The pioneer and the p53 protein
This scientist saw something in the DNA of cancer that everyone else overlooked
MISSION
The mission of The University of Texas MD Anderson Cancer Center is to eliminate cancer in Texas, the nation and the world through outstanding programs that integrate patient care, research and prevention, and through education for undergraduate and graduate students, trainees, professionals, employees and the public.

VISION
We shall be the premier cancer center in the world, based on the excellence of our people, our research-driven patient care and our science. We are Making Cancer History®.

CORE VALUES
Caring
By our words and actions, we create a caring environment for everyone.

Integrity
We work together to merit the trust of our colleagues and those we serve.

Discovery
We embrace creativity and seek new knowledge.
SUPPORT THAT SKEWS YOUNG
Cancer180 helps patients, survivors and caregivers between the ages of 18 and 39 connect with other young adults affected by the disease.

NEW FACES IN NURSING
Job growth in the field far exceeds that of other occupations, and more and more men are entering the profession.

SINGLE-CELL SIGNIFICANCE
To better understand the evolution of cancer, Nicholas Navin, Ph.D., developed a way to analyze genetic material from individual cancer cells. That’s a lot harder than it sounds.

GREETED WITH A SMILE
Senior financial analyst Kenny Lee has an amazing story to tell about his journey from Vietnam to America and MD Anderson, where he helps welcome new patients.

ZEROING IN ON THE BEST TREATMENT
Some 60,000 women in the U.S. are diagnosed each year with DCIS – ductal carcinoma in situ – the earliest stage of breast cancer. They face the difficult decision of how to treat the condition. Researchers at MD Anderson are studying ways to make this tough choice easier.

A TINY ATTACK
Colon cancer patients whose disease doesn’t respond to chemotherapy and spreads to the liver are benefiting from tiny, radioactive glass beads called TheraSpheres that travel through the bloodstream to kill cancer cells.

STORIES OF CAR T THERAPY SUCCESS
These patients’ T cells have been removed and re-engineered so they are able to recognize and attack cancer.

REST AND RESEARCH
MD Anderson experts are addressing sleep issues triggered by cancer and cancer treatments that can affect patients’ outcomes and quality of life.
SMART BOMB VIRUS SHOWS PROMISE AS A BRAIN TUMOR IMMUNOTHERAPY

A cold virus engineered to attack the most common and deadly of brain tumors allowed 20% of patients with recurrent glioblastoma to live for three years or longer, researchers from MD Anderson report in the Journal of Clinical Oncology.

In a Phase I clinical trial, the altered adenovirus, called Delta-24-RGD or DNX-2401, was injected one time directly into the tumors of 25 patients whose glioblastoma had recurred after surgery and other treatments, a patient group that typically has a median survival of six months.

"Of those five long-term survivors, three had durable complete responses, which is impressive for a Phase I clinical trial in glioblastoma," says lead author Frederick Lang, M.D., chair of Neurosurgery. "Many Phase I trials might have one patient who does well, so our result is unusual, but we’re always cautious in assessing results with this very difficult disease."

Toxicities were minimal, with two patients experiencing low-grade side effects related to treatment.

Dose escalation proceeded to the highest concentration of the virus that could be manufactured, with no dose-limiting side effects.

Eighteen patients (72%) had some tumor reduction. Median overall survival was 9.5 months.

Imaging of treated patients and analysis of surgically removed tumors from 12 other patients treated with the targeted virus before surgery in a separate part of the trial confirmed both the original tumor-killing mechanism and a resulting immune reaction that the researchers think is behind the long-term responses.

“We designed DNX-2401 to specifically infect cancer cells, replicate inside those cells to kill them, and spread from cell to cell in a destructive wave throughout the tumor,” says senior author and drug co-inventor Juan Fueyo, M.D., professor of Neuro-Oncology. “The clinical trial shows that happens, as predicted by our preclinical research, and it also shows that in some patients, viral infection was followed by an immune reaction to the glioblastoma that led to the strong responses.”

In the three complete responses, imaging showed evidence of inflammation and immune activity a month after treatment, followed by a steady decline in tumor size until at least 95% of it vanished.

“In the case of these long-term complete responders, the virus breaks the tumor’s shield against immune response by killing cells, creating multiple antigen targets for the immune system,” says co-inventor Candelaria Gomez-Manzano, M.D., associate professor of Neuro-Oncology. “These tumors are then completely destroyed.”

Glioblastomas normally do not attract the attention of the immune system, with virtually no penetration of tumors by T cells, white blood cells that attack invaders and abnormal cells.

The study showed the immune system wiped out the virus within a month, but tumor reduction in complete responders continued for a year or longer. Analysis of the surgically removed tumors from the second part of the trial showed widespread cell death in the tumors and infiltration of T cells.

With no detectable tumor, minimal initial side effects and no ongoing treatment with other methods that come with stronger side effects, such as radiation and chemotherapy, patients’ quality of life is good, the researchers note.

— Scott Merville
FIDLER HONORED FOR HIS LANDMARK FINDINGS RELATED TO CANCER METASTASIS

The American Association for Cancer Research (AACR) selected Isaiah J. Fidler, D.V.M., Ph.D., professor of Cancer Biology, as the recipient of this year’s Margaret Foti Award for Leadership and Extraordinary Achievements in Cancer Research.

The award was presented to Fidler April 15 in Chicago at the AACR’s annual meeting.

In cancer firsts, Fidler and Margaret Kripke, Ph.D., MD Anderson professor emerita of Immunology, are noted for their groundbreaking studies that demonstrated tumors are composed of unrelated, different cells.

Fidler, who joined MD Anderson in 1983, also showed that metastases are non-random biologic events whose outcomes depend on the interaction between tumor cells and the cellular environment in which they exist. This cellular environment is called a microenvironment and includes the normal cells, molecules, and blood vessels that surround and feed a tumor. A tumor can change its microenvironment, and the microenvironment can affect how a tumor grows and spreads.

By uncovering the complex underpinnings of these biological processes, Fidler showed that metastasis isn’t random.

Most recently, Fidler published his team’s findings on a potential new approach to treating glioblastoma, a fast-growing and incurable form of brain cancer. The study indicated that brain cancer cells in mice were significantly reduced when treated with a combination of the oral chemotherapy drug temozolomide (TMZ), and macitentan, a drug originally approved for treating pulmonary hypertension.

In the past, Fidler’s groups showed that tumors that spread to the brain after originating elsewhere can trick brain cells called astrocytes into protecting the tumors, making them resistant to chemo. In this latest study, he explored whether astrocytes actually shield brain tumor cells from TMZ.

The results, Fidler believes, may represent a significant new therapeutic approach for treating glioblastoma.

The Margaret Foti Award, established in 2007, is named for former AACR Chief Executive Officer Margaret Foti, Ph.D., M.D., and recognizes an individual whose leadership and extraordinary achievements have had a major impact on the field.

Past MD Anderson winners include Waun Ki Hong, M.D., professor of Thoracic Head and Neck Medical Oncology, in 2016, and John Mendelsohn, M.D., professor of Genomic Medicine and former president, in 2012.

Isaiah J. Fidler with a portrait of Stephen Paget, an English surgeon and pathologist who first theorized that metastasis did not occur randomly.

Wyatt McSpadden

SMALL INCREASE IN MEDICATION MAY PLAY A BIG PART IN HELPING SMOKERS QUIT

Increasing the dosage of a prescription smoking-cessation medication by 1 milligram a day – going from 2 to 3 milligrams – more than doubled abstinence rates after three months in some patients, according to MD Anderson research.

