What You Fund
2019 Allocations

Thanks to this extraordinary community, $42 million was raised in 2019—bringing the total to more than $220 million in thirteen years. Cycle for Survival funding opens doors for hundreds of MSK physicians, scientists, and research teams pursuing bold ideas. It takes every one of us, from first-year riders to Decade Riders, to continue this momentum and move the needle on rare cancer cures.

Within six months of the close of fundraising, donations are allocated to support a wide-reaching research enterprise that empowers scientists and doctors to make lifesaving discoveries. Their common theme: to advance trailblazing innovations that will help patients everywhere.

The funding includes research on these specific cancer types:

- Adenoid Cystic Carcinoma
- Adrenal Cortex Carcinoma
- Appendix Cancer
- Angiosarcoma
- Bladder Cancer
- Blood Cancer
- Brain Cancer
- Carcinosarcoma
- Cholangiocarcinoma
- Chordoma
- CIC-DUX4 Sarcoma
- Endometrial Cancer
- Esophageal Cancer
- Ewing Sarcoma
- Gallbladder Cancer
- Gastrointestinal Stromal Tumors (GIST)
- Germ Cell Tumors
- Glioblastoma
- Kidney Cancer
- Leiomyosarcoma
- Leukemia
- Liposarcoma
- Liver Cancer
- Lymphoma
- Medulloblastoma
- Melanoma
- Merkel Cell Carcinoma
- Mesothelioma
- Multiple Myeloma
- Neuroblastoma
- Osteosarcoma
- Ovarian Cancer
- Pancreatic Cancer
- Pancreatic Neuroendocrine Tumors
- Retinoblastoma
- Rhabdomyosarcoma
- Sarcoma
- Stomach Cancer
- Thyroid Cancer

$42 MILLION RAISED IN 2019

- $2,000,000 SARCOMA
- $5,000,000 HOPP
- $1,500,000 CENTER FOR HEMATOLOGIC MALIGNANCIES
- $1,500,000 PRECISION PATHOLOGY BIOBANKING CENTER
- $3,500,000 IMMUNO-ONCOLOGY
- $3,500,000 PANCREATIC CANCER
- $3,000,000 COMPUTATIONAL ONCOLOGY
- $3,000,000 BRAIN CANCER RESEARCH
- $1,500,000 MSK-ACCESS LIQUID BIOPSY RESEARCH
- $1,000,000 ORGANOID
- $2,500,000 PEDIATRICS
- $1,000,000 BRAIN CANCER RESEARCH
- $3,000,000 CENTER FOR MOLECULAR ONCOLOGY
- $3,500,000 DIRECTED SUPPORT
- $2,000,000 FUNDAMENTAL CANCER SCIENCE
- $9,000,000 EQUINOX INNOVATION INITIATIVE: TRANSLATIONAL RESEARCH PROGRAMS + GRANTS PROGRAM
Equinox Innovation Initiative

The Equinox Innovation Initiative—named in honor of Cycle for Survival’s longtime founding partner—fuels game-changing research that embodies the innovative spirit of Equinox.

These coveted grants and projects are awarded to MSK physicians and scientists annually through a highly competitive process that enables them to pursue cutting-edge research with speed and agility.

In addition to the grants, translational research programs focused on metastasis, cell biology, cell engineering, brain tumors, and immunotherapy will be funded to support leading experts at MSK, including Dr. Robert Benezra, Dr. Kristian Helin, Dr. Luis Parada, Dr. John Petrini, Dr. Michel Sadelain, and Dr. David Scheinberg.

Blood Cancer
Drawing on MSK’s trove of clinical and genetic research, Dr. Ed Reznik is analyzing the metabolism of cancer cells to pinpoint which patients will respond to new therapies for acute myeloid leukemia (AML) and which have an innate or acquired resistance to the medicines. This work will pave the way for doctors to better match AML patients with the most appropriate drug and to devise new strategies to keep those treatments working.

Bone Marrow Transplants
To help strengthen kids’ immune systems after bone marrow transplants, Dr. Jaap Jan Boelens is turning to the gut. Since a healthy gut microbiome is necessary for normal immune development in children, Dr. Boelens is sequencing their stool samples to identify the ideal mix of microorganisms and viruses for optimal immune recovery—research that could lead to gut-altering strategies capable of helping kids quickly recover a balanced immune system after this powerful lifesaving procedure.

