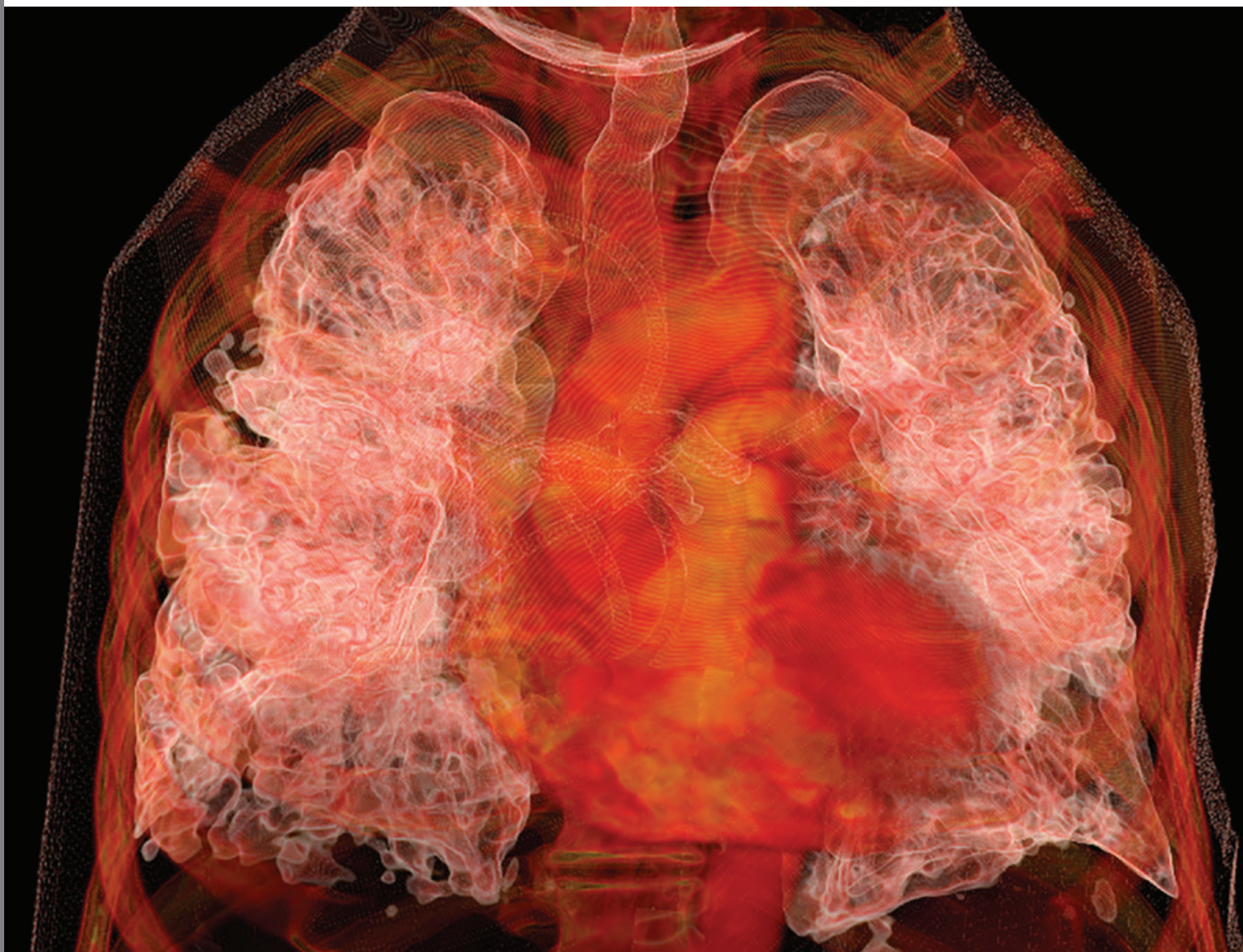




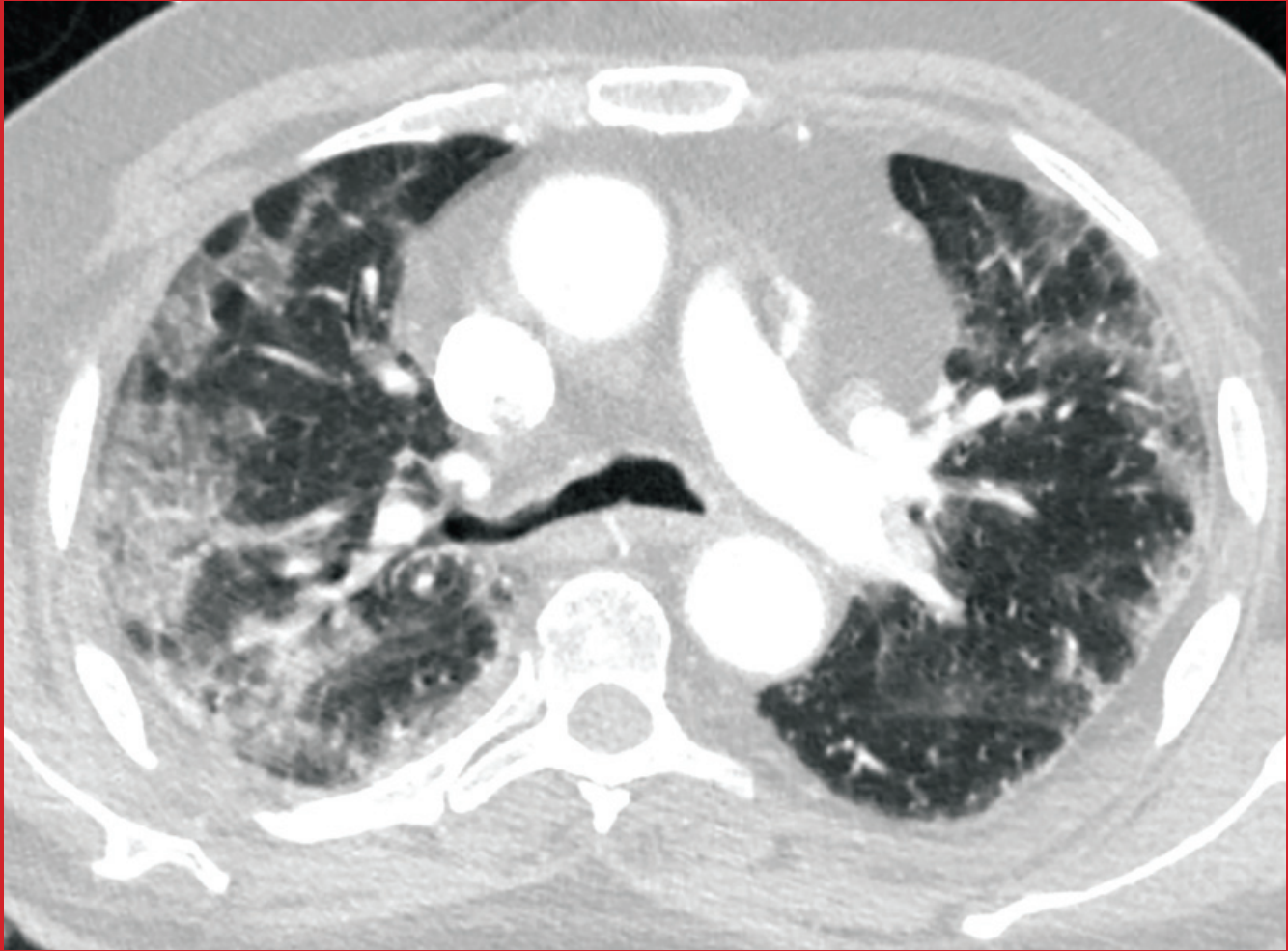
DEPARTMENT OF RADIOLOGY AND BIOMEDICAL IMAGING

IMAGES



UCSF

University of California
San Francisco



ABOVE: Axial CT image from a patient with COVID-19 pneumonia showing typical groundglass opacities throughout both lungs.

ON THE COVER: 3D Surface rendering of a patient with COVID-19 pneumonia showing heterogeneity of the lung parenchyma.

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MESSAGE FROM THE CHAIR

Dear Friends:

Looking back at images of 2020, I am struck by how much things can change over the short period of just one year. In a photograph that I took on January 24, 2020, at Mission Bay Hospital, it looks strange to see the CT control room crowded with trainees and faculty, with only one fellow wearing a mask – because he was using sterile technique during an interventional procedure. January 24 also happened to be the day that the first SARS-CoV-2 case was reported in France.

In the third week of February, case clusters were reported in northern Italy. On March 11, Italy was locked down, and on March 16, the Bay Area began sheltering-in-place. By early April, New York City was ravaged by more than 9,000 new, confirmed cases each day, UCSF built tents outside of the Emergency Department at Parnassus, and with our affiliated hospitals we established Hospital Incident Command Centers to manage this once-in-a-century pandemic. Though few among us knew the terms R naught, super-spreader, PPE, community transmission, and flatten the curve, we learned quickly!

The forces of change became very clear. But I don't think any of us anticipated the scale or the pace of change that we would experience, and the degree to which that change would be guided by external rather than internal forces.

As if SARS-CoV-2 were not enough, the challenges of 2020 were amplified by other pandemic-level crises: protests and civil rights marches sparked by George Floyd's death in police custody in Minneapolis; catastrophic wildfires in the western U.S., with 4M+ acres of California burned to the ground and days of smoke-filled air; economic upheaval, with job losses alongside growing income and wealth inequity.

Some of these challenges were *opportunities* to improve the way we work, to join together as a community and to create new circumstances such as telework and virtual conferences to better balance our work and personal lives. With respect to imaging,

I can't think of another time in recent history when the centrality of imaging to patient care has been so apparent. As a core clinical service of our health system, imaging guides how we make decisions about patient care, connecting symptoms to diagnosis and treatment. The pandemic forced us to transform our practices overnight to ensure the safety of our people and our patients, and to ensure that our colleagues received necessary imaging studies to inform patient care. In this telehealth future, imaging's centrality to patient care will only accelerate.

Other challenges revealed major issues for us to *overcome* individually, as an organization, and as a society. Chief among this set of challenges: the financial crisis that followed the pandemic; globalized supply chains that could not manufacture or deliver necessary PPE; the disproportionate impact of the pandemic on women, especially in terms of care-giving responsibilities and careers; and sustained examination of our approach to equity in health and careers.

Returning to January 2020, we had just finished updating our strategic plan, guided by our vision of leveraging our department's core strength of innovation to improve health. As a tool to manage change, the five strategic aims in our plan could not have come at a better time:

1. To diversify our financial portfolio through regional expansion, corporate partnerships and philanthropy,
2. To extend our reach by increasing the visibility and influence of our people within and outside of UCSF,
3. To use team science and 'moonshots' for innovating new research and discovery,
4. To build our community and focus on the wellbeing of our people, and
5. To strengthen our operations with new structures and resources to improve the way we work every day.

We are implementing each of these aims as I write, with more to come this year. (See Dr. Jane Wang's overview of strategic plan implementation on page 16.)

Looking ahead to our Clinical plans for 2021, we will see an upgrade to the PACS system, which is part of a University of California systemwide initiative that will improve how we interact with and interpret images. We have several active faculty recruitments for IR, pediatrics, MSK, and neuroradiology. We are upgrading and replacing several clinical scanners. We are poised to develop a focused ultrasound program at the Precision Cancer Medical Building (PCMB) and have several community expansion projects in the works. In October our clinicians began reading mammography and ultrasound studies and performing image-guided breast biopsies at the Berkeley Outpatient Center, a collaboration with the John Muir Health Cancer Center. (See story on page 14).

Our Education programs continue to innovate and excel. Doximity has ranked our diagnostic residency #1 in the country for the seventh year in a row. We conducted our first entirely virtual review course, with 101 external registrants from 7 countries, not counting our own residents and fellows. This was an incredibly well-executed program with more than 70 lectures over 5 days with 47 faculty and course leaders.

I expect that our CME courses will be virtual in the future, and that our department will once again define the standard for continuing medical education. Our T32 program, now in its 15th year, is the most successful program of its kind, with a remarkable track record of placing more than 75% of fellows in academic faculty positions around the US.

Even as our Research organization was shut down or at 50% or lower density for most of 2020, our researchers hit some remarkable milestones. Here are just two examples:

Based on the tremendous success in research funding in 2019, we moved from the #4 to the #2 position nationally, and to the #1 position for public institutions in terms of extramural funding for radiology departments in 2020. The number of investigators who received new awards in 2020 matched 2019 figures, a remarkable feat during a pandemic, with several of our investigators receiving grants of \$1M or higher.

Dr. Tom Hope and his team, together with colleagues at UCLA, obtained FDA approval for a new prostate cancer imaging technique – PSMA-PET – using new molecular tracers for initial staging or localization of recurrence.

This is the first of several molecular probes to be translated into clinical practice at UCSF. (See story on page 10).

We expect continued growth in research programs through faculty recruitments in focused ultrasound and MR imaging science. We formed several research collaborations with internal and external partners in 2020 that will begin in 2021. Some especially notable collaborations are with colleagues in neurology, psychiatry, neurosurgery, and oncology. Similar to investments in our clinical infrastructure, a new research PET/CT scanner will come online at China Basin, a partnership with the Department of Neurology and partially funded by philanthropy.

As you read through these pages, I hope that you enjoy these glimpses into how we are innovating the future of our field. I am so proud of our people. Though there was uncertainty all around us in 2020, our front line of technologists, nurses, front desk staff, residents, and fellows met profound challenges with compassion, adaptability, and courage. My profound appreciation to all of you, for your dedication to service and your willingness to look out for each other and keep our patients safe and well-cared for. Thank you.



Christopher Hess, MD, PhD

Christopher Hess, MD, PhD
*Alexander R. Margulis Distinguished Professor,
and Chair of the Department of Radiology and
Biomedical Imaging*

CLINICAL AND RESEARCH NEWS

Leveraging Genomics for Brain Tumor Imaging

By Pavithra Viswanath, PhD

Gliomas are the most common form of malignant primary brain tumors in adults. Despite decades of research, they remain a challenging form of cancer to diagnose and treat. Because the anatomical location of these tumors can prohibit biopsy sampling, especially for repetitive longitudinal analyses, glioma patient management in the clinic relies heavily on non-invasive magnetic resonance imaging (MRI). At diagnosis, MRI is used to guide initial evaluation of lesion location and to assess the breakdown of the blood-brain barrier as determined by contrast enhancement. MRI is also heavily used to monitor disease progression, tumor recurrence and treatment effects. However, anatomic MR images are inadequate for detecting molecular events and can fail to distinguish “true” tumor from morphologically similar areas of gliosis, edema and necrosis. Importantly, to date, there are no reliable methods to distinguish tumor recurrence from pseudoprogression and pseudoresponse, which can result from treatment with radiation, chemotherapy, immunotherapy and anti-angiogenic therapy as well as emerging targeted therapies. The consequences of an incorrect assessment are unnecessary or delayed treatment, morbidity and shortened survival. There is an urgent need to identify non-invasive biomarkers that track molecular drivers of tumor proliferation.

The Promise of Telomeres

The last decade has seen major advances in our understanding of glioma genomics with the identification of several oncogenes and tumor suppressors that drive tumor initiation and maintenance. Many of these oncogenic events also result in metabolic reprogramming and this relationship forms the basis of the assertion that metabolic reprogramming is a hallmark of cancer. In an era of precision personalized medicine, this relationship also provides a rational basis for the development of non-invasive, magnetic resonance spectroscopy (MRS)-detectable metabolic imaging methods and therapeutic targets that can aid in diagnosis, stratification and treatment response monitoring for glioma patients. Metabolic imaging provides a unique platform to translate our understanding of glioma genomics into clinically useful imaging modalities (Figure 1).

Among the myriad genomic alterations that have been identified in gliomas, mutations that lead to telomere maintenance are notable because they are inextricably linked to tumor proliferation. Telomeres are capped structures at chromosomal ends that shorten with every

cell division and act as a natural barrier to uncontrolled proliferation. To achieve immortality, all cancer cells need a telomere maintenance mechanism. Low-grade oligodendrogliomas (LGOGs) undergo mutations that reactivate the telomerase reverse transcriptase (TERT) pathway for telomere maintenance, while low-grade astrocytomas (LGA) undergo mutations that allow utilization of the alternative lengthening of telomeres (ALT) pathway. As molecular hallmarks of tumor proliferation, TERT and ALT are diagnostic biomarkers of “true” tumor burden. Imaging TERT and ALT, therefore, has the potential to non-invasively differentiate tumor from normal brain and from anatomically indistinguishable areas of gliosis, edema, necrosis, pseudoprogression and pseudoresponse. TERT or ALT imaging can also inform on response to chemoradiotherapy and emerging inhibitors of telomere maintenance. In essence, imaging TERT or ALT status has the potential to provide a non-invasive readout of tumor proliferation and treatment response in LGOGs and LGAs.

A Step Toward Non-Invasive Glioma Detection

In light of the link between genomics and metabolism, in collaboration with the group headed by Sabrina Ronen, PhD, and researchers from the UCSF Brain Tumor Center, we set out to identify non-invasive, MRS-detectable imaging biomarkers of TERT or ALT status in preclinical LGOG and LGA models, respectively. To begin with, we used ¹H-MRS to identify steady-state metabolite levels linked to TERT or ALT in genetically engineered and patient-derived LGOG and LGA models. Our results indicated that TERT was associated with elevated ¹H-MRS-detectable levels of NAD(P)/H, GSH, aspartate and AXP (combined signal from ATP, ADP and AMP) while ALT was linked to elevated α -ketoglutarate (α -KG), glutamate, alanine, and AXP.

With this steady-state metabolic picture in hand, we then set out to identify hyperpolarized ¹³C-MRS imaging biomarkers of TERT or ALT status. Alanine metabolism to pyruvate depends on α -KG, while further metabolism of pyruvate to lactate depends on NADH. Because our data indicated that elevated α -KG was linked to ALT and elevated NADH was linked to TERT, we examined the utility of hyperpolarized [^{1-¹³C}]-alanine for imaging TERT or ALT status. As shown in Figure 2A, hyperpolarized [^{1-¹³C}]-alanine was metabolized predominantly to pyruvate in a patient-derived LGA model (BT142) that uses ALT for telomere maintenance. In contrast, hyperpolarized

[1- ^{13}C]-alanine was converted to lactate in a patient-derived LGOG model (SF10417) that uses TERT for telomere maintenance (Figure 2B). Mechanistically, these ^1H - and hyperpolarized ^{13}C -MRS-detectable metabolic biomarkers were linked to alterations in expression of alanine transporters and enzymes linked to α -KG and NADH metabolism. Furthermore, we also verified the validity of our ^1H -MRS biomarkers and biological mechanisms in LGOG and LGA patient biopsies.

In summary, we have, for the first time, leveraged an understanding of the metabolic consequences of TERT and ALT to identify combinations of ^1H -MRS biomarkers

with differential hyperpolarized [1- ^{13}C]-alanine metabolism that can non-invasively inform on TERT or ALT status in preclinical glioma cell models, orthotopic tumor xenografts, and patient biopsies. Our metabolic imaging biomarkers enable non-invasive detection of a molecular hallmark of tumor proliferation and have the potential to impact diagnosis and treatment response monitoring for LGOG and LGA patients.

Pavithra Viswanath, PhD, is an associate adjunct professor in the Neuro Research Group in the Department of Radiology and Biomedical Imaging.

Figure 1. Advances in tumor genetics, epigenetics and biology can be harnessed to drive the preclinical development of novel, metabolic imaging biomarkers and therapeutic targets.

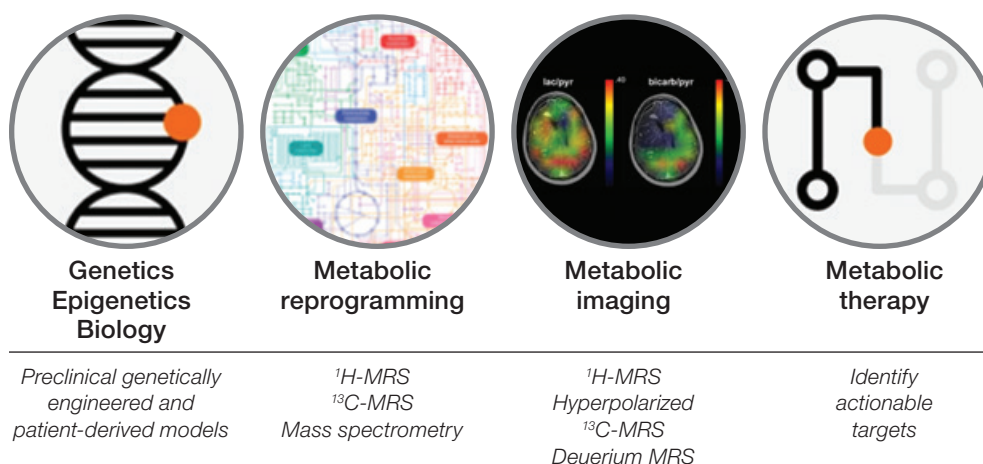


Figure 2A. 2D echo planar spectroscopic imaging studies of hyperpolarized [1- ^{13}C]-alanine metabolism to predominantly pyruvate in tumor (magenta) and contralateral normal brain (blue) voxels in a rat bearing an orthotopic patient-derived LGA tumor.

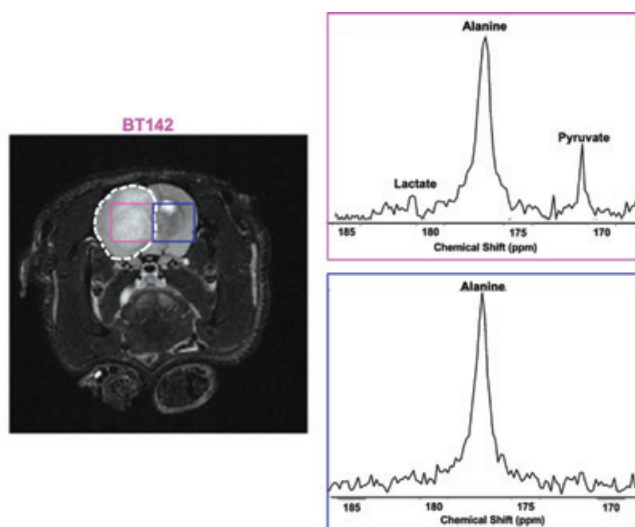
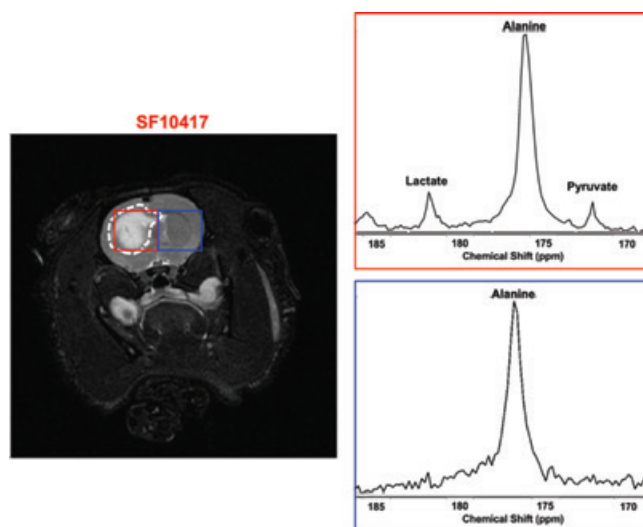


Figure 2B. Hyperpolarized [1- ^{13}C]-alanine metabolism to predominantly lactate in tumor (red) and contralateral normal brain (blue) voxels in a rat bearing an orthotopic LGOG tumor.



Multidisciplinary Approach to the Placenta Service

By Mark Sugi, MD; Liina Poder, MD; Priyanka Jha, MBBS; Vickie Feldstein, MD

The Department of Radiology and Biomedical Imaging is an integral part of the recently established Multidisciplinary Approach to the Placenta Service (MAPS) at UCSF. Radiologists from the Abdominal Imaging/Ultrasound and Interventional Radiology sections, technologists, sonographers, and nurses in our department are part of the large collaborative team. Together we care for patients whose pregnancies are complicated by placenta accreta.

Placenta accreta spectrum (PAS) disorders occur when the placenta attaches too strongly onto, or too deeply into, the uterine wall. In the setting of PAS, the placenta cannot be delivered or removed normally, as it does not readily or fully separate from the uterus. Thus, there are potentially life-threatening consequences for both the mother and infant due to markedly increased risk of significant bleeding during and following delivery, particularly if the diagnosis of PAS has not been established prenatally. The diagnosis, management and postpartum care for PAS disorders require a multidisciplinary team approach that draws expertise from across the medical center focused on optimizing safe outcomes for mothers and babies.

There are different degrees of severity in the overall category of PAS disorders. In a typical pregnancy, the placenta attaches to a thin inner layer of the uterus. This allows the placenta to separate from the uterine muscle and be expelled after delivery. In accreta, the placenta attaches abnormally and is too adherent to the uterus. In increta, the placenta invades and involves the uterine muscle. In percreta, the placenta grows into and through the uterine wall, and may attach to nearby organs such as the bladder.

The most common risk factor for PAS is prior uterine surgery, specifically cesarean section (C-section) and the risk increases with each additional C-section. History of previous C-section in association with placenta previa (when the placenta implants over the cervix) in the current pregnancy further increases risk of PAS. It is known that if the placenta attaches to the uterus in the region of scarring from any prior surgery (such as C-section or fibroid resection), there is increased risk of developing PAS. Importantly, the incidence of PAS has increased dramatically – quadrupled since the 1980s – primarily due to the rise in rates of birth by cesarean section.

Multidisciplinary Approach

The UCSF MAPS team uses a multidisciplinary approach to diagnose and care for pregnant women with PAS, who are at high risk for peripartum complications. The diagnosis of PAS is, in most cases, first suspected on an obstetric sonogram. Upon referral, evaluation at UCSF starts in the Radiology Department, where targeted scans are done to evaluate the placenta and uterus. The imaging studies (sonograms and, in most cases, MRI exams) are interpreted by faculty members with particular interest and expertise in this entity. Our growing experience with characteristic, atypical and sometimes subtle findings of this high-risk condition has enhanced our ability to confidently recognize PAS and offer information about degrees of invasion. The findings are reviewed with colleagues who specialize in maternal-fetal medicine/high-risk obstetrics. The results and clinical plan are discussed with the patient and her family. When PAS is suspected or confirmed by imaging, patients are closely followed by our team which includes gynecologic/oncologic surgeons, anesthesiologists, neonatologists, nurse coordinators from the obstetric service, operating room and neonatal care unit. Multiple meetings, referred to as “huddles,” are held to coordinate pregnancy care and prepare for an optimized safe delivery.

“Huddles” Meet Regularly

The subspecialized group convenes, often with more than 20 participants from different departments, to discuss each case (as might be done at a tumor board) to review findings and address the potential needs of the patient and her family. The obstetric sonograms and MRI scans are presented, after which a detailed checklist is used to identify key personnel, confirm anesthesia and surgical plans, and discuss staffing and operating room requirements. Possible complications that might necessitate participation by additional specialists from Urology or Vascular Surgery, for example, are anticipated. Based on the imaging findings, plans for preparing the surgical specimen for review by dedicated pathologists are also discussed. The checklist ensures a systematic approach to the care of each MAPS patient and permits identification of small adjustments that can result in significant improvements to the process. Information

The UCSF Multidisciplinary Approach to the Placenta Service plays an important role in the diagnosis and management of pregnancies complicated by placenta accreta spectrum (PAS) disorders – ensuring the health and well-being of mothers and their children.

