UCLA Health

# UCLA Radiology

NEWSLETTER OF THE DEPARTMENT OF RADIOLOGICAL SCIENCES

SPRING 2018

# Image-guided Treatments

**Dieter Enzmann, MD**
Professor of Radiology
Leo G. Rigler Chair
Radiological Sciences

The remarkable success of radiology has generated the not uncommon question: What is the future of radiology? Historical success was driven by dramatic improvements in diagnostic capabilities in MR, CT, X-ray, and US. Success calls to mind Charles Handy's quote: "The world keeps changing. It is one of the paradoxes of success that the things and the ways which got you where you are, are seldom those that keep you there." What are the new ways? The last newsletter highlighted machine learning as one way.

Pablo Picasso provides further insight: "Success is dangerous. One begins to copy oneself, and to copy oneself is more dangerous than to copy others. It leads to sterility." An enticing opportunity for radiology to not copy itself is to innovate and expand delivery of image-guided, minimally invasive treatments (IgRx) for common health problems. This requires a re-balancing of strategic direction between our well-established diagnostic component and interventional radiology (IR). Our Department employs the strategy of closely linking diagnostic imaging with image-guided therapy. More closely linked treatments offer UCLA Radiology very effective, direct contact with patients. While there are several possible futures for radiology as a specialty, those that include direct patient contact are more favorable ones.

Being a local treatment, IgRx can play an innovative role in "precision medicine." In this context, IgRx requires new skill sets and additional funds of knowledge. The new IR training program recognizes this development. In addition, IR is continuing to organize into two sub-specialty areas, including vascular IR, oncologic IR, and image-guided pain management to match the increasing sophistication of these medical treatment domains. This newsletter provides excellent examples of such sub-subspecialty services.

IgRx will extend beyond anatomic guidance to consider physiologic, molecular, and genetic information. IgRx will be refined to include "image information-guidance," meaning imaging skills must be at a high level. As this happens, new image-based information will be integrated with drug, device, and energy delivery to guide and monitor treatments tailored to patients.

The Department is aligning itself with another major healthcare trend, that of moving care into outpatient settings. The Department is translating and moving sophisticated diagnostic CT and MR imaging into our comprehensive community imaging centers. Concomitantly, we are moving vascular and oncologic IgRx from the usual hospital settings to outpatient venues as we firmly established both their quality and safety. Our new comprehensive community imaging centers are well equipped for the Department to focus on delivering three key services: vascular, oncologic, and pain image-guided treatments. The future of radiology indeed looks bright when its diagnostic and treatment arms are not only closely linked, but when IgRx can be performed in a variety of venues, convenient and safe for patients. The strategy adds differentiated value to UCLA Radiology and UCLA Health.

An enticing opportunity for radiology to not copy itself is to innovate and expand delivery of image-guided, minimally invasive treatments (IgRx) for common health problems.

# Two Thermal Ablation Therapies Treat Pain from Bone Metastases

**Scott J. Genshaft, MD**
Director of Community Outpatient Interventional Radiology
Assistant Clinical Professor of Radiology

UCLA has established a clinical program using thermal ablation to provide palliative care to patients who suffer uncontrolled pain from bone metastases. Two different technologies are utilized — cryoablation and Magnetic Resonance-guided Focused Ultrasound (MRgFUS). Uniquely among interventional radiology cancer therapies, these thermal ablation procedures aim not just to slow or reverse tumor growth, but to reduce pain as much — and for as long — as possible.

