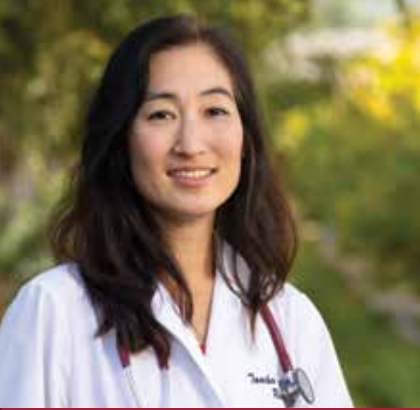
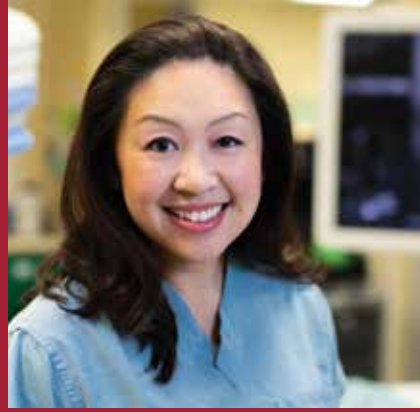




# Extending Our Reach In Diverse Ways



# 2020 ANNUAL REPORT



# Extending our Reach in Diverse Ways

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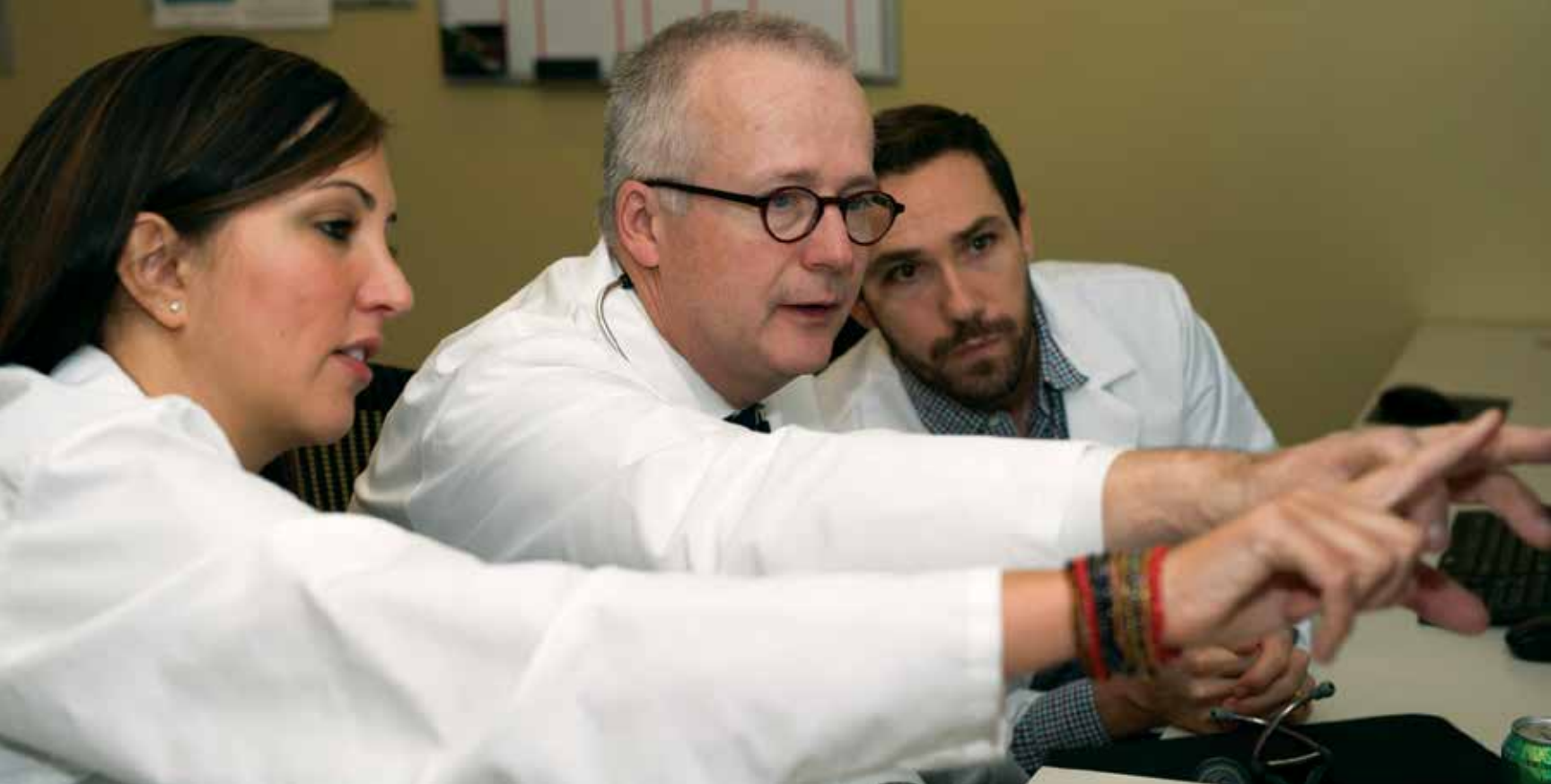
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# Our Broad Reach

Over the course of an academic year we have many opportunities to learn what our colleagues are accomplishing: rounds at the division or department level, news items on department and division websites, award ceremonies, and our annual state of the department conference, among others. Once a year, we publish our annual report which contains articles about the clinical, educational, research, and outside activities of individuals and groups throughout the department.

Every annual report has a theme. This year's report focuses on how we're extending our reach, whether through recent advances in treating a variety of diseases, or different approaches to the practice of medicine, or the diverse faces of medicine at Stanford. In these pages any one of us might find a nugget of information that could move our own research forward after a conversation with the colleagues an article describes.

Each individual article is like a pebble tossed in the water, its ripples widening over time to an unknowable extent, not unlike a lab discovery that turns into a drug development project and thereafter becomes a therapy that is successful in clinical trials until ultimately it becomes a treatment that heals patients worldwide.

Here are a few examples of how we're making an impact beyond our department: Our colleagues are transforming care for patients with sarcoidosis by treating them within a hub of all the subspecialists involved in their care so that they can see everyone they need to see on a single day. Several faculty members are applying artificial intelligence to underpin new approaches to caring for patients with pulmonary and other diseases. You can learn about the work that nocturnists do when they assume the overnight care of patients in our recently-opened hospital. With an emphasis on diversity, we are making it possible for sexual and gender minority populations here and elsewhere to receive better treatment through the creation of a database by The PRIDE Study. For women in medicine there is a new seminar series tailored for them with space devoted to connect and to share wisdom.

These and the other articles in this annual report are but a snapshot of the larger picture of what we in the Department of Medicine do every day. I hope you will spend some time here learning about the work of our colleagues and take pride in the accomplishments we all achieve through a variety of amazing talents and activities.

Sincerely,  
Robert Harrington, MD  
Chair, Department of Medicine



# Taking PRIDE in Their Work

**IN OCTOBER 2016,  
THE NATIONAL INSTITUTES OF HEALTH  
MADE A BOLD PROCLAMATION:**

*Mounting evidence indicates that sexual and gender minority (SGM) populations have less access to health care and higher burdens of certain diseases, such as depression, cancer, and HIV/AIDS. But the extent and causes of health disparities are not fully understood, and research on how to close these gaps is lacking.*

That statement reinforced what two young physicians—Mitchell R. Lunn, MD, MAS, and Juno Obedin-Maliver, MD, MPH, MAS—already knew. They understood that the largest threat to describing the health status and health-related needs of LGBT people was the lack of population-based data.

“The data didn’t exist because common collection techniques like the U.S. census and medical forms don’t typically ask patients about their sexual orientation or gender identity,” says Lunn, assistant professor of nephrology.

To overcome the deficit, Lunn teamed with Obedin-Maliver (now assistant professor of obstetrics and gynecology) in 2015. They set out to collect the data through a national, longitudinal, dynamic, cohort study. That is, they wanted to gather information from the same individuals within the United States repeatedly over a period of time.

Their overarching goal was to understand how identifying as an SGM person affects one’s health—physically, mentally, and socially.

“We view health in a very holistic way,” Lunn says. “Social health includes things like your experiences of stigma and discrimination in society, but also the things that make you happy: your support system, the things that make you resilient, the things that bring you joy, how your families are structured, for example.”

## In the Beginning

The story really began in 2015 when, as research fellows at UC-San Francisco, Lunn and Obedin-Maliver launched a pilot of The Population Research in Identity and Disparities for Equality (PRIDE) Study using an iPhone app. They believe that was the first time a mobile app had been used to specifically recruit large numbers of an underrepresented population for clinical research.

Armed with data from 1,000 participants nationwide who had completed online demographic and health surveys during the pilot, Lunn and Obedin-Maliver launched a web-based platform in 2017 to reach a more diverse pool of participants that now exceeds 16,000 people.

They brought their work to Stanford in early 2019, largely for the opportunity to work collegially with Obedin-Maliver’s mentor, Leslee L. Subak, MD, department chair of obstetrics and gynecology. Subak was starting an SGM program at Stanford that was backed by Stanford School of Medicine Dean Lloyd Minor, MD, and Department of Medicine Chair Robert Harrington, MD.

Between 2019 and early 2020, 10 papers were published, in press, or under review. They address such topics as substance use, eating disorders, survey design, and optimal ways to ask about sexual orientation and gender identity for research purposes.

## Campus-wide Collaboration

Now others at Stanford are working in conjunction with The PRIDE Study.

One is Eleni Linos, MD, MPH, DrPH, professor of dermatology, who had a paper published in the Oct. 4, 2019 issue of *JAMA Open Network*. A finding in that paper suggests the possibility that the tanning industry may be targeting gay and bisexual men, who are six times more likely than heterosexual men to tan indoors during their lifetimes and about twice as likely to suffer from skin cancer. Linos’ research team hopes to partner with The PRIDE Study to investigate the marketing and advertising efforts of the tanning industry.

In another project, Amy Dobberfuhr, MD, MS, an instructor of urology, is working with Obedin-Maliver to look at urinary voiding among transgender people.

“You can imagine that if you feel discriminated against about which bathroom you’re going to use, then you may ‘hold it’ and not pee until you feel safe. And over time that can result in dysfunction of how you empty your bladder,” says Lunn.

## Community Engagement

A key component of The PRIDE Study is community engagement.

“Juno and I are not the ones deciding research questions,” Lunn explains. “Every study that we do, every paper that we write,



Juno Obedin-Maliver, MD, MPH, MAS (left), and Mitchell R. Lunn, MD, MAS, want to understand how identifying as a sexual and gender minority person affects one's health—physically, mentally, and socially.

every collaboration that we do with investigators at Stanford, or outside of Stanford, gets reviewed by a scientific committee as well as an advisory committee of 11 people from across the country who are SGM advocates and bring various perspectives. They have equal weight in deciding if a study that we do moves forward.”

Lunn and Obedin-Maliver don't want the study's research to live and die in medical journals. Instead, they want it to get back to the communities they are hoping to serve.

“We really want to be partners with folks and make sure that they're involved not only in the research itself, but also in receiving results of the research in ways that are accessible for them,” Lunn says.

That's why they oversee the creation of community-friendly summaries that translate scholarly research into descriptions of the research and its outcomes that are easy for all members of SGM communities to understand.

Eventually they intend to expand those activities to include short videos, infographics, and other communications that will be easy to share via social media.

## Far-reaching Effects

Lunn and Obedin-Maliver would not have embarked on this work without the hope of changing clinical practice.

As an example, The PRIDE Study is involved in an examination of how people are screened for problematic or harmful alcohol use.

“Conventionally, those types of analyses are based on somebody's sex assigned at birth. A survey might look at what happens if you have more than five drinks at a time if you're male versus having four drinks at a time if you're female,” says Lunn. “But how does that work for gender minority people? What if you're a transgender person who's been on hormones for 20 years? Which one of those is the appropriate answer? So we have studies like that, which we hope will influence screening guidelines.”

The researchers also think about using the study to move beyond medicine and into “social health” and public policy.

“If we can show that people who have had many traumatic experiences on the basis of their gender identity or sexual orientation have certain health outcomes, then that can provide some evidence to actually change policy and laws,” he says.

“I hope that the long-ranging effects of this study are that SGM people get more competent and appropriate care based on their sexual orientation and gender identity. And that society changes to make life better for them. And by making life better for them, it can improve their health,” he adds.

Many other longitudinal cohort studies, like the famous Framingham Heart Study, go on for generations. As to how long The PRIDE Study will continue, Lunn says, “we'll keep this going for decades—or until we're no longer needed.”

# Taking Veteran Care on the Road

They travel roughly 400 times a year, to sites as far-flung as Sonora, King City, and the edge of the Yosemite Valley, serving eight counties and parts of two others. They visit Santa Cruz once a week, working with homeless veterans and supplying medical needs for countless veterans each year. And they just got a new van.

They are the VA Palo Alto's Mobile Medical Outreach team. Led by Jean Lighthall, MD, clinical assistant professor of primary care and population health, the team of eight has traveled to various sites around their catchment area, helping provide veterans with medical care for the past 12 years.

As Lighthall explains, the group—two part-time physicians, two registered nurse practitioners, two health techs, a business outreach specialist, and an outreach coordinator—has two goals. The first is simple: Get health care to veterans who need it. Some veterans don't even know they're eligible. "It's a great thing to offer someone," she says. Team members often see patients for an initial visit, which includes taking their history, giving a basic physical exam, and offering appropriate medication and referrals.

With very few exceptions, the patients are walk-ins. As Lighthall puts it, "You can just stop in and get the services."

The other goal is to improve access for veterans already enrolled in the system who have difficulty seeing doctors for various reasons including distance, homelessness, lack of transportation, and substance abuse. By coming directly to them, the Mobile Medical Outreach team can address these problems.

Lighthall says it may be more than physical access problems that stop veterans from getting the care they need. "One thing that we see a lot is that there are veterans, particularly of the Vietnam era, who weren't treated as well as they could have been when they first came back and went to the VA," she says. "Or just because their whole homecoming was so bad, many didn't want to have anything to do with the VA or any type of veteran's benefits." But the Mobile Medical Outreach is addressing this problem, too. As Lighthall puts it, "We may be a little more welcoming than the big huge concrete structures like the Palo Alto VA. We're just out there with our van."

From left: Danny Molina, Doral Gonzales, Jean Lighthall, MD, and Anna Coulter.





To that end, the Mobile Medical Outreach team travels—a lot. They split up and go everywhere: to colleges to see younger veterans, halls for veterans of foreign wars and American Legions, libraries, senior centers, veteran resource centers, and Native American pow-wows, including the Stanford and Stockton pow-wows. They make 30 to 40 site visits a month, often covering several events a day, with two vans and help from host sites when exam rooms are available. At each site, they see patients, sometimes up to 10 or more. In 2018 they served 870 veterans, and 149 of them were homeless, almost 20% of the total.

