

SUMMER 2023

# MSKNews

MEMORIAL SLOAN KETTERING CANCER CENTER

## Why Your First Decisions Matter

Choosing MSK Got Kieran Treated and Back to His Life Quickly

**ALSO INSIDE**

Exposing a Cancer Cell's Weakness

Food as Medicine

AI vs. Cancer

Jillian's Journey: An MSK Love Story



Memorial Sloan Kettering Cancer Center



Dear MSK Community,

In cancer care, firsts make a difference:

- The first tests that diagnosis the disease.
- The first choices about where to be treated.
- The first decisions about how to treat it.

At Memorial Sloan Kettering Cancer Center (MSK), we are constantly improving how we help people with those important firsts — to offer them peace of mind early in their journey, when they are feeling overwhelmed, frightened, and unsure of the next steps.

In this issue of *MSK News*, we explore how MSK has developed new ways to deliver a diagnosis faster, so treatment can begin more quickly. We explain how MSK is transforming cancer treatment with an arsenal of tests to diagnose cancer right down to its molecular structure. Our test MSK-IMPACT® was the first of its kind to be authorized by the Food and Drug Administration, and it has unlocked the secrets of more than 100,000 cancer samples. It has revealed new targets for therapies that have helped our patients and people with cancer around the world. None of these advances would have been possible without a generous and visionary donation from **The Marie-Josée and Henry R. Kravis Foundation**, which established the **Center for Molecular Oncology** nearly a decade ago. This kind of swing-for-the-fences cancer science depends on philanthropy. And all of this discovery starts with basic research to understand the fundamental behavior of cells.

You will also read about our new world-class disease detective **Kojo Elenitoba-Johnson, MD**, who is leading our pathologists — the doctors who diagnose abnormal cells. Dr. Elenitoba-Johnson has helped transform pathology, from peering down a microscope to dissecting the origin of cancer at the level of genes and molecules.

This issue of *MSK News* also delves into how MSK is using molecular insights about cancer to help more people, including a look at fascinating new research that may explain why colorectal cancer takes a greater toll in the Black community. These findings reinforce the need to continue to increase diversity in research studies.

We will bring you up to date on how we have been using artificial intelligence to speed up the process of scientific discovery. And you will learn about a diet that may help prevent multiple myeloma.

Concluding this issue is the inspiring story of **Jillian Allegretti**, who went from being a patient with breast cancer to Employee of the Month at MSK Monmouth, working side by side with the same people who cared for her. It is a situation she never could have imagined five years ago when she was first diagnosed, and we are proud to introduce you to her.

We hope you enjoy reading about just some of the latest developments at MSK. It is encouraging evidence that we are making progress in our mission of ending cancer for life.



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

## MSKNews

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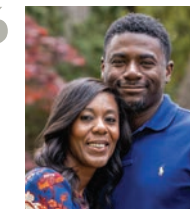


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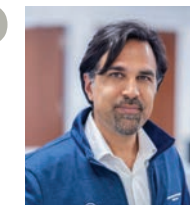
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### BACK COVER: IT'S PERSONAL



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Staff member Jillian Allegretti shares a love story, a viral video, and a special connection with the people of MSK Monmouth.



### What Are Cancer Vaccines? How Can They Prevent and Treat Cancer?

Scan the QR code with your smartphone's camera to listen to our podcast, *Cancer Straight Talk from MSK*, hosted by Dr. Diane Reidy-Lagunes.





# The Ride of His Life

How MSK's Rapid Diagnosis program sped up Kieran's cancer treatment

Kieran Healy saw an MSK expert within a week of calling for an appointment. He was quickly diagnosed with a type of lymphoma and joined a clinical trial that gave him access to a new drug. Now cancer free, Kieran is back to enjoying 40-mile bike rides.

**Kieran Healy was feeling worse by the day. A new father at 43 years old, he was bone-tired and losing weight. He had night sweats and a strange lump in his belly. His local hospital in Manhattan ordered an ultrasound and a CT (computed tomography) scan. But he would have to wait over a month.**

“It was clear that something was going wrong,” says Kieran, an avid cyclist and documentary film editor. “But I wasn’t getting answers as to what.”

When he finally got the scan, doctors suspected cancer — most likely lymphoma. They said the next steps would be a biopsy (tissue sample) and a different test called a PET (positron emission tomography) scan, but the appointments were delayed for another two weeks.

Not wanting to wait a moment longer, his wife, Emily, called Memorial Sloan Kettering Cancer Center (MSK) to arrange a second opinion. Things moved quickly, thanks to MSK’s new Rapid Diagnosis program, which expedited the process to get Kieran a cancer diagnosis and treatment by specialists within just 10 days of his first appointment at MSK.

Kieran says getting access to MSK’s world-renowned experts was easier than he and Emily expected, or could have hoped.

“The MSK team was like, ‘Something is wrong. We’re getting you in here,’ ” he says. “I felt so much better about being taken care of at MSK.”

## 10 Days That Changed Everything

Kieran met with interventional radiologist Stephen Solomon, MD, who ordered an imaging test that same afternoon. The next day, Dr. Solomon’s team performed a biopsy. Using precise MRI (magnetic

resonance imaging)-guided scans, they were able to extract a tumor sample from his upper torso near the armpit — a safer region than his abdomen.

The tumor was analyzed by MSK pathologists (doctors who use a microscope to make a diagnosis). They diagnosed Kieran with diffuse large B cell lymphoma — one of the more than 70 types of lymphoma. Then, the team

narrowed the diagnosis even further: to a rare and aggressive subtype called T cell rich.

Kieran met with medical oncologist Ariela Noy, MD, who told him the cancer had already damaged his liver and bone marrow. He was admitted to the hospital that day.

Thanks to the diagnostic testing he received at MSK, doctors knew quickly



Dr. Stephen Solomon leads the MSK Rapid Diagnosis program. His team performs biopsies and sends tissue samples to MSK pathologists — experts in diagnosing more than 400 types of cancer.



that Kieran qualified for an MSK-run clinical trial (research study). He started treatment with a chemotherapy called R-CHOP, combined with epcoritimab — a new type of drug to boost the body's own immune response against lymphoma cells.