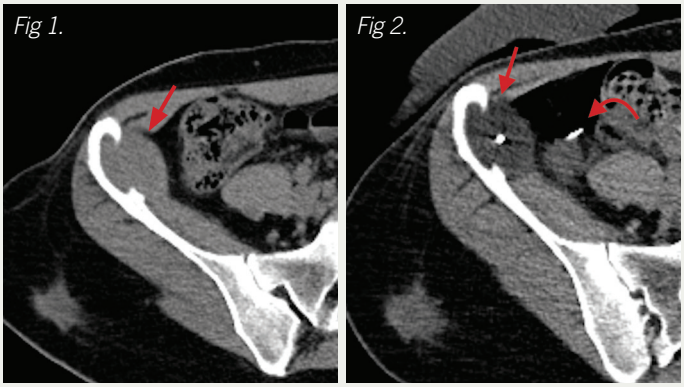



*Fig 1. Patient with a history of metastatic thyroid carcinoma with a painful right iliac metastasis (red arrow) refractory to radiation and chemotherapy. Palliative cryoablation of the lesion was performed with a single probe. Fig 2. A low-density ice ball encompasses the entire lesion (straight red arrow). A catheter was inserted (curved red arrow) to displace the adjacent colon with air and saline. Following the ablation, the patient experienced a significant decrease in pain.*

"Eighty percent of cancer patients who develop metastatic disease ultimately develop bone metastases," says Scott Genshaft, MD, assistant professor of radiology. "Half of the patients with bone metastases at some point in their disease have uncontrolled pain."

Both ablative procedures are well tolerated and can provide early and durable relief of pain symptoms, usually within a week and sometimes immediately. Palliative thermal ablation can ease suffering during a long battle with cancer or at the end of life while reducing or eliminating the need for narcotics.

Both cryoablation and MRgFUS have been studied at UCLA as part of multicenter clinical trials. The Multicenter Study of Cryoablation for Palliation of Painful Bone Metastases (MOTION) employed cold-based ablation therapy delivered directly to the targeted tissue using a cryotherapy probe. The interventional radiologist first determines that the patient's pain is related to a known site of metastatic disease and marks the treatment location. Under guidance of CT, ultrasound or both, a probe cooled to extremely low temperatures by circulated gas is used to selectively freeze the targeted tissue. The treatment is performed as an outpatient procedure in the hospital under moderate sedation.

An advantage of cryoablation over thermal ablation procedures that use heat to destroy tissue is that cryoablation is less painful and does not require general anesthesia. "Instead of being activated by heat, the nerves are numbed by cold temperatures," explains Dr. Genshaft. "We're able to not only kill the majority of the tumor in the target area, but also the nerves that are transmitting the pain signals."

Another study in which UCLA is participating uses focused ultrasound energy (MRgFUS) to ablate tumor and nerve cells without the need to introduce any probes into the patient's body. The Magnetic Resonance-guided High Intensity Focused Ultrasound for Palliation of Painful Skeletal Metastases trial is a stage IV multicenter study that is currently enrolling patients.

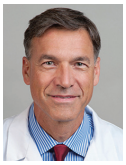
The interventional radiologist marks the target area corresponding to a known area of metastatic disease. Using ultrasound guidance, the physician performs a nerve block with a long-lasting anesthetic. After an anesthesiologist administers general or monitored anesthesia care, the patient is positioned in an MRI scanner over an array of ultrasound transducers that deliver the ablative energy to the tumor without the need for any device to be placed inside the patient's body. MRI is used to guide the ultrasound treatment and to perform real-time thermal mapping of the target area to confirm the ablation's success. The MRgFUS treatment is performed in an outpatient setting.

"The MRgFUS treatment is exciting because it has the potential to help many new patients," says Dr. Genshaft. "The non-invasive treatment appeals to patients, and with this therapy we can offer patients another alternative to radiation therapy." Dr. Genshaft also points out that MRgFUS has already won FDA approval for this indication.

"Both of these treatments can eliminate pain or reduce it to a level that allows for a very good quality of life," states Dr. Genshaft. Both can be repeated if needed to treat the same focal trigger point of disease, or focal points that are unmasked after a successful initial treatment. Dr. Genshaft and his colleagues are available for consultation for all patients who are suffering from pain due to their bone metastases to evaluate whether they may benefit from these therapeutic procedures.