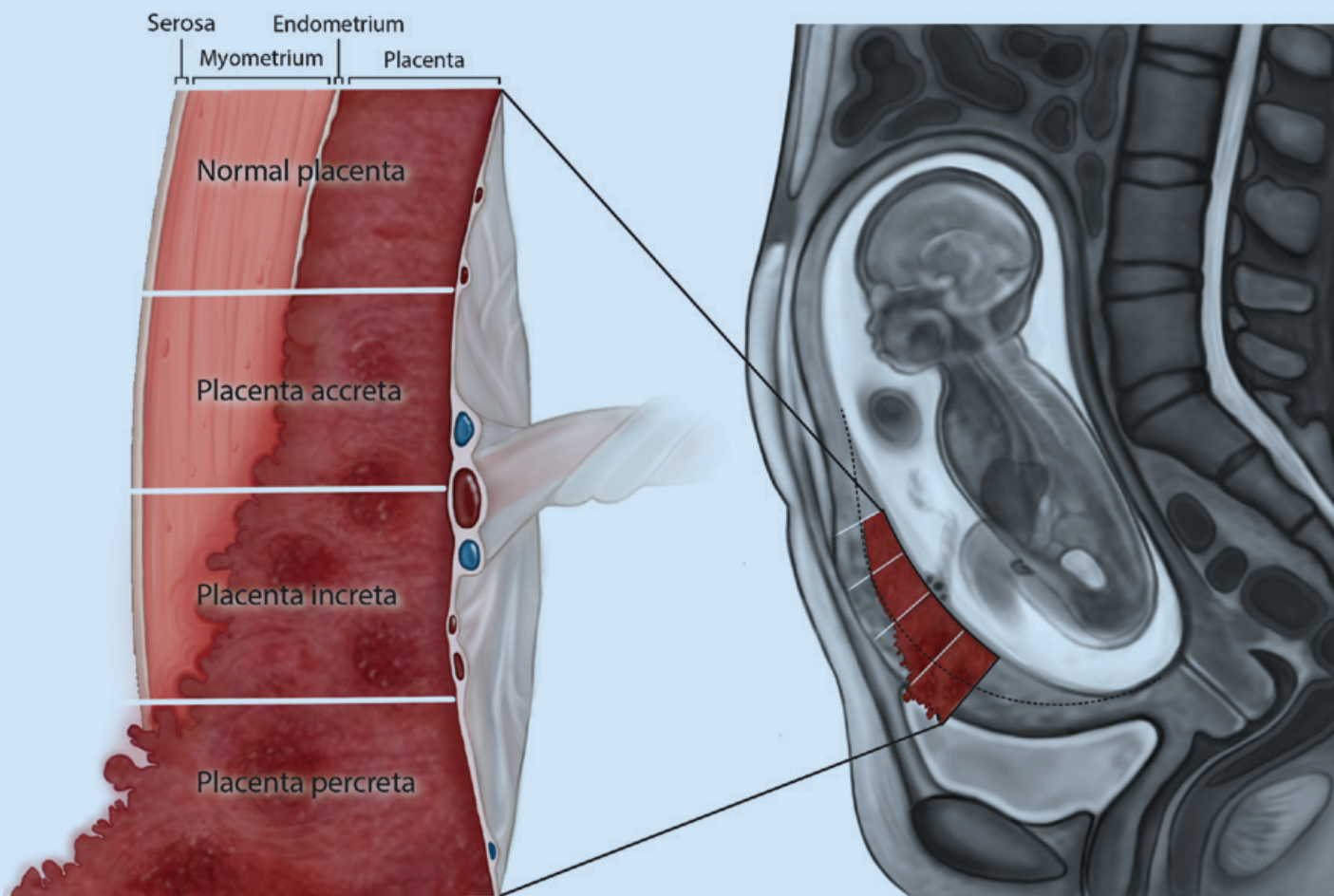
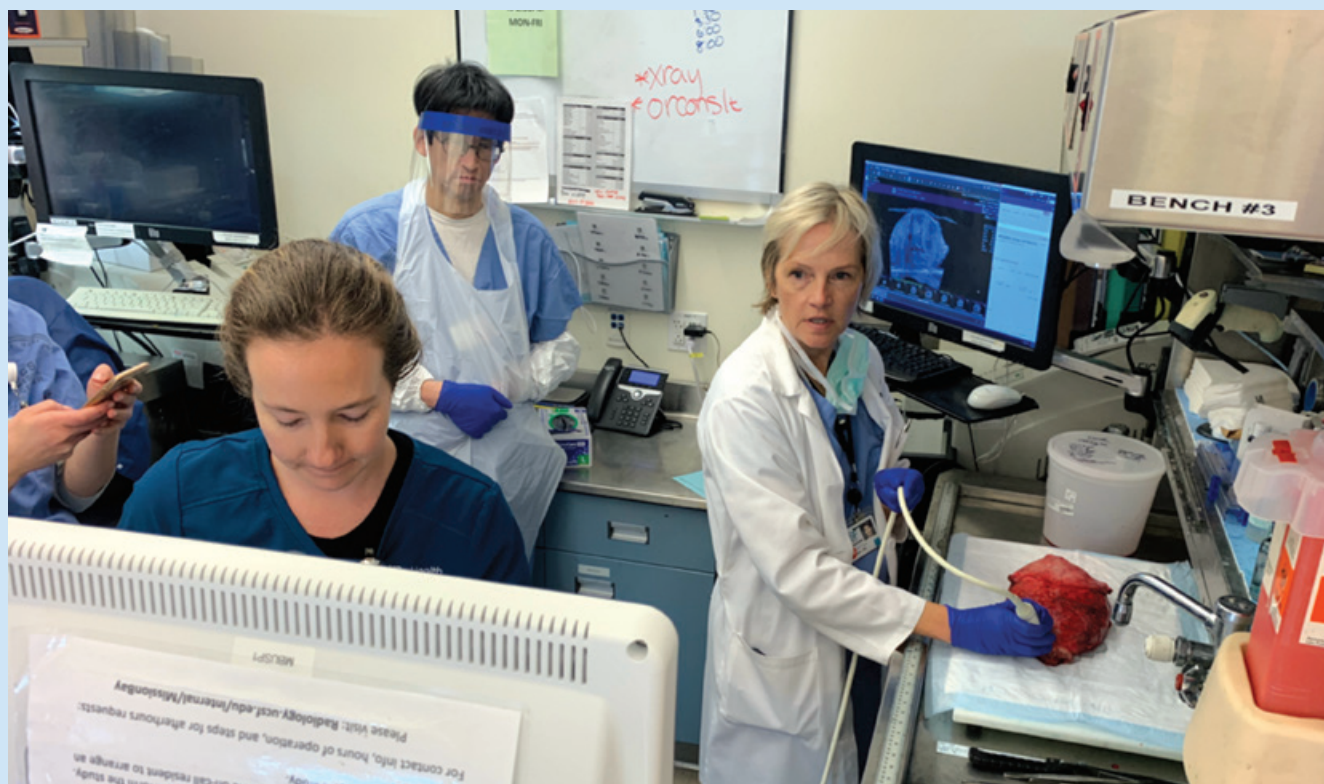
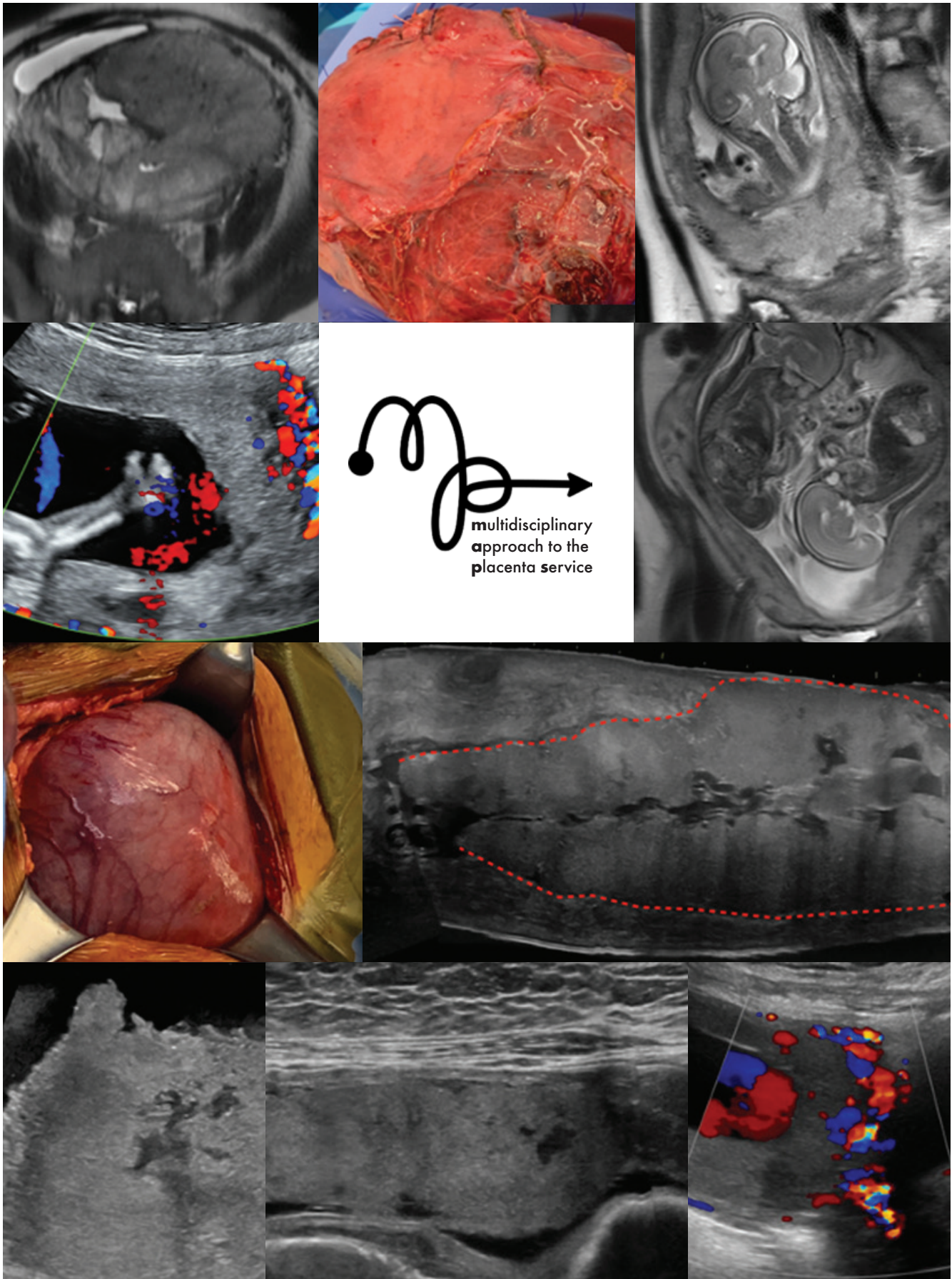


Diagram indicating degrees of placental invasion, with MRI imaging correlation. (© UCSF Department of Radiology & Biomedical Imaging 2020)



Dr. Liina Poder (Radiology) and sonographer Shelby Collins examine the resected uterus and placenta. Ultrasound of the surgical specimen is done to evaluate areas suspicious for PAS involvement noted on prenatal US and MR imaging studies.



from every MAPS delivery is carefully recorded, including surgical details, postoperative course and findings at pathology. The multi-disciplinary MAPS team holds routine de-briefing meetings. The ultrasound (US) and MRI findings are reviewed and compared to the intraoperative observations by the surgeons and the histopathologic reports of the pathologists. Direct correlation among imaging, surgery and pathology provides valuable information to each service and team member. This feedback is essential to increasing the accuracy of our diagnoses and the success of our outcomes.

In the setting of PAS, the adherent placenta and gravid uterus are often highly vascular, placing the patient at significant risk of life-threatening bleeding. When PAS is recognized and determined to be significantly invasive, based on US and MRI imaging studies, a specific pathway for safe delivery is planned. The team of MAPS providers has grown to rely on the accurate interpretation of these challenging high-stakes studies by members of our UCSF Radiology Department. In such cases the obstetric care plan involves cesarean-hysterectomy whereby the infant is delivered via C-section, the placenta remains attached and the uterus is then surgically removed. Intra-operative US to “map” the placenta prior to uterine incision is now routinely performed in these cases. There is longstanding experience with this application of US as the UCSF Fetal Treatment Center is the birthplace of *in utero* surgery.

Safe Deliveries

Our faculty have experience with the use of intraoperative US to identify the placental edge and determine where to enter the uterus to safely access and deliver the infant. Following ultrasound-guided hysterotomy (incision into the uterus), the baby is delivered and cared for by the Neonatology team. The placenta is left in place and the uterus is then closed by the OB/GYN surgeons in preparation for the next step. To minimize bleeding, the patient undergoes uterine artery embolization (UAE), performed by UCSF interventional radiologists. The uterine arteries are selectively embolized to limit blood flow to the uterus and pelvis. To accommodate this complicated time-urgent sequence of events, these cases are often done in a dedicated hybrid operating suite, equipped for both surgical and IR procedures. Immediately following UAE, the surgeons perform a hysterectomy, removing both the uterus and placenta in situ. A retrospective study published by Maureen Kohi, MD, and colleagues showed that this step-wise coordinated approach resulted in decreased blood loss, transfusion requirements and length of stay in the intensive care unit for patients with placenta increta¹.

Research conducted by members of our MAPS team has been instrumental in identifying, defining and refining knowledge about PAS. Liina Poder, MD, and Priyanka Jha, MD, spearheaded a recent joint consensus statement between the Society of Abdominal Radiology and the European Society of Urogenital Radiology for magnetic

resonance imaging of PAS. It proposes standardized imaging protocols and reporting of specific imaging features associated with PAS². Our faculty are participants in multi-institution collaborations, raising awareness of PAS and establishing consensus recommendations to clarify terminology used in imaging and pathology reports³. Consistent use of language and classification criteria are crucial and will facilitate meaningful data collection and future research endeavors.

Our interest in imaging manifestations of PAS in conjunction with ongoing improvements in MRI technology have allowed for new insights into useful, clinically relevant findings. One such imaging feature that emerged from the collaborations is the “placental bulge” sign, described by several of our MAPS radiologists in 2019⁴. This sign, defined as deviation of the outer uterine contour beyond the expected plane caused by abnormal outward bulge of placental tissue, is one of several imaging findings that carries high specificity for the diagnosis of PAS. Histopathologic definitions of PAS have been refined and reported by an expert panel including Poder and other UCSF MAPS team members. These guidelines provide further information about grading of PAS based on the degree of invasion of the uterine wall.

The UCSF Multidisciplinary Approach to the Placenta Service plays an important role in the diagnosis and management of pregnancies complicated by PAS disorders. These high-risk pregnancies are increasing in frequency. Accurate prenatal detection with high-quality imaging and expert interpretation, along with carefully coordinated efforts by multiple specialists to establish a delivery plan tailored to the circumstances of each patient form the foundation of our service, which is committed to the health and well-being of mothers and their children. ■

Mark Sugi, MD, is an assistant professor of clinical radiology; Liina Poder, MD, is a professor of clinical radiology and director of Ultrasound; Priyanka Jha, MBBS, is an associate professor of clinical radiology, and Vickie Feldstein, MD, is a professor of clinical radiology in the Department of Radiology and Biomedical Imaging.

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FDA Approval Gained for Prostate Cancer Imaging Technique

By Elizabeth Fernandez and Duane Bates

Method Is ‘Game Changer’ That Should Become Standard of Care, Say Researchers From UCSF and UCLA Who Validated Its Effectiveness

The University of California’s two nationally ranked medical centers, UC San Francisco and UCLA, and their nuclear medicine teams have obtained approval from the U.S. Food and Drug Administration to offer a new imaging technique for prostate cancer that locates cancer lesions in the pelvic area and other parts of the body to which the tumors have migrated.

Known as prostate-specific membrane antigen PET imaging, or PSMA PET, the technique uses positron emission tomography in conjunction with a PET-sensitive drug that is highly effective in detecting prostate cancer throughout the body so that it can be better and more selectively treated. The PSMA PET scan also identifies cancer that is often missed by current standard-of-care imaging techniques.

“UCLA and UCSF researchers studied PSMA PET to provide a more effective imaging test for men who have prostate cancer,” said Jeremie Calais, MD, MSc, an assistant professor at the David Geffen School of Medicine at UCLA. “Because the PSMA PET scan has proven to be more effective in locating these tumors, it should become the new standard of care for men who have prostate cancer, for initial staging or localization of recurrence.”

A clinical trial conducted by the UCSF and UCLA research teams on the effectiveness of PSMA PET proved

pivotal in garnering FDA approval for the technique at both universities. The PSMA drug used in the technique was developed outside the U.S. by the University of Heidelberg.

“It is rare for academic institutions to obtain FDA approval of a drug, and this unique collaboration has led to what is one of the first co-approvals of a drug at two institutions,” said Thomas Hope, MD, an associate professor at UCSF. “We hope that this first step will lead to a more widespread availability of this imaging test to men with prostate cancer throughout the country.”

How It Works

For men who are initially diagnosed with prostate cancer or who were previously treated but who have experienced a recurrence, a critical first step is to understand the extent of the cancer. Physicians use medical imaging to locate cancer cells so they can be treated.

PSMA PET works using a radioactive tracer drug called 68Ga-PSMA-11, which is injected into the body and attaches to proteins known as prostate-specific membrane antigens. Because prostate cancer tumors overexpress these proteins on their surface, the tracer enables physicians to pinpoint their location.

The current standard of care in prostate imaging is a technique called fluciclovine PET, which involves injecting

Thomas Hope, MD, and Peter Carroll, MD, chair of the Urology Department, stand at the PACS workstation where the images from the PSMA PETs are viewed and interpreted. (Photo by Maurice Ramirez)



patients with fluciclovine, a synthetic radioactive amino acid. Since prostate cancers consume more amino acids than normal prostate cells, the tumors accumulate large amounts of the synthetic tracer, making them easier to detect during scans.

In their research comparing PSMA PET and fluciclovine PET, the UCLA and UCSF research teams found that imaging with PSMA PET was able to detect significantly more prostate lesions than fluciclovine PET in men who had undergone a radical prostatectomy but had experienced a recurrence of their cancer. Their findings indicate that PSMA PET should be strongly considered both before initial treatment in men with high-risk cancers and in cases of cancer recurrence after surgery or radiation to provide more precise care. The PSMA tracer also can be used in conjunction with CT or MRI scans.

UCSF and UCLA are the only two medical centers in the U.S. that can offer PSMA PET to the public through this FDA approval. A limited number of other U.S. medical centers are currently using PSMA as an investigational technique, generally as part of a clinical trial. However, more hospitals will have the opportunity to adopt the technology after applying for expedited FDA approval, which is now possible as a result of the initial FDA approval gained by UCLA and UCSF.

“I believe PSMA PET imaging in men with prostate cancer is a game changer because its use will lead to better, more efficient and precise care,” said Peter Carroll, MD, MPH, a professor at the UCSF Helen Diller Family Comprehensive Cancer Center.

“Prostate cancer is one of the most common cancers in men, with more than 190,000 newly diagnosed cases expected just this year alone,” said Johannes Czernin,

MD, chief of the Ahmanson Translational Theranostics Division at UCLA. “That’s why this major effort between the UCLA and UCSF nuclear medicine divisions and our many partners was important and will significantly change for the better how this cancer is detected and treated.”

The UCLA research team was led by the nuclear medicine faculty from the molecular and medical pharmacology department’s Ahmanson Translational Theranostics Division. They worked in collaboration with the departments of urology, radiation oncology and radiology, along with support from the Geffen School of Medicine, the UCLA Jonsson Comprehensive Cancer Center and the Prostate Cancer Foundation.

The UCSF research team was led by faculty from the molecular imaging and therapeutics section of the Department of Radiology and Biomedical Imaging, who worked in collaboration with the departments of urology, radiation oncology and medical oncology. Support was provided by the UCSF Helen Diller Family Comprehensive Cancer Center and a philanthropic gift to the UCSF Department of Urology, and by the Prostate Cancer Foundation.

“‘Game changer’ is almost an understatement for how prostate cancer patient care could be improved by this technique,” said Jonathan W. Simons, MD, CEO of the Prostate Cancer Foundation. “After investing more than \$26 million in research on PSMA over many years, we are honored to congratulate the research teams at UCSF and UCLA on their milestone achievement.” ■

Elizabeth Fernandez is a senior public information representative at UCSF and Duane Bates is the communications director for Jonsson Comprehensive Cancer Center at UCLA.

For information about PSMA PET patient care, visit UCLA and UCSF websites.

The UCLA Jonsson Comprehensive Cancer Center is a leader in cancer care, research and education. Our more than 500 physicians and researchers develop new therapies, diagnostics and other technologies, and work to advance our understanding of the disease. We do this while remaining patient-focused and providing the best cancer care possible. As one of only 51 comprehensive cancer centers designated by the National Cancer Institute, we have the resources on our campus, through our community clinics and with our partners, to treat even the toughest cancers and discover new ways to prevent and eliminate this disease.



Learn more at cancer.ucla.edu.

The UCSF Helen Diller Family Comprehensive Cancer Center (HDFCCC) integrates the work of researchers and clinicians who are dedicated to four fundamental pursuits: laboratory research into the causes and events of cancer’s progression; clinical research to translate new knowledge into viable treatments; compassionate, state-of-the-art patient care; and population research that can lead to prevention, early detection, and quality-of-life improvement for those living with cancer. The HDFCCC holds the National Cancer Center’s designation as a comprehensive cancer center. The Center’s 420-plus members and associate members represent dozens of departments and institutes across UCSF, which is the only University of California campus devoted exclusively to the health sciences. Members are faculty investigators in laboratory, clinical, and population-based research who collaborate across the cancer spectrum, from basic biology to risk factors and prevention and control strategies.



Learn more at globalcancer.ucsf.edu.

DEPARTMENT UPDATE

Remaining Focused on Diversity and Inclusion in Pandemic

By Matthew Bucknor, MD

Disparities in outcomes for racial and ethnic minority groups with COVID-19, as well as the calls for social justice following the recent killings of Black men and women, along with horrific incidents of anti-Asian violence, have highlighted the ongoing, painful challenges that our country faces with injustice, bias, racism and systemic oppression. These events remind us of the paramount importance of our commitment to dismantle structural barriers in education, research, employment and health care, in every aspect of our work at UCSF.

A commitment to these values means not abandoning our focus, even in the midst of a pandemic. Thanks to the unwavering commitment of faculty mentors, staff, trainees and students, the Research Initiative to Promote Diversity in Radiology (RIDR) program, which aims to improve access to careers in radiology, successfully took place in the summer of 2020. Faculty mentors and staff worked collaboratively to convert the research and mentorship experience to an online format, using Zoom to facilitate trainings, high quality research experiences and career development sessions for the 10 high school, college and medical students selected to participate in 2020. The students met the challenge enthusiastically, many leveraging the online shift to engage in events and learning activities across the campus. They also presented their work at the first-ever online Student Summer Symposium at the end of July.

Recently named Director of Outreach Javier Villanueva-Meyer, MD, and Director of Global Health Tatiana Kelil, MD, will lead the charge to continue expanding the impact of our outreach efforts, despite the challenges presented by COVID-19. They were named in the 2018 and 2020 classes of John A. Watson Scholars, respectively, awards

that acknowledge faculty who share our commitments to diversity and service to the underserved.

We also continue to improve department educational opportunities on diversity, inclusion and bias by providing regularly updated resources through our *Radiology Rounds* and *RadNews* department newsletters. In addition, we offer an annual unconscious bias training session for residency and faculty interviewers each fall. This year, committee member Kevin McGill, MD, helped arrange to bring speaker Sunny Nakae, PhD, MSW, senior associate dean, Equity, Inclusion, Diversity and Community Partnerships at the California University of Science and Medicine, School of Medicine, for a grand rounds entitled, “Bias Breaks for Residency Admissions Committees,” which was incredibly well-received.

We know that there is no “Mission Accomplished” in this work. Members of the Diversity and Inclusion Committee remain eager to discover new ways to promote these essential values. In the spring, I was one of several Black faculty invited to speak at the UCSF United for Justice and Equality Town Hall (<https://diversity.ucsf.edu/addressing-discrimination>). In the fall, our department’s Diversity and Inclusion Committee launched a set of new anti-racist initiatives focused on building community and mentorship among our under-represented and minority (URM) faculty and learners, as well as pay equity. We also partnered with the Quality and Safety and Operations committees to develop new programs around health equity.

Despite the work ahead, we are encouraged by the inspiring early career trajectories of numerous students and trainees who have participated in our programs. A commitment to diversity and inclusion remains a core focus of the department’s mission, both as intrinsic values and as a means to improve our patient care, education and research missions. We remain strongly committed to pursuing this important and challenging work, even in the face of the twin pandemics of COVID-19 and systemic racism. ■



Learn more at radiology.ucsf.edu/about/diversity



Matthew Bucknor, MD, (pictured at left) is an associate professor in residence in the Musculoskeletal Imaging subspecialty section, chair of the Radiology and Biomedical Imaging Diversity and Inclusion Committee, and associate chair of wellbeing and professional climate in the Department of Radiology and Biomedical Imaging at the University of California, San Francisco.

A Year of Changes

By Christopher Laubenthal, MBA

Change is a challenge even under the most carefully planned circumstances. But when we are forced to change rapidly, the process is much more difficult and stressful. And here at the end of a long 2020, one that looked nothing like we thought it would in January 2020, it is important to acknowledge just how much change we did not choose last year. Thank you to all for helping each other make it through 2020.

That ability to face uncertainty as a team, providing each other the support we needed at just the right moments stands out in my memories of 2020. We found ways to solve problems because we are flexible and creative. But those solutions were always improved upon when everyone was contributing, spotting the cracks in a plan and listening to each other when we voiced concerns. Ultimately, we found solutions that would work in our ever-evolving new normal. We adapted to the UC-wide hiring freeze early in the pandemic period and everyone stepped up in myriad ways to fulfill our missions.

Some of the changes we faced this year were bittersweet, like the retirement of Enrique Menendez, MD, our director of research administration. After nine years with the department and more than 20 with UCSF, he turned the page to the next chapter and we celebrate that change with him. Although the loss of his expertise worried some and certainly his daily absence saddens us all, the team he has mentored over his career has allowed continuity. (See page 20.)



*Christopher Laubenthal, MBA,
and the Bakar Precision Cancer
Medicine Center at Mission Bay*

The research administrative team brings new strengths and energy that have already opened up opportunities, such as with the new scientific steering committees leading us to the kinds of change we get to choose. (Read more about the scientific steering committees in the Research note on page 46.) The team Enrique built has already begun to lead these new initiatives and conversations while at the same time parenting and working from home. Managing this challenge not only says so much about their talent and dedication, it says that we empathize with the experience of many of you in similar situations.

Across the department, all of us have managed the transition to working from home. The sometimes-competing priorities of learning new ways to work and our upended family lives have forced hard choices, week after week. As shelter-in-place eased, many of the administrative staff began to rotate to our on-site facilities to support the essential clinical and education mission of the department. Balancing our virtual and on-site activities remains a major challenge and we will continue to evolve and discover new ways to support our faculty. We are all still here for each other even if we are not physically in the same place.

I have really enjoyed watching how we have bent technology toward the ends of maintaining and even enhancing team cohesion and community. Zoom lunches, virtual social engagement activities, ergonomics lectures on adapting our new home offices, all of these are little bricks in a foundation that we can rely on when it comes time to collaborate on work. They continue to matter as we look at how to build adaptive budgets, how to support our recruitment of residents, fellows and faculty virtually, or how to adapt our communication channels so we are not overwhelmed and are better informed of the change ahead.

Although there are many questions on the horizon, I am excited about how we will respond. How will adoption and distribution of the COVID-19 vaccines affect patient volumes and access? How can we continue the good work already begun on increasing diversity, equity and inclusion, so that we are not just checking a box, but making dismantling systemic racism part of our daily lives? What are the unknown unknowns? There is no team I trust more than this one to be ready to answer all these questions in 2021. ■

Christopher Laubenthal, MBA, is the associate chair, Administration, in the Department of Radiology and Biomedical Imaging.

Improving Access to Breast Care in the East Bay

By Bonnie Joe, MD, PhD

Research shows that better cancer survival outcomes derive from improvements in prevention, screening, treatment and follow-up care. Improving access to care is also critical, according to the American Cancer Society. This includes primary and specialty care, along with improved coordination and communication among providers.

Having primary care physicians and specialists in the same location allows for enhanced care coordination, collaboration and knowledge sharing. Kimberly Ray, MD, is an associate professor who now leads the new collaboration between UCSF and John Muir Health at the Berkeley Outpatient Center in the East Bay.

Announced early in 2020, the UCSF-John Muir Health Cancer Center adds cancer services to the wide range of specialties offered in a single, close-to-home location at the jointly operated Berkeley Outpatient Center. For patients with breast cancer or benign breast conditions, dedicated breast radiologists and breast surgeons will

be available to evaluate and discuss treatment options, including the latest minimally invasive techniques.

Ray, a specialist in breast imaging, rejoined the Department of Radiology and Biomedical Imaging faculty in 2020 (see page 31) and previously served as medical director of the Avon Breast Imaging Center at Zuckerberg San Francisco General Hospital. She was instrumental in bringing digital breast tomosynthesis (DBT), also called 3D mammography, first to ZSFG and then to UCSF.

Starting in mid-October 2020, breast imaging services available at the Berkeley Outpatient Center include 2D and 3D mammography, breast ultrasound and image-guided breast biopsy, with plans to add breast MRI in the future.

In addition to cancer care and imaging services, the Berkeley Outpatient Center provides 19 (and counting) specialty care services. They also provide urgent care for non-life-threatening medical conditions. ■



At left: Kimberly Ray, MD
Below: Mammography suite at the Berkeley Outpatient Center.

Bonnie N. Joe, MD, PhD, is a Professor in Residence and Chief of Breast Imaging in the Department of Radiology and Biomedical Imaging at the University of California, San Francisco.



RADWomen UCSF: Supporting Women in Radiology

RADWomen UCSF is a new initiative promoting advocacy for female faculty, trainees, and staff in radiology at UCSF. The program leaders are Kimberly Kallianos, MD, an assistant professor and director of the department's Cardiac & Pulmonary Imaging fellowship program; Priyanka Jha, MBBS, associate professor in Abdominal Imaging; and Christine Glastonbury, MBBS, professor, interim chief of Neuroradiology and vice chair for Academic Affairs. "Our aims align with the department's overall goals of increasing diversity," said Kallianos, adding that "issues facing women faculty and trainees include career development, mental and physical health, parenting and caregiving, burnout and stress."

