

World-class theranostics care in a community-based cancer center

Willis Knighton Cancer Center continues its leadership by bringing advanced treatments to patients across Ark-La-Tex and south-central U.S.

A world class cancer center is located where many would least expect it, in a community of fewer than 300,000 residents with a poverty rate higher than the national average. For nearly three decades, Willis Knighton Cancer Center in Shreveport, Louisiana has been delivering some of the most advanced cancer treatments available today, pioneering technologies such as image-guided radiation therapy (IGRT), proton therapy and now, theranostics.



Lane R. Rosen, MD, medical director of Radiation Oncology, Proton Therapy and Nuclear Oncology at Willis Knighton Health, helped create the Radiation Oncology Department in 1997, launching the center's journey in cancer care with intensity modulated radiation therapy (IMRT), followed by IGRT in 2003. Willis Knighton became the first community hospital-based single-room, compact proton therapy center in the world in September 2014. In March 2025, the center again took another leading step forward with the opening of its Nuclear Oncology Department, bringing theranostics treatment to patients with prostate and neuroendocrine cancers.

The radiation oncology department is equipped with CT and MR simulators, a dedicated CT for brachytherapy, two PET/CT, and a StarGuide SPECT/CT. Willis Knighton's close integration of imaging technology with treatment planning and delivery facilitates the appropriate type of treatment for each patient, including multi-modality treatments, monitor response, and help manage side effects.

Willis Knighton Cancer Center's commitment to furthering the field of theranostics includes the creation of the first U.S.-based theranostics fellowship program. Dr. Rosen's vision for the program is to train clinicians who can then go into the community and help other radiation oncology departments start theranostics programs.

Dr. Rosen credits the center's success to hospital administrators support who allow physicians to practice medicine by focusing on the patient and their outcome while taking a team approach to treating cancer.

"We have put together a team of like-minded individuals who are extremely aligned in the goal and desire to further the field of radiation oncology. To accomplish this, we have always chosen the best equipment at that time for the best patient care,"

says Dr. Rosen.

A partnership built for success

Building a world-class theranostics program requires investing in the right technologies that will enable excellence in care. Yet, selecting equipment is more than just choosing features and capabilities. It's also about picking the right partner for long-term success.



"GE HealthCare has taken a leadership role in this field, recognizing the potential of theranostics and committing to it," says Dr. Rosen. "Their team, especially Dr. Ilya Gipp, have given us honest and valuable advice for many years, in many different ways. That creates a level of trust with an organization—something you begin to build over time."

The two organizations even collaborated on the naming of Willis Knighton's theranostics program.

"We were struggling to come up with our name," explains Carlos Palomeque, BS, CMD, Medical Dosimetrist. "We went through different names, and when Dr. Gipp suggested nuclear oncology to Dr. Rosen, we thought that really resonates with what we're doing. It fits what we are offering to patients as it also captures radiopharmaceutical therapies like Yttrium-90 (Y90) and radium-223."

"Technology can enable transformation, but partnership is what makes it happen. The successful launch and continued growth of Willis Knighton Cancer Center's Nuclear Oncology Program, now delivering some of the most advanced radiotheranostics therapies available today, demonstrate what can be achieved when healthcare organizations, clinical experts, and industry come together around a shared vision," says Ilya Gipp, MD, PhD, Chief Medical Officer – Oncology, GE HealthCare. "By combining Willis Knighton's leadership with GE HealthCare's experience supporting theranostics programs, we helped build more than a new service line – we helped establish a sustainable foundation for expanding access to advanced cancer care. Ultimately, the true measure of success is not the technology itself, but the patients who now have access to innovative therapies closer to home, bringing greater hope and new possibilities for their care."



Carlos Palomeque



Jake Wang



Brittany Ward



Casey Robinson



Yohan Walter

Dr. Rosen credits the GE HealthCare and MIM partnership with helping Willis Knighton develop a gold-standard program and to continue improving it.

Creating a community-based theranostics program

As part of a community hospital, Dr. Rosen views his department as belonging to the local community. Connecting with patients and supporting them throughout their treatment journey are critical components of the program.

Jake Wang, MD, PhD, serves as Clinical Chief and Co-Medical Director of the Nuclear Oncology Program at Willis Knighton. Dr. Wang played a key role in establishing the nuclear oncology program alongside Dr. Rosen.