Their work is often more focused on same-day and urgent care, but they also provide stopgaps for struggling communities. “Stockton and Modesto are really short on medical providers,” Lighthall explains, “so we’re bridging some of those patients. We see them on follow-ups and act like their primary care physicians just so they’re not out there with no care, or no continuity of care.” Their services include referrals to specialists, mental health care, physical therapy, ordering labs, prescriptions, and giving vaccines for diseases including influenza and hepatitis A (especially important considering the recent hepatitis A outbreak among the homeless).

The team, which is the only VA medical mobile outreach program of its kind in the Bay Area, is small for such a large project. But it’s clearly a labor of love for Lighthall and her colleagues. Lighthall, who got involved with the VA in what she calls the “second half” of her career, worked for the VA while in medical school and “loved the veterans.” When she wanted a change from “the traditional internal medicine practice,” she turned to the VA. She’d been interested in working with the homeless population for a long time, and she’s been with the outreach team in one form or another since 2008. She was named section chief for outreach in 2013.

The program has grown in its 12 years, and the team has adjusted, traveling to new sites and discontinuing visits to old



Jean Lighthall, MD, works with a veteran patient.

ones when they seemed unnecessary. Still, the number of sites and the area they cover has grown exponentially. “We’re always looking to find areas of need,” Lighthall says.

As for the future? Lighthall isn’t opposed to further expansion, but she also has high hopes for telehealth. Their new van is now equipped with telehealth capabilities, which could mean a further expansion into specialty care. “We could go out there with a nurse practitioner or with a health tech and then a patient could come to the van and we could loop them into dermatology or cardiology without having them drive all the way into Palo Alto,” Lighthall explains.

It’s clear that the team works incredibly hard, but they see their rewards in the community. They work tirelessly to get veterans care on their own terms. Lighthall’s pride in the program is as apparent as it is earned. As she adds, “I think we’ve been able to bring in veterans who have been very reluctant to receive care and they’re happy that they’re now able to get that care.”

## A Vet Provides Outreach

Doral Gonzales, a nurse practitioner who works with the team, is a veteran herself. She retired from the army in 2012 at the rank of lieutenant colonel after a 22-year career that included deployments to Afghanistan and Iraq. She’s worked with the Palo Alto VA since 2008 (with gaps for her deployments) and earned a midwifery degree at UC–San Francisco as well as a master’s in family nurse practice and a doctor of nursing practice in 2010. During her time in Iraq she served as a trauma nurse in combat support hospitals as part of a triage unit, and in Afghanistan she worked in a Department of Defense detainee facility treating enemy combatants and prisoners of war. She also worked with a clinic with multinational medical providers to provide for women and children who had injuries from exploding mines.

At one point in Iraq a rocket-propelled grenade exploded 20 feet from her, causing a traumatic brain injury as well as

post-traumatic stress disorder. Gonzales explains that this background has made her both dedicated to veterans and able to speak their language. “I went through a lot with the VA,” she explains, “so I figured I might as well work there. And then I wanted to do outreach because I couldn’t stand being inside a clinic with four walls, so I knew I was going to be out and about, helping veterans who had the same issues with PTSD that I did. Most of us, my health techs and I, are veterans, so the veterans trust us. And we have rapport with them; we connect.” During her time in the program she’s taught others how to interact with their veteran patients. “When we started adding more providers, we trained them on how military speak works and how to relate to the way veterans speak so it was easier for them to connect with the veterans,” she says. “This made the veterans more open, trusting us with their issues. It’s really important to me that we continue with the outreach.”

# The Power of Connection

## THE WOMEN IN MEDICINE GROUP IS CREATING COMMUNITY AND AMPLIFYING RESIDENTS' VOICES.

In 2010, Cybele Renault, MD, a clinical associate professor of infectious diseases, sat down at her desk to draft a grant proposal. The resulting four-page document read like a manifesto, with an outline for a new seminar series tailored exclusively to women in medicine along with space devoted to personal reflection: She recounted, among other memories, a sinking moment early in her career when she realized that, out of three trainees performing the same work under the same mentor at the same county hospital, only the male trainee was being paid.

The series, Renault imagined, would combat experiences like hers, and provide space for students, residents, and fellows to connect and share wisdom with each other and learn critical skills about how to navigate the academic landscape, identify bias, challenge sexism, and not burn out along the way.

She submitted the grant and awaited an official response. Months later, she heard the news: Her proposal had been denied. She applied again but received the same result.

Undaunted, Renault scheduled a meeting with Larry Katznelson, MD, professor of endocrinology and neurosurgery and associate dean for graduate medical education, to discuss her ideas. “I shared my grant proposal and told him ‘I want to do this!’” Her enthusiasm was met with instantaneous support: “He said, ‘I’ll

secure funding from Graduate Medical Education. Tell me what you need.’ He gave me free rein—there was trust and recognition of my passion and the need for something like this at our institution.”

Renault now had funding, a name (Women in Medicine, or WIM) and a sense of purpose. She just needed to form a community. She reached out to all the residency program directors at Stanford and asked them to appoint a female resident to join the fledgling group’s leadership council. “I wanted to establish a core council of representatives so we could figure out the next steps—what topics to focus on, which issues we should address, how we should prioritize time and funds.”

## Hearing the Call

Partway through her four-year neurology residency, Rebecca Miller-Kuhlmann, MD, clinical assistant professor of neurology and neurological sciences, hit “pause” to have a baby. She spent her maternity leave adjusting to the rhythms and changes that come with a new arrival, but she also found time to read Sheryl Sandberg’s book *Lean In*, which had been recommended by a friend. “I found the book to be really fascinating and eye opening,” she explains, “and it put a different lens on some of my own experiences.” When she returned to campus and heard about Renault’s newly formed WIM program, she jumped at the chance to participate: “I wanted to be involved immediately.” She reached out and became one of the first to join the new group.

The inaugural meeting took place on campus. Renault had gathered roughly 20 female residents from different specialties in a conference room to discuss the program and its future. Each of them brought different perspectives and a long list of questions. Miller-Kuhlmann set the scene: “Cybele got up and just started sharing her reasons for wanting to found this group and the power of community among women, and she discussed the challenges that were unique to women. The tone of the room shifted, everyone began talking and sharing the experiences they’ve had—all of the experiences: the good, the bad, the ugly—it was a powerful meeting.”

The group got to work. They organized skills-based trainings on contract negotiation tactics and workshops on implicit bias. They invited influential speakers like Mary Hawn, MD, chair of the Department of Surgery, and groups like the Clayman Institute for Gender Research to share their perspectives. They set up panels of women in leadership roles and scheduled off-campus happy hours. They connected mentors to mentees. They sponsored wellness events and partnered with like-minded groups. They tackled tricky topics: social justice, fertility and maternity concerns, microaggressions, wage gaps. And they took notes

Residents stretch during a Women in Medicine-sponsored yoga class.







From left: Becca Tisdale, MD, Cybele Renault, MD, and Brooke Gabster, MD.

along the way, eventually homing in on a set of best practices: host four to six events per year in crowd-pleasing venues, listen to suggestions, and always make space for conversation and authentic connection.

This last piece is what makes WIM so vital, Miller-Kuhlmann says, and it's the low-octane gatherings that often linger most in her mind. "We've had some events where it's just the women from the group sitting outside on picnic blankets, eating pizza together and figuring out the challenges of the world," reflects Miller-Kuhlmann. "Pizza and meaningful conversation—the great uniters."

Today's WIM group is entirely resident-led, with Renault and Miller-Kuhlmann acting as co-faculty advisors. It's just what Renault intended when she submitted her proposal almost a decade ago.

"That was always the goal. I'm so inspired by the residents' momentum and their willingness to share their experiences," she says. "They've designed a program that supports them and improves the broader Stanford community. They're leaving a legacy—they want things to be better for the women who come after them."

## WIM Group Leadership Council

Katrina Houpis  
Mary Ellen Irene Koran  
Julia Chandler  
Audrey Rose Verde  
Mita Hoppenfeld  
Julia Anne Armendariz  
Anne Kuwabara  
Katherine Werbaneth  
Anna Janas  
Hayley Elizabeth Miller  
Adela Wu  
Jessica K. Buesing  
Lauren Michelle Shapiro  
Danielle Helena Rochlin  
Jasmyn Kaur Johal

# A Helping Hand

## NEW INITIATIVES ARE SUPPORTING VULNERABLE POPULATIONS IN NEARBY COMMUNITIES.

A few years ago at an annual department retreat, faculty within the division of primary care and population health voted on the activities or initiatives they felt would improve the division. A top priority emerged: community engagement.

“Our faculty were interested in better aligning with our community partners, with the goal of trying to meet their needs in clinical, educational, administrative, and research support; across the board there was interest in everything we asked about,” says Baldeep Singh, MD, professor of medicine and vice chief of academic affairs in the division, who was asked to coordinate the effort. “There was clearly a lot of untapped energy.”

In response, division leaders named Jonathan Shaw, MD, MS, as the new director of community partnership. He started reaching out to community organizations that might be in need of doctors’ time and expertise.

Around the same time, Loto Reed—program specialist for community engagement and wellness within the division—proposed the idea of a staff-led community service program. “Lots of the staff were interested in giving back to the community and finding ways to build culture within our staff team,” she says.

By the end of 2018, both faculty and staff suddenly had an overabundance of new opportunities for community engagement. The community partnership effort organized by Shaw offered faculty the chance to serve patients in need. Another program,

SCOPE (Stanford Community Outreach Partnership Engagement), the outcome of Reed’s proposal to the division chief, Sang-ick Chang, MD, offered opportunities outside patient care.

## A Coordinated Effort

When Shaw started reaching out to local organizations and clinics that provide “safety net” health care—services to low-income and vulnerable populations who lack insurance—they immediately expressed interest in having help from Stanford.

Shaw initially set up a collaboration with Mayview Community Health Center, a nonprofit primary care clinic devoted to providing health care to low-income families. Stanford Hospital generously offered funding to cover faculty support for this effort; the funds were used to support division of primary care and population health physicians in spending some of their clinical time at Mayview.

“These organizations don’t just need clinicians a few hours a week,” says Shaw. “They really need lots of support.” The partnership launched with direct clinical care, but has grown to include non-monetary support via capacity-building, education, and research, he says.

Kirsti Weng, MD, MPH, clinical associate professor of medicine, and Meenadchi Chelvakumar, MD, clinical assistant professor of medicine, are being supported in seeing patients at Mayview. Weng was named medical director there, and another three—Singh, along with Chang and Maria Tiscareno, MD, clinical assistant professor of medicine—have now joined the Mayview board of directors. In addition, the partnership has launched a new student clerkship, which lets Stanford medical students spend time at Mayview during their training.

“It’s really grown into a multi-faceted collaboration,” Shaw says.

In addition, affiliations with two other programs began in 2019. A Stanford physician-fellow in primary care, Kenji Taylor, MD, has begun working at Roots Community Health Center in Oakland.

Closer to Stanford, clinical assistant professors Laura Vaughan, MD, and Tamara Montacute, MD, are now providing rotating clinical time at Peninsula Healthcare Connection, a clinic within Palo Alto’s Opportunity Center. The clinic offers primary care for homeless individuals in Santa Clara County. Clinical associate professor Kathan Vollrath, MD, MPH, is acting as an external

From left: SCOPE team members Meredith Fischer, Catherine Brown Johnson, and Darlene Veruttipong make blankets.







From left: Baldeep Singh, MD, Jonathan Glazer Shaw, MD, MS, and Kirsti Weng, MD, MPH.

quality consultant there, offering her expertise to help improve patient safety and implement program changes.

“We’re still working on building up these relationships with our partners,” says Shaw. “It’s a slow process.”

The division hopes to collaborate with other divisions and departments that have an interest in community engagement. Until now, volunteer efforts throughout Stanford Medicine have been fragmented, Singh says. “Some departments have been doing lots of great work, but the effort remains uncoordinated.”

Singh and Shaw would like to provide subspecialty care to their community partners and help link information with other departments—such as pediatrics and psychiatry—that already have active community programs.

“Traditionally, community engagement was not part of Stanford Medicine’s mission,” says Shaw. “As a vision, we would like to make it part of our mission, and we’d love to see that spread.”

## An Active Volunteer Net

In early 2018, SCOPE’s initial team of 10 staff members set their motto as “Putting Compassion into Action” and began by partnering with three community organizations that serve low-income and homeless individuals. The SCOPE team helped coordinate at least one event a month, including preparing and serving meals at shelters, sorting through used clothing,

volunteering time at food pantries, and making winter care packages to be distributed to community partners.

“Through SCOPE we found a great outlet to serve and to interact with colleagues outside of work,” says Reed. “We started inviting staff from other divisions who we knew might be interested, and it kind of took on a life of its own.”

In 2018 alone, more than 100 people each logged over 200 volunteer hours at events organized by SCOPE. Some could devote only a few hours to volunteering, while others became regulars, spending time in the communities on SCOPE projects and forging new connections with colleagues outside of the usual workday. The central SCOPE team—including Reed—volunteer their time outside of work to coordinate the community partnerships by holding monthly lunch meetings. “The success of SCOPE has truly been a team effort by both the SCOPE team that has been so dedicated and the volunteers who continue to see the value of giving back to the community even in the smallest way,” says Reed.

Like Shaw, Reed also quickly realized that there’s a greater need to coordinate volunteer efforts throughout the Stanford campus.

“We’d like to develop a central volunteer hub so that anyone from Stanford can access volunteer events or inform us of new volunteer events to be posted,” explains Reed. She hopes that a website will make it easier for Stanford staff and faculty to help local communities in need.



# Practitioner Liability

## PHYSICIANS WITH MULTIPLE MALPRACTICE CLAIMS DON'T SKIP TOWN; THEY STOP PRACTICING OR GO SOLO.

Stanford researchers analyzed more than a decade's worth of data about nearly half a million physicians and found that those who were sued repeatedly were no more likely to move their clinical practices to new states or regions than colleagues who had no legal claims against them.

But physicians who accrued multiple claims were more likely to cease practice, shift into smaller practice settings, or go solo.

Stanford Health Policy's David Studdert, LLB, ScD, MPH, and Michelle Mello, PhD, JD—both professors of medicine and of law—published their findings in the Mar. 28, 2019 issue of *The New England Journal of Medicine*.

The researchers studied 480,894 physicians and nearly 69,000 malpractice claims. They found that claims were grossly maldistributed, with nearly 90% of the physicians experiencing no claims over a 10-year period, 9% experiencing one claim, and 2% experiencing multiple claims. The multi-claim physicians accounted for nearly 40% of all claims paid over a decade.

