

2017 Funding Allocations



MEMORIAL SLOAN KETTERING | EQUINOX

Cycle for Survival fights back against rare cancers with 100% of every dollar. This extraordinary community funds groundbreaking clinical trials, research studies, and technologies led by Memorial Sloan Kettering.

Within six months of the events, donations support a bold research enterprise—empowering scientists and doctors to make lifesaving discoveries and advance trailblazing innovations that will help patients everywhere. Raising \$34 million this year—and more than \$140 million in the eleven years since inception—is all thanks to the determined riders, supporters, patients, researchers, and physicians who are making a lasting impact.

Here is how that \$34 million is transforming the fight against rare cancers.

\$34 Million Raised in 2017



Funded Research

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, which span across many critical areas of research.

»»» Precision Prevention

When cancer is identified early, the likelihood of survival increases by 80 percent. Imagine finding someone's disease long before it fully develops into cancer—and having the power to stop it immediately. Precision prevention is a new field set to change the future of cancer as we know it.

Most current screening methods are insufficient, and many miss the first signs of cancer entirely. Two exceptions are the Pap smear and colonoscopy: both find cancer at its earliest, most treatable stage. Cycle for Survival is seeding a groundbreaking endeavor, run by **Luis Diaz, MD**, which applies the concepts of precision medicine to healthy individuals in a bold step to ultimately increase survival rates. The team is creating tools to screen and flag those people most likely to develop cancer—triggering a life-saving medical intervention to reduce any chance of disease progression.

»»» Epigenetics

Epigenetics is an entirely different approach to understanding and treating cancer. By reversing diseased cells back into healthy ones, patients are spared the dangerous side effects of traditional therapy. Regarded by many as the next frontier of oncology, MSK is pursuing high-impact trials and research into how epigenetic drugs affect cell behavior.

While radiation and chemotherapy fight disease, they can harm the rest of the body. In contrast, epigenetics focuses on the mechanisms by which all of the cells in our body adopt different roles, and which are markedly altered in cancerous ones. By studying how genes are irregularly turned on and off in cancer cells, MSK President and CEO **Dr. Craig Thompson, Dr. Ross Levine**, and others are developing new drugs that turn cells back to normal after they malfunction and become malignant. Cycle for Survival is funding innovative laboratory research and clinical trials exploring the effect of epigenetics in cancer development and the role of drugs that reverse these alterations. They will test two types of therapies, paired with other drugs to simultaneously target multiple genetic and epigenetic abnormalities. Thanks to Cycle for Survival, science becomes medicine.

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

The CMO has ushered in a new era of cancer research, diagnosis, and treatment—leading to answers and hope for patients who otherwise had none. Cycle for Survival continues to support this transformative effort. The CMO fuels MSK's expansive precision oncology venture, identifying cancer-driving genetic mutations and targeting them with superb accuracy.

In this era of personalized medicine, all roads lead back to the Marie-Josée and Henry R. Kravis Center for Molecular Oncology (CMO). Directed by **Dr. David Solit**, the CMO's reach stretches far and runs deep. Thanks to Cycle for Survival, CMO researchers are constantly improving MSK-IMPACT, the all-important test used by physicians and scientists to explore and find the genetic mutations that cause cancer. The team recently hit a major milestone: announcing the results of their first 10,000 tumors sequenced. Undoubtedly this work is just getting started, and with Cycle for Survival's backing, so much more will be achieved.

»» Precision Pathology Biobanking Center

The future of cancer treatment is all about precision: how to tackle each patient's unique disease with a personalized approach. Pathology makes this possible—and at MSK, these samples are stored in a state-of-the-art “biobank.” Cycle for Survival's investment created this powerful infrastructure, laying the foundation for pace-setting rare cancer research.

Led by **Dr. Michael Roehrl**, the Precision Pathology Biobanking Center is the nucleus for MSK's clinical and molecular data: used by physicians and scientists throughout MSK to better understand their patients' disease and adjust therapy, all in real-time. The Center feeds a wide breadth of programs, and is a springboard for a rapidly growing field called “theranostics”—when pathology, diagnostics, and treatment are evaluated in an integrated manner for each patient to make the best, most personalized plan. Thanks to Cycle for Survival's support in 2016 and 2017, MSK's next-generation biobank is poised to maximize the full potential of data to outsmart cancer.

