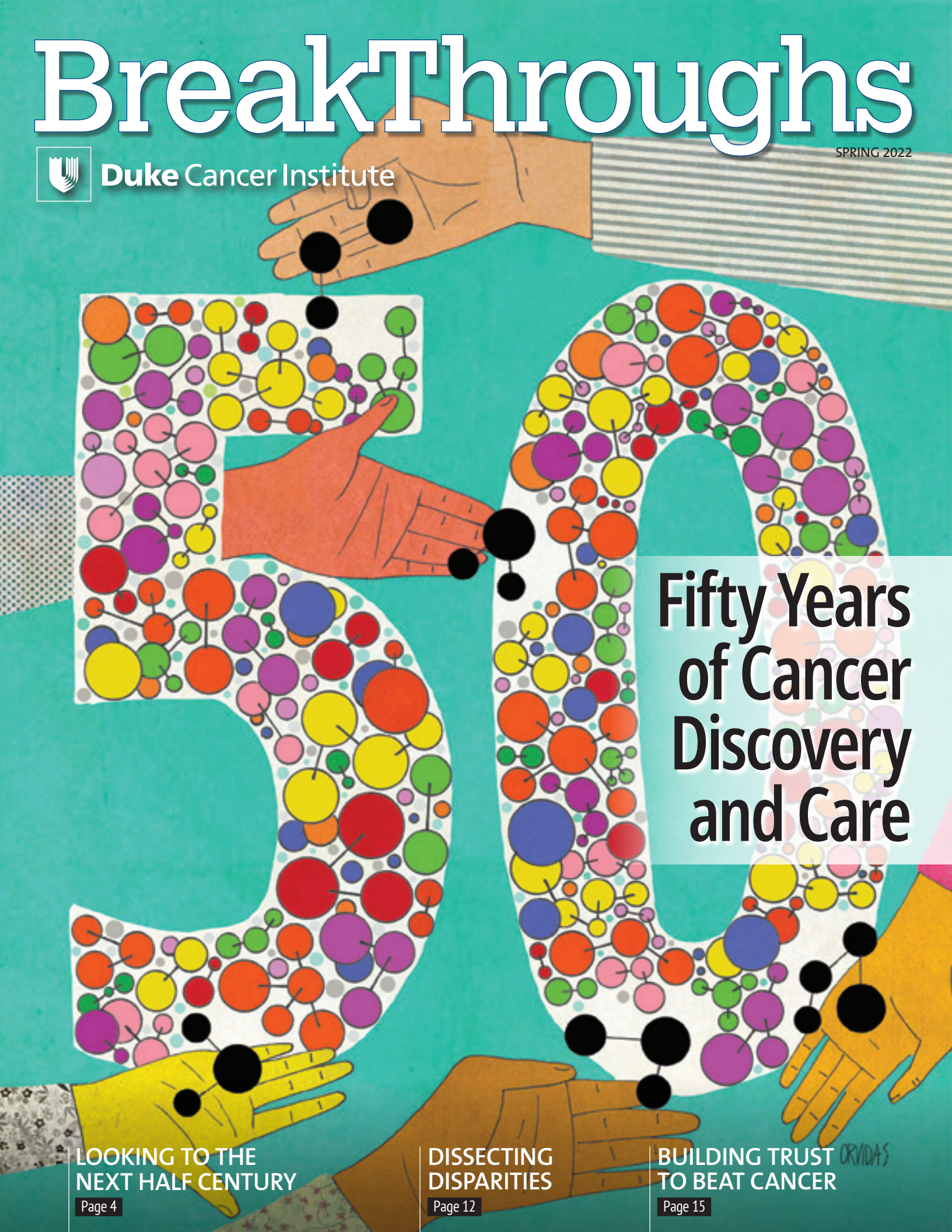
BreakThroughs

Duke Cancer Institute

SPRING 2022



Fifty Years of Cancer Discovery and Care

Looking to the Future of Cancer Care

LES TODD

MICHAEL B. KASTAN

ON THE COVER:
Duke Cancer Institute is celebrating 50 years of transforming cancer care and discovery as a comprehensive cancer center designated by the National Cancer Institute.
Illustration by Ken Orvidas.

WHEN CONGRESS DECLARED THE "WAR ON CANCER" in 1971, there were no mammograms, colonoscopies, or prostate specific antigen tests. Chemotherapy was in its early days, there were no minimally invasive surgeries, and radiation therapy was imprecise.

In 2022, as Duke Cancer Institute (DCI) begins celebrating 50 years of research, breakthrough treatments, and exceptional cancer care and support services, please join us in marveling at how far cancer prevention and care have come.

Duke was one of the first eight National Cancer Institute (NCI) designated Comprehensive Cancer Centers in the United States, following the passage of the National Cancer Act of 1971, and it has maintained this NCI designation, uninterrupted, for 50 years.

This achievement is something that all of us at DCI are very proud of, and I hope that you — our donors and friends — share in this pride. Thank you for the role you play in helping us maintain this designation. We could not do it without you.

In fiscal year 2021, we took care of more cancer patients than at any other time in the history of Duke Health system — more than 66,000 patients. And we are now ranked as the No. 1 cancer program in the Carolinas and beyond by *U.S. News & World Report*.

> ...WE ARE DEDICATED TO MAKING SURE EVERYONE HAS AN EQUAL OPPORTUNITY TO SURVIVE CANCER BY STRENGTHENING PARTNERSHIPS WITH THE COMMUNITIES WE SERVE...

Looking ahead to the next half century, we will continue to expand our transformative discoveries to lead in finding better ways to prevent, diagnose, and treat cancer. And we are dedicated to making sure everyone has an equal opportunity to survive cancer by strengthening partnerships with the communities we serve and working to eliminate barriers to accessing care and meeting patient's needs.

Michael B. Kastan, MD, PhD
Executive Director, Duke Cancer Institute
William and Jane Shingleton Professor,
Pharmacology and Cancer Biology
Professor of Pediatrics

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New Insight into How Breast Cancer Drug Works Could Lead to Improvements

In a study that upends current concepts of immunotherapies for breast cancer, researchers at Duke Cancer Institute have described a new process for how the drug pertuzumab works in tandem with trastuzumab.

The combination therapies have been frontline treatments for HER2-positive breast cancers, but the way they work has not been well understood. Better insights into the drugs' mechanisms could enhance their current use and lead to ways to improve them.

