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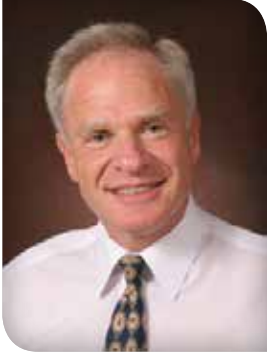
TGen Today

A PUBLICATION OF THE TRANSLATIONAL GENOMICS RESEARCH INSTITUTE

Powering
Science
Empowering Life

tgen[®]
AN AFFILIATE OF  City of Hope.

A Non-Profit Biomedical Research Institute



A Look Inside...

Dear Friends,

As TGen celebrates its 15th anniversary on June 26, 2017, we reflect on our past accomplishments with eyes trained on a bright future with our colleagues and partners at City of Hope.

When Dr. Jeffrey Trent returned home to Arizona to launch the Translational Genomics Research Institute in 2002, using information from an individual's unique genome to guide treatment was an interesting premise. Today, precision medicine is the promise of smarter treatment for patients around the world.

In this issue, you'll learn how that promise is becoming a reality.

As the head of TGen's Collaborative Sequencing Center and our new Director of Scientific Operations, Dr. Winnie Liang is a pathfinder in precision medicine. Dr. Liang is among a cohort of dynamic women, propelling our science forward into the next 15 years.

When TGen was founded, children diagnosed with rare cancers did not have much hope for a brighter tomorrow. Today, the Neuroblastoma and Medulloblastoma Translational Research Consortium and TGen are working to change that. Supported with a generous donation from Dell, this is the world's first pediatric precision medicine clinical trial, and it is transforming how cancer is treated for the littlest patients.

A rare form of brain cancer, Diffuse Intrinsic Pontine Glioma, took the life of 7-year-old Hollis, but not before he inspired family, friends and strangers alike with his infectious spirit. His legacy of relishing the present and living the #MostBestDays will live on in a new research project at TGen.

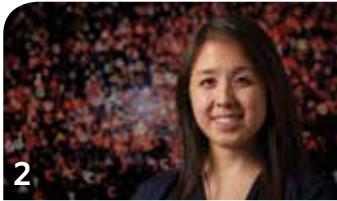
For the past 15 years, TGen has been the beneficiary of the passion and advocacy of so many supporters. We hope you'll enjoy two personal stories behind two very big events that benefit our research: Cycle for the Cure, which has surpassed \$1 million in total funds raised during its seven-year run; and the Seena Magowitz Golf Classic which is celebrating its landmark 15th anniversary this year in Boston.

As always, we are grateful to share these milestones with you, our old friends, and for the new friends who are joining with us as we march forward.

With gratitude,

A handwritten signature in black ink that reads "Michael Bassoff". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Michael Bassoff
President, TGen Foundation



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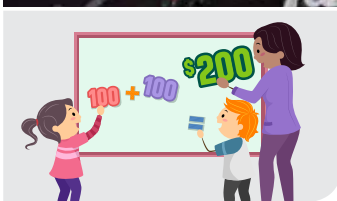


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Anton's Challenge Supports Rare Childhood Disorders Clinic

By supporting Anton's Challenge, your gift will be matched dollar-for-dollar to give hope and answers to rare disease patients.

About TGen

Translational Genomics Research Institute (TGen) is a Phoenix, Arizona-based non-profit organization dedicated to conducting groundbreaking research with life changing results. TGen is focused on helping patients with neurological disorders, cancer, and diabetes, through cutting edge translational research (the process of rapidly moving research towards patient benefit). TGen physicians and scientists work to unravel the genetic components of both common and rare complex diseases in adults and children. Working with collaborators in the scientific and medical communities literally worldwide, TGen makes a substantial contribution to help our patients through efficiency and effectiveness of the translational process. TGen is allied with City of Hope, a world-renowned independent research and cancer and diabetes treatment center. This precision medicine alliance enables both institutes to complement each other in research and patient care, with City of Hope providing a significant clinical setting to advance scientific discoveries made by TGen. For more information, visit: www.tgen.org. Follow TGen on Facebook, LinkedIn and Twitter @TGen.



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A portrait of Dr. Winnie Liang, a woman with long dark hair, smiling. The background is a blurred pattern of colorful letters and symbols.

Powering Science

Empowering Life

TGen's Dr. Winnie Liang is a trailblazer, both literally and scientifically.

Ever since her days playing in the woods near her childhood home in Cherry Hill, N.J., Dr. Liang has pursued her curiosities with science and nature — always following her instincts in her quest to find solutions.

Her elevation to TGen's Director of Scientific Operations parallels her climb to some of the world's top backpacking treks, from the highlands of Peru to the base of some of the tallest mountains in the Himalayas.

Dr. Liang's own brush with cancer has instilled in her an ever-greater sense of urgency to do whatever she can, as fast as she can, and to explore the best possible treatments for patients, while seeing as much of the world as possible

on her own two feet.

