric patients with ultra-low dose CT (ULDCT). His ULDCT protocol achieved an effective dose like a four-view radiograph exam while providing additional diagnostic information and faster diagnosis compared to radiography. Dr. Kofler presented his work at the 2022 AAPM annual meeting, and he is currently preparing a manuscript to be submitted to the Pediatric Radiology journal. Under the guidance of our pediatric radiologists - Drs. Feinstein and Zaritzky, a pilot study has been initiated to implement the ULDCT protocol for detecting inhaled foreign bodies in pediatric patients.



Radiology residents with Assistant Program Director, Nisa Oren, MD.

CURRENT RESIDENTS 2022



DIAGNOSTIC
RADIOLOGY

26

RESIDENTS



INTERVENTIONAL
RADIOLOGY

10

RESIDENTS



CLINIC PHYSICS
IMAGING

2

RESIDENTS

RADIOLOGY FELLOWSHIP PROGRAMS

The Fellowship Programs at the University of Chicago provide our trainees with exposure to a wide array of common and rare clinical diagnoses, as well as mentoring them to develop critical thinking skills and to ask questions that will propel radiology into the future.

The University of Chicago Department of Radiology offers one and two-year fellowships in four subspecialty areas:

- **Abdominal Radiology**
- **Breast Imaging**
- **Musculoskeletal Imaging**
- **Neuroradiology**

ABDOMINAL RADIOLOGY FELLOWSHIP

PROGRAM LEADERSHIP



Abraham Dachman, MD
PROGRAM DIRECTOR

The Abdominal Radiology Fellowship is a one-year comprehensive, structured, ACGME approved fellowship comprising clinical, teaching, and research activity in all aspects of abdominal imaging using all available modalities. There is extensive participation in abdominal MRI (MRI 5 blocks, CT 2 blocks, US 2 blocks, 4 flexible blocks including elective time, MSK and PET-CT. Body biopsies on US block and throughout the year.). The patient population and clinical experience represents both a comprehensive outpatient setting and inpatient tertiary referral center with a high volume of oncology, surgery, gastroenterology, transplantation, and emergency referrals. Fellows will learn to perform and interpret 3D CT angiography, virtual colonoscopy, MRI of the prostate, and other cutting-edge diagnostic studies.



(L to R) Current Abdominal Imaging fellow, Oyinlolu Adeyanju, MD, Dr. Abraham Dachman, Dr. Kirti Kulkarni and current Breast Imaging Fellow, Neetal Bhawe, MD.

BREAST IMAGING FELLOWSHIP

PROGRAM LEADERSHIP



Kirti Kulkarni, MD
PROGRAM DIRECTOR

The Breast Imaging Fellowship at the University of Chicago is a one-year non-accredited clinical fellowship program. The fellowship offers extensive clinical experience in screening, diagnostic mammography, breast ultrasound, breast MRI, and breast interventional procedures. This fellowship is closely supervised by fellowship-trained breast imaging faculty at University of Chicago and NorthShore University HealthSystem. The program has a multidisciplinary approach with focus on diagnostic evaluations, consultations, image guided procedures and appropriate recommendations. The breast imaging section recruits 2 fellows per year.

The fellowship is split between University of Chicago Medical Center and NorthShore University Health System, which provides a comprehensive learning experience. The ultimate goal of a fellowship program in breast imaging is for fellow graduates to be fully prepared to assume a leadership role in any breast imaging facility.

NEURORADIOLOGY FELLOWSHIP

PROGRAM LEADERSHIP



Olga Pasternak Wise, MD, MS
PROGRAM DIRECTOR

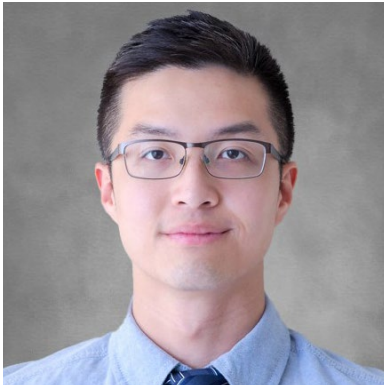
The Neuroradiology Fellowship is a one-year ACGME-accredited clinical training program which includes immersive experience in advanced neuroimaging and the full range of both adult and pediatric imaging procedures of the central nervous system. The fellowship also offers extensive training in head and neck imaging/oncology, adult and pediatric level 1 trauma imaging experience and stroke imaging. Pediatric neuroimaging is fully integrated throughout the fellowship year including neonatal cases, with ample exposure to a wide array of adult and pediatric neuro-interventional procedures. Neuroradiology works very closely with other departments in the hospital including Neurosurgery, Neurology, Neuropathology, Neuro-Oncology, Radiation Oncology, and Otolaryngology.

The congenial environment facilitates rewarding multidisciplinary experience in clinical care and scholarly projects. The Neuroradiology fellowship includes 3 fellows and is currently approved for 4 total fellow spots, pending funding approval.

There are approximately 8 months of rotation at the University of Chicago Medical Center and 4 months of rotation at NorthShore University Health Systems, which provide a fully complementary learning experience. There is opportunity for consideration for a second year of more advanced, non-accredited training as well.

MUSCULOSKELETAL IMAGING FELLOWSHIP

PROGRAM LEADERSHIP



Lawrence Lo, MD
PROGRAM DIRECTOR

The Musculoskeletal Imaging Fellowship at the University of Chicago Medical Center is a one-year non-accredited clinical training program constituting a closely supervised experience in the application and interpretation of imaging examinations and procedures as they relate to the analysis of disorders of the musculoskeletal system, including bones, joints, and soft tissues. One position is offered per year. The Musculoskeletal Radiology Section offers state-of-the-art multimodality imaging and image-guided interventional procedures for the patients of the University of Chicago Medical Center. The busy Orthopaedic Oncology Service has long been an example of a team-approach to patient care, and the Musculoskeletal Radiology Section provides comprehensive services as part of the University of Chicago Musculoskeletal Oncology Group, including CT and US-guided bone/soft tissue biopsies, as well as radiofrequency ablation procedures. The radiologists also work closely with the Section of Sports Medicine to offer imaging services to elite athletes, such as professional basketball players and college athletes, and with the Section of Rheumatology to diagnose complex disorders of joints.

RESIDENCY AND FELLOWSHIP ADMINISTRATIVE LEADERSHIP TEAM




Lee Brauer
GME PROGRAM ADMINISTRATOR



Monica Rubio
GME PROGRAM ADMINISTRATOR

CURRENT FELLOWS 2022

 ABDOMINAL IMAGING	 BREAST IMAGING	 NEURORADIOLOGY IMAGING	 MUSCULOSKELETAL IMAGING
1 FELLOW	2 FELLOWS	3 FELLOWS	1 FELLOW

GRADUATE PROGRAM

GRADUATE PROGRAM IN MEDICAL PHYSICS



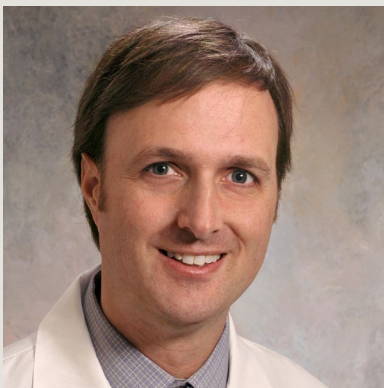
Samuel G. Armato III, PhD
PROGRAM DIRECTOR

The Graduate Program in Medical Physics at the University of Chicago offers research training leading to the Doctor of Philosophy degree. Primary areas of research interests by the program faculty include four components: physics of diagnostic radiology, physics of nuclear medicine, physics of magnetic resonance imaging, and physics of radiation therapy.

Unique features of the Program include the faculty's focused effort on research in medical imaging and radiation therapy and on the training of high-level medical physicists who enter successful careers ranging from clinical to academic to industry to government.

The Program currently consists of 22 faculty who hold appointments in either the Department of Radiology or the Department of Radiation & Cellular Oncology and secondary appointments to the Committee on Medical Physics. Most research projects involve collaboration between basic scientists and clinical colleagues in the Department.

MEDICAL STUDENT EDUCATION



Chris Straus, MD
DIRECTOR

Medical student education remains an exciting challenge and a focus of utmost importance, given its impact on our collective ability to provide our patients with the highest level of care. Medical student expectations and curricular changes have experienced continual revision and expansion over the past 5 years, driven by increasing student interest and demand. We are making steady but slow headway on shifting back radiologist-led medical imaging instruction, but the need for more change remains. As of writing, the school curricular requirements remain under review and revision, with announcements anticipated in the coming year. Students choosing radiology as a career have not collapsed yet remain diminished compared to a longer range or analysis by a rolling average. However, students who have chosen radiology continue to match impressively often at top programs nationally.

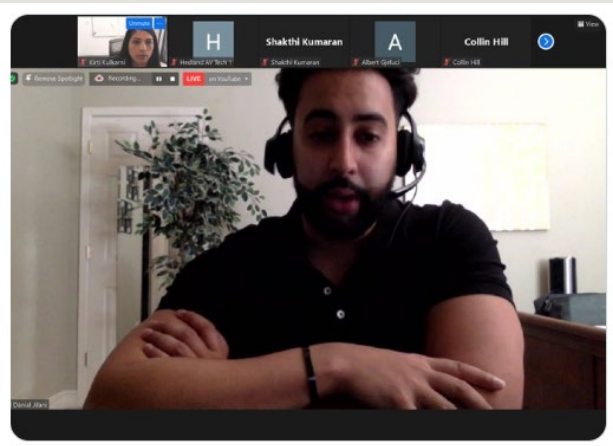
Efforts remain underway to augment a student's experience in our specialty, including a new position for students to assist

our residents in the ER Radiology reading room. This volunteer program is modeled after a successful program at Dartmouth and we are hopeful that a new cohort of students will be able to better appreciate a radiologist's role in the patient care continuum. Students are also encouraged to select one of many summer research projects our faculty make available annually. These efforts are supplemented with additional small research grants through the Radiology Research and Opportunity Program (RROP), smaller departmental-controlled funds available for student-led projects with a short turnaround (usually two days).

Our pre-clinical and senior electives remain well utilized and demonstrate a distinct uptick in registration. Approximately a 100% increase has been achieved possibly following changes and a collective effort to promote this option through the student interest group. Registered students for the MS1 elective remain impacted by the COVID-19 pandemic and suspension of this course. Materials are otherwise available for all students digitally and self-directed through programming sponsored by the American College of Radiology and a program led by Dr. Straus. This new program in beta-test has made much of the UChicago programming now available to all medical students or trainees nationally and in Canada.

External outreach and departmental awareness have otherwise remained a strong suit in programming, despite the heavy impact of COVID-19. Our regional radiology interest group remains in place and the data collected has been published demonstrating proof of concept as programming steadily increased. Our single-day student informational Radiology expo that targeted the upper Midwest programs and students beyond the UChicago campus has been transferred to the Chicago Radiological Society. This collective hopes to maintain the program though we remain active participants.

New Departmental hires have been approached and several have expressed an interest in student educational challenges. 2023 will be a year of onboarding these new voices and energy, expanding and keeping the University of Chicago as a critical resource and voice in medical student education when it comes to medical imaging. We intend to keep up with innovation and advancement, which was started over the past 20 years.



Alumni Dr. Danial Jilani moderating a session during the radiology expo for medical students.

RADIOLOGY ALUMNI

PAUL C. HODGES ALUMNI SOCIETY

The Hodges Society remains strong and a laudable departmental asset. We continue our year-over-year growth as we fulfill our mission of assisting our department and talented alumni scattered worldwide. Successful spring induction of the newest postgraduate alumni of residents, fellows, and staff at the annual June departmental celebration, marked the end of the academic year. The Board again authorized the continuation of existing and ongoing programming, yet we continue to look for new ways to augment the experience of our trainees and alums, targeting networking and resources that are especially valuable to those navigating the job market. Trainees remain the largest recipient of resources generated by Hodge's endowment, given that this has the greatest long-term effect on inspiring excellence in patient care and the advancement of our program's reputation.

Hodges maintains contact with our Alumni base through our electronic newsletters, traditional mailings, and outreach at professional meetings. A robust set of topics are to be covered throughout a full annual cycle including educational highlights, faculty advances, departmental achievements, and areas of research. The expanded newsletters have been popular and informative. Our Hodges network and respective contact lists outperform every other department in the Biological Sciences Division, again setting an example and bar of performance for other departments. Our vision of an interactive and Alumni controlled website where messaging can be shared through secure channels remains a goal we promote with departmental leadership.

Alumni funding covers a significant portion of trainee supportive resources and now all of the travel and meeting expenses when trainees present at professional meetings. Hodges augments each trainee with approximately \$2000 per year in material not

otherwise available to trainees in other specialties or radiology programs. We believe this makes our program more attractive to the best candidates and assists our program directors in attracting top talent. We support team-building skills in addition to traditional educational materials, along with a robust networking system to assist in landing subsequent training positions and employment downstream. 2022-23 is especially exciting in that we expect to relaunch the Fennessy Irish Exchange program, which was delayed and deferred by COVID-19 in 2020. Given the delay, we hope to come out of the proverbial gate strong by increasing the number of transatlantic trips from one annually to possibly two or more, schedules allowing. We anticipate our first Irish trainee observer this coming late winter or spring and hopefully, we will send our representative to Cork Ireland before June. We are thrilled to think this program will get underway, creating a gateway for their top talent to see our department and systems generating research, networking, and potential postgraduate training opportunities.

The 30-member Hodges board represents our broad reach nationally and internationally, with alums penetrating leadership positions across the specialty. The success is very much in part secondary to the broad representation from over a 50-year span, including our Chief residents.

