

TGen Today

JULY | 2015

A PUBLICATION OF THE TRANSLATIONAL GENOMICS RESEARCH INSTITUTE



DETECTING CANCER IN ITS INFANCY

Liquid Biopsies Change
How We Look for Cancer



A Non-Profit Biomedical
Research Institute



A Look Inside...

Dear Friends,

We've come to count on TGen to be there, working with doctors to find new, more precise treatments when the traditional "standard of care" fails their patients. Today at TGen, our scientists are working to set a new standard of care through the **promise of early detection**.

The **promise of early detection** means TGen will be the first step doctors take instead of the last resort for their patients. By finding cancer cells before they spread and identifying people at-risk for diabetes and Alzheimer's before they become patients, TGen scientists will be able to intervene with targeted therapy to improve survival and quality of life.

Thanks to screenings like mammogram and colonoscopy, breast and colon cancer survival rates have improved dramatically over the past few decades. TGen is working to develop powerful new tools to bring the **promise of early detection** to evasive cancers like that of the ovary and pancreas, as well as to scourges like Alzheimer's disease.

Led by Drs. Muhammed Murtaza and Kendall Van Keuren-Jensen, TGen's Center for Noninvasive Diagnostics uses advanced genomic analysis to pursue safer, more accurate, faster ways of diagnosing disease through simple blood, saliva or urine tests.

Our new collaboration with Baylor Research Institute will develop this concept of "liquid biopsy" for cancer patients at the earliest stages, guiding us toward personalized vaccines and prevention strategies tailored for each individual patient.

Of course, the healthiest option is not getting sick in the first place. The **promise of early detection** gets us even closer to that goal, as TGen works at the leading edge of this new frontier. This issue of *TGen Today* is dedicated to the work we are doing on the **promise of early detection**, imagining a brighter future for patients today.

We thank you for your continued commitment to this journey.

A handwritten signature in black ink that reads "Michael Bassoff". The signature is fluid and cursive, with a large, sweeping flourish at the end.

Michael Bassoff
President, TGen Foundation



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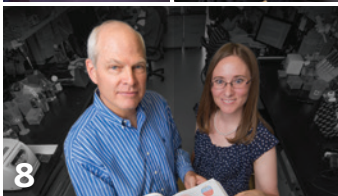
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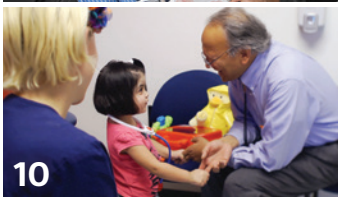
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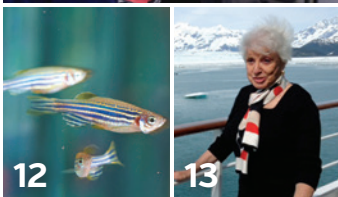
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The Translational Genomics Research Institute (TGen) is a non-profit organization dedicated to conducting ground breaking research with life changing results. Research at TGen is focused on helping patients with diseases such as cancer, neurological disorders and diabetes. TGen is on the cutting edge of translational research where investigators are able to unravel the genetic components of common and complex diseases. Working with collaborators in the scientific and medical communities, TGen believes it can make a substantial contribution to the efficiency and effectiveness of the translational process. For more information, visit: www.tgen.org



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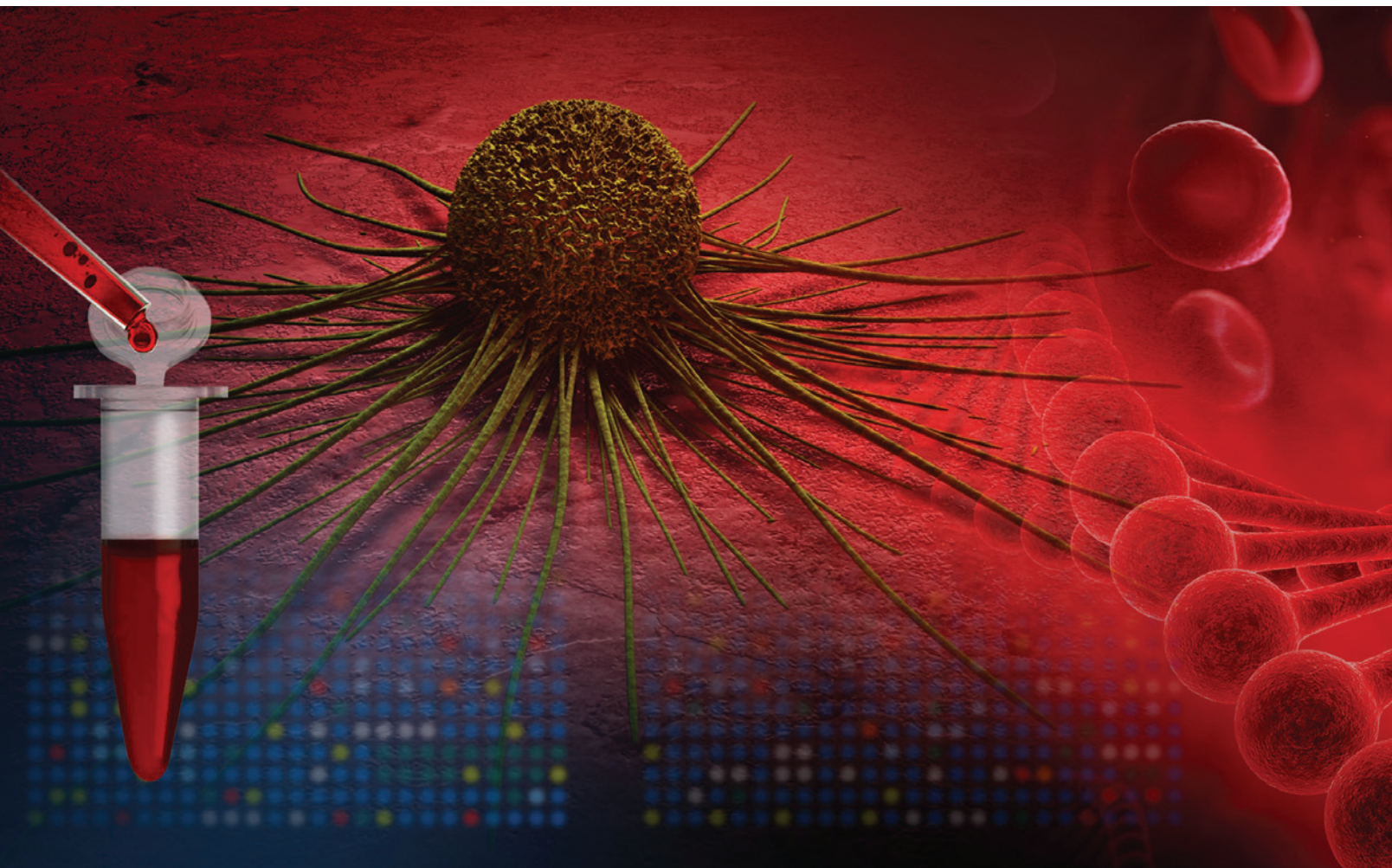
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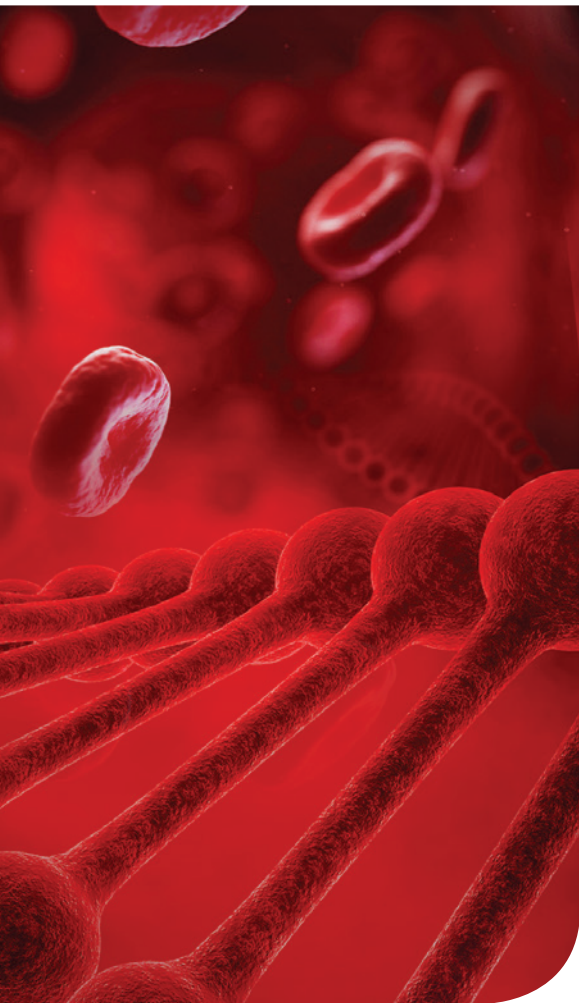
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Detecting Cancer in its Infancy