The research team — which was led by Zachary Hartman, PhD, an associate professor in the Departments of Surgery and Pathology at Duke University School of Medicine and member of the Duke Cancer Institute — published their findings in the journal *JCI Insight*.

> "IT SUGGESTS THAT ENHANCING COMPLEMENT ACTIVITY IN TUMORS COULD IMPROVE OUR EXISTING THERAPIES."
>
> Zachary Hartman

The team found that pertuzumab doesn't just interrupt a cancer-causing signaling system driven by the protein HER2, but also elicits a different kind of immune response that is critical for its efficacy.

When combined with trastuzumab, the therapies lead to activation of an immune response known as the complement system, a blood defense system that aids in the body's ability to clear foreign substances and pathogens.

"Our finding overturns existing dogma in how pertuzumab functions and demonstrates a new mechanism of action for tumor-specific antibodies," Hartman said. "It suggests that enhancing complement activity in tumors could improve our existing therapies."

– Sarah Avery

BRIAN STRICKLAND

Brian Brigman, director of the Duke Sarcoma Center, presents a case at the tumor board.

New Sarcoma Center Launches

In April 2022, Duke Cancer Institute announced the launch of the Duke Sarcoma Center, a center of excellence for treatment and research into sarcoma (rare cancers that affect the supporting tissue of the body).

The center is spearheaded by orthopaedic surgical oncologist and Professor of Orthopaedic Surgery and Pediatrics Brian E. Brigman, MD, PhD. It is the natural outgrowth of Duke's personalized sarcoma treatment grounded in research and commitment to training the next generation of sarcoma clinicians and scientists.

"Over the last 15 years or so, our specialized team has really grown into a national leader in this area," Brigman said. The center is a recognition of this accomplishment and the beginning of even better care, research, and training at Duke, he said.

The team includes 25 specialists across the disciplines of orthopaedic surgery, surgical oncology, medical oncology, pediatric oncology, radiation oncology, radiology, neurosurgery, and pathology.

These providers see more than 900 new patients per year and are actively caring for more than 2,000 patients, Brigman said. "Sarcomas may be rare cancers, but they're not rare for us."

According to the American Cancer Society, about 3,910 new cases of cancer in the bones and joints and an estimated 13,190 new cases of soft tissue sarcoma will be diagnosed in adults and children this year. An estimated 2,100 people are expected to die from bone and joint sarcoma and 5,130 from soft tissue sarcoma.

That's about 17,000-plus diagnoses and 7,000-plus deaths too many.

"Because they occur anywhere in the body, can affect people of any age, and have more than 100 different subtypes, they are very challenging to diagnose and cure," Brigman said. "This work requires a true team approach. There's ample evidence to suggest that patient outcomes are better when they're treated by an integrated, subspecialized sarcoma team."

– Julie Harbin

FOR MORE INFORMATION:
dukecancerinstitute.org/sarcoma-0

KEN ORVIDAS

Looking to the FUTURE of Cancer Care

When Joseph O. Moore, MD, came to Duke as a fellow in 1975, he and his mentors treated chronic myeloid leukemia (CML) with a chemotherapy regimen that was like a "wet blanket." It suppressed the cancer for a few years. "But it didn't change the trajectory of the disease," Moore said. Patients developed acute leukemia, which was almost always fatal.

By the early 1990s, younger patients could achieve a cure with a bone marrow transplant, though complications were common. By 1999, Moore was the Duke investigator for a national study of a targeted drug, imatinib, which stops leukemia cells from growing by shutting down a key protein. When imatinib was approved by the Food and Drug Administration (FDA) in 2001, it transformed CML into a disease easily treated by taking a pill.

When Moore retired from clinical practice in 2019, he was involved in a study following people with CML who had been taking imatinib long term, which showed they could safely stop therapy.

BY ANGELA SPIVEY

The CML example provides a snapshot of just how far cancer treatment has come in the last 50 years. For many patients, "There's an expectation of success and people living normal lives," said Moore, professor emeritus of medicine.

Much of that progress can be traced to research funded by the "war on cancer," which launched in 1971 when congress passed the National Cancer Act. The act gave the National Cancer Institute (NCI) the authority and funds to create a national cancer program. The backbone is a network of comprehensive cancer centers that provide patient care and conduct rigorous research to find new and better ways to prevent, diagnose, and treat cancer.

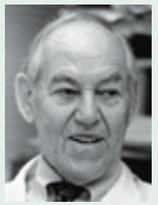
Duke was one of the original eight such centers, designated in 1973 because of the strong research and clinical care programs it had already put into place, including one of the first brain tumor programs in the United States, said Steven Patierno, PhD, deputy

Top, Joseph O. Moore in the late 1980s. Bottom, Moore before his retirement in 2019.

Duke Cancer Institute
50th Anniversary

1971 The National Cancer Act is signed, committing the United States to a "war on cancer."

1972 The National Cancer Institute awards Duke $5.4 million toward the Animal and Laboratory Isolation Facility, the first of its kind.



1973 Duke is named a comprehensive cancer center by the National Cancer Institute, one of the nation's original eight. William Shingleton, MD, is appointed Duke's first cancer center director.

1975 The Edwin L. Jones Cancer Research Building opens, thanks to a $1 million gift from Edwin L. Jones Jr. (in honor of his father, Edwin L. Jones Sr.) and National Cancer Institute funding.

1978 The Edwin A. Morris Building opens, thanks to a $1 million gift from Morris, bringing together multidisciplinary inpatient and outpatient cancer care.

1983 Gertrude Elion, a drug development pioneer, begins serving as a mentor to Duke medical and graduate students in neuro-oncology and pediatric bone marrow transplant.

1987 Rachel Schanberg founds the Duke Cancer Patient Support Program, which begins with Schanberg as the only full-time employee.

director of today's Duke Cancer Institute (DCI), and professor of medicine.

In fact, one of the advocates for the 1971 National Cancer Act was William Shingleton, MD, the first director of the Duke Comprehensive Cancer Center, as DCI was known in 1973. The chance to work with Shingleton and other research pioneers was one of the reasons that Moore came to Duke for fellowship and stayed on as faculty, he said.