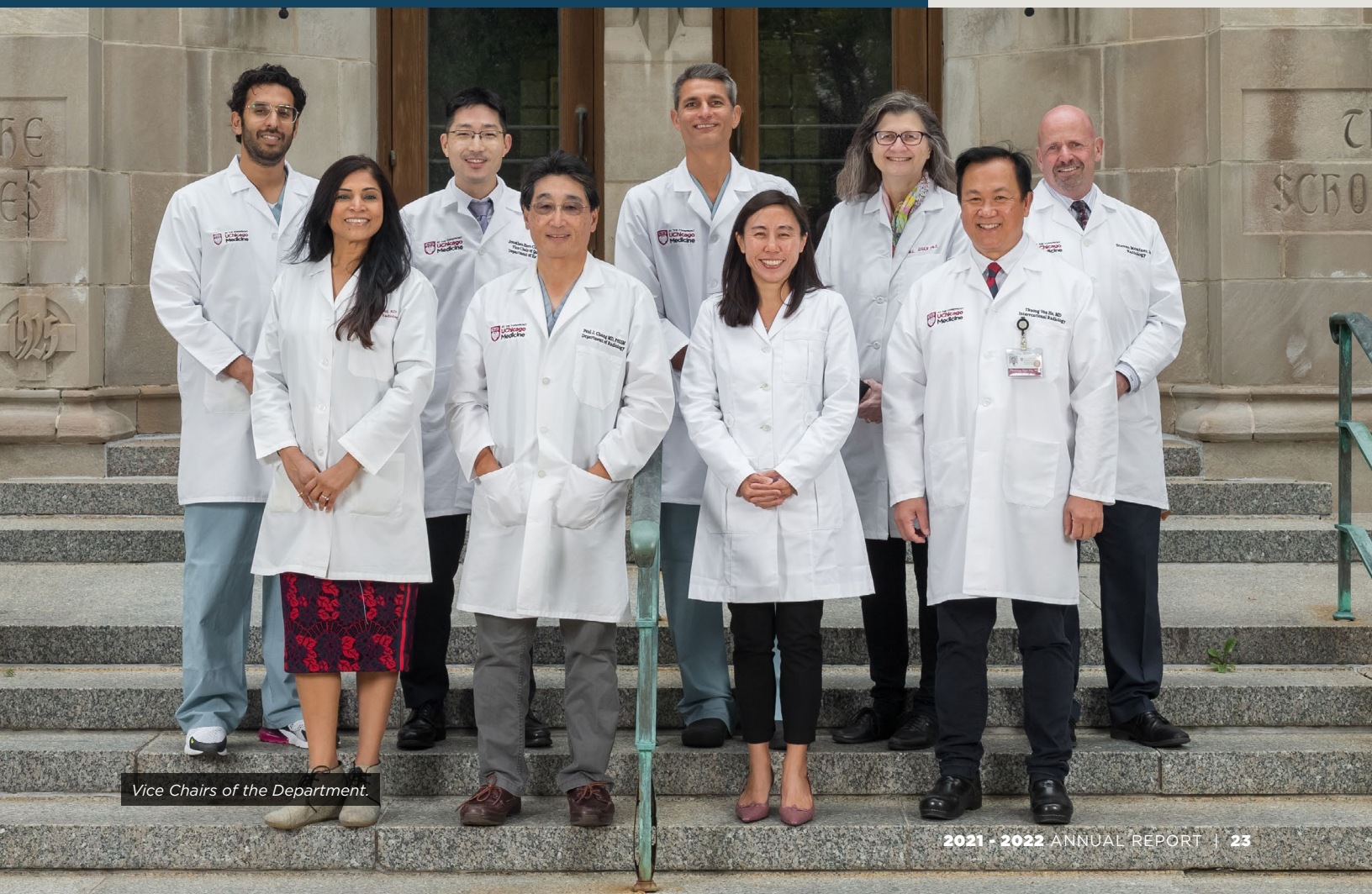
Research Awards and supportive funding again total over \$10,000 a year. Current recipients are honored at our annual Alumni RSNA event and on the department's website.

A special thanks to the Paul C. Hodges Alumni and past supporters of the Society. Your generosity and interest in funding our efforts remain paramount to our overall success and departmental mission.

INITIATIVES 2022

The work of our Vice Chairs remained united and forward-thinking during 2021-2022 academic year. We are proud to display the progress of our department and excited for the initiatives led by our Vice Chairs.

Highlighted below is the work of the Vice Chair committees for Wellness, Informatics, Quality, Academic Affairs, Basic Science Research, Communications, Operations, Diversity and Inclusion, and Business Development.



Vice Chairs of the Department.

VICE CHAIR REPORTS

VICE CHAIR OF WELLNESS



Osman Ahmed, MD

Dr. Osman Ahmed is currently the Vice Chair of Wellness for the Department of Radiology. Since beginning in this role last year, Dr. Ahmed formed a wellness committee with members including Drs. Mario Zaritzky, Michael Hurley, Melvy Mathew, Emily Marshall, Steve Zangan, Lydia Chelala, Kevin Little and staff liaisons, Mandy Velligan, and Allison Lange. With their guidance and significant contributions, the committee has embarked on initiatives that aim to serve the wellness mission. This mission is founded on 3 core principles: To improve team morale and social health through community-based activities and gatherings, maximize ease of practice with IT workflow optimization, and strengthen the bonds among all members of the Department.

In the short time the committee has been operating, a Department-wide survey was distributed to understand the desire of faculty members on how to best improve wellness. A series of initiatives have since been initiated based on those responses with plans for social gatherings, department-sponsored meals, home workstations, and better engagement with members of the IT department. Such events are planned throughout this year and the upcoming year. Once complete, another survey will be provided to solicit more suggestions on how the wellness committee can serve the Department.

Finally, it is also important to recognize the work first started by our residents Drs. Patrick Tran and Ethan Ungchusri. Patrick and Ethan were instrumental in coordinating meetings with Kim Lenner and upper-level administration to help bring a milk tea (i.e., bubble tea) machine that was recently installed on the first floor of DCAM. This initiative was recognized on social media, garnering over 200 retweets on Twitter and bringing a lot of positive attention to the institution. Future plans to add Freedom Pay (cashless card for night float resident meals) to the machine along with initiatives to provide free bubble tea to members of the Department are currently underway.



Residents enjoying the newly installed Boba tea machine in DCAM.

VICE CHAIR OF INFORMATICS



Paul Chang, MD

Vice Chair of Informatics Paul Chang MD, FSIM, is an internationally recognized expert in the field of imaging informatics. His research and development projects are primarily related to imaging informatics as well as enterprise-wide informatics interoperability issues. His work in workstation design has resulted in presentation and navigation models that have been adopted by most PACS systems. He was co-founder of Stentor PACS (acquired by Philips Medical Systems), which was based on a novel lossless wavelet-based image distribution algorithm co-invented by Dr. Chang. Dr. Chang has been awarded the Gold Medal by the RSNA “for having revolutionized the practice of radiology through his expertise in the field of imaging informatics.”

Informatics initiatives at the University of Chicago include 1) the development of a robust SOA-based Enterprise Service Bus (ESB) that provides granular access to clinical information to allow the creation

of customized clinical and research applications; 2) an ambitious “closed loop imaging” infrastructure that establishes interoperability across information systems, including modalities, to improve efficiency and quality in image acquisition, interpretation, and results in delivery/acknowledgment; 3) an enterprise-wide business intelligence and analytics infrastructure leveraging existing SOA architecture and NoSQL approaches to support advanced analytics, AI/machine learning, and complex workflow orchestration.

Examples of 2021-2022 radiology informatics deliverables include.

Deployment and Implementation of various clinical applications including:

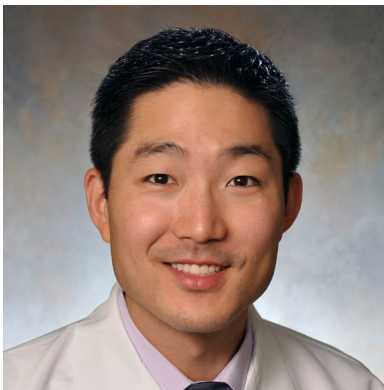
- PACS consolidation with Ingalls
- Ambra Image Exchange
- Aria Radiation Therapy EMR consolidation (Ingalls/Hyde Park)

- Medicalis Actionable Findings Solution
- Epic Mammography Module at UChicago Medicine
- Zeiss Ophthalmology PACS
- Implementation and support of multiple AI clinical applications, including lung cancer screening, pulmonary embolism, lung density analysis, and stroke hemorrhage detection
- Philips IntelliSpace Portal for Radiation Oncology
- PowerScribe One speech recognition upgrade

Software development deliverables including:

- Development of a research portal with distributed AI algorithms to support the ImagiQ NSF project
- Co-development of AI-enabled Natural Language Processing (NLP) applications in radiology
- Development and deployment of Auto-Protocolling of Radiology Studies as part of our ongoing imaging ordering decision support infrastructure
- Software development to support departmental peer learning initiatives

VICE CHAIR OF QUALITY



Jonathan Chung, MD

Our current quality improvement program, led by Vice Chair Jonathan Chung MD, has been developed upon three main pillars: appropriate use of imaging, taking advantage of synergies, and leveraging technology.

1. Appropriate use of imaging: Given the current constraints and payment climate we work in, it is essential to use imaging appropriately, only when the benefit/risk and cost ratio makes sense. Radiology should lead the appropriate imaging initiative as stewards of this limited resource.
2. Synergies: In our department, we also want to leverage our potential synergies to create quality work that provides 2-for-1s and 3-for-1s as often as we can. Certainly, there are QI projects that are essential and do not offer multiplicative advantages, so we prioritize our QI opportunities based on

overall impact on patient care first and then on potential synergies—whether financial, helping in wellness, research, or education.

3. Technology: The field of Radiology has had to work harder to grow and evolve with the current healthcare climate. From a clinical, research, and educational standpoint, there is little room to simply work harder unless we are willing to sacrifice our department’s overall wellness and ultimately patient care. Thinking outside the box, radiology lives in the RIS/PACS environment, and thus, can benefit from tech-based tools. We are already using AI in our clinical practice and plan to leverage NLP in large ways to reduce waste while improving patient care, clinical efficiency, and billings.

As an example of an initiative that leverages all of these pillars is our transition to peer learning last academic year, spearheaded by Pritesh Patel, MD. Data showed that traditional peer review does not improve the diagnostic performance of radiologists. Moreover, traditional peer review is an extra administrative burden to radiologists, which is increasingly important as our clinical volumes increase. The traditional peer review format also led to undesirable behavior in our teams, hurting morale. We have now transitioned to peer learning, using an efficient tech-based interface fully integrated into our RIS/PACS environment and created by Divya Mukta from the Rad IT development team. This has improved ease of practice and promoted a just culture with an overall emphasis on improving performance rather than punishing mistakes.

VICE CHAIR OF ACADEMIC AFFAIRS



Kate Feinstein, MD

Vice Chair Kate Feinstein, MD, FACR and Zheng Feng Lu, PhD lead the Academic Affairs team. Monique Shelton is the senior academic affairs specialist. Ms. Shelton, Dr. Feinstein, Dr. Montner, Allison Lange, and Kimberly Lenner meet weekly to track faculty recruitment, academic appointments, faculty credentialing, and faculty promotions. The departmental Diversity and Inclusion Council has authored a search committee guide to assist search committee members in recruiting a diverse applicant pool and evaluating them without bias. Over the past year, with the help of search committee chairs, search committee members, and interviewers, the department has recruited a musculoskeletal radiologist, a nuclear medicine physicist, a cardiothoracic radiologist, an emergency radiologist, two neuroradiologists, two breast radiologists, and two pediatric radiologists. The promotions committee, chaired by Dr. Brian Funaki, has been instrumental in assessing faculty members' readiness for promotion. Kudos to Drs. Pritesh Patel, Osman Ahmed, and Saad Ali for being promoted to Associate Professor, and to Steffen Sammet for his promotion to Full Professor. Several faculty members are preparing for promotion at the Associate and Full Professor levels.

Programs for mentors and mentees including CV construction and pathways to promotion lectures have been well received. Mentoring workshops and steps to national recognition guidance are planned. The Basic Scientists are working on a mentorship program. In the future, the programs will be combined for a uniform radiology mentorship policy.

VICE CHAIRS OF BASIC SCIENCE RESEARCH



Maryellen Giger, PhD

The Department of Radiology has 12 basic science faculty members, along with four clinical medical physics faculty members, with imaging science research interests including computer-aided diagnosis & machine learning/ deep learning analysis for the interpretation of a variety of medical images (such as breast, thoracic, thyroid, colon, cardiac, ovarian, skeletal & radioisotope images), new acquisition methods for MRI and MRIS, novel tomographic reconstruction methods, new methods for PET, SPECT and optical imaging, evaluation methodologies & ROC analysis, and developments of novel imaging instrumentation.

The faculty labs include over 70 grant-supported researchers including research professors, research associate professors, research assistant professors, research lab computer scientists & staff, post-docs, graduate students, medical students, and undergraduates. Over the past few years, the faculty have brought in over \$39M, average \$7.9M per year of funding to the department along with multiple collaborative agreements, material transfer agreements, and patents. In addition, the faculty are quite active in various undergraduate research programs, especially during the summer months, making our lab activities even more vibrant.

Highlights from the past few years include the growth of the MRI research and resource center, the creation of the molecular imaging & cyclotron center, the rise in micro-to macro-tomographic imaging and reconstruction methods, investigations integrating diagnosis and therapy, and the creation of MIDRC, the Medical Imaging and Data Resource Center (midrc.org). These highlights are presented in this report.



Patrick La Riviere, PhD

VICE CHAIR OF COMMUNICATIONS



Kirti Kulkarni, MD

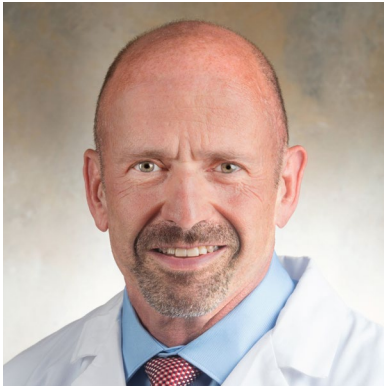
Better communication builds better connections! This is the value driven by the Communications team, led by Kirti Kulkarni, MD and team members Sam Goslin, Mandy Velligan, Allison Lange, and Patricia Reyes. In the past year, the communications team has created an annual report for the year 2020-2021. It was a creative and enthusiastic initiative to work with the leadership, various sections and faculty members about their accomplishments and future vision. The communications team was instrumental in creating a streamlined process to upgrade and update the Department of Radiology website in a timely and continuous manner. This allows the viewers to see weekly and monthly updates, share news and events and prioritize the information that has to be delivered. The committee's work in optimizing our academic website has led to a 34.8% increase in our website's Quality Assurance score (59.8% to 94.6% in the last year). Website quality assurance ensures the quality of a site meets divisional and institutional website standards and procedures requirements, including link function, formatting, and accessibility. Website Quality assurance pairs optimizers and developers to ensure everything looks and works correctly on all relevant devices and browsers.

Led by Dr. Kulkarni's appreciation for transparency and camaraderie, the team has also put together an agenda for an Alumni Engagement Series, which will comprise of quarterly educational and interactive events for the alumni. This will give us an opportunity to strengthen the bond and keep them in tune with some of the breakthrough events in the Department of Radiology. Another initiative that the team is working on is to create educational videos with our faculty for referring physicians and patients.

Furthermore, within the department itself, communication has been emphasized through daily teachings with trainees and creating a culture that prioritizes emotional investment in the job. This is important for creating a workplace where people come for growth and a sense of fulfillment, which translates into authentic communication and foster relationships.

The Communications team is particularly proud that their initiatives were highlighted in a case study published and distributed by the ACR. It has provided a platform to spread the importance of communication not only at the University of Chicago but throughout the field of radiology.

VICE CHAIRS OF OPERATIONS



Steve Montner, MD

The Radiology Operations is critical to the function of the department; we oversee tasks from ensuring that the right equipment is available to having adequate faculty hires to support clinical work. The team is headed by Steven Montner, Executive Vice Chair of Radiology Operations and President of the Medical Staff, and Thuong Van Ha, Associate Vice Chair of Radiology Operations. The Executive Vice Chair and Associate Vice Chair rely on the support of the Hospital and Departmental Administration.