"It felt like MSK's main goal was to get me better as fast as possible, and they found a way to do it more efficiently," says Kieran. "You could tell that they cared."

### Peace of Mind for People Worried They Have Cancer

The speed with which Kieran's cancer was diagnosed and treated reflects a coordinated effort to make sure that MSK is accessible to anyone with a suspected cancer. Previously, people needed a confirmed cancer diagnosis before being seen at MSK.

"If you have a scan with a suspicious spot, we can get you in right away to be evaluated," says Dr. Solomon. "The big advantage to coming to MSK first is that

we are set up to do biopsies quickly, with the most expert interventional radiologists and pathologists working together to deliver a fast and accurate diagnosis."

### 'I Can Get Back to the Way I Was'

Kieran, whose cancer had engulfed his liver and spread to other organs, is now in remission. After one year of therapy, he is no longer in treatment.

"We don't see any lymphoma," says Dr. Noy. "His overall health is great."

Kieran calls Dr. Noy "Super-Oncologist," because she's his superhero.

"These people are top in their field," says Kieran. "They really tried to help me understand everything that was going on. They didn't just say: 'This is what we do. Enjoy your chemo.' They explained the illness and the treatment, and they were very honest with me."

Kieran says those moments with his doctors and nurses kept him strong. "The confidence you have in your care helps make the fight better, knowing that you don't have to worry about whether or not your team is just going through the motions and the

### How Do Patients Get Access to the MSK Rapid Diagnosis Program?

Make an appointment at [msk.org/appointments](https://msk.org/appointments) or call 833-347-1665.

An MSK Patient Access representative will help you schedule an appointment with an interventional radiologist — usually within 2 to 4 business days.

Patients need to provide their medical records — typically their CT or PET scans.



"We don't see any lymphoma. His overall health is great."

— Ariela Noy, MD

Dr. Ariela Noy treats Hodgkin and non-Hodgkin lymphomas and certain forms of leukemia. Her patient Kieran calls her "Super-Oncologist."

### The Benefits of MSK Rapid Diagnosis

- MSK diagnoses and treats more than 400 different types of cancers. Our pathologists (doctors who use a microscope to make a diagnosis) are some of the world's leading experts in diagnosing both common and rare types.
- MSK has a unique molecular test called MSK-IMPACT®, which looks for mutations in more than 500 genes that could be driving the cancer. These results help pinpoint the right diagnosis and treatment plan.
- Being diagnosed at MSK means having access to clinical trials (research studies) for the latest therapies that may not be available elsewhere.
- Having the biopsy (tissue sample) done at MSK eliminates the time and effort required to track down specimens from other institutions.
- Reducing the number of appointments before seeing a cancer specialist is a relief for patients who are anxious to get treatment started as soon as possible.



Kieran is grateful to be able to keep up again with his energetic young son.

protocols," he says. "I felt they really cared about me."

Kieran will continue to be carefully monitored for recurrence, but now he is planning for the future. He is back on his bike again and took part in a 55-mile ride around the boroughs of New York City this spring to raise money for cancer research.

"I can get back to the way I was," says Kieran. "I'm able to exercise. I can

play with my son and really horse around with him. I'm almost back to feeling normal, mentally and physically."

Kieran talks about the future with enormous gratitude and exuberance for life. His new documentary tells the story of the popular R&B singer Gloria Gaynor, through the many twists and turns of her career. Her big hit could also be the theme song for Kieran's journey: "I Will Survive." •

**Dr. Solomon holds the Enid A. Haupt Chair in Clinical Investigation.**



# Exposing a Cancer Cell's Weakness

MSK tests with “impact”



It was a major milestone a decade in the making. Inside a bustling lab at Memorial Sloan Kettering Cancer Center (MSK) on an otherwise ordinary Thursday in February 2023, specially trained technicians performed a unique test for the 100,000th time. The test analyzed DNA from a patient's tumor sample. The extraordinary tool allowed doctors to diagnose the exact type of cancer it was with exquisite precision, just as it had done 99,999 times before.

Dr. Michael Berger is focused on developing new methods to characterize the genetic makeup of individual cancers.

The landmark sample came from an MSK patient in their late 40s with colorectal cancer. The tumor was analyzed with a cancer genetic test called MSK-IMPACT®, which examines tumor tissues to look for cancer-causing mutations (changes) in more than 500 genes. The goal: Target that mutation with a drug.

“The tumor had a total of 50 mutations detected by MSK-IMPACT, a number that’s about seven times higher than the typical colorectal cancer,” says cancer geneticist Michael Berger, PhD, Co-Director of the Marie-Josée and Henry R. Kravis Center for Molecular Oncology and Elizabeth and Felix Rohatyn Chair for Junior Faculty. “Three of those mutations can be targeted with existing drugs.” But even more hopeful, the test revealed that this patient’s own immune system could potentially be enlisted to fight the cancer cells.

## Treating Cancer Based on Its Genetic Mutations — Rather Than Its Location

Researchers have known for several decades that cancer cells contain gene mutations that cause them to grow out of control. Peering deep into the chaos of cancer cells, tumor DNA sequencing tests developed at MSK uncover all kinds of changes in their genes. Also known as molecular tests, they provide important clues to understanding what makes each individual tumor unique — and often reveal weaknesses that can be targeted with an expanding arsenal of treatments.

In 2017, MSK-IMPACT was the first test of its kind to be authorized for patients by the Food and Drug Administration (FDA). A related test also developed at MSK called MSK-ACCESS® was approved for clinical use in 2019. Known as a liquid biopsy, this test analyzes bits of DNA shed from tumor cells that can be found in a blood sample. It can help monitor whether a patient is responding to treatment.

