IOWA HEALTH CARE | Holden Comprehensive Cancer Center

HOLDEN COMPREHENSIVE CANCER CENTER

2024 ANNUAL REPORT

OUR MISSION:

DEFEAT CANCER

CANCER.UIOWA.EDU

Cancer in Iowa

2ND
highest rate of new cancers in the U.S.

21,000
estimated new cancers among Iowans in 2024

6,100
estimated cancer deaths among Iowans in 2024

168,610
Iowans who are cancer survivors

Holden at a glance

105,364
annual visits

Patients seen from all **99** Iowa counties and over **30** U.S. States

194
FTE nurses, medical assistants and other staff

290
members from **5** colleges and **36** departments

265
accruals to interventional treatment trials

Message from the Director

At University of Iowa Health Care Holden Comprehensive Cancer Center, 2024 has been a year of significant change, growth, and remarkable progress. There is palpable excitement about where we are headed as a center and our focus on meeting the challenge of defeating cancer. Our commitment to advancing cancer research, education, and care has never been stronger. This year's changes in leadership and structure are setting the stage for an even brighter future.

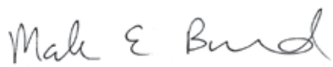
As Iowa's only NCI-designated Comprehensive Cancer Center, Holden remains deeply rooted in our mission to fight cancer on all fronts. As we evolve, we maintain our focus on making impactful scientific discoveries and translating these into improved, compassionate care. Our approach to integrated research, education, and clinical care remains at the heart of what we do, enabling us to deliver the most advanced treatments and technologies to patients. We are seeing faster progress in treatment areas and the adoption of new tools for cancer screening and prevention, which are transforming lives in Iowa and beyond.

The multidisciplinary oncology groups (MOGs) that define our center's unique structure remain a cornerstone of our work, bringing researchers and clinicians together to collaborate in a way that shortens the time from discovery to patient care. This structure has allowed us to take a truly comprehensive approach, with each MOG focused on specific cancer types, ensuring that patients receive care deeply informed by the latest research.

Our commitment to education is equally strong. Our graduate students continue to benefit from firsthand clinical exposure, observing the journey of patients in our care. This experience not only enriches their training but also fosters a deep understanding of the real-life impact of their work. Our students and early-career faculty are developing the skills and empathy they need to lead the next generation of cancer research and care.

While this year has brought change, we view these shifts as opportunities to reimagine what's possible. The progress we are making is a testament to our adaptability and unwavering focus on our mission. With new leadership and an enhanced structure, we are more prepared than ever to push the boundaries of cancer treatment and research, bringing hope to those we serve.

Thank you for your trust and support. Together, we are making a difference.



Mark E. Burkard, MD, PhD
Director
University of Iowa Holden Comprehensive Cancer Center

Q+A with Director Mark Burkard

Iowa has the second highest cancer rate in the country.

It is an alarming trend that is top-of-mind for the clinical, research, and outreach teams within UI Health Care Holden Comprehensive Cancer Center.

The cancer center's newly appointed director, Mark Burkard, MD, PhD, is looking at ways to advance patient-centered care in Iowa. Burkard—a physician-scientist who was a faculty member at the University of Wisconsin-Madison for the last 16 years—says UI Health Care is uniquely positioned to create a statewide cancer care network that brings Holden's expertise closer to home for more Iowans.

"Holden Cancer Center is a well-known comprehensive cancer center nationally. It has been a National Cancer Institute-designated cancer center for more than 20 years, so there is a very strong platform to build on," Burkard says. "I see this role as an opportunity to work at an institution that is already strong thanks to the people working here–from the physicians to the clinical research staff, to the genetic counselors, the basic scientists, epidemiologists, and the translational researchers."

What motivates you to work in the field of oncology?

I've spent many, many hours in oncology clinics getting to know patients, and you really make a strong connection with people as they face perhaps the scariest thing in their lives. And what I see happening in the field of cancer, I'm just very excited about. We're going from this era where we had very few treatments for people with incurable cancer to prolonging lives profoundly. We're making it easier to access care and are finding better ways of caring for our cancer patients, whether it's better medicines, better models of care, better radiation strategies, or surgeries that preserve quality of life. There's been this steady progress. I like being part of this fast-moving field; it brings a lot of hope to our patients.

