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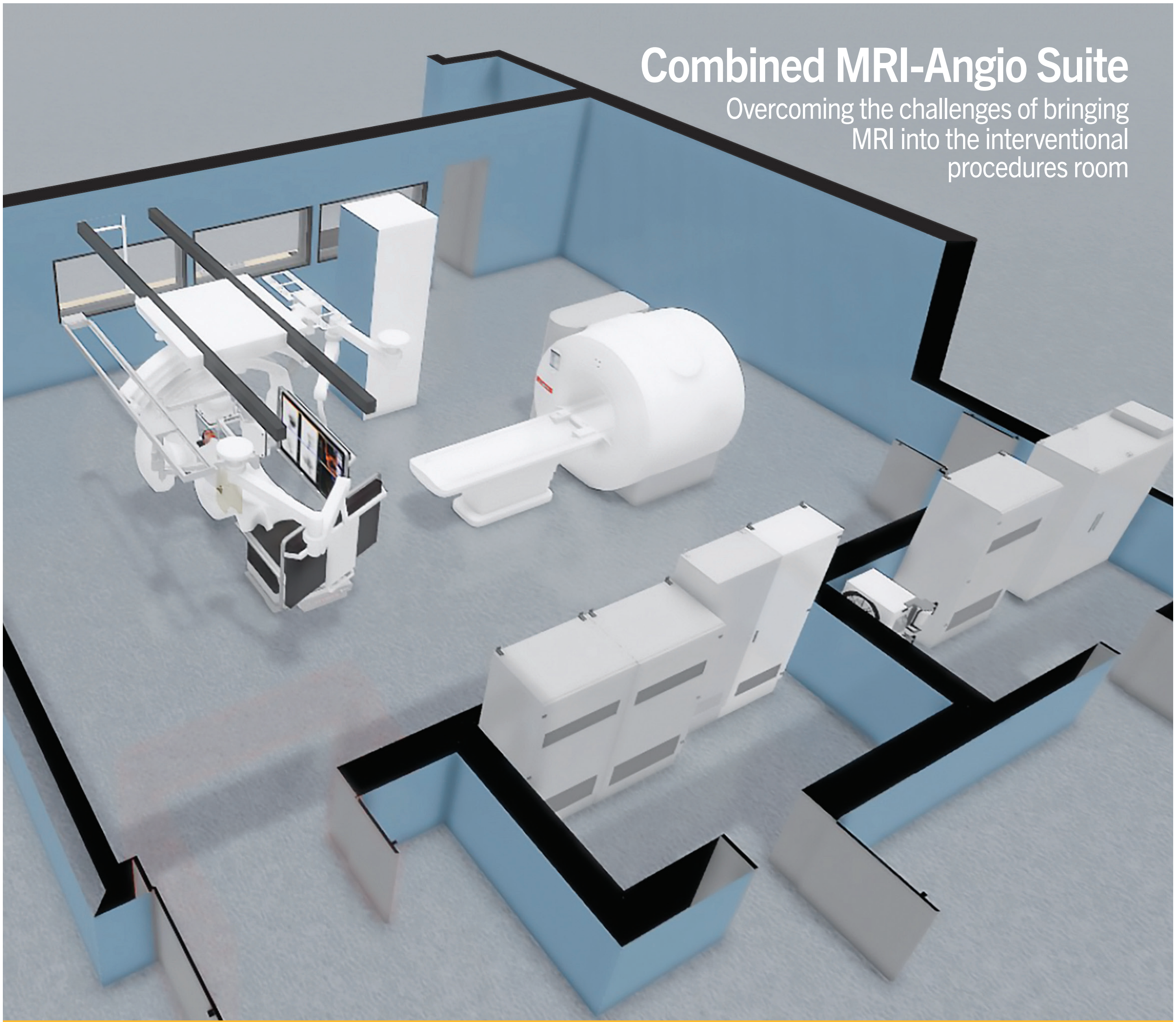
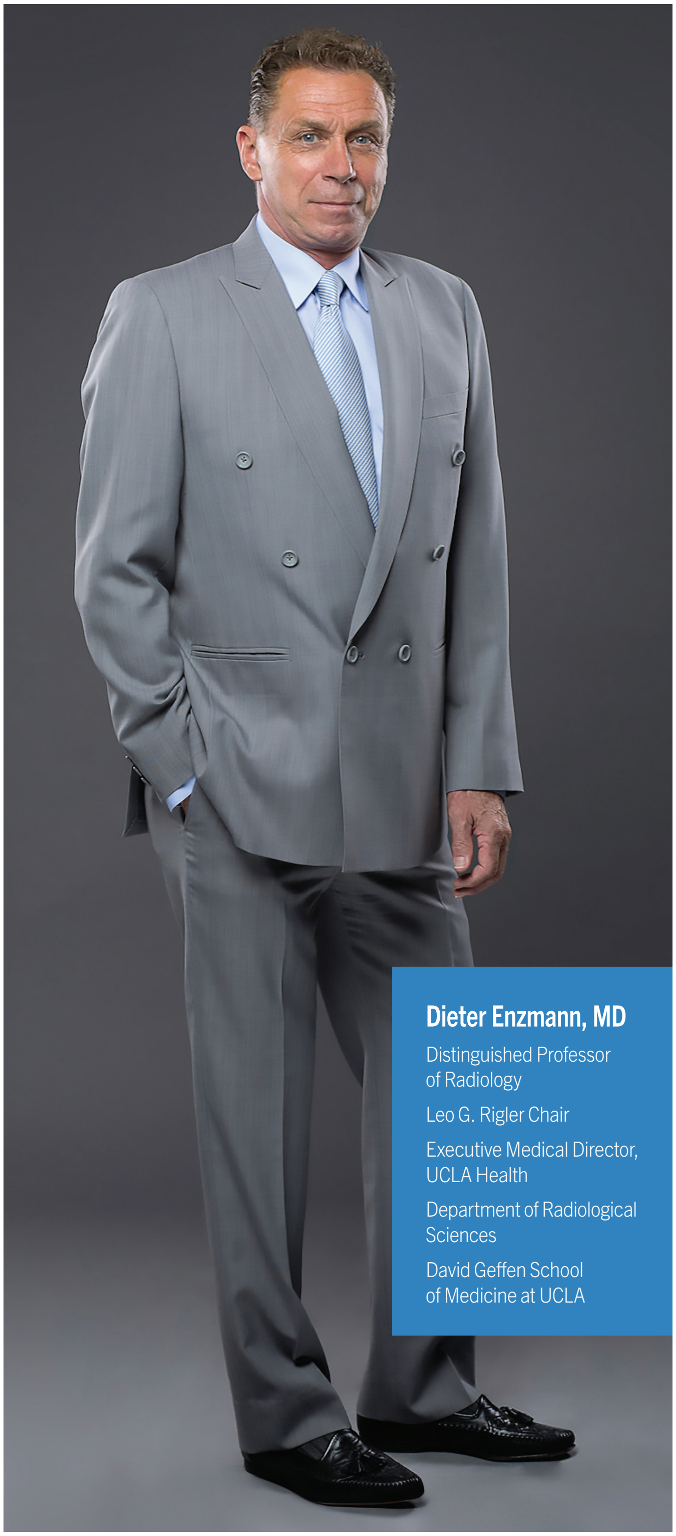


Combined MRI-Angio Suite

Overcoming the challenges of bringing MRI into the interventional procedures room

Chair's Message

This final *UCLA Radiology Newsletter* editorial takes a conceptual look at the evolution of radiology, drawing parallels to key features of the First and Second Industrial Revolutions. This helps to explain how radiology has grown into a successful, large-scale imaging service. As these features unfold again in the Third Industrial Revolution, we gain insights into radiology's future.



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The First Industrial Revolution's pivotal feature was the separation of production from consumption. Before this, a blacksmith would make pairs of horseshoes ordered individually by customers who often stood by during production. The introduction of steam power began replacing human muscle, allowing production to scale up independently. Instead of a blacksmith hammering out individual horseshoes, large mechanical machines driven by steam could stamp out thousands of horseshoes independent of individual orders. This separation of production and consumption ushered in economies of scale because each incremental horseshoe made by machines cost less. Steam power scaled up production in manufacturing significantly, transforming the world economy from centuries of an essentially flat GDP into one with a sharp upward spike. Expansion of this concept of separating production from consumption in the First Industrial Revolution changed the entire world. It took a while for it to influence radiology.

Early radiology did not benefit from this concept because production was not separated from consumption. Common GI fluoroscopic studies like upper GIs, barium enemas, myelography and even angiography resembled the blacksmith model. Much of early radiology resembled the pre-First Industrial Revolution model.

The Second Industrial Revolution was characterized by the use of electricity and computers. This started the separation of the production of radiology information work output from consumption. Radiology information work output began to scale up beyond individual radiologist brain power using computer power, beginning to grow at a rate akin to Moore's Law. This marked the beginning of radiology becoming a larger-scale business.

Further innovations in the Second Revolution allowed radiology to expand the separation of production concept with CT and MR technologies. This not only increased radiology information work output but also profitability. Yet the separation was not as complete as the blacksmith model, where the machine's output could be in the thousands without any link to the blacksmith. In radiology, the separation was partial, as CT and MR production was still linked to the radiologist brain power.

Radiology's production of information work output surged in the Second Industrial Revolution when digital imaging technologies separated production from consumption. For instance, doubling or tripling CTA or MRA vascular information work output didn't require doubling or tripling of radiologist brain power units that would have been required had vascular information needed to rely on the blacksmith model of performing lengthy cerebral angiographic procedures to generate the same amount of information work output. CTAs and MRAs produced more information work output by their separate production process in contrast to a film- and fluoro-based of cerebral angiography with a one-to-one relationship with radiologists similar to the "blacksmith" model. The full First Revolution concept of complete separation was not yet achieved.

