

More can benefit from stroke treatment

A trial led by Stanford shows dramatically better outcomes for patients



PHOTO: STEVE FISCH

Last April, Cindi Dodd, a 46-year-old graphic designer who lives in Salinas, went to bed around 10:30 p.m., anticipating a 5 a.m. wake-up from her husband because she was scheduled for outpatient surgery at Stanford.

Though she arrived at Stanford Hospital the

next morning, she didn't walk through the doors as an outpatient; she came via helicopter as the victim of a massive ischemic stroke.

"My husband woke me up at 5 o'clock as planned, and when I started to speak to him, I knew what I was trying to say in my mind, but it had nothing to do with the sounds that were coming out of my mouth," Dodd said. Her left side was paralyzed.

Her husband called 911. An ambulance arrived shortly afterward and rushed Dodd to

Salinas Valley Memorial Hospital. But because she'd had the stroke while asleep, no one knew when it occurred. In such cases, physicians refer to the last time the patient was well, which for Dodd was 10:30 p.m. The attending physician explained that it was too late to administer clot-busting medication or for her to undergo a thrombectomy, a blood clot removal procedure.

But an emergency room physician told her husband about a clinical trial led by researchers at

SEE STROKE ON PAGE 4

PHOTO: STEVE FISCH



Dennis Lund, MD
Interim CEO,
Stanford Children's
Health

David Entwistle
President and CEO,
Stanford Health
Care

Lloyd Minor, MD
Dean, Stanford
University School of
Medicine

COMMUNITY MATTERS

A bold plan for improving human health

This is an important moment for Stanford Medicine.

For the first time, the medical school and the two hospitals have teamed up to create an integrated strategic plan. This is a pivotal development that will have a significant impact on our future and our ability to serve our surrounding community.

Stanford Medicine doesn't think small. Our mission is bold: improving human health through discovery and care. We do that as we serve our neighbors locally and our commu-

nity globally. We do that as we inspire and prepare the next generation of leaders in science and medicine. We do that through precision health: predicting, preventing and curing disease. *Precisely.*

The integrated strategic plan draws the road map for how Stanford University School of Medicine, Stanford Health Care and Stanford Children's Health will work hand in hand to fulfill that mission.

The yearlong process to create the plan proved that Stanford Medicine is all in. The response for ideas was overwhelming —

SEE COMMUNITY MATTERS ON PAGE 6

► San Francisco Chronicle

“In the past, physicians have been reluctant to jump into the fray. But people are getting too frustrated and too tired. We are starting to voice our outrage. And we’re still not as vocal as we should be.”

David Spain, MD, professor and chief of trauma and critical care surgery, on the reaction of physicians to recent mass shootings. *April 4*

► The New York Times

“What this tells us is that you can mitigate some of your genetic risk for heart disease by being fit, no matter how high that risk may be.”

Erik Ingelsson, MD, PhD, professor of cardiovascular medicine, on his recent study showing that physical fitness enhances heart health even for those with a high genetic risk for heart disease. *April 18*

► NBC NEWS

“Jennifer’s donation gave us a tool we didn’t have.”

Michelle Monje, MD, PhD, assistant professor of neurology, regarding the donation of a 6-year-old girl’s fatal brain tumor and how the tumor sample is being used in research to find a cure for the disease. *April 17*

► TIME

“It would be nice to know if there were genes to make corals more or less susceptible to global warming.”

Phillip Cleves, PhD, postdoctoral scholar in genetics, on his research that successfully used the gene-editing tool known as CRISPR on a type of ocean coral. *April 23*

The keys to dieting success

An interview with Christopher Gardner

Many dieters face a dilemma when they’re trying to lose weight: Will a low-fat diet work best, or should they try the low-carb approach? Nutrition expert Christopher Gardner, PhD, professor of medicine at the Stanford Prevention Research Center, wanted to provide some answers.

For one year, his team tracked 609 overweight people who were assigned to follow either a healthy low-fat diet or a healthy low-carb diet. The team hoped to determine whether a dieter’s genotype patterns or insulin levels could predict which diet would work best.