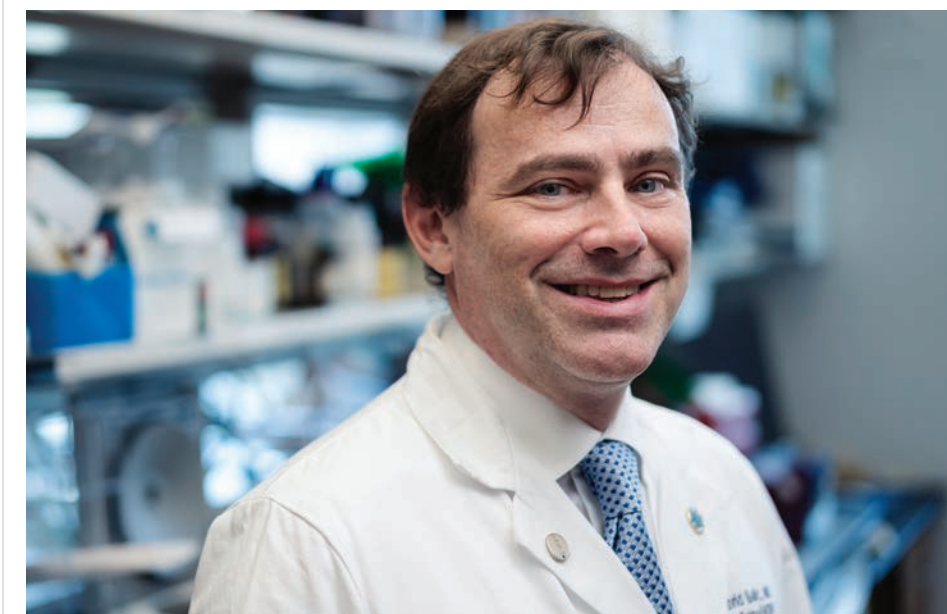
Together, the tests developed at MSK have helped revolutionize the way cancer is treated around the world. Therapies are no longer chosen based solely on where a tumor arises in the body. Instead, the tumor’s unique molecular characteristics guide treatment decisions.

“As more and more targeted therapies and immunotherapies become available, it becomes critical to be able to predict which patients are most likely to benefit from each treatment option,” says physician-scientist David Solit, MD, Geoffrey Beene Chair, who studies how patients respond to precision oncology therapies. “The results of tumor and liquid biopsy testing can also tell us which patients may be eligible for clinical trials,” he adds.

Dr. Solit is the Founding Director of the Center for Molecular Oncology, established in 2014 thanks to a generous gift from The Marie-Josée and Henry R. Kravis Foundation.

## Special Benefits for MSK Patients

MSK’s cancer DNA tests are offered to thousands of patients every year. The cost is covered by most insurance plans or through the generosity of philanthropic donations.



Dr. David Solit studies how genetic changes in tumors support growth, metastasis, and other aspects of cancer.

The tests developed at MSK have helped revolutionize the way cancer is treated around the world.



## Thanks to MSK Tests, Rick Avoided Surgery

When Richard “Rick” Miranda (right) was diagnosed with cancer for a second time, he was desperate to avoid another surgery. The recovery from his first operation, done at a different New York City hospital five years earlier, had been long and difficult.

This time, hoping for an effective drug treatment instead, Rick came to MSK. The MSK-IMPACT® test revealed his tumor, called a liposarcoma, was caused by a mutation in the gene *MDM2*. He got encouraging news from his doctors, sarcoma experts Samuel Singer, MD, and Mrinal Gounder, MD, who said he could participate in an early-stage clinical trial (research study) of a drug targeting that mutation.

“I was so grateful when I learned I could enroll in a clinical trial rather than have surgery,” Rick says.

More than a year later, the tumor has stopped growing. Rick, now 64, remains on the drug and is managing the side effects that have reduced his appetite and his energy. Now retired from his job as head of the Brooklyn Hispanic Chamber of Commerce, Rick is still an active member of the business community. He helps to run the *NYC Racial Justice Reporter*, a digital and print media outlet that promotes women- and minority-owned businesses in New York City.

“The nurses at MSK are the highest quality and very compassionate,” Rick says. “I’ve got the best doctors in the world. I feel so confident in my care.”



## MSK Test Reveals a Family’s Risk

Three generations of the Deutsch family are under the watchful eye of MSK experts, after Judah Deutsch (center) was treated for a benign brain tumor when he was 7.

MSK-IMPACT® testing revealed that he had a rare mutation in the *SDHD* gene. It did not cause his brain tumor, but it is linked to other tumors. Michael Walsh, MD, a pediatric oncologist and geneticist at MSK Kids, recommended testing to learn if others in the family were at risk. It turned out Judah’s father, his grandfather, and one of his brothers all had the mutated *SDHD* gene.

In the eight years since Judah was first treated, both he and his dad, Michael (right), developed benign growths in their neck arteries, called paragangliomas, which are related to *SDHD*. Caught early, Michael’s first tumor was surgically removed and a second one is being monitored. Judah’s paraganglioma was treated successfully with proton radiation therapy.

Many years ago, Judah’s grandfather Lenny (left) had been treated for a different tumor — a rare stomach cancer called GIST (gastrointestinal stromal tumor), which is also linked to the *SDHD* mutation. He is now being monitored for additional tumors linked to this gene.

“Our whole family sees Dr. Walsh,” Michael says. Everyone with the mutation is scanned regularly at MSK. And, happily, all are doing well.

“The Deutsch family’s story goes beyond using genetic testing for people with cancer,” Dr. Walsh says. “It illustrates our opportunity to improve the lives of families for generations. They’ll know to be screened so any tumors can be caught and managed early.”

Unlike tests used at most other hospitals, MSK’s tumor sequencing also includes a sample of a patient’s normal DNA. That’s how doctors can determine whether the cancer-causing mutation is present exclusively in the cancer cells or was inherited from a parent. This knowledge is vital for patients’ families, who may be completely unaware that an increased cancer risk lurks in their genes. In some cases, identifying an inherited cancer mutation also suggests which types of drugs may work.

