



Memorial Sloan Kettering
Cancer Center

2023 ANNUAL REPORT

ENDING CANCER FOR LIFE





(Cover) MSK Kids patient Joshy
(This page) Graduate student Jian Zheng in the lab of molecular biologist
Xiaolan Zhao, PhD, at the Sloan Kettering Institute

We go beyond offering leading-edge cancer treatments; we care for our patients in the fullest sense of the word.

Our scientists explore every possibility, persistently pushing the boundaries of our understanding of cancer and uncovering novel therapies.

We stand as a beacon for the best and brightest minds, dedicated to the pursuit of knowledge and mentorship, nurturing the discoverers of tomorrow.

We come together every day with one mission: ending cancer for life.



Physicist Jessica Huang, MS, DABR, comforts a patient before an external beam radiotherapy treatment.

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A MESSAGE FROM THE CHAIRMAN

AND THE PRESIDENT

(From left) Scott Stuart and Selwyn M. Vickers, MD, FACS

Every day, the people of Memorial Sloan Kettering Cancer Center (MSK) are driven by a singular mission: ending cancer for life.

That relentless focus enables us to provide the world’s best, most compassionate care to every person who comes to MSK. It is what propels us to transform the understanding of cancer through landmark scientific discoveries and lifesaving clinical advances. And it is why we educate and train the next generation of cancer leaders who will bring the MSK standard of excellence to the world for decades to come.

In 2023, MSK reaffirmed the core values that have long made us who we are. In this Annual Report, you will see how these fundamental principles inspire us and drive unstoppable progress. Our values are simple but powerful.

- Respect for the Individual:** We ensure everyone is heard and valued.
- Excellence Through Inclusion:** Everyone succeeds when diversity thrives.
- Integrity:** We do what is right, even when it’s hard.
- Innovation With Lasting Impact:** We challenge ourselves to constantly learn and improve.
- Stewardship:** Each person takes responsibility to strengthen MSK to better serve our patients and everyone facing cancer.
- One MSK:** We work together to do what no one else can in cancer.

We uphold these values in service to our patients, who are at the center of everything we do. In this Annual Report, you will read about the year’s remarkable advances to help cancer patients with some of the most challenging diseases.

In brain cancer, for example, a unique collaboration between MSK researchers and clinicians helped create the first breakthrough treatment in more than 20 years for one of the most common forms of the disease. For patient Alicia Kalogeropoulos, this has made all the difference.

MSK researchers also launched the next phase of a heralded clinical trial of a promising treatment for pancreatic cancer — a vaccine specifically tailored for each patient, to supercharge their immune system against the disease. MSK has been at the forefront of this approach and has discovered new insights into the very earliest stages of pancreatic cancer that may one day make it easier to treat.

Recognizing that patients are deeply concerned about their quality of life, MSK made major strides in reducing side effects of cancer treatment, particularly in breast, prostate, and rectal cancer. We listen to and learn from our patients, and we develop personalized approaches based on what’s important to them and their loved ones.

We are known for our unique ecosystem of discovery, spanning everything from the lab bench to the bedside. This year, for example, we used sophisticated engineering and advanced computational methods to shed light on the earliest cell states leading to pancreatic cancer. We are forging the future of cancer treatment with one of the largest clinical trial programs in cancer in the country. Also this year, MSK investigators contributed to Food and Drug Administration approval of seven drugs.

Ever the innovator, MSK launched a first-of-its-kind PhD program that marries the insights of engineering with the unparalleled resources of MSK. This effort will help our researchers harness some of the most advanced tools in medicine, including nanotechnologies, CRISPR gene editing, AI, and much more.

In 2023, MSK was honored to take part in a powerful documentary film, *American Symphony*, that features

New York Times best-selling author Suleika Jaouad and her Grammy-winning husband, Jon Batiste. The film follows Suleika as she undergoes a successful stem cell transplant at MSK — it also inspired a major campaign that encourages people to register to donate stem cells. This effort is particularly important for people of diverse ethnic backgrounds whose unique tissue types often make it more challenging to find a donor match.

This Annual Report will also introduce some of the extraordinary people of MSK, including Maddy Ruff, who was treated at MSK Kids for bone cancer as a teenager. Two decades later, she works at MSK to help researchers discover the kind of groundbreaking therapy that saved her life. She sets a shining example for other patients hoping for a healthy and vibrant future.

None of the successes achieved this past year would be possible without philanthropic support from our dedicated giving community, spanning so many regions and walks of life. We are deeply grateful to the more than 415,000 donors who gave 600,000 gifts in 2023. This support is an affirmation of what we do and helps to lay the foundation for MSK’s future.

As we look ahead, the work continues across our organization to help reduce suffering, save lives, and unleash discoveries that will change cancer science. We are the standard-bearers, and together, united by our values, the people of MSK form the most capable force against cancer in the world.

Selwyn M. Vickers, MD, FACS
President and Chief Executive Officer

Scott M. Stuart
Chair, Board of Trustees

INNOVATION WITH LASTING IMPACT

**Every day at MSK, we challenge ourselves
to constantly learn and improve.**

We create and apply bold new thinking that makes a difference in the lives of patients. We embrace discovery, knowing that exploring the unknown is the best way to fuel progress in cancer treatment and care around the world.

Research technician Adrienne Chandra, MS, works with Vinod Balachandran, MD, studying pancreatic cancer.



NEW HOPE

FOR TREATING BRAIN CANCER

Alicia Kalogeropoulos had everything she wanted in her life at age 27: a loving husband, a first house, and a meaningful career as a nurse anesthetist. One day she tripped at home and hit her head. Fearing a concussion, Alicia's husband, Alex, took her to the emergency room. A scan revealed awful news. She had a tumor in the front of her brain. "I had no symptoms," she remembers. "It was a complete shock."

Suddenly, Alicia felt her bright future teetering on the edge.

"I was very scared because the only stories I had heard of people with brain tumors didn't turn out well," she says.

After a five-hour surgery to remove the tumor, Alicia faced a harrowing decision. Doctors said the cancer was likely to grow again and recommended chemotherapy and radiation. But she worried how these treatments could affect her quality of life, including her fertility.

Then the tumor started to grow.

A doctor in Boston told her about another option: A clinical trial at Memorial Sloan Kettering Cancer Center (MSK) was testing a new drug for her type of cancer, a low-grade glioma — one of the most common. Leading the trial was **Ingo Mellinghoff, MD, FACP, Chair of MSK's Department**

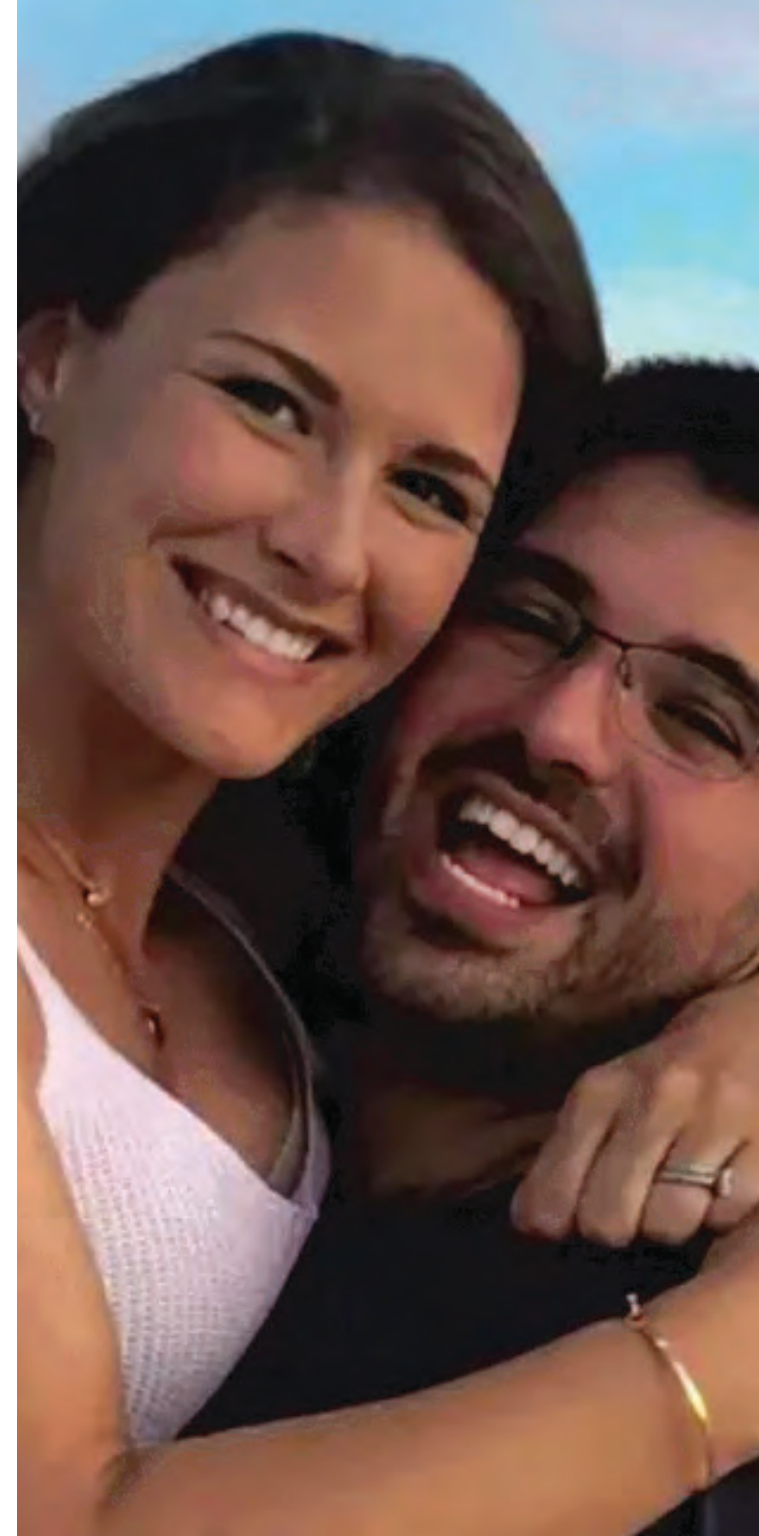
of Neurology. The drug, vorasidenib, targets a mutation in *IDH* genes. The mutations are present in 80% of low-grade gliomas, including Alicia's.

She came to MSK and immediately felt hopeful. "Dr. Mellinghoff and the research nurses were excited and optimistic," Alicia says. "They made me feel like I was joining a team, not just a trial."

Results from the phase 3 trial demonstrating vorasidenib's potential were published in *The New England Journal of Medicine* and reported by Dr. Mellinghoff at the 2023 annual meeting of the American Society of Clinical Oncology in Chicago.

"This has the potential to be the first new treatment option in low-grade gliomas in more than 20 years," Dr. Mellinghoff says. It happened as a result of years of painstaking work by determined scientists in research labs across MSK.

Alicia Kalogeropoulos with her husband, Alex



Why Brain Cancer Is So Hard To Treat

There are more than 125 types of brain cancer, and they are especially challenging to treat. Brain surgery is complex. There is a network of blood vessels and closely spaced cells forming a tight seal to protect against toxins. This blood-brain barrier also makes it difficult for drugs to penetrate.

To overcome these hurdles, MSK's **Brain Tumor Center** brings together researchers and clinicians across the institution focused on meeting the dire need to improve therapies. Led by **Luis Parada, PhD**, the team has created a unique resource to study the biology of glioblastomas, the deadliest brain tumors, using models known as patient-derived xenografts (PDX).



Research by Ingo Mellinghoff, MD, FACP, shows a new drug could reach the brain to treat low-grade gliomas.

Immediately after surgery in the hospital, a patient's tumor cells are whisked across the street to the laboratory. The human glioblastoma cells grow into a new tumor, which can be analyzed at the molecular level and used to test drugs.

"These PDX models are as close as you can get to experimenting on human brain tumors," Dr. Parada says. "To my knowledge, no other program is as comprehensive and rigorous as the one we have at MSK."

It's this kind of collaboration between scientists and clinicians that pushes forward discoveries in the lab into potential treatments for patients.

That's the story of vorasidenib — now a pill taken once a day. Before the phase 3 clinical trial using it in patients around the world, Dr. Mellinghoff led a phase 1 study, which confirmed that the drug crossed the blood-brain barrier and almost completely blocked the effect of mutant *IDH* enzymes in tumor cells.

With the phase 3 trial complete, the Food and Drug Administration must still approve vorasidenib before it becomes widely available.

In the wake of this advance against low-grade tumors, MSK researchers hope their PDX models will enable real progress against glioblastomas and other deadly brain tumors.

"There are many exciting drugs in development," Dr. Mellinghoff says. "We are getting a much better understanding of the genetic changes occurring in these tumors, as well as developing better

biomarkers to monitor how the tumors progress or respond to treatment."