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Dr. Wang says. “Our first goal was to provide good quality access to theranostics care in this region,” Dr. Wang says. “Part of providing good care is knowing precisely what we are delivering to patients. We also want to serve as a model for other radiation oncology departments in the country, demonstrating how to deliver high-quality theranostics care in a community hospital setting.”

Willis Knighton Cancer Center is focused on improving patient outcomes, incorporating the hospital’s award-winning and nationally recognized dosimetry and physics teams into the decision-making care pathway process. While dosimetry is the standard-of-care in radiation oncology, Dr. Rosen says it historically has not been done to the same extent in radioligand therapy. His vision to center the program within the radiation oncology department means, “the imaging, the planning, the delivery, the dosimetry, the monitoring and the follow-up can be done under a department with all this expertise in one place, and in one site.”

Delivering high-quality theranostics care and improving patient outcomes requires the right technology and the right team members to enable more informed clinical decisions. Practice guidelines from the Society of Nuclear Medicine and Molecular Imaging (SNMMI) and the European Association of Nuclear Medicine (EANM) establish the use of quantitative SPECT/CT in theranostics, including recommendations for post-treatment imaging and protocols.^{1,2}

With support from the hospital, Willis Knighton added two more nuclear medicine technologists and a dedicated nuclear oncology nurse coordinator. As important as it is to have clinical expertise, the team at Willis Knighton understood that to succeed, the nuclear oncology program needs a nurse to coordinate all aspects of the patient’s care, including patient education, safety and compliance.

Brittany Ward, BSN, RN, nuclear oncology nurse at Willis Knighton Cancer Center, was hired specifically for the theranostics program. She estimates that 95% of patients return for their post treatment imaging. There are a variety of factors for the 5% who don’t receive all their imaging exams—for example, they don’t drive and rely on



a family member or can’t take off work as often as needed. For many of Willis Knighton Cancer Center’s patients, cancer is occasionally not their biggest problem.

“I’ve discovered that financial burden is often more important to people than their overall health,” says Ward. “I did not learn that until I started at the cancer center, so I work to find resources for these patients to alleviate that financial burden and get them to understand the importance of their health.”

Ward will help the patients find the financial support they need through Willis Knighton’s charity care program and pharmaceutical companies. She tailors patient education to each individual, so they understand the importance of imaging compliance on their overall treatment plan, as well as radiation safety precautions, logistics of treatment duration and potential side effects.

Ward has also learned that nursing care in theranostics therapy is critical to coordinating patient care.

“Nursing sits at the intersection of advanced oncology treatments and radiation safety,” she explains. “These therapies require precise coordination, close monitoring for toxicities and strict safety protocols. In theranostics, nurses bridge advanced science with patient-centered care by ensuring safe administration, educating patients on complex treatments and managing both the clinical and emotional aspects of care.”

Choosing the right SPECT/CT for today and tomorrow

Yohan Walter, MS, DABR, is the Chief of Radiation Physics Research and lead physicist for the center’s nuclear oncology program. During graduate school, he began to think that photon-counting CT might help improve spatial and energy resolution in SPECT imaging. It was while he was finishing his residency in therapeutic physics at Willis Knighton that the organization decided to pursue theranostics and began its search for the best SPECT/CT system to fit their needs and vision for excellence.

Just as the center was finalizing its SPECT/CT system selection, Walter came across a promotional video on StarGuide.

StarGuide is GE HealthCare's most advanced SPECT/CT utilizing the latest advancements in Cadmium Zinc Telluride (CZT) technology and optimized for theranostics. It features a 3D dynamic acquisition of with 12 CZT Digital Focus Detectors that support a wide energy range capable of imaging the dual energy peaks of tracers used in Theranostics, such as the 113 keV and 208 keV emission peaks of Lutetium-177 used to diagnose and evaluate treatment response for prostate cancer.³

"We were close to finalizing an order for a competitor's system when I approached my chief of physics, Terry Wu," Walter says. "I told him, 'If our goal is to build the best theranostics program, we need the best tools to do it. And I really think we need to look at this StarGuide'" Walter presented his rationale to Dr. Rosen, who along with Dr. Wang changed their purchasing recommendation to StarGuide.

