UCLA Health

UCLA Radiology

NEWSLETTER OF THE DEPARTMENT OF RADIOLOGICAL SCIENCES

WINTER 2018

Our Mission in Global Health

Chair's Message

Dieter Enzmann, MD
Professor of Radiology
Leo G. Rigler Chair
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

It is no surprise academic radiology departments such as ours are mobilizing to rapidly adapt to clinical changes by scaling up, implementing local/regional growth, increasing productivity, improving quality, and lowering costs. Academic radiology departments are, in fact, scaling up all of their missions to such a level that they may be more accurately termed "academic radiology systems." Combining our deep expertise in imaging, technology, sophisticated telecommunications, and machine/deep learning, UCLA Radiology seeks to make an even broader, meaningful international impact.

UCLA Radiology has always engaged in international resident education and in international research with other academic programs primarily in Europe and Asia. We have benefitted greatly from these international relationships. We are now broadening our participation in "world health" in conjunction with UCLA Center for World Health by building on initiatives pioneered in the Department by Dr. Maria Ines Boechat. Current "world health" initiatives are now expanding under the leadership of Dr. Kara-Lee Pool to improve basic diagnostic services in some of the poorest regions in the world. For example, our knowledge of diagnostic screening provides a strong foundation to create such services in developing countries. In that endeavor, ultrasound (US) technology offers many advantages including portability, ease of use and rapid adoption. Its increasing "miniaturization" combined with machine/deep learning can lower the barrier to practical, effective diagnostic use.

Interestingly, the process of modifying technology to make it simpler and easier to use in resource-limited environments can stimulate "reverse innovation" from which we can benefit as we move to lower costs. The features of "simple and less costly" are no less advantageous in our academic environment. Observing how those features accelerate learning and speed up adoption can inform our service delivery. The behavioral lessons learned from technology modifications to enhance ease of use to gain non-academic world effectiveness can be applied in our current, cost conscious environment. UCLA Radiology's "world health" initiatives, while clearly part of our educational outreach mission can concomitantly form a mutually beneficial clinical relationship to help practical, useful knowledge find its way back to us.

Academic radiology departments are, in fact, scaling up all of their missions to such a level that they may be more accurately termed "academic radiology systems."

Making a World of Difference Through Global Health Efforts

Kara-Lee Pool, MD
Assistant Professor-in-Residence
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

Among the serious obstacles to improving health care delivery in low- and middle-income countries (LMICs) is a lack of access to and expertise in radiology services. While accurate diagnosis is always crucial for effective treatment, in countries that are low on resources the need to avoid the waste of unnecessary treatments underscores the importance of diagnostic clarity. "Incorrect diagnoses lead to unnecessary treatments that not only fail to help patients, but also waste limited resources," explains Kara-Lee Pool, MD, Assistant Professor of radiology and creator of the UCLA Radiology Residency Global Health Pathway. "There is a growing need to implement sustainable radiology services in countries that lack robust health care resources."

UCLA Radiology has played an active role in improving radiology services in a number of countries. "Our goals include increasing capacity by expanding educational opportunities. We empower local health care workers to improve diagnostic accuracy using accessible diagnostic tools," states Dr. Pool. "Ultrasound, X-ray, mini-PACS systems and even CT and MRI can be implemented depending on the country's needs and resources."

Research is an important aspect of UCLA's global health efforts. "We try to test the way we teach; we also try to test the way we implement programs so we can continue to do better next time," explains Dr. Pool. "UCLA shares its research with others undertaking similar work so they can replicate and even improve upon our successes."

To achieve its aims, UCLA works on multiple levels to improve access and delivery of radiology services. Dr. Pool works with LMIC governments at the Ministry of Health level to ensure recognition of the role radiology can play. UCLA also works with large international organizations — including the World Health Organization and RAD-AID — to inform governments making important health care delivery decisions.

At the other end of the spectrum, UCLA experts work at the local level with clinics, international universities and local non-governmental organizations (NGOs) to improve radiology services.

Dr. Pool working alongside research coordinator Washifa Isaacs in South Africa.

Maintaining a focus on teaching, research, and international collaboration ensures that improvements in health care outcomes will be sustainable long after individual projects have ended.

To help UCLA radiology residents understand global health radiology needs and to enable them to apply their insights and energy to helping improve care worldwide, Dr. Pool established the UCLA Radiology Residency Global Health Pathway, a four-year residency pathway that offers advanced training in global health radiology.