The findings, published in the Journal of Clinical Psychopharmacology, found that this relatively small increase in varenicline benefited patients who had cut down on smoking, but not quit completely. The increased dose also offered prolonged benefits at six- and nine-month follow-ups, with minimal side effects.

The study was conducted by MD Anderson’s Tobacco Treatment Program (TTP), which provides evidence-based tobacco-cessation services, including counseling and medications, at no cost to MD Anderson patients, employees and their families. The program tests innovative approaches to improving cessation rates in clinical trials open to the public.

In multiple studies, varenicline led to improved cessation rates relative to other medications, but more than half of smokers still failed to quit at the end of their treatment, explains lead author Maher Karam-Hage, M.D., professor of Behavioral Science and associate medical director of the TTP.

Based on those results, the researchers wanted to see if increasing varenicline dosage would improve cessation rates among those who had already reduced daily cigarette consumption by at least half.

In the study, TTP patients who were previously treated with varenicline and who by six weeks had cut their daily cigarette consumption in half were offered the option of increasing their dose.

Three months after increasing their intake to 3 milligrams, 26% of patients reported not smoking in the previous seven days, compared to 11.5% of those who remained at 2 milligrams per day.

This difference was statistically significant, and the differences in abstinence rates remained significant during follow-ups six and nine months later.
Survivor Natalie Martinez had no way of predicting that a routine visit to her dentist would lead to a diagnosis of tongue cancer.

“My dentist pointed out a suspicious spot on my tongue,” says Martinez. “I had a biopsy and doctors at MD Anderson monitored the spot for a few years. By 2014, it had become cancerous.”

Martinez, now 37, was surprised by her diagnosis.

“My family has a history of cancer so I always knew it was a possibility,” she says. “But I thought I’d be older if and when it happened.”

Surgery to remove part of her tongue, followed by eight weeks of chemotherapy and radiation left her mentally, physically and emotionally exhausted. But recovery, she found, was even more difficult than treatment.

“The medical procedures were the easy part, because I had a goal each day,” she says. “But when treatment ended, I was sent home and told to come back in three months for a follow-up appointment. I wasn’t ready. Everything I’d been through hit me hard.”

Martinez met with a counselor who recommended MD Anderson’s Cancer180 program, named for a young survivor’s observation that “when cancer strikes, life does a 180.”

The program provides a social environment where young adult patients, survivors and caregivers ages 18 to 39 connect with other young adults affected by cancer. Together they attend social outings, educational activities and connect through online resources including a Cancer180 website and Facebook page.

“Young adult survivors sometimes feel alone,” says Diana Leipold, a manager of Volunteer and Patient Programs. “They may be isolated from friends due to treatment, and find themselves with an experience that few of their peers can understand.”

Traditional support groups don’t always appeal to this age group, Leipold says. Instead, young survivors prefer connecting in social ways through Cancer180 outings to sporting events, cooking and pottery-making classes, ice skating, movies, and more. Cancer180 also sponsors an annual, one-day Young Adult Survivorship conference where topics such as fertility, employment and long-term survivorship are discussed.

Martinez, who juggles motherhood and a career as an engineer, credits Cancer180 with giving her much-needed support.

“Don’t be afraid to reach out to other survivors,” she says. “You might be surprised how much it can benefit you.”

Heather Curl was 29 when she was diagnosed with Hodgkin’s lymphoma.

Side effects from a dozen rounds of chemotherapy caused lasting problems with memory, vision, and fatigue.

Curl received a flyer through the mail for the Cancer180 survivorship conference and decided to attend, mainly to gain information about navigating insurance.

“I was feeling very lonely and isolated,” she says. “It was a big deal for me to go to the conference myself, because I’m shy. But I ended up meeting a whole table of awesome people and left armed with knowledge, resources and a fresh dose of much-needed hope.”

One of the resources Curl signed up for was Cancer180’s career and college counseling service. Today, she’s a University of Houston-Clear Lake student majoring in business and accounting. Her goal is to work for a nonprofit cancer organization after graduation.

When cancer treatment ends, life doesn’t automatically return to normal, Curl says.

“People assume you’re fine once you’ve made it through treatment, but the cancer experience will be with you always.”

For more information about Cancer 180, visit www.cancer180.org.
Think nursing is just for women?

Think again.

Three male nurses explain why more men are joining the profession

By Ronda Wendler
Photos by Wyatt McSpadden

Richard Wang sometimes gets second glances when people hear he's a nurse.

"It gets even better when I tell them my wife's a doctor," says Wang, who cares for stem cell transplant patients at MD Anderson.

Wang is one of a growing number of men catching on to what female nurses have known for years. Nursing is a reliable, well-paying and meaningful job with a sense of purpose and service.

"Almost 90% of registered nurses in this country are women, but more men are entering the field today than ever before," says Susan Stafford, director of professional nursing practice at MD Anderson.

U.S. Bureau of Labor statistics show the number of male nurses has tripled since 1970. Where men were once a curiosity—a male in a female-dominated profession—they're quickly becoming the norm. Why the upward trend?

"A lot of male-dominated jobs in manufacturing, agriculture, construction and other industries have disappeared because of automation or outsourcing," Stafford says.

Nursing, in contrast, is growing far faster than the average growth for other professions. Registered nurse jobs are expected to increase by 15% between now and 2026. Nurse anesthetists, nurse midwives, and nurse practitioners are expected to see a 31% increase in jobs during that same time period.

Advances in medicine are allowing people to live longer, Stafford says, so more nurses will be needed to care for aging baby boomers.

"Nursing is the high-demand, high-growth job of the future," she says. "It's a passion, a science and an art that will always be needed."

Culture shift

Longstanding societal beliefs about gender roles are changing, Stafford says, easing the way for more men to become nurses.

"Today, men nurture children, cook and do housework while women run companies and serve as primary breadwinners. Walls are breaking down both ways, male and female roles are merging, and nursing can be an equally rewarding profession for women and men."

Millennials in particular are curious about the profession, Stafford says, and are less bound by notions of traditional masculinity.

Then there's the pay, which has been climbing steadily since 1980. The median salary for a registered nurse today is $70,000, and for advanced practice nurses, it's $107,460, according to the Bureau of Labor Statistics. Just out of nursing school, many new RNs make $50,000 to $60,000 or even higher, depending on where they work.

"Nurses are paid a very liveable wage," and that's one of the reasons men are attracted to the field," Stafford says.
Richard Wang, who was treated at MD Anderson as a child, now cares for the cancer center’s stem cell transplant patients. Wang likes going home each day to his baby boy John Christopher knowing that he did “something meaningful for someone else” at work.
Former longtime pastry chef Jarrod Vance works on MD Anderson’s melanoma/sarcoma unit.

For men wanting to forego a traditional 9-to-5 schedule, a position in nursing offers flexibility. A nurse may work long hours – a 12-hour shift three or four days a week, then have three or four days off.

“Those 12-hour days fly by,” says Wang, whose three-days-on, four-days-off schedule allows him to spend more time with his wife, Erica, a pediatrician, and their newborn, John Christopher. But the best part of nursing, he says, “is going home each day knowing that I did something meaningful for someone else.”

Wang has experienced nursing’s impact firsthand. At age 9, he was diagnosed with rhabdomyosarcoma, a soft-tissue cancer. At MD Anderson’s Children’s Cancer Hospital, he went through chemotherapy, radiation and surgery.