“There is an emerging awareness that a small group of ‘frequent flyers’ accounts for an impressively large share of all malpractice lawsuits,” says Studdert. “This study confirms that and, for the first time, begins to shed light on the professional trajectories of these practitioners.”

Geographic relocation was a key focus of the study. The researchers used data from the National Practitioner Data Bank, which was established by Congress in the early 1990s. The data bank was created partly in response to widespread concerns that patients were endangered by practitioners who accumulated troubling track records of malpractice claims and disciplinary problems, then moved to another state for a fresh start.

“Many of the laws and institutions that govern health professionals are at the state level,” says Studdert. “It's possible to take advantage of that fragmentation to avoid oversight, and this is what the data bank was set up to stop.”

When a malpractice claim is paid on behalf of a health practitioner, or the practitioner is subjected to certain forms of disciplinary action, the information must be reported to the

data bank. And before a hospital may credential a physician, it is required to query the data bank to examine the physician's history. Medical groups, health plans, and professional societies are encouraged to make such queries as well, but they are not required to do so.

“Contrary to popular wisdom, we do not see evidence of unusual geographic movement among frequent fliers,” says Mello. “They are no more likely than other physicians to relocate.”

While this finding may be interpreted as evidence that the data bank is doing its job, the study was not designed to test it, and the authors were hesitant to draw that conclusion.

But not all of the study's findings were so reassuring. As physicians accrued malpractice claims, their likelihood of shifting into small medical groups or solo practice increased sharply. For example, the study found that physicians who had accrued two to four claims were 50% to 60% more likely to enter solo practice than physicians with no claims, and physicians with five or more claims were nearly 2.5 times more likely to enter solo practice.

The study goes on to consider why these shifts to smaller practice occur, suggesting that “it may become necessary if a hospital or practice group severs its ties with a claim-prone physician or imposes burdensome remedial actions as a condition of recredentialing. Physicians may also seek a new practice setting if they perceive that their reputation among their colleagues has become tarnished.”

“Whatever lies behind these shifts,” says Studdert, “it is problematic. From a patient safety standpoint, this is the study's most troubling finding.”

The study reviews aspects of small group and solo practice settings that are likely to amplify the risks claim-prone physicians pose for patients. “In small and solo practice there tends to be less oversight by administrators and peers,” Studdert says. It is also hard for physicians in these settings to adopt infrastructure improvements, implement processes to improve care, and access advice and information from peers and support staff.”

Although the finding that frequent fliers were significantly more likely to cease practice appeared to be reassuring, the authors sounded a cautionary note here, too.

“You would hope and expect that many of these practitioners will be de-credentialed and perhaps leave medicine, and those outcomes are indeed more likely,” says Mello. “But the fact is that



David Studdert, LLB, ScD, MPH

the vast majority of physicians who have had multiple malpractice claims paid against them continue to deliver care and treat about as many patients as their colleagues do.”

Liability insurers may be in the best position to monitor multiple-claims physicians, according to Studdert, but may not be doing so.

“Whatever lies behind these shifts, it is problematic. From a patient safety standpoint, this is the study’s most troubling finding.”

David Studdert, LLB, ScD, MPH

“Someone is continuing to provide insurance for these physicians despite their poor liability records,” he says. “It’s not clear how much those liability insurers know about these physicians’ histories, or what if anything they are doing to address the risk.”

The researchers formed the study cohort by linking data on physicians who billed Medicare between 2008 and 2015 with malpractice payment reports in the data bank over the same period.

Other co-authors of the study included Matthew J. Spittal from the Melbourne School of Population and Global Health, University of Melbourne; Yifan Zhang from Stanford’s Center for Health Policy; and Derek S. Wilkinson and Harnam Singh from the Health Resources and Services Administration in the U.S. Department of Health and Human Services.

# A Patient's Last Wish



**A BOWL OF ICE CREAM.**



**A MARIACHI BAND.**



**A WORD CLOUD.**

When patients in end-of-life care were asked if there was one wish they'd like to have fulfilled, those were some of the simple requests that came forth.

"It makes you reflect on what becomes important to people at the end of their life," notes Minh-Chi Tran, MD, clinical assistant

professor of medicine and director of the Wish Project at Stanford Health Care–ValleyCare.

In 2018 Tran launched the Wish Project to bring comfort to the dying by celebrating their lives and passions and to ease grief for families.

"We do this by granting wishes to those who have little time left with us and hope our small acts are able to leave a lasting and memorable impact on all those involved," she says.

The germ for the idea was an article in the Aug. 18, 2015 issue of *Annals of Internal Medicine*.

That article described the 3 Wishes Project at St. Joseph's Healthcare in Hamilton, Ontario, Canada. The project tried to bring peace to the final days of critically ill patients and to ease the grieving process by eliciting and implementing a set of wishes identified by patients, families, clinicians, or the project team.

Minh-Chi Tran, MD (left) and Betts Cravotto are granting wishes to bring comfort to the dying.





Tran received funding from the ValleyCare Charitable Foundation to start a similar program at Stanford Health Care–ValleyCare Medical Center, where she is one of 13 hospitalists on staff.

“It was very low key at first, and I just started doing the projects with my patients on occasion here and there. Then I opened the program to my fellow hospitalists, and now the program has expanded to the whole hospital after we received a grant from the ValleyCare Foundation. What’s great is that everyone’s been so excited about it, especially the ancillary staff and hospital volunteers,” she explains.

While Tran has no formal goals for expanding the program, during the fall of 2019 she started building a component for high school student volunteers so they can become more involved in this aspect of medicine and health care.

## How Does the Program Work?

When staff members in the hospital have a patient they think is nearing the end of life, they can refer the patient to Tran or her fellow clinical assistant professors of medicine Silvia Loica-Mersa, MD, and Kathleen Jia, MD. One of those three hospitalists then works with a Wish List program volunteer to pair them with the patient.

“What makes the program work so well is our 10 volunteers—especially Betts Cravotto, our lead volunteer. She generally spends an hour or two at a time with the family, just talking to them. And I think that the time she spends with them is probably more important than the wish itself,” Tran says.

“It’s an honor when families trust me and allow me into this very personal time, this sacred part of their lives,” Cravotto says.

One wish she granted was setting up a romantic dinner for a couple whose wedding anniversary was a month away—too long to wait when the husband was only days away from the end of his life.

“The wife brought nice clothes from home for her husband to wear, and she dressed beautifully. The nurses brought flowers and decorated the table, which made for a charming setting for their special dinner. That was just such a blessing to them, but what moved me the most was hearing the wife say that we gave them something to be happy and excited about amid all the negative and depressing things they had been living with for months,” Cravotto says.

In the program’s first 15 months, 26 wishes had been granted, with most wishes costing less than \$30.

The wish from the program’s first patient was for a copy of his favorite movie, “The Graduate.” Volunteers acquired a copy of the film, and the patient watched it after being transported home. He was also given CDs with mixed compilations of his favorite

music, which were played in his hospital room with a sound system donated by a volunteer.

One patient asked for a glass of root beer as his last wish. In that instance Betts provided a variety of brands of root beer. Because the patient had a difficult time swallowing, she and hospital staff saw that a thickener was added to the root beer to prevent choking. A family member later thanked Betts and the staff, saying that “it was the first time [my] father had eaten in days, and it made the event a special and memorable day.”

On two occasions, families held brainstorming meetings with a volunteer and developed “word clouds” that used typography to create artwork composed of words the families use to describe the patient based on their reflections and memories.

Then there was a patient’s request for a mariachi band, which volunteers arranged in April 2019, when the patient was on comfort care.

## A Lasting Impact

Despite many advancements in medicine, all patients and their care teams must face death as an eventual reality. While the medical profession often turns to facts, science, and evidence before making decisions and taking action, the Wish Project is based on something else.

“I guess in terms of the actual science of it, it’s kind of hard to quantify,” Tran confesses.

This is an aspect of medicine that is tough for all those involved—family, friends, providers, staff, and the patient.

“What appealed to me, and why I found the project so rewarding, is that there’s a lot less science to it. It’s more humanistic, and just about caregiving. Something I found surprising about the project is that it takes very little to give families and people the feeling of being heard,” says Tran.

“I feel like we’re always running around trying to follow the latest guidelines in medicine and making sure we’re giving everyone the most up-to-date care. But often what people really want is just a feeling that someone cares and that someone knows a little bit more about them,” she says.

“It’s providing something surprisingly simple yet meaningful that honors or memorializes their loved one,” adds Cravotto.

“It makes me learn a lot about my patients on a personal level that we don’t usually get into as their doctor on a busy day,” says Tran. “But I like the pause that it makes us take by just asking what they care about, and what they want to have at the end of their life.”

# Leading the Way in Esophageal Diseases

**GASTROENTEROLOGIST JOO HA HWANG IS ONE OF JUST A FEW DOCTORS IN THE COUNTRY PERFORMING INNOVATIVE ENDOSCOPIC PROCEDURES TO TREAT CANCERS AND OTHER DISEASES OF THE ESOPHAGUS AND STOMACH.**

Over the past decade, gastroenterologists in eastern Asia have perfected techniques that allow them to perform new procedures on the esophagus, stomach, and colon using an endoscope—a thin flexible tool that can snake through the digestive tract. The noninvasive techniques not only treat certain gastrointestinal diseases, but are helping lower the mortality rate from gastric cancer by offering a new, non-surgical way of removing precancerous and early cancerous lesions before they grow.

These experimental methods, however, have been slow to catch on in the United States. At Stanford, gastroenterologist Joo Ha Hwang, MD, PhD, professor of medicine, wants to change that. Hwang is leading the way in performing and studying these new esophageal approaches and advocating for better gastric cancer screening. “These procedures, which we’re helping to further develop and study, really represent the cutting-edge medicine that we’re delivering here at Stanford,” says Hwang.

## An At-Risk Population

Gastric cancer is the fifth most common cancer worldwide, but its incidence in the United States is relatively low—about 27,000 people are diagnosed with stomach cancer each year. Its prevalence is highest in people of Asian, Pacific Islander, and Hispanic descent, but even among these populations, there are no official screening guidelines in this country.

“It tends to be diagnosed at a late stage here, because the early stage cancer often doesn’t have symptoms,” says Hwang. “That means the survival rate is not very good.”

In the United States, physicians recommend that adults get screening colonoscopies, in which an endoscope is used to look at the lower part of the gastrointestinal tract, where colon cancer can occur. But this lower endoscopy doesn’t cover the stomach and other “upper” areas of the digestive system.

In Asia, however, gastroenterologists use an endoscope to examine the upper part of the gastrointestinal tract for signs of early cancer

in adults every few years. That means most cases of gastric cancer there are identified much earlier, and the survival rate in Asia is better than in the United States.

Hwang and his colleagues have been studying the incidence of gastric cancer in the United States and the most at-risk populations, and think that regular screening within certain populations could help reduce mortality here. In 2020, they’ll be hosting a gastric cancer summit at Stanford. “We’re bringing in leaders in gastric cancer from all over the world to talk about how we can establish screening guidelines for high-risk populations in the U.S.,” says Hwang.

## Less Invasive Surgery

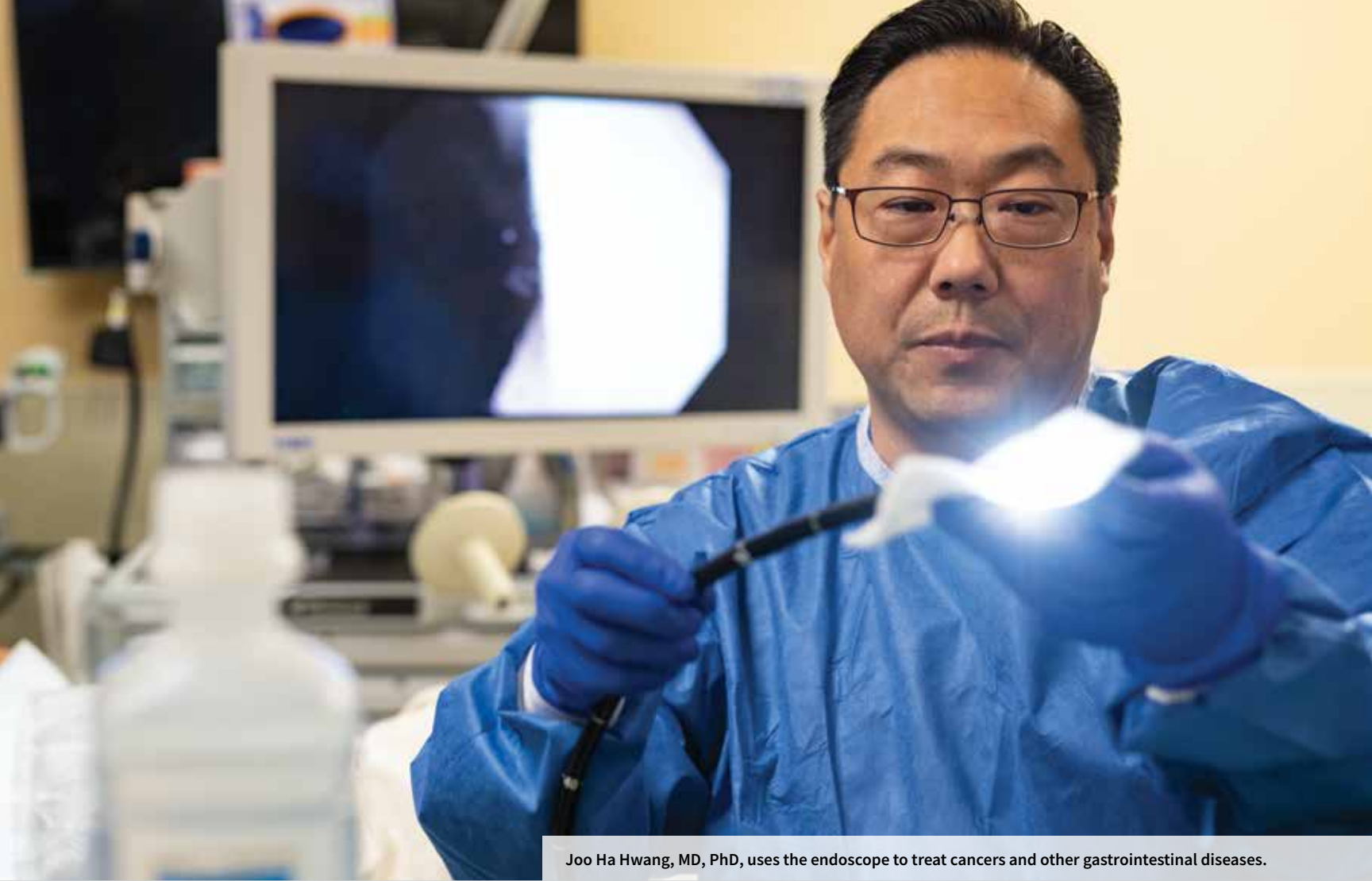
The push toward increased gastric cancer screening is, in part, due to a relatively new procedure to help remove pre-cancerous and early cancerous lesions from the stomach. Until recently, such lesions could be seen and biopsied using the endoscope, but removing them required surgery.