»» The Human Oncology and Pathogenesis Program

The Human Oncology and Pathogenesis Program (HOPP) is constantly pushing the boundaries of possibility for patients battling cancer. Drawing together expert physician-scientists with a range of specialties, HOPP is taking on cancer, one person—one breakthrough—at a time.

Led by **Dr. Charles Sawyers**, HOPP is essential to MSK's “translational” research program: ideas and scientific observations from the lab are turned into new approaches to help rare cancer patients everywhere. Thanks to Cycle for Survival, HOPP continues to foster paradigm-changing, imaginative research targeting many rare cancers. Year after year, Cycle for Survival has been a proud partner with HOPP—providing vital resources to this wide-reaching scientific machine. Progress generated from this unique enterprise not only informs and guides the investigations underway at MSK, but impacts oncology research globally.

»» Sarcoma

The Jennifer Goodman Linn Laboratory of New Drug Development in Sarcoma and Rare Cancers—named in honor of Cycle for Survival's founder—is a constant reminder of why we fight. To treat more than 70 types of sarcoma, MSK is exploring ways to match the right drug to the right person.

MSK's Sarcoma Medical Oncology Service, directed by **Dr. William Tap** is leading research to better understand these diseases, and grow the arsenal of options to counter them. Cycle for Survival is advancing MSK's immunotherapy program—turning the immune system against sarcoma. One study uses drugs to stop cancer cells from growing; another evaluates immunotherapy's effect on pediatric sarcomas. MSK is also finding ways to predict patient response, so the best drug can be chosen from the start. Another Cycle for Survival project will determine if the genetic drivers behind other cancers cause sarcoma—a major step toward better treatments.

»» Computational Oncology

One of the biggest unrealized opportunities in cancer research today is big data. Cycle for Survival's instrumental support of computational oncology will bolster MSK's groundbreaking program to mine this unprecedented influx of genomic and clinical data—and discover what matters most to help patients battle cancer.

Contained in a single tumor sample are potentially thousands and thousands of genetic mutations. To identify which should be targeted with anti-cancer therapies, **Drs. Nikolaus Schultz** and **Barry Taylor** look for common threads within this great diversity of molecular changes. Cycle for Survival is advancing their work in translational genomics: using DNA sequencing to help patients fight cancer right now. Recognizing that cancer changes and evolves—becoming harder to wipe out—their groups leverage sequencing data to stay a step ahead. By tracking how rare cancers evade treatment, alternate approaches can be implemented sooner—and save lives.

»» Center for Hematologic Malignancies

Major discoveries into the hows and whys of leukemia, lymphoma, and myeloma have delivered promising new options for patients everywhere. Cycle for Survival is advancing research and innovation across multiple fronts—synergizing how laboratory science is swiftly translated into new ways of helping people fight blood cancer today.

Directed by **Dr. Ross Levine**, the Center for Hematologic Malignancies is an MSK-wide collaboration that brings therapies to patients faster than ever before based on new insights from MSK scientists. The team is conducting a series of clinical trials to evaluate drugs aimed at the behavior of cells—uncovering ways to effectively combat cancer, with fewer side effects. This research relies on genomic sequencing, a predictor of whether someone's disease will respond to treatment, and on state-of-the-art laboratory research designed to identify and test novel, more effective treatments. Cycle for Survival will continue supporting testing every rare blood cancer patient at MSK: analytics that build out a robust data platform, allowing seamless integration of genomics into all future studies.

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 to enable cutting-edge research to be pursued with speed and agility.

Dr. Omar Abdel-Wahab, *Hematologic Oncology*

Targeting Myelodysplastic Syndrome

To help men and women with myelodysplastic syndrome and related blood cancers, Dr. Omar Abdel-Wahab seeks to understand how two exciting new therapies currently in clinical trials work.

Dr. Vittoria Arslan-Carlon, *Anesthesiology & Critical Care Medicine*

Neurodevelopment of Retinoblastoma Patients

Dr. Vittoria Arslan-Carlon is examining the impact of treatment, including multiple exposures to anesthesia, on the neurodevelopment of children with retinoblastoma, a pediatric eye cancer.