The Global Health Pathway is intended to inspire residents to continue to do global health work when they graduate, but all participants benefit in ways that will help them throughout their careers. Experience in LMICs builds the residents' problem-solving skills, and learning to have success despite limited resources benefits them whether they continue to work in LMICs or practice radiology domestically in a variety of settings. They also have the opportunity to collaborate with others from different backgrounds and specialties.

UCLA radiologists have taken part in global health projects around the world, including South Africa, Malawi, Brazil, China, Guyana and India. In Malawi, UCLA radiologists collaborated with UCLA Department of Medicine physicians to implement point-of-care ultrasound at three clinics to assist in the diagnosis of extrapulmonary tuberculosis. The program — which trained local health care providers to acquire and interpret ultrasound images — was so successful that the government of Malawi plans to implement UCLA's training program throughout the country.

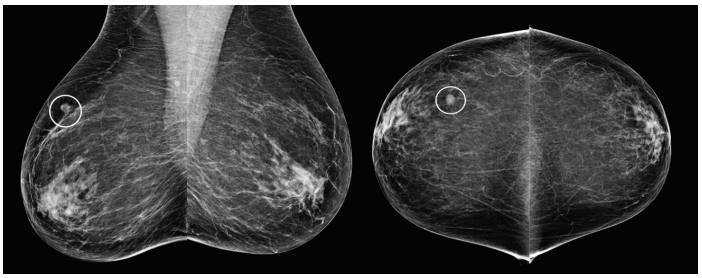
In South Africa, UCLA radiologists are collaborating with breast surgeons and breast radiologists to implement breast ultrasound in high volume surgical clinics in an effort to decrease the time to diagnosis and better triage patients to an appropriate treatment strategy.

Dr. Pool notes that much of the credit for UCLA Radiology's successes in global health goes to the support of colleagues who believe in the mission. "We are lucky to have a large radiology faculty — from our junior faculty up to our vice-chairs and chairman— who not only support these efforts and goals, but also contribute their time and expertise to global health."

Breast Cancer Risk Assessment Advised by Age 30 for Potential Early/Supplemental Screening

Anne C. Hoyt, MD
Professor of Radiology
Chief, Breast Imaging
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

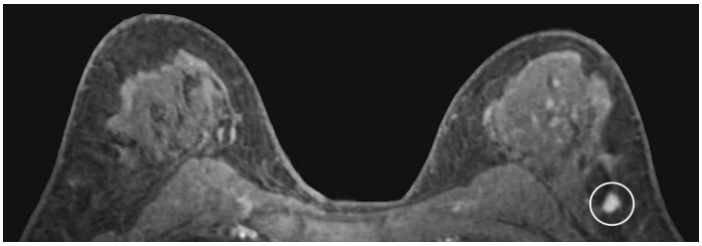
Although breast cancer continues to be the second-leading cause of cancer death among women in the United States, screening mammography has made a significant impact by identifying early, treatable cancers. Since the introduction of widespread mammography screening in the mid-1980s, the U.S. breast cancer mortality rate has declined by as much as 40 percent, after the rate had remained largely unchanged over the previous four-plus decades.



Bilateral screening mammography in an asymptomatic woman detects a 9 mm unsuspected invasive ductal carcinoma in the right upper outer quadrant (circled).

"Screening mammography decreases the number of deaths, extends life expectancy, and results in improved quality of life for women," says Anne C. Hoyt, MD, UCLA clinical professor of radiology and medical director of breast imaging. "It results in less extensive surgeries, fewer mastectomies, and less frequent or aggressive chemotherapy." For that reason, Dr. Hoyt notes, there is widespread agreement that for average-risk women, annual screening mammography beginning at age 40 and continuing until the patient has a remaining life expectancy of 5-10 years saves the most lives.

For high-risk women, Dr. Hoyt says, there can be a benefit to beginning annual screening at a younger age, and utilizing supplemental screening approaches. Therefore, the American College of Radiology now recommends that all women — especially black women and women of Ashkenazi Jewish ancestry, two groups known to have higher breast cancer rates — be evaluated for breast cancer risk by age 30 so that those identified as being at elevated risk can benefit from supplemental screening earlier in their lifetimes.



Supplemental screening MRI reveals an unsuspected 6 mm irregular, homogeneously enhancing mass (circle) in the lateral left breast of a 44-year-old woman with a elevated risk for breast cancer and negative screening mammography. Subsequent biopsy showed invasive ductal carcinoma.