Center for Noninvasive Diagnostics holds promise for earlier diagnoses, treatments – even cures

TGen's Center for Noninvasive Diagnostics uses advanced genomic analysis to pursue safer, more accurate and faster ways of diagnosing disease. Center Co-Directors Drs. Muhammed Murtaza and Kendall Van Keuren-Jensen describe how the center's techniques work.



What is unique about TGen's Center for Noninvasive Diagnostics?

Imagine diagnosing an otherwise hidden cancer with a simple blood test: no exploratory surgery or needle biopsy necessary. Imagine finding the earliest signs of Parkinson's or Alzheimer's disease in a small amount of blood. Recent studies have shown that free-floating DNA, known as circulating DNA, and extracellular RNA [believed to play a role in cell regulation], exist in body fluids such as blood, urine, saliva and cerebral spinal fluid. Developing a method to noninvasively study this molecular material would provide safer medical testing procedures and potentially more accurate diagnoses, leading to medical treatments that are "more precise," according to each patient's condition. If successful, doctors could address these conditions years, even decades, before more serious symptoms occur.

How will noninvasive diagnostics change how disease is fought?

By sampling and sequencing circulating DNA and extracellular RNA, doctors and scientists hope to discover methods that could detect cancer and other diseases in their earliest stages. For cancer patients, researchers believe the analysis will also help guide treatment decisions and increase a patient's chances for an improved outcome. In neurological diseases like Alzheimer's, identifying patients in the early stages of disease would lend itself to clinical trials of new treatments and prevention therapies.

What is DNA and what does it do?

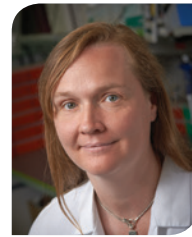
DNA exists in the nucleus of all living cells. Its structure is like that of a twisted ladder, with two "backbones" holding an array of chemical "steps" in between. The chemicals in DNA contain recipes that create the proteins needed for the processes of life. TGen specializes in sequencing DNA, spelling out – in order – all of the nearly 3 billion base-pair nucleotides that make up the building blocks of life.

What is RNA?

Like DNA, nucleic acids comprise RNA as well. Unlike DNA, however, which contains two inter-coiled strands; RNA has only a single strand. RNA is a functional copy of DNA that can have many regulatory roles in a cell. RNA can create proteins, regulate the levels of other RNAs and proteins, or have structural capabilities.

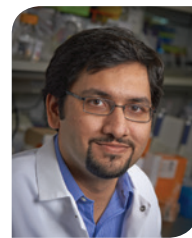
How can DNA and RNA detect and inform about disease?

If one or more of the chemical sequences in DNA or RNA read abnormally, a genetic disease or medical condition may be present. In a cancer, errors in the DNA sequence can drive abnormal growth of cancer cells and enable them to evade treatment. Differences in the levels of RNA can also indicate that an abnormal process is occurring.



Kendall Van Keuren-Jensen, PhD
Co-Director,
Center for Noninvasive Diagnostics

Dr. Van Keuren-Jensen is an Associate Professor in TGen's Neurogenomics Division. She received her PhD from Stony Brook University at Cold Spring Harbor Laboratory in New York.



Muhammed Murtaza, PhD
Co-Director,
Center for Noninvasive Diagnostics

Dr. Murtaza holds a joint appointment at TGen and Mayo Clinic Arizona and is a recipient of the Science Foundation Arizona's Bisgrove Scholars Award. At TGen, he is a Research Assistant Professor in the Cancer and Cell Biology Division. He completed dual degrees in medicine and surgery from Aga Khan University, Pakistan, and graduate studies at Trinity College, University of Cambridge, England.



From left: Drs. Joyce O'Shughnessy [Baylor], John Carpten and David Craig [TGen]

THE FUTURE OF MEDICINE IS HAPPENING NOW

PRECISION MEDICINE

TGen-Baylor
collaboration
advances research
and increases
patient options
for diagnosis
and treatment

“This collaboration provides an opportunity for TGen and Baylor to leverage our respective strengths, technologies and talent to make a difference in the lives of cancer patients.”

– Dr. Jeffrey Trent

While a great deal of buzz about “precision medicine” followed President Obama’s use of the term in his recent State of the Union address, the scientists and doctors at TGen have worked the genome to provide patients with precision medicine outcomes for over a decade.

TGen has always believed that one-size-fits-all medical care is an outdated approach, and that by utilizing the latest technologies, and collaborating with the strongest of partners, we can develop better tools to increase our understanding of complex diseases like cancer, and to better predict which treatments might be most effective.

Toward that goal, TGen’s most recent collaboration with Baylor Research Institute (BRI) at Dallas provides cancer patients greater access to liquid biopsies (a method for diagnosing disease in its earliest stages), gene sequencing (a look at your genome to treat your disease), personalized vaccines and one-of-a-kind clinical trials (the right drug, at the right dose, at the right time).

TGen and BRI will collaborate in these areas of precision medicine to answer critical patient and physician questions about specific treatment options available to the patient as well as the best prevention strategy tailored for each patient.