There’s a mind-boggling amount of data about cancer mutations and potential drugs, so MSK researchers have pioneered another important tool for precision oncology: OncoKB®. OncoKB is a database that’s accessible nationwide to help doctors match the right drugs to their patients, based on their tumor DNA tests.

## Discovering New Cancer Drugs Based on Genetic Mutations

Molecular tumor tests don’t only identify the best treatments available for patients today. They also have changed the approach to researching the best therapies of tomorrow.

“It used to be that you’d organize a clinical trial to recruit patients who all had the same type of cancer,” Dr. Berger says. “But as we’ve gotten better at recognizing which drugs were likely to target which mutations in someone’s tumor, we discovered that people with many different kinds of cancer could benefit from the same drug because they all share mutations in the same gene.”

Unfortunately, MSK’s disease detectives haven’t solved all cases. In about 5% to 10% of patients, the underlying genetic cause of the cancer cannot be found. And in more than half of patients, even when the tests can detect the culpable mutations, no drugs are available yet to target them.

“The field of pharmacology has made huge progress developing effective therapies for certain mutations,” Dr. Solit says. “But there are still dozens of genes that contribute to cancer that do not yet have a drug available for clinical use. They are in development, but more work needs to be done.”

As thousands of tumors continue to be tested at MSK, there will be more milestones ahead, revealing even more ways to crack cancer’s code — and end it for life. •

## How MSK Diagnoses Cancer With Molecular Tests

A guide to knowing which test MSK patients will receive

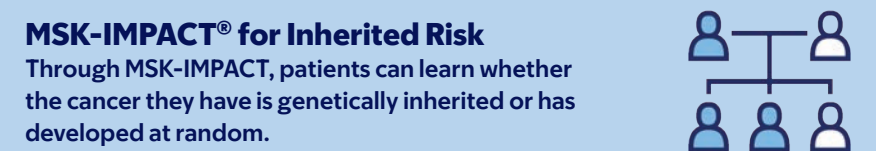
### MSK-IMPACT®

People with advanced solid tumors get MSK-IMPACT using a tissue biopsy. MSK-IMPACT is also for earlier-stage cancers — including lung, breast, and colorectal — that have an FDA-approved targeted therapy.



### MSK-IMPACT® Heme

People with blood cancers — especially acute myeloid leukemia — may get MSK-IMPACT Heme.



### MSK-IMPACT® for Inherited Risk

Through MSK-IMPACT, patients can learn whether the cancer they have is genetically inherited or has developed at random.



### MSK-ACCESS®

Patients in treatment — especially for lung cancer — may get MSK-ACCESS. This liquid biopsy test examines tumor DNA floating in the bloodstream and can detect recurrence and drug resistance.

### MSK Kids Testing

All patients at MSK Kids receive molecular testing. New whole genome tests in development identify the unique mutations (changes) driving pediatric cancers.



Philanthropy has supported precision diagnosis at MSK from its earliest days, making possible the development of **MSK-IMPACT®**, **MSK ACCESS®**, and **OncoKB®**. Donations paid for these tests before they were covered by insurance.

Major support includes **Cycle for Survival®**, the **Farmer Family Foundation**, **The Marie-Josée and Henry R. Kravis Foundation**, **Robert and Kate Niehaus**, and **Nonna’s Garden Foundation**.



# Food as Medicine

## Why one doctor thinks diet could help control cancer

When Urvi Shah, MD, was diagnosed with Hodgkin lymphoma in 2016 during her first year as a hematology-oncology fellow, she heard lots of recommendations from friends and family about what she should and shouldn't eat. She thought, as a doctor who was training to treat people with cancer, she should already know what diet was best. But as it turned out, she didn't.

**"I realized that we don't really get taught any of this in medical school," Dr. Shah says. "But as a patient, I realized it was a natural question. Patients really want to feel empowered to do something for their own health."**

That's when she started to read more about the topic of diet, almost as a side hobby. She learned it was common for oncologists to tell their patients to eat whatever they want. The idea seemed to be that cancer treatment is hard enough, so why not? Maybe that argument made sense in an era when chemotherapy, which can cause nausea and vomiting, was the mainstay of treatment. But these days, new therapies are better tolerated.

"Now what complicates treatment more often are the patients' other health issues, such as diabetes, obesity, cardiovascular disease, and kidney disease," she says.

Therefore, treatment plans should focus on lifestyle factors patients can control, like diet.

"Other specialties, like cardiology and endocrinology, already have well-established dietary guidelines to accompany treatment," Dr. Shah says. "So why were we so behind in oncology?"

She was determined to find out.

### Shifting Her Focus to Cancer Diets

When Dr. Shah started as a faculty member at Memorial Sloan Kettering Cancer Center (MSK), she initially planned to focus her research on immunotherapy. But her experience being a patient with cancer led her down a different path.

"I said to my Service Chief in 2019 that I would like to conduct a pilot study on diet and see how that goes," Dr. Shah says. "And then one study led to the next,

**"Patients really want to feel empowered to do something for their own health."**

—Urvi Shah, MD





and to the next. And soon, it became my full-time research focus.”

Dr. Shah now has four ongoing dietary interventional trials. She says they would not have been possible without the extensive research trial infrastructure and robust core facilities to study patient samples at MSK, as well as the scientific expertise and support of Marcel van den Brink, MD, PhD; Alexander Lesokhin, MD; Saad Usmani, MD; Neil Iyengar, MD; Jun Mao, MD, MSCE; and Sergio Giral, MD, among many others at MSK.

Partly because of her training, and partly because of her own bout with cancer, Dr. Shah is particularly interested in developing dietary guidelines for cancer, especially hematological malignancies, like leukemia, lymphoma, and multiple myeloma.

### Can Diet Prevent MGUS or Smoldering Myeloma From Progressing to Multiple Myeloma?

It was just a few years ago that Dr. Shah started her first study, a small clinical

trial (research study) of 20 people. Each participant had a precursor condition, which is considered a precancerous state that may or may not progress to full-blown cancer.