“Nurses kept my childhood as normal as possible,” he recalls. “They helped me make friends with other patients and encouraged me to leave my room and join in activities.”

After high school, Wang joined the U.S. Army and served as a medic during Operation Iraqi Freedom. When his tour of duty was over, he returned home, graduated from nursing school, and joined MD Anderson.

“Patients benefit from hearing my story,” he says, “because it gives them hope and shows them that life after cancer can return to normal.”

On second thought

Jarrod Vance became a registered nurse after working as a pastry chef at top-ranked hotels and restaurants for 17 years. Like many men who come to nursing as a second profession, he was motivated after caring for a loved one through illness – in this case, his father.

“My dad had a hip and knee replacement, and needed help recuperating,” Vance says. “I became his caregiver.”

Nurses taught Vance how to dress his father’s wounds, administer shots to prevent blood clots, and assist with physical therapy.

“The more I did this,” he says, “the more rewarding it became and the more confident I became in my caregiver skills.”

During this time he married a nurse, Penelope, and became “instant dad” to three stepsons.

“With my new family,” he says, “I wasn’t about to resume working nights and weekends as a pastry chef.”

Penelope loved her job, Vance noticed. Not only that, but she out-earned him.

“All the signs were telling me to enter nursing school,” he says, “so I did.”
The first day Vance walked into his classroom, he was greeted by a sea of ponytails – a reminder that nursing is a female-dominated profession. He was one of 10 male students in a class of 100.

“We all had one thing in common,” he says. “We had a sense of purpose and wanted to learn.”

Today, Vance works on MD Anderson’s melanoma/sarcoma unit, where he trained as a student. His gender rarely comes into play.

“Every so often, a female patient will request a female nurse based on cultural or religious reasons,” he says. “Likewise, some male patients feel more at ease with a male nurse, especially during procedures like inserting a catheter.”

But Vance says the vast majority of patients view nursing as gender-neutral.

“Patients who initially feel hesitant relax when you demonstrate confident professionalism,” he says. “Male or female, all nurses receive the same basic education and training. It’s just that simple.”

**Outdated stereotypes**

Derrick Ferguson recalls his early days as a nurse in the 1980s.

“I’d walk into patients’ rooms and they’d mistake me for a doctor.”

Today, Ferguson holds a nursing license and a law degree. He works in a managerial role, assuring patient safety and health care accreditation standards are met throughout MD Anderson.

Outdated misconceptions make him cringe, like the misguided belief that men become nurses because they couldn’t “hack it” in medical school, or male nurses are “working toward” becoming doctors.

“It’s time to put those old stereotypes to bed,” Ferguson says. “Men go into nursing for the same reasons women do. They want to make a difference. They feel called to help people.”

Popular culture is to blame, he says, for enforcing outdated beliefs.

“Remember Gaylord Focker, Ben Stiller’s male nurse character in the movie ‘Meet the Parents?’” Ferguson asks. “His future father-in-law ridiculed him for having a ‘woman’s’ job.”

Nursing remains so strongly associated with women that one campaign to recruit men to the profession featured the slogan “Are you man enough to be a nurse?”

The effort got a boost when a recent study of 109 students from 37 states found that male nursing students displayed more manly characteristics than males majoring in other subjects.

“The nursing profession is attracting males who hold a high degree of masculinity,” the researchers wrote.

“You’re not going to lose your man card by becoming a nurse,” Ferguson says.

“Men go into nursing for the same reasons women do,” says Derrick Ferguson.

“They want to make a difference. They feel called to help people.”
Guillermina ‘Gigi’ Lozano and the genetics of cancer

MD Anderson’s chair of Genetics has spent her career studying how cancers form – and how to prevent them.

By Michael Hardy
Photos by Robert Seale

Shortly after arriving at MD Anderson in 1987 as a junior faculty member, Guillermina Lozano, Ph.D., attended several seminars hosted by the center’s biochemistry department.

The biochemists giving the presentations were studying the role of transcription factors – proteins that regulate how genes express themselves. Lozano, a geneticist working to understand p53, a gene known to suppress tumor development, suddenly wondered if p53 could itself be a transcription factor.

“I went back to my office and pulled out the sequence of p53 and said, ‘oh, here’s this negatively charged domain that could attract the transcriptional machinery and here’s this positive domain that could bind DNA. Maybe it is a transcription factor.’ So then we planned the experiments that would test that hypothesis.”

The experiments proved the hypothesis correct and Lozano published her findings in the journal Science, establishing her reputation as one of the world’s foremost cancer researchers. In 2017, she became the sixth MD Anderson scientist elected to the National Academy of Sciences, but the first chosen for research conducted while on faculty at the institution.

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The p53 gene
This is a tumor suppressor gene, which means it inhibits unrestrained cell division and the formation of tumors. When p53 is mutated, it’s inactivated and is associated with many types of cancer such as breast, bladder, lung and ovarian, as well as cholangiocarcinoma (bile duct cancer), head and neck squamous cell carcinoma and Li-Fraumeni syndrome.

Texas, to be closer to their Mexican relatives, and Lozano was forced to adjust to a less challenging public school.

After graduating, she enrolled at nearby Pan American University (now the University of Texas-Rio Grande Valley). “I grew up in a Mexican-American culture,” she recalls. “I’m a woman. I was expected to get married and have a family, I wasn’t expected to go to college. My father only let me go to Pan American so that if my future husband ever left me, I would be able to support myself.”

After graduating from Pan American, however, Lozano was accepted into a summer program at the National Institutes of Health in Bethesda, Maryland. She had planned to become a science teacher, but her experience at the NIH set her on a new trajectory.

“It was absolutely cutting-edge research,” she says. “I loved it. I was learning so much, and I had a great mentor who I still keep in touch with. That’s when I really decided research is what I wanted to do.”

Lozano’s NIH experience led to a job offer even further afield – Munich, Germany, where she was hired as a laboratory technician at the prestigious Max Planck Institute. Although she loved working as a tech, and enjoyed the opportunity to travel around Europe, Lozano knew she wanted to become a researcher in her own right, so she returned to the U.S. and got her doctorate at Rutgers.
University and the University of Medicine and Dentistry of New Jersey. She then completed a postdoctoral fellowship at Princeton University under renowned cancer researcher Arnold Levine.

It was at Princeton that Lozano first began cloning and manipulating mouse DNA to study how cancers develop. Not long after moving to Houston to join MD Anderson, her mentor Levine published a paper announcing the discovery of p53 as a tumor suppressor that regulates cell division to prevent tumors from growing. Because of its cancer-fighting abilities, p53 is sometimes called the “guardian of the genome.”

The power of p53

Lozano built on Levine’s breakthrough by establishing that p53 is a transcription factor. Her team then went on to recognize the physiological importance of two proteins, Mdm2 and Mdm4, that play a role in blocking p53 – and thus allowing tumors to grow. By manipulating these proteins, Lozano believes, clinicians may some day be able to stop cancers on the molecular level before they spread. Drug companies have developed experimental treatments based on her research, but so far they’re too toxic for use in humans.

“I think every tumor cell has to somehow dampen p53,” she explains. “For about 90% of tumor cells, we know what the pathway is – it’s either delete p53, or neutralize it by making lots of the inhibitors Mdm2 or Mdm4. We need to discover how the other 10% undermine the p53 pathway.”

Over the years, Lozano has fielded several offers from rival cancer centers. What keeps her at MD Anderson, she says, is the synergy and collaboration of the center’s basic scientists and its clinicians. It’s the same kind of intellectual cross-fertilization that led to her insight into p53 as a transcription factor back in 1987.