Adding radiologists to a group increases their number and aggregate work output, but this type of size and scale does not achieve true economies of scale. Adding an incremental radiologist still requires adding high-cost radiologist brain power. Forming a national group of 1,000 radiologists to generate a large amount of radiology information work output increases scale in numbers, but a roughly one-to-one relationship between the radiologist "brain unit" and radiology information work output remains, as does the associated radiologist brain power cost. This type of scale produces limited economies of scale. Further separation of work output production from the radiologist brain unit is required, where increments in radiology production output come at a cost lower than that of a full radiologist brain unit.

Currently, there remains a roughly linear relationship between radiologist brain units and radiologist information work output. More radiology information work output requires more radiologist brain units. This is set to change with the Third Industrial Revolution driven by GPU power and generative AI (gen AI) because it will allow for further separation of radiology information work output using gen AI "thinking units" from radiologist brain units. Those gen AI/GPU units can produce more horseshoes without blacksmiths, i.e., radiologists. Moreover, those "gen AI/GPU thinking units" can far exceed the number of "radiologist thinking units," working day and night by a thousandfold or more. Gen AI/GPUs scale up much more and faster than the radiologist's brain units. When radiologic information work output is driven by "gen AI/GPU brain units" rather than by "radiologist brain units," whole new production curves are created. The conceptual lesson from the First Industrial Revolution will finally have fully been absorbed into radiology.

The Third Revolution will be based on completely separating the production of cognition from the radiologist brain units to gen AI/GPU brain units, with the latter able to achieve enormous scale. Just like the historical role of steam power, "gen AI/GPU thinking power" will create new cognition work output productivity curves, which I believe will impact the world economy just as steam power did in the First Industrial Revolution.

Viewed historically, in the Third Revolution, gen AI/GPU is playing the role of steam power and will dramatically change not just radiology but likely the entire economy. In this "Cognitive Revolution," gen AI/GPU thinking power will produce prodigious amounts of radiology cognitive work output and do so using less expensive Gen AI/GPU thinking units that scale well compared to radiologist brain units that do not. Real economies of scale will only be achieved by their combination in radiology. The future of radiology will look quite different.

The revolution sequence is a repeating cycle: humans are relieved of physical labor, then additional work tasks, and now cognitive tasks. Not only are humans relieved of those tasks, but importantly those tasks are performed by different, separate production units that scale dramatically. This is happening rapidly with gen AI and current LLMs (large language models) or even small language models. When gen AI/GPU brain units perform radiology information work output of many individual radiologist brain units at a lower cost per incremental gen AI/GPU unit, true economies of scale are achieved because information work output is of lower cost. This is multiplied further if gen AI/GPU brain units produce not only radiology information work output but radiology cognitive work output at a lower incremental cost compared to a radiologist brain unit. The number of these gen AI/GPU brain units is essentially unlimited except for the energy cost required to run them.

The sequential drivers of these revolutions — steam engines, computers and now gen AI/GPUs — all have in common the ability to perform human production tasks as separate production units that can scale up dramatically compared to humans performing these tasks. We are truly on the cusp of something really new when we scale up human cognition tasks without human links. Cognition can achieve economies of scale not achievable by human brain units. It's the steam-driven machine stamping out horseshoes without the blacksmith. This Third Revolution will be accelerated when quantum computing replaces current GPUs.

Radiology has gradually leveraged the previous two industrial revolutions, but leveraging the Cognitive Revolution will be different and indeed will be much faster than the gradual pace of the previous two because this one is even more transformative. AI in its many forms will not replace the raison d'être of radiology in human health, but it brings economies of scale to every component of its value chain.[1] Even interventional radiology should prepare for the new Cognitive Revolution with the separation of cognition from production.

I was fortunate to witness firsthand the gradual effects of the First and Second Revolutions on radiology. I look forward to observing the Third Revolution's lightning-speed transformation of radiology. Fortunately, our Department is well-designed for this new speed. R

[1]Enzmann DR. Radiology's Value Chain. Radiology. 2012 Apr;263(1):243-52

Combined MRI-Angio Suite will overcome imaging limitations

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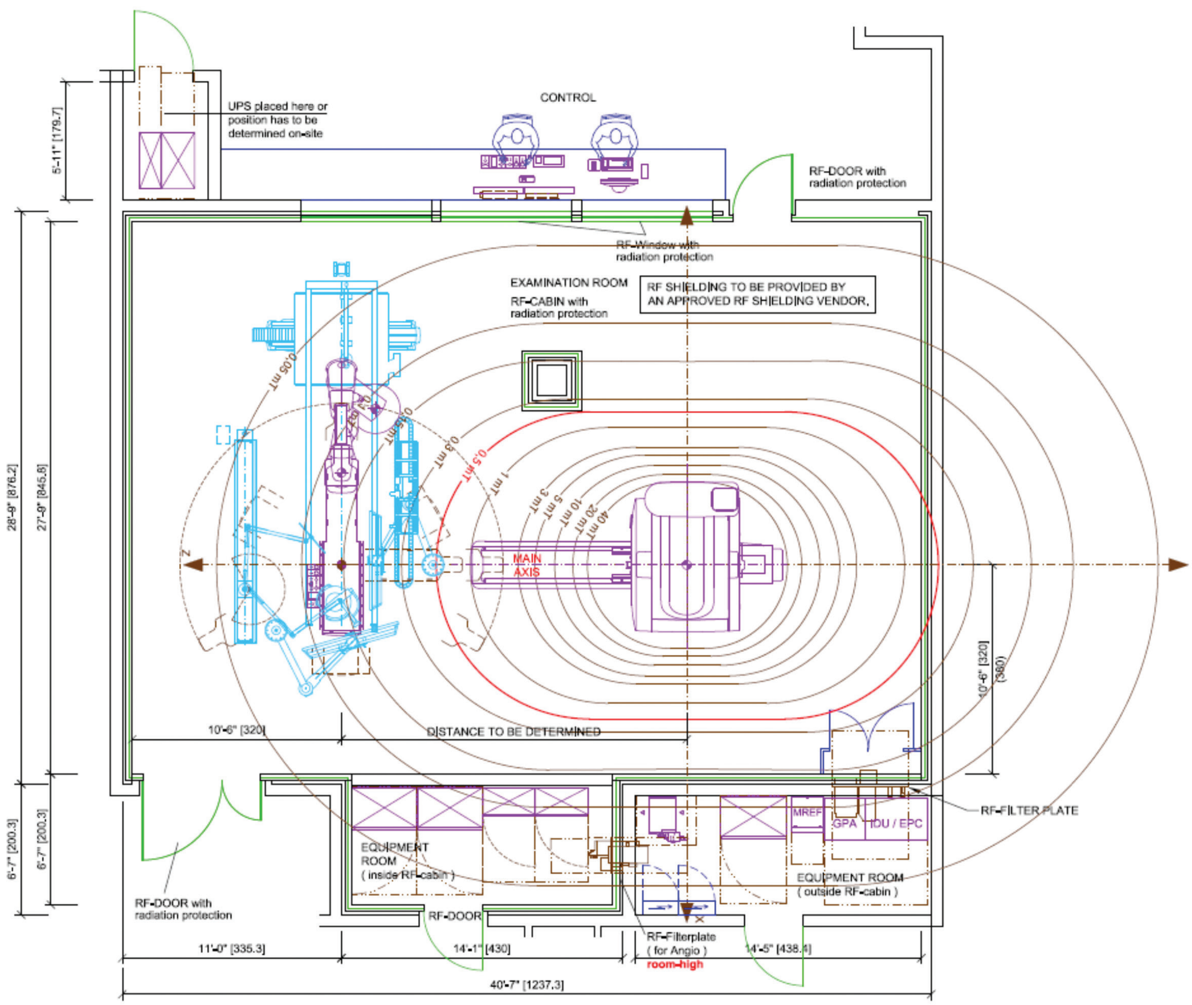
Interventional radiologists have made great strides in using medical imaging to guide minimally invasive procedures to treat various conditions. The angiography typically employed in interventional suites provides accurate and detailed imaging of radiopaque structures and those rendered radiopaque with injected contrast agents, as well as the catheters and other devices interventionalists employ in performing procedures. With excellent spatial and temporal resolution, angiography is well-suited to guiding interventionalists through the intricate anatomy they often must navigate to perform a range of procedures without exposing patients to the risks of open surgery.



However, other imaging modalities far surpass angiography when it comes to imaging most tissues. Interventional radiologists often consult CT and MRI images before procedures to help plan their interventions and after procedures to see the results more clearly and make decisions on further care.

Interventional radiologists have long pondered how advantageous it would be to bring other imaging modalities — specifically MRI imaging — into the interventional suite. However, the technological barriers to doing so have until now been insurmountable. “Putting an MRI scanner together with an X-ray scanner is very challenging because of the mixing of magnetism and metal,” explains John Moriarty, MD, FSIR, professor of radiology and medicine and vice chair of clinical research in the UCLA Health Department of Radiology. “People have been thinking about this for decades.”

Working with Siemens Healthineers, UCLA plans to bring this vision to fruition with the launch of its Combined MRI-Angio Suite in 2025. According to Dr. Moriarty, “What makes this unique

“It will not only improve treatments we already provide, it could also dramatically expand what we can do because we’ll be able to see structures that we can’t currently see with X-ray imaging.” – Gary R. Duckwiler, MD

is that it combines the most up-to-date type of MRI scanner with the most up-to-date type of X-ray scanner. The new suite is going to have a special type of magnet and exceptional equipment — both the angio suite and what we use in it — allowing us to combine the two. With both machines in the same room — and with the procedure table able to be repositioned for either — physicians will have rapid access to information about the relevant tissue and its function as they perform interventional procedures.