"Our goals for women in academic radiology include enhanced support for the specific issues facing women," said Glastonbury. "We are really excited about the improvements we are making for our female faculty and trainees, which are linked directly to career advancement."

As a component of the initiative, Kallianos, Jha and Glastonbury received a UCSF Chancellor Fund Needs and Enrichment Award to support speakers for a series of talks to raise awareness of special circumstances faced by women in academia and medicine. With this grant support, RADWomen UCSF hosted the inaugural UC-wide "Radiology Grand Rounds: Women in Medicine," a virtual event held September 30. It featured Christina Mangurian, MD, MAS, of the UCSF Department of Psychiatry presenting on "Fostering Resilience during COVID-19: Pearls from the UCSF COPE Team." Her lecture was followed by a lively interactive discussion moderated by Margo Pumar, MD, a physician in the Department of Psychiatry. "A silver lining of the pandemic has been the development of advanced virtual conferencing, which allowed us to bring in a number of speakers from beyond our immediate geographic area for RADWomen UCSF-sponsored events, including panelists from five UC campuses," said Kallianos. "The presentations and discussions have been well received. People appreciated the honesty and that we involved many people in the conversation."

RADWomen UCSF's second event in November was an invited lecture by Miriam Bredella, MD, an alumna of UCSF Radiology. Bredella is a vice chair and director of the Center for Faculty Development at Massachusetts General Hospital and a professor of Radiology at Harvard Medical School in Boston. She spoke on the "Impact of COVID-19 on Women in Academia: What Can We Do?" The discussion session that followed focused on issues

facing women in academia and identification of solutions to these challenges, with expertise provided by Bredella based on her experience directing faculty wellbeing at the School of Medicine, Harvard.

The third RADWomen UCSF event was a UCSF-wide Grand Rounds being organized for International Women's Day, in collaboration with departments of Psychiatry, Neurology, Radiation Oncology and Office of Diversity. The invited guest speaker was Reshma Jagsi, MD, DPhil, Newman Family Professor and Deputy Chair in the Department of Radiation Oncology and director of the Center for Bioethics and Social Sciences in Medicine at the University of Michigan. She spoke on "Promoting Equity for Women in Academic Medicine: An Evidence-Based Approach." RADWomen UCSF events allow Radiology to join diversity efforts with other departments at UCSF and beyond. "We have the power of collective action to reform the status quo," said Jha. Future events focused on trainees and early career faculty are also in the pipeline.

"Advocacy for women in UCSF Radiology from RADWomen UCSF has included support for new mothers and was instrumental in providing a new lactation room in Radiology at the Parnassus Campus," said Jha. "RADWomen UCSF is an effort toward fulfilling promises to women at all levels, establishing an environment where our circle of influence widely overlaps that of diversity and equity, so that we can invent a future of our imagination. I find it incredibly gratifying to be able to contribute to our department's and UCSF's diversity efforts." ■



Speaker Dr. Miriam Bredella (top left) is welcomed by Drs. Kimberly Kallianos (top right), Christine Glastonbury, (lower left) and Priyanka Jha (lower right) at the second RADWomen UCSF event.

"RADWomen UCSF is an effort toward fulfilling promises to women at all levels, establishing an environment where our circle of influence widely overlaps that of diversity and equity, so that we can invent a future of our imagination." – Priyanka Jha, MBBS

Roadmap for the Future: Strategic Plan 2020–2025

By Zhen Jane Wang, MD

Our Department of Radiology and Biomedical Imaging at UCSF has long been recognized as a leader in delivering high-quality patient care, conducting cutting-edge research, and educating and training the next generation of radiologists and imaging scientists. As we look ahead, our Strategic Plan 2020–2025 provides us a roadmap for the future and guides us in our shared commitment to building a culture of innovation through collaboration. Work on a strategic plan to guide our growth through 2025 began in 2019, in a planning process that brought together faculty and staff from all levels, locations and across all mission areas. We held two department-wide retreats and a series of workgroup sessions to clarify our department’s vision – *Leading Imaging Innovation to Improve Health* – and define five strategic aims:



While the COVID-19 pandemic has created extraordinary difficulties in all of our lives, our vision remains steadfast and has steered us through many of these challenges. The people in our department, who share a common focus on striving for excellence, have worked tirelessly to advance our various strategic goals. Here are just a few examples highlighting their work:

- To **Diversify our Financial Portfolio**, we formed a Business Strategy group, led by Bill Dillon, MD, and Tom Hope, MD, to guide our data-driven expansion into regional markets and to enable us to better serve our patients by bringing UCSF excellence close to their homes. A reinvigorated Development Committee, led by Steven Hetts, MD, is building fundraising strategies to increase philanthropy to support department initiatives and innovative programs.
- Despite the many demands placed on them, our faculty have dedicated their time helping us **Expand Our Reach** by participating on and leading committees at the School of Medicine, Campus and Health System levels. We continue to build strategic partnerships through many impactful clinical, research and educational programs.
- We are reimagining our research infrastructure to effectively support our **Team Science & “Moonshots”** objective. We have realigned our redesigned infrastructure, cores and resources to meet the needs of our researchers and to facilitate collaborative work and rapid clinical translation. (See article, page 46.)
- Much work has been done, led by Matt Bucknor, MD, to **Enhance Community & Professional Development**. Examples include promoting and supporting the well-being of our people, which has been particularly

important through the COVID-19 pandemic, and in upholding and re-affirming our commitment to diversity, equity, and inclusion. (See article, page 12.) Susan Wall, MD, Sharmila Majumdar, PhD, and Christopher Hess, MD, PhD, developed a new professional development course this past year with the goal of strengthening the academic radiology research career especially for our junior faculty.

- Last year saw accelerated efforts, led by Pallav Kolli, MD, and Ron Zagoria, MD, to increase quality and safety in our care delivery, and to **Strengthen Operations**. Our patient-centered care task force has worked tirelessly to optimize patient experience and safety in Radiology. Work continues to advance the experience of referring providers and our reading room workflow has been redesigned to better enable our radiologists to practice at the top of their license.

Our commitment to engage and empower our diverse and inclusive community of talents is integral to all of the aims in our Strategic Plan. Their dedication, creativity and collaborative spirit make UCSF Radiology and Biomedical Imaging an exceptional place for our patients, trainees, staff and faculty. Our culture of innovation and our Strategic Plan will guide us as we push boundaries and reach new heights in care delivery, education and discovery. We will Lead Imaging Innovation to Improve Health. ■

Zhen Jane Wang, MD, is a professor of radiology, associate chair for strategic planning, and the associate director for the T32 clinician scientist training program in the Department of Radiology and Biomedical Imaging at the University of California, San Francisco.

New Appointments

Christine Glastonbury, MBBS, is Vice Chair for Academic Affairs



Christine Glastonbury, MBBS, was appointed to the role of vice chair for Academic Affairs in March 2019. In this position, she

oversees faculty recruitment, mentorship, professional development, promotion and tenure for our faculty and non-faculty academics.

Glastonbury has been a member of the UCSF faculty since 2002, initially as a neuroradiologist at San Francisco General Hospital and as a body radiologist at the San Francisco Veterans Affairs Medical Center. Prior to her tenure at UCSF, Glastonbury completed undergraduate medical training and residency at the Royal Adelaide Hospital in Australia and clinical fellowships in London (general and oncologic radiology) and Salt Lake City, UT (neuroradiology and body MR).

Recognized internationally for her expertise in Head and Neck Radiology, Glastonbury holds joint appointments in Radiation Oncology and Otolaryngology–Head and Neck Surgery. She is a member of the Expert Panel for Head and Neck for the multidisciplinary American Joint Committee on Cancer for tumor staging, serves on the editorial board of *Radiology: Oncologic Imaging*, and has co-authored and edited multiple textbooks and over 100 scientific articles. She is known for her world-class lectures in the U.S. and abroad. She is recognized for the expertise and enthusiasm that she brings to teaching and developing the careers of the next generation of radiologists.

Glastonbury previously served as program director of the UCSF Neuroradiology Fellowship Program and currently serves as interim

chief of Neuroradiology. She is also the director of Physician Faculty Mentoring for the department. Within the broader UCSF system, she is a member of the UCSF Office of Research Task Force on Equity and Anti-Racism and the Academic Senate's Committee on Committees.

Outside of UCSF, she is an active member of many national and international professional society committees in radiology and neuroradiology, including the Executive Council of the American Roentgen Ray Society and Executive Committee of the American Society of Head and Neck Radiology. She is the program president for the World Federation of Neuroradiological Science's Symposium Neuroradiologicum slated for New York City in May 2022.

Thomas Hope, MD, is Associate Chair for Business Strategy



In January 2020, Thomas Hope, MD, was appointed associate chair for business strategy in the Department of Radiology and Biomedical Imaging. In this

role, Hope will oversee strategies to broaden and develop the department's joint ventures.

Hope is an associate professor and the director of Molecular Therapy in the Department of Radiology and Biomedical Imaging at the University of California, San Francisco. He serves as chief of Nuclear Medicine at the San Francisco VA Medical Center. He also chairs the Cancer Center's Molecular Imaging and Radionuclide Therapy Site Committee. In 2007, he received his medical degree from Stanford University School of Medicine and then completed a one-year internship at Kaiser Permanente, San Francisco. Hope completed a Diagnostic Radiology residency at UCSF in 2012, followed by a clinical fellowship in Body MRI and Nuclear Medicine at Stanford Medical Center in 2013.

Hope's main research focus is on novel imaging agents and therapies, particularly in prostate cancer and neuroendocrine tumors. He led the development of Ga-68 PSMA-11, a drug subsequently approved by the FDA. He has combined his interest in MR imaging with PET in the simultaneous modality PET/MRI, helping lead the development of the clinical PET/MRI program. Additionally he leads the PRRT (peptide receptor radionuclide therapy) program for neuroendocrine tumors at UCSF.

An international leader in PET/MR research and the translation of new molecular imaging agents, Hope launched the highly successful PSMA prostate program at UCSF and championed the use of multiple new targeted therapies to treat patients with neuroendocrine and other tumors. He current serves as principal investigator on grants from the NIH and the Prostate Cancer Foundation. He has received numerous accolades in molecular imaging, including the Henkin Fellow and Marc Tetalman Memorial Award from the Society of Nuclear Medicine and Molecular Imaging, the Young Investigator Award from the Prostate Cancer Foundation, and the Wylie J. Dodds Research Award from the Society of Abdominal Radiology.

Alastair Martin, PhD, is Associate Chair for Capital Projects



Alastair Martin, PhD, was appointed associate chair for Capital Projects for the department in July 2019. In this role, Martin oversees all

departmental capital projects, with responsibilities that include supervising the annual capital budget process, identifying and prioritizing new clinical capital needs and upgrades, managing vendor relationships, and overseeing capital installation and facilities renovation and expansion.

Martin brings to this position strong technical and leadership skills, ensuring that the department maintains its long record of strength in this area. After receiving his PhD in medical biophysics from the University of Toronto in 1994, he served as a postdoctoral fellow at the University of Western Ontario for two years, and went on to join Philips Medical Systems in 1996 as a clinical scientist. In this capacity, he worked at the University of Minnesota, where his research focused on developing techniques for MR guidance of neurosurgical procedures. In 2001 he joined UCSF to be a part of the XMR project, while continuing in his position as senior clinical scientist for Philips. In 2005, he left Philips to join the faculty at UCSF Radiology and Biomedical Imaging.

In addition to this administrative responsibility, Martin will continue to maintain a significant presence in research and education. He has had a longstanding interest in MR-guided interventions, especially for neurosurgical and endovascular applications. He has gained international renown for his expertise in the use of MRI for the placement of deep brain stimulators. As director of graduate studies for the Master of Science in Biomedical Imaging (MSBI) program, he has also been a leader for educating trainees in biomedical imaging.

Srikantan Nagarajan, PhD, Named Radiology Research Faculty Mentoring Program Director



In November 2020, Srikantan “Sri” Nagarajan, PhD, was selected as the director of Research Faculty Mentoring in the Department of Radiology and

Biomedical Imaging. In this role, Nagarajan will oversee and coordinate

all research faculty mentoring in the Department. The Research Faculty Mentoring program focuses on ensuring that junior academic research faculty receive the appropriate mentoring and guidance needed to advance in their academic research endeavors and their careers at UCSF. Nagarajan has been an active participant in the department’s mentoring program, and brings to this role his experience as a leading researcher familiar with the academic advancement of research faculty at UCSF.

A professor in the Department of Radiology and Biomedical Imaging at UCSF, Nagarajan holds joint appointments in the UCSF departments of Bioengineering and Therapeutic Sciences and Otolaryngology-Head and Neck Surgery. He is an active Core member in the UCB-UCSF Joint Graduate Program in Bioengineering, has served on its Executive, Admission and Advising committees, and currently serves as the head graduate advisor. He also directs the Biomagnetic Imaging Laboratory at UCSF.

With special expertise in biomedical engineering and integrative neuroscience, Nagarajan has multiple research interests, including understanding human brain plasticity associated with learning and disease and determining neural mechanisms of speech motor control. He focuses on the development and refinement of multimodal structural and functional brain imaging and brain computer interfaces, for diagnosis and assessment in diverse patient populations. Nagarajan’s current translational research program includes conducting multimodal brain imaging studies in people with autism, dementia, tinnitus, brain tumors, epilepsy, traumatic brain injury, schizophrenia, asymmetric hearing loss, stroke and voice disorders. Nagarajan has served as principal investigator and co-investigator on several research grants from the NIH, NSF and DOD. He has published over 225 peer-reviewed articles,

numerous conference papers and several book chapters. He has co-authored two books (Springer-Verlag): *Adaptive Spatial Filters for Electromagnetic Brain Imaging* (2008) and *Electromagnetic Brain Imaging: A Bayesian Perspective* (2015).

Zhen Jane Wang, MD, Named Associate Chair for Strategic Planning



In January 2020, Zhen Jane Wang, MD, was appointed associate chair for Strategic Planning for the department. In this role, she will provide

oversight of the work and initiatives supporting the department’s vision and mission and the five strategic aims articulated through the strategic planning process. (See page 33).

In addition to her new role, Wang will continue her role as an associate director of the T32 Clinician Scientist Training Program, a program designed to give radiologists-in-training and junior nuclear medicine physicians the skills required to become independent investigators and leaders in biomedical imaging.

Wang received her undergraduate degree in Electrical Engineering from Brown University, and her medical degree from Northwestern University Medical School. She completed her residency training in Diagnostic Radiology at UCSF in 2007, serving as a chief resident from 2006–2007. She subsequently completed a fellowship in abdominal imaging at UCSF. Wang joined the faculty in 2008.

Wang’s research interests primarily focus on identifying novel imaging techniques and their development into practical and clinically useful diagnostic tools. She leads NIH-funded research in hyperpolarized carbon-13 MR imaging of kidney cancer as well as metabolic imaging of pancreatic cancer. ■

Retirements

David Avrin, MD, PhD



After a long and storied career with UCSF, David Avrin, MD, PhD, retired in October 2020.

“Although we will greatly miss

David as a senior member of the Abdominal Imaging and Interventional Radiology sections, I could not be prouder of his accomplishments and professional success over the years,” said Christopher Hess, MD, PhD, department chair. “We extend our warmest congratulations to David for a career marked by many accomplishments, his long record of outstanding service to the department and to UCSF, and his lasting contributions to the field of radiology.”

After completing his MD/PhD (Electrical Engineering) and residency at Stanford, Avrin began his tenure at UCSF in 1979 as a visiting fellow in ultrasound. Since 1980, he spent most of his career on the UCSF faculty. A sojourn of several years at the University of Utah (2002–07) as professor and director, Body Imaging preceded his most recent UCSF appointments as professor in the School of Medicine and professor of Clinical Radiology and program director of the Clinical Informatics ACGME Fellowship Program (2007–present). From 2007–2016, while serving as our department’s vice chair, Informatics, he oversaw extensive integrations of patient-care information systems (Epic/APeX) with radiology systems to support our clinical, education and research missions, as well as the conversion of the IDXrad Radiology Information System to Radiant RIS.

As a clinician and teacher, Avrin’s focus was MR and CT studies of the abdomen and pelvis. He taught residents, fellows, and occasionally, medical students. In interventional radiology, Avrin performed a wide spectrum of services, supervising hands-on instruction for residents and fellows. Each autumn (2009–15), he taught the Radiology 170.07 Current Issues in Medical Informatics Seminar, open to all medical, nursing, pharmacy and dental students. Avrin mentored and supervised a number of pre- and postdoctoral students and residents over the years, many of whom have gone on to positions as faculty or into private practice.

For two decades, Avrin has kept a busy schedule of presentations at national and international meetings focused on topics related to informatics interoperability and data analytics. His applied research in radiological and medical informatics has focused on infrastructure and applications for system integration and clinical image sharing. Over the years, Avrin contributed nearly 60 peer-reviewed articles and numerous chapters, reviews, articles and conference abstracts.

In 2020 the Society for Imaging Informatics in Medicine awarded Avrin its first Gold Medal. He is a Fellow of the American College of Radiology, the Society of Computer Applications in Radiology and the Society of Abdominal Imaging. He has held leadership roles with the RSNA including as chair of the Radiology Informatics Committee, the Education Committee, the Digital Roadmap Steering Committee, and the Research and Education Foundation Corporate Giving Subcommittee. Avrin has served as reviewer and associate editor for *RadioGraphics*; reviewer for *Radiology* and *Journal of Academic Radiology*; and reviewer and Editorial Board member for *Journal of Digital Imaging*.

A. James Barkovich, MD



A. James Barkovich, MD, professor in residence and chief of Pediatric Neuroradiology in the Department of Radiology and

Biomedical Imaging and a renowned expert in the field of neuroradiology and pediatric neuroradiology, retired at the end of June 2020 after a long and successful career.

“We were honored to have Dr. Barkovich as a colleague for 35 years,” said department chair Christopher Hess, MD, PhD. “He truly ranks among the world’s foremost pediatric neuroradiologists. We will miss him and wish him well in retirement.”

When Barkovich began his tenure at UCSF in 1986, imaging of the pediatric brain was performed rarely and typically with invasive techniques. Uniting innovations in imaging technology at that time – MRI and CT scans – with his knowledge of brain development, Barkovich laid the foundation for what became the clinical standard for pediatric brain imaging and simultaneously opened new vistas into the science of brain development and maturation. He also pioneered the MR compatible incubator. This prototype, developed in conjunction with technicians from General Electric, is now widely used around the world in the study of neonates with brain injuries.

In addition to brain development, he greatly informed the fields of neonatal brain injury, abnormal brain development, childhood epilepsy and CSF fluid dynamics. His work set the standards for predicting outcome after a neonatal brain insult using advanced MR imaging parameters such as structural, diffusion and spectroscopy. This work has been

at the core of the Neonatal Brain Disorders Program at UCSF, funded by the NIH-NINDS, for the study of the mechanisms underlying hypoxic-ischemic damage to the developing brain for the past 25 years.

Barkovich received his medical degree from George Washington University, Washington, DC, and completed his residency in radiology at Letterman Army Medical Center, San Francisco in 1984. This was followed by a fellowship in Neuroradiology from Walter Reed Army Medical Center in 1986, before joining the faculty at UCSF Radiology in 1986.

The list of commendations Barkovich received during his career is long. He received the Society for Pediatric Radiology Presidential Recognition Award in 2019, acknowledging his impact and service to the profession. The Academy of Radiology Research awarded him its Distinguished Investigator Award in 2013. In 2012 he received both the Radiological Society of North America Outstanding Achievement in Research Award and the American Society of Neuroradiology (ASNR) Gold Medal. Barkovich served as ASNR president (1998-1999) and secretary general of the World Federation of Neuroradiological Societies (2002-2006).

Barkovich published more than 400 peer-reviewed publications. Of particular note, he designed a classification system of malformations of cortical development (based on embryology, genetics, and MR imaging) that is used internationally. Collaborations with colleagues at UC San Diego and Harvard have explored the genetic underpinnings of the neurological disorders he has studied for years.

On October 28, 2020, the department held a special symposium in celebration of Barkovich and his extraordinary career.

Enrique Menendez, MD



Enrique Menendez, MD, director of research administration in the Department of Radiology

and Biomedical Imaging, retired in September 2020. The entire department recognized Menendez for his unconditional dedication, compassion and congeniality. It is difficult, if not impossible, to sum up his achievements over 27 years of dedicated service to the UC community.

Menendez earned his medical degree in 1990 from Mexico's Universidad de San Carlos de Guatemala. His career at UCSF began at the Mount Zion campus as a clinical assistant. In 2008, his path to the department led him to the San Francisco Veterans Affairs Medical Center (SFVAMC), where he worked with Michael Weiner, MD, professor and senior investigator with a very large research portfolio and an extensive lab.

"Enrique never said no to a request or an idea. He just said, 'I'll do it.' If something needed to be done by a certain date, I could always count on Enrique to get it done. There was nothing too large or small that he wouldn't do. He doesn't shy away from challenges, and he is absolutely

"As a trained physician, Enrique always understood the science of our research and clinical programs... he will be remembered as a hardworking, committed, and compassionate person, a true example to look for and follow." – Sharmila Majumdar, PhD

thorough, timely and enthusiastic," said Weiner.

Building on his SFVAMC experience, in 2013 Menendez assumed his position as director of research for UCSF Radiology. "As a trained physician, Enrique has always understood the science of our research and clinical programs. As a financial and research director, his expertise in program requirements and business principles, combined with his medical training, has made him a consummate collaborator," said Sharmila Majumdar, PhD, vice chair for Research and Margaret Hart Surbeck Distinguished Professor in Advanced Imaging.

Throughout his career, Menendez has built highly effective interdisciplinary teams of finance, IT, administrative and research coordination staff to support the needs of multimillion-dollar, multi-site projects for radiology research programs. One of Menendez's colleagues, Lorel Hiramoto, site director for Radiology and OHNS at Zuckerberg San Francisco General, said "Enrique's outgoing nature serves as a natural foundation for collaboration. Collaboration occurs at many different levels, and Enrique is adept at all of them. When he identifies an issue, he will fill the gap, solve the problem or create a plan. He shares his knowledge and experience whether he's working in a group of two or 20. Although others recognize him as the leader and he is comfortable with that role, he possesses much humility and has exceptional listening skills."

In addition to his professional accomplishments, Menendez led his teams in fun and creative team-building activities: volunteering with non-profits as a group, regular staff picnics (pre-COVID-19) and entering (and almost always winning) the China Basin Halloween costume contest with a clever and funny team theme. ■

In Memoriam

Harry K. Genant, MD

1942–2021



Our long-time colleague, mentor, teacher, and friend Harry K. Genant, MD, passed away peacefully at his home in Napa on January 14.

Many of us knew Harry as a charismatic and entrepreneurial physician scientist who inspired, with his enthusiasm and brilliance, collaborators from around the world for nearly half a century. His trainees and colleagues will remember him as a generous and convivial host at his Tiburon home where many occasions and professional milestones were celebrated over the years. He was a devoted husband to Gail Genant, MD, his wife of 52 years; cherished father to Laura, Jonathan, and Justin; and proud grandfather of five.

Born in Freeport, Illinois in 1942, Genant's first career aspiration was to become an astronaut though he realized after a short stint at the U.S. Air Force Academy that he wasn't cut out for military-style discipline. Fortunately for generations of musculoskeletal radiologists and their patients, he found his vocation in medicine and radiology where his ground-breaking research in non-invasive and quantitative imaging methods for osteoporosis, arthritis and orthopedics contributed significantly to our understanding of bone fragility, and our ability to evaluate patients at risk of osteoporotic fractures and predict their response to therapy. Friend and collaborator Daniel Rosenthal, MD, from Harvard's Massachusetts

General Hospital in Boston recalled that "Harry was one of the most brilliant radiologists that I ever encountered. I always felt that he set a standard of excellence that was almost unattainable by anyone else." Lynne Steinbach, MD, former Chief of Musculoskeletal Imaging at UCSF and President of the International Skeletal Society noted that "Harry was a true giant in radiology. Intelligence, inquisitiveness and innovation were characteristics that propelled him to the top. He had a great influence on my career."

As a testament to his stature in the profession, Genant was a Fellow of the American College of Radiology and an Honorary Fellow of the Royal College of Radiologists, United Kingdom. He was recognized by the International Osteoporosis Foundation with the prestigious Medal of Achievement in 2019 and the Olof Johnell Science Award in 2013. The International Society for Clinical Densitometry recognized him as the Paul D. Miller ISCD Service Award winner in 2013. In 2012 the American College of Rheumatology elected him as an ACR Master; that same year, he was the Louis Avioli Annual Lecturer for the American Society of Bone and Mineral Disease. In 2004, Genant gave the Radiologic Society of North America's Annual Oration, "The Future of Bone Imaging in Osteoporosis."

Genant received his medical degree from Northwestern University in Evanston, IL in 1967, completed an internship on the Osler Service at Johns Hopkins University in 1968, and trained as a resident in medicine and radiology at the University of Chicago, where he was chief resident and assistant professor in Radiology during the years 1968 – 1974. Genant joined the faculty of the University of California, San Francisco in 1974 as chief of Musculoskeletal Radiology, where he remained for more than

30 years, becoming professor of Radiology, Medicine, Epidemiology and Orthopaedic Surgery.

Among his many accomplishments, Genant was perhaps most gratified to mentor and train dozens of fellows worldwide, many of whom affectionately called him "Clint Westwood" for his striking resemblance to the actor Clint Eastwood. Today, his mentees are national and international leaders in bone research in their own right, a fitting tribute to the strength of his sponsorship. Miriam Bredella, MD, UCSF alumna and professor at Harvard Medical School, noted that "Harry was a great mentor, sponsor, and role model.

Today, his mentees are national and international leaders in bone research in their own right, a fitting tribute to the strength of his sponsorship.

I would not be where I am today without him." Thomas M. Link, MD, chief of Musculoskeletal Imaging at UCSF remarked that "Harry shaped multiple careers throughout the world, his generosity and support towards international radiologists was unsurpassed and he had a major role in defining the international reputation of UCSF Radiology. We will miss him very much."

Genant founded the Osteoporosis and Arthritis Research Group in the Department of Radiology, UCSF, and served as its executive director until his retirement in 2004. This group, once numbering over 130 physicians, scientists and research associates, produced field-defining research in imaging for osteoporosis, arthritis, and orthopedics. Sharmila Majumdar, PhD, who was hired by Genant as

an assistant professor in 1989, remarked that “We in the bone research field have lost an anchor and legend, one who 20 years after retiring was still participating actively and recognized by students and researchers worldwide.”

Seeking a new outlet for his energy and creativity, Genant co-founded Synarc (now Synarc-BioClinica) in 1998, a global, contract research organization specializing in management of quantitative imaging and biomarkers in large, multicenter, multinational, pharmaceutical drug trials. Genant served as a Board member and chairman emeritus for Synarc-BioClinica, and at the time of his passing was a senior consultant. Thomas Fuerst, PhD, BioClinica's chief scientific officer, noted that “even as we are devastated to have lost Harry as a mentor, leader and friend, we are confident in the strength of his legacy.”

During his extraordinarily productive academic career, Genant was editor or co-editor of more than 40 books and author or co-author of more than 300 chapters or invited articles, over 600 articles in peer-reviewed scientific and medical journals, and over 1500 abstracts presented at national and international scientific meeting.

Tireless in his service to the profession, Genant held many leadership roles, including as president of the Association of University Radiologists, International Skeletal Society, and International Bone Density Workshop series (also Founder). Scientific chair of the First through Sixth International Congresses on Osteoporosis in China. Chair of the WHO Task Force on Osteoporosis; International Steering Committee for Artificial Gravity for the joint U.S., German and Russia Space Programs. Co-chair of the Second International

Conference on Osteoporosis (Japan), IOF Global Initiative on Vertebral Fracture Assessment, and IOF Bone Quality Working Group. Member of the Radiologic Devices Panel of the U.S. Food and Drug Agency. Board member of the International Osteoporosis Foundation. Genant also lent his expertise and time as associate editor of *Bone and Journal of Orthopaedic Translation*, and Editorial Board member of *Osteoporosis International*, and many others over the years.

Among Genant's numerous awards are honorary lifetime memberships in the American Academy of Orthopedic Surgeons and the International Society for the Study of the Lumbar Spine and honorary memberships in the Italian Radiologic Society, the Chinese Osteoporosis Society, the Chilean Society of Osteology, the Hungarian Society of Osteology and the European Society of Skeletal Radiology.

Genant matched his accomplishments in academia and business with athletic skills as a marathon runner, sailor, hiker, golfer and cyclist. He greatly enjoyed travel adventures with his family, reunions with friends and family at scenic points both near and far.

As his friend and colleague Claus Glüer said, “The skeletons have stopped dancing and mourn the passing of Harry. We owe you so much, we have lost so much, but your spirit and legacy will remain – in our hearts and in science.”

