IT STARTS WITH
ONE
What starts as one idea, one interaction, one moment, can change the landscape of cancer care.

These moments happen across Memorial Sloan Kettering every day.
It is a privilege to benefit patients' lives through our scientific discoveries," molecular geneticist Britta Weigelt says. Learn more about her work with the Gynecology Service on page 28.
Message from the CHAIRMAN
SCOTT M. STUART
Chair, Boards of Overseers and Managers

and the PRESIDENT
CRAIG B. THOMPSON
President and Chief Executive Officer

Memorial Sloan Kettering made remarkable advancements in our understanding and treatment of cancer in 2019.

Accelerating progress — like cancer itself — poses unique challenges that call for the highest level of expertise, compassion, and commitment. This was never clearer than when this report went to press, as our community grappled with the unprecedented and evolving COVID-19 pandemic. Because of the tireless efforts and dedication of our staff members, our mission to provide the best cancer care to every person we treat has remained steadfast. Our community continues to be prepared, responsive, and optimistic about our capabilities in the midst of this ever-changing situation. As always, the health and safety of our patients and staff is our top priority.

In this report, we reflect on a year of positive momentum for MSK, as we undertook a number of transitions designed to position MSK to lead the future of cancer care.

In key leadership roles, new perspectives were strategically integrated with MSK’s legacy of excellence. After a nationwide search, Lisa DeAngelis was named Physician-in-Chief and Chief Medical Officer, the latest role in her impactful three-decade career at MSK. (Learn more about Dr. DeAngelis on page 9.)

In addition, Michael Harrington joined MSK in June as Executive Vice President and Chief Financial Officer, bringing with him a wealth of experience from his dozen years at the Cleveland Clinic. We also welcomed Ronanne Taylor as Senior Vice President and Chief Marketing & Communications Officer. A highly accomplished and recognized marketing professional with more than three decades of experience, she will shape and lead an integrated marketing and communications strategy that will help grow and differentiate MSK’s brand presence worldwide.

MSK also appointed Claus Jensen as the inaugural Chief Digital and Technology Officer. His leadership is a critical piece of MSK’s plan to increase our ability to leverage digital technology. By applying such technologies as artificial intelligence and machine learning, as well as other computational methods, to the enormous amount of data produced by MSK’s research scientists and clinical investigators, we are working to develop new ways to improve the care of people with cancer.

Helping More People
In 2019, we marked a milestone in MSK’s efforts to provide patient-centered cancer care. At the end of the year, we celebrated the completion of the David H. Koch Center for Cancer Care at Memorial Sloan Kettering Cancer Center, on Manhattan’s Upper East Side. This 800,000-square-foot facility represents the future of outpatient cancer care, including first-of-their-kind facilities for MRI-guided radiation therapy and immuno-oncology, as well as state-of-the-art facilities for interventional radiology and precision medicine. The opening of MSK Nassau in Uniondale, on Long Island, provides an updated facility for MSK’s patients in Nassau County and eastern Queens. (Take a look inside these facilities on page 40.) The MSK Ralph Lauren Center joined our outpatient system, providing cancer services to underserved people in East Harlem. Finally, the opening of the New York Proton Center provides the first center in New York where MSK patients have access to this powerful treatment. These new facilities will save lives for decades to come.

The year also saw important advances across our research enterprise. One testament to the preeminence of the work conducted at MSK is that 54 faculty members were ranked among the most highly cited researchers in science by the Institute for Scientific Information. They represent the largest collection of such biomedical leaders at any freestanding cancer center in the world, and their expertise spans all disciplines of cancer.

Among the many highlights in 2019 were the work of Sloan Kettering Institute immunologist Andrea Schietinger and her team on how tumors...
can reduce the activity of T cells, one of the immune system’s most powerful cancer killers; important insights into the metabolism of cancer cells by SKI chemical biologist Yael David and cancer biologist Hans-Guido Wendel; and the work of SKI developmental biologist Luis Parada and colleagues, who identified a compound that kills glioblastoma cells by starving them, offering a path for new research into one of the most difficult cancers to treat.

MSK also bolstered its leading role in immunotherapy by establishing the Center for Experimental Immunoncology under the direction of SKI’s Michael Glickman. The center will link together the full spectrum of researchers pursuing aspects of this form of treatment, a continuum that brings insights from the lab to patients more quickly.

Last year also saw MSK leading the way in offering hope to people with metastatic cancer. Medical oncologist Eileen O’Reilly led a clinical trial that resulted in the US Food and Drug Administration’s approval of the PARP inhibitor olaparib (Lynparza®), a type of targeted therapy for the treatment of people with metastatic pancreatic cancer who have a BRCA mutation. In the field of metastatic breast cancer, medical oncologist Shami Modi helped lead a clinical trial of the drug deruxtecan (Enhertu®), leading to patient experience ratings in the 95th percentile or higher for inpatient care at Memorial Hospital and for ambulatory care at both the Josie Robertson Surgery Center and MSK Monmouth.

More than a dozen of our faculty members received prestigious awards. From our unsurpassed nursing staff, Kevin Browne and Bevin Cohen were honored by the New York Academy of Medicine, and Nancy Houllahan was elected president of the Oncology Nursing Society, which also recognized Janine Kennedy for her excellence in cancer nursing management. Also of note, Maria Jasin was awarded the Shaw Prize in Life Science and Medicine; Scott Lowe was elected to the National Academy of Medicine; Valerie Rusch became her term as president of the American College of Surgeons and received the college’s highest honor, the Distinguished Service Award; Michel Sadelain received the International Prize from France’s Inserm; Charles Sawyers was awarded the inaugural Stat Biomedical Innovation Award; and Adrienne Boire, Yael David, and Alex Kentsis each received a Pershing Square Sohn Cancer Research Alliance Prize for Young Investigators.

As always, MSK’s mission to provide hope and improve outcomes continues to be sustained by generous philanthropic support. We are deeply grateful to foundations and corporations as well as the thousands of individuals and families who support MSK every year, including those who participate in Cycle for Survival, Kids Walk for MSK Kids, and Fred’s Team, raising tens of millions of dollars for cancer research.

We believe that the steps taken across MSK in 2019 will help us continue to be at the very forefront of cancer research, prevention, and treatment.

All of MSK looks forward to what’s ahead during Scott’s tenure as Chair of the Boards of Overseers and Managers, which began at the start of 2019. With your continued support, we look forward to helping many more people live healthier, happier lives.

When Lisa DeAngelis was named Physician-in-Chief and Chief Medical Officer in September 2019, she assumed new responsibilities at an institution she knows well. During more than 20 years at MSK, she has chaired the Department of Neurology, co-founded the Brain Tumor Center, cared for hundreds of people with brain cancer, and conducted vital clinical research, including work that helped develop the current regimen to treat primary central nervous system lymphoma.

Now she oversees the treatment delivered by more than 1,200 MSK doctors and 4,000 registered nurses who care for people at more than 20 facilities across New York and New Jersey. She also directs MSK’s robust clinical research programs and oversees the more than 85 fellowship and residency training programs offered throughout the institution.

“Lisa is an internationally renowned physician and a fierce advocate for both patients and faculty,” says Craig B. Thompson, MSK President and CEO. “Her expertise and unique understanding of MSK’s mission made her the ideal person to lead our clinical enterprise into the future.”

Alongside her leadership role, Dr. DeAngelis continues to treat patients, some of whom she has seen for decades. “For me, it’s essential to remain connected to patients and families, and to remember why we’re here,” she says.

Dr. DeAngelis is equally committed to MSK’s role in advancing the future of cancer care, from research on the most basic questions of cancer biology investigated at the Sloan Kettering Institute to the latest treatments for patients, including immuno-oncology and precision medicine. “I think SKI and the hospital have never been as well integrated as we are now,” she says. “There is an enormous engine of collaboration between us that helps us understand and identify cancer’s vulnerabilities.”