"Theranostics begins and ends with imaging. Every critical decision from patient selection and treatment planning to personalized dosimetry and assessing treatment response depends on high-quality imaging and the insights it provides," says Dr. Lane Rosen. "Advanced imaging and dosimetry technologies, including GE HealthCare's StarGuide and MIM Software solutions, give our team the confidence to make more informed clinical decisions at every stage of the patient journey. What matters most is that these technologies are not simply about producing better images or generating more data – they enable us to deliver more precise, personalized care and continually improve outcomes for every patient we treat."

At Willis Knighton, the value of StarGuide and MIM Software extends well beyond improved image quality and workflow efficiency. Together, they support a financially sustainable theranostics program by enabling reimbursable post-therapy SPECT/CT imaging and dosimetry.

"Establishing a Nuclear Oncology Program is not simply about adding a new service – it is about thoughtfully integrating the staff, processes, and technology into a model that can deliver lasting value," says Dana Robinson, COO of Willis Knighton Cancer Center. "From the outset, our goal was to build on the strengths of our existing radiation oncology team rather than create a separate infrastructure. By combining advanced imaging, personalized dosimetry, and established clinical expertise within an efficient workflow, we have created a program that is both operationally sustainable and positioned for continued growth. As reimbursement models continue to evolve, they further support our ability to invest in innovation while expanding access to advanced theranostics across the communities we serve."

As a result, post-therapy imaging becomes more than a tool for monitoring treatment response. It serves as both a clinical asset and an economic driver, strengthening the long-term sustainability of a



comprehensive nuclear oncology program while advancing precision, value-based cancer care.

Dr. Wang adds, "Dr. Rosen and I believe that StarGuide is the best SPECT on the market that we can get today and it fits our needs. It has high resolution and the acquisition time is fast—I don't think it is feasible for other SPECT machines to do these scans routinely."

Most full-body SPECT/CT exams take approximately 24 minutes to complete on the StarGuide at Willis Knighton, compared to 45 minutes for a conventional dual-head SPECT/CT system. The fast imaging time also reduces the patient's burden, so they are less likely to move, allowing for better quality imaging and, subsequently, better quality dosimetry data.

Scanning patients on StarGuide is simple and seamless, according to Casey Robinson, BS, CNMT (PET), RT(R), Technical Director of Nuclear Oncology at Willis Knighton Cancer Center

"Once you set up StarGuide for the patient scan, it just does everything for you," Robinson says.

Robinson is one of four technologists in the department and the primary operator of StarGuide at Willis Knighton. If he is unavailable, another technologist can step in. Robinson says that for the occasional user of StarGuide, "it is super easy to operate. This scanner, you really can't mess it up."

As easy as the system is to operate, it's the excellent imaging capabilities that really impress Robinson. He says, "There is no comparison to StarGuide with other SPECT/CT cameras. GE HealthCare has taken a major leap in the field of theranostics with StarGuide—the ring base with 12 CZT detectors versus two dual head detectors—it is just more superior than other available systems with high sensitivity, better scatter rejection and better spatial resolution."

Robinson is impressed with how well patients tolerate the detectors coming in as close to them as possible. Initially, he was concerned it would increase a patient's claustrophobia.

“I’ve been blown away. We had one patient that was extremely claustrophobic and I thought there was no way he could do it because he struggled with the PET scan. Amazingly, he did it, and I think it is because it is so fast and is not over their head very long,” Robinson explains.

StarGuide and MIM at the center of excellence in theranostics care

The first SPECT images Walter saw after finishing his residency were from StarGuide. Soon after he received a SPECT/CT from an external site for a patient undergoing lutetium.

“I didn’t even know what to look at on the external SPECT/CT image, it was a blob of activity, there was scatter everywhere and everything was either all washed out or lighting up when I window-leveled it,” Walter adds. “I couldn’t see anything on the dual-head SPECT.

“To put it simply, the StarGuide is an unbelievable system, just in enhancing our ability to see the disease itself, compare directly against the PET, and identify problematic and responding areas. StarGuide has been an excellent tool. The quantitative accuracy is, of course, a big cherry on top,” Walter adds.

In each patient undergoing theranostics, Walter and Palomeque contour every single lesion—advanced prostate cancer patients can have numerous small lesions, anywhere from 40 to 90. The image quality of StarGuide helps them more clearly see the lesions and MIM software helps streamline their workflow. They began using MIM software with the launch of the Nuclear Oncology Department.