Raymond H. Thornton, MD

1968–2020

Raymond Howard Thornton of Yorktown Heights, New York, passed peacefully on Thursday, October 1, 2020. Thornton earned three degrees in piano performance from the prestigious The Julliard School in NYC. While completing his



DMA in piano performance, he completed coursework and was admitted to the University of Pittsburgh School of

Medicine. From there, he completed his residency in diagnostic radiology (2003), serving as chief resident, and a fellowship in interventional radiology at UCSF (2004).

His first physician appointment was at The Memorial Sloan Kettering Cancer Center where he helped numerous patients, guided residents and fellows, handled quality assurance issues, wrote radiology board questions, and presented papers for the NIH in Washington, DC, Japan and various other places. He also taught and practiced at the University of Utah at Salt Lake City and most recently, Cape Cod Hospital. The son of Howard R. and Kathryn J Thornton, he is survived by his loving mother and his precious partner of 21 years, John “Chip” Holmes with whom he made his life, along with their two fur babies, Victoria and Tucker.

Thornton enjoyed life – music, reading, gardening – and lived it to its fullest. It is the family's wish that all who knew and loved Ray would advocate for better diagnosis and treatment of Lyme Disease and better mental health care of all those working in medicine. In lieu of flowers, the family requests that donations be made to “The Benefit Fund in Memory of Ray Thornton” at People's Bank, 421 Main Street, Point Pleasant, WV 25550. Condolences may be expressed to the family and memories may be shared by visiting www.wilcoxfuneralhome.com. ■

Faculty on the Move

Ordovás and Westphalen Depart for the University of Washington

Karen Ordovás, MD, MAS, and Antonio Westphalen, MD, PhD, both left UCSF in July to accept positions in the Department of Radiology at the University of Washington in Seattle. Ordovás is a professor of Radiology and chief of the Cardiothoracic Section. Westphalen is a professor of Radiology, Urology and Radiation Oncology and chief of the Body Section.

"Drs. Ordovás and Westphalen came to UCSF together in 2003 as postdoctoral students. We are grateful for their combined 35 years of outstanding service in our department," said Christopher Hess, MD, PhD, department chair. "Although we will miss them as colleagues and friends, we are happy that they have found positions together in another fine radiology department. We wish them well."



Karen Ordovás, MD, MAS, began her tenure at UCSF in 2003 as a postdoctoral fellow with Charles Higgins, MD, studying MRI

of cardiac disease. After serving as clinical fellow from 2005 to 2006, she joined the faculty in 2007. She subsequently completed a master's degree in Clinical Research through the UCSF Department of Epidemiology & Biostatistics, with funding from an American Roentgen Ray Society scholarship. In 2014 she took the role of director of Cardiac Imaging, and since 2016 has served as co-director of UCSF's Advanced Cardiac Imaging Fellowship, while holding a joint appointment in the UCSF Department

of Medicine in recognition of her many collaborative projects with the Division of Cardiology.

Ordovás' research programs have focused on cardiac MRI in non-ischemic cardiomyopathies and congenital heart disease. Her research has notably advocated for the use of cardiac MR for the evaluation of female heart disease. She is a Fellow of the North American Society for Cardiovascular Imaging (NASCI), the Society for Cardiovascular Magnetic Resonance (SCMR) and the American Heart Association. An internationally recognized expert in cardiothoracic imaging, she lectures regularly in the U.S. and abroad, including as a keynote speaker at RSNA and in frequent Grand Rounds engagements. Ordovás is the immediate past-president of NASCI and serves on the executive board of SCMR, chairs the American College of Radiology's Cardiology Research Council and is an associate editor for *Circulation: Cardiovascular Imaging and Radiology: Cardiothoracic Imaging*.

Among her many contributions to the department, Ordovás stands out for her mentorship of more than 60 trainees, including five international postdoctoral scholars, five NIH T32 scholars, and five UCSF faculty. Beyond UCSF, Ordovás founded and chaired the NASCI Research and Education Fund and chaired the SCMR mentoring program for three years.



Antonio Westphalen, MD, PhD, arrived at UCSF in 2003 as a postdoctoral fellow in our department to study abdominal imaging with Fergus Coakley,

MB, BCh. He served as a clinical fellow from 2004 to 2005, and from 2005 to 2006 was a fellow in the very first cohort of the department's NIH-funded T32 program. He joined the faculty in 2006, and in 2010 completed a

master's degree in Clinical Research in the UCSF Department of Epidemiology & Biostatistics. He received his PhD from the doctoral degree program in Surgical Sciences, Urology at Universidade Federal do Sul, Brazil in 2012.

His many contributions to the care of patients with prostate disease were recognized by his joint appointment in the UCSF Department of Urology in 2014. Since 2015, Westphalen has been director of the Clinical Prostate MRI program and since 2018, the chair of the MR Safety Committee.

Westphalen's research has focused on MR spectroscopic imaging of prostate cancer and the relative accuracy of different interpretive approaches. He is internationally recognized for his work in advancing the field of prostate cancer imaging. Active in many of the major radiological societies, Westphalen has lectured broadly in the U.S. and internationally and is especially well known for running intensive prostate MR workshops. Among other accolades, Westphalen received an RSNA research grant and a UCSF CTSI KL2 research grant. He was recently appointed chair of the Society of Abdominal Radiology's Prostate Cancer Disease Focused Panel which collaborates with urologists, oncologists, radiation oncologists and other groups to improve patient care through the clinical incorporation of optimized imaging techniques for detection, staging and treatment.

Westphalen has taught and mentored UCSF medical students, 15 doctoral candidates, 10 international scholars, UCSF faculty, more than 300 UCSF trainees in various fields, and countless colleagues in highly reviewed CME courses. He is a long-standing member of the Society for Abdominal Radiology and the Association for University Radiologists mentoring programs. During his tenure at UCSF, Westphalen directed or co-directed all UCSF, and most prostate SAR, MRI hands-on workshops.

Maureen Kohi, MD, FSIR, Becomes Chair of Radiology at University of North Carolina – Chapel Hill



In December, Maureen P. Kohi, MD, FSIR, accepted the role of Ernest H. Wood Distinguished Professor and Chair of the Department

of Radiology at University of North Carolina – Chapel Hill. “While we will miss Maureen as a colleague and friend, we know she will flourish in her new role. She will bring the same outstanding leadership and vision to UNC as she demonstrated here and will extend our department’s reach within the broader academic community,” said Department Chair Christopher Hess, MD, PhD. “We are extremely grateful for her years of service and contributions as a member of our faculty and leadership and wish her all the best in this next step of her academic and professional career.”

Kohi received her undergraduate degree from Stanford University and her medical degree with honors from New York Medical College. She completed her Diagnostic Radiology residency at

UCSF, during which she completed a one-year research fellowship as a recipient of our NIH T32 Training Grant program (2008–2009). Following her residency, Kohi completed two fellowships at UCSF, one in vascular and interventional radiology and the other in women’s imaging. In July 2012, Kohi joined the UCSF faculty in Vascular and Interventional Radiology. She has served as the associate program director for the Interventional Radiology residency and fellowship, as the co-director of the high-intensity focused ultrasound program, and as IR section chief since February 2018.

Kohi’s primary research interest is in the field of women’s health and interventions. Her research focuses on evaluating minimally invasive treatment options for symptomatic uterine fibroids, optimizing the management of pregnant patients presenting with invasive placenta, and evaluating gender differences in vascular and oncologic diseases. Her clinical research and interests also include interventional oncology, hepatobiliary disease interventions, management of portal hypertension and inferior vena cava filters.

Kohi’s leadership in our field is significant. She serves as an executive council member of the Society for Interventional Radiology (SIR), as the

development division chair of the SIR Radiology Foundation and scientific chair of SIR’s Annual Meeting. She also is an associate editor for the *Journal of Vascular and Interventional Radiology*. Kohi chairs the Women in Interventional Radiology Governing Council, is a member of the Vascular Interventional Advances Physician Board and is the current president of the Western Angiographic and Interventional Society.

One of Kohi’s most significant contributions has been the promotion of diversity and inclusiveness in diagnostic and interventional radiology. She recently completed the first benchmark study evaluating the change in the representation of women in SIR and presented her findings at the Cardiovascular and Interventional Society of Europe annual meeting in Copenhagen, Denmark. Kohi has created a number of initiatives to promote women in radiology and in interventional radiology at UCSF, regionally with partners at Stanford University, and nationally. She co-founded the Diversity and Inclusiveness grant committee for SIR that supports diversity and inclusion initiatives, including travel funds for women and underrepresented minorities. ■

We are #UCSFRadGrateful for

... all the UCSF Health essential workers.

... our amazing class of first year residents. They have shown courage, resilience and grace from Day 1.

... techs at UCSF Parnassus making everything run smoothly.

... working for racial justice.

... keeping patient interactions safe during the pandemic.

... our amazing administration colleagues that keep us running.

As 2020 drew to a close, the UC San Francisco Department of Radiology and Biomedical Imaging launched a gratitude campaign (#UCSFRadGrateful) posted on our social media. This campaign gave UCSF Radiology faculty, staff and trainees the opportunity to share images and captions to give kudos and appreciation to colleagues.

Honors and Awards 2020

Ronald L. Arenson, MD

Recipient, Gold Medal, Radiological Society of North America

David Avrin, MD

Recipient, Gold Medal, Society for Imaging Informatics in Medicine

Matthew Bucknor MD

Recipient, Andrew J. Lockhart Memorial Prize

RSNA Education Exhibit Cum Laude Award, "Ultrasound Guided Musculoskeletal Interventions: Pain-Free"

Soonmee Cha, MD

Semifinalist, Aunt Minnie "Most Effective Radiology Educator"

Hailey Choi, MD

RSNA Education Exhibit Cum Laude Award, "Ultrasound Guided Musculoskeletal Interventions: Pain-Free"

Miles Conrad, MD

Recipient, Hereditary Hemorrhagic Telangiectasia (HHT) "You Lift Me Up" Award

Selected as Medical Student Coach, UCSF School of Medicine Education Coaching Program

Christopher Dowd, MD

Named Fellow, Society of Neuro Interventional Surgery

Michael Evans, PhD

Recipient, Pilot Award from the Lymphangioma myomatosis (LAM) Foundation

Recipient, UCSF School of Pharmacy, Dean's Apple Award

Vickie Feldstein, MD

Recipient, Outstanding Alumnus Award, UCSF Department of Radiology and Biomedical Imaging
RSNA Education Exhibit Certificate of Merit, "Ultrasound Guided Interventions to Diagnose and Treat OB/GYN Disease"

Nicholas Fidelman, MD

Promoted to professor of Clinical Radiology

Robert Flavell, MD, PhD

Selected for the Society of Nuclear Medicine and Molecular Imaging's annual "Ones to Watch" list of 30 early career professionals

Christine Glastonbury, MBBS

Recipient, Chancellor's Fund Needs and Enrichment Award
Recipient, Radiological Society of North America Honored Educator Award

Heather Greenwood, MD

Promoted to associate professor of Clinical Radiology

Van Halbach, MD

Grant Hieshima Luminary Lecturer, Society of Neurointerventional Surgery

Jessica Hayward, MD

Promoted to associate professor of Clinical Radiology

Travis Henry, MD

Recipient, Hideyo Minagi Award for Outstanding Teacher, UCSF Department of Radiology and Biomedical Imaging
Semifinalist, Aunt Minnie "Most Effective Radiology Researcher"

Christopher P. Hess, MD, PhD

Named Fellow, the American Society for Functional Neuro Radiology (ASFNR)
Named Fellow, American Institute for Medical and Biological Engineering (AIMBE)
Named Fellow, International Academy of Medical and Biological Engineering (IAMBE)

Michael Hope, MD

Promoted to professor in residence

Courtney Lawhn Heath, MD

Recipient, Rahul Desikan Award 2020

Priyanka Jha, MD

Promoted to associate professor of Clinical Radiology
Recipient, Chancellor's Fund Needs and Enrichment Award
RSNA Education Exhibit Certificate of Merit, "Ultrasound Guided

Interventions to Diagnose and Treat OB/GYN Disease

Bonnie Joe, MD, PhD

Elected RSNA Foundation Board of Trustees

RSNA Education Exhibit Certificate of Merit, "The Milky Way Exploration: MR Evaluation of the Lactating Breast"

Kimberly Kallianos, MD

Recipient, Chancellor Fund Needs and Enrichment Award

Tatiana Kelil, MD

Selected to the UCSF 2020 Class of John A. Watson Scholars
RSNA Education Exhibit Certificate of Merit, "The Milky Way Exploration: MR Evaluation of the Lactating Breast"

Named to Radiographics Social Media & Digital Innovation Committee

Maureen Kohi, MD

Named to VIVA Physicians Board of Directors
President of the Western Angiographic and Interventional Society

Ryan Kohlbrenner, MD

Recipient, Radiological Society of North America Seed Grant

John Kurhanewicz, PhD

Recipient, UCSF Radiology and Biomedical Imaging Award for Outstanding Faculty Mentoring

Peder Larson, PhD

Editor's Pick, Magnetic Resonance in Medicine "Iterative Motion-Compensation Reconstruction UTE for Free Breathing Pulmonary MRI"
Editor's Pick, Magnetic Resonance in Medicine "Extreme MRI: Large-scale Volumetric Dynamic Imaging from Continuous Acquisitions"

Amie Lee, MD

Promoted to associate professor of Clinical Radiology
RSNA Education Exhibit Certificate of Merit, "The Milky Way Exploration: MR Evaluation of the Lactating Breast"

Camilla Linden, MD
Recipient, 2019–2020 Special Recognition Teaching Award, UCSF Volunteer Clinical Professors (VCP) Advisory Board

Sharmila Majumdar, PhD
Named chair of the UCSF Academic Senate

Kevin McGill, MD, MPH
RSNA Education Exhibit Cum Laude Award, “Ultrasound Guided Musculoskeletal Interventions: Pain-Free”

Tara Morgan, MD
RSNA Education Exhibit Cum Laude Award, “Ultrasound Guided Musculoskeletal Interventions: Pain-Free”

RSNA Education Exhibit Certificate of Merit, “Ultrasound Guided Interventions to Diagnose and Treat OB/GYN Disease”

Melanie Morrison, PhD
Recipient, UCSF Chancellor Postdoctoral Fellowship (PI Janine Lupo, PhD)
Recipient, Bruce Hasegawa Award

Daria Motamedi, MD
RSNA Education Exhibit Cum Laude Award, “Ultrasound Guided Musculoskeletal Interventions: Pain-Free”

Srikantan Nagarajan, PhD
Inducted into the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows

Karen Ordovás, MD
Elected vice-secretary treasurer, Board of Trustees of the Society of Cardiovascular Magnetic Resonance (SCMR)

Miguel Hernandez-Pampaloni, MD, PhD
Promoted to professor of Clinical Radiology, Molecular Imaging & Therapeutics

Rina Patel, MD
RSNA Education Exhibit Cum

Laude Award, “Ultrasound Guided Musculoskeletal Interventions: Pain-Free”

Liina Poder, MD
RSNA Education Exhibit Cum Laude Award, “Ultrasound Guided Musculoskeletal Interventions: Pain-Free”
RSNA Education Exhibit Certificate of Merit, “Ultrasound Guided Interventions to Diagnose and Treat OB/GYN Disease”

Andreas Rauschecker, MD, PhD
Recipient, UCSF 2019–20 Long-Term Mentor Award
RSNA Awardee for Research Scholar Grant

Bhavya Rehani, MD
Recipient, UCSF Chancellor Award for Public Service
Invited Plenary Speaker, Annual Oration in Diagnostic Radiology, RSNA 2020

Jeffrey D. Rudie, MD, PhD
Recipient, 2020 American Society of Neuroradiology Foundation Research Grant in Artificial Intelligence

David Saloner, PhD
Recipient, UCSF Radiology Master of Science in Biomedical Imaging Teaching Award

Vinil Shah, MD
Promoted to associate professor of Clinical Radiology
RSNA Education Exhibit Cum Laude Award, “Ultrasound Guided Musculoskeletal Interventions: Pain-Free”

Dorothy Shum, MD
RSNA Education Exhibit Certificate of Merit, “Ultrasound Guided Interventions to Diagnose and Treat OB/GYN Disease”

Lori Strachowski, MD
Awarded an American Osteopathic College of Radiology (AOCR) Honorary Fellowship for her contributions as teaching faculty at OACR CME and webinars

Mark Sugi, MD
RSNA Education Exhibit Cum Laude Award, “Ultrasound Guided Musculoskeletal Interventions: Pain-Free”

Derek Sun, MD
Promoted to associate professor of Clinical Radiology

Graham Wallace, MD
Recipient, Outstanding Clinical Faculty Award, UCSF Department of Radiology and Biomedical Imaging

David M. Wilson, MD, PhD
Promoted to professor in residence, Neuroradiology

UCSF Health Honors and Awards

Abraham Carillo, RT
Lanna Lee Award for Outstanding Technologist

Gloria Gamit
Richard A. Sollitto Award for Outstanding Support Staff

Mark How, MS
Invited presenter at the SIGNA Master PET/MR Summit 2020

Daphne Peñaflor, RN
Selected, UCSF Nursing Leadership Academy Program 2020

Lindsay Lawless, RN
Recipient, DAISY Foundation Award for Extraordinary Nurses

UCSF Campus Staff Employee Awards

Sandria Wong
Recipient, Cathy Garzio Award for Outstanding Campus Employee

Renante Ramos
Recipient, UCSF STAR Award

Jacqueline Whitlock
Recipient, UCSF STAR Award ■

THE YEAR IN PICTURES



ACADEMIC AFFAIRS

Promoting Academic Success for All Faculty and Non-Faculty Academics in Radiology

By Christine Glastonbury, MBBS

As of January 2021, our department has 141 faculty, including 38 imaging scientists and 103 clinician radiologists, clinician educators and clinician scientists. The department's Academic Affairs team is here to manage the complexities of often-opaque UCSF academic processes for all of our faculty and non-faculty academics (NFAs). Over the past two years, we have streamlined and clarified faculty and NFA hiring, annual reviews, committee composition and the academic advancement processes. We also promote transparency, equity and diversity in our department. We have brought in new workshops and courses and are building systems to source opportunities to better support and celebrate our faculty and NFAs in their career pathways to success.

Recruitment

In 2020, we hired 12 outstanding new faculty members including four imaging scientists, and will welcome two more before the end of the 2020–21 academic year. We are thankful for the search chairs and all the faculty who serve on search committees. They invested many hours participating in these searches, in particular Jane Wang, MD, Bill Dillon, MD, Jesse Courtier, MD, Rob Flavell, MD, PhD, Bonnie Joe, MD, PhD, and Brett Elicker, MD.

Prior to the pandemic, we had significantly changed the search process to better address inherent biases, with the aim to increase the diversity of our teams. Since the UCSF hiring freeze and campus visit limitations in March 2020, we have continued to incorporate these strategies while modifying our processes for remote interviewing. Despite the pandemic, we continue to hire for exceptional clinical and research needs and have multiple ongoing searches. We currently have two new clinical faculty confirmed for July 2021.

Faculty Mentoring Program

Sri Nagarajan, PhD, is our new director of Mentoring for the imaging scientist faculty, following the tenure of Dan Vigneron, PhD, in that leadership role. Sri and I continue to expand and build on the department's faculty mentoring program that is currently focused on our junior (assistant professor) faculty. The program's aim is to build for each faculty member a network of mentors who can guide and support them through career direction decisions and research collaborations and provide sponsorship opportunities. Mentoring is, as I often like to say, a team sport. With the physical distancing brought by the



Gifts for faculty to celebrate National Mentoring Month, January 2021.

pandemic, actively mentoring and sponsoring faculty is somewhat challenging yet more important than ever. The contributions of many faculty in our department who generously share their expertise, experience and time continue to make this program valuable and successful.

We honor and celebrate all faculty mentors every January during National Mentoring Month, and this past June made special acknowledgment of the mentoring work of John Kurhanewicz, PhD, who received the 2020 Radiology Award for Outstanding Faculty Mentoring.

Academic Advancement

For the 2020 academic year, around 60 faculty members submitted their packets for academic advancement, culminating in many successful merit actions and the promotion of 10 faculty to associate professor or full professor. For the current academic advancement cycle effective July 1, 2021, every advancement packet submitted to the Committee on Academic Personnel (CAP) included a statement from the faculty member on diversity, equity and inclusion (DEI), and every chair's letter included discussion of the faculty member's contributions to DEI. While this is not currently a UCSF requirement for promotions, it is strongly encouraged. Our faculty embraced this new recommendation, sharing impressive work and achievements in addressing inequities, injustices and imbalances, and in outreach. Overall, our faculty have shown significant commitment in their efforts to promote diversity and inclusion within the department and on campus.

As we seek to reduce inherent biases in all our academic affairs processes, including the academic review process, we require unconscious bias training for our Merits and Promotions Committee members. We have also instituted different measures for the full evaluation and voting on advancement packets. Now that all packets for advancement effective July 2021 have been submitted, we hope to be able to celebrate in person later this year those faculty promoted to associate and full professor, and thank the members of the Merits and Promotions Committee for their hard work and dedication to supporting and promoting our faculty.

Faculty Development

After the success of the previous academic year's professional development workshops, Susan Wall, MD, together with Sharmila Majumdar, PhD, and Chair Christopher Hess, MD, PhD, led a new workshop: *Developing and Strengthening Your Academic Radiology Research Career*. This 12-session course covering "how to get started in research" through to "designing and managing clinical trials" covered a broad range of issues relevant to brand new and seasoned faculty. Zoom meetings allowed participation and interaction that might otherwise have been difficult across campuses and ensured plentiful attendance and discussion at each session. As we develop new courses and restructure courses such as the CV workshop and speaker training course, our team continues to resource opportunities for development, grants and courses external to the department for our faculty. Developing junior faculty is another essential part of Academic Affairs, and our goal is to encourage senior faculty to actively sponsor junior faculty, especially underrepresented minorities, to leadership opportunities that help lead them to professional success.



Developing and Strengthening Your Academic Radiology Research Career: Participants in one of the department's professional development workshops.



Academic Affairs Leadership team, from left: Christine Glastonbury, MBBS, vice chair, Academic Affairs; Susan Wall, MD, advisor to the Chair for Faculty Development; Amy Pradhan, MPH, MS, director, Academic Affairs and Site Operations; Lorna Kwok, Academic coordinator; Jocelyn Pulido, Academic coordinator

Department Committees

In order to allow more equitable representation in our department across academic series and ranks, and across different hospital and research working sites, we invited faculty to self-nominate for departmental committees. The committee chairs enthusiastically addressed their charge to diversify their membership. While seemingly minor, the opportunity to participate in governance of our work environment and our work practice, is an important a shared service opportunity. We have brought new faculty to all committees, included trainees on some committees, and hope to be able to provide increased visibility and voice to all faculty.

Non-Faculty Academics

Our NFAs are specialists and professional researchers who work with imaging and clinician scientist faculty, and who might become department faculty. This past year we instituted a more formalized annual review, and a merits and promotions process to ensure successful development of NFA career potential in our department. The Academic Affairs team manages the visas, hiring and on-boarding for NFA faculty.

The Academic Affairs team is here to help our faculty and NFAs navigate the complexities of UCSF academic processes and to promote academic success. Please visit our website and the updated Faculty Thrive Guide for more resources. The website includes recorded past events and upcoming courses and opportunities. radiology.ucsf.edu/academic-affairs ■

Christine Glastonbury, MBBS, is a full professor of Clinical Radiology, the vice chair for Academic Affairs, and interim section chief of the Neuroradiology Section in the Department of Radiology and Biomedical Imaging at UCSF.

New Faculty

The UC San Francisco Department of Radiology and Biomedical Imaging would like to extend a warm welcome to the talented new faculty members that joined the department in 2020. We are proud of their accomplishments and look forward to their contributions as faculty members to our clinical, educational and research endeavors.



Rachelle Durand, DO



Jeremy Gordon, PhD



Roxanna Juarez, MD



Yoo Jin Lee, MD

Rachelle Durand, DO

Assistant Professor of Clinical Radiology

Durand earned her DO from the University of North Texas Health Science Center in 2012 and completed a Diagnostic Radiology residency at Wayne State University in 2017, where she served as a co-chief resident, and received the 2017 Radiology Resident of the Year Award. While at the Children's Hospital of Philadelphia, Durand completed a fellowship in Pediatric Radiology in 2018, and a fellowship in Pediatric Interventional Radiology in 2019. Durand's professional interests are therapies for vascular anomalies and optimizing the effectiveness of gastrostomy tube placement. Durand's research involves characterizing the mechanics of neonatal PICCs, metastatic thyroid ablation therapy and vascular anomalies.

Jeremy Gordon, PhD

Assistant Adjunct Professor

Jeremy Gordon earned a PhD in Medical Physics in 2013 from the University of Wisconsin. He began in our department as a postdoctoral scholar (2013–2016), followed by a role as senior development engineer (2016–2020). Gordon's research uses advanced imaging techniques to provide physiologic and metabolic information with MRI, with a focus on the development of novel and rapid acquisition strategies and reconstruction methods for spectroscopic imaging on preclinical and clinical systems. These methods are applied to prostate cancer research, other cancers and metabolic diseases.

Gordon is an author on 34 peer-reviewed publications and is a distinguished reviewer for the journal *Magnetic Resonance in Medicine*.

Roxanna Juarez, MD

Assistant Professor of Clinical Radiology

Juarez earned her MD from Brown University in 2014, followed by an Internal Medicine internship at Greenwich Hospital – Yale New Haven Health in 2014. While there, she received the Browning Award for trainees who display exceptional teamwork. Juarez completed a Diagnostic Radiology residency at Georgetown University Hospital in June 2019. In 2020, she completed a Nuclear Medicine fellowship in our department. With Robert Flavell, MD, PhD, and Thomas Hope, MD, Juarez has conducted research focused on molecular imaging for evaluating and monitoring prostate cancer. She has extensive past research experience at Georgetown University.

Yoo Jin Lee, MD

Assistant Professor of Clinical Radiology

Lee completed her MD in 2007 at Kyungpook National University, South Korea, followed by her internship (2008) and Diagnostic Radiology residency (2012). Lee was a research associate in Cardiovascular Radiology (2017), a clinical fellow in Cardiothoracic Radiology (2018), a clinical instructor (2019), and a clinical fellow in Nuclear Medicine (2020) at the University of Virginia. Lee's clinical work focuses on thoracic, cardiac and noninvasive vascular



Eugene Ozhinsky, PhD



Preethi Raghu, MD



Andreas Rauschecker, MD, PhD



Kimberly Ray, MD

imaging for endovascular intervention and cardiovascular surgery and vascular disease. Her research focuses on the efficacy of cardiac MR in diagnosis of myocarditis. She has worked closely with cardiology-biomedical teams on cardiac MR sequence development, and spiral pulse sequences for myocardial perfusion imaging.

Eugene Ozhinsky, PhD

Assistant Adjunct Professor

Ozhinsky earned his PhD in 2012 from the UCSF-UC Berkeley Bioengineering Program and joined our department as a postdoctoral scholar the same year. Since 2014, Ozhinsky has been a specialist, working on deep learning algorithms for object detection and classification in radiographs and MR images of patients with hip fractures and osteoarthritis. He also works on PACS data mining and transfer pipelines for training deep neural networks. As principal investigator on an NIBIB Trailblazer R21 grant, he is leading development of MR thermometry and ultrasound beamforming techniques for targeted hyperthermia treatments. Ozhinsky received the Magna Cum Laude Award from the International Society of Magnetic Resonance in Medicine (2014) and is an author on over 20 journal articles.

Preethi Raghu, MD

Assistant Professor of Clinical Radiology

Raghu earned her MD at Albany Medical College, NY (2014), where she also completed an internship (2015). Her Diagnostic Radiology residency was at Rochester General Hospital, NY (2015) and Virginia Mason Hospital & Medical Center in Seattle (2016-19). Raghu completed a Body Imaging clinical fellowship at Stanford in 2020. Raghu is trained in the Virginia Mason Production System for hospital quality and safety. She served on the Washington State Radiological Society as VP of the Resident and Fellow Section (2018-19) and on the Committee on Women and Diversity (2017-18). Raghu had the Top Educational Exhibit at the American Roentgen Ray Society "Nuclear

Medicine Power Hour" (2019) and earned case prizes from the SRU (2018, 2019).