Leukemia
Dr. Jacob Glass is seeking to identify the characteristics of mixed phenotype acute leukemia—a rare and difficult-to-treat subtype in which multiple forms of the disease occur at the same time. Using a combination of computational biology and genomics, he is working to better characterize the features of each cancer, potentially leading to a better prediction of how MPAL would respond to different treatments.

Lymphoma
To diagnose—and prevent—recurrent primary central nervous system lymphoma, Dr. Christian Grommes is using MSK-IMPACT, a test developed by MSK that identifies 468 different cancer-causing genes, to detect the presence of circulating tumor DNA in the cerebral spinal fluid to diagnose brain lymphomas and monitor response treatment. He will identify patients with persistent circulating tumor DNA despite response to initial treatment on conventional imaging—those patients at high risk of recurrence—to offer additional immunotherapy using the drug nivolumab to prevent recurrent disease.

Metastasis
Using zebrafish models of human metastatic melanoma, a particularly aggressive form of cancer, Dr. Richard White is investigating whether certain genes can predict if cancers will spread, or metastasize. He has teamed up with two other well-known melanoma researchers, Leonard Zon and David Adams, to identify how these genes get altered in humans, before using the fish to distinguish their function. Because zebrafish are small and grow quickly, they allow scientists to study how cancer cells change over time. Dr. White even developed a transparent strain of zebrafish, casper, to monitor every step of cancer progression. This could lead to new therapies that target metastasis—the cause of 90 percent of cancer deaths—before it even happens.

Metastatic Sarcoma
Dr. Michael Roehrl is mapping out how patients’ proteins (i.e. the “machines of life”) impact disease progression and outcomes in sarcomas. The goal is to find new ways to control metastasis and help patients fight the disease with treatments tailored to their individual needs. For the first time, his team will analyze patients’ sarcomas simultaneously at both epigenetic and deep protein levels to gain insight into the pathways that cause these rare cancers to spread. They aim to identify new subtypes of sarcomas and learn how and why these diseases metastasize.
**Pancreatic Cancer**
To improve immunotherapy treatments for patients with pancreatic cancer, **Dr. Tuomas Tammela** is building on previous research that revealed a promising new way to promote anti-tumor response. Knowing that cancer cells hijack signals from normal stem cells, his team is working to block those signals to make the cancer more vulnerable—potentially leading to a first-of-its-kind therapy for patients who currently have no treatment options.

**Recurrence**
A patient’s risk of cancer recurrence increases when traces of the disease remain in the bloodstream after surgery. **Dr. Yelena Janjigian** is using MSK-ACCESS, a blood test that detects DNA shed from tumors, to study whether combination immunotherapy treatments can improve outcomes for people whose cancers have been surgically removed. The goal: to eradicate this circulating tumor DNA, which predicts a patient’s chance of recurrence, and if detected and treated early, may maximize the chances of a cure.

**Sarcomas**
**Dr. Edmund Bartlett** is studying whether immunotherapy drugs become more effective when combined with chemotherapy delivered directly to an arm or leg affected by sarcoma. This approach attempts to limit the side effects of chemotherapy while triggering an inflammatory response in sarcoma tumors. The goal is to enhance the efficacy of PD-1 inhibitors, drugs that release the immune system’s natural brakes, so it can mount a stronger attack against cancer.

**Soft Tissue Sarcoma**
Soft tissue sarcomas are frequently treated with surgery followed by radiation therapy, which kills cancer cells or slows their growth by damaging those cells’ DNA. **Dr. Atif Khan** is studying whether this DNA damage can be enhanced with drug combinations to trigger immune responses in sarcoma cell lines that can be exploited to improve outcomes. His research could pave the way for the development of new drug treatments and combinations to better control local cancers as well as those that have spread.

**Thyroid Cancer**
**Dr. Laura Boucai** is examining whether radioactive iodine—frequently used as a targeted therapy for thyroid cancer—may lead to clonal hematopoiesis, a rare blood condition associated with a higher risk of cardiovascular disease as well as certain forms of leukemia. If the relationship is confirmed, the result would provide crucial new information to inform treatment decisions for patients.