And by joining TGen, Dr. Liang has found fulfillment both professionally and in her private aspirations.

"It wasn't until I came to Arizona that I really had the opportunity to experience all the possibilities," she said.

At 7 years old, she remembers receiving summer mailings that first introduced her to basic scientific analyses, such as measuring rainfall. She loved playing outside with her friends, constantly exploring the woods and her neighborhood until sunset.

In high school, Dr. Liang's favorite class was biology. Her teacher challenged her with college-level course material, a step up that gave Dr. Liang confidence when she entered Pittsburgh's Carnegie Mellon University.

Parallel Paths

A summer college internship landed her at The Jackson Laboratory in Bar Harbor, Maine, where she fell in love with hiking in nearby Acadia National Park.

When she graduated Carnegie Mellon with a degree in the Biological Sciences, she wasn't sure what she wanted to do. But like so many turns in her life, her next steps just seemed to flow.

"It was really just out of serendipity and luck," she said, when a fellow Carnegie Mellon grad, Dr. Dietrich Stephan, recruited her to work at the Children's National Medical Center in Washington, D.C.

There Dr. Liang was first introduced to the science of gene expression profiling, a molecular test that measures the activity of genes to create a global picture of

cellular function.

Under Dr. Stephan's guidance, Dr. Liang was part of the development of the National Institute of Neurological Disorders and Stroke (NINDS)/National Institute of Mental Health (NIMH) Microarray Consortium, which conducted expression profiling for scientists funded by NINDS or NIMH federal grants. This service, under the National Institutes of Health (NIH), became a part of TGen.

When Drs. Stephan and Liang joined the first wave of scientists at TGen's launch, they brought the consortium with them. It was the launch pad for TGen's Neurogenomics Division, and helped propel Dr. Liang's study of Alzheimer's disease.

Dr. Liang's ambition eventually found her working full time at TGen while pursuing graduate studies at Arizona State University, eventually earning a Ph.D. in Molecular and Cellular Biology. Rather than leave TGen for her post-doctoral fellowship, Dr. Liang chose to take advantage of an opportunity, stemming from her graduate work, to evaluate the effect of a gene called GAB2 in Alzheimer's disease under TGen's Dr. Kendall Van Keuren-Jensen, now an Associate Professor of Neurogenomics and Co-Director of TGen's Center for Noninvasive Diagnostics.

To this day, Dr. Liang remains a key member of the Arizona Alzheimer's Consortium (AAC), a group of hospital and academic scientists, who have helped make the Grand Canyon State one of the global leaders in researching this memory-robbing disorder.

In 2007, continuing her love for hiking, backpacking, traveling and volunteering, Dr. Liang joined the Arizona Wilderness Coalition, a group of nearly 2,000 individuals, businesses and partner organizations responsible for helping protect nearly 3 million acres of wilderness in Arizona through bipartisan federal legislation in 1984 and 1990. Some of her favorite places to hike in Arizona include the Superstition Wilderness, the McDowell Sonoran Preserve, Salome Wilderness, and Aravaipa Canyon.

Struck by Cancer

In the summer of 2009, Dr. Liang's world was suddenly in doubt. It started with frequent bouts of exhaustion and a series of brief fevers and itchiness, graduating to chest pains — all dismissed as something else. One morning, she woke with a large lump in her neck. A trip to the doctor prompted a CT scan, a visit to the emergency room and admission to a hospital, all in the same day. Diagnosis: stage IV Diffuse Large B-Cell Lymphoma (DLBCL), a type of blood cancer.

While chances for survival decline with late stage cancer, fortunately there is an established chemo-immunotherapy regimen for DLBCL known as R-CHOP. Following six rounds of treatments, Dr. Liang saw her cancer diminish, and in 2015 she celebrated a major milestone by going cancer-free for five years. And she's still going strong.

As a teenager, she had wanted to see the world, but her mother counseled her to wait until retirement. "I respected her opinion but decided that I would make no plans to wait." Following her bout with cancer, and with many of her friends involved with raising families, Dr. Liang was emboldened to set out on her own.

"We all know that every day is a blessing and I want to take advantage of that while I can. The places I've had the privilege of visiting in the last few years have been incredibly amazing," she said, recalling trips to Cusco, Peru, once the capital of the Inca Empire, and hiking the Inca Trail, which ends at Machu Picchu, the high mountain ruins considered one of the Seven Wonders of the World. She also trekked through the Annapurna (Goddess of the Harvests) Conservation Area, home of the Annapurna massif, which at 26,545 feet is the world's 10th highest and one of the most dangerous peaks, in the Himalayas of north-central Nepal.

"It's beautiful, joyful and grounding to have the opportunity to widen my lens through interacting with people from different backgrounds, experiencing different countries, learning about other cultures, seeing breathtaking places, and

recognizing the connection we all have with one another. I never expected to be able to experience so much already, and I am immensely grateful," said Dr. Liang, who at the end of this summer will climb the 19,341-foot Mount Kilimanjaro, the highest peak in Africa.