Over the last year, the department continues to deal with the effect of the pandemic, and the need for remote working continued on an intermittent basis for many in the department. Together with the IT personnel, we continued the work of the re-distribution of workstations to offices and to personal home offices, in order to allow clinical work to proceed without interruptions.

Faculty recruitment, hiring, and retention are an important part of the Radiology Department as we seek to expand and accommodate our growth in volumes. Radiology Operations facilitate this process. The department was able to hire two neuroradiologists, a breast imager, and a musculoskeletal radiologist. Recruitments are underway in other sections in both Clinical Associate and School of Medicine tracks.



Thuong Van Ha, MD

Radiology Operations supports faculty endeavors in clinical work, clinical research, and educational activity. We work closely with individual sections to identify problem areas and provide solutions. We encourage sections to identify problems and contribute ideas to find solutions. An example is the unprecedented contrast shortage over the summer due to manufacturing and supply issues. The department convened a meeting where ideas were exchanged. Together with the radiology administration, managers, support staff, and faculty, we were able to come up with a plan that allowed imaging exams and interventional procedures to continue without disruption.

Radiology Operations has been working to further integrate operations with our partners at Ingalls and Orland Park. River East and South Loop expansion continue. Equipment upgrades at the main campus this year included a Neuro IR suite upgrade with entirely new equipment and a new Bariatric Fluoroscopic room currently being installed. Looking further ahead, we will be aiding in the institutional expansion into a new Northwest Indiana Campus and the new Cancer Center here on the Hyde Park Campus.

VICE CHAIR OF DIVERSITY AND INCLUSION



Carina Yang, MD

The department's D&I Council core members and its leadership have been committed to furthering the department's Mission Vision Values in diversity, equity, and inclusion. Dedicated D&I Grand Rounds featured two disparate, less often discussed but extremely important topics. The winter session focused on disability in medicine, with a talk entitled "Disability as Diversity in Medicine: Creative Inclusion" presented by Peter Poullos, MD, Associate Professor of Radiology and Gastroenterology at Stanford University. Although initially a Gastroenterology fellow, Dr. Poullos decided to retrain in Radiology after a spinal cord injury left him partially paralyzed from the neck down. He discussed the underrepresentation of disability in medicine with the suggestion of easily implementable approaches to improving representation.

In the spring, many department members had tears in their eyes upon a heartfelt and candid presentation by Kamalani Hanamaikai, DO, currently an interventional radiologist with Chandler Regional Medical and Mercy Gilbert Hospital in Arizona. In his talk "My Indirect Pathway: A Journey Which Led to My Life's Passion in Radiology," Dr. Hanamaikai detailed his underprivileged upbringing and the importance of second chances as well as consistent strong mentorship in achieving successes, which ultimately led him to his current role in radiology.

The Radiology Faculty Advancing in Medical Education (FAME) sessions continued to be popular, and an impactful presentation on minimizing bias in narrative assessment and in letters of recommendation was offered once more. Department members participated in several virtual "cultural sharing" sessions, including an interactive summer session entitled "Ask Me Anything: Exploring Religious and Cultural Diversity within our Radiology Department" with an eager panel of diverse faculty and trainees of varying religions. Our live winter cultural sharing potluck event was an immense

success, with plans to make it annual – sweet and savory foods across many nationalities and ethnicities were on display and enjoyed by many in the department. With regards to recruitment, we emphasized holistic evaluation with a sample template format to be used during trainee applicant review across the department, establishing a diverse core search committee, and then pairing applicants who are underrepresented in medicine (URiM) with URiM interviewers. At the faculty level, each search committee continues to have a D&I council member serve as a monitor of Best Practices.

The new Women in Radiology (WIR) group was established, and the inaugural event centered on a book club discussion of "The Confidence Code," with the hope for more similar social and educational events in the future. WIR has been planning a new bi-annual D&I Grand Rounds series focused on professional development programming, such as workshops for all faculty and trainees as well as presentations from early-career female radiologists to share their areas of expertise. There will be opportunities for our trainees to have protected time with our rising female radiologists during the speakers' visits.

We are further enhancing departmental diversity and increasing cultural competency. We now have regular D&I spotlight interviews with various diverse faculty and trainees, especially those who are URiM, published in our regular Paul C. Hodges Alumni Society newsletter as well as monthly Departmental Newsletters. Department members describe their unique backgrounds and their opinions of the obstacles to increasing diversity and inclusion in our field. In the coming year, we hope to connect more to our surrounding community, with a planned breast cancer education session at Bridgeport Free Clinic, unfortunately, delayed by COVID earlier this year, as well as more opportunities to provide service now that we are moving onto the next phase of the pandemic. We look forward to yet another productive year ahead!

VICE CHAIR OF BUSINESS DEVELOPMENT



Steve Zangan, MD

The business development team, led by Vice Chair Steven Zangan MD, plays an instrumental role in the ambitious UChicago Medicine Vision 2025 plan. This plan incorporates five key strategies to build upon our strengths and expand the forefront of health, discovery, and innovation.

First, we aim to excel in the patient and clinical experience. We will build a digitally enabled organization for patients and support the ease of practice for our physicians. The department has successfully implemented Ambra Image Exchange, allowing seamless cloud-based sharing of imaging studies from outside institutions. Patients can even upload their imaging through MyChart. We have also developed a remote second opinion program, through which patients receive written or telehealth second opinions from our expert radiologists without leaving home.

Strategies two through four target enhanced growth, specifically in our signature specialty programs, offsite

locations, and Southside community. Currently, our radiologists elevate signature specialty programs in oncology, transplant, heart and vascular medicine, and trauma, among others. Growth here will allow us to integrate the discovery and delivery of novel therapies and build capabilities for treating complex conditions. In August 2022, we broke ground on a new \$121 million state-of-the-art care center in Crown Point, Indiana. A comprehensive imaging center is the cornerstone of the 130,000-square-foot two-story facility. Expected to open in the spring of 2024, the multispecialty care center and micro-hospital will be our largest off-site facility and the first freestanding building in Indiana. We also wish to grow our enterprise to Orland Park, South Loop, River East, and Ingalls Hospital. Expanding our health system network will integrate patient care, expand access, and elevate coordination throughout our health system. Additionally, we have created clinical, educational, and research opportunities with global partners through our international sites, such as the Center in Beijing. Lastly, we plan to improve the health of our local community. Through programs like the breast imaging South Side Task Force, we strengthen partnerships with the local community to improve access and care delivery for our neighbors.

The fifth and final strategy will be to deliver high-quality, cost-effective care. Our faculty hold key leadership roles within the University of Chicago Physician Group, finance teams, and contract committees, allowing us to deliver exceptional value through high-quality care with greater cost efficiency. Our success has laid the foundation for the new era of value-based care.



This rendering shows what UChicago Medicine's new 130,000-square-foot multispecialty care center and micro-hospital in Crown Point will look like when it's finished in spring 2024.

CLINICAL SECTIONS

The Department of Radiology continues to expand in areas of clinical service, education, and research. New facilities, new programs, and new faculty abound. The Department is in the middle of the most aggressive expansion of imaging facilities ever at the University of Chicago, and of a magnitude rarely encountered nationwide.

The subspecialized training and practice of our clinical radiologists focus a wealth of expertise in diagnostic imaging and intervention. The Sections represent the administration structure of the professional staff, with the Section Heads responsible for all aspects of patient care, quality assurance, teaching, and academics within their subspecialties. The Section Chiefs work in conjunction with Dr. Aytekin Oto, Chairman, Dr. Steve Montner, Executive Vice Chair of Operations, Dr. Thuong Van Ha, Associate Vice Chair for Operations, and other Vice Chairs of the department on a weekly basis to work on various initiatives.



Members of the Section of Abdominal Imaging: (L to R) Grace Lee, Abraham H. Dachman, Carla Harmath, Joelle Wazen, Paul Chang.

ABDOMINAL IMAGING

CARLA HARMATH, MD

ASSOCIATE PROFESSOR OF RADIOLOGY SECTION
CHIEF, ABDOMINAL IMAGING

The abdominal section has been very productive clinically and academically over the past year. The section clinical productivity is high, and the report turn-around time has been within the departmental guidelines. In addition, several section members had significant accomplishments and awards, with recognized societal work.

Dr. Mathew was interviewed for an RSNA News article entitled "[Imaging of Testicular Germ Cell Tumors: Diagnosis, staging, treatment and surveillance can be driven by imaging](#)" by Laura Sirtonski. **Dr. Patel** implemented peer learning and was promoted to associate professor in 2022. **Dr. Chang** was awarded top doctor in two editions of the Chicago magazine: "2021 Top Doctors: Chicago." Chicago Magazine, "2022 Top Doctors in Cancer: Chicago." Chicago Magazine. **Dr. Dachman** received the "Distinguished Service

Award" (aka 'Gold Medal') from the Illinois Radiological Society. He also received a Distinguished Reviewer award from the journal Abdominal Radiology and was awarded "Top Doctors" from Castle Connolly Medical, TD. **Dr. Paushter** received the Distinguished Reviewer Award American Journal of Roentgenology 2021 and the Advanced Level Quality Certificate, from the Radiological Society of North America, 2022. **Dr. Lee** was invited to provide a review for Life - "Is Endorectal Coil Necessary?". **Dr. Oren** received The Mark Ronald Tetelman Memorial Award for Outstanding Teaching, in June 2022 and became the Associate Director of the Radiology Residency Program at The University of Chicago. **Dr. Harmath** received the distinguished reviewer award from the Abdominal Radiology and Radiology Editor's Recognition Award. She was promoted to Associate Professor in 2021.

The section had several peer-reviewed publications this past year:

Medved M, Chatterjee A, Devaraj A, **Harmath C**, Lee G, Yousuf A, Antic T, Oto A, Karczmar G. "High Spectral and Spatial resolution (HiSS) MRI of the prostate cancer: a pilot study." Magnetic Resonance in Medicine. 2021;00:1-9 <https://doi.org/10.1002/mrm.28802>

Arora, S., Catania, R., Borhani, A... **Harmath, C**. HCC: role of pre- and post-treatment tumor biology in driving adverse outcomes and rare responses to therapy. Abdom Radiol (2021). <https://doi.org/10.1007/s00261-021-03192-8>

Arora S, **Harmath C**, Catania R, Mandler A, Fowler KJ, Borhani AA. Hepatocellular carcinoma: metastatic pathways and extra-hepatic findings. Abdom Radiol (NY). 2021 Jun 5. doi: 10.1007/s00261-021-03151-3. Epub ahead of print. PMID: 34091729. <https://doi.org/10.1007/s00261-021-03192-8>

Carlson B, **Harmath C**, Turaga K, Kindler HL, Armato SG 3rd, Straus C. The role of imaging in diagnosis and management of malignant peritoneal mesothelioma: a systematic review. Abdom Radiol (NY). 2022 May;47(5):1725-1740. Epub 2022 Mar 7. PMID: 35257201. <https://doi.org/10.1007/s00261-022-03464-x>

Kleijch WJ, Marshall EL, Blunt KF, Kinsey T, Reiser I, Lu ZF, **Mathew M, Patel P, Chang P, Paushter D, Harmath C, Dachman A**. A Clinically Optimal Protocol for the Imaging of Enteric Tubes: On the Basis of Radiologist Interpreted

Diagnostic Utility and Radiation Dose Reduction. Acad Radiol. 2022 Apr 30:S1076-6332(22)00191-X. Epub ahead of print. PMID: 35504809 <https://doi.org/10.1016/j.acra.2022.03.014>

Borhani A, Furlan A, Elsayes K, **Harmath C**, Horvat N, Kamath A, Kambadakone A, Kierans A, Humar A, Kielar A. "Pre-operative Imaging of Living Liver Donor." RadioGraphics 2021 Oct;41(6):1572-1591. PMID 34597229. <https://doi.org/10.1148/rg.2021210012>

Gundogdu, B., Pamuksuz, U, Chung, J., Telleria, J., Liu, P., Khan, F., **Chang, P**. Customized Impression Prediction from Radiology Reports using BERT and LSTMs. Journal of IEEE Transactions on Artificial Intelligence. DOI: 10.1109/TAI.2021.3086435

Life - "Is Endorectal Coil Necessary? - A Review"; **Lee, G** RADIOLOGY-in press-RAD 21-1895-"Comparing Radiologist Performance Diagnosing Clinically Significant Prostate Cancer with Multiparametric Versus Hybrid Multidimensional MRI"; Abdominal Radiology-"Physically Implausible Signals as a Quantitative Quality Assessment Metric in Prostate Diffusion-Weighted MR Imaging"

Wazen J, **Dachman AH**. Preparing Patients for CT Colonography. In: Flores EJ, Yee J, Copit D, Goldin J, eds. Tumor Imaging: From Screening to Response Assessment. Leesburg, VA: ARRS, 2022:40-44.

THORACIC IMAGING

JONATHAN H. CHUNG, MD

PROFESSOR OF RADIOLOGY SECTION CHIEF,
THORACIC IMAGING

The Thoracic Imaging Section in the department of Radiology at the University of Chicago Medicine (UCM) provides cutting-edge clinical imaging exams of the lungs, heart, and thoracic vasculature. We direct the acquisition of and provide expert diagnostic interpretations of standard chest CT, high-resolution chest CT (HRCT), coronary CT angiography, MRI, and chest radiograph examinations. We work closely with our clinical colleagues in numerous specialties using a multidisciplinary approach, including Pulmonology, Cardiology, Cardiothoracic Surgery, Oncology, Infectious Disease, and Emergency Medicine.

Even in the era of COVID-19, our section was able to support and foster increased volumes across modalities. Under **Dr. Luis Landeras's** leadership, our team was able to increase lung cancer screening volume by 40% compared to the year prior. Similarly, there was a 15% increased cardiac CT and cardiac MRI volume compared to the year prior, due to the outreach directed by **Dr. Luis Landeras** and **Dr. Karima Addetia** (Co-Directors of Cardiac MRI and CT). We expect volumes across our section to increase this academic year. With the clinical retirement of **Dr. Heber MacMahon**, we were able to recruit **Dr. Lydia Chelala** from the University of Maryland, where she completed both fellowship and residency, including her service as chief resident. She was awarded best clinical fellow of the year during her last training year. She was a highly sought-after applicant, having already demonstrated excellent clinical skills and an extremely high academic career trajectory as a researcher and academician.