A cancer of plasma cells (a type of white blood cells) called multiple myeloma usually arises from precursor conditions called monoclonal gammopathy of undetermined significance (MGUS) and smoldering myeloma (meaning it has no symptoms).

Multiple myeloma is one of 13 cancers that is associated with obesity. Recent studies have shown that people with these precursor conditions who also have an elevated body mass index (BMI) are twice as likely as people with these conditions who have a normal BMI to progress to multiple myeloma.

That observation provided Dr. Shah with the rationale to conduct her study. “We wanted to enroll patients with an elevated BMI, help them lose weight with healthy plant-based foods, and see if that made any difference to the blood markers by which we measure their precursor conditions.”

So she partnered with a company called Plantable that provides nutritional coaching as well as chef-prepared, plant-based entrées mailed right to your door. While on the trial, participants could eat as much as they wanted, as long as it was whole plant-based foods such as fruits, vegetables, nuts, seeds, whole grains, and legumes. The idea was that because plant-based foods are higher in fiber, people would feel fuller faster and would end up consuming fewer calories overall, while still benefiting from the high-nutrient density of plant-based foods.

But would it work?

### One Patient’s Cancer Diagnosis and Dramatic Turnaround

Will Wright’s troubles began in 2010. He was on his way from Long Island, where he lives, to Rockefeller Center, where he had worked for more than a decade as a news manager for NBC Universal and MSNBC. That June morning, he stepped off the train, then began the three-flight walk up the steps to the street. When he reached the top, he fainted.



Will Wright before (left) and after (right) adopting a whole-food, plant-based diet.



Dr. Sham Mailankody specializes in treating blood disorders.

“That was pretty dramatic because I had experienced weakness before, but I had never gotten to the point where I actually collapsed,” Will says.

A series of tests revealed he had cancer — in two places.

“In the same week, I was diagnosed with having both prostate cancer and kidney cancer. Plus, I was anemic for some reason,” Will says. “It looked pretty bleak.”

Surgeons at MSK first removed part of his kidney and then his prostate. Still, the anemia didn’t go away.

That’s when he went to see MSK oncologist Sham Mailankody, MD, who specializes in blood disorders. In 2016, Dr. Mailankody diagnosed Will with MGUS.

“That was depressing because I had just gotten rid of two cancers and here I was staring down another one,” Will says.

But Dr. Mailankody had some encouraging news. As he explained to Will, MGUS is the kind of disorder that if the blood markers stay under control, you can die *with* it, not *from* it.

But how is it possible to keep MGUS under control?

As it happens, Dr. Shah was working on that very question. Will started seeing Dr. Shah in mid-2019, for monitoring of his MGUS. He was a Type 2 diabetic who was overweight and had been on insulin for 30 years. Dr. Shah thought that Will might be the perfect person

to participate in her first pilot study of a vegan diet — one of only 20 people.

“I can tell you right up front, being a child of the South and from a family who believed in Southern cooking with all its richness and cholesterol and fat, I didn’t think for a second that I would spend any serious time being vegan,” Will admits. But, he followed the rules religiously.

The results were dramatic. The trial itself lasted a year. One month in, Will no longer needed insulin. He was no longer diabetic. His vision improved. Even his hair seemed to grow faster.

Now, nearly two years since the start of the trial, he’s down 65 pounds and feels like a new man. To his great surprise, he even likes being vegan. “I have learned to cook phenomenal Thai food that my wife savors,” he says.

Most important, his MGUS markers, which had been rising steadily for the past six years, have plateaued — a possible indication that the progression of his MGUS has been halted.

### ‘I’m Into the Light’

Will’s case is far from the only success story from that first trial. On average,

patients lost about 8% of their body weight after 12 weeks of being in the study, Dr. Shah says. And many have experienced other benefits as well. A participant with depression was able to stop taking anti-depressants because their mental health improved while on the plant-based diet.

Those encouraging results led Dr. Shah to conduct additional, larger studies. The one she has open now is a large, multicenter study for 150 patients called NUTRIVENTION-3. In 2023, the American Society of Hematology bestowed upon her a prestigious ASH Scholar Award for her work on this study.

Does Dr. Shah practice what she preaches? “I do,” she says. “I follow what I tell patients. I do exactly this.”

Perhaps that’s why her patients trust and admire her so much.

“If I had another daughter, I would want her to be like Dr. Shah,” Will says. “It looked pretty dark back in 2010. Thanks to Dr. Shah, I’m into the light.” •

**On average, patients lost about 8% of their body weight after 12 weeks of being on the study.**



# New Leads in an Unsolved Mystery

Why colorectal cancer is more difficult to treat in Black people



After treatment for rectal cancer, Roxanne Joseph is back to enjoying an active life with her husband, Rory, and their two children.

At first, Roxanne Joseph thought she was just hitting the gym weights too hard. The Brooklyn police officer was in top physical condition at age 41 and felt great. But after noticing blood in her stool, she remembered her uncle's colorectal cancer diagnosis four years earlier. Her doctor referred her to a gastrointestinal specialist, who recommended a colonoscopy. When she awoke from the procedure, he gently confirmed her worst fears: She had the same disease.

"My whole world turned upside down," she says. "He was telling me I had a large tumor that would have to come out with surgery. I just lay there panicking and wondering, 'What's going to happen to me? Am I going to have to retire? My uncle had to wear a bag after his treatment. What is my life going to be like?'"

Roxanne consulted with the police force's medical division, which recommended that she go to Memorial Sloan Kettering Cancer Center (MSK). In April 2022, she met with MSK surgeon Philip Paty, MD, who explained that the location of the colorectal tumor she had was low, in the rectum. This can be challenging to treat — the pelvis is narrow and contains nerves related to bodily functions — but Roxanne says that Dr. Paty immediately put her at ease.