“This collaboration provides an opportunity for TGen and Baylor to leverage our respective strengths, technologies and talent to make a difference in the lives of cancer patients,” said Dr. Jeffrey Trent, TGen President and Research Director.

This collaboration aligns the best

science of both institutions, said Dr. Robert Pryor, M.D., President, CEO and Chief Medical Officer at Baylor Scott & White Health.

“We will combine TGen’s strengths in genomics and proteomics with BRI’s strengths in metabolomics and immune-based approaches, initially focusing on genomic – or molecular – and translational research for oncology,” Dr. Pryor said. “The collaboration is consistent with Baylor’s commitment to delivering precision medicine to patients.”

A joint program located at Baylor Charles A. Sammons Cancer Center on the campus of Baylor University Medical Center at Dallas will manage operations, while the research will take place in clinics and labs throughout the health care system as well as across multiple labs at TGen.

Dr. Alan Miller, chief of oncology for Baylor Scott & White Health – North Texas, said the joint effort will concentrate on three significant research areas: women’s cancer, including breast and gynecological; abdominal malignancies, including pancreatic, colorectal and liver; and hematological cancer, including leukemia, lymphoma and multiple myeloma.

The American Association for Cancer Research (AACR) recently recognized TGen and Baylor for having the most cited paper of any in 2013 in their journal *Molecular Cancer Therapeutics*. The ground-breaking study of 14 triple-negative breast cancer patients identified numerous potential therapeutic drug targets.

“TGen is a proven leader in genomic approaches to cancer and other diseases, this collaboration will accelerate our efforts to bring the latest developments directly to our patients,” Dr. Miller said.

Dr. John Carpten, Deputy Director of Basic Science and Professor and Director of its Integrated Cancer Genomics Division, will lead the TGen efforts.

“I’m optimistic our work with Baylor will result in advances that can quickly add to a patient’s treatment options, either through our clinical trial efforts, or the development of new drugs that prove effective,” Dr. Carpten said.

TGen has identified specific gene defects in numerous disease processes that could lead to immediate targeted therapies for patients. Beyond cancer, additional areas of research include infectious disease, cardiovascular, diabetes, neurology and metabolic disease.

IN BRIEF

The relationship brings TGen’s genomic and molecular research platform along side Baylor’s clinical research platform with the hope of providing added depth and improved outcomes based on genomic and genetic information. Through advanced technologies, TGen and BRI will analyze patients’ gene sequences to find and create areas to launch clinical trials, develop new medications and implement preventive strategies best suited to each patient’s individual disease. While the initial focus centers around cancer, downstream efforts will focus on infectious disease, cardiology, diabetes, neurology and metabolic disease. To learn more, watch the video at: www.bit.ly/1fyB0fp





Dr. Alan Bryce, Mayo Clinic's lead clinical investigator with patient Joel Spatt.

SU2C Clinical Trials

Combat Advanced Skin Cancer

TGen and Mayo Clinic deliver benefits from recently FDA-approved nationwide precision medicine clinical trials

For skin cancer patients with advanced melanoma – those with a targetable BRAF gene mutation – new drug treatments are making a significant difference in their survival and quality of life.

But for about half of all metastatic melanoma patients, those without the BRAF mutation, there are no proven treatments.

Metastatic melanoma is a type of cancer that has spread from the skin to other parts of the body, most frequently the lungs, muscles, brain and liver. More than 9,000 Americans die each year because of metastatic melanoma.

To address this unmet medical need, TGen and Mayo Clinic are helping launch a national set of clinical trials, applying the latest in precision medicine to treat advanced melanoma. The clinical trials are the culmination of nearly four years of research under the Stand Up To Cancer [SU2C] Melanoma Dream Team, co-led by Dr. Jeffrey Trent, TGen President and Research Director, and Dr. Pat LoRusso at the Yale University Cancer Center.

Mayo Clinic is the only clinical site in Arizona to offer this new treatment, sponsored by SU2C and the Melanoma Research Alliance.

“We are addressing a continuing and significant unmet medical need for advanced melanoma patients who have progressed beyond our most promising current treatments,” said Dr. Trent. “The Stand Up To Cancer-Melanoma Research Alliance grant gives us the ability to align cutting edge genomic research with world-recognized clinical centers like the Mayo Clinic, all joining forces to conquer this terrible disease.”

“This trial addresses a continuing and significant unmet medical need for advanced melanoma patients.”

The clinical trials will enroll patients for whom immune therapy did not work or was not an option, and uses the latest molecular sequencing techniques to best match targeted drugs to the unique genetic alterations present in tumors missing the BRAF mutation.

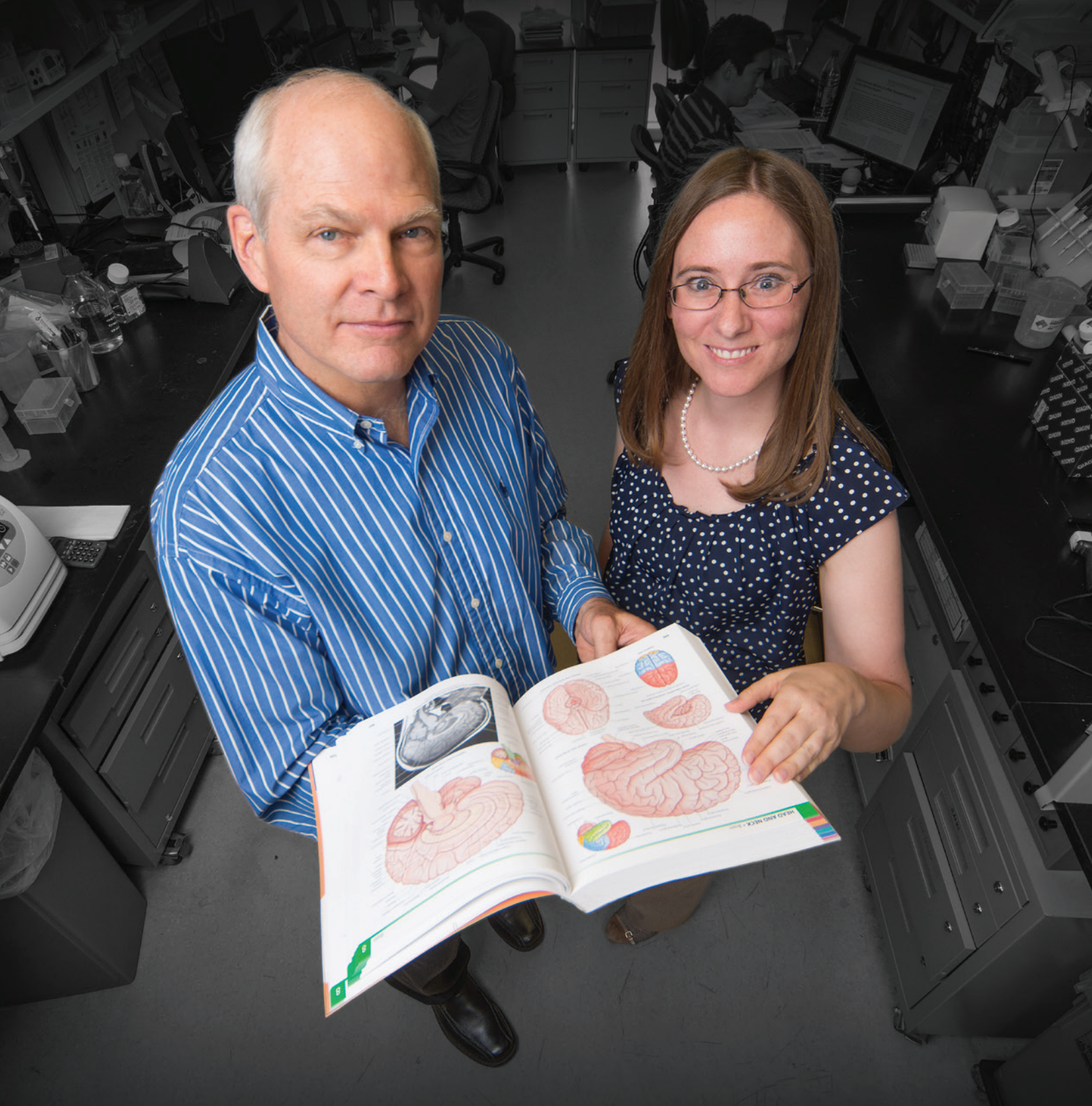
“This study is unique in offering more than 20 different