After Alicia started taking vorasidenib in December 2021, her tumor stopped growing. It has held steady and even appeared to shrink slightly in 2023. The drug has caused no side effects.

"I was very scared finding out I had brain cancer initially because I immediately thought this meant I was going to die," Alicia says. "I am no longer scared because I have faith in the future of medicine and technology." •

There are more than

125

TYPES of brain cancer

This research receives essential philanthropic support from the **MSK Giving** community, including **Cycle for Survival**®, **Judith W. and Anthony B. Evin** and **The AE Family Foundation**, **Fred's Team**®, **Richard A. and Susan P. Friedman**, the **National Brain Tumor Society**, and **The Schneider Family** (Dr. Mellinghoff); and **Cycle for Survival**®, **Fred's Team**®, the **A. James & Alice B. Clark Foundation** and the **Nussdorf Family Foundation**, and **The Mortimer B. Zuckerman Family Foundation** (Dr. Parada).

Dr. Mellinghoff holds the **Evin Family Chair in Neuro-Oncology**.

Dr. Parada holds the **Albert C. Foster Chair**.

SURVIVING AGAINST THE ODDS



Vinod Balachandran, MD, studied long-term pancreatic cancer survivors to help develop a vaccine that could prevent the disease from returning after surgery.

Pancreatic cancer has long been a forbidding disease. While the five-year survival rate has inched upward in recent years, it remains quite low — about 12%. But surgeon-scientist Vinod Balachandran, MD, has focused on a glimmer of hope: A small percentage of people manage to beat the odds and survive. He wondered, “What made them different?”

In 2017, as reported in *Nature*, Dr. Balachandran’s laboratory unearthed an important clue in these rare pancreatic cancer survivors, which might help keep one of the deadliest cancers at bay.

“We have a long way to go before knowing if this will be an effective treatment,” Dr. Balachandran says. “But we’ve come this far thanks to MSK’s commitment to encouraging out-of-the-box ideas for new approaches for the most challenging cancers.”

The discoveries in 2017, supported by more evidence in *Nature* in 2022, uncovered the survivors’ secret: proteins in the pancreatic tumors called neoantigens that act as red flags to the immune system. Rare survivors of pancreatic cancer had immune cells called T cells that recognized these neoantigens present in their tumors and circulating in their blood — sometimes up to 12 years after their tumor was removed. These T cells, alerted to danger, may have delayed the cancers from coming back.

“The power of the immune systems in those patients to naturally fight pancreatic cancer was amazing to see,” Dr. Balachandran says.

Based on these findings, Dr. Balachandran approached Genentech, a member of the Roche

Group, and BioNTech, who had been researching and developing an individualized cancer vaccine called autogene cevumeran that targets a patient’s unique tumor neoantigens. Their vaccine uses messenger RNA (mRNA), a recipe telling the body to make proteins that bring on a protective immune response.

Genentech and BioNTech agreed to manufacture autogene cevumeran for each of the 16 patients enrolled in a Memorial Sloan Kettering Cancer Center (MSK)-led phase 1 clinical trial. It was given in combination with chemotherapy and a monoclonal antibody to patients who had surgery for pancreatic ductal adenocarcinoma, the most common form of pancreatic cancer. The trial’s primary objective was to evaluate the treatment’s safety.

The early results of the phase 1 study were encouraging. Data demonstrated a manageable safety profile, and in 8 of 16 of the patients participating, the vaccines activated T cells. The MSK team was able to track these activated T cells with the help of **computational biologist Benjamin Greenbaum, PhD.**

“Not only did the vaccines stimulate many of these T cells,” says Dr. Balachandran, “but we continued to detect them in patients up to three years later.

These findings supported our strategy aimed at tailoring each cancer vaccine to each patient’s tumor to train the immune system to stop the cancer.”

After following patients for an average of three years after treatment, of the eight patients in whom vaccines activated T cells, six did not see their cancers return after surgery. The other two responders relapsed. Of the eight patients whose immune systems did not respond to the vaccine in the phase 1 clinical trial, seven saw their cancers return during the study period. Researchers do not yet know if the vaccine actually caused the delay in the cancer recurrence; finding out requires larger studies.

In June 2023, Genentech and BioNTech initiated a phase 2 clinical trial to evaluate autogene cevumeran in approximately 260 patients at various sites around the world, including at MSK.



Benjamin Greenbaum, PhD, developed a method to track immune T cells activated by the vaccine.

Preventing — Not Just Treating — Pancreatic Cancer

MSK researchers are also looking for clues that would help arrest the disease at its earliest stage. Using cutting-edge technologies, scientists at the **David M. Rubenstein Center for Pancreatic Cancer Research** are zeroing in on the interaction between genetic mutations and external factors that can turn a normal pancreatic cell cancerous.

Researchers in the laboratory of **computational biologist Dana Pe’er, PhD**, and **cancer biologist Scott Lowe, PhD**, combined sophisticated genetic engineering and advanced computational methods to study the earliest cell states leading to pancreatic cancer. Using a genetically modified mouse model, they were able to mimic pancreatic cancer in humans from its earliest beginnings to when it spreads.

Their research, reported in *Science*, found that damage to tissue can trigger very fast changes — within 24 to 48 hours — in ways that foster cancer’s emergence and runaway growth. Inflammation from this tissue damage enhanced the cells’ ability to shed their original identity and adapt, a trait known as plasticity.

“This discovery gives a new, detailed understanding of how pancreatic cells progress to cancer when exposed to inflammation,” Dr. Lowe says. “It also

“I’ve chosen to focus not on why people don’t survive, but rather on why they

LIVE”

—Vinod Balachandran, MD

provides a road map for developing strategies to detect or possibly even prevent pancreatic tumors before they reach an incurable stage.”

It’s this kind of collaborative deep dive into a disease at its most basic level that offers reasons to be optimistic — even about pancreatic cancer.

“At MSK, we have the resources and the freedom to ask the most pressing questions, and then go where the science leads,” Dr. Balachandran says. “I’ve chosen to focus not on why people don’t survive, but rather on why they live. We are learning a patient’s own immune system could be their secret weapon.” •

This research receives essential philanthropy from the **MSK Giving** community, including, **Margaret M. Keane** (Dr. Balachandran); **Stand Up To Cancer** (Drs. Balachandran and Greenbaum); **The Mark Foundation for Cancer Research** (Drs. Greenbaum and Lowe); **Cycle for Survival®** (Drs. Lowe and Pe’er); and **Break Through Cancer** and the **William C. and Joyce C. O’Neil Charitable Trust** (Dr. Lowe).

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

Dr. Pe’er holds the **Alan and Sandra Gerry Endowed Chair** and is a **Howard Hughes Medical Institute Investigator.**

CONTROLLING A RELENTLESS LEUKEMIA

Ever since he was in college, Michael Rosensweig has endured a series of grueling treatments for acute myeloid leukemia (AML). This kind of blood cancer is relentless. It moves quickly and needs aggressive, often harsh, treatment with chemotherapy, sometimes followed by a bone marrow transplant. Even when these therapies stop the cancer, AML often returns.

Then Michael found out that he qualified for a groundbreaking clinical trial of an experimental targeted therapy.

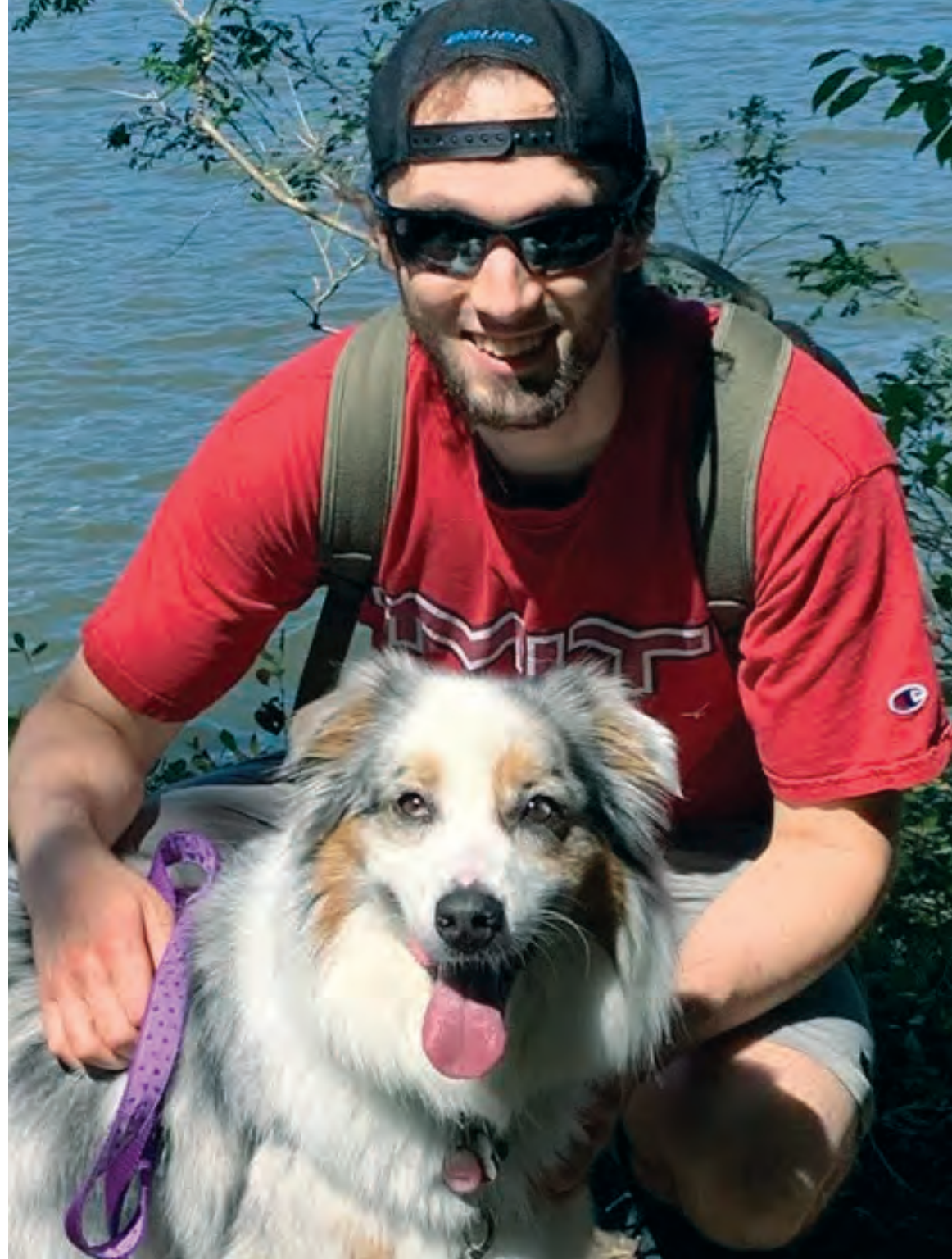
“I’ve been through a lot,” says Michael, now 35 and a software engineer living in Manhattan. “But I’m still here and more hopeful than ever.”

The outlook for Michael and other AML patients has begun to improve dramatically, thanks to research in laboratories and clinics at Memorial Sloan Kettering Cancer Center (MSK) focused on conquering the cancer’s major challenge: AML has many subtypes, with an array of genetic mutations driving the cancer.

“We now have a much better understanding of what drives this disease,” says hematologic oncologist Eytan Stein, MD, Director of the Program for Drug Development in Leukemia. “It’s an amazing, exciting time to be doing leukemia research.”

In the past few years, several new targeted therapies are showing remarkable results. One new drug, venetoclax (Venclexta®), is effective in older people when combined with another therapy.

Michael Rosensweig, enjoying the outdoors with Snow, has dealt with AML on and off for more than a decade.



In addition, MSK’s **Leukemia Service** led trials that resulted in the approval of two drugs by the Food and Drug Administration — enasidenib (Idhifa®) and ivosidenib (Tibsovo®).

A New Class of Drugs To Treat AML

In 2023 came perhaps the biggest breakthrough of all: proof that a new class of drugs known as menin inhibitors could stop the most lethal form of AML. It was the culmination of research begun a decade ago in the labs of leukemia oncologist **Ross Levine, MD, MSK’s Deputy Physician-in-Chief for Translational Research**, and **Scott Armstrong, MD, PhD**.

That groundwork paved the way for a phase 1 clinical trial led by Dr. Stein and published in *Nature*, which showed that a menin inhibitor called revumenib was effective in people whose cancer had certain molecular mutations common in AML:



“It’s an amazing, exciting time to be doing leukemia research,” says Eytan Stein, MD (left), with nurse practitioner Coleen Ranaghan, RN, MSN.

- More than half of these patients responded to revumenib.
- About 30% had a complete response with partial hematologic recovery, which means that no cancer was detectable in their blood.