# Image-Guided Procedure Effective in Treating Pain Caused by Pudendal Neuralgia

**J. Pablo Villablanca, MD, FACR**
Professor, Diagnostic Neuroradiology
Director, Interventional Spine Service
Medical Director of MRI



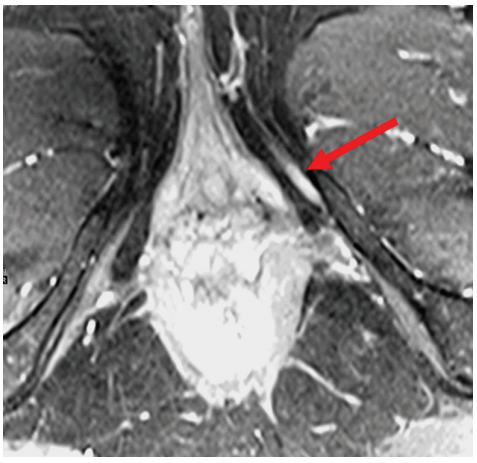
Pudendal neuralgia produces burning pain and hypersensitivity of the external genitalia and perineum. The condition is caused by inflammation of the pudendal nerves and is usually invisible on medical imaging. When conservative therapies fail, pudendal nerve block can be very effective in managing symptoms and improving quality of life.

"The condition has traditionally been very difficult to treat, and is very incapacitating," explains J. Pablo Villablanca, MD, professor of radiology and head of the UCLA Radiology Pain Service. "Patients have such bad pain that they can't sit comfortably — the area becomes so sensitive that many can't even wear underwear."

Both women and men can be affected by pudendal neuralgia, but the condition is much more common in women. It is sometimes associated with trauma to the pelvic floor — including trauma caused by childbirth or pelvic-floor surgery — but often occurs idiopathically.

Conservative approaches include mindfulness training to help patients focus away from their pain, pelvic-floor-muscle massage and medications to mediate nerve-associated pain. When these measures are not adequate, patients can be referred to an interventional radiologist for evaluation for a pudendal block. When appropriate, MRI imaging of the pelvis can be used to rule out structural anomalies, including tumors on or adjacent to the pudendal nerves. In addition, the pelvic nerve MRI may reveal physical abnormalities of the pudendal nerves that can help confirm the diagnosis.

If the pelvic MRI with nerve imaging shows that the nerve is abnormal, or if it shows no abnormality but the patient's symptoms match pudendal neuralgia, and they have failed conservative treatments, then they are candidates for an image-guided pudendal nerve block.



*The contrast enhanced MRI of the pelvis with nerve imaging shows swelling, enhancement (arrow) and bright T2W signal involving the left pudendal nerve at the level of Alcock's canal, consistent with left pudendal neuritis.*

The pudendal nerve block is tailored to the individual patient's symptoms. When symptoms present bilaterally, the block will be administered to both pudendal nerves. Patients with unilateral symptoms are treated only on the affected side. Similarly, the nerve block can be administered either before or after the pudendal nerve branches to the genital and perineal regions.

"The goal is to customize the treatment to the individual patient needs and to deliver these treatments to a location that maximizes the clinical improvement," says Dr. Villablanca.

Under very low-dose CT guidance, a slender needle is passed through the buttocks muscles into the floor of the pelvis where the pudendal nerves are located. A long-acting anesthetic and a steroid are injected to treat pain and reduce inflammation. If necessary, the outpatient procedure can be repeated if pain symptoms return.

"The procedure is image-guided, and therefore very precise," says Dr. Villablanca. "Because the CT used is extremely low dose, radiation exposure need not be a concern, even when there are repeated treatments." CT guidance offers the interventional radiologist the ability to deliver the medications with great precision.

Dr. Villablanca reports positive early results using nerve blocks to treat pudendal neuralgia. "We are now in the process of analyzing our patient data, but it appears that more than half of patients get at least moderate pain reduction and improved functional capacity. A significant percentage of our patients show a marked improvement in symptoms, with a smaller percentage achieving complete resolution."

Many patients suffering from pudendal neuralgia are not currently receiving adequate treatment because the condition is under-recognized and poorly understood. Dr. Villablanca refutes that view saying, "These people are suffering with a real condition and they deserve our attention and the best care we can provide."