Neither of those factors predicted diet success as hoped, but Gardner and his colleagues found that some of the participants in both groups were able to lose weight by changing their relationship with food.

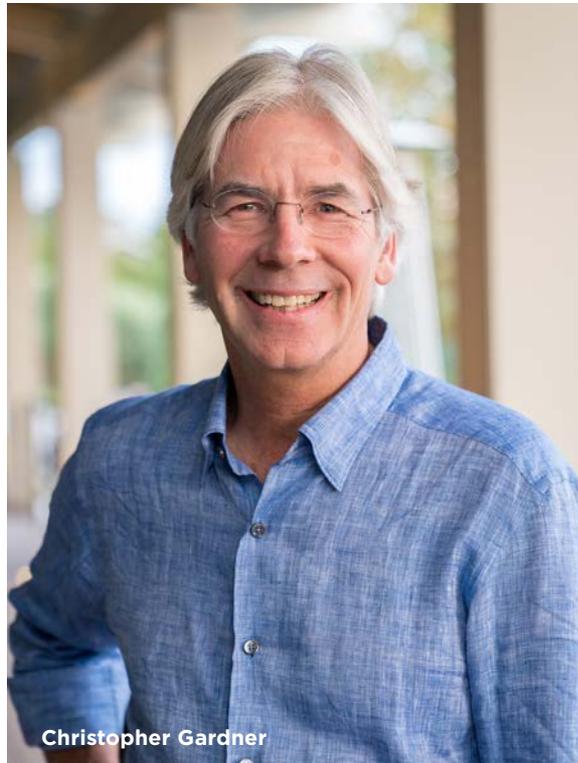
Gardner discussed his recent diet study and his recommendations for losing weight in an interview with *Stanford Medicine News*.

Why did you want to find out whether a person’s genetics or insulin levels could indicate whether they’d lose more weight with a low-carb or a low-fat diet?

We had some hints from past studies that both of these factors might help explain part of the massive variability that is consistently seen in weight-loss research studies. For example, in a typical weight-loss study, some participants lose up to 50 or 60 pounds, while a few gain weight. Data from a pilot study suggested that a person’s genotype patterns and blood insulin levels could be helpful in predicting which

Clinical trials such as this one are made possible by the participation of community members, both those who are healthy and those with specific conditions. Information about participating in clinical trials at Stanford is available online at clinicaltrials.stanford.edu.

people were more likely to lose weight on a particular diet. After 12 months of following 609 overweight and obese study participants who collectively lost more than 6,500 pounds, we found that neither of those factors helped to explain the range of differential weight change response to either the healthy low-fat or healthy low-carb diets. We were not able to predict which diet was best for whom, as we had hypothesized.



Christopher Gardner

Should we focus on what type of diet — low-fat or low-carb — we want to follow, or are there other weight-loss strategies that are more crucial to consider?

Our study results suggest that it would likely be better to focus on foundational aspects of food habits first. During our yearlong study, the healthy low-fat group was advised to emphasize foods like steel-cut oats and lentils and to limit high-carb foods, and the healthy low-carb group was told to emphasize foods like nuts,

seeds, avocados and salmon while limiting their consumption of fats.

Both groups, though, were told to maximize their intake of vegetables (particularly non-starchy vegetables), to minimize added sugars and refined grains, and to choose whole foods rather than highly processed foods. Both groups were also advised to work on “mindful” eating, which involved things like not eating in the car, not eating while looking at a TV or phone screen, cooking more for themselves at home, and eating more sit-down meals with family or friends. Therefore, some of the strategies that applied to both groups — the foundational aspects of food habits — were helpful for most of the participants who lost weight.

Additionally, participants were asked to think in terms of “eating plans,” meaning that they could adopt these new behaviors for years to come, rather than thinking about “diets,” which most people follow for a short time and then abandon.

What changes were made by the most successful dieters in your study?

Our five health educators, who held 22 evening class sessions for the study participants during the year, had a lot of contact with the participants. One consistent theme we heard from the participants in both diet groups who lost 20 to 60 pounds was that we had “changed their relationship to food.” Although the study was not designed to test this specifically, we would like to explore this secondary finding in future studies.

