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# TGen Today

A PUBLICATION OF THE TRANSLATIONAL GENOMICS RESEARCH INSTITUTE



Research for *Her Future*  
finding paves way for ovarian cancer trials

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AN AFFILIATE OF City of Hope.

A Non-Profit Biomedical Research Institute



## A Look Inside...

Dear Friends,

There is a sense of excitement and possibility at TGen, with new faces and new ideas bringing a new energy to the laboratories.

In this issue of *TGen Today*, you will meet a young scientist and mother-to-be, Dr. Jessica Lang, who is working to bring new hope to women with ovarian cancer. Inspired by their mother's battle against ovarian cancer, the founders and board members of Colleen's Dream Foundation are funding new clinical trials against the disease, using compounds identified by TGen's research. TGen recognized Colleen's Dream Foundation's commitment to helping women by awarding them with its Collaborative Spirit Award at this year's annual Founders Dinner.

You will also meet Dr. Sarah Highlander, an expert in medical microbiology, and the recently appointed Research Professor and Director of TGen's Clinical Microbiome Services Center at the Pathogen and Microbiome Division at TGen North in Flagstaff. This innovative center will explore how microbes can enhance or harm human health.

As an affiliate of City of Hope, our scientists and clinicians are working closely with their California colleagues to layer their genomic expertise into City of Hope's research and care stream. An exciting innovation in cancer treatment under the direction of Dr. Christine Brown at City of Hope is CAR T, a type of immunotherapy that uses a patient's own immune cells to target their individual cancer. Here you will read about Dr. Brown's work and her collaboration with TGen Dr. John Altin, as together they explore new ways to make CAR T and other types of immunotherapy more precise and more effective.

We also take a moment to recognize a few of the people who make this research possible, and they are not scientists. They are ordinary men and women, and even kids, who raise funds to support our science. I hope you are as inspired as I am by the efforts of four high school friends who have raised more than \$50,000 for our Center for Rare Childhood Disorders, and moved by the families of DIPG patients who are working to ensure their children will not be forgotten.

Thank you for your ongoing support and your friendship.

With gratitude,

A handwritten signature in black ink that reads "T.J. Isaacs". The signature is stylized and cursive.

T.J. Isaacs  
*Interim Director*  
TGen Foundation



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TGen, the Translational Genomics Research Institute, is an affiliate of City of Hope. We are an Arizona-based, nonprofit medical research institute dedicated to conducting ground breaking research with life-changing results. We work to unravel the genetic components of common and complex diseases, including cancer, neurological disorders, infectious disease, and rare childhood disorders. By identifying treatment options in this manner, we believe medicine becomes more rational, more precise and more personal.



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# The Human Microbiome:

## EXPLORING THE MICROSCOPIC INHABITANTS OF OUR BODIES

As children, we learn to wash our hands as a way of warding off germs. And that's good advice. What we don't learn, however, is that many of these germs, or microbes, are good for us; that not only are they beneficial but also essential for optimum health and survival.

These microbes — bacteria, viruses, fungi and parasites — live on and within the human body, making up the human microbiome. It's an area of research that scientists have only recently begun to explore.

These collections of single-cell and multicellular organisms and viruses — there are more than ten thousand different types — exist in specific microbiome communities on or in different parts of the body, including the eyes, nose, skin, mouth, lungs, stomach, colon and genitals.

The bad microbes — pathogens — cause disease. But the good microbes play important roles in everything from immune function to nutrition. For example, good bacteria help our bodies digest food and they produce essential vitamins in the intestinal tract, including Vitamin K and biotin.



"You can't survive without the microbes on and in your body. They protect you. They create barriers against infection, and compete against pathogens," said Dr. Sarah Highlander, the new Research Professor and Director of TGen's Clinical Microbiome Services Center, located in Flagstaff at TGen's Pathogen and Microbiome Division, or TGen North.

By focusing on the human microbiome, this new effort will enhance TGen's position as a leading center for genomic analysis by including the ability to examine the impact of the microbiome on human health. This can range from: gastrointestinal disorders, such as irritable bowel disease; to skin problems, such as dermatitis; to mental disorders like autism spectrum.

"There are completely different compositions of organisms — communities — at different body sites. If you're healthy, these microbial communities are doing good things for you," said Dr. Highlander, whose new center will support the investigations of hundreds of physicians and researchers at TGen and City of Hope.

**"You can't survive without the microbes on and in your body. They are protecting you, they create barriers against infection, and compete against pathogens."**

Even some viruses, which once were thought of only as invaders that make people sick, are now considered integral parts of the human microbiome and may be part of the human defense system.