**Treatment Resistance**
Too often, cancer cells adapt to a drug that initially worked, forcing patients to change their course of treatment. For rare cancers, there is often no “Plan B.” **Drs. Marc Ladanyi** and **Romel Somwar** are focused on overcoming treatment resistance for a group of rare cancers that share fusions of the gene NRG1. By studying cell lines of these tumors in the laboratory, his team hopes to further understand the mechanisms driving resistance to medicines that target the proteins HER2 and HER3—leading to better outcomes for patients.

**The December Challenge: Organoids**

*Cycle for Survival's December Challenge raised over $2 million to power progress and accelerate discoveries in rare cancer research with $1 million going to organoids—mini 3D versions of a patient's tumor created in a lab to test drug effectiveness and help predict their response to treatment. Although organoids are about the size of a poppy seed, they mimic the complex genetic characteristics and function of organs, making them ideal for testing. This approach to precision medicine can accelerate the discovery of more effective treatment options for people facing a variety of cancers.*

Every participant who donated and received donations from five donors during the month of December had their name displayed in the lab where Cycle for Survival funding is powering new discoveries.
2019 Research Programs

MSK is on the frontline of the battle against rare cancers. Cycle for Survival is proud to support the advancement of comprehensive initiatives at MSK, spanning many critical areas of research.

The Center for Hematologic Malignancies

Building on the groundbreaking discoveries made in blood cancer research over the past decade, Cycle for Survival is fueling new treatment investigations at The Center for Hematologic Malignancies (CHM)—where MSK's world-renowned laboratory scientists are working with clinical investigators to make promising treatment options a reality for people with blood cancers.

Drawing from various areas of expertise, CHM is an MSK-wide collaboration that brings therapies to patients faster than ever before—making unparalleled progress in leukemia, lymphoma, myeloma, and stem cell transplantation. The team, led by physician-scientist Dr. Ross Levine, is conducting laboratory research and clinical trials aimed to improve outcomes for patients with blood cancers. At the heart of this research are detailed molecular studies of all patients treated for blood cancers at MSK, and state-of-the-art studies looking into targeted and immune-based treatment approaches for blood cancers. Cycle for Survival is providing the necessary funding for this work which will inform new treatments for blood cancer patients everywhere.

The Marie-Josée and Henry R. Kravis Center for Molecular Oncology

Cycle for Survival is a major supporter of the groundbreaking work of the Marie-Josée and Henry R. Kravis Center for Molecular Oncology. The genomic discoveries uncovered through this revolutionary program provide answers—and fresh hope—to countless people with rare cancers.

Today, doctors target cancer cells more precisely than ever before, and work is underway to continuously improve this approach. The results of MSK-IMPACT sequencing, a technology invented at MSK—and the first such test to receive FDA authorization—can guide treatment decisions by identifying which genetic mutations are causing a person's cancer. For patients battling rare diseases, this information can point to previously unconsidered mutation-targeted treatment options that result in dramatic tumor regressions or even wipe out the disease. Among the leaders of this endeavor are Drs. David Solit, Marc Ladanyi, and Michael Berger. Cycle for Survival’s investment in this dynamic effort has been vital to its success and momentum: MSK just surpassed 45,000 tumors sequenced since 2014.

Computational Oncology

When diagnosed with cancer, patients often ask, “What caused my disease?” and “How can we beat it?” Cycle for Survival is fueling MSK’s computational oncology program: using the institution’s unique abundance of data to uncover the answers, guide treatment, and change the lives of people battling rare cancers.

MSK’s Chief of Computational Oncology Dr. Sohrab Shah is leading a new initiative to harness MSK’s vast clinical and molecular data resources, gathered over time, to predict how cancers respond to different treatments. These data assets have enduring research and clinical value that is currently untapped. Cycle for Survival is supporting MSK’s research into the development of machine learning and AI-driven systems capable of synthesizing information locked away in separate diagnostics into unified predictive tools. This approach—drawing on insights from radiology, pathology, genomics and other areas—has great potential to improve patient care, both by identifying mechanisms in specific cancers that routinely lead to treatment failure, as well as improving our understanding of therapeutic response.

Human Oncology and Pathogenesis Program

The Human Oncology and Pathogenesis Program (HOPP) is MSK’s hallmark translational research program: a collaborative hub that bridges discoveries made in the lab with clinical research, leading to new and improved treatments for cancer. Cycle for Survival support has been vital to the success of this multi-disciplinary initiative—much to the benefit of patients with rare cancers.