An excellent example of the combined suite’s power is in treating acute ischemic stroke. “Currently, I’ll have an MR or CT image of the affected tissue from before I begin the procedure to get an idea of what the function of that tissue is,” explains Gary R. Duckwiler, MD, professor of radiology and director of interventional neuroradiology at UCLA Health. However, during the interventional procedure to treat the cause of the stroke, Dr. Duckwiler now has no source of updated information on the health of the affected tissue, no way of knowing whether it is receiving some blood flow or if it is entirely cut off from circulation. As the interventional procedure continues and the functional imaging information from before the procedure grows more and more outdated, the lack of clarity on the current status of that tissue increasingly hampers the treatment team’s ability to determine how aggressively to treat the ischemia.

“With the new combined suite, we’ll have the exquisite tissue and functional resolution of MR imaging that we don’t currently have just doing angiography,” continues Dr. Duckwiler, “It will not only improve treatments we already provide, it could also dramatically expand what we can do because we’ll be able to see structures that we can’t currently see with X-ray imaging. We feel this will open up new realms of possibilities in assessing and treating acute stroke.”

Another significant advantage that the Combined MRI-Angio Suite will offer in acute stroke care is the time savings associated with having the MR scanner in the interventional procedures room. “Normally for acute stroke, the patient will come in through the ER, they’ll have a quick evaluation, they’ll get a scan, and then decisions on their condition and care will be made, including administering or not administering intravenous thrombolytic,” explains Dr. Duckwiler. “If it is a large vessel occlusion and there is tissue that we can salvage, they are transported to the angio suite, and we’ll do our procedure. Afterward, to reassess what is happening, we do imaging again.” The vision for the new suite will be for patients to be transported directly from the emergency department to the combined suite, where the initial MR scan will occur. This change to a “one-room solution” is estimated to advance the treatment timetable by approximately one hour. Because of the critical importance of rapid revascularization of brain tissue in acute stroke patients, this time savings should result in a striking reduction of lost brain tissue, which equates to lives saved, patients walking and talking, and families not burdened by rehabilitation costs and tasks.

Dr. Moriarty says of the combined MRI-Angio Suite, “The main areas we think this will be very helpful include the brain, where we’re going to be able to see either stroke or bleed or tumor within the brain. The next is within the heart and lungs, visualizing and treating either clots or tumors. The third is within the liver.”

One of the exciting applications of the Combined MRI-Angio Suite is in treating heart arrhythmias. “The ability to identify tissue characteristics of the heart and simultaneously perform ablations opens up a new frontier in interventional therapeutics,” states Kalyanam Shivkumar, MD, PhD, Professor of Medicine (Cardiology), Radiology & Bioengineering and director of the UCLA Cardiac Arrhythmia Center & EP Programs.

Currently, liver tumors are very challenging to treat, and patients with liver cancer who are listed for transplantation often see their cancer advance while they await treatment; many will die before a suitable organ becomes available. “The ability to see the tumor, to treat the tumor, with this specific room is going to help us prevent that from happening,” states Dr. Moriarty. “We hope to be able to see and treat things that we cannot see and treat right now. We will be able to do this without having to open the abdomen to see the tumor.”

UCLA leveraged technical expertise within the university to help make it possible to add an MR scanner to the angio suite. “This involves impressive engineering and architectural changes to the hospital itself,” explains Dr. Moriarty. UCLA is also willing to commit its resources to making the new suite a reality. “This is a costly endeavor; it takes a lot of time and expertise to put together. We have made a long-term commitment to improving our patients’ care.” R

Breast Imaging Center studying use of AI in same-day exams

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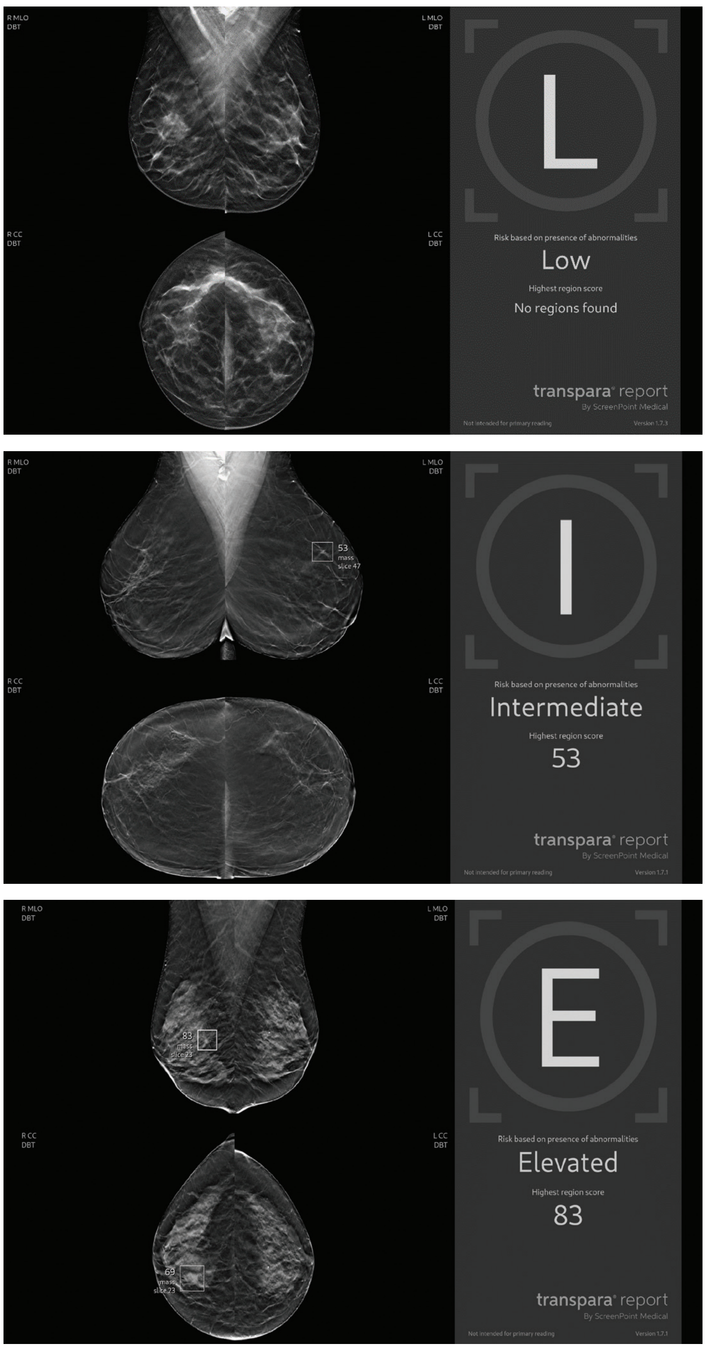
Having a screening mammogram can be an anxiety-provoking experience, especially for women who are "called back" or asked to return for further testing of a potentially abnormal area on their mammogram. "Women often believe that they have something very serious and may die of breast cancer. There's a lot of fear and anxiety between the time a woman learns that she has an abnormal screening mammogram and her next appointment for further evaluation," says Anne C. Hoyt, MD, professor of radiology and director of the Santa Monica Women's Imaging Center. Around 10% of screening mammograms result in a callback; fortunately, about 95% of those are ultimately determined to be false positives, where no breast cancer is found.



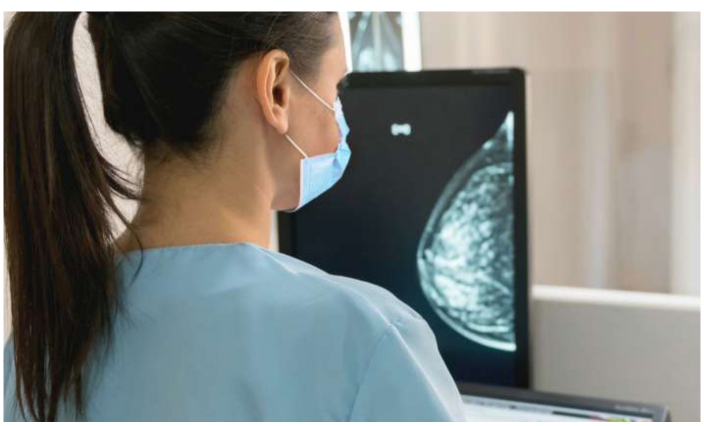
Although guidelines vary, all expert organizations, including the American College of Radiology (ACR), agree that annual screening mammography is proven to save lives. The large numbers of women recommended for screening under the various guidelines create the potential for a great deal of stress, albeit usually temporary, when screening mammograms require further evaluation. Dr. Hoyt emphasizes that among screening mammograms determined to be suspicious, "most are false positives and don't require a biopsy or ultimately show anything worrisome."

UCLA is currently working under a five-year, $1 million Phased Innovation Award from the Agency for Healthcare Research and Quality (AHRQ) to develop and implement a workflow that would allow for same-day diagnostic evaluation of women who have abnormal screening mammograms. The team is harnessing artificial intelligence (AI) to streamline the process of reviewing screening mammograms while also taking advantage of AI's potential to improve diagnostic accuracy. Mammograms flagged as suspicious by the AI algorithm would be read by a radiologist on-site. If the suspicious finding is confirmed, the patient would be offered same-day diagnostic evaluation. Those not flagged as suspicious by the AI would still be confirmed by a radiologist and any deemed to be abnormal would result in a conventional callback diagnostic appointment. The project is one of the first funded under an AHRQ initiative that supports early-stage projects in digital health to encourage translation into clinical implementation.

Beside mitigating the stress associated with waiting for a diagnosis, an additional benefit of offering same-day diagnostic mammography is that it would decrease the risk of losing women to follow-up, which happens for a variety of reasons between screening and diagnostic imaging.