# Interventional Radiologists Offer Minimally Invasive Approaches to Venous Diseases

**John Moriarty, MD, FSIR**
Associate Clinical Professor of Medicine and Radiology
Director of Cardiology-Interventional Radiology Innovation
Department of Radiology
David Geffen School of Medicine at UCLA

Venous disease comprises a group of circulatory disorders that are both very common and highly treatable, including deep vein thrombosis, pulmonary embolism and varicose veins. Using advanced image guidance, interventional radiologists are able to offer highly successful, minimally invasive treatment for these conditions that in most cases enables patients to quickly return to enjoying their normal activities.

### Deep Vein Thrombosis

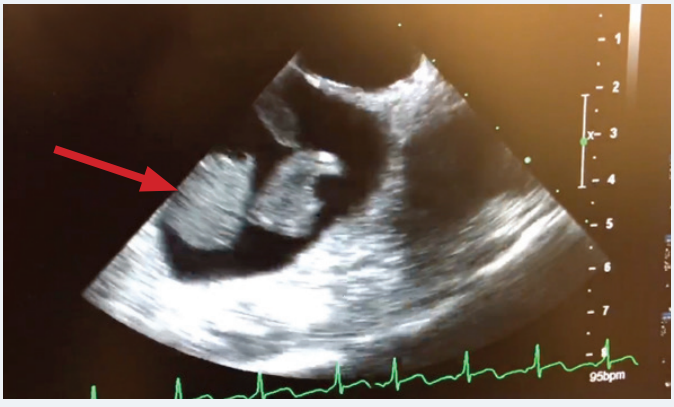
"Deep vein thrombosis is not only very common, with up to one million new cases each year in this country, but also carries a large burden of disease," says John Moriarty, MD, FSIR, associate professor of radiology and medicine (cardiology). Blood clots, which typically form in veins in the legs, can cause pain and swelling. When clots persist over time, the condition is known as post-thrombotic syndrome and can cause heavy, swollen legs with pain, discoloration and skin ulcers.

Interventional radiologists can remove clots directly from patients' veins and place stents to restore blocked blood flow. Using a combination of imaging techniques for visualization, physicians insert a catheter just above the ankle and work up through the leg, breaking up and suctioning out clots.

### Pulmonary Embolism

Clots in the veins can also break free and travel to the heart and lungs, where they increase pressure in the pulmonary arteries and damage the right side of the heart, presenting a significant risk of sudden death. Treating pulmonary embolism is frequently an emergency procedure.

Following a prompt and careful evaluation, a multidisciplinary treatment team tailors a treatment plan to the individual patient. Procedures are performed with X-ray, ultrasound and — increasingly — cardiac ultrasound and CT guidance as a series of catheters are passed through the veins and into the heart and lungs. Often, a small ultrasound transducer is placed within the heart to guide the way through the heart to where clots are located.




*Ultrasound shows large clots in the right side of the heart, at risk for moving to the lungs and causing a Pulmonary Embolus (PE)*

### IVC Filters

IVC filters are small metal cages that can be placed in the interior vena cava to trap clots before they can travel through the heart and become pulmonary emboli. The filters are retrievable and should remain in the body only as long as they are needed — usually a matter of weeks. "The longer IVC filters are left in patients, the higher the complication rate," warns Dr. Moriarty. "I'm frequently asked by patients about filters that they've been told cannot be removed. This is almost always incorrect. Almost all filters can be removed if they get sent to a dedicated center like ours." Using advanced imaging and removal techniques that include the use of lasers, UCLA interventional radiologists have successfully removed IVC filters that have been in place for decades, those that have moved in the body, and filters that have broken apart.

### Varicose Veins

Varicose veins are a common condition in the superficial veins of the legs, where they cause pain, leg heaviness and itching and present a cosmetic problem. Varicose veins result when the valves that control the flow of blood in veins become dysfunctional and allow blood to reflux, or flow backward. This disturbance to the normal flow of blood causes the veins to dilate.

