




Memorial Sloan Kettering
Cancer Center

2022 ANNUAL REPORT

A close-up photograph of a woman with long blonde hair in a ponytail, smiling warmly. She is holding a young child who is wearing a brown knit hat and a grey quilted winter jacket with orange accents. The child is also smiling. The background is a soft, out-of-focus green.

**IT
TAKES
MSK**



**It takes the people of MSK —
in every operating room,
every lab, every corridor,
and every neighborhood —
to achieve our mission:
Ending cancer for life.**

(This page) Emeline Aviki, MD, MBA, FACOG, specializes in surgery to treat gynecologic cancers.
(Cover) Kelly Spill, pictured with son Jayce, is expecting another child after successful treatment for rectal cancer.

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Physician-scientist Michael Foote, MD, cares for people with gastrointestinal cancers. His research focuses on drugs targeting specific cancer proteins and therapies to help the immune system attack cancer cells.

Message From the President and the Chairman

We will remember 2022 as a time of transition at Memorial Sloan Kettering Cancer Center (MSK). We were thankful to resume more normal operations after a long period of social distancing. At MSK, we share a deep, personal connection with our patients, our mission, and each other. It's what enables us to brainstorm ideas that lead to the next scientific breakthrough. It's how we help our patients and their loved ones find hope in their darkest hour, and it's how we support one another as we collectively confront the daunting challenge of cancer. It's also how we mentor the next generation of clinicians and scientists.

In 2022, MSK was once again recognized as one of the top two cancer centers in the country by *U.S. News & World Report* — as we have been since the ratings were established more than three decades ago. We are known worldwide for our commitment to outstanding and compassionate patient care, for our innovation in all things, and for sharing our knowledge. As you will read in this report, these three pillars of MSK are stronger than ever.

- **Our teams don't just treat our patients with leading-edge therapies; they care for them in the fullest sense of the word.** Our compassion is reflected in the nurse who keeps a "feel-good folder" for her patients, or the door attendant who makes it a point to remember patients' names, or the interpreter who ensures that a patient's test is explained in their preferred language, bringing comfort and understanding while alleviating anxiety. For these reasons and more, in 2022 MSK again earned Press Ganey's Pinnacle of Excellence Award for providing a consistently exceptional patient experience. And when the surveyors from the Joint Commission on Hospital Accreditation performed their rigorous site inspection, not only did they laud our patient care and safety efforts, but they also applauded our work in building greater equality, diversity, and inclusion, even as we strive to do more.
- **Our scientists explore every possibility in their relentless effort to propel our understanding of cancer forward and discover new therapies.** In 2022, in addition to groundbreaking advances in immunotherapy and targeted therapy, we led clinical trials that resulted in 14 FDA approvals of therapies to treat liver cancer, lymphoma, lung cancer, histiocytosis, and more. At the Sloan Kettering Institute (SKI), brilliant scientists continued to uncover the answers that will lead to tomorrow's treatments by asking fundamental questions about biology. This dedication to basic, discovery science sets us apart from our peers, and we are looking forward to celebrating the 75th anniversary of SKI in 2023.



- **The best and brightest minds continue to seek knowledge and mentorship at MSK, so that they can spread the MSK way at institutions across the nation and around the world.** In 2022, we were thrilled to enjoy our Academic Convocation and Commencement in person for the first time since 2019, allowing us to properly honor the graduates of the Gerstner Sloan Kettering Graduate School of Biomedical Sciences. We also celebrated the inaugural class of the MSK Bridge program, which gives college graduates from underserved communities experience in the lab, so these aspiring scientists can become the discoverers of tomorrow.

All these efforts depend on generous support from so many people. Inspired by our stellar Development team, last year more than 400,000 individuals, families, foundations, and companies contributed to raising nearly \$570 million to enable our mission. To all the benefactors of MSK, we are profoundly grateful for your partnership.

As we look to the future, we appreciate the foundation laid by Craig B. Thompson, MD, who in 2022 returned to his beloved lab in SKI's Cancer Biology and Genetics Program after an extraordinary 12-year tenure as President and CEO.

The theme of this Annual Report echoes the message of our "It Takes MSK" brand campaign, launched in 2022. Working together, we do what no one else can in cancer, as the evidence shows time and again in the following pages.

This pivotal moment is filled with the promise of new opportunities and achievements that will benefit generations of people with cancer to come. We move forward united in the belief that anything is possible.

SELWYN M. VICKERS, MD, FACS
President and Chief Executive Officer

SCOTT M. STUART
Chair, Board of Trustees

IT TAKES MSK

To Believe

Care begins with compassion
and confidence, to inspire patients
as soon as they arrive.

Joshua Morales welcomes patients
and their families as they come to MSK.



Joshua's job is door attendant. His mission is much more.

“I show them that we care, and seeing their reaction inspires me. As much as I try to boost their energy, they also boost mine.”

— Joshua Morales



Joshua makes patients feel so comfortable, many often ask for a hug.

All it takes is a smile and a simple question: “How are you doing today?” That’s how Joshua Morales greets everyone who walks in the door of the David Koch Center for Cancer Care at Memorial Sloan Kettering Cancer Center (MSK).

“The people who are at the doors — the valet parking, the concierge desk — we are the first step for patients,” says 25-year-old Joshua. “The doctors are important, of course. But I believe welcoming someone

coming through that door is the first step in saving their life.”

Joshua pays special attention to those who come in alone. “I keep my spirit high for them,” he says, “because they are going through something that a lot of people don’t understand.”

But Joshua understands. He spent his childhood as a patient at MSK. His hospital records from a decade of care are now kept in a glass frame, “like an achievement,” he says.



Joshua spent much of his childhood at MSK Kids being treated for acute lymphoblastic leukemia. He celebrated his high school graduation with his oncologist, Peter Steinherz, MD (far right).

Born and raised in the Bronx, Joshua came to **MSK Kids** at age 3, diagnosed with acute lymphoblastic leukemia. He endured multiple rounds of chemotherapy and a bone marrow transplant under the care of **pediatric hematologic oncologist Peter Steinherz, MD.**

Joshua’s memories are a blur of trips back and forth to the hospital. His father was a police officer working two jobs. His mother never left his side. Sometimes they slept overnight in the waiting room. His big brother, Jonathan, would visit, but Joshua was hooked up to so many machines, they couldn’t do much together.

Joshua didn’t go to a regular school until he was in third grade. It was his first experience being around healthy children. “I had to be careful to not get scrapes or bruises on the playground, jump in puddles, or get dirty like other kids,” says Joshua. “When you have a low immune system, you have to focus on preventing infections.”

Joshua is now cancer free. He hasn’t been seen at MSK Kids since he was 14, although he returned to participate in the annual high school

graduation ceremony. “I had the opportunity to meet other people that I didn’t know, going through the same experience that I had,” he says. “It was surreal.”

Joshua wanted to be a police officer like his dad, to protect and serve others. But his father worried it was dangerous, so Joshua learned to be a mechanic. Then in February 2020, just as the pandemic was taking hold, a family friend told him MSK was hiring people to greet patients. He applied and two weeks later got the job that he says is “the most perfect fit.”

“I get to know patients, and sometimes they are shocked that I remember their names,” says Joshua. “I show them that we care, and seeing their reaction inspires me. As much as I try to boost their energy, they also boost mine.”

He’s recently bonded with one patient in particular — a man in his 40s diagnosed with leukemia who comes to appointments by himself. “One day, he told me he had to get an operation and he was scared, really nervous,” says Joshua. “I had leukemia too. So I shared my story, and we spent

45 minutes talking. I told him, ‘Not only is MSK the best, but they treat you like you’re one of their own.’”

This patient is doing much better now, Joshua happily reports. For Joshua, this job is personal.

“I feel like, whatever happened so that I was saved, this is my way to pay it forward,” he says. “I say, ‘The first step in beating cancer is believing you can beat it.’ The energy you give off will help someone feel more hopeful. If you take the time to have a conversation, you never know how you can inspire them.” •

IT TAKES MSK

To Improve Health Equity

We are breaking down barriers to make world-class care available to everyone.

(From left) MSK genetic counselors Rania Sheikh, MS, and Anna Strang, MS, and MSK health psychologist Jada Hamilton, PhD, are focused on making cancer genetic testing more equitable.



A Win-Win

MSK reaches more patients with game-changing tests to improve their treatment.



Longtime coach Ivan Marquez is bringing his people skills to a new challenge: helping people with cancer navigate genetic testing.

Ivan Marquez was sitting in the waiting room to see his prostate cancer doctor when his skills as a longtime coach kicked into gear. He noticed what he called a “newbie” sitting with a companion, the two of them whispering in Spanish.

“They were clearly petrified,” Ivan says. “So I went over to chat with them in Spanish to try to *tranquillo* them. I told them, ‘First of all, you’re in the best place on the planet to deal with it.’ ”

Before becoming a patient at Memorial Sloan Kettering Cancer Center (MSK), Ivan was a head coach for men’s college volleyball, so he knows how to talk people through stressful events. But more than that, Ivan is something of a cancer pro himself. He’s been living with stage 4 prostate cancer for more than 15 years.

He wasn’t always so calm under pressure, however. “When I first started coming in for treatment, I was scared of everything,” he says. “I couldn’t do a simple blood draw. I couldn’t do a simple biopsy. I caused the nurses many headaches by fainting a couple of times.”

Eventually, though, he learned to trust his treatment team, confident that they were giving him the best care possible. He calls his **prostate cancer oncologist, Michael Morris, MD**, his hero. “I’ve always had the attitude that whatever MSK advises me to do, they’re a good coach,” he adds. “I can coach basketball and volleyball. They can coach cancer.”

Now, in addition to giving impromptu pep talks to anxious patients, Ivan is also working with a team of researchers at the **Robert and Kate Niehaus Center for Inherited Cancer Genomics at MSK**. There, **health psychologist Jada Hamilton, PhD**, is focused on ensuring Spanish-speaking patients have equitable access to genetic counseling.

Achieving that goal is key to MSK’s mission to break down barriers to high-quality cancer care.

“We have to realize that the greatness of a place like MSK lies in our ability

to treat people from every spectrum of life,” said **Selwyn M. Vickers, MD, FACS, President and CEO of MSK**, during his first *Cancer Straight Talk* from MSK podcast interview (episode 30, “Achieving Excellent Healthcare for All”). “There’s data to show that when you improve access for those who historically couldn’t get it, you improve the quality of care for everyone else as well. In fact, you make it better.”