Dr. Ping Chi, *Sarcoma Oncology Service*

Tumors Deficient in the SMARCB-1 Gene

The gene SMARCB1 has been shown to suppress tumor growth. Dr. Ping Chi is investigating SMARCB1-deficient tumors, and in particular how the genetic and epigenetic alterations as a result of this deficiency impact the development, diagnosis, and treatment of some forms of sarcoma

Dr. Alexander Drilon, *Thoracic Oncology Service*

Resistance to NTRK Inhibitors

Dr. Alexander Drilon is leading a study to identify why cancers that rely on a gene called NTRK eventually develop resistance to new medicine designed to halt the growth of these tumors.

Dr. Daniel Heller, *Molecular Pharmacology & Chemistry*

New Approaches in Drug Delivery for Pediatric Brain Tumor Patients

Dr. Daniel Heller is developing nanomedicines—tiny particles that target drugs directly to tumors—to improve the effectiveness and reduce side effects of medicines in the treatment of medulloblastoma and other forms of brain cancers.

Dr. Prasad Jallepalli, *Molecular Biology*

DNA Replication

“Cohesin” proteins trap and bind DNA molecules, and are important to the DNA replication process. Dr. Prasad Jallepalli's lab is studying the link between cancer and these proteins.

Dr. Maria Jasin, *Developmental Biology Program*

Understanding BRCA2 and Treatment Response

By focusing on the DNA binding process within BRCA2, Dr. Maria Jasin seeks to understand the protein's role in tumor suppression: how does BRCA2's presence impact a tumor's sensitivity or resistance to treatment.

Dr. Andrew Kung, *Chair, Department of Pediatrics*

Treating Malignant Rhabdoid Tumors

To expand treatment options for children with malignant rhabdoid tumors—and, eventually, for other cancer types—Dr. Andrew Kung is exploring the efficacy of a drug that inhibits the activity of the XPO1 protein.

Dr. Marc Ladanyi, *Chief, Molecular Diagnostics Service*

Strategies for Targeting Pediatric Sarcoma

Building on the early success of a novel, DNA-based compound targeting desmoplastic small round cell tumors in the lab, Dr. Marc Ladanyi is developing a treatment strategy that could fight other types of sarcoma caused by similar genetic alterations to the one in desmoplastic small round cell tumors.

Dr. Ross Levine, *Director, Center for Hematologic Malignancies*

Role of Genomics in Development and Treatment of Leukemia

Dr. Ross Levine is studying the role of two genes that contribute to acute myeloid leukemia and developing new approaches to model these genes. This work will inform future clinical studies designed to target multiple genetic drivers that cause cancer.

Dr. Eric Pamer, *The Castori Center for Microbes, Inflammation & Cancer*

Rebuilding the Gut Microbiome

Stem cell transplant can disrupt a patient's gut microbiome. CMIC's clinical trial will determine if rebuilding the microbiome boosts resistance to infection and reduces inflammation.

Dr. Elli Papaemmanuil, *Epidemiology & Biostatistics*

Genetic Mutations in Ovarian Clear Cell Cancer

For women with ovarian clear cell carcinoma, Dr. Elli Papaemmanuil is using genomics and statistical analysis to understand how subgroups of patients respond to therapy. The aim is to match each patient to the best treatment option.

Drs. David Scheinberg and Andrea Schietinger, *Molecular Pharmacology Program*

Targeting Genetic Mutations for Immune Response in Patients

Drs. David Scheinberg and Andrea Schietinger are developing a screening method to choose which genetic mutation in a tumor to target for the best immune response.

Dr. Bryan Tsou, *Cell Biology Program*

Role of Two Genes Found in Abundance in Tumors

Dr. Bryan Tsou is investigating two genes, discovered by MSK researchers, that help cells stay healthy—and yet are found in abundance in tumors.

Drs. Fresia Pareja, Jorge Reis-Filho, and Britta Weigelt, *HOPP*

Understanding Granular Cell Tumors

Drs. Fresia Pareja, Jorge Reis-Filho, and Britta Weigelt are exploring the complex makeup of granular cell tumors to understand why “inactive” mutations spark this rare disease.

Translational Research Programs, Directed Support, and Pediatrics

Every single project that Cycle for Survival funds represents a bold step toward new and better ways to fight rare cancers. MSK's Translational Research Programs, Directed Support, and pediatric cancer research projects aim to improve the lives of patients of all ages.

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 also proud to fuel studies led by MSK's Department of Pediatrics—the nation's largest, 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.