Microbiomes are not limited to people, or even animals. While the new Clinical Microbiome Services Center will help investigate specific problems related to many serious human diseases, such as diabetes and cancer, it also will address the health needs of animals and microbes found the environment, such as in soil and water.

"Having a clinical services center dedicated to the microbiome will help ensure that we provide comprehensive clinical information to physicians and researchers that will in turn benefit patients," said Dr. David Engelthaler, Director of TGen North.

"It also will allow us to better support our internal and external microbiome research needs in this growing area of human, veterinary and environmental health sciences," he said. "Animals, the environment and humans are in constant contact and flux. So, the study of all of these systems is critical to the TGen North concept of 'One Health'."

An area of investigation that Dr. Highlander predicts will have a huge impact on health is in the realm of "bacteriotherapy," in which a specific organism, or a set of organisms, may have a specific therapeutic role, such as response to chemotherapy, as has been shown in limited proof-of-principle studies.

"The probiotics that we buy at the grocery store are like shooting a shotgun, perhaps an empty one. We don't know what they're doing or if they are effective. In the near future, we expect there will be specific organisms, or microbial metabolites, that people will be able to take as targeted therapeutics. They will have specific beneficial effects against specific diseases," she said.

"I'm really excited to be in a position at TGen where I think we now, using the human microbiome, can have a significant impact on human health," Dr. Highlander said.

## LEADING The Way



Dr. Sarah Highlander, an expert in medical microbiology and the human microbiome, is the new Research Professor and Director of TGen's Clinical Microbiome Services Center.

Dr. Highlander most recently was a Professor of Genomic Medicine at the J. Craig Venter Institute in La Jolla, Calif., where she worked for three years on microbiome projects that ranged from travelers' diarrhea to antibiotic resistance transmission to pediatric tooth decay.

Prior that she spent nearly 24 years at the Baylor College of Medicine in Houston. As an Associate Professor and Graduate Program Director in the Department of Molecular Virology and Microbiology, she taught and mentored budding doctors and doctoral students, in addition to her research responsibilities. Dr. Highlander also was an Adjunct Associate Professor in the Human Genome Sequencing Center at Baylor, where from 2007 to 2014 she was a Principal Investigator on the National Institutes of Health-sponsored Human Microbiome Project.

Dr. Highlander holds more than a dozen patents, is the author of more than 70 peer-reviewed publications, numerous book chapters, and has helped secure more than \$16 million in federal grant funding.



# Research for *Her* Future

finding paves way for ovarian cancer trials

Ovarian cancer is the deadliest of the reproductive cancers, attacking grandmothers, mothers and even their daughters.

Typically ovarian cancers strike postmenopausal women, but one very rare form — small cell carcinoma of the ovary, hypercalcemic type (SCCOHT) — targets young women and girls, killing two-thirds of these patients within two years.

“I am a young scientist, age 30, and these women are even younger than I am,” said Dr. Jessica Lang, a postdoctoral fellow in Dr. Will Hendricks’ Lab in the Integrated Cancer Genomics Division at

TGen. “They may have kids of their own — they may be kids themselves. Because this is a reproductive cancer, they may never have the ability to bear children, if they do survive this cancer at all.”

Dr. Lang’s research has taken on special meaning this year as she anticipates the birth of her first child — a daughter.

“These women receive their diagnosis when they are in the prime of their lives: launching their careers, starting their families and exploring the world,” she said. “We want to find effective treatments for these young women that will give them hope to live a long life — or even to have a

fighting chance.”

Now, there is hope: The results of a study published earlier this year by TGen researchers in the journal *Clinical Cancer Research* suggest an existing leukemia drug, ponatinib, shows promise against SCCOHT. Dr. Lang was co-lead author on the study with Dr. Hendricks.

Additionally, Dr. Sunil Sharma, TGen’s Deputy Director of Clinical Sciences and Director of Applied Cancer Research and Drug Discovery, helped develop a drug, seclidemstat, at Salarius Pharmaceuticals of Houston that also shows promise against SCCOHT.





## Two Shots at SCCOHT

SCCOHT is interesting because it is driven by a single genetic mutation (in *SMARCA4*), whereas most cancers have mutations in many genes that contribute to tumor development.

With a single genetic mutation, SCCOHT is relatively simple to study. It becomes more tantalizing because the genetic mutation that drives SCCOHT is found in a complex of proteins called SWI/SNF, which is mutated in one-fifth of all cancers.

"If we can understand how this (SWI/SNF) affects this rare ovarian cancer, we can translate these same findings to a large number of other cancer types, including other forms of ovarian cancer, lung cancers, pancreatic cancers and others," Dr. Jessica Lang explained.