“I’m not a physician, but I understand that some of the problems they encounter are problems that I can study as a basic scientist,” she says. “We wouldn’t be the number one cancer hospital without the underlying research that drives patient care. That collaboration is what keeps me here.”

The pioneering discovery

Lozano was the first to establish p53 as a transcriptional activator of other genes. Transcription is the first step in a gene’s expression of its protein. She also showed that common p53 mutants fail to launch transcription, and discovered other proteins, Mdm2 and Mdm4, which play critical roles in inhibiting p53 activity in development and cancer.
The Lozano Lab

“The research in my lab has been focused on understanding the functional mechanisms of cancer-associated genes by generating mouse models. We have a long-standing interest in the p53 gene as the most mutated in cancer. Mutation of the p53 gene is a critical event in the elaboration of many tumors of diverse origin. The p53 protein is activated in response to DNA damage, serving as a checkpoint in the elimination or repair of cells with damaged DNA. Alterations in components of the p53 pathway, such as amplification of the Mdm2 gene, which encodes a p53 inhibitor, also contributes to tumorigenesis. The overall goal of my laboratory is to understand the signals that regulate the p53 pathway and the consequences of expressing wild-type or mutant p53.”

The keys to her success

Scientific curiosity

“I have always wanted to learn new things.”

A strong and supportive family: Her husband, Greg, and daughter, Rebecca

“If not for my family, I would have worked nonstop and would probably have burned out by now.”

A competitive nature

“When one of my teachers in high school said that boys were smarter than girls, I set out to prove him wrong, and I did – I had the top grade in that class all year.”

Know yourself

“To be successful in any endeavor, it is very important to know your strengths and weaknesses, and to play to your strengths.”

Strike a balance

“It is vitally important to have interests outside the laboratory.”

Lozano’s pursuits beyond research:

“I enjoy traveling with my husband. Some recent trips we’ve taken include visits to Vietnam, Cambodia, Singapore and Sedona, Arizona. This year we plan to go to Stockholm and Portugal. I also enjoy growing orchids. I have a greenhouse and more than 50 orchids, with about 20 blooming at any one time. I also love exploring nature through hiking and bird-watching.”

The honors

Lozano was elected to the National Academy of Sciences in 2017. She is the sixth scientist from MD Anderson to be named to the academy. Others include Jim Allison, Ph.D., chair of Immunology; Craig V. Jordan, Ph.D., professor of Breast Medical Oncology; Ronald DePinho, M.D., professor of Cancer Biology; and Nancy Jenkins, Ph.D. and Neal Copeland, Ph.D., both professors of Genetics.

Lozano also is an elected fellow of the American Association for the Advancement of Science and member of the National Academy of Medicine. Her many honors include the Mattie Allen Fair Research Chair in 2004 from MD Anderson, and AACR’s Minorities in Cancer Research Jane Cooke Wright Lectureship. In April, she was awarded the President’s Leadership Award for Advancing Women and Minority Faculty at MD Anderson.
Frustration often leads to innovation. Thomas Edison himself called discontent the “first necessity of progress.”

For Nicholas Navin, Ph.D., it drove him to pioneer a technique that has revolutionized the way researchers are able to study cancer. Understanding evolution within cancer cells is a longtime interest for the associate professor of Genetics and Bioinformatics. In other words, how does a single, tiny cell with a few mutations grow uncontrollably into devastating disease?

To answer that question, Navin needed to analyze DNA from individual cancer cells, but that proved easier said than done. Traditional methods weren’t useful because they relied on mixtures of millions of cells.

“I spent most of my graduate studies slicing up tumors into multiple regions and doing genomic profiling,” Navin says. “And no matter how much I sliced up the tumor, I would always deal with a mixed population. So that was very frustrating.”

Analyzing DNA from a single cell

A tumor can contain billions of cells, many of which aren’t cancerous, with diverse genetic profiles. The mixed samples Navin was able to collect did not provide clear answers, so he decided to devise a better technique.

In 2011, as a postdoctoral fellow in Cancer Genetics at Cold Spring Harbor Laboratory in New York, Navin published one of the first methods for analyzing DNA from a single cell. The technique, now widely used, involves meticulously isolating an individual tumor cell, amplifying its genetic material to provide enough sample for analysis, and analyzing the DNA for anomalies.

In just a few days, this can be repeated for thousands and thousands of individual cells, creating a picture of the cell diversity within a tumor and how they interact – known as the tumor architecture. Understanding biology at this level can provide valuable insights into cancer growth and progression, particularly in the disease’s early stages.

“You can trace back all the events that occurred up to that one single cell that started the tumor,” Navin says. “That is very useful for studying things like invasion, metastasis and therapy resistance.”

Moon shots collaborations

Navin is confident this technique will benefit both patients and researchers. Through MD Anderson’s Moon Shots Program™, he is collaborating with clinicians across several cancer types to more rapidly incorporate the use of single-cell analysis, with the goal of improving care.

The ability to work with expert cancer doctors and pathologists together under one roof, along with access to a large volume of patient samples, provides an unparalleled advantage for identifying and developing clinical applications, Navin explains.

Through those collaborations, it has become clear that single-cell analysis is extremely useful for both studying a large number of individual tumor cells, and in cases where very few cells are available for study.

“Single-cell analysis will be critical as we enter the era of precision medicine. Dr. Navin’s work has already begun to provide insight into how a tumor’s genotype [and] phenotype evolve in response to therapeutic interventions. These insights will lay the foundation for more rational approaches for treatment over the lifetime of a patient.”

— Lee Helman, former scientific director for clinical research at the National Cancer Institute’s Center for Cancer Research
Targeting AML recurrence

For example, Navin is working with Michael Andreeff, M.D., Ph.D., and Marina Konopleva, M.D., Ph.D., both professors of Leukemia, and the Myelodysplastic Syndromes and Acute Myeloid Leukemia Moon Shot™, to study a very rare collection of cells that lead to relapse in patients with acute myeloid leukemia (AML).

In certain AML patients, a small subset of leukemia cells survives initial treatment with chemotherapy. This condition, called minimal residual disease, is associated with recurrence and poor prognosis. However, these cells only represent approximately one out of 10,000 cells in the bone marrow, making them difficult to study.

“There is no way to identify these cells before treatment,” Andreeff says. “That’s why it’s so important to isolate these very rare cells after treatment. This technique is unique and extremely valuable in doing that. It also shows the value and benefit provided by collaborations within the Moon Shots Program.”

Improving outcomes for prostate cancer patients

Similarly, Navin is partnering with Amado Zurita-Saavedra, M.D., and Ana Aparicio, M.D., both associate professors of Genitourinary Medical Oncology, through the Prostate Cancer Moon Shot™ to study the evolution of prostate cancer cells in response to different treatments such as hormonal therapy or chemotherapy.

They are using single-cell analysis to study circulating tumor cells in the blood of prostate tumors, and metastasized cells taken from bone marrow. With Navin’s methodology, the team is able to analyze these limited samples and observe changes in a patient’s tumor throughout the course of treatment, without the need for invasive biopsies.

“We want to learn what it is that’s being enriched and what it is that’s disappearing from individual tumors in the context of life-prolonging therapies for prostate cancer, in order to make it more clinically relevant,” Zurita-Saavedra says. “Our end goal is to be able to anticipate therapy response in our patients.”

Understanding the tumor architecture during therapy will help predict response to available treatments, and help guide clinicians in choosing one with a higher probability of success, he explains.