Redoubling Efforts

Since her cancer scare, Dr. Liang also has branched out from neuroscience disorders to study cancer. She recently worked with TGen President Dr. Jeffrey Trent in collaboration with Mayo Clinic, Memorial Sloan Kettering Cancer Center and others on a significant study, funded by Stand Up To Cancer and the Melanoma Research Alliance, of a rare type of skin cancer known as acral melanoma.

Dr. Liang has always wanted to help patients. In high school, she considered going to medical school but research appealed to her more because she thought she could impact more patients. Her desire to find new treatments as soon as possible initially attracted her to TGen, whose translational mission is exactly that. And since her illness, her empathy has only multiplied.

"You have the experience of how it feels to have no answers and living each day with uncertainty," she said. "I told myself when I was sick that, if I ever get through this, I want to do more to help others in need."

continued on page 13



Dr. Liang after hiking the Inca Trail, which ends at Machu Picchu, Peru, considered one of the Seven Wonders of the World



TGen's Dr. Michael Berens with Shawnee and Shane Doherty and a photo of their son Hollis

A Life of Most Best Days

Wearing his Arizona Diamondbacks hat and a jersey with his name on it, little Hollis Doherty strode toward the pitcher's mound at Chase Field while nearly 45,000 fans, including dozens of his Little League companions and their families, cheered.

At his side stood his parents, Shawnee and Shane, and his older brother, Rhett — all with green hearts surrounding an "H" drawn on their hands, symbolizing Hope for Hollis.

On this day, amid a thunderous roar, 7-year-old Hollis threw out the first pitch.

He didn't look like a boy with a fatal brain tumor that day; in fact, he didn't look much different than he did before he and his parents learned of his illness. And yet, just a few months later, he would be gone.

On this day, however, Hollis was in his glory.

It was one of a series of "most best days," a description of how his parents wanted Hollis to live: to receive medical care in which the treatment was not worse than the disease. And for nine months, from the time of his diagnosis with Diffuse

Intrinsic Pontine Glioma (DIPG) until his passing in January 2017, Hollis experienced life to its fullest.

There would be a trip to Hawaii, thanks to the Make-A-Wish Foundation. Hollis would meet his sports heroes on the Diamondbacks, Arizona Cardinals, Phoenix Suns, and Arizona Coyotes. He and Rhett would even step out onto the ice across a red carpet for a ceremonial puck drop before a Coyotes hockey game against the San Jose Sharks.

His well-wishers included famous golfers, Olympians and well-known comedian Will Ferrell. An insignia with green shamrocks, hearts and H's for Hollis graced his social media pages. Local TV and radio stations featured his story. And while he battled his disease, clear up to within days of his passing, he played sports. And his teams won!

Hollis really did have a lot of "most best days."

But not nearly enough. Children like Hollis need more.

In an effort to give other young patients with DIPG a fighting chance, this spring Hollis' parents presented TGen with a donation of \$30,000 to initiate the Hope Through Hollis Fund at TGen.

"We want pediatric oncologists to communicate to other parents whose children are diagnosed with DIPG that there is hope," Shane said.

Quarterbacking the TGen DIPG team is Deputy Director Dr. Michael Berens, who met the Doherty's through church, and helped the family navigate treatment options for Hollis.

"By divine intervention, it so happens that we came upon one of the best medical coaches we could ever have asked for in Mike Berens," Shawnee said. "We called Mike the day Hollis was diagnosed to find out what our treatment options were, and he was candidly honest with us — that there were none proven to be curative; none that are generally effective. There are only experimental clinical trials."

No current treatment would keep

Hollis alive.

He did receive treatment involving an experimental immunotherapy vaccine offered in Germany. Dr. Berens' team now is evaluating a sample of Hollis' tumor to see what positive effect that treatment might have had. Next, working with what they learn by sequencing, or spelling out the 3 billion base pairs of Hollis' genome, TGen researchers hope to collaborate with other research institutes to devise new treatments for DIPG, and eventually initiate clinical trials to provide more effective therapeutics for this disease.

DIPG is a type of central nervous system tumor that forms from glial, the supportive tissue of the brain and spinal cord. About 350 children and their families receive a DIPG diagnosis each year. The average survival following diagnosis is one year.

"I believe a breakthrough in DIPG treatment will emerge by engaging the best scientists and physicians to participate in an aggressive and innovative translational strategy against DIPG," said Dr. Berens, who also is director of TGen's Cancer and Cell Biology Division, and head of TGen's Glioma Research Lab.

"The most critical members of the team, however, are patient advocates and families," Dr. Berens said. "These individuals provide continuous inspiration and motivation, oversee and drive the growth of the program, and provide the network by which positive outcomes reach those in need as quickly as possible."

The research and clinical goals, said Dr. Berens, are to develop "biological bullets" against DIPG, and eventually launch clinical trials in which new and significant therapies can be immediately applied to patients.

Shawnee and Shane are now enlisting the public and other parents of children with DIPG to raise \$200,000 to continue additional phases of TGen research.