Now, specially trained gastroenterologists—like Hwang, who went to Korea and Japan for training—can surgically remove the pre-cancers and early cancers endoscopically. The procedure, called an endoscopic submucosal dissection (ESD), takes only a few hours. Patients can generally go home the following day, rather than staying in the hospital several nights as they might after a typical surgery.

“Stanford is now one of the highest volume sites in the United States for ESD,” says Hwang. “We get patients not only from Northern California, but from Hawaii, Alaska, and really all over the country.”

There’s another procedure in the upper digestive tract that’s also heralding a shift from more invasive surgeries toward endoscopic versions. It’s called per-oral endoscopic myotomy, or POEM, and it involves cutting into the muscles that surround the esophagus. Like with ESD, Hwang learned the approach abroad and is now one of the leading POEM providers in the United States. He uses it to treat two conditions—achalasia and gastroparesis.

In achalasia, patients have trouble swallowing because the ring-shaped muscle between the esophagus and stomach doesn’t relax normally, trapping food in the esophagus. Before POEM, the mainstay treatments for achalasia were Botox injections—which relax the muscles, but only for a few months—or surgery.



Joo Ha Hwang, MD, PhD, uses the endoscope to treat cancers and other gastrointestinal diseases.

In POEM, Hwang can use a small knife passed through an endoscope to cut through the inner layers of the esophagus to access the muscle and make a slit in it. Then the esophagus is closed with tiny clips.

“Patients can’t feel the incision or clips, and they can swallow right away. It’s one of the most gratifying procedures I do,” says Hwang.

In another version of POEM, known as gastric per-oral endoscopic myotomy, or G-POEM, the same approach is used to cut the muscle at the base of the stomach, the pylorus, for people with gastroparesis. In this more common disease, the stomach can’t empty itself of food in a normal fashion, leading to heartburn, nausea, vomiting, and feeling full quickly when eating.

## Collaborative Research

As the number of esophageal endoscopy procedures offered at Stanford grows, the Esophagus Center is becoming a dynamic epicenter for collaboration and research. Hwang works with other gastroenterologists as well as surgeons and otolaryngologists.

“We are very integrated with the surgery department, and it’s a very multidisciplinary collaborative group,” says Hwang. He’s also working closely with the Stanford Medicine Center for Asian Health Research and Education (CARE) on his gastric cancer screening efforts.

Research questions remain, such as which patient populations benefit most from ESD and POEM, and what are the underlying causes of achalasia and gastroparesis. During POEM procedures, Hwang takes biopsies that may help answer these questions.

The numbers of ESD and POEM cases at Stanford are some of the highest in the country. There are very few training opportunities in the United States for physicians to learn these cutting-edge procedures. Hwang hopes that changes in the near future: “We hope to offer a fellowship training program in these eventually, to help disseminate the knowledge and techniques so that other patients may benefit from these procedures.”



# Immunotherapy Gives Hope to Multiple Myeloma Patients



Michaela Liedtke, MD

For most of us, a common cold or a stomach bug is a nuisance, but usually in a matter of days the body's immune system will fight off the invading disease-causing agents and we'll get back to normal. In more serious situations, the immune system even defeats pneumonia, endocarditis, and other severe health threats.

But that's not the case for the 20,000 to 30,000 Americans who are diagnosed with multiple myeloma each year. Multiple myeloma is a form of cancer that affects plasma cells, the white blood cells in the bone marrow that produce antibodies to fight disease and infection.

Current treatment options include chemotherapy, radiation therapy, specialized drugs, and stem cell transplants. Despite advances in these approaches, the average American will succumb to multiple myeloma about seven to 10 years after being diagnosed with the disease.

"While we can treat the disease well initially, almost every single patient with multiple myeloma relapses, and every time the disease comes back, it becomes more resistant to therapies, making it even harder to treat," says Michaela Liedtke, MD, associate professor of hematology.

A novel treatment using CAR-T cells is showing promise for treating multiple myeloma. Understanding the treatment requires a short course in cell therapy (see sidebar).

Liedtke explains that the treatment uses the patient's own T cells, which reside in the body after eradicating the cancer.

Her expertise in CAR-T cells derives from her connection with Crystal Mackall, MD, Ernest and Amelia Gallo Family Professor of Pediatrics and Internal Medicine, and founder of the Stanford Center for Cancer Cell Therapy.

Liedtke's research on the subject was part of a study published in the May 2, 2019 issue of *The New England Journal of Medicine*.

"With this new CAR-T cell technology, known as BB 2121, ultimately the hope is that it will cure the disease and make it go away forever," Liedtke proclaims.

"If any other cancer cells should develop in the future—if a relapse should ever occur—then the CAR-T cells should be ready to address that relapse or alternatively additional CAR-T cells could be infused. That's the theoretical context," she says.

In fact, CAR-T cell technology has proven to be effective in treating acute lymphoblastic leukemia (ALL), especially in children.

"There are studies using similar CAR-T cells showing that half to two-thirds of children with relapsed ALL, another hematological cancer, can be cured of their disease," she says.

## What Are CAR-T Cells?

T cells, part of the immune system that defends the body against infections, can become compromised when a patient develops a malignancy. One way to overcome that is to remove the T cells from the patient's body and "re-educate" them in the laboratory. That is, each T cell is given a chimeric antigen receptor (CAR), which is why these engineered biological units are known as CAR-T cells.

After the T cells have been converted to CAR-T cells, they are reintroduced into the patient's bloodstream and circulate in the body. The CAR-T cells are able to recognize, hunt for, and bind to certain characteristics on the surface of cancer cells before destroying them.

The CAR-T cells become very prolific and recreate themselves in great numbers. These expanded numbers of CAR-T cells circulate throughout the body and continue to hunt for myeloma cells until all the malignant cells are destroyed.

# Novel Cancer

## Treatment Shows Promise

A novel immunotherapy combination appears safe for use in patients with a type of blood cancer called non-Hodgkin's lymphoma. Not only that, but half of the 22 people enrolled in an early clinical trial of the therapy had a positive response, and about one-third went into complete remission from their cancer.

The therapy combines Hu5F9-G4 (an experimental antibody developed by researchers at Stanford) and a commercially available anti-cancer antibody called rituximab.

"It was very gratifying to see how the treatment was well-tolerated and showed a clinically meaningful response," says Ranjana Advani, MD, professor of medicine at Stanford. Advani is the lead author of a paper describing the results of the phase-1 trial that was published in *The New England Journal of Medicine*.

Some patients showed signs of a transitory anemia or reactions at the injection site, but there were few other significant side effects to the treatment, according to the paper.

Although there are many things that can kill cancer cells, the real test of a therapy is whether it can kill the cancer cells without harming normal cells. Advani says she was particularly pleased that the researchers observed only minor side effects in the participants.

### A Personal Trial

Clinical trial participant Michael Stornetta, a retired Santa Rosa businessman who said he had never previously been sick with anything worse than colds, flus, and the usual childhood maladies, was hit with follicular lymphoma over five years ago. He said that after attempting multiple therapies with "varying degrees of success," he was referred to the Hu5F9-G4 trial at Stanford.

In October of 2017, he drove with his wife and son to Stanford to view the first scans that would reveal whether the experimental treatment was working. The scans showed that his cancer was significantly reduced. By strange coincidence, the very day he learned that he had lost his house in a devastating wildfire, he also learned that the treatment was working.



Ranjana Advani, MD

### How the Combination Works

In 2010, researchers led by Irving Weissman, MD, director of the Stanford Institute for Stem Cell Biology and Regenerative Medicine, showed that the CD47 protein that covers nearly all cancer cells acts as a "don't eat me" signal to immune cells called macrophages.

Weissman and his colleagues later developed the Hu5F9-G4 antibody that blocks the CD47 protein, prompting macrophages to engulf and devour cancer cells.

For this clinical trial, participants were administered a combination of Hu5F-G4 and the rituximab antibody that has been shown to amplify positive "eat me" signals.

The antibody combination was used to treat people with two types of non-Hodgkin's lymphoma: diffuse large B-cell lymphoma and follicular lymphoma.

"It's very exciting to have a potentially new class of immunotherapy like this," says Advani. "For the first time we have an antibody that activates macrophages against cancer and appears to be safe for use in humans."

# Making a Place for Cancer Survivors

## PRIMARY CARE PHYSICIAN JENNIFER KIM IS HELPING PATIENTS BRIDGE THE GAP BETWEEN CANCER TREATMENT AND THE REST OF THEIR LIVES.

Every cancer patient hopes for a clean scan or blood test showing that all signs of cancer have disappeared. But it doesn't always mean the end of the cancer story. Compared with the rest of the population, cancer survivors are at an increased risk of recurrence and second tumors. They also can have a host of complex physical, emotional, and psychosocial concerns related to their disease.

Many survivors are plagued by a fear of their cancer returning, and the anxiety can manifest itself in many ways. Treatments can also leave patients with ongoing nerve pain, lung and heart problems, or fertility issues.

Finding a health care provider to address those issues can be tricky. While oncologists can't keep seeing patients indefinitely after signs of their cancer have disappeared, primary care physicians can be wary of answering patients' questions that might relate to an oncology diagnosis. It leaves patients in an awkward position.

"People often feel a little bit lost when their oncologist, who they've been seeing regularly for months or years, says they're doing great and don't need to come back," says Jennifer Kim, MD, a clinical assistant professor of medicine who is piloting a cancer survivorship clinic at Stanford.

Through her new clinic, Kim is helping bridge the gap between oncology and primary care, ushering both patients and health care providers through this transition.

## A Growing Population

As of 2019, the population of cancer survivors in the United States has grown to 17 million people. Improved treatments and earlier detection methods mean that people live longer after a cancer diagnosis than ever before—many decades, in some cases. That growing population has led to the emergence of cancer survivorship as a niche field within medicine.

In recent years, it has become popular for oncology clinics around the country to offer patients a survivorship care plan—a one- or

two-page document that outlines the patient's history with cancer, any potential long-term problems they might experience, and recommendations for follow-up care or screening tests.

"Even when this is done, the information in the document isn't always being fully communicated to primary care doctors," says Kim.

Oncology programs have also started looking for other ways to ease patients through the transition from cancer treatment to more routine medical care, including integrating primary care doctors into their practices more closely.

## Launching a Clinic

Two years ago, breast oncologist Lidia Schapira, MD, approached Kim about starting a survivorship clinic. First, Kim had to read up on what Schapira meant.

"In all my training, I hadn't even heard of the word survivorship," says Kim.

But the more she read—and the more meetings and seminars on survivorship she attended—the more intrigued she became. She agreed to start a pilot program; she spent time shadowing oncologists at Stanford so she'd better understand the ins and outs of cancer treatment. Then she set aside two half-days a week to see patients with breast and gynecologic cancers from the Stanford Women's Cancer Center.

She helped address specific problems each patient might be having, whether or not the issues were related to a tumor, and set up a long-term plan for cancer screening and primary care needs. The model was immediately successful, with positive feedback from patients and oncologists alike, and Kim's schedule filled. Since then, she's expanded to see people who are survivors of lung, colon, and childhood cancers.

For some people, one appointment with Kim is enough to send them on their way with a plan. For others, it may require months of follow-up before they feel ready to move to another primary care provider. In either case, Kim gives them information to pass along to their doctor—or, if they're continuing to receive care at Stanford, she might call or message the primary care provider directly.

"The advantage of me doing this instead of an oncologist is that I know what most primary care doctors can understand," says Kim. "I try to hand off recommendations that are manageable and not





Jennifer Kim, MD, is helping bridge the gap between oncology and primary care.

full of the kind of detail and inside jargon that oncologists might use.”

“In all my training, I hadn’t even heard of the word survivorship.”

Jennifer Kim, MD

## Survivorship Education for Doctors

Kim can see only so many patients, but her hope is that as more primary care doctors become aware of the unique needs of cancer survivors, others will step up. To that end, Kim and Schapira designed an online continuing education course for primary care doctors to learn key points about survivorship—common long-term and delayed effects of chemotherapy and radiation, for instance.

“You don’t need to be a survivorship expert to integrate these things into your everyday practice,” says Kim. For instance, if someone who once had prostate cancer treatment complains of frequent urination to their primary care doctor, they might normally test for diabetes or pelvic floor issues. But simply being aware that this can be a delayed complication of prostate cancer treatment can help them treat it more appropriately.

She thinks that with a little extra education, primary care doctors can become more comfortable treating cancer survivors. Rather than referring these patients back to oncologists, primary care physicians armed with the right knowledge can handle many of the long-term effects of cancer and cancer treatment on their own.

“Survivorship is a chronic disease, just like diabetes and high blood pressure,” says Kim. “So it’s appropriate for primary care doctors to manage these patients who need a little extra care; it’s just that some training is needed for us to get there.”

# The Down-to-Earth Goals of Two Nephrology Fellows

Two current nephrology fellows share a common background through their residencies at University of Miami/Jackson Memorial Hospital in Florida. Since coming to Stanford two years apart for fellowship, their pathways have diverged somewhat, although their long-term dedication to nephrology and their friendship is unchanged.

Dimitri Augustin, MD, MS, is a fourth-year postdoctoral fellow in nephrology who grew up in South Florida and received both his undergraduate and medical degrees from the University of Miami. He earned a master's in biochemistry and molecular biology with a biotechnology focus at Georgetown University before medical school. Those studies "opened my eyes to ask how translational research, biotechnology, and medical devices can fit together," he says. During the third year of his internal medicine residency in Miami, he met Daniel Watford, a first-year resident.

Watford, currently a second-year fellow in the division of nephrology, was born and raised in Durham, North Carolina. He did his undergraduate work at Princeton University followed by medical school and a master's of public health at UNC-Chapel Hill. The next step in his career provided the first opportunity for him and his wife to live in the same city. "I couples-matched with my wife, who is an anesthesiologist—now in chronic pain medicine—to Jackson Memorial Hospital in Miami for residency," he says. "I completed three years of residency and a year of chief residency there."

## Watford's Trek

Watford explains his cross-country path to Stanford: "I got acquainted with Stanford in a couple of ways. One was through Dimitri Augustin who was one of my senior residents when I was an intern. We hit it off early, initially in more of a mentor relationship that quickly blossomed into a close friendship."