For Dr. DeAngelis, MSK will meet the opportunities and challenges of the future thanks to the dedication of the people who call MSK home. “Our exceptional team of doctors, nurses, researchers, and staff is dedicated to providing the best, most advanced, and compassionate care to our patients,” says Dr. DeAngelis. “It is an honor to lead and work alongside them.”
Now a high school freshman, Joey (here with his pup, Mia) was cared for by a team of experts at MSK Kids who designed a unique treatment plan when other options didn’t work.

“I It’s made me a better person,” says 17-year-old Joey. “I want to help others like me.”

At 13, Joey developed an adrenal cortical carcinoma, a cancer that usually strikes adults. It started in his abdomen and spread to his lungs. His parents sought help at two hospitals in two states but did not get the answers they were looking for: Both hospitals refused to operate because they deemed the surgery too risky.

After a call to Memorial Sloan Kettering in 2018, the family finally got the help they had been desperately seeking. Pediatric surgeon Michael La Quaglia agreed to do the surgery. He was able to remove the abdominal tumor as well as a tumor in Joey’s right lung.

The surgery was a critical first step, but Joey’s disease continued to progress. He moved on to chemotherapy. Even after six rounds, the cancer proved relentless. “The tumors never really got any smaller,” Dr. Dela Cruz recalls. “They slowly got bigger.”

Joey’s tumor type was rare in children — so rare that his care team wanted to find out exactly how it had developed and if other treatments might put him into remission. It was a case for an in-house team of disease detectives at MSK known as the Pediatric Translational Medicine Program (PTMP). Its members, who come from both medical and research teams, banded together to get to the bottom of Joey’s illness.

This kind of collaboration is the hallmark of the PTMP: Pooling resources and knowledge to treat the rarest of cancers. Joey’s case is a testament to the power of this approach.

“Now a high school freshman, Joey (here with his pup, Mia) was cared for by a team of experts at MSK Kids who designed a unique treatment plan when other options didn’t work.”
Hints of Hope
Step one for the PTMP in gathering clues is genetic testing of a child’s tumor using MSK-IMPACT™. This advanced diagnostic tool looks at the 468 genes most commonly mutated in cancers. The results give MSK care teams insight as to whether such traditional treatments as surgery, chemotherapy, or radiation will be enough to wipe out the disease or if a novel therapy is a better approach.

Joey’s MSK-IMPACT results didn’t offer many hints. So the investigators in the PTMP tried whole-genome sequencing for additional insight. In this technique, all of the genetic material in the cancer is looked at comprehensively. While MSK-IMPACT is usually covered by insurance, whole-genome sequencing at MSK Kids has been made possible through philanthropic and research support.

Joey’s whole-genome sequencing held the key to what his doctors thought could be a breakthrough. The test showed that the many mutations in the tumor made him a candidate for a promising type of immunotherapy called checkpoint inhibitors. These drugs rev up the body’s immune system, allowing it to better target and attack the cancer cells.

“Tumors with extremely high numbers of mutations, like Joey’s, have been shown to respond to checkpoint inhibitors,” Dr. Dela Cruz adds.

A New Approach
In January 2019, Joey started on a checkpoint inhibitor called pembrolizumab (Keytruda®). Unfortunately, the medicine didn’t work quite as well as they had hoped.

“Faced with slowly progressive disease and the belief — and hope — that his tumor should respond to checkpoint inhibitor therapy, we suggested giving Joey a combination of immunotherapies,” says Dr. Dela Cruz. The team had only anecdotal evidence it would work. But Joey and his family jumped at the opportunity.

“I wasn’t nervous at all,” Joey says. As he reflects back on that decision, he blows up a latex glove, filling it like a balloon.

“I wanted to do whatever it took for me to feel better,” he adds.

After Joey completed two rounds of a combination of two immunotherapy medicines, the cancer had all but disappeared. “When I opened the scans, I thought I had the wrong patient file,” Dr. Dela Cruz recalls. “There was a dramatic response. It was hard to believe.”

“Discovery Mode”
Joey’s experience is helping more members of the PTMP make other important advances for MSK’s youngest patients.

“We’re in discovery mode every time we look at changes in these genes,” says geneticist and pediatric oncologist Michael Walsh, another member of the PTMP. He not only treats children with cancer and those who have a predisposition to cancer but he also studies mutations that may cause the disease. “When we take a deep dive and look more broadly, we can discover new things,” Dr. Walsh remarks.

Computational biologist Elli Papaemmanuil leads the bioinformatic component for the PTMP. Her team combines math, computer science, and genetics to analyze large amounts of data in order to characterize the makeup of a patient’s cancer. The findings provide clues into a patient’s diagnosis and the likely risk of the patient having inherited any cancer-causing mutations from a family member, as well as inform potential treatment options. Her team’s work was especially helpful in determining Joey’s care plan.

“Our preliminary data have opened our eyes to the diversity and complexity of pediatric cancers and how important it is to look at the entire genome to inform our care for children,” she says.

One Step Further
At MSK Kids, the ripple effect of treatment and care goes far beyond one family. The PTMP, MSK’s Department of Pathology, and the Sloan Kettering Institute’s research-based Antitumor Assessment Core often work together to create an exact replica of a child’s tumor, using samples from their actual cells or tumor tissue. MSK teams test this replica against

“Despite the difficulties, Joey kept his sense of humor during treatment.”

— Filemon Dela Cruz, pediatric sarcoma specialist

“Filemon Dela Cruz (with Joey at a routine checkup) says that Joey’s whole-genome sequencing gave him and other members of the care team important insights.”

“Filemon Dela Cruz says that Joey’s whole-genome sequencing gave him and other members of the care team important insights.”

“Geneticist and pediatric oncologist Michael Walsh studies cancer-causing mutations in children.”

“Pediatric sarcoma specialist Julia Glade Bender was part of the team that came up with Joey’s unique care plan.”
various drugs, at different doses, to see how it behaves. They can then form hypotheses about how the child’s tumor will respond. But that’s not all. “These models teach us many things, even beyond just a single patient,” says Dr. Dela Cruz. “What we learn from every child can help future generations.”

The excitement spreads as the groups share their findings across MSK. One particular goal? To match the discoveries to a patient who could benefit from them. That means sometimes a clinical trial here at MSK will have just one enrollee. This requires strong support from the US Food and Drug Administration and a pharmaceutical company willing to offer the drug to just one person. But the payoff is huge. So far, five single-patient use (SPU) clinical trials at MSK have advanced to full-fledged studies offered at MSK and elsewhere, with new discoveries unfolding at every turn.

“We always collect a lot of data when we do SPUs, so we can learn as much as possible about how and why these drugs work or don’t,” says Dr. Glade Bender. “Because we collect so much information with them, they can eventually lead to clinical trials that may be expanded to other hospitals.”

When a medicine gets approved after such rigorous testing, it’s a watershed moment for young people everywhere who need it. It’s a “think local, act global” approach that is bringing hope to kids at MSK — and beyond.

A Bright Future

The combination of surgery, chemotherapy, and immunotherapy medications was difficult for Joey. Immunotherapy, especially, was not easy — he developed fevers, low blood counts, and autoimmune hepatitis, which is when the immune system attacks the liver. But thanks to MSK’s expertise in immunotherapy, his team knew how to manage these side effects. And Joey says he found positive moments to hang on to. He passed the time by watching movies, taking walks, and playing video games with his friends.

Jake was “always by his side to cheer him up,” says Chrissy. Joey also attended a Major League Baseball game as part of a partnership with the New York Yankees that raises funds for MSK Kids. He even got a signed baseball from star right fielder Aaron Judge.

“Immediately, I felt comfortable at MSK,” Joey recalls. “MSK is my home away from home.”

Today, after completing all of his treatments, Joey shows no evidence of disease. A high school freshman, he comes to MSK Kids to see Drs. Glade Bender and Dela Cruz every few months for a checkup. His parents are grateful they finally got the answers they needed at MSK — although Joey says he had a good feeling about the hospital when he walked through the doors.

As Chrissy recounts it, “The first day Joey came here, he said, ‘Mom, it’s OK now. I’ll hopefully be able to help a lot of people.’”

By helping to further the research into childhood cancer, he’s doing just that.