Dr. Hoyt explains that the risk assessment weighs many factors, including a family or personal history of breast and/or ovarian cancer, density of breast tissue, ages at first menstrual cycle and first child, and any prior biopsies showing atypia. For women with a genetics-based increased susceptibility, a calculated lifetime risk of 20 percent or higher, or a history of chest or mantle radiation therapy at a young age, annual mammography and supplemental screening with contrast-enhanced breast MRI is usually recommended, beginning at age 30 — or as young as 25 for certain higher-risk cases. "Screening mammography is a proven exam, but it's imperfect and doesn't find all breast cancers," Dr. Hoyt explains.

She notes that compared to traditional two-dimensional mammography, digital breast tomosynthesis — 3D mammography — finds approximately two additional cancers per 1,000 cases, a significant number considering that 2D mammography finds 5-6 per 1,000. In addition to 2- or 3D mammography, high-risk women ideally should undergo annual supplemental MRI screening. "MRI is the most sensitive test for detecting breast cancer," Dr. Hoyt explains. "Supplemental screening breast MRI picks up 15-16 more cancers than mammography per 1,000 women screened, and when an abnormality is found on an MRI, 20-35 percent of the biopsies show cancer."

Ultrasound can be helpful as a supplemental screening modality for high-risk women who choose it over MRI — whether because of cost, insurance, the desire to avoid contrast injection, or for medical reasons. But Dr. Hoyt notes that although screening ultrasound detects 3-4 additional cancers per 1,000 patients, the false-positive rate is high.

Dr. Hoyt emphasizes that high-risk women should be counseled on the risks and benefits of early and supplemental screening. Potential risks include radiation exposure, overdiagnosis, false positives and unnecessary biopsies. Dr. Hoyt points out that radiation exposure is minimal and has gotten lower over time; the issue of overdiagnosis tends to be confined to low-grade ductal carcinoma in situ cancers; and although about 10 percent of women are recalled for further evaluation and 1-2 percent end up having a biopsy after a screening mammogram, the complication rate from minimally invasive core needle biopsy is less than 1 percent. "Nearly all women who have had false-positive mammography are still endorsing screening," Dr. Hoyt notes.

Lung Cancer Screening Now Recommended for Certain High-Risk Patients

Denise R. Aberle, MD
Professor of Radiology and Bioengineering
Vice Chair for Research
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

Compelling evidence of the benefits of lung cancer screening for high-risk patients has led to the development of national recommendations for low-dose computed tomography (LDCT) to screen and follow-up high risk patients who meet eligibility criteria. As one of the original sites of the National Lung Screening Trial (NLST), one of two randomized trials upon which lung cancer mortality reductions with LDCT have been shown, UCLA has offered screening since the early 2000s, and the UCLA Lung Cancer Screening Program continues to be a leader in evaluating, counseling, screening and treating appropriate patients.

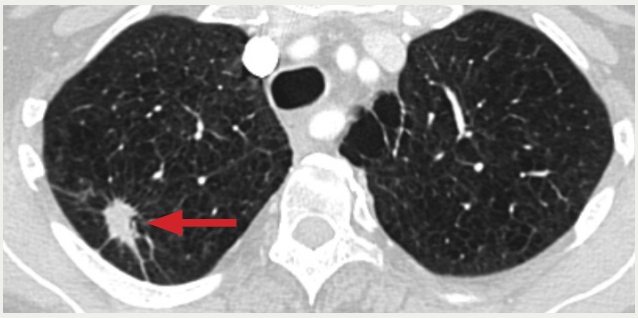
Both the NLST and the Dutch-Belgian Randomized Lung Cancer Screening Trial (which goes by the Dutch acronym NELSON) have found that LDCT screening of high-risk patients is effective both at finding early cancers and reducing the number of late-stage cancers. "This is the first time that not just one, but two large trials have shown that screening reduces lung cancer mortality," says Denise R. Aberle, MD, UCLA professor of radiology and bioengineering, and co-director of the UCLA Lung Cancer Screening Program.

Without screening, Dr. Aberle notes, most lung cancers are found either incidentally, or in patients who develop symptoms, by which time they are likely to have advanced disease. Lung cancer continues to be the leading cause of cancer death in the U.S. for both men and women.

The NLST results, published in 2011, resulted in similar recommendations by both the U.S. Preventive Services Task Force (USPSTF) and Centers for Medicare & Medicaid Services (CMS). Screening is a covered benefit in asymptomatic individuals 55 to 80 years (USPSTF) or 55 to 77 years (Medicare). Individuals may be current or former smokers with a minimum 30 pack-year cigarette smoking history (pack-years are the product of packs of cigarettes smoked per day multiplied by total years smoked) and former smokers must have quit within the preceding 15 years. The guidelines stress that screening should occur at a multidisciplinary center that can provide follow-up care, such as UCLA.