As Holden Cancer Center's newest director, what is your vision for cancer care in Iowa over the next several years?

Cancer care is changing quickly. It's evolving in many ways and getting more complicated. When I started, there was one treatment for melanoma. Now, there are many effective treatments. It's very challenging for a general oncologist to stay on top of all that is happening in cancer care. Offering cutting-edge treatments—cellular therapy, a new immunotherapy, or a targeted drug—is even more challenging.

What we want to do as an academic healthcare system in a rural state is provide more support to oncologists across Iowa so Iowans can get the best expert care in their communities. In Wisconsin, I created a statewide molecular tumor board, for example, and would like to find more ways for oncologists to collaborate on tumor boards. More advanced or experimental therapies like cellular therapy programs are important as we think about the future. There are more ways to incorporate telehealth and treatments at home, particularly for rural Iowans. We know how important it is to deliver care locally so Iowans don't have to travel great distances.

Access seems to be a challenge as demand for cancer care continues to rise, particularly in rural parts of the state. Do you have a strategy for improving access to care?

There's an opportunity for a more streamlined approach to delivering cancer care that will take collaboration. When patients are seeing their surgeon or coming for their initial visit in Iowa City—or another place—it's important to coordinate visits with all their providers and the experts they need right from the start.

In October, we announced an agreement with Mission Cancer + Blood to create a comprehensive cancer care network uniquely positioned to tackle Iowa's elevated cancer rates. By joining forces, we can provide more patients with access to comprehensive services, shortened time between diagnosis and treatment for rare and complicated cancers, and expanded options for the latest therapies offered in clinical trials.

For example, if we find a patient with a rare genetic variant and have a powerful new medicine that could change their life, we can connect them to the appropriate clinical trial right away. We want to deliver the best care in a highly complex, changing field and do it closer to patients' homes.

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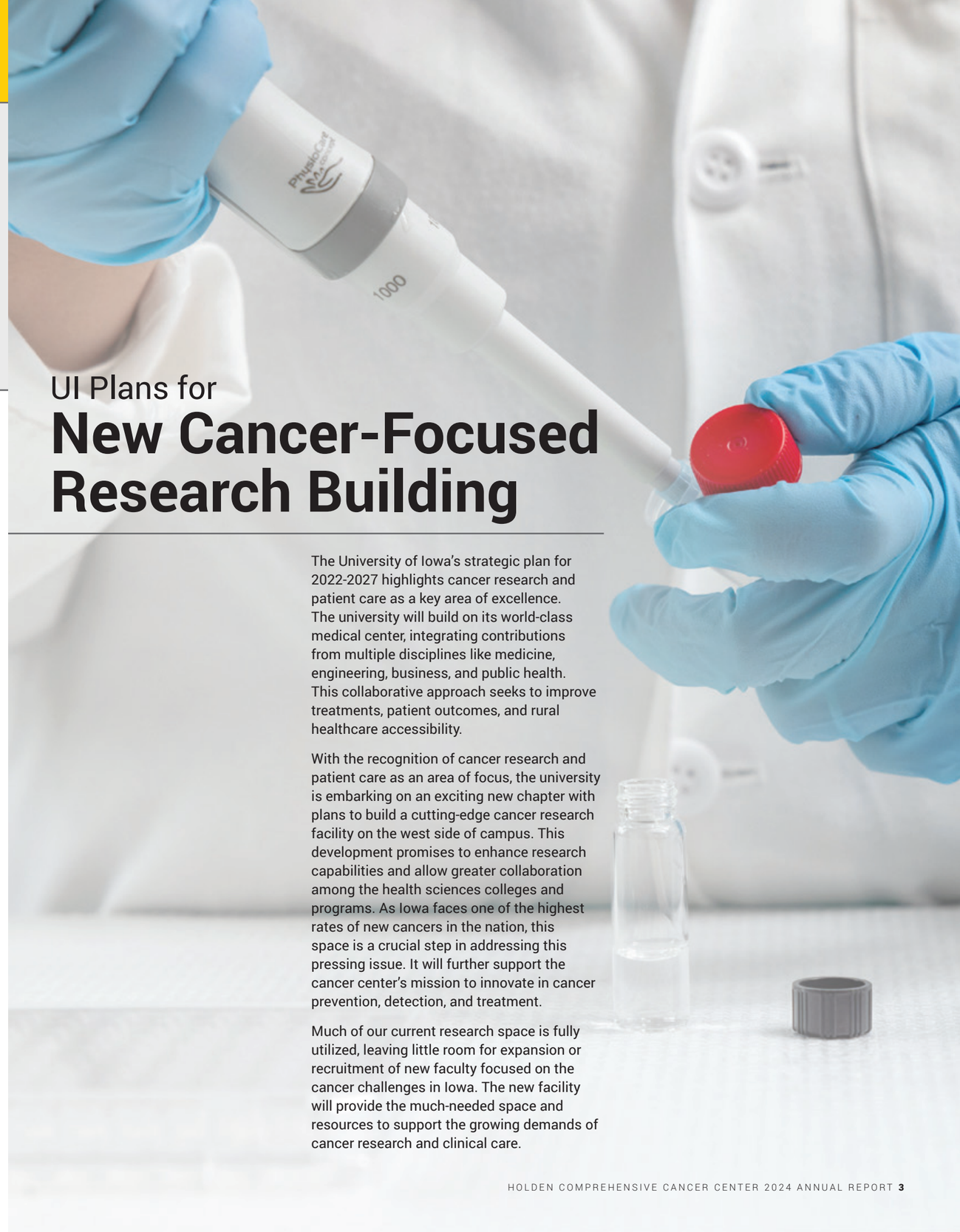