Making Cancer Genetic Testing Easier

In this era of precision medicine, genetic testing is essential for people at high risk of developing cancer or already diagnosed with it. Genetic testing can:

- Directly influence a patient’s treatment options.
- Guide a prevention and surveillance plan for future cancer.
- Indicate whether family members are also at risk for cancer based on a genetic predisposition.

But many people have anxieties around genetic testing or simply lack accurate information. They might not take advantage of it because of scheduling conflicts, transportation limitations, or general mistrust of the medical establishment.

“We brought Ivan on as a patient representative to help us review our genetic testing information materials, to make them more accessible,” Dr. Hamilton says. “He has such a valuable perspective, coming from Puerto Rico and having experience being a patient at MSK himself — in addition to just being a lovely person with an amazing background. We made him a member of the Scientific Advisory Board for the studies we’re conducting.”

In particular, Ivan’s broad experience as a coach and his expertise in sports management (he has a graduate degree from the University of Southern California) lends itself perfectly to Dr. Hamilton’s research, which revolves around something called “mainstreaming” — to break down barriers to genetic testing.



“There’s data to show that when you improve access for those who historically couldn’t get it, you improve the quality of care for everyone else as well. In fact, you make it better.”

— Selwyn M. Vickers, MD, FACS



Ivan with his oncologist, Michael Morris, MD



Chief Health Equity Officer Carol Brown, MD, FACOG, FACS, is bringing MSK's powerful genetic testing platform to underserved communities.

The traditional process for genetic testing requires a few different meetings. First, patients have a pretest session with a professional genetic counselor to get basic information. Then, after the test, they need another session to understand the results and learn about treatment implications.

The mainstreaming model, piloted by Dr. Hamilton and her collaborators in the MSK **Clinical Genetics Service**, makes testing and the process of learning the results more convenient. Here's how:

- The patient's own cancer doctor gives them educational materials that cover the basics.
- They can give consent for testing on the spot to their doctor.
- Once the results are in, patients meet with MSK's Clinical Genetics Service via a telemedicine session to discuss those results with a genetic counselor and a doctor.

Key to successfully broadening the reach of this approach is making sure that the educational materials are linguistically, culturally, and educationally appropriate. And that's where Ivan's expertise has been invaluable. "He's able to put himself in the shoes of a patient and understand where they are coming from," Dr. Hamilton says.

Ivan was able to advise Dr. Hamilton's team on the best language to use, and even the best vehicle for delivering information. "We were trying to come up with something that can speak to all these people who are probably scared about finding out the results of the test," Ivan says. "And that's when we decided to create an animation that would explain the testing in friendly terms."

Dr. Hamilton and her team of MSK co-investigators **Kenneth Offit, MD**; **Mark Robson, MD**; **Jennifer Hay, PhD**; and **Zsofia Stadler, MD**, are getting ready to open a clinical trial funded by a Cancer Moonshot grant from the National Cancer Institute to evaluate the mainstreaming approach in medically underserved patients, including those who speak Spanish or Haitian Creole, using the materials that Ivan helped develop.

MSK's Commitment to Closing Gaps in Cancer Care

Dr. Hamilton's work is just one of the ways that MSK is striving for better access for all. The **Office of Health Equity** has several initiatives to improve clinical care and research for people in underserved communities. In particular, the **Cancer Health Equity Research Program (CHERP)**, led by **Chief Health Equity Officer Carol Brown, MD, FACOG, FACS**, is working to bring the benefits of advanced genetic testing to hospitals in historically underserved parts of the city, including the Queens Cancer Center and Kings County Hospital Center.

"Both of those hospital centers have very dedicated, outstanding oncologists," Dr. Brown says. "But because they see the most underserved patients — who either have no insurance or are on Medicaid — they are limited in terms of the type of testing they can do and the sort of tools they can offer."

That's why, several years ago, as part of then Vice President Joe Biden's Cancer Moonshot Initiative, Dr. Brown and her team launched a program called **MSK-IMPACT To End Disparities (IMPACTED)**, in order to bring genetic testing to patients at these sites free of charge.

MSK-IMPACT® is MSK's state-of-the-art genetic testing platform that looks for mutations in 500-plus genes that drive cancer. It helps doctors identify which new or experimental drugs a particular patient might benefit from, based on their unique tumor genetic profile. The test also is able to identify cancer mutations that a person may have inherited from their parents by sequencing normal cells from a patient, in addition to the cancer cells. In that way, it also identifies families who should consider more intensive screening based on having an inherited risk of developing cancer.

So far, the MSK-IMPACTED program has offered genetic testing to more than 600 patients at CHERP sites.

"We're really proud of this effort to bring the latest, most advanced developments in treatment and prevention



Clinical research coordinators Etsen Barthelus and Isabel Pagán-López are key members of Dr. Hamilton's team.

and genetic risk assessment to those patients who are the most vulnerable and who are the least likely to have access," Dr. Brown says.

More Diversity Leads to More Discovery

Improving equity doesn't end with improving access to genetic testing. There's also the issue of follow-through. MSK **gastrointestinal oncologist Zsofia Stadler, MD**, who directs MSK's Clinical Genetics Service, and her colleague, **gynecological oncologist Ying Liu, MD, MPH**, have found evidence that non-white people are less likely to follow up after genetic testing. They are also less likely to participate in "cascade testing," which systematically identifies other family members who could be at risk from an inherited mutation.

Beyond improving care for individuals and their families, there's another major reason to pursue these projects: It's good for science in general.

"We now are gaining more understanding that the diversity of our patients and our biospecimens is fundamental to the validity of our clinical trials," Dr. Vickers shared with staff at an MSK town hall meeting. "Diversifying our patient population is not a peripheral exercise. It's actually the core of what we do."

Dr. Stadler agrees wholeheartedly. "We knew that we weren't getting the full spectrum of inherited mutations in cancer patients because certain populations are underrepresented in our sample," Dr. Stadler explains. "The MSK-IMPACTED program allows us to broaden our understanding of the diversity of mutations in all cancer patients by including more people."

Ivan Passes the Ball Forward

Ivan is incredibly grateful for the care he has received at MSK, especially from Dr. Morris. "I know I wouldn't be alive if it weren't for him," he says.

But it hasn't been a one-way street when it comes to support. "I tell him, 'I made you a star,'" Ivan says, beaming. He's referring to the fact that he's organized several fundraisers for Dr. Morris' research and raised more than \$25,000 through his many connections in the sports world and an extensive social media following. He counts both Walter the Howling Frenchie and Grumpy Cat (RIP) as followers of his Instagram.

Ever the coach, Ivan sees his advocacy work with Dr. Hamilton and MSK as just beginning. "I just want to do more," he says. •

Generous financial support for **MSK-IMPACTED** comes from **Marie-Josée and Henry R. Kravis**.

Dr. Brown holds the **Nicholls-Biondi Chair for Health Equity** at MSK.

Dr. Offit holds the **Robert and Kate Niehaus Chair in Inherited Cancer Genomics**.

“Genetic testing can help not just cancer patients but at-risk family members as well, to keep entire families healthy.”
— Zsofia Stadler, MD

IT TAKES MSK

To Find Treatments for the Toughest Cancers

Teams of experts, from oncologists to nurse practitioners to data analysts, work tirelessly to save the lives of their patients — and those they may never meet.



Scan here for the top clinical advances of 2022.



(From left) Jenna Sinopoli, MSN; Martin Weiser, MD (seated); Jinru Shia, MD; Luis Diaz Jr., MD; Jill Weiss, BS (seated); Marc Gollub, MD; Miteshkumar Patel, MS (seated); Raylene Langis, BSN, RN; Andrea Cercek, MD; Mina Ito, BS (seated); Alexa Colon, BS; Rachel Rassam, NP (seated); Julio Garcia-Aguilar, MD, PhD; and Joe Bacani, BSN, RN (on floor)

The Clinical Trial That Changed Everything for Its Patients

How a small but groundbreaking study could rewrite the playbook for treating solid tumors.

100%
success rate

All 18 people in the trial saw their rectal cancer disappear.

“I’d always dreamed of having a huge family.”

For Kelly Spill, learning she had rectal cancer didn’t only mean facing a potentially life-threatening disease.

The diagnosis also threatened many of the things she held dearest in life.

Kelly was diagnosed at 28, just months after giving birth to her son, Jayce. She and her husband, John Bonito, were heartbroken to learn that the standard treatment for rectal cancer — usually a combination of surgery, radiation, and chemotherapy — could make another pregnancy nearly impossible.

“A specialist told me I would probably never be able to carry a second child,” Kelly recalls.

Hoping for the best, Kelly joined a clinical trial being conducted exclusively at Memorial Sloan Kettering Cancer Center (MSK). The goal was to help people like Kelly overcome rectal cancer while preserving their quality of life — using immunotherapy alone.

That would mean avoiding surgery, radiation, and chemotherapy, which can have life-altering consequences for people with rectal cancer. Instead, participants would have infusions of an immunotherapy agent every few weeks, while their tumors were closely monitored.

The trial was small, with 18 patients enrolled when results were announced in June 2022. Like Kelly, all the participants had a specific and quite rare genetic mutation in their tumor that made them eligible. This mutation — classified as mismatch repair-deficient, or MMR(d) — occurs in only about 5% to 10% of people diagnosed with rectal cancer.

The MSK team watched with growing excitement as one patient after another saw their tumor shrink, often so quickly that it even surprised the doctors involved.

The results of the trial were so astounding that they made headlines around the world when they were announced in June. All 18 people in the trial saw their rectal cancer disappear — every single patient, including Kelly. Experts say that kind of result has never been seen before in a cancer trial. Statistician James White, who works closely with MSK researchers, calculated the odds of such an outcome at a trillion to one.

Kelly says, “It was like suddenly the rain had stopped and we were getting a rainbow.”

Today, the clinical trial continues to enroll patients and change lives. The approach of using immunotherapy alone against tumor types with

the same genetic mutation is also being investigated in other forms of cancer, potentially opening a new avenue of therapy for many people.

As for Kelly and her husband, they are thrilled to announce that she is pregnant, and they look forward to the birth of their second child.

Using Immunotherapy Alone To Treat Rectal Cancer

The MSK clinical trial was led by **medical oncologist Andrea Cercek, MD, Section Head of Colorectal Cancer**, and **physician-scientist Luis Diaz Jr., MD, Head of the Division of Solid Tumor Oncology**.