― Joey, MSK Kids patient

Jennifer James is a dedicated philanthropist who has hosted or participated in more than 50 fundraising events, inspired more than 11,000 donations from almost 7,000 donors, and raised $3.1 million — all to support MSK Kids.

“After my daughter, Scarlett, was diagnosed with cancer, I was compelled to fund research that would improve treatments for children. I made a promise to myself that I would do whatever I could to help other families,” Jennifer says.

Scarlett was diagnosed with T-cell lymphoma in 2013 when she was just 6 years old. She endured 25 months of difficult treatment — unable to return to school for two years. During a chemotherapy appointment, Jennifer saw a postcard for Kids Walk for MSK Kids, an annual fundraising event in Central Park.

“It had been seven months since Scarlett was diagnosed, and Kids Walk for MSK Kids would be the first opportunity people had to see her and support our family,” says Jennifer. “Most people really do want to support you. Sometimes they just don’t know how.”

Once Scarlett’s doctors, Peter Steinherz and Neal Shukla, gave the green light for her to participate, Jennifer invited all of their friends and family to join.

The event helped light a spark in Jennifer. Knowing that philanthropy funded much of the research that led to the chemotherapies that Scarlett needed, Jennifer wanted to fund the development of more-targeted treatments with fewer side effects. Pediatric cancer research is drastically underfunded, receiving less than 4 percent of federal cancer research dollars. To help close that gap, Jennifer created The Scarlett Fund. Mostly through grassroots efforts and small donations, The Scarlett Fund raised enough to seed the Pediatric Translational Medicine Program, now directed by Dr. Shukla. “The money that The Scarlett Fund raised is proof that one donation makes a difference,” Jennifer says. “It all adds up.”

While The Scarlett Fund raises money for research, it also raises awareness about the opportunities for everyone — especially kids — to get involved. “I try to empower children to make a difference,” Jennifer says. “If I help raise a community of young people who know about pediatric cancer, then hopefully they will become more involved as they grow up.”

Through The Scarlett Fund, young people around the country have organized lemonade stands, talent shows, bake sales, and numerous greeting card drives that deliver supportive messages to kids with cancer. Today, Scarlett visits schools in New York City to educate students about pediatric cancer and also serves on the Kids Walk for MSK Kids Student Board. Because of her work, Scarlett received an inaugural American Girl Character Counts award. In addition to Kids Walk for MSK Kids, Jennifer participates in MSK’s Cycle for Survival, has run seven marathons with Fred’s Team, is Co-Chair of MSK’s Patient Family Advisory Council for Quality, and is a member of The Society of MSK.

In December 2019, the family received the ultimate good news: Scarlett was declared cancer free. After living with the diagnosis for six long years, Jennifer asked 13-year-old Scarlett if she wanted to take a break from her work with The Scarlett Fund.

Her response: “No, Mommy. I want to give more.”

To learn about the many options for supporting MSK through philanthropy, visit Giving.MSKCC.org.

― Jennifer James, right, with daughter Scarlett, son Austin, and husband Robert. Photo credit: Sara Beth Turner
In 2019, Memorial Sloan Kettering distinguished its world-renowned pediatrics department with a unique identity inspired by the vision the program holds for the future. Vibrant visuals and extraordinary stories celebrate MSK’s exceptional pediatric care — we are proud to introduce MSK Kids.

The Department of Pediatrics, MSK’s leadership, and the Department of Marketing & Communications worked together for more than a year and a half to create the foundation that brought MSK Kids to life. The new logo and name debuted at Kids Walk for MSK Kids in May 2019.

All of MSK’s pediatric efforts — across surgery, oncology, radiation oncology, radiology, pathology, nursing, supportive care, and beyond — are represented in new ways as part of MSK Kids.

MSK Kids is dedicated to caring for children, teenagers, and young adults with cancer and related diseases. It’s where the latest science meets the compassionate care that has always been a hallmark of MSK. And as the largest pediatric cancer program in the country, MSK Kids offers unparalleled expertise and cutting-edge treatments often not available elsewhere.

Parents and other loved ones are an integral part of care, working with teams of experts to ensure the most individualized approach for each child.

“MSK Kids represents every individual who touches the life of a child treated here. It’s about unifying people, science, and care to support every child and their family,” says Andrew Kung, Chair of the Department of Pediatrics.

After carefully identifying the core values and messages that define MSK Kids, the team developed a unique design and spirited imagery to illustrate MSK’s commitment to caring for young people with cancer. Together, the new brand and voice have come to life in every avenue of MSK, from the institution’s website to advertisements throughout the New York City metro area. As MSK Kids grows and evolves, one constant will remain: the most state-of-the-art and compassionate care for MSK’s young patients.
A cell’s identity is determined by the genes it turns on. Until recently, the only way to learn what genes were turned on in cells was to look at the blend of genetic material pulled from thousands of cells. This technique provides a clear measure of overall gene activity but is a poor indicator of what’s happening inside individual cells.

And that’s a problem because in biology, even one cell can make a difference.

Thanks to an approach called single-cell analysis, the picture is changing. This technique combines advanced genomic sequencing tools and sophisticated computational methods. With it, biologists can peer inside individual cells to see which particular genes are turned on.

In essence, researchers can zoom in on a tissue’s pointillist parts.

Sloan Kettering Institute Developmental Biology Program Chair Kat Hadjantonakis is keen to exploit the power of single-cell analysis. She wants to use the method to answer long-standing questions about how we develop as embryos. One in particular has stoked her passion: What happens to cells in extraembryonic tissues, such as the placenta, as an embryo grows?

“The dogma in the field of mammalian embryonic development was that extraembryonic tissues, such as the placenta, are just that — they’re external to the embryo,” she says. “They support the embryo during its in utero development, but they’re dispensable for adult life because...”
Sonja Nowotschin, a senior research scientist in the Hadjantonakis lab in SKI and co-first author on the Nature paper, is studying the role that extraembryonic cells play in development and disease. She says, "The second you are born, you shed your extraembryonic tissue." But what Dr. Hadjantonakis and her co-investigators have found with the help of single-cell analysis is that, in mice, cells from extraembryonic sources and cells from the embryo do mix. Adult tissues, such as the gut, in fact, contain mixtures of the two. The results alter the story of mammalian development. They also raise the question of how these extraembryonic interlopers might impact cancer.

**Decisions, Decisions**

Using cutting-edge microscopic imaging methods, Dr. Hadjantonakis’s team first observed that mouse embryos contained cells from extraembryonic tissues more than a decade ago. At that time, the discovery elicited more questions than answers. One question has persisted ever since: “Are these cells different based on where they come from?” she asks. “We could never really address that question because a technique to do so didn’t exist.” Now, with single-cell analysis, it does. Single-cell analysis had to await the development of computational methods powerful enough to handle the massive amount of complex data that comes from sequencing the gene products of thousands of individual cells at once. To wield these methods appropriately, training in computational biology is required.

That’s why Dr. Hadjantonakis teamed up with SKI computational biologist Dana Pe’er, a world-renowned expert in single-cell analysis who also possesses the mathematic acumen needed to interpret this kind of data. They used the technique to analyze gene activity in nearly 120,000 individual cells of the developing mouse embryo and researchers used single-cell analysis to analyze gene activity in nearly 120,000 individual cells of the developing mouse embryo.
Computational biologist Dana Pe’er is an expert in single-cell RNA sequencing. The Pe’er lab uses powerful computational methods to analyze vast amounts of data, with the goal of answering fundamental questions about biomedical science.

“The idea that the major internal organs in our body are a mosaic mixture of embryonic and extraembryonic tissues was shocking to me,” says Dr. Pe’er, who is Chair of the Computational and Systems Biology Program at SKI. “It’s even more surprising than if you told me that the heart was made up of both heart cells and cells from the brain.”

Whether this patchwork of cells with different origins matters for the functioning of major internal organs is unknown. The SKI researchers think that the differences may not count as much when tissue is healthy but could have consequences during disease.

“One of the things that is being discovered — in my lab and in others — is that cancer cells tend to revert to developmentally more primitive states to do their evil deeds,” Dr. Pe’er says. “Some of the nastiest cancers are those involving internal organs, like the lungs, gut, pancreas, and liver. For combating them, understanding the normal development of these tissues is going to be critical,” she adds.