UI Plans for New Cancer-Focused Research Building

The University of Iowa's strategic plan for 2022-2027 highlights cancer research and patient care as a key area of excellence. The university will build on its world-class medical center, integrating contributions from multiple disciplines like medicine, engineering, business, and public health. This collaborative approach seeks to improve treatments, patient outcomes, and rural healthcare accessibility.

With the recognition of cancer research and patient care as an area of focus, the university is embarking on an exciting new chapter with plans to build a cutting-edge cancer research facility on the west side of campus. This development promises to enhance research capabilities and allow greater collaboration among the health sciences colleges and programs. As Iowa faces one of the highest rates of new cancers in the nation, this space is a crucial step in addressing this pressing issue. It will further support the cancer center's mission to innovate in cancer prevention, detection, and treatment.

Much of our current research space is fully utilized, leaving little room for expansion or recruitment of new faculty focused on the cancer challenges in Iowa. The new facility will provide the much-needed space and resources to support the growing demands of cancer research and clinical care.

I-CAN

UI helping Iowa's community hospitals

improve cancer care

By many measures, cancer care at St. Anthony Regional Hospital in west central Iowa is going well. The 99-bed hospital located in Carroll, Iowa, a community of 10,000, opened an adjacent cancer center in 2020. It offers medical oncology, radiation oncology, and infusion therapies and draws some 15,000 patients a year from a 17-county area.

But Lori Pietig, the hospital's director of cancer services, has seen the bleak outlook put forth in the 2024 Cancer in Iowa report: The state of Iowa has the second-highest rate of new cancers in the U.S., with rural populations experiencing greater cancer mortality than urban ones. She knows there is room for improvement.

So, when the opportunity arose for rural hospitals like St. Anthony to receive guidance and support from University of Iowa cancer experts by joining the Iowa Cancer Affiliate Network, or I-CAN, Pietig seized it.

"With smaller centers like ours, everybody wears many hats, and we try not to burn our staff out by piling more work on them. That said, we have seen a minimum of a 20% increase each year in new patient referrals and continue to get about 15 new referrals a week," says Pietig, a Carroll native who served the hospital as director of radiology before becoming its first-ever cancer services director in 2020. "Although our days are full, we see an opportunity for growth, and I-CAN is helping us plan for it."

St. Anthony is one of six hospitals serving rural populations across the state that are participating in the network, which is coordinated by UI researchers and clinicians in partnership with Holden Comprehensive Cancer Center. The hospitals—which also include Mahaska Health in Oskaloosa, MercyOne Clinton, MercyOne Dubuque, Southeast Iowa Regional Medical Center in West Burlington, and Spencer Hospital—receive reports about common cancers and risk factors specific to the populations they treat, assistance with collecting data to achieve Commission on Cancer standards, strategic planning guidance on expanding their cancer services, educational opportunities and training, and access to clinical trials, among other things.