Through these and other collaborations, Navin continues to expand on the clinical possibilities for single-cell analytics, which include early detection of cancer using blood samples, non-invasive tumor monitoring and the analysis of patient samples that are too small to be processed with standard methods. He also is working with the Moon Shots Program to incorporate the use of single-cell analysis more broadly at MD Anderson.

In 2017, Navin won the Jack and Beverly Randall Prize for Excellence in Cancer Treatment, which honors creative MD Anderson faculty members who have shown uncommon foresight and ingenuity in the fight against cancer. He was one of the first young researchers to be named an Andrew Sabin Family Fellow. The fellowship was established to fund creative, independent thinking and high-risk, high-impact research. In 2015, Navin received the American Association for the Advancement of Science Martin and Rose Wachtel Cancer Research Award, which recognizes the nation’s top early-career scientists whose research focuses on cancer.
Kenny Lee knows what it’s like to feel alone. At age 11, he left his native Vietnam, without family or friends, to begin a new life in America. The journey was perilous and often lonely. “I learned to care for myself and constantly fight for survival,” he says.

Today, Lee has come a long way. He’s a senior financial analyst in MD Anderson’s Division of Internal Medicine. He also volunteers with the cancer center’s greeter program where he welcomes new patients.

“Cancer can make you feel isolated from the outside world,” Lee says. “I, too, felt alone during my move to America, so I drew from my own experiences to help others.”

Born in Saigon during the Vietnam War, his mother supported the family by selling street food. Lee rarely saw his father, who eventually fled Vietnam and lived in a Malaysian refugee camp for two years before moving to the United States.

When Lee was 9, he and his mother tried to make it out by boat, but were captured and jailed overnight. Over the next two years, they attempted three more escapes, but were captured each time.

With only enough money for a single boat fare, Lee’s mother put her then-11-year-old son on a boat in the middle of the night with 65 strangers. They sailed for seven days before arriving at an Indonesian island, only to be turned away by the local government. Then, as they headed to another island nearby, their boat struck a coral reef and sank.

Lee and his fellow passengers swam to shore and camped for nine days until their food supply ran out. The United Nations High Commissioner for Refugees (UNHCR) became aware of the travelers’ plight and relocated them to the Pulau Galang refugee camp in Indonesia, where Lee lived for 10 months. With help from the UNHCR, he reconnected with his father and joined him at his home in Cleveland, Ohio.

“I didn’t know any English,” Lee says, “but with the help of a tutor, I was able to learn.”

But life with a father he barely knew was difficult. After years of friction with his father and stepmother, Lee ran away from home twice, then moved in with a friend’s family and received welfare and food stamps.

During the day, he went to school. At night, he worked as a waiter.

When Lee was a high school senior, the family he lived with moved away. On the brink of exhaustion and with nowhere to turn, he once again contacted his father, who allowed him to move back in, provided he get a job and not attend college.

But Lee had other ideas. With student grants, loans and various part-time jobs, he attended Kent State University.

“I had very little contact with my dad while I was in college,” he says. “I invited him to my graduation, and was shocked when he attended.”

With dual degrees in finance and accounting and wanting a fresh start, Lee moved to Houston. He worked a few years as a tax preparer, then accepted a position at MD Anderson where he’s worked for 15 years.

During this time, he traveled back to Pulau Galang, the Indonesian refugee camp where he sheltered during childhood after leaving Vietnam. The camp was deserted and in disrepair, but some of the original buildings remained.

“I found the room where I stayed,” Lee says. “It brought back so many memories.”

Ten years ago, Lee’s stepmother called to say his dad had Stage IV lung cancer. Lee returned to Ohio for a final visit, and the estranged father and son reconciled. A year later, his father died in hospice at age 55.

In addition to his greeter duties, Lee volunteers with hospice patients. He’s especially drawn to patients without families.

“We all came into this world with empty hands and one day we’ll leave this world with nothing,” he says. “No matter what you have – money, titles, power – everyone just wants someone to talk to in the end.”

### About the greeter program

- **Z** Started in 1994
- **Z** 186 greeters
- **Z** All active employees
- **Z** 1-hour shifts once a month
- **Z** 2,250 hours contributed each year
Joyce Crawford of Point Blank, Texas, was the first low-risk DCIS patient enrolled in the COMET clinical trial. COMET stands for Comparing Operative to Monitoring and Endocrine Therapy.

igia Toro de Stefani, Ph.D., had just retired from a busy academic medical research career when a mammogram revealed a suspicious mass in her right breast. Her doctors in Brownsville, Texas, referred her to MD Anderson, where she was diagnosed with ductal carcinoma in situ, or DCIS, often called “stage 0” breast cancer – the very earliest stage.

Toro and her husband, Enrico Stefani, M.D., Ph.D., researched everything they could about the condition before meeting with MD Anderson surgeon Alastair Thompson, M.D., to discuss treatment options.

DCIS is a cluster of cancer cells inside a milk duct. The cells are held in place by the duct’s wall, but they have the ability to break through the wall. That’s when they become invasive.

“That won’t happen to everyone,” Toro de Stefani says, “but there’s no predicting when cells will break through the duct and spread, and when they won’t.”

Studies show that about 75% of DCIS cases may never become invasive breast cancer.

Still, current guidelines for DCIS often recommend surgery, usually lumpectomy followed by radiation, to remove suspicious lesions.

“I didn’t relish the thought of having surgery at my age,” Toro de Stefani says, “especially since my doctor determined that I was at low risk for developing invasive cancer.”

She decided to forego surgery and instead opted for active surveillance.

Now, Toro de Stefani returns to MD Anderson every six months for a routine mammogram to see if the abnormal cells have spread, and takes a daily hormone therapy pill to keep any growth in check. And she eats a low-carb diet and exercises to stay at a healthy weight and lower her cancer risk. A year has passed since her initial diagnosis, without any change.

“I just live a normal life without having to have surgery,” she says. “The only inconvenience is having a mammogram every six months, then waiting for the results to see if they’re the same or not.”
Difficult decisions for patients

Toro de Stefani is one of 60,000 U.S. women diagnosed with DCIS each year. Each must decide on a treatment option.

Current guidelines that recommend lumpectomy and radiation are causing concerns that the condition may be overtreated, since most cases never become invasive.

“This gives medical professionals enormous uncertainty about how to advise women on an individual basis,” says Thompson, professor of Surgery at MD Anderson. “And therefore, historically the treatments have ranged from active surveillance on one end of the spectrum all the way to mastectomies on the other.”

Thompson says DCIS diagnoses have increased as breast imaging has become more accurate and frequent. The National Institutes of Health estimates that by 2020, more than 1 million women in the U.S. will be living with a DCIS diagnosis, compared to 500,000 in 2005.

Before mammograms became common, many women had the condition for years without being aware of it, because it grows so slowly and causes no symptoms.

“Perhaps, surprisingly, given that breast screening has been around for three or four decades, we’re only now really coming to grips with the fact that we often diagnose some conditions like DCIS as breast cancer even though they’re not conventional, invasive breast cancers,” Thompson says.

He’s participating in three DCIS research studies that he hopes will make treatment decisions easier.

Surgery or wait-and-see

Thompson is a co-principal investigator of the COMET, or Comparing Operative to Monitoring and Endocrine Therapy for low-risk DCIS, clinical trial.

The trial compares invasive surgery – with or without radiation – to active surveillance where patients have a mammogram every six months for five years, without active treatment. All study participants may also opt for hormone therapy, which is usually a pill a day for five years. MD Anderson is one of 100 participating sites nationwide.