“People with these types of alterations tend to have the most dangerous type of this already tough disease,” Dr. Stein says. “What we’ve seen in this study is very promising.”

Another Chance for Michael

When Michael participated in the clinical trial in 2021, his AML had returned three times since he was a junior at the Massachusetts Institute of Technology.

Michael feared he had run out of chances. But Dr. Stein’s groundbreaking trial gave him the opportunity to avoid another round of intensive chemotherapy requiring weeks of hospitalization. Instead, he could take a pill at home twice a day for four weeks.

“Being able to do treatment from home and just be normal for a while was so nice, as opposed to being stuck in a hospital bed for months,” Michael says.

Engineering the Immune System To Fight AML

Researchers are also making inroads treating AML with chimeric antigen receptor (CAR) T cell therapy. This treatment involves removing T cells from a patient and outfitting them in the lab with receptors that recognize specific targets — known as antigens — on the surface of a cancer cell. When these modified cells are put back into the patient, they patrol the bloodstream looking for cancer cells to destroy.

This research receives essential philanthropic support from the **MSK Giving** community, including **Cycle for Survival®**, **Mazumdar Shaw Philanthropy**, **Lewis A. Sanders**, and **Wendy and Neil Sandler** (Dr. Sadelain); **Fred’s Team®** (Dr. Stein); and **Comedy vs Cancer** (Dr. Park).

Dr. Levine holds the **Laurence Joseph Dineen Chair in Leukemia Research**.

Dr. Sadelain holds the **Stephen and Barbara Friedman Chair**.

About

20,800

people are diagnosed with AML
in the U.S. each year

But AML is a wily enemy. Its cells have different target antigens from cell to cell. So CAR T therapy could inadvertently weaken the entire immune system, requiring the patient to have a “rescue” bone marrow transplant.

Physician-scientist **Michel Sadelain, MD, PhD**, a pioneer in CAR T cell research, has developed an ingenious tactic for solving that problem in mice, reported in *Cancer Cell*. His team designed CAR T cells that activate into supercharged killing mode only if they sense two particular AML antigens at sufficient levels. These antigens — ADGRE2 or CD371 — can be present even at low levels, and the CAR T cells are still potent against them, without causing severe effects.

A clinical trial using this approach is now beginning under the direction of **hematologic oncologist Jae Park, MD**.

As for Michael, thanks to the menin inhibitor, he was able to receive a bone marrow transplant. Now cancer free for two years, he says, “I’ve got my life back and I’m so grateful.” •

FROM DATA TO CURES



(From left) Research fellow Ignacio Vazquez-García, PhD; Sohrab Shah, PhD, who heads MSK's Computational Oncology Program; and Adam Weiner, a graduate research assistant in the Shah Lab

The microscope. The petri dish. The X-ray. A handful of tools have radically changed the practice of medicine and biomedical research.

Although easy to overlook, the computer microchip, with its layers of silicon and engineering wizardry, is without a doubt one of the most important.

Today, as the instruments used in the lab and the clinic become more sophisticated, computation plays an increasingly essential role in scientific discovery and in improving patient care.

"Biology is really becoming an information science," says **Dana Pe'er, PhD**, an investigator at Memorial Sloan Kettering Cancer Center (MSK) and Chair of the **Computational and Systems Biology Program** at MSK's **Sloan Kettering Institute**.

And what sets MSK apart is the ability for computational and cancer experts to work together as partners to illuminate human biology and improve treatment outcomes.

Dr. Pe'er's research group, for example, recently developed a computational tool — dubbed Spectra — to help analyze research done with a technique called single-cell sequencing. The technology is akin to taking an orchestra and isolating individual musicians from it, or groups like the woodwinds.

By guiding data analysis in a unique way, the Spectra algorithm will provide new insights into the complex interplay among thousands of cells, including those that are critical to helping today's groundbreaking immunotherapy treatments work for more people.

"Interpreting this type of data is incredibly complex and rife with many statistical pitfalls," Dr. Pe'er says. "Spectra both finds patterns that are too complex for a human to possibly identify and also easily finds patterns that would take researchers months using other methods."



Dana Pe'er, PhD, and her team are developing new computational tools to accelerate cancer research.

AI and Cancer Care

The importance of computation isn't limited to the laboratory. MSK is a world leader in the clinical use of home-grown artificial intelligence (AI) models, notes **Joseph Deasy, PhD, Chair of MSK's Department of Medical Physics**.

For example, AI is being used routinely to improve the efficiency and quality of radiation therapy treatment planning.

MSK researchers, led by **computer scientist Harini Veeraraghavan, PhD**, have developed AI

methods — trained on MSK imaging data — that can accurately identify healthy tissues that can be spared while zeroing in on tumor tissues. Thanks to this research, the approach now covers more than 40 tissue types and has been used for over 6,000 cancer treatments, making it a great example of the positive impact AI is already starting to have in medicine.

What's more, because AI programs can be trained to adapt and improve over time, they perform in ways far superior to traditional computing approaches.



Joseph Deasy, PhD (right), speaks with Sadegh Alam, PhD.

How Data Is Improving Patient Care

And it's not just AI that is making a difference. Harnessing the power of large data sets is central to improving cancer diagnosis and continuously advancing patient care, says **Sohrab Shah, PhD**, who heads MSK's **Computational Oncology Program**. Moreover, MSK is poised to extend its leadership in the field, thanks to the **Halvorsen Family Foundation's** transformational \$25 million gift establishing **The Halvorsen Center for Computational Oncology**. Among the top priorities for the center are investigating tumor evolution and drug resistance, immuno-oncology, and AI-powered next-generation personalized medicine.

This includes the river of data created during the process of providing care to patients with cancer — an electronic record that includes everything from their age, ethnicity, and gender to the genetic mutations driving their cancer and measurements of how much a particular medicine shrank their tumors. Every week, some 10,000 imaging scans are done at MSK — each rich with electronic data.

“The primary purpose of gathering all this information is to treat each patient properly and effectively,” Dr. Shah says. “But all this information has enduring value by creating a large data set from which patterns can be analyzed for the benefit of future patients.”

Dr. Shah helped lead research, for example, that performed a variety of advanced analyses on samples from patients with high-grade serous ovarian cancer — one of the most challenging cancers to treat.

The team uncovered several mechanisms that help explain why ovarian cancers have been resistant to immunotherapy, finding the disease is even more complex than previously thought. There are profound differences in the ability of different types of ovarian cancer to evade the patient's immune system. Their findings were published in *Nature*, one of the top scientific journals in the world.

“Uncovering these mechanisms that are driving resistance to therapy creates an opportunity to find ways to improve treatments,” Dr. Shah says. “It also will lead to better methods for both detection and prevention.”

Harnessing the power of computation is helping in other ways, too. AI technology has already sped data collection and cut scan times in half in recent years, says **Lawrence Schwartz, MD, Chair of MSK's Department of Radiology**.

“In many settings, a healthy woman's mammogram is read for a second time with an AI technology to make sure that nothing was missed,” he says. “But we're certainly just at the beginning of the journey to understand what AI can do.” •

This research receives essential philanthropic support from the **MSK Giving** community, including **The Warren Alpert Foundation**, **Break Through Cancer**, **Cycle for Survival®**, **Israel Englander**, **Fred's Team®**, the **Halvorsen Family Foundation**, the **Ovarian Cancer Research Alliance**, and the **LesLois Shaw Foundation** (Dr. Shah); and **Cycle for Survival®** and **The Society of MSK** (Dr. Pe'er).

Dr. Deasy holds the **Enid A. Haupt Chair in Medical Physics**.

Dr. Norton holds the **Norna S. Sarofim Chair in Clinical Oncology**.

Dr. Pe'er holds the **Alan and Sandra Gerry Endowed Chair** and is a **Howard Hughes Medical Institute Investigator**.

EVERY WEEK

, approximately

10,000

imaging scans are done at MSK — each rich with electronic data

Teaching Machines To Recognize Cancer

Artificial intelligence (AI) technology has been in the spotlight as AI chatbots and image generators have become widespread, leading to renewed conversations about the technology's role in medicine.

One of AI's most immediate applications for patient care is to help humans pore over digital pictures — such as diagnostic images and pathology slides. These are promising tools with the potential to significantly augment a human expert's perception, stamina, and efficiency. But, on the whole, they are still being fine-tuned.

Larry Norton, MD, Medical Director of MSK's Evelyn H. Lauder Breast Center, is an international

expert on breast cancer and has appeared on CNN and *Good Morning America* to talk about the role of AI in detecting the disease.

The basic technology used to teach computers to recognize patterns in an image based on a library of pictures they've been trained on is actually several decades old, Dr. Norton notes.

But there are recent advances that show promise for predicting future risk of breast cancer from a mammogram. They are highlighting ways AI could help overcome some of the current limitations of routine breast cancer screening.

“AI programs can look at mammograms and identify areas that human radiologists may want to look at more carefully,” Dr. Norton says. “But it's not a stand-alone technology — it's not going to replace a radiologist.”

If a machine detects an abnormality or area at high risk for developing into cancer, it can't, for example, order additional tests like a contrast-enhanced digital mammogram or MRI that can provide doctors with additional information, he says.

“The major advantage to AI right now is it speeds up the reading of the mammogram so that a radiologist can see more mammograms accurately over a certain period of time,” Dr. Norton told *Good Morning America* in March 2023.

Moreover, machines are very good at learning what they are taught, but they're not good at identifying new things they have no previous experience with, he adds.

And while AI technology is getting better all the time, it is not yet a replacement for standard care, Dr. Norton notes.

“A skillful radiologist is still your best partner,” he says. “And your best protection is getting screened — about half of people who should be getting annual mammograms are not getting them.” •

Breast cancer expert Larry Norton, MD, is a frequent guest on news programs like *Good Morning America*.

SIDELINING SIDE EFFECTS

Marc Scarduffa, pictured with his dog Ulysse, was able to keep working during the clinical trial he took part in at MSK. “Most people didn’t know I had cancer,” he says.

Marc Scarduffa was blindsided when he learned he had stage 3 rectal cancer.

Fit and strong as he celebrated his 50th birthday, he had scheduled a colonoscopy simply because he knew he had reached the recommended age to begin screening for colorectal cancer (the recommended age has since been lowered to 45).

Marc had no symptoms, no family history of the disease, and every expectation of a clean bill of health.

However, he woke up after the procedure to grim news. He recalls the doctor telling him, “You have a major tumor, buddy. You need to get to an oncologist.”

So began a journey that would bring Marc to Memorial Sloan Kettering Cancer Center (MSK). At MSK, he found a new approach to rectal cancer that not only successfully treated his disease but did it with less toxic treatments that caused fewer side effects and provided a better quality of life.

It’s part of the intense focus across MSK to help people facing cancer live their best lives during and after treatment.

Rectal Cancer Treatment Without Radiation Therapy

For Marc, the key was a clinical trial investigating whether people with rectal cancer that has not spread (metastasized) could be spared radiation therapy. Since 1990, the standard of care for rectal cancer has been chemotherapy and radiation, followed by surgery.

Led by **gastrointestinal oncologist Deb Schrag, MD, MPH**, who is also Chair of the **Department of Medicine**, the successful results of the clinical trial that included Marc were announced in June 2023 at the America Society of Clinical Oncology, the country’s largest cancer conference. The study was also published in *The New England Journal of Medicine*.

Dr. Schrag started the trial with a hypothesis: Could changing the chemotherapy regimen typically given before surgery allow patients to skip radiation altogether? Preliminary evidence suggested it was possible.

Dr. Schrag hoped eliminating radiation would spare people serious side effects, which can include infertility.

“My colleagues and I began seeing more young women with rectal cancer who were devastated — not just because they had cancer but because the standard treatment we had to offer them would mean that they would not be able to carry a pregnancy to term,” Dr. Schrag says. “That was one of the big reasons we looked for a way to help patients — and to see if we could achieve favorable outcomes without the uniform application of radiation.”

People facing rectal cancer, says Dr. Schrag, are also anxious about other long-term consequences of radiation, which can damage sexual and bowel function.

There are also concerns about radiation and its impact on bone marrow, which makes blood. “Most of your bone marrow is made in the pelvic bones,” explains Dr. Schrag. “When you radiate those bones, the bone marrow resilience can be impaired, which makes it more difficult to give chemotherapy if cancer comes back.”

Marc says he also heard about radiation side effects from other people with cancer. “I was happy to not have to undergo radiation therapy. Among other things, no radiation meant I didn’t have to lose my hair, which I was very enthusiastic about.”

‘MSK Is the Gold Standard’

The trial, led by Dr. Schrag and involving more than 1,100 patients, was a bold move — if it worked, it would upend 20 years of standard practice. The trial divided participants into two separate arms. Before undergoing surgery, half of the patients were given the standard treatment: radiation plus a chemotherapy called 5FU.