Establishing the network

Through her work as director of the Iowa Cancer Registry and professor of epidemiology in the UI College of Public Health, Mary Charlton saw that many hospitals in Iowa were treating a high volume of cancer patients but were not collecting or monitoring data on the quality of their cancer care, something needed to be accredited by the Commission on Cancer—and to improve outcomes for patients. That was cause for concern, and she reached out to Ingrid Lizarraga, a UI breast surgeon and the state chair for the Commission on Cancer.

"We asked ourselves, what if we built a network to extend Holden's resources out and help these hospitals do some of the things they need to do to meet these standards? They don't have to figure it out by themselves and reinvent the wheel," says Charlton, who received a five-year grant from the National Cancer Institute in 2021 to develop the network. "We can be good subject matter experts and help train them. We can even loan a person from the Iowa Cancer Registry to work closely with them and help collect their data."

Meeting standards set by the Commission on Cancer, whether or not the hospitals formally apply for accreditation, benefits the entire state, Charlton says.

"Local providers are doing an amazing job considering the limited resources they're working with, but we want all Iowans to get the best care possible regardless of where they live. You shouldn't be at a disadvantage because you live in a rural area," Charlton says. "You should be able to get really good care close to your home, and that's what we're trying to support."

Lizarraga, who serves as I-CAN's medical director, visits the hospitals to see what services they currently offer and to understand their challenges and goals, and then works with them to identify opportunities for growth and improvement. Quality cancer care is multifaceted, she says.

"When you think about cancer treatment, you think about diagnosis, about surgery, about chemotherapy and radiation, and that's one area of services that may be limited. But we've found that an even bigger gap exists for supportive services, such as genetic counseling, talking to a dietitian to help you with your care, access to specialized rehab, and good survivorship follow-up."

Not only do I-CAN hospitals have access to a password-protected website with resources, their health care professionals also can sign up for educational webinars, gain feedback on what they are doing, participate in a collaborative consult program, and learn how to establish a tumor board, a group of expert cancer providers who meet regularly to review and discuss cases. The network also collaborates with the Iowa Cancer Registry to support cancer data collection and analysis that can be used for quality improvement and planning resource allocation.

Lizarraga spent several years as a general surgeon in West Burlington before coming to Iowa for a fellowship in breast surgery and joining its surgical oncology faculty. She says another valuable aspect of the network is the interaction it facilitates between the community partners.

"It allows the hospitals to share their ideas with each other, and sometimes they come up with things together that work well because they have similar barriers or resources. For example, a solution that works at the University of Iowa may not be appropriate for West Burlington, but a solution in West Burlington may translate well to Carroll or to Spencer," Lizarraga says. "Plus, it fosters a sense of community among the hospitals and among the providers. Often these hospitals have just one medical oncologist or one radiation oncologist, and it can be lonely. It's important to have colleagues to bounce ideas off, and this network can provide that community of clinicians."

Read more online

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>
> **MARY CHARLTON**
> DIRECTOR, IOWA CANCER REGISTRY; PROFESSOR OF EPIDEMIOLOGY, UI COLLEGE OF PUBLIC HEALTH

> **We've known for a long time** that if you increase the amount of oxygen within a tumor, you can make it more responsive to radiation, certain chemotherapies, and potentially immunotherapies."
>
> **JAMES BYRNE, MD, PHD**
> ASSISTANT PROFESSOR, UI CARVER COLLEGE OF MEDICINE DEPARTMENT OF RADIATION ONCOLOGY

Foaming in on cancer

James Byrne appreciates a well-made cappuccino, but not because he's a connoisseur of espresso drinks. He's more interested in the foam on top.

For Byrne, MD, PhD, an assistant professor in the University of Iowa Carver College of Medicine Department of Radiation Oncology, it's using foam—and creams, hydrogels, and solids—to create new, biocompatible materials that may improve the effectiveness of chemotherapy and radiation in treating cancers. Specifically, these gas-entrapping materials, or GeMs, are designed to carry high concentrations of therapeutic gases directly into tissues, including tumors.