SWI/SNF is a protein complex that regulates the chromatin environment, or the way DNA in the cell is packaged so that some genes are expressed and others are not. The TGen team is trying to identify how the loss of the chromatin regulator SWI/SNF impacts the development of cancer.

*SMARCA4* is known as an "epigenetic" gene that broadly controls how other genes are regulated in the genome. When *SMARCA4* is mutated, it is broken and cancer can develop through sweeping epigenetic imbalances. Seclidemstat has shown promising preclinical results in ovarian cancers and is also currently being clinically evaluated in other cancers. Thus, we have two shots to take down SCCOHT.

From discovery of the driver for this cancer to development of a possible treatment, TGen has been leading the charge against SCCOHT.

In 2014, TGen led an international team that identified a mutation in the *SMARCA4* gene that causes SCCOHT. The American Society of Clinical Oncology recognized the discovery as one of the year's biggest cancer research breakthroughs in its publication, *Clinical Care Advances 2015*.

Now, we are on the verge of testing these promising treatments in clinical trials, thanks to the leadership of Colleen's

Dream Foundation, an Arizona-based nonprofit founded by Nicole Cundiff and her husband Billy, a 12-year veteran kicker in the NFL.

Colleen's Dream Foundation was honored with 2018 TGen Collaborative Spirit Award for its commitment to ovarian cancer research. Colleen's Dream recently awarded TGen \$450,000 to fund a clinical trial for these new ovarian cancer treatments.

"The research being done at TGen is some of the most exciting we've ever seen," said Nicole Cundiff, CEO of Colleen's Dream Foundation. "Whether

the drug they developed leads to another amazing discovery, or it becomes a first line ovarian cancer treatment, we truly believe what they're doing will move the needle and we couldn't be more proud to support an institute located here in Arizona."

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EPISODE 6: MOM-TO-BE MAKES OVARIAN CANCER DISCOVERY





# Pucker Up, Buttercup!

Pucker Up. That was the challenge thrown down by TGen scientists, Phoenix Children's Hospital physicians and patient families, as they gamely "sucked lemons" for the LemonFace Challenge on May 17 — the second DIPG Awareness Day — in Arizona.

The LemonFace Challenge began to raise awareness of Diffuse Intrinsic Pontine Glioma (DIPG), a rare and deadly childhood brain cancer.

"We meet in very difficult circumstances, and we want to send a signal that we don't travel alone," said TGen's Dr. Michael Berens, head of the Glioma Research Lab at TGen.

Dr. Berens joined Dr. Cynthia Wetmore, Director of the Center for Cancer and Blood Disorders at Phoenix Children's, to lead the

group in eating lemons and posing with their best sourpusses.

"There are teams of people in white coats at the lab bench, and at the bedside, and we are all dissatisfied with the status quo," Dr. Berens said. "The heroes are the families that touch us and motivate us."

Among the families present for the LemonFace Challenge were Shane and Shawnee Doherty, who lost their 7-year-old son Hollis to DIPG in early 2017. Hollis inspired an outpouring of awareness and support, and the Hope through Hollis Fund at TGen recently topped its initial goal of raising \$200,000 for DIPG research.

Funds support TGen's effort to build a DIPG tumor atlas, a collection

of tumor samples and accompanying analysis, to help scientists understand the fundamental genomic causes of the disease and reveal vulnerabilities for new drug development. This work is a critical first step in identifying new treatments and subsequently testing them in clinical trials.

Additional families joining the Doherty's in support TGen include: The Tyler Hallsey Foundation, named for a 15-year-old boy from Anthem, Arizona, who passed away from DIPG in 2014, made a gift of \$90,000. Paul and Cyndi Cozzi contributed \$30,000 to TGen DIPG research on behalf of their 18-year-old son Camron, who also recently succumbed to this aggressive cancer. A student-led advocacy group, Students



(left to right) Phoenix Children's Hospital's (PCH) Dr. Michael Etzl, Bella Hurtado and TGen's Dr. Michael Berens.



Supporting Brain Tumor Research (SSBTR) recently acknowledged the importance of DIPG research with a \$30,000 donation.

The Los Angeles Dodgers prodded the Arizona Diamondbacks to join the #LemonFaceChallenge, giving DIPG efforts a welcomed social media boost on a national scale. Diamondback fans have also helped raise \$3,500, and the team has raised an additional \$30,000. The Diamondbacks also inspired TGen and Phoenix Children's to take the sour plunge for Brain Cancer Awareness Month and DIPG Awareness Day in May.

About 350 children are diagnosed with DIPG annually, and nearly all die within two years of diagnosis.