treatment options in a single trial. By leveraging the power of cancer genomics, we believe we can treat each patient with the best drug for their individual situation. This design offers patients a huge advantage over the old model of treating all patients the same way and only testing one drug at a time,” said Dr. Alan Bryce, Mayo Clinic’s lead clinical investigator on the trial.

“By analyzing a patient’s tumor at a molecular level, there is an opportunity to identify individually matched treatments. Our study explores this concept of precision medicine for treatment of cancer at a level that has not been done before,” said Dr. Aleksandar Sekulic, a physician-scientist with a joint appointment at Mayo Clinic and TGen.

Other institutions involved in the study are: Wayne State University; National Cancer Institute; University of Michigan; Baylor University Medical Center; Indiana University; Vanderbilt University; and the Memorial Sloan-Kettering Cancer Center.

For more information about this clinical trial, please call the Mayo Clinic Cancer Center Clinical Trials Referral Office at (855) 776-0015.



Breaching the Barrier

Clinical trial uses multiple drugs to cross blood-brain barrier and attack glioblastoma tumors

Led by faculty at TGen and UC San Francisco (UCSF), a comprehensive genetic review of treatment strategies for glioblastoma brain tumors was published recently in the Oxford University Press journal *Neuro-Oncology*.

The study, *Towards Precision Medicine in Glioblastoma: The Promise and The Challenges*, covers how these highly invasive and almost-always-deadly brain cancers may be treated, reviews the continuing challenges faced by researchers and clinicians, and presents the hope for better treatments by harnessing the power of the human genome.

The study also describes a pioneering 15-patient clinical trial underway at UCSF, guided by TGen research. As part of the trial, TGen provides an expert, multidisciplinary panel for each patient's genomic profile to help guide treatment recommendations.

"This study thoroughly explores how we arrived at the current standard-of-care, and how – through cutting-edge genomic technologies – we might find better answers for these patients who need our help today," said Dr. Jeffrey Trent, TGen President and Research Director and the study's senior author.

Funded by The Ben & Catherine Ivy Foundation, the study is one of several simultaneous and coordinated efforts seeking to uncover the molecular source of this deadly brain cancer with the goal of prolonging survival of glioblastoma patients.

"These studies, and their associated clinical trials, have the potential to lift our knowledge of glioblastoma to an unprecedented new level," said Catherine Ivy, President of The Ben & Catherine Ivy Foundation. "Developing drug compounds that breach the blood-brain barrier and are effective against tumors would fulfill one of the medical community's most critical unmet needs, and boost the hopes of brain tumor patients everywhere."

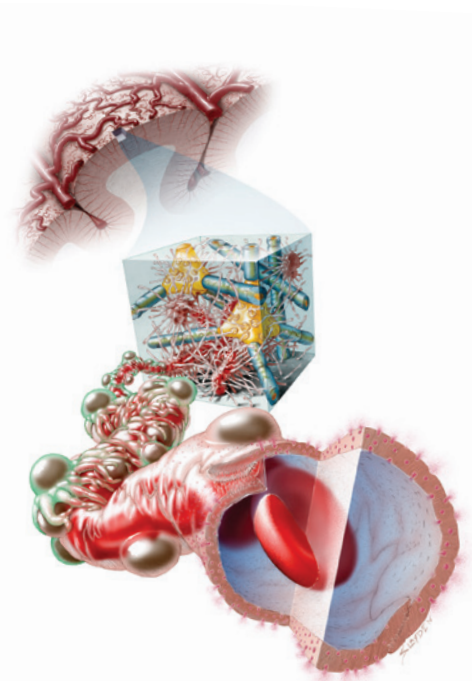
One of the major difficulties in treating brain tumors is finding drugs that can penetrate the blood-brain barrier, which buffers the brain from the rest of the body's blood-circulatory system. Located along capillaries, the blood-brain barrier protects the brain from rapid changes in the body's metabolic conditions and minimizes exposure to molecules that are toxic to neurons in the brain.

"This study outlines strategies for overcoming past failures, primarily by applying targeted combination therapies that match the tumors' genetic changes with drug compounds that can reach the central nervous system," said Dr. Sara Byron, Research Assistant Professor in TGen's Center for Translational Innovation, one of the study's co-lead authors.

The cancer's intrusive penetration into adjoining tissues is another major issue as it prevents the complete surgical removal of tumors from the brain, even with follow-on radiation and chemotherapy: "It is this invasive, infiltrative disease component that is the ultimate cause of recurrence, resistance and death," the authors suggest.

In the clinical trial begun at UCSF, patients receive multiple biopsies at the time of surgery across different regions of the brain tumor. The biopsied samples undergo extensive genome-wide profiling, which provides information on a selection of drugs that might target the brain cancer and diffuse regions of the lesion inaccessible to surgery.

Drug selection is individualized, and multiple FDA-approved agents (up to four) are allowed. Trial leaders implement "rules" for drug selection using the specialized drug pharmacopeia designed for this trial. The drugs are chosen for their ability to reach the brain, and the patient's past treatment history, with oversight from a tumor board that drafts a report to the treating physician.



What is the Blood-Brain Barrier?

- Located along capillaries
- Buffers brain from body's circulatory system
- Protects brain from rapid changes in body's metabolic conditions
- Minimizes exposure to molecules that are toxic to brain
- Challenge: Find drugs to penetrate barrier and work effectively against tumors

◀ Dr. Michael Berens (at left), TGen Deputy Director for Research Resources, has helped guide TGen's Phase 0 clinical trials for glioblastoma patients at Barrow Neurological Institute. Dr. Sara Byron, a TGen Research Assistant Professor in TGen's Center for Translational Innovation, is co-lead author of a study about state-of-the-art treatments for glioblastoma published in the Oxford University Press journal *Neuro-Oncology*. Both projects are funded by The Ben & Catherine Ivy Foundation.