The other half received no radiation before surgery. Instead, they were given the chemotherapy regimen called FOLFOX, which for two decades has been given after surgery. But switching the order of treatments by administering FOLFOX first would prove to have major benefits.

After five years, the results were clear: The patients who received only FOLFOX before surgery did just as well as the patients who received traditional chemo and radiation, offering doctors and patients a new treatment option that eliminated the side effects of radiation.

For Marc, chemotherapy alone had only minor side effects. “Most people didn’t know I had cancer, and I continued to travel for work,” he says.



Deb Schrag, MD, led a study to help people with rectal cancer potentially avoid serious side effects from radiation.

The success of his treatment, along with the focus on his quality of life and the compassion of his care team — including **gastrointestinal oncologist Leonard Saltz, MD**, and **colorectal surgeon Martin Weiser, MD** — convinced Marc that “MSK is the gold standard for cancer care.”

He adds, “I’m such a big fan of MSK, and I’ve told several people with cancer to go there.”

MSK physicians are also advancing other options for people with colorectal cancer by applying the principles of precision medicine. In a landmark study involving the 8% of patients whose tumors have a specific genetic makeup, MSK researchers successfully treated the cancer with immunotherapy alone, allowing patients to skip the usual treatment of radiation, chemotherapy, and surgery, which can have life-altering side effects.

Similar studies are underway to see if the approach can be used to treat other cancer types.

20,000 people with stage 2/3

rectal cancer could be

SPARED RADIATION

by this new treatment
approach

U.S. News & World Report named MSK **#1 in UROLOGY** on its 2023 Best Hospitals ranking.



Treating Prostate Cancer With Ultrasonic Waves

An innovative approach at MSK also helped John Brannan “get a new lease on life” after he was diagnosed with prostate cancer.

A doctor at another hospital suggested surgery as soon as possible. But John was troubled after two people he knew who had undergone similar surgery described persistent side effects, which can commonly include urinary and sexual problems.

John learned of an MSK clinical trial for people like him with intermediate-risk prostate cancer and decided to participate. Led by **urologic cancer surgeon Behfar Ehdai, MD**, the trial investigated a treatment known as MRgFUS, which uses high-intensity focused ultrasonic waves guided by magnetic resonance imaging (MRI).

“We believe this novel treatment strategy will improve the lives of many prostate cancer patients,” says Dr. Ehdai. “Instead of removing all the tissue in the prostate, we have learned that it is safe and effective to treat specific areas and greatly reduce the burden on patients.”

‘No Cuts, No Bruises, No Pain — and Home the Same Day’

The treatment uses focused ultrasonic waves — precisely guided by MRI imagery — to heat the cancer cells inside the prostate to more than 158 degrees (70 degrees Celsius), which kills them.

“Using only sound waves means patients have no cuts, no bruises, no pain — and go home the same day,” says Dr. Ehdai.

John walked out several hours after his treatment and returned to the hotel where he was staying with his wife and had dinner. “It was pretty much back to normal right away,” he says. “It’s a phenomenal use of technology.”

Dr. Ehdai now teaches fellow specialists at other centers how to use the novel treatment. He is also preparing for a phase 3 clinical trial scheduled to begin in 2024 that will compare the technology with standard-of-care treatment to test each method’s effectiveness and safety.



John Brannan, pictured with his wife, Lita, says he “was pretty much back to normal right away” after the experimental ultrasound treatment for prostate cancer.

MSK specialists are just as determined to help people with prostate cancer who are not candidates for this treatment, including people with more advanced disease.

For instance: “In radiation therapy, we’re constantly trying to design our treatments to minimize side effects,” says **radiation oncologist Sean McBride, MD, MPH**. Part of that effort, he explains, is listening to patients.

“When a patient has options between different radiation choices, we try to find out what’s most important to them,” he says. “Perhaps its sexual function, bowel function, or urinary function. There are subjective factors that guys bring to the table that help us hone our recommendations.”

Seeing the Whole Patient

A plan that was carefully tailored to personal needs also proved invaluable for Vivian Moore.

At age 80, she was diagnosed with triple-negative breast cancer, a particularly aggressive form of the disease. While some people her age may have wondered whether undergoing treatment with potentially hard side effects would be worth it, she never considered foregoing cancer care.

“I felt comfortable there,” she says, having been cared for by MSK 10 years earlier for bladder cancer. “And I had a lot of confidence that their team would get me through whatever I was facing.”

MSK crafted a treatment plan for Ms. Moore based on her stamina and other needs, with input from

breast cancer experts who have special training and experience treating patients over age 65, including Ms. Moore’s **MSK breast oncologist, Diana Lake, MD**.

“We felt the whole team looked closely at my mom’s individual case to determine what treatments she could tolerate,” says Ms. Moore’s daughter, **Nicole**. “They didn’t make assumptions based on her age but took a very holistic approach.”

Among the care team members was **geriatrician Farnia Amirnia, MD**, who evaluated Ms. Moore to check for possible problems with thinking and mental processing, which can be a side effect of the drugs used to treat breast cancer, especially in older people. Thankfully, this was not a problem for Ms. Moore. Today at age 82, she has recovered from her cancer and treatment without side effects.

These patients are just the latest example of MSK’s innovation, seeking to use the least amount of treatment to achieve the most benefit. At any stage of life, the cancer experts at MSK are determined to find new ways to reduce side effects and preserve quality of life for the people in their care. •



Vivian Moore had confidence her MSK team would successfully treat her breast cancer with the fewest side effects possible.

Dr. Schrag’s research receives essential philanthropic support from the **MSK Giving** community.
Dr. Schrag holds the **George J. Bosl Chair**.
Dr. Weiser holds the **Stuart H.Q. Quan Chair in Colorectal Surgery**.

A NEW BREED OF CANCER FIGHTERS

(From left) Kayvan Keshari, PhD, and Daniel Heller, PhD, Co-Directors of The Pat and Ian Cook Doctoral Program in Cancer Engineering, are eager to mentor students in the first-of-its-kind program that trains engineers to apply their skills against cancer.

It's the power of serendipity. In science, great ideas often come from chance encounters between two experts from different worlds.

That's what happened one afternoon a few years ago in the lobby of the Zuckerman Research Center, the 23-story home to lab researchers at Memorial Sloan Kettering Cancer Center (MSK). Biomedical engineer **Dan Heller, PhD**, started up a conversation with a gynecologic oncologist about his work using nanotechnology to develop tiny implantable sensors to better detect disease.

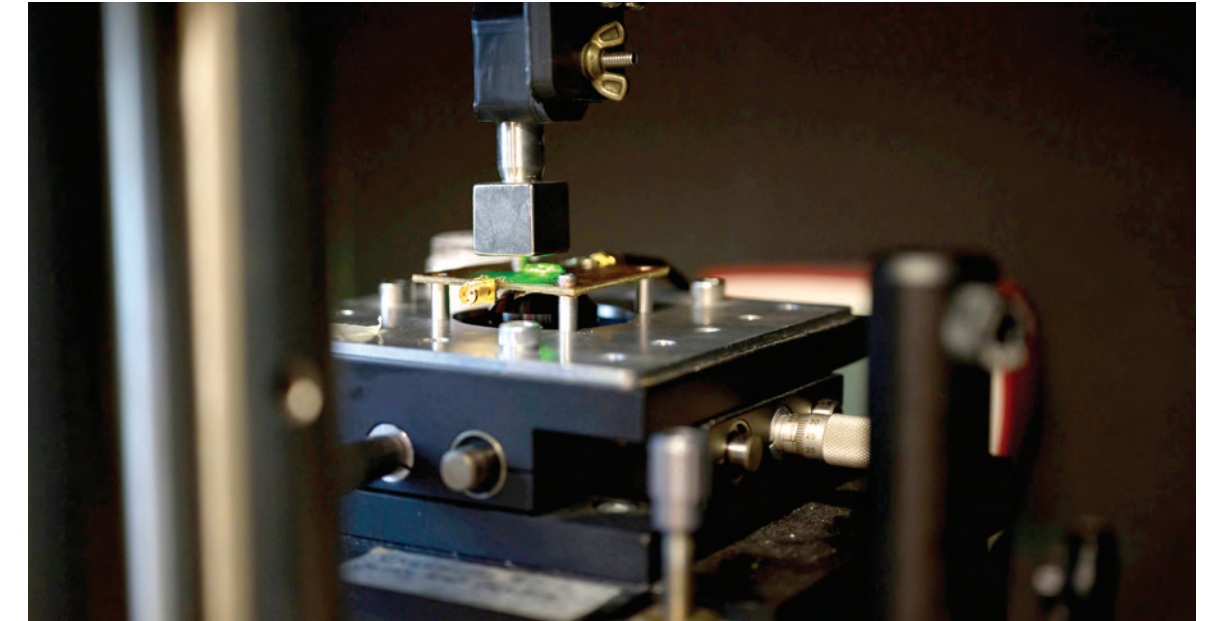
"I learned there is a desperate need for a better way to detect ovarian cancer," Dr. Heller recalls. "This cancer is so deadly because it's very difficult to diagnose early."

The impromptu conversation kicked off a collaboration. Eight years later, Dr. Heller's lab — working in consult with **gynecologic surgeon Kara Long Roche, MD, MSc** — had designed and begun testing a device that might spot the first signs of ovarian cancer by detecting a molecular fingerprint in blood samples.

"This is what can happen when you marry engineering skills with urgent medical needs," says Dr. Heller, head of the **Cancer Nanotechnology Laboratory** at the **Sloan Kettering Institute**. "In a biomedical center like MSK, you are surrounded by problems to solve and questions to answer."

Now a first-of-its-kind PhD program in cancer engineering will enable aspiring scientists to tackle tough cancer problems. **The Pat and Ian Cook Doctoral Program in Cancer Engineering**, made possible by a generous gift from **MSK Trustee Ian Cook and Pat Cook**, was launched in 2023 by MSK's **Gerstner Sloan Kettering Graduate School of Biomedical Sciences (GSK)** under the leadership of **GSK Dean Michael Overholtzer, PhD**. The visionary new program joins the elite **Cancer Biology PhD Program**, which began in 2006.

"There are many engineers and physical scientists who love making new technologies but would like to go a step further and put them into practice," says Dr. Heller, program Co-Director.



Students in the new program have unparalleled access to cutting-edge tools like this custom-built microscope for optically detected magnetic resonance.

His equally passionate **Co-Director, Kayvan Keshari, PhD**, says this approach will transform cancer discovery for the future.

"We want budding researchers to be aware that this amazing opportunity exists in a way that was not available when Dan and I were starting our careers," Dr. Keshari says. "People focused on engineering tend not to have a cancer institution on their radar. Until someone comes here, it's hard to really appreciate the power of this place. We want them to know they can come here and do truly astounding things."

Students will have unparalleled access to cutting-edge tools such as nanomaterials, CRISPR

gene editing, atomic force microscopes, 3D printers, and organoid models of cancer.

And, they'll have the opportunity to engineer brand new technologies to accelerate discovery.

Drs. Heller and Keshari, both at the Sloan Kettering Institute, are inspiring instructors, eager to mentor students in the first class from a variety of backgrounds and disciplines, including engineering and the physical sciences.

"In most institutions, you can develop amazing technologies but never translate your ideas," Dr. Keshari says. "At MSK, you might actually be able to do something that can change someone's life." •

Dr. Keshari holds the Fred Lebow Chair.

EXCELLENCE THROUGH INCLUSION

We succeed when diversity thrives.

We actively address barriers to diversity and inclusion in our workforce, our science, and the care we provide. Our doors are open to all. Our researchers explore the biology of cancer among people of different ethnicities, improving outcomes for everyone and leading the way to more equitable care.

Maria and Pedro Lara are grateful for MSK's expertise in bone marrow transplants for people who are ethnically diverse.



SEEKING A MATCH FOR EVERYONE

Pedro Lara has lived the American dream. A native of El Salvador, he came to the United States as a young man more than 50 years ago and built a proud life working many jobs in Brooklyn. But when Pedro needed a stem cell transplant after developing non-Hodgkin lymphoma, his ancestry made it difficult to find a donor.

It's a growing problem as the population becomes more diverse: Patients of Latin American, Asian, African, Middle Eastern, and mixed ancestry have complex tissue types and may have trouble finding a match if there isn't one available in their family. For example, for people of Latin American descent like Pedro, the odds of finding a matched donor in a public registry are less than 50%. For Black patients, the odds are only about 30%.

But researchers at Memorial Sloan Kettering Cancer Center (MSK) have developed several techniques over the past decade that offer hope to these patients by dramatically expanding the universe of potential donors. These days, patients don't necessarily need a perfect match.

"Our outcomes for transplants using stem cells that are only partially matched are just as successful as for those that use fully matched donors," says **transplant specialist Brian Shaffer, MD**. "This is important because about half the people we treat identify as being a racial or ethnic minority."