"He broke everything down for me and made me confident I was going to be OK," Roxanne recalls. Dr. Paty told her he was optimistic she wouldn't need an ostomy bag to collect her stool. "It was such a relief. I had tears coming out of my eyes."

Before the tumor could be removed safely, her doctors needed to shrink it with chemotherapy.

The side effects of this treatment can be rough, and they were hard on Roxanne. She underwent several rounds and suffered severe nausea, dizziness,



Roxanne (pictured with her shorkie, Leo) is very appreciative of her MSK doctors' skill, which minimized the effects of treatment. "I don't have to retire and go on disability. I get to be my normal self again. I'm just really grateful that I had the team that I had."



**“Dr. Yaeger and Dr. Paty were so compassionate, so warm, so caring. I couldn’t ask for two better doctors to be with me on this journey.”**

—Roxanne Joseph, MSK patient

and nerve pain. At one point, she wanted to quit, but medical oncologist Rona Yaeger, MD, encouraged her, calmly answering every question.

“Dr. Yaeger and Dr. Paty were so compassionate, so warm, so caring,” Roxanne says. “I couldn’t ask for two better doctors to be with me on this journey.”

In September, the tumor had shrunk enough for Dr. Paty to remove it. Nine months later, Roxanne is doing well, with no signs of cancer.

### The Molecular Changes That Make a Difference

Roxanne feels fortunate. She is beating the odds. Black patients are 40% more likely to die from colorectal cancer than other ethnic groups. Recent work at MSK has shown that even among patients with colorectal cancer who were treated at the same institution, those of African ancestry don’t live as long after diagnosis as those of European or East or South Asian ancestry.

MSK researchers are discovering that one reason for this disparity in out-

comes could be due to the differences in the molecular profiles of tumors between patients of different ancestries. Fewer patients with African ancestry have tumors that are likely to respond to newer treatments (like immunotherapy or targeted therapy).

In fact, patients of African ancestry whose tumors were sequenced at MSK were about 30% less likely to have the genomic changes that would make them good candidates for immunotherapy, according to research presented by computational biologist Henry Walch, MS, at the American Association for Cancer Research Annual Meeting in April 2023. (Genomic changes include mutations in the DNA of a cell. They are important because they can sometimes be targeted with drugs.)

There haven’t been as many targetable mutations identified in Black Americans because most genomic research has failed to include large populations of non-European ancestry. “The hope is that with more diverse populations in our research studies,



Henry Walch presented his findings on the genetic makeup of colorectal tumors at the annual meeting of the American Association for Cancer Research.

**“This study is part of a much broader effort to understand why patients of African ancestry with colorectal cancer have poor outcomes.”**

—Henry Walch, MS

we will find new targets that might benefit these patients,” says Walch.

There appears to be another important difference in the colorectal tumors in patients of African ancestry — one that could make it harder to predict a prognosis (outcome). In most patient groups, a mutation (change) in the APC gene indicates that the patient will have a better outcome compared with someone who does not have an APC mutation. Among patients of African ancestry, however, having an APC mutation in the tumor seemed to make no difference in outcome.

“This finding surprised us. For patients of other ancestries, we observed a very significant difference in overall survival based on the presence of APC mutations, which allows us to classify the prognosis of patients,” Walch says. “However, in patients of African ancestry, APC status was not associated with any differences in overall survival at all.”

“This study is part of a much broader effort to understand why patients of African ancestry with colorectal cancer have poor outcomes,” he says. “Our ultimate goal is to identify ways to intervene and save more lives in this

underserved community of patients.”

MSK has been trying to ease the burden of colorectal cancer for Black Americans in many ways — through patient information sessions, community health fairs, and other programs to drive home the message that colorectal cancer screening saves lives. The MSK Ralph Lauren Center offers Harlem and the surrounding community convenient access to screening for colorectal cancers, and MSK physicians have been part of NYC Department of Health outreach efforts that have increased colonoscopies by 64% over the past two decades.

### A Return to Normal

Today, Roxanne has almost fully recovered and is ready to enjoy life again with her husband, son, and daughter. She is preparing to return to work soon, as a community affairs officer.

“I’m Caribbean,” she says. “Getting to work in a Caribbean community, helping people participate in decisions to keep their neighborhoods safe — it’s my biggest joy.”



Roxanne enjoys her work as a community affairs officer for the NYPD in Brooklyn.

She is especially happy that Dr. Paty’s surgical expertise has enabled her to stay on the job she loves. Thanks to his skill, she did not need an ostomy bag.

“I don’t have to retire and go on disability. I get to be my normal self again,” she says. “I’m just really grateful that I had the team that I had. Because if I had gone somewhere else, I don’t think the outcome would have been the same.” •

**Dr. Paty holds the Talcott Chair for Clinical Excellence.**



MSK surgeon Dr. Philip Paty was able to remove the tumor Roxanne had despite its challenging location, without harming Roxanne’s ability to function normally.



# Fighting Cancer With Computers, Math, and ARTIFICIAL INTELLIGENCE

**It's not all beakers and test tubes — computers and algorithms are some of the most powerful tools in cancer research.**

The field of oncology hums with data. Imaging scans, laboratory tests, tumor mutations, medications and dosage — they're all captured in electronic record systems.

There's a clinical record of how a person was treated and how the cancer they had responded to the treatment, of what worked and for how long.

"The primary purpose of gathering all this information is to treat each patient properly and effectively," says Sohrab Shah, PhD, who heads the Computational Oncology Program at Memorial Sloan Kettering Cancer Center (MSK). "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."

Away from the clinic, too, across MSK's 100-plus research laboratories, sophisticated

computational methods are playing an increasingly vital part in answering fundamental questions about human biology and cancer biology. Here, scientists from "wet labs" (think white coats, petri dishes, and microscopes) team up with specialists from "dry labs" (think computer models and statistics) to decipher the troves of data generated by modern research technologies.

"Biology is really becoming an information science," says Dana Pe'er, PhD, 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.

