

SYNTHESIS



Grateful
cancer patient
treks to
Mount Everest

PAGE 18

“Switch” to activate
cancer cell death

PAGE 12

High-intensity focused
ultrasound treatment
for prostate cancer

PAGE 20

Higher cancer rates
in areas of poverty

PAGE 30

Dear Reader,



In this issue of Synthesis, we have good news to share, including our latest success stories, our newest endeavors, and updates on our most promising scientific discoveries.

“Care” and “cure” are at the forefront of our work. Many of the talented researchers at UC Davis Comprehensive Cancer Center collaborate closely with our oncologists to speed the application of new laboratory breakthroughs in clinical trials and bring them to the patient bedside. As you will see, our team is making extraordinary progress. Nevertheless, while our efforts to improve cancer patient outcomes are clearly succeeding, too many of us are still losing friends and family to advanced cancer. Our unrelenting work continues, as shown within the pages of Synthesis.

For starters, we are proud to show the remarkable leaps forward in treating two difficult cancers: liver and pancreatic cancer. Learn in this issue how one female scientist is leading the way with many of these breakthroughs while simultaneously mentoring other women scientists.

Discover why our commitment to diversity, equity and inclusion is expanding as we continue to deepen our strengths in laboratory science to help overcome health disparities in the region. You will meet one of our oncology surgeons, once a farmworker, who resided in a region with higher-than-average cancer rates. This “lived experience” has inspired him to pursue a career in high-impact cancer treatment and research.

Did you know that lung, liver, stomach and cervical cancer rates are worse in areas of poverty? Read about the reasons behind that in our new report. What people eat, or have access to eat, can affect their risk of cancer, which is why we have a new Foods that Fight Cancer project we want to tell you about.

Giving everyone access to genetic testing, no matter their financial resources, is key to unleashing the benefits of targeted cancer therapy that relies on molecular profiling of tumors. We're proud to have played a role in getting biomarker testing legislation for the state of California signed into law that takes effect this summer. An article highlighting this success is inside this issue.

We always enjoy spotlighting people who are helping us in our mission in this magazine. There's no reason you can't have fun — and even “compete” — while taking a swing at raising money for cancer research. Find out about the Sunday on the Green golf fundraiser, which was started by a grateful patient and his wife. We also introduce you to the wife of a U.S. Marine who tells us that his sense of duty inspired him to give back after receiving treatment for a cancer that, after a gallant fight, eventually took his life. He lives on, however, with his generous and enduring gift.

Cancer is formidable, but the incredible team we have put together is taking on the challenge. We are grateful for your ongoing and future support of UC Davis Comprehensive Cancer Center.

Primo “Lucky” Lara Jr., M.D.

DIRECTOR, UC DAVIS COMPREHENSIVE CANCER CENTER

BREAKING BARRIERS TO BEAT CANCER™

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in this issue

14

THE MAGAZINE OF UC DAVIS COMPREHENSIVE CANCER CENTER

VOL 27 NO 2 / SUMMER 2024

HIGHLIGHTS

- 2** Director named a Top 20 AAPI Change Maker
- 4** David Cooke, interim physician-in-chief, to lead IDEAL
- 6** UC Davis earns Comprehensive Breast Imaging Center accreditation



32

SCIENCE & EDUCATION

- 9** Liver cancer and gene therapy
- 12** ‘Switch’ to activate cancer cell death
- 14** Progress in fighting lethal pancreatic cancer

COMPASSIONATE CARE

- 18** Medical team helps cancer patient on Mount Everest trek
- 20** High-intensity focused ultrasound treatment for prostate cancer
- 22** Cancer blood tests jump-start diagnoses

COMMUNITY OUTREACH

- 30** Higher cancer rates in areas of poverty
- 31** Foods that Fight cancer: a pilot study
- 32** Farmworker turned surgeon gives back



37

DONOR SPOTLIGHT

- 34** Sunday on the Green tees off to outscore cancer
- 36** Sense of duty inspires team spirit to help fund research
- 37** The latest in cancer care comes with a healing garden

Primo “Lucky” Lara Jr. named among The Sacramento Bee’s Top 20 AAPI Change Makers



Primo “Lucky” Lara Jr. was designated one of this year’s Top 20 Asian American and Pacific Islander (AAPI) Change Makers by The Sacramento Bee newspaper.

The Bee’s Equity Lab and the Nehemiah Emerging Leadership Program (NELP) are partners in the Change Maker series. The Equity Lab is a team of journalists dedicated to promoting equity and inclusion, and NELP is a professional development program for people from culturally diverse backgrounds. The Change Makers program recognizes people in the Sacramento region who The Bee says “lead with fearlessness.”

In announcing the Top 20 Change Makers, The Bee acknowledged Lara as the first Filipino American leader of a National Cancer Institute-designated cancer center. Lara was nominated by Elisa Tong, a UC Davis Health internist and tobacco researcher. In her nomination, Tong said about Lara that “His work with community



Primo “Lucky” Lara Jr.
Director, UC Davis Comprehensive Cancer Center

and academic partners to reduce flavored tobacco use in the AAPI, Black and Latino communities helped to pass strong new local and state laws to stop its sale.”

For a multimedia profile earlier this year, The Bee asked Lara about his best advice for leaders.

“The best advice I’ve heard is, ‘Be kind always.’ The ability to provide comfort allows you to be humble,” he replied.



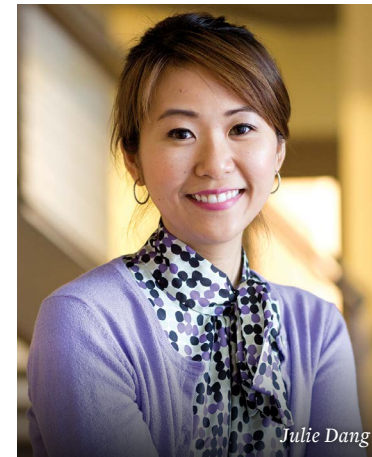
Cancer center recognized nationally for excellence in surgical oncology care

UC Davis Comprehensive Cancer Center has been designated an American College of Surgeons (ACS) Surgical Quality Partner. The award is given to cancer programs that excel in quality of care, preventing complications, saving lives and reducing costs.

ACS quality improvement programs are grounded in more than a century of experience and are an important measure of a hospital’s surgical quality.

The designation follows the news that UC Davis Medical Center and the cancer center earned accreditation once again from the Commission on Cancer, a quality evaluation program of the ACS.

Julie Dang named to Cancer Health’s 25: Champions of Health Equity



Julie Dang

Alongside high-profile individuals including President Joe Biden, UC Davis Comprehensive Cancer Center’s Julie Dang has been named one of the top 25 people nationally who is breaking down barriers to cancer health equity. Dang is the executive director of the cancer center’s Office of Community Outreach and Engagement.

Cancer Health magazine’s fourth annual Cancer Health 25: Champions of Health Equity award recognizes

Americans who are dedicated to defining and responding to health disparities. Winners included doctors, nurses, researchers, volunteers, patient navigators, grassroots advocates and one world leader.

As a cancer health disparities behavioral scientist, Dang works to ensure that diverse and underserved populations have access to cancer prevention and intervention tailored

to their culture and community. Her areas of expertise include breast and colorectal cancer screenings for Black, Latino and Native American communities. She also is committed to boosting Asian-American participation in cancer research and clinical trials, and promoting testing for hepatitis B, which can lead to liver cancer.

Dang has been awarded a five-year National Cancer Institute Mentor Research Scientist Development Award to Promote Diversity (K01). She is using the federal grant to increase uptake of the human papillomavirus (HPV) vaccine, which will reduce racial and ethnic disparities in HPV-associated cancers.



Elisa Tong to help lead health equity-focused population science research

Elisa Tong has been named assistant director for population sciences for UC Davis Comprehensive Cancer Center. The UC Davis Health internist and renowned cancer center tobacco researcher will focus on health equity to improve cancer prevention, screening, treatment and survivorship.

Tong will join Shehnaz Hussain, the associate director for population sciences. She also will work with the cancer center director, its senior leaders and program leaders to facilitate and disseminate impactful research on cancer determinants and outcomes.

Tong is the director and principal investigator of the Tobacco Cessation

Policy Research Center, a community-academic research and training partnership. She supports the California Tobacco Control Program, and has collaborated with the California Cancer Registry. Tong’s work with the registry confirms that nearly half of the deaths from 12 cancers are due to tobacco use, and that nearly 70,000 Californians recently diagnosed with cancer continue to have high tobacco use rates.

She has been medical director of the cancer center’s SToP: Stop Tobacco Program and serves as a co-chair for the UC Lung Cancer Consortium population health and policy subcommittee. Previously, Tong led UC Quits for the five

UC health systems, which prompted more than 20,000 tobacco referrals to the free state quitline. She also founded and leads CA Quits, which advances tobacco treatment in California to address health inequities.



Elisa Tong



David Tom Cooke takes on new roles

David Tom Cooke talks to the new IDEAL team leaders, Miquell Olivia Miller and Luis Godoy.

Cancer center interim physician-in-chief

David Tom Cooke is the new interim physician-in-chief for UC Davis Comprehensive Cancer Center. He leads the development and oversight of the cancer center's performance targets and metrics, setting standards of care, measuring and improving clinical outcomes and disseminating best practices. Cooke also oversees the medical directors of the inpatient oncology units and outpatient clinics, as well as the cancer center's disease groups, physicians and prominent clinicians who are leaders in their field.

Cooke is a professor and founding chief of the Division of General Thoracic Surgery, for which his motto is "equality of great quality." He is an ardent advocate for reducing the cancer burden on marginalized communities, working toward health equity for all. Last year, he was recognized for care and compassion in medicine after the nonprofit organiza-

tion Physicians for a Healthy California presented him with its 2022 Ethnic Physician Leadership Award. Cancer Health magazine also included him in Cancer Health's 25: Black Lives Matter list in 2021.

Associate director of IDEAL

Cooke is also stepping into the role of associate director of the cancer center's Office of Inclusion, Diversity, Equity and Accessibility (IDEAL). Cooke will lead the newly appointed IDEAL team that includes assistant directors Miquell Olivia Miller and Luis Godoy. Cooke replaces Luis Carvajal-Carmona as the leader of IDEAL after Carvajal-Carmona became the associate vice chancellor for the UC Davis Office of Academic Diversity.

Cooke said he hopes the Office of IDEAL will help achieve a leadership roster that reflects the communities the cancer center serves. Overall objectives include:

- Promoting pathways for career and leadership development opportunities for under-represented cancer center academicians
- Developing infrastructure and policies designed to promote a culture of inclusivity, diversity equity and accessibility

"The Office of IDEAL is a mission critical facet of UC Davis Comprehensive Cancer Center, as required for our National Cancer Institute 'comprehensive' designation," said Cooke. "It will lead the development of our plan for enhancing diversity, which includes increasing the number of diverse cancer center members, who are skilled clinical, translational, and basic science cancer researchers."

Rounding out the Office of IDEAL team are Allyn Fernandez, chief operations officer of the cancer center, and analyst Krandalyn Goodman.

Edward Kim is the new medical director of the UC Davis Cancer Care Network

UC Davis Comprehensive Cancer Center oncologist Edward Kim is the new medical director of the UC Davis Cancer Care Network (CCN).

The goal of the CCN is to improve cancer care in community hospitals so patients can access the latest advancements in treatments without having to leave the convenience of their local hospital. Community oncologists work directly with UC Davis oncologists to ensure that the latest diagnostic and treatment options are available to their patients.

"I am thrilled to have the opportunity to follow in the footsteps of the previous medical director, Dr. Richard Bold," Kim said. "It is truly an exciting time for the UC Davis Cancer Care Network, which

has seen remarkable growth and development over the past few years. I look forward to working with the outstanding CCN team to advance the highest level of cancer care to patients served by our network of community cancer centers."

Kim is currently the medical director of the Office of Clinical Research at UC Davis Comprehensive Cancer Center. He has been directly involved in expanding the cancer center's clinical trials into counties that the CCN affiliates serve. This has enabled cancer patients living in rural areas to access clinical trials that typically are available only at academic institutions.