The researchers' goal under the current grant is to get such a same-day center ready to launch clinically and to trial it at UCLA in the near future. However, effectively implementing AI in the clinic is still an open challenge. "While growing published evidence shows that AI improves the efficiency and accuracy of radiologist interpretations, most of these studies are done in the laboratory environment. In this project, we are trying to implement these AI algorithms clinically, which requires anticipating potential issues like when AI makes an occasional mistake," says William Hsu, PhD, professor of radiological sciences and bioengineering, who is a biomedical informaticist affiliated with the Medical & Imaging Informatics group. To anticipate the potential issues of the proposed AI-assisted workflow, UCLA researchers are conducting computer simulations to assess different workflows for screening mammography with same-day diagnostic evaluation, answering such questions as what the staffing needs of such a center would be and how patient wait times would be affected. "There is a perception that AI will work 'out of the box' and all we need to do is install it within our health system," continues Dr. Hsu. "With this project, we are taking a data-driven approach toward understanding how AI can be effectively incorporated into the clinical environment."

The first two years of the grant have supported the planning phase. For example, the investigators wanted to ensure that the AI algorithm used to support the same-day diagnostic exam workflow performed as advertised in UCLA's patient population. UCLA has been evaluating a commercial algorithm already cleared for use by the FDA to read 2D and 3D screening mammograms. Dr. Hsu notes that, "the AI algorithm was primarily trained on a large cohort of women undergoing screening in Europe, which reflects a different demographic profile than what we see here at UCLA." To validate the algorithm for use at UCLA, the researchers ran a subset of UCLA's own screening mammogram images from the past few years through the algorithm and evaluated its performance. They found that the algorithm performed well, even when judged against the performance of human radiologists. "It didn't necessarily outperform our radiologists — we have very strong specialists and it's really hard to do better than them," explains Dr. Hsu. "But its performance gave us confidence that if we start using this as a triaging tool, it would not substantially increase the number of women who would be erroneously identified as having an abnormal result, which would put a burden on our radiologists who would be making the final determination of whether a same-day diagnostic exam is necessary."



The next three years of the AHRQ grant constitute the implementation phase. During this phase, UCLA researchers will pilot the new workflow with its AI first-pass reading and ultimately ramp up the same-day breast cancer screening and diagnostic service.

While there are a few other centers in the U.S. that offer same-day diagnostic exams following abnormal screening mammograms, they are mostly limited to dedicated clinics serving a relatively small number of patients. By integrating AI into the workflow, the UCLA team hopes to develop a system that can be scaled to one day serve all its breast cancer screening patients.

"As breast imaging radiologists, we see women who are recalled for abnormal mammograms on a daily basis, and the anxiety is truly palpable," says Dr. Hoyt. "From our perspective, the same-day model presents many challenges, especially the unpredictability of how many women might need further evaluation in a given day. However, we have some really exciting, novel ideas about how to manage this unpredictability. At the end of the day, it is about the individual woman's experience and we are willing to think outside of the box to devise a way to make breast cancer screening and diagnosis better for women."

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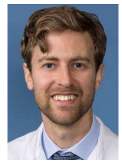
Interventionalists continue to expand use of percutaneous biliary endoscopy



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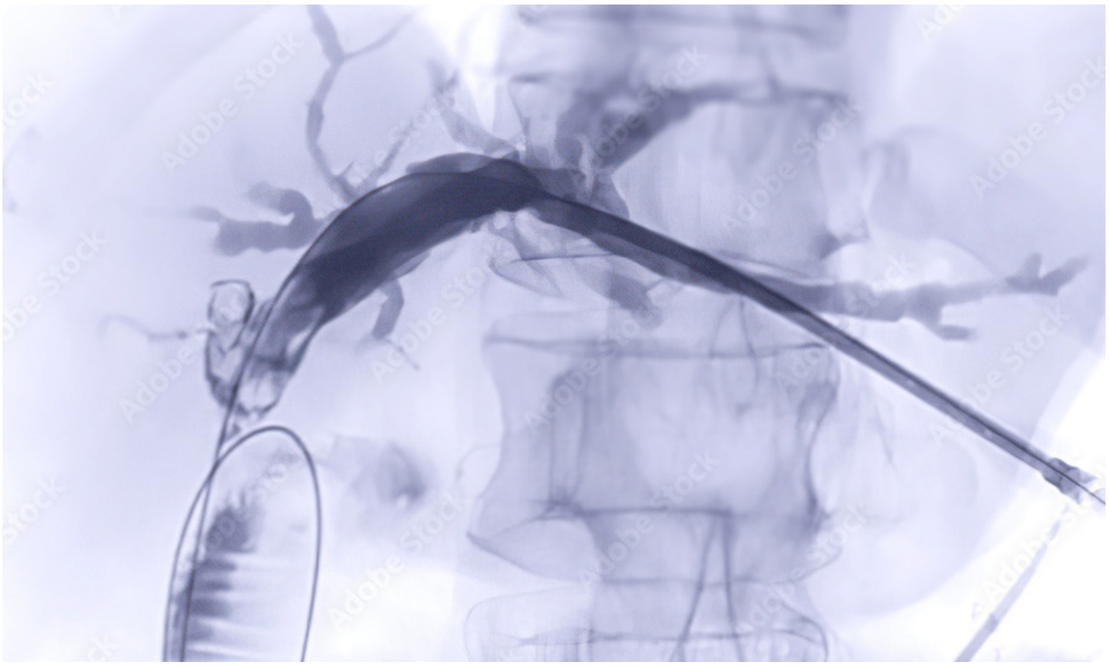
Use of percutaneous biliary endoscopy has continued to expand as it proves to be an increasingly important tool for interventional radiologists. Recent advances at UCLA include the completion of a prospective study using percutaneous biliary endoscopy to treat benign biliary strictures, as well as extending the technique and gaining experience in using it in cases that would be extremely challenging or impossible to treat using other available modalities.



The Percutaneous Endoluminal Benign Biliary Laser (PEBBL) study enrolled six patients between late 2022 and late 2023 to study the long-term safety and efficacy of using percutaneous biliary endoscopy to treat benign biliary strictures utilizing a laser to cut scar tissue at the anastomotic location under direct visualization. Patients who have undergone liver transplantation, had a Whipple procedure to treat pancreatic cancer, or had any other surgery during which a new connection was made between the bile duct and the bowel are prone to developing scar tissue at the anastomosis that can interfere with bile drainage. Many of these patients have had to live with long-term biliary drains.

"The PEBBL study results were positive, with significant improvement in luminal gain," says Ravi N. Srinivasa, MD, professor of clinical radiology, Division of Vascular and Interventional Radiology. "Another very positive outcome was that these patients no longer needed to have recurrent biliary drains put in. Some patients came into the study with long-term, in-dwelling biliary drains for as long as five to 10 years."

In the course of treating patients with benign biliary strictures with direct visualization through endoscopy, UCLA interventional radiologists noted some cases where the suture left at the hepaticojejunostomy anastomosis — the anastomosis that is typical with liver transplantation — was too tight or had scarred over in a way that strangulated the anastomotic site, preventing the bile ducts from draining. "In the past, we've always assumed that strictures seen on fluoroscopy were just scar tissue," explains Zachary M. Haber, MD, assistant professor of radiology, Division of Vascular and Interventional Radiology. "Now that we have endoscopes that can fit in this space and we're using them more often, we're finding that it's not always just scar tissue — sometimes it's something else that's mechanically blocking the anastomosis." Gastroenterologists performing conventional endoscopy through the mouth are seldom able to reach strictures in hepaticojejunostomy anastomoses as the distance is too far. "Our procedure is a direct shot into the liver, and you don't have far to traverse to get to these strictures," Dr. Haber explains. Once at the level of the anastomosis, the interventional radiologist uses a laser to cut the suture and forceps to pull it out

UCLA interventional radiologists are continuing to discover novel ways to help patients by expanding the use of percutaneous biliary endoscopy.

through the endoscope. "Just pulling the suture out cures them," says Dr. Haber, "it's pretty remarkable."

Stent Removal

UCLA interventional radiologists are also using percutaneous biliary endoscopy to remove long-term, in-dwelling biliary stents. "We would typically never have dared to remove a stent percutaneously, especially an uncovered biliary stent, because of the risk of causing trauma to the duct," says Dr. Srinivasa. "Doing this procedure with fluoroscopy alone, you could be damaging the duct, perforating the duct, causing significant bleeding, and you would have no way of knowing."

Using a combination of fluoroscopy and endoscopy provides a way for interventionalists to treat these challenging cases, which is described in an article by Dr. Haber recently published in the *Journal of Vascular and Interventional Radiology (JVIR).* The technique involves using direct endoscopic visualization to assess the stent and any associated stones and debris to determine how best to extract them. These stents often unravel and come out in pieces, so this is an iterative process. After removing a piece using fluoroscopic guidance, the endoscope is used again to plan the next extraction and monitor for signs of damage. "We take another look with the endoscope to make sure there's no bleeding or complications — perforations and things like that. As long as we see that things are looking good, then we continue with the removal," explains Dr. Srinivasa.

Combined Endoscopy

UCLA interventional radiologists are continuing to discover novel ways to help patients by expanding the use of percutaneous biliary endoscopy. One recent example is the case of a patient who had undergone partial liver resection to treat her liver cancer. A line of surgical staples placed at the time of the resective surgery was unintentionally blocking the drainage of bile from the liver to the bowel, making the patient dependent on a drain that diverted the bile externally. UCLA gastroenterologists and interventional radiologists collaborated to devise a unique, combined procedure using endoscopes to provide visualization and access from two directions to address the patient's challenging and complex anatomy.

"This was a kind of Hail Mary attempt at a life-altering procedure using a combined endoscopic technique to meet the patient's unique needs," explains Dr. Haber. While gastroenterologists approached the site of the staples via ERCP, interventional radiologists used percutaneous biliary endoscopy to access the site from the opposite side. The two teams then used endoscopy to pass thin wires through the staple line and create a new pathway to place a tube to re-establish drainage from the bile duct to the bowel. "The area has now re-grown, with the body healing around the new drain so it bypasses the staple line and drains to the bowel," says Dr. Haber.