As Duke celebrates its 50th anniversary of transforming cancer discovery and care, researchers and providers envision a future when all cancers are easily treatable, physicians can detect and stop cancer earlier and earlier, and everyone has the same opportunity to survive cancer.

REDUCING TOXICITY

Surgery, as well as treatments that are toxic to all cells, like standard chemotherapy and radiation, were the main treatments when the war on cancer began, and they are still used today. One of Duke's contributions was making chemotherapy easier to tolerate, through clinical studies that led to the FDA approval in 1990 of a growth factor (G-CSF) that stimulates bone marrow recovery, decreasing infections and hospitalizations. "G-CSF is used all over the world now for patients getting chemotherapy," said Michael Kastan, executive director of Duke Cancer Institute and the William and Jane Shingleton Professor of Pharmacology and Cancer Biology.

Also in the 1990s, Duke made pioneering advances in stem cell transplant for patients with blood cancers. In 1992, Duke opened the nation's first outpatient bone marrow transplantation program. High-dose chemotherapy is given on an inpatient basis, but Duke's procedure allowed bone marrow infusions to be performed at outpatient clinics. "Patients did not have to be hospitalized, so they were able to move about more and eat better. The costs tend to be lower as well," said Nelson Chao, MD, MBA, Donald and Elizabeth G. Cooke Professor and chief of Duke's Division of Hematologic Malignancies and Cellular Therapy.

Nelson Chao

Today, the program has evolved to providing all follow-up care outside the clinic for bone marrow transplant patients in recovery, at their homes or an apartment near Duke. The team was the first in the world to test this practice in 2014. In 2020, in response to the COVID-19 pandemic, they made it standard of care. The practice reduces the number of people each patient is exposed to and may reduce complications and improve survival, Chao said.

HITTING THE TARGET

Thanks to advances like these, the death rate from cancer in the United States has declined every year since 1991, according to the American Cancer Society.

Targeted therapies, which directly "hit" a specific protein or other molecule that has caused cancer to grow, have played a large role in that progress, Kastan said.

> "WE'D EVENTUALLY LIKE TO STOP USING CYTOTOXIC THERAPIES, BUT THAT'S GOING TO BE A LONG TIME."
>
> **Michael Kastan**

COURTESY OF GLAXOSMITHKLINE INC. HERITAGE CENTER.

The first targeted therapy — imatinib, the drug that Moore mentioned — wasn't approved by the FDA until 2001. Duke has made key contributions in developing other targeted therapies, including Avastin, the first cancer therapy that worked by stopping blood vessel growth, cutting off the tumor's blood supply. In 2004, Duke clinical studies led to approval of Avastin for colon cancer, and in 2007, Duke researchers at the Preston Robert Tisch Brain Tumor Center led studies showing that it worked for brain tumors, leading to FDA approval for that use.

Michael Kastan

In 2012, Duke breast cancer researchers led clinical trials that resulted in approval of lapatinib and trastuzumab, some of the first targeted therapies to treat metastatic breast cancer. "They both have become standard therapies for high-risk breast cancer," Kastan said.

Despite such developments, some cancers still have low survival rates, and there still aren't targeted therapies for most tumor types, because research is in "its infancy" in understanding the genetics of tumors, Kastan said. "We'd eventually like to stop using cytotoxic therapies, but that's going to be a long time."

Scott Antonia

Immunotherapies, which harness the immune system's own ability to fight cancer, are another focus for the future. Immunotherapies that emerged beginning in 2010 have led to improved survival times for some cancers, and by 2015 they made it possible for lung cancer patients to achieve long-term survival for the first time, said Scott Antonia, MD, professor of medicine. The DCI Center for Cancer Immunotherapy, which Antonia directs, works to translate Duke discoveries into new immunotherapies, and to make these treatments work better for more patients.

THE RIGHT TREATMENT FOR THE RIGHT PATIENT AT THE RIGHT TIME

No matter the type of treatment, the future of cancer care will continue to move toward precision medicine, or "finding the right treatment for the right patient at the right time," Kastan said. This includes choosing treatments based not only on the genetics of the tumor, but also on the genetics, age, and risk factors of each patient.

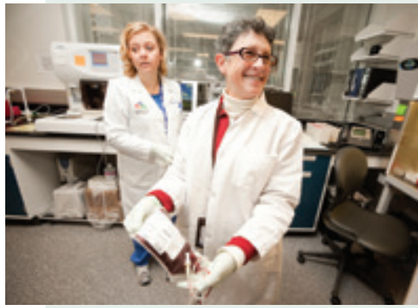
Duke has made some inroads with a Molecular Registry of Tumors that stores information about mutations in patients with advanced cancers, uses Duke-created software to match patients with treatments that may work best for their tumor, then notifies doctors automatically. In addition, Duke researchers in prostate cancer and colorectal cancer have in the last three years led clinical trials showing that a "liquid biopsy" can be used to track how tumors are evolving and responding to treatment, Kastan said. Liquid biopsies use a blood test to detect circulating tumor cells or tumor DNA, so they are less invasive and faster than traditional tissue biopsies.

Another vision for the future is a time when no one ever develops full-blown cancer. A group of Duke researchers from many

KEN RUTH

Bishop Ronald Godbee and Meira Epplein

different fields are working together on the idea of "interception" — intervening once someone has started down the "cascade" of events leading to cancer, but before actual cancer has developed, said Meira Epplein, PhD, co-leader of the Cancer Risk, Detec-



1990 Jeffrey Crawford, MD, leads a research team that wins Food and Drug Administration approval of the growth factor G-CSF to decrease infections and hospitalizations after chemotherapy.

1992 Duke opens the nation's first outpatient bone marrow transplantation program.

1993 Duke researchers led by Joanne Kurtzberg, MD, are the first in the world to use umbilical cord blood from an unrelated donor to treat children for leukemia and other diseases.

1994 Duke scientists are involved in a research group that helps apply the discoveries of the BRCA1 and BRCA2 genes to understanding susceptibility to ovarian and breast cancer.

1996 Duke establishes the Carolinas Cord Blood Bank, one of the nation's first public umbilical cord blood banks.

2004 Duke researchers lead a study that leads to Food and Drug Administration approval of the drug Avastin to treat colon cancer, the first cancer therapy to be approved that works by preventing the growth of new blood vessels.