Another factor in Watford's decision had to do with an American Society of Nephrology (ASN) meeting in 2016 "where I was a 'Kidney STARS' participant. This program aims to stimulate interest in nephrology among medical students and residents through travel funding to attend the ASN national meeting as well as a multitude of networking opportunities. While attending the meeting in Chicago I met the chief of nephrology, Glenn Chertow, and several other Stanford faculty members during a social event. The combination of that opportunity and my connection with Dimitri spearheaded me coming here."

Watford met his wife, who was originally from Seattle, at a pre-med summer program at Yale in 2007. She did both

undergraduate and medical school at the University of Washington before residency in Miami. For fellowship, "Stanford was on our radar, both because it's a fabulous training program, and because of the added attraction of being on the West Coast, making it possible to be closer to my wife's family. Dr. Chertow was very supportive through the whole process of recruiting and has made us truly feel part of a family."

Once the two friends arrived at Stanford for their fellowships two years apart, they followed different research pathways.

## Augustin's Research Aims

Before Augustin started his fellowship, he was thinking about the intersection of technology and medicine: "I thought there were definitely areas within nephrology that could benefit from technology, but I didn't have any specific ideas at that time." He also had interests in interventional nephrology and vascular access for patients who must undergo kidney dialysis several times a week.

While he was a fellow of the Stanford Biodesign Program a few years ago, he says, "I learned about the device innovation process and how it could be used in medicine. One need we started looking into involved problems with hemodialysis fistula maturation."

Dialysis patients require surgery to create a connection, called a fistula, between their vascular system and the dialysis machine. The surgery connects an artery to a vein, after which the vein dilates and thickens to withstand the blood flow required to send blood through the dialysis machine. There is a period of time following the surgery before the fistula is mature enough to be used for dialysis. That period may last over 90 days.

Methods for determining how mature a fistula is—and how ready it is for dialysis—can include repeated physical exams and at times an ultrasound study. Augustin hopes to find a better way. "During that maturation time," he explains, "the patient has to use a temporary catheter, and that can be associated with an increased risk for infections and hospitalizations."

Augustin and his colleagues are in the very early days of designing and creating a wearable device for assessing fistula maturation. With the help of a Kidney Innovation Accelerator (KidneyX) award, they are validating the concept and understanding how the data would be used.



From left: Nephrology fellows Dimitri Augustin, MD, MS, and Daniel Watford, MD, MPH, look over data from a patient with kidney disease.

KidneyX is an initiative of the U.S. Department of Health and Human Services and the ASN. The first 15 KidneyX awards are funding different concepts to redesign dialysis. Augustin's KidneyX Redesign Dialysis Phase 1 prize is helping to fund development and testing of their concept to monitor arteriovenous fistula maturation in real time.

While the road ahead for the device is very long, and it may be many years before it comes before the U.S. Food and Drug Administration for marketing approval, Augustin says that "Fistula maturation is a real problem area that I have an interest in, am dedicated to, and want to make changes in."

## A Focus on Transplant Candidates

On the other hand, Watford's particular interest comes into play further along the kidney disease process when a patient is in line for a kidney transplant. Northern California has one of the longest kidney transplant wait lists in the country: nine to 10 years for cadaver donation. Given such long waiting periods, during which time the health status of the patients is ever changing, Watford became interested in devising ways to best gauge how well these patients will do both prior to and after transplant. The ultimate goal is to determine a means for providers and transplant programs to ensure the most suitable

and medically optimized candidates remain on the transplant list and are offered organs in a time when wait lists are growing ever longer.

The transplant readiness assessment clinic (TRAC) is a novel way for patients to be reassessed for readiness to undergo transplant. TRAC was spearheaded by associate professor Jane Tan, MD, PhD, MS, and clinical assistant professor Xingxing Cheng, MD, MS. As patients move up the wait list toward the one-year point until likely transplant, Watford explains that "we bring them back to TRAC to reassess their physical function. We are using two measurements to assess their readiness: the six-minute walk test and the one-minute sit-to-stand test, with the goal of correlating these measures to outcomes such as removal from wait list or death before transplant as well as some post-transplant outcomes such as rehospitalization and mortality."

The hope is that these two objective measures will prove useful in determining patients' readiness for transplant and provide a tool for programs with the longest waiting times to more effectively manage their wait lists.

Should these two fellows achieve their research goals, many patients with kidney disease at Stanford and elsewhere will undoubtedly benefit.



# Immunology and Rheumatology Faculty Reach Across Divisions to Fight Disease

In many ways, modern medicine is getting more intimate in scope: Think targeted cell-based therapies or interventions tailored to the microbiome. But in another sense, its scope is also getting broader: More and more frequently, doctors from various specialties are realizing how important interdisciplinary care is to fight diseases and care for patients. The immunology and rheumatology division is a perfect illustration of this principle. Among others, both Matt Baker, MD, MS, clinical assistant professor of immunology and rheumatology, and Tamiko Katsumoto, MD, clinical assistant professor of immunology and rheumatology, are working collaboratively with other divisions on research and patient care.

## A Hub to Treat Sarcoidosis

Baker “really fell in love with immunology” when he worked in a lab at the National Institutes of Health before attending medical school at Harvard. His path to medicine was unusual: He grew up in a tiny town in Oregon, living in a log house and attending the local high school, where they had classes in “hatchet throwing and log rolling.” He remembers being struck by the role that his father (the town dentist) and the town doctors played. “It was very Rockwellian—seeing them take care of entire families or

running down to help when there was an injury at a sporting event,” Baker explains, “so I always had this idea that I would go into medicine.” After internal medicine training, he chose to specialize in rheumatology. “Ten or 20 years ago, many of the other fields within medicine weren’t really focused on the immune system,” Baker says. “But now it’s clearly involved in just about everything. It was, and is, a really exciting time to be in the field.”

His work eventually led him to Stanford, where he’s become one of the go-to doctors on the West Coast for sarcoidosis, a rare disease that can manifest in various ways, including fibrotic lung disease, lymph node enlargement, and life-threatening problems in the heart. Ron Witteles, MD, associate professor of cardiovascular medicine, often referred his sarcoidosis patients with cardiac involvement to Baker. Soon Baker and Witteles were co-managing close to 20 patients. “There was a need to bring people together around sarcoidosis,” Baker explains. They wanted to “formalize and standardize” their practice.

At first, this included capturing patient information in a database and collecting samples from willing patients to use for future studies. It snowballed from there—cardiac sarcoidosis is a rare form of the disease; it’s more common to see pulmonary problems. So Baker and Witteles started to include pulmonologists (including Rishi Raj, MD, clinical professor of pulmonary and critical care medicine) in their work. From there, it transformed into what is now known as the Stanford Multidisciplinary Sarcoidosis Program, co-directed by Baker, Witteles, and Raj and staffed by Emily Braley, RN. The program began in June 2019, and as the only program of its kind in Northern California, it’s become a hub for sarcoidosis patients.

As part of the program, doctors try to coordinate their clinic days so they can see patients together or at least ensure that the patients can see all the different subspecialists they need to in one day. Baker and his colleagues hope to develop their own algorithm and practice guidelines for the diagnosis and management of sarcoidosis.

Baker is also collecting patient samples to investigate specific cell types that might be involved in sarcoidosis pathogenesis, and he’s

Sarcoidosis is a rare disease that can manifest in various ways.





Tamiko Katsumoto, MD, explains her work.



Matt Baker, MD, MS (right), talks with a patient.

recruiting for a study to determine the effectiveness of a drug approved for rheumatoid arthritis in sarcoidosis patients.

The far-reaching ambition of the program is a simple one. “A lot of people come from far away,” Baker says, “so we want to make their visits efficient. Our goal is to be able to provide the best collaborative care possible.”

## A Working Group for Adverse Events

Katsumoto also preaches the benefits of interdisciplinary work. She always had “a profound love of internal medicine,” and when the time came to choose her specialty, she found herself torn between oncology and immunology and rheumatology. Ultimately she chose immunology and rheumatology, but as she points out, in many ways her career has now come full circle: After years at UC-San Francisco, then Genentech, and now Stanford, her work has resulted in the creation of a new interdisciplinary project: the Immune-Related Toxicity Group.

The idea for this group arose from the growing trend of applying immunology to cancer treatments, and in Katsumoto’s case, the use of checkpoint inhibitors to fight tumors. As Katsumoto explains, “Normally, the immune system is capable of identifying a tumor and mounting a productive response against it. When cancer develops, often the tumor evolves mechanisms of resisting immune attack.” The checkpoint inhibitors administered by doctors then block the resistance mechanism of the tumor, thereby “unleashing the immune system by taking the brakes off” and allowing the immune system to recognize and attack the tumor. Checkpoint inhibitors have generated impressive long-term responses in some patients, but there’s a secondary issue. When you take the brakes off the immune system, it leaves the patient vulnerable to “immune-related adverse events.”

“Sometimes you get collateral damage to your own internal organs,” Katsumoto says. That’s where she and her colleagues in medicine—jokingly referred to as “the cleanup crew”—come in, and how she first got the idea for the group.

Katsumoto realized while treating these adverse events that there were still knowledge gaps, despite the existence of several guidelines. Clinical questions frequently arise, such as how to optimally manage these adverse events, whether it’s safe to restart the checkpoint inhibitor, and whether it’s safe to use checkpoint inhibitors in patients with pre-existing autoimmunity. Katsumoto wondered about creating a working group, akin to a tumor board, that could provide consultative services, a database, and even a biobank for all these adverse events. As Katsumoto puts it, “It became clear that there was a need for us to come together as a larger multidisciplinary group to really discuss these cases and learn from each other.”

The group is still in its infancy, but Katsumoto has identified interested parties from various disciplines (including oncology, dermatology, gastroenterology, pulmonary medicine, endocrinology, nephrology, hepatology, and neurology), and she’s already getting referrals for patients from colleagues. She’s also involved in a large multisite NIH trial seeking to discover whether patients with pre-existing autoimmunity can safely use checkpoint inhibitor therapy. Another major project involves biomarkers: If doctors can discover which biomarkers identify patients who will respond negatively to checkpoint inhibitor therapy, they can identify problems before any therapy is administered.

She’s hoping to convene the group as a resource for doctors in this rapidly changing field. “This could be a springboard for a lot of collaborative research projects,” Katsumoto envisions. She also hopes that identifying “point people” in various divisions can help improve clinical care.

The Immune-Related Toxicity Group is a relatively new idea for Katsumoto, but her goals for the project prove her determination, and her collaborators are just as eager. “The use of checkpoint inhibitor therapy is growing, almost exponentially. More and more medications are getting approved for new indications every day,” Katsumoto says. And that only proves the greater need for collaboration. As Katsumoto asserts, “The field is growing in real time. We need to band together.”

# CREDESCENCE Brings Together Multiple Groups in Successful Trial

Sun Kim, MD, MS, associate professor of endocrinology, was a principal investigator at Stanford for a recent randomized, placebo-controlled clinical trial of the drug canagliflozin, which is a sodium glucose co-transporter 2 inhibitor. This class of drug for Type 2 diabetes controls high blood sugar while lowering the risk of death from heart attack or stroke in patients who also have heart disease.

Canagliflozin was approved by the Food and Drug Administration based on the CANagliflozin cardioVascular Assessment Study, or CANVAS, which assessed the drug in patients with or at high risk of cardiovascular disease. Patients were excluded unless they had “almost normal kidneys,” according to Tara Chang, MD, associate professor of nephrology, who is director of clinical research for the division of nephrology.

Yet patients with Type 2 diabetes are at high risk for kidney disease, so testing the drug in diabetic patients with kidney disease became the aim of another clinical trial, CREDESCENCE (Evaluation of the Effects of Canagliflozin on Renal and Cardiovascular Outcomes in Participants with Diabetic Nephropathy).

“What made us so excited about CREDESCENCE was that we focused on people with advanced kidney disease,” says Chang. “CREDESCENCE was a sicker population than CANVAS with regard to kidney disease, and canagliflozin worked amazingly well.”

Sun Kim, MD, MS, a principal investigator for CREDESCENCE, examines a patient with Type 2 diabetes.



The primary composite end point of the study included end-stage kidney disease, doubling of serum creatinine, or renal or cardiovascular death. End-stage kidney disease was defined as needing dialysis, getting a kidney transplant, or having kidney function less than 15% of normal. In the end, says Chang, “People randomized to canagliflozin had a 30% lower rate of this primary outcome compared with patients who were randomized to placebo.”

That was a home run: The trial was ended early because of benefit, a rarity. It is the first trial in nearly 20 years to identify a therapy that slows progression to renal failure in patients with Type 2 diabetes.

A few years ago, says Kim, Stanford’s Department of Medicine participated in few clinical trials. “Stanford has a long history of strength in basic science research,” she explains, “and we have really great mechanistic and physiology studies. But we weren’t focusing much on clinical trials. The infrastructure to support clinical research was very cumbersome; just simple Institutional Review Board approval was very time-consuming.”

Then Ken Mahaffey, MD, professor of cardiovascular medicine, started up the Stanford Center for Clinical Research, and the department began to grow its participation in clinical trials. Kim mentions a few pain points that have eased in recent years: “Ken streamlined a lot of logistics and helped with operational aspects of the larger programs for grant and proposal submissions.”

Much of the reward of participating in CREDESCENCE for Kim was working with a team to design and conduct the trial, including other Stanford researchers with important roles: Mahaffey as the overall study co-principal investigator with Vlado Perkovic from Australia as well as Chang and Glenn Chertow, MD, MPH, professor of nephrology, as national leaders in the United States responsible for site recruitment and retention and data quality. Mahaffey also co-led and Chang was a member of the event adjudication committee.

Kim affectionately calls her partnership with Mahaffey and Chang the CKD (cardiology, kidney, diabetes) group. As a caregiver, she says, “It’s exciting to tell a patient that this drug can control glucose, and it has other benefits like helping the kidneys and the heart.”

The CREDESCENCE database is a rich one, and abstracts are already underway for upcoming meetings in endocrinology, nephrology, and cardiology to inform the medical community about the striking results.



# New Approaches to Tobacco Control

The tobacco products of today are not just your grandfather's unfiltered Lucky Strikes or Camels, but rather natural and organic cigarettes, confectionary-flavored e-cigarettes and vapes, and emerging heated tobacco products. Jodi Prochaska, PhD, MPH, associate professor of medicine with the Stanford Prevention Research Center, is making seminal contributions to the rapidly changing field of tobacco control.

Prochaska has over a dozen active grants, all directed at addressing tobacco and nicotine use, from evaluations of novel treatments to study of policy dissemination to advances in medical education.