Andreas Rauschecker, MD, PhD

Assistant Professor in Residence

Rauschecker earned his MD and PhD at Stanford, followed by an Internal Medicine internship at Albert Einstein Medical Center. He completed a Diagnostic Radiology residency at the University of Pennsylvania (2018) on the NIH T-32 research track. He joined UCSF as an NIH T-32 postdoctoral research fellow in 2018 and was an ACGME clinical fellow in Neuroradiology. Rauschecker's research is focused on artificial intelligence techniques for quantitative characterization and diagnosis of the fetal brain and applications of machine learning to understanding brain-behavior relationships in typically developing children. He has received the RSNA Roentgen Fellow Research Award (2019), and the Society for Imaging Informatics in Medicine's Roger A. Bauman MD Award (2019), among others. He is an author of more than 25 peer-reviewed articles

Kimberly Ray, MD

Associate Professor of Clinical Radiology

Ray completed a clinical fellowship in Breast Imaging in our department in 2007. From 2007–2013, Ray was the medical director of the Center for Breast Imaging and Diagnosis at St. Joseph Hospital in Orange, CA. In 2013, she joined UCSF Mount Zion as assistant professor in the Women's Imaging Section, becoming associate chief of Women's Imaging at ZSFG in 2014. Ray was an attending radiologist at Kaiser Permanente, East Bay (2018–20). In 2018, she was selected as a fellow of the Society of Breast Imaging, an honor demonstrating her leadership in that field. Ray leads the Breast Imaging service at the new Berkeley Outpatient Center. We are delighted to welcome her back to UCSF.



Mark Sugi, MD



Olga Tymofiyeva, PhD



Pavithra Viswanath, PhD



Sean Woolen, MD

Mark Sugi, MD

Assistant Professor of Clinical Radiology

Sugi earned his medical degree at UCLA (2011) and completed an internship in UCLA's Department of Orthopedic Surgery (2012). In 2019, Sugi completed a Diagnostic Radiology residency at the Mayo Clinic in Scottsdale, AZ. Sugi completed an Abdominal Imaging and Ultrasound clinical fellowship in our department in 2020. From 2019–20, Sugi served as secretary and treasurer of the Residents and Fellows section of the Society of Abdominal Radiology (SAR). He is also a member of the SAR Early Career Committee. Sugi has an interest in image-guided biopsy and unique surgical procedures performed at UCSF. Sugi is an author on more than 10 peer-reviewed publications.

Olga Tymofiyeva, PhD

Assistant Adjunct Professor

Tymofiyeva earned a PhD in Physics at the University of Wuerzburg, Germany. She came to our department as a postdoctoral scholar in 2010, followed in 2014 by a position as an assistant professional researcher. Tymofiyeva's primary research focus is non-invasive mapping of structural and functional connectivity in the developing brain. She develops and applies advanced MRI techniques to study the neurobiological substrates of mental disorders and the effects of mind-body interventions on children and adolescents. Tymofiyeva is currently the principal investigator for the "Brain Change" study, an NIH-funded study of brain plasticity in adolescents undergoing a mindfulness meditation training. She is an author on over 35 journal articles and one book chapter.

Pavithra Viswanath, PhD

Associate Adjunct Professor

Viswanath received her PhD from the Indian Institute of Science, Bangalore, in 2007. She joined our department in 2014 as an associate specialist in the lab of Sabrina Ronen, PhD. Viswanath's research seeks to leverage insights from cancer genomics to drive the preclinical development of imaging modalities and therapies that will benefit patients. She is researching oncogenic events that drive tumor pathogenesis which also result in the reprogramming of tumor metabolism. Viswanath believes that deeper understanding of metabolic reprogramming in preclinical tumor models will be a springboard for the identification of non-invasive metabolic imaging methods and metabolic drug targets. Viswanath is an author of 20 publications in high-impact journals.

Sean Woolen, MD

Assistant Professor of Clinical Radiology

Woolen completed his MD (2014) and internship (2015) at Indiana University. He completed a Diagnostic Radiology residency at University of Michigan (2019) and a fellowship in Diagnostic US/AI in our department (2020). Woolen has experience in meta-analysis, QI, machine learning and clinical trials. He has designed and led multicenter patient preference research, multidisciplinary teams of researchers across clinical departments and has collaborated with basic science faculty. In 2018, Woolen received the University of Michigan Quality Investigator Award and the Top Research Article Award, given for the best research article published by a resident. Woolen is an author on more than 15 journal articles, including several first author publications. ■

Faculty Promotions 2020



Heather Greenwood, MD

Associate Professor
of Clinical Radiology
Breast Imaging



Jessica Hayward, MD

Associate Professor
of Clinical Radiology
Breast Imaging



Priyanka Jha, MD

Associate Professor
of Clinical Radiology
Abdominal Imaging/
Ultrasound



Amie Lee, PhD

Associate Professor
of Clinical Radiology
Breast Imaging



Vinil Shah, MD

Associate Professor
of Clinical Radiology
Neuroradiology



Derek Sun, MD

Associate Professor of
Clinical Radiology
Abdominal Imaging/
Ultrasound



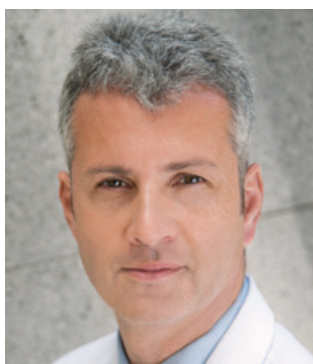
Nicholas Fidelman, MD

Professor of Clinical
Radiology
Interventional Radiology



Michael Hope, MD

Professor in Residence
Chief of Radiology
San Francisco VA Medical
Center



Miguel Hernandez-Pampaloni, MD, PhD

Professor of Clinical
Radiology
Molecular Imaging &
Therapeutics



David Wilson, MD, PhD

Professor In Residence
Neuroradiology

EDUCATION

UCSF Training Programs 2020–2021

By Soonmee Cha, MD

The 2020–2021 academic year proved to be very challenging, but we prevailed and remained at the top of our game. The diagnostic radiology residency program did not sit back on their laurels. For the seventh year in a row, *Doximity* ranked us #1 in the nation. We have the best residents in the world, and I am deeply grateful for their teamwork, camaraderie and resilience during this unprecedented pandemic of our lifetime. Our faculty's unwavering support for our residents and the educational mission during this difficult time elevated our program to yet another level of excellence.

Residency Program

Although we wanted to send our 13 seniors off with their traditional commencement ceremony at the Four Seasons Hotel, COVID-19 prevented us from the pomp due to the circumstance. However, we successfully hosted the first UCSF Radiology Residency Virtual Graduation via Zoom with about 200 attendees. Family and friends who could not attend physically logged in to celebrate with us. We welcomed guests from all around the country and even as far as South Korea! We wish much success to our Class of 2020.

We welcomed 13 new first-year residents to our radiology family on July 1, 2020, socially distanced but professionally connected with much warmth and appreciation. Thirteen of them will follow a four-year diagnostic radiology track, and one will complete three years of diagnostic radiology training before transitioning

to a focused, two-year Interventional Radiology training program. We sent them online video modules to orient them prior to the first day. They quickly adjusted to our “new norm” and hit the ground running. They are a dedicated and hard-working class, and we look forward to working with these bright and talented radiologists in the coming years.

A big thank you to our outgoing chief residents, Jonathan Jo, MD, Ryan Navarro, MD, MS, and Alexandra Wright, MD, who did an excellent job last year. They worked very hard to help make the residency program run smoothly, especially with all the changes that needed to be made when the pandemic hit. I commend them for going above and beyond the call of duty. They passed the torch to Evan Calabrese, MD, PhD, Olivia Linden, MD, and Mark Winkler, MD, who accept these new duties and responsibilities with the same fervor and dedication. They are off to a great start working on innovative ways to conduct our first virtual interviews, a new resident Twitter feed and Instagram page, and much more.

I could not accomplish all that is needed to run a residency program by myself. I owe much gratitude to Jason Talbott, MD, PhD, associate program director, head of the residency selection committee, and residency site director at Zuckerberg San Francisco General, for his dedication to the residency program and our trainees. He truly cares for the trainees and advocates for them to receive the best experience and training. I would also like to thank our residency site directors Jesse Courtier, MD, at Mission Bay, and Preeti Sukerkar, MD, PhD, at

Dr. Soonmee Cha in orientation session with incoming residents, July 2020.



San Francisco Veterans Affairs Medical Center. These outstanding faculty, along with the wonderful Education Team (Melinda Parangan-Chu, Sandria Wong, Cindy Flores Gaytan, Samira Zebarjadian and Sora Kang) are the backbone of this Education Program's solid foundation and success in serving our residents.

Fellowship Training Program

We welcomed 49 bright, mature and promising trainees to our fellowship programs. Due to the sunset of the Vascular Interventional Radiology Fellowship last June, we have five trainees in our new Independent Interventional Radiology Program. We are excited to have them with us this year and our faculty are dedicated to guiding them in expanding their knowledge in their chosen subspecialty. A special thanks to our program directors:

- Director of Fellowship Programs: **Spencer Behr, MD**
- Abdominal Imaging/Ultrasound: **Derek Sun, MD**, program director and **Mark Sugi, MD**, associate program director
- Breast Imaging: **Elissa Price, MD**, program director
- Cardiac & Pulmonary Imaging: **Kimberly Kallianos, MD**, program director
- Independent Interventional Radiology: **Evan Lehrman, MD**, program director and **Vishal Kumar, MD**, associate program director
- Molecular Imaging and Therapeutics: **Miguel Pampaloni, MD, PhD**, program director and **Courtney Lawhn-Heath, MD**, associate program director
- Musculoskeletal Radiology: **Rina Patel, MD**, program director
- Neuroradiology: **Vinil Shah, MD**, program director and **Yi Li, MD**, associate program director
- Neurointerventional Radiology: **Van Halbach, MD**, program director and **Matthew Amans, MD**, associate program director
- Pediatric Radiology: **Jesse Courtier, MD**, program director

2020 was definitely challenging for the trainees, the department and for all. COVID-19 threw a wrench at us, but the well-oiled machine that we are, didn't stop our gears. It proved the strength, resilience and grit the trainees have to come together during these unprecedented times. Education, training, patient care, research didn't stop. Shelter-in-place may have temporarily slowed our momentum, but we quickly picked up the pace. This speaks volumes to the commitment, perseverance and tenacity we have to collaborate and get the job done.

We are very fortunate to work with world-renowned radiologists who also happen to be dedicated educators and advocates of our residents. Thank you for taking the trainees under your wings and guiding them to the next level. I would also like to thank our chairman, Christopher

Hess, MD, PhD, for his unwavering support for our residents, training programs, and educational mission.

We are excited to see what the future holds for our trainees. We expect great things to come in the upcoming years. The talent, intellectual curiosity and drive these trainees have is very promising for the future of radiology.

2020 Notable Education Awards and Accomplishments

- **Evan Calabrese, MD** – RSNA Research & Education Foundation Grant, 2020
- **Soonmee Cha, MD** – Semi-Finalist Nominee for Aunt Minnie's Most Effective Radiology Educator
- **Maggie Chung, MD** – Certificate of Merit, RSNA Educational Exhibit, 2020
- **Madhavi Duvvuri, MD, MPhil** – Grand Prize Winner, WAIS Innovation in IR Virtual Poster Presentation
- **Andrew Fenster, MD** – Certificate of Merit, RSNA Educational Exhibit, 2020
- **Elizabeth George, MD** – American Society of Neuroradiology (ASNR) Scholar Award in Neuroradiology, 2020
- **Masis Isikbay, MD** – ZSFG Krevans Award for Outstanding Service
- **Yoon-Jin Kim, MD** – Tier Three Winner, WAIS Innovation in IR Virtual Poster Presentation
- **Kirti Magudia, MD, PhD** – RSNA Trainee Research Prize
- **Arian Mashhood, MD** – Cum Laude Award, 2020, American Society of Pediatric Neuroradiology
- **Kesav Raghaven, MD** – Elmer Ng Outstanding Resident Award
- **Jeffrey Rudie, MD** – ASNR Foundation Neuroradiology Research Grant in Artificial Intelligence
- **Jaehoon Shin, MD, PhD** – SIR Research Grant
- **Karl Soderlund, MD** – Outstanding Fellow/Clinical Instructor Teaching Award
- **Jae Ho Sohn, MD, MS** – RSNA Research & Education Foundation Grant, 2020
- **Ethan Speir, MD** – RSNA Trainee Research Prize, 2020
- **Maya Vella, MD** – Medical Student Teaching Award
- **Sandria Wong** – Cathy Garzio Award for Outstanding Radiology Staff
- **Alexandra Wright, MD** – Elmer Ng Outstanding Resident Award ■

Soonmee Cha, MD, is a professor in residence of Radiology and Neurological Surgery, vice-chair of Education, program director for the Diagnostic Radiology Residency Program, and associate program director for the integrated interventional Radiology Residency.

PGY-2 Residents: Class of 2024

Joe Baal, MD



Joe Baal earned his medical degree in 2019 from UCSF where he graduated with distinction in the Clinical and Translational Research Pathway.

He received a certificate in Advanced Training in Clinical Research (ATCR) funded by the NIH from UCSF's Graduate Division (2017–2018).

Baal has managed radiology lecture recordings and has created diagnostic algorithms for applications aimed at addressing barriers to medical education in developing countries for Health4TheWorld. He has volunteered at the Mabuhay Health Center, a free clinic serving San Francisco's underserved Filipino community. Baal is the co-founder and coordinator of the Future Physicians Mentorship Program and helped develop the Quiziology app, a medical imaging-based quiz application.

He is an author on eight peer-reviewed journal articles and has conducted research with Ronald Zagoria, MD, (2018–2020) and Thomas Link, MD, PhD, (2017–2020) in the UCSF Department of Radiology and Biomedical Imaging.

Baal completed a one-year internship at UCSF Fresno in 2020. In July 2020, Baal joined the department as a first-year diagnostic radiology resident.

Katherine Cecil, MD



In 2019 Katherine Cecil received her medical degree from Baylor College of Medicine, Houston, TX. She completed an internship at the

University of Pittsburgh Medical Center, PA in 2020.

Cecil was awarded Honors in Foundational Sciences at Baylor College of Medicine in 2017, where she received the Baylor College of Medicine Merit Scholarship (2015–2019).

Cecil conducted research in the Department of Anesthesia, Texas Children's Hospital, Houston (2017–2018) in which she collected data examining yield of anesthetic use for MRI in children with suspected neurological abnormalities. She also conducted research at the Cerebrovascular Center, Cleveland Clinic, OH (2014–2015) as a research assistant performing human subjects research in the Neurological Critical Care Unit.

At Baylor, she was the research chair (2017) and vice president (2018) of the Student Interest Group in Neurology, for which she managed finances, and developed the Mobile Stroke Ride Along opportunity for Baylor students. She joined the department as a first-year diagnostic radiology resident in July 2020.

Madhavi Duvvuri, MD, MPhil



Madhavi Duvvuri earned her medical degree at The Johns Hopkins School of Medicine in Baltimore, MD, in 2019. She completed her MPhil in Physics

at the University of Cambridge, King's College, UK in 2015.

At Johns Hopkins School of Medicine, Duvvuri conducted research in retrospective imaging studies assessing embolic coil efficacy in treating pulmonary AVMs, and researched efficacy and outcomes of the pulmonary embolism attack team at Johns Hopkins Hospital (2016–2019). In her research in the departments of Otolaryngology and Biomedical Engineering (2016–2019), she engineered a novel biodegradable, drug-eluting stent to treat laryngotracheal fibrosis. Her research was featured in a "Rising to the Challenge" segment by Johns Hopkins University. She is an author on more than 10 peer-reviewed journal articles.

Duvvuri received a 2017 American Medical Association Foundations Seed Research Grant, and the SIR 2019 Student Scholarship. She was the Grand Prize Winner at the Western Angiographic and Interventional Society Innovations in IR 2020.

Duvvuri completed her internship at UCSF and joined the department as a first-year diagnostic radiology resident in July 2020.

Emily Huang, MD



In 2019, Emily Huang received her medical degree from Harvard Medical School in Boston, MA. This was followed by a one-year internship at

Signature Healthcare Brockton Hospital in Boston, MA.

Huang completed research in the Department of Radiology at Brigham and Women's Hospital with mentor Jeffrey Duryea, PhD, (2018–2020) focused on developing and validating software for quantification of cartilage loss seen in knee MRI in osteoarthritis. At the Department of Radiology, Massachusetts General Hospital (2018–2019), she conducted a retrospective review of abdominal CT imaging to characterize the epidemiology of Paget's Disease of bone in patients. Huang is an author on eight peer-reviewed journal articles.

Huang joined UCSF in 2020 as a diagnostic radiology resident.

Kevin Leu, MD, PhD



Kevin Leu obtained his PhD (2017) and his MD (2019) from the University of California, Los Angeles Medical Scientist Training Program (MTSP). While at UCLA,

Leu received the MSTP's Pick Scholarship, awarded to top senior trainees (2016 and 2017). He also received a UCLA Dissertation Year fellowship (2016).

His research at UCLA focused on perfusion-weighted MRI in primary brain tumors for the development of leakage-correction algorithms that more accurately recover perfusion characteristics of the tumor, and the simulation of the effects of MRI protocols and leakage-correction algorithms on the computation of perfusion imaging biomarkers to best standardize clinical trials.

Leu's transitional year internship was at Sunrise Health GME Consortium, Southern Hills Hospital in Las Vegas, NV. In July 2020, Leu joined UCSF as an incoming diagnostic radiology resident.

Blair Lowery, MD



Blair Lowery obtained his medical degree in 2019 from the Medical University of South Carolina (MUSC), in Charleston, SC. He received

the MUSC Jerry and Jenny Reves Diversity Scholarship Endowment in 2015 and was inducted into the Gold Humanism Honor Society in 2018. Lowery's research has focused on applying novel calcium subtraction software to aortic/TAVR CT scans for pre-procedural measurement of the aortic root anatomy and investigating whether noise-optimized virtual monoenergetic image series (VMI+) improves myocardial evaluation compared to standard linearly blended images acquired with cardiac dual-energy computed tomography (DECT). In June 2020, Lowery completed his one-year internship at Stanford University Medical Center and joined the department as a diagnostic radiology resident in July 2020.

Chris Murphy, MD

In 2013, Chris Murphy obtained his medical degree from the University of Arizona (UA), College of Medicine in Tucson, AZ, where he received the UA Commitment to Underserved People Student Leadership Award in 2010. He completed his internship at the Naval



Center, San Diego, CA (2013–2014).

Murphy served as an undersea medical officer for the Naval Undersea Medical Institute of the United States Navy

(2014–2015), where he was a general medical provider in a primary care clinic serving active duty Marines.

From 2015–2017, Murphy was an undersea medical officer for the Navy Experimental Diving Unit, in which he was co-investigator, participant and medical provider for human subject research in underwater diving physiology, hyperbarics and equipment testing. He was also a member of the Internal Review Board and Scientific Review Committee and was a Bends Watch Provider, staffing a 24-hour emergency line for diving casualties worldwide. He also served as a Navy medical officer for NASA's Extreme Environments Missions Operations (NEEMO21), assigned to an international team of astronauts and scientists conducting month-long saturation diving operations at the Aquarius Reef Base in Islamorada, FL.

In 2018–2019, he was an undersea medical officer with the Command Submarine Development Squadron 5, a competitively assigned position directly responsible for medical support in high-risk submarine, diving and expeditionary environments. He served as the assistant department head and staff physician, responsible for more than 600 active-duty service members and served as chief medical officer.

In July 2020, Murphy joined the department as a first-year diagnostic radiology resident.

Justin Remer, MD



Justin Remer obtained his medical degree from the Warren Alpert Medical School of Brown University in Providence, RI

in 2018, where he was a member of the Gold Humanism Honor Society. While in medical school, Remer was a medical volunteer, assisting in evaluating and caring for patients in the Dermatology Clinic and taking part in treatment planning. He also volunteered in the Brown University Student Clinic where he taught first- and second-year medical students how to take medical histories and trained them to assist in care for vulnerable and underprivileged patient populations.

As a dermatology/epidemiology research fellow (2019) in the Providence Veterans Affairs Department of Dermatology, Remer analyzed data from multiple clinical trials and across the national VA dermatology clinical database. He assisted in designing and drafting a proposal for a new multi-institutional, nationwide cooperative, double-blinded, randomized controlled trial to evaluate the role of Imiquimod as a chemo preventative agent for basal cell carcinoma development in high-risk populations. Remer completed his internship at the New York Medical College/Westchester Medical Center in Valhalla, NY. He joined the department as a first-year diagnostic radiology resident in July 2020.

Stephen Wahlig, MD



Stephen Wahlig obtained his medical degree from Duke University in Durham, NC in 2019. Wahlig received the Duke-NUS

Singapore Scholar fellowship (2017–2018) and served as a research assistant at the Singapore Eye Research Institute, developing protocols for hypothermic storage and transport of cultured corneal cells and investigating the role of optical coherence tomography in measuring the corneal transition zone. Wahlig is an author on three peer-reviewed publications.

Wahlig served as a Duke-NUS first-year mentor (2017–2018), working

with a group of 15 Duke-NUS first-year medical students. He also served as a tutor for student athletes (2015–2016). Wahlig completed a one-year internship at the Iowa Methodist Medical Center in Des Moines, IA before joining the department as an incoming diagnostic radiology resident in July 2020.

Charlie Wang, MD, PhD



Charlie Wang obtained his PhD from Case Western University in Cleveland, OH in 2018. His emphasis was on MRI, pulse sequence

development, MR spectroscopy, MR fingerprinting and phosphate metabolism. He earned his medical degree from the same institution in 2019.

Wang received an NIH HLBI Individual Predoctoral Fellowship grant (2014–2016) and an Institutional Imaging T32 grant (2011–2013). Wang is an author on over 10 peer-reviewed journal articles.

Wang completed his one-year internship at the MetroHealth Medical Center in Cleveland, OH. He joined the department as a first-year diagnostic radiology resident in July 2020.

Melinda Wang, MD



Melinda Wang earned her medical degree at Weill Cornell Medical College in New York, NY in 2019, followed by an internship at UCSF in 2020.

She received the Radiological Society of North America Travel Award (2018), the Society of Interventional Radiology (SIR) Medical Student Travel Scholarship (2018) and the St. Baldrick's Foundation Summer Fellowship Award (2016).

Wang's research experience at UCSF Interventional Radiology (2017–2018) included initiating and designing a randomized controlled

trial comparing the effects of dexamethasone and standard of care on post-operative ischemic pain after uterine artery embolization. She also performed retrospective studies on intraoperative blood loss in patients with invasive placenta, and researched workforce diversity. Her research at Weill Cornell School of Medicine was in the Molecular Imaging Innovations Institute and the Department of Neurosurgery (2014–2016). She is a first author on six peer-reviewed publications.

Wang has served on the SIR Women in Interventional Radiology Committee (2017–2019) and participated in the Weill Cornell Pre-Op program (2014–2016), which provides structured exposure to a range of surgical specialties to students early in their medical education. She was the chamber music director for the Weill Cornell Music and Medicine Initiative (2014–2015).

She joined the department as an incoming resident in 2020.

Alex Ward, MD



Alex Ward earned his medical degree at New York Medical College in Valhalla, NY in 2019. While there, Ward was a member of the Radiology Interest

Club and served as a medical student peer tutor (2016–2017). He was an Office of Admissions volunteer (2015–2017), meeting with prospective students to give a broad overview of medical school and provide information about New York Medical College. He also served as an interviewer for the school's mini-multiple interview.

He is the first author of two *Journal of Urology* peer-reviewed articles: "Impact of Minimally Invasive Urologic Procedures on 30 Day Unplanned Readmission at a Tertiary Care Academic Center" 2017, (Apr; 1994): 11, and "Analysis of 30 Day Readmission to an Adult Urology Service: Assessment of Risk Factors

and Basis for a Quality Index Metric." 2017, Apr; 197(4): 1228.

Ward came to UCSF in July 2020 after completing a one-year internship at Greenwich Hospital, Greenwich, CT. He joined the department as a first-year diagnostic radiology resident in July 2020.

Kali Xu, MD



Kali Xu received her medical degree from the University of North Carolina (UNC) School of Medicine, Chapel Hill in 2019.

Xu's recent research investigations include a retrospective analysis of sinus imaging at UNC to identify patterns of overuse and opportunities for quality improvement (2018). She also conducted a systematic review of extraneural metastasis of primary CNS tumors via cerebrospinal fluid shunts. She performed research at Stanford University (2015 and 2016) in which she analyzed high angular resolution diffusion imaging correlates of cognitive impairments in Parkinson's disease by reconstructing white matter tracts and extracting diffusivity measures for correlation analysis with neurocognitive scores.

Xu provided service to the Special Olympics, North Carolina, as a medical volunteer (2017–2019). In addition, Xu was a laboratory manager, LabCorp liaison and medical volunteer for the Student Health Action Coalition's free community clinic.

Xu received the 2018 Apex Award for Magazine Writing (*The New Physician*, March/ April 2017 issue). She received the Combining Clinical and Research Careers in Neuroscience Symposium (National Institute of Health) Travel Award in 2018 and was named to the Eugene Mayer Honor Society for Community Service. Xu completed her one-year internship at the Santa Clara Valley Medical Center in San Jose, CA. In July 2020, Xu joined the department as an incoming diagnostic radiology resident. ■

Professor Conrad Adds Role as School of Medicine Bridges Curriculum Coach

In July 2020, Miles Conrad, MD, MPH, professor in the Interventional Radiology (IR) section at Zuckerberg San Francisco General (ZSFG) and UCSF, began serving as faculty in the UCSF School of Medicine Bridges Curriculum Coaching Program. The Bridges program provides UCSF students with academic guidance to promote professional and personal development throughout the medical school experience.

"The coaching role is a 20% faculty position with the School of Medicine. It entails teaching exam skills and providing an introduction to fundamental clinical medicine, with an emphasis on patient care, physical exam, professionalism, and clinical reasoning. Diversity, equity, and inclusion are placed at the forefront of the curriculum," said Conrad. Last year marked the first time that the Department of Radiology and Biomedical Imaging has participated in the Bridges coaching program, and Conrad notes that he was honored to receive Dr. Hess's nomination for the program.

Each coach guides a cohort of six first-year medical students through their medical school curriculum. "The Bridges program is organized so that all medical students are divided into small groups and assigned to a microsystem within the hospital," says Conrad. "A microsystem is a small group of people who work together regularly to provide care for specific groups of patients. As I am based at ZSFG, their microsystem or home base is the IR service. Although the students are assigned to IR at ZSFG, it does not mean they will go into Radiology, but their introduction to clinical medicine takes place at this site."

"ZSFG has a long history of medical student education," said Conrad, who credits Mark Wilson, MD, ZSFG's chief of Radiology and IR,

for "creating an incredibly welcoming environment for the medical students. The entire section, including nurses, technologists, nurse practitioners, and faculty were really excited to be involved in early medical education. The other attendings, Sujal Nanavati, MD, Vishal Kumar, MD, and Eugene Huo, MD, are gifted educators. I only wish I had the opportunity to work with someone as thoughtful and deliberative as Dr. Nanavati during early medical school."

Quality Improvement Project

IR will also serve as the focus of a year-long quality improvement (QI) project. Along with Conrad, Brian Haas, MD, assistant professor in Radiology, and Laura Lang, MD, an assistant professor in the Department of Anesthesia, the students will be doing a QI project called the "Clears for Breakfast" initiative. Almost all IR inpatients are ordered a strict "NPO" diet or Nil Per Os for eight hours while waiting for procedures utilizing moderate sedation. "That's understandably too long and just plain miserable for many of our patients, particularly if they are rescheduled at the end of the day," said Conrad.

A priority in the project is to identify if there are disparities in NPO times between patients of different demographics.

"Patients with limited English proficiency (LEP), for example, may be NPO for longer as they often require the extra step of using an interpreter to advocate for themselves. Or, we may discover that NPO times differ disproportionately between patients of different race or socioeconomic status," said Conrad.

The team's intervention will be aimed at increasing the percentage of inpatients who receive a breakfast of clear liquids such as black coffee, tea or broth the morning

of their IR procedure. Clears only need to be held for two hours prior to sedation procedures.

"Obviously, many patients would love to drink coffee or tea in the morning. Even a warm cup of broth would be comforting and nourishing," noted Conrad. "This is the first project of its kind in any IR environment that we know of in the United States and the fact that medical students are running it is even more exciting."



See a photo of a "Clears for Breakfast" initiative student cohort on the back cover.

White Coat Ceremony

Because of the pandemic the School of Medicine's traditional white coat ceremony, held in September for all first-year students was virtual in 2020. In person, socially distanced, fully masked white coat ceremonies were held by each Bridges coaching group separately. For Conrad's group, that meant holding their white coat ceremony for the six students on the roof garden of ZSFG. "It has a nice view of San Francisco and it was open, allowing for social distancing," said Conrad. After donning white coats, signifying their entrance into the medical profession, the students recited the UCSF Physician's Oath together.

"The students' families were there on FaceTime and Zoom, including one student's 103-year-old grandmother," said Conrad. "It was beautiful, and it was emotional. Several of the students in my coaching group have overcome great adversity to get to UCSF or are the first of their generation to attend college. So it was a meaningful moment and a testament to their resiliency and perseverance. Not to mention, there was the significance of young and dedicated future physicians starting their careers on the roof of a public health hospital overlooking San Francisco in the midst of a raging pandemic. That moment and day were a gift that I'll always cherish." ■



Miles Conrad,
MD, MPH

Radiology Continuing Medical Education

UCSF Radiology's 2021 Annual Review Virtual CME Conference Co-Chairs Soonmee Cha, MD, Vickie Feldstein, MD, and Elissa Price, MD, faced the challenges of conducting the 2021 Annual Radiology Review Course virtually this year with a get-it-done mindset. The course was held over five days, January



From left: Soonmee Cha, MD; Elissa Price, MD; Vickie Feldstein, MD

11–15, and the new format received positive reviews from faculty and attendees.