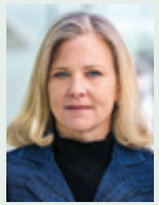
2007 Duke's brain tumor group conducts a clinical study that leads to the approval of Avastin to treat recurrent glioblastoma, the first new treatment for this aggressive brain tumor in more than a decade.

2010 Duke Cancer Institute is created as Duke's first single entity to unite all cancer care, research, and education.

2011 Andrew Berchuck, MD, and other members of the Cancer Genome Atlas Ovarian Cancer Working Group publish the first comprehensive genomic analysis of ovarian cancer.

2011 Duke Cancer Institute launches an Office of Health Equity to improve population health for communities it serves.

2012 Duke researchers led by Kimberly L. Blackwell, MD, develop some of the first targeted therapies to treat metastatic breast cancer. In 2013, Blackwell is named one of *Time* magazine's 100 most influential people.



2012 The Duke Cancer Center building opens, providing integrated research and care in a patient-centered environment.

2012 Duke Cancer Institute member Robert Lefkowitz, MD, is awarded the Nobel Prize in Chemistry for discovering the mechanisms of G-protein-coupled receptors, which has led to the invention of approximately one third of all FDA-approved drugs.

2014 Duke researchers identify genetic mutations that play a role in brainstem glioma, resulting in changes to the World Health Organization glioma classification scheme.

tion, and Interception research program.

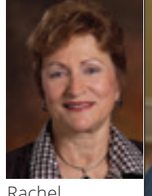
For instance, gastroenterologists are practicing interception when they remove pre-cancerous polyps during a colonoscopy. Another example — testing and treating for the stomach bacterium H. pylori, which causes ulcers and is thought to infect 50 percent of the world's population. Infection with H. pylori increases risk of stomach cancer, but treating an infected person with a two-week course of antibiotics eradicates the bacterium and reduces risk of stomach cancer by 50 percent, Epplein said.

Epplein has worked with community partner Bishop Ronald Godbee to host H. pylori testing events at a Durham church. Participants received letters about their results and were encouraged to share this information with their primary care doctors and, if appropriate, ask to be treated.

The research group is working to develop other methods of interception and new ways to identify people at high risk for cancer.

TREATING THE PERSON, NOT JUST THE CANCER

Duke was one of the first cancer centers committed to attending to the needs of the patient as a person. In 1987, Rachel Schanberg founded the Duke Cancer Patient Support Program in memory of her daughter, Linda Schanberg Clark, who died from Hodgkin's disease at age 26. "She was the first to say that her daughter received excellent medical care, but she felt there were many challenges for her daughter and her family that no one talked about," says Cheyenne Corbett, PhD, who worked with Schanberg and is now co-director of the Duke Supportive Care and Survivorship Center.



Rachel Schanberg

Schanberg quit her job as a school counselor to direct the program. Corbett heard about it in 2002 when she was finishing a doctoral degree in family therapy at Nova Southeastern University in Florida. "Even then, there were very limited options in cancer centers or in the community to help families facing cancer," Corbett said.

JARED LAZARUS

Cheyenne Corbett and her mother Nancy Corbett, a cancer survivor

The Duke Cancer Center building opened in 2012.

Corbett started working with Schanberg in 2002 part time, coordinating volunteers and providing counseling. There was very little money, but Schanberg persisted. "She was one of the strongest, feistiest people I've ever met," Corbett said.

"Every day, if Rachel saw a patient in need or someone who looked lost or confused or sad, she would stop and sit and just connect with them," Corbett said. "That's the heart of what we do: Stop and really listen to what the patient is going through." Corbett became director of the program when Schanberg retired in 2006, and she and her team have grown their cancer support services and research into the DCI Supportive Care and Survivorship Center, created in 2017.

The center offers an array of services to all DCI patients and their families, such as therapy, patient navigation, tobacco cessation, a teen and young adult oncology program, financial assistance, exercise consults, a program focused on heart health of cancer patients, a sexual health and intimacy program, a cancer genetics program, and fertility services. The center also leads research and training programs.

A NEW ERA AT DUKE

In 2010, then-Chancellor for Health Affairs Victor Dzau, MD, announced plans to unite all of Duke's cancer care, research, and education under one organization — Duke Cancer Institute (DCI). This structure breaks down barriers between departments and between the health system and the university, said Kastan, an accomplished cancer biology researcher who came to Duke in 2011 after leading the cancer center at St Jude's Children's Research Hospital. "I knew that in the setting of this structure, that the sky was the limit, and that we could do great things in this environment with the great people at Duke."

The new investments in cancer care and research included a 267,000-square-foot Duke Cancer Center building. It opened in 2012 with natural light, family space, and clinics set up so that patients can see multiple providers in one building. Duke staff and patients worked with architects and designers to make the building "a physical embodiment of Duke Cancer's philosophy of patient-centered care," Corbett said. "That is one of the reasons why it's such a special space; the voices of team members, patients, and families were included in the design."

WORKING TOWARD HEALTH EQUITY

In 2012, after Patierno left his position as founding executive director of the George Washington University Cancer Center to become deputy director of DCI, one of the first things he and Kastan did was launch an Office of Health Equity to improve population health for communities that DCI serves. "Lack of access to care, lack of early detection, lack of healthy lifestyle, lack of education, lack of health insurance, lack of trust in the medical system — all of these things work together, and we need to implement solutions that address all of them," Patierno said.

Nadine Barrett

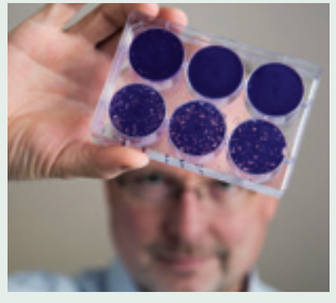
In 2017, that team, led by Nadine Barrett, PhD, won an Innovators Award from the

Duke Cancer Institute
50th Anniversary

2014 The Duke Adult Bone Marrow Transplant team is the first in the nation to test at-home care for stem cell transplant recipients in recovery.

2015 DCI member Paul Modrich, PhD, is awarded the Nobel Prize in Chemistry for his 40 years of study of how the body repairs mistakes in the DNA code.

2016 Shelley Hwang, MD, PhD, is named one of Time magazine's 100 most influential people. She leads the first large, national trial to compare the benefits of surgery or monitoring for low-risk ductal carcinoma in situ or "stage 0" breast cancer.