“The standard treatment for rectal cancer can work well,” explains Dr. Cercek. “But surgery, radiation, and chemotherapy can be particularly hard on people with this cancer because of the location of the tumor. They can suffer life-altering bowel and bladder dysfunction, incontinence, sexual dysfunction, and infertility.”

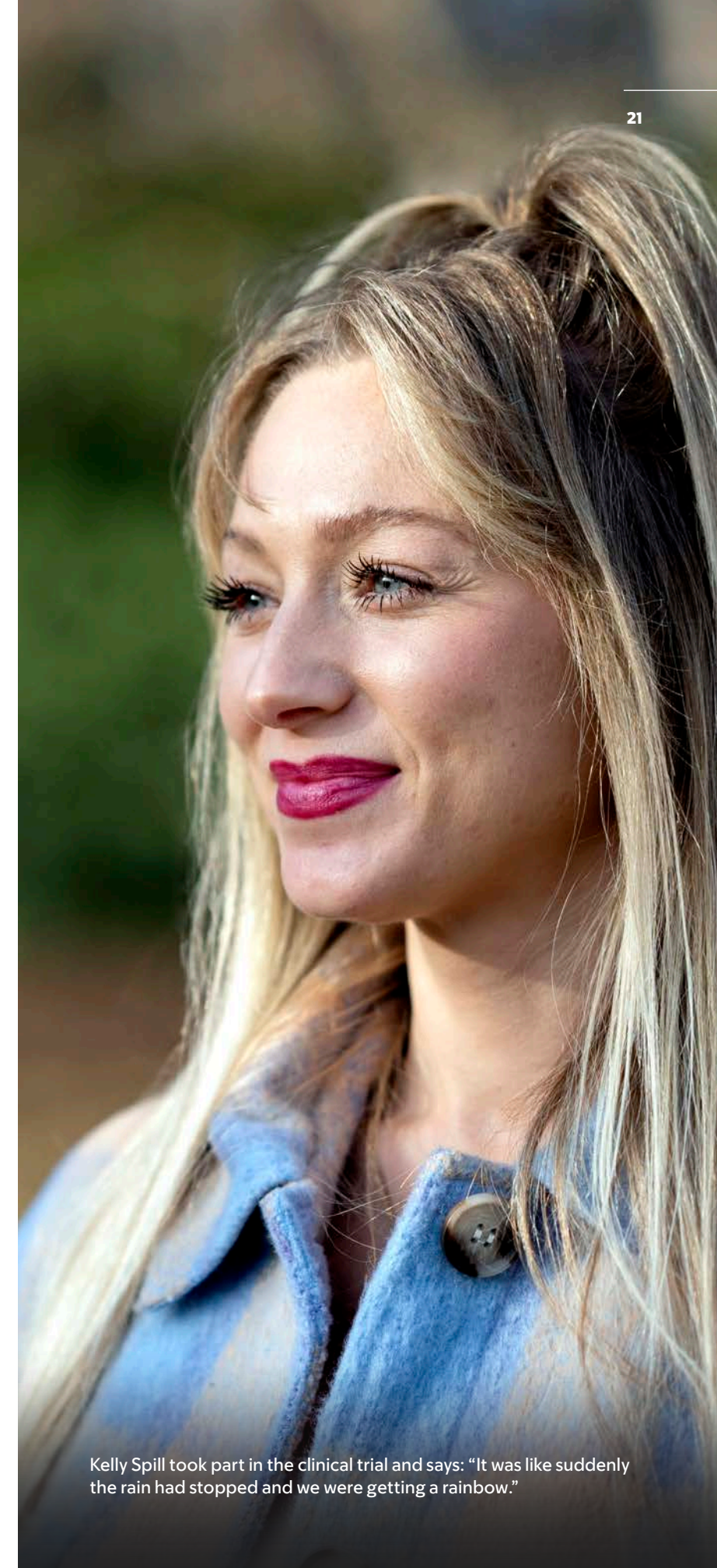
To avoid these awful side effects, Drs. Cercek and Diaz designed the clinical trial to investigate if the body’s own immune system could be deployed to attack cancer cells, using a form of immunotherapy called a checkpoint inhibitor.

Previous work by Dr. Diaz had shown that checkpoint inhibitors are effective in targeting rectal tumors that harbor the genetic mutation MMR(d), which prevents tumor cells from fixing damaged DNA. Dr. Diaz explains: “We wanted to see if we could make a tumor with the MMR(d) mutation recede and eventually disappear using only immunotherapy to spare patients these life-altering consequences of standard treatment.”

Life-Changing Results

Like Kelly, the other patients enrolled in the trial hoped their cancer could be treated with immunotherapy alone.

Another trial patient, Avery Holmes, recalls: “It went from this terrifying experience of ‘Am I going to die?’ to ‘Maybe I can get through this.’ I can’t imagine what my life would be like if this clinical trial wasn’t available.”



Kelly Spill took part in the clinical trial and says: “It was like suddenly the rain had stopped and we were getting a rainbow.”



“The response to the trial has been overwhelming. We nearly doubled the enrollment of patients in two months after the research was made public.”

— Luis Diaz Jr., MD

Sascha Roth was the first patient to join the clinical trial. “At a hospital at home in Washington, D.C., doctors wanted to start me on standard treatment, which would begin with chemotherapy,” she says. “But I had also consulted the specialists at MSK. They told me standard treatment was not a good fit for me because I have Lynch syndrome — an inherited trait that often leads to colorectal cancer. As it turned out, I was a perfect candidate for this trial.”

After her treatment at MSK, Sascha has no evidence of cancer more than two years later — a key milestone in treating rectal cancer. “My whole experience has been like a dream,” she says. And she has seamlessly returned to her vibrant social life while running her family’s home decor business.

The trial’s promise also energized the MSK staff dedicated to the research. This large team included

clinical trial nurse Jenna Sinopoli, MSN; clinical research supervisor Jill Weiss; medical oncologist Melissa Lumish, MD; the colorectal surgery team who carefully monitored the tumor responses; and many people who checked in patients, drew blood, ran tests, logged results, organized data, and more.

“One day, a young woman introduced herself to me at the elevator,” recalls Dr. Cercek. “She said: ‘I’m the person who runs the biopsies from clinic rooms into the lab to be tested. It’s so amazing to be part of your study because everyone is so happy when the results come back and the tumor is gone — it’s just so inspiring.’”

Expanding Access to More People With Rectal Cancer

“The response to the trial has been overwhelming,” says Dr. Diaz. “We nearly doubled the enrollment of patients in two months after the

The New York Times

A Cancer Trial’s Unexpected Result: Remission in Every Patient

The study was small, and experts say it needs to be replicated. But for 18 people with rectal cancer, the outcome led to “happy tears.”

One of the many headlines from the international news coverage of the study

research was made public. There are now 29 rectal cancer patients in the trial — and more continue to enroll.”

MSK is also expanding the trial to hospitals that are members of the MSK Cancer Alliance, including the Hartford HealthCare Cancer Institute in Connecticut, the Lehigh Valley Cancer Institute in Pennsylvania, the Miami Cancer Institute at Baptist Health South Florida, and MSK collaborator New York Cancer & Blood Specialists.

An FDA advisory committee in February 2023 authorized a larger clinical trial to be led by MSK involving multiple clinics. This would be a key step in gaining full FDA approval so the approach could be used for patients at other hospitals who are facing rectal cancer and have the MMR(d) mutation.

A Possible New Approach to Solid Tumors

MSK is also using the success of the rectal cancer trial to expand this novel approach to more cancers.

Dr. Cercek explains: “The MMR(d) mutation that we targeted in the trial is only found in 5% to 10% of all rectal cancers. But the mutation is also found in solid tumors, including gastric (stomach), colon, liver, bladder, esophageal, prostate, pancreatic, and other cancers. That means we could potentially help a lot more people.”

Drs. Cercek and Diaz and colleagues at MSK have opened new clinical trials to investigate the approach in other cancers — and are now enrolling patients. These trials are open for people whose tumors have the MMR(d) mutation in all cancer subtypes, including of the colon, bladder, stomach, prostate, and liver.

Dr. Diaz, appointed by President Biden to the National Cancer Advisory Board, has coined a term for this new method — “immunoablative” therapy — which means using immunotherapy to replace surgery, chemotherapy, and radiation to remove cancer.

The new approach is also aimed at targets beyond MMR(d), including *HER2*, a gene that can produce too much of a protein that fuels cancer growth. That clinical trial, led by Dr. Cercek, is also open at MSK and enrolling patients. Says Dr. Diaz: “The rectal cancer clinical trial is just the tip of the iceberg.”

Even people who understand that the new approach isn’t going to help their loved ones are emailing Dr. Cercek. “People have reached out to say, ‘My relative has advanced

disease, and we know things are not going well. But thank you for giving us hope that something better will come in the future.’”

‘A Whole Better Version of Me’

Today, many of the patients who participated in the trial are helping others. Kelly counsels others diagnosed with rectal cancer and says she has found a new perspective on life. “I’m not the same person that I was before cancer. I love who I am, and I love who I was. But this is a whole better version of me these days.”

Sascha says one key takeaway of the experience for her is that it really does take MSK to make these kinds of breakthroughs. “MSK research and cancer care is simply years ahead of where other hospitals — even really good ones — are or should be.” •



Sascha Roth was the first person to join the clinical trial and traveled from Washington, D.C., for care at MSK.

Dr. Diaz and Dr. Cercek’s research has been made possible by the philanthropic support of the MSK donor community, including **Cycle for Survival**®.

Dr. Diaz holds the **Grayer Family Chair**.

“The MMR(d) mutation is also found in solid tumors including gastric (stomach), colon, liver, bladder, esophageal, prostate, pancreatic, and other cancers. That means we could potentially help a lot more people.”

— Andrea Cercek, MD

A Major Advance in Treating Metastatic Breast Cancer

MSK-led research could change the practice of medicine for millions of people whose breast cancer has spread.

Standing ovations may be common on Broadway, but they are extremely rare at medical conferences. So when people leapt to their feet at the end of a presentation by Shanu Modi, MD, at one of the year's most important cancer meetings, she was overwhelmed.

"It really caught me off guard," remembers Dr. Modi, a breast medical oncologist at Memorial Sloan Kettering Cancer Center (MSK). "I knew going in that people were enthusiastic about this data and were anxious to see the results. But the level of emotion in the room at that moment left me speechless."