A Reason to Believe

NARAYANAN LAB ACCELERATES DISCOVERIES TO BENEFIT CHILDREN

A recent poll* found that 62 percent of Americans remain unaware of the ability to use a patient's genomic data to provide improved prevention, diagnosis and treatment for a host of diseases and disorders, a process TGen researchers and clinicians refer to as precision medicine.

TGen leverages patient genetic information toward improved care. A prime example of using genomic data – information contained in a patient's DNA – is TGen's Center for Rare Childhood Disorders (C4RCD). Since its inception, the Center has enrolled more than 900 participants and analyzed the genetics or

* Poll of 1,000 adults by KRC Research published in Personalized Medicine Coalition.



genomics of more than 200 families, with a diagnostic success rate of nearly 40 percent.

With the opening of a lab in TGen's Neurogenomics Division under the direction of C4RCD Medical Director, Dr. Vinodh Narayanan, TGen enhances its position in the area of genomic enabled medicine even further.

And there is no place better to start than with the urgent needs of children with undiagnosed, difficult-to-treat, and just plain mysterious, diseases and conditions.

Dr. Narayanan divides his time supervising lab discoveries at TGen and seeing young patients at the C4RCD clinic.

"The inclusion of Dr. Narayanan's lab within TGen provides us with accelerated opportunities to help benefit the young patients he sees in our C4RCD clinic," said Dr. David Craig, TGen's Deputy Director of Bioinformatics, Director of the Neurogenomics Division, and Co-Director of C4RCD.

Like other research at TGen, Dr. Narayanan's research attempts to go beyond conventional medicine, using the power of the human genome to dig deeper into the causes and potential cures of disorders that previously have been difficult, even impossible, to treat.

Dr. Narayanan's relationship with TGen goes back to 2005, when TGen forged a clinical research partnership with Barrow Neurological Institute at St. Joseph's Hospital. At the time, Dr. Narayanan worked as a pediatric neurologist: Dr. Narayanan provided treatment for patients, and TGen handled the genomic research.

Following Dr. Narayanan's recommendation, TGen sequenced the DNA of one of his patients – a Phoenix girl named Shelby Valint, who had spent most of her life in a wheelchair with an undiagnosed condition.

Shelby's DNA sequence revealed a biological deficiency that prevented her from producing sufficient dopamine, a brain chemical needed for muscle coordination, strength and balance, a fate shared with Parkinson's disease patients. Soon after, a combination of Parkinson's medications allowed Shelby to gradually recover her mobility and ability to speak. Today, she's your typical teenager with a love for dance.

With Shelby's results as an example of what's possible, Dr. Narayanan now uses the power of genomic sequencing to help other children.

An initial area of research for Dr. Narayanan is Rett Syndrome, named after Austrian pediatrician and neurologist Dr. Andreas Rett, who first defined the disorder in 1966 as the cause for numerous ailments, everything from problems in neurodevelopment to forms of autism.

A 1999 discovery revealed that Rett Syndrome stems from a change in a single gene, MECP2, which makes it an ideal model to study.

"Since then, the focus has been on trying to understand the biology of MECP2; how this mutation causes the neurological problems, and then trying to discover cures," Dr. Narayanan said.

TGen scientists are developing high-through-put assays to find compounds that might eventually become candidate drugs for treatment.

"We are right in the thick of it. The next phase is really trying to discover drug treatments for this disorder. This is an exciting phase," said Dr. Narayanan. "Each patient poses unique questions. This is the challenge – and the vision – of personalized medicine."

Just as TGen has shown in recent years that genomic sequencing can help treat many types of cancer, Dr. Narayanan believes precision medicine will be able to make advances in neurological disorders of the brain and nervous system.

"Each child has a different genetic diagnosis, a different molecular problem," he said. "How are we to use that information of genetic diagnosis to discover a treatment that is tailor-made for each patient? That's the challenge of the future. And I think we might make some headway through our center."



Dr. Narayanan works with Research Assistant Professor Dr. Sampath Rangasamy

Zebrafish help scientists in fight against pancreatic cancer, rare diseases

A new lab at TGen has lights that mimic the natural circadian rhythms of the sun and earth – they gradually brighten like a sunrise, stay on 14 hours then dim like a sunset and remain dark for 10 hours before beginning the process anew.

It's just one of the ways TGen scientists care for hundreds of tiny zebrafish (part of the minnow family), a new asset in the battle against pancreatic cancer and other diseases. For more than a decade, this glassy striped fish smaller than a door key has proved an important model organism in scientific research. Named for the uniform horizontal stripes on the side of its body, the zebrafish is a tiny creature that packs a punch in terms of biological similarities with the human.

TGen researchers believe zebrafish can aid in the search for therapeutics that could help slow down, and even reverse, the growth and spread of pancreatic cancer.

Because they are vertebrates, about 70 percent of the genetic code is comparable to humans. They have genetic similarities for the overwhelming majority of genes that cause human disease. They grow to maturity in a matter of weeks and are relatively inexpensive to manage.

Importantly, like humans, they have a pancreas, an organ near the stomach that produces digestive juices and several key hormones. And because of their transparent scales, they can provide a window into the real-time development of cancer tumors.

"Because of their translucent nature you can see what is wrong noninvasively through a microscope," said Dr.

Haiyong Han, a TGen Associate Professor, head of TGen's Pancreatic Cancer Research Unit.

By studying altered genes in zebrafish, TGen researchers can monitor the initiation, growth

and fatal effects of pancreatic tumors, including their spread to other organs.

"Our ability to study these tiny fish is going to be of tremendous benefit for our scientific investigations, and ultimately for our pancreatic cancer patients," said Dr. Daniel D. Von Hoff, TGen's Distinguished Professor and Physician-In-Chief.