Only a small percentage of federal cancer research dollars goes to pediatric cancer, and only a small fraction of that is dedicated to DIPG. Most of the current effort is due to caring individuals, and the Doherty's believe Hope Through Hollis at TGen is making a difference.

"We believe we have created a sense of urgency and dedication," said Shane. "We want to make an impact. We want to do more than move the emotional needle. We want to move the treatment-benefit needle."



Hollis and Rhett meet with the Arizona Diamondbacks



Hollis with cornerback Patrick Peterson of the Arizona Cardinals



Green hearts surrounding an "H" drawn on their hands, symbolizing Hope for Hollis.

It was one of a series of **"most best days"** ...to receive medical care in which the treatment was not worse than the disease.

TGen is an integral part of a nationwide DIPG clinical trial

Since 2014, TGen has been part of a nationwide clinical trial conducted by the Pacific Pediatric Neuro-Oncology Consortium (PNOC), using precision medicine to identify new treatments for children with a rare type of cancer called Diffuse Intrinsic Pontine Glioma (DIPG).

DIPG generally attacks the pons area of the brain stem, which is responsible for vital body functions such as breathing. Survival is poor and 90 percent of children die within a year.

Beyond surgery and radiation, the PNOC clinical trial is focused on whether DIPG patients can gain clinical benefit from FDA-approved drug therapies that are matched to aberrations identified in the patient's tumor. Through this study, genomic profiling for 24 DIPG patients has been performed, and treatment recommendations have been outlined for each patient, following individual tumor boards.

PNOC is led by University of California San Francisco and includes: TGen, Dana Farber Cancer Institute, Memorial Sloan Kettering Cancer Center, University of Texas, Washington University, University of Utah, and children's hospitals in San Diego, Los Angeles, Oakland, Columbus, Portland, Seattle, Memphis, Philadelphia, Chicago and Washington, D.C.

A race against time


The fight against children's cancers never rests

In just five years, TGen and Dell have turned weeks into hours, giving months and years back to children with cancer.

"In the first four years, we were looking at relapsed and refractory cancer, and they were incurable, but we've seen that change," explained Dr. Giselle Sholler, Chair of Beat Childhood Cancer (formally the Neuroblastoma and Medulloblastoma Translational Research Consortium). "We've even had some patients graduate from hospice. We've been able to take what we've learned, and now we will be able to treat them properly at diagnosis."

Beat Childhood Cancer is a group of more than 40 universities, children's hospitals and research institutes worldwide working with TGen to develop new therapies for children with these rare and deadly cancers. This is the world's first precision medicine clinical trial for pediatric cancer.

Dell has provided more than \$15 million in funding, employee engagement and computing resources in support of the effort, enabling Beat Childhood Cancer to expand the trials to Europe and the Middle East in 2015.



TGen Assistant Professor
Dr. Will Hendricks

TGen recently sequenced the 200th genome from this cohort of young patients, and the scope of the project has expanded into osteosarcoma, other sarcoma subtypes and even more rare pediatric cancers.

“For many of these tumors, and particularly a swath of solid tumors that are higher risk and more aggressive, we don’t yet have good treatments,” explained Dr. Will Hendricks, Assistant Professor in the Integrated Cancer Genomics Division at TGen. “This is an area that is historically underfunded and understudied, in part because they tend to be more rare than adult cancers.”

About 15,700 children under age 19 are diagnosed with any form of cancer each year, which is less than 1 percent of all cancer diagnoses, according to the National Cancer Institute. By comparison, more than 87,000 women and men will be diagnosed with melanoma this year.

Cancer is the second-leading cause of death in children behind accidents, and one of the challenges in treating pediatric cancer is that children are not “little adults.”

“Adult cancers are caused by the environment or by us harming our bodies with things like smoking, and adult cancers have a lot of mutations,” Dr. Sholler explained. “In children there are fewer mutations, and understanding the biology of the cancer and how it develops is different.”

Based on initial findings from this study, Dr. Sholler predicted that in the future, children’s cancers may not be treated based on the tissue biology — like lymphoma or neuroblastoma — but instead on the pathways and what drives the cancer growth.

Because of TGen’s comprehensive approach — analyzing DNA, RNA and proteins — scientists and clinicians can identify new features of these tumors to help guide current treatment. They are also assembling a ‘genomic landscape’ across all the tumors that have been profiled at all phases that will serve as a powerful resource for the broader scientific community. Genetic profiling of these children’s tumors has even guided diagnosis in some cases, empowering physicians to try different treatments.

“That’s what’s motivating and inspiring behind these studies,” Dr. Hendricks said. “As genomicists, as research bench and computer scientists, we get to use our knowledge directly to help patients. We’re seeing responses, seeing tumors shrink, seeing extended survival for some of these patients, and we’re making a difference for these



Kellen is a patient in the upfront neuroblastoma clinical trials supported by Dell.

kids who don’t have other options.”