Dr. Modi's peers were applauding clinical trial results that suggest a new standard of care for more than half of people with metastatic breast cancer. The study found the first targeted therapy to be effective in patients with low levels of a protein called HER2 on their tumors.

The protein HER2 activates cancer growth. When doctors say a cancer is "HER2-positive," that means there are high levels of the protein on the surface of cancer cells. "We have wonderful targeted therapies for HER2-high cancers. They were among the first targeted drugs," says Dr. Modi. "It's been frustrating that these drugs have not been effective treating breast cancers with lower levels of HER2." But Dr. Modi's research demonstrates there's a way to block

HER2 even when levels of the protein are low — the case for about 55% of people with breast cancer.

In the international clinical trial, patients with HER2-low metastatic breast cancer survived significantly longer when they took the targeted drug trastuzumab deruxtecan (also known as T-DXd, or Enhertu®). The drug stopped tumors from growing for an average of more than 10 months, about twice as long as standard chemotherapy. Patients who received T-DXd lived on average almost two years — about six months longer than those who received standard treatment.

"T-DXd is far better than anything else we've traditionally been able to offer to this very significant proportion of patients," Dr. Modi says. "We're finding so many who can benefit from it."

An Innovative New Class of Cancer Drugs

T-DXd is an antibody-drug conjugate, a new class of drug that consists of two parts linked together: an antibody that homes in on cancer cells and a potent dose of chemotherapy. Like a heat-seeking missile, the antibody delivers the chemotherapy payload directly to its target, reducing the collateral damage of side effects seen with more traditional chemotherapy.

One reason this antibody-drug conjugate is so effective is the

"bystander effect." It kills not only cancer cells but also some of the cells around them, known as the tumor microenvironment, which includes the blood vessels and immune cells that support tumor growth.

"Cancer is not just a disease of cancer cells. It's a disease that involves other cells living in the vicinity of the cancer cells that help keep them alive," says **medical oncologist Larry Norton, MD, MSK Senior Vice President and Medical Director of the Evelyn H. Lauder Breast Center.** "Our ability to target the microenvironment — whether with an antibody-drug conjugate, an immunotherapy, or new drugs in development — is leading to a major revolution in cancer treatment."

The transformational results Dr. Modi presented in June 2022 at the Annual Society of Clinical Oncology meeting were published in *The New England Journal of Medicine* on the same day. Two months later, the drug was approved after being granted Fast Track designation from the U.S. Food and Drug Administration (FDA). (It had already been approved to

treat HER2-positive breast cancer.) There are side effects from T-DXd, but most can be managed with medication. Severe lung inflammation is the most serious, but it is uncommon.

'It's Just a Start'

Thanks to targeted therapies that can keep cancer at bay for months or even years until the next treatment advance comes along, there's been a lot of talk about transforming metastatic cancer from a fatal disease to a chronic condition. But even that is not good enough for Dr. Modi — or her patients.

"Our ultimate goal is to fully eradicate metastatic breast cancer," she says. "Prolonging survival by six months is meaningful for these patients, but it's just a start."

Studies are already underway to combine T-DXd with other drugs, like immunotherapy, and to give it sooner after someone is diagnosed with breast cancer. This drug was also recently approved by the FDA to treat lung cancer with *HER2* mutations.

"T-DXd has opened the door, and we can see the sunlight coming

through," Dr. Norton says. "We are not at the end of the tunnel yet, but we know which direction we need to go."

That moment in the conference ballroom when Dr. Modi's peers stood up to cheer her results was powerful for her personally. She was first drawn to oncology for the intellectual challenge and to breast cancer, specifically, for a deep emotional connection to her patients. "They inspire me in so many ways," she says. "I'm always optimistic that there's something great just around the corner. It's our job to find it." •



Larry Norton, MD, holds the Norna S. Sarofim Chair in Clinical Oncology.

Shanu Modi, MD, draws inspiration for her research from her patients.



"T-DXd is far better than anything else we've traditionally been able to offer to this very significant proportion of patients. We're finding so many who can benefit from it."

— Shanu Modi, MD

IT TAKES MSK

To Decode the Most Challenging Mysteries in Science

For 75 years, scientists at the Sloan Kettering Institute have made breakthrough discoveries about why cells turn cancerous, forging new paths for the treatments of tomorrow.



Scan here for
the top research
advances of 2022.

Computational biologist Yu-Jui “Ray” Ho, PhD, uses his computing skills to better understand the biological changes caused by cancer from multiple angles.



The Next Frontier in Cancer Research

To understand cancer, we must study it in the context of the ecosystem in which it lives and grows.

The majority of cancer deaths are caused by **METASTASIS.**

The idea that's revolutionizing the field of cancer research is as simple as it is profound: Cancer doesn't happen in isolation.

Cancer doesn't arise in isolation. It doesn't grow in isolation. And it doesn't spread in isolation.

Therefore, cancer can't be studied in isolation.

Cancer develops in the context of the human body, with all its many complexities. Tumor cells interact with — and change — tissue in their immediate environment, with the body's immune defenders, and with the byways through which they travel to seed new tumors far from their site of origin.

That's why scientists at the Sloan Kettering Institute are putting critical questions of cancer's human environment at the heart of a new research initiative: **The Marie-Josée and Henry R. Kravis Cancer Ecosystems Project.**

"It is for us, as scientists and physicians, a watershed moment in cancer research," says **Joan Massagué, PhD, Director of the Sloan Kettering Institute**, who oversees the effort. "We are expanding the focus from mutant genes in the context of cancer genomes — a staple of research over the past decade and a great source of therapeutic as well as diagnostic insights — to include a focus on cancer cells in the context of biological ecosystems."

To use an environmental analogy, it is shifting focus from individual trees to trees within the context of a living forest habitat, from the microbes in the soil below to the birds in the canopy above. This perspective emphasizes that cancer is not just a disease of an organ or tissue, but a disease of the whole organism that has it.

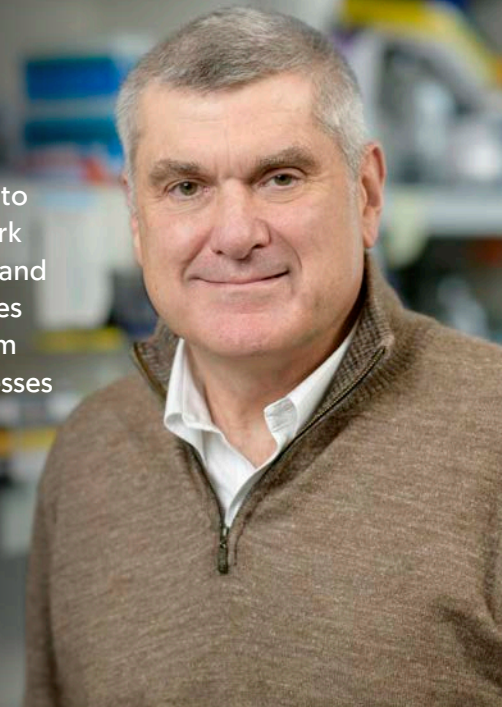
As its name implies, the goal of the Kravis Cancer Ecosystems Project is to galvanize a more systemic approach than has previously been undertaken, with the aim of tackling the most difficult challenges in the field, including that of cancer metastasis.

"Metastasis is the main reason for cancer deaths," notes **medical oncologist Karuna Ganesh, MD, PhD**, whose lab at the Sloan Kettering Institute focuses on the molecular mechanisms by which tenacious cancer stem cells drive its spread. "In fact, more than 90% of cancer deaths are caused by the process of metastasis. This is a process of normal regeneration that's gone lethally wrong. Once cells learn how to spread to distant organs, they typically become unstoppable."

The more scientists understand about the cancer ecosystem, the more they can begin to design new therapies that bring the greater context to bear.

"We have proof of principles at every level, from diagnosis to treatment — and work continues to understand the molecular nuances of cellular metabolism and how these processes go wrong in cancer."

— Craig B. Thompson, MD



"Some of the important questions my lab is trying to understand: What's wrong with T cells in tumors? Why don't they attack the cancer? And why is it so hard to reprogram them with immunotherapy?"

— Andrea Schietinger, PhD



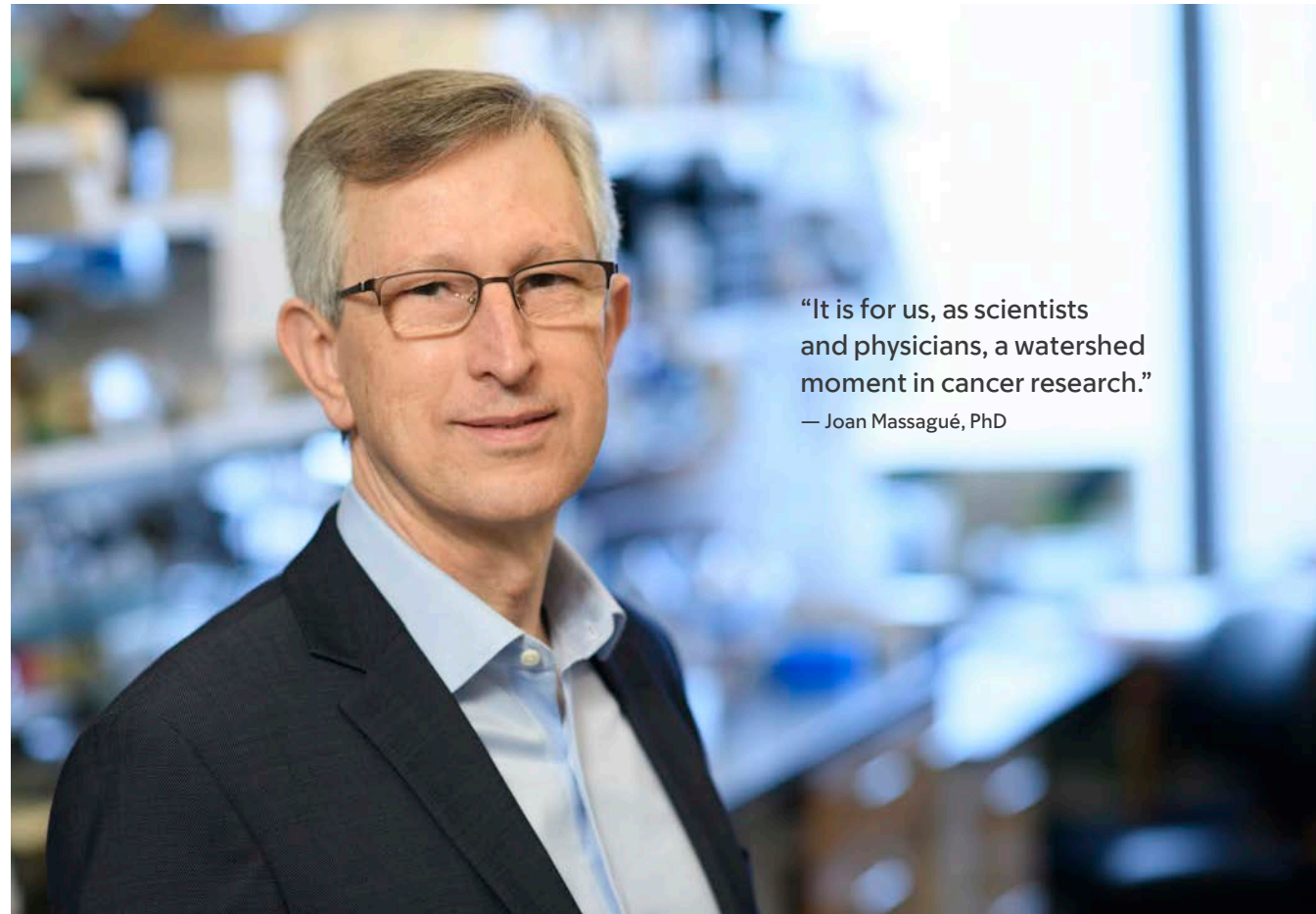
"Memorial Sloan Kettering Cancer Center is really unique in its synthesis of a world-class cancer hospital with a world-class research institute."