"You can't just blindly swing the latest computational method at a problem, out of the box. It doesn't work," says

Dr. Pe'er, who is also a Howard Hughes Medical Institute Investigator, one of the highest recognitions in science. "You have to model the problem based on the right assumptions. And for that, biological expertise is indispensable."

## Teaching Machines To Recognize Cancer

One powerful tool for scientists and doctors is artificial intelligence (AI). The technology has been in the spotlight in recent months as AI chatbots and image generators have become popular, leading to renewed conversations about its role in medicine.

AI's most immediate application 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.

"Machine learning is very good at what you've taught it," Larry Norton, MD, Medical Director of MSK's Evelyn H. Lauder Breast Center, told *Good Morning America* during a segment on the increasing use of AI to help radiologists detect breast cancer. "But when machines see something they have no experience with, they're not very good at identifying it."

And while AI technology is getting better all the time, it is not yet considered the standard of 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."

What's critical, Dr. Pe'er says, is for experts to work together on each type of clinical task. "There are cases when the AI can perform much better than a pathologist alone, but this can only happen with the right training," she says.

## Enlisting AI in Cancer Research

Meanwhile, AI has had a quiet and notable role in bioscience research for years, decades even, Dr. Shah notes.

For example, Dr. Shah and MSK pathologist Jennifer Sauter, MD, were co-senior authors of a recent study that used AI to combine data from patients'



"Biology is really becoming an information science," says Dr. Dana Pe'er, Chair of the Computational and Systems Biology Program. At MSK, computation experts and cancer experts are working together to answer important questions in biology and oncology.

digital pathology slides and CT scans to better predict immunotherapy outcomes. Real-world data was used to teach the program to find patterns that could predict whether a given person's lung cancer would be likely to respond well to immunotherapy.

Immunotherapy, of course, has been revolutionary for many patients, especially those with lung cancer — but it doesn't work for a large number of people. So researchers continue to look for ways to predict who will be likely to benefit from immunotherapy, as well as for ways to make treatment work better for more people.

"Our method outperformed standard-of-care approaches considerably by combining different sources of data," Dr. Shah says. "And this type of expert-guided machine-learning approach holds a lot of promise for improving our ability to provide personalized care."

Meanwhile, Dr. Pe'er points to a collaboration with neuro-oncologist Adrienne Boire, MD, PhD, where compu-

tational methods helped figure out how cancer cells survive in the barren environment of the cerebrospinal fluid.

Using single-cell RNA sequencing — which requires high-octane math and statistics to sort through huge quantities of data about gene activity across tumor cells — the researchers were able to show that iron-hungry cancer cells reprogram themselves to gobble up all the nearby iron.

The discovery suggested a new treatment approach, and the findings formed the basis for a phase 1 clinical trial that launched in 2022.

"Oftentimes, there are so many factors and data points that come into play in biology, it's well beyond our human ability to perceive meaningful patterns," Dr. Pe'er says. "Still, it takes both computational and biological expertise to frame the questions in the right way for a computer to find sensible and actionable patterns. And as computational cancer researchers, that's our craft." •

Computational research at MSK is generously supported by the MSK Giving community, including Cycle for Survival®, Jackie and Richard Emmet, Israel Englander, Alan and Sandra Gerry, the Parker Institute for Cancer Immunotherapy, and The Warren Alpert Foundation.

Dr. Boire holds the Geoffrey Beene Junior Faculty Chair. Dr. Norton holds the Norna S. Sarofim Chair in Clinical Oncology. Dr. Pe'er holds the Alan and Sandra Gerry Endowed Chair. Dr. Shah holds the Nicholls-Biondi Chair.



Dr. Sohrab Shah, Chief of Computational Oncology at MSK, is helping to improve cancer treatment by harnessing the power of data routinely generated by patient care.



# Chief Disease Detective

How Kojo Elenitoba-Johnson helps lead the diagnosis of cancer at MSK

Dr. Kojo Elenitoba-Johnson recently joined MSK as the inaugural Chair of the MSK Department of Pathology and Laboratory Medicine and is a member in the Human Oncology and Pathogenesis Program. He leads teams of MSK experts in interpreting lab tests and diagnosing disease.

## The connection might not be clear at first glance between tennis, Ping-Pong, and pathology.

But Kojo Elenitoba-Johnson, MD, a pathologist at Memorial Sloan Kettering Cancer Center (MSK), says, “The principles of the racket sports I like to play are very instructive.”

He continues: “If you want to hit the ball in the sweet spot, you better be in the right position. And to do that requires hard work and preparation.”

Dr. Elenitoba-Johnson says he looks for lessons he can apply to medicine from all aspects of life, whether he’s reading history or enjoying jazz. And his illustrious career has proven to be a case study in hard work and discovering insights that have pushed the frontiers of pathology.

### How Does That Work?

As a child growing up in Lagos, Nigeria, Dr. Elenitoba-Johnson was “always curious about how things work,” he says. “I loved science and math because of how well they explain the whole universe.”

During his high school years, he says, “I grew to understand that the highest manifestation of this, in my opinion, is biology — particularly human biology.”

His desire to understand how the human body works led him to medical school at home in Nigeria. There, Dr. Elenitoba-Johnson recalls, “The instruction was excellent, and I had several influential professors.” He discovered a new focus for his fascination with how

things work — diagnosing disease and the science of pathology.

“In my second year,” he says, “I was compelled by the idea that medicine is divided into two areas. The first is coming up with an accurate diagnosis of what actually is going on. The second is intervening to try to help.”

He explains, “I found this first area particularly intriguing because without the right diagnosis, you are left with speculation, hand-wringing, and poor care — particularly with cancer, which is an area where I hoped to contribute to research.”

After graduating, he came to the U.S. as a pathology resident at Brown University. “At that time, we were experiencing a global revolution in pathology, centered on the immune system as well as the birth of molecular pathology. For the first time, we were able to use molecular techniques to better understand what kind of cells tumors arose from with great specificity.”

