



MEMORIAL SLOAN KETTERING | EQUINOX

Cycle for Survival 2020 Allocations

Cycle for Survival fights back against rare cancers with 100% of every dollar raised. Funding Memorial Sloan Kettering’s clinical trials, laboratory research, and technology development leads to new drugs and more effective treatments.

This Is Your Impact

Even though we weren’t able to have our final weekend of events, thanks to you, **Cycle for Survival raised \$40 million for rare cancer research in 2020** — bringing us to more than \$286M since 2007. Within six months of the close of fundraising, 100% of 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.

SARCOMA \$1,250,000	HEMATOLOGIC MALIGNANCIES \$2,000,000
IMMUNO-ONCOLOGY \$2,000,000	BIOBANKING CENTER
\$1,500,000	MOLECULAR ONCOLOGY \$4,000,000
HOPP \$5,000,000	MSK KIDS \$2,000,000
DIRECTED SUPPORT	

\$40 MILLION RAISED IN 2020

LIGHT SHEET FLUORESCENCE MICROSCOPES	\$1,000,000
ORGANOIDS \$1,250,000	BRAIN CANCER \$4,000,000
PANCREATIC CANCER \$1,000,000	COMPUTATIONAL ONCOLOGY
\$2,000,000	EQUINOX INNOVATION INITIATIVE \$9,000,000

37,500

participants registered across the country

Surpassed a quarter of a billion dollars

raised since 2007

250,000

donations helped raise \$40 million

2020 Research Programs

MSK is on the front line in 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.

Brain Cancer • \$4,000,000

The Neuro-Oncology Research Translation in Humans (NORTH) Program aims to accelerate brain cancer research and beget 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 closely with MSK's Brain Tumor Center, the NORTH Program is pursuing leading-edge research initiatives designed to expand our understanding of brain cancer and develop 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 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 possible biomarkers that could predict tumor recurrence earlier than ever before to matching tumor DNA found in a patient's cerebrospinal fluid using a tumor's genetic profile — with each one delivering insights into how to better determine care in the future. The recruitment of renowned neuro-oncology physicians and researchers across the Department of Neurology is also integral to MSK's brain cancer research progress. Cycle for Survival is proud to support neuro-oncology recruitment efforts.

The Center for Experimental Immuno-Oncology • \$2,000,000

The Center for Experimental Immuno-Oncology (EIO) was formed in 2020 to unite the research community at MSK and SKI around identifying and understanding immune pathways, with the goal of empowering new immunotherapy approaches. The EIO Center operates under the emerging understanding that tumors are formed by co-evolving groups of interactive cancer cells and immune cells. Dr. Michael Glickman brings his years of experience in immunology to lead the center's many initiatives that will strengthen MSK's leading role in the field.

To catalyze collaboration among investigators, the center plans to foster an intellectual community around immuno-oncology and create resources such as a bank of tumor and blood-derived cell samples. Investigators will test their emerging therapies on these human tumor samples, expediting their potential availability. With Cycle for Survival support, the EIO Center will continue to build on existing research and expand the breadth of MSK's efforts in immuno-oncology.

The Center for Hematologic Malignancies • \$2,000,000

Building on the seminal discoveries made in blood cancer research over the past decade, Cycle for Survival is supporting investigations at the Center for Hematologic Malignancies (CHM), where MSK's renowned laboratory scientists are working with clinical investigators to make promising therapeutic options a reality for people with blood cancer.

Drawing from various areas of expertise, the 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 center, under **Dr. Omar Abdel-Wahab**, is conducting laboratory research and clinical trials aimed at improving outcomes for patients with blood cancer. At the heart of this research are studies to better understand the genomic drivers that cause blood cancer and state-of-the-art clinical trials that explore targeted and immune-based treatments. Cycle for Survival is providing the necessary funding for this work, which will inform new approaches for people around the world with blood cancer.

Computational Oncology • \$2,000,000

When diagnosed with cancer, people often ask, “What caused my disease?” and “How can we beat it?” Cycle for Survival is fueling MSK’s Computational Oncology program, which was founded to address these very questions. Using the institution’s unique abundance of data to uncover cancer’s origin and vulnerabilities, researchers are gaining insights that will be instrumental in guiding medical decisions that could change the lives of people battling rare cancers.