Dr. Ghassan Abou-Alfa, *Gastrointestinal Oncology Service*
Cholangiocarcinoma

Dr. David Abramson, *Chief, Ophthalmic Oncology Service*
Retinoblastoma

Dr. Nadeem Abu-Rustum, *Chief, Gynecology Service*
Ovarian and Uterine Cancer

Dr. Srikanth Ambati, *Department of Pediatrics*
Sarcoma

Dr. Cristina Antonescu, *Director, Bone and Soft Tissue Pathology*
Angiosarcoma, GIST, Rhabdomyosarcoma

Dr. Chris Barker, *Radiation Oncology*
Merkel Cell Carcinoma

Dr. Mary Baylies, *Developmental Biology Program*
Rhabdomyosarcoma

Dr. Robert Benezra, *Cancer Biology and Genetics Program*
Brain Cancer

Dr. Bernard Bochner, *Urology Service*
Bladder Cancer

Dr. Jayanta Chaudhuri, *Immunology Program*
Lymphoma

Dr. Dennis Chi, *Deputy Chief, Gynecology Service*
Ovarian Cancer

Dr. John Chodera, *Computational Biology Program*
Cancer Drug Resistance

Dr. Lisa DeAngelis, *Chair, Department of Neurology*
Brain Cancer

Dr. Mark Dickson, *Sarcoma Service*
Sarcoma

Dr. Ira Dunkel, *Department of Pediatrics*
Pediatric Brain Cancer

Dr. Joseph Erinjeri, *Interventional Radiology Service*
Interventional Radiology

Dr. Darren Feldman, *Genitourinary Oncology Service*
Testicular Cancer; Germ Cell Tumors

Dr. Emily Foley, *Cell Biology Program*
Ovarian and Uterine Cancer

Dr. Igor Gavrilovic, *Neurology Service*
Brain Cancer

Dr. Sergio Geralt, *Chief, Adult Bone Marrow Transplant Service*
Multiple Myeloma

Dr. Michael Glickman, *Immunology Program*
Bladder Cancer

Dr. Jan Grimm, *Molecular Pharmacology Program*
Molecular Imaging

Dr. Philip Gutin, *Chair, Department of Neurosurgery*
Brain Cancer

Dr. Anna-Katerina Hadjantonakis, *Developmental Biology Program*
Cell Lineage Development

Dr. John Healey, *Chief, Orthopaedic Service*
Bone Cancer

Dr. Daniel Heller, *Molecular Pharmacology Program*
Nanomedicine

Dr. Martee Hensley, *Gynecologic Medical Oncology Service*
Gynecologic Sarcomas

Dr. Alan Ho, *Head and Neck Oncology Service*
Thyroid Cancer

Dr. Danwei Huangfu, *Developmental Biology Program*
Pancreatic Cancer

Dr. Christine Iacobuzio-Donahue, *Associate Director for Translational Research, Center for Pancreatic Cancer Research*
Pancreatic Cancer

Dr. Andrew Intlekofer, *Lymphoma Service*
Lymphoma

Dr. Yelena Janjigian, *Gastrointestinal Oncology Service*
Esophageal Cancer

Dr. William Jarnagin, *Chief, Hepatopancreatobiliary Service*
Gallbladder cancer

Dr. Xuejun Jiang, *Cell Biology Program*
Cell Autophagy

Dr. Alexandra Joyner, *Developmental Biology Program*
Pediatric Brain Cancer

Dr. Yasmin Khakoo, *Director, Child Neurology Program*
Pediatric Brain Tumors

Dr. Alex Kentsis, *Department of Pediatrics; Molecular Pharmacology Program*
Pediatric Leukemia

Dr. Kitai Kim, *Cancer Biology & Genetics Program*
Leukemia and Lymphoma

Dr. Virginia Klimek, *Leukemia Service*
Myelodysplastic Syndrome

Dr. Andrew Koff, *Molecular Biology Program*
Glioma and Liposarcoma

Dr. Jason Konner, *Chief, Medical Oncology at MSK Monmouth*
Clear Cell Ovarian Cancer