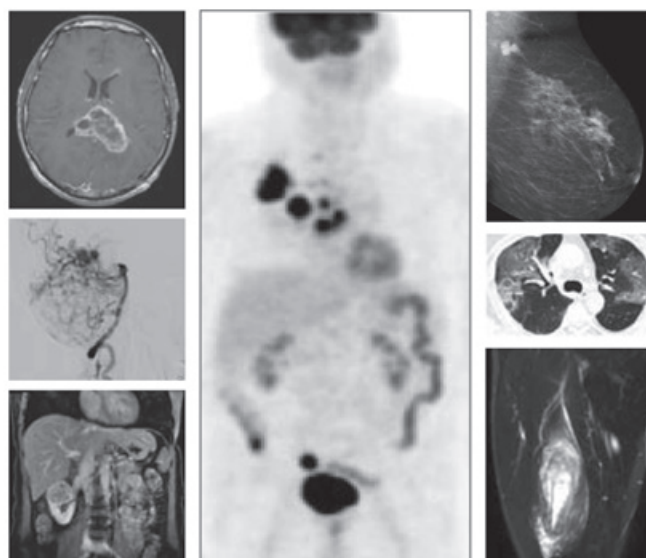
"The lectures and rapid-fire case presentations by our faculty

members were uniformly excellent – so carefully prepared, beautifully displayed and well delivered," said Feldstein.

"A big thank you to my co-chairs, Drs. Elissa Price and Vickie Feldstein, for their enormous effort and contribution!" Cha added.

"With the Department's tremendous faculty speakers and long-standing reputation for providing high quality teaching and materials, our program is primed to provide exceptional virtual CME offerings," according to Price. "This was just the beginning." More than 100 people from seven different countries attended. Nearly 50 UCSF Radiology faculty delivered over 70 lectures including interactive Q&A and multiple-choice question sessions. The large and varied audience was engaged, informed and very appreciative that the stay-at-home restrictions did not cancel the event. "It was gratifying to host the virtual CME course. Collaborating with co-chairs Drs. Soonmee Cha and Elissa Price was a treat," said Feldstein. "I was in the audience when UCSF held its first such meeting in 1991, and served as program chair from 2010–2012, so it was fitting – though a daunting challenge – to help move this conference into the virtual Zoom realm."

"We were greatly aided by the tireless and reliable Gaelen Lombard in UCSF Continuing Medical Education, along with the entire Post-Graduate Education office staff," said Feldstein. "This was a highly successful event involving great teamwork and collaboration," said Cha.



The Four Seasons Resort Nevis (above) is a modern embodiment of the spirit and soul of the Caribbean.

"Thank you to our faculty and staff who made this course very special."

UCSF Imaging Update 2021

The UCSF Imaging Update in Nevis is planned for December 5-10, 2021. This week-long course is designed for both the general and sub-specialty radiologist and is intended to provide an update on recent advances in relevant topics in abdominal, thoracic, musculoskeletal, breast, neuro and pediatric imaging. Presentations will focus on practical methods to optimize basic and cross-sectional techniques for CT, MRI and ultrasound, as well as how to recognize and avoid potential pitfalls in interpretation. Each daily session will include an open question period and discussion. ■

The COVID-19 outbreak has caused significant travel disruptions to national and international conferences. The health and safety of our meeting attendees is of utmost importance to us, and we base all decisions as to whether to hold a CME conference on information from UCSF and national health officials. For further information, please contact: UCSF Radiology Continuing Medical Education / 415-476-5731 / rad-cme@ucsf.edu

Master of Science in Biomedical Imaging – Learning the Fundamentals of Medical Imaging

By Susan Noworolski, PhD

The Master of Science in Biomedical Imaging (MSBI) program annually enrolls 10 to 20 students, who spend one year learning the fundamentals of medical imaging at UCSF. While many MSBI students are graduates of other UC institutions, others arrive from across the U.S. and around the world. The class of 2020 included students from institutions in Russia, Poland and India, as well as Kansas and Arizona. The program is designed to bring students with diverse backgrounds rapidly up to speed on the scientific underpinnings of medical imaging technologies. Students entering the program typically have an undergraduate degree in engineering or the physical or biological sciences.

Program Director Alastair Martin, PhD, and Director of Graduate Studies Susan Noworolski, PhD, lead the MSBI, with Program Administrator Rukayah Abdolcader rounding out the administrative team. The faculty includes 13 professors from the Department of Radiology & Biomedical Imaging. A wide range of clinical faculty contribute to the MSBI program by giving guest lectures and hosting students for shadowing or demonstration experiences. These real-world applications of medical imaging are particularly popular with the students.

A Breadth of Learning Experiences

Mandatory core MSBI core courses deliver in-depth training in the principles of in-vivo imaging modalities, including MRI, CT, PET, SPECT and ultrasound. Students also choose from a wide set of electives related to imaging applications for major diseases and different organ systems.

Following their coursework, students bring the various elements of their learning together in applied

research projects, working with faculty supervisors or as interns with industry partners. MSBI students benefit from the department's wide range of state-of-the-art imaging facilities. The students consistently report that the hands-on activities and the research opportunities are highlights of the MSBI program.

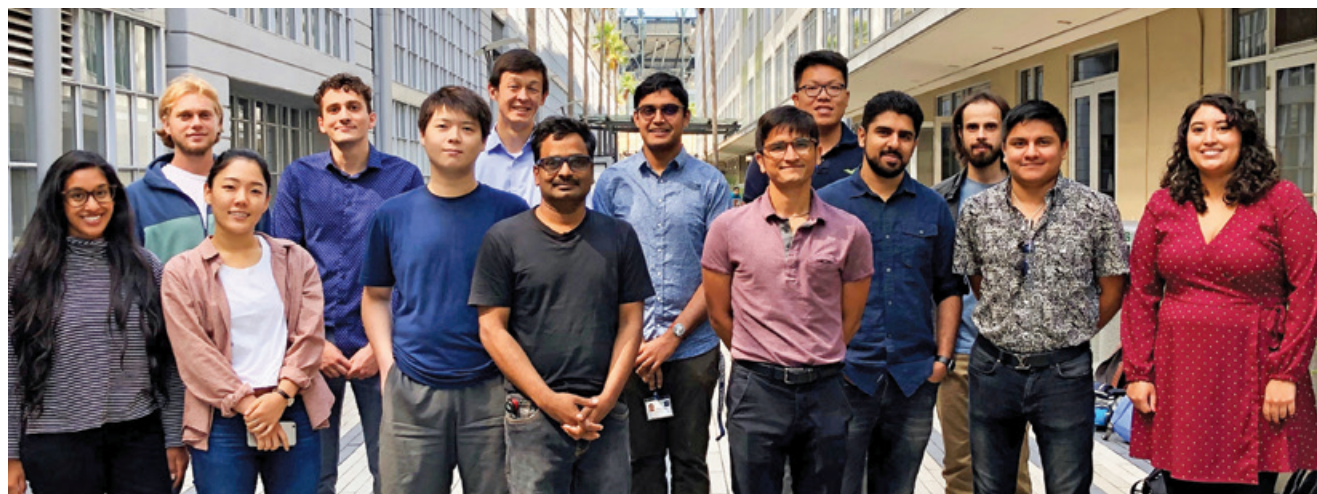
With the pandemic, much learning and all events have transitioned to online. Our community has remained engaged through not just talks and discussions, but with trivia games and via ice-breakers with the incoming 2020–2021 class. Research, particularly that focused on computational imaging, has continued and flourished.

A high percentage of MSBI students remain through the summer academic quarter to apply their newly honed skills on a wide range of research projects under the supervision of UCSF faculty. These projects culminate in the MSBI Imaging Symposium, held in late August, where the students' research accomplishments are highlighted.

MBSI Class of 2020

The MSBI class of 2020 had nine graduates, five of whom will continue part-time for the 2020–2021 academic year. More than half the class had aspirations of continuing on to medical school, which has been a popular destination for MSBI graduates. Others intend to pursue a doctorates or explore job opportunities in academic labs or industrial settings. All will leave having experienced an intense and fulfilling year within our department.

Susan Noworolski, PhD, is a professor of Radiology and Biomedical Imaging and of the Graduate Group in Bioengineering. She is director of Graduate Studies for the Master of Science in Biomedical Imaging program at UCSF.



UCSF Master of Science in Biomedical Imaging Class of 2020

Goldberg Center's Transformation for Remote Learning

By Emily M. Webb, MD

When San Francisco's shelter-in-place order went into effect in early March 2020, medical education at UCSF was abruptly and markedly altered. Students were pulled from the classroom and from many clinical rotations. Teachers scrambled to develop remote methods for delivering an equivalent medical curriculum – fast! Not surprisingly, this led to a flurry of activity for the Goldberg Center for Advanced Imaging Education. Happily, our department's many dedicated educators collectively rose to meet the needs of our medical students.

Most urgently, we had to devise remote curricula for third- and fourth-year students who were registered for a variety of reading room electives across multiple subspecialties. This was a Herculean effort, that could not have succeeded without the tremendous efforts of Medical Student Education Coordinator Samira Zebarjadian. She was rightfully recognized with a STAR Spot award for her tireless work during this period of rapid implementation.

Our longstanding fourth-year classroom elective was reimaged and launched over Zoom. While we miss the more personal interaction with the medical students, the course continues to be popular, and we will likely continue some of the digital teaching methods even when classroom teaching resumes. We were also lucky that our required third-year "Appropriate Use of Diagnostic Tests" curriculum was able to transition to a Zoom-based platform. This remains one of the most popular additions to the core clinical year at UCSF and is a great opportunity for students to learn about radiology as part of their first exposure to clinical medicine.

Starting in July 2020, medical students were back in reading rooms, adhering to social-distancing protocols. Thank you to all the faculty who have been flexible in providing crucial in-person learning to our UCSF students.

Our Education Team

Priyanka Jha, MD, bravely took on the role of co-director for Medical Student Education amidst the pandemic turmoil. A well-respected educator within the Department of Radiology and Biomedical Imaging and nationally, Jha brings her many talents to this new leadership role.

Many faculty, fellow and resident members of the Medical Student Education Committee supervise the Goldberg Center's medical student programs. We were fortunate to have many new trainees and faculty express interest in working in medical student education in 2020, which will help us meet the many challenges of the rapidly shifting curriculum. Emily Webb, MD, and Priyanka Jha, MD, serve as committee co-chairs. Our trainee representatives include Maya Vella, MD; Tyler Gleason, MD; Sage Kramer, MD; Jamie Holtz, MD, and Kevin Sweetwood, MD. Faculty committee members include: Matt Amans, MD; Matt Barkovich, MD; Taylor Chung, MD; Miles Conrad, MD; Brett Elicker, MD; Vickie Feldstein, MD; Shital Gandhi, MD; Michael Heller, MD; Joe Leach, MD; Evan Lehrman, MD; Kevin McGill, MD; Sujal Nanavati, MD; Rina Patel, MD; Elissa Price, MD; Leo Sugrue, MD, and Khai Vu, MD.

Maya Vella, MD, a former UCSF resident, current fellow in cardiothoracic imaging and future faculty member, won the Outstanding Medical Student Educator Award for the Department of Radiology and Biomedical Imaging in 2020 in recognition of her many contributions to medical student education over the last five years. She is only the second trainee to win this award, which speaks to her enthusiasm and dedication to teaching. We look forward to working with her for years to come. In addition, many other UCSF faculty, fellows and residents give generously of their time in our programs. We and the UCSF medical students who benefit directly from their contributions and time truly appreciate their efforts. ■

Emily Webb, MD, is a professor of Clinical Radiology in the Abdominal Imaging Section, and she is the co-director of the Goldberg Center for Advanced Imaging Education in the Department of Radiology and Biomedical Imaging.



Medical Student Education Coordinator, Samira Zebarjadian (at left), was recognized with a STAR Spot award for her tireless work during this period of rapid implementation.



For more information about the Goldberg Learning Center's activities, contact Samira.Zebarjadian2@ucsf.edu or visit radiology.ucsf.edu/education/medical-students.

Alumni News

1967 – Charles Gooding, MD, and Gretchen A.W. Gooding, MD (1975), Mill Valley, CA, celebrated their 59th wedding anniversary on June 19, 2020. They are pictured at their son Gunnar Gooding's wedding **1** 30 years ago.

1974 – Peter Moskowitz, MD, Palo Alto, CA, a graduate of the UCSF Radiology residency class of 1974 and a founding board member of the Margulis Society, is pictured here on Zoom among classmates at their 46th reunion, **2** held virtually on June 28, 2020. "Great fun, and a wonderful and inexpensive way for residency and fellowship alumni to stay connected when they live at a distance from San Francisco!" he said.

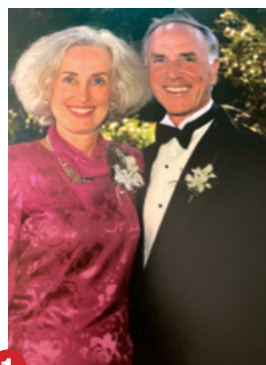
1993 – Howard Rowley, MD, Madison, WI, was awarded the American Society of Neuroradiology's 2020 Gold Medal **3** for his exceptional service and achievement in the field of neuroradiology.

1997 – Kelly Broderick, MD, Menlo Park, CA, writes: "I was 1997 Radiology and 1998 Ultrasound. I've been with the San Mateo division of CAIMA since 1999 doing general radiology with an emphasis on ultrasound and breast imaging. I'm very proud of our ultrasound department. We strive to uphold the standards of the UCSF department and work closely with our excellent sonographers. Last year I became medical director of Radiology at the San Mateo County Hospital, where we had our first COVID-19 patient, with the classic CT findings, on Feb. 28 in the midst of a whirlwind of creating department policy for functioning safely. Working in both the private hospital and public hospital setting over the years, I'm a strong advocate for health equity. My two daughters are both out of college, one in a PhD program at Weill Cornell/Memorial Sloan Kettering, and the other on her way to graduate school while working in a virology lab at University of Washington. Next time it's safe to visit NYC, I hope to see my residency mentor Dr. Hedvig Hricak. Photo from the 2018 Body Imaging Course in Kona." **4**

1997 – Erin Simon Schwartz, MD, FACR, Philadelphia, PA, former neuroradiology fellow (1997) was named chief of the Division of Neuroradiology in the Department of Radiology, Children's Hospital of Philadelphia (CHOP) in November 2020. Schwartz is the editor of *Applied Radiology*.

2004 – Miriam Bredella, MD, Boston, MA, has been named the director of the Center for Faculty Development at Massachusetts General Hospital. She was also elected to the Emerging Leaders Club of the International Society for Strategic Studies in Radiology (IS3R) for outstanding leadership, high-quality scientific work and departmental management/service to professional organizations. Bredella received the 2020 Innovative Initiatives Award from the Boston Women's Workforce Council for initiatives to promote women faculty during the COVID-19 pandemic. **5**

2005 – Gregory Zaharchuk, MD, Stanford, CA, was named a fellow of the American Institute for Medical and Biological Engineering (AIMBE) in 2020. ■

**1****3****2****4****5**

The Margulis Society

By Nick G. Costouros, MD

The creation of the Margulis Commons, formerly Stone Library, and funded in part by the Margulis Society, will greatly benefit UCSF radiology residents. The renovation, begun in late 2020, features a modern layout designed to facilitate education. It is equipped with video conferencing capabilities and a PACS workstation and offers a greatly enhanced workspace for residents rotating at the Parnassus campus. We look forward to continuing to update this space in 2021 and appreciate the support of Margulis Society donors for providing initial funding to get the project underway.

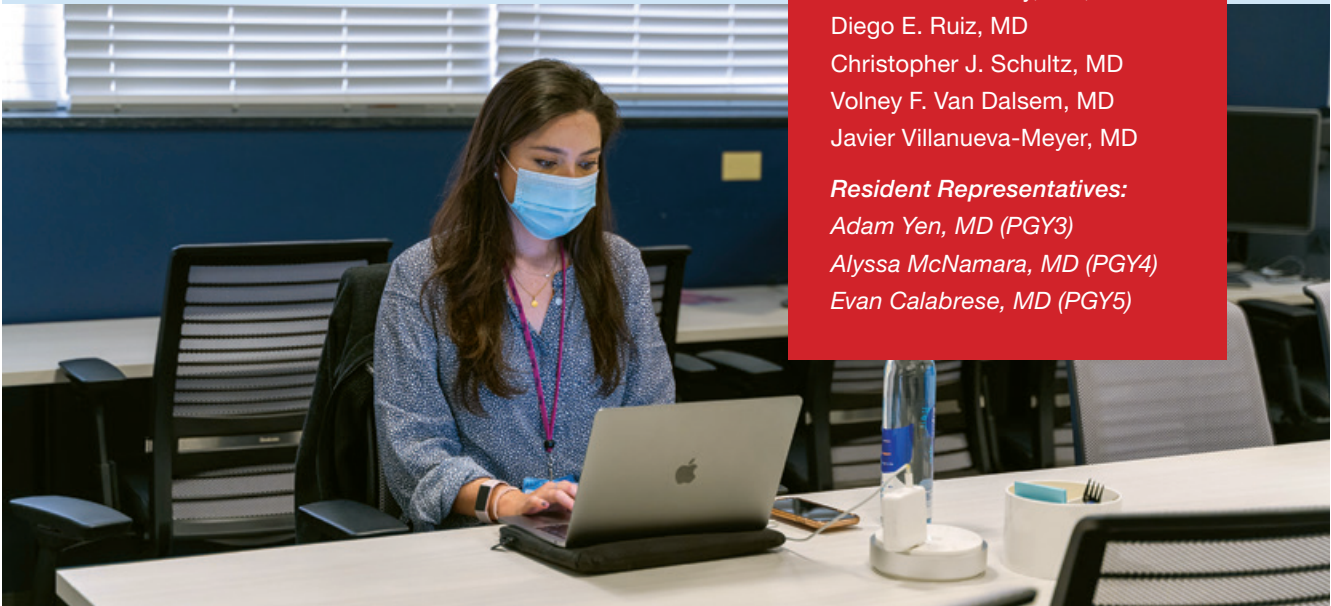
While in-person events were not possible in 2020, we plan to hold a virtual alumnus lecture and virtual career conference in 2021 and welcome the participation of our alumni.

We are grateful to our alumni for the support of our resident and fellow training program through your donations to the Margulis Society during the past year. ■



Learn more about the Margulis Society at radiology.ucsf.edu/education/margulis-alumni

Chief resident Olivia Linden, MD, in the Margulis Commons.



The Margulis Society Board of Directors

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Resident Representatives:

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Alyssa McNamara, MD (PGY4)

Evan Calabrese, MD (PGY5)

In Memoriam: As *Images* was going to press, we learned of the untimely passing of board member **James S. Chen, MD, PhD**, on March 22, 2021. Dr. Chen completed his residency (2008) and fellowship (2009) in UCSF Radiology. After graduating from UCSF, he joined the Kaiser Permanente group at Oakland, where he worked a radiologist with particular expertise in chest and cardiac imaging. Dr. Chen was a beloved friend and colleague in the UCSF radiology community and beyond, and also served as a longstanding board member and past president of the Margulis Society. Dr. Chen is survived by his wife Sandy and daughters Lila and Elise. If you'd like to share a memory with his family, please visit www.caringbridge.org/visit/jimchen

RESEARCH

Redesigning Our Research Infrastructure

Welcome to the research section of *Images* 2021! In a challenging year for research across the nation, our teams pulled together to work effectively while adjusting to the new normal of California



Sharmila Majumdar, PhD

and UCSF guidelines for reduced density of people in all of our research spaces, and coordinating work hours to promote physical distancing for personnel. Principal investigators were key to prioritizing which lab members were allowed to work onsite and to managing research labs with reduced numbers of onsite support staff.

They also monitored laboratory and research protocols for compliance with the guidelines of the UCSF Office of Research.

Research is a key component of the department's vision and strategy, and during the year we took time to evaluate and improve our research structure and processes.

Research Redesign

Last year we began to implement a plan to redesign the department's research infrastructure, with a goal of removing research silos and channeling department investments into shared research resources. We worked within the blueprint of the department's strategic plan in this endeavor, with an eye to the overall goal of the department's research: to use scientific excellence to improve patient treatment through our investigations.

The new Scientific Infrastructure–Core Services Plan crosses all areas of research in the department. Under the executive leadership of Z. Jane Wang, MD; Christopher Laubenthal, MBA, and myself, the restructuring was finalized, and as of late 2020, all steering committees were up and running. The infrastructure is designed with 11 Scientific Steering committees to oversee our core efforts as follows:

I. Human Imaging

1. Research, chaired by Daniel Vigneron, PhD (QB3)
2. Blended Research/Clinical, chaired by Javier Villanueva-Meyer, MD (China Basin Landing, Mission Bay Hospital, Precision Cancer Medicine Building)
3. Extremity CT, chaired by Galateia Kazakia, PhD (China Basin Landing)
4. MEG, chaired by Srikantan Nagarajan, PhD (Parnassus/Mission Bay sites)

5. Interventional MR, chaired by David Saloner, PhD (Parnassus site)

II. Pre-Clinical Imaging

1. NMR, chaired by Renuka Sriram, PhD, and John Kurhanewicz, PhD
2. MicroPET/MicroCT, chaired by Youngho Seo, PhD, and David M. Wilson, PhD

III. Clinical Research Coordinators, chaired by Olga Tymofiyeva, PhD, and Z. Jane Wang, MD

IV. Cyclotron, chaired by Robert Flavell, MD, PhD

V. Research Image Analysis, chaired by Spencer Behr, PhD, and Sharmila Majumdar, PhD

VI. Scientific Computing Services (SCS), chaired by John Mongan, MD, PhD

Each Scientific Steering Committee includes faculty stakeholders who partner with staff to achieve programmatic and strategic goals. With formal charters, faculty are focused on science and technology, while staff oversee and manage operations and finances. Faculty stakeholders partner with staff to achieve strategic, operational, quality and safety goals.

The structure is designed to promote engagement, interaction and scientific creativity amongst our research teams and to allow for optimal research collaboration across UCSF.

Grants

Our department is well known for its research and our portfolio is funded by federal grants from the National Institutes of Health and the Department of Defense, as well as from foundations and industry. In 2020, we had 45 new grants for \$36,364,707 in total funding.

I would like to acknowledge the dedication and hard work of our research faculty, postdoctoral scholars and clinical research coordinators, all of whom went the extra mile last year to keep our research projects moving forward during the pandemic. I would particularly like to thank Enrique Menendez, MD, our wonderful research director who retired in September, for his longtime commitment to promoting the excellence of our department's research endeavors (see page 20).

I hope you will enjoy learning more about our research initiatives in the following pages.

Sharmila Majumdar, PhD
Margaret Hart Surbeck Professor
Vice Chair, Research
UCSF Radiology and Biomedical Imaging

Body Research Group

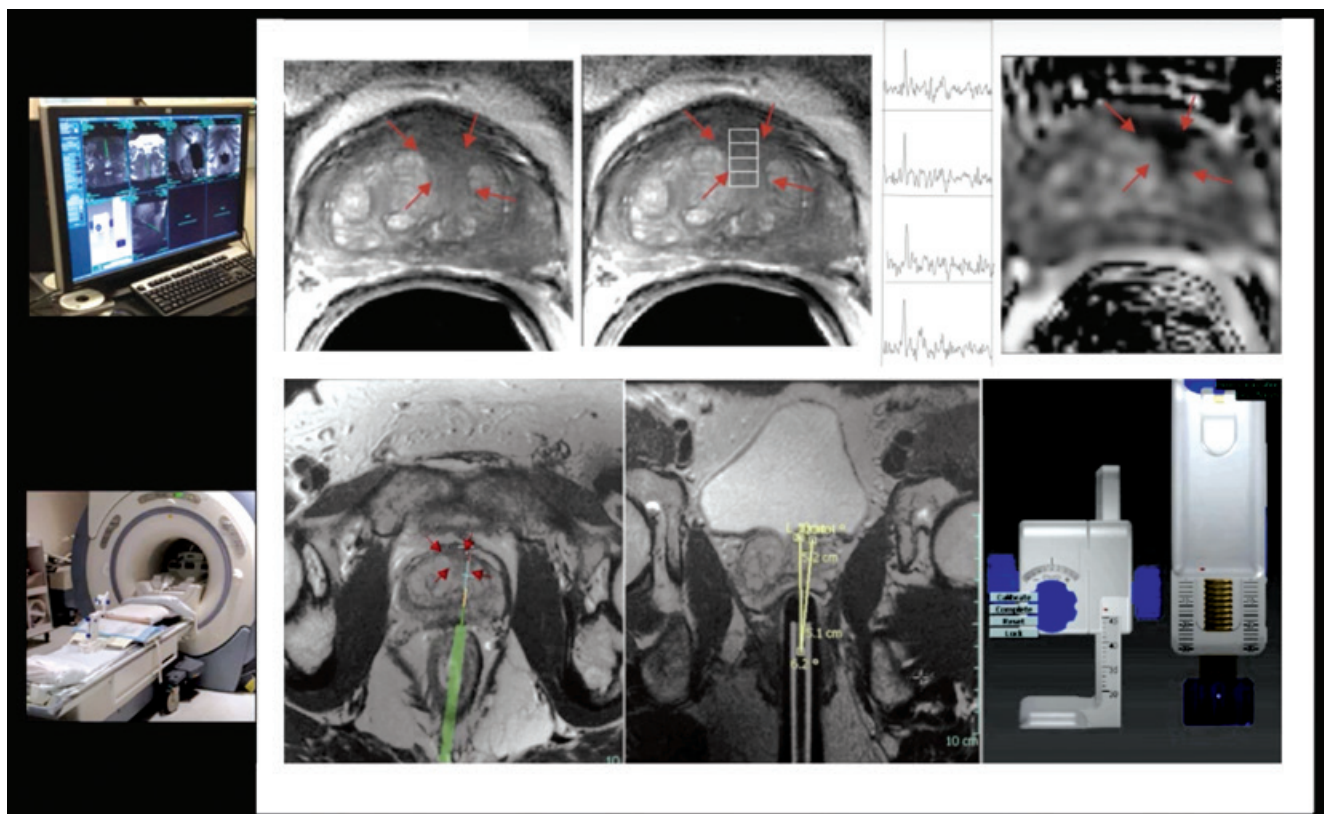
John Kurhanewicz, PhD, Director

Over the last year, the Body Research Group continued to focus on the development and translation of innovative imaging methods and approaches to enable precision medicine in pathologies of the abdomen, breast and musculoskeletal system. By utilizing novel imaging technologies, imaging probes, and advanced deep learning and artificial intelligence tools, our work aims to advance the understanding of disease mechanism, to accelerate disease diagnosis, and to provide individualized treatment and early assessment of therapeutic response or resistance.

The Body Research Group encompasses a large number of faculty with broad expertise, including engineering, basic and clinical imaging science, and clinical radiology. New faculty members include **Eugene Ozhinsky, PhD**, and **Jeremy Gordon, PhD**. The productivity of this large research group is demonstrated by its more than 150 peer-reviewed publications, 30 NIH grants, and the wide gamut of research performed in 2020 which is highlighted on these pages.

Abdominal/Pelvic Imaging

Research in abdominal/pelvic imaging continues to focus on developing novel imaging tools for early diagnosis, risk stratification and treatment response monitoring in various abdominal and pelvic diseases, such as cancers, diabetes, and liver and kidney disease. Cutting-edge imaging methods, such as hyperpolarized ¹³C metabolic MRI (HP ¹³C MRI), positron PET/CT and integrated PET/MRI, in conjunction with targeted probes, are being employed to interrogate metabolic and physiological processes central to disease progression, to target disease for personalized treatment, and to inform on therapy response at the earliest possible point in time. Highlights in this area at UCSF include a large number of ongoing clinical trials involving HP ¹³C MRI, including a trial of early-stage patients on active surveillance (U01, **Robert Bok, MD, PhD/Daniel Vigneron, PhD**); technical development for imaging of pre-surgery and metastatic prostate





cancer patients (BRP, Gordon/Vigieron); assessing treatment response of metastatic prostate cancer (2 R01s, **John Kurhanewicz, PhD/Rahul Aggarwal, MD, Vigieron/Aggarwal**); assessment of renal cancer aggressiveness (ACS and R01, **Peder Larson, PhD/Jane Wang, MD**); and three new patient studies involving pancreatic cancer (RAP, Wang/Gordon/Vigieron), cardiac disease (Larson/Roselle Abraham, MD), and fatty liver disease (R01, **Michael Ohlinger, MD, PhD**).