Dr. Sohrab Shah is leading an initiative to harness MSK’s vast clinical and molecular data resources to predict how cancers will respond to different therapies. These valuable data sets have untapped research and clinical value that could hold the key to many unsolved questions. Cycle for Survival is supporting MSK’s research to develop machine learning and AI-driven systems capable of synthesizing patient information locked away in separate diagnostic silos 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 what’s behind treatment failures for specific cancers and by improving our understanding of therapeutic responses.

The David M. Rubenstein Center for Pancreatic Cancer Research • \$1,000,000

Pancreatic cancer is projected to become the nation’s second leading cause of cancer death within 10 years. This aggressive disease rarely causes symptoms at first — making it a challenge to detect in its early stages — and is often caught only after it has metastasized and is inoperable. Cycle for Survival is fighting back by funding 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 research focused on early detection methods, prevention, immunotherapy strategies, and genetic sequencing of this complex disease. **Dr. Christine Iacobuzio-Donahue** heads up a multidisciplinary team of scientists and physicians who work 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 launch TOPCOAT (Tracking of Pancreatic Cancer Progression and Resistance), which aims to guide decision-making by studying patients over the course of their care. The center continues to pioneer patient-specific cancer models for personalized medicine, as well as study DNA and RNA changes in pancreatic cancer cells that cause resistance to chemotherapy.

Human Oncology and Pathogenesis Program • \$5,000,000

The Human Oncology and Pathogenesis Program (HOPP) is MSK’s hallmark translational research program: a collaborative hub that bridges discoveries made in the lab to clinical research, leading to new and improved treatments for cancer. Cycle for Survival funding has been vital to the success of this multidisciplinary initiative — much to the benefit of people 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 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, long-standing partner of this renowned program, inciting paradigm-changing research that has reshaped how rare cancers are understood and treated. HOPP researchers are among the foremost experts in oncology, and their findings impact the lives of people with cancer worldwide.

The Marie-Josée and Henry R. Kravis Center for Molecular Oncology • \$4,000,000

Cycle for Survival is a major supporter of the innovative work conducted at 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. MSK-IMPACT™ is a genomic sequencing tool developed at MSK that analyzes tumors for DNA mutations in 505 genes known to play a role in cancer. It was the first such test to receive FDA authorization and can guide treatment decisions by identifying the genetic causes of a person's cancer. For patients battling rare diseases, this information can point to previously unconsidered mutation-targeted drugs and immunotherapies that result in dramatic tumor regressions or even wipe out the disease. Among the leaders of this endeavor are **Dr. David Solit** and **Dr. Michael Berger**. Cycle for Survival's investment in this dynamic effort has been critical to its success and momentum: MSK has surpassed 58,000 tumors sequenced using MSK-IMPACT since 2014.

MSK Kids • \$4,000,000

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.

Organoids • \$1,250,000

In a revolutionary way to study cancer, researchers across MSK are growing organoids. These miniature, 3-D versions of a patient's tumor are created in a lab to test a drug's effectiveness and help predict the patient's response to treatment. Although organoids are about the size of poppy seeds, they mimic the complex genetic characteristics and functions of organs, making them ideal for testing.

By observing how cancer behaves in organoids, researchers can devise novel strategies to target potential vulnerabilities and better understand how a person's tumor may respond to different approaches. Cycle for Survival support will fund a joint endeavor, led by **Dr. Charles Sawyers** and **Dr. Scott Lowe**, to explore the genomic alterations that can lead to the creation of tumors. This approach to precision medicine can accelerate the discovery of more effective treatments for people facing a variety of cancers.

Precision Pathology Biobanking Center • \$1,500,000

Biobanking is an innovative, science-driven process that delivers on the promise of precision medicine: to make informed decisions based on the molecular analysis of a patient's disease. For people with rare cancers, access to specimens that can be used to better understand the molecular causes of the disease is particularly important. Researchers at the Precision Pathology Biobanking Center (PPBC) are working to collect and evaluate every patient's tumor to provide more insight.