Dr. Andrew Kung, *Chair, Department of Pediatrics*
Pediatric Cancer

Dr. Brian Kushner, *Department of Pediatrics*
Neuroblastoma

Dr. Michael La Quaglia, *Chief, Pediatric Surgical Service*
Pediatric Sarcomas

Dr. Eric Lai, *Developmental Biology Program*
Cell Proliferation

Dr. Christina Leslie, *Computational Biology Program*
Cell Biology

Dr. Ming Li, *Immunology Program*
Immunotherapy

Dr. Scott Lowe, *Chair, Cancer Biology & Genetics Program*
Cholangiocarcinoma

Dr. Vicky Makker, *Gynecologic Medical Oncology Service*
Gynecologic Cancers

Dr. Christine Mayr, *Cancer Biology and Genetics Program*
Cell and Protein Functions

Dr. Paul Meyers, *Department of Pediatrics*
Sarcoma

Dr. Shakeel Modak, *Department of Pediatrics*
Neuroblastoma

Dr. Craig Moskowitz, *Lymphoma and Hematology Services*
Blood Cancer

Dr. Robert Motzer, *Genitourinary Oncology Service*
Kidney Cancer

Dr. Philipp Niethammer, *Cell Biology Program*
Inflammatory Signals Guiding Blood Cells

Dr. Roisin O’Cearbhaill, *Gynecologic Medical Oncology Service*
Ovarian Cancer

Dr. Richard O’Reilly, *Chief, Pediatric Bone Marrow Transplant Service*
Pediatric Acute Myeloid Leukemia

Dr. Eileen O’Reilly, *Associate Director for Clinical Research, Center for Pancreatic Cancer Research*
Pancreatic Cancer

Dr. Kenneth Offit, *Chief, Clinical Genetics Service*
Ovarian Cancer

Dr. Michael Overholtzer, *Cell Biology Program*
Metastatic Melanoma and Prostate Cancer

Dr. Luis Parada, *Director, Brain Tumor Center*
Brain Cancer

Dr. John Petrini, *Director, Functional Genomics Initiative; Chair, Molecular Biology*
Myodysplasia

Dr. Michael Postow, *Melanoma and Immunotherapeutics Service*
Melanoma

Dr. Xiaohui Qu, *Molecular Biology Program*
Gene Expression

Dr. Diane Reidy Lagunes, *Gastrointestinal Oncology Service*
Pancreatic Neuroendocrine Tumors and
Adrenocortical Carcinoma

Dr. Neal Rosen, *Molecular Pharmacology Program*
Cholangiocarcinoma

Dr. Alexander Rudensky, *Ludwig Center for
Cancer Immunotherapy*
Immunotherapy Research

Dr. David Scheinberg, *Molecular Pharmacology Program*
Mesothelioma

Dr. David Solit, *Director, CMO; Make An Impact*
DNA Sequencing

Dr. Neal Shukla, *Department of Pediatrics*
Pediatric Lymphoma

Dr. Amber Simpson, *Memorial Hospital
Research Laboratories*
Gallbladder cancer

Dr. Samuel Singer, *Chief, Gastric and Mixed Tumor Service*
Sarcoma

Dr. Lorenz Studer, *Developmental Biology Program*
Cell Biology

Dr. Joseph Sun, *Immunology Program*
Leukemia

Dr. Tanya Trippett, *Department of Pediatrics*
Pediatric Blood Cancers

Dr. Meng-Fu Tsou, *Cell Biology Program*
Cell Development

Dr. Andrea Ventura, *Cancer Biology & Genetics Program*
Identify Non-Coding RNA

Dr. Leonard Wexler, *Department of Pediatrics*
Rhabdomyosarcoma

Dr. Jedd Wolchok, *Chief, Melanoma &
Immunotherapeutics Service*
Immunotherapy

Dr. Joao Xavier, *Computational Biology Program*
Metabolism of Cancer Cells

Dr. Xiaolan Zhao, *Molecular Biology Program*
Cell Repair

The December Challenge: Funding Supercomputing to Accelerate Research

This past December, the Cycle for Survival community raised \$1.5 million to fund new supercomputing equipment to unlock the power of genetic data—and deliver more personalized treatments to patients worldwide.

DNA sequencing provides key insights into what causes cancer. Today's technologies have led to an influx of data with the potential to significantly advance the development of cancer therapies. Supercomputers—a powerful network of interconnected computers—interpret and analyze trillions of data points to uncover patterns impossible to see with the naked eye. Armed with this new equipment, researchers will be able to find answers that human analysis alone cannot solve.

Participants who met the Challenge—raising at least \$1,000 by the end of December—have their names displayed in the MSK lab that houses supercomputing machinery.