In biology, as in art, getting up close and personal with the subject can change the way you see the world.

“The idea that the major internal organs in our body are a mosaic mixture of embryonic and extraembryonic tissues was shocking to me.”

— Dana Pe’er, Chair of the Computational and Systems Biology Program, Sloan Kettering Institute
At first glance, Robert Rose’s visits to Memorial Sloan Kettering’s Rockefeller Outpatient Pavilion may appear deceptively routine. Robert, 67, has kidney cancer. Once a month, he sees MSK nurses Kristen Clemens and Stephanie Hicklin. Working as part of a team, they ask him about such symptoms as fatigue or feeling unusually cold, take his vital signs, and draw his blood, all while bantering about “what’s going on with each other’s families and who’s expecting a baby,” says Robert.

But on closer examination, these procedures are part of an intricate effort at the furthest frontier of cancer research, and Ms. Clemens and Ms. Hicklin are playing a vital role. They are clinical trials nurses, with specialized skills for testing potential new therapies. Robert is participating in a phase I clinical trial — a first-in-human investigation that is the high-stakes moment when medicine that has shown great promise in a lab is given to people for the very first time.

First in Human
For eight years, Ms. Clemens worked at MSK as an inpatient nurse, caring for people in the hospital as they recovered from surgery and other cancer treatments. However, she felt drawn to research to advance the understanding and treatment of cancer. In 2017, she joined a specialized nursing team at MSK that cares for people who enroll in first-in-human clinical trials.

“First-in-human trials are done to establish a standard therapeutic dose of a new cancer drug and to make sure it’s safe and effective in people,” says Ms. Clemens. “That means that my patient could be one of a handful of humans — or maybe even the very first human — to receive what could become the next blockbuster cancer treatment. For me as a nurse, it adds an entirely different dimension to the time we spend together.”

Robert Rose dances with his daughter, Lillianne, at her wedding in 2019. A phase I clinical trial for kidney cancer is helping to make sure he can “live his life to the fullest,” says nurse Kristen Clemens. Photo credit: Anastasia Romanova Photography
Her feelings are echoed by her colleague Ms. Hicklin. “I wanted to specialize as a clinical trials nurse because we are at the forefront of cancer research while still providing direct patient care,” Ms. Hicklin says. Providing that care in a first-in-human clinical trial requires a substantial team. This includes principal investigators, who oversee the trial and evaluate patients while continuously analyzing the trial’s results.

“Without [clinical trials] nurses, I wouldn’t be able to do my job,” explains Eytan Stein, Director of the Center for Drug Development in Leukemia. “Nurses assess and help manage toxicities, and coordinate the tests that are crucial to understanding how these new drugs affect patients. They make sure that patients understand their treatment and receive the support they need to successfully participate in the clinical trial.”

Robert’s health has improved considerably on the trial, which combines the immunotherapy treatment nivolumab (Opdivo®) with an investigational drug called IL-10, which he injects into his belly every day. “His tumors have shrunk or disappeared, after years of being sick,” says Ms. Clemens. “He is back to gardening and growing tomatoes. He was able to see his daughter get married.”

In short, Ms. Clemens says, “He is living life to the fullest.”

Creating the Future of Cancer Care
Still, successes with first-in-human trials are few and far between, which makes it challenging to find funding. “Philanthropy plays a crucial role in getting first-in-human trials off the ground, especially for rare diseases for which large pharmaceutical companies may not be focusing their efforts,” Dr. Stein says.

MSK works to ensure that philanthropy has the maximum impact on vital research. For instance, at the recently opened David H. Koch Center for Cancer Care at Memorial Sloan Kettering Cancer Center, which was generously supported by a $150 million gift — the largest in MSK’s history — an entire floor is devoted to clinical trials, especially those in the earliest phases.

“Without [clinical trials] nurses, I wouldn’t be able to do my job,” explains Eytan Stein, Director of the Center for Drug Development in Leukemia. “Nurses assess and help manage toxicities, and coordinate the tests that are crucial to understanding how these new drugs affect patients. They make sure that patients understand their treatment and receive the support they need to successfully participate in the clinical trial.”

A Special Bond with Patients
Of course, caring for people who are part of a first-in-human investigation requires not just superb medical skills but also compassion and a warm bedside manner. MSK’s clinical trials nurses make sure every patient knows they are being cared for according to their individual needs. Ms. Hicklin explains that being part of a clinical trial that investigates a new therapy “can sometimes be scary for patients and their families because they don’t know how they’re going to react or if it is even going to work. But I remind them that the whole team will be here every step of the way supporting them through it, and that every cancer treatment available today started with a trial just like theirs.”

While caring for Robert over the past two and a half years, both nurses have developed a strong bond with him. Ms. Hicklin says, “He asks a lot of questions about our lives. He is the kind of person who cares about his nurses.”

Ms. Clemens adds, “I love to see him when I’m training clinical trials nurses because he really knows the drill. He will run down the list of questions he knows I’m going to ask.”

Robert says part of joining a clinical trial is to help other patients in the future. Photo: Courtesy of Robert Rose

“Clinical trials are providing more treatment options for patients, helping people live longer, and ultimately bringing us closer to a cure.”

— Stephanie Hicklin, clinical trials nurse

Robert says part of joining a clinical trial is to help other patients in the future. Photo: Courtesy of Robert Rose
Manisha Koirala, one of India’s leading film actors, sensed something was amiss when her extended family filed into her room and stood silently around her bed. She had been waiting all day in the Kathmandu, Nepal, hospital for a diagnosis to explain the mysterious pain and bloating in her abdomen. Nobody spoke. “What is it?” she asked. “Won’t someone tell me what’s wrong?”

Her eyes fell on her lifelong doctor, pleading for an explanation. Through tears, he told her she had advanced ovarian cancer. It had spread everywhere.

Manisha was in a state of shock. As the reality of the news set in, she thought about making peace with it and “saying goodbye to everyone and everything,” she says. But she was not ready to give up. Her family members urged her to go to the United States to seek treatment.

The long journey paid off: Today, after successful treatment at Memorial Sloan Kettering, she remains in remission after more than seven years.

Raising the Bar
MSK’s expertise in gynecologic cancers has given new hope to many women who, like Manisha, face tough odds. In 2019, U.S. News & World Report ranked MSK number one for gynecology in its listing of the nation’s best hospitals. This honor reflects the dedication MSK brings to caring for people with all stages of cervical, ovarian, and endometrial cancers.

“Our team takes great pride in raising the bar of exceptional patient care, and we’re honored to receive the number-one designation,” says Nadeem Abu-Rustum, Chief of the Gynecology Service.
The gynecologic team is made up of more than 50 highly skilled doctors who focus exclusively on treating these diseases, including very challenging cases, such as Manisha’s.

“The gynecologic cancer group has extensive collaboration, not just between the surgeons and oncologists but also the other specialties, like pathology, radiology, and radiation oncology, as well as the nurses and other medical staff,” Dr. Abu-Rustum says. “Patients benefit greatly from the insights of top specialists working closely to produce the best outcomes.”

Highly Specialized Techniques
Treating these cancers almost always starts with surgery. But before treatment can begin, a precise diagnosis is essential. MSK’s pathologists use state-of-the-art equipment and the most-advanced techniques to classify and assess cancers. “The female reproductive system is one of the body’s more complex organ systems,” says Lora Ellenson, Director of Gynecologic Pathology. “Each member of our team has expertise concerning the immense variety of tumor types that arise there. This allows the treating doctor to choose the most effective therapy.”

If surgery is needed, some doctors within the gynecologic team specialize even further in particular cancers. For example, MSK has five surgeons who deal solely with ovarian cancer.

“This has enabled us to develop a deep level of expertise for treating this cancer because we have done such a large number of procedures,” explains Dennis Chi, Head of Ovarian Cancer Surgery, who operated on Manisha.

“When I met Dr. Chi, he told me he had done similar surgeries on late-stage ovarian cancer, and the patients were still doing well,” Manisha says. “I became confident seeing his confidence.”