MIM Encore provides an efficient, accurate workflow for all their contouring, including organs and bones, and provides a visual comparison of prior imaging to identify discrepancies between different time point imaging results, which are areas of concern. They can track multiple cycles into one visual representation and review images and results with the physicians in MIM Encore. And they can follow aspects like the total lesion activity and total tumor volume, which are helpful for comparison against follow-up PET/CTs.

“Encore gives us the best qualitative and quantitative set of information to base our patient care decisions upon,” adds Walter.

Walter has applied standardized dosimetry concepts from external beam radiation therapy to theranostics. His goal is to identify where they can improve the process, particularly in dosimetry, as well as in monitoring lesions for response or progression.

For Palomeque, the most challenging aspect was understanding the concept that he is not contouring targets to treat, like in external beam radiation therapy, but contouring areas where treatment was delivered. This influences how he approaches contouring and handling these cases.



“We delineate the target based on the doses that we get, but we also need to be aware of the PET imaging data,” Palomeque adds. “Performing those fusions of PET and SPECT images in MIM and comparing to what we are treating is very valuable to know if an area—a lesion—got treatment from the infusion.”

Using the tools in MIM, Palomeque can standardize and control many aspects of radioligand therapy dosimetry and propagate information from one cycle to the next.

“MIM SurePlan MRT has lots of impressive capabilities,” Palomeque says. “We use the dose accumulation readouts when generating our end-of-treatment report, which has both visual and quantitative information that’s useful for tracking progress and establishing the “new baseline” for the patient moving forward,” Palomeque adds.

They also use MIM SurePlan Liver Y90. “This was actually one of the main reasons we went with MIM, because we wanted to start performing post-administration dosimetry for these cases, too,” says Walter. It was also important that the MIM platform is scalable, and they could easily add their nuclear oncology physics fellow, who will be helping Walter and Palomeque with clinical cases.

“We can certainly continue to lean on these tools as we grow and as new agents are added. MIM has also been updating their models to support new isotopes as they come out,” Walter adds.

Personalizing care to improve patient outcomes

It is the ability to clearly see the lesions on SPECT and measure the response to treatment that allows the Willis Knighton team to personalize each patient’s care. According to Walter, as the team began developing its protocols, the biggest questions they had were how many times the patient should undergo imaging and when that imaging should occur.

After visiting a leading theranostics site in the U.S. that also uses StarGuide, the team decided to initially follow their protocol of imaging 24-hours post treatment. However, during their training on the MIM software, they learned that for a single time point they may want to capture the imaging two to three days after Lutetium

or PSMA radioligand treatments, and three to four days after DOTATATE treatments.

The first few patient cases were managed with single time point imaging. However, Dr. Wang was not satisfied with the data. With external beam radiation therapy, Willis Knighton achieves variations in dosimetry of less than 3% and with accuracy less than 1 mm. However, he found in the literature that $\pm 10\%$ variations in dosimetry were considered acceptable and variations up to 20% to 30% based on single-time points were reported.

“When I looked at my data, it wasn’t where we wanted it—we wanted to improve it,” Dr. Wang says.

Dr. Wang’s single time point data showed a $\pm 15\%$ variability in organs and tumor doses, and although it was better than the $\pm 20\%$ variability in the literature, it was still unacceptable to the team. So, Willis Knighton switched to multi-time point imaging, in part to evaluate the different data they captured from single- and multi-time points.

The Nuclear Oncology program currently treats two to eight patients each week. Every patient undergoes SPECT/CT the same day as treatment and again two days later, which provides valuable information on the patient’s response to treatment.

The power of MIM software also helped the team chart a better path to tracking patient progress and identifying areas to closely watch for response or progression. According to Palomeque, because radiation dose is what causes the DNA damage and cell death, they believe it is a more direct metric to follow than SUV.

“That’s where the DVP (dose volume product) comes in, because we can get a measure of the dose and the volume in one metric,” Palomeque explains. “We also have a predictive number, the dose-volume quotient, which we are characterizing and using in our process.”

Based on this information, the team can identify patients who may benefit from a combination of theranostics and external beam radiation therapy.