SEE DIETING ON PAGE 4

PHOTO: PAUL KEITZ

Operating rooms of the future

Monitors, lights and other devices in the operating rooms at the new Stanford Hospital will hang from the ceiling, allowing more space for the medical team, robots and portable equipment.

PHOTO: STEVE FISCH

New suites bring advanced technology to surgery patients

Both hospitals on the expanding Stanford Medicine campus have reinvented their surgical suites to support the techniques of today and the innovations of the future.

In the main building of Lucile Packard Children's Hospital Stanford, the new surgical and imaging suites opening at the end of June will complete the Treatment Center. At the new Stanford Hospital, opening in late 2019, the entire second floor will be devoted to surgery.

"Traditional operating rooms are giving way to interventional platforms that can support new surgical techniques and technologies," said George Tingwald, MD, director of medical planning for the new Stanford Hospital. Tingwald, who is both a surgeon and an architect, brings a unique perspective to planning surgical suites.

In the new hospitals, operating rooms, cardiac catheterization labs, angiography suites, endoscopy procedure rooms and imaging suites are grouped together in one space. Physicians from multiple specialties — surgery, interventional imaging, angiography, anesthesia and cardiac catheterization — will work together, side by side, in these new facilities.

Doctors at both hospitals are enthusiastic about the upgraded facilities and what they will mean for patient care outcomes.

"Ultimately, the capabilities of these surgical and interventional radiology suites will translate to patients' receiving less radiation exposure, and spending less time under anesthesia and less time in the hospital overall," said Dennis Lund, MD, interim CEO and chief medical officer for Stanford Children's Health and a pediatric general surgeon.

Advanced capabilities

The new pediatric surgical center adds six surgical suites and four interventional radiology labs,

giving the children's hospital the most advanced surgical, interventional and hybrid technologies available anywhere. It will nearly double Packard Children's capacity for pediatric surgical procedures, helping alleviate scheduling delays.

"The new suites bring an unprecedented collection of advanced technologies and procedural bandwidth for Packard Children's," said Lund. "And it's all contained within a relatively small footprint, which will optimize the efficiency of our care services in a whole new way." The Treatment Center also includes a state-of-the-art imaging center, which opened in December.

Before the new hospital opened, interventional radiology, nuclear medicine and surgical services were in different parts of the hospital campus. Now a patient can check into the Treatment Center and go from service to service within one area.

Integrated functions

The three acres of surgical floor space in the new Stanford Hospital will include 20 operating rooms and eight interventional/radiology rooms with fixed image-guidance. These surgical suites are grouped together with imaging technology that includes two MRIs, one CT and one interventional MRI.

At 800 to 1,000 square feet each, the new ORs are more than double the size of those in the existing hospital. Overhead booms hoist lights, monitors and fixed equipment off the floors, freeing up space for movable medical equipment, robots, and medical teams and trainees.

"The new ORs will have the most advanced technology, making surgery more precise and

safer," said Mary Hawn, MD, MPH, professor and chair of surgery. "We will have the ability to route images to any screen in the room and view radiographic images alongside laparoscopic images." New glare-reducing green lighting will enable surgeons to see images clearly without plunging the OR into darkness, a key factor in the increasing number of procedures that rely on guidance from projected images.

The nearby interventional MRI will allow patients to be scanned during surgery, then returned to the OR with the images necessary to complete the procedure. Two copper-lined rooms provide radio-frequency shielding for procedures, such as deep brain stimulation, that require surgeons to take microelectronic recordings of brain signals without interference from nearby cellphones or medical equipment.

The surgical floor has a convenient, centralized area for registration and family waiting, and a combined pre- and postoperative area for patients.

Increased efficiency

Hybrid rooms merge the latest imaging, radiology and surgery platforms into adjacent surgery suites, where multistage procedures can now be performed at one scheduled time and location.

For example, when a patient is having a brain tumor removed in one of the neuro-hybrid suites, surgeons can take in-suite interventional MRI images to confirm that they removed all of the tumor before closing the surgical site. Previously, surgeons had to complete the surgery before they knew the outcome, which could mean the patient had to undergo additional surgeries. In addition, cardiac hybrid suites combine an OR with a catheterization lab, so care teams can perform a minimally invasive catheter procedure in conjunction with open-heart surgery. [▶](#)

“It used to be that by five or six hours after a stroke, we had to say ‘I’m so sorry, you arrived too late to be treated,’” he said. “But this is a new world.”