During Manisha’s 11-hour surgery, Dr. Chi removed all the visible tumors, even those as small as a grain of sand. This extensive procedure is called radical debulking surgery. MSK’s ovarian cancer specialists are extremely practiced at this approach, which boosts the effectiveness of chemotherapy given afterward to destroy any lingering cancer cells. Studies at MSK and around the world have shown that removing this much cancer tissue makes a big difference in improving survival.

Preserving Well-Being
Helping women maintain the best quality of life is a top priority for the gynecologic team. To achieve this, they perform minimally invasive surgeries whenever possible, enabling women to leave the hospital sooner and complete their recovery at home. They’ve perfected surgical techniques to reduce the risk of side effects, such as lymphedema, a painful swelling that can develop after lymph nodes have been removed. They are also adept at operating in ways that can help women preserve their fertility.

Dr. Chi’s surgery put Manisha in the best position to start receiving chemotherapy, which was overseen by medical oncologist Vicky Makker.
While Manisha responded well to treatment, she faced side effects common to people on chemotherapy, such as pain, weakness, and nausea, which required careful management by Dr. Makker. She also encountered feelings of fear and, at times, felt emotionally depleted. “These treatments can lead to complex emotional and psychosocial issues that we must anticipate and be ready to address,” explains Dr. Makker.

The close partnership between the gynecologic specialists and the social workers, counselors, and other experts in MSK’s support programs helps women maintain a sense of hope while facing what is likely the biggest challenge of their lives. Clinical psychologists offer emotional and spiritual support during and after treatment, and certified therapists guide women dealing with sexual health challenges.

Advancing the Field
MSK doctors are leading many clinical trials testing new therapies, including immunotherapy. Multiple MSK-led trials are testing the use of drugs called checkpoint inhibitors, which help unleash the body’s immune cells to attack the cancer.

The team is also working with researchers to improve the understanding of how gynecologic cancers develop, progress, and respond to treatment. Molecular geneticist Britta Weigelt leads a laboratory that studies the genetic makeup of gynecologic cancers — both in tumor cells and DNA shed into the bloodstream — to learn more about how mutations cause and promote these cancers and how they affect resistance to treatments.

“We have created a collaborative space for people on the gynecologic team, including oncologists, surgeons, and pathologists, to perform research addressing clinical needs related to these cancers,” she says. “This allows us to translate findings from our lab to patients — and vice versa — at an incredibly rapid pace. It is a privilege to benefit patients’ lives through our scientific discoveries.”

One project that began in 2019 is a collaboration between the gynecologic team and Chief of Computational Oncology Sohrab Shah. Called MSK SPECTRUM, it involves the study of genetic mutations that develop in serous ovarian cancer, the most common type. By conducting genetic analysis of the cancer cells at multiple stages of treatment, the researchers are gaining insights into how the cancer evolves over time, both spontaneously and in reaction to treatment. They hope to shed light on how the immune system responds to these changes so they can design better therapies.

The goal of all this research and collaboration is to lead to even more success stories like Manisha’s. She returned to acting in 2017 and now uses her celebrity status and personal story to draw attention to ovarian cancer.

“Dr. Chi had been the first doctor to give me hope, and he, Dr. Makker, and the entire team gave me my second life,” Manisha says. “I don’t have enough words to thank them.”

Medical oncologist Vicky Makker (center) collaborates closely with other specialists, including nurses and physician assistants, such as Elizabeth Butler (right), to tailor care plans.

The gynecology team, including radiation oncologist Fumiko Chino, comes together weekly to discuss challenging cases and decide on the best approach for caring for each patient.

MSK patients with gynecologic cancer benefit from the combined expertise of surgeons, medical oncologists, nurses, radiologists, radiation oncologists, and pathologists.

Molecular geneticist Britta Weigelt (right) leads a research team that studies genetic mutations in gynecologic tumors. Their work is uncovering how these cancers develop and respond to treatments.
Whether it’s a routine check of cholesterol and iron levels or a much more serious and complex test, the experience of having blood drawn is nearly universal: You roll up your sleeve and get a tourniquet on your arm, then a swab with an alcohol wipe and a needle stick.

But what happens to the blood after it’s whisked away to a lab has become increasingly cutting-edge. Technology can now reveal secrets in blood that would have remained a mystery just a few years ago.

Perhaps one of the most exciting blood tests to arise in the past few years is the liquid biopsy. These tests aim to characterize the molecular workings of cancer in a way that’s easier, faster, and less invasive for patients.

Liquid biopsies saw a big leap forward in June 2019, when the New York State Department of Health approved a liquid biopsy test called MSK-ACCESS, developed at Memorial Sloan Kettering. “Unlike most other liquid biopsies, which look for only a few mutations associated with one particular type of cancer, this test is very different because it can be used for any kind of advanced cancer,” says medical oncologist Bob Li, whose research focuses on the development of liquid biopsies and the use of these tests in patient care.

“This test directly compares a patient’s cancerous and normal DNA for accurate diagnosis,” adds Dr. Li, who is Co-Director of Health approved a liquid biopsy test called MSK-ACCESS, developed at Memorial Sloan Kettering. “Unlike most other liquid biopsies, which look for only a few mutations associated with one particular type of cancer, this test is very different because it can be used for any kind of advanced cancer,” says medical oncologist Bob Li, whose research focuses on the development of liquid biopsies and the use of these tests in patient care.

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of the Thoracic Liquid Biopsy Program at MSK. MSK-ACCESS (a much shorter name for Analysis of Circulating Cell-Free DNA to Evaluate Somatic Status) is already starting to be used as a standard part of care across MSK. The test, which is currently funded by philanthropy, can detect common cancer mutations in 129 genes using only a blood sample.

Liquid biopsies are one of the methods being developed to support the growing field of precision medicine. Precision drugs aim to zero in on the molecular changes that define a tumor, stopping cancer cells from growing while sparing healthy tissue. But to treat cancer with one of these targeted drugs, doctors have to figure out which gene mutation is propelling the tumor. Once they identify a cancer’s so-called driver mutation, they can select the best drug to block that mutation and quell the cancer’s growth.

Finding the driver mutation is usually not an easy task. Tests like MSK-ACCESS illuminate a cancer’s genomic changes by sifting through hundreds of potential cancer-causing mutations in millions of DNA molecules. “We developed MSK-ACCESS to address the urgent clinical needs in molecular diagnosis, particularly when tumor biopsies are not able to provide the necessary answers,” says geneticist Michael Berger, Associate Director of the Marie-Josée and Henry R. Kravis Center for Molecular Oncology (CMO) at MSK. MSK-ACCESS was developed by the CMO and members of the Department of Pathology.

The same collaborative team also developed MSK-IMPACT™, a test that has been used since 2014 to search for mutations and other genetic changes in tumor tissue. “All of the data that we’ve collected from MSK-IMPACT was used to develop MSK-ACCESS,” Dr. Berger says. “When we are able to obtain tissue samples, MSK-IMPACT is still the gold standard for molecular analysis,” Dr. Berger adds. “But liquid biopsies have a lot of practical advantages and open up a range of new clinical opportunities.”

Taking a Wide-Ranging Look at Cancer

MSK-ACCESS and other liquid biopsies are designed to take advantage of one of the attributes of cancer cells: When they die, cancer cells break apart and release their DNA into the bloodstream. Liquid biopsy tests can search this free-floating genetic material and detect cancer mutations.

“We developed MSK-ACCESS to address the urgent clinical needs in molecular diagnosis, particularly when tumor biopsies are not able to provide the necessary answers,” says geneticist Michael Berger (left), with senior computational biologist Helen Won.

Medical oncologist Bob Li, Co-Director of MSK’s Thoracic Liquid Biopsy Program, is focused on finding less-invasive ways to monitor people being treated for cancer.

“Being able to get results quickly can help guide rapid precision therapy and provide peace of mind to patients and their families.”

— Bob Li, Co-Director of the Thoracic Liquid Biopsy Program
“Liquid biopsies have a lot of practical advantages and open up a range of new clinical opportunities.”