As a medical oncologist for adult patients, Kim specializes in the treatment of gastrointestinal malignancies,



Edward Kim

including pancreatic, hepatocellular, biliary, esophageal, gastric and colorectal cancers.



Beat Cancer podcast beats the competition

UC Davis Comprehensive Cancer Center's *Beat Cancer* podcast received the 2023 Gold Award for Best Healthcare Podcast presented by eHealthcare Strategy & Trends. Christian Joyce and Stephanie Winn are the hosts of *Beat Cancer*, interviewing researchers, oncologists and other specialists involved with innovative science and the latest treatments underway at the cancer center.

The eHealthcare Leadership Awards recognize outstanding health websites and digital initiatives, highlighting the role of digital communications. The national awards program, now in its 24th year, draws some 1,000 entries annually. It recognizes the very best websites and digital communications of health organizations.

Beat Cancer offers an in-depth discussion of the science, research and advancements taking place at UC Davis Comprehensive Cancer Center. Find *Beat Cancer* on the cancer center website or your favorite podcast platform. Would you like a topic covered? Email us at beatcancer@ucdavis.edu.

Elizabeth Morris named 2024 Gold Medalist by Society for Breast Imaging

UC Davis Health Professor and Chair of the Department of Radiology Elizabeth Morris has been selected as the Society of Breast Imaging (SBI) 2024 Gold Medalist.

Morris' research focuses on how to use newer techniques, such as magnetic resonance imaging (MRI), for early breast cancer detection. In collaboration with her colleagues, she has written over 230 research papers, 40 chapters and five books about breast diseases with an emphasis on the use of MRI. She has received grants from the National Cancer Institute, U.S. Department of Defense, Susan G. Komen Foundation and Breast Cancer Research Foundation.

In announcing the award, SBI said Morris has a distinguished record as a radiology and breast imaging leader. After graduating summa cum laude from UC Davis with a degree in biochemistry, she received her medical degree from UC San Francisco and completed her residency at



Elizabeth Morris (right) pictured with SBI past president Mary Newell (left).

Weill Cornell Medical College. She also received a body and breast imaging fellowship at Memorial Sloan Kettering Cancer Center, where she remained on the faculty until December 2020 as the chief of the breast imaging service and holder of the Larry Norton Endowed Chair.

Morris is a fellow of SBI, the American College of Radiology and the International Society of Magnetic Resonance in Medicine. She also is a past president of SBI.

Morris received the gold medal during the 2024 SBI Breast Imaging Symposium in April in Montreal, Canada.

UC Davis earns Comprehensive Breast Imaging Center accreditation

The American College of Radiology (ACR) has recognized UC Davis Medical Center as a Comprehensive Breast Imaging Center. The designation acknowledges facilities that achieve excellence in women's health by participating in rigorous quality assurance programs.



The designation is considered prestigious because it is awarded only after the ACR performs an independent, comprehensive assessment of the medical imaging facility. In this case, the evaluation took place at the main breast radiology location at the UC Davis Health Lawrence J. Ellison Ambulatory Care Center in Sacramento.

To receive the designation, a center must be fully accredited by the ACR in mammography, breast magnetic resonance imaging (MRI), stereotactic breast biopsy and breast ultrasound.

"We are very proud to provide the whole region with the very highest level of breast imaging services available," said Shadi Aminololama-Shakeri, chief of the Division of Breast Radiology. "Our entire team makes this seal of quality and excellence possible for our patients and allows us to deliver the very highest quality of care that patients come to expect from UC Davis."

National Cancer Institute awards UC Davis hematologist a prestigious research grant



UC Davis Comprehensive Cancer Center hematologist Brian Jonas has earned the National Cancer Institute (NCI) Research Specialist Award (R50) to further his leadership in NCI-funded cancer research and clinical trials. This award supports exceptional scientists in advancing their careers by pursuing cancer research opportunities.

Jonas is a professor of medicine in the Division of Malignant Hematology, Cellular Therapy and Transplantation in the Department of Internal Medicine. His vision is to transform clinical care and research on blood cancer disorders, especially acute myeloid leukemia and myelodysplastic syndrome.

As the chair of the Data and Safety Monitoring Committee at the cancer center, Jonas contributes to clinical trial infrastructure, and ensures the highest quality and accountability in trials. He also is chair of the Hematology Disease Team Committee and oversees the management of the malignant hematology clinical trial portfolio, including several NCI-funded trials.



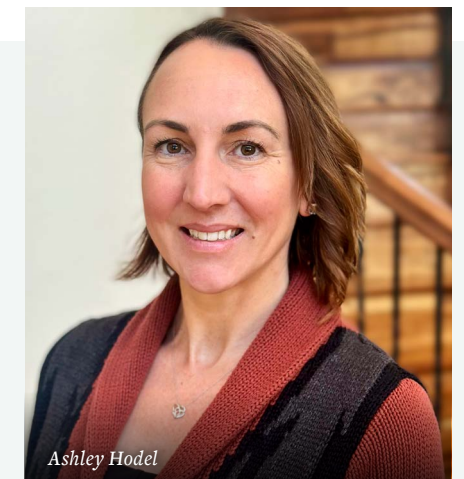
Ashley Hodel to lead cancer center's strategic planning

Ashley Hodel has been appointed executive director for programs, planning and evaluation for UC Davis Comprehensive Cancer Center. Before joining the cancer center, she was the academic coordinator for the UC Davis Center for Neuroscience, where she managed two predoctoral training grants.

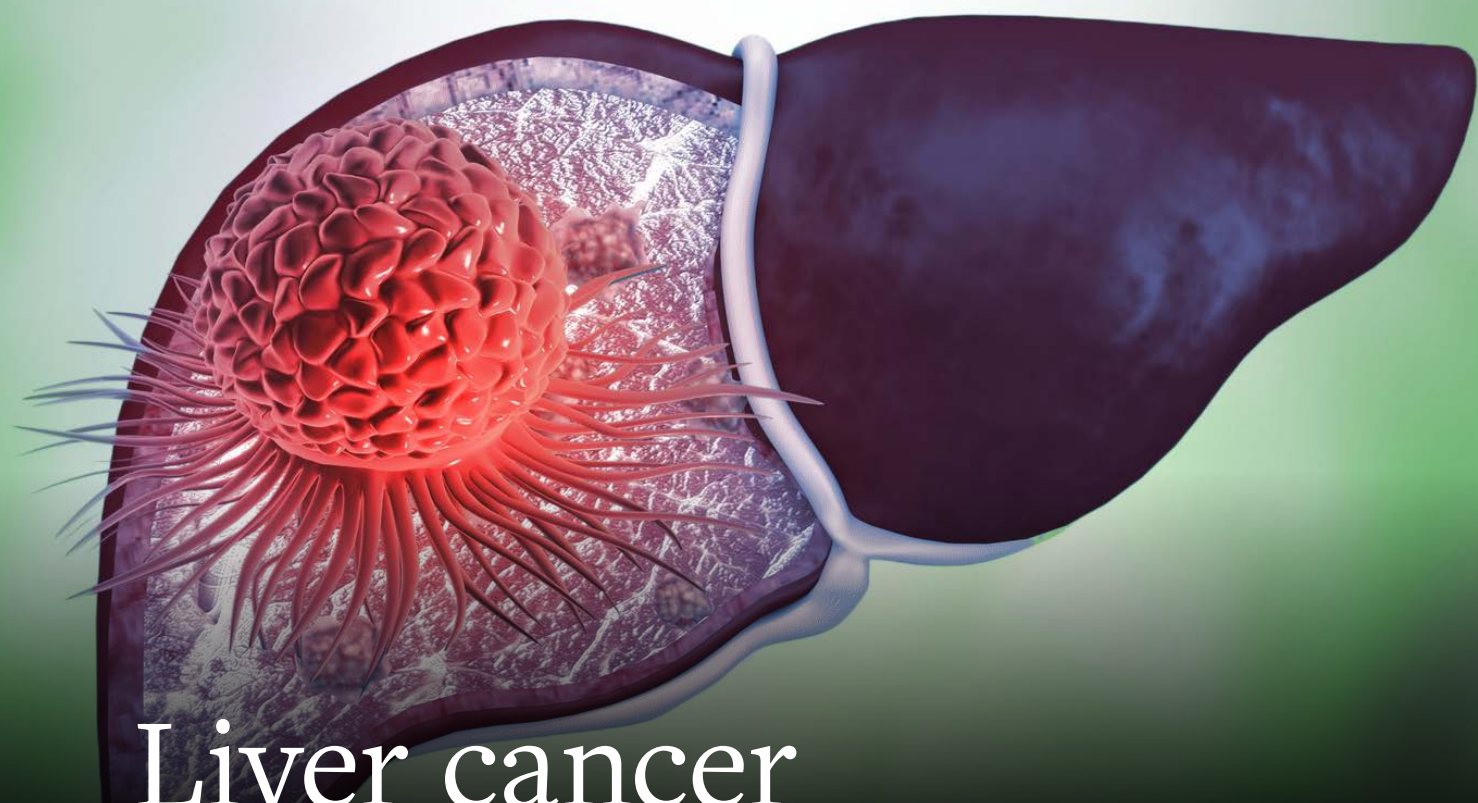
In her new role, she will manage and oversee the cancer center's National Cancer Institute Cancer Center Support

Grant, its intramural programs and its strategic planning process as well as its research shared resources programs.

Hodel has more than a decade of direct research, scientific design, science grant writing and mentorship experience. She has a Ph.D. in animal biology with a focus on breast cancer biology and endocrinology. Hodel spent several years with the Jackson Laboratory in Sacramento, where she



managed contracted research projects and oversaw the commercial lab's research programs.



Liver cancer

Liver cancer is a leading cause of cancer deaths worldwide, accounting for the yearly loss of more than 700,000 lives. Each year in the United States, about 25,000 men and 11,000 women are diagnosed with liver cancer, while 19,000 men and 9,000 women die from the disease.

Risk factors for liver cancer include long-term hepatitis B or hepatitis C infections, obesity, non-alcoholic fatty liver disease, excess alcohol consumption, auto-immune liver disease and exposure to aflatoxins (a toxin found in moldy peanuts or grains).

SYMPTOMS OF LIVER CANCER:

- Weight loss/loss of appetite
- Nausea or vomiting
- Enlarged liver (fullness under the ribs on the right side)
- Enlarged spleen (fullness under the ribs on the left side)
- Pain in the abdomen or near the right shoulder blade
- Swelling or fluid build-up in the abdomen
- Itching, yellowing of the skin and eyes

HCC

The most common type of liver cancer, hepatocellular carcinoma (HCC), is increasingly taking lives. The rising number of cases is due to the risk factors above, especially growing obesity rates. UC Davis Comprehensive Cancer Center researchers are leading the way in finding a cure.

Gene therapy studies discover potential new treatments for liver cancer

Galectin 1 protein

Researchers at UC Davis Comprehensive Cancer Center have shown that inhibiting a specific protein using gene therapy can shrink liver cancer in mice. Silencing the galectin 1 (Gal1) protein, which is often over-expressed in liver cancer, also improved the anti-cancer immune response and increased the number of cancer-fighting killer T cells inside tumors.

“We’ve long known that Gal1 is a biomarker for hepatocellular carcinoma (liver cancer),” said Yu-Jui Yvonne Wan, a distinguished professor in the Department of Pathology and Laboratory Medicine and senior author of the study. “Gal1 expression in normal tissue is quite low and increases with fatty liver disease, inflammation and liver carcinogenesis. Now, we can see that Gal1 is more than a biomarker — it’s a potential therapeutic target.”

Cancer that starts in the liver is one of the world’s most common cancers. And the numbers are increasing, with incident rates more than tripling since the 1980s. The disease also can be quite deadly. In advanced stages, the five-year survival rate is less than 20%.

Additional scientists participating in the research included: Ying Hu, Farzam Vaziri and Dongguang Wei from UC Davis; Xin Chen from University of Hawaii; and Jinping Lai from Kaiser Permanente Sacramento Medical Center.

“Gal1 expression in normal tissue is quite low and increases with fatty liver disease, inflammation and liver carcinogenesis. Now, we can see that Gal1 is more than a biomarker — it’s a potential therapeutic target.”