2016 A re-engineered poliovirus developed at Duke by Matthias Gromeier, MD, to treat glioblastomas receives "breakthrough therapy" status from the Food and Drug Administration.

2019 Researchers in the Duke Center for Prostate and Urologic Cancers publish key studies showing that if Black men have access to newer prostate cancer therapies, they fare better than white men, starting a national discussion.

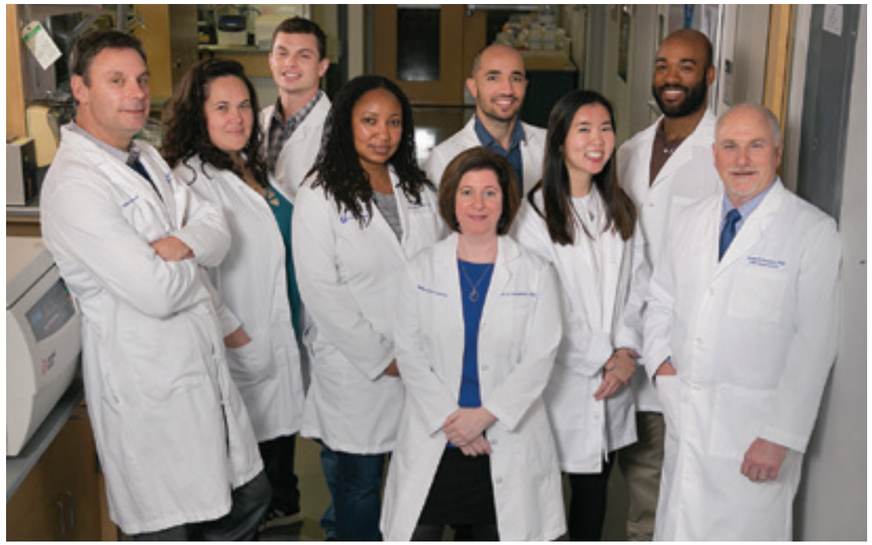
2020 A clinical trial opens of the first human-derived targeted immunotherapy for solid tumor cancers, developed at Duke by Edward Patz Jr., MD.

2020 In response to COVID-19, DCI makes at-home care the standard for all stem cell transplant patients in recovery, and all support services available via telehealth.

2020 Donald McDonnell, PhD, receives the Susan G. Komen Brinker Award for Scientific Distinction for improving understanding of estrogen receptor signaling, leading to development of new breast cancer therapies.

2021 Scientists from around the world, led by Sandeep Dave, MD, MS, publish initial results from the Atlas of Blood Cancers Genomes, a systematic genomic profile of all 100 different blood cancers.

2022 Duke University School of Medicine Dean Mary Klotman, MD, speaks at a Duke employee event celebrating Duke Cancer Institute's 50th anniversary.



KEN HUTH

Members of the Patierno/Freedman/George lab, which studies health disparities in prostate cancer.

American Association for Cancer Research, for their work developing community partnerships to reduce cancer disparities. Those activities include developing a diverse and engaged community advisory council, forming a research agenda, and implementing a program of community-facing navigation and screening events. The team is now part of a larger program called Community Outreach, Engagement, and Equity.

If cancer screening shows that someone needs further care, there are many points where the system can break down, Patierno said. Duke employs people called navigators who try to find and overcome those gaps. The same community-facing navigators who work with people at screening events provide detailed follow-up to arrange treatment, at Duke or even at other cancer centers, depending on the person's location and needs, said Angelo Moore, RN, PhD, assistant director of community outreach, engagement, and equity for DCI.

Angelo Moore

At Duke, the community-facing navigators make a "warm handoff" to internal patient navigators, who help make their first appointments and connect them to financial services, transportation, and other support. The team continually works to improve and expand this model, which spans pre-treatment through active cancer treatment and survivorship (care after active cancer treatment ends), Patierno said. A paper describing the model was published in April 2020 in *Cancer Medicine*.

"The ultimate goal is to achieve cancer health equity," Patierno said, which means that everyone would have an equal opportunity to prevent, detect, treat, and survive cancer.

If the next 50 years are anything like the previous ones, there will be more "fantastic evolutions" in cancer care, as Moore described it. After coming to Duke for a fellowship in 1975, then staying on as faculty, Moore never left, he said, because there wasn't a better place to do what he loved: "Treating patients, running clinical studies, and helping people."

DRAWBRIDGE MEDIA

Stacey Phipps and her 8-year-old daughter, Kerry.

Stacey Phipps and her daughter, Kerry, lit the virtual Tree of Hope at the Duke Cancer Patient Support Program's 31st annual Tree of Hope Lighting Ceremony. The December 2021 virtual event kicked off Duke Cancer Institute's celebration of the 50th anniversary of its designation as a comprehensive cancer center by the National Cancer Institute (NCI).

When Phipps was diagnosed with breast cancer in fall 2020, she went to several treatment centers for second and third opinions, but the personal treatment she received at Duke stood out.

"In some places I just felt like I was a patient, but at Duke I felt like I was a person," she said. For instance, her Duke Raleigh oncologist, Vijay G. Paryani, MD, asked about her husband and daughter by name, and he asked about her career. "He was really interested in my life outside of cancer, and I could feel that," Phipps said.

> "HE [VIJAY PARYANI, MD] WAS REALLY INTERESTED IN MY LIFE OUTSIDE OF CANCER, AND I COULD FEEL THAT."
>
> **Stacey Phipps**

"When I was diagnosed with breast cancer, my immediate thought was about my daughter, Kerry, and what would happen to her if something happened to me," Phipps said.

The family participated in a Duke program designed for families facing cancer, called KidsCan! Children and teens can talk with people their own age about their parents' cancer, and parents can talk to each other about what it's like to be a parent while undergoing cancer treatment.

"When I finished treatment at Duke, it sounds funny to say, but I was sad that I wasn't going to see my care team for a while," Phipps said. "I really felt that everyone really cared about me, and I missed them in an odd way."

"I'm just so blessed to live in a place where I have such good care available to me," she said. "I find my hope by looking at this 8-year-old next to me."