Section members represented the department at the local, national, and international levels. **Dr. Lydia Chelala** served as a speaker for the American Institute for Radiologic Pathology (AIRP) and an invited speaker for Robert Wood Johnson University Hospital. **Dr. Luis Landeras** served on the Diversion and Inclusion Committee and the UCCCC Innovative Imaging Strategy Working Group in addition to his role as Co-Director of Cardiac MRI and CT locally and the Cardiac Certifying Committee (American Board of Radiology) nationally. **Dr. Steven Montner**, in his overarching role as Executive Vice Chair of Operations in Radiology as well as in his role as Vice President of the MSO, served on 15 local committees including chairing the Physician Assistance Committee and served nationally on the Society of Thoracic Radiology Awards Committee and Health and Wellness Committee. **Dr. Jonathan Chung**, in his role as Vice Chair of Quality in Radiology, served on the Section Chief Committee and the Quality Improvement Committee locally and 11 committees/offices nationally, serving as chair of the ACR



Members of the Section of Thoracic Imaging: (L to R) Jonathan Chung, Steve Montner, Chris Straus, Lydia Chelala.

Appropriateness Criteria® Expert Panel 1 on Thoracic Imaging. In total, our sectional members reviewed for or were on editorial boards of over 20 peer-reviewed journals.

As a section, we published 13 peer-reviewed manuscripts during the last academic year. Notable publications include **Dr. Lydia Chelala's** timely paper on cardiac MRI findings of myocarditis after COVID-19 mRNA vaccination in adolescents, **Dr. Luis Landeras's** co-authorship of a paper on myocardial perfusion reserve and left ventricular ejection fraction in cardiomyopathies, and **Dr. Jonathan Chung** co-authorship of a multi-society and multidisciplinary practice guidelines on the integration and application of clinical practice guidelines for the diagnosis of idiopathic pulmonary fibrosis and fibrotic hypersensitivity pneumonitis. As in previous years, our section continued its role as an international leader in the diagnosis of interstitial lung disease (ILD) clinically and academically. In the past 5 years, our multidisciplinary ILD has published more peer-reviewed papers than any other ILD team in the world and has established UCM as one of the major centers for ILD nationally. **Dr. Luis Landeras** again won a departmental teaching award, winning the Senior Class Teacher of the Year Award.

As a section, our goals in the next year are to continue our standard of excellence in our tripartite mission of clinical care, research, and education, incorporate our new faculty member into our practice, and continue to grow our clinical volume in specific areas of academic interest as well as in areas that align with departmental and institutional goals.

BREAST IMAGING

HIROYUKI ABE, MD, PHD

PROFESSOR OF RADIOLOGY
SECTION CHIEF, BREAST IMAGING

The mission of the Section of Breast Imaging within the Department of Radiology is to provide excellent comprehensive screening and diagnostic breast health care for our patients. Major emphasis is given to top-notch clinical care, participation in national clinical trials to further screening guideline policies, investigation of important laboratory observations that translate into clinical applications, and education and outreach in the neighboring south side community. We cover DCAM and two off-site locations, River East and Orland Park, with 3 attending radiologists. Imaging studies and procedures we perform include screening and diagnosing mammograms, automated and hand-held breast ultrasounds, ultrasound-guided/stereotactic/MR-guided biopsy, wire/seed localization procedures, and interpretation of the outside study.

Our volume significantly increased in comparison to that in the last year. The volume of the mammogram showed a 9% increase (screening: 9185/8563, diagnostic: 1188/1531; this year/last year), and the volume of biopsy procedures showed a 13% increase (US-guided biopsy: 435/392, stereotactic biopsy: 87/71, MR guided biopsy: 23/27). Interpretation of outside examination (IOE) is another important job in our section. The number of IOEs in this academic year is 679 out of 205 patients. Despite this high volume, we managed our work with only 3 attending radiologists, and the sectional

productivity was 84 percentile of the Association of Administrators in Academic Radiology (AAARD).

Our section continues to thrive on both educational and research activities. Dr. Kulkarni is one of the founders of the Midwest Breast Imaging Fellowship Consortium (MWBIFC) and a board member of the Chicago Radiological Society. Dr. Abe is a member of the RSNA annual program committee for the last two years. Dr. Kulkarni is a member of the global health initiative program at the University of Chicago and engages in various mentorship programs on the south side of Chicago. Dr. Kulkarni has co-chaired the Chicagoland Radiology Expo for the last six years.

Both Drs. Abe and Dr. Kulkarni are involved in multiple research projects and they published 4 peer-reviewed papers and co-authored 9 presentations in the international academic meetings this academic year. There are 6 active grants, including 1 NIH funding. We are participating in the national multi-institutional trials, such as I-SPY, and research trials, such as CAPS (Chicago Alternate Prevention Study).

Our sectional goal for the academic year 2022-23 is to continue our standard of excellence in our clinical care, research, and education.



Members of the Section of Breast Imaging (L to R) Kirti Kulkarni, Hiroyuki Abe and Breast Fellow, Neetal Bhawe

MUSCULOSKELETAL IMAGING

SCOTT STACY, MD

PROFESSOR OF RADIOLOGY
SECTION CHIEF, MUSCULOSKELETAL IMAGING

The 2021-2022 academic year was a time of transition for the Musculoskeletal (MSK) Imaging Section. Dr. Larry Dixon, a fixture in the Department of Radiology since 1985, retired after serving the University for over 35 years. During his career at the University of Chicago, Dr. Dixon served as the Section Chief of Musculoskeletal Imaging, Director of the Musculoskeletal Imaging Fellowship, and Chair of the Radiology Residency Selection Committee. He also served on the Medical School Admissions Committee and provided lectures and instruction to students at the Scholl College of Podiatric Medicine. He was a three-time recipient of the Marc Tetalman Memorial Award for Outstanding Teaching, which has to date not been achieved by any other radiologist in the Department.

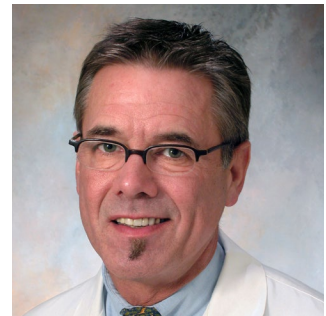
Dr. Narayan Sundaram and his wife Millie welcomed the arrival of their baby boy, Niyam Krishna Sundaram, in July 2021. Dr. Sundaram continued in his roles as Assistant Program Director for the Diagnostic Radiology Residency and Program Director of the Musculoskeletal Imaging Fellowship. In the spring, Dr. Sundaram announced that he would be resigning from the Department in July 2022 to pursue a career in private practice closer to his home.

Exam volumes have since risen to well-above pre-pandemic levels; and despite being understaffed, the section continued to offer state-of-the-art multimodality imaging and image-guided interventional procedures for the patients of University of Chicago Medicine. Our proximity to the Orthopaedic and Rheumatology outpatient clinics facilitated communication and consultation with other physicians specializing in disease processes of the bones, joints, and associated soft tissues. The noon conference curriculum for the residents continued in full, as did the orthopedic intern rotations and limited observerships; furthermore, Dr. Chris Straus continued to serve as the Director of Medical Student Education for the Department, as well as a mentor to all students considering a career in Radiology. Over the past year, Drs. Sundaram and Stacy worked together to provide a series of concise, educational PowerPoint presentations to ultrasound technologists so that they could begin to perform selected MSK exams independently. The section members presented lectures at virtual grand rounds and visiting professorships and contributed to the academic mission of the department with scientific and educational exhibits as well as a peer-reviewed publication. The section took part in projects studying neoplasms arising in association with nerves (other than schwannomas and neurofibromas), glomus tumors, unrecognized fractures that can arise in association with renal osteodystrophy, and a deep learning algorithm that may discern subtle non-displaced fractures of the proximal femur.

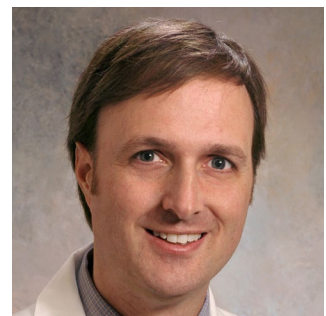
In July of 2022, the Section will welcome Dr. Larry Lo to the Department. Following his Diagnostic Radiology Residency at the University of Maryland, Dr. Lo completed a Musculoskeletal Radiology Fellowship at Brigham and Women's Hospital and supplemented this with an Imaging Informatics Fellowship at the combined program of the University of Maryland and the VA Maryland Healthcare System. He then spent a year as Assistant Professor of Clinical Radiology in the Department of Musculoskeletal Imaging at the University of Pennsylvania. Dr. Lo has expressed interest in clinical operations, quality, and education. We are excited to have him join our Department as we search for and hire another MSK radiologist to return to full staffing of the section.



Scott Stacy, MD



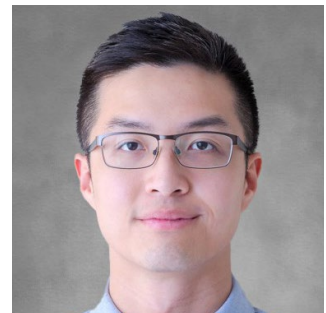
Larry Dixon, MD



Chris Straus, MD



Narayan Sundaram, MD, MBA



Larry Lo, MD

NUCLEAR MEDICINE

DANIEL APPELBAUM, MD

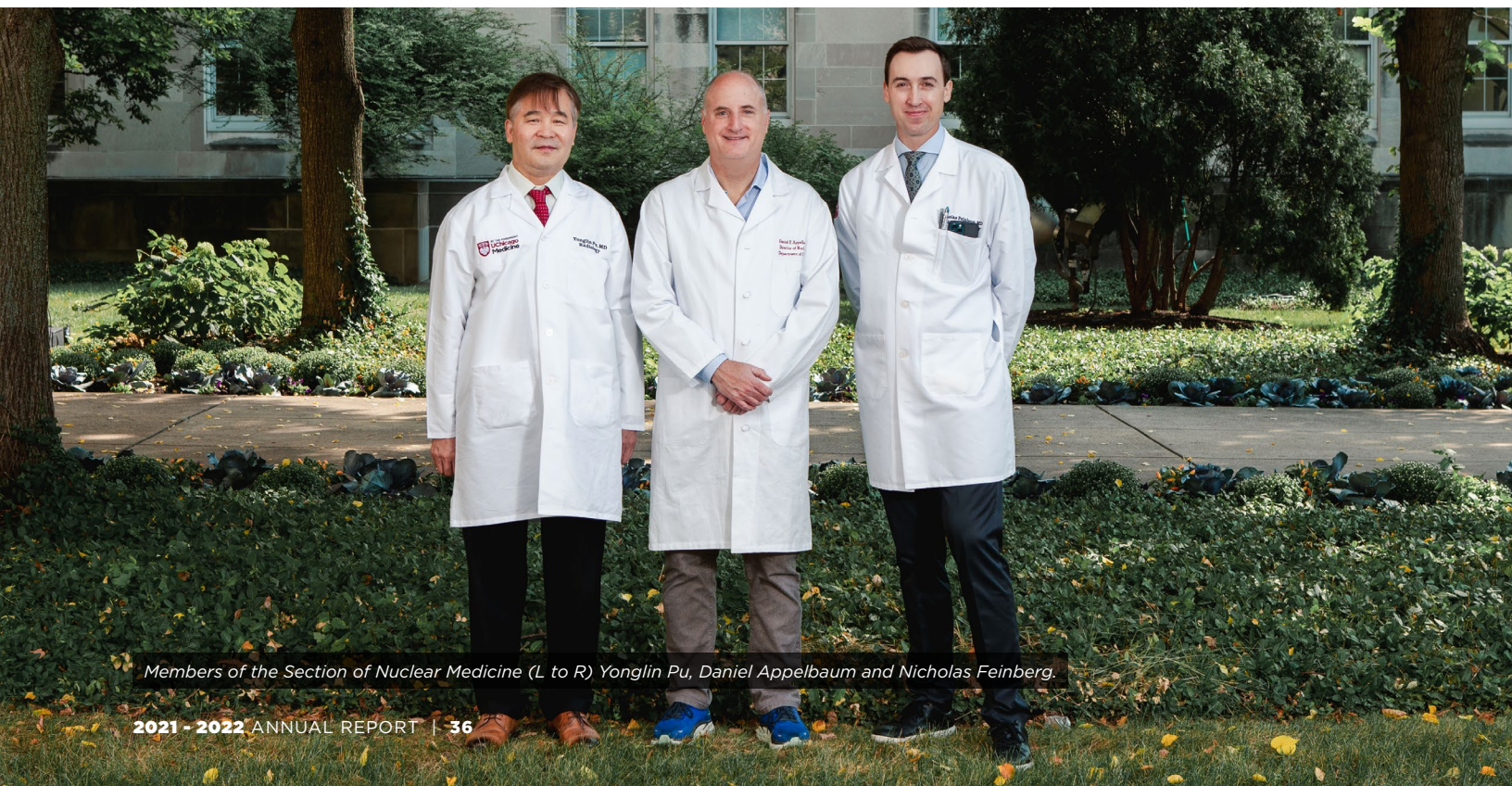
PROFESSOR OF RADIOLOGY
SECTION CHIEF, NUCLEAR MEDICINE

This has been another exciting year for the section of Nuclear Medicine. Our clinical volumes continue to grow at our main Hyde Park campus, and we have also begun to expand our services into our off-campus sites of Orland Park and soon Crown Point Indiana. Much of this growth has been in PET and theranostics, which has seen an increase in the utilization of existing tracers and radionuclide therapies. However, perhaps more notable has been the dawning of the era of PSMA-based radiotracers for both diagnosis and therapy (“theranostics”) for patients with prostate cancer.