— Michael Berger, Associate Director of the Marie-Josée and Henry R. Kravis Center for Molecular Oncology

These tests have several benefits for patients. Since a more invasive procedure like a tissue biopsy isn’t required and liquid biopsies can be done during a regular office visit, they can be performed much more often. This allows doctors to monitor cancer more closely, to learn if it’s changing and becoming resistant to treatment. Additionally, in people with cancer that is widespread, a single liquid biopsy test provides a comprehensive look at the genetic changes across every tumor in the body.

Research done by Dr. Li and colleagues has found that liquid biopsies are also faster than tissue biopsies. When time is of the essence for patients and their families, speed matters.

Finding a tumor’s driver mutation quickly is important because it enables people who are sick to start the right drug sooner. And when a tumor develops resistance to therapy, knowing earlier on that a drug has stopped working can help ensure that the patient will continue to get effective treatment.

“Liquid biopsies can make a huge difference in patient care,” Dr. Li says. “Being able to get results quickly can help guide rapid precision therapy and provide peace of mind to patients and their families.”

New Applications for an Important Tool

“We are still learning all the ways that MSK-ACCESS can benefit our patients,” Dr. Berger says. “I’m excited to continue developing this test with my colleagues.” He notes that the team already has plans to expand the way the test is used. For one thing, MSK-ACCESS will be an integral part of upcoming studies aimed at determining which patients are at the greatest risk of having their cancer come back after surgery.

“Liquid biopsies hold promise for many additional applications in the future,” Dr. Li concludes. “But it’s important for patients to know that liquid biopsy is already here today in the clinic. For people with advanced-stage cancer, these tests may provide important guidance for making treatment decisions.”

The 60-year-old New Jersey resident went to MSK Monmouth, just a short distance from his home in Tom’s River. At his first appointment with medical oncologist Anahid Namakydoust, Steve learned that the cancer was actually stage IV and that, depending on its mutations, he might benefit from targeted therapy. Dr. Namakydoust ordered a genetic test of the tumor to find out what was propelling its growth. The results were inconclusive, so she ordered a liquid biopsy. That test revealed that the tumor was driven by a fusion gene called ALK-PON1.

Fusion genes occur when a gene breaks off from one chromosome and attaches itself to another. In adults, they are usually found in blood cancers, they are much less common in solid tumors like Steve’s. In fact, Dr. Namakydoust and her colleagues had never seen this particular fusion gene before.

Based on the liquid biopsy results, Dr. Namakydoust thought Steve might be a good candidate for a drug called alectinib (Alecensa®). Alectinib is approved to target ALK gene fusions. But because his specific fusion was completely new, she wasn’t sure whether it would be effective.

“Dr. Namakydoust and her team did a lot of research and worked very hard to find the best treatment for me,” Steve says. Thankfully, Dr. Namakydoust was right: Steve has been taking alectinib for more than a year and feels great. “I could feel the tumor shrinking within the first week. My cough was already getting better,” he says. “I take four pills in the morning and four at night. That’s it. Other than a little fatigue, I don’t have any side effects.”

“When Steve came to see me a few days after starting the drug, I could immediately that his health was improving,” Dr. Namakydoust says. “I told him he didn’t realize how sick he’d been until he started feeling better.”

Steve’s been able to continue working — as a print coordinator for a civil engineering firm. And he’s excited for warm weather, when he’ll be able to resume his favorite hobbies: fishing, swimming, and long walks with his pit bull rescue, Bunny.

For now, Steve sees Dr. Namakydoust every three to four months. She is following his progress with CT scans. And since MSK-ACCESS has been approved for clinical use, she’ll be able to monitor his cancer with the liquid biopsy as well.

“I was in rough shape before I started this treatment. I’ve really come a long way,” Steve says. “From where I sit, I just feel very grateful.”

Steve Buechse had been coughing for months and was tired all the time. In January 2019, he found out why: He had a tumor pressing on both sides of his windpipe. He was diagnosed with stage III lung cancer. Steve thought he’d be facing an uphill battle of complicated treatments and all the potential side effects that can come along with them. “I knew right away that this was serious, and I needed to get to Memorial Sloan Kettering,” he says.

At his first appointment with medical oncologist Anahid Namakydoust, Steve learned that the cancer was actually stage IV and that, depending on its mutations, he might benefit from targeted therapy. Dr. Namakydoust ordered a genetic test of the tumor to find out what was propelling its growth. The results were inconclusive, so she ordered a liquid biopsy. That test revealed that the tumor was driven by a fusion gene called ALK-PON1.

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In 1884, Memorial Sloan Kettering — then known as the New York Cancer Hospital — was founded in Manhattan. It was the first hospital in the United States dedicated solely to cancer care at a time when few treatment options existed. Fast-forward 135 years through countless extraordinary advances in research, treatment, and education, and MSK has grown to be the world’s largest private cancer center, setting the pace for a field that continues to evolve at incredible speed.

A network of more than 20 patient care facilities around New York and New Jersey has flourished from that original hospital on the Upper West Side. In 2019, the institution’s capacity expanded further still: MSK Nassau opened its doors to residents of Long Island and eastern Queens. The year also marked the culmination of a vision many years in the making — the completion of the David H. Koch Center for Cancer Care at Memorial Sloan Kettering Cancer Center on New York City’s Upper East Side.

Take a look inside and see how one mission serves as the foundation for these world-class facilities, guiding each person who walks through the doors.

Nurse Jodie Pindulic is one of the many staff members who help create a caring and healing community at the David H. Koch Center for Cancer Care at Memorial Sloan Kettering.
Regional Care Network Medical Site Director Pamela Drullinsky (left) is one of the more than 300 staff members providing world-class care at the new facility. This includes personalized care plans and new therapies being studied in clinical trials.

Located in Uniondale, the 114,000-square-foot facility offers nearly every aspect of outpatient cancer care. The bright, welcoming space is designed to meet patients’ and caregivers’ needs.

MSK Nassau’s infusion areas provide a calm setting for patients receiving chemotherapy, immunotherapy, and other types of infusions.

MSK Nassau has three linear accelerators. Highly trained radiation oncologists and radiation therapists, like Derek Fogelson, use these machines to deliver precise radiation treatments.

Occupational therapist Claudine Campbell helps patients manage the side effects of cancer and its treatment. MSK Nassau offers comprehensive rehabilitation services including rehabilitation medicine, physical and occupational therapies, and therapies for edema (swelling).

MSK Nassau was built to foster collaboration. By working side by side, care team members — such as clinical nurse Shirley Pang (left) and medical oncologist Kenneth Ng — combine their expertise for each patient’s benefit.

Thanks to an on-site rapid-response lab staffed by experts, such as clinical pathologist Maly Fenelus, patients can get important test results quickly and discuss them with their care teams.
The David H. Koch Center for Cancer Care at MSK offers patients innovative treatment options, including one of the country’s first MR-linear accelerators. This technology combines radiation therapy and magnetic resonance imaging to target cancer cells with great precision. The facility also has spaces specifically designed to study new therapies in early-phase clinical trials.

The 25-floor facility brings together nearly every aspect of cancer care under one roof. Patients can receive many of the services they need in a single visit.

Stephen Solomon, Chief of the Interventional Radiology Service, and his team provide patients with minimally invasive image-guided therapies at the new facility.

In total, some 1,300 employees — including nurses with specialized expertise — work together at the David H. Koch Center for Cancer Care at MSK to help patients and caregivers have the best possible experience.

The facility’s postanesthesia care unit provides patients with private rooms in which to recover after outpatient procedures. Care teams are stationed right outside. Sixteen inpatient rooms equipped with cutting-edge technology for care and comfort are available for those requiring a short stay.

Medical oncologist and Medical Director of the David H. Koch Center for Cancer Care Paul Hamlin leads the clinical staff, all of whom are dedicated to providing comprehensive care to each patient.

The David H. Koch Center for Cancer Care at MSK offers patients innovative treatment options, including one of the country’s first MR-linear accelerators. This technology combines radiation therapy and magnetic resonance imaging to target cancer cells with great precision. The facility also has spaces specifically designed to study new therapies in early-phase clinical trials.