— Karuna Ganesh, MD, PhD



"Traditionally, when we think about metabolism, we think about nutrients being broken down into constituent molecules to provide energy and fuel growth. What my lab is particularly interested in is the potential for metabolites to serve as signals — telling a cell what to do, and even influencing tumor initiation."

— Lydia Finley, PhD



“It is for us, as scientists and physicians, a watershed moment in cancer research.”

— Joan Massagué, PhD

And the effort is intentionally interdisciplinary — bringing together scientists with expertise in a variety of specialties, from cancer genetics to immunology, from stem cells to single-cell analysis.

“For example, I study cancer in model systems,” says **cancer biologist Scott Lowe, PhD**. “We have other people that study cancer in patients. We have others that are computational biologists that can help us analyze big data sets.”

In concrete terms, the project — made possible by a generous gift from **The Marie-Josée and Henry R. Kravis Foundation** — involves coming together to uncover new insight into several key biological processes.

Perhaps the most immediate is cancer metabolism: how cancer takes in and uses nutrients for energy and

building blocks. Scientists at MSK, including **cell biologist Lydia Finley, PhD**, and **cancer biologist Craig B. Thompson, MD**, are learning that cancer cells can adapt their metabolism in ways that give them the capacity to reproduce endlessly.

“The emerging field of cancer metabolism is off to an exciting start,” Dr. Thompson says. “We have proof of principles at every level, from diagnosis to treatment — and work continues to understand the molecular nuances of cellular metabolism and how these processes go wrong in cancer.”

Dr. Finley adds: “Traditionally, when we think about metabolism, we think about nutrients being broken down into constituent molecules to provide energy and fuel growth. What my lab is particularly interested in is the

potential for metabolites to serve as signals — telling a cell what to do, and even influencing tumor initiation.”

Also crucial to understanding cancer are the interactions between tumor cells and other cells in the immediate environment. **Immunologist Andrea Schietinger, PhD**, is laser-focused on understanding why immune cells often fail to stop cancer from growing in their midst. Collaborating with her are the many clinicians and translational researchers at MSK who work with patients and patient-derived tissue samples.

“Some of the important questions my lab is trying to understand: What’s wrong with T cells in tumors? Why don’t they attack the cancer? And why is it so hard to reprogram them with immunotherapy?” Dr. Schietinger says.

Answering questions like these takes a place like MSK.

“Memorial Sloan Kettering Cancer Center is really unique in its synthesis of a world-class cancer hospital with a world-class research institute,” Dr. Ganesh says.

Meanwhile, Dr. Ganesh, Dr. Massagué, and **neuro-oncologist Adrienne Boire, MD, PhD**, are dedicated to studying the deadly process of metastasis and the question of how cells that are shed from tumors can make their way in often hostile new environments. They are learning how metastatic cells co-opt the normal processes of wound healing to take root in new organs.

Dr. Boire, for example, has been studying the mystery of how cancer cells can grow in cerebrospinal fluid, which is deficient in the iron cancer cells depend on for growth.

“They actually reprogram themselves to gobble up all the nearby iron,” she says. “By hogging this nutrient, the cancer cells ensure they stay alive and grow while other cells — notably, immune cells that have entered the same space — are left short. And these findings point to a possible strategy for treatment.” Also studying how cancer hijacks normal processes is **developmental biologist Anna-Katerina “Kat” Hadjantonakis, PhD**. “At a fundamental level,” she says, “we need to understand how cells normally behave to understand how they misbehave during disease.”

In fact, the more scientists learn, the more they are realizing that nearly every system in the body — from the endocrine system to the nervous system to the digestive system — can affect cancer growth. With that knowledge comes the hope that each of these systems could one day be harnessed against cancer.

“Immunotherapy has shown us the tremendous power of treatments that use the immune system to attack tumors,” Dr. Massagué says. “We believe that new findings that emerge from the Kravis Cancer Ecosystems Project will allow us to leverage other parts of the ecosystem to the same end.” •



“At a fundamental level, we need to understand how cells normally behave to understand how they misbehave during disease.”

— Kat Hadjantonakis, PhD

Alan and Sandra Gerry are longtime supporters of metastasis research at MSK through **The Alan and Sandra Gerry Metastasis and Tumor Ecosystems Center**, providing a basis for much of the research highlighted here.

Dr. Boire holds a **Geoffrey Beene Junior Faculty Chair**.

Dr. Ganesh is a **Josie Robertson Investigator**

Dr. Hadjantonakis holds an **Alfred P. Sloan Chair**.

Dr. Lowe holds the **Geoffrey Beene Chair**.

Dr. Massagué holds the **Marie-Josée and Henry R. Kravis Foundation Chair**.

Dr. Schietinger holds the **Catherine and Frederick R. Adler Chair for Junior Faculty** and is a former **Josie Robertson Investigator**.

Dr. Thompson holds the **Douglas A. Warner III Chair**.

Finding Order Within the Chaos of Cancer

How a new understanding of cancer's most infamous gene could help stop tumors earlier.

If you know the name of just one gene involved in cancer, it should be p53. Half of all cancers have a broken version of it — making it the most common of all cancer mutations.

The protein made by the gene — p53 — helps guard the body against cancer, in part by detecting and repairing damaged DNA. That's why scientists call it the “guardian of the genome.” This tumor suppressor gene is so famous, there's a popular science book about its discovery.

And yet, over the 30 years since p53 was first discovered, it has remained a stubborn mystery, resisting efforts to tease apart exactly how the loss of the gene's protection leads to the development of cancer.

In August 2022, however, researchers in the Sloan Kettering Institute were able to provide some new answers in a groundbreaking study published in *Nature* — answers that hint at new avenues for treatment.

“Rather than promoting genetic chaos, what we see when cells lose p53 is an orderly progression of genetic changes that is actually quite predictable,” says the study's senior author, **Scott Lowe, PhD, Chair of the Cancer Biology and Genetics Program in the Sloan Kettering Institute.** “That came as a complete surprise to us and

suggests a new way to think about possibly treating cancer.”

It's not surprising that such a discovery was made at the institute. It's a research hub within Memorial Sloan Kettering Cancer Center (MSK) that brings together scientists from many disciplines to tackle foundational questions in biology. And over the 75 years since it first opened its doors, investigators there have made significant advances in the fundamental understanding of cancer, as well as helped pioneer advances in chemotherapy, radiation therapy, drugs targeting specific cancer mutations, and modern immunotherapies.

“When people ask, ‘Why is it important to support *basic science* research?’ — and by that I mean research aimed first and foremost at deepening our understanding of biology — I like to point to studies like this,” says leading cancer metastasis researcher **Joan Massagué, PhD, Director of the Sloan Kettering Institute.**

Seeing Is Believing

For years, scientists struggled to fully understand p53's role in cancer, in part because there are few good laboratory models that allow the study of p53 function at the earliest

stages of tumor development, well before cells have acquired obvious hallmarks of cancer.

To bring those early changes into view, Dr. Lowe's lab — including study first authors **Timour Baslan, PhD; Zhen Zhao, MD, PhD; and John P. Morris IV, PhD** — produced a unique mouse model of pancreatic cancer in which p53's loss could be detected early on, just as the cells started to transition from benign to malignant.

The model's key feature is a set of colorful fluorescent tags that can be seen under the microscope. These colorful patterns allowed the scientists to identify specific populations of cells that had lost p53 function but hadn't yet turned into cancer.

“It's sort of like the first wobble as the wheels start to fall off the wagon,” Dr. Lowe says.

A deeper analysis was able to pinpoint the genetic changes that occurred immediately following p53 loss and those that continued after.

A Hidden Order Is Revealed

Instead of opening a Pandora's box

of genetic chaos, the researchers observed that changes caused by the loss of p53 always seemed to unfold in a consistent pattern — genetic deletions, duplication of chromosomes, more deletions, and finally, gaining additional copies of certain genes.

Knowing that there are “rules” to the genetic evolution of tumors suggests new ways to think about treating them, the scientists say.

Many existing cancer drugs target extra copies of genes that arise in tumors. But these additions happen late in a tumor's evolution, so not all cells in the tumor will have them. This means that drugs targeting such changes leave some of the earliest-developing cancer cells unscathed.

A more effective approach to treating cancer might be to target the gene deletions that occur very early in cancer development, immediately after the loss of p53, since these changes will be found in almost all of the tumor cells — leaving far fewer of them to grow and spread.

Targeting these deletions could be tricky, Dr. Lowe notes, but the possibility is there: “If there's order and rules to cancer development, then we might ultimately be able to understand and exploit those rules against the cancer itself,” he says.

“When or where the next major advance in cancer treatment will occur is unknown, but it often begins with basic research,” Dr. Massagué says. •

This work was supported in part by the **David M. Rubenstein Center for Pancreatic Cancer Research.**

Dr. Massagué holds the **Marie-Josée and Henry R. Kravis Foundation Chair.**

Dr. Lowe holds the **Geoffrey Beene Chair** at MSK and is a **Howard Hughes Medical Institute Investigator.**



Scott Lowe, PhD, identified a precancerous sign in cells that is “sort of like the first wobble as the wheels start to fall off the wagon.”