(top row, left to right) Dr. Cynthia Wetmore (PCH), Richard and Sandy Perkins, Dr. Michael Berens (TGen), Dr. Michael Etzl (PCH). (bottom row, left to right) Shane and Shawnee Doherty, Bella and Lizette Hurtado, Kathleen and Chris Hallsey.





In 2017, City of Hope researchers identified a method to effectively target cells that exhibit a specific antigen common in brain cancer. A case study published in the Dec. 29, 2017, edition of the *New England Journal of Medicine* outlined the treatment results of a City of Hope patient with glioblastoma. The study was led by neurosurgeon Behnam Badie, M.D., chief of neurosurgery at City of Hope; Christine Brown, Ph.D., Heritage Provider Network Professor in Immunotherapy and associate director of the T Cell Therapeutics Research Laboratory at City of Hope (pictured here); and Stephen J. Forman, M.D., Francis & Kathleen McNamara Distinguished Chair in Hematology and Hematopoietic Cell Transplantation and director of City of Hope's T Cell Immunotherapy Laboratory.





# Cancer Assassins

## TGen Provides Boost to City of Hope CAR T Research

One of the most exciting developments in cancer treatment is immunotherapy, and City of Hope is at the forefront of this new frontier through its robust chimeric antigen receptor, or CAR T, cell therapy program.

“Immunotherapy is about waking up the immune system to recognize and destroy cancer,” explained Christine Brown, Ph.D., Heritage Provider Network Professor in Immunotherapy at City of Hope. “We can reprogram T cells to recognize and directly kill those (cancer) cells.”

In CAR T therapy, a patient’s immune cells are removed from their bloodstream, genetically engineered and re-programmed to recognize and attack targets on their cancer cell, and then reintroduced into the body to seek and destroy the tumor.

As an affiliate of City of Hope, TGen will use our expertise to chart a path to greater precision in CAR T therapies for cancer patients.

“Our genomics platforms can look at both the weapon — the CAR T cells and their effectiveness — as well as the targets, or the cancer cells, and how they’re shifting and changing,” explained TGen Professor Michael Berens, Ph.D., Deputy Director and head of the Glioma Research Unit.

The challenge in CAR T therapy is identifying the most effective markers to target among the thousands that may be present on a tumor.

TGen’s genomics technology can accelerate the identification of these targets. Traditionally, CAR T cells are aimed at proteins that are found at high levels on the surface of tumor cells but are at low levels or absent on healthy cells. In addition to identifying additional targets of this kind, TGen scientists are working on PepSeq, a new assay that allows them to identify a different class of targets — known as neoantigens.

“Neoantigens are exciting because they are found only in tumor cells and nowhere else in the body, making them highly-specific targets for an immune response with less potential for side-effects,” explained John Altin, Ph.D., an assistant professor in the Pathogen and Microbiome and Integrated Cancer Genetics divisions at TGen, who helped to invent the new assay.

Immune responses against neoantigens may be either targeted by the CAR T cells directly, or may be a beneficial side effect of CAR T therapy. Ultimately, these approaches promise to generate a more successful immune response for cancer patients at City of Hope.

“The PepSeq technology is going to empower what we learn from each patient on a clinical trial, so we can understand why a patient might respond or might not respond,” Dr. Brown said. “It really allows us to improve on that therapy, and hopefully to bring new therapies that are more potent, to patients more rapidly.”

TGen President and Research Director Jeffrey Trent, Ph.D., is collaborating with Dr. Brown at City of Hope to use the new assay for CAR T therapies against HER2 breast cancer. The TGen team is also investigating the effectiveness of CAR T against pancreatic cancer, the third-leading cause of cancer death. Pancreatic cancer has proven resistant to other immunotherapy approaches because it has a near-impenetrable physical barrier and an inhospitable environment that thwarts T cells.

In addition to the neoantigen assay, Dr. Berens is eager to deploy TGen’s single-cell sequencing technologies to study RNA and the epigenome in CAR T therapy and brain tumors. RNA carries out the instructions coded in the DNA blueprint. The epigenome is the machinery on the DNA helix that turns genes on and off, depending on a cell’s specific function and location in the body.

With single-cell RNA sequencing, “we can now watch how the engineered T cells behave,” Dr. Berens explained. “Is it only the CAR T cells that control the tumor, or are they showing the rest of the patient’s immune system what to do?”

The epigenome of a cancer stem cell can convert a cell from being quiet and acquiescent to one that is actively invading the surrounding tissue, even though the DNA does not change, Berens said, which can help oncologists understand how brain tumors escape immunotherapy.

“This is another area where TGen’s genomics can really add value to City of Hope’s CAR T programs,” he said.

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EPISODE 4: WHAT IS CAR T THERAPY?