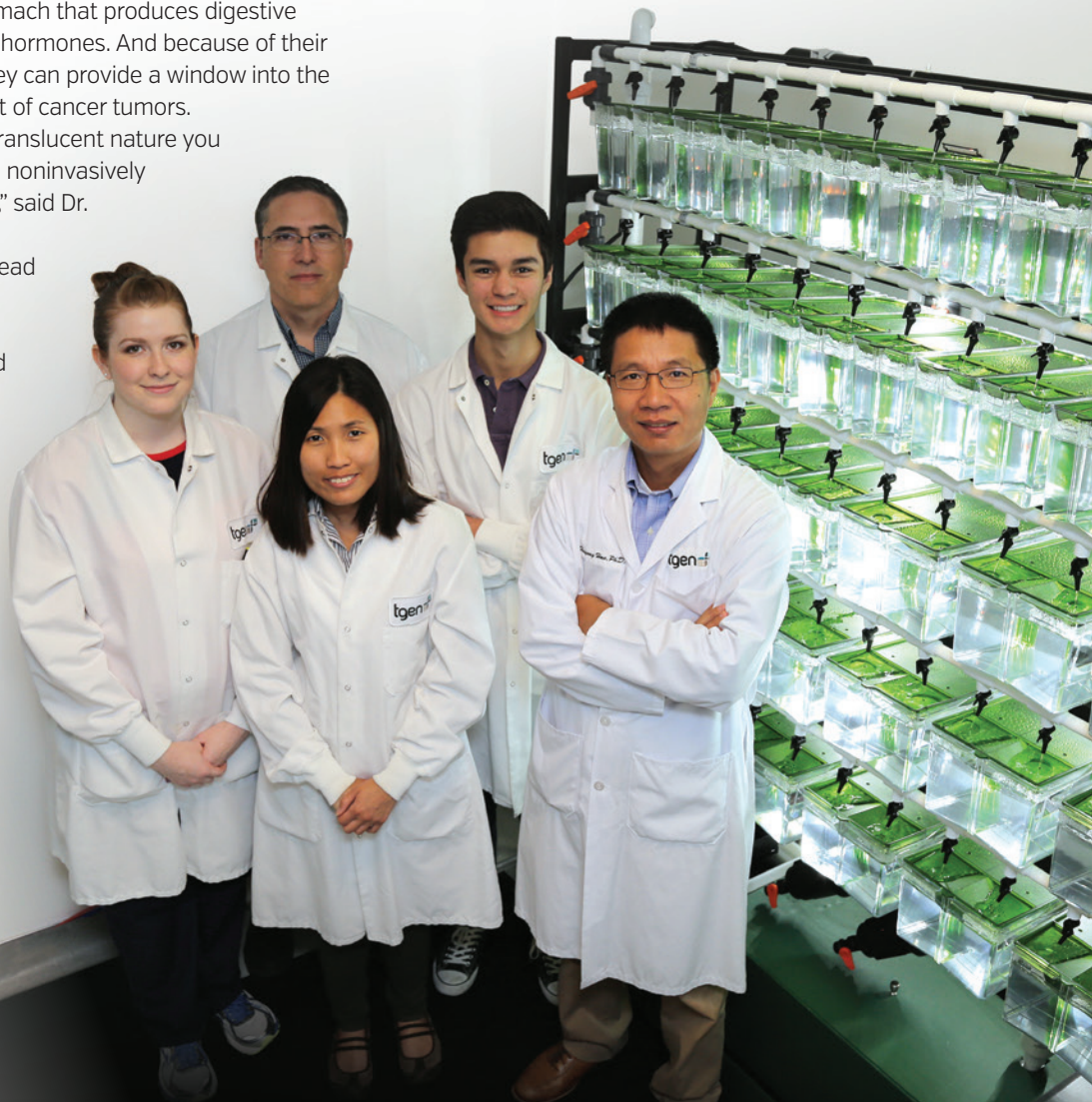
Pancreatic cancer will claim the lives of more than 40,000 Americans this year, making it the nation's fourth leading cause of cancer related death. Median survival for patients with advanced pancreatic cancer is less than 6 months following diagnosis, and the 5-year survival rate is less than 6 percent for all patients. Pancreatic cancer's lethal nature stems from the fact that diagnosis typically occurs when the disease has reached its late stage – when surgery is often no longer an option – and its propensity to rapidly spread to distant organs.

An Institutional Animal Care and Use Committee, or IACUC, oversees care of the zebrafish. IACUC reviews all testing procedures and ensures the humane treatment of the fish throughout their lifecycle.

TGen's zebrafish project is funded by the Seena Magowitz Foundation.



Fish tanks hold varying ages of Zebrafish, from larvae to adults. The Zebrafish lab is run by TGen Associate Professor Dr. Haiyong Han [at right] and his staff [from left] Research Assistant Jennifer Harper, Senior Research Assistant Ruben Munoz, Research Associate Serina Ng, and Intern James Hunt.



Eleanor Light, Scientist and Scientific Philanthropist



After a career in science, Eleanor Light went on to become a successful entrepreneur in the travel and hospitality industry. She funded the Light Family Room at the C4RCD and an exam room named for her granddaughter Ellie.

Eleanor Light earned a degree in Chemistry with a minor in Physics from Cornell University in 1952. At that time, women earned less than 10 percent of all bachelor's degrees in the sciences.

"When I graduated, I had a choice: Work for General Electric and get paid half of what a man made, or go to a small company and get full pay," she recalled.

A rare woman in a male-dominated world, Mrs. Light succeeded as scientist, entrepreneur and also a philanthropist, providing funding for family and patient rooms at TGen's Center for Rare Childhood Disorders.

"I want to do something concrete. It's about giving so you can see the benefit to others," she said. "It's such an easy legacy to leave."

Mrs. Light began her scientific career working in a top-secret uranium enrichment lab and reviewing French and German scientific papers for the Atomic Energy Commission. Typically, her assignments were ones that male chemists declined, which is how she found herself in Muscle Shoals, Ala., preparing sarin gas components at an Army Chemical Corps plant.

"When the plant was built, they never planned on having a woman there," she explained. "They needed somebody to go down there, and all the men refused, so they had to build a ladies' room for me!"

The plant was never fully operational, as three months later during a shift-change, she arrived to witness a fireball engulfing the plant after an earth-shaking explosion.

She was not harmed, but several men lost their lives.

Recalled to the home office, she was sent to Salt Lake City

to supervise a laboratory checking uranium ores. She ultimately landed on the ground floor of a company making electronics components, where she would work for eight years. She published technical papers and was recognized in the press for being "a lone woman in a man's world." As she ascended the ranks and the industry grew, she received a stock option for her contributions. During this time, she met and married her husband Irwin, a dentist.

He proposed on their fourth date, and they were married 52 years, but after she became a mother, her career came to an abrupt end.

"At this time, you are much more concerned with family matters..." the letter read. "Under the circumstances, we are terminating your employment."

After four restless years, she started anew in the hospitality industry. In 1985, the Lights relocated to Paradise Valley, where Dr. Light joined her business full time.

Dr. Light became active in their new community, serving as the first volunteer for the TGen Foundation.

"Irwin was among the first community leaders to step forward and offer their time to support TGen's efforts, and we will never forget his leadership," remembers TGen Foundation President Michael Bassoff. Dr. Light died from cancer in 2011.

A tour of TGen, sponsored by her community Vi at Silverstone, reignited Mrs. Light's interest shortly after her husband's death. Through her philanthropy today, she is helping the next generation of scientists.

"I think my career was fascinating, and to this day, it still makes me happy," she said. "Now, I like to think about how many people that will come after me that can benefit."

It is never too early to think about creating a will or estate plan. Retirement accounts, real estate, life insurance and investments that took a lifetime to build up can be significantly diminished by taxes after passing without proper planning.

Including a legacy gift to TGen in financial and estate plans ensures that the cause you've supported throughout your life will continue to thrive afterward. Additionally, these gifts can provide tax benefits for you and your heirs, while you are alive. Regardless of age, gender, marital status or family size, investing a few hours in planning for end-of-life can minimize confusion during a difficult time and protect the assets it has taken a lifetime to build.

Making a gift to TGen in those plans will help continue our life-saving work. To learn more about legacy gifts at TGen, please contact TGen Foundation at 602-343-8411.