“When or where the next major advance in cancer treatment will occur is unknown, but it often begins with basic research.”

— Joan Massagué, PhD

IT TAKES MSK

To Train the Next Generation

Our mission is to help those starting
out find their footing.

Susan De Wolf, MD, uses running as an opportunity to reflect and plan — and as a small respite in a busy schedule seeing patients and conducting laboratory research.



Bedside to Bench — and Back Again

Physician-scientists not only treat disease,
they do research to cure it.



Susan De Wolf, MD, enjoys a quiet moment with her husband, Jonathan Steinman, MD, PhD, and their children, Esther and Isaac.

Susan De Wolf's sneakers beat a rhythm against the pavement. As she winds her way through Manhattan's Central Park, this is a creative moment for her, a reflective moment. A precious moment of calm and focus.

On this fall morning, Dr. De Wolf, a physician-scientist at Memorial Sloan Kettering Cancer Center (MSK), is writing a response in her head to the reviewers of a journal article she recently submitted for publication. Other outings might find her mapping out a new set of laboratory experiments or looking forward to sharing good news with a patient.

"I'm a pretty avid runner," she says. "That time in the mornings or evenings is often when I get organized and think about what I need to do next."

With one foot in the clinic and one foot in the lab, Dr. De Wolf must bring a runner's balance to every part of her life. As an Assistant Attending Physician, she treats patients in MSK's Leukemia Service. She's also an active member of the lab of **Marcel van den Brink, MD, PhD, the Alan N. Houghton Chair**, where she is pursuing answers to thorny questions about blood cancers and how to better rally the body's immune defenders against them.

"People who decide to become physician-scientists are really a special group of individuals," says **Katharine Hsu, MD, PhD, a physician-scientist at MSK** who directs the **Tri-Institutional MD-PhD Program**, or Tri-I, that unites Weill Cornell Medicine, The Rockefeller University, and MSK. "They're not only interested in providing each individual patient with the best possible care — they're passionate about pursuing research to understand why illness occurs and how we can better prevent and treat it."

And the many demands on physician-scientists' time and energy don't end at the clinic or laboratory doors. Dr. De Wolf is also enmeshed in a vibrant family life, raising two young children with her husband, an equally busy physician-scientist pursuing a

fellowship in pediatric endocrinology at nearby Columbia University.

"My kids are amazing, and I adore spending time with them," she says. "We love to explore New York City on foot and by bike. My husband has a bike that can carry both kids on the back."

No Set Path for Physician-Scientists

MSK is helping to support Dr. De Wolf and other early career physician-scientists with resources and mentorship to launch careers in the face of the unique challenges that come with juggling the rigors of clinical care and laboratory research.

"There isn't a single, linear path for physician-scientists," Dr. De Wolf says. "You have to be truly excited about living in both worlds."

Dr. De Wolf was named to the first cohort of **Louis V. Gerstner, Jr. Physician Scholars** — made possible by a \$25 million gift from Gerstner, a long-serving member of MSK's Board of Trustees and the Chairman of the Board of MSK's **Gerstner Sloan Kettering Graduate School of Biomedical Sciences**.

"The development of the Gerstner Physician Scholars Program is critically important to address the shortfall of cancer subspecialists who are highly trained as experts in both clinical care and scientific research, and who can translate their findings from the bench to the bedside, and back," says **Monika Shah, MD, Deputy Physician-in-Chief of Education and Faculty Affairs at MSK**.

Funding that Dr. De Wolf receives through the program helps pay her salary and support her research projects — allowing her the time to develop the preliminary data necessary to win larger competitive grants from external sources like the National Institutes of Health, an important step in kick-starting an independent career.

Dr. De Wolf says the mentorship she's received from Dr. van den Brink has been invaluable. And, likewise, he's excited to help foster her career.

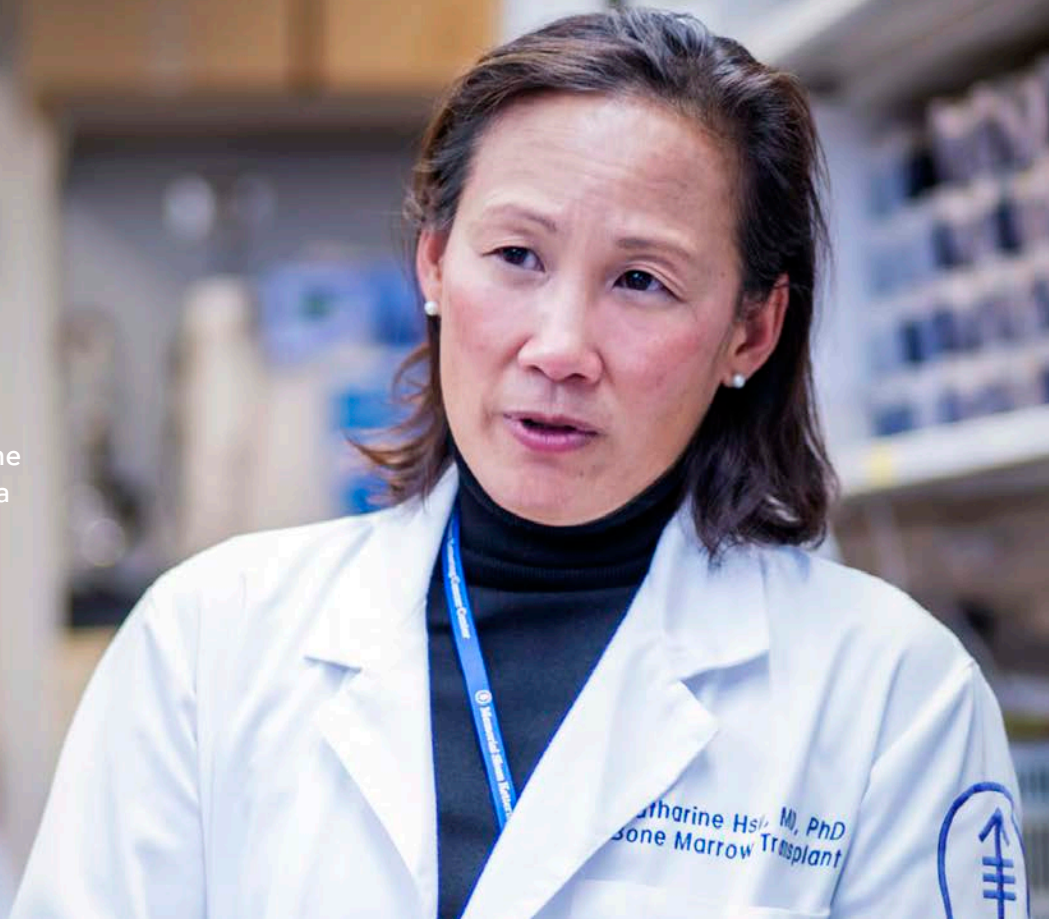


“There isn't a single, linear path for physician-scientists. You have to be truly excited about living in both worlds.”

—Susan De Wolf, MD

“People who decide to become physician-scientists are really a special group of individuals.”

— Katharine Hsu, MD, PhD



“Susan represents the next generation of very intelligent, well-trained, highly motivated physician-scientists, who excel both at the bedside and the bench,” Dr. van den Brink says. “Physician-scientists are more than ever ideally positioned to perform groundbreaking research and translate this into novel lifesaving therapies.”

The questions Dr. De Wolf is trying to answer in the lab are ambitious, while seeing patients in the clinic serves as a reminder of how her benchwork matters on a human scale.

“Right now, a bone marrow transplant is the only curative treatment we have for acute myeloid leukemia and myelodysplastic syndromes, or MDS,” she says. “And we know that T cells are really important for eradicating leukemia in the transplant setting. But when it comes to immunotherapy, we haven’t figured out how to get your own T cells to work against your leukemia or MDS. Figuring out why is what I want my career to be about.”

Steeped in the nuances of the biology down to the genetic and mechanistic levels, and aware of how each different treatment approach works, Dr. De Wolf says the best part of her job is where these two worlds overlap.

“The coolest part is when I’ve been taking care of a patient and they’ve allowed us to do research on samples taken from them,” she says. “To be able to see their leukemia, see their T cells, and strive to truly understand what’s going on at a deep, deep level so that we can take what we’re learning to try to help them and help other patients — that’s the best.”

Training the Next Generation

As Dr. De Wolf emphasizes, there are numerous paths that bring aspiring physician-scientists to MSK. Among them, more than 600 applicants apply to the Tri-I MD-PhD program each year, competing for fewer than 20 positions, which are fully funded from start to finish. The commitment required of both applicants and institutions isn’t small — trainees

spend an average of 8.4 years in the program, after which they will go on to do several additional years of medical training.

“The combined MD-PhD training creates a whole that’s greater than the sum of its parts,” says Dr. Hsu, herself a graduate of Tri-I. “Medical training is pretty straightforward. It covers a broad range of topics, though to a relatively shallow degree. In contrast, pursuing a PhD means understanding one very narrow topic extremely deeply, but it also trains you to think differently and more mechanistically about the things you encounter in the clinical setting.”

The program also nurtures students through the challenging transitions between medical school, the lab, and back again.

Not only is the Tri-I MD-PhD program one of the oldest and largest in the country, but it is also unique in offering access to more than 280 laboratories across the three institutions, as well as to world-renowned hospitals and specialty care centers.

Leaders at Tri-I and MSK also understand the importance of fostering the next generation of physician-scientists, including pathway-building programs to help more undergraduate students obtain fundamental

laboratory experience — particularly those from backgrounds and communities that are underrepresented in the sciences.

“Even if you have somebody who’s very confident they want to be a physician-scientist, if they haven’t demonstrated that they know what commitment and resilience is required to be successful in the laboratory, they’re not going to be selected,” Dr. Hsu says.

Dr. De Wolf, too, speaks of how formative her early experiences in the lab were — starting with a middle school science teacher who helped her land a summer gig wrangling nematode experiments in the lab of future Nobel Prize winner Martin Chalfie, PhD, and continuing through medical school to the present day.