—YU-JUI YVONNE WAN, PH.D., PROFESSOR, UC DAVIS MEDICAL CENTER

microRNA-22

The University of California has filed a patent application investigating the use of microRNA-22 (miR-22) gene therapy for treating hepatic and metabolic diseases. They took the step after cancer center research showed that it holds promise as an effective treatment for liver cancer.

MicroRNAs are small molecules that contain ribonucleic acid (RNA), a type of genetic material. MicroRNAs are widely found in plants and animals. They are “non-coding,” meaning they do not make proteins like some other RNA molecules.

Wan and Ying Hu, an assistant professional researcher in Wan’s lab, made the discovery.

The researchers found that gene therapy that induces the body to create

miR-22, a naturally occurring molecule, successfully treated mice with hepatocellular carcinoma.

The miR-22 treatment reduced liver inflammation and produced better survival outcomes with no observable toxicity compared to the FDA-approved liver cancer treatment lenvatinib.

“This research introduces miR-22 gene therapy as a promising and innovative approach for treating hepatocellular carcinoma,” Wan said. “The study’s findings suggest that miR-22 therapy could provide better survival outcomes, enhance anti-tumor immunity, improve metabolism and reduce inflammation.”

Other scientists involved with the research study included Tahereh Setayesh, Farzam Vaziri, Xuesong Wu and Samuel T. Hwang from UC Davis.



Yvonne Wan: Committed to helping women scientists succeed

Yu-Jui Yvonne Wan speaks from experience when she talks about the challenges female researchers can face, especially young scientists juggling being a mother and a wife while pursuing careers.

“It is not just the priority of child raising; there is also the fact that many research opportunities for female scientists take a backseat to a husband’s career,” Wan said.

Wan came to the U.S. to pursue advanced degrees after graduating from Taipei Medical University in 1979. She became a single mother when her children were only 7 and 12. At that time, Wan was a full professor in residence at UCLA, which required her to rely on research funding to support herself and her research programs.

In 2003, Wan left California for the University of Kansas Medical Center and

became the director of a newly founded Liver Center. She also recruited and built a strong liver research team there.

Nine years later, in 2012, Wan joined the Department of Pathology and Laboratory Medicine at UC Davis Health. She is now a university distinguished professor and the only East Asian woman with this title at the UC Davis School of Medicine.

Serving three medical schools for a combined total of more than 35 years, Wan has mentored over 120 students, postdoctoral fellows and faculty members. At UC Davis alone, her lab has hosted more than 50 students,

trainees, and postdoctoral fellows. Many are faculty members now and have their own research labs and programs.

Wan strives to help junior scientists succeed in their careers while balancing time to spend with their families. Six female scientists working in her lab have taken maternity leave. Wan was there to mentor the young mothers through the process and provide personal and professional support.

She also mentors and supports female researchers in grant writing and guides career development. Many of Wan’s mentees have received national and international recognition through their innovative research.

“Being successful is about our individual choices,” Wan said. “It starts with seeking mentors who can provide guidance and knowing you are not alone.”

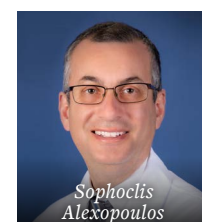
Wan strives to help junior scientists succeed in their careers while balancing time to spend with their families.

Left to right, cancer researchers Yu-Jui Yvonne Wan and Ying Hu.



New liver transplant program launched

UC Davis Health has launched a new adult liver transplant program, expanding the existing services of the UC Davis Transplant Center and providing comprehensive care to patients with liver disease.



The liver transplant program is the third solid organ transplant program to launch at UC Davis Health, joining adult and pediatric kidney transplants. It is the only liver transplant program available in California north of San Francisco.

“As an academic medical center, UC Davis Health made an institutional commitment to develop a viable liver transplant program to meet the health care needs of our community,” said Diana L. Farmer, chair of the Department of Surgery. “This expansion enhances our already robust Transplant Center and allows patients to have liver transplant care available in their own backyard.”

The new program is approved by the United Network for Organ Sharing (UNOS), the agency that manages the nation’s organ transplant system. UC Davis Health already has completed six successful liver transplants in the past year.

A liver transplant is an operation that replaces a patient’s diseased liver with a whole or partial healthy liver from another person. Currently, transplantation is the only cure for liver insufficiency or liver failure because no device or machine reliably performs all the functions of the liver.

“For liver disease patients, access to advanced therapies, including transplantation, can be difficult,” explained Sophoclis Pantelis Alexopoulos, medical director for the Transplant Center. “At UC Davis Health, we are committed to ensuring equitable access to transplantation for patients throughout the region.”

UC Davis Health has welcomed nationally recognized specialists to grow and build its liver transplant program. The large team includes hepatobiliary surgeons, hepatologists, liver transplant anesthesiologists, advanced practitioners, transplant coordinators, nurses, financial coordinators, social workers, dietitians, pharmacists, and transplant administrators.

“Our ability to successfully perform transplants in complex cases of severe liver disease is due to the multidisciplinary, integrated care provided by our liver transplant team,” said Lea K. Matsuoka, section chief for liver transplantation and hepatobiliary surgery at the Transplant Center. “Our team provides patients with comprehensive care throughout the transplant process, from assistance with lodging to support with nutrition and medications. Patient care does not end after the surgery; it is only beginning.”

Established in 1985, the UC Davis Transplant Center has been a leader in organ transplantation for decades. Recently, UNOS selected the center as a model hospital, and the Centers for Medicare & Medicaid Services chose it to guide national best practices for transplant.

Could there be a ‘switch’ to activate cancer cell death?

A research team from UC Davis Comprehensive Cancer Center has identified a crucial epitope (a protein section that can activate the larger protein) on the CD95 receptor that can cause cancer cells to die. This new ability to trigger programmed cell death could open the door for improved cancer treatments.



CD95 receptors, also known as Fas, are called death receptors. These protein receptors reside on cell membranes. When activated, they release a signal that causes the cells to self-destruct. Modulating Fas also may extend the benefits of chimeric antigen receptor (CAR) T-cell therapy for solid tumors like ovarian cancer.

“We have found the most critical epitope for cytotoxic Fas signaling, as well as CAR T-cell bystander anti-tumor function,” said Jogender Tushir-Singh, an associate professor in the Department of Medical Microbiology and Immunology and senior author of the study.

“Previous efforts to target this receptor have been unsuccessful. But now that we’ve identified this epitope, there could be a therapeutic path forward to target Fas in tumors,” Tushir-Singh said.

Finding better cancer therapies

Cancer is generally managed with surgery, chemotherapy and radiotherapy. These treatments may work initially, but

in some cases, therapy-resistant cancers return. Immunotherapies, such as CAR T-cell-based immune therapies and immune checkpoint receptor molecule activating antibodies, have shown tremendous promise to break this cycle. But they help only an extremely small number of patients, especially those with solid tumors such as ovarian, triple-negative breast cancer, and lung and pancreatic cancer.

T cells are a type of immune cells. CAR T-cell therapies involve engineering patient T cells by grafting them with a specific tumor-targeting antibody to attack tumors. These engineered T cells have shown efficacy in leukemia and other blood cancers but have failed repeatedly to combat solid tumors. The reason is that tumor microenvironments keep T cells and other immune cells at bay.

“These are often called cold tumors because immune cells simply cannot penetrate the microenvironments to provide a therapeutic effect,” said Tushir-Singh. “It doesn’t matter how

well we engineer the immune receptor activating antibodies and T cells if they cannot get close to the tumor cells. Hence, we need to create spaces so T cells can infiltrate.”

Death receptors do precisely what their name implies — when targeted, they trigger programmed cell death of tumor cells. They offer a potential workaround that could simultaneously kill tumor cells and pave the way for more effective immunotherapies and CAR T-cell therapy.

Development of drugs that boost death receptor activity could be an important weapon against tumors. However, though drug companies have had some success targeting Death receptor-5, no Fas agonists have advanced to clinical trials. These findings could potentially change that.

The right target

While Fas plays an essential role in regulating immune cells, Tushir-Singh and his colleagues knew they might be able to target cancer cells selectively

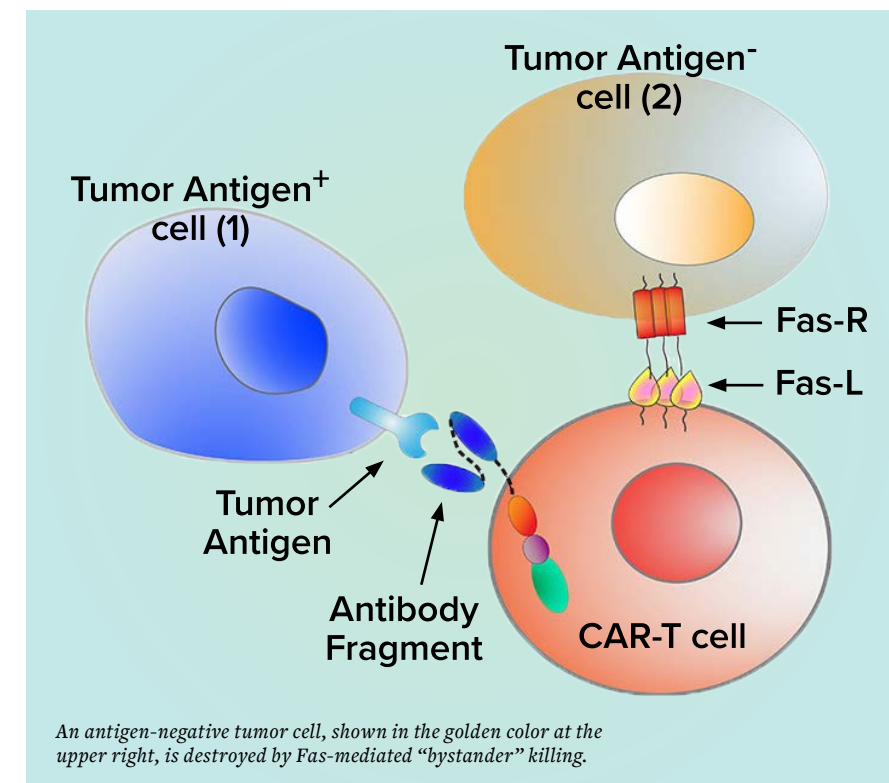
if they found the right epitope. Having identified this specific epitope, he and other researchers can now design a new class of antibodies to selectively bind to and activate Fas to potentially destroy tumor cells specifically.

Other research in animal models and human clinical trials has shown that Fas signaling is fundamental to CAR-T success, particularly in tumors that are genetically heterogeneous. Genetically heterogeneous tumors have a mix of different cell types, which can respond in varying ways to treatment.

An Fas agonist could generate a CAR-T bystander effect, in which the treatment destroys cancer cells that lack the molecule that the tumor-targeting antibody is designed to hit. In other words, activating Fas may destroy cancer cells and improve CAR-T efficacy, a potential one-two punch against tumors.

In fact, the study showed that tumors with a mutated version of the epitope of Fas receptors will not respond to CAR-T at all. This finding could lead to new tests to identify which patients will benefit most from CAR T-cell immunotherapy.

“We should know a patient’s Fas status — particularly the mutations around the discovered epitope —



before even considering giving them CAR-T,” Tushir-Singh said. “This is a definitive marker for bystander treatment efficacy of CAR-T therapy. But most importantly, this sets the stage to develop antibodies that activate Fas, selectively kill tumor cells, and potentially support CAR T-cell therapy in solid tumors.”

Additional scientists involved in the research include Tanmoy Mondal, Himanshu Gaur, Brice E. N. Wamba, Abby Grace Michalak, Camryn Stout, Matthew R. Watson, Sophia L. Aleixo, Arjun Singh, Roland Faller, Gary Scott Leiserowitz and Sanchita Bhatnagar from UC Davis and Salvatore Condello from Indiana University School of Medicine.

Ovarian Cancer

The risk of ovarian cancer increases with age. Ovarian cancer is rare in women of childbearing age. The typical patient is in her 60s and past menopause. Women who have been pregnant and have breastfed their babies as well as women who have taken birth control are less at risk of ovarian cancer.