Future Investigation

The use of percutaneous biliary endoscopy is likely to continue to grow and diversify as physicians test new ideas for improving on current percutaneous biliary endoscopy techniques or treating other conditions that are not being optimally managed using other available treatments. The first category includes a refinement to percutaneous biliary endoscopy laser treatment of benign biliary strictures that Dr. Srinivasa recently explored for the first time during the PEBBL trial. "I had noticed that the literature for ureteroenteric anastomoses included discussion of the injection of an anti-inflammatory steroid after laser treatment of existing scar tissue to inhibit the formation of new scar tissue from the laser procedure," explains Dr. Srinivasa. To explore the utility of injecting steroid — in this case triamcinolone — through the endoscope at the level of the anastomosis, Dr. Srinivasa was forced to improvise as no needles were available to reach the stricture through the biliary endoscope. "I kind of 'MacGyvered' an endobronchial ultrasound biopsy needle to create a way to inject at the anastomosis," says Dr. Srinivasa. "It wasn't straightforward."

The patient did not develop a recurrent stricture, but Dr. Srinivasa's inquiry was intended only to test the concept for benign biliary strictures. The technique would have to be studied with a far greater number of patients, and a more suitable needle would have to be developed before steroid injection could be considered part of any standard of care for benign biliary anastomoses.

Cryoablation increasingly used to treat multifocal lung cancer

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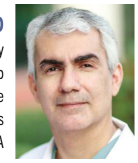


The detection of early-stage lung cancer has increased over the past decade. This is due in part to increased lung cancer screening and use of CT scans. U.S. Preventive Services Task Force recommendations on lung cancer screening — which call for annual screening with low-dose computed tomography of adults ages 50 to 80 who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years — have contributed to increased detection of early-stage lung cancers, including a cohort of patients diagnosed with multifocal primary lung cancers. These include synchronous multifocal lung cancer — multiple primary lung cancer lesions detected at the same time — as well as metachronous lung cancer, in which patients have had lung cancer treated and later present with new, primary lesions in other areas of the lungs.

CT suite with Interventionist performing cryoablation under CT guidance. The patient is under moderate sedation, so is awake and responding to commands.

The presence of primary lesions in multiple locations in the lungs figures significantly in treatment decision-making. Preserving surrounding healthy lung tissue takes on increased significance when treating multiple locations within the lungs, especially for patients whose breathing or overall health is already compromised by other unrelated conditions.

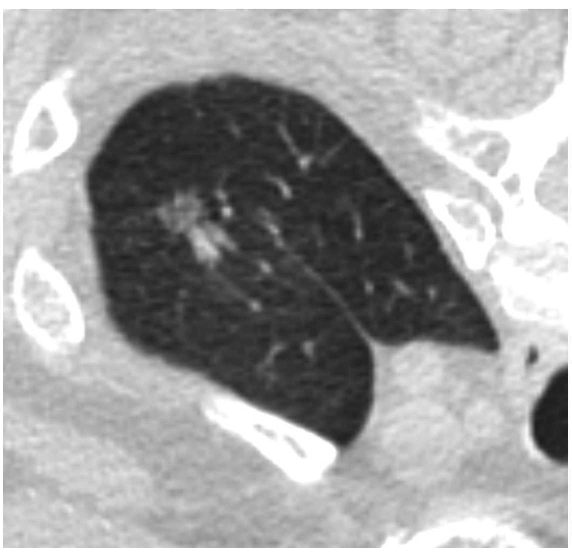
Image-guided percutaneous ablation is an effective treatment option for multifocal lung cancer patients, as well as for other lung cancer patients who are not good candidates for resective surgery. "Lung cancer ablation is a treatment option that I've been providing to an ever-increasing group of patients with lung cancer," says Fereidoun Abtin, MD, professor of radiology, at the joint Cardiothoracic and Interventional Section at the David Geffen School of Medicine at UCLA. While Dr. Abtin and his UCLA colleagues have used ablation in treating lung cancer for many years, indications for its use have expanded to include multifocal lung cancer as recognition and acceptance of the modality has increased. "Over time, the other members of our multidisciplinary team — including surgeons, oncologists and radiation oncologists — have increasingly recognized the role of ablation, so we get these patients earlier on and are able to locally destroy the cancer cells and control local tumors. It's a service that we can offer to patients at UCLA that many other centers don't."

Dr. Abtin emphasizes, "The value of this procedure is the fact that patients don't lose lung function, and the ability to do multiple treatments in patients. There are a handful of patients who have had 10 or 15 lung cancers ablated and they're doing fine. One of my patients ran a marathon two weeks after her ablation."

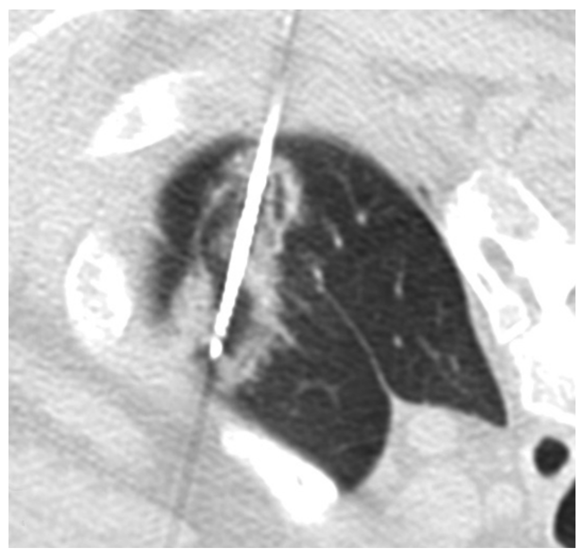
Most ablations on lung cancer patients at UCLA are cryoablations, which are performed primarily as outpatient procedures without use of general anesthesia. Under conscious sedation and local anesthesia, the cryoprobe is percutaneously introduced inside the tumor using CT guidance. Compressed gas is circulated to the cryoprobe, where its rapid expansion within the probe produces extremely low temperatures. Multiple freeze/thaw cycles can be used to destroy the targeted cells. While only one tumor is treated per outpatient session, multiple sessions can be scheduled to treat additional tumors. Following the ablation procedure, patients are observed, typically for two to four hours, and barring any problems during this observation period, are able to go home. "More than 90% of our patients are able to go home on the same day," says Dr. Abtin. "The remaining 10% includes patients with a single lung, those with serious comorbidities and patients who live too far from our center to return home the same day."

UCLA interventional radiologists use other ablation modalities in addition to cryoablation. "We also use microwave ablation, radiofrequency ablation and irreversible electroporation," states Dr. Abtin. The amount of time it takes to perform the ablation procedure varies with the ablative modality used, but is on the order of 45 to 90 minutes. The most common complication of percutaneous lung tumor ablation is air leak, which calls for the placement of a chest tube. This is most common among patients who have been heavy smokers. The majority of these patients are also able to return home on the same day.

When Dr. Abtin and his colleagues in the Cardiothoracic and Interventional Section reviewed their lung tumor ablation cases for 2015-16, the most recent year for which five-year survival data was available, they found that patients who underwent ablation for multifocal lung cancer showed a five-year survival rate above 95%. This favorable survival data included patients who had two or three ablations done, and also those who had four or more primary lung cancers treated with individual ablation procedures. "This speaks to the fact that if you treat these patients before these tumors become larger, and before they become invasive, you're able to control the progression of these tumors. None of these patients became respiratory cripples, none required long hospital stays or developed major complications," says Dr. Abtin. The recurrence rate for this group of patients was less than 4%, and all those with recurrences were able to be re-treated, in most cases with another percutaneous ablation procedure. R



A nodule in the left upper lobe of the lung in a patient with multiple lung cancers. She had undergone surgery in the past, but developed seven new lung cancers. This is one of the cancers that was abated using cryoablation.



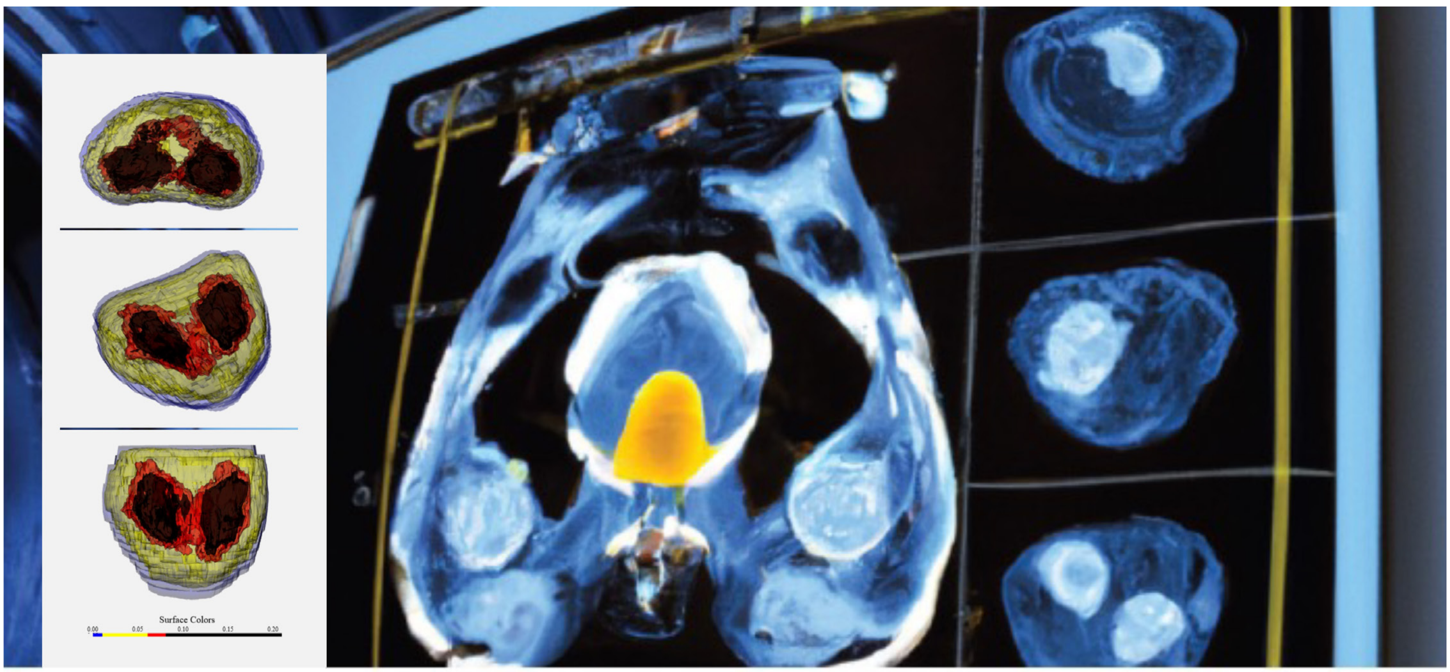
A probe was placed into the tumor, which generated ice that engulfed the tissue. Cancer cells die immediately at the time of ablation. The patient was sent home with an adhesive bandage covering the site of access and was back on her conference calls the next day.