Initially, patients came into the program because they had relapsed under the standard of care. Their tumors would be biopsied and sent to TGen for sequencing and analysis, then a tumor board — the team of scientists and oncologists — would assemble to discuss results and make treatment recommendations based on the patient’s genetic profile. At first, the process could take a month or more from biopsy to treatment, but now it takes less than two weeks. Thanks to the collaboration with Dell, the computer processing time alone has shrunk from 10 days to six hours.

When the Beat Childhood Cancer first began, the tumor board met perhaps once a month, but now, they are having two or three tumor boards per week.

The next phase of this project is to introduce this precision medicine process on the front-line when a child is first diagnosed with cancer, instead of after they have relapsed under the standard of care. This expansion has been made possible through the continued support of Dell and its Powering the Possible initiative.

To recognize their contributions TGen presented Dell with the 2017 John S. McCain Leadership Award, presented annually at its Founders Dinner to recognize individuals and organizations whose leadership and dedication have made a significant impact in the fight against disease and helping patients worldwide. Karen Quintos, Chief Customer Officer for Dell accepted the award.

“Technology is changing the world,” said Quintos, “Things that you thought were five to 10 years away are now in the here and now, and we don’t want to wait another 10 years. We want to take that and figure out how to give that opportunity to the world.”

15 years of DISCOVERY

**FIRST TO PERFORM
WHOLE GENOME
SEQUENCING TO
INFORM CANCER THERAPY**



5 FDA APPROVALS
FOR NEW CANCER
TREATMENTS



**COMPILED LARGEST
exRNA DATASET AS
POTENTIAL BIOMARKERS
FOR CONCUSSIONS**



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SAMPLES
SEQUENCED

>500
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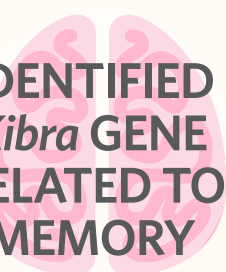
460
PATIENTS
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AT OUR CENTER FOR
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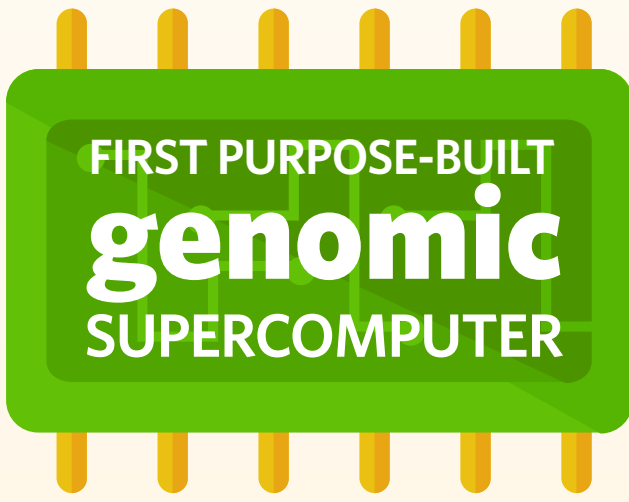


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141 countries
6 continents



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CPU HOURS!

GENOMIC
PROCESSING
SHRUNK FROM
WEEKS
TO **HOURS**



TGEN NORTH
DEVELOPS
GENOMIC
TESTS FOR
MRSA • KLEB
LYME • VALLEY FEVER





Sixteen years ago, Roger Magowitz sat with his mother, Seena, in her doctor's office. The diagnosis was advanced pancreas cancer, and she had three-to-six months left.

"I asked the doctor, 'What do we do next?' and he said to get her affairs in order. There was nothing we could do," Roger recalled. "That becomes a pretty harsh pill to swallow when it's your family."

A self-made success in the furniture industry, Roger set out to do something, and one year later, he hosted the Seena Magowitz Golf Classic, raising \$10,000 for pancreatic cancer research.

Fifteen years later, the Seena Magowitz Golf Classic will celebrate having raised more than \$10 million total for pancreatic cancer research when the extravaganza lands in Boston for a weekend of golf, glamour and good times, August 26-28. This year, Ken Murphy, President and Chief Executive Officer of Mattress Firm, will be the Honorary Chair and Derrick Hall, President and CEO of the Arizona Diamondbacks will serve as Master of Ceremonies.

"Thanks to Roger Magowitz, and the leadership of those like Ken Murphy and Derrick Hall, the Seena Magowitz Golf Classic is helping TGen to provide answers and hope today to thousands of pancreatic cancer patients," said Michael Bassoff, President of TGen Foundation.

This investment in research at TGen is paying dividends for patients.

A phase Ib/II clinical study named for Seena Magowitz and conducted since 2013 by TGen and HonorHealth in Scottsdale, reported a high rate of tumor shrinkage for patients with advanced pancreatic cancer, in results presented at the 2017 Gastrointestinal Cancers Symposium in San Francisco. In addition, the median overall survival rate of 16.5 months has exceeded the historical average of six-to-12 months with standard chemotherapy.