The same dysfunction can affect veins in other parts of the body, including the pelvic area. In men, a varicocele in the veins going into the testicles can cause pain and infertility. In women, pelvic congestion syndrome can cause severe pelvic pain.

Interventional radiologists can treat varicose veins in an office procedure that takes about an hour. A catheter is placed into the vein under image guidance and radiofrequency energy is used to ablate the inside of the vein and cut it off from the flow of blood.

### Care for Venous Diseases at UCLA

UCLA interventional radiologists maintain dedicated venous clinics in Westwood, Santa Monica and Manhattan Beach. Each clinic is equipped with the imaging technology to treat all non-emergency venous problems. In addition, emergency treatment for DVT and pulmonary embolism is available at UCLA hospitals both in Westwood and Santa Monica.

# PAE: A Minimally Invasive Alternative for Treatment of Symptomatic Prostate Enlargement

**Justin McWilliams, MD**
Associate Professor, Interventional Radiology
Director, Fellowship Program
Co-Director, UCLA HHT Center of Excellence

Prostate artery embolization (PAE) is a recently developed procedure to treat benign prostate hyperplasia (BPH) and alleviate urinary obstructive symptoms. During PAE, an interventional radiologist implants small beads in the blood vessels that supply the prostate gland, depriving it of blood supply and causing it to shrink.

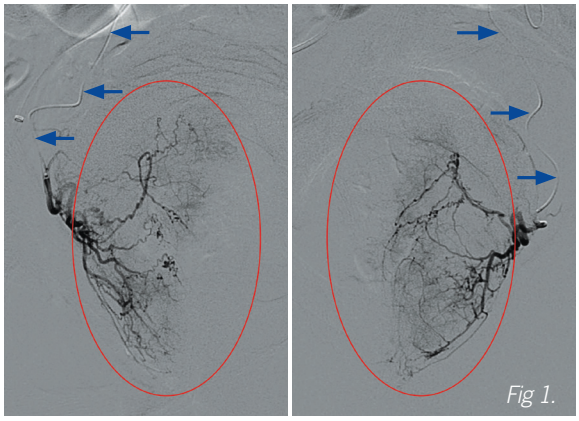



*Fig 1. Prostate artery embolization procedure. A small microcatheter (blue arrows) is advanced into the prostate artery on each side. Contrast injection shows the hypervascular enlarged prostate (red ovals). Small microspheres are injected through the microcatheter to block the blood supply to the prostate, resulting in prostate shrinkage and improvement in urination.*

The PAE procedure is performed through a small puncture made in the groin, which provides access to both prostate arteries. Unlike other procedures that treat BPH, including TURP (transurethral resection of the prostate) and prostatectomy, PAE carries no risk of bladder incontinence or retrograde ejaculation, and there are no reported instances of erectile dysfunction.

"At least 80 to 90 percent of men who undergo prostate artery embolization experience significant improvement in their BPH symptoms," states Justin McWilliams, MD, associate professor of Radiological Sciences. "The PAE procedure has greatly improved the quality of life of many of my patients." The best candidates for the procedure have an enlarged prostate, severe urinary symptoms, have failed medical therapy, and have failed or refused surgical therapy.

Prior to the embolization procedure, patients undergo a CT angiogram of the pelvis to show the size of the prostate as well as the size and location of the prostate arteries, followed by a clinic visit in interventional radiology to discuss the procedure. On the day of the procedure, the patient is put under conscious sedation and the access site is numbed. A catheter is advanced under X-ray guidance into the arteries of the pelvis and contrast dye is used to locate the prostate arteries on each side. A small microcatheter is guided into each prostate artery and embolization beads are administered into the artery to block the flow of blood. Patients typically go home three to four hours after the procedure.

Patients usually begin to experience improvement of BPH symptoms within a week after the procedure, with continued improvement over the next one to three months. Most patients experience a 25 to 40 percent shrinkage of the prostate. Prostate symptom scores show significant improvement, similar to that reported for TURP.