Symptoms

- Bloating or abdominal swelling
- Decreased appetite, getting full quickly, weight loss
- Pelvic pain
- Changes to bowel or bladder habits

Risks

- Family history of breast or ovarian cancer
- Having children later in life or never having a full-term pregnancy
- Older age
- Changes to bowel or bladder habits

Researchers identify protein that causes pancreatic cancer to spread

Severe pancreatic cancer is associated with metastasis, which is the spread of secondary tumors that usually cause death. Little is known about the molecular mechanisms that drive metastasis.

Now, UC Davis researchers have found that abnormal expression of the protein Engrailed-1 (EN1) promotes pancreatic cancer progression and metastasis in artificial samples and in mice. The team also found that elevated EN1 was associated with severe, metastatic pancreatic cancer in human patients. This suggests that EN1 might make a good target for pancreatic cancer therapies. The work was supported by a UC Davis Comprehensive Cancer Center pilot grant and the National Institutes of Health.

“We identified a novel epigenetic factor that can contribute to metastasis in pancreatic cancer, which is one of the most

challenging cancers to treat,” said Chang-il Hwang, an assistant professor in the UC Davis Department of Microbiology and Molecular Genetics and a senior author on the paper. “A better understanding of these mechanisms would allow us to identify potential targets and improve patient survival.”

Epigenetic changes are modifications in gene activity without changes in DNA sequencing.

Uncovering a main actor in pancreatic metastasis

Metastasis is an important component of pancreatic cancer progression, but researchers have not been able to identify

Recent work by Chang-il Hwang, assistant professor of microbiology and molecular genetics (left) and doctoral student Jihao Xu (right) has identified a protein linked to metastatic pancreatic cancer. This could lead to new ways to treat the disease. (Sasha Bakhter/College of Biological Sciences).

genetic mutations responsible for it. For this reason, Hwang thought that nongenetic factors, such as epigenetic changes or altered protein production, might be at play. His team previously identified several transcription factors — proteins that control the production of other proteins — that are elevated in pancreatic cancers that have undergone metastasis compared to primary tumors.

“It’s very clear that EN1 is a really important factor behind the aggressiveness of pancreatic cancer.”

—JIHAO (RENO) XU

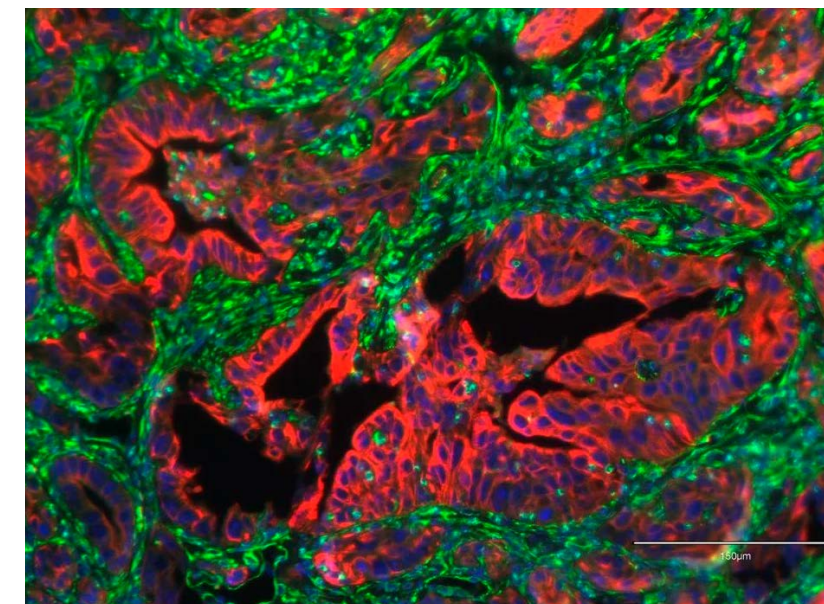
One of these proteins, EN1, is essential for the survival of neurons during development and is not usually produced in adult pancreatic cells. EN1 has been shown to promote aggressive forms of breast cancer. It is also associated with poor prognosis in other cancers, including glioblastoma and salivary gland adenoid cystic carcinoma. However, its role in pancreatic cancer had not yet been described.

The researchers tested whether inhibiting EN1 or ramping up its expression impacted the growth and survival of pancreatic cancer “organoids” — three-dimensional clumps of lab-grown tissue. They found that, without EN1, pancreatic cancer cells were less likely to survive and divide, but adding extra EN1 increased the tumors’ survival. Next, the researchers genetically modified mouse pancreatic cancer cell lines so that they produced more EN1 than usual. They found that the cells showed increased rates of cell invasion and migration, key features of metastasis.

“It’s very clear that EN1 is a really important factor behind the aggressiveness of pancreatic cancer,” said first author Jihao (Reno) Xu, a doctoral candidate in the Biochemistry, Molecular, Cellular and Developmental Biology graduate group. “When we take the tumor cells and make them overexpress EN1, they

become more metastatic and aggressive, and when we knock it down, they become less metastatic.”

Additional scientists involved in the research included: EunJung Lee, Keely Y. Ji, Omar W. Younis and Alexander D. Borowsky, UC Davis; Jae-Seok Roe, Yonsei University; Claudia Tonelli, Tim D.D. Somerville, Melissa Yao, Joseph P. Milazzo, Herve Tiriack, Youngkyu Park, Christopher R. Vakoc and David A. Tuveson, Cold Spring Harbor Laboratory; Ania M. Kolarzyk and Esak Lee, Cornell University; Jean L. Grem, Audrey J. Lazenby, James A. Grunkemeyer and Michael A. Hollingsworth, University of Nebraska Medical Center.



Micrograph showing a pancreatic tumor with experimentally depleted levels of EN1, which reduces metastatic activity (Jihao Xu).



Teaming up to take on pancreatic cancer

The UC Davis Comprehensive Cancer Center is hoping to dramatically change outcomes for pancreatic cancer patients. The cancer center has joined the UC Pancreatic Cancer Center, which brings together all of the five University of California comprehensive cancer centers to fight pancreatic cancer. This includes sharing research, coordinating trials, developing therapies and treating and educating patients about this often-fatal cancer.

Novel method to detect pancreatic cancer could offer better treatment



World's first endoscopic, ultrasound-guided pancreatic cancer biopsies with new needle

UC Davis Health endoscopy team members performed the world's first endoscopic, ultrasound-guided core biopsies of a pancreatic tumor. Endoscopy is a procedure in which a thin, flexible tube inserted through a natural opening or a small incision enables doctors to view and biopsy tissues inside the body. During the endoscopic procedures, the team efficiently collected a larger than normal core of tissue, which helped improve diagnostic accuracy.

Antonio Mendoza Ladd, medical director of gastrointestinal endoscopy, performed the procedures using a specialized instrument called EndoDrill GI. Mendoza Ladd and his team used the instrument to biopsy a gastrointestinal stromal tumor and two pancreatic tumors. Together, these three cases were the first ever performed in the United States, and the pancreatic tumor biopsies were the first cases in the world done with the novel instrument.

The new device, developed by BiblInstruments AB, is considered groundbreaking because it affords much better access to deep tissues in the upper gastrointestinal tract. This includes the pancreas, stomach, esophagus, lymph nodes and liver, where cancer can often go undetected until it has advanced.

"These initial biopsies obtained with this innovative technology provided us with tissue cores that surpassed the typical ones collected with regular needles," Mendoza Ladd said.

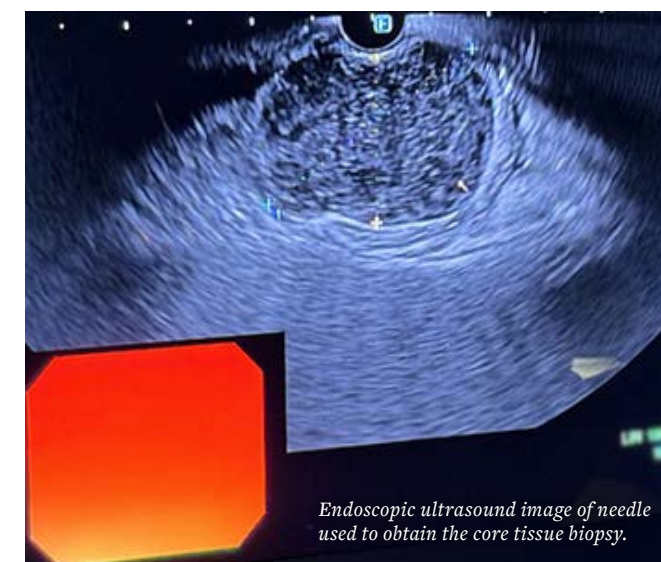
How the novel biopsy procedure benefits patients

Traditionally, tissue samples for diverse types of gastrointestinal tumors are collected using a procedure called endoscopic ultrasound, or EUS. This involves the use of a flexible tube with a small camera attached to an ultrasound probe at the end. The endoscopist inserts the tube down the throat and into the stomach or upper bowel area to collect tissue samples using a repetitive, stabbing motion. Patches of cells and tissue fragments collect in the needle channel.

The new technology, in contrast, enables removal of core tissue samples by means of an electric high-speed rotating cylinder that is more precise than the traditional needle biopsy method. The ultra-flexibility of the instrument allows it to access deep-lying tumors that would otherwise be difficult to reach.

"Because of the characteristics of certain tumors, sometimes endoscopic ultrasound procedures do not collect a good sample, and we end up needing to repeat the procedure to collect more tissue," Mendoza Ladd explained. "With this novel procedure, we were able to easily get a higher-quality core sample on the first pass of the needle, allowing us to provide extra tissue to pathologists that can be used to improve the diagnostic yield of the sample."

The higher quality samples enable doctors to make a more accurate diagnosis. This leads to more targeted treatment for patients with some of the most serious cancers, such as in the pancreas, stomach, esophagus, lymph nodes and liver.



Endoscopic ultrasound image of needle used to obtain the core tissue biopsy.



Medical team helps cancer patient make ambitious trek to Mount Everest

As a symbol of gratitude, he carried a UC Davis Health flag on his adventure

At first, bladder cancer patient Ruben E. Muñoz was given a resounding “no!” by his doctors at UC Davis Comprehensive Cancer Center when he told them about his plans to trek to Mount Everest.

The retired computer engineer from Elk Grove had always dreamed of visiting Mount Everest, located in the Himalaya mountain range between Nepal and Tibet. Rising 29,000 feet into the atmosphere, it is the tallest point on Earth. More than 300 people have died attempting to climb its treacherous terrain.

“I told my doctors that the trek was not to the peak, but to the base camp of Mount Everest, which rests at 18,000 feet, but that didn’t seem to change their minds,” Muñoz said. “I was in treatment for stage 4 bladder cancer, and they thought I was crazy. Family and friends expressed the same level of concern. I told everyone, ‘Then send me to a psychiatrist because I’m going!’”

When it appeared obvious that the 68-year-old Muñoz was not backing off his plans, his oncologist, Mamta Parikh, and other doctors decided that if they couldn’t stop him from trekking to Mount

Everest, they would do all they could to support him and make sure that he survived the trip.

There were some hitches along the way.

“As Mr. Muñoz had a remarkable response to clinical trial therapy initially, we kept having the conversation about when the hike might become a reality,” Parikh said. “Unfortunately, when he had to discontinue the trial treatment due to side effects, the cancer spread, again, and he had to delay the trip so he could try a second immunotherapy combination.”

Quest to Mount Everest continued

Muñoz never gave up hope that he could make the journey to Mount Everest and his positive spirit prevailed. The second immunotherapy treatment brought his bladder cancer under control. As his cancer retreated, his plans for the hike advanced. Family and friends supported him with positive thoughts and prayers, and his doctors helped prepare him for the trek.

“While he knew the risks, he felt this was his chance,” Parikh said. “To

support him as best as I could, we set up hydration appointments for him and paused treatment a few weeks before his planned trip. We also sent some steroids with him just in case he developed side effects while he was hiking.”