Pancreatic cancer is the third-leading cause of cancer-

If not **me** then **who?**

related death, claiming the lives of 43,000 Americans this year. Symptoms normally do not appear until late stages of the disease, and only about one in four patients survives more than a year after diagnosis. Seena Magowitz had only five months.

"My mother was my world," said Roger, whose parents divorced when he was only 2. "Being a single parent — it's not easy now, but when she did it 55 years ago, it certainly wasn't easy. She had a big influence on me. She was my mother, my father, my friend."

And his inspiration.

The 15th annual Seena Magowitz Golf Classic will feature a weekend packed with once-in-a-lifetime activities, from Boston Red Sox baseball at historic Fenway Park, to a festive clambake, to championship golf at Wellesley Country Club. The event culminates with a gala dinner, headlined by TGen Distinguished Professor and Physician-In-Chief Dr. Daniel D. Von Hoff.

"Dr. Von Hoff has assembled the world's finest team, and our donors can see the difference that he and TGen have made — we are seeing the results," Roger said. "Now we're getting more warriors that are patients and survivors who come. These people want to give back and make that kind of difference."

To register for the Seena Magowitz Golf Classic or to support the event through sponsorship, please visit www.seenamagowitzfoundation.org.

Seena Magowitz Golf Classic

Boston Harbor Hotel, August 26-28, 2017

- Saturday, August 26, 2017
4:05 PM - Baltimore Orioles vs. Boston Red Sox
- Sunday, August 27, 2017
10:15 AM - Cruise to Thompson Island Clambake & Lobster Fest
5:30 PM - Cocktail Hour
6:30 PM - Dinner with Dr. Daniel D. Von Hoff, Keynote
- Monday, August 28, 2017
9:00 AM - Golf Classic, Wellesley Country Club

TGEN'S CYCLE FOR THE CURE

SETS THE PACE



2017 Cycle for the Cure Co-Chairs Robyn DeBell and Vicki Vaughn



Stacey Roswell, right, won the grand prize trip to Paris for leading the top fundraising team.



Co-Chair Vicki Vaughn, TGen's President and Research Director Dr. Jeffrey M. Trent, Co-Chair Robyn DeBell and TGen Foundation President Michael Bassoff at the after party.

When TGen's Cycle for the Cure announced in March that the top fundraiser for 2017 would win a trip to Paris for the Tour de France, Stacey Roswell knew she had to win.

But not for herself.

"It's not that I didn't want to go to," Stacey said. "But, the more I thought about it, the more sense it made to give it to my friend Cathy's family."

Cathy Cooper passed away in late February, days before the Cycle 2017 kickoff. She had a fought a courageous, 12-year battle against breast cancer and was survived by her husband Dr. Randy Cooper and two sons Jacob and Shane.

"When Stacey called and said she wanted to ride in memory of Cathy and her battle with inflammatory breast cancer, I was a little overwhelmed and yet elated at the same time," recalled Dr. Cooper. "Over her many years of this journey, Cathy had come in contact with TGen, and when she passed, we directed everyone to make a donation to TGen. Anything that we could do to help raise awareness and funds — this is exactly what Cathy would want."

From Stacey's college friends to her kids' high school classmates, a total of 132 people joined her effort. Together the For Cathy Team raised \$15,089 for TGen's cancer research programs.

"It wasn't just somebody with deep pockets giving a big sum," Stacey explained. "It was so many people opening their hearts and giving."

Overall, 267 indoor cyclists, yoga and fitness enthusiasts raised \$201,492 at Cycle for the Cure on May 7 at Village Health Clubs and Studio 360 in the Phoenix area. Guaranteed Trust Life kicked off the fundraising with a \$50,000 presenting sponsorship, enabling Cycle for the Cure to surpass \$1 million in total funds raised since the event started seven years ago.

"There are many volunteers, donors, and sponsors who give their time, energy and money make Cycle for the Cure a success," said Cycle founder and co-chair Vicki Vaughn. "To have been able to reach \$1 million is attributable to them and to their passion."

This passion is familiar to Stacey: She has ridden in all seven Cycle for the Cure events.

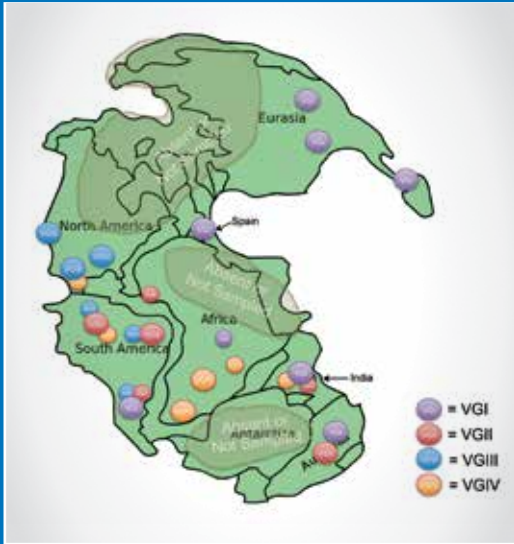
Her husband Michael, son Ethan, 19, and Stacey rode in the two-hour spin this year, while her daughter, Emma, 17, handed out towels and water to riders. Her oldest daughter, Kylie, 29, has ridden in the past. Stacey's sister, Linda Shoolman, rallied her daughters Rachel from Montana and Abby from Massachusetts to support this research, in honor of family members fighting cancer, including Stacey, a 14-year breast cancer survivor.