PLANNED GIVING

FIVE for 5



TGen's
Cycle for the Cure

Cycle for the Cure celebrated its fifth anniversary in May. More than 200 cyclists, yoga and kinesis enthusiasts converged on the Village Health Clubs to raise a record of over \$182,000 for cancer research at TGen. We asked volunteer co-chairs Robyn DeBell and Vicki Vaughn five questions in honor of the event's fifth anniversary.

What sparked your passion for TGen?

Vicki Vaughn: Years ago, while serving on another committee, I took a tour of TGen headquarters. I was so in awe of what they were doing that I asked how I could help, right then and there. Each year since, I have worked on fundraising events and very much feel part of the TGen family.

Robyn DeBell: Being involved with TGen's mission is like having a sneak peek into the future of personalized medicine: It's amazing. I am intrigued by the intellectual brilliance, passion and dedication of the young researchers. They make me feel that the funds we help generate are used immediately for critical medical discoveries. It feels electric, fast paced, timely and so appreciated.

How is working with TGen different than your other charitable endeavors?

Vicki Vaughn: There are many worthwhile charitable causes, but the breadth and importance of personalized medicine, touches every possible medical issue from cancer, to neurological disorders, to infectious diseases. TGen is a world leader in this approach, and it makes me want to, not only raise funds for their mission, but also spread awareness so others want to help.

Robyn DeBell: The 'T' in TGen stands for teamwork: The whole Foundation team is responsive, cheerful, efficient, hands-on, and grateful. Several scientists participate in our Cycle event. As fundraisers, we like to confirm that money remains in Arizona to help patients. It is unique to be welcomed to take a TGen tour or meet with the scientists we are supporting.

How has TGen touched you personally?

Vicki Vaughn: There are so many loved ones I could name, but my hope is that our children and grandchildren will not have to struggle with this personally. I believe that as personalized

medicine is implemented more broadly, patients will greatly benefit, and that one day, prevention will be possible.

Robyn DeBell: We were early TGen supporters and always benefitted from learning about new discoveries, and we suddenly needed TGen medical expertise for my husband Michael. After a year, we are in remission and credit TGen for the personalized and collaborative approach, always with our family's consideration at the center of all the decisions. We are advocates for and believers in TGen's focus.

How competitive are you on your spin bike?

Vicki Vaughn: This is almost funny, because it would not seem that riding a stationary bike is competitive, but it can be. With a heart monitor and computer, it's fun to challenge yourself to go more miles, burn more calories and even perfect your form!

Robyn DeBell: Spinning is an easy, healthy fun way to get great exercise. I like to recruit as many new riders as possible to try Cycle for the Cure. When I spin, I am always in the front row in the same bike position!

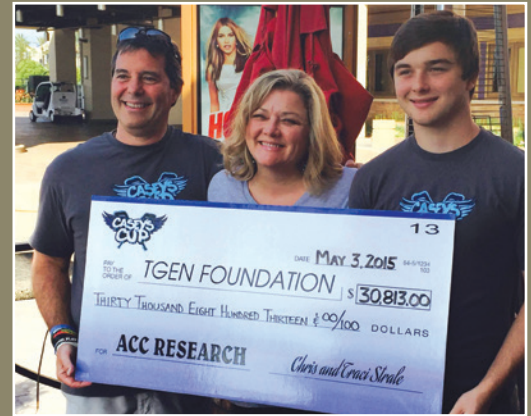
What is your vision for Cycle for the Cure in the next five years?

Vicki Vaughn: We would love to make this a national movement! We are working towards more sponsorships, more locations and more workout modalities. The Ocotillo Village Health and Fitness Club is committed to join us next year. This year, the Cycle Event expanded to include yoga, kinesis and a hike. Not to mention, we have a post ride party that has taken on a life of its own.

Robyn DeBell: TGen's Cycle for the Cure will occur for the sixth year on May 1, 2016 with a goal of raising over \$200,000. This accomplishment will require creativity and some new ideas! The need is great, but so is our passion. We want to help amp-up cancer research efforts by TGen. We feel fortunate and energized to help pay it forward!

Inaugural Casey's Cup in Anaheim raises over \$30,000 for Adrenocortical Carcinoma research at TGen

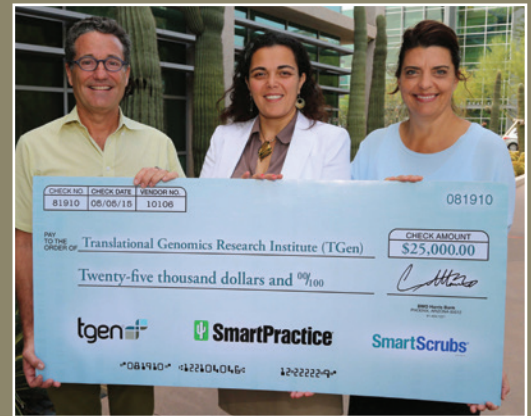
Casey's Cup hopes to put Adrenocortical Carcinoma (ACC) on ice. The inaugural 3-on-3 Ice Man Charity Tournament hosted more than 60 teams in April at The Rinks Anaheim Ice Facility in Anaheim, California. ■ The event raised \$30,813 for ACC research at TGen. ■ "Everything begins with a dream and ours quickly became reality with the help of family and friends," said Traci Strale, Casey's mother and the event organizer "Not everyone knew Casey, and still they lent support in some way, shape or form. The feeling is "thankful" and that does not even begin to describe it." ■ Casey Strale was a young man with an indomitable will and a passion for hockey. Defying doctors' grim warnings that he would not survive multiple surgeries, Casey went on to thrive for four years following his initial diagnosis, playing ice and roller hockey as a Junior Duck at Anaheim Ice and rising to the rank of assistant team captain. Casey passed away at age 16 in June 2013, almost four years after being diagnosed with a cancer so rare it only strikes one to two people in a million each year. ■ With teams ranging in age from "pee-wee" to adult, Casey's Cup featured guitarist Gary Hoey, plus special "Casey's Wings" jerseys. The mascot for the event was the Ice Man, which is "like an Iron Man, only cooler," in the words of its namesake, Casey Strale.