# 1.2 MILLION & Counting

Fitness at TGen is a focus of both our science, and the funding of our science. For the 8th year, TGen volunteers organized a fundraising weekend at the Village Health Clubs in Phoenix, Scottsdale and Chandler.

The event, previously known as *Cycle for the Cure* — changed to *Fitness for the Cure* for the 2018 edition to include a number of exercise related activities — raised an amazing \$165,000 (and counting) bringing the total amassed over the event's history to more than \$1.2 million for TGen cancer research.

A key participant in this annual event is Dr. Matt Huentelman, a long-distance cyclist and a Professor in TGen's Neurogenomics Division.

Earlier this spring, Dr. Huentelman authored a study published in the *Journal of Applied Physiology* that, based on the results, suggest — for the first time — how exercise could be customized based on genomics.

"We hope to leverage these findings into more precise exercise recommendations in the future — ones that are tailored to an individual not only based on their physiological needs but also based on their molecular response to exercise," Dr. Huentelman said.

Meantime, organizers and supporters of *Fitness for the Cure* are doing some leveraging of their own.

"We expanded the event beyond spinning and yoga to include a variety of exercise modes, enabling TGen supporters to select the activities that best fit their goals and passions," said Vicki Vaughn, one of the co-chairs of the event.

Fitness for the Cure now includes hiking, tennis, a variety of yoga, a fitness boot camp, or an hour of interval training called Mixed Fit.

"Village Health Clubs are exclusive, state-of-the-art workout facilities, and we are so glad that they support all the good work TGen does to find better treatments for the many types of cancer that afflict Arizonans," said Vaughn's co-chair Robyn DeBell.

The presenting sponsor of *Fitness for the Cure* was Guarantee Trust Life Insurance Company, an 82-year-old nationwide health and life insurance firm that specializes in helping policyholders pay for the high out-of-pocket costs associated with cancer treatment and other critical illnesses. GTL donated \$50,000 to this year's Fitness for the Cure, bringing its total donations in recent years to more than \$200,000.

"We are extremely excited about our collaboration with TGen as we work together to create innovative insurance policies which actually pay for genetic testing. By leveraging TGen's world class research capabilities we believe we can craft more precise plans of care and deliver better outcomes for our policyholders when they are faced with critical illnesses such as a cancer diagnosis," said GTL Chairman, President and CEO Richard S. Holson III.

Meantime, Dr. Huentelman is excited about the future possibilities of his exercise study, which was conducted in collaboration with Arizona State University's College of Health Solutions, with contributions from Midwestern University and Purdue University.

By better understanding the unique molecular processes stimulated by different types of exercise, the researchers hope to find better ways to promote muscle health. They also maintain that this research could lead to more effective exercise interventions that target abnormalities associated with specific muscle dysfunctions.





# Kidz Who Care RUN FOR RARE

It's an unusually cold Sunday morning in late February as four young men prepare to welcome 250 runners in the third annual Run for Rare Disease Research. They wrestle card tables into place, find a power source for the finish line timer, and discuss the best places to display sponsor banners — all typical activities hours before a race. But this race is a bit different, given that the four who execute the entire event are high school freshmen who launched the inaugural event three years earlier at age eleven.

The Run for Rare Disease Research, an annual spring event held on the Arizona Canal, raises funds for TGen's Center for Rare Childhood Disorders. The date coincides with and recognizes National Rare Disease Day, which is the last day of February.

In 2016, with little oversight from adults, Xander Black, Michael Bendok, Matthew Linhart and Samuel Steiner sat out to make a difference in their community by founding

their own kid-run charitable foundation, Kidz4Causes.

"I wanted to do this because all around us the message is about making yourself better and worrying about how you are doing and all the while we forget about the fact that other people are suffering," says Samuel Steiner. "When I saw my little brother struggling with a rare disease, it made me realize other people are suffering and I could help — even in a small way — and feel good about it."

Samuel's younger brother, Harry, diagnosed with a rare and chronic illness at age eight, has been on the receiving end of the Center's services. It was Harry's personal story that inspired the boys to support the Center, whose mission is to fundamentally change and improve the care and management of children with rare and undiagnosed diseases.

The four accomplished the unlikely at their inaugural event: raising over \$15,000. They have

now raised more than \$50,000, a portion of which was matched by Anton's Challenge, a matching fund named for one of the Center's very special patients, making their contribution to the center nearly \$100,000.

Their funds help the Center support basic research to identify and inform better treatment options for some of TGen's youngest patients. The researchers also share their results with the global community of investigators and clinicians to foster additional breakthroughs toward the development of new treatments.