Patients who fall within these guidelines can be referred to the UCLA Lung Cancer Screening Program, where they participate in a shared decision making visit (a requirement for reimbursement) that includes counseling on both the benefits and potential risks of screening. Potential risks include false-positive results that may precipitate unnecessary additional testing, expense, anxiety, and potential complications, as well as overdiagnosis and radiation exposure.

Documented shared decision making adds to the burden of referring patients for screening, and many clinicians don't have time or are unaware that this must be fully documented in the electronic medical record as a requirement for screen reimbursement. For this reason, the first screening exam now mandates a referral to the UCLA Lung Cancer Screening Program. This referral will ensure shared decision making, protect patients from denial of screen reimbursement, and save providers considerable time.



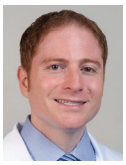
Older, asymptomatic former heavy smoker who was referred for lung cancer screening. There is a solid, spiculated nodule in the right upper lobe. This proved to be an early stage primary lung adenocarcinoma. Following resection, the patient is without evidence of recurrence or metastatic disease.

Regarding risks, Dr. Aberle notes that false positives have been substantially reduced since the threshold for a positive screen was increased. "The majority of nodules we see are small and require no immediate follow-up," she says, "and in cases of larger nodules, the recommendation is most often simply a short-term follow-up to make sure the nodule hasn't changed." Patients are informed of the potential for overdiagnosis — the discovery of cancers that either wouldn't be lethal or would unlikely be the cause of death due to other significant comorbidities. The potential risks of radiation are discussed, though among high-risk patients the radiation exposure with contemporary LDCT is small relative to the benefits of early lung cancer detection.

Independent of screening, smoking cessation counseling is an essential part of shared decision-making. "We spend at least half of decision making on that," says Brett Schussel, NP, who is nurse practitioner and co-director of the program. "It's an opportunity to help patients consider the effects of smoking on their overall health, and to encourage a path to quitting. We provide nicotine replacement, other pharmacotherapy, and follow-up counseling to help patients quit smoking. If we achieve only higher smoking cessation rates, the program has already provided patients a huge service."

Musculoskeletal Ultrasound Offers Unique Advantages

Benjamin D. Levine, MD
Associate Clinical Professor of Radiology
Director, Musculoskeletal Interventions
Department of Radiological Sciences
David Geffen School of Medicine at UCLA



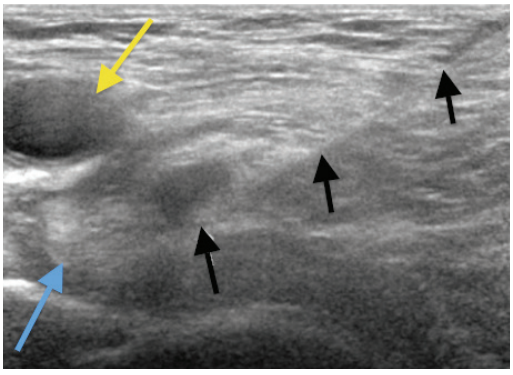
Each of the imaging modalities available to radiologists providing care for patients with musculoskeletal pathologies has its own strengths and limitations. In the United States, musculoskeletal ultrasound is currently seeing increased utilization and it is likely to continue to grow as physicians become more familiar with its unique capabilities and advantages.

Musculoskeletal disorders include a large and varied group of pathologies that contribute significantly to the cost burden of health care. Health care systems are constantly being challenged to find cost effective ways to provide evidence-based care to patients, and ultrasound is emerging as such a modality in musculoskeletal imaging.

High spatial resolution and dynamic imaging

Technological improvements have led to ultrasound transducers that now produce better quality images at significantly higher resolution. In fact, current ultrasound transducers offer a higher spatial resolution — measured in the number of pixels used to make up a digital image — than does magnetic resonance imaging (MRI). This has led to increased utilization of ultrasound for many musculoskeletal diagnoses where MRI was previously considered the imaging modality of choice.

"Studies have shown that ultrasound has accuracies equivalent to MRI for many musculoskeletal diagnoses," states Benjamin Levine, MD, associate professor of radiology, "one in particular being rotator cuff tears of the shoulder." The current medical literature supports ultrasound and MRI being equally accurate in diagnosing full- and partial-thickness tears of the rotator cuff. In fact, the Society of Radiology and Ultrasound published a consensus statement at their 2013 conference that musculoskeletal ultrasound should be the primary examination performed for patients with suspected rotator cuff tears.