## Tobacco Use in Alaska

Prochaska's most scenic project is centered in the Norton Sound region, an inlet in the Bering Sea off the west coast of Alaska. Funded by the National Heart, Lung, and Blood Institute, the Healing and Empowering Alaskan Lives Toward Healthy Hearts (HEALTHH) project uses telemedicine to address significant inequities in tobacco use and tobacco-related disease in the region. About half of Alaska Native men and a third of Alaska Native women smoke—a level of prevalence that hasn't been seen in the continental United States since the 1960s. "It's a very high smoking prevalence in a remote location, without easy access to treatment. Developing partnerships and trust is critical," Prochaska states. The HEALTHH project works closely with the local tribal health council, in collaboration with a team in Anchorage, including two doctoral students of Alaska Native heritage who received their own fellowship awards on the project.

Launched in 2012, the HEALTHH team has made over 125 trips to the Norton Sound region. "Half the 299 participants are randomized to telemedicine-based counseling for quitting smoking and exercising, and half are randomized to telemedicine-based counseling for a heart-healthy Native diet and compliance with medications for hypertension and/or high cholesterol," Prochaska explains. Though too early for outcome results, Prochaska says, "The telemedicine treatment approach has been rated highly, and participants are sharing their successes."

## The Challenge of Vaping

As for e-cigarettes, Prochaska notes, "The science is trying to catch up with the unregulated free-market growth of e-cigarettes, and there's a huge gap in training for clinicians in terms of best practice for when a patient asks about vaping." She and her colleagues created a free online CME course to help clinicians work through scenarios with patients asking about e-cigarettes.



Jodi Prochaska, PhD, MPH

From an earlier project, Prochaska and her colleagues, in collaboration with HealthTap, studied hundreds of patient-doctor interactions on e-cigarettes, then designed and evaluated a highly interactive course to address the most prevalent concerns. Prochaska describes the course as "a non-linear, Go-Pro, first-person, choose-your-own-adventure, clinician-led experience." She explains, "The course features a day in the life of a clinician—exposed to media reports on e-cigarettes; in the exam room, encountering patient questions about vaping; and venturing out to visit a virtual vape shop." So far, over 1,000 health care providers from 70 nations have taken the course. Knowledge scores have significantly improved, and course ratings have been high.

Prochaska is also the faculty director for the Department of Medicine's Master of Science (MS) Program in Community Health and Prevention Research. She teaches a highly rated course on theories of behavior change and community-based interventions.

Prochaska is a product of social scientists who emphasized "higher education, service to the community, and well-being." Her father, James Prochaska, developed one of the field's leading theories of behavior change. Her early start, with an emphasis on "encouragement to ask questions and seek out answers," has served her well through two decades in the tobacco control field and will continue to help her pursue solutions on the increasingly complicated tobacco frontier.

# T Regulatory Cells

## Join the Mainstream

Just 70 years ago, cancers of the blood were essentially untreatable while other cancers, of solid organs for instance, could be cut out with surgery or burned out with radiation. Eventually chemotherapeutic agents became capable of killing a cancer without killing the patient, but they were brutal. Then along came blood and marrow transplantation which could give patients a new lease on life. However, they required immunosuppressive agents to keep the patient's immune system from rejecting the transplant—and those came with serious side effects. Consistent steps forward but always with asterisks.

Today some high-risk patients at Stanford with severe cancers, including leukemias, lymphoma, and myelodysplastic syndrome, are enrolled in a Phase 2 randomized clinical trial in which they forgo immunosuppression in favor of treatment with T regulatory cells, known as T regs, thanks to work by a team led by Everett Meyer, MD, PhD, assistant professor of blood and marrow transplantation.

Progress has been slow and steady. According to Meyer, “It’s actually been a 20-year effort. The proof of concept was done in 2003, and the trial itself opened in 2011. After I joined as faculty in 2015 and the person who had opened the trial left, I revamped it and did some basic science to fix some problems. Once we reopened the trial we had pretty good success.”

Patients in the trial are quite sick, Meyer explains, and their course is rigorous: “They’ve either failed an initial therapy or they’re so high risk that we expect their disease to come back. They need a bone marrow transplant, and we have to get donor grafts into them and then prevent their grafts from causing graft-versus-host disease, a major complication. We also need to allow their new donor immune system the space and freedom to attack and kill the cancer. That graft-versus-leukemia effect is the secret sauce of our transplant.”

Once a patient receives a bone marrow transplant, T regs attempt to teach the patient’s new immune system how to regrow in a way that will help the anti-leukemia response and prevent complications. Using immunosuppressive medications, on the other hand, is a “strategy that essentially says we’re going to cripple the immune system just enough to make it work,” according to Meyer.

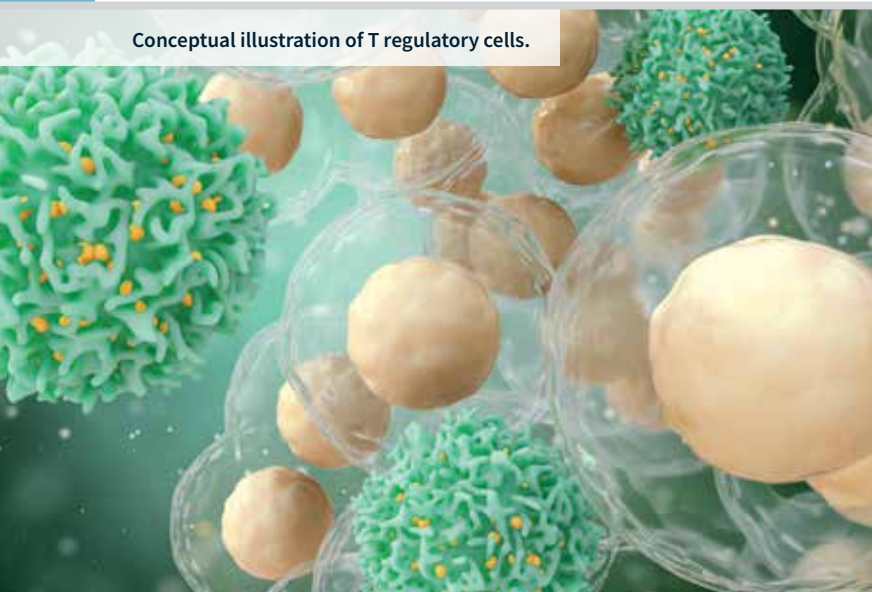
Not all patients in the ongoing randomized trial get to skip immunosuppressive medications. Only half the patients get T regs alone while the other half get T regs plus a single-agent immunosuppressive. By comparing the two groups, Meyer will be able “to understand how effective these T regulatory cells are. So far, we’ve seen very few mild cases of graft-versus-host disease in the 17 patients we’ve treated.”

T regulatory cells have shown promise in newer frontiers such as solid organ transplant and islet tolerance, and the treatment of autoimmune disorders such as rheumatic disease or Type 1 diabetes. Meyer considers himself fortunate to have collaborators in many divisions: Seung Kim, MD, PhD, professor of developmental biology; Justin Annes, MD, PhD, assistant professor of endocrinology; Sam Strober, MD, professor of rheumatology and immunology; Robert Negrin, MD, professor and chief of blood and marrow transplantation; and Judith Shizuru, MD, professor of blood and marrow transplantation, have been “guiding forces.”

He is especially pleased to work with “the people who do cell therapy, because they’re the quiet, unsung, committed heroes moving things forward. I know certain things, but I know I don’t know more. And they do. Being able to interact with them is a gift.”

“It’s nice to talk to students and fellows, tell them this is the future, and wonder how much further they’re going to take it.”

Conceptual illustration of T regulatory cells.





Everett Meyer, MD, PhD, leads a team that replaces immunosuppressive agents with T regulatory cells for patients with specific cancers.



# Diagnosing Lung Disease

## with Help from Computers

### APPLYING MACHINE LEARNING ALGORITHMS TO PATIENT DATA IS HELPING STANFORD RESEARCHERS BETTER DIAGNOSE AND TREAT LUNG DISEASE.

Parts of medicine can be trial and error—if one drug doesn't work, try another; if a diagnosis isn't leading to a cure, maybe the diagnosis is wrong. But eliminating that trial and error, through more informed diagnostic tests, saves time for both clinicians and patients. In the division of pulmonary, allergy and critical care medicine, machine learning algorithms are now guiding those more personalized treatment decisions.

“We're at a critical juncture in pulmonary medicine, where innovative analysis approaches are needed to handle the large number of patient samples and clinical variables we are collecting for research,” says Andrew Sweatt, MD, a clinical assistant professor of pulmonary, allergy, and critical care medicine. “Machine learning is a promising tool that can help us with most of this high-throughput data.”

In machine learning, a computer program sifts through data—whether it's information on the levels of different molecules in a blood sample or scans of the lungs—and finds otherwise hidden patterns. Often, such programs can do a better job than the human eye at spotting structure in the data, finding correlations between data and patient outcomes, or pinpointing groups of variables that set some patients apart.

“We're not trying to replace doctors, but with machine learning, there's a huge potential for augmenting clinical decisions by physicians,” says Husham Sharifi, MD, instructor of pulmonary, allergy, and critical care medicine.

### Guiding the Treatment of a Rare Disease

Many patients with pulmonary arterial hypertension (PAH) have other underlying diseases—scleroderma, lupus, cirrhosis, congenital heart disease, or HIV, to name a few. Others have been exposed to drugs or toxins, such as methamphetamine. And in

roughly a third to half of patients, the rare lung disease appears without any explanation. In all cases, though, the underlying disease is the same: The small arteries that carry blood through the lungs narrow over time due to structural changes. This progression leads to high blood pressure in the lungs and places strain on the heart.

“It's a very aggressive disease, and there's a lot of room to improve patient outcomes,” says Sweatt.

Without treatment, nearly half of all patients die within five years of their diagnosis. Over the past decade, several drugs have been approved to treat PAH. The treatments don't consistently work in all patients, however, although they all have the same mechanism—to relax and open blood vessels.

A large body of research has suggested that there's a component of PAH that's mediated by the immune system, and new drugs are in development to target this inflammation. Sweatt wanted to know whether some patients would be better helped by these new drugs. Until now, PAH has been grouped into subtypes based on the patient's underlying predisposition, and all subtypes have been treated the same.

Sweatt and his colleagues collected blood samples from 385 PAH patients and measured levels of 48 immune proteins and signaling

Andrew Sweatt, MD





Joe Hsu, MD (left) and Husham Sharifi, MD, discuss diagnostic techniques using machine learning.

molecules. Then they let a machine-learning program parse the data set.

“My goal was to remain agnostic by avoiding common preconceived notions about the disease, and instead let the molecular data alone tell the story,” says Sweatt.

It worked—the program revealed four previously unknown subtypes of PAH based on the immune profiles of the patients. One-third of the patients studied had minimal inflammation, suggesting that drugs targeting the immune system may not be helpful for them. The three other groups were each distinguished by their unique inflammatory signatures in the blood.

Importantly, the clinical disease severity and risk of death also differed among the four subgroups.

“What really stood out is that these immune phenotypes were completely independent of the cause of PAH,” says Sweatt. In other words, patients who had underlying immune diseases like lupus or scleroderma were just as likely to be in each subcategory of PAH as patients with no underlying disease. “It means we really detected a hidden system for classifying patients that is highly relevant to underlying disease biology and clinical outcomes,” he says.

The data suggest that different types of immune drugs may work against PAH for different patients, but more work is needed to determine whether the new immune subtypes can help guide treatment. Sweatt’s research has been recognized as an innovative first step toward precision medicine in PAH. Building on this foundational work, Sweatt also has additional machine learning-based studies planned to better understand the biological underpinnings and therapy ramifications of each immune subtype.

## Narrowing Down a Diagnosis

Another challenge involves graft-versus-host disease of the lungs—also known as bronchiolitis obliterans syndrome (BOS). In that case, the challenge is not differentiating subtypes of

patients, but diagnosing them in the first place. Graft-versus-host disease is a complication of a bone marrow or blood stem cell transplant in which the donated bone marrow or stem cells start attacking the body. But BOS can closely resemble other common complications of a transplant, including infections and inflammatory disorders.

“All these types of lung disease are poorly defined,” says Joe Hsu, MD, an assistant professor of pulmonary, allergy, and critical care medicine. “The way we typically diagnose graft-versus-host disease is to look for everything else and, if we don’t find anything else, diagnose that.”

Hsu and Sharifi wanted to do better at diagnosing BOS. They started collecting CT scans from patients with BOS as well as from transplant patients who had similar symptoms but did not have BOS. Then they used a machine learning approach—telling a computer program which cases were which and letting it learn how to differentiate them.

The machine, it turned out, became so good at telling BOS apart from other lung diseases that it was even slightly better than thoracic radiologists, who regularly read CT scans of the chest. The program learned to differentiate normal lung, mild BOS, severe BOS, and alternative diagnoses.

“It was seeing things that the eye couldn’t necessarily pick up on and improving the diagnosis quite a bit,” says Hsu.

Since each diagnosis is treated differently, fast and easy diagnosis is critical. Hsu and Sharifi say in the future, similar programs might be able to differentiate other diagnoses as well, such as chronic obstructive pulmonary disease (COPD). Pulmonology, Sharifi points out, is full of numerical and imaging data that can be leveraged with machine learning.

“For a lot of other aspects of medicine, it’s a bigger challenge to integrate artificial intelligence because clinical notes can be so messy and unstructured,” he says. “But this is a good example of where algorithmic and computational analysis can be used hand in hand with a doctor’s advanced training and experience.”

# The Medical Promise of Artificial Intelligence

Now that computers can be taught to process large amounts of data and to recognize patterns in them, their usefulness in medicine is greatly enhanced.

In the hands of Olivier Gevaert, PhD, assistant professor of biomedical informatics, patients with a variety of diseases including cancers, neurodegenerative diseases, and cardiovascular diseases are being helped without even knowing it, thanks to artificial intelligence.

Gevaert fuses data from disparate sources to create algorithms to guide clinicians making diagnoses, prognoses, and treatment decisions. Since medical knowledge is said to double every few months, there will always be a plethora of data for him and his colleagues to work with.

About the methods he uses to study reams of data, Gevaert says, “I see them as different tools in the toolbox of machine learning. Some of them have more of a statistical flavor, some are more mathematical, some are pure machine learning. They are all part of the big brother field of machine learning.”

## From Cancers in General to Specific Cancers

Besides using different tools, Gevaert and his colleagues use many different types of data: radiographic images, genetics, clinical data, even economic data. Much of this work has been focused on cancers since he came to Stanford as a postdoctoral fellow in 2010 after completing his master’s and PhD at the University of Leuven in Belgium.

“For example,” he says, “we developed computational algorithms for identifying cancer-causing genes using multi-omics data from genes, molecules, and proteins, among others. We use any type of

machine-learning algorithm to integrate these different types of data.”

In addition to employing omics data, those in Gevaert’s lab fuse multiscale biomedical data—bridging the molecular-using omics data, the cellular-using pathology data, and tissue-using medical imaging data. They hope to learn which data source is most predictive of diagnosis, treatment, outcome, and prognosis.