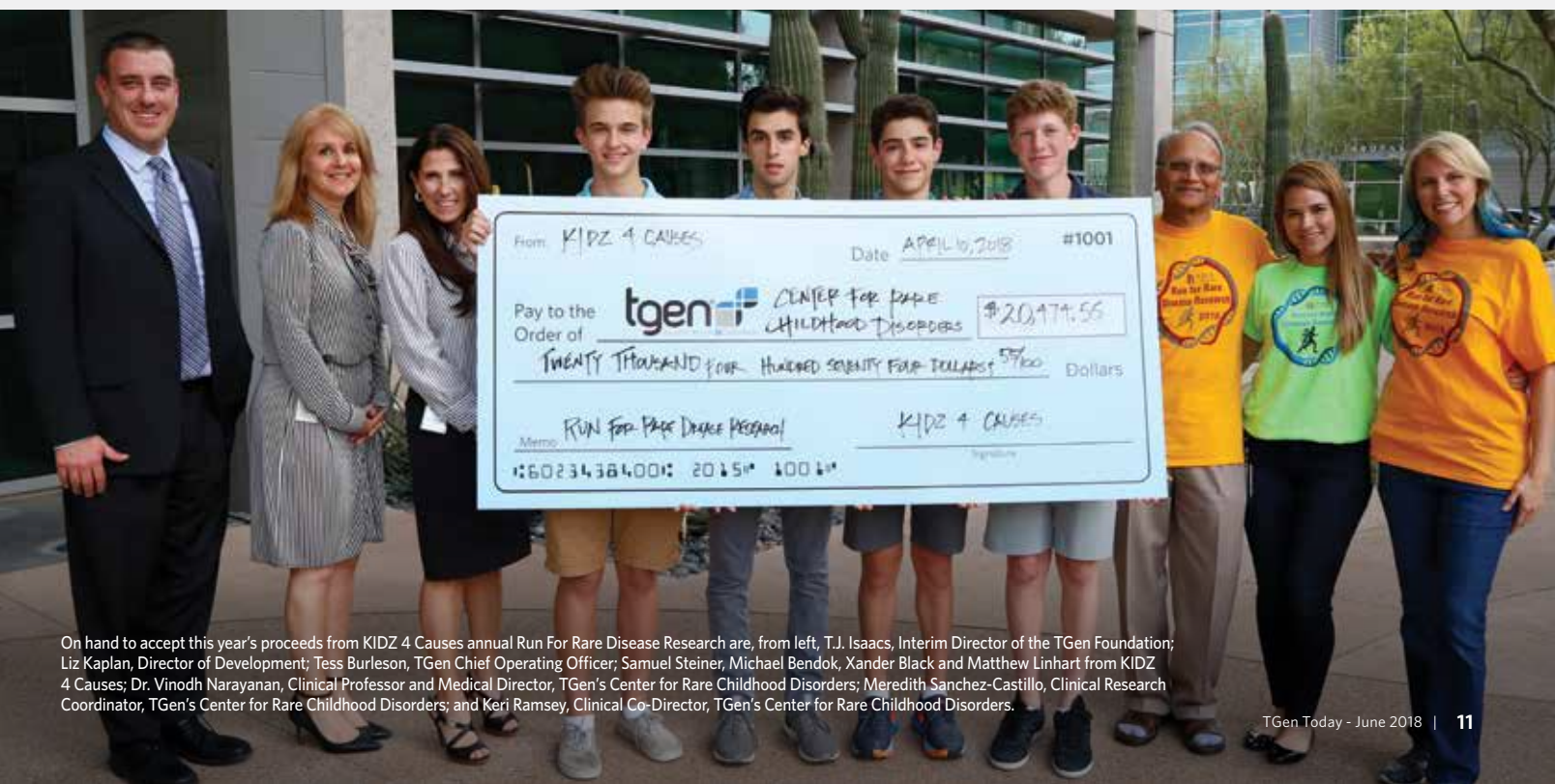
What these kids accomplished with just a pad of paper, a bicycle and unabashed determination is inspirational to TGen.

"It is so great to see children being so involved in philanthropy and understanding this idea of giving back," said TGen President and Research Director Dr. Jeffrey Trent on race day. "It is a reminder to us that anything is possible and that we, ourselves,

can stand in our own way of accomplishing great things."

The 2018 event raised more than \$20,000, exceeding everyone's expectations. Michael, Matthew, Samuel and Xander proudly presented a giant ceremonial check to TGen's Chief Operating Officer, Tess Bursleson, who echoed Dr. Trent's remarks. "We are so proud of these teens who are doing such great work and making a difference in our community," she said.