MSK established the PPBC to collect, analyze, and catalog patient samples, a process designed to build insight and develop more tailored treatments. **Dr. Michael Roehrl** and the PPBC team are constructing the premier archive of human tissue and blood 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 leading-edge approach to proteomics, the global study of the proteins that make up 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.

Sarcoma • \$1,250,000

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 to beat rare cancers. Cycle for Survival support has enabled MSK's Sarcoma Medical Oncology Service to drive research forward with unprecedented speed.

The 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 and therapies to combat the 100-plus types of the disease. This includes running more than 31 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 reputation as a leader in sarcoma research.

2020 Directed Support

Omar Abdel-Wahab, MD

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Blood Cancer*

David Abramson, MD

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Pediatric Retinoblastoma*

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Pediatric Neuroblastoma*

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Sarcoma*

Daniel Coit, MD, FACS

*Surgical Oncologist
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Hepatopancreatobiliary Fellowship Program
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Hepatobiliary Cancer*

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*Physician-in-Chief and Chief Medical Officer
Scott M. and Lisa G. Stuart Chair
Brain Cancer*

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*Medical Oncologist
Liposarcoma*

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*Pediatric Oncologist
Pediatric Brain Cancer; Pediatric Retinoblastoma*

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Interventional Radiology

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Medical Oncologist
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Vice Chair for Clinical Research
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CIC-DUX4 Sarcoma

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Medical Oncologist
Gallbladder Cancer

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Osteosarcoma; Synovial Sarcoma

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Medical Oncologist
Sarcoma; Leiomyosarcoma

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Medical Oncologist
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Adenoid Cystic Carcinoma;
Pediatric Acute Myeloid Leukemia

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Pediatric Neuro-Oncology

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Hepatobiliary Cancer

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Medical Oncologist
Blood Cancer

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Medical Oncologist
Gynecologic Cancer; Ovarian Cancer

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Chair, Department of Pediatrics
Lila Acheson Wallace Chair for Pediatric Research
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Pediatric Sarcoma

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Laurence Joseph Dineen Chair in Leukemia Research

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Gynecologic Cancer

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Evrin Family Chair in Neuro-Oncology
Brain Cancer; Glioblastoma

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Vice Chair for Clinical Affairs
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*Chief, Neuroblastoma Service
Neuroblastoma*

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Robert and Kate Niehaus Chair in
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Michael Postow, MD

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Immunotherapy*

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Bladder Cancer*

Sohrab Shah, PhD

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Mesodermal Tumor; Carcinosarcoma*

Neerav Shukla, MD

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Pediatric Cancer*

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*Chief, Gastric and Mixed Tumor Service
Vincent Astor Chair of Clinical Research
Sarcoma*

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Cholangiocarcinoma; DNA Sequencing;
Make-An-Impact*

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Enid A. Haupt Chair in Clinical Investigation
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*Hematologic Oncologist
b. Myelofibrosis*

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Sarcoma; Leiomyosarcoma*

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Pediatric Cancer*

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Kidney Cancer*

Leonard Wexler, MD

*Pediatric Oncologist
Rhabdomyosarcoma*

Jedd Wolchok, MD, PhD

*Chief, Immuno-Oncology Service
Lloyd J. Old/Virginia and
Daniel K. Ludwig Chair in Clinical Investigation
Immunotherapy*

Yoshiya "Josh" Yamada, MD

*Co-Chief, Multi-Disciplinary Spine Tumor Service
Chordoma*

2020 Equinox Innovation Initiative Award Recipients

Mutation Patterns That Lead to Acute Myeloid Leukemia

Using multiple methods of single-cell analysis, **Dr. Ross Levine** is studying how patterns of mutations in the stem cells that create blood can lead to acute myeloid leukemia. By more fully understanding how stem cells evolve and progress toward leukemia, scientists are getting closer to identifying new ways to treat and prevent cancer at precancerous stages.

Dr. Levine is Chief of the Molecular Cancer Medicine Service and Laurence Joseph Dineen Chair in Leukemia Research.

Liquid Biopsy to Monitor Diffuse Midline Glioma

Dr. Alexandra Miller is using a new diagnostic technique to more effectively treat children who have a type of brain cancer called diffuse midline glioma. In collaboration with **Dr. Michael Berger**, they are using liquid biopsy, a test that can detect small amounts of tumor DNA in the cerebrospinal fluid and blood, to diagnose the cancer sooner and monitor its progression. Going forward, care teams will be able to easily take multiple samples by liquid biopsy over time, so they can track changes in tumors and plan treatment accordingly.