“Without a SPECT, we wouldn’t be able to react to what is happening in the patient until our mid-treatment or follow-up PET, which is about 20 weeks after beginning their treatment. That’s a lot of time for inaction. Because we have the SPECT, we can react immediately after every treatment cycle. With a team that covers both external beam radiation therapy and radioligand therapy, we can work quickly to deliver any additional necessary therapy such as stereotactic body radiation therapy (SBRT) in the tight window between cycles, rather than waiting until after all cycles of radioligand therapy, when the synergy might not be as strong,” Palomeque adds.

An unanticipated benefit of StarGuide is its 16-slice CT imaging capabilities that also provides important data for following patients



after treatments. As reported in the literature, patients can have PSMA-negative disease. According to Walter, in several cases they identified suspicious PSMA-negative lesions in the CT images. Comparing these images with prior time-point SPECT/CTs showed the lesions were growing, prompting the team to swap the mid-treatment PSMA PET with FDG PET.

“Normally, we would have to wait for PSA progression to order an FDG PET, but now we’re able to catch these much earlier and switch their care plan to a more ideal regimen,” Walter says. “It’s been very important for these patients that we have the ability to catch these things. It also emphasized the importance of image quality on the SPECT side, because we had some PSMA and DOTATATE-negative disease in close proximity to positive disease. If our SPECT was poor image quality, it could appear to be activity in those areas, causing us to miss those problematic areas.”

In fact, Walter explains that one recent patient had PSMA-positive, FDG-negative disease, PSMA-negative, FDG-positive disease, and PSMA-and FDG-positive disease, all on the same axial CT slice. There were also large lesions with PSMA-positive and PSMA-negative subparts, which would have been much tougher to characterize on a lower-quality SPECT.

As important to Dr. Wang, he hopes the data they derive from MIM software and StarGuide can help identify parameters to indicate if a patient is a responder or non-responder earlier in the treatment cycle—perhaps as early as after the first or second treatment. Dr. Wang reviews the different time points and dosimetry data with Walter and Palomeque—they have the dose to organs and dose to each individual lesion, and they can see the response on subsequent cycles.

“We also see the opportunity to identify lesions that we should consider adding an external beam radiation boost, or SBRT, between the cycles,” Dr. Wang adds. “We are hoping that can generate better control of the disease.”

“It is very important to review the dose distribution to the tumor and the organs. With MIM, we have the template reports to help us

summarize each patient,” Dr. Wang explains. “I don’t think we know yet what 100 gray radioligand therapy to a tumor means. Is it the same as 60 gray in five fractions with external beam SBRT? I don’t know biologically what that means. But the first step is collecting the data and bringing it all together, and that is where MIM really helps.”

The data from StarGuide and MIM is what enables Willis Knighton to truly personalize the therapy to the individual patient.

“‘We’ve found that almost a third of our patients would benefit from a change in their treatment. Sometimes that may mean stopping treatment, changing the dose or incorporating some form of external radiation or proton therapy. The more we perform radioligand therapy and capture and analyze the data, the more we can refine the techniques and the timing and the how to interpret the dose. And I’ll bet that number goes higher over time,’” adds Dr. Rosen.

Ready to lead the future of cancer care

Dr. Wang is excited about the future potential of theranostics in cancer care, particularly as more agents are approved for clinical use. He believes that collaborating with industry and combining theranostics and radiation oncology will further move the field ahead.

“Our department is always seeking to advance radiation therapy technologies, making sure what’s best for the patient and extending out our capabilities,” Dr. Wang says. “We learn so much from each individual patient from the dosimetry, the biology, the therapy response and mechanisms, and then thinking about what we can further optimize and improve. We want to share our experience with others, and that’s how we advance the field of radiation oncology with theranostics.”

Adds Dr. Rosen, “We see this field moving potentially to a pathway of external beam and then a beta particle, and then an alpha particle for failure, and then perhaps radiosurgery for sites of oligometastatic disease that are poor responders. So, it will be about using all our tools for each patient, and that is why we believe theranostics must be captured in a radiation oncology department. In the field of radiation oncology, we follow our patients with imaging, manage their side effects, know their prognosis and determine their best treatment path for the best possible outcome. Radiation oncology is perfectly positioned for theranostics, and I think this will become 30% or more of a radiation oncology practice over the next couple of years if we can train enough clinicians.”

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3. Radiopharmaceuticals may not be approved by ministers of health in all regions.