In 2015 on the day her oncologist was to release Stacey from post-therapy breast cancer care, her final blood test led to a diagnosis of stage 0 chronic lymphocytic leukemia.

"My prognosis is good, and when my white cell count gets too high, I'll have chemo again," she said, matter-of-factly. "I feel like if I can raise this money for Cathy, it will also be benefiting me. When you love your life so much, you fight for it."

Supporters like Stacey are the reason that Cycle for the Cure continues to draw such a passionate following, explained co-chair Robyn DeBell.

"The hang-tags on our bikes remind us of the real people — some who are survivors and some who are not — that are the reasons we ride and raise money," she said. "As long as TGen needs funding, we are committed to growing and refining Cycle for the Cure."



A Pangea representation of present day geographically dominant *C. gattii* populations.

TGen finds global dispersal of potentially deadly fungus tied to continental drift

Cryptococcus, a type of fungi found worldwide that is responsible annually for upwards of 625,000 deaths, was likely originally spread across the globe in conjunction with continental drift, according to a report by TGen. ■ *Cryptococcus* — Greek for “hidden sphere” — is a fungus usually found in decaying trees and soils. It grows in cultures as yeast. Two primary species of *Cryptococcus* — *Cryptococcus neoformans* (*C. neoformans*) and *Cryptococcus gattii* (*C. gattii*) — can cause severe illness, including meningitis, and death. ■ In a letter published June 14 in the journal *mSphere*, TGen researchers advance a growing hypothesis that currently separated populations of *Cryptococcus* fungi were once connected as part of the super-continent known as Pangea. The separation of the populations likely occurred millions of years ago through continental drift, rather than through other methods of dispersal, like wind, or from human causes. ■ For example, the subtype of *C. gattii* called “VGI” is commonly found in southwestern Europe’s Iberian Peninsula (Spain and Portugal) and in sub-Saharan Africa. Now separated by the Mediterranean Sea, Spain was the only European connection to Africa in Pangea. ■ “Much of the focus on global pathogen dispersal has been on possible human causes. What seems clear is that *Cryptococcus* largely dispersed millions of years ago, quite likely through continental drift,” said Dr. David Engelthaler, Co-Director of TGen’s Pathogen Genomics Division, TGen North, in Flagstaff.



Creator Steve Darnell — owner of car shop WelderUp and star of the reality TV show *Vegas Rat Rods* works on the “Cancer Car.”

Celebrity-designed hot rod at Barrett-Jackson will benefit TGen research

Barrett-Jackson Auction Co. will auction a “Cancer Car” hot rod, honoring a 2-year-old boy with kidney cancer and made famous by a Discovery Channel reality star, to fund cancer research at TGen. ■ Creator Steve Darnell — owner of car shop WelderUp and star of the reality TV show *Vegas Rat Rods* — forged this car in the spirit of Ed “Big Daddy” Roth’s 1960s Rat Fink designs. ■ “It’s ugly. It’s meant to be ugly, because that is how cancer presents itself. It’s brutal,” said Darnell of the 1931 Ford, much of it covered in a rusty patina. Incorporated into the design are 10-dozen metal roses surrounding a 392-cubic-inch Hemi engine from a 1957 Dodge. ■ Known as the Cancer Car, this vehicle portrays from front to rear the hopeful journey of a cancer patient as you move through the car’s form — evolving from the black dead cancer roses of diagnosis, to the fresh living red blooms of recovery. ■ This rat rod — a vehicle made of scrap parts from multiple cars — will be sold to benefit TGen at the Barrett-Jackson auction in Las Vegas, Oct. 19-21.



Dr. Daniel Von Hoff — Distinguished Professor, Physician-In-Chief, and Director of Molecular Medicine at TGen

Von Hoff honored by Columbia University

Dr. Daniel Von Hoff — Distinguished Professor, Physician-In-Chief, and Director of Molecular Medicine at TGen — received a gold medal for excellence in clinical medicine from his alma mater, Columbia University. ■ Columbia University College of Physicians and Surgeons Alumni Association presented the award May 13 in New York City to Dr. Von Hoff, a world-renowned expert in new therapies for patients with cancer. ■ This year marks the 250th anniversary of P&S, and its founding as the first medical school in Colonial America to award a Medical Doctorate degree. ■ “This recognition is especially gratifying as it is being presented by notable fellow graduates of my medical school, and I am deeply humbled and appreciative to be counted among those devoted to the welfare of patients,” said Dr. Von Hoff, who has been instrumental in developing numerous new cancer treatments. He also is a Senior Consultant-Clinical Investigations for City of Hope.