Cardiology resident Colin McNamara also ordered an altitude test to check his tolerance for reduced oxygen at high elevations, prescribed medication for altitude sickness and other medicine to control cholesterol levels to prevent a heart attack. UC Davis Health pediatrician and personal friend Erik Orlando Fernandez y Garcia also rallied behind Muñoz to help him get ready for the trip.

Showing gratitude with a UC Davis Health flag

Muñoz had one more request for his doctors. He wanted a UC Davis Health flag to take with him to Mount Everest. His doctors came through for him, working with the UC Davis Health marketing team to create a custom flag just for the trip.

“I am so grateful for the care I’ve received. The trip to Mount Everest would never have happened if not for

my medical team, and I wanted to make sure a part of UC Davis Health came with me,” Muñoz explained.

Most of the time, he draped the flag across his shoulders and back as he hiked. Sometimes, though, the flag took center stage in group photos with sherpas (Tibetan mountain guides) and other hikers Muñoz met along the way. The flag also found its way onto giant boulders and became part of the foreground in many views of Mount Everest’s stunning snow-capped peak.

“When Mr. Muñoz sent us the picture of the UC Davis flag at Everest Base Camp, it was truly moving,” Parikh said.

Not only did Muñoz complete the trip, but he felt immense joy during the adventure and physically felt wonderful.

“It was an awesome experience,” he said. “My body handled the change of altitude in an amazing way and I was able to enjoy the trek from beginning to end.”

A hardy soul with a passion for taking on big dreams

“Personally, I always believe we need to continue enjoying our lives even with the adversity of life-changing experiences like cancer,” Muñoz said.

He is not one to shy away from challenges or ignore his ambitions. Always athletic, by the time he was in his teens he was a track and soccer star in his native country of Peru. He wanted to explore beyond his hometown of Lima and decided to follow his dreams of life in the United States, emigrating when he was 23.

“I wanted to leave Peru to complete my college education, participate in college sports and get reunited with my family,” he explained. “My parents, Christian ministers, were already living in this country. I thank them for teaching me the power of prayer and [about] having faith in God.”

Muñoz enrolled in California State University, Sacramento, pursuing the

burgeoning field of computer science in the late ’80s. He took on another challenge 20 years later. California was opening the first competitive market for electricity in the country, based on an electronic marketplace that traded energy. Muñoz became one of the architects of the early computer infrastructure of the California Independent System Operator (Cal ISO), which maintains reliability for most of the statewide power grid.

“Stress is something that came with the job,” Muñoz said. “One way to relieve the stress was to form a hiking group with friends at the Cal ISO.”

It was the Fight or Flight hiking group, made up of eight friends (two women and six men) who put together the trek to Mount Everest base camp.

“We called it ‘Team Fight or Flight Road Trip to Everest’ because when I was diagnosed with bladder cancer in 2019 hiking became harder. We trained on Auburn and Tahoe trails, and I’d feel sick for the first 15 minutes of the hike, and then shift into what I called, ‘Fight or Flight’ and feel great,” Muñoz said.

Two years after his diagnosis, Muñoz retired from the Cal ISO but continued to hike with his former colleagues — and get ready for the experience of a lifetime: the Mount Everest hike, which took place in October 2023.

An unequalled experience

Generally, hiking to the first base camp at the foot of Mount Everest requires sound physical and mental fitness due to its high altitude, steep trails and harsh weather conditions. Even the most fit individuals are urged to boost their stamina before the trip.

Each day on the climb brought new challenges and scenery. And each day brought Muñoz new joys and an understanding of how people lived in the surrounding environment. Muñoz said keys to success on the trip included

good nighttime rest, adequate hydration, pacing yourself well and doing what the group’s guide called “walking the mountain.”

Muñoz explained, “That means to make the same effort on every step, going uphill, downhill or on flat surface, just like the natives do.”

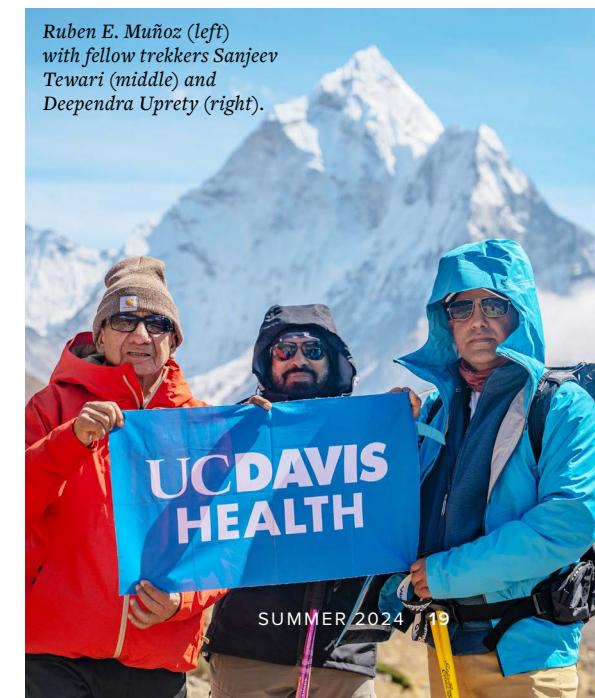
Camaraderie among hikers meeting on the trail also was important. Muñoz said the sense of a shared goal, among everyone in the quest together, allowed people to connect with each other on a much deeper level than people who might meet elsewhere or under different circumstances.

Returning home

“At the end of the day, we are here to serve our patients and, whenever possible, help them meet goals which are meaningful to them” Parikh said. “When Mr. Muñoz returned, we were so relieved to find on his most recent scans that his cancer remains under control.”

Muñoz is continuing to hike with his Cal ISO friends, as well as to play and coach soccer.

“I believe you don’t stop living just because you have cancer,” Muñoz said. “I told my doctors I’d rather live a whole year fully, doing activities I enjoy, than live 10 years in a bed.”



Ruben E. Muñoz (left) with fellow trekkers Sanjeev Tewari (middle) and Deependra Uprety (right).

Prostate cancer therapy at UC Davis is first in region

Photo of the probe used as part of new high-intensity focused ultrasound technology.

High-intensity focused ultrasound technique is a game changer; dramatically reducing recovery time and side effects

An estimated 1 in 8 men at some point will get prostate cancer, which is the second leading cause of death in American males. Advancements in treatment have significantly improved the odds of surviving prostate cancer, but they often come with undesirable side effects such as incontinence and erectile dysfunction.

Now UC Davis Comprehensive Cancer Center is offering a leading edge, non-invasive prostate cancer procedure without a blade, an incision, a scar or any radiation. It is called high-intensity focused ultrasound (HIFU). The idea is to avoid the risks and the side effects that come with a radical prostatectomy while reducing time away from work or activities.

Sacramento man is one of the first to benefit from new treatment

Jason Stokes, 53, is younger than most men diagnosed with prostate cancer, which is typically discovered in people 65 and older. Busy with work, family and outdoor activities such as mountain biking and skiing, the idea of avoiding major surgery was appealing.

“For me, it was a no-brainer,” Stokes said. “I’d get the peace of mind that comes with treating the cancer, while avoiding the side effects of a prostatectomy and the risks of receiving radiation therapy.”



Jason Stokes is back to skiing with his daughter Alex Stokes

An estimated 80% of early-stage prostate cancer patients who undergo HIFU will not need additional treatment. The robotic platform, developed by Focal One, removes prostate tissue by focusing high-intensity ultrasound waves only on the affected area, causing localized heating that destroys the cells in the gland without damaging the healthy surrounding tissue.

“The technique is like sunlight passing through a magnifying glass. It is concentrated at one point resulting in a significant temperature increase around the targeted focal point,” said Marc Dall’Era, acting chair of the Department of Urologic Surgery.

The outpatient procedure takes less than two hours and patients can return to work and normal activities within a week. Conventional surgery to remove the entire prostate typically requires an overnight stay in the hospital and a recovery of six weeks or more.

Stokes underwent the procedure on a Friday and said he could have gone back to work the following Monday, although he had already planned to take two additional days off for recovery.

“I was mountain biking within a week of the procedure and skiing with my family a week after that,” he added.

Stokes was fortunate that his cancer was caught early, which made him a good candidate for the HIFU procedure. It was discovered by his primary care physician who noticed

a lump during a routine digital exam. Even though a blood test indicated his prostate-specific antigen (PSA) levels were not alarmingly high, a biopsy showed an early prostate cancer that was also visible on MRI.

“I kept thinking to myself, ‘Why can’t they just beam it out?’” Stokes said. “When Dr. Dall’Era explained the HIFU technique I thought, ‘This is the closest we’re going to get to that.’”

Procedure is less invasive, less risky and less expensive

Stokes will need to undergo PSA blood testing at three, six, and 12 months as well as an MRI scan. Additionally, a biopsy may be performed at one year to assess the full outcome of the procedure.

“We are excited to be the first in the region to offer this unique prostate cancer treatment,” Dall’Era said. “Men like Jason can go on with their lives and not play the waiting game as they put off a radical prostatectomy. Essentially, HIFU is less invasive, less risky and, ultimately, less expensive than conventional surgery. Most importantly, it preserves quality of life.”

Stokes wants other men with early-stage prostate cancer to talk to their doctor about treatment options.

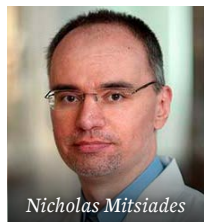
“I’m lucky UC Davis Health recognized me as a person and not just as a patient,” Stokes said. “Everyone from the doctors to the nurses and the administrative staff are so great. They were supportive of my lifestyle and goals, helping me weigh the alternatives and even helping to navigate insurance to make it all happen.”





Cancer blood tests jump-start diagnoses and targeted therapy

New research led by cancer center Chief Translational Officer Nicholas Mitsiades shows that blood tests used to hunt for cancer DNA may help detect cancers faster and guide the use of targeted therapies.



Nicholas Mitsiades

The results of the study were published in NPJ Precision Oncology. The international, peer-reviewed journal focuses on targeted cancer care based on the genetics of individual patients.

Mitsiades and his research team from several cancer centers across the country made a potentially life-saving discovery. While monitoring a patient for prostate cancer DNA after treat-

ment, the researchers identified genetic material coming not from prostate cancer, but from a type of cancer that starts in or near the urinary bladder. Their analysis showed that DNA from the cancer could be detected in the blood at least 18 months before clinical diagnosis becomes possible using conventional screening such as computed tomography (CT).

After Mitsiades' team discovered the asymptomatic urothelial cancer, they used data from the blood sample

to develop a targeted treatment plan based on the newly detected cancer's specific gene mutations.

DNA sequencing in blood provides a fast, less-invasive method for cancer detection

DNA from some cancers may circulate in a patient's blood and can be extracted from a simple blood sample. Scientists can genetically sequence the DNA — determining the order of the building blocks of genetic instructions — and

characterize the cancer based on what's found in the blood sample.

"We want to collect information about a patient's cancer in the least invasive way possible," Mitsiades said. "The more we can learn about a patient's cancer, the more we can treat it with safer and hopefully more effective drugs by targeting mutations that show up in the DNA sequencing."

Sequencing of tumor DNA circulating in the blood is a remarkable technological advancement. While a tissue biopsy is needed for a tumor's initial diagnosis, repeated collection of samples of tumor tissue is painful and inconvenient. By sequencing tumor DNA from blood samples, a patient's tumor can be monitored with little discomfort. It also can reveal mutations that suggest a partic-

ular treatment path. "Driver mutations" that spur the growth of cancer can be found in blood samples and indicate an aggressive cancer long before it can be detected on other types of tests.

The patient in the study already had been treated for prostate cancer with radiation and androgen deprivation therapy and was taking part in a long-term study to track potential cancer recurrence. The research team took blood samples at regular intervals and analyzed them for cancer DNA fragments that would indicate his prostate cancer had returned.

Using circulating tumor DNA analysis to improve patient treatment

"It appears that by sequencing DNA circulating in the blood, we can see

evidence of cancer growth months or years before it shows up in CT scans," Mitsiades said. "Now we need clinical trials that will examine whether, by acting upon DNA information from a patient's blood, we can help them live longer."

For years, the gold standard of care for cancer treatment has been to treat patients after tumors showed visible signs of growth on scans.