YOU CAN HELP
To donate, visit **bit.ly/dcispring22**

KEN HUTH

Dissecting Disparities in Cancer Outcomes

BY ANGELA SPIVEY

WHEN TOMI AKINYEMIJU, PHD, CAME FROM NIGERIA to Michigan for college in 2001, she realized that she had drastically underestimated the cold. "It was the first snowstorm of the winter," she said. "I arrived in Michigan wearing a cute little hoodie, thinking I was all bundled up." Her brother, who had been living in the state for a while, brought her a winter jacket.

Another culture shock — when she applied for a part-time job, the application asked her to check a box to indicate her race. In Nigeria, where she had lived since she was three years old, she had never had to think about it. "Why does it matter what race I am?" she thought.

It matters a lot. "The more time I spent in the United States, the more I understood that there are complex historical, structural, and systemic factors that shape everyday interactions," she said. "The moment you step outside your door, one of the first things people notice is your race. And with that comes a series of unspoken and complex social cues to negotiate and navigate any preconceived assumption and implicit association, and to get to present your true self. Sometimes it is an uphill battle."

Race, and how people are treated differently because of it, leads to major differences in health outcomes. As a bit of an outsider, Akinyemiju (pronounced Ah-keen-yah-MEE-jew) saw this aspect of culture and health as something to be examined and dissected. She has built her career doing that.

She meticulously studies what drives cancer outcomes, trying to understand why some groups of people fare worse than others, and what can be done to erase those disparities.

THE STRESS OF SYSTEMIC RACISM

In the United States, African Americans and Hispanics tend to have poorer cancer outcomes compared to white patients. For instance, Black people with lung cancer are more likely to die than whites with the disease. In ovarian cancer, survival rates for white women have increased since the 1970s, but survival rates for Black women have gone down.

Akinyemiju, associate professor and vice chair for diversity, equity, and inclusion in the Department of Population Health Sciences and associate research professor in the Duke Global Health Institute, points out that disparities like these have multiple causes. She and a team that includes a biostatistician and a medical geneticist measure those aspects: biological factors like genetic predisposition, as well as what are called "social determinants of health." That term refers to factors such as socioeconomic status, education, access to health care, and systemic racism.

The biological and social intersect in an idea called allostatic load, which is biological wear and tear caused by a state of chronic stress. The idea was developed in 1993 by a researcher at Rockefeller University, Bruce McEwen, PhD. "Before that, it was clear that the social context in which people lived affected people's health. But the concept of allostatic load allowed us to measure how that happens," Akinyemiju said.

> "IDEALLY, WE ARE INTERVENING TO PREVENT THE FUNDAMENTAL CAUSE OF THIS, WHICH IS THE SOCIETAL STRUCTURE THAT CONTINUES TO DISADVANTAGE A WHOLE GROUP OF INDIVIDUALS."
>
> Tomi Akinyemiju

Allostatic load is calculated by looking at markers of strain on several of the body's organs and systems, including the heart, the immune system, and the neuroendocrine system (hormones that respond to the nervous system). High allostatic load indicates that the body is in a state of over-reaction or hyper-reactivity, Akinyemiju said.

"Everybody has a normal stress response, right? We all get stressed out, then we adjust," Akinyemiju said. "Our bodies know how to modulate themselves. But the more adversity you experience, the more your body has to keep reacting. It's fight or flight, but always being in fight mode. Things wear and tear faster."

In general, allostatic load increases as people age. But when Akinyemiju's team analyzed data from a Centers for Disease Control survey that tracked more than 50,000 people over 30 years, they saw that higher allostatic load scores began at younger ages for African American and Hispanic/Latinx participants, and the scores stayed higher over time, compared to white people. This work was published in June 2021 in the journal *Preventive Medicine*.

In a different study that looked at healthy people over time, Akinyemiju's team again found that African Americans in the study had higher levels of allostatic load, and these higher levels were statistically linked to higher risk of death overall and higher risk of death from cancer. Other studies have linked high allostatic load to increased risk of death from heart disease.

Akinyemiju says that treatments to address some of the elements of high allostatic load, such as high blood pressure or high blood sugar, can help, but the underlying issues must also be addressed. "Ideally, we are intervening to prevent the fundamental cause of this, which is the societal structure that continues to disadvantage a whole group of individuals," she said. "So there's a bigger societal conversation we need to have about those deeply entrenched issues."

Terry Hyslop

DOES STRESS AFFECT CANCER TREATMENT?

Other Duke researchers wonder if stress directly affects how the immune system fights cancer.

Terry Hyslop, PhD, professor of biostatistics and informatics, has long studied health disparities in breast cancer. In October 2021,

she received a Susan G. Komen and Gilead Sciences, Inc., Metastatic Breast Cancer Collaborative Research Grant to evaluate how stress contributes to higher rates of metastasis (spread to other organs) and worse breast cancer outcomes in Black women compared to white women. In particular, the team is studying how stress affects immune system signaling. One of the goals, Hyslop said, is to identify characteristics of sub-populations that could benefit from lifestyle interventions or clinical trials of specific treatments.

Akinyemiju collaborates on the Komen project to measure the impact of structural racism. "We define this as policies, laws, and practices that have become embedded into how we do things but that have a historical basis rooted in racism and discrimination," she said.

KEN HUTH

Akinyemiju's research team: From left: Melina Ksor, research assistant; Chioma Omeogu, research assistant; Deavion Godfrey, research intern; Anjali Gupta, research assistant; April Deveaux, MD, PhD, research scientist; Tomi Akinyemiju, MD, PhD; Alex Alexandar, research assistant; Ashwini Joshi, MPH, associate in research; and Haotian Ruan, research assistant.

"EVEN WHERE THERE IS A THERAPY THAT IS EFFECTIVE AND FDA APPROVED, THERE ARE STILL BREAKDOWNS IN ACCESS, AND IT'S OUR JOB TO MEET PATIENTS WHERE THEY ARE TO MAKE SURE WE MEET THEIR NEEDS."

Tomi Akinyemiju

EQUALIZING CARE

Not everyone gets equal access to cancer prevention and treatment. Fixing the problem is urgent, Akinyemiju said, because studies show that when everyone receives equal access, some of the racial differences in cancer outcomes are erased.

For instance, Akinyemiju's team has found that when Black people with lung cancer receive immunotherapies, which have become standard of care for advanced non-small-cell lung cancer, they actually fare better than white people receiving the same treatment. In their analysis of data about more than 3,000 lung cancer patients treated with immunotherapies, the death rate among Black patients was 15% lower than for white patients. The study was published online in November 2021 in the *Journal of Immunotherapy*.