"More than 90% of our patients are able to go home on the same day," says Dr. Abtin. "The remaining 10% includes patients with a single lung, those with serious comorbidities and patients who live too far from our center to return home the same day."

Prostate tumor location atlas can contribute to more individualized targeting of biopsy cores

Grace Hyun J. Kim, PhD, MS
Assistant Professor
Co-director, Center for Computer Vision and Imaging Biomarkers
Dept of Biostatistics, Fielding School of Public Health at UCLA
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

The UCLA Center for Computer Vision and Imaging Biomarkers Lab (CVIB) — with the Integrated Knowledge Database (IKD) — is advancing a personalized medicine approach to prostate cancer imaging that aims to improve targeting of biopsy cores and increase the detection of clinically significant prostate cancer. CVIB has developed a voxel-wise Subpopulation Prostate Atlas (vSPA), and is researching its use as an interactive tool for visualizing the prevalence of prostate cancer lesions. The tool is centered on a probabilistic map that was created in IKD using data from a population with clinically significant prostate cancer, yielding a personalized predictive map for identifying the location of secondary lesions that go undetected on MRI.



A voxel-wise Subpopulation Prostate Atlas (vSPA) showing age < 65, PSA in (4, 10), white, non-Hispanic

Researchers used histopathology findings and clinical and demographic data from over 800 de-identified UCLA patients who had undergone radical prostatectomy to construct a digital atlas showing the prevalence of prostate tumors by location. The clinical and demographic data included age, prostate-specific antigen (PSA) level, race and ethnicity. These variables can be used to interactively query the atlas database to produce customized maps of probabilistic tumor locations that match the individual characteristics of each patient.

The pathology-based atlas is matched to annotated MRI images of each prostate to correlate confirmed cancerous lesions with their corresponding MRI images. Because there are physical differences in the size and shape of the prostates being studied, as well as differences in how the MRI images are acquired, MRI data is registered, or conformed to a virtual "average prostate" for the purposes of the model using artificial intelligence. A mixed effect model was used to evaluate the spatial distributions of voxel-wise lesion prevalence between the atlas and known risk factors of Gleason score and tumor stage. Individualized vSPA was plotted for visualization using the clinical and demographic variables, and the predicted probabilities by Bayesian inference were calculated.

CVIB's research indicated that spatial distribution of subpopulation maps were statistically different by Gleason score and tumor stages ($P<0.05$). Because the subpopulations show different tumor distributions, clinical and demographic data can inform personalized assessment of prostate tumor location and may yield better targeting of biopsy cores. The subpopulation atlas can be updated with new cases over time, which could yield better accuracy of subpopulation atlases and perhaps more granular subdivision of patient populations. R

RadiologyLive brings together physically disparate radiologists

Edward J. Zaragoza, MD
Professor of Radiology
Section Chief Acute Care Imaging
Vice Chair of Information Technology
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

As one of the most longstanding current faculty members in the Department of Radiology, Edward J. Zaragoza, MD, professor of radiology and IT clinical director, has been witness to a tremendous amount of growth within the department. "This used to be a small department where you knew everybody, and the footprint of the department was the B Level of the old hospital. Everything was in close, tight proximity, so it was quite easy to get a consult within just a few footsteps." The department has since grown very large, with many radiologists working in a geographically dispersed network of practices that spans from Palos Verdes to Santa Clarita and from downtown Los Angeles to Thousand Oaks.

One of the greatest challenges of working within so sprawling a department is that interactions that used to take place organically among colleagues who all knew one another and had frequent in-person encounters — both planned and through happenstance — now don't happen as often or as easily. "All the geographical diversity we've created spreads us very thin in terms of face-to-face communication," explains Dr. Zaragoza.

"To be a good radiologist, you need to be humble," continues Dr. Zaragoza. "When you look at an image you're reading and go 'This is unusual, but I'm not certain why it's unusual.' You want another set of eyes to look at it — you want an intradepartmental consultation.

"The truth of the matter is that really smart people get help when they need it," he explains. "Before I say something that might commit somebody to go to the OR, I want to be certain that we say the right thing. Patients always come first before my ego. I'll reach out to somebody I respect and we'll go over the case together and come up with the best possible diagnosis for that patient. We all lean on one another to be sure that the patients get the best possible care."

To address this challenge of having a large faculty practicing at many locations, UCLA Radiology implemented RadiologyLive, a technology solution based on Microsoft's Teams product. Teams had already been in use across the UCLA Health enterprise, and the Department of Radiology was taking advantage of such features as its ability to store reference materials to allow easy access to content such as tumor grading and disease staging standards. Most relevant to UCLA Radiology's need for intradepartmental communication and consultation, Teams also has a chat function along with voice and video conferencing functions integrated into the product's design.

Yet despite its promise as a tool for connecting UCLA radiologists with their colleagues, Dr. Zaragoza realized that Teams still lacked some key capabilities that would help make it ideal for intradepartmental collaboration. "I realized that if we could

train this application to know the subspecialty alignments of our radiologists, we could devise a query that could say, 'show me the acute care imaging faculty that are active on duty right now,' or 'who are my radiology colleagues on duty right now that I could reach out to?'"

Dr. Zaragoza and Dieter Enzmann, MD, Distinguished Professor of Radiology, Leo G. Rigler Chair, Department of Radiological Sciences, worked together to determine the desired functionality and appearance of a modified Teams environment and employed an outside IT firm to create custom code to included database integration that adds subspecialty information and scheduling data, extending Teams' functionality and enabling users within the department to see which of their colleagues are available in real time. This enhanced version of Teams, known as RadiologyLive was brought online about a year and a half ago.

RadiologyLive enables users to see lists of their colleagues by subspecialty and uses a color-coding system to indicate who is currently at their workstation and available for live interaction, who was recently available but may have temporarily stepped away, and who is currently unavailable. RadiologyLive links with

Outlook so it has access to each individual's daily calendar, and with QGenda, which the department uses to manage staffing at its many locations.

Once the user has identified a colleague who is available, they can use Team's native text, voice and video capabilities to communicate with them. Teams also provides image-sharing features that enable users to view images as they discuss them. "This technology allows us to do something that we used to do effortlessly when we were a small department," states Dr. Zaragoza. "With these tools, we can have the same level of consultation and collegiality even though we're widely distributed geographically."

Beyond its invaluable use in facilitating collaborations that help ensure that patients get the best care possible, Dr. Zaragoza points out another of RadiologyLive's benefits. "The ability to have a 'water-cooler conversation' with a colleague is very humanizing and helps to improve our sense of wellbeing. It invites us to have a sense of community within our department." R

DEPARTMENT HIGHLIGHTS AND UPDATES

In Memoriam: Richard "Rick" Steckel, MD

Our former UCLA Radiology chair and colleague, Richard J. Steckel, MD (Rick), passed away on June 20, 2024, at the age of 88.

Rick graduated *magna cum laude* with a BA in biochemistry from Harvard University in 1957, and went on to earn his MD from Harvard Medical School in 1961. He completed his radiology residency at Massachusetts General Hospital and served in the Public Health Service during the Vietnam War, where he completed a research fellowship at the National Institutes of Health.

He joined the UCLA Radiology faculty in 1967 in the Chest Section, where he became a professor of radiology. Rick served as department chair from 1994 until 2000, when he retired. During his career, he authored over 130 peer-reviewed articles and several books.

Rick had a significant impact on tertiary care at UCLA as the founding director of the Jonsson Comprehensive Cancer Center at UCLA from 1974 to 1994. Equally important, he was a co-founder of the Venice Family Clinic in Los Angeles, contributing to community health care.

After retirement, he moved to Santa Barbara and volunteered teaching radiology residents at the Santa Barbara Cottage Hospital. Rick was a lifelong violinist who played in youth orchestras, movie studios in Hollywood and chamber music groups, including a trio in his living room on the morning of his last day.

We who knew and worked with Rick offer our sincere condolences to his wife, Julie Raskin Steckel; his daughter, Jan Steckel; and his son, David Steckel. He leaves behind a community of colleagues, students and fellow musicians who were enriched by his generosity, sense of humor, intellect and compassion. His impact on UCLA Health is still felt today. R

Travis Gilchrist, MPH, named CAO of Department of Radiology

Travis Gilchrist, MPH, has been named the new chief administrative officer (CAO) of the Department of Radiology at UCLA. Mr. Gilchrist is an accomplished health care executive with a wealth of experience in health care management, business development and financial operations. He also serves as CAO of the UCLA Department of Radiation Oncology.

With his extensive experience managing clinical and research budgets, Mr. Gilchrist is well qualified to manage the financial and operational functions of the Department of Radiology. He has a proven track record in building and fostering strategic relationships with team leaders and health care managers, in overseeing lab and space expansion and in handling construction projects on campus.