Mitsiades and his colleagues believe that precision oncology tools like circulating tumor DNA sequencing create opportunities to respond to cancer earlier. These tools could help by identifying malignancies that have acquired mutations causing resistance to current therapy. Physicians then could quickly apply alternative, targeted therapies.

At UC Davis Comprehensive Cancer Center, genetic tests already are offered regularly to patients who also have the option to participate in precision oncology research at the cancer center.

"It appears that by sequencing DNA circulating in the blood, we can see evidence of cancer growth months or years before it shows up in CT scans."

—NICHOLAS MITSIADES, CHIEF TRANSLATIONAL OFFICER



ACKNOWLEDGMENTS

Research study coauthors from Baylor College of Medicine and Ben Taub General Hospital include Quillan Huang, Heidi Dowst, Neda Zarrin-Khameh, Attiya Batool Noor, Patricia Castro, Michael E. Scheurer, Guilherme Godoy and Marta P. Mims. Coauthor Irene Mitsiades is affiliated with Harvard Medical School and Boston University.

Access to life-saving biomarker testing becomes a reality

The University of California helped enact a critically important new state law taking effect this summer. It ensures cancer patients get access to biomarker testing to ensure they are receiving the best treatment.

Biomarkers are genes, proteins and other substances that can help pinpoint the molecular drivers of cancerous tumors. Biomarker testing has become an essential part of “personalized medicine,” which tailors treatment depending on the biological makeup of tumors.

“Knowing the biology of cancer is essential to identifying the most effective treatments,” UC Davis Comprehensive Cancer Center Director Primo “Lucky” Lara Jr. said. “Biomarkers can help doctors better see what makes certain cancers tick,

allowing for a more personalized approach to diagnosing and treating the disease.”

Until this year, a lack of insurance coverage has often blocked patients from accessing biomarker testing. Authored by California State Senator Monique Limón, the new law prevents that by mandating Medi-Cal and private health plan insurers to cover medically necessary biomarker testing as of July 1.

The University of California joined the American Cancer Society Cancer Action Network to co-sponsor Senate Bill (SB) 496 in 2023. The University of California Cancer Consortium provided expert insights during the bill making process. Following the Legislature’s passage of the bill in October, Gov. Gavin Newsom signed it into law.

“Everyone should have equitable access to these life-saving tests regardless of their insurance provider. That’s why SB 496

Genetic examples: Harmful BRCA1 and BRCA2

Approximately 5–10% of cancers are associated with an inherited gene mutation, but some types of cancers carry even higher risks. For example, women who have the BRCA1 or BRCA2 mutations are more likely than women without the genetic variants to develop breast or ovarian cancer, according to the National Cancer Institute:

Breast cancer: About 13% of women in the general population will contract breast cancer sometime in their lifetime. By contrast, 55–72% of women who inherit the BRCA1 variant and 45–69% of women who inherit BRCA2 variant will develop breast cancer.

Ovarian cancer: About 1% of women in the general population will develop ovarian cancer sometime during their lifetime. By contrast, 39–44% of women who inherit BRCA1 and 11–17% of women who inherit BRCA2 will develop ovarian cancer.

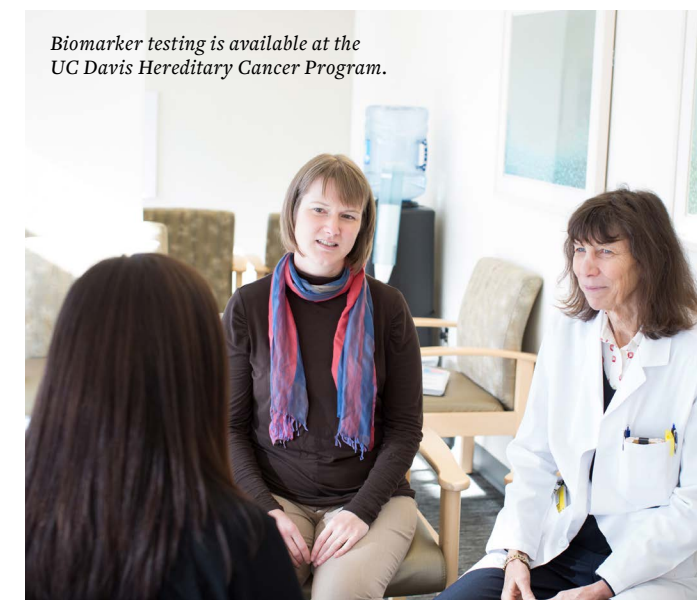
Other cancers, such as prostate, pancreatic and colorectal cancers, also are linked to BRCA1 and BRCA2 gene mutations.

is a win for all Californians with cancer,” Lara said.

Not all cancer cells are alike. The American Cancer Society said that even people with the same type of cancer can have different gene changes or different levels of certain proteins that can help the cancer cells grow. Biomarker testing can be helpful because these changes might also affect how well the cancer responds to certain types of treatment, such as targeted drug therapy and immunotherapy.

Checking a person’s tumor cells for these changes helps ensure that patients receive the right treatment at the right time. Targeted therapies can be less toxic than standard chemotherapy while being more effective.

“Improving access to biomarker testing can not only achieve better outcomes, improve quality of life and reduce costs but it is also key to reducing health disparities,” Lara said.



Biomarker testing is available at the UC Davis Hereditary Cancer Program.

“Everyone should have equitable access to these life-saving tests regardless of their insurance provider. That’s why SB 496 is a win for all Californians with cancer.”

—PRIMO “LUCKY” LARA JR.,
DIRECTOR, UC DAVIS COMPREHENSIVE CANCER CENTER

UC Davis Hereditary Cancer Program

Genetic testing can help determine whether a mutation is the underlying cause of a patient’s cancer and whether they have a higher risk of developing additional cancers. Testing, through blood or saliva sampling, also helps inform family members of cancer patients about their potential risk of getting cancer due to an inherited predisposition to cancer.

“If two or more of your relatives on the same side of the family have been diagnosed with breast, ovarian, uterine or colorectal cancer, it is wise to talk to a genetic counselor,” said Jeanna Wellborn, director of the Hereditary Cancer Program at the cancer center.

Wellborn and her team of licensed and certified genetic counselors and physicians provide cancer genetics services. These include cancer risk assessment, pre-test counseling, genetic testing, post-test counseling and personalized recommendations for cancer screening and risk reduction by practicing healthy habits.

“At some point, testing for an inherited predisposition to cancer may become routine,” Wellborn said, although she stresses that patients should be comfortable with knowing the information.

“Many people who inherit a gene variant will never get cancer, so it is important that people don’t panic or live in fear,” Wellborn said. “What’s key is knowing you may have a higher risk of certain types of cancer, which could help catch cancer earlier or prevent it altogether.”

Find out more about the Hereditary Cancer Program: **800 770-9261.**

Breast CT scanner invented at UC Davis is moving toward commercialization

Mammography and its cousin technology digital tomosynthesis have saved countless lives by helping diagnose breast cancer when it is treatable. Magnetic Resonance Imaging (MRI) is also used at UC Davis Health for breast imaging, often in women who are at high risk of breast cancer. Now, a third option is emerging as a promising diagnostic technology: Breast computed tomography (CT).

Breast CT is more comfortable for women. During a mammogram breasts are compressed, which can be painful. With the breast CT system, women lie on their stomachs on a table containing holes through which breasts drop into a pendant position for scanning.

The fully three-dimensional, high-resolution breast CT scanner could revolutionize breast cancer detection because research shows it may be able to catch breast cancer in its earliest stages.

What makes it different is its ability to detect mass lesions, with adequate detection of microcalcifications, or small calcium deposits, as well. Both mass lesions and microcalcifications can be indicators of potential early-stage breast cancer.

UC Davis researchers recently studied the ability of breast CT to detect these small calcium deposits. They used a computer simulation to embed likenesses of microcalcifications of different sizes and locations

into breast CT images, then used artificial intelligence to track them. The results were published in the journal *Medical Physics*.

“Breast CT is a promising tool for the early detection of breast cancer,” said Shadi Aminololama-Shakeri with the UC Davis Department of Radiology breast imaging program. “Visualization of microcalcifications, which may be the size of grains of sand and smaller, have posed a challenge since the development of the early breast CT

prototypes. We are continuing to see improvement with the scanner so we can confidently use it in the clinical realm with the goal of early detection for optimal treatment of breast cancer.”

A Canadian public company, Izotropic Corp., was formed to manufacture the UC Davis-based design of the breast CT scanner on a larger scale. The company has licensed several UC Davis-owned patents.

While the design of the commercial scanner differs from the model created at UC Davis, the experience of UC Davis researchers helped shape the new scanner.

“As an example of the type of academic and industry partnerships we are trying to grow here at the cancer center, we are getting closer to celebrating the commercialization of the breast CT scanner that was invented here at the Boone Lab,” UC Davis Comprehensive Cancer Center Director Primo “Lucky” Lara Jr. said.

In 2004, John Boone and his team were the first in the world to perform a cone beam breast CT examination on a patient. The latest generation of the CT scanner designed and tested at UC Davis achieved nearly four times the spatial resolution of the earlier scanners.

“The fourth UC Davis scanner, called the Doheny, is more advanced than earlier systems that we developed,” said Boone, a distinguished professor in the UC Davis Department of



Radiology and the Department of Biomedical Engineering. “This is due to the combination of a pulsed X-ray source, a smaller focal spot, a higher resolution flat-panel detector, and more advanced CT reconstruction algorithms.”

The Doheny has now evolved into the IzoView, which is in the final stages of completion at the new Izotropic manufacturing facility established in Sacramento. The company hopes to engage in U.S. Food and Drug Administration (FDA) trials in the next year. Boone and Aminololama-Shakeri have a financial interest in Izotropic, for which Boone is a director.

“We’re very excited about the prospect of this economic development project and look forward to following its progress,” Lara said.

UC Davis breast CT clinical trials

UC Davis has conducted phase II clinical trials with the Doheny scanner to compare its performance with mammography, breast tomosynthesis and MRI. More than 600 patients have participated by undergoing breast CT scans. Researchers are evaluating the results of those clinical trials.

The breast CT program at UC Davis was funded by the National Institutes of Health and other research organizations and has attracted over \$20 million in external research funding.

“With dozens of graduate students, colleague radiologists in the breast imaging center and staff researchers, we have improved the design of the UC Davis breast CT systems over the past 25 years, with a commensurate improvement in imaging performance,” Boone said. “The Izotropic breast CT system [IzoView] is the culmination of the UC Davis efforts and is designed to be a cost-effective clinical tool.”

Boone added that he expects the scanner to improve the lives of innumerable breast cancer patients after Izotropic achieves FDA clearance for the system.



Mom's 'gut feeling' leads to cancer diagnosis

When Dianna Cooley's daughter, 3-year-old Peyton, began having recurring low-grade fevers in July 2019, they made multiple trips to an urgent care clinic near their home in Roseville. Cooley was told her daughter had an infection and was sent home with antibiotics.



Peyton and her mom Dianna Cooley

"I kept giving her the medicine, but the fevers were not going away," Cooley said. "I began noticing bruises on her legs and she looked really pale. My mom 'gut feeling' told me something was really wrong."

They visited the clinic again and insisted on a blood test this time. When the results came back, the physician at the clinic told Cooley to take Peyton to the local hospital emergency department immediately.

"The tests showed Peyton had extremely elevated white blood cells," Cooley recalled. "The next thing I knew we were transferred to UC Davis."

A frightening diagnosis, a trusted provider

A UC Davis Children's Hospital physician promptly diagnosed her condition: acute lymphoblastic leukemia (ALL), a type of cancer that causes the bone marrow to produce too many lymphocytes (a type of white blood cell).

"As a parent, you're freaking out," Cooley said. "But I knew about UC Davis' amazing reputation, so I was very grateful we were there."

"Regardless of how rigorous her journey was, Peyton was always a little ray of sunshine. Her big and vibrant personality filled the infusion room every time she walked in."

—MACKENZI LEE, UC DAVIS CHILD LIFE SPECIALIST



Peyton Cooley and UC Davis facility dog Huggie.



Peyton kisses her special American Girl doll who also lost her hair.