"Even where there is a therapy that is effective and FDA approved, there are still breakdowns in access, and it's our job to meet patients where they are to make sure we meet their needs," Akinyemiju said.

Akinyemiju's team documents and analyzes those breakdowns. They're doing that now in a large study of patients with ovarian cancer, funded by the National Institutes of Health. Called the Ovarian Cancer Epidemiology, Healthcare Access and Disparities (ORCHiD) study, this effort will measure health care access and how it affects treatment, quality of life, and survival in 1,600 patients from cancer registries in North Carolina and eight other states.

CULTIVATING SENSITIVITY

Some elements of health care access are straightforward to measure, like whether patients can afford treatments or have insurance, or whether they live near a major cancer center that offers the latest treatments and support services. But other factors aren't as well studied because they involve surveying patients and measuring intangible elements like trust.

Those patient perceptions matter, Akinyemiju said. "If a provider is recommending a particular medication that may have substantial side effects, if you don't trust the recommendation and trust that the provider is giving you their best work, you may not follow their guidance."

The ORCHID team developed a survey that better captures these feelings, by conducting focus groups and testing with patients. "Some focus group participants have said that at times they felt like they were just a number," Akinyemiju said. "We hear this a lot from our patients who are lower income and who are racial minorities — this issue of empathy and patient-provider communication and cultural sensitivity being missing. Our patients explain that even simple acts help, like the provider putting a hand on their shoulder, and saying, 'We'll do everything we can, we're here for you.' Patients know it when they feel it."

Cultural sensitivity training is one part of a far-reaching strategy that must happen to improve access to care, Akinyemiju said. As associate director for community outreach and engagement at Duke Cancer Institute, she leads a team effort to address cancer health disparities (*see Building Trust to Beat Cancer, at right*). This work includes research, providing cancer screening and education in the community, and working collaboratively with other scientists to ensure that Duke Cancer Institute is improving health outcomes for all the patients it serves.

Back when Akinyemiju was just starting her PhD in epidemiology, she had her eye on studying HIV, but received funding on a doctoral fellowship to study cancer. It may have been a happy accident, but as she learned more about cancer, she realized she had found her life's work.

"I realized that cancer, and advancing cancer health equity, is one of the top global health challenges of our generation," she said. "Meeting that challenge requires that we identify and address the fundamental causes of cancer disparities and promote equitable access to cancer prevention and treatment. This must be a top priority for the next 30, 40 years."

Building Trust to Beat Cancer

KEN HUTH

Black men tend to be diagnosed with prostate cancer at a later stage compared to white men, and they are twice as likely to die from the disease.

A program accelerated by donor support aims to reduce that disparity by increasing the number of men who receive screening, education, and follow-up care to find the disease earlier, when it's more curable.

Current national guidelines recommend that each man decide individually whether or not to be screened via a prostate specific antigen (PSA) blood test. An elevated PSA may be a sign of prostate cancer, but not in every case, said Dan George, MD, a medical oncologist and co-leader of the Duke Cancer Institute (DCI) Prostate & Urologic Cancer Center.

"SOME PEOPLE ARE JUST AFRAID THAT THEY'RE GOING TO GET BAD NEWS. THEY THINK ABOUT BEING A BURDEN ON THEIR FAMILY."

Angelo Moore

At Duke, since 2017, the electronic medical record has included a health maintenance check to discuss prostate cancer risk and an algorithm to guide screening developed by a team of doctors from the Duke Departments of Primary Care, Family Medicine, Radiology, Urology, and Medical Oncology, George said. The algorithm requires that doctors in the Duke Primary Care Network

have conversations with men about whether to have their PSA checked. Since 2017, Duke Primary Care has seen an increase in prostate cancer screening, from 50% of men to 75%.

As a result, at Duke Health system, more than 60,000 men have their PSA checked each year. Out of those, thousands need further follow-up, George said. "This is where the one-to-one conversations with our patient navigators are so vital."

A fund established by DCI Board of Advisors member Donna Bernstein allows the center to dedicate a patient navigator to have those conversations with Black men at greatest risk of having aggressive prostate cancer: those with a screening PSA level above 10 ng/ml. The Prostate Cancer Fund Honoring Coach Clifford Ray is named for Bernstein's lifelong friend, a former National Basketball Association player and coach and two-time cancer survivor.

"It can be difficult to have somebody come in for cancer screenings, get treatment, and see a specialist when they feel fine," said Angelo Moore, PhD, RN, NE-BC, assistant director of community outreach, engagement, and equity for DCI. "Some people are just afraid that they're going to get bad news. They think about being a burden on their family," said Moore, an Army veteran who has had three aunts die from cancer. "So we have to overcome all those issues before they're able to come for a referral."

Community-facing navigators help men understand that the goal of PSA screening is to find cases of aggressive prostate cancer and treat it before it becomes lethal, said LaSonia Barnett, community-facing navigator lead at Duke Cancer Institute. "We're building a relationship with the patients over the phone," she said. "We get to know their thoughts. Are they fearful? How do they feel about the next steps?" Barnett also helps men understand what an elevated PSA level means, and she explains what the treatment options are if they do have cancer, and can connect them to support resources, such as transportation or financial assistance.

This project is part of a larger effort in which Moore's team builds relationships in the community to reach people before they ever need cancer care (*See "The Path to Care," at right.*) "We're trying to reach historically marginalized and medically underserved populations with education and early detection," Moore said.

– Angela Spivey

YOU CAN HELP

expand programs to provide more people the cancer screening and treatment they need. To give, use the enclosed envelope, or visit **bit.ly/dcispring22**

The Path to Care

When 60-year-old Vennice Roberts visited the emergency room in December 2020, X-rays showed a spot on her lung.

Doctors suspected cancer, so she was connected with Nadia Aguilera-Funez, a community-facing navigator with Duke Cancer Institute (DCI).

The spot turned out to be a blood clot caused by COVID-19.

But Aguilera-Funez stayed in touch. She and LaSonia Barnett, DCI community-facing navigator lead, got Roberts approved for a program that provided medication free of charge.

Then they helped her get cancer screenings. She had never had a colonoscopy, and she hadn't had a mammogram for several years.