Importantly, says Gevaert, “You can imagine that if you treat each data source in isolation, you will have some predictive value. But what happens if we put them together? Is the sum greater than the parts?”

“We did one study where we showed that combining clinical data, genomic activity, imaging, and pathology data improved our ability to predict outcomes for a number of cancers.”

## Transfer Learning to Pre-train a Model

If Gevaert and his colleagues are able to make their toolbox more generic and flexible, it can be used in different disease areas. Because the models that they train are very complex, they need a lot of data.

“What we’re trying to do,” he explains, “is called transfer learning, which means we’re using data in one disease area to train the models before we transfer them to another disease area where we have fewer data. This is pre-training.”

Using thousands of MRI images from a large cohort of healthy people and people with neurodegenerative diseases, for example, they can pre-train a model so it knows what a brain is and what an MRI image looks like. And then they can further train it using a cohort of as few as 200 brain tumor patients at Stanford.

For the past year, the Gevaert lab has also focused on cardiovascular diseases. For now they are most interested in diagnostics. “We have some preliminary results where we have looked at labs and symptoms in patients over time,” he explains. “We have clinical records of all Stanford patients for the past 15 years and we have looked at a subset of about 150,000 patients with up to 20 cardiovascular diseases. We’re now trying to distinguish them from people who are healthy.”

Artificial intelligence has opened many doors for study within the health care realm. And Olivier Gevaert and his colleagues will walk through as many of those doors as possible.

Olivier Gevaert, PhD





# Marina Basina's Masterful Teaching and Patient Care

Clinical associate professor of endocrinology Marina Basina, MD, has been caring for patients with Type 1 diabetes since she completed her fellowship and joined the Stanford faculty in 2003. She heads the inpatient diabetes service and has chaired the diabetes task force since 2009. Not only is she a beloved and highly regarded expert in diabetes and glucose control, but she also is an award-winning educator.

Basina has well-recognized and truly extraordinary teaching skills. After her first year on faculty, she won the 2004 House Staff Award for Demonstrating Excellence in Clinical Teaching. She was awarded her division's Fellows Teaching Award in 2009 and 2010, and yearly from 2012 to 2018. Also in 2018, she received the Stanford University Master Teacher Award, which colleagues jokingly suggest might have been created to honor a teacher "who won so many awards a new one was needed."



Marina Basina, MD

## Expanding Her Teaching Skills

In addition to coaching trainees about the disease, the patients, and the technology, such as insulin pumps and glucose monitors that simplify life for these patients, Basina also teaches patients and their families, both in person and online. She serves as an advisor to several community groups, each of which was organized to meet the needs of a few patients and now has much greater reach via the internet.

The first of these is CarbDM ([carbDM.org](http://carbDM.org)) which was started by the mother of a newly diagnosed 8-year-old who couldn't find much support in the community. Beyond Type 1 ([beyondtype1.org](http://beyondtype1.org)) is a second such organization; it currently has over 2 million members in more than 150 countries. The third organization, Sugar Mommas, is for women with Type 1 diabetes who have small children or are pregnant or trying to get pregnant.

## Fifteen Years of Technological Change

Basina points out that things are much better for her patients with diabetes than they were when she completed her fellowship more than 15 years ago. She describes diabetes as "a 24-hours-a-day, 7-days-a-week, 365-days-a-year condition. Anyone who has Type 1 diabetes will likely tell you that it is a difficult, demanding, and challenging condition, requiring daily attention. It is upsetting, and it never goes away." Between personal glucose monitors and insulin pumps, daily life has improved somewhat but remains challenging. However, now there are options for those who qualify.

One option, which would eradicate the disease, is transplantation. There are two types of transplantation for diabetes: pancreas as an organ transplant and islet cell transplantation. Basina points out that organ transplantation has been used for many years, but only certain patients with significant diabetes complications are eligible for it. Patients are on a wait list for a long time and afterward must take immunosuppressive medications to avoid rejection of the pancreas. Many patients become insulin-independent for 10 years or longer, but some need to start using insulin again within a decade.

But, explains Basina, things continue to change: "Islet cell transplantation is a promising and developing field that has been shown in some studies to improve patients' quality of life and prevent severe low blood sugars. This procedure is approved in Canada, Australia, and several European countries. Hopefully, it will be FDA approved and available here in the U.S. after clinical trials in the near future."

Fredric Kraemer, MD, chief of the division of endocrinology, gerontology, and metabolism, recently had this to say about Basina: "Marina is a tremendous asset for the division, department, hospital, and school. She is the consummate master clinician and educator par excellence. We are all fortunate to benefit from having her on our faculty."

# The Enormous Reach of the Stanford Medicine 25

**ONE THING THAT RONALD WITTELES, MD, ASSOCIATE PROFESSOR OF CARDIOVASCULAR MEDICINE, ENJOYS DOING WHEN HE PARTICIPATES IN AN EXCHANGE WITH ANOTHER RESIDENCY PROGRAM IS JOINING MORNING ROUNDS ON THE CARDIAC CARE UNIT (CCU).**

As the residency director for the Department of Medicine, he is interested in noting differences between what Stanford residents do on rounds and what residents at other institutions do. As he is a cardiologist, a CCU is familiar territory.

Visiting Yale not long ago, he showed up at the CCU early one morning, unannounced, and walked down a hall to join a group of residents huddled around a computer. To his surprise—and that of the residents once they turned around and noticed him—he saw himself on the screen. The Yale resident group was using the Stanford Medicine 25 website to review proper procedure for measuring a pulsus paradoxus, a rapid fall in blood pressure during inspiration. Witteles had authored the section of the website and been videotaped demonstrating the correct technique.

## How the Stanford Medicine 25 Came About

Such an event was never in the mind of Abraham Verghese, MD, vice chair of medicine; John Kugler, MD, clinical associate professor of hospital medicine; and Brooke Cotter, MD, adjunct clinical assistant professor of primary care and population health. Back in 2008 the three shared their concern that bedside physical diagnosis skills taught in the first and second year of medical school are never revisited much after that, not even in the students' clinical years. As a result, the new interns at Stanford had varied and generally weak bedside exam skills.

"The body is a text and has a story to tell you," says Verghese, "but you need to be literate, to be able to read the clues. The physical diagnosis maneuvers described in the textbook can appear straightforward on the page, but at the bedside the theoretical knowledge doesn't help when the technique is poor. Talking about this with John, we had no appetite to teach the whole physical exam course again to interns, and they had no time. But we both wondered, 'What if we taught them just a few

things that were very technique dependent? Would it not elevate their technique in general?' It would be like teaching novice cooks 25 involved dishes—they would no doubt also become more comfortable in the kitchen and better appreciate a culinary expert's skill."

They settled on what has become the Stanford 25, a set of physical diagnosis skills best taught one on one at the bedside. In the beginning, they taught one such skill in a special session during morning report, then another during another session two weeks later, and so on. It became quite popular, but its principals felt it needed something more.

## Moving to the Ether, Reluctantly

They invited some residents to a focus group dinner in Verghese's apartment and, he says, "I asked them to free associate about the Stanford 25 and tell us what additional things they wanted. The first thing they said they wanted was a website. That was the last thing I wanted; this is all about hands on! But they convinced us that they needed an online correlation to what they were doing with their hands."

Blake Charlton, MD, then a medical student and now an interventional cardiology fellow at UC-San Francisco, put together a website during an elective project based on input from Verghese and research on the specific skills. They made basic videos of themselves performing the 25, which were posted on the site.

## A Further In-Person Enhancement

As the popularity of the Stanford 25 increased, both inside and outside of Stanford, the "bed-med" team sensed a hunger for this applied skill and decided to put on an annual symposium promoting the culture of bedside medicine, with John Kugler taking the lead. The course, now in its fifth year, promised attendees that they would learn to perform and interpret a competent physical exam and, most importantly, to teach advanced physical exam skills at a patient's bedside.

The popular symposium aims to train clinician-educators who train others at their institutions. "The bedside is where the patients are," says Verghese, "and we want to show people the joy and renewal that comes from teaching at the bedside and watching students' eyes open in wonder when we show them how to read the body."



Errol Ozdalga, MD (far right), and Abraham Verghese, MD (holding iPhone), demonstrate one of the Stanford 25 physical diagnosis skills to a group of attentive residents.

## Focusing on the Website

In 2011, then-third-year resident Errol Ozdalga, MD, offered to take over the website, correcting some errors, revamping the website, and expanding the topics and content. He also created a blog and used social media and other venues to promote the content online to drive more traffic to the site. “I thought if it looked good and made sense,” he says, “people would learn from it.”

He made sure it was widely accessible, and he created many new videos, first working with professional videographers and later doing it himself, from storyboarding to filming and editing, often with other faculty. He then migrated the videos to a YouTube channel. He also committed to having a Stanford 25 session during morning report every other week—without fail—which, says Verghese, “is a major undertaking by itself. And he hasn’t deviated.”

Ozdalga, currently clinical associate professor of hospital medicine and director of the Stanford Medicine 25, discusses another aspect of the Stanford 25: “We involve other faculty from neurology, dermatology, ob/gyn, and many faculty from our medicine department. We also have faculty from outside

Stanford, including outside the U.S., whom I have filmed to capture how they teach specific exams. I’m in debt to them all for volunteering time to help grow the content on the website and YouTube channel.”

During a Stanford 25 session, a real patient—as opposed to an actor playing the role of a patient—is often brought in, and the instructors focus on a single element of the physical exam to teach the residents. Ozdalga recalls being “super nervous about teaching my fellow residents a particular skill during a Stanford 25 session. Of course, that’s how you learn: You get thrown in the deep water.”

Today the Stanford 25 website has 5,000 visitors daily and is second only to Stanford’s news office in hits for a Stanford website. In the first six months of 2019, the Stanford 25 website had over 1 million page views: 1.068 million to be precise.

Verghese says, “What Errol has done is truly miraculous, wedding his love of teaching at the bedside with his love of technology. The Stanford 25 is already a well-known go-to resource the world over, but with more resources and personnel I have no doubt he can make this brand grow and be even more iconic.”



# Why Aren't There More Female Cardiologists?

We know that slightly more than half of medical students in the United States are women, as are about half of internal medicine residents. But, as assistant professor of cardiovascular medicine Fatima Rodriguez, MD, MPH, says, “Something happens at the critical transition when people are deciding what specialty fellowship to do.”

Joshua Knowles, MD, PhD, assistant professor of cardiovascular medicine, who directs the general cardiology fellowship program, knows what those numbers look like at Stanford. “Over the last few years, of 450 applications for fellowship we’ve received per year in cardiology, only 20% to 25% have been women,” he says. “The deficit in general cardiology only grows in subspecialties like interventional cardiology and electrophysiology, where only 10% of people doing fellowships are women.”

Celina Yong, MD, MBA, MSc, assistant professor of cardiovascular medicine, became aware abruptly of how few female colleagues she had in interventional cardiology: “I remember going to one of our big national conferences when I was a trainee and sitting in a 1,000-person auditorium, listening to a great lecture that I was passionate about. When I looked around, I realized that I was the only female physician in the room.”

Bongeka Zuma (left), a medical student interested in cardiology, meeting with Fatima Rodriguez, MD, MPH.



## What to Do About Women Not Choosing Cardiology

Work-life balance was the number one concern of internal medicine trainees who responded to a survey, published in the Aug. 2018 issue of *JAMA Cardiology*, about career preferences and cardiology perceptions. Recognizing the need for a committed and diverse workforce, several professional cardiology societies have undertaken studies and published articles addressing the issue. Negative perceptions of cardiology, such as adverse job conditions and interference with family life, often lead women to pursue other subspecialties.

Yong has taken a research approach to increasing the number of women in cardiology. “To better understand the barriers for women and to overcome misperceptions,” she says, “I’ve focused on collecting and analyzing firsthand data on these issues, with hopes that we can use a data-driven approach to enable large-scale institutional change to happen.” Writing in the *Journal of the American College of Cardiology*, she proposed three recommendations: “changing professional expectations to accommodate young families, providing resources for young mothers in the catheterization lab, and equalizing opportunities for promotion. My hope in putting those ideas forth in publication form, and backing them up with actual data, was to get more wheels turning across the country.”

## What Stanford Is Doing

Knowles mentions several efforts to increase the numbers of women in the fellowship program. “We invite as many talented women as we can. We pair them with leaders in the field so that they can see others like them who have made it. And our fellows and faculty established a Women in Cardiology interest group to stimulate interactions outside the office.”

Women in medicine at Stanford do not face the wage inequity often mentioned elsewhere as a drawback to choosing certain specialties. In the Department of Medicine, a thoughtful and logical approach to salaries eliminates inequity. Cathy Garzio, vice chair and director of finance and administration for the department, describes the plan: “In fiscal 2017, we introduced our compensation plan using a methodology where we pay people based on their medical specialty, their rank—assistant or associate or full professor—and their years at that rank. We are super transparent about our methodology and our principles.”



Celine Yong, MD, MBA, MSc, in the catheterization lab at the Palo Alto Veterans Administration Hospital.

## What Young Female Faculty Are Doing

Both Rodriguez and Yong feel called to contribute their ideas and efforts to increase the number of women in cardiology. Rodriguez believes one way is through mentorship: “We need to focus upstream—in medical school and residency—to try to attract talented women to cardiology. Many of us make it a point to mentor women interested in careers in cardiology, because one of

“When I looked around, I realized that I was the only female physician in the room.”

Celina Yong, MD, MBA, MSc

the reasons they are not choosing cardiology is because they don’t see a lot of role models in this field.”

Yong sees potential in the recently-funded Stanford Advancement of Women in Medicine program. The goal, she says, “is to develop an evidence base for actionable interventions that will improve the representation of women in all specialties and at the highest levels of leadership. By developing a foundation of research to better understand the infrastructure, policy, and cultural barriers to gender equity throughout medicine, we hope to translate those findings into interventions with maximum measurable impact.”

It is clear that two of Stanford’s young female cardiologists will try to reverse the trend of their specialty losing so much talent. With luck, their efforts will encourage women in other specialties to do the same.





Nocturnist Rita Pandya, MD, cares for hospital patients overnight.



# All in a Night's Work

## WHEN DOCTORS LEAVE THE HOSPITAL FOR THE DAY, ANOTHER TEAM OF DOCTORS—NOCTURNISTS—STEP IN.

They begin their shifts under cover of darkness, slipping through the hospital's doors just as others are getting ready to head home. They do the work of several—often overseeing as many as 30 patients at a time. They're specialists and generalists wrapped into one, able to shift identities in the blink of an eye. And you never quite know where they'll turn up: at the bedside, assessing the condition of a heart transplant recipient; in the hallway, advising a resident on treatment plans; seated in the lobby, calming the family of a recently admitted patient.