Stanford and, with his permission, called Stanford. Within 30 to 45 minutes, a helicopter was on the scene to whisk Dodd to Stanford Hospital.

Dodd’s treatment at Stanford was part of a trial looking at whether more people can benefit from thrombectomy. Until recently, the procedure was recommended only for patients who reach a treatment center within six hours of a stroke. The trial, sponsored by the National Institutes of Health and conducted at 38 health centers, confirmed that people whose stroke occurred more than six hours earlier can benefit.

Ischemic strokes account for about 85 percent of the roughly 750,000 strokes suffered annually in the United States. They occur when blood supply to part of the brain is cut off by a clot in a cerebral blood vessel. The resulting lack of oxygen and glucose quickly kills brain tissue in the immediate vicinity, and the affected area continues to expand until blood supply is restored.

Thrombectomy involves guiding a cagelike stent through the circulatory system to the site of an acute-stroke patient’s brain clot, where the stent then encases the clot and physically extracts it. As many as 35 to 40 percent of all strokes occur during sleep, so the short window of time severely limits the number of stroke patients receiving this procedure.

Brain-imaging software developed at Stanford helped identify stroke patients for the trial who could benefit from thrombectomy. Gregory Albers, MD, the director of the Stanford Stroke Center, developed the software about a decade ago with Roland Bammer, PhD, then an associate professor of radiology at Stanford and now a professor at the University of Melbourne in Australia, and software engineer Matus Straka, PhD, who was then a senior scientist at Stanford.

Different individuals’ strokes spread through brain tissue at different rates, Albers explained. It’s not so much the amount of time elapsed since a stroke began as the amount of salvageable brain tissue that determines who will benefit from stroke therapy, he said.

In the trial, patients were evaluated at treatment centers between six and 16 hours after incurring strokes originating in either of two large arteries in the brain: the middle cerebral artery or the internal carotid artery. Patients age 90 or younger whose brains showed evidence of substantial amounts of salvageable tissue were randomized into two groups: One set of patients, the intervention group, received thrombectomies. The others, the control group, received standard medical therapy.

Among the patients in the study, those who received a thrombectomy had far superior outcomes compared with those who didn’t. Some patients showed dramatic improvement even when their brain clots were removed as long as 10 hours after the end of this six-hour window.

“Nearly half of all patients treated between six and 16 hours after the onset of their symptoms were largely spared from the consequences of their stroke,” said Albers, the trial’s principal investigator.

“These astounding results will have an immediate impact in the clinic and will help us save many lives,” Walter Koroshetz, MD, director of the National Institute of Neurological Disorders and Stroke, said in an NIH news release. “I really cannot overstate the size of this effect.”

The American Hospital Association has issued new acute-stroke treatment guidelines that reflect what the study found.

Patients in the study were followed for 90 days after their strokes. (After this time period, stroke patients typically experience little additional recovery.) By 90 days, 26 percent of the patients in the control group had died and 16 percent had devastating disability. In contrast, only 14 percent of the patients who received thrombectomies had died, and 8 percent had severe disability. The combined plunge in these feared outcomes, from 42 percent of patients to 22 percent, represents the biggest improvement seen in any stroke-treatment trial to date, said Albers.

Albers noted one caveat: “Our trial’s excellent results reflect our selection of patients most likely to benefit,” he said. “Only about half of the patients we screened with the brain-imaging software had enough salvageable brain tissue to enter the study. For the others, the procedure was considered unlikely to be effective.”

As a result of the trial’s findings, thrombectomy procedures for late-arriving patients will probably double, said Albers. “It used to be that by five or six hours after a stroke, we had to say ‘I’m so sorry, you arrived too late to be treated,’” he said. “But this is a new world.”

Dodd is profoundly grateful that she was sent to Stanford to become a part of the study. By the time her husband and high school-age son drove up from Salinas, she was already out of surgery. Seven days later, she was discharged.