"I feel very lucky that MSK opened their doors to me," says Pedro, now 76. "From my first visit, I felt like God had given me a great opportunity. I truly found my angels."

Finding a Donor for Every Patient

To find a suitable match, doctors look for immune markers on white blood cells called HLA types. If two people share all eight markers, they are considered a full match. People with non-European ancestry have more diverse HLA types, which are more difficult to match.

At MSK, even without a fully matched donor, patients have several options:

- A family member who is only a half match
- An unrelated donor who is less than a full match
- A cord blood transplant, using stem cells collected from umbilical cords

A Transplant Offers Pedro the Best Chance of Successful Treatment

Pedro came to MSK after being treated for non-Hodgkin lymphoma at another hospital. The cancer was still present, and the chemotherapy had damaged his bone marrow.

"When Pedro first came to see me, he was getting blood and platelet transfusions every few days. He needed a transplant," says his doctor, **BMT expert Michael Scordo, MD**. "Although Pedro was 74, he was in good health. MSK has done extensive research on the best ways to care for older patients who need transplants."

The next step was finding a donor. Pedro is one of eight siblings, but they were too old to provide healthy cells, even if they were a perfect match. (Ideal donors are under 40.) Pedro has no children and there were no full matches in the public donor databases, either.

Fortunately, Pedro's niece in Northern California, **Debbie Crystal Lara**, then 27, was a half match.

"When I learned that I was the best match, of course I was willing to donate my cells," Debbie says. "It was a blessing to know that I would be able to help my uncle." The team at MSK and **NMDP** arranged for Debbie's cells to be collected at a facility in San Diego. They were quickly frozen and shipped to MSK.

Pedro's team had a protocol to help make the half-match transplant successful. "With partially matched donors, we give an extra drug for two days after the transplant. This helps prevent the donor's immune cells from attacking the recipient," Dr. Scordo says.

Indeed, Pedro had very few complications and recovered quickly. Exactly one month after his transplant, he was discharged from the hospital.

More than two years later, Pedro says he feels great. Now retired from his job as a handyman, he misses working but fills his days in other ways — riding his bike, snuggling with his cat, and teaching his wife to dance.

Pedro says he is grateful for the care he received at MSK, not only from his medical team but also for the emotional, psychological, and financial support — even covering travel costs when his weakened immune system made it dangerous for him to use public transportation.

"Everyone I met throughout my journey gave me the confidence that I would be well again," he says. •

For people of **LATIN AMERICAN, ASIAN, OR PACIFIC ISLANDER** descent, the odds of finding a matched donor in a public registry are less than

50%

FOR BLACK PATIENTS, the odds are only about

30%

versus

80%

FOR WHITE PATIENTS



Suleika Jaouad said she and her husband, Jon Batiste, experienced the “highest highs and lowest lows” of their lives during her bone marrow transplant.

Life often imitates art.

But in the documentary film *American Symphony*, life interrupted art instead.

As a result, a love story for the ages unfolded on-screen, a team of specialists saved a young woman’s life, and a campaign was born that will help people with cancer for years to come.

The film was originally intended to document the debut of a symphony composed by **Jon Batiste**, the Grammy- and Oscar-winning musical phenom and former band leader of *The Late Show With Steven Colbert*.

But during production, Jon’s wife, **Suleika Jaouad**, received her second bone marrow transplant at Memorial

Sloan Kettering Cancer Center (MSK), 13 years after she was first treated at MSK for acute myeloid leukemia.

Suleika gave viewers a rare look inside the life of a stem cell recipient, drawing on her skills as an Emmy Award-winning and *New York Times* best-selling writer, advocate, and cancer survivor. “We rode out the highest highs and the lowest lows of our lives,” she recalls. “The movie morphed from a music documentary into one about love and art and survival — about what happens when the human spirit is tested again and again.”

To mark the movie’s premiere on Netflix, MSK launched an important campaign with **NMDP**, which operates the world’s most diverse blood stem cell registry.

Called “**American Symphony: Become a Lifesaver**,” the campaign has a goal to increase the number of people who register to donate blood stem cells, particularly in ethnically diverse communities where finding a donor match can be especially challenging.

At a special screening of the documentary, Suleika and Jon shared their immense gratitude with 150 members of the MSK team. “This film comes as we celebrate 50 years of pioneering stem cell transplants at MSK,” reflected **Sergio Giralt, MD, bone marrow transplant specialist**. “And we will continue to move this field forward.” •



(Top, from left) Suleika during her stem cell transplant at MSK; Suleika hugs two members of her transplant care team during a special screening of *American Symphony*; Jon thanks Sergio Giralt, MD, MSK bone marrow transplant specialist and cellular therapist. (Bottom) Suleika, center, and Jon, back row, with MSK team members who attended a screening of *American Symphony*. The event launched the “Become a Lifesaver” campaign to encourage people to become stem cell donors.

NEW INSIGHTS INTO A DEADLY DISPARITY

(From left) Linda Collins with her doctor, Carol Brown, MD, FACOG, FACS, who successfully treated Linda for endometrial cancer. As MSK's Chief Health Equity Officer, Dr. Brown is helping reveal why this cancer is more deadly for Black women.

The numbers are stark and deeply troubling.

Endometrial cancer — which develops in the lining of the uterus (womb) and is sometimes called uterine cancer — is on the rise in the U.S. In 1987, there were 35,000 cases annually. That number has nearly doubled in 2023 to more than 66,000 cases.

Deaths from the disease have also grown alarmingly in the same period, from fewer than 3,000 to more than 13,000 in the U.S. every year. And the trend line is not getting better.

“Endometrial cancer has been increasing at unprecedented levels over the past five years,” says gynecologic surgeon **Carol Brown, MD, FACOG, FACS, Chief Health Equity Officer** at Memorial Sloan Kettering Cancer Center (MSK). “It’s becoming much more common in all women in the U.S., and it’s occurring at much younger ages.”

Against this backdrop, a particularly worrying situation is unfolding for Black women. Dr. Brown explains that the “incidence of endometrial cancer — and the death rate — are rising almost one and a half times more quickly in Black women than in white women.”

This disturbing trend mirrors a long-standing disparity involving endometrial cancer that finds Black women are almost twice as likely to die of the disease as white women.

“This is one of the few cancers where things are getting worse, not better,” says **Carol Aghajanian, MD, Chief of the Gynecologic Medical Oncology Service**.

In 2023, researchers and clinicians at MSK played a leading role in addressing this cancer disparity. Their efforts stretch across the entire continuum of MSK, including groundbreaking research that provides insights at the molecular and genetic level, clinical trials that investigate new therapies, and hands-on work in communities most affected by endometrial cancer, where outreach and access to MSK treatment can be lifesaving.



Carol Aghajanian, MD, says endometrial cancer is “one of the few cancers where things are getting worse, not better.”

Why Endometrial Cancer Is So Deadly for Black Women

It has long been known that Black people in America suffer disproportionately from a host of cancer types. The American Cancer Society puts it bluntly: “For most types of cancer, Black people have the highest death rate and shortest survival rate of any racial or ethnic group [in America].”

Dr. Brown, who has devoted her career to helping end these disparities, explains: “The theory has been

that some of the disparity with endometrial cancer might be related to lower access to adequate health-care, which can mean cancers are diagnosed at more advanced stages, when they are harder to treat.”

Now, more pieces of the puzzle are coming into focus thanks to new research by Dr. Brown and MSK colleagues, including Dr. Aghajanian; **molecular geneticist Britta Weigelt, PhD**; the MSK gynecologic pathology group, led by **Lora Hedrick Ellenson, MD**; and **medical oncologist and clinical geneticist Ying Liu, MD, MPH**.

ENDOMETRIAL CANCER is rising almost 1.5 TIMES FASTER

in Black women than in white women



Ying Liu, MD, MPH, says: “We are proud to be doing the deepest dive yet” into endometrial cancer.

“In the past decade,” says Dr. Brown, “we’re learning that most of the disparity in endometrial cancer outcomes has to do with the more aggressive types of cancer that Black women get.”

Take the endometrial cancers called serous carcinoma and carcinoma sarcoma. MSK research shows these types of cancer are more likely to be diagnosed in Black women and are also more aggressive than the type more commonly found in white women.

Reasons for Disparity Discovered at the Molecular Level

In November 2023, MSK researchers published first-of-its-kind work that provided important new answers about this disparity.

Drs. Brown, Aghajanian, Weigelt, Ellenson, and Liu, along with colleagues from MSK, published findings in *Cancer Discovery* that showed Black women not only had more aggressive tumor types but also had other key factors that made their cancers higher risk and more difficult to treat.

One such factor is a molecular subtype of endometrial cancer called copy number-high, or TP53 abnormal, abbreviated as CN-H/TP53abn. People whose endometrial tumors are CN-H/TP53abn generally have worse outcomes, Dr. Weigelt says.

“The difference between Black and white patients is really striking,” she says. Almost 70% of Black patients had this high-risk molecular subtype of endometrial cancer, as opposed to only 35% of white patients.

The team also found that the tumors of Black women are less likely to be of a molecular subtype called microsatellite instability-high (MSI-H), a subtype that benefits from some forms of immunotherapy.

Checkpoint Inhibitors and Endometrial Cancer

One of the most common forms of immunotherapy is known as a checkpoint inhibitor. This therapy works by unleashing the patient’s own immune cells so they recognize and attack cancer cells, which can camouflage themselves to appear normal.

“Checkpoint inhibitors have been a game-changer,” Dr. Liu says. “They have completely transformed how we treat advanced and recurrent endometrial cancer.”

This form of immunotherapy works best when an endometrial tumor displays many mutations. That makes it easier for the immune system to recognize that the tumor cells are not normal and attack them.

Here’s where MSK researchers found a key difference in Black women: Their endometrial tumors had relatively few mutations. “That means,” explains Dr. Weigelt, “that these patients benefit much less from checkpoint inhibitors than white women.”

To begin to address this challenge, Dr. Aghajanian has also published early research in *The New England Journal of Medicine* about efforts to explore if immunotherapy could be made more effective against endometrial tumors that do not have lots of mutations. She stresses that it is very early days for this research but says: “This is just one approach we are taking to end this disparity.”

How MSK Leads the Field in Endometrial Cancer

“No institution is better suited to making these kinds of discoveries than MSK,” Dr. Brown says. “We have incredible resources and data on a very large group of women of African ancestry — that’s really unique.”

She also credits the **Gynecology Disease Management Team** leadership, Dr. Aghajanian, and **Nadeem Abu-Rustum, MD, FACOG, FACS**, as well as the **Marie-Josée and Henry R. Kravis Center for Molecular Oncology**, established with foundational support from **MSK Trustee Marie-Josée Kravis and Henry Kravis**. “Their determination to make a difference for endometrial cancer patients allowed us to offer genetic and molecular testing for every patient with endometrial cancer who walked through the door.”

Unfortunately, outside of these efforts, access to genetic testing lags far behind for Black women, according to Dr. Liu’s recent research. And endometrial cancer has been a low priority for federal cancer research funds, despite the growing incidence and death rate from the disease.