Those words of encouragement are all the boys need to refuel their ambition for next year. Their impact is what inspires them to keep this going. They have a real story to tell that strikes the heart of the community and has attracted loyal followers. With their loyal followers and maturing skills, they continue to bring in the dollars that make the difference. This has been the impetus of their continued success.



On hand to accept this year's proceeds from KIDZ 4 Causes annual Run For Rare Disease Research are, from left, T.J. Isaacs, Interim Director of the TGen Foundation; Liz Kaplan, Director of Development; Tess Bursleson, TGen Chief Operating Officer; Samuel Steiner, Michael Bendok, Xander Black and Matthew Linhart from KIDZ 4 Causes; Dr. Vinodh Narayanan, Clinical Professor and Medical Director, TGen's Center for Rare Childhood Disorders; Meredith Sanchez-Castillo, Clinical Research Coordinator, TGen's Center for Rare Childhood Disorders; and Keri Ramsey, Clinical Co-Director, TGen's Center for Rare Childhood Disorders.



\$1 donations for Jr. Frosty coupon sheets raised more than \$97,400 for cancer research at TGen, through the Bernice E. Holland Foundation.



The winning bidder was Art Sullivan of Lynnwood, Wash, whose hammer price was \$100,000 for Project Prestone. He immediately donated the car back to TGen to raise more funds at a future Barrett-Jackson auction.



Dr. Michael Berens, a TGen Deputy Director and one of the authors of the Ivy Glioblastoma Atlas Project (Ivy GAP).

## Wendy's Gives Cancer Cold Shoulder with Jr. Frosty Campaign

Wendy's customers at 214 participating restaurants in ten states gave cancer the cold shoulder this spring! ■ Their \$1 donations for Jr. Frosty coupon sheets raised more than \$97,400 for cancer research at TGen, through the Bernice E. Holland Foundation. ■ Since 2016, participating Wendy's restaurants have raised close to \$300,000 for TGen's cancer research, contributing to \$1.1 million raised overall through the Bernice E. Holland Foundation. Wendy's restaurant operator, Rick Holland, established the Bernice E. Holland Foundation in 1999 in memory of his mother who succumbed to cancer. The foundation will also host its annual Golf Tournament and Auction, June 10-11, in Colorado Springs. ■ "When it comes to fighting cancer, TGen is in a class by itself," Rick Holland said. "TGen is creating state-of-the-art diagnostic and therapeutic tools for physicians and their patients, and we wholeheartedly support those efforts."

## Project Prestone Puts Barrett-Jackson Over \$2 Million for Cancer Research

A black-and-gold beauty drove Barrett-Jackson's contribution to cancer research at TGen past the \$2 million mark at the 47th annual Scottsdale auction in January. ■ A 1987 Chevrolet Monte Carlo SS Aero Coupe resto-mod dubbed Project Prestone was the first product of the Barrett-Jackson Collection Showroom Service Department. The car debuted at the 2017 Connecticut auction and underwent a complete transformation, thanks to presenting sponsor Prestone. ■ "I've been involved in countless restorations, starting at a young age, and I can appreciate the tremendous amount of work that goes into this incredibly rewarding experience," said Craig Jackson, auction Chairman and CEO, who established the Barrett-Jackson Cancer Research Fund at TGen in 2010 in memory of his late father Russ and brother Brian. "We are proud to once again donate a special collector car for charity and have the entire hammered price going to support the incredible work being done at TGen." ■ Art Sullivan of Lynnwood, Washington, hammered home a winning bid of \$100,000 and then promptly donated the car back to TGen to raise additional funds at a future Barrett-Jackson auction. ■ Mr. Sullivan said he was inspired to bid for the vehicle because he and his wife had recently lost a dear friend and their beloved dog to cancer.

## Ivy-Funded Brain Tumor Atlas Published in the Journal Science

This year, an estimated 13,000 Americans will be diagnosed with glioblastoma, which is the most deadly and aggressive form of brain cancer. ■ In the ongoing pursuit of new therapies, a growing number of researchers studying the disease are using the Ivy Glioblastoma Atlas Project (Ivy GAP): a publicly available anatomic transcriptional atlas of human glioblastoma. A report on the Ivy GAP and the associated Ivy GAP Clinical and Genomic Database published May 10 in the journal *Science*. The study was funded by The Ben and Catherine Ivy Foundation. ■ "This visionary contribution provides researchers with a map of glioblastoma that can direct researchers right up to the doorstep of this disease and opens the door to its biology at a scale never before thought possible," said Dr. Michael Berens, a Deputy Director of the TGen, and one of the study's co-authors. ■ Ivy GAP includes detailed information about genes expressed in the many anatomical regions of glioblastoma. ■ "It sets the stage for researchers to conduct more detailed analysis, characterize micro-environments, and understand how tumor cells interact with host cells. These studies will lead to improved clinical outcomes by pointing to novel therapeutic targets in future patients," said Dr. Berens, who helped select the genes explored in the study and linked up labs to provide tissue samples.