Although PAE is a relatively new treatment for BPH, the data on durability is promising. Most men whose symptoms improve after the embolization have continued to do well at one and three years after embolization, and the majority have continued to do well five years after embolization. While long-term data is not yet available, Dr. McWilliams points out that if BPH symptoms do return, the patient would still be a candidate for other urologic therapies, such as TURP and prostatectomy, or for re-embolization.

PAE is not yet FDA approved for BPH and is currently available at a limited number of centers, including UCLA. Not all insurances are currently reimbursing for PAE, but insurance coverage is expanding as more studies show the success of the treatment. "PAE is a safe and effective procedure and is a viable alternative to surgery in selected patients with severe symptomatic BPH," states Dr. McWilliams.

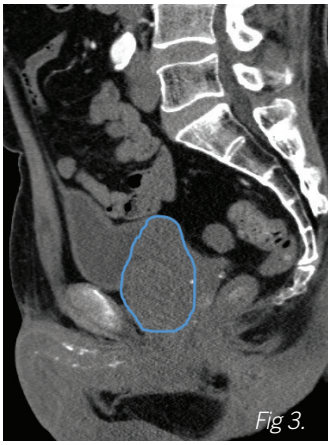




*Fig 2. Sagittal CT image one week prior to PAE demonstrates an enlarged prostate (outlined in blue) with a prostate volume of 150 cc. The patient was unable to urinate due to severe BPH, and was living with an indwelling Foley catheter (arrow).*
*Fig 3. Sagittal CT image six months after PAE demonstrates reduction in prostate size (outlined in blue), now measuring 100 cc, a 33 percent reduction. The Foley catheter was removed three weeks after PAE, and the patient was able to urinate freely.*



# UCLA Radiology expands into Palos Verdes

The UCLA Department of Radiology brings world-class expertise to the Palos Verdes community with the launch of our UCLA Palos Verdes Imaging and Interventional Center and our UCLA Palos Verdes Women's Imaging Center. The new facilities opened in January 2018 in two offices that occupy over 16,000 square feet. Over 100 UCLA radiologists bring a wealth of expertise to the community, with subspecialists available to interpret specialized studies.

At our Women's Imaging Center, 3D mammography, ultrasounds, MRI, DEXA and breast biopsies are offered in a spa-like setting designed to promote ease and comfort. 3D mammography has been shown to have 40 percent greater specificity and 15 percent fewer call backs for additional patient evaluations than traditional mammograms.

Our Imaging and Interventional Center is the first outpatient center in California to use the Siemens MAGNETOM Vida 3-Tesla MRI. This machine has the latest technologies that adapt to the patient's body and movement, resulting in higher-quality images while increasing patient comfort. The Siemens Flash CT has dual source capability, resulting in high-quality images, and supports specialty studies including gout, cardiac, and lung cancer screening evaluations.

**Palos Verdes Imaging and Interventional Center & Women's Imaging Center**
501 Deep Valley Drive, 3rd and 4th Floors
Rolling Hills Estates, CA 90274
Central Scheduling: 310-301-6800
http://radiology.ucla.edu/pvic

# UCLA Interventional Radiology Scheduling Team

*From left: Rachel Eggins, Carlos Garcia, Morena Penate, Gretel Lambey, Ivette Yoshinaga, Oudrey Monzon, Alice Wilson, Tran Van Thu, Fernando Reyes (Missing in photo) Jonathan Wilder, Jackie Williams*

The UCLA Interventional Radiology Scheduling Team collaborates with our radiologists and NPs to ensure patients get the right procedure at the right time. Based at 100 UCLA Medical Plaza in Westwood, the team schedules clinic visits and IR procedures for the Vascular and Cross Sectional Interventional Radiology providers. 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 IR Scheduling Team offers consultations and procedures in Westwood, Santa Monica, Manhattan Beach, Santa Clarita, and Palos Verdes.

To learn more, go to *http://radiology.ucla.edu/clinical-programs*

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