Mr. Gilchrist has served as the Department of Radiology's interim CAO since May 2022. He has focused on financial and strategic assessments encompassing research, grants administration and purchasing support. His active leadership will help the department achieve its ambitious goals and carry out its missions across the institution and the surrounding community. R

Denise Aberle, MD

National Cancer Institute's Liquid Biopsy Consortium receives $4.6 million grant from NCI

Computed tomography is the current standard for finding suspicious masses in the lungs. However, imaging can often lead to the detection small pulmonary nodules, which can present challenges when discerning whether they're cancerous. UCLA and four other institutions — members of the National Cancer Institute's Liquid Biopsy Consortium — have received a $4.6 million grant from the National Institutes of Health to develop liquid biopsy technology for the early detection of lung cancer.

Liquid biopsy could serve as a noninvasive alternative, allowing physicians to determine the molecular makeup of a tumor without extracting tissue or performing surgery.

"The goal is to create a blood test that can be used in clinics to complement CT imaging assessment of lung nodules for cancer risk, helping doctors decide if and when further testing is needed," explains Denise Aberle, MD, professor of radiology in the David Geffen School of Medicine at UCLA and one of the principal investigators on the grant.

The grant will support work in developing technology called EFIRM-liquid biopsy, which detects markers indicating the presence and nature of cancer. Aberle and colleagues discovered a type of "ultrashort and single-stranded" DNA associated with the disease. They're hoping that the combination of such DNA, specific genetic changes, detailed imaging and other factors will allow them to detect lung cancer at its earliest stage.

Other members of the Liquid Biopsy Consortium are Massachusetts General Hospital, the University of Miami School of Medicine, Johns Hopkins and Yale. R

> Aberle and colleagues discovered a type of "ultrashort and single-stranded" DNA associated with cancer.

Kyung Sung, PhD, receives NCI Award to use AI to identify prostate cancer in Black men

A team of investigators from the UCLA Jonsson Comprehensive Cancer Center and the University of Alabama at Birmingham was awarded $2.8 million from the National Cancer Institute to develop an artificial intelligence model capable of improving the identification of prostate cancer in Black men, addressing a critical health care disparity.

Not only are Black men 50% more likely than white men to develop prostate cancer, they're also likely to experience a more aggressive form of the disease, leading to higher death rates when compared to white men.

Led by Kyung Sung, PhD, associate professor of radiology at the David Geffen School of Medicine at UCLA, a team of scientists will design AI models using racially associated MRI-based tissue characterization. In 2020, Dr. Sung and Holden H. Wu, PhD, associate professor of radiology, received a $2.7 million grant from the institute to develop new techniques to improve the quality of prostate magnetic resonance imaging and new artificial intelligence methods that use prostate MRI to assist cancer diagnosis.

Building on that work, Dr. Sung's current team hopes to help reduce the gap in diagnosing prostate cancer among men of different races. "By using MRI analysis specifically designed for each racial group, we hope this could help improve the detection of aggressive prostate cancer for all men, reducing racial disparities," says Dr. Sung. R

Michael Douek, MD, MBA, Vice Chair of Clinical Operations

Dr. Douek joined our faculty in 2007 as an assistant professor and in 2020 was appointed clinical professor of radiology. In 2011, he was appointed medical director of the Beach Imaging & Interventional Center, Santa Monica and in 2015 was also appointed the inaugural section chief of the newly created Oncology Imaging Section. Dr. Douek also served as a co-medical director of the Department of Radiology, Santa Monica-UCLA Medical Center & Orthopaedic Hospital. Dr. Douek has recently accepted the position of clinical vice chair.

Omar Sahagun, MD, Vice Chair of Community Patient Care

Dr. Sahagun joined UCLA radiology in 2016 as a member of the Acute Care and Abdominal Imaging Sections, and became the lead radiologist in the then-newly established UCLA Santa Clarita Imaging and Interventional Center. In June 2022, Dr. Sahagun was appointed North Valley regional medical director and was added to the department's Clinical Council. Dr. Sahagun has recently accepted the position of vice chair of community clinical care.

James Chalfant, MD, North Valley Regional Breast Imaging Director

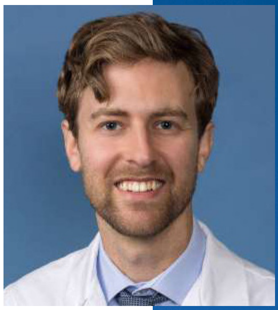
Dr. Chalfant join UCLA in 2020 an assistant professor in the Breast Imaging Section. He currently serves as the Mammography Quality Standards Act (MQSA) lead physician for breast imaging in the North Valley community breast imaging centers and has also assisted with clinical operations in the North Valley since April 2022. Dr. Chalfant has recently accepted the position of North Valley regional breast imaging medical director, overseeing clinical operations to ensure our breast imaging services continue to meet the highest standards of quality and safety.

Adam Plotnik, MD, Medical Director of Interventional Radiology at MLKCH

Dr. Plotnik is an assistant professor in the Interventional Radiology Section and is actively involved in the IVC Filter Clinic and the UCLA Fibroid Treatment Program. He played the pivotal role in establishing the interventional radiology service at Martin Luther King, Jr. Community Hospital (MLKCH) and was appointed lead physician in radiology there in 2016. He is the chair of the Diagnostic Services Committee and a member of the Medical Executive Committee at MLKCH. Dr. Plotnik has recently accepted the position of medical director of IR at MLKCH. This position and role represent important clinical contributions to our department's EDI program.

Lea Azour, MD, Director of Wellbeing

Dr. Azour served as the director of wellbeing in the Department of Radiology at the NYU Grossman School of Medicine, where she led various initiatives aimed at enhancing faculty wellbeing. She recently joined our department as an associate professor in the Cardiothoracic Section. Her dedication to the wellbeing of clinicians extends to the national stage where she serves as the chair of the Society of Thoracic Radiology Wellness Committee and is an active member of the National Academy of Medicine Action Collaborative on Clinician Well-being and Resilience. Dr. Azur recently accepted the position of director of wellbeing at UCLA Radiology, where her extensive experience, leadership and dedication will drive initiatives that prioritize the wellbeing of our faculty members.



Zachary Haber, MD, Medical Director at UCLA West Valley Medical Center

Zachary Haber, MD, has been named the inaugural medical director in the Department of Digestive Diseases at UCLA West Valley Medical Center.

Dr. Haber earned his bachelor of science in neuropsychology at the University of California, Santa Barbara, graduating Magna Cum Laude. He attended the New York University School of Medicine, where he was selected for the Alpha Omega Alpha National Medical Honor Society and the Gold Humanism Honor Society. After a transitional intership at Scripps Mercy Hospital in San Diego, Dr. Haber completed his diagnostic and interventional radiology residency at UCLA, receiving the Bruce Barack Teaching Excellence Award.

Dr. Haber joined UCLA, as Interventional Radiology Section as a faculty member. His areas of clinical and research focus include Y90 radioembolization for liver cancers, endoscopy for complex biliary pathology and embolization for treating enlarged prostates. Dr. Haber is dedicated to medical education at all levels, serving as the course chair of the interventional radiology medical student rotation at the David Geffen School of Medicine at UCLA and assistant program director of the interventional radiology residency independent pathway.

Anthony Christodoulou, PhD, Joins UCLA Radiology

Anthony G. Christodoulou, PhD, joins UCLA Radiology from his previous post at Cedars-Sinai, where he was associate professor of biomedical sciences and the director of Magnetic Resonance Technology Innovations for the Biomedical Imaging Research Institute.

He received his doctorate in electrical and computer engineering from the University of Illinois at Urbana-Champaign, and his bachelors and masters degrees in electrical engineering from the University of Southern California.

Dr. Christodoulou's research laboratory develops and translates novel magnetic resonance imaging (MRI) techniques through innovations in MR physics, machine learning and image reconstruction. His group's primary focus is on multidimensional quantitative imaging methods for the diagnosis, risk prediction and treatment monitoring of cardiovascular diseases and cancer.

His work on 4D cardiovascular MR (CMR) received the best-paper award at the 2011 IEEE Engineering in Medicine and Biology Conference. His work on multidimensional quantitative cardiovascular imaging, dubbed MR multitasking, received the 2016 Society for Magnetic Resonance Angiography (SMRA) E. James Potchen Award for Best Oral Presentation, was a finalist for the 2017 Society for Cardiovascular Magnetic Resonance (SCMR) Early Career Award and received the 2018 SCMR Clinical Seed Grant Award.

Dr. Christodoulou is an executive board member of the SMRA, a fellow of the SCMR, and a member of the ISMRM, IEEE, and AHA.

Kathleen Brown, MD, Named Interim Vice Dean for Education

Kathleen Brown, MD, FACR, will serve as the interim vice dean for education for the David Geffen School of Medicine at UCLA (DGSOM) effective April 1, 2024. Reporting to Dr. Steven Dubinett, Dr. Brown will work as a key member of the dean's leadership team to oversee educational programs at the undergraduate, graduate and post-graduate levels in the DGSOM. She will also provide leadership and guidance to the education office of the DGSOM.

Dr. Brown is professor of clinical radiology in the Cardiothoracic Imaging Section in the Department of Radiological Sciences. She holds dual board certification in internal medicine and radiology. She currently serves as vice chair for equity, diversity and inclusion in the Department of Radiological Sciences and assistant dean for justice, equity, diversity and inclusion for the David Geffen School of Medicine at UCLA. Dr. Brown is active in medical student and resident education and has served on numerous medical education committees at DGSOM. She is a past chair of the Applied Anatomy College and co-chair of the College Chairs Committee. She was honored to receive the Excellence in Education Award from the David Geffen School of Medicine in 2010 and the Serge and Yvette Dadone Clinical Teaching Award in 2018 "in recognition of outstanding dedication, innovation and sustained excellence in education."