Joyce Crawford, 69, a retired correctional officer from Point Blank, Texas, was the first patient to enroll in the COMET trial at MD Anderson.

Last fall, a screening mammogram showed abnormal-looking cells in her left breast that “looked like little grains of salt.” At her doctor’s recommendation, Crawford sought treatment at MD Anderson and was given the option to enroll in the COMET trial or to pursue standard care, which might include surgery.

Crawford carefully considered the risks and weighed her options. She loved to fish, go to the beach and care for her four grandchildren, ages 3 to 13. She hoped to avoid surgery and stay active.

After “listening to her heart,” she enrolled in the active surveillance arm of the study. She takes a daily hormone pill and returns to MD Anderson for mammograms every six months. Crawford says she prefers a wait-and-see approach over surgery, even if it involves some uncertainty.

“I’m not worried about it. I’m happy I did what I did,” she says. “The mammograms will show whether I need to do anything else or not. I check myself, and I’ve never felt a lump.”

Ductal Carcinoma In Situ (DCIS)

According to the American Cancer Society, DCIS is non-invasive or pre-invasive breast cancer, which means the cells that line the ducts have changed to cancer cells but haven’t spread through the walls of the ducts into the nearby breast tissue.

DCIS is considered a pre-cancer because sometimes it can become an invasive cancer. This means that over time, DCIS may spread out of the ducts into nearby tissue, and could metastasize. Currently, there’s no good way to predict which will become invasive cancer and which won’t. Therefore, almost all women with DCIS will be treated.

In most cases, a woman with DCIS can choose between breast-conserving surgery (BCS) and simple mastectomy. In cases where the area of DCIS is very large, the breast has several areas of DCIS, or BCS cannot remove the DCIS completely, mastectomy might be a better option.

Other studies

Thompson also is co-principal investigator for the PRECISION, or PREvent ductal Carcinoma In Situ Invasive Overtreatment Now study. The multi-institutional effort aims to learn more about why DCIS turns into invasive breast cancer in some women but not in others. The goal is to prevent overtreatment of DCIS patients who were never at risk for invasive breast cancer.

After nearly three decades of treating DCIS patients, Thompson feels optimistic about what the future holds.

“We’re getting to the stage where we can actually have a chance for nailing stage 0 cancer in terms of understanding it and better individualizing the treatment if treatment is needed.”
assumed it was another false alarm.

Just minutes after enduring my very first mammogram at the age of 39, a little earlier than is typically recommended because of prior cysts, the technician left and returned with a doctor.

“We found an irregularity we need to biopsy.”

Weeks later, I called my OB/GYN for the results, still blithely assuming this would be another harmless cyst and a recommendation to cut back on the caffeine (not happening).

All it took was a pause. The briefest pause when I asked her for the results. Maybe one second? Two, tops? I suddenly felt awake.

“Your results showed a malignancy – it’s called DCIS. There were a few spots.”

Thus began a journey of decisions ranging from which hospital to choose, to the type of surgery, to whether adjuvant hormone therapy would be worth the potential side effects. In my life, I’ve agonized over choosing the right granite for counters, interior colors on a car, highlights or lowlights. I never expected to have so much choice – lumpectomy, mastectomy, or double mastectomy – when faced with my own treatment for ductal carcinoma in situ, a cancer I could barely call cancer. A pre-cancer cancer.

I researched every observational study, clinical trial or brief I could find on the topic of DCIS, which is the most common form of early-stage breast cancer and affects 60,000 women a year – many of whom, like me, have no outward symptoms.

We know about 20 to 30% of DCIS cases will become invasive, but researchers don’t know exactly which tumors will “break through” the milk ducts that contain them.

But that’s changing, thanks to researchers at MD Anderson who discovered a direct genomic lineage between DCIS and an invasive form of breast cancer called intraductal carcinoma (IDC). Simply put, someday we will know which premalignant tumors are essentially harmless and which require aggressive treatment.

For now, the goal of DCIS treatment is to reduce the patient’s odds of developing an invasive form of breast cancer. I was referred to an oncologist, breast surgeon and radiation oncologist who appraised the prognostic factors of my DCIS, such as tumor size, and nuclear grade, which can help predict the chance of recurrence. Together, those findings guided us to a thoughtful, data-driven treatment plan – but ultimately, the big decision of whether to have a lumpectomy, mastectomy, or bilateral prophylactic mastectomy was mine alone.

As I awaited the surgery date, thoughts vacillated from “just do the lumpectomy, there’s no reason to perform radical surgery for a cancer that’s not really cancer” to “why would you take the chance on this coming back? Do the bilateral mastectomy and have total peace of mind.” I didn’t have to decide until the week before, and this was a decision only I could make.

I met with a plastic surgeon to learn about reconstruction options, risks, and the recovery process. I underwent genetic testing to rule out HER2 or BRCA mutations. I spent hours sifting through patient forums, and would fall asleep Googling recurrence rates of DCIS based on multiple factors, including my age.

In the end, I chose a lumpectomy rather than mastectomy because of the tumor’s small size and my confidence in regular screenings under the care of excellent physicians at MD Anderson. Because of the tumor’s intermediate nuclear grade, my radiation oncologist recommended 4-5 weeks of radiation and optional adjuvant hormone therapy if I wished to further decrease my already low chance of recurrence.

The surgery, in March 2017, went smoothly and I began radiation the following month. I remember very little about the hours and days immediately following surgery, but I’ll never forget the women I met during radiation treatment at MD Anderson’s Radiation Oncology Center.

“It’s absolutely striking how many women are impacted by this disease – women of all ages and ethnicities,” one woman said. “Honestly, we all just need a hug.”

One day, there were just four of us, including a woman from Louisiana whose hometown doctors had overlooked the most effective treatment plan for her triple-negative breast cancer.

“After my diagnosis, I would tuck my 11-year-old daughter in bed at night, and then listen to her pray. She asked, ’God, please don’t let my mom die,”’ she said. “If I hadn’t come to Houston, I’d be dead.”

When I left my final radiation session and rang the bell, joined by my husband and the radiation therapists who for weeks brought me warm blankets and helped position me comfortably under the industrial blare of equipment, I realized this isn’t the end of my journey. And that’s OK.

I will continue with the screenings that have saved millions of women’s lives and caught cancers – both aggressive or non-invasive – early enough to allow thoughtful discourse among doctors and their patients.
Elsie Kroeger and her husband, Tim, had been looking forward to a spring break vacation with their grandkids for months.

But on the day of their departure, Elsie was struck with severe stomach pain and nausea.

“I told them, ‘Go on without me, I’ll meet you there when I feel better,’” she recalls.

As her family headed to their vacation destination, Elsie drove to the emergency room. Doctors there detected a suspicious mass in her colon, and referred her to a specialist. Further tests revealed she had stage 4 colon cancer, the most advanced form of the disease.

“I’d been having bowel problems for a year,” she says, “but assumed it was irritable bowel syndrome or a sensitive stomach.”

Kroeger decided MD Anderson was her best hope. Doctors prescribed chemotherapy and performed surgery, but the cancer kept growing. Malignant cells crept outside her colon and formed tumors in her liver.

“Up to 70% of people with colon cancer eventually develop liver metastases,” says Armeen Mahvash, M.D., associate professor of Interventional Radiology. “That’s because the blood supply from the intestines is connected directly to the liver, so the malignant cells travel through the bloodstream.”