By bringing together a brilliant collective of MSK physicians and scientists who have one foot in the laboratory and the other in the clinic, HOPP serves as a unique and rapid incubator for innovative cancer-fighting strategies. Led by Dr. Charles Sawyers, the program focuses on developing novel cancer therapies, often for people with malignancies that lack effective
treatments or standards of care. Cycle for Survival has been a proud, longstanding partner of this renowned program, fueling paradigm-changing research that has reshaped how rare cancers are understood and treated. HOPP researchers are among the world’s foremost experts in oncology and their findings impact the lives of patients everywhere.

**Immunotherapy**

For more than a century, MSK has set the pace in immunotherapy, using the immune system to seek out and destroy cancer cells, and Cycle for Survival’s support continues to propel the science forward.

Today CAR T cell therapy and checkpoint inhibitors—pioneering therapies first developed by MSK scientists—are helping to improve the lives of patients everywhere with advanced blood, lung, kidney, bladder, head and neck, and other cancers. While these drugs are changing the way many cancers are treated, there is still much work to be done: they do not work for all cancers, they have side effects, and some patients who initially respond well eventually develop resistance to treatment. Led by Dr. Jedd Wolchok, MSK physician-scientists are taking aim at these problems with the overall goal of making immunotherapy stronger and more effective, as well as to identify the patients who will benefit most from a particular type of therapy. They are also working every day to develop new approaches—including innovative combination therapy, cancer vaccines, laboratory-engineered antibodies, and the use of tiny “nanoparticles” to deliver drug therapies—that have the potential to increase the effectiveness of these treatments.

**MSK-ACCESS**

Traditional surgical biopsies can be invasive and aren’t always comprehensive. With funding from Cycle for Survival, MSK researchers have harnessed the power of cell-free DNA (cfDNA) to create MSK-ACCESS, a revolutionary liquid biopsy test that provides noninvasive genomic profiling and disease monitoring using the deep-sequencing of 129 cancer-associated genes.

Human cells, including cancer cells, can shed DNA into the bloodstream and other bodily fluids, and with a simple blood draw, this test—developed by Dr. Michael Berger and his colleagues in MSK’s Marie-Josée and Henry R. Kravis Center for Molecular Oncology and Department of Pathology with major support from Cycle for Survival—provides a unique, noninvasive way to both profile the genes that cause cancer and guide treatment decisions. MSK-ACCESS is impacting the study of all cancers at MSK, but may be especially life-changing for people with rare cancers who don’t have tumor tissue available or who have cancers that are difficult to biopsy. It can also help to determine the need for additional treatment post-surgery, and may open new doors for people with rare cancers by identifying new or relapsed cancer early and flagging drug resistance as soon as it begins to occur—providing an opportunity to pivot the treatment strategy before disease progresses.

**The Neuro-Oncology Research Translation in Humans Program**

The Neuro-Oncology Research Translation in Humans (NORTH) Program aims to accelerate brain cancer research and the next generation of treatments for both adult and pediatric brain tumors. Cycle for Survival support plays a central role in the program’s ability to bring emerging concepts and scientific discoveries from the laboratory to the patients who need them.

Working in close collaboration with MSK’s Brain Tumor Center, the NORTH Program is pursuing a series of leading-edge research initiatives designed to expand brain cancer research and the development of new therapies for primary and metastatic brain tumors. Because progress in brain tumor-related drug development has been slow, efforts to speed up the process of turning discoveries made in the lab into lifesaving treatment options are crucial, and Cycle for Survival is proud to provide key funding to support brain tumor drug discovery. Dr. Ingo Mellinghoff is leading a series of projects—from studying potential biomarkers that could predict tumor reoccurrence earlier than ever before, to matching tumor DNA found in a patient’s cerebral spinal fluid using a tumor’s genetic profile—with each one delivering new insights into how to better determine treatment decisions in the future.