Dr. Brown's interest in health care disparities has been demonstrated by previous service on the American College of Radiology Imaging Network (ACRIN) Special Populations Committee, composed of ACRIN researchers, research associates and advocates committed to improving diversity in participation in clinical trials in the United States. Her research interests include low-dose CT for lung cancer screening.

Gary Duckwiler, MD, Selected for UCLA Health Innovation Challenge Award

Gary R. Duckwiler, MD, professor and director of interventional neuroradiology, director of the INR Fellowship Program, co-director of the UCLA HHT Center of Excellence, was selected as an awardee of the UCLA Health Innovation Challenge Invent HealthTech Track for his project titled Vonova. Dr. Duckwiler received $25,000 in project funding with the award.

Vonova is a catheter-based platform to provide a less invasive and more accessible way to map the brain's activity and pinpoint the source of seizures. It can also deliver electrical stimulation to the brain to treat seizures and alter the disease cells.

RESIDENT AWARDS

Tyler Callese, MD

Resident Scholarship, Western Angiographic and Interventional Society Annual Meeting, Oct. 2023

Distinguished Laboratory Investigation Award, Journal of Vascular and Interventional Radiology, Dec. 2023

Savannah Fletcher, MD

UCLA Taylor Choy International Elective Award for Academic Excellence

Logan Hubbard, MD, PhD

RSNA Trainee Research Prize in Cardiac Imaging, 2023 - “Combining Coronary CT Angiography and Coronary Flow Capacity Measurement with a Low-Dose Comprehensive Cardiac CT Technique - Validation Versus Rb-82 PET”

Tracie Kong, MD

UCLA Taylor Choy International Elective Award for Academic Excellence

Shamaita Majumdar, MD

Certificate of Merit for Educational Exhibit - Seize the Day: Image-Guided Interventions in Epilepsy, ASNR, May 2023

Sipan Mathevosian, MD

John R. Bentson Award for Clinical Excellence

Mark McArthur, MD

2023 Stanley Baum Outstanding Poster and Exhibit Award at AUR

Jason Ni, MD

Vascular InterVentional Advances (VIVA) Physicians-In-Training Scholarship, 2023

David Reilly, MD

Bruce Barack Award for Teaching Excellence

Christopher Yu, MD, PhD

Gold Medal Award, Exhibit at ARRS 2023 American Roentgen Ray Society - A Primer on MR Imaging of Meniere’s Disease and Endolymphatic Hydrops

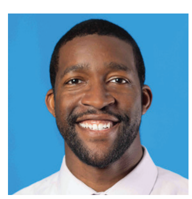
UCLA Taylor Choy International Elective Award for Academic Excellence

FELLOW AWARDS

Soheil Kooraki, MD

Recipient of 1st and 2nd place awards in UCLA Radiology research poster competition, Selected as vice chair of Early Career Committee of Society of Advanced Body Imaging (SABI-ECC)

Invited to serve on the Publications & Guidelines Committee of North American Society of Cardiovascular Imaging (NASCI)



Chukwuemeka Kingsley Okoro, MD

California Radiological Society - Presidential Award, Residents/Fellows Section

Puja Shahrouki, MD

UCLA Taylor Choy International Elective Award for Academic Excellence

RSNA Research & Education Foundation Roentgen Resident/Fellow Researcher Award

Chief Residents 2023-2024

Left to right: Tracie Kong, Phoebe Ann, Christopher Yu, David Reilly, Naomi Walker – Chief Residents 2023-2024

Phoebe Ann, MD

Phoebe is from Irvine, California. She studied at Caltech, where she developed a passion for analytical problem solving, math and physics. She completed medical school at Northwestern University in Chicago, after which she immediately returned back to the warm weather of LA. One of her life's biggest accomplishments is adopting and loving her dog Toto, who has transformed from a scared abused shadow to the sassy queen of the household. Phoebe hopes to facilitate academic growth and learning within this residency she loves, as well as foster opportunities for social networking and camaraderie.

Tracie Kong, MD

Tracie was born in Beijing, China and grew up in Plainsboro, New Jersey. She studied molecular biology at Princeton University and received the Sigma Xi Book Award. She decided to trade fruit flies (as model organisms, not pets) for a white coat, and attended Washington University School of Medicine in St. Louis, where she was inducted into the Gold Humanism Honor Society. Tracie continued her westward migration and completed an internship year at Scripps Mercy Hospital in San Diego before starting radiology residency at UCLA. Since moving to LA, she has enjoyed the food scene and also fulfilled her dream of getting an adorable puppy. Tracie looks forward to working with her wonderful co-chiefs and supporting the personal and professional growth of UCLA residents. After residency, she plans to pursue a pediatric radiology and pediatric neuroradiology fellowship.

David Reilly, MD

Dave was born and raised in Long Valley, New Jersey. He attended Bucknell University for undergraduate where he majored in neuroscience and studio art followed by a year of research at Columbia University. Dave attended medical school at Thomas Jefferson Medical College, after which he accepted a commission to Lieutenant in the Medical Corps of the US Navy. His internship was spent at Walter Reed National Military Medical Center. He was then sent to flight school, where he trained at the Naval Aviation Medical Institute and was a naval flight surgeon. His time in the Navy was served with the 12th Marine Air Group in Iwakuni, Japan, and Carrier Air Group Eleven aboard the USS Theodore Roosevelt. It was with great excitement that he joined

Chief Residents 2023-2024

UCLA as an Integrated Diagnostic and Interventional Radiology resident and is honored to be able to serve alongside Tracie, Naomi, Phoebe and Chris as chief. When not working, Dave enjoys painting, tinkering at his workbench or playing with his dog, Toad. Dave is grateful for the hard work of the outgoing chiefs and is excited by the opportunity to work with his co-chiefs to contribute to an already excellent program.

Naomi Walker, MD

Naomi is a Southern California native who grew up basking in the sunny warmth of the Inland Empire. She earned her bachelor of science in biology at the University of California, Irvine. She then earned her medical degree from the David Geffen School of Medicine at UCLA, where she was a recipient of the David Geffen Medical Scholarship. Naomi was overjoyed to continue her training as a radiology resident at UCLA, working alongside inspiring mentors and friends who continue to support her every step of the way. Following residency, she plans to continue her training with a fellowship in neuroradiology. In her free time, Naomi loves spoiling her two dogs (Tobi & Tessa), practicing yoga, and exploring the diverse culture of Los Angeles. As a chief resident, Naomi is committed to advocating for her peers and enhancing their residency experience at UCLA.

Christopher Yu, MD, PhD

Chris was born in Baltimore, Maryland. Before coming to UCLA, he was at the University of Pennsylvania in Philadelphia, where he earned his medical degree and doctoral degree in bioengineering. He does miss the Philly cheesesteaks, roast pork sandwiches and scrapple, but thinks LA street tacos are an adequate replacement. In-N-Out is also adequate. Chris and his wife spend most of their spare time watching YouTube videos suggested by the omniscient algorithm and sending each other Reddit links. He enjoys cooking various types of food and tries to keep his many house plants alive as practice for their future child. He's honored to be a chief alongside Dave, Naomi, Phoebe and Tracie, and aims to support all residents in the program and help maximize their training experience.

Recent Events

Dr. Join Luh (third from left) visited UCLA to present Interventional Radiology Grand Rounds in July of 2023.Pictured here with a group of radiology faculty, fellows and residents.

Recent Events

In August of 2023, the Radiology Department hosted the annual Welcome Reception. This event introduces new faculty, fellows and residents to the department. Pictured here is a group of adbominal imaging faculty and fellows.

Pictured here is a group of neuroradiology faculty and fellows, also at the department's annual Welcome Reception.

UCLA and the American College of Radiology hosted the 6th Annual Radiology Career Symposium in February of 2024. The goal of this event is to help introduce fellows, residents and medical students to a variety of career paths within the field of radiology. This year's event was hosted in a hybrid format at Ronald Reagan UCLA Medical Center.

Radiology Fellows 2023-2024

Abdominal Imaging / Cross Sectional IRg

Nazanin H. Asvadi, MD
Barry Bardia Golestany, MD
Alan D. Huynh, MD
Kevin Young Kim, MD
Christopher Lin, DO
Landon J. Melchior, MD
Samantha C. Phung, DO

Breast Imaging

Iris E. Chen, MD
Cheickna Fofana, MD
Claire A. Lis, MD
Adam E. Sierra, MD
Tiffany T. Yu, MD

Cardiothoracic Imaging

Cato Chan, MD
Joshua K. Sweigert, MD

Diagnostic Neuroradiology

Daniel Adran, MD
Charles B. Davis, MD
Brandon L. Gisi, MD
Joseph D. Saucier, MD
Puja Shahrouki, MD

Interventional Neuroradiology

Charles B. Beaman, MD
Keiko A. Fukuda, MD
Catherine Peterson, MD

Interventional Radiology

Samuel J. LaRussa, MD
Russell A. Reeves, MD, MS
Zhaoying Xian, MD

Musculoskeletal Imaging

Jonathan Lin, MD
Brian K. Ng, MD
Chukwuemeka K. Okoro, MD
Zaid I. Patel, MD

Pediatric Imaging

Soheil Kooraki, MD

Residents: Diagnostic Radiology Class of 2027

Supriya Bhupathy, MD
California University of Science and Medicine

Alexander Boyarko, MD
University of Cincinnati College of Medicine

Sundus Lateef, MD
West Virginia University School of Medicine

Linda Lu, MD
University of South Florida College of Medicine

Sana Malik, MD
Morehouse School of Medicine

Khoi Nguyen, MD
JS Weill Medical College, Cornell University

Wendy Qiu, MD
Creighton University School of Medicine

Megan Quan, MD
Saint Louis University School of Medicine

Hannah Riskin-Jones, MD
University of California, Los Angeles, Geffen School of Medicine

Jeffrey Rosenthal, MD
Emory University School of Medicine

Frank Salamone, MD
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