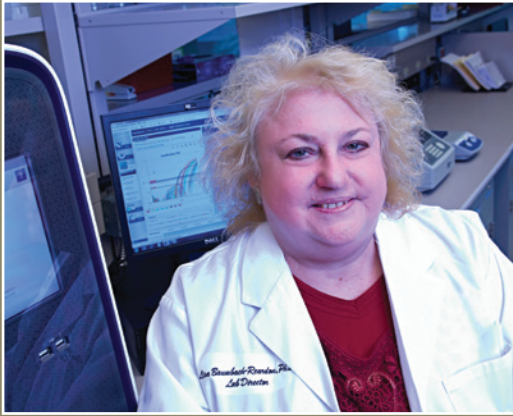
Chris Strale, Traci Strale and son Kyle Strale

\$25,000 donation supports breast cancer research

Finding the right local charity to contribute to can be difficult at times, but for Dr. Charlotte Thrall, Healthcare Director of SmartPractice Wellness Clinic, all it took was a quick search of the web. Thrall was looking for a project to fund when she discovered a press release on the TGen website about Dr. Bodour Salhia's breast cancer research. ■ That search led Thrall and SmartPractice President and CEO Dr. Curtis Hamann to TGen and a May 5 meeting with Dr. Salhia, where they presented a check for \$25,000 in support of her research into preventing breast cancer metastasis, or spread, elsewhere in the body. ■ Dr. Salhia's primary research objective is to use a biomarker she has identified to create a test that could help physicians know which breast cancer patients are most at risk of having their cancer metastasize. Her goal is a simple, non-invasive blood test that could detect an "at risk" biomarker in circulating cell-free DNA. This test would indicate both those who are at risk, and those who are not. ■ "If successful, patients would not have to wait until symptoms developed," Dr. Salhia said. ■ SmartPractice® is a family-owned, Phoenix-based firm passionate about their mission for healthier practices and healthier patients. For more than 45 years it has proudly partnered with the dental and health care professionals nationwide. A portion of the proceeds of their innovative line of Pink Ribbon exam gloves and supplies generates a donation to fund breast cancer research and awareness programs.



Dr. Curtis Hamann, Dr. Bodour Salhia and Dr. Charlotte Thrall



Dr. Lisa Baumbach-Reardon

Dr. Lisa Baumbach-Reardon elected to AACR's Minorities in Cancer Research (MICR) Council

The American Association of Cancer Research (AACR), the world's oldest and largest professional organization dedicated to preventing and curing cancer, elected TGen Associate Professor Dr. Lisa Baumbach-Reardon to its Minorities in Cancer Research (MICR) Council. ■ Dr. Baumbach-Reardon will serve a 3-year term on the MICR Council, which includes nearly 4,000 of the 35,000 members of AACR. ■ The Council explores ways to increase the number, participation, visibility and recognition of minority scientists in cancer research. Dr. Baumbach-Reardon's main focus in cancer research has been a heightened understanding of the genetic and genomic basis of breast cancer in women of African ancestry. ■ "I have witnessed how MICR has increased awareness and understanding of disparities in cancer across ethnicities," said Dr. Baumbach-Reardon, who has been active in AACR and MICR for nearly a decade.



After solving the Rubik's Cube mystery, Intel is helping TGen solve the genome puzzle by donating \$10,000 raised from the Rubik's Cube challenge to TGen's research.

Working with Intel to help solve a Rubik's Cube

Describing life sciences as a puzzle, Intel challenged attendees at the Bio-IT World 2015, April 21-23 in Boston, to solve a genomic-themed Rubik's Cube. Solving the cube revealed a clue to a special Twitter message – a puzzle within a puzzle, but the payoff was big: Intel awarded TGen \$25 for every re-tweet of the message about Intel's new code optimization site. ■ "It was really neat seeing all those people in Boston twisting and turning cubes, trying to solve them as quickly as possible," explained James Lowey, TGen Vice President of technology. ■ The new code resource ensures genome-processing runs as fast as possible on Intel-based systems, like those that power TGen's discoveries. ■ "Working closely with Intel, TGen has been able to reduce genomic data processing time from weeks to hours," Lowey said. "This is as cool as solving a Rubik's Cube in seconds!" After solving the Rubik's Cube mystery, Intel is helping TGen solve the genome puzzle by donating \$10,000 raised from the Rubik's Cube challenge to TGen's research. ■ Intel also hosted a TGen MindCrowd.org memory quiz kiosk in its booth at the Health Information and Management Systems Society (HIMSS) conference April 12-16 in Chicago.



Dr. Daniel D. Von Hoff

Dr. Daniel D. Von Hoff named AZ Business magazine's Researcher of the Year

AZ Business magazine on April 9 named TGen's Dr. Daniel D. Von Hoff as its 2015 Researcher of the Year. Dr. Von Hoff, TGen's Distinguished Professor and Physician-In-Chief, directs clinical trials at the Virginia G. Piper Cancer Center Clinical Trials at HonorHealth that translates TGen research discoveries into new treatments for patients. ■ "Our work in translation of laboratory discoveries into clinical trials is vitally important for the many patients who we all strive to help," said Dr. Von Hoff.

Upcoming TGen Fundraising Events:



July 26, 2015

Purple Pansies Customer Appreciation Day [Alpharetta, GA]
for pancreatic cancer research.
www.casanuovarestaurant.com

September 11, 2015

9th Annual Terri Link Memorial Golf Tournament [Statham, GA]
for adrenocortical carcinoma research.
www.tgenfoundation.org/events

September 27, 2015

Purple Pansies Gala & Wine Dinner [Alpharetta, GA]
for pancreatic cancer research.

September 29, 2015

Howard Young's 6th Annual Atlanta Golf Classic [Alpharetta, GA]
for pancreatic cancer research.

October 15, 2015

Guys Night Out [Saks Fifth Avenue, Phoenix, AZ]
for prostate cancer research.

October 16, 2015

17th Annual Key to the Cure [Saks Fifth Avenue, Phoenix, AZ]
a fashion show benefiting women's cancers research.
www.tgenfoundation.org/kttc

October 24, 2015

Mito What? BBQ [Mesa, AZ]
for mitochondrial disease research.
www.tgenfoundation.org/events

November 1, 2015

10th Annual stepNout Run/Walk/Dash [Scottsdale, AZ]
for pancreatic cancer research.
www.tgenfoundation.org/step

December 3-6, 2015

Wonderland Market [Scottsdale, AZ]
a holiday shopping extravaganza benefiting TGen research.
www.wonderlandmarket.com

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



Terri Link Memorial Golf Tournament



Key to the Cure



stepNout Run/Walk/Dash

Much More than a Golf Tournament

Seena Magowitz Golf Classic almost doubles its fundraising goal



Promising it would be “much more than a golf tournament,” honorary chairman Gary Fazio delivered on his word as the 13th annual Seena Magowitz Golf Classic almost doubled its fundraising goal, bringing it to \$2 million and counting.

“What began as a charity golf gathering in 2003 has become a major annual event, drawing hundreds of attendees from across the nation and making major contributions to the advancement of pancreatic cancer research,” said Fazio, the chief executive officer of Serta Simmons Bedding LLC.

Fazio challenged his company to raise \$200,000 for the tournament, which supports the fight against pancreatic cancer. Fazio’s employees and their vendors tripled the initial goal, raising a total of \$600,000.

TGen Distinguished Professor, Physician-in-Chief, Dr. Daniel Von Hoff gave the keynote address at the tournament gala on May 14. He spoke about the importance of early detection of pancreatic cancer.

“We need a mammogram for the pancreas,” Dr. Von Hoff explained. “Just

like breast cancer, if pancreatic cancer is detected early, we will be able to find a cure.”

The Seena Magowitz Golf Classic is the largest fundraising event that benefits TGen research. The event was again held in conjunction with the Furniture/Today bedding industry conference. Arizona Diamondbacks President and CEO Derrick Hall served as the tournament’s master of ceremonies.

The Seena Magowitz Foundation was created by Roger E. Magowitz as a way to honor his mother who passed away from pancreatic cancer in 2001.