Upcoming Events Benefitting TGen:

To learn more about these events, please call the TGen Foundation at 602-343-8411 or visit: tgen.org/events

Focus on Lyme Charity Golf Classic [Flagstaff, AZ]

July 10, 2017

Raising funds move TGen's LymeSeq rapid diagnostic for Lyme disease closer to clinical trials.

www.focusonlyme.org

Purple Pansies | Casa Nuova Italian Restaurant [Alpharetta, GA]

July 30, 2017 | Customer Appreciation Day

September 24, 2017 | Eighth Annual Gala

Both events benefit pancreatic cancer research at TGen.

www.purplepansies.org

Seena Magowitz Golf Classic [Boston, MA]

August 26-28, 2017

A blockbuster weekend of baseball, golf and discovery in historic Boston, benefiting pancreatic cancer research.

www.seenamagowitzfoundation.org

11th Annual Terri Link Memorial Fund Golf Tournament [Statham, GA]

September 29, 2017

A fun best-ball tournament benefiting groundbreaking research into Adrenocortical Carcinoma at TGen

www.tgen.org/events

Key to the Cure [Phoenix, AZ]

October 6, 2017

Fashion fights cancer with a high-energy runway show, benefiting women's cancer research at TGen.

www.tgen.org/events

Barrett Jackson Collector Car Auction [Las Vegas, NV]

October 19-21, 2017

Steve Darnell and the team from WelderUp auction their custom Cancer Car "Rat Rod" to benefit TGen's pediatric cancer research.

www.barrett-jackson.com

StepNOut 5K Walk Run Dash [Scottsdale, AZ]

November 5, 2017

Come out for a fun, family-friendly fitness event, benefiting pancreatic cancer research.

www.tgen.org/events

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Since 2010, using next generation genomic sequencing, Dr. Liang has specialized in helping other scientists at TGen as head of the institute's Collaborative Sequencing Center, using precision medicine to provide the best treatment recommendations for physicians and their patients.

Now, as Director of Scientific Operations, she is hoping to help other TGen scientists in a variety of ways, from identifying resources, improving communication, and coordinating staff needs with fundraising efforts at the TGen Foundation, to name a few. TGen has never had this position before, and Dr. Liang plans to keep it flexible and organic: proactive rather than reactive.

"Having seen the changes that TGen has gone through in the past few years, I thought there was a need for someone whose priority is to support the amazing scientific staff and faculty we have at TGen," she said. "My goal is to be a resource. When challenges or roadblocks are encountered, sometimes there may be no obvious possibility for a solution, but I plan to tackle these so our scientists can focus on what we do best — innovative research and translating findings to the clinic to help patients today. I hope we continue to expand our impact, and I think that is something that seems more likely because of our alliance with City of Hope."

Above all, Dr. Liang plans to continue following her instincts and curiosity and being true to her self — the same advice she would give to young scientists — in addition to recognizing that through teamwork, collaboration, integrity and compassion, we all can achieve amazing things.

"Even in the face of uncertainty and challenges," she said, "the world is truly each person's oyster. Our lives and livelihoods are what we make of it."



Dr. Liang in the foothills of Nepal's Annapurna

Anton's Challenge

Supports TGen's Center for Rare Childhood Disorders Clinic

Anton was less than two weeks old in 2006, when he met Dr. Vinodh Narayanan, Medical Director of TGen's Center for Rare Childhood Disorders.

"I remember his little hands were clenched tight," Dr. Narayanan recalled.

Anton needed tube feedings for almost one year before slowly transitioning to regular food. He suffered from cold-induced sweating and lack of reaction to pain.

His long road to a diagnosis ended when TGen sequenced his genome. Further genetic testing led to a new discovery and a confirmed diagnosis of Crisponi / CISS1 syndrome, which affects fewer than 1 in 1 million people worldwide.

The diagnosis made a huge difference. Today, Anton is active in sports, but has to be cautious about exposure to heat. He is monitored closely to avoid known complications of Crisponi syndrome.

Inspired by this brave boy, a generous donor has created Anton's Challenge, a \$4.5-million matching fund that will give more rare disease patients hope and answers. All gifts will be doubled. The goals of Anton's Challenge are three-fold:

- End the diagnostic odyssey for more kids by increasing our genetic testing
- Add clinical and scientific staff so we can care for more families
- Expand our clinical trials to test new treatments for these patients

"Meeting Anton's Challenge will allow us to move from making a genetic diagnosis to laboratory research aimed at discovering novel treatments for rare disorders," explained Dr. Narayanan.

By supporting Anton's Challenge, your gift will be matched dollar-for-dollar to help make this vision a reality. To learn more about Anton's Challenge and to make a donation, please visit tgen.org/match and watch a short video about another patient, Campbell, whose life has been transformed by TGen's Center for Rare Childhood Disorders.

Your donation will be doubled when you make a gift to the Anton's Challenge Fund today at www.tgen.org/match.