The mammogram showed that she had stage 1 breast cancer.

Roberts lost her job, then her health insurance. Since 1989, she had worked as a cook supervisor at a nursing facility. "I loved to cook for the residents, watching people enjoy my meal," she said.

"THEY HAVE BEEN A BLESSING IN MY LIFE. SOMETIMES WE HAVE TO GO ON A JOURNEY THAT WE DON'T WANT TO GO ON. BUT I'M GETTING BETTER."

Vennice Roberts

The team connected Roberts with a program that provides treatment free of charge, and have been with her every step of the way.

"Together, we wanted to show her there was hope even as things were crumbling down," Aguilera-Funez said. "We held her by the hand and didn't let go."

"All I have to do is call them," Roberts said. "They have been a blessing in my life."

Roberts is used to taking care of others, and it has been hard to accept that she can't return to work because of effects from COVID-19 and a slipped disk in her back.

"Sometimes we have to go on a journey that we don't want to go on," Roberts said. "But I'm getting better. And I met a lot of people going through cancer who were worse than I was."

WHAT IS A PATIENT NAVIGATOR?

A navigator guides a patient through the health care system. Navigators help patients communicate with their health care providers so they get the information they need to make decisions about their health care.

VALARIE WORTHY
INTERNAL NAVIGATOR

Helps patients keep track of and get to medical appointments, coordinates care, and helps patients complete insurance paperwork.

LASONIA BARNETT
COMMUNITY NAVIGATOR LEAD

Educates about cancer prevention and screening; assists with cancer screening or finding a primary care provider; finds financial assistance and directs patients to further care.

ANGELO MOORE
ASSISTANT DIRECTOR OF COMMUNITY OUTREACH, ENGAGEMENT, AND EQUITY

Leads the community-facing navigation team. Three of his aunts died from cancer.

NADIA AGUILERA-FUNEZ
BILINGUAL COMMUNITY NAVIGATOR

Educates about cancer prevention and screening; assists with cancer screening or finding a primary care provider; finds financial assistance and directs patients to further care.

VENNICE ROBERTS
DCI PATIENT

She encourages everyone to get screened for cancer. "I want people to know there is help out there."

KEN HUTH

THE GAIL PARKINS MEMORIAL OVARIAN CANCER WALK & 5K RUN will celebrate 20 years of progress and 20 years of memories on Saturday, September 24, 2022, with an in-person event at Sanderson High School in Raleigh, North Carolina, and a virtual event throughout September. Melanie Bacheler organized the walk in memory of her mom, Gail Parkins, who lost her two-year battle with ovarian cancer at the young age of 56. The event raises awareness about ovarian cancer and its symptoms, provides funds for Duke ovarian cancer research, and pays tribute to those touched by the disease. In 2021, the event raised more than $222,000. To register, donate, or volunteer, visit **ovarianawareness.org**

THE THIRD ANNUAL TEE OFF VS. CANCER golf tournament in Atlanta raised more than $230,000 to support areas of greatest need in research and care at Duke Cancer Institute. The event was founded and organized by 1979 Duke University graduate and Duke Cancer Institute Board of Advisors member Rick Geiryn, and 1979 Duke graduate and emeritus Board of Advisors member Michael Fields. Join them for their fourth annual tournament on September 19, 2022. Visit **bit.ly/dciteeoff** for details. Want to organize your own golf tournament to benefit Duke cancer? Email **dcidevelopment@duke.edu.**

WHEN DUKE CANCER INSTITUTE BOARD OF ADVISORS MEMBER NANCY WRIGHT finished chemotherapy treatment for pancreatic cancer, nurses on the fourth floor of Duke Cancer Center brought out a small bell for her to ring to celebrate. Feeling inspired, Wright's family, including her husband, J. Gordon Wright, who 10 years ago this year survived stage 4 lymphoma, donated the Sound of Hope Bell in her honor. The Wrights stopped by the Seese-Thornton Garden of Tranquility across from Duke Cancer Center to ring the bell shortly after it was installed in April 2022.

LES TODD

An Extra Birthday

KEN HUTH

The color blue and butterflies always make Jamie Cooper Moales think of her late sister, Sara Elizabeth Cooper.

She tears up talking about her. "You would think after 21 years, it would be easier. But it isn't always," Moales said. "Sara was super friendly and wanted to make everybody feel special."

They were both into softball and volleyball and played instruments in the marching band. "She was outgoing and everyone's best friend. I was the studious and nerdy one," Moales said.

In 1999, when Sara was 16, she came to Duke for a biopsy and was diagnosed with non-Hodgkin's lymphoma. After responding well to the first round of treatments, her cancer soon relapsed. Additional chemotherapy failed, so she had a stem cell transplant at Cincinnati Children's Hospital, where she spent her 17th birthday. The transplant was not successful, and the cancer spread. She died of the disease in September 2000, at her family's home in West Virginia.

> *"...because of the care she received at Duke, we had one more birthday with her, and for that my family is immensely grateful."*
> – JAMIE COOPER MOALES

"While Sara did not have the outcome we hoped and prayed for, because of the care she received at Duke we had one more birthday with her, and for that my family is immensely grateful," Moales said.

Moales made a gift to start the Sara Elizabeth Cooper Immunotherapy Research Fund at Duke Cancer Institute to support work to develop new treatments that harness the immune system's innate ability to fight cancer.

"I believe that if Sara were diagnosed today, the promise of immunotherapy would have saved her life," she said.

To learn more or give to this fund, visit:
bit.ly/saracooperfund

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ERIN HULL

STRONGER THAN EVER

Father of five and Baptist pastor John Sanders was diagnosed with stage 2 pancreatic cancer in 2018. After a second opinion at Duke, he had a 12-hour surgery at Duke, then a plan of oral chemotherapy devised by Duke doctors, working with specialists near his South Carolina home. He has been cancer free since 2020.

"I tell everyone, everywhere I go, 'If you want to live, you need to come to Duke,'" he said at an April event where more than 500 researchers, providers, staff, and patients celebrated Duke's 50 years of cancer research and care. "My hope, my faith, and my resilience have never been stronger."

> "MY HOPE, MY FAITH, AND MY RESILIENCE HAVE NEVER BEEN STRONGER."
>
> **John Sanders**

Visit **dci50th.org** to support the next 50 years of Duke cancer care.

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