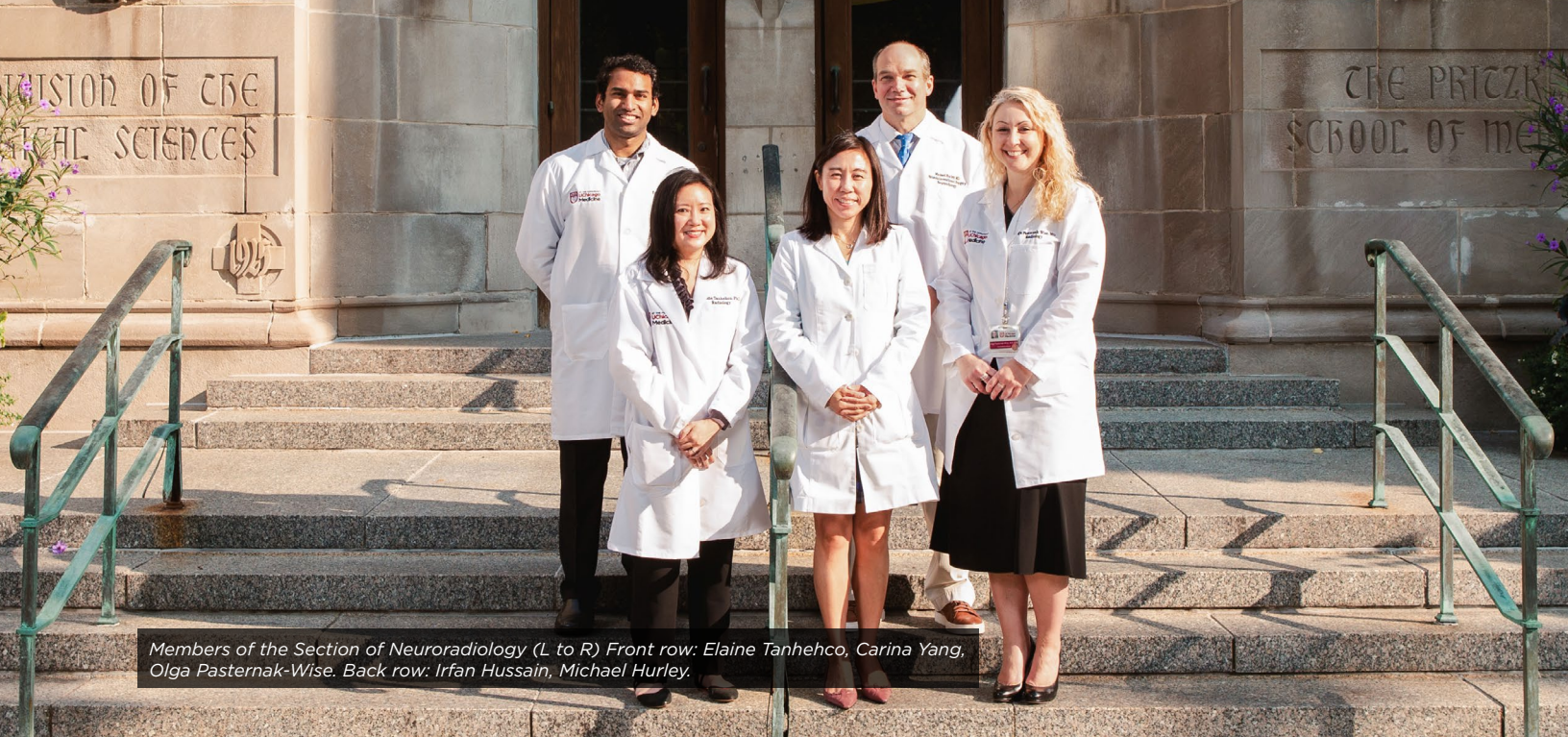
This past year, our section is proud and excited to have been the first in the region and once of the very first nationally to offer to patients this powerful new theranostic paradigm first for diagnosing and then treating advanced cases of metastatic prostate cancer. We now are working closely with those involved with the planning and design of our new Cancer Center to leverage the excitement and success of theranostics with prostate and other cancers to integrate seamlessly into the overall patient experience at our new future site. Furthermore, we are excited to be bringing nuclear medicine / PET and these related therapies to our affiliated satellite centers. As a first successful step, we began several months ago to offer nuclear cardiology services to Orland Park. We look forward to building on these efforts of greater patient access with our other offerings.

To help support our growth, we are pleased to have recently welcomed two new young faculty members to our ranks who have infused the section with tremendous new energy and ideas. Our new physicist, Kevin Little, PhD, has for example streamlined and “digitized” our critical but hitherto cumbersome QC endeavors of all our equipment. He has also worked closely with our Interventional Radiology colleagues to introduce our first post-therasphere bremsstrahlung imaging procedure, which assists greatly in both verifying treatment location as well as allowing more precise patient dosimetry. And Nick Feinberg, MD, although only very recently joining the faculty, has already made his presence felt for example updating our myriad dictation templates and improving resident education.

Our research program remains strong and as we hone in on a new radiochemist candidate to lead our medical cyclotron, we are excited about what the near future will bring. Clinically our theranostics program will also reap the benefits of having this facility (the only one in all of Illinois). And so, the synergy created through our unique theranostic and cyclotron programs, coupled with our local and regional expansion and new young faculty, makes every member of the section of nuclear medicine excited about our path forward.



Members of the Section of Nuclear Medicine (L to R) Yonglin Pu, Daniel Appelbaum and Nicholas Feinberg.



Members of the Section of Neuroradiology (L to R) Front row: Elaine Tanhehco, Carina Yang, Olga Pasternak-Wise. Back row: Irfan Hussain, Michael Hurley.

NEURORADIOLOGY

MICHAEL HURLEY, MD

PROFESSOR OF RADIOLOGY
SECTION CHIEF, NEURORADIOLOGY

The Neuroradiology section provides state-of-the-art multimodality diagnostic and interventional neuroradiology services. The section works in close operation with referring services, participating in at least six interdisciplinary conferences including cerebrovascular, head and neck, brain tumor, and epilepsy meetings weekly. As part of a Certified Comprehensive Stroke Center (CSC), the section is prepared for rapid assessment of stroke cases for possible intervention, and neuro-interventional radiology services are provided around the clock, including approximately 150 emergent mechanical thrombectomies over the past year, making U of C one of the busiest stroke thrombectomy centers in the Midwest. The CSC was successfully recertified by the Joint Commission this year.

The diagnostic neuroradiology section has come through a tough year with the departure of Dr. Aleks Kalnins in January 2021 on top of increasing study volume which now exceeds pre-COVID levels. Two new faculty were recruited during the year, Dr. Elaine Tanheco starting in August 2022 and Dr. Irfan Hussain in September 2022. We are currently interviewing several candidates for an additional section member, either faculty or clinical associate, to start later this year. We expect continued growth in imaging volumes on the main campus and with the addition of outpatient imaging centers soon.

Dr. Michael Hurley joined the department as Professor of Radiology and Section Chief of Neuroradiology in August

2021. He also co-directs the neuro-interventional service with Dr. Tareq Kass Hout, an Interventional Neurologist, bringing radiology and neurology perspectives to the table in a true multi-departmental collaboration working closely with the Department of Neurosurgery. To keep up with the increasing volumes, we will have two new state-of-the-art Phillips Azurion 7 biplane neuro-interventional suites coming online this year, one replacing the current main neuro-interventional suite, and the other becoming a dedicated second neuro-interventional suite, and critical backup for emergencies. We are also upgrading the myelography room to a modern C-arm unit which will allow us to increase our volume of fluoroscopy-guided spine procedures, heretofore bottle-necked through the main neuro-interventional suite. Ms. Abigail Murphy, APN, joined the interventional neuroradiology service in February 2022, covering all aspects of the service, including an outpatient clinic, inpatient rounding, and procedures.

Members of the section accounted for over 20 peer review publications combined. **Dr. Daniel Ginat** added twelve peer-reviewed journal publications to an already long list of about 150. **Dr. Michael Hurley** added six publications and has sourced grant funds to develop an animal stroke research model in close collaboration with Dr. Tim Carroll's MR research lab. **Dr. Olga Pasternak** has also received grant seeding for machine learning in the assessment of brain injuries. **Dr. Saad Ali** is an active committee member for

the ASNR and was promoted to Associate Professor during the year. **Dr. Carina Yang** continues to lead and provide simulation safety training for the RSNA and has been an invited speaker on diversity and inclusion. **Dr. Jack Collins** is an essential resource for multi-departmental research, actively involved in several projects, and developing his interest in fMRI research. Close collaboration with Dr. Tim Carroll's MRI research lab includes NIH-funded multicenter studies of vessel wall imaging in intracranial atherosclerotic disease, and unruptured intracranial aneurysms, in partnership with Northwestern University.

Drs. Jack Collins and Olga Pasternak are our section leads for MR and CT quality respectively, working closely with our technologist leadership to ensure optimized image acquisition and processing despite the current post-covid challenges with technologist staff shortages.

It was Dr. Carina Yang's last year as ACGME Neuroradiology fellowship program director after many years of excellent service, now handing the baton to Dr. Olga Pasternak. Our neuroradiology fellows presented at the American Society of Neuroradiology annual meeting. We added catheter simulator training sessions to the curriculum last year. The section also had fun creating a virtual online open house video to help prospective fellows appreciate the positive culture and mission at U of C. We have three excellent neuroradiology fellows for the forthcoming year.

In summary, the neuroradiology section has come through a challenging year stronger, with increased faculty, new infrastructure, and enthusiasm to meet the demands of a rapidly growing clinical and academic practice.

INTERVENTIONAL RADIOLOGY

BRIAN FUNAKI, MD

PROFESSOR OF RADIOLOGY
SECTION CHIEF, INTERVENTIONAL RADIOLOGY

Interventional Radiology continues to serve a broad base of patients and grow rapidly. We provide the full gamut of interventions with 9 fellowship-trained faculty and have made great strides in the past year despite staffing challenges in nursing. We have established a successful and growing independent clinic under the direction of Dr. Navuluri in the DCAM with advanced practice nurses, house staff, and faculty seeing patients who require longitudinal care. This includes patients with vascular malformations, HHT, hepatic malignancies, vena cava filters, fibroid disease, and adrenal disorders to name a few. We initiated operations in our outpatient access center in Mitchell Hospital and hope to be fully operational when our staffing needs have been met.

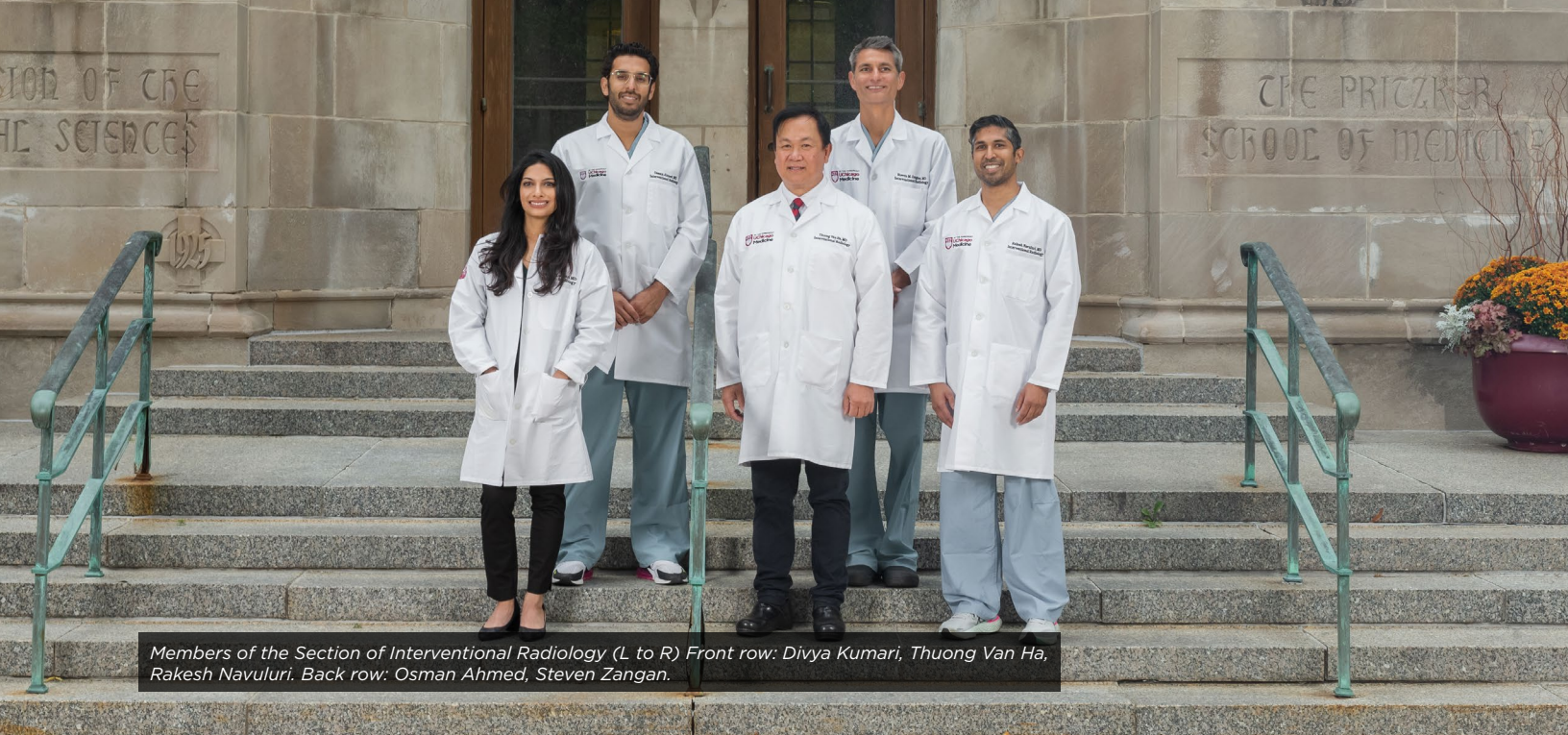
Section members represented the department on both local and national committees. At the University of Chicago: Privileges, Institutional Review Board, CLABSI, Sedation, Radiology Education, Clinical Process Review, Promotions, Health Equity, Diversity, Graduate Medical Education, HHT Center of Excellence, Promotions, Admissions to Pritzker School of Medicine, and Value Analysis Team. National committees include SIR Medical Student, SIR SARC, ABR Core Exam, Association of Program Directors, Association of Chiefs in IR, and SIR Joint Sponsorship. Additionally, Dr. Zangan is a University Ombudsperson and Dr. Van Ha is an Associate Vice Chair of Radiology Operations.

The IR residency led by Dr. Navuluri has been among the most competitive residencies in the USA and we have matched outstanding candidates that continue to progress through their training. Currently, we no longer

match fellowship spots as our IR residency is at capacity. Academically, our section continues to thrive on a national and international level. Dr. Funaki was recently appointed Deputy Editor of the Journal of Vascular and Interventional Radiology and Dr. Ahmed is an Associate Editor. Dr. Lorenz is the Chairman of the American College of Radiology's Appropriateness Criteria Expert Panel on Interventional Radiology. Drs. Funaki and Navuluri were examiners for the American Board of Radiology oral certifying examinations and Dr. Funaki is on the committee that prepares the examination. Dr. Leef along with members of the Section of Trauma Surgery has organized a national joint IR-Surgery trauma meeting entitled, "How to Save a Life," which continues to flourish, going into its 3rd year.

More than 20 manuscripts were published by section members during the academic year. Multiple new grants have been or are in the process of being secured. More than 30 invited national and international lectures were given by section members; all full-time faculty lectured at all major radiology meetings including SIR, RSNA, ARRS, GEST, and CIRSE. Drs. Funaki, Leef, Van Ha, and Lorenz were recognized as "Top Docs" by Chicago Magazine. In addition, Dr. Van Ha was named "Top Cancer Doc" in the June edition of Chicago Magazine. Dr. Funaki was awarded the Senior Distinguished Faculty at U of C.

As a section, our goals in the next year are to continue our standard of excellence in our tripartite mission of clinical care, research, and education, and fully establish our access center in Mitchell Hospital.



Members of the Section of Interventional Radiology (L to R) Front row: Divya Kumari, Thuong Van Ha, Rakesh Navuluri. Back row: Osman Ahmed, Steven Zangan.