In a study published last year in the journal *Advanced Science*, Iowa researchers led by Byrne and assistant research scientist Jianling Bi, PhD, report using GeMs to deliver high levels of oxygen directly into tumors, which boosted chemotherapy and radiation therapies in mouse models of prostate cancer and a type of sarcoma.

"We've known for a long time that if you increase the amount of oxygen within a tumor, you can make it more responsive to radiation, certain chemotherapies, and potentially immunotherapies," says Byrne, a member of Holden Comprehensive Cancer Center. "The challenge has been how to deliver an effective dose of oxygen in a safe, controlled fashion."

The research team—which includes colleagues from the Massachusetts Institute of Technology, Beth Israel Deaconess Medical Center, and Harvard Medical School—showed that GeMs can increase oxygen levels in solid tumors, rendering them more vulnerable to chemotherapy or radiation. The increased oxygen levels also appeared to improve immune reactivity, which is key to generating a response to immunotherapy.

In the culinary arts, foams and foam variations are not uncommon—think of whipped cream, lemon meringue, and chocolate mousse. Byrne, Bi, and colleagues drew inspiration from molecular gastronomy—the scientific focus on the chemical processes involved in cooking—to create GeMs comprising three primary ingredients: a gas, a foaming agent, and a thickening agent.

"We use several unique, custom-built pressurized systems to incorporate high concentrations of gas into small volumes of these biocompatible materials, which can be injected or implanted into tissues and allow for prolonged, controlled release of the gas," Byrne says.

The foam GeMs, for example, are created using a whipping siphon—essentially the same device baristas use—but reverse-engineered to accept various gases, including oxygen. The lab's whipping siphons use safe, low-cost components in many processed foods to make the GeMs.

Read more online

By varying the quantity of each component, the researchers can control the release of oxygen from the material. And because the GeMs are manufactured with safe and edible components, Byrne notes that the translatability of these materials for cancer care is likely to be extremely high.

Intra-tumoral delivery of cancer treatment is an approach that has blossomed over the past decade due to the ability to place high concentrations of drugs inside the tumor with minimal side effects. Foam, in particular, can be injected into areas of a tumor that are harder to treat or remove by surgery.

High-dose IV vitamin C plus chemotherapy

doubles survival in advanced pancreatic cancer

Results from a randomized phase 2 clinical trial show that adding high-dose intravenous (IV) vitamin C to chemotherapy doubles the overall survival of patients with late-stage metastatic pancreatic cancer from eight months to 16 months.

“This is a deadly disease with very poor outcomes for patients. The median survival is eight months with treatment, probably less without treatment, and the five-year survival is tiny,” says Joe Cullen, MD, University of Iowa professor of surgery and radiation oncology and senior author of the study. “When we started the trial, we thought it would be a success if we got to 12 months survival, but we doubled overall survival to 16 months. The results were so strong in showing the benefit of this therapy for patient survival that we were able to stop the trial early.”

In the study, 34 patients with stage 4 metastatic pancreatic cancer were randomized to receive either standard chemotherapy (gemcitabine and nab-paclitaxel) or chemotherapy plus infusions of high-dose vitamin C. The results showed that the average overall survival was 16 months for the patients receiving the chemotherapy plus vitamin C, compared to eight months for the patients getting just chemotherapy. In addition, progression-free survival extended from four to six months.

“Not only does it increase overall survival, but the patients seem to feel better with the treatment,” Cullen says. “They have fewer side effects and appear to be able to tolerate more treatment, and we’ve seen that in other trials, too.”

The new study is not the only evidence of the benefit of including IV vitamin C in cancer treatment. Earlier this year, the results of another UI phase 2 clinical trial in patients with glioblastoma, a deadly form of brain cancer, were published. That study also showed a significant increase in survival when adding high-dose IV vitamin C to standard-of-care chemotherapy and radiation. Cullen was also part of that trial along with his colleague Bryan Allen, MD, PhD, UI professor and head of radiation oncology.

Cullen, Allen, and their colleagues at UI Health Care have been researching the anti-cancer effect of high-dose, IV vitamin C for almost two decades. Their work revealed a critical difference between vitamin C given intravenously and vitamin C taken orally. Giving vitamin C through an IV produces very high levels in the blood, which cannot be achieved with oral delivery. These high concentrations result in unique chemical reactions within cancer cells that render them more vulnerable to chemo- and radiation therapies.