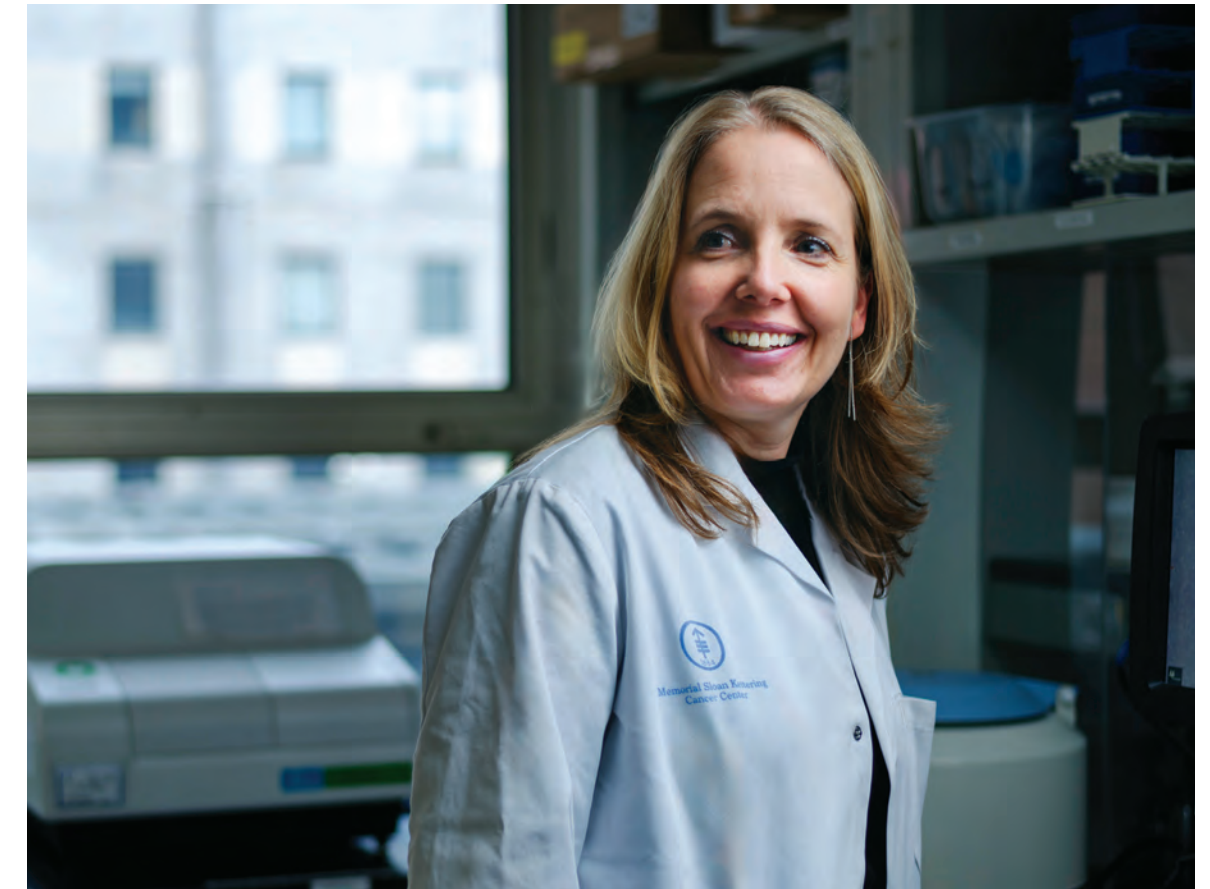
Reaching Out to People Who Need It Most

Dr. Brown stresses that all these approaches rely on efforts to teach people — patients and providers as well as the wider community — about the grim realities of endometrial cancer and its disproportionate effect on Black women.

“We’ve made a lot of changes here at MSK over the past decade,” she says, “in educating people and making them aware of cancer disparities in general, and particularly endometrial cancer.”

MSK is also a key contributor to national efforts. Dr. Aghajanian is the Chair of the **NRG Oncology Gynecologic Cancer Committee**. NRG Oncology is part of the **National Cancer Institute’s National Clinical Trials Network Program**. Dr. Aghajanian explains that “it is important to expand scientific discoveries to cover a larger group of women that represents the entire U.S.”

For the MSK team on the front lines of endometrial cancer, the alarm bells are most certainly ringing. “This cancer has been understudied and underfunded,” concludes Dr. Liu. “At MSK, we’re proud to be doing the deepest dive yet into what drives this cancer disparity that hurts so many women.” •



Britta Weigelt, PhD, is a molecular geneticist whose team has helped identify a molecular subtype of endometrial cancer that is particularly dangerous and more often found in Black women.

This research receives essential philanthropic support from the **MSK Giving** community, including **Break Through Cancer** (Dr. Aghajanian), and the **Arbour Way Foundation/Robin & Marc Wolpow, Cycle for Survival®**, the **Trust of Evelyn H. Lauder**, and **Jamie Nicholls and Fran Biondi** (Dr. Brown).

Dr. Aghajanian holds the **Avon Chair in Gynecologic Oncology Research**.

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

WE ARE One MSK

We work together to do what no one else can in cancer.

We work collaboratively across all parts of the institution, combining our respective expertise to deliver exceptional and compassionate patient care, research innovation, and training for the next generation of leaders. The people of MSK give their all every day, leaving no stone unturned to support our patients every step of the way.



COMING FULL CIRCLE



Maddie Ruff, who was treated at MSK Kids, now works as an MSK clinical research associate and sets an inspiring example for patients.

Madeleine Ruff, MHA, helps manage clinical trials that test new cancer treatments to see how well they work. It's an important job but one that doesn't seem all that unusual, until you learn that Maddy started her career as a professional rock 'n' roll and jazz singer. It's certainly not the typical road to the front lines of cancer research at Memorial Sloan Kettering Cancer Center (MSK).

But Maddy sees her circuitous path to a career in healthcare as a “full-circle beautiful story” that started almost two decades ago at MSK Kids.

A Special Bond at MSK Kids

Maddy was just 16 years old and focused on a career in music when a nagging pain in her left ankle was diagnosed as osteosarcoma, a rare bone cancer. Maddy and her parents met with **MSK orthopedic surgeon John Healey, MD**, who told her MSK was treating more of these tumors than any other center in the country. Maddy liked him immediately.

“He was so honest and straightforward with me,” she remembers. “He talked directly to me about amputation, not just my parents. He said, ‘This is a tough cancer. But we’re going to beat it.’” Maddy’s left leg was amputated below the knee.

After surgery, she had nine months of chemotherapy, which she says was a “rough ride.” Maddy was determined to finish high school on time and went straight on to college, where she graduated with a music degree. But even after she got the good news that she was cancer free, Maddy never lost touch with Dr. Healey’s office. She was glad to share her story with other young osteosarcoma patients whenever he asked. She even performed at a major event where he was honored.

For the next 10 years, Maddy lived the artist’s life in New York City. By 2020, her music career had slowed down as she moved up the corporate ladder with a hospitality group. But she lost her job during the COVID-19 pandemic. It was a difficult time. She learned



At 16, Maddy learned to walk again with a prosthetic leg after surgery at MSK for a rare bone cancer.



Maddy is now on a team testing new cancer treatments.

that MSK was hiring and called Dr. Healey’s office for guidance.

“I reached back out to these people who saved my life,” she says. MSK came through for her one more time.

A New Path Toward Hope for Patients

Maddy’s first job at MSK was as an office coordinator for **gynecologic surgeon Jennifer Mueller, MD, FACOG**, and her team in the **Department of Surgery**. There, Maddy found out she had the right stuff — empathy, sensitivity, and patience — that a job helping patients requires. She explains: “You’re basically the first person patients speak to.” She discovered she loved working in healthcare and

Dr. Healey holds the Stephen McDermott Chair in Surgery.

made the big decision to begin a new career chapter at MSK. “It was just time for me to grow,” she says. By August of 2023, she had completed her Master of Health Administration degree. “I started over in a new career in my early 30s,” says Maddy. “I was making up for lost time.”

Maddy’s career path then took her to the **Department of Research** at **MSK Nassau** on the administration side, which included consenting patients to trials. She has a keen understanding of the impact clinical trials have on the lives of all MSK patients, present and future.

“Research is the basis of what our standard-of-care treatments are now,” says Maddy.

Patients who choose to participate in a trial at MSK receive the most advanced cancer treatment available, sometimes years before it’s offered anywhere else.

“The reason I’m alive is because of the research that led to the treatments I had as a patient,” says Maddy gratefully.

Maddy is now overseeing a number of clinical trials for MSK’s **Department of Neurology** in Manhattan. In addition to her passion for research, Maddy generously shares another part of her cancer story with many MSK orthopedic patients.

“I’m also an amputee. Sometimes patients ask me about it,” says Maddy. “It often creates a kind of common ground, a level of respect.” She does it to offer hope. “It’s something that makes me feel good,” says Maddy. “I have a unique opportunity to be representative of what is possible for those patients.”

As for her first love, music, Maddy hasn’t abandoned it. She calls herself a weekend warrior and still sings with a wedding band. Maddy is hitting all the right notes, wherever she goes. •



THE BEST OF BOTH WORLDS

Sammy is back to playing varsity baseball after successfully being treated at MSK Kids for a rare cancer.

Today Sammy is a healthy 16-year-old boy — a top varsity athlete who plays three sports. But two years ago, his life was very different. Sammy was dealing with a neuroendocrine tumor, a rare and aggressive cancer, in the lower part of his colon.

Sammy's remarkable treatment and recovery are a result of the special kind of teamwork at MSK Kids — the pediatric department at Memorial Sloan Kettering Cancer Center (MSK).

“Regular children's hospitals have expertise in many areas, but it's not as deep as if you concentrate on one area, like cancer,” says **MSK Kids pediatric surgical oncologist Enrico Danzer, MD**, one of Sammy's doctors. “At MSK, we have surgeons who see adult patients and who have expertise in particular organs. We also have surgeons who specialize in pediatric surgery. When our teams work together, patients get the best of both worlds.”

So it was for Sammy. His unique case also required the knowledge of medical oncologists familiar with treating younger patients diagnosed with cancers that usually affect older adults.

“We always felt like the whole MSK team was taking care of Sammy,” says his mother, **Alyson**.

That kind of collaboration is why in 2023 the American College of Surgeons designated MSK the first-ever Level I Specialty Children's Center in Oncology.

At MSK, Experts Come Together To Provide the Best Care for Kids With Cancer

Everything about Sammy's cancer experience was out of the ordinary, beginning with his diagnosis. Since age 4, he had been coping with ulcerative colitis. In November 2021, during a routine colonoscopy, his gastroenterologist saw something suspicious and collected a few samples. Tests revealed a high-grade neuroendocrine carcinoma, a rare cancer usually diagnosed in people older than 50.

Sammy and his parents were referred to MSK Kids, where doctors determined that the cancer was aggressive but treatable.

The team decided that Sammy's first treatment should be chemotherapy to destroy as much of the tumor as

possible and reduce the risk that it would spread. They chose not to give radiation to avoid damaging the areas related to fertility. Even in those early days, they envisioned a future full of possibilities for Sammy.

The side effects of chemotherapy were rough. But throughout treatment, Sammy continued going to basketball practice, supporting his team from the bench on the days he didn't feel well enough to play. The drugs worked and destroyed 95% of his tumor, but there was a high risk it would come back.

Sammy's surgeons wanted to make sure that every tumor cell was removed, while at the same time protecting important nerves in the pelvic area. His history of ulcerative colitis made the surgery even more complicated. Dr. Danzer and **colorectal surgical oncologist J. Joshua Smith, MD, PhD**, collaborated closely every step of the way — from planning the surgery to teaming up during the procedure. They were able to do the operation through small incisions using minimally invasive techniques.

From Surgery Back to the Playing Field, Thanks to MSK Kids Expertise

Sammy was hospitalized for almost two weeks after his surgery. Between chemotherapy and recovery from surgery, he lost 30 pounds — mostly muscle. He was anxious to get back to feeling like himself again: Baseball season was starting.

“When I first went back, I was allowed to swing a bat and throw a ball, but I wasn't allowed to slide into bases yet, which kind of stunk,” Sammy remembers. “My energy wasn't all there, and I had to give my body time to adjust.”

In the fall, about four months after surgery, his doctors gave him the good news: His body had fully healed. It was perfect timing for varsity soccer tryouts, where he made goalie.

Sammy spent the winter building back his strength. In the spring, he made the varsity baseball team, where he played center field — an especially demanding position involving long throws and lots of running.



Sammy's expert care team included (from left) gastrointestinal oncologist Nitya Raj, MD; pediatric surgeon Enrico Danzer, MD; pediatric hematologist-oncologist Julia Glade Bender, MD; and colorectal surgeon J. Joshua Smith, MD, PhD.

Sammy continues to have regular follow-up visits at MSK. He is cancer free, and so far there is no evidence that the cancer will come back.

Beyond the relief that Sammy would be OK, Sammy and his parents also appreciated how his care team spoke to him directly, in spite of his young age, explaining everything in terms he could understand. “It's just another way that every member of the staff went above and beyond,” says **Larry**, Sammy's dad. “We are grateful for everyone who took care of Sammy.” •



Sammy is now cancer free — and grateful.

‘I NEVER IMAGINED IT COULD HAPPEN TO ME’

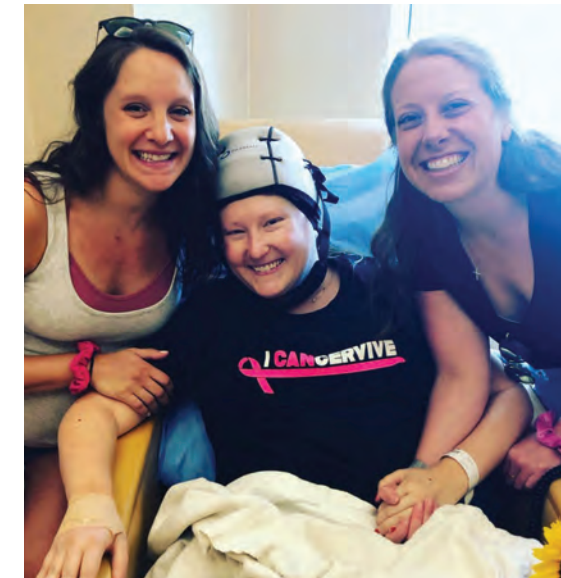
It's easy to see that nurse practitioner Jaclyn Stout has a true passion for nursing.