The facility promotes collaboration by bringing together care teams. Hematologic oncologist Gunjan Shah (left) is part of the largest gathering of hematologic experts ever at MSK. Specialists in blood and marrow stem cell transplantation, chimeric antigen receptor T cell therapy, lymphoma, and other blood cancers are all on-site.
2019 IN REVIEW

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* = Scott M. Stuart

+ ex officio

+ The Boards of Overseers and Managers and the Memorial Sloan Kettering community note with sadness the passing of David H. Koch, Philip H. Geier, Jr., and Donald B. Marron.
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Molecular Pharmacology

VIVIANE TABAR, MD
Neurosurgery

DEREK TAN, PhD
Chemical Biology
## PATIENT CARE

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<td>Patient Admissions: Adults</td>
<td>21,064</td>
<td>21,708</td>
<td>21,953</td>
<td>22,792</td>
<td>24,175</td>
</tr>
<tr>
<td>Patient Admissions: Children</td>
<td>1,403</td>
<td>1,370</td>
<td>1,553</td>
<td>1,451</td>
<td>1,422</td>
</tr>
<tr>
<td>Total Admissions</td>
<td>22,467</td>
<td>23,078</td>
<td>23,506</td>
<td>24,243</td>
<td>25,597</td>
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<tr>
<td>Total Patient Days</td>
<td>191,827</td>
<td>160,072</td>
<td>161,681</td>
<td>171,798</td>
<td>173,702</td>
</tr>
<tr>
<td>Average Patient Stay (days)</td>
<td>6.8</td>
<td>6.9</td>
<td>6.9</td>
<td>7.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Bed Occupancy Rate (1)</td>
<td>90.9%</td>
<td>92.5%</td>
<td>94.3%</td>
<td>95.2%</td>
<td>96.2%</td>
</tr>
</tbody>
</table>

| Outpatient MD Visits: Manhattan | 489,897  | 512,342  | 526,006  | 541,146  | 562,224  |
| Outpatient MD Visits: Regional Network | 136,506  | 153,451  | 196,232  | 235,400  | 276,849  |
| Total Outpatient Visits     | 626,403  | 665,593  | 772,238  | 776,546  | 839,073  |
| Screenings (2)              | 22,403   | 23,497   | 31,683   | 38,738   | 52,772   |
| Surgical Cases              | 21,368   | 23,066   | 25,330   | 27,919   | 27,379   |

| New Radiation Oncology Patients Starting Treatment: Manhattan | 4,408    | 4,831    | 5,283    | 4,434    | 5,538    |
| New Radiation Oncology Patients Starting Treatment: Regional Network | 3,017    | 3,399    | 4,530    | 5,203    | 6,616    |

| Diagnostic and Interventional Radiology Procedures | 466,848  | 498,372  | 543,322  | 573,383  | 631,174  |
| Clinical Investigation Protocols (3) | 879      | 1,072    | 1,133    | 1,139    | 1,159    |

(1) Based on adjusted bed count
(2) Data from 2015 and 2016 represent individual screening visits; data from 2017 through 2019 represent screening procedures.
(3) Excludes studies closed to accrual

## STAFF

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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<tbody>
<tr>
<td>Sloan Kettering Institute Members</td>
<td>140</td>
<td>131</td>
<td>133</td>
<td>130</td>
<td>133</td>
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<tr>
<td>Hospital Attending Staff</td>
<td>1,033</td>
<td>1,091</td>
<td>1,148</td>
<td>1,228</td>
<td>1,358</td>
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<tr>
<td>Registered Nurses</td>
<td>2,605</td>
<td>2,864</td>
<td>3,721</td>
<td>3,905</td>
<td>4,522</td>
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<tr>
<td>Administrative and Support Staff</td>
<td>10,965</td>
<td>11,638</td>
<td>12,325</td>
<td>13,332</td>
<td>14,570</td>
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<td>Total Staff (1)</td>
<td>14,711</td>
<td>15,697</td>
<td>17,301</td>
<td>18,569</td>
<td>20,559</td>
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<tr>
<td>Volunteers</td>
<td>967</td>
<td>943</td>
<td>1,019</td>
<td>960</td>
<td>770</td>
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<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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</thead>
<tbody>
<tr>
<td>Residents and Clinical Fellows: Positions</td>
<td>464</td>
<td>468</td>
<td>468</td>
<td>476</td>
<td>475</td>
</tr>
<tr>
<td>Residents and Clinical Fellows: Annual Total</td>
<td>1,723</td>
<td>1,734</td>
<td>1,749</td>
<td>1,714</td>
<td>1,690</td>
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<tr>
<td>Research Fellows</td>
<td>355</td>
<td>344</td>
<td>346</td>
<td>325</td>
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<tr>
<td>Research Scholars</td>
<td>98</td>
<td>92</td>
<td>120</td>
<td>111</td>
<td>171</td>
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<td>Research Associates</td>
<td>110</td>
<td>112</td>
<td>115</td>
<td>117</td>
<td>132</td>
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<td>Graduate Research Assistants</td>
<td>47</td>
<td>43</td>
<td>37</td>
<td>34</td>
<td>39</td>
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<td>PhD Candidates</td>
<td>265</td>
<td>292</td>
<td>278</td>
<td>266</td>
<td>277</td>
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<td>MD/PhD Candidates</td>
<td>20</td>
<td>26</td>
<td>24</td>
<td>22</td>
<td>20</td>
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<td>Registrants in CME Programs</td>
<td>3,581</td>
<td>4,724</td>
<td>6,098</td>
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<td>Medical Observers</td>
<td>574</td>
<td>563</td>
<td>511</td>
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<tr>
<td>Medical Students</td>
<td>548</td>
<td>569</td>
<td>577</td>
<td>524</td>
<td>477</td>
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<td>Nursing Students</td>
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<td>351</td>
<td>355</td>
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<td>595</td>
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<td>Social Work Students</td>
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<td>Laboratory Medicine Students</td>
<td>18</td>
<td>20</td>
<td>13</td>
<td>15</td>
<td>12</td>
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(1) In 2019, 24 staff members held appointments in both the Institute and the Hospital.
## FINANCIAL SUMMARY

### MEMORIAL SLOAN KETTERING CANCER CENTER

### 2019 TOTAL OPERATING REVENUES (Dollars in Thousands)

<table>
<thead>
<tr>
<th>Revenue Type</th>
<th>2019</th>
<th>2018</th>
<th>2017</th>
<th>2016</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Care Revenue</td>
<td>$4,560,174</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contributions and Pledge Payments</td>
<td>$268,525</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants and Contracts</td>
<td>$234,402</td>
<td>$257,893</td>
<td>$296,493</td>
<td>$344,536</td>
<td>$4,560,174</td>
</tr>
<tr>
<td>Other Income</td>
<td>$137,538</td>
<td>$161,245</td>
<td>$191,843</td>
<td>$168,226</td>
<td>$172,525</td>
</tr>
<tr>
<td>Net Assets Released from Restrictions — Pledge Payments</td>
<td>$129,528</td>
<td>$86,850</td>
<td>$86,800</td>
<td>$122,701</td>
<td>$6,000</td>
</tr>
<tr>
<td>Unrestricted Investment Return Allocated to Operations</td>
<td>$90,648</td>
<td>$136,979</td>
<td>$137,750</td>
<td>$151,473</td>
<td>$123,499</td>
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<tr>
<td><strong>Total Operating Revenues</strong></td>
<td>$5,483,376</td>
<td>$5,288,897</td>
<td>$4,909,854</td>
<td>$4,690,794</td>
<td>$5,483,376</td>
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</table>

### 2019 TOTAL OPERATING EXPENSES (Dollars in Thousands)

<table>
<thead>
<tr>
<th>Expense Type</th>
<th>2019</th>
<th>2018</th>
<th>2017</th>
<th>2016</th>
<th>2015</th>
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</thead>
<tbody>
<tr>
<td>Compensation and Fringe Benefits</td>
<td>$2,892,770</td>
<td></td>
<td></td>
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<tr>
<td>Purchased Supplies and Services</td>
<td>$2,026,254</td>
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<tr>
<td>Interest Expense</td>
<td>$40,099</td>
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<tr>
<td>Depreciation and Amortization</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>$5,288,897</td>
<td>$5,026,254</td>
<td>$4,700,827</td>
<td>$4,509,794</td>
<td>$5,288,897</td>
</tr>
</tbody>
</table>