After two weeks in the hospital, Peyton was able to continue her treatment as an outpatient of UC Davis Comprehensive Cancer Center.

"Regardless of how rigorous her journey was, Peyton was always a little ray of sunshine," child life specialist Mackenzi Lee said. "Her big and vibrant personality filled the infusion room every time she walked in."

Thanks to expert and compassionate care, Peyton was soon back to her rambunctious self, even during two and a half years of arduous treatments.

Confidence abounds

Peyton has now been cancer-free for more than two years and is in second grade. She is a bundle of joy who is not shy about telling people about her treatment.

"She likes people to know that she had cancer," Cooley said. "Peyton speaks for herself."

Cooley takes cues from her daughter and doesn't hesitate to share her experience as well.

"I love how my daughter was treated," Cooley said. "Peyton did wonderfully and I could not be happier or more confident in the level of care at UC Davis."

Rates of lung, liver and other cancers high among Californians living in poverty

A new report from UC Davis Comprehensive Cancer Center has uncovered significant disparities in cancer incidence among people in persistent poverty areas of California. Lung, liver, stomach and cervical cancers are significantly more prevalent within poverty areas than among California's population at large. Cancer diagnosis is also more likely to be delayed in these areas.

The report, titled "The Burden of Cancer in Persistent Poverty Areas of California," is designed to help guide policymakers, clinicians and researchers as they develop strategies to support low-income Californians.

The report, which uses data from the California Cancer Registry, was prepared by the California Cancer Reporting and Epidemiologic Surveillance (CalCARES) program team. CalCARES, based at UC Davis Comprehensive Cancer Center, manages the day-to-day operations of the registry for the California Department of Public Health.

"Our main purpose was to understand cancer incidence patterns among Californians in persistent poverty areas, given that they face numerous challenges in addition to their cancer

diagnoses," said Ani Movsisyan Vernon, lead author and researcher with the CalCARES team.

Linking poverty to cancer disparities
U.S. counties experiencing persistent poverty — 20% or greater poverty rates over an extended period of time — are more likely to be rural and to have larger proportions of racial and ethnic minorities. People living in those areas are more likely to be exposed to environmental and occupational carcinogens and to have poor access to reliable transportation and health care, among other stressors.

While links between poverty and worse cancer outcomes are known, Movsisyan Vernon and coauthors wanted to determine the relationship between persistent poverty in California and cancer incidence. Are people in persistent poverty areas at higher risk of certain cancers? Are they diagnosed at later stages?

The combined burdens of cancer and poverty

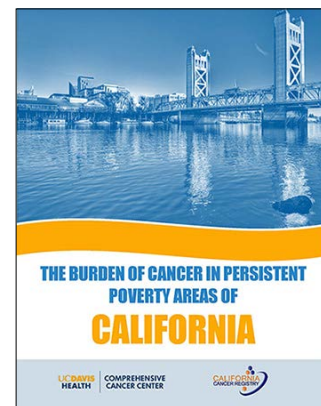
To answer their questions, researchers used California Cancer Registry data from 2006 to 2020 and annual census

tract population estimates from the National Cancer Institute.

They found that proportions of Latino and Black patients are larger in persistent poverty areas, and that most patients in poverty are uninsured or have public health insurance.

Importantly, higher incidence rates of late-stage lung, colorectal and cervical cancers, which are all screen-detectable, were observed in persistent poverty areas. This lag in timely diagnoses can result in treatment delays and worse cancer outcomes.

The other authors of the study are Frances B. Maguire, Ayman T. Ullah, Brenda M. Hofer, Arti Parikh-Patel, Theresa H. M. Keegan and Theodore Wun, all of UC Davis.



Foods that fight cancer

Pilot project studies whether educational outreach at food pantries can spread the word about foods that reduce cancer risk

Food banks and food pantries are often the last line of defense against food insecurity. According to the U.S. Department of Agriculture, nearly 13% of Americans faced food insecurity at some point in 2022. Hunger isn't the only issue. Food must be nutritious to be beneficial. Lack of nutrients can lead to numerous chronic illnesses including cancer.

About one in three people will be diagnosed with cancer in their lifetime, but people living in underserved communities face an even higher cancer burden. Access to healthy food in these areas is often limited and, when it is available, is expensive or unappealing.

"Regularly eating a variety of fruits, vegetables, whole grains, beans and other plant-based foods can lower the risk of cancer," said Cassandra J. Nguyen, assistant professor in the UC Davis Department of Nutrition. "We need to spread the word about foods that fight cancer, especially with people facing a higher cancer risk, so they know that what you eat can impact your chances of getting cancer."

Nguyen is co-leading a new pilot study with UC Davis nutrition researcher Gerardo Mackenzie. They are evaluating the best way to provide nutrition education to clients who use charitable food banks. The one-year project is being funded by a UC Davis Comprehensive Cancer Center grant. It is being conducted in partnership with the Sacramento Food Bank and Family Services.

"Good nutrition is so important because we estimate that 30% to 40% of cancers may be preventable with better diet," Mackenzie said. "This study is a small step that could lead to a bigger study that can help us further understand the impact food has on cancer risk."

Educational materials in several languages have been developed and distributed to clients at the food bank in the hope of gaining valuable insights on the best way to encourage healthy eating.

"The objective of the pilot project is to develop intervention materials based on the American Institute for Cancer Research's 26 Foods that Fight Cancer program. We also want to evaluate the effectiveness of materials designed to engage clients and educate them about foods that lower cancer risks," said Nguyen.

Key Foods that Fight Cancer™

APPLES

Linked with lower levels of some breast cancers and may decrease lung, bladder and digestive tract cancers.

What's in apples:

- Dietary fiber
- Antioxidants
- Immunity boosters

BEANS, PEAS, LENTILS

Known as pulses, the edible seed from a legume plant. May decrease colorectal cancer and obesity.

What's in pulses:

- Dietary fiber
- Antioxidants
- Folate for healthy cell growth

ORANGES

May decrease lung, bladder and digestive tract cancers including disease in the colorectal tract and the upper part of the stomach.

What's in oranges:

- Dietary fiber
- Antioxidants like vitamin C
- Anti-inflammatory compounds

CARROTS

May decrease types of breast, lung, bladder and digestive tract cancers.

What's in carrots:

- Antioxidants like vitamin A
- Anti-diabetic, obesity and inflammatory compounds



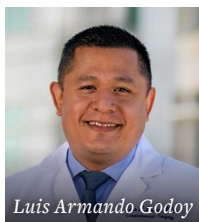
Once a farmworker, UC Davis surgeon recognized nationally for commitment to diversity in medicine



Luis Godoy was a young father when he graduated from high school in 1997 (left). His wife, Rita, and two kids celebrated his graduation from UC Davis in 2008 (right).

UC Davis Health thoracic surgeon Luis Armando Godoy's path to medicine has been filled with adversities. An immigrant from a small Mexican village, he went from being a farmworker picking stone fruit alongside his parents to working as an assistant professor at the UC Davis School of Medicine. His experiences along the way, including becoming a father while in high school, helped to shape his desire to fight inequities and promote diversity in medicine.

In recognition of his outstanding efforts to support students from underserved backgrounds, Godoy has been awarded the Association of American Medical Colleges (AAMC) Herbert W. Nickens Faculty Fellowship. The award recognizes leadership in fighting inequities in medical practice and education.



Luis Armando Godoy

Inspiring journey from farmland to operating theater

Godoy was born in Tacátzcuaro, Michoacán, a small village in rural central Mexico. His family migrated to California when he was 5 years old. In Northern California, he worked with his parents on farms in Suisun Valley, picking peaches and nectarines. He had to drop out of high school temporarily to avoid gangs and bullying.

"Ashamed of being a farmworker, afraid of being bullied and teased, I fell into one of the most prevalent social scripts that affects my community. I foolishly joined a gang. They were respected and feared, they were accepting and

welcoming, and made me feel like I belonged," Godoy said about that time in his life.

He became a father while he was a senior in high school. His new responsibilities motivated him to work harder and finish school. Despite working three jobs — as a construction worker, cook and car mechanic — he managed to graduate from high school on time.

After high school he worked as a medical assistant. Because he was bilingual, one of his duties was to interpret for Spanish-speaking patients. By communicating with them in their native language, he was able to address their needs, concerns and fears.

He described his experience as a medical assistant: "It lit a fire within me to pursue a career in medicine. It showed me the importance of the doctor's hands and heart in treating patients." Godoy decided to pursue his dream of becoming a physician. He enrolled at Solano Community College, then in 2006 transferred to UC Davis, where he completed his undergraduate education and a post-baccalaureate program. In 2012, he was accepted into the UC Davis School of Medicine, where he also finished his residency in cardiothoracic surgery. As a medical student, he was recognized with multiple awards and honors. In 2013, the UC Davis School of Medicine inducted him into the Gold Humanism Honor Society for his excellence in clinical care, leadership and service to his community. He went on to receive the Outstanding Medical Student in Surgery Award and Dr. Gabriel Smilkstein Humanitarian Award. As a resident, Godoy was inducted into the Alpha Omega Alpha medical honor society.

Godoy is now an assistant professor of thoracic surgery and the diversity and inclusion director in the Department of Surgery. He is also the assistant director of the cancer center's IDEAL (Inclusivity, Diversity, Equity and Accessibility) Program, helping to diversify the oncology workforce.

"I knew from the first moment that I walked into the operating room that this is where I was meant to be. All my life's experiences of working with my hands, repairing and restoring the broken had led me to that point," Godoy said.

'White Ribbon Relay' makes stopover at cancer center on a cross-country journey to reduce the stigma of the nation's most lethal cancer



An international movement to raise awareness about lung cancer came to UC Davis Comprehensive Cancer Center as part of a first-ever cross-country "White Ribbon Relay" organized by college students participating in the American Lung Cancer Screening Initiative (ALCSI). The initiative is dedicated to changing the perception of lung cancer, which often carries a stigma due to its link to tobacco use.

College campuses affiliated with ALCSI chapters collaborated with the White Ribbon Project, a grassroots effort in which participants create two-foot-tall white ribbons made from wood that symbolize lung cancer — the No. 1 cause of cancer death in the U.S.

The students simulated a relay during the winter months by sending the oversized white ribbons, one from the West Coast and one from the East Coast, to fellow participants in communities across the U.S., including Sacramento.

The ALCSI chapter at UC Davis received the West Coast white ribbon in late December and presented it to David Tom Cooke, the center's interim physician-in-chief and chief of UC Davis Health's Division of General Thoracic Surgery.

Cooke took possession of the ribbon from two of the chapter members, posed for a photo, then handed the ribbon back to the students who sent the ribbon to its next destination in the relay — the University of Washington.

"It doesn't matter who you are or where you are from, lung cancer is a killer and, while we are making great strides, we need more attention and more research funding to cure more people with this disease," Cooke said. "I applaud these students, their enthusiasm and dedication, and the creative way they are using the White Ribbon Relay to spread awareness about lung cancer."

The UC Davis ALCSI chapter was started in 2022 by four undergraduate students: Dorian Le, Sara Mukai, Anjolie Doan and Mindy Tieu. Their work is being overseen by Cooke and Jeffrey Yang, a thoracic surgeon at Massachusetts General Hospital in Boston and an assistant professor of surgery at Harvard Medical School.

The final destination for the ribbons moving inland from both coasts was the home of White Ribbon Project founders Pierre and Heidi Onda, in Denver.

UC Davis Comprehensive Cancer Center has numerous lung cancer clinical trials that benefit diverse communities. It also recently launched a dedicated Lung Cancer Integrated Service Line offering innovative screening and care navigation.



Cancer center Interim Physician-in-Chief David Cooke (center) accepts white ribbon from students Mindy Tieu (left) and Anjolie Doan (right) during cross-country relay.

Sunday on the Green fundraiser tees off to raise money for blood cancer research

Annual golf tournament on par to reach 10-year goal of \$500,000 to support UC Davis Comprehensive Cancer Center



Joe Tuscano (middle) with the founders of Sunday on the Green, Nicki and Loel Heupel.