With her cancer spreading and her options dwindling, Kroeger enrolled in a clinical trial designed for people whose colon cancer, like hers, didn’t respond to the chemo and progressed to the liver.

Patients in the trial are injected with tiny, radioactive glass beads called TheraSpheres that travel through the bloodstream to the liver to kill cancer cells. Chemotherapy also is given to control cancer that may be lurking elsewhere in the body. The study is designed to find out if TheraSpheres plus chemo are more effective than chemo alone.

MD Anderson is among 100 hospitals participating in the trial worldwide, and has more patients enrolled than any other site.

“This offers one more option to patients who have none,” says Mahvash, leader of the MD Anderson segment of the trial.

How it works
Before treatment begins, Mahvash “maps” the patient’s liver.

“During this trial run, we inject contrast dye into the blood vessels, which identifies on X-ray the vessels that route blood out of the liver to the rest of the body,” he explains. “We then block off, or embolize, those vessels to prevent the TheraSpheres from traveling outside the liver during treatment and harming other tissues and organs.”

The pre-treatment mapping also allows doctors to customize bead delivery to the exact location and size of each patient’s liver tumors.
Armeen Mahvash, M.D., associate professor of Interventional Radiology, uses TheraSpheres to treat cancer in the liver.
Elsie Kroeger's beloved dog, Yoda, never left her side during her cancer treatment.
With mapping done, the patient goes home, then returns a week later for treatment.

Mahvash starts by making a small slit in the patient’s groin. He then inserts a plastic catheter into the incision and snakes it up through the arteries to the liver.

With the tip of the catheter in place, he injects millions of the radioactive beads directly into the tumors. Each microscopic bead is smaller than a grain of salt and is embedded with the radioactive isotope yttrium, also called Y-90. The beads lodge in the tumor vessels, stopping blood flow and emitting an extremely high dose of radiation to kill cancer cells.

The entire procedure is finished in about an hour.

“The radiation kills the tumors from within,” Mahvash says, “and targets multiple tumors in the liver all at once, while sparing healthy liver tissue.”

The tiny beads deliver up to 40 times more radiation than conventional cancer radiation therapy, which uses a machine to aim high-energy radiation beams from outside the body into the liver.

Conventional radiation is given five days a week for several weeks. TheraSpheres typically are delivered in one session.

The beads will continue to release radiation over the course of two weeks following treatment, gradually decreasing to insignificant levels and with few side effects.

Patients go home about three hours after the treatment and can resume their regular activities in two days. The most common side effect is two weeks of fatigue, the same as traditional radiation.

“This minimally invasive and precise procedure has been shown to improve patients’ quality of life and increase their life expectancy,” says Mahvash. “It allows us to treat a very difficult disease in an elegantly simple way.”

Future uses

Besides treating colon cancer that has spread to the liver, TheraSpheres have proven useful in treating primary liver cancer that originates in the liver.

Researchers are now starting to think about how the technology can help handle other forms of cancer. Early studies show kidney cancer may be their next target. The blood supply to the kidneys is very rich, which could make them good candidates for the irradiated beads.

“The more vascular the tumor,” Mahvash says, “the more beads will get concentrated in the tumor, and the better the effect.”

Life-extending procedure

Treating colon cancer that’s spread to the liver with radiation-containing beads is considered palliative, meaning it typically does not provide a cure, but can help slow down or halt the growth of the disease and alleviate symptoms.

“Some patients who are given a window of six to 10 months to live end up living significantly longer,” Mahvash says. “This means more time to attend a high school or college graduation, walk a daughter down the aisle, or see a grandchild born.”

Not long after her TheraSphere treatment, Elsie felt well enough to enjoy a night on the town with her husband. The couple celebrated their 46th wedding anniversary at a local restaurant and danced to the first song played at their wedding – “Misty” by Johnny Mathis.

“We swayed and held each other and cried,” says Elsie, who’s looking forward to attending her granddaughter’s wedding later this year.

“Added time to life is priceless,” Mahvash says. “We want people facing this diagnosis to know about this treatment option.”

Mahvash and Maria Briones Dimayuga, a senior coordinator of clinical studies in Interventional Radiology, are investigating TheraSpheres’ potential to help patients whose colorectal cancer has spread to the liver.
I t started with a stomach ache. Then Mario Quezada, who was 10 at the time, began feeling weak and extremely fatigued. 

“When he became too tired to play sports at school, I knew something was very wrong,” says Mario’s mother, Miriam. “He loves sports.”

A trip to the family doctor resulted in multiple medical tests, then bad news: Mario had leukemia. That’s when his MD Anderson Children’s Cancer Hospital journey began.

The fourth-grader underwent aggressive chemotherapy treatments and missed the last two weeks of school. His parents and teachers coordinated Mario’s lessons with MD Anderson’s accredited K-12 in-hospital school so he could continue his 5th grade education at home while continuing to battle cancer.

The journey was rough, but Mario, now 16, finished treatment and has been cancer free for three years. He comes back to MD Anderson every three months for follow-up care.

During his days at the hospital, Mario became involved with imPACT, the Patient Advisory Council for Teens. The group is made up of patients and survivors ages 13 to 18 who work to improve the hospital experience for pediatric patients.

“Being part of imPACT was the only good thing about getting cancer,” says Mario, now a high school junior. “I met other teens who had cancer and made some really good friends.”

While participating in imPACT, Mario weighed in on the kid-friendly redesign of the Children’s Cancer Hospital. When technology was upgraded in Kim’s Place, the hospital’s teen rec room, he offered advice about what teenagers like. And he helped select themes for the hospital’s annual prom. But his proudest moment as an imPACT member was when he helped create a comic book series about teen cancer for newly diagnosed peers. The five-book series was based on ideas and content contributed by Mario and other members of imPACT.

“It was a long, but cool project,” says Mario. “The comic books let us share our stories with teens who are just like us.”

The imPACT of input from pediatric patients

By Katrina Burton
Stuart, Florida, is a small town of 16,000, just north of Palm Beach. Known as “The Sailfish Capital of the World,” it’s the type of place one almost misses while gaping at the breathtaking views along the state’s Atlantic coast.

It’s a place resident and cancer survivor Jamie Galucci is very happy to be – back at home with her family and her job as a paralegal.

There was a time when Galucci didn’t think she would have many more chances to enjoy the magnificent Atlantic Ocean sunrises. In 2015, at age 27, she was diagnosed with a very aggressive form of diffuse large B-cell lymphoma.

Today she’s in full remission and healthy, thanks to the exciting new therapy known as CAR T-cell therapy. With CAR T, T cells are separated out during a blood draw, then re-engineered to produce receptors called chimeric antigen receptors (CAR) on the cell surface. The receptors give T cells the ability to recognize and kill cancer cells once they’re infused back into the patient.

Galucci initially was treated in Florida with chemotherapy, which successfully reduced the tumor mass but did not kill the cancer. After researching treatment online, she sought a second opinion at MD Anderson, where Jason Westin, M.D., assistant professor of Lymphoma and Myeloma, recommended getting Galucci into remission so she could ultimately undergo a stem cell transplant.

Under Westin’s guidance, she returned to Florida for more chemo, then came back to MD Anderson where she received some disappointing news: Not only was she not in remission, but her cancer was growing. Plans for a stem cell transplant were scrapped, and Galucci instead prepared to undergo concurrent chemo and radiation at MD Anderson.

There was a six-day waiting period before treatment would begin, so she traveled home to save money and spend time with her family. While there, she received a phone call that would forever change her life.