Translational Studies

There is also a great number of translational pre-clinical HP 13C MRI studies underway. A new NCI U24 co-clinical trial grant (**Renuka Sriram, PhD/Donna Peehl, PhD/Kurhanewicz**) was funded to optimize quantitative HP 13C MRI techniques for assessing therapeutic response to treatment of advanced prostate cancer. Additionally, NIH-supported theranostic clinical trials involving the use of Lutetium (Lu)-PSMA to treat advanced prostate cancer patients (**Thomas Hope, MD/Aggarwal**) progressed in 2020 and FDA approval of 68GA PSMA-11 is expected by the end of 2021.

New PET Agents

Patient research also continued on new PET agents: 18F-PSMA agent, CTT1403, and its theranostic (Lu)-PSMA analog (**Henry VanBrocklin, PhD, Youngho Seo, PhD, Spencer Behr, MD**). **Michael Evans, PhD**,

is clinically translating several new PET probes for body imaging applications, including a new DOD grant for detecting the glucocorticoid receptor with PET in treatment-resistant, castration-resistant prostate cancer. Several studies by Larson (with **Kirti Magudia, MD, PhD**, and **Antonio Westphalen, MD, PhD**). The group led by **Susan Noworolski, PhD**, includes **Matthew Gibbons, PhD**, and is using machine learning approaches to improve the assessment of the presence and aggressiveness of prostate cancer based on multiparametric 1H MRI data. **Benjamin Yeh, MD's**, ongoing NIH-funded research (R01, STTR) focuses on expanding the information obtainable from existing clinical CT scanners using new "color" CT contrast agents with a single pass of a dual-energy scanner.

Musculoskeletal Imaging

Research in musculoskeletal imaging continues to have a strong focus on developing biomarkers for quantitative imaging in degenerative joint disease, lower back pain, osteoporosis and bone metabolism. In collaborative, inter-disciplinary efforts, the team focuses on diseases such as osteoarthritis, osteoporosis, diabetes, HIV and cancer. A new peripheral computed tomography scanner funded by the NIH (**Galateia Kazakia, PhD**) was installed this year. **Roland Krug, PhD**, continues developing new MRI methods for measuring endplate pathologies (endplates separate discs and vertebrae in the spine) to better

select patients for non-addictive and minimally invasive treatments. **Sharmila Majumdar, PhD**, received a grant for improving imaging of low back pain, including developing deep-learning-based technologies for faster image reconstruction, tissue segmentation and spinal degeneration detection, which is now in its second phase.

Breast Imaging

Research in breast imaging continues to span all aspects of breast cancer care: improving screening for early detection; developing more accurate, less invasive means of diagnosis; improving pre-surgical planning; and developing imaging biomarkers for treatment monitoring and prognostication. In ongoing studies, **Bonnie Joe, MD, PhD**, in collaboration with Kheiron, Inc., is using machine learning of mammographic and MRI images to improve breast cancer screening. A major focus of the breast imaging program is the use of quantitative MRI biomarkers to randomize patients and assess drug efficacy during neoadjuvant treatment in the ongoing multi-center I-SPY 2 Trial. This quantitative multi-center trial led by **Nola Hylton, PhD**, is augmented through the use of a breast MRI calibration phantom developed by **David Newitt, PhD**, in collaboration with scientists at the National Institutes of Standards and Technology and quantitative MRI data acquisition and analysis protocol developed by **Lisa Wilmes, PhD**. Hylton also indicates that a new clinical trial design involving MRI-guided breast cancer de-escalation/reassignment treatment protocol should begin no later than early 2021. A recent programmatic effort in breast imaging at UCSF is the development of quantitative molecular imaging for breast cancer using dedicated breast PET (MammiPET), and Hylton and **Ella Jones, MD**, received an NIH grant to use MammiPET for the characterization of breast cancer and its response to therapy. ■

Neuro Research Group

Sabrina Ronen, PhD, Director

Investigations in the Neuro Research Group are aimed at developing and implementing novel multimodality imaging of the human brain to improve and enhance the detection and treatment of neurologic and psychiatric disorders. Studies span preclinical, translational and clinical research and leverage a broad range of advanced imaging approaches to characterize the anatomy, physiology and metabolism of the healthy and diseased brain. Imaging methods include magnetic resonance imaging (MRI), positron emission tomography (PET), magnetoencephalography/magnetoencephalographic imaging (MEG/MEGI), proton and hyperpolarized C-13 magnetic resonance spectroscopy (MRS) and computerized tomography (CT).

During the past year, members of the Neuro Research Group advanced novel imaging methods in several areas. Studies led by **Olga Tymofiyeva, PhD**, focused on monitoring the adolescent brain. She developed methods to image changes in the adolescent brain that are associated with psychiatric disorders such as depression, anxiety and attention deficit disorder. She also showed the utility of her imaging approaches to monitor different interventions, including anti-depressant medications and mindfulness meditation. (See Panel A) **Matt Barkovich, MD**, and his team continued their efforts to improve the imaging of the neonatal brain using a range of advanced imaging methods. Most recently this has included metabolic imaging with hyperpolarized C-13 MRS. This provides a readout of cellular metabolism and can help distinguish normal and pathological states.

The group led by **Srikantan Nagarajan, PhD**, used MEGI to image the brain and demonstrate that the functional brain in patients with schizophrenia is fundamentally reorganized and recruits higher-order visual cortices for auditory processing of phonemes. (See Panel B) Combined with PET with amyloid-beta (A β) and TAU tracers, Nagarajan also showed that MEGI is sensitive to network disruptions mediated by TAU and A β that are associated with cognitive decline in Alzheimer's disease (AD). **Susanne Mueller, MD**, showed the utility of machine learning to segment internal brainstem structures from MRI data acquired at 3T and 7T to provide a better understanding of the role of the brainstem in normal and diseased states, including AD, amyotrophic lateral

sclerosis or epilepsy. (See Panel C) Machine learning and AI methods are also being used by the team led by **Duygu Tosun-Turgot, PhD**, for neuroimaging endophenotypes and predictors of post-traumatic brain injury dementia in veterans, disentangling effects of comorbid neuropathologies in AD. In the laboratory of **Linda Chao, PhD**, a new study showed the value of neuroimaging for assessing a recently developed program called Preventing Loss of Independence through Exercise (PLIÉ). The imaging clearly shows the value of PLIÉ in enhancing functional connectivity in people with mild cognitive impairment.

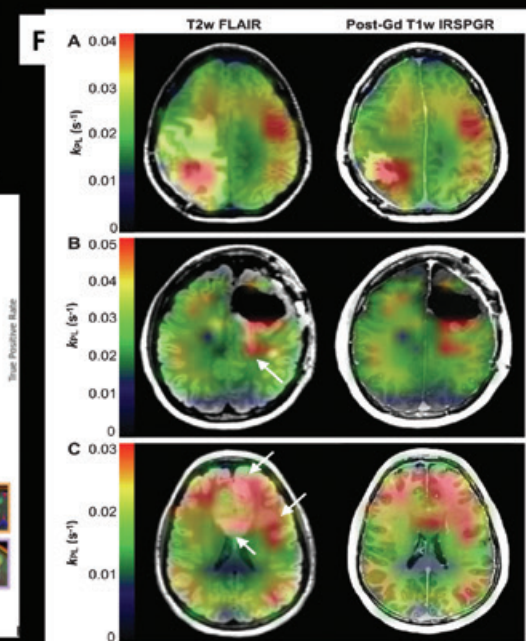
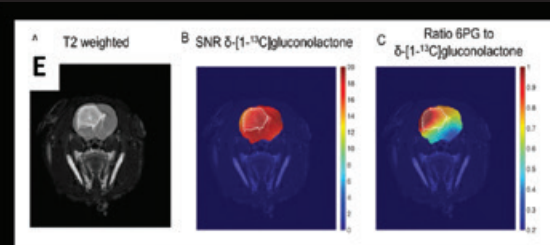
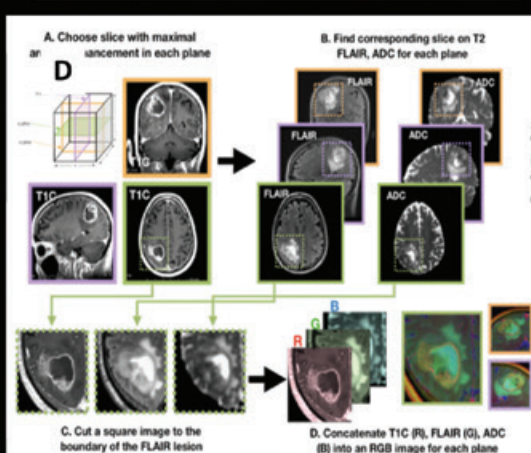
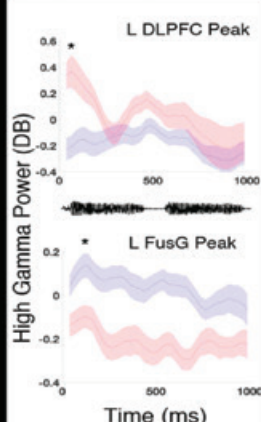
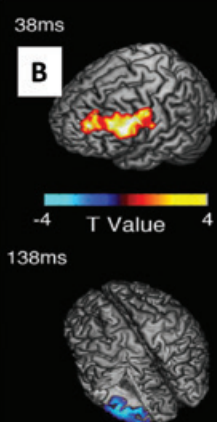
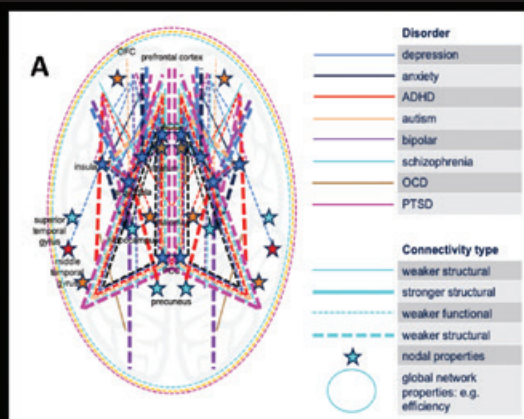
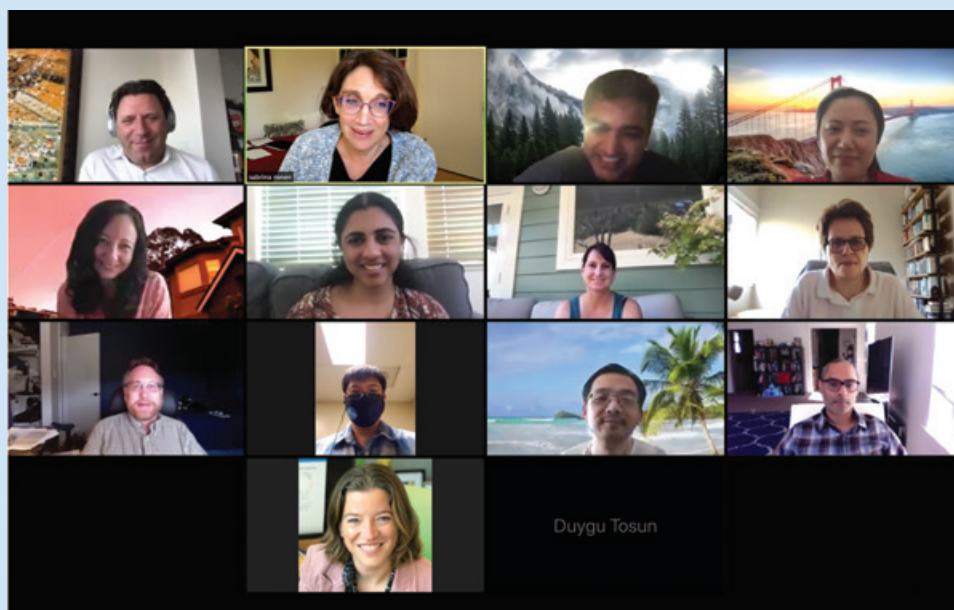
William Dillon, MD, and **Vinil Shah, MD**, use CT/MR and PET with NaF to localize and direct therapy for spinal pain by interventional techniques. To help in pain management, Tosun-Turgot's team is also developing patient-specific functional MRI (fMRI) markers of anticipation biases in pain management.

Myriam Chaumeil, PhD, and **Peder Larson, PhD**, have recently optimized new methods for longitudinal evaluation of demyelinated lesions in a multiple sclerosis mouse model using ultrashort echo time magnetization transfer imaging. **Janine Lupo, PhD**, and her team have focused on improving the characterization of brain tumors. To that end, they have used advanced deep learning methods to improve the analysis and interpretation of brain tumor images. Her lab found that they could achieve 91% prediction accuracy on the validation set, and 81% accuracy on the test set, showing that deep learning methods can help stratify patients into the three major WHO 2016 brain tumor subtypes prior to surgical resection. (See Panel D)

Sabrina Ronen, PhD, and **Pavithra Viswanath, PhD**, have focused on developing novel imaging approaches for brain tumors. They recently demonstrated the utility of hyperpolarized C-13 gluconolactone as a novel C-13 MRS probe that can detect alterations in glucose metabolism that are linked to replicative immortality in brain tumors. (See Panel E)

Finally, **Yan Li, PhD**, and her team have used hyperpolarized pyruvate and C-13 MRS metabolic imaging to evaluate brain metabolism and the metabolic abnormalities associated with brain tumors in patients. (See Panel F) ■

We aim to serve patients who suffer from neurodegenerative disorders, traumatic brain injury, epilepsy, multiple sclerosis, cerebrovascular disease, psychiatric disease, brain development issues, brain tumors and more.



Vascular and Cardiac Research Group

David Saloner, PhD, Director

The Vascular and Cardiac Research Group (VCRG) continues to focus on the development of rigorous, quantitative and high-quality imaging that provide novel insights into the anatomic and physiological drivers of cardiovascular disease. There is increased emphasis on the acquisition of functional markers that reflect the underlying physiology impacting cardiovascular function.

Non-invasive Imaging

The VCRG team has expanded investigations into non-invasive MR imaging of the velocity field across a broad range of vascular territories and in the heart. These methods generate maps of blood flow velocities in three dimensions and through the cardiac cycle – so-called 4D Flow methods. More recent strategies resolve this data into different phases in the respiratory cycle (referred to somewhat unimaginatively as 5D Flow). Massive undersampling of the data with appropriate reconstruction algorithms are needed to maintain viable acquisition times. Studies are in progress that utilize these capabilities to determine the impact of different treatment interventions in modifying pre-existing adverse flow conditions. An example is interrogating changes in the distribution of flow through different cerebral territories in patients with intracranial arteriovenous malformations in response to radiation treatment, or to the administration of pharmacologic interventions.

Clinicians and scientists in the VCRG also have active funded projects that focus on the extraction of advanced metrics of hemodynamics that offer insights into the presentation of different pathologies. Promising metrics include the ability to measure wall shear stress, a measure of frictional forces on the vessel wall, and a measure that, when pathologically low, appears to upregulate the rate

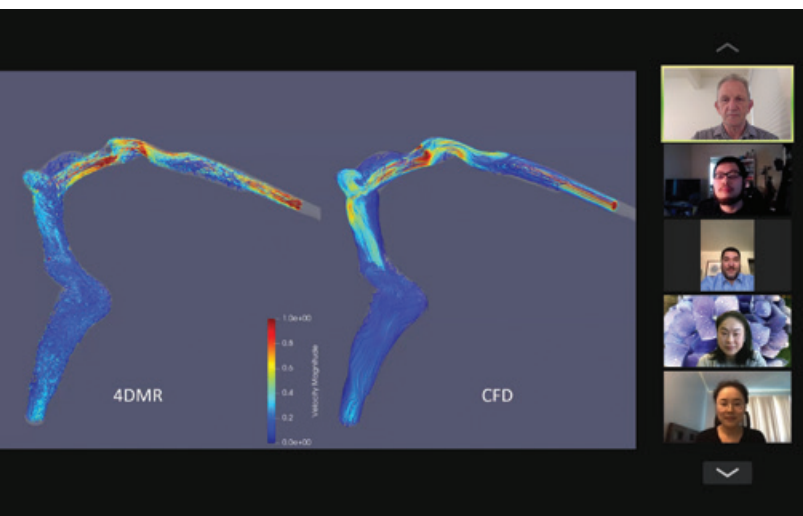
of growth in aneurysmal disease. Non-invasive imaging can also be used to identify the presence and to quantitatively measure the extent of the dissipation of turbulent kinetic energy in conditions as diverse as arterial stenosis, valvular disease and irregularities in venous geometries. Accurately measuring the dissipated energy provides an opportunity to better assess the pressure drop across these types of lesions, evaluate their hemodynamic significance, and provide guidance to clinicians as to the need for treatment interventions.

In addition to exploring the transport of blood through the cardiac chambers, studies are pursued to determine quantitative identification of different components of the myocardium. Tissue mapping sequences offer the potential to define regions of the myocardium that have experienced ischemic insults, and that can indicate whether that tissue can be salvaged. Similar tissue mapping methods are under investigation in the characterization of atherosclerotic plaque of the extracranial carotid arteries, and to provide measures of stroke risk that are more informative than the traditional parameter of diameter stenosis.

Novel Analysis Methods

Image sets generated with the advanced methods utilized in the group can be vast and difficult to evaluate, even by the expert reader. The VCRG has a concerted effort directed at the utilization of semi-automated methods that can quantify the pathology of interest. Knowledge-based algorithms are pursued that leverage expert input together with sophisticated computational algorithms to generate a wide range of candidate descriptors of increased disease vulnerability. These methods have been demonstrated to provide accurate and robust image evaluation while greatly reducing the fatigue and error that result from manual readings. Machine Learning methods are also being evaluated for improved assessment of coronary artery lesions, and in defining the risk of abdominal aortic aneurysms from anatomic and compositional image features. Furthermore, these types of tools lend themselves to extracting information from large data bases of historical data – data that can provide the volume of information needed to provide the link between imaging features and clinical outcomes.

In a number of the more mature approaches, investigators at UCSF are collaborating in multi-center studies, both domestically and internationally. These studies are designed to validate the generalizability of the novel imaging and analysis methods, and to provide recruitment of a sufficient number of subjects to demonstrate the predictive abilities of putative biomarkers in larger outcome studies. ■



Advanced Imaging Technologies Specialized Resource Group

Dan Vigneron, PhD, Director

Over the past year, the Advanced Imaging Technologies Specialized Resource Group has continued its mission “to advance imaging science to benefit human disease studies developing new technologies, hardware and advanced methodologies.” Leveraging outstanding expertise in imaging physics and world-leading facilities for both preclinical and clinical translation research, we accomplished significant advances in virtually all aspects of imaging research in 2020 despite COVID-19 restrictions. New developments in radionuclide PET and SPECT imaging by Youngho Seo, PhD, Henry VanBrocklin, PhD, Robert Flavell, MD, PhD, Michael Evans, PhD, Thomas Hope, MD, and David M. Wilson, MD, PhD, have led to new advances and funding for combatting infections, COVID-19, HIV, MS, cardiac, and brain research and extended into advancing theranostic targeted therapies. Also, 7Tesla MRI projects led by Peder Larson, PhD; Joseph (An Thanh) Vu, PhD; Duan Xu, PhD; Yan Li, MD, and Janine Lupo, PhD, are developing improved brain imaging techniques including silent-fMRI, high-resolution fMRI, diffusion imaging, MR spectroscopy, and microbleed imaging.

There have been extensive new hardware upgrades at the San Francisco VA Medical Center. Additional upgrades are slated for next year to facilitate parallel transmit technology and 7T body imaging (e.g., cardiac, knee, wrist and spine). Collaboration with UC Berkeley and Massachusetts General Hospital on the NIH BRAIN Initiative Next Generation 7T project has drawn philanthropic support from the Weill Neurohub. This has resulted in a new brain-centric 7T MRI scanner with unprecedented in-vivo imaging resolution capabilities, now undergoing initial evaluation.

New hyperpolarized stable-isotope MRI molecular imaging technologies to advance preclinical and clinical research enabling novel quantitative measurements of cellular metabolism were developed by John Kurhanewicz, PhD; Sabrina Ronen, PhD; Flavell; Donna Peehl, PhD;

Renuka Sriram, PhD; Jeremy Gordon, PhD; Michael Ohliger, MD, PhD; James Slater, Myriam Chaumeil, PhD; Robert Bok MD, PhD; Li; Larson and Daniel Vigneron, PhD, to advance preclinical and clinical research enabling novel quantitative measurements of cellular metabolism. Major new funding was awarded for upgraded equipment, and new applications for pioneering studies using this exciting new MR molecular imaging approach to metastatic prostate cancer, pancreatic cancer, renal cancer, brain tumors, multiple sclerosis, lymphoma, and heart disease have been made. Interventional MRI technology was also advanced through the research of Alastair Martin, PhD, and Steven Hetts, MD, on image-guided surgery and endovascular devices.

Cardiac imaging is another focus of the AIT-SRG technology development, led by David Saloner, PhD; Larson; Jing Liu, PhD; Dimitrios Mitsouras, PhD, and Seo focusing on vascular and cardiac MR imaging, metabolic imaging, X-ray, CT, and PET/SPECT, and machine-learning/deep-learning analyses. Galateia Kazakia, PhD, received new funding to study the biological mechanisms that drive increased cortical porosity and fracture risk in the setting of aging and diabetes, using the recently installed High Resolution peripheral Quantitative CT (HR-pQCT) human scanner.

The research conducted by the Advanced Imaging Technologies Research Group has been highly productive, supporting more than 100 publications and 20 grants totaling more than \$30 million. New faculty members include: Eugene Ozhinsky, PhD; Pavithra Viswanath, PhD; Olga Tymofiyeva, PhD, and Jeremy Gordon, PhD. Along with ongoing interactions with the organ system-focused research interest groups, we have collaborated closely with two newer technology resource groups: Chemistry, Probes and Molecular Therapy (CPMT), led by David Wilson, MD, PhD, and the Center for Intelligent Imaging (Ci²) led by Chris Hess, MD, PhD, and Sharmila Majumdar, PhD. ■



Chemistry, Probes and Molecular Therapy Specialized Research Group

David Wilson, MD, PhD, Director

David Wilson, MD, PhD, is the director of the Chemistry, Probes and Molecular Therapy (CPMT) Specialized Resource Group (see tiny.ucsf.edu/CPMT). Robert Flavell, MD, PhD, is the chief of Molecular Imaging and Therapeutics (MI&T) Specialized Resource Group (see tiny.ucsf.edu/MIT). Thomas Hope, MD, is the director of molecular therapy and Miguel Pampaloni, MD, is the director of nuclear cardiology. The highlights presented here represent the efforts of radiochemistry and nuclear imaging researchers.

Radiochemistry/Nuclear Imaging Faculty Achievements

Denis Beckford-Vera, PhD: Published manuscripts, “PET/CT Imaging of Human TNF α Using [89Zr] Certolizumab Pegol in a Transgenic Preclinical Model of Rheumatoid Arthritis” (Beckford-Vera et al., *Molecular Imaging and Biology*). “PET imaging of the EPR effect in tumor xenografts using small 15 nm diameter polyethylene glycols labeled with zirconium-89” (Beckford-Vera et al., *Molecular Cancer Therapeutics*). Received a fundable score on his R21 entitled, “Molecular imaging of persistent HIV:CD30.”

Michael Evans, PhD: Awarded grants from the LAM Foundation, Marcus Program in Precision Medicine Innovation, the Cancer League and the Department of Defense (“Detection of the glucocorticoid receptor with PET in treatment resistant castration resistant prostate cancer”). Selected to the Education Committee of the World Molecular Imaging Society. Received Distinguished Investigator award, Academy for Radiology and Biomedical Imaging Research. Published 10 peer-reviewed papers including, “A Novel Radioligand Reveals Tissue Specific Pharmacological Modulation of Glucocorticoid Receptor Expression with Positron Emission Tomography” (Huang et al., *ACS Chemical Biology*).

Robert Flavell, MD, PhD: Awarded Department of Defense PCRP translational science award for “Clinical Translation of a Novel PET Imaging Companion Biomarker Targeting CD46 for Treatment Planning in Adenocarcinoma and Neuroendocrine Prostate Cancer.” Published 16 manuscripts including, “Factors predicting metastatic disease in 68Ga-PSMA-11 PET positive osseous lesions in prostate cancer” (Chiu et al. *Journal of Nuclear Medicine*)

and “Amino Acid-Derived Sensors for Specific Zn²⁺ Detection Using Hyperpolarized ¹³C Magnetic Resonance Spectroscopy” (Wang et al. *Chemistry*).

Ella Jones, PhD: Awarded NIH grant R01: “Dedicated breast PET and MRI for characterization of breast cancer and its response to therapy”; Multi-PI: Nola Hylton, Ella Jones, Vivas Ignasi (OncoVision). Published manuscript, “Current Landscape of Breast Cancer Imaging and Potential Quantitative Imaging Markers of Response in ER-Positive Breast Cancers Treated with Neoadjuvant Therapy” (Jones et al. *Cancers*).

Youngho Seo, PhD: Published 13 peer-reviewed manuscripts, including “¹²⁴I-MIBG PET-CT to monitor metastatic disease in children with relapsed neuroblastoma” (Aboian et al. *Journal of Nuclear Medicine*). Filed two inventions with the UCSF Office of Technology Management: “Prediction of Future Healthcare Expenses of Patients from Chest Radiograph Using Deep Learning (Inventors: Jae Ho Sohn, Yixin Chen, Dmytro Lituiev, Benjamin L. Franc, Youngho Seo) and “CT-less attenuation correction approach for cardiac SPECT using deep learning” (Inventors: Youngho Seo, Jaewon Yang, Grant Gullberg).

Henry VanBrocklin, PhD: Awarded Alzheimer’s Disease Discovery Foundation grant to translate excitatory amino acid transporter 2 (EAAT2) tracer into humans and initiate study of EAAT2 expression in Alzheimer’s disease versus healthy controls. NIH R43 subcontract to demonstrate proof of principle preparation and quality testing of zirconium-89 antibodies in a single automated device. First to evaluate zirconium-89 antibody distribution in human subjects using the EXPLORER PET scanner at UC Davis. ⁸⁹Zr-VRC01, HIV viral coat protein antibody, demonstrated differences in uptake in untreated viremic patients versus antiretroviral-treated patients versus healthy controls. A new highly scored R01 is pending in this area.

David Wilson, MD, PhD: Published manuscripts “Sensing living bacteria in vivo using D-alanine derived ¹¹C radiotracers” (Parker et al., *ACS Central Science*) and “High enantiomeric excess in-loop synthesis of d-[methyl-¹¹C]methionine for use as a diagnostic positron emission tomography radiotracer in bacterial infection” (Stewart et al., *ACS Infectious Diseases*). Awarded UCSF Bold and Basic grant for “Chitin-targeted PET radio tracers for specific imaging of fungal pathogens.” He is a chartered member of the Imaging, Probes and Contrast Agents standing study section at the NIH.