Golfers and non-golfers alike teamed up to raise money for blood cancer research at UC Davis Comprehensive Cancer Center. The 10th annual Sunday on the Green benefit event in May at Ancil Hoffman Golf Course hit a major milestone. With monies raised this year, the Carmichael-based organizer of the event, the non-profit Better Life Foundation, reached its goal of generating half a million dollars for blood cancer research.

The 18-hole golf tournament provided friendly competition and fun on-course activities. More than 110 golfers registered for the event, which was sponsored by the Better Life Foundation and this year's title sponsor, California Statewide Certified Development Corporation. Afterward, many non-golfers joined the golfers at the Afternoon Patio Party.

The event raised money not only from participating single and foursome golfers, but also from sponsorships, raffles and

an auction. Proceeds from the event fund research being conducted by Joseph Tuscano, director of the cancer center's Stem Cell and Bone Marrow Transplantation program.

Tuscano and his team hunt for novel and non-toxic therapies to treat lymphoma, leukemia and other cancers, including multiple myeloma, lung and colorectal cancers.

Sunday on the Green was started in 2014 by Loel Heupel and his wife Nicki as a platform to raise funds for blood cancer research. Loel was diagnosed with non-Hodgkin lymphoma in January 2006 and then Waldenstrom's macroglobulinemia in 2011.

"Loel and Nicki Heupel are passionate believers in pursuing research into non-toxic therapies for blood cancers," Tuscano said. "They are some of the most generous and giving people I have ever met. I salute them for all they are doing to help others with cancer and find a cure."

In 2012, Loel underwent a successful stem cell transplant performed by Tuscano and his team. Within months of the advanced treatment transplant, Loel was back golfing, cycling and skiing and feeling grateful for the care he received at the cancer center.

"During the course of my cancer treatment, I was the beneficiary of the dedication, compassion, and selfless service of Dr. Tuscano," Loel said. "Creating a nonprofit, fundraising foundation to support his team's blood cancer research was a way to show gratitude for the positive impact he has had on so many patients' lives."

Meet the Sunday on the Green honoree for 2024

Sunday on the Green annually honors a patient who has benefited from blood cancer research. This year, the recipient was Vietnam War veteran Robert Mochel of West Sacramento.

"I'm not used to being in the spotlight," said Mochel, who was nicknamed "Mojo" during his two-year tour of duty in Vietnam. "I tell you what, though, Dr. Tuscano is fantastic and I'm pleased to help bring attention to his research. I feel a bond with him that I've never felt with any other doctor."

Mochel was diagnosed in 2020 with myelodysplastic syndrome, a blood cancer that some researchers suspect may be linked to exposure to the toxic defoliant Agent Orange. During the 1970s, he was stationed with the U.S. Army in the Vietnamese province of Tây Ninh. Mochel served as a gunner in a Bell UH-1 "Huey" helicopter that routinely dropped the defoliant. That meant he was in close contact with the chemical herbicide and later became aware of the cancer risks it posed.

A routine blood test before Mochel underwent knee surgery at Sacramento VA Medical Center in 2019 showed abnormalities, and Mochel was later referred to a hematologist. UC Davis Health partners with the Sacramento VA Medical Center to provide care. That's where Mochel met Tuscano, who oversaw his first stem cell transplant to treat his condition in 2022.

"Unfortunately, soon after the first stem cell transplant, I came down with COVID and then RSV," Mochel said. "My

health spiraled downward. Fortunately, Dr. Tuscano lined up a second stem cell donor who was an even better match, and this last transplant went great."

After Mochel's second transplant in August 2023, he felt so good that he played for a third time in this year's Sunday on the Green tournament.

"Raising money for blood cancer research is so important and this is such a fun event. I've managed to play every year since my first stem cell transplant," Mochel said. "I hope Sunday on the Green gets bigger every year."

Donors are welcome to provide ongoing support to the cause by visiting the Better Life Foundation website to make a contribution.



Robert Mochel was the patient honoree at this year's Sunday on the Green.

Sense of duty inspired one non-Hodgkin lymphoma patient to give back



Nancy and Mat Wroblewski were married for 57 years.

Patient's widow continues to fulfill his wishes to help fund Joe Tuscano's quest for a cure

From the 1950s through the 1980s, people living or working at Camp Lejeune, a U.S. Marine Corps base in North Carolina, were potentially exposed to contaminated drinking water. The U.S. Department of Veterans Affairs has acknowledged that industrial solvents from dry-cleaning waste and leaking underground fuel storage tanks were detected in the water on the base.

The contaminated water at Camp Lejeune has been linked to eight types of cancers, including non-Hodgkin lymphoma. Retired Marine Corporal Mat Wroblewski was diagnosed with the blood cancer in 2003. He had been based at Camp Lejeune in the late 1950s.

His widow, Nancy Wroblewski, said her husband wanted no part of suing the Marines or seeking benefits from the Camp Lejeune Families Act of 2012.

He simply wanted to get well, and he did just that after seeking treatment from Joseph Tuscano at UC Davis Comprehensive Cancer Center.

The treatment that Mat completed in 2004 kept his lymphoma in remission for 14 years. During that time, Mat retired, and his sons took over his company, Precision Contacts, Inc. (PCI) of El Dorado Hills, a manufacturer of semiconductor products.

Nancy said that in retirement her husband enjoyed playing pool and volunteering with El Dorado County's Sheriff's Team of Active Retirees, known as S.T.A.R. The trained volunteers enhance vital crime prevention services and community awareness.

Mat's lymphoma eventually re-emerged, however, confirmed by testing in October 2018. He immediately underwent radiation therapy. Their hope for remission was dashed in May 2019 with the discovery that the cancer had spread to his brain. Mat passed away just two weeks later.

"I've seen and heard more complaints from people with a cold than I ever experienced or heard from Mat during any of his bouts with lymphoma," Nancy said. "I hope Dr. Tuscano can experience many successes making others' lives cured or at least comfortable — until the cure."

Always the team player

"Mat has always been a determined person," Nancy said. "Whether it was

in the Marines or volunteering, when he joined a group, he was 'all in' 100%."

As part of a large community of cancer patients battling blood cancers, he was equally committed to finding a cure and he knew that funding research was key to making progress, even if he were not around to benefit from that research.

Upon his imminent death, he and Nancy decided to contribute \$125,000 to Tuscano's blood cancer research. She recently pledged another \$200,000.

"After Mat's remission, he and Nancy became dedicated to supporting our research," said Tuscano. "They both were committed to helping to reduce the impact and suffering from this malignancy by supporting groundbreaking research that utilizes the body's natural defenses and immune system to fight the cancer in a relatively nontoxic way."

Nancy also is making plans to leave a gift in her estate.

"Life has really been good to us during our 57-year marriage, and I am so grateful for the care that Mat received from Dr. Tuscano and UC Davis," Nancy said. "Mat was very proud of being a Marine, never showing any anger or regret about his time at Camp Lejeune. His treatment allowed him to live another 14 years, and most importantly, he was able to do all the activities he enjoyed and be with his family."

Nancy said her job now is to make Mat's wishes a part of the race for a cure.

Cancer care coming to Folsom and western El Dorado County

Cancer patients in Folsom and the nearby foothills region of western El Dorado County will soon have access to chemotherapy and other cancer care services close to home. The new \$171 million Folsom Medical Office Building spanning 34 acres near E. Bidwell Street at U.S. 50 is scheduled to open in 2025.

Oncology services within the three-story health care complex will include state-of-the-art individual "infusion bays." Patients receiving treatment can socialize with other patients, work from their laptops or have guests join them in private pods designed to be as comfortable as a living room.

Most of the infusion bays also have views of an outdoor healing garden featuring plants that reflect the natural biome of El Dorado County. The nature theme will continue indoors with soft purple and orange colors depicting native lupine and poppy wildflowers "blooming" on wall murals in the reception and treatment areas.

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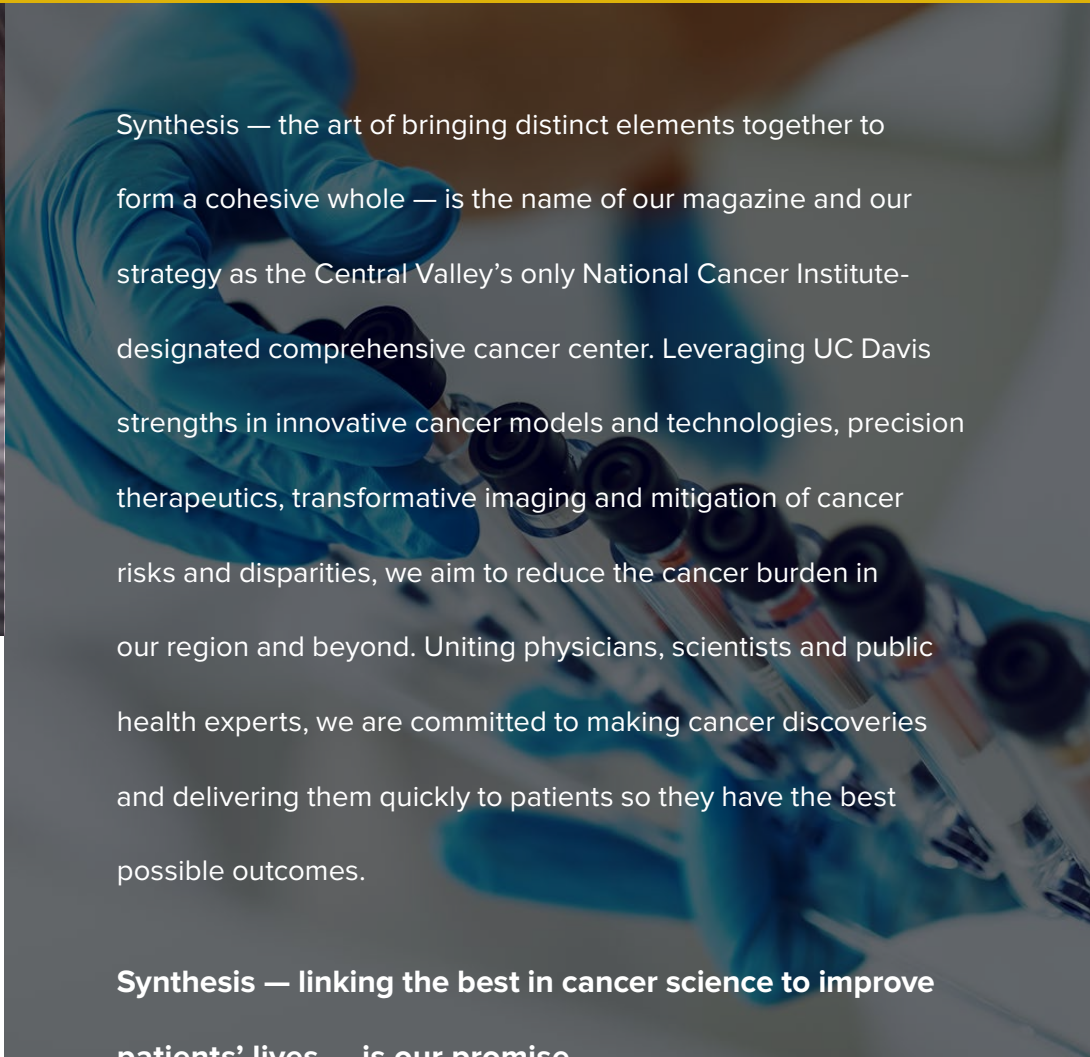
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We have **better cancer treatments** today because **people like you participated in a clinical trial.**

If you're interested in exploring new treatment options, a clinical trial may be right for you. **Ask your doctor today about clinical trials.**

Breaking Barriers to Beat Cancer



Synthesis — the art of bringing distinct elements together to form a cohesive whole — is the name of our magazine and our strategy as the Central Valley's only National Cancer Institute-designated comprehensive cancer center. Leveraging UC Davis strengths in innovative cancer models and technologies, precision therapeutics, transformative imaging and mitigation of cancer risks and disparities, we aim to reduce the cancer burden in our region and beyond. Uniting physicians, scientists and public health experts, we are committed to making cancer discoveries and delivering them quickly to patients so they have the best possible outcomes.

Synthesis — linking the best in cancer science to improve patients' lives — is our promise.