## Chronic Traumatic Encephalopathy (CTE)

Chronic traumatic encephalopathy (CTE) is a neurodegenerative disease found in athletes, military veterans, and others with a history of repetitive brain trauma. Currently, diagnostic tools do not exist making detecting and treating head trauma a concern for many athletes participating in contact sports. ■ As part of an ongoing effort to improve outcomes for those at high risk for repetitive brain injury, TGen hosted the first of many “collection date” opportunities to study chronic traumatic encephalopathy (CTE) on March 28. Former and current professional football players, residing in the Phoenix area, were invited to participate in this study, designed to help TGen investigator Dr. Kendall Van Keuren-Jensen identify methods of detecting CTE in the living with the ultimate objective of improving treatment for those who have suffered brain injuries.

■ Nine participants representing a diverse population of athletes with varying degrees of contact sport participation and experiences, gave Dr. Van Keuren-Jensen a great first perspective on the effects of traumatic brain injury.

## TGen Bioscience Leadership Academy Welcomes Inaugural Class

On June 18, 20 talented high school students will kick off the inaugural year of TGen’s latest educational offering: TGen Bioscience Leadership Academy.

■ The program, which runs June 18 through June 29, exposes high school students interested in the biosciences to a full array of biomedical topics and career possibilities. Thirty-two community leaders in the sciences and education participated in the selection process that saw one student from any given high school selected to ensure the program represents a cross section of Arizona students and schools. ■ Program support comes from a three-year pilot grant from the Helios Education Foundation. Helios also funds TGen’s flagship intern program, the Helios Scholars at TGen.

## Upcoming Events Benefitting TGen



### 16th Annual Seena Magowitz Golf Classic [Boston, MA] August 25-27, 2018

The Seena Magowitz Golf Classic began 16 years ago in an effort to raise money to fight pancreatic cancer, a disease that will claim 44,000 American lives this year. [www.seenamagowitzfoundation.org](http://www.seenamagowitzfoundation.org)

### 12th Annual Terri Link Memorial Fund Invitational [Statham, GA] September 7, 2018

Join Drew Link and friends for a day on the greens as they raise funds to benefit Adrenocortical Cancer (ACC) Research at TGen. [www.tgen.org/events](http://www.tgen.org/events)

### Step-N-Out 5K Walk Run Dash [Scottsdale, AZ] November 4, 2018

Come out for a fun, family-friendly fitness event, benefiting pancreatic cancer research. [www.tgen.org/events](http://www.tgen.org/events)

To see all current events, please call the TGen Foundation at 602-343-8411 or visit: [www.tgen.org/events](http://www.tgen.org/events)



As part of an ongoing effort to improve outcomes for those at high risk for repetitive brain injury, TGen hosted the first of many “collection date” opportunities to study chronic traumatic encephalopathy (CTE).



Thanks to the generosity and partnership of Helios Education Foundation, high school students interested in the biosciences now have a program specifically tailored to them in the TGen Bioscience Leadership Academy.



16th Annual Seena Magowitz Golf Classic is a fun-filled event with a goal To triple the 5-Year survival rate of pancreatic cancer and continue the pursuit of defeating pancreatic cancer, the most brutal of cancers.

## Colleen's Dream Foundation Receives Collaborative Spirit Award

TGen honored Colleen's Dream Foundation with the 2018 Collaborative Spirit Award at its Annual Founders Dinner to honor the Scottsdale-based nonprofit for its commitment to ovarian cancer research.

Colleen's Dream contributed \$450,000 to fund TGen-led clinical trials for a rare form of ovarian cancer, small cell carcinoma of the ovary, hypercalcemic type. The trials are scheduled to begin this year.

"The research being done at TGen is some of the most exciting we've ever seen," said Nicole Cundiff, CEO of Colleen's Dream Foundation. "Whether the drug they developed leads to another amazing discovery, or it becomes a first line ovarian cancer treatment, we truly believe what they're doing will move the needle and we couldn't be more proud to support an institute located here in Arizona."

Colleen's Dream was founded in 2012 by Nicole Cundiff and her husband Billy, a veteran NFL kicker, in memory of Nicole's mother Colleen Drury, who was diagnosed with Stage 3C ovarian cancer in 2007 and passed away in 2013. (Related story, Page 4.) Watch and learn more about Colleen's Dream and the Collaborative Spirit Award at [www.youtube.com/tgenvideo](http://www.youtube.com/tgenvideo)