Molecular Imaging and Therapeutics Clinical Faculty Achievements

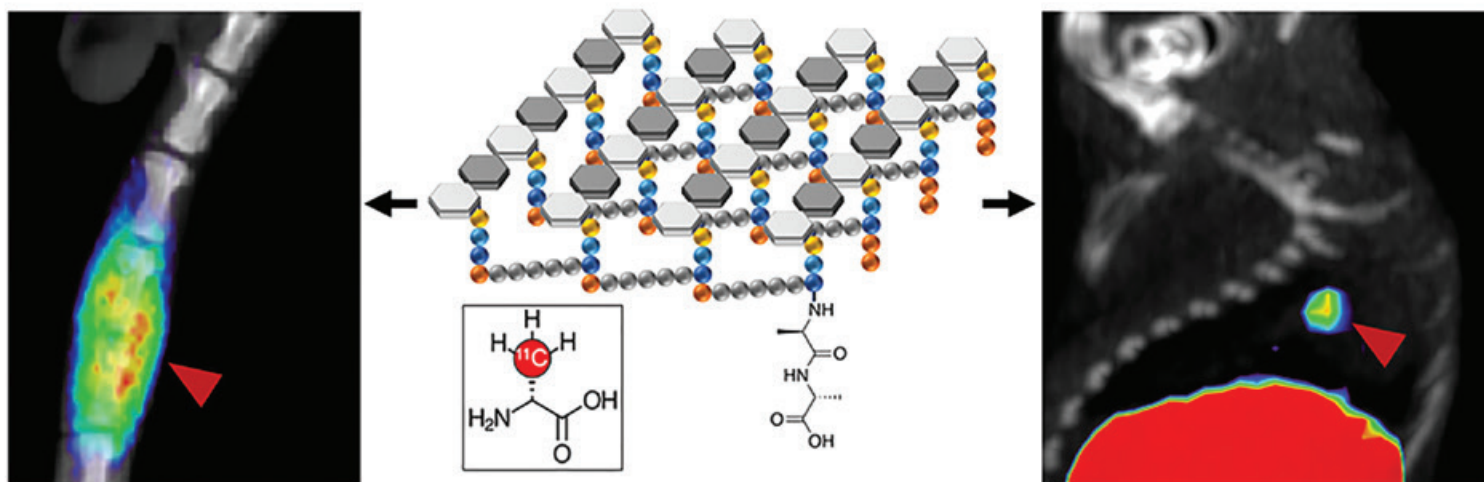
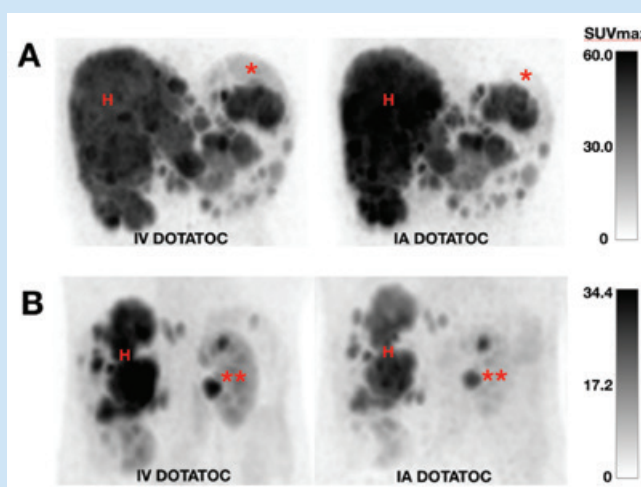
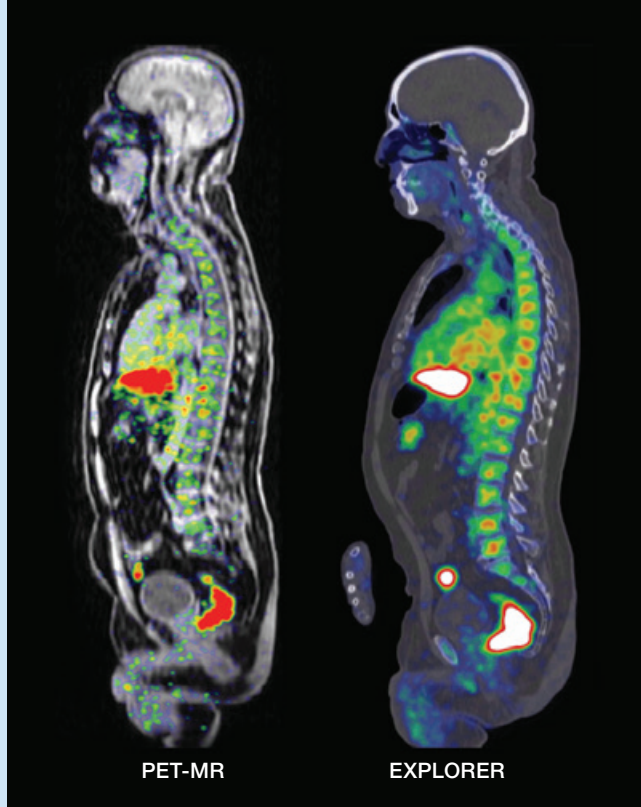
Spencer Behr, MD: Published manuscript, “Phase I study of CTT1057, an 18F-labeled imaging agent with phosphoramidate core targeting prostate specific membrane antigen in prostate cancer” (Behr et al., *Journal of Nuclear Medicine*).

Thomas Hope, MD: Published manuscripts “NANETS/ SNMMI Procedure Standard for Somatostatin Receptor-Based Peptide Receptor Radionuclide Therapy with ¹⁷⁷Lu-DOTATATE” (*Journal of Nuclear Medicine*) and “Rectal cancer lexicon: consensus statement from the society of abdominal radiology rectal & anal cancer disease-focused panel” (*Abdominal Radiology*). Awarded grants, R01CA235741 “MELT: Modulation of PSMA Expression for Lutetium Therapy” and R01CA229354 “Immunogenic priming with Lu-PSMA targeted therapy in advanced prostate cancer.”

Roxanna Juarez, MD: Welcomed to the Molecular Imaging and Therapeutics Section in August 2020.

Courtney Lawhn-Heath, MD: Joined the Molecular Imaging and Therapeutics Section in January 2020. Published manuscripts, “Intra-arterial Peptide Receptor Radionuclide Therapy using 90Y DOTATOC for Hepatic Metastases of Neuroendocrine Tumors” (*Journal of Nuclear Medicine*) and “Single-Center Prospective Evaluation of (68)Ga-PSMA-11 PET in Biochemical Recurrence of Prostate Cancer” (*American Journal of Roentgenology*).

Miguel Pampaloni, MD: Published manuscript, “Long-term corticosteroid-sparing immunosuppression for cardiac sarcoidosis” (Rosenthal et al. *Journal of the American Heart Association*). ■



Center for Intelligent Imaging Marks a Year of Achievement

Sharmila Majumdar, PhD, Executive and Scientific Director

During a year that challenged all of us in any simple aspect of our lives, there is nothing simple or ordinary about the outstanding achievements of the Center for Intelligent Imaging (ci²).

The ci², founded by **Sharmila Majumdar, PhD**, and **Christopher Hess, MD, PhD**, in 2019, is an institutional resource focused on applications of artificial intelligence (AI) and image analysis tools in medical imaging. The Center provides the internal UCSF community and external academic and industry partners a unique resource in which to discover, innovate, and translate AI tools to improve patient care.

While its focus is AI and technology, trans-disciplinary efforts and “human intelligence” are the real fuel of the ci². The number of faculty, post-doc students, and staff affiliated with the center grew in the last year to over 75. ci² is comprised of clinical radiologists, imaging scientists, engineers, machine learning scientists, data engineers, clinicians, post-doctoral fellows, and students collaborating to develop and deploy tools that will solve critical clinical problems by advancing the ways in which health care professionals utilize and deliver imaging.

In the last year, ci² members garnered many awards, including: *summa* and *magna cum laude* recognitions from the International Society of Magnetic Resonance in Medicine; Radiological Society of North America recognitions for the pioneering work by residents; and the best paper award at the Medical Imaging with Deep Learning conference. *Nature's Scientific Report* and *Radiology: Artificial Intelligence* are just two of the dozens of journals that published work submitted by ci² members.

The large number of studies performed by the center includes AI applications in MRI physics, neuroimaging, cardiology, and musculoskeletal imaging, among others. ci² efforts are shaping the all-life cycle of imaging from

acquisition through processing, quantitative evaluation, and assisted diagnosis, up to outcome prognosis and disease modeling.

Our mission is to make real differences and see our technology translated to clinical use. The ci² Computation Core, led by **Jason Crane, PhD**, is working toward deployment and integration of AI-assisted tools in the clinical workflow, together with our industrial partners, including NVIDIA, GE Healthcare Systems, and Siemens.

Because a “fast and furious” field like AI in medicine needs young minds and a new generation of scientists with strong technical and clinical backgrounds, education is a key component of the center. The ci² Educational Core, led by **Valentina Padoia, PhD**, and **Andreas Rauschecker, MD, PhD**, is charged with developing and providing research training opportunities in the field of AI for medical imaging. The training and research opportunities extend across all levels – undergraduate, graduate, medical school, post-graduate, residency, clinical fellowship, and faculty – and will be fostered by having outreach ambassadors.

In 2020 we had our first ci² summer internship program. This was an opportunity for students at different points on their academic path to work on clinically relevant AI projects while mentored by ci² faculty members. Their results were remarkable; all 13 interns were asked to present their research at the Radiology Department's Summer Symposium, alongside 12 students and interns participating in the Research Initiative to Promote Diversity in Radiology (RIDR) Program or working on individual projects with faculty. After working diligently over two months on individual projects, all of these talented interns and students delivered presentations to an audience of faculty, staff, friends, and family that exceeded 100 persons over the course of the two-hour symposium.■



Simply put, ci² places UCSF at the center of multidisciplinary efforts to develop AI imaging to improve diagnostic medicine and patient outcomes.

CLINICAL SECTIONS



Abdominal Imaging

Ronald Zagoria, MD, Chief

The Abdominal Imaging and Ultrasound Section is made up of renowned abdominal imaging experts who diagnose and treat disorders of all organs in the abdomen and pelvis, such as the liver, kidneys, GI tract, pancreas, colon, uterus, ovaries, prostate, and bladder. The section is focused on serving patients, conducting research, and training the next generation of radiologists.

As of early 2021, our clinical work volumes are now at pre-COVID-19 levels and the strong focus on patient care from our dedicated physicians, technologists and staff was essential to the successful operation of the section during 2020 as the pandemic surged. In July, we bid farewell to longtime faculty member **Antonio Westphalen, MD**, (see page 23) – his expertise, and excellence in service to our section and UCSF over the past 16 years as a faculty member are irreplaceable. The Abdominal Imaging Section welcomed three new faculty members in June: **Preethi Raghu, MD**; **Mark Sugi, MD**, and **Sean Woolen, MD**, (see *New Faculty*, page 30) all three of whom quickly became valued members of the team.

Abdominal Imaging offers routine and advanced specialty services including, but not limited to, kidney tumor ablation, CT colonography (virtual colonoscopy), multiparametric prostate MR imaging, liver fat and fibrosis assessment, elastography, fallopian tube recanalization, prenatal and obstetrical ultrasound studies (also called US or sonograms), doppler ultrasound, abdominal ultrasound, gynecology/pelvic ultrasound, thyroid ultrasound, musculoskeletal ultrasound, scrotal ultrasound, ultrasound-guided biopsies, and ultrasound-guided transplantation monitoring.

Some organ-specific areas of focus include MRI, US and CT techniques to optimize assessment of prostate cancer and guide treatment decisions; advanced hepatic imaging, including multi-detector CT, CT

cholangiography, new hepatobiliary MR contrast agents and MR cholangiopancreatography; and subspecialized US exams for OB/GYN applications and US-guided biopsies. Through our own research results we have implemented the safest (low radiation dose) CT scans with tailored contrast enhancement (enteric and intravenous) to optimize examinations based on each patient's specific situation. We are leaders in the use of focused MRI exams to improve efficiency and patient comfort for numerous scan indications. We use dynamic contrast-enhanced MRI, US and CT for disease assessment in all areas in the abdomen and pelvis.

Working with the UCSF Fetal Treatment Center, our radiologists offer ultrasound services that include prenatal diagnosis with ultrasound and MRI of complex fetal and placental abnormalities.

Breast Imaging

Bonnie N. Joe, MD, PhD, Chief

The Breast Imaging Clinical Section celebrated its one-year anniversary at the UCSF Bakar Precision Cancer Medicine Building on UC San Francisco's Mission Bay campus in September 2020. The full-service imaging clinic is within steps of the UCSF Bakar Cancer Hospital and the Mission Bay research building for the UCSF Helen Diller Family Comprehensive Cancer Center. The Breast Imaging service at the Berkeley Outpatient Center in Berkeley, CA, opened in October 2020, with a goal of offering UCSF excellence of care to East Bay patients. (See page 14). The service at the Berkeley Outpatient Center is led by **Kimberly Ray, MD**, who rejoined the section in June as an associate professor. (See page 30).

Breast Imaging at UCSF offers state-of-the-art radiology services, enabling us to provide the highest possible level of care in radiology for our patients with cancer.



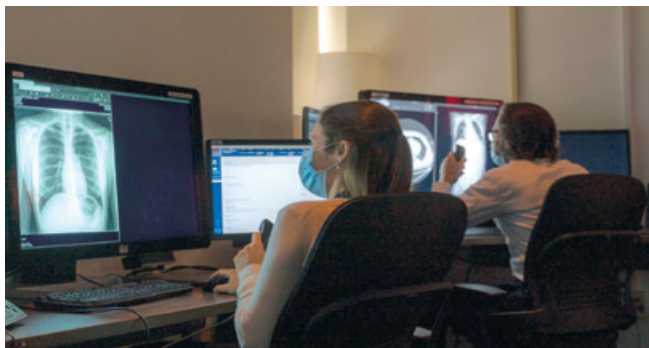
We offer mammography, including tomosynthesis (also known as 3D mammography) and MRI for breast cancer screening. Mammography, ultrasound and MRI are available for diagnostic evaluations, cancer staging and treatment response assessment. Dedicated breast PET and functional MR imaging are offered in conjunction with research trials. We provide image-guided breast biopsy and localization under ultrasound, stereotactic and MRI guidance.

Cardiac and Pulmonary Imaging

Travis Henry, MD, Acting Chief

The Cardiac and Pulmonary Imaging Section at UCSF Radiology is dedicated to safely performing the most current clinical imaging exams of both the respiratory and cardiovascular systems using advanced imaging modalities, such as high-resolution chest CT (HRCT), coronary CT angiography, MRI and percutaneous CT-guided lung biopsies. We develop and implement state-of-the-art methods for providing early diagnosis and improved outcomes for patients suffering from cardiac and pulmonary diseases. We work closely with clinical colleagues in numerous specialties, including pulmonology, cardiology, cardiothoracic surgery, oncology, infectious disease and others to provide rapid and accurate diagnoses.

We are a world leader in HRCT for the diagnosis and management of interstitial lung disease. In 2020 we became one of the first centers in the region to use HeartFlow Fractional Flow Reserve for coronary CT imaging on our state-of-the-art 256 detector row scanners at Mission Bay. Cutting-edge MRI techniques such as T1 mapping are now being used for assessment of cardiac disease in patients with pulmonary hypertension. Cardiac MRI and CTA using computational modeling for quantitative assessment of ventricular performance and multidimensional flow techniques are routinely used to assess congenital heart disease in both pediatric and adult patients. We perform and interpret CTA for the UCSF transcatheter aortic valve (TAVR) program, which was recently ranked #1 in the Bay Area by *US News and World Report*.



Interventional Radiology

Nicholas Fidelman, MD, Acting Chief

In 2020, the Interventional Radiology section bid farewell to **Maureen P. Kohi, MD**, who accepted the chair of Radiology position at the University of North Carolina Chapel Hill (see page 23). Dr. Kohi's innumerable accomplishments while at UCSF were celebrated at a virtual department-wide event on December 8. **Nicholas Fidelman, MD**, is serving as acting chief.

Our new faculty members, **Michael Heller, MD**, and **Alexander Lam, MD**, are working to expand the scope of our clinical practice to include endovascular arteriovenous fistula creation for hemodialysis, peripheral artery disease, geniculate artery embolization, ablation of painful bone metastases, and treatment of superficial venous disease.

The opening of two new angiography suites at the Bakar Precision Cancer Medicine Building (PCMB) coincided well with our mission to provide accessible high-end outpatient care. At PCMB, we are expanding our outpatient prostate and uterine artery embolization practices and offering outpatient liver-directed therapies to treat primary and metastatic liver disease.

Many of our faculty have been recognized at the university and national level. **K. Pallav Kolli, MD**; **Evan Lehrman, MD**; **Andrew Taylor, MD, PhD**; **R. Peter Lokken, MD**, and **Vishal Kumar, MD**, have been named Fellows of the Society of Interventional Radiology, a record accomplishment for our section. **Ryan Kohlbrenner, MD**, received the Haile T. Debas Academy of Medical Educators Excellence in Teaching award. **Nicholas Fidelman, MD**, started a two-year term as the director of the Interventional Radiology Appropriateness Committee panel at the American College of Radiology. He was also recognized as the Top Reviewer by the *Journal of Vascular and Interventional Radiology*, and was promoted to the rank of professor at UCSF.



Our faculty continue their involvement in cutting-edge research. Kohlbrenner received the Radiological Society of North America grant for the project titled “Pharmacokinetic Comparison of Selective Prostatic Arterial and Intravenous PSMA Radioligand Infusions in Treatment of Prostate Cancer Patients.”

The implementation of a new IR residency guided by **Evan Lehrman, MD**, brings great excitement for the future of UCSF IR and the goal of training well-rounded and clinically focused interventional radiologists. We look forward to the interview season and the match of our fourth IR residency class.

We also welcomed several additions to the IR family in 2020, with the birth of Harper Lam and Theo Kohlbrenner in April and Ethan Heller in June. Congratulations!

Molecular Imaging and Therapeutics

Robert Flavell, MD, PhD, Chief

While 2020 was a difficult year for all of us, our faculty, staff and trainees rose to the challenge, achieving several notable successes. In particular, we would like to thank our technologists and nurses, who excelled on the front lines. They provided outstanding patient care despite the additional challenges posed by the ongoing pandemic. Our technologists and nurses also had many notable accomplishments in 2020, including new educational milestones, community and leadership roles for **Chloee Wendorf, Wendell Wade, Mark How and Erika Padilla-Morales**.

We are excited to welcome two new faculty to our section: **Courtney Lawhn-Heath, MD, and Roxanna Juarez, MD**. Lawhn-Heath is a graduate of our own Diagnostic Radiology Residency, and the first trainee to complete the combined Nuclear Radiology/Diagnostic Radiology ABR pathway at UCSF. She joined the faculty in January 2020, and has particular interests in education,

having already been appointed assistant program director of our Nuclear Medicine fellowship program. Her other research and clinical interests include breast cancer imaging and neurodegenerative disease. Juarez completed her residency at Georgetown University in Diagnostic Radiology, followed by a one-year Nuclear Medicine fellowship at UCSF. She joined our faculty in August 2020 and has research interests in imaging the response to immunotherapy, as well as interests in education and community outreach. These outstanding physicians will ensure the continued development of our educational, clinical and research missions.

On the research front, a major milestone in 2020 was the submission and approval of a new drug application to the Food and Drug Administration for the use of 68Ga-PSMA-11 in prostate cancer patients. Led by **Tom Hope, MD**, in collaboration with others in our department, as well as investigators at UCLA, this represents the culmination of years of effort. We look forward to seeing the continued use of this agent in prostate cancer patients at UCSF and elsewhere. (See page 10.)

Several other members of our group achieved notable milestones, including high-impact publications and new grant funding in the area of molecular imaging and theranostic probe development and implementation. Our group has close interactions with the Chemistry, Probes and Molecular Therapy and Advanced Imaging Technologies Specialized

Resources Groups, and many of the achievements of our section are further detailed in their summaries.

Our clinical enterprise is in an expansion phase, with a new PET/CT instrument being installed at China Basin. An additional PET/CT scanner is planned at the Parnassus site, with construction likely to begin in the next 12 months. In the near future, we hope to install additional scanners in locations convenient for our patients and to leverage continued innovations in molecular imaging technology to extend our reach and clinical impact.



Musculoskeletal

Thomas M. Link, MD, PhD, Chief

The team of the Musculoskeletal Section had a challenging but successful year in 2020.

The pandemic froze operations, research and meetings for parts of the year, and required us to restructure our operations to provide a safe environment for faculty, trainees and technologists. Moving PACS workstations to faculty offices, reading out and meeting via Zoom fundamentally altered our operations. It forced



us to rethink how we administer patient care as well as interactions with clinicians and education. As of July 2020, imaging and procedure volumes had stabilized and operations had resumed to near-full capacity.

Associate Chair for Wellbeing and Professional Development **Matthew Bucknor, MD**, was actively involved in creating new guidelines for faculty to meet their needs, while maintaining high standards of patient care and education. Thanks to the hard work of **Rina Patel, MD**, as Fellowship director, we filled all fellowship spots for 2021 with top candidates. **Kevin McGill, MD**, successfully built and grew a new ultrasound-guided biopsy program at the Bakar Precision Cancer Medical Building at Mission Bay. We are also very pleased that **Lynne Steinbach, MD**, continued her support for our section and provides world-class training for our residents and fellows. Bucknor has consolidated his MR-guided High Intensity Focused Ultrasound Program and the number of novel, minimally invasive procedures to treat bone tumors increased. In line with the increasing development of precision cancer treatment, the number of bone biopsies for bone metastases also increased.

Due to the pandemic, the 2020 Howard Steinbach Memorial lecture was postponed to 2021, when it will be given by Stacy Smith, MD, from Harvard's Brigham and Women's Hospital.

Neuro Interventional Radiology

Randall T. Higashida, MD, Chief

The Neuro Interventional Radiology (NIR) Section at UCSF is one of the premier programs in the world specializing in the minimally invasive treatment of complex brain, head, neck and spine vascular abnormalities. These include the interventional treatment of both ruptured and non-ruptured brain aneurysms, arteriovenous malformations, dural fistulas, vascular tumors of the head, neck and spine, and other complex conditions.

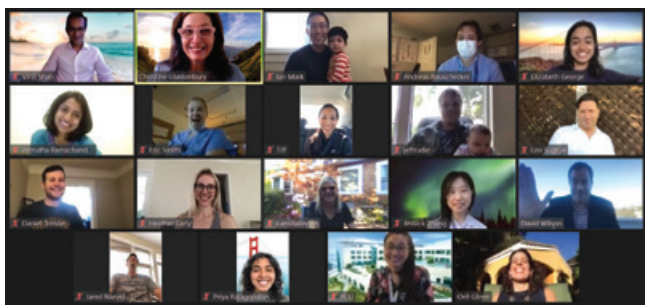
Three nationally recognized clinics are co-chaired by the NIR faculty: the Vascular Anomalies Clinic (**Christopher Dowd, MD**, and **Daniel Cooke, MD**); Hereditary Hemorrhagic Telangiectasia Clinic (**Steven**

Hetts, MD) and the Pulsatile Tinnitus Clinic (**Matthew Amans, MD**). In addition, our NIR Clinic sees outpatients for evaluation and treatment of complex neurovascular disorders. Our emergency stroke network has been enhanced by both teleradiology and video conferencing capabilities at key hospital sites which triage care to UCSF.

Recent NIR section accomplishments include:

- UCSF was certified by the Joint Commission as the only Comprehensive Stroke Center in San Francisco, indicative of the breadth and depth of the outstanding services provided collaboratively by neurology, neurosurgery, NIR and other departments. Planning for a more integrated service line continues.
- **Van Halbach, MD**, was honored by giving the annual Luminary Lecture at the Society of NeuroInterventional Surgery (SNIS). Through the efforts of UCSF alumni, this lecture will be named in perpetuity after the founding mentor of our division, **Grant Hieshima, MD**.
- **Christopher Dowd, MD**, was honored as a Fellow of SNIS for his many contributions to the field and the society.
- **Steven Hetts, MD**, chief of NIR at Mission Bay, finished a two-year term as the UC Systemwide Academic Senate Representative to the Regents Health Services Committee and will serve as the next Vice-Chair of the UCSF Academic Senate Committee on Academic Personnel. He worked with **Miles Conrad, MD, MPH**; **Danny Langston, NP**, and **Tori Lomax** to secure recertification for the UCSF HHT Center of Excellence.
- **Daniel Cooke, MD**, chief of NIR at ZSFG and SFVAMC, led innovative research collaborations with Siemens using angiography suites to identify intracranial hemorrhage, laying the groundwork for direct-to-angio stroke interventions. He continued his seminal work elucidating the molecular mechanisms at play in endothelial cells obtained from brain aneurysms and AVMs.
- **Matthew Amans, MD**, promoted to associate professor of Clinical Radiology, led innovative patient care and research in the UCSF Pulsatile Tinnitus Clinic, which he co-directs. He is the incoming chair of the UCSF Academic Senate Faculty Council.





July Friday Night ZOOM Connect for new fellows, instructors and faculty

Neuroradiology

Christine M. Glastonbury, MBBS, Interim Chief

While the academic year 2019–20 didn't go quite as we had planned, the Neuroradiology section had a very successful, productive and Zoom-connected completion to the year and a great start to the 2020–2021 academic year. We sadly, but with deep pride, said farewell to four fellows and three outstanding Neuroradiology clinical instructors – **Jackie Junn, MD**; **Arian Mashhood, MD**, and **Karl Soderlund, MD** – and were delighted to welcome nine stellar new ACGME fellows, four clinical instructors who stayed after fellowship, and one new faculty member, **Andreas Rauschecker, MD, PhD**.

The end of the academic year also saw the retirement of the director of Pediatric Neuroradiology at UCSF and one of our beloved faculty members of nearly 35 years, **Jim Barkovich, MD**. In October we celebrated Jim's distinguished career and his extraordinary academic achievements with an international gathering (via Zoom) hosted by **Bill Dillon, MD**.

The 2020 UCSF Radiology Department provider survey recognized the exceptional care that our Neuroradiology section provides to our referrers and patients, of which we are extremely proud. We continue to celebrate the many outstanding honors and achievements of our fellows, clinical instructors and faculty, the most recent of which are listed below. We also want to acknowledge the hard work, flexibility, resilience and humor of our section members through so many modifications to how we work, teach and connect since the imposition of COVID-19 restrictions.

- **Elizabeth George, MD**, clinical instructor: ASNR Foundation award in fetal MR
- **Jeffrey Rudie, MD**, clinical instructor: ASNR Foundation award in artificial intelligence
- **Karl Soderlund, MD**, clinical instructor: 2020 Fellow Teaching award presented by the UCSF Radiology residents
- **Apple Palad**, administrative officer: UCSF Star Spot Award
- **Camilla Lindan, MD**, visiting clinical professor: 2019–2020 Special Recognition Teaching award from the UCSF School of Medicine

- **Matthew Barkovich, MD**: Appointed director of SFVAMC Neuroradiology
- **Soonmee Cha, MD**: Directed the Radiology Residency program to its seventh consecutive year at the #1 ranked program by Doximity
- **Christine Glastonbury, MBBS**: RSNA Honored Educator award
- **Orit Glenn, MD**: Appointed director of Pediatric Neuroradiology
- **Andreas Rauschecker, MD**: UCSF School of Medicine Inquiry Curriculum Long Term Mentor award
- **Vinil Shah, MD**: promoted to associate professor, July 2020
- **Javier Villanueva-Meyer, MD**: 2020 Diane D. Ralston Clinical and Basic Neuroscience Teaching award presented by the Neurosurgery residents and appointed director of Neuroradiology Quality Improvement and Operations
- **David Wilson, MD**: Promoted to professor, July 2020



Pediatric Radiology

Ronald A. Cohen, MD, Interim Chief

UCSF Pediatric Radiology provides specialized imaging for infants, children and pregnant women. Recognized as a top-ranked hospital, UCSF Benioff Children's Hospital in San Francisco and Oakland offers a unique pediatric-focused environment that is safe and pleasant for patients and their families.

The Pediatric Radiology Section is dedicated to the health of children, conducting research and training the next generation of radiologists. The mission of the Pediatric Radiology Section is to improve the health of children through advanced clinical imaging and research. The section studies pediatric disease through the lens of imaging and is focused on the development of new imaging technologies. Several basic science and clinical studies are ongoing with collaborations with multiple pediatric and surgical specialists.



SFVAMC Radiology

Michael D. Hope, MD, Chief

We have adjusted many of our practices at the San Francisco Veterans Affairs Health Care System (SFVAHCS) during the past year due to COVID-19. To ensure a safe patient experience in Radiology, we revamped our clinical imaging workflow with expanded technologist and administrative support and continue to deliver timely and comprehensive imaging services for our veterans. We have made great strides in providing more accessible imaging for veterans with a new mobile CT unit at our Eureka clinic, and have installed a state-of-the-art PET/CT scanner in San Francisco. Our faculty continues to thrive, with **Preeti Sukerkar, MD, PhD**, taking on the role of Residency site director, **Joseph Leach, MD, PhD**, becoming Fellowship site director, and **Eugene Huo, MD**, assuming the position of chief of Quality and Safety. We are proud to now offer robust video conferencing and reliable wireless internet throughout the Radiology Department.

While our research efforts have been put on pause during the pandemic, we have made important progress nonetheless. We have established a VISN 21 Anatomic 3D Visualization/Printing Service – called Translational Radiology and Surgical Technologies, or TRST 3D – that will provide advanced visualization and models of radiology exams to improve surgical planning for veterans. This service is based at SFVAHCS with **Dimitris Mitsouras, PhD**, as the Technical director. We continue bring on new talented PhD researchers, most recently **Eugene Ozhinsky, PhD**, and remain focused on developing projects in musculoskeletal MRI and big data through the VA system.

Zuckerberg San Francisco General (ZSFG)

Mark W. Wilson, MD, Chief of Radiology

In addition to being the city's main public hospital and Level 1 Trauma Center, ZSFG is an active teaching hospital, closely allied with UCSF.

During 2020, we fully operationalized our Interventional MRI system at ZSFG. It has been a boon for stroke care and has also opened up an array of MR-guided procedures, such as musculoskeletal and oncologic interventions. (Ref: Narsinh K, et al. Combined Angiography-MRI Suite Enables Tissue-based Decision-making Regarding Revascularization during Acute Ischemic Stroke Intervention. *Radiology*. In Press)

A DEXA unit was installed in the Avon Women's Health Center at ZSFG. Bone densitometry is widely used to assess bone mineralization. It will also be used to assess mineralization abnormalities in patients with HIV. ■



Thank You

The Department of Radiology and Biomedical Imaging
is grateful to the many alumni, friends, and faculty
who give back with a gift to the department.

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Quality Improvement Project: A student cohort takes the UCSF Shuttle from Kanbar Center to Zuckerberg San Francisco General (ZSFG) for the “Clears for Breakfast” initiative for patients in the Interventional Radiology section. Pictured on the left, front to back: Christian Garcia Hernandez, Brooke Warren, and Yenenesh Belachew. Pictured on the right from front to back: Nicole Truong, Anthony Nguyen, and Norman Archer. Read more about this UCSF School of Medicine Bridges Curriculum quality improvement project on page 39.