Jakki, as she's called, is a skilled and compassionate caregiver who's been at Memorial Sloan Kettering Cancer Center (MSK) for 10 years. She loves her work caring for surgery patients recovering from bladder, prostate, kidney, or testicular cancer. "As a bedside nurse and now as a nurse practitioner, I've had two of my dream jobs," says Jakki, who is FNP-BC, PCCN, and OCN certified.

But Jakki, 33, also brings something else to the job — hard-won wisdom. When she was just 28 years old, she was diagnosed with breast cancer and discovered firsthand what it's like to be in a cancer patient's shoes. She still remembers the day five years ago when she got the results of the biopsy. "It started this journey that has been the most interesting, rewarding, and challenging of my life. I never imagined it could happen to me."

The experience changed her perspective as a nurse, she says. "It shed a new light on what it was like to be a patient."

Jakki Stout, MSK nurse practitioner and former MSK breast cancer patient, has a heroic message of recovery and hope.



Jakki (center), in treatment, with MSK nurses Kara Freedman, CNS (left), and Kristin McCormack, RN (right), at her side

Recovery Starts With Support

From the start, Jakki says, MSK colleagues and friends were at her side. "I really, really relied on my nursing friends." She was diagnosed with stage 2B invasive breast cancer (estrogen receptor-positive, progesterone-positive, and HER2-positive). A young woman, she wanted to preserve her fertility. So MSK referred her to an outside specialist to freeze her eggs. Then came the treatment: chemotherapy, a mastectomy, and targeted immunotherapy. Her family was loving and supportive, but she says her fellow nurses carried her through in ways only they could, letting her express raw emotions and feel fatigue. They gave her a safe space that allowed her to just be a patient.

A big part of Jakki's work as a nurse practitioner is helping hospital patients who have had major cancer surgery meet all the milestones to go home safely, and as quickly as possible. "Recovery really happens at home for the patient," she says. What she knows now from personal experience is that the key factor to a good outcome for patients is good support at home.

"I was able to get through everything because I had such a strong support system with my family

and friends," she recalls. "You need people around you who are going to be there for you emotionally, physically, and mentally."

Before her patients are discharged, Jakki makes sure they plan for ways to navigate their post-op period at home — just like she did — from grocery shopping to walking the dog to making a cup of tea. "One of the fundamental things I learned during my own recovery from cancer is the importance of having people that care about you and love you, to help you get through the challenges of daily life."

Today, Jakki is cancer free with no evidence of disease and has no problem sharing her cancer story with patients — when she thinks it might help. But she never wants the focus to be on her. "I'm here to care for them," she says. "It's something I've gone through, but I've gone through it. I'm back in action, working, and taking care of others."

A Message of Hope for Millions

Jakki's unique insights as a patient are now benefiting her fellow nurses, who often reach out to her for guidance on how best to support their friends and loved ones recently diagnosed with cancer. "It makes me happy that at least if I had to go through that, I can be a resource to help other people," she says.

Jakki's inspiring message of hope, courage, and support has already reached millions of people. Her recovery from breast cancer, her joy in her work, and her warm friendships with fellow nurses inspired NBC News' *Today* show to celebrate her as part of its Heroes Week in 2023. The beautiful tribute ended with anchor **Al Roker** coming to MSK to surprise her with news that a special nurses' lounge at MSK will be designated in her honor.

For Jakki, whose todays are filled with happiness, health, and laughter, and who has met cancer on both front lines — as a nurse and a patient — her message to MSK patients and those who support them is clear: "There's always a light at the end of the tunnel. I was a patient, and I came back. And my life continued after cancer. I was able to be even better than I was before." •



The *Today* show's Al Roker honored Jakki with a special lounge for MSK nurses in her name.

STEWARDSHIP

We each take responsibility for strengthening MSK to better serve our global cancer community today and in the future.

This core value is taken to heart by everyone who works at MSK, to honor the tremendous generosity of the MSK Giving community. We carefully utilize our resources. We are grateful for the philanthropy that enables our scientists and caregivers to drive more innovation and save more lives, now and in the future.

MSK patient Alyssa Bingham and her friends Alexandra Ramirez and Kelyn Egbuka ran the 2023 TCS New York City Marathon with Fred's Team® to raise money for breast cancer research at MSK.



MSK GIVING

“We are the most capable force against cancer the world has ever seen, and the MSK Giving community is an essential part of our strength. We will continue to innovate in cancer care and research, find new cures, and make sure that everyone can access these breakthroughs. Together, there is nothing we can’t achieve.”

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

In 2023, the MSK Giving community raised a record-breaking \$1 billion — 100% of which will support our Memorial Sloan Kettering Cancer Center (MSK) mission of ending cancer for life. Every single member of the MSK Giving community was key to this historic success.

This was a milestone year for “The MSK Campaign: Leading Science. Changing Lives.” The MSK Campaign is a multi-year effort to make a farsighted difference across MSK’s three pillars: patient care, research, and education. Organized across six strategic initiatives, The MSK Campaign is an opportunity for our vibrant community to ensure that MSK will have the resources needed to create

new treatments and cures, turning a legacy of innovation into impact for people with cancer around the world.

Innovating cancer care at MSK and globally is one of the core priorities of The MSK Campaign. In 2023, MSK received the largest donation in its history, \$400 million from **Kenneth C. Griffin, Founder and Chief Executive Officer of Citadel and Founder of Griffin Catalyst**, and **David Geffen, Founder of The David Geffen Foundation**, to elevate standards of care for all people with cancer. The transformational gift was first announced on *Good Morning America*.

To learn more about how you can change lives with us, please visit giving.mskcc.org.

Philanthropy by the Numbers

In 2023, more than **415,000** individuals, families, foundations, and companies contributed **600,000** donations.

Raising a historic \$1 billion for cancer care, research, and education

Patient care and greatest needs
\$753 million

Research
\$244 million

Education
\$15 million



Monica Seetharaman, a clinical nurse at MSK Monmouth, is grateful to the MSK Giving community.



MSK

DONORS

**The MSK Giving Community in 2023:
Together, Advancing MSK's Mission**

More than **415,000** **DONORS** contributed to MSK.

142,000
DONORS gave to MSK for the first time.

55,000
DONORS increased their giving.

Donors live in **84** **COUNTRIES** + all **50** **STATES**.

22,000
PEOPLE RAISED MONEY
on MSK's behalf.

82,000
DONORS made two or
more donations.

240 **DONORS** told us that MSK was in their estate plans.

Randy, a brain tumor survivor, basks in a sunny day at the beach.

JOSHY'S JOURNEY



Josh and Vanessa are eager to give back after their son's successful treatment for kidney cancer at MSK Kids.

The MSK Giving community is a mighty force of hundreds of thousands of people united in a common purpose. Each has a story to tell about their reasons for giving.

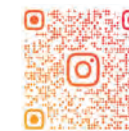
For Vanessa and Josh, it's their precious son, Joshie. He was just 5 months old when he was diagnosed with a pediatric kidney cancer.

Seeing such a rambunctious 4-year-old now, it's hard to imagine what his family endured. Joshie had multiple surgeries, followed by six rounds of radiation and 15 sessions of chemotherapy — all overseen by his compassionate **pediatric hematologist-oncologist Michael Ortiz, MD**. Thankfully, the treatment worked, and Joshie started pre-K last year. He loves swimming, playing in the park, and watching superhero cartoons.

Forever grateful for their son's care at **MSK Kids**, Vanessa and Josh saw an ad for **Cycle for Survival®** and immediately signed up to raise money for research on rare cancers.

In a moment filled with emotion, Vanessa shared their good news with their fellow riders. "We are happy to say in the care of Dr. Ortiz and his amazing team at MSK, Joshie is in remission!" she exclaimed amid tears and cheers.

This family is just one example of the legions of people who give generously to MSK, making a real difference in the lives of patients now and for generations to come. •



Scan this QR code to see Joshie's journey.



(Above) Vanessa and Josh are embraced by Cycle for Survival emcee Christian Litke.



(Left) Vanessa and Josh inspired their fellow riders by sharing the good news that their son is in remission.

MORE THAN A JOB

Even when they're off the clock, the people of MSK devote themselves to raising money for cancer research through events like Cycle for Survival®, MSK's biggest fundraising event of the year, focused on conquering rare cancers. These are just two of the people who epitomize the best of MSK through their stewardship.



Jennifer Brosnan is beloved for her leadership of MSK colleagues on the In It to Spin It team.

Bringing People Together

For Jennifer Brosnan, an Associate Director for Content Operations at MSK, joining the movement to beat rare cancers was initially a way to honor her aunt, who died of leukemia in October 2013. Jennifer was working as a producer at CNN when a friend invited her to hop on a stationary bike and join their Cycle for Survival® team.

Several years later, Jennifer landed a job at MSK and in a matter of months, she became captain of In It To Spin It, the MSK Marketing & Communication department's Cycle for Survival team.

"I just started bringing people together, and I've been doing that ever since," she says.

Jennifer has been part of Cycle for Survival for 12 seasons, securing her status as a Decade Rider, which is a milestone for participants who have been riding for at least 10 years. Along the way, she and her team have raised more than \$136,000 for rare cancer research, and 100% of every dollar has gone directly to the labs at MSK.

'A Direct Line of Impact'

Through her work at MSK, Jennifer makes regular visits to MSK labs and clinics for film shoots. She says that meeting researchers and seeing the results of her fundraising is one of the best parts of her job.

On a recent tour of the Integrated Genomics Operation, a collaborative core facility led by Neeman Mohibullah, PhD, Jennifer saw a large rectangular box that was flashing purple lights like a machine from the future. She discovered that it was a genome sequencing tool, called the NovaSeq X Plus, bought with support from Cycle for Survival. With the power of the NovaSeq X Plus, MSK scientists can perform a wide range of genome sequencing tasks at a larger scale and lower cost than with previous technologies.

"It's truly a direct line of impact," she says. "I feel lucky to be here."

Fueling Rare Cancer Breakthroughs

Lymphoma specialist Santosha Vardhana, MD, PhD, first heard about Cycle for Survival® as an early-career research fellow at MSK. When he discovered that people riding stationary bikes were supporting his work on T cell lymphoma, an extremely rare type of cancer that forms in the lymph system, he says he had to get involved.

Like Jennifer, Dr. Vardhana is a Decade Rider and passionate team captain. Every season, he rallies colleagues and labmates to join his squad, and they've raised more than \$228,000 for rare cancer research.

"MSK's T cell lymphoma program is one of the strongest of its kind in the world, thanks to the Cycle for Survival community," he says.

Over the years, Dr. Vardhana's research has been supported by numerous philanthropic funds, including the Equinox Innovation Initiative, named

in honor of Cycle for Survival's founding partner, the fitness company Equinox.

Dr. Vardhana is determined to understand why immunotherapy doesn't work for everyone. The idea that immune cells can be harnessed to attack tumors has revolutionized cancer care, but these novel treatments unfortunately still have a low success rate. In the Santosha Vardhana Lab, Dr. Vardhana's research team is using next-generation techniques to better understand the biological mechanisms that drive immune system regulation. Their mission is to make cancer treatments like immunotherapy effective for more patients.

It Takes a Village

In 2023, Dr. Vardhana found another reason to ride with Cycle for Survival after his mother, Raji, died

from a rare cancer. The definition of a caregiver, his mother taught him that no goal can be accomplished alone, and her commitment to helping others continues to inspire him to do more.

Now named Raji's Riders, Dr. Vardhana's team remembers her legacy by pedaling in honor of those caring for friends or family members with cancer. "I want to celebrate the people who make daily phone calls, go to appointments, sit in the chemo suite, and change their life plans — all for their loved ones," he says.

Since 2007, Cycle for Survival has directed more than \$375 million for rare cancer research at MSK. To learn more, visit cycleforsurvival.org.



The immunotherapy research of Santosha Vardhana, MD, PhD, has been supported by Cycle for Survival. Dr. Vardhana's reason to ride is also deeply personal — the memory of his mother, Raji, and to honor all the caregivers.

The SOCIETY of MEMORIAL SLOAN KETTERING CANCER CENTER

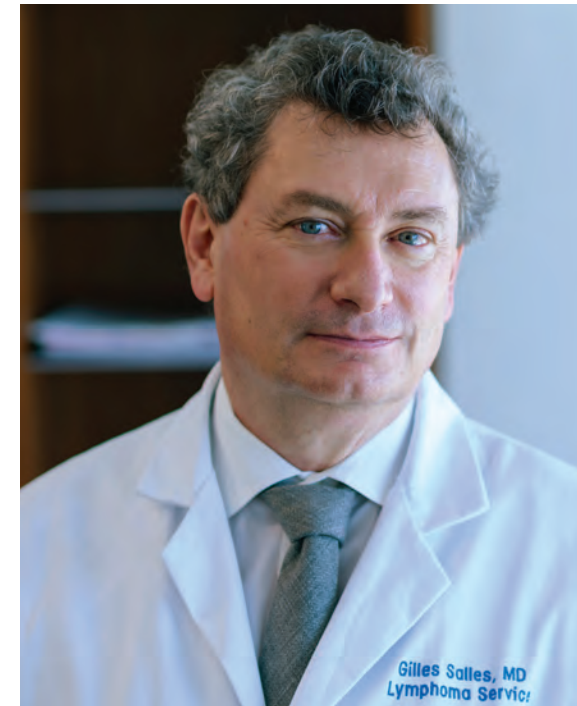
The Society of Memorial Sloan Kettering Cancer Center (MSK), an organization of dedicated volunteers, raised an extraordinary \$6.6 million in their 2022–2023 season, fueling innovations in cancer care, research, and education.