“I had this amazing postdoctoral mentor that first summer who taught me how cool it was to be in the lab, and I basically spent the rest of my schooling finding ways to spend time in the lab,” she says. “Having one foot in the lab and one in clinical medicine is something that’s been part of who I am since I was a first-year medical student — and that would have never happened without a lot of generous support and mentorship along the way.” •

MORE THAN
600
APPLICANTS
apply to the Tri-I
MD-PhD program
each year.

Also among the first Gerstner Scholars:



Morgan Freret, MD, PhD
A radiation oncology resident who researches leptomeningeal metastasis



Juan Osorio, MD
A medical oncologist who focuses on the treatment of gynecologic cancers



Samir Zaidi, MD, PhD
A medical oncologist who specializes in the care of genitourinary malignancies

IT TAKES MSK Kids

To Treat the Whole Child

Emily Crimmins, MS
Child Life Specialist

There is a sense of warmth and community at MSK Kids that's quite special.

My job is helping children and their families cope with the stress of being in the hospital. Child life specialists are trained to identify children's needs through play and come up with the age-appropriate ways to ease their burden and help them be resilient. It's important to protect their mental and emotional well-being, so they can focus simply on being a kid. We offer weekly programs like bingo, Lego challenges, and toddler story time to give children the chance to connect with one another and do what kids are meant to do: play!

It is a privilege to be able to help people in their most vulnerable moments. I am inspired by my patients every day.



Filemon Dela Cruz, MD Pediatric Oncologist

When people learn what I do, they often apologize for asking because they imagine it must be so hard to talk about caring for a child who has cancer. While there are sad moments, I remind people that most children with cancer are fortunately cured.

I'm a member of the Pediatric Sarcoma program and the Pediatric Translational Medicine Service, which focus on bringing discoveries in the laboratory directly to the patient. We use tumor models to identify and prioritize developing drugs that are effective against pediatric cancer and given in ways that minimize side effects. When I speak with patients and families about donating tissue for research, I thank them for this gift — a gift that represents a lasting legacy to future children. It is truly an honor and a privilege to work together with them on a mission to improve outcomes for all children diagnosed with cancer.



Alyson Childers, RN Clinical Trials Nurse

I really, really love my job because I get to offer something to patients that they aren't going to have anywhere else. A lot of our patients come to us kind of beaten down with being told that their treatment isn't working, and I feel like, more often than not, we can offer them hope and a new option.

I have a "feel good" folder. It's for pictures sent to me of special events — playing soccer, the first day of school, graduation, a wedding. I also use it to remind me of things important to my patients — a book they're reading, someone they've started dating — so I can always follow up and ask, "How that's going?"

At MSK, it's not just about giving medicine to patients. It's really about treating the entire kid and the entire family. And I just feel really lucky to be a part of it.



Melanie Escalona Manager, Facilities Operations

Working at MSK Kids is personal for me. During the interview process, my maternal grandfather was diagnosed with leukemia. Being deeply involved in his care prepared me for helping others at a very vulnerable time in their lives. My job is to support whatever is needed by patients and their care teams. From making sure our rooms are fully outfitted with equipment and supplies to handling accommodations for a family with a child in treatment, I care about every single detail. Having the right assortment of snacks in the room is important!

There is a special harmony here between our patients, caregivers, and every member of the staff. We want everyone walking through our halls to know they are not walking alone. We are all in this together.



Hassan Musleh, MD Clinical Research Manager

Giving families every possible option to treat their child is a beautiful thing. My main responsibility is managing the research protocols for the Neuroblastoma Service — everything from logistics to legal requirements to making sure that data collected is accurate. Research protocols can fail or succeed based on how they are managed. I'm proud to say that in 2020, our service led the efforts in receiving FDA approval for a therapy to treat neuroblastoma.

I remind my staff that everything we do, we are doing for others. We make a difference in the lives of people who will never meet us or know our names. The work we do might give a child more time with their family, allow them to graduate school, fall in love, and maybe one day have a family of their own.



IT TAKES MSK

To Provide the Best in Nursing Care

MSK nurses and advanced practice providers offer not only compassionate care but also problem-solving skills that push the field forward.

Meet three winners of the Robbins Family Awards for Nursing Excellence on the following pages.

Jennifer Ogilvie, MSN, RN, NE-BC, has spearheaded donations of medical equipment to nurses in her home country, Jamaica.



**Jennifer Ogilvie, MSN,
RN, NE-BC**
Clinical Supervisor

**Excellence in
Humanitarian Efforts**
After seeing dramatic disparities
between the U.S. and Jamaica,
Jennifer organized donations
of medical supplies to benefit
nursing students abroad.



I was born in Jamaica. Jamaican people are some of the warmest and kindest people. But the country does not have as many resources as the United States.

After I came to MSK, I started going on visits and medical missions back home. Every time, something tugged at my heart. I thought, “There must be something I can do to help the practitioners care for their patients when we are not there.” I discovered that nursing students there didn’t have basic equipment, like blood pressure cuffs, stethoscopes, or blood glucose machines. The costs can be prohibitive. One U.S. dollar is 150 Jamaican dollars, so a \$150 stethoscope here could cost as much as \$15,000 in Jamaican money.

I reached out to some of my nursing friends, saying, “Hey, do you want to donate this stethoscope, or a textbook, or some bandages?” My colleagues are a special breed. They always want to do something to help somebody else. I made an Amazon registry of needed items. When people bought them, they were shipped to my home, and then I shipped them to Jamaica.

I’ve done two donations so far, about 400 items in total. Next, I am doing one just for nursing textbooks. We also send tablets. So many people here have tablets that their kids don’t use anymore. You’d be surprised how many people these can help.

I’ve gone back to meet some of the students and faculty who had received the supplies. They were so grateful, they wanted to repay us. They brought us mangoes, pineapples — whatever they could. For people who don’t have much and still find something to share, that, to me, says it all. I was thrilled to meet them and so thankful to those who are always willing to give to others.

Melissa Zimmermann, MS, BSN, RN-BC
Nursing Informatics Specialist

Excellence in Innovation

Melissa’s expertise in both nursing and computer science enabled her to help create an automated alert system for urgent lab results, streamlining communication so clinicians can focus on their patients.

Nursing informatics is the intersection between clinical practice and information technology. Having a fundamental understanding of what nurses do day-to-day has really served me in helping communicate the needs from the technical side to nursing, and vice versa.

The past few years, our team at MSK helped automate a process that saves time for both the lab and clinicians. When someone gets blood work and the results come back “critical” — for example, a patient’s potassium is low and needs replacement — the provider needs to be notified within a short window. It used to be a multistep process requiring phone calls. Now it’s just an automated alert message to the provider on service that day.

Having efficient systems is so important. It gives patients confidence in their care. And it frees us to spend time with people when they need us the most.



Tom Bracken, MA, RN, OCN
Clinical Nurse IV

Excellence in Clinical Nursing Leadership

After more than a decade owning a landscaping business, Tom became a nurse, bringing his leadership skills to educational programs for neurology nurses.

I never had dreams of becoming a nurse. I went to school for forestry. That led me to develop my own landscaping business, which I had for 15 years. But I was looking for a meaningful change.

My wife and I have friends who were nurses, and I saw how they loved their jobs. I also had a personal experience. In my 20s, my appendix burst, and I was in the hospital for two weeks. The best nurse I had was a male nurse. That made me see that it wasn’t just a female profession. I decided I wanted to do what he did.

Coming in as a second-career nurse, I was intimidated by a lot of things. I want to help new nurses because I know what it’s like. There are intricacies of our unit that I can teach. With help from my colleagues, I retooled our unit’s orientation and developed an advanced training program for nurses about to start in our Neuro Advanced Care Unit (NACU). I want to build their confidence. The nursing care at MSK is phenomenal, and I want to help maintain that.

In both of my careers, the emphasis has been on taking care of others: “What do I need to do to make this person happy? What’s the problem, and how do we fix it?”

The **Robbins Family Awards for Nursing Excellence** are made possible by the generosity of MSK Board Member **Clifton S. Robbins**.

Scan here to learn about the other honorees:



MSK GIVING

“MSK is a global leader, thanks to the broad and immense support we get from our donor community. Philanthropic contributions truly impact the people MSK takes care of, as well as those we recruit and train. Donors make our scientific discoveries possible, helping people with cancer worldwide.”

— Selwyn M. Vickers, MD, FACS,
President and Chief Executive Officer, Memorial Sloan Kettering Cancer Center

Patient Care and Greatest Needs

Taking care of people with cancer and their families is central to our mission, and our donor community continues to elevate the standards of care for Memorial Sloan Kettering Cancer Center (MSK) patients and people worldwide — improving access and equity for everyone. In 2022, philanthropy supported:

- A new endowed chair in oncology care and patient experience who will innovate how and where people receive cancer care to improve quality of life and outcomes.
- Programs to help people with cancer access the care they need.

Research

MSK research leads to new cures and treatments for people with cancer. Drug development, clinical research, and laboratory research are all essential to saving lives. In 2022, philanthropy supported:

- Investigations to further understand how and why cancer spreads and becomes resistant to treatment, including looking beyond genetics to the disease’s entire ecosystem.
- MSK’s ability to swiftly explore promising avenues of research as soon as they emerge.

Education

MSK is committed to educating future leaders in cancer research and care, and ensuring that the next generation of scientists and clinicians are as diverse as the people they help.

- In 2022, philanthropy supported:
- Fellowships and internships to provide equitable access to training and recruit top talent to the field.
 - Twelve PhD programs that prepare scientists for leadership roles across all areas of cancer research, such as cancer biology and computational oncology.

Philanthropy by the Numbers

In 2022, more than **409,000** individuals, families, foundations, and companies contributed more than **575,000** donations.

Raising
\$569 million
for cancer care,
research, and
education.



Patient care and greatest needs
\$272.9 million



Research
\$282.2 million



Education
\$13.9 million

Hundreds of people pack this tent in New York’s Central Park to participate in Cycle for Survival. It was one of many events in the region and around the country raising money to fight rare cancers.

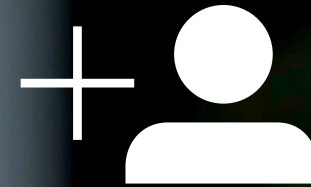


MSK DONORS



Mallory Pawlik, RN, MSK Hauppauge

The MSK Giving Community in 2022: Together, Advancing MSK's Mission



Nearly **145,000 donors** gave to MSK for the first time.



Nearly **50,000 donors** increased their giving.



More than **250 donors** told us that MSK was in their estate plans.



Donors live in **89 countries** and all **50 states**.