Transverse ultrasound image over the anterior hip shows real time ultrasound guidance of the needle (black arrows) to the iliopsoas bursa around the tendon (blue arrow). The use of ultrasound guidance allows accurate placement of the needle to the desired location, while safely avoiding critical structures, such as in this case the femoral artery (yellow arrow).

In addition to offering high resolution, the dynamic capabilities of ultrasound imaging make it more suitable than other imaging modalities for a number of uses. For example, some pathologies are elicited only when performing certain dynamic maneuvers, such as with flexion of the hip or abduction of the arm. Unlike other modalities, ultrasound enables real-time imaging as a patient performs certain maneuvers or positions. "Dynamic imaging capabilities coupled with greater spatial resolution have contributed to increased ultrasound utilization at UCLA for musculoskeletal disorders," says Dr. Levine.

The dynamic imaging capability of ultrasound also makes it ideally suited for performing image-guided procedures, including aspirations and injections. Fluid can be aspirated from a joint, tendon sheath or bursa, for example, in cases of suspected infection or inflammatory processes such as gout or rheumatoid arthritis. Ultrasound-guided injections can also be performed for introducing contrast for an MRI arthrogram, or injecting platelet-rich plasma or stem cells.

Novel procedures using musculoskeletal ultrasound

UCLA radiologists are also using musculoskeletal ultrasound in more innovative ways that take advantage of its high spatial resolution and dynamic capabilities. For patients with calcific tendinosis — particularly in the shoulder — musculoskeletal ultrasound is being used in an irrigation and lavage procedure to remove the calcium and alleviate pain. The procedure is used as a minimally invasive treatment alternative to surgery. Ultrasound guided techniques enable the musculoskeletal radiologist to be highly accurate in targeting calcium deposits for treatment.

Another unique use of musculoskeletal ultrasound at UCLA is in the diagnosis and management of snapping hip syndrome, which involves abnormal and abrupt movement of the iliopsoas tendon, iliotibial band or gluteus muscle around the hip. "The exact cause of someone's hip pain can be quite an elusive diagnose to make," says Dr. Levine. "There are many different causes of hip pain, and snapping hip is one that is often not thought of." UCLA radiologists employ dynamic ultrasound visualization of the abnormal movement of the iliopsoas tendon during hip motion followed by an injection into the bursa surrounding the tendon. This procedure has been shown to be safe and effective in determining if the hip pain is being caused by tendon snapping, allowing treatment management to be tailored accordingly.

David Geffen School of Medicine

9th Annual UCLA Musculoskeletal Ultrasound Course and Hands-on Workshop

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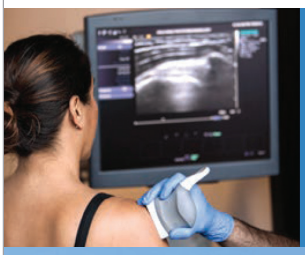

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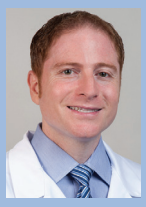

Benjamin D. Levine, MD
Associate Clinical Professor of Radiology
Director, Musculoskeletal Interventions
Musculoskeletal Imaging
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

Clinical Co-director

Kambiz Motemedi, MD
Professor of Radiology
Director, Beach Imaging & Interventional Center
Musculoskeletal Imaging
Department of Radiological Sciences
David Geffen School of Medicine at UCLA

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DEPARTMENT HIGHLIGHTS

UCLA Radiology Breast Interventional Scheduling Team

From left: Glenda L. Lobo, Yesenia Evangelista, Myrna Alvarez, and Jorge Lara

The UCLA Radiology Breast Interventional Scheduling Team collaborates with our radiologists, mammographers, and sonographers to ensure patients get the right procedure at the right time. Based at 200 UCLA Medical Plaza in Westwood, the team schedules breast mammography, breast ultrasound, and breast IR procedures. To ensure that the patient receives the most appropriate service, the team routinely collects past images and clinical history to collaborate with the clinic team. The Breast Interventional Scheduling Team supports breast diagnostic studies and procedures in Westwood, Santa Monica, Manhattan Beach, Santa Clarita, Thousand Oaks and Palos Verdes. To learn more, go to *http://radiology.ucla.edu/breast*

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Department of Radiological Sciences
405 Hilgard Avenue
Los Angeles, CA 90095

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Silviya Aleksiyenko, MPA
Director of Development
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saleksiyenko@support.ucla.edu
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Leila Farzami

WRITERS
David Barrad
Dan Gordon

DESIGN
SD Graphics

Contact us at:
RadNewsletter@mednet.ucla.edu

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