He continues: “At the same time, the idea that cancer was a genetic disorder was becoming mature. More and more mutations were being identified, and their roles were beginning to be recognized. We had new tools and insights that went beyond microscopic evaluation of tumors, which is what pathologists did traditionally.”

Dr. Elenitoba-Johnson felt these new insights were most optimally integrated in the field of hematopathology, which studies blood disorders. Throughout his career, lymphoma has been an area of particular expertise.

### One of the First Experts in His Field

Dr. Elenitoba-Johnson was exhilarated by these new windows into cancer. In fact, during his training, the specialty of molecular pathology was so young that he was one of the first people to be credentialed in the field by the American Board of Pathology.

As his career progressed, he made major contributions to pathology while holding leadership positions at premier institutions of biomedical research, including the University of Utah, the University of Michigan, and the University of Pennsylvania.

He calls the opportunity to help lead pathology efforts at MSK the “privilege of a lifetime.”

“What is particularly appealing at MSK,” he explains, “is that MSK is the world leader in so many areas, especially in the clinical aspect of pathology. And it is the top destination for the most sophisticated training.”

For people facing cancer, Dr. Elenitoba-Johnson says that means he will continue MSK’s “enduring tradition of leading practice in my field in a way that impacts patient care.”

### A Shared Commitment

Dr. Elenitoba-Johnson’s commitment to advancing the diagnosis of cancer is shared by his wife and fellow molecular hematopathologist, Megan So-Young Lim, MD, PhD. The two met when they were fellows at the prestigious National Institutes of Health (NIH), and their careers have been entwined ever since.

Dr. Lim is an accomplished physician-scientist and investigator whose independent research program is supported with funding from the NIH. Drs. Lim and Elenitoba-Johnson were co-recruited to MSK. Given that they both conduct research on lymphoma, they are able to leverage synergies in expertise and creativity.

“She’s an exceptional pathologist and scientist,” Dr. Elenitoba-Johnson says. “We have complementary ways of solving problems, which adds to the quality of the work we’re able to deliver together.”

Dr. Elenitoba-Johnson says they also make a good duo in the kitchen. “I like to discover cultures through food — in truth, I really like to eat,” he says with a laugh. “She’s of Korean descent and



Dr. Elenitoba-Johnson and his wife, Dr. Megan So-Young Lim, in Costa Rica

I’m from Nigeria. Over time, we’ve learned to blend the two cuisines. We tell people, ‘You’ll have to go far to try another Korean-Nigerian meal.’”

Among those who have enjoyed their creations is MSK President and CEO Selwyn M. Vickers, MD, FACS, who says Dr. Elenitoba-Johnson is an excellent cook. “Dr. Vickers came to our apartment for dinner and took the risk,” says Dr. Elenitoba-Johnson humbly.

Making unexpected connections between disparate things is just one of the reasons that Dr. Elenitoba-Johnson describes himself as a perpetual learner. He views curiosity as a lifelong pursuit — much like racket sports — and says he is tailor-made for the study of pathology.

“It turns out, the more we know, the more there is to discover. It’s endlessly fascinating.” •

The Warren Alpert Foundation and the Farmer Family Foundation have generously supported the Department of Pathology and Laboratory Medicine at MSK.

Dr. Elenitoba-Johnson and the Human Oncology and Pathogenesis Program have received additional support from Cycle for Survival® and other MSK donors.

Dr. Elenitoba-Johnson holds the James Ewing Alumni Chair in Pathology.



# It's Personal

... for Jillian Allegretti,  
of MSK Monmouth



**There's something patients don't know about Jillian Allegretti as she helps them manage their appointments at MSK Monmouth, one of several Memorial Sloan Kettering Cancer Center (MSK) regional locations. Behind her warm smile and calm professionalism lies a shared experience and a touching love story.**

Five years ago, she was on the other side of the desk, undergoing treatment for stage 2 breast cancer at age 25. Knowing it could be a tough road, she told her boyfriend Max he didn't need to stick around. But instead, he doubled down for Jillian. As she grew weak and lost her hair, every day he reassured her she was strong and as beautiful as she had always been.

And on the last day of chemotherapy, Max walked into Jillian's infusion suite, dropped to one knee, and asked her to marry him.

"What?! Yes!" she exclaimed, as their loved ones who were packed into the tiny room burst into applause and tears. The overwhelming moment was captured on a video that soared across the internet.

"It was a great day all around because I finished chemo," Jillian remembers. "But

then, to have the man that I love propose made it even more special."

That was five years ago. Now married and cancer free, Jillian is an outpatient care coordinator at MSK Monmouth, working for the very person who used to check her in for treatment.

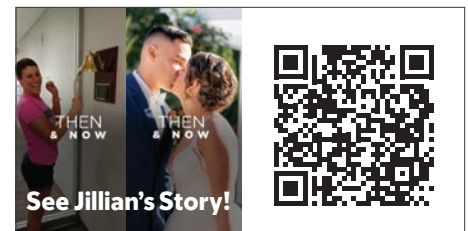
"Having cancer and seeing everything that goes into making a hospital thrive, I wanted to be a part of it," she says. "When you are diagnosed, you feel like you are losing all control of everything. Your body is betraying you. You have no idea what to expect. My job is to comfort patients: 'Let's take control of your schedule. This is what to expect. This is how many hours you are going to be here.'"

Jillian says working with the people who saved her life is "amazing and strange at the same time."

After thoughtful consideration, Jillian has decided not to tell patients that she's been one, too. If a patient is enduring a chemotherapy regime similar to hers, she will reassure them, but without revealing her own history.

"Everybody's experience is different with cancer," she says. "And I never wanted to be the person that was like, 'You'll be fine.' I want people to feel all the things that they're feeling and know it's OK to not be OK. Having cancer is miserable. It's scary, and it's hard."

Now, in an uplifting turn of events she never could have imagined five years ago, Jillian was recently awarded Employee of the Month. It's a humbling honor for what she says is the "calling of her life." •



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