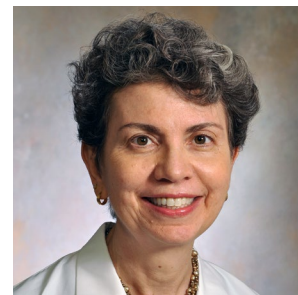
PEDIATRIC RADIOLOGY

KATE FEINSTEIN, MD

PROFESSOR OF RADIOLOGY
SECTION CHIEF, PEDIATRIC RADIOLOGY

The pediatric radiology section has continued to focus on taking care of our patients and staff during the pandemic. Many of our referring physicians have returned to in-person consultations and we have welcomed the interactions. Our interdisciplinary meetings, via Zoom, remain quite successful and it is highly likely that we will use this technology routinely because it enhances attendance and brings more voices to the table.

We quickly realized our sectional goal of removing barriers to screening exam participation in our underserved population was not a possibility. We pivoted and adopted the goal of developing a better pathway for children with possible foreign body aspiration. We approached the medical physicists to be the lead partner with us because their expertise was critical to the project. We wanted to find a more specific and sensitive method than the traditional radiographic approach, and employ CT, at a radiation dose like the standard exam. Our long-term vision is to deliver a rapid and accurate diagnosis, prevent unnecessary airway endoscopies under general anesthesia, and decrease costs. The medical physicists calculated the dose of the standard radiographic exam, built a CT phantom, and designed an ultra-low dose CT protocol. Pediatric radiologists and a pediatric otolaryngologist evaluated the phantom exams. The work was presented at the American Association of Physicists in Medicine Annual Meeting in July. We are preparing to pilot the pathway for the fall with the otolaryngologists and pediatric emergency physicians. This ongoing project highlights the section's teamwork.



Kate Feinstein, MD



Seng Ong, MD



Mario Zaritzky, MD

CLINICAL IMAGING MEDICAL PHYSICS

ZHENG FENG LU, PHD

PROFESSOR OF RADIOLOGY
SECTION CHIEF, CLINICAL IMAGING MEDICAL PHYSICS

The Clinical Physics Section consists of five ABR-certified diagnostic medical physicists that cover the clinical physics aspect of all the imaging equipment in the Radiology Department at the UChicago Hyde Park campus, at the UChicago Medicine Centers for Advanced Care at Orland Park and South Loop, as well as at the Solis Mammography sites in River East and Orland Park. They lead the QA/QC program in Radiology, provide professional services for equipment evaluation and optimization, interface with maintenance operations, perform radiation safety evaluations of equipment, manage patient dosimetry, and guide preparation for regulatory and accreditation inspections. For new installations, they contribute to equipment specification, site planning, shielding designs, radiation protection surveys, magnetic fringe-field evaluation, and acceptance testing. The clinical physicists are directly involved in patient care (e.g., imaging protocol management, protocol optimization to minimize artifacts and improve image quality), radiation safety (e.g., patient dose monitoring, alerts for dose audits), MR safety, teaching, and administrative functions. They also play an essential role in developing policies and procedures for the radiology department (e.g., QC policies for various imaging modalities, radiation dose monitoring policies, imaging pregnant patient policies, etc.). In addition, our clinical physicists assist in lending expertise to other departments beyond radiology when topics surrounding radiation are of concern (cardiology, urology, speech

pathology, etc.). They are closely involved in PQI projects with other clinical sections and ongoing efforts to improve quality in the radiology department. In education, they oversee a CAMPEP-accredited Imaging Physics Residency Program that recruits one resident per year. They actively contribute to the education of the Medical Physics Graduate Program by teaching courses and supervising students. Also, they participate in the education of radiology residents, fellows and staff.

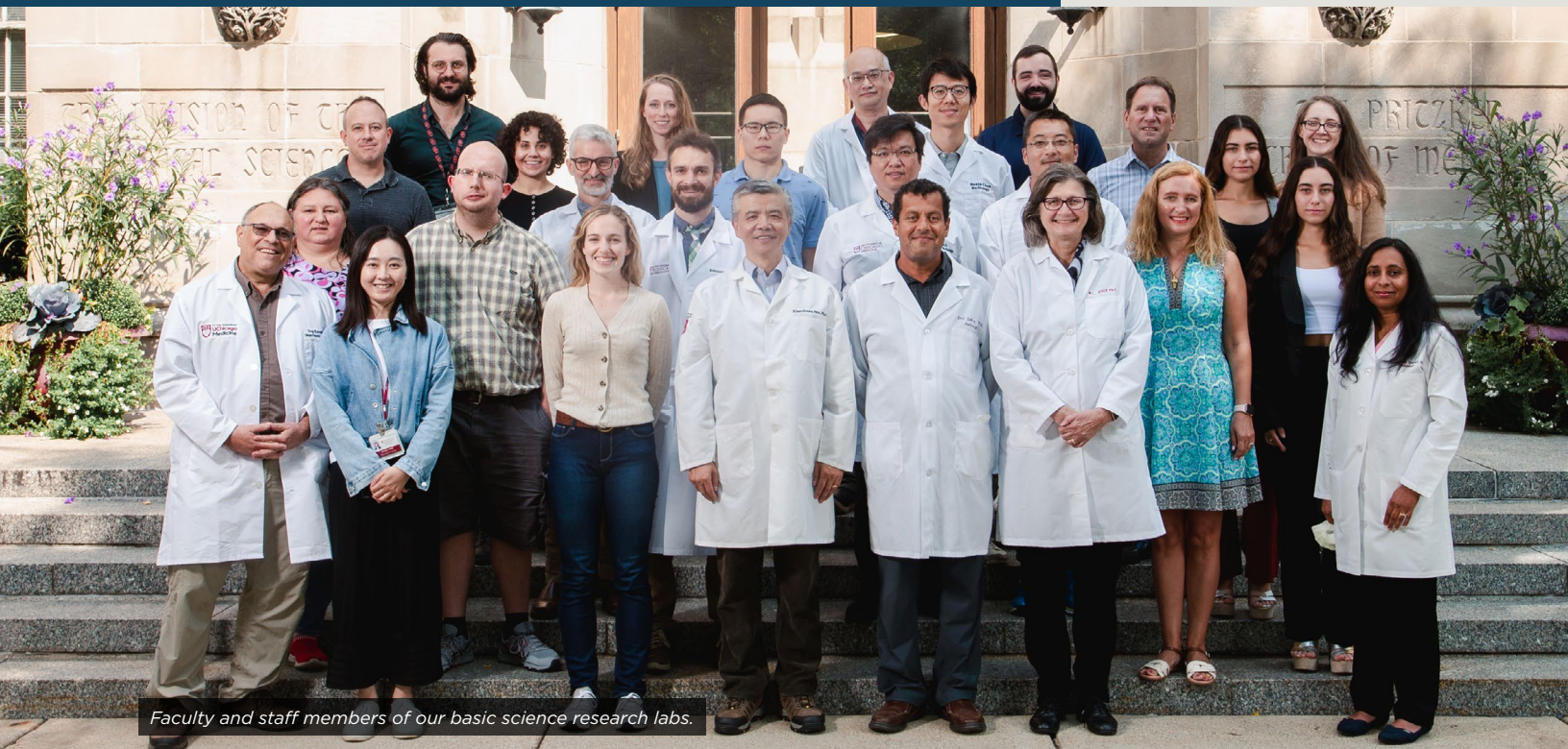
As experts in the field, section members hold committee and leadership positions in professional organizations such as the American Association of Physicists in Medicine (AAPM), Conference of Radiation Control Program Directors (CRCPD), American Board of Radiology (ABR), American Registry for Diagnostic Medical Sonography (ARDMS), International Electrotechnical Commission (IEC), International Atomic Energy Agency (IAEA), and International Commission on Radiological Protection (ICRP). During the past academic year, the Clinical Physics Section has published more than 12 peer-reviewed articles, 15 scientific presentations, more than 13 invited presentations, 2 book chapters, and 9 new or ongoing funded grant involvements. At the 2022 SPIE Medical Imaging Conference, a Cum Laude award was won for the poster on “task-specific evaluation of clinical pediatric fluoroscopy systems” with Dr. Marshall as its first author and Dr. Reiser as its last author.



Members of the Section of Clinical Imaging Physics (L to R) Front row: Emily Marshall, Kevin Little, Ingrid Reiser, Chao Guo. Back row: Steffen Sammet, Zheng Feng Lu, Samuel G. Armato, Nicholas Gruszauskas, Cameron Kofler.

RESEARCH DIVISIONS AND LABS

The basic science group in the department was reorganized this year with the elimination of subsections other than the clinical medical physics section. Maryellen Giger remains as Vice Chair for Basic Science Research and Patrick La Riviere joins her as Associate Vice Chair for Basic Science Research. The research in the department remains broad and far-reaching. The new organizational structure seeks to encourage collaboration within the basic science group and between it and the clinicians in our department and beyond. The clinical medical physics section is under the leadership of Zheng Feng Lu and, in addition to providing clinical physics services, serves as a critical bridge between the basic scientists and clinical radiologists. Recent exemplary highlights are presented in this report in focused articles.



Faculty and staff members of our basic science research labs.

RESEARCH LABS

MARYELLEN L. GIGER, PHD LAB

A.N. PRITZKER DISTINGUISHED SERVICE PROFESSOR OF RADIOLOGY,
COMMITTEE ON MEDICAL PHYSICS, AND THE COLLEGE

The Giger Lab has been investigating, developing, and translating computer-aided diagnosis/machine learning/deep learning methods for cancer, thoracic diseases, neuro-imaging, and other diseases with collaborations throughout the medical center and the world. The lab's AI research in breast cancer for risk assessment, diagnosis, prognosis, and the therapeutic response has yielded various translated components, and can be viewed as "virtual biopsies". In addition, they have made major advancements in AI for lung screening LDCTs with algorithms for diagnosing emphysema and assessing coronary artery calcifications. They have extended their AI in medical imaging research to include the analysis of COVID-19 on CT and chest radiographs, and many

members of the lab participate in the NIBIB-funded Medical Imaging and Data Resource Center (MIDRC; midrc.org). Members also work across scales, devising AI techniques for furthering the cellular understanding of lupus and breast cancer through the analysis of microscopy images. In recent years, the lab has extended its AI development and translation to other conditions including thyroid cancer, ovarian cancer, pediatric hydronephrosis, and brain injuries. Current members of the Giger lab include Karen Drukker, Hui Li, Heather Whitney, Chun-Wai Chan, Li Lan, John Papaioannou, Alexandra (Sasha) Edwards, Madeleine Durkee, Jordan Fuhrman, Lindsay Douglas, Natalie Baughan, Gabriel Casella, Joseph Cozzi, Beatrice Katsnelson, and Elise Katsnelson.

PATRICK LA RIVIERE, PHD LAB

PROFESSOR OF RADIOLOGY

The La Riviere Lab works on computational imaging across a wide variety of scales, modalities, and subjects. At the smallest scale, the lab works on novel approaches to computational microscopy in collaboration with investigators at the National Institutes of Health (NIH) and the Marine Biological Laboratory. Most recently, they have developed a multiview confocal microscope that achieves super-resolution using both classical and learning-based computational strategies. Done in collaboration with Hari Shroff at NIH, this work was published in *Nature* in November 2021. At the largest scale, the lab works on tomographic imaging of the Great Pyramid at Giza using naturally

occurring cosmic ray muons to probe for unknown voids in the interior of the pyramid. Working in collaboration with detector developers at Fermilab and the University of Virginia, the La Riviere lab is developing the tomographic reconstruction approaches for the project, which is still in the planning and simulation phase. A recent paper in the *Journal for Advanced Instrumentation in Science* described the progress. Naturally, the lab still works at the human scale as well, performing research in image-guidance for radiation therapy using x-ray fluorescence tomography, novel approaches to megavoltage radiation detection, and a novel combination of megavoltage and kilovoltage detection.

XIAOCHUAN PAN, PHD LAB

PROFESSOR OF RADIOLOGY

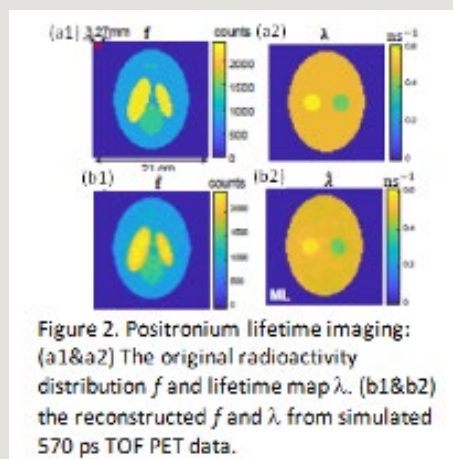
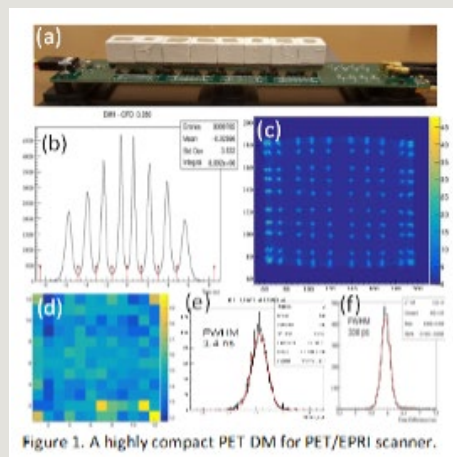
The Pan lab conducts research on tomographic imaging and its applications, including advanced cone-beam CT imaging, dual- and multiple-energy CT imaging, molecular imaging, magnetic resonance imaging, electron paramagnetic resonance imaging, and objective assessment of image quality. The overall objectives of the research are to improve existing and develop new, imaging technologies and workflows with a strong emphasis on translation to preclinical, clinical, and practical applications. The Pan lab collaborates with investigators in our department and in the Departments of Radiation and Cellular Oncology, Pathology, and Surgery at the University of Chicago. Additionally, we have collaborations with investigators from other academic institutions, national labs, and industries. Recent research programs in the Pan lab include algorithm-enabled dual- and

multiple-energy CT for applications to improving diagnosis in radiology and treatment planning and assessment in radiation therapy, advanced cone-beam CT tailored to guide and assess surgical and orthopedic procedures, quantitative imaging such as tomosynthesis imaging with limited-angular-range data for improved lung and breast cancer screening, and development of fast CT imaging of surgical specimen for intraoperative specimen assessment and guidance in breast-conserving surgery and for guiding and facilitating specimen grossing in pathology. In collaboration with leading veterinary researchers in the country, the Pan lab also investigates innovative cone-beam CT systems and imaging workflow for equine imaging. A university spin-off is transforming technological inventions researched and developed in the Pan lab.