In addition to Cullen and Allen, the UI team included cancer physicians and researchers from the Departments of Surgery, Radiation Oncology, Internal Medicine in the UI Carver College of Medicine, the UI College of Public Health, and the Medical College of Wisconsin in Milwaukee.

Read more online

Theranostics:

Revolutionizing cancer care

"We know that radiation is probably the single most effective agent at treating cancers," says John Buatti, MD, professor in the Carver College of Medicine Department of Radiation Oncology. "While radiation can selectively damage cancer cells more than normal tissues, it can also damage normal tissues. With theranostics, we've been able to use precision medicine to link radiation to molecular targets—delivering radiation more precisely to tumors without harming surrounding cells."

Founded on a legacy of advancements in imaging technology, UI Health Care's current theranostics program is the product of a decades-long commitment to interdisciplinary collaboration—bridging radiology, radiation oncology, and nuclear medicine.

With more than a dozen active and pending theranostics trials, UI researchers are helping to advance cancer research and understanding and provide new options for patients who otherwise haven't had access to effective treatments.

For most of the 2000s, theranostics for cancer at UI were limited to neuroendocrine cancer treatments. Then, in 2022, UI Health Care specialists participated in the first national clinical trial that evaluated a therapeutic drug for prostate cancer. This marked the first non-neuroendocrine theranostics treatment and a major step forward, as prostate cancers are much more common than neuroendocrine cancers. The Iowa team is now overseeing theranostics trials for additional cancers, including pancreatic cancer.

Innovation goes beyond just the type of cancer that's being researched in the UI theranostics lab and extends to the fundamental characteristics of these therapeutic agents.

"Part of our current research efforts focuses on using alpha emitters instead of beta emitters to deliver radiation to tumors," explains Yusuf Menda, MD, professor and director of the nuclear medicine division in the UI Department of Radiology. "We expect that using alpha particles will improve tumor treatment compared to the current standard approved isotopes because alpha emitters are expected to be significantly more effective in killing tumors."

UI Health Care is actively recruiting for an alpha-emitting study in a phase 1 trial and has imaged ten patients in preparation for the alpha-emitter therapy. The team is waiting on toxicity data before moving to the next trial cohort.

"The imaging prior to treatment provides important data about the radiation doses and bio-distribution, or how it spreads throughout the body, of the agent," Menda says.

UI physicists Mark Madsen, PhD (retired), and Stephen Graves, PhD, assistant professor in the Department of Radiology and its nuclear medicine division, have been instrumental in helping the UI team use the imaging information to calculate dose measurements. This data helps personalize patient treatment, maximizing dose safety and efficacy.

"If you think about it," Buatti says, "it's complicated to figure out how much radiation dose gets to an actual tumor. If I have some form of radioactivity, and I inject it into your blood, and you have this molecular uptake at a tumor, it almost always has some of the radioactive compound metabolized. Maybe some gets excreted in the urine, maybe it gets excreted in other ways, but 100% of it doesn't just automatically go to the tumor and stay there."

The prevailing question, Buatti poses, is when you give someone an injection like this, how much is the tumor getting over the time that the radioactivity is present?

"We've worked on developing deep-learning-based algorithms to be able to automatically identify normal organs and bone marrow as well as multiple tumors very quickly so that we can calculate doses more accurately," he says.

Researchers are examining a potential new cancer receptor target known as fibroblast activating protein inhibitor (FAPI). Iowa is one of four sites in this phase 1 trial, which could impact how solid tumors, like pancreatic cancer or sarcomas, are identified and targeted by theranostic products. Patients may qualify for theranostics treatment if tumors have specific FAPI receptors.

The UI team is also looking at compounds being tested for small-cell lung cancer, melanoma, and breast cancer.

"From a patient care point of view, these compounds are for people who don't have good, effective treatment options," Buatti says. "They're not good candidates for surgery. They're not good candidates for standard radiation therapy. They're not good candidates for chemotherapy. Theranostics treatments fill a real void."

Read more online

With theranostics, we've been able to use precision medicine to link radation to molecular targets—delivering radiation more precisely to tumors without harming surrounding cells."