They aren't superheroes of the Marvel variety, though they sound like it. They're nocturnists—shorthand for nocturnal hospitalists—a dedicated, experienced team of physicians who care for hospital inpatients overnight.

The rise of nocturnists is a fairly recent phenomenon, driven in part by the increasing popularity of the hospitalist field, limitations on physician and resident work hours, and a widespread push to improve patient safety. The nocturnist program, which began at Stanford Hospital 11 years ago, has grown exponentially, says Rita Pandya, MD, clinical assistant professor of medicine and the nocturnist group manager, and shows no signs of slowing down. "We currently cover nine services—hematology and oncology; gastroenterology, hepatology, and liver transplant; electrophysiology; pulmonary hypertension; cystic fibrosis; lung transplant; heart transplant; ventricular assistance device; and renal transplant—and we're continuing to expand."

"For these services, the nocturnists provide care for about 50% of the patient's hospital stay," explains Neera Ahuja, MD, clinical professor and division chief of hospital medicine. "This is not insignificant, and it is a responsibility that our nocturnists take very seriously."

Each nocturnist shift, which lasts from 7 p.m. to 7 a.m., begins the same way: with sign-out, a critically important information exchange that brings nocturnists up to speed on the health and care plans for patients they will be responsible for, and a chart review. Inpatient work and patient admissions follow.

The rest of the evening is more variable, and it's this element of surprise that appeals to nocturnists like Vijay Prabhakar, MD, a clinical instructor of medicine who has been on the service since 2018. "During the night, we complete any tasks that the day

teams have asked us to follow up on and respond to any nurse pages or changes in patient condition," Prabhakar explains. "We also interact with many different providers—nurses, residents, fellows, physician assistants, nurse practitioners, and attendings."

Pandya recalls previous shifts that were so fast-paced she "almost felt like an intern again." She continues, "You're never quite sure what will come your way. We cover a lot of different specialties so we're always taking in lots of information. That's one of the things that makes this work so exciting, though. You're constantly learning new things."

Yet there are opportunities for continuity and connection on the night shift, too. "We end up seeing a lot of the same patients, and you get to know them really well," says Pandya. "We spend time talking to them and get to know more about them each time. Just this past week I was able to take one of my patients' service dogs out for a walk."

Prabhakar agrees, describing a memorable night when the nurses of the hematology and oncology unit of the main hospital invited him to a late-night potluck for a departing colleague. "Getting to meet some of the nurses face to face and enjoy the delicious food was definitely something I will not forget."

Midnight comes and goes, and the nocturnists' complex shift remains in full swing. "As the sole primary providers in-house for a large number of patients," Prabhakar says, "you have to be able to astutely assess, diagnose, and treat deteriorating patients and help stabilize them by morning." During a recent night, Pandya details, there was a resident who needed help with a procedure, an overnight discharge that required paperwork, and a hospice patient who passed away. This work, she explains, "requires an ability to be proactive and a wide knowledge base that helps individuals toggle between various pathologies quickly."

By 7 a.m., the hospital has awakened in earnest. Sun streams through the lobby windows and physicians and nurses file in, coffee in one hand, phone in the other, to begin their first shift. Meanwhile, the nocturnists complete their charts and sign-offs, wrap up their work, and head home to recharge. But don't worry—they'll be back tonight.



# off Hours

**EACH TUESDAY AT NOON, HEIDI ELMORE MAKES HER WAY ACROSS CAMPUS TO STANFORD HOSPITAL, WHERE SHE SPENDS THE NEXT HOUR TEACHING PATIENTS AND THEIR CAREGIVERS HOW TO KNIT AND CROCHET. AN EXPERIENCED FIBER ARTIST, ELMORE BELONGS TO A COMMUNITY OF STAFF MEMBERS WHOSE EXTRACURRICULAR EXPLOITS AND PASSIONS INFORM—AND ENHANCE—THEIR IDENTITIES ON AND OFF-CAMPUS.**

## A Single Thread

Heidi Elmore's daydreams look a bit different from others'. While some imagine the next vacation they'll take, Elmore's mind turns to stitch combinations and color variations for the latest needlepoint project she's working on—a tapestry of vintage Nintendo characters for her son and his wife.

Elmore's hands—and mind—are always busy. She'll meet with a volunteer group to crochet or knit during her lunch break, and will spend evenings poring over YouTube tutorials or attending training classes.

Elmore, an administrative associate and cancer center lead worker in oncology, first discovered her talent for fiber arts after her grandmother died. "I found her lace-making materials after she passed. I figured I'd try her hobby, and it stuck."

Over the years, Elmore has refined her craft and produced countless one-of-a-kind wares. Her portfolio now includes a mask, crocheted Edwardian gloves, and a leather belt she collaborated on with a friend. But one of the most meaningful things Elmore has worked on is Stanford Hospital's Warm Wishes Survivorship Quilt—an offshoot of the Palliative Care Knitting and Crocheting with Friends program, which teaches patients, caregivers, and others how to knit and crochet. The idea behind the quilt, which is still in progress, is to "let patients and staff members stop by to create a square of the quilt and write a warm wish on the small tag," Elmore explains.

Elmore often finds that her off-hours hobby informs her work on campus. Whether in her living room moving fabric through her nimble fingers or at her desk managing travel schedules and processing financial information, she is drawing on the same skill set: patience, attention to detail, and resilience.

"I like taking a single thread, combining it with other things, and making an entirely different product," she reflects. "That is also a lot like life—whether you're at work or at home. We take all the little pieces and stitch them together to make something new and wonderful."

Heidi Elmore (center), demonstrates knitting techniques to patients and caregivers.







Margaret Wootton (center) sings with the California Bach Society.

## Pitch Perfect

In the California Bach Society rehearsal room, a chord is slowly forming. Thirty voices—a mix of altos, sopranos, tenors, and basses—join together, rising and swelling in response to the conductor’s cues. Everything is unified: They breathe together, pause together, gather volume and fade together.

The result is ethereal and harmonious, a moment “where the total is much more than the sum of its parts,” explains Margaret Wootton, a faculty affairs specialist in the division of oncology who has been singing with the Bach Society, which specializes in Renaissance and baroque music, for over 25 years.

Growing up, Wootton, an alto, sang all the time. But her most formative musical experiences were in her family’s church choir, which she joined at age 8. Today, Wootton lends her voice and her professional skills to the choirs she performs in. She sat on the California Bach Society’s board for six years and currently leads its marketing and public relations. “In addition to singing, I’m writing press releases, placing ads, and developing marketing campaigns.”

These offstage efforts often mirror her work environment in oncology, where she manages the appointments and promotions of roughly 50 faculty members. In a choir, and at Stanford, she continues, “It’s a team sport, and each person’s contribution matters.”

## Big Cat Advocate

The Santa Cruz Mountains extend from the city of San Francisco to just north of Monterey Bay. The range contains lagoons and marshes, peaks that rise up to 3,806 feet, forests of redwoods, and densely vegetated canyons. It’s an area of unique biodiversity and is particularly well suited to support populations of pumas—more commonly known as mountain lions.

It’s here that Summer Vance, life science research professional for hematology, volunteers with the UC Santa Cruz Puma Project, an 11-year-old endeavor to track and understand the ways that habitat fragmentation influences the physiology and behavior of pumas.

Animals were always a part of Vance’s childhood. “I had lots of pets growing up and was definitely the little girl who dreamed of being a veterinarian,” she recalls. A job as a wildlife ranger in Yosemite National Park opened up a world of possibility. “Discovering the field of wildlife biology was a total enlightenment for me,” she recalls.

Vance spends her weekdays in the Bhatt laboratory, toggling between independent research projects, assisting lab members, and performing general lab housekeeping tasks. She spends her weekends performing fieldwork for the Puma Project, setting camera traps, collecting GPS data, and capturing the big cats to collar and obtain samples. She’s also found time to foster four house cats that she rescued from a feline infectious peritonitis research lab. “Three years post-adoption, all the cats are doing great,” she reports.

If there is one word that unites Vance’s varied pursuits, it would be perseverance. “Perseverance is huge in any field, and especially sciences. When working with wildlife you may have to wait to collect any meaningful data, because the animals don’t function on your schedule. In the lab, even though you can plan your experiments, you can’t control the outcomes, and a huge portion of research is failing, trying to understand what failed, and trying again.”



Summer Vance volunteers with the Puma Project.





Jeanne Simonian (right) with second grade teacher Maria Lucia Perez Murillo.

## Giving Back

For the past seven years, Jeanne Simonian has ushered in the beginning of school in the same way: with a shopping spree. But instead of clothing to suit the new season and update her wardrobe, Simonian stockpiles items like pencils, pens, notebooks, anti-bacterial hand soap, coffee gift cards, and technical equipment. That's because Simonian and her family are a dedicated Adopt-a-Teacher family with the Ravenswood Education Foundation, which was founded 12 years ago to reduce inequity in East Palo Alto schools. "We are making a difference in one teacher's life and positively impacting the lives of students," Simonian explains. "And we have been lucky enough to support the same second grade teacher, Maria Lucia Perez Murillo, for almost a decade."

Simonian and her family provide holistic assistance throughout the year, touching base with Maria at regular intervals to see what she needs. This help can take many forms: Simonian and her family have purchased fans for overheated rooms, helped organize classroom parties, cleaned and organized supply closets, and even asked their friends for donations to the foundation in lieu of birthday gifts when their children were younger. "We try to make Maria's life as a teacher a bit less stressful," says Simonian. "I work behind the scenes to assist in small ways to alleviate the challenges of an educator who is teaching underserved students."

She employs this same behind-the-scenes strategy in her role as a fellowship program coordinator in hematology and oncology, where she provides administrative and operational support for residents and clinical fellows. Her job is to ensure a superior fellowship program that adheres to the standards of professional medical organizations, with the goal of sending "competent hematologists and oncologists out into the community and world at large."

## Body of Work

The key to doing well in a bodybuilding competition is not brute strength, but consistent effort. You have to lace your shoes, pack your gym bag before work, and show up to perform your training circuit every day. You have to say "no" to margaritas, nights out with friends, and your own exhaustion and fear, and "yes" to grueling routines, regular progress checks, and strict diets.

This is how Brenda Norrie, fellowship coordinator for infectious diseases, wins awards, and how she mustered the confidence to appear on four bodybuilding stages.

Norrie has always been active. After years of casual running, she started looking for another athletic outlet. She found it in the weight room. "At first," she explains, "I spent time in the gym when it wasn't crowded, because it can be intimidating. I took the time and learned how to perform and execute maneuvers and lifts." Results quickly followed, and in 2014 she began preparation for her first bodybuilding competition.

She took to competition immediately. "I got this huge rush on stage, remembering how much effort I put in and then watching it all come together."

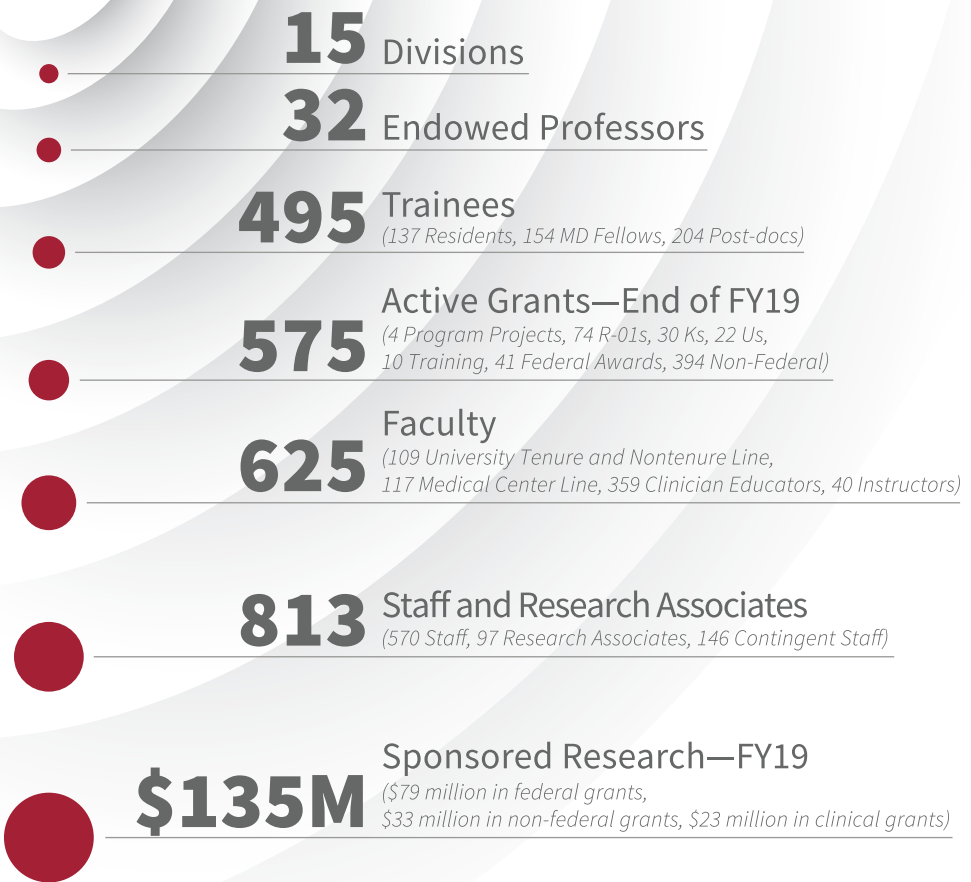
Norrie approaches her work at Stanford with the same sense of commitment and discipline. As a fellowship coordinator, she oversees the entire training life cycle for 11 infectious disease fellows, from recruitment to orientation to onboarding and, finally, graduation. "Bodybuilding," she explains, "has instilled work ethic and patience, and has taught me that if I want to achieve something, I just need to feel the fear and do it anyway."

Brenda Norrie in the weight room.



# Department of Medicine

## In Numbers



“They’re leaving a legacy—they want things to be better for the women who come after them.”

**Cybele Renault, MD**

“I like taking a single thread, combining it with other things, and making an entirely different product. That is also a lot like life—whether you’re at work or at home. We take all the little pieces and stitch them together to make something new and wonderful.”

**Heidi Elmore**

“If we can show that people who have had many traumatic experiences on the basis of their gender identity or sexual orientation have certain health outcomes, then that can provide some evidence to actually change policy and laws.”

**Mitchell R. Lunn, MD, MAS**

“You can imagine that if you treat each data source in isolation, you will have some predictive value. But what happens if we put them together?”

**Olivier Gevaert, PhD**

“It means we really detected a hidden system for classifying patients that is highly relevant to underlying disease biology and clinical outcomes.”

**Andrew Sweatt, MD**