CHIEN-MIN KAO, PHD LAB

ASSOCIATE PROFESSOR OF RADIOLOGY

The Kao's lab currently focuses on positron emission tomography (PET) imaging research. They have reported several novel high-performance detector designs to address the challenge arising due to a significant increase in the number of detection channels as the spatial resolution of PET improves and the axial length increases. For example, they have successfully prototyped a compact detector module (DM) made of 8 detect units (DUs) that in turn contains a 12x12 array of 1mmx1mmx10mm LYSO crystals (Fig. 1(a)). The DM produces only 6 outputs from which each DU and each crystal can be correctly identified (Figs. 1(b) and 1(c)). The crystal-level energy resolution is very uniform, yielding an average of 14.4% for the entire DM (Fig. 1(d)). The coincidence time resolution (CTR) between two DUs is about 1.4 ns (Fig. 1(e)); however, it may be improved to 330 ps for time-of-flight (TOF) imaging in the future after the channel-dependent timing offset is calibrated. This DM will be employed to develop a compact PET system capable of sub-millimeter image resolution that can be embedded inside an electron paramagnetic resonance imaging (EPRI) system for studying oxygen imaging with animal models for improving cancer treatment. Successful initial imaging has been demonstrated by using a test system consisting of 4 such DMs. The DM is also promising for developing hybrid PET/MRI systems. Kao's lab has also developed a reconstruction algorithm for positronium lifetime imaging (PLI) that maps the lifetime of the positron in tissue before it annihilates with an electron to produce annihilation photons that are measured in standard PET imaging. The positron lifetime can be affected by several tissue microenvironment parameters such as oxygen concentration and thereby provide additional information complementary to that given by the PET tracer uptake. PLI is only recognized as feasible and PET systems having about 10 ps TOF is believed to be necessary. Their new algorithm demonstrates that PLI is also possible when the TOF resolution is as limited as 570 ps. This breakthrough will allow PLI by using a practical PET system. Dr. Kao's lab has also published on the topics of PET kinetic modeling and multimodality in vivo oxygen imaging using PET, CT, EPRI, and MRI.



CHIN-TU CHEN, PHD LAB

ASSOCIATE PROFESSOR OF RADIOLOGY

The Chen Lab's research interests, primarily in molecular imaging and theranostic, cover imaging physics & instrumentation, image reconstruction & processing, imaging tracers & theranostic probes, physiological modeling, quantitative & intelligent image analysis, as well as their applications in cancer, neurological & behavioral disorders, cardiovascular diseases, diabetes, tissue & organ injury, and repair, etc. Current major research projects include: (1) semiconductor detector-based SPECT and PET inserts for hybrid imaging in use with CT, MRI, or EPRI; (2) multi-modality image reconstruction, processing, and analysis in which information from one imaging source is employed to improve and enhance images from other sources;

(3) Argonne/UChicago Joint Radioisotope Initiative for accelerator-based production of uncommon medical radioisotopes such as V-48, Sc-43/47, Tb-155/161, etc.; (4) the use of these uncommon radioisotopes in cancer imaging and theranostic applications, for example, V-48-vanadyl for early diagnosis and staging of colorectal cancer, Sc-43/47-PSMA-617 for high-risk and advanced prostate cancer, Sc-43/47-DOTATATE for neuroendocrine tumors, etc.; (5) integrated imaging of PET, MRI and EPRI for improving radiotherapy of hypoxic tumors; (6) investigation of nicotine receptors using PET, MRI, fluorescence microscopy, and study of the role of nicotine and its receptors in Alzheimer's disease.

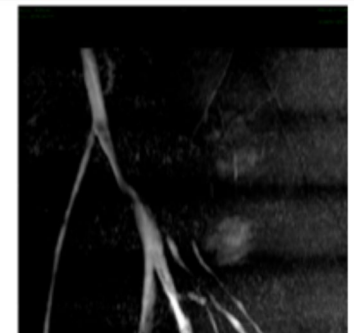
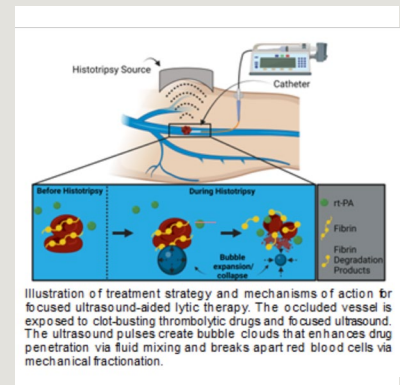
KENNETH BADER, PHD LAB

ASSISTANT PROFESSOR OF RADIOLOGY

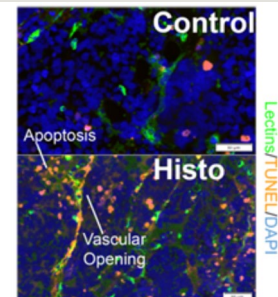
Members of the BADER (Biomedical Acoustics Development and Engineering) Lab have been investigating the use of focused ultrasound to break down deep vein thrombosis, or clots that form in the leg. Deep vein thrombosis is a common ailment for patients at the University of Chicago Medical Center, and many of them end up in the catheter laboratory for lengthy procedures (up to 3 days) that are not always effective. Our focused ultrasound systems can spontaneously generate bubbles in soft tissues like a clot, which enhances the drug's action as part of the standard-of-care. We have conducted studies to understand the bubble-clot interaction, and have identified two primary mechanisms responsible for clot disruption: 1) Direct interaction between the bubbles and the clot resulting in irreversible damage to erythrocytes (the primary component by weight of the clot). 2) Enhanced delivery of the lytic due to bubble-induced fluid mixing, as indicated by increases in fibrin remnants (the primary extracellular scaffolding of the clot).

To determine the reason thrombi become resistant to lytic drugs, we analyzed their composition and identified a wide range of thrombus morphologies that depended on the age and etymology of the specimen. A link was also identified between the response of the sample to lytic drug and its magnetic microstructure, providing a means to predict treatment outcomes using MRI.

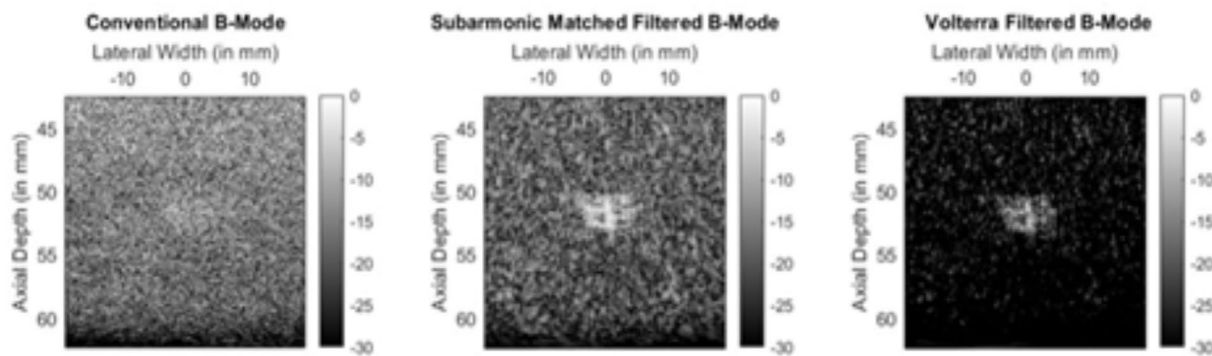
We also explored the use of focused ultrasound for the treatment of renal tumors, observing tumor tissue was nonviable in regions targeted by bubble activity and strong perfusion surrounding the ablation zone for regions that were previously hypoxic. To improve image guidance for deep abdominal targets like the kidney, we have shown chirp-coded excitation, a sequence that has increased sensitivity at depth compared to other ultrasound imaging methods and increases contrast compared to standard sequences. Additional processing further improves bubble detection.



Representative MRI sequence under development to identify clots in the veins.



Assessment of tumor treated with focused ultrasound. There is an increase in vessels (Lectins) and lethal cell damage (TUNEL) for histripsy treated tumor (Histo) relative to the control samples.



Detection of bubble clouds generated by focused ultrasound with a standard ultrasound sequence (Left), chirp coded excitation (Center), and chirp coded excitation images with additional processing via a Volterra filter (Right).

RADIOLOGY TRANSLATIONAL RESEARCH

The University of Chicago's history is rooted in innovation, collaboration, and translation. The world's first use of Tc-99m for medical imaging was demonstrated at the University of Chicago. Image co-registration and integration research conducted at the university in the 1980s germinated the field of multi-modality imaging. In the early 1990s, the University of Chicago pioneered the field of computer-aided diagnosis (CAD), developing the first prototype for mammographic CAD and collaborating with industry to see its translation to the clinical arena. This tradition of innovation and translation remains strong as evidenced through the rapid growth and national recognition of our leadership in NIH-funded MIDRC (the Medical Imaging and Data Resource Center; midrc.org) as well as solidified through research in the Cyclotron facility, the MRIRC lab, and Neuro MRI.



Members of the Cyclotron staff (L to R) Anna Kucharski, Rich Freifelder and Mohammed Bhuiyan.

CYCLOTRON FACILITY

The Cyclotron Facility opened in 2017 and has entered into its 5th full year of operations. The Facility continues under the Scientific Direction of Chin-Tu Chen, PhD, and its Program Director, Richard Freifelder, PhD. The past year has seen a marked increase in our activities. The Facility manufactures PET tracers for imaging in oncology, neurology, and cardiology to serve the pre-clinical and clinical research community, not only here at UC but also in the Chicago area. We have new isotopes which include ^{43}Sc and related compounds. Available drugs, uses and indications can be found at voices.uchicago.edu/cyclotron.

Most of our drugs are available for cellular and animal studies. However, we hold an IND for fluorothymidine (FLT), a cancer proliferation agent, for human use. We expect to expand that to Northwestern in 2023. We also produce two other drugs for human use: ^{18}F -MK6240 a tau imaging agent and ^{18}F -NAV4694 an amyloid agent. Both are used in about 6 different clinical trials that are being run in hospitals in the Midwest. The drugs are licensed by Cerveau and Meilleur Technologies.



The Cyclotron in its vault

Radiopharmaceutical production/distribution is highly regulated. For commercial producers of ^{18}F -FDG distribution is not a problem. But for non-commercial drugs used in clinical trials, the rules and regulations are not clear. Previously, we had distributed our IND drugs only to the Chicago Biomedical Consortium or the Institute for Translational Medicine, as distribution with “a Consortium” is allowed by the state and the NRC. Last year, to expand to other facilities, we formed the University of Chicago Cyclotron Facility Consortium. As distribution of PET drugs is practical for any site that can be reached within 6 hours of travel we have now expanded our distribution to 14 states in the Midwest.

We have distributed to: Advocate, Amita Health, Indiana Univ., Univ. of Kansas, The Mayo Clinic, Northwestern Medical, Northwest Radiology (IN), Rush Univ., Swedish Hospital, Univ. of Wisconsin at Madison, and Washington Univ. in St. Louis. Our shipments are by certified, bonded couriers and are by motor vehicle or airplane from Midway. Since our start in March of 2021, we have manufactured 151 batches of these drugs and 201 patients have been injected as part of these clinical trials into Alzheimer’s research.

We are expanding our Alzheimer’s imaging drugs. We have produced ^{11}C -PIB, the gold standard in amyloid imaging against which all ^{18}F -based drugs are compared. With its 20-minute half-life, ^{11}C -PIB, is challenging to manufacture and can only be used onsite. The IND for ^{11}C -PIB is held by Washington Univ. in St. Louis. We have submitted our validation runs and a final review and inspection is being completed for this DIAN-TU clinical trial drug.

We are adding new hot cells for radiochemistry and additional staffing to expand our ^{11}C work and move towards the clinical production of ^{13}N -NH₃ as a cardiac imaging agent. ^{13}N ($t_{1/2}$ = 10-minutes) has superior imaging qualities compared to ^{82}Rb . This Radiology/Cardiology project will establish a cardiac PET program at the UC and is not available anywhere else within the State of Illinois. We expect to obtain FDA approval for clinical usage of this drug in 2023 under an ANDA held by Ionetix.

Development of onsite production capability of a radiopharmaceutical can take 6-9 months. We welcome discussions with researchers to understand their needs and research. We will have a new faculty-level radiochemist to enhance our research work, bring new ideas and compounds to the University, and to be better able to work with physician-scientists and basic scientists on new and novel tracers. The Cyclotron Facility is a unique facility with many challenges but it also affords access to unique drugs that are available nowhere else in the state or in the Chicago region.

HIRO OFFICE

The goal of the Human Imaging Research Office (HIRO) is to assist University of Chicago investigators and research staff with medical imaging exams performed on human subjects for research purposes. This includes the acquisition, analysis, collection, de-identification, and distribution of image data for both basic science research and clinical trials. Our services ensure research-related imaging fulfills protocol requirements and allow investigators to obtain HIPAA- and IRB-compliant clinical research data.

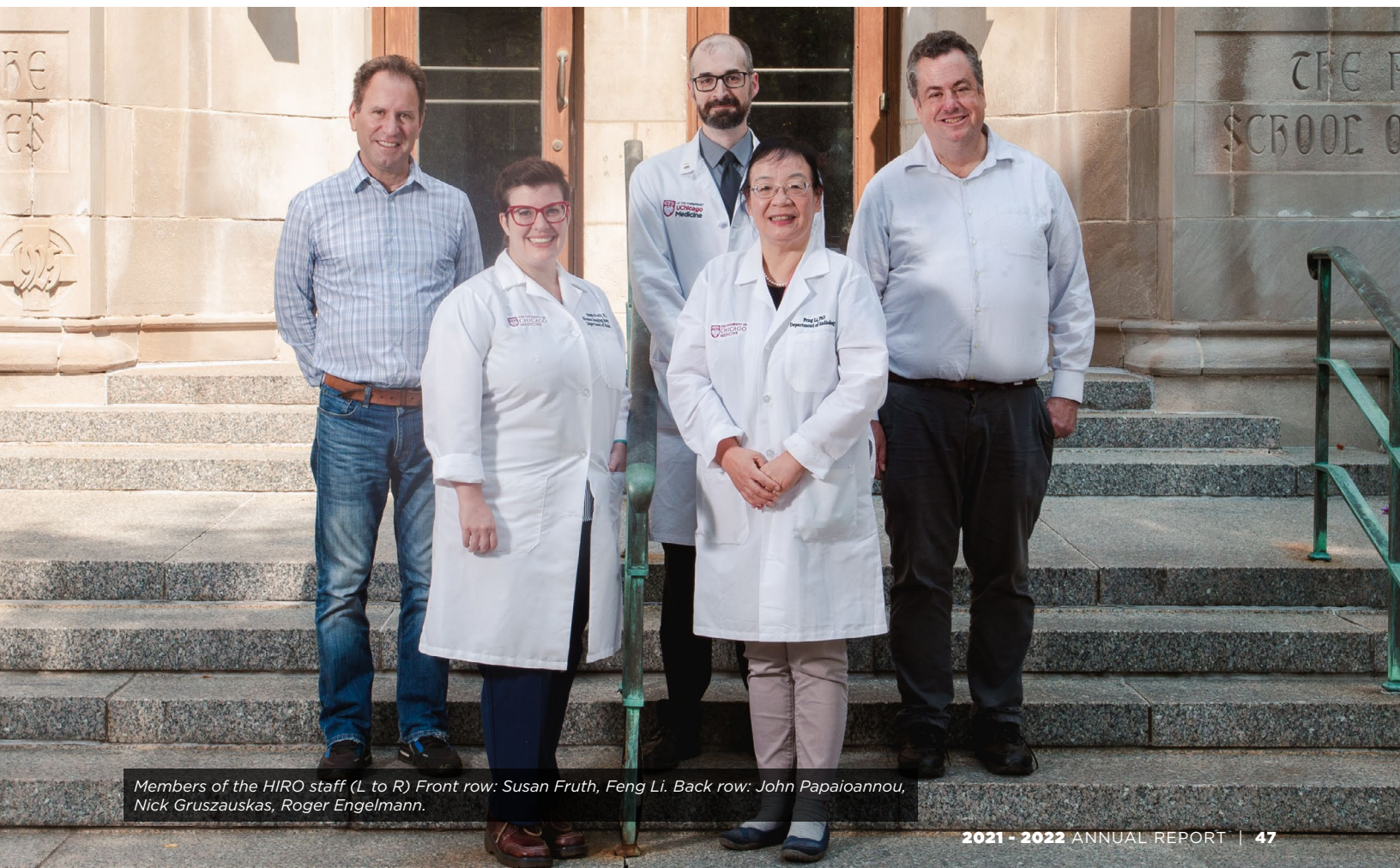
HIRO provides services for almost all types of medical imaging, including X-ray (radiography, fluoroscopy, mammography, angiography, cardiac cath), DXA, CT, MRI, ultrasound (general, echocardiography, vascular, OB-GYN), nuclear medicine (planar, SPECT, MIBG), PET, ophthalmology imaging, endoscopy and bronchoscopy, and many types of specialty imaging.