More than **17,000 people** raised money on MSK's behalf.

More than **76,000 donors** made two or more donations.



THE SOCIETY

of Memorial Sloan Kettering Cancer Center



Hematologic oncologist Sergio Giral, MD

“The Society’s longtime support has allowed MSK to pursue promising ideas to improve detection, diagnosis, and treatment of some of the most challenging cancers in the world. We are deeply grateful for this generous and visionary philanthropic partnership.”

— Lisa DeAngelis, MD
Physician-in-Chief, Chief Medical Officer, and Scott M. and Lisa G. Stuart Chair

The Society of Memorial Sloan Kettering Cancer Center (MSK) has forged a long tradition of fueling progress at MSK. Funds raised by dedicated volunteers of The Society have been essential to MSK’s continued innovation and advances in cancer care, research, and education for more than 75 years.

In 2022, The Society returned to hosting its in-person events. The Winter Lunch supported the **Adolescent and Young Adult Fertility Preservation Fund at MSK**, and in May, The Society celebrated its 15th annual Spring Ball. In attendance was **Scott Stuart, Chair of MSK’s Board of Trustees**, along with **Craig B. Thompson, MD**, who was honored for 12 years of leadership ahead of stepping down as MSK President and CEO in September. The Society hosted its first-ever Fall Lunch in October, gifts from which were allocated to the **MSK Cancer Health Equity Research and Care Initiative**, led by **Carol Brown, MD, FACOG, FACS, Senior Vice President, Chief Health Equity Officer, and Nicholls-Biondi Chair for Health Equity**.

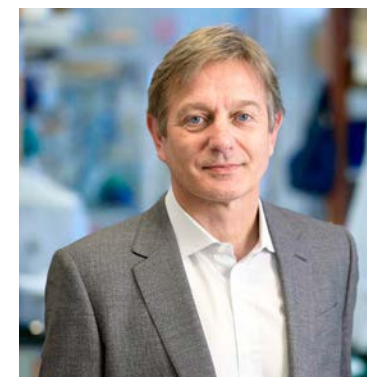
The Society’s 2022–2023 campaign supported three key efforts in immunotherapy research:

- The work of **hematologic oncologist Sergio Giral, MD**, to improve access and outcomes for patients who could benefit from chimeric antigen receptor (CAR) T cell therapy. Dr. Giral is **Deputy Head of the Division of Hematologic Malignancies** and holds the **Melvin Berlin Family Chair in Multiple Myeloma**.
- The investigations of **stem cell transplant oncologist Marcel van den Brink, MD, PhD**, into gut bacteria’s potential influence on the outcome of immune-based cancer treatments. Dr. van den Brink is **Head of the Division of Hematologic Malignancies** and holds the **Alan N. Houghton Chair**.
- **The Cell Therapy Correlative Core at MSK**, a new hub to support immunotherapy efforts at all stages.

Muffie Potter Aston assumed the role of The Society’s President in May 2022, following three years of distinguished service by **Kate Allen**. Muffie has been a member of The Society’s Administrative Board since 1999, served as Chair for many of its committees and events, and was Vice Chair of The Society’s Associates Committee. She will continue to build on The Society’s steadfast commitment to strengthening the impact of scientific and clinical leadership at MSK.



Muffie Potter Aston is President of The Society of MSK.



Marcel van den Brink, MD, PhD, treats and researches blood malignancies.

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2022

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Statistical Profile

Memorial Sloan Kettering Cancer Center

	2018	2019	2020	2021	2022
PATIENT CARE					
Patient Admissions: Adults	22,792	24,175	21,517	23,060	23,123
Patient Admissions: Children	1,451	1,422	1,305	1,082	990
Total Admissions	24,243	25,597	22,822	24,142	24,113
Total Patient Days	171,798	173,702	160,922	171,356	170,076
Average Patient Stay (days)	7.1	6.8	7.1	7.1	7.18
Bed Occupancy Rate ⁽¹⁾	95.2%	96.2%	85.9%	91.3%	88.17%
Outpatient MD Visits: Manhattan	541,146	562,224	505,224	478,520	396,347
Outpatient MD Visits: Regional Network	235,400	276,849	276,700	254,208	289,653
Total Outpatient Visits	776,546	839,073	781,924	732,728	686,000
Screenings	38,738	45,263	45,549	51,185	56,023
Surgical Cases	27,919	27,379	23,967	26,764	26,504
NEW RADIATION ONCOLOGY PATIENTS					
Starting Treatment: Manhattan	4,434	5,538	4,173	4,607	4,573
New Radiation Oncology Patients					
Starting Treatment: Regional Network	5,203	6,616	6,666	7,460	7,803
DIAGNOSTIC AND INTERVENTIONAL					
Radiology Procedures	575,383	631,174	591,450	659,966	684,225
Clinical Investigation Protocols ⁽²⁾	1,139	1,159	1,254	1,898	1,935

(1) Based on adjusted bed count

(2) Excludes studies closed to accrual

	2018	2019	2020	2021	2022
STAFF					
Sloan Kettering Institute Members	130	133	137	140	158
Hospital Attending Staff	1,228	1,358	1,417	1,457	1,508
Advanced Practice Providers	702	836	885	901	1,082
Registered Nurses	3,398	3,874	3,993	4,063	4,645
Administrative and Support Staff	13,137	14,333	14,774	14,937	14,468
Total Staff ⁽¹⁾	18,569	20,559	21,105	21,461	21,838
Volunteers	960	770	432	262	438
EDUCATION					
Residents and Clinical Fellows: Positions	476	475	460	568	592
Residents and Clinical Fellows: Annual Total	1,714	1,690	1,619	1,691	1,952
Research Fellows	325	346	277	184	183
Research Scholars	133	171	150	105	102
Research Associates	117	132	153	182	138
Graduate Research Assistants	34	39	28	34	34
PhD Candidates	266	277	282	300	317
MD/PhD Candidates	22	20	21	26	25
Registrants in CME Programs	7,246	7,921	6,582	6,507	7,685
Medical Observers	569	596	31	12	73
Medical Students	524	477	246	350	445
Nursing Students	512	595	507	475	570
Social Work Students	6	7	0	8	16
Radiation Oncology Technology Students	15	19	19	18	15
Physical Therapy Students	8	6	4	9	6
Occupational Therapy Students	2	2	3	4	4
Laboratory Medicine Students	15	12	20	20	19

(1) In 2021, 37 staff members held appointments in both Sloan Kettering Institute and the Hospital.

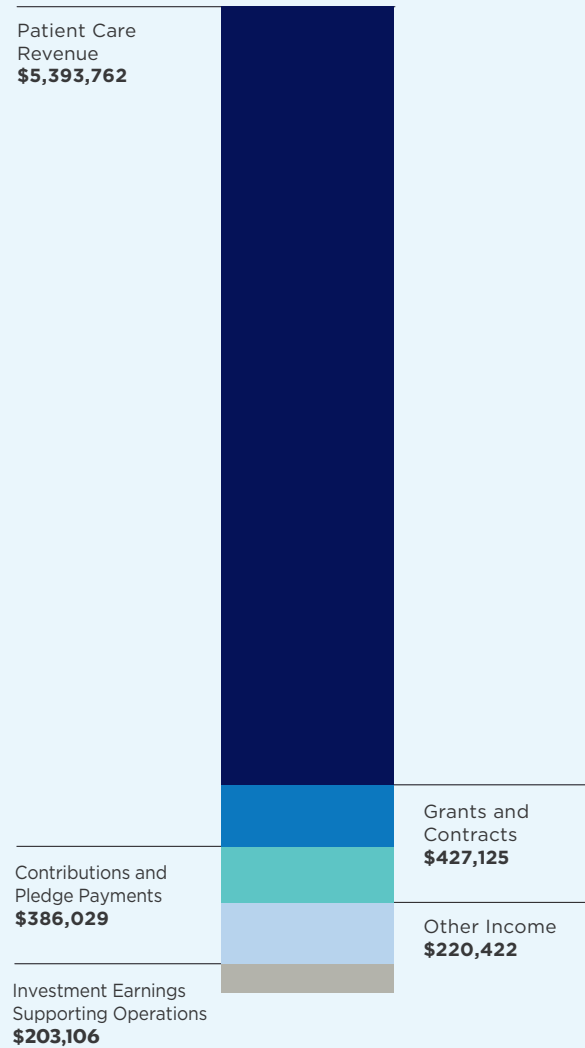
Financial Summary

Memorial Sloan Kettering Cancer Center

2022 TOTAL OPERATING REVENUES

(Dollars in Thousands)

\$6,630,444



2022 TOTAL OPERATING EXPENSES

(Dollars in Thousands)

\$6,878,496



Combined Statements of Activities

Memorial Sloan Kettering Cancer Center

	2018	2019	2020	2021	2022
OPERATING REVENUES (Dollars in Thousands)					
Patient Care Revenue	\$ 3,973,778	\$ 4,560,174	\$ 4,261,296	\$ 5,011,551	\$ 5,393,762
Grants and Contracts	334,536	368,743	347,540	411,772	427,125
Contributions	168,226	172,525	175,641	162,290	183,434
Net Assets Released From Restrictions	122,701	96,000	105,975	198,462	202,595
Other Income	159,140	123,489	357,654	443,099	220,422
Investment Earnings Supporting Operations	151,473	162,445	159,090	171,191	203,106
Total Operating Revenues	4,909,854	5,483,376	5,407,196	6,398,365	6,630,444
OPERATING EXPENSES					
Compensation and Fringe Benefits	2,587,336	2,892,770	3,184,891	3,315,428	3,628,897
Purchased Supplies and Services	1,756,174	2,026,254	2,123,302	2,312,86	2,689,562
Depreciation and Amortization	300,239	329,774	412,493	422,309	437,224
Interest	47,045	40,099	103,682	112,663	122,813
Total Operating Expenses	4,690,794	5,288,897	5,824,368	6,163,263	6,878,496
(Loss) Income From Operations	219,060	194,479	(417,172)	235,102	(248,052)
Philanthropic Revenue	383,341	254,401	263,572	576,457	452,083
Capital Spending	700,827	628,148	264,706	218,168	547,591
BALANCE SHEET SUMMARY					
Assets	10,623,567	11,621,453	13,315,250	14,941,252	14,012,590
Liabilities	4,196,154	4,646,113	5,246,709	5,116,862	5,272,308
Net Assets	6,427,413	6,975,340	8,068,541	9,824,390	8,740,282

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