JOHN BUATTI, MD
PROFESSOR, UI CARVER COLLEGE OF MEDICINE DEPARTMENT OF RADIATION ONCOLOGY

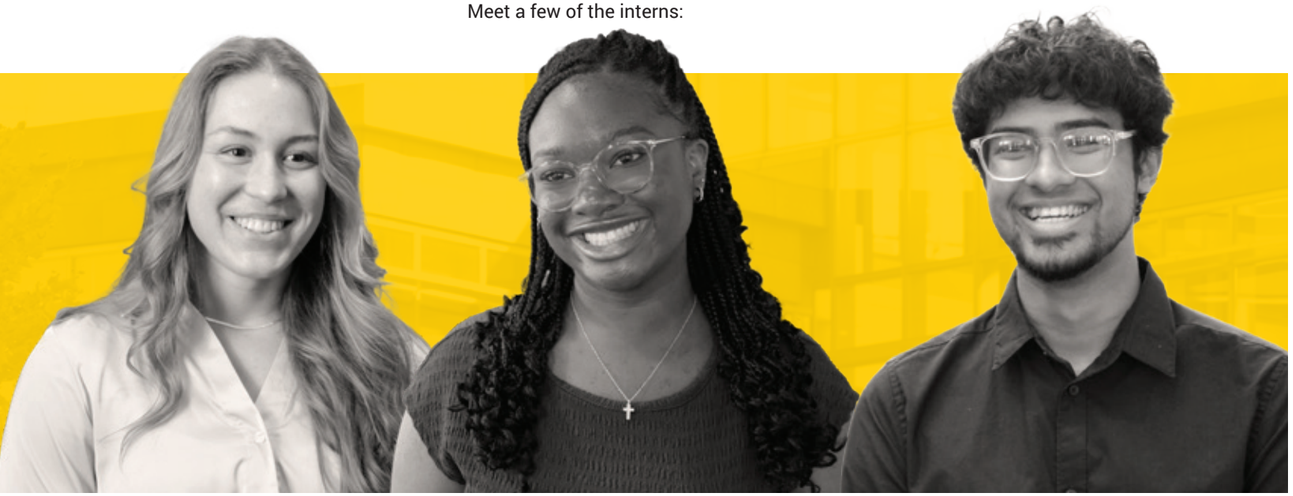
Future leaders

in cancer research

Cancer touches the lives of nearly everyone in Iowa and across the nation. Cancer research is essential for prevention and discovering new treatments. Bringing new and different voices into cancer research enhances problem solving, fosters innovation, and speeds up our progress toward finding a cure for this life-changing disease.

Over the summer, UI Health Care welcomed 11 undergraduates from colleges and universities nationwide to Iowa City as part of the American Cancer Society's Diversity in Cancer Research (DICR) internship program, with funding and support from the National Cancer Institute. These interns spent ten weeks in a lab exploring a cancer research topic, learning about different career paths, and receiving mentorship from experts in cancer treatment and research.

Meet a few of the interns:



Nina Sandoval

I'm originally from Arizona, and I'm going to school at Minot State University in North Dakota. I saw this program as an opportunity for higher-level research and lab experience. The University of Iowa is a lot bigger than the university I currently attend, so it provides me with more opportunities to get hands-on experience that I wouldn't necessarily get otherwise. This summer, I studied different signaling pathways with TRAF3 and how that can affect cancer. I got to make a lot of new friends and connections as well.

Eryka Appiah-Amaning

I'm from Dallas, TX, and attend Prairie View A&M University. I'm a junior biology major and a proud Undergraduate Medical Academy scholar. I am thankful to have had the chance to listen to different people, gather different perspectives, and learn new things to bring back to my school and share with others.

Riaz Meah

I attend Thomas Jefferson University in Philadelphia and am currently a pre-medical studies major. I haven't had a lot of research experience coming into this internship. It took me a little while, but I was amazed by what I was able to accomplish. I couldn't have done it without the people at the lab giving me the motivation to move forward. Everyone here is so friendly and close-knit. I know as soon as I leave here and go back home to Philadelphia, I'm going to try to join a lab there. This program helped me realize that cancer research is something I definitely want to continue doing.

These are the next generation of cancer researchers, clinicians, and scientists, and the Holden Comprehensive Cancer Center is proud to have played a part in their journey.

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