Over the past year, the HIRO continued to work with the Center for Research Informatics (CRI's) Clinical Research Data Warehouse (CRDW) Team to provide medical imaging data for their COVID-19 Limited Data Mart. The Data Mart now has 205,668 chest radiographs, 11,375 chest CT scans, and 6,204 head CT scans. In addition, the HIRO was responsible for coordinating the University of

Chicago's COVID-19 clinical and image data contributions to the National Institute of Biomedical Imaging and Bioengineering's (NIBIB's) Medical Imaging and Data Resource Center (MIDRC). The HIRO is proud to contribute to the research community's efforts in investigating and combating this pandemic.

Apart from supporting research in the pandemic arena, the HIRO also provided vital support and services to over 190 clinical trials across 12 different departments and sections during the past year. It also delivered copies of thousands of imaging exams to dozens of basic science labs for use in research and development projects. Clinical trials that utilized HIRO services produced at least 238 journal publications in 2021. Finally, the HIRO also facilitated CT scans for dozens of fossilized specimens for paleontologists at the University of Chicago as well as researchers at the Field Museum of Natural History!

The HIRO's staff consists of Sam Armato, PhD (faculty director), Nicholas Gruszauskas, PhD, (technical director), Susan Fruth (senior research imaging coordinator), Adam Starkey (software developer), Roger Engelmann (software developer), John Papaioannou (software developer), and Feng Li (research radiologist).



Members of the HIRO staff (L to R) Front row: Susan Fruth, Feng Li. Back row: John Papaioannou, Nick Gruszauskas, Roger Engelmann.

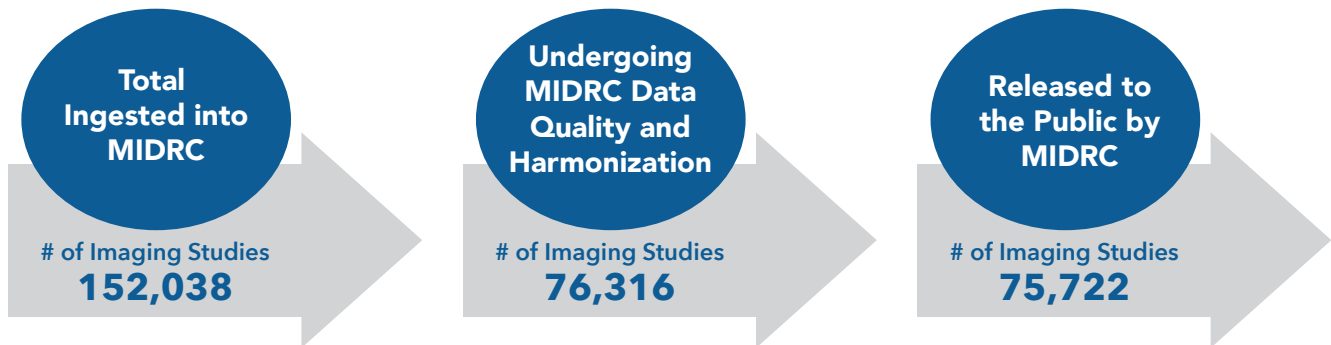
MIDRC

The Medical Imaging Data and Resource Center (MIDRC) is a multi-institutional effort including the AAPM, ACR, and RSNA that is funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB) and hosted by our Department of Radiology on the Gen3 platform at the University of Chicago. MIDRC's goal is to collect, curate, and publish imaging and related clinical data on an **Open Commons** to support research into the uses of AI for diagnosis and treatment of COVID-19, including long COVID. MIDRC has collected over 150,000 imaging studies of COVID-19 patients and control cases with similar imaging protocols in just the past two years. MIDRC supports medical imaging research as well as providing a **Sequestered Commons** for independent testing to enable translation. MIDRC is the only data repository/ data commons to have sequestered commons to allow for fair comparisons of algorithms (e.g., across different races, age groups, etc.) as well as expediting translation through regulatory to clinical practice.

Besides its sequestered datasets, MIDRC has other unique attributes such as carefully curating the incoming data as well as harmonizing DICOM metadata using the LOINC (Logical Observation Identifiers, Names, and Codes)

standard to enable effective cohort building on the MIDRC data portal. Another unique attribute is MIDRC's goal to collect diverse data, as well as to strive to mitigate bias in its study population, data collection, curation, and analysis by pursuing efforts to ensure the data set is representative of the population, and actively seeking data contributions from rural and under-represented community hospitals and smaller healthcare systems. MIDRC investigators aim to develop ethical and trustworthy machine learning algorithms that account for and reduce data bias. Furthermore, MIDRC, through the Gen3 platform, has developed and demonstrated interoperability with other COVID-19 data commons such as NHLBI Biodata Catalyst and NCATS N3C to help investigators gain access to multi-omics data.

Other members of UChicago Radiology participating in MIDRC include Sam Armato, PhD, Natalie Baughan, Gillian Campbell, Chun-Wai Chan, MSc, Karen Drukker, PhD, Jordan Fuhrman, Nicholas Gruszauskas, PhD, Hui Li, PhD, John Papaoiannou, MS, Katherine Pizer, Mena Shenouda, and Heather Whitney, PhD. All in the department are invited to visit midrc.org.



MRIRC CORE RESEARCH FACILITY

The newly founded University of Chicago MRI Research Center is dedicated to supporting clinical and basic research studies that include MR imaging components. The MRIRC houses two MRI scanners and employs experienced support staff that includes three MRI Physicists, of which one is a Certified Medical Physicist with Special Competency in MRI Physics (ABMP), two highly experienced MR Technologists, of which one serves primarily as the Operations Manager for the Center, and one Clinical Research Coordinator.

The MRI scanners sited at the MRIRC are a Philips Achieva 3.0T scanner and a Philips Ingenua 3.0T wide-bore scanner, both equipped with dStream technology and the latest,

state-of-the-art operating software. The scanners are equipped for neuro, body, cardiac, musculoskeletal imaging in adult and pediatric patients, as well as animal imaging. The scanners have the necessary equipment for clinical trials and functional MRI (fMRI), including devices for presenting visual and auditory stimuli during fMRI scans and for recording behavioral responses. The Philips Ingenua scanner is equipped with MRI-guided high-intensity focused ultrasound (HIFU). Support from veterinary technologists with specialized imaging experience is available from the Integrated Small Animal Imaging Research Resource and the Animal Care Facility.



Members of the MRIRC staff (L to R) Front row: Ambereen Yousef, Greg Karczmar, Xiaodong Guo, Zhen Ren, Batuhan Gundogdu. Back row: Donovan Gorre, Bruce (Ernest) Jamison, Milica Medved.

The MRIRC supports a wide range of studies originating in the UC Comprehensive Cancer Center; the Departments of Cardiology, Endocrinology, Health Studies, Nephrology, Neurobiology, Neurology, Oncology, Organismal Biology and Anatomy, Psychiatry & Behavioral Neurosciences, Psychology, Radiation & Cellular Oncology, Radiology, and Surgery; as well as outside institutions including Rush Medical Center, Lurie Children’s Hospital, and Illinois Institute of Technology. Both imaging and interventional studies (HIFU, laser ablation) have been conducted or are ongoing at the MRIRC.

The MR Physicists at the MRIRC are responsible for technical aspects of study initiation and perform ongoing quality control, ensuring high image quality and data integrity. In addition, they collaborate with principal investigators on development of specialized MRI protocols, custom QA protocols, as well as innovative MRI and data analysis methods. Research at the MRIRC includes development of new fMRI methods, MRI methods for characterizing stroke, breast, and prostate cancer imaging, use of quantitative MRI in clinical trials, including improvements in quantitative MRI methods, and development of new cardiac imaging methods. Some examples of the MRIRC research activity include:

Prostate Cancer Screening with MRI: Several studies focused on the development of screening protocols or novel prostate MRI methods are underway. A novel sequence developed at the Department of Radiology is the Hybrid Multi-dimensional MRI, a 5-dimensional imaging method (3 spatial and 2 parametric dimensions) that exploits the interdependence of measured values of quantitative tissue properties (ADC and T2) to calculate volume fractions and other characteristics of the epithelial, luminal, and stromal compartments in each image voxel. This novel analysis allows for more accurate detection of prostate cancer.

Breast Cancer Screening with MRI: Quantitative MRI methods that are designed to find breast cancer early when it is usually highly responsive to therapy are under development. Analysis of ultrafast dynamic contrast-enhanced MRI (DCEMRI), with temporal resolutions of under 5 seconds improves visibility of cancerous lesions to allow for more accurate detection of breast cancer. High Spectral and Spatial resolution (HISS) MRI is a form of spectroscopic imaging that can be used to classify breast lesions without the use of contrast agents—an important application that may facilitate wider adoption of MRI breast cancer screening beyond the current high-risk population.

Abdominal and Pelvic MRI: Close collaboration with principal investigators from Departments of Surgery and Obstetrics and Gynecology resulted in development of novel imaging protocols for detection of peritoneal mesothelioma lesions and prediction of uterine fibroid growth.

Functional MRI (fMRI): The MRIRC supports numerous fMRI studies originating from the Departments of Psychiatry and Psychology, as well as with multiple outside institutions. The research areas include psychiatric diseases, cognition, dementia, sensory perception, recreational drug use, transition from acute to chronic pain, etc.

Neuro MRI: New MRI scans that map out oxygen utilization in the brain and identify clinically unstable atherosclerotic plaques (the source of many ischemic strokes) and brain aneurysms (the source of hemorrhagic strokes) are being developed. Additionally, there is ongoing research on identifying the contributions of the microstructural cytoarchitecture of tissue to the macroscopic MRI signal using techniques including diffusion-weighted MRI and echo-planar spectroscopic imaging.

**FUTURE
LEADERS
& PETS OF
RADIOLOGY**



Riya Patel - 8.1.2022
Daughter of Pritesh Patel, MD



Zolly Amps Webb - 9.2.2022
Son of Anderson Webb, MD



Aiden Whittington - 7.12.2022
Son of Angela Whittington, MD



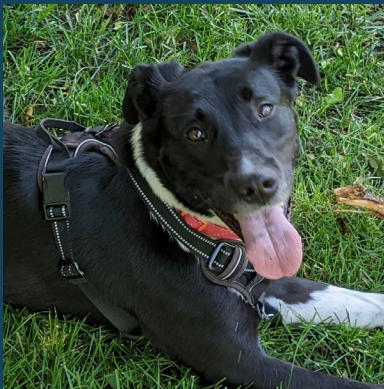
Miley - Jon Fergus



Cholo - Noemi Brunner



Lincoln & Libby - Steve Zangan



Lena - Kevin Little



Zeus & Tucker - Steve Montner



Maddie - David Paushter



Pepe - Sam Armato



Cooper - Zheng Feng Lu



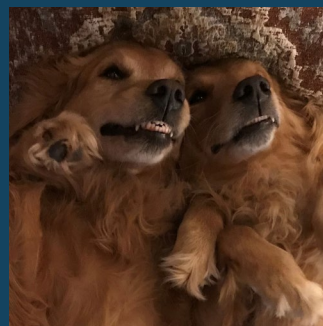
Lucy - Melvy Mathew



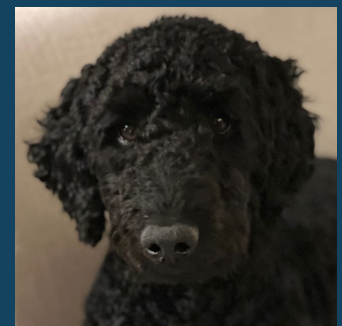
Bentley & Bella - Vernita Burns



Lilah with daughter Lia - Carmela Gonzalez



Glen & Fiddich - Kim Lenner



Freddie - Emily Marshall

**RADIOLOGY
SNAPSHOT:
TOGETHER
WE THRIVE!**



Radiology residents enjoying a summer cookout.



Kirti Kulkarni and Joelle Wazen attend the Shamrock Shuffle.



Emily Marshall, Carina Yang and Jessica Telleria-Cano at the end of the year graduation dinner.



Radiology employees gather for a holiday party.



Faculty and trainees celebrate Doctor's Day 2022.



TECHNOLOGISTS

280



LEAD TECHS

29



NURSES

8



CLINICAL & BASIC
SCIENCE FACULTY

65



BASIC SCIENCE
RESEARCHERS

40



ADMINISTRATIVE
STAFF

39



RESIDENTS

38



FELLOWS

7



GRAD
STUDENTS

21



TECH MANAGERS

8



IT

11



ASSISTANT
DIRECTORS

2



CLINIC
COORDINATORS

14



CLINIC LEADS

3



FILM FILE
COORDINATORS

4

OUR MISSION

To advance patient care by being at the forefront of radiology through diagnosis, inclusive care, expert training, and advanced research that leads to breakthroughs in the field.

OUR VISION

To lead the world in radiology and defy the status quo in a collaborative work environment that promotes team wellness and diversity.

OUR VALUES

PATIENT-FOCUSED – We treat all with compassion, respect, and dignity.

INCLUSION – We collaborate in a diverse, curious, and innovative team.

INTEGRITY – We hold ourselves accountable for the accuracy and quality of our work.

EQUITY – We strive to create a welcoming environment focused on wellness.

INNOVATION – We are committed to continuous development within our department and within the field.



THE UNIVERSITY OF
CHICAGO

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