**The David M. Rubenstein Center for Pancreatic Cancer Research**

By 2020, pancreatic cancer is projected to become the nation’s second leading cause of cancer death. This aggressive disease rarely causes symptoms at first—making it a challenge to detect in its early stages—and is often caught only once it metastasizes and becomes inoperable. Cycle for Survival is fighting back by supporting the expansion of genomic analysis to pinpoint the drivers and reveal the vulnerabilities of this devastating disease.
The mission of the David M. Rubenstein Center for Pancreatic Cancer Research is to pursue groundbreaking research focused on early detection methods, prevention, immunotherapy strategies, and genetic sequencing of this complex and challenging disease. As Director of the Center, Dr. Christine Iacobuzio-Donahue brings together a multidisciplinary team of scientists and physicians to translate the discoveries made in the laboratory into more targeted treatments for patients. Cycle for Survival is playing a key role in this ambitious initiative by helping to launch the TOPCOAT initiative (Tracking of Pancreatic Cancer Progression and Resistance) that aims to guide care management based on studying patient over the course of their treatment. The Center continues to pioneer patient specific cancer models for personalized medicine, as well as studying DNA and RNA changes in pancreatic cancer cells that cause resistance to chemotherapy.

**Precision Pathology Biobanking Center**

Biobanking is an innovative, science-driven process that delivers on the promise of precision medicine: to make informed treatment decisions based on the molecular analyses of a patient’s disease. For people with rare cancers, there can be few opportunities to better understand their conditions because clinical trials are often limited or don’t exist. Researchers at the Precision Pathology Biobanking Center (PPBC) are working to change that by collecting and evaluating every patient’s tumor to provide more insight.

MSK established precision pathology to serve as a hub for collecting, analyzing, and cataloguing patient samples, a process designed to build insight and develop more tailored treatments. Led by Dr. Michael Roehrl, the PPBC team is constructing the premier archive of human tissue samples with the ultimate goal of mapping out and tracking how cancer-causing molecular changes influence disease progression. Taking the next leap beyond genomics, the PPBC is developing new technologies, including a cutting-edge approach to proteomics, the global study of the proteins that makeup the molecular machinery of human cells. This allows researchers to identify changes across multiple cancer types—revealing how primary tumors grow and metastasize. Cycle for Survival funding is making it possible for researchers to design and implement clinical studies that use this data, especially for basket trials, a precision medicine approach that targets molecular changes regardless of the patient’s cancer type.

**Sarcoma**

The Jennifer Goodman Linn Laboratory of New Drug Development in Sarcoma and Rare Cancers at MSK—named in honor of Cycle for Survival’s founder—is a powerful symbol of the movement’s commitment to defeat every form of sarcoma. Cycle for Survival support has also empowered MSK’s Sarcoma Medical Oncology Service team to drive research forward with unprecedented speed.

The Sarcoma Medical Oncology Service, led by Dr. William Tap, works tirelessly to improve outcomes for patients. Cycle for Survival has given MSK’s physician-scientists the resources to build one of the world’s largest and most productive programs dedicated to sarcoma, rapidly growing an arsenal of research programs and options to combat the 70+ complex types of the disease. This includes more than 20 clinical trials at a time to test novel strategies against these malignancies. Scientists are also studying ways to manipulate how drugs work and predict if a therapy will be effective for a patient before it’s even prescribed. Cycle for Survival’s backing has cemented MSK’s worldwide reputation in sarcoma research.

**Sloan Kettering Institute**

Sloan Kettering Institute (SKI) was founded in 1945 to develop new techniques to conquer cancer. Today, SKI’s laboratories operate as the crucial experimental research arm of MSK: advancing science to help cancer patients worldwide.

Directed by Dr. Joan Massagué, SKI represents the very best of scientific inquiry. Spanning nine research programs, its staff of more than 100 laboratory investigators, 400 fellows, and 300 graduate students works together toward SKI’s collective mission: devising better ways to combat cancer.

As a result, MSK ranks as one of the world’s top academic institutions in producing FDA-approved drugs for cancer treatment. Cycle for Survival’s longtime support for SKI has propelled innovation, advanced sophisticated technologies, and bolstered infrastructure in profound ways. This year’s funding will be directed to key strategic initiatives: furthering scientists’ ability to turn ideas once considered impossible into meaningful breakthroughs for patients battling rare cancer.
Directed Support and MSK Kids
Each project that Cycle for Survival funds represents a bold step toward new and better ways to fight rare cancers.

Behind every breakthrough are teams of determined, focused scientists who started with an idea to help people beat cancer. Every year, Cycle for Survival recognizes the potential of a wide range of research projects and topics—any one of which could profoundly change the lives of patients and their loved ones. Cycle for Survival is proud to fuel studies led by MSK Kids—the largest pediatric cancer program in the country, and home to a specialized precision oncology program singularly focused on childhood cancers. All of these research endeavors exemplify the progress and momentum underway at MSK for targeting rare diseases.