“The Society’s impact extends across MSK, supporting research and clinical efforts that improve both the physical and mental well-being of people with cancer,” says The Society President Muffie Potter Aston. “I am proud to lead and work alongside such a dedicated group of philanthropists, who are committed to progressing and upholding The Society’s extensive legacy of giving.”

The Society is making good progress toward its 2023–2024 fundraising campaign, with a \$1 million effort to support lymphoma research conducted by Gilles Salles, MD, PhD, Chief of MSK’s Lymphoma Service and Steven A. Greenberg Chair. In addition, The Society’s research grant program allocated \$1 million to MSK’s social services, assisting patients with essentials such as transportation and food. The group also



Muffie Potter Aston is President of The Society of MSK.



Gilles Salles, MD, PhD, received funding for his work studying lymphoma.

distributed stipends for childcare assistance and dedicated resources to enhance patient care, investing in art and music programs, virtual reality headsets, and technology charging stations.

The Society hosted seven events in its season, including its 16th annual Spring Ball, which raised over \$2 million, and the Associates Fall Party, which raised more than \$619,000. Nearly \$700,000 raised at the Spring Ball was allocated to MSK’s **Global Cancer Disparities Initiatives (GCDI)** to improve outcomes for people with cancer in low- and middle-income countries. GCDI’s work is coordinated through the **African Research Group for Oncology**, a partnership between MSK researchers and collaborators in Nigeria. Society funding also supported stem cell transplant research led by **pediatric hematologist-oncologist Andrew Harris**,



The Society supported the research into stem cell transplants by Andrew Harris, MD.

MD, and MSK’s **Pediatric Transplant and Cellular Therapy Service**. The Society actively participated in **Cycle for Survival®** in 2023, and its members look forward to sponsoring rides in New York City and Palm Beach, Florida, in 2024.

Through these efforts and more, The Society continues to fulfill a legacy of giving that it has upheld for more than 75 years.

“The Society of MSK is woven into the fabric of our institution, providing significant support and advocacy for people with a wide range of cancers,” says **Lisa DeAngelis, MD, MSK’s Chief Physician Executive and Scott M. and Lisa G. Stuart Chair**. “A vibrant, dynamic, and highly effective partner of MSK, The Society impacts countless people while helping to further our mission of ending cancer for life.” •

The Society raised an extraordinary

\$6.6

MILLION in the 2022–2023 season

MSK DONORS

Gifts of \$100,000 and Above

\$100,000,000+

David Geffen
Kenneth C. Griffin

\$25,000,000–\$99,999,999

Commonwealth Foundation
for Cancer Research
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Stavros Niarchos Foundation
The Druckenmiller Foundation

\$10,000,000–\$24,999,999

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Kay Van Norton Poche

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The Mark Foundation For Cancer
Research
The Ralph Lauren Corporate
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Troper Wojcicki Foundation
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Trust of Sunil T. Thomas
Trust of Thayer Talcott, Jr.

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As of December 31, 2023

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Statistical Profile

Memorial Sloan Kettering Cancer Center

	2019	2020	2021	2022	2023
PATIENT CARE					
Patient Admissions: Adults	24,175	21,517	23,060	23,123	24,519
Patient Admissions: Children	1,422	1,305	1,082	990	1,072
Total Admissions	25,597	22,822	24,142	24,113	25,591
Total Patient Days	173,702	160,922	171,356	170,076	177,198
Average Patient Stay (days)	6.8	7.1	7.1	7.18	7
Bed Occupancy Rate ⁽¹⁾	96.2%	85.9%	91.3%	88.17%	94.8%
Outpatient MD Visits: Manhattan	562,224	505,224	478,520	396,347	628,976
Outpatient MD Visits: Regional Network	276,849	276,700	254,208	289,653	373,284
Total Outpatient Visits	839,073	781,924	732,728	686,000	1,002,260
Screenings	45,263	45,549	51,185	56,023	61,264
Surgical Cases	27,379	23,967	26,764	26,504	28,646
New Radiation Oncology Patients					
Starting Treatment: Manhattan	5,538	4,173	4,607	4,573	4,725
New Radiation Oncology Patients					
Starting Treatment: Regional Network	6,616	6,666	7,460	7,803	8,365
Diagnostic and Interventional					
Radiology Procedures	631,174	591,450	659,966	684,225	738,363
Clinical Investigation Protocols ⁽²⁾	1,159	1,254	1,898	1,935	1,861

(1) Based on adjusted bed count

(2) Excludes studies closed to accrual

	2019	2020	2021	2022	2023
STAFF					
Sloan Kettering Institute Members	133	137	140	158	158
Hospital Attending Staff	1,358	1,417	1,457	1,508	1,493
Advanced Practice Providers	836	885	901	1,082	1,053
Registered Nurses	3,874	3,993	4,063	4,645	4,638
Administrative and Support Staff	14,333	14,774	14,937	14,468	13,754
Total Staff ⁽¹⁾	20,559	21,105	21,461	21,838	21,077
Volunteers	770	432	262	438	370
EDUCATION					
Residents and Clinical Fellows: Positions	475	460	568	592	593
Residents and Clinical Fellows: Annual Total	1,690	1,619	1,691	1,952	1,824
Research Fellows	346	277	184	183	207
Research Scholars	171	150	105	102	135
Research Associates	132	153	182	138	140
Graduate Research Assistants	39	28	34	34	41
PhD Candidates	277	282	300	317	312
MD-PhD Candidates	20	21	26	25	25
Registrants in CME Programs	7,921	6,582	6,507	7,685	7,615
Medical Observers	596	31	12	73	81
Medical Students	477	246	350	445	401
Nursing Students	595	507	475	570	610
Social Work Students	7	0	8	7	7
Radiation Oncology Technology Students	19	19	18	15	12
Physical Therapy Students	6	4	9	6	6
Occupational Therapy Students	2	3	4	4	3
Laboratory Medicine Students	12	20	20	19	26

(1) In 2023, 19 staff members held appointments in both the Sloan Kettering Institute and the Hospital.

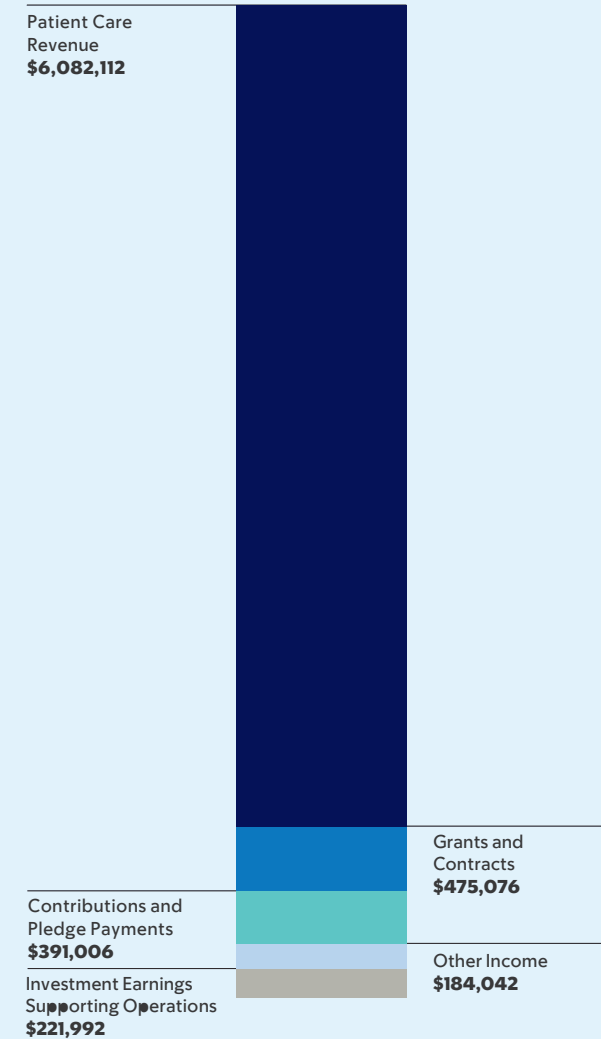
Financial Summary

Memorial Sloan Kettering Cancer Center

2023 TOTAL OPERATING REVENUES

(Dollars in Thousands)

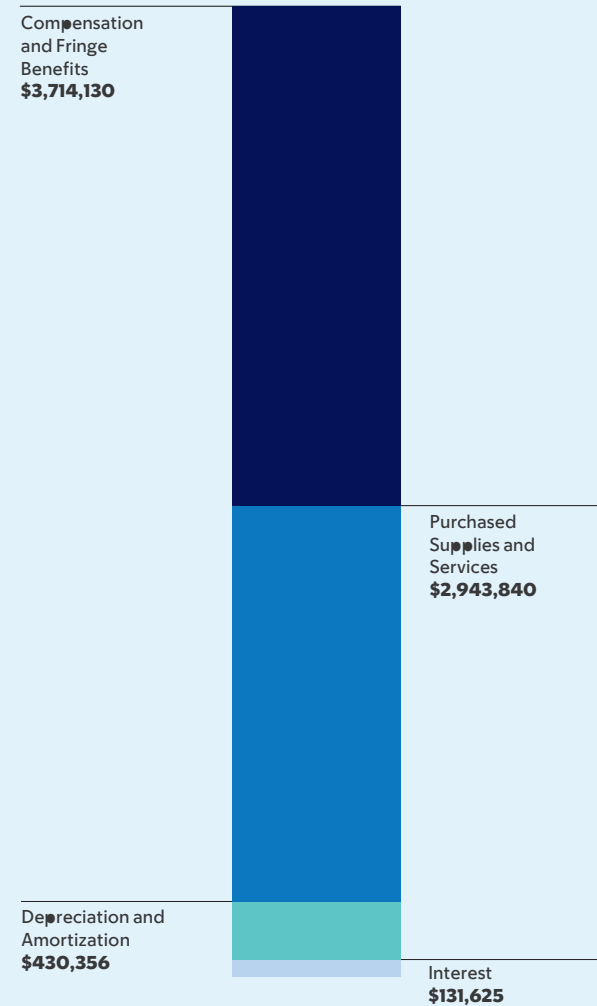
\$7,354,228



2023 TOTAL OPERATING EXPENSES

(Dollars in Thousands)

\$7,219,951



Combined Statements of Activities

Memorial Sloan Kettering Cancer Center

	2019	2020	2021	2022	2023
OPERATING REVENUES (Dollars in Thousands)					
Patient Care Revenue	\$ 4,560,174	\$ 4,261,296	\$ 5,011,551	\$ 5,393,762	\$ 6,082,112
Grants and Contracts	368,743	347,540	411,772	427,125	475,076
Contributions	172,525	175,641	162,290	183,434	201,427
Net Assets Released From Restrictions	96,000	105,975	198,462	202,595	189,579
Other Income	123,489	357,654	443,099	220,422	184,042
Investment Earnings Supporting Operations	162,445	159,090	171,191	203,106	221,992
Total Operating Revenues	5,483,376	5,407,196	6,398,365	6,630,444	7,354,228
OPERATING EXPENSES					
Compensation and Fringe Benefits	2,892,770	3,184,891	3,315,428	3,628,897	3,714,130
Purchased Supplies and Services	2,026,254	2,123,302	2,312,86	2,689,562	2,943,840
Depreciation and Amortization	329,774	412,493	422,309	437,224	430,356
Interest	40,099	103,682	112,663	122,813	131,625
Total Operating Expenses	5,288,897	5,824,368	6,163,263	6,878,496	7,219,951
Excess (deficit) of Revenue Over Expenses	194,479	(417,172)	235,102	(248,052)	134,277
Philanthropic Revenue	254,401	263,572	576,457	452,083	448,663
Capital Spending	628,148	264,706	218,168	547,591	407,777
BALANCE SHEET SUMMARY					
Assets	11,621,453	13,315,250	14,941,252	14,012,590	14,681,783
Liabilities	4,646,113	5,246,709	5,116,862	5,272,308	5,447,924
Net Assets	6,975,340	8,068,541	9,824,390	8,740,282	9,233,859

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