Dr. Berger is Associate Director of the Marie-Josée and Henry R. Kravis Center for Molecular Oncology.

Cancer Risk With Bloom Syndrome

Dr. Maria Jasin is investigating a common inherited mutation in the BLM gene, which is associated with Bloom syndrome. Individuals with this syndrome have a higher chance of developing cancer of all types. Recent innovations in tumor sequencing have allowed researchers to find BLM mutations in people without Bloom syndrome. Dr. Jasin's research aims to suggest novel therapeutic strategies that would provide hope to many people with rare and common cancers.

Dr. Jasin is William E. Snee Chair.

Outcome Disparities in Endometrial Cancer

Black women with endometrial carcinoma are more likely to die from the disease than white women, even when controlling for such factors as stage at diagnosis, obesity, and hypertension. **Dr. Carol Brown** is pursuing a comprehensive pathology review correlated with data from MSK-IMPACT™ to reveal whether genetic alterations in these women's cancers can explain their disparate outcomes. The study, the largest molecular characterization of endometrial carcinomas in Black women to date, will also assess the prognostic value of genomic profiling on survival for these women.

Dr. Brown is Senior Vice President, Chief Health Equity Officer, and Nicholls-Biondi Chair for Health Equity.

Fusion-Positive Sarcomas

Fusion-positive sarcomas are aggressive cancers with distinct genetic aberrations. A team led by **Dr. Neerav "Neal" Shukla** is harnessing liquid biopsy, a noninvasive test, to determine how disease-defining mutations change in people undergoing treatment for these rare sarcomas. The goals: to create a standard liquid biopsy that can be used for diagnosis and to measure treatment response and tailor therapy in patients with these sarcomas.

Dr. Shukla is Director of the Pediatric Translational Medicine Program at MSK Kids, Memorial Sloan Kettering's pediatric program.

Treatment Resistance in Renal Cell Carcinoma

One of the biggest obstacles in developing effective cancer immunotherapies is figuring out why only certain patients respond to treatment. **Dr. A. Ari Hakimi** is researching resistance to targeted and immune-based therapies in people with advanced renal cell carcinoma, a type of cancer that forms in small tubules of the kidneys. Dr. Hakimi and team are characterizing the role of immune cells in people who respond to or are resistant to immune and targeted therapies.

Malignant Peripheral Nerve Sheath Tumor

A malignant peripheral nerve sheath tumor (MPNST) is a highly aggressive sarcoma that cannot be easily treated with standard therapies. **Dr. Ping Chi** recently discovered that people with all forms of MPNST have mutations that inactivate important tumor suppressor genes. Establishing the underlying causes of MPNST has allowed Dr. Chi's lab to identify a therapeutic strategy that counteracts these genomic mutations and simultaneously prompts the immune system to seek and destroy cancer cells.

Cancer Risk With Bloom Syndrome

While combining chemotherapy with the drug venetoclax (Venclexta®) has led to meaningful improvements for older people with acute myeloid leukemia, most individuals treated with this drug combination eventually see the disease progress. **Dr. Anthony Daniyan** is engineering a next-generation chimeric antigen receptor (CAR) T cell that targets lingering treatment-resistant cells in this rare blood cancer.

Investigating a Sarcoma Mutation

The DICER1 gene helps regulate healthy cell growth and division. When this gene is disrupted, individuals are at a greater risk of developing certain types of cancer, including sarcoma. **Dr. Eric Lai** and his team are researching DICER1-associated sarcomas to understand what drives cancer growth and potentially uncover new strategies to treat people with this syndrome.

Uncovering Genomic Mutations in Renal Cell Carcinoma

To improve targeted and immune-based therapies for people with a group of rare and aggressive kidney cancers called unclassified renal cell carcinoma, **Dr. Yingbei Chen** and collaborator **Dr. Emily Cheng** are studying the interaction between genomic causes of uncontrolled cancer growth and the immune system's role in cancer progression. They hope that the findings will lead to new treatment options and better outcomes for people with this disease.