By Ron Gilmore
Photos by Nick de la Torre

Souped-up T cells are attacking cancer and restoring patients’ lives

Sattva Neelapu, M.D., professor of Lymphoma and Myeloma, was co-leader of a clinical trial in which 42% of patients with aggressive large B-cell lymphoma remained in remission 15 months after treatment with CAR T therapy.
"I learned I had been moved to the top of the list as a participant in a new CAR T clinical trial at MD Anderson," she says. "I was very nervous because I knew there could be many side effects, some potentially deadly, but I felt I had no choice."

Galucci, the youngest patient to participate in the trial overseen by Sattva Neelapu, M.D., professor of Lymphoma and Myeloma, began her treatment in November 2015. Patients in the study were treated with Yescarta, which are T cells genetically modified to recognize a protein called CD-19 on the surface of cancerous B cells. After the requisite chemotherapy treatments, she was infused with her own altered T cells. Although she did have some serious complications, including coma, neurotoxicity and seizures, she pulled through and on Dec. 29, was informed she was in remission. More than two years later, she remains in remission.

"I have bounced back without any major residual side effects or issues since approximately March 2016," Galucci says. "I am living proof that immunotherapy is successful and groundbreaking."

In October 2017, almost two years after Galucci received CAR T-cell therapy at MD Anderson, the FDA approved Yescarta for use in diffuse large B-cell lymphoma.

Weighing the options
A little over three years ago, Tomas Sandoval, then 39, was awaiting the birth of his second child when he was diagnosed with non-Hodgkin's lymphoma. Sandoval underwent a stem cell transplant at MD Anderson, and the treatment kept the disease at bay.

However, six months later, the cancer returned and progressed rapidly to stage IV. "I had a large chest mass and few options left when I joined the CAR T clinical trial at MD Anderson," says Sandoval, who lives in College Station, Texas. "It was a really tough time, but CAR T saved my life."

Within a week of infusion, Sandoval's mass was gone, and within three weeks he was declared in remission. Although he had heard CAR T could have serious side effects, his were relatively minor. Sandoval has been back at work since 2015 and grateful to be watching his children grow up.

Back to bass fishing
When Jimmy Boyd wasn't at his job as a warehouse manager in Haughton, Louisiana, a small town near Shreveport, he likely was out at his lake house fishing with his three children or one of his eight grandchildren.

But in March 2016, Boyd was diagnosed with non-Hodgkin's lymphoma. After a year of chemotherapy and radiation at a hospital in Shreveport, the cancer wasn't responding and Boyd was recommended for MD Anderson's CAR T trial.

Following six months on the waiting list, Boyd received CAR T therapy in July 2017. Just over a month later, PET scans revealed he was in remission. Boyd is still in remission today, and he's back at the lake house where he casts for large-mouth bass and builds memories with his grandchildren.

"I really had very few side effects, other than some fever and confusion," says the 68-year-old Boyd. "I still come back to MD Anderson every three months for a PET scan, and am not quite at the point where I can do strenuous activities like I used to. But Dr. Neelapu says that will just take time."
The research of rest and recovery

At the Sleep Center, experts are opening eyes to the important role quality sleep can play in cancer care

By Claudia Feldman

Photos by Nick de la Torre
Experts such as Diwakar Balachandran, M.D., have shown that improved sleep quality can relieve cancer-related symptoms such as fatigue, pain and mood disturbance.

Kathy McKinney got through the surgery, the chemotherapy and the radiation. Why, she wondered, did she still feel so bad? Even though her treatment at MD Anderson had been successful, she spent her days groggy and tired.

“It felt like a hangover,” McKinney says, “but I am not a drinker.” Relief came after a referral to the sleep experts at MD Anderson, one of only a few cancer hospitals in the country with a sleep lab onsite.

It just makes sense, says Diwakar Balachandran, M.D., professor of Pulmonary Medicine and sleep center director. “Sixty percent of all cancer patients have some type of sleep disorder.”

McKinney quickly was diagnosed with sleep apnea, a problem she probably had before her breast cancer. Other patients tell Balachandran that they slept perfectly well before their diagnosis and treatment, but not after.

Sleep trouble and treatment

Claudine James, for example, developed sleep problems after treatment for breast cancer in 2000.

“My biological clock is off,” James says. “I’m really fatigued during the day, but I could easily stay up all night.”

Patients like James reinforce Balachandran’s conviction that cancer and cancer treatments can trigger sleep issues – and his hope that dealing with those issues can have a positive effect on cancer outcomes.

He is only half-joking when he says the anticipation of such breakthroughs disturbs his own sleep.

“Animal models suggest a link, but we haven’t found it in humans,” Balachandran says. “That’s the promise … the Holy Grail.”

A young doctor’s awakening

Balachandran grew up in Chicago and attended medical school at Northwestern University. During a pulmonary critical care fellowship at the University of Chicago, the young doctor was introduced to the developing field of sleep medicine. Specialists had to be experts in pulmonology, neurology and chronobiology – the study of the natural physiological rhythms of organisms. And, a passion for research helped, too.

After a second fellowship in sleep medicine at Beth Israel Deaconess Medical Center in Boston, Balachandran was hooked. When he and his wife moved to Houston in 2003, he helped start a sleep lab for underserved patients in what was then the Harris County Hospital District. In 2005, he moved to MD Anderson, where he, Lara Bashoura, M.D. and Saadia Faiz, M.D., both associate professors of Pulmonary Medicine, opened the sleep center the following year.

The power of sleep

Since then, the staff has treated and maintained research data on almost 4,000 cancer patients. One challenge, Balachandran says, has been to convince both patients and oncologists that sleep problems are important and shouldn’t be ignored during cancer treatment.

Balachandran and other experts already have shown that improved sleep quality can relieve cancer-related symptoms including fatigue, pain and mood disturbance. Also, numerous studies illustrate that treating cancer-related insomnia reduces inflammation, which may have an impact on the disease. What Balachandran hopes to prove one day is that sleep treatments can have a positive effect on tumor growth, metastasis and mortality.

Meanwhile, McKinney, 58, and James, 48, are grateful for the relief they’ve received.

To deal with her sleep apnea, McKinney uses a CPAP machine and mask every night at bedtime. They allow her to start each day refreshed and rested.

“Before the CPAP, I couldn’t even complete a sentence,” says McKinney, a retired elementary school secretary. “Now I’m kayaking, gardening and driving back and forth from Houston to our lake house. I can do anything I want to do.”

James, a federal administrative judge, still wrestles with the unfortunate combination of sleepiness and insomnia. But after consulting with Balachandran and spending two nights at the sleep lab, she takes medication to help her with the daytime sleepiness. At night, on her own, she is able to get five hours of rest. She doesn’t take a sleep aid because she wants to keep her prescriptions to a minimum.

“I was worried that the sleep problems could destroy my career, but with my medication, they’re manageable,” James says. “Dr. Balachandran definitely made my life better.”
Using virtual reality googles, patients in MD Anderson Children’s Cancer Hospital’s K-12 school can experience field trips to some of the most beautiful places in the world.

As Adolfo Chavez III
LOCATIONS
MD Anderson has Houston-area locations in the Texas Medical Center, Bay Area, Katy, Sugar Land, The Woodlands, Bellaire and West Houston (diagnostic imaging), Memorial City (surgery) and The Woman’s Hospital of Texas (gynecologic oncology). MD Anderson physicians also provide cancer care to Harris County’s underserved patients at Lyndon B. Johnson Hospital. In addition, there are two research campuses in Bastrop County, Texas. The institution also has developed a network of national and international locations.

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