### OPERATING REVENUES (in thousands)

<table>
<thead>
<tr>
<th>Revenue Type</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Care Revenue</td>
<td>$2,745,619</td>
<td>$3,068,587</td>
<td>$3,536,976</td>
<td>$3,973,778</td>
<td>$4,560,174</td>
</tr>
<tr>
<td>Contributions</td>
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<td>161,245</td>
<td>191,843</td>
<td>168,226</td>
<td>172,525</td>
</tr>
<tr>
<td>Grants and Contracts</td>
<td>234,402</td>
<td>257,893</td>
<td>296,493</td>
<td>344,536</td>
<td>4,560,174</td>
</tr>
<tr>
<td>Net Assets Released from Restrictions — Pledge Payments</td>
<td>129,528</td>
<td>$86,850</td>
<td>$86,800</td>
<td>$122,701</td>
<td>$6,000</td>
</tr>
<tr>
<td>Other Income</td>
<td>273,556</td>
<td>242,934</td>
<td>159,458</td>
<td>159,140</td>
<td>123,499</td>
</tr>
<tr>
<td>Unrestricted Investment Return Allocated to Operations</td>
<td>90,648</td>
<td>$136,979</td>
<td>$137,750</td>
<td>$151,473</td>
<td>$123,499</td>
</tr>
<tr>
<td><strong>Total Operating Revenues</strong></td>
<td>$3,611,291</td>
<td>$3,954,488</td>
<td>$4,409,320</td>
<td>$4,909,854</td>
<td>$5,483,376</td>
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### OPERATING EXPENSES

<table>
<thead>
<tr>
<th>Expense Type</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation and Fringe Benefits</td>
<td>$1,987,388</td>
<td>$2,131,070</td>
<td>$2,335,132</td>
<td>$2,587,336</td>
<td>$2,892,770</td>
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<tr>
<td>Purchased Supplies and Services</td>
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<td>1,756,174</td>
<td>2,026,254</td>
</tr>
<tr>
<td>Depreciation and Amortization</td>
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<td>287,145</td>
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<td>329,774</td>
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<tr>
<td>Interest Expense</td>
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<td>48,724</td>
<td>45,343</td>
<td>47,045</td>
<td>40,099</td>
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<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>$2,892,770</td>
<td>$3,764,651</td>
<td>$4,169,765</td>
<td>$4,509,794</td>
<td>$5,288,897</td>
</tr>
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</table>

### INCOME FROM OPERATIONS

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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributions and Pledge Payments</td>
<td>$276,747</td>
<td>$317,270</td>
<td>$318,386</td>
<td>$383,341</td>
<td>$254,401</td>
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<td>Capital Spending</td>
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<td>$737,965</td>
<td>$700,827</td>
<td>$628,148</td>
</tr>
<tr>
<td><strong>Total Operating Income</strong></td>
<td>$1,047,620</td>
<td>$1,051,404</td>
<td>$1,056,351</td>
<td>$1,164,168</td>
<td>$988,549</td>
</tr>
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</table>

### BALANCE SHEET SUMMARY

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<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
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<td>$9,891,492</td>
<td>$10,636,012</td>
<td>$10,623,567</td>
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<td>Liabilities</td>
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<td>4,160,515</td>
<td>4,530,909</td>
<td>4,396,354</td>
<td>4,646,113</td>
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<tr>
<td><strong>Net Assets</strong></td>
<td>5,533,963</td>
<td>5,730,977</td>
<td>6,105,103</td>
<td>6,227,213</td>
<td>6,975,340</td>
</tr>
</tbody>
</table>
In 2019, Memorial Sloan Kettering received nearly 800,000 donations from 550,000 individuals, families, foundations, and companies who contributed more than $417 million to fund cancer research, care, and education. We are grateful to everyone who came together to make landmark achievements possible.

Thank you for being a member of the MSK community and accelerating progress.

“Philanthropy is absolutely essential to our mission.”
— Lisa DeAngelis, Physician-in-Chief and Chief Medical Officer
WHO ARE MSK DONORS?

Unrestricted gifts give MSK leadership the flexibility to allocate resources where they can make the greatest immediate impact.

MORE THAN
25,000 people have given every year for 4 or more years

50% made a gift online

More than 1,300 have given every year for 20-plus years

10 donors have given EVERY YEAR for 44 years

Donors live in all 50 states & 99 countries around the world
Supporting Research
The Society of Memorial Sloan Kettering has been a philanthropic anchor for the institution for decades. As a result of its efforts, MSK scientists and doctors are provided the critical funds that allow them to pursue leading-edge research, create targeted therapies, and improve outcomes for people with cancer worldwide.

The 2019–2020 Society Campaign addressed the second most common cause of cancer-related death: colorectal cancer. Long associated with older people, these cancers are now part of an alarming trend: They are rising in younger adults under 50. Memorial Sloan Kettering’s Center for Young Onset Colorectal Cancer is harnessing MSK’s unsurpassed expertise in cancer diagnostics, research, and patient care to swiftly translate lab discoveries into targeted treatments that outsmart these cancers in patients of all ages. This year’s Society Campaign awarded funds to Julio Garcia-Aguilar, Chief of the Colorectal Service, and medical oncologist Andrea Cercek to spearhead more-effective treatments and new avenues for prevention.

The Society’s pediatrics initiative supported the research of Andrew Kung, Chair of the Department of Pediatrics, and raised vital funds for precision cancer medicine for MSK Kids. Precision medicine brings the right drug to the right patient at the right time. At MSK Kids, critical support for the Precision Cancer Medicine Program will help bring new, more effective drugs to children with cancer — faster.

Each spring, The Society awards research grants to MSK’s promising young investigators. In 2019, the grants supported projects including the implementation of liquid biopsies to improve responses to immunotherapy treatments and defining genetic signatures involved in multiple myeloma in 9/11 survivors.

The Society Prize is awarded at the annual MSK Academic Convocation to a researcher, doctor, or team leader who has made a positive and lasting impact in the fight against pediatric cancer. The 2019 recipient was Kevin Shannon, a physician-scientist and professor at the University of California, San Francisco. Dr. Shannon’s research into RASopathies has advanced our understanding of the causes of, and more recently led to new therapeutic options for, various forms of childhood and adult cancers.

Supporting Patient Care
For more than 70 years, patient care has been at the heart of The Society of MSK’s mission. Some of the most cherished traditions and events at MSK — including the festive holiday parties held throughout the year; complete with overflowing gift bags for patients — are sponsored by The Society. This year was no different, with more than 200 of our youngest patients and their families and friends at Pediatric Prom in May.

Supporting Education
The Society’s 2019 Health Education Seminar focused on important aspects of healthy living and cancer prevention, highlighting nutrition, exercise, and the microbiome. The seminar featured Director of Nutrition Moshe Shike, Director of the Exercise Oncology Service Lee Jones, and Head of the Division of Hematologic Malignancies Marcel van den Brink.

The Society Scholars Prize honors postdocs who are performing at the highest level while also managing family obligations and adjusting to being new parents. This merit-based prize is awarded annually to at least ten full-time postdoc researchers who submit a brief application and personal statement. They are reviewed by a selection panel made up of MSK faculty parents, with final approval from The Society’s President, in consultation with its Executive Committee. The prize provides a cash award for up to four years and is open to postdocs at MSK who have a dependent child under 4 years old.

Andrew Kung (left), Chair of the Department of Pediatrics, with 2019 Society Prize recipient Kevin Shannon, a professor in the department of pediatrics at the University of California, San Francisco.

Andrew Felipe Campesato and his family.

From left: Amanda Taylor, Kathryn Davis, Jamee Gregory, Ferebee Taube, and Hope Geier Smith at the 12th Annual Spring Ball.

An MSK Kids patient enjoying the 2019 Pediatric Prom.
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