A year later, she is almost fully recovered after a combination of her thrombectomy, intensive rehabilitation and personal gumption. Dodd, who sports a tattoo reading, “I can, and I will,” is talking, walking and driving as before. “I am literally standing on this Earth as a wife and a mother because of that procedure,” she said. “It saved my life.” [▲](#)

DIETING FROM PAGE 2

What are the best ways of changing our relationship with food?

The single descriptor that best captures this is mindfulness, which is the opposite of mindlessness. With 24/7 accessibility of foods, and a global food system that makes it possible to have any food you want delivered to you in ever more convenient and time-saving ways, it has become easier and easier to eat and drink without really thinking about it — mindless eating.

Mindfulness involves not eating while looking at a screen, and not eating while driving or walking or in a store. Mindfulness includes cooking more meals for ourselves; shopping for fresh, whole foods at the local farmers’ market; and sitting down and taking

the time to enjoy meals and eating occasions with friends and family. It means bringing back some of the food literacy and culinary literacy that has been lost with the relentless increases in “convenience.” Taking a greater interest in the external and societal costs that come with our food choices — in terms of potential human labor abuses, animal rights and welfare, and environmental sustainability — contributes importantly to mindfulness and to changing our relationship to food.

Will science ever give us an answer about the “ideal” diet, or is that hoping for too much?

I’m happy to tell you science already *has* provided an answer about the “ideal” diet. But I’m

frustrated to say that even though this information is out there, and has been for decades, it isn’t recognized or appreciated. Health professionals agree that the majority of our diets should come from whole, plant-based foods — vegetables, beans and legumes, nuts and seeds, whole grains, and fruits — and most of us should cut back on meats and dairy, and especially on convenience foods that tend to be heavily processed and that contain addictive combinations of salt, sugar and fat.

When a healthy foundation is set, there is plenty of room for individuals to find their own favorite, personalized diet approach by dialing certain things up and down. There are many ideal diets waiting to be enjoyed — if we can get the foundational principles right. [▲](#)

Fighting deadly diseases — with a phone



A tool developed by Stanford researchers lets people around the world help build a mosquito map

The next time you hear the buzz of a mosquito, rather than running inside or slathering on repellent, pull out your cellphone. With a tool developed by a Stanford lab, you can contribute to global knowledge about mosquitoes — and help reduce the prevalence of the diseases they spread.

Manu Prakash, PhD, assistant professor of bioengineering, and his lab are looking for citizen scientists to use their mosquito-monitoring platform, Abuzz. With enough users around the world recording mosquitoes, Abuzz will be able to produce a detailed global map of different species — helping public health officials in targeting mosquito populations.

More than mere pests, mosquitoes can carry deadly diseases, including malaria, yellow fever, dengue, West Nile virus, chikungunya and Zika. Diseases spread by mosquitoes result in millions of deaths each year, largely in areas with limited resources.

“We could enable the world’s largest network of mosquito surveillance — just purely using tools that almost everyone around the world now is carrying in their pocket,” said Prakash. “There are very limited resources available for vector surveillance and control, and it’s extremely important to understand how you would deploy these limited resources where the mosquitoes are.”

With enough users recording and submitting mosquitoes’ high-pitched whine, Abuzz can create a map that tells us exactly when and where the most dangerous species of mosquitoes are most likely to be present. That knowledge could lead to highly targeted and efficient control efforts.

“If you see a mosquito and you swat it, you’ve saved yourself an itch for one day. But if you see a mosquito and you record it and you send the data to the Abuzz project, then you’ve contributed to an effort that can reduce the burden of mosquito-borne disease for many generations in the future, hopefully,” said Haripriya Mukundarajan, a graduate student in the Prakash lab.

Abuzz is a low-cost, fast, easy way to gain an incredible amount of new data about mosquitoes. To help the researchers, hold your phone’s microphone to the sound of that mosquito buzzing overhead and capture a recording. Then download the recording on the Abuzz website



Felix Hol, PhD; graduate student Haripriya Mukundarajan; and Manu Prakash, PhD (left to right) record mosquitoes using cellphones.

(web.stanford.edu/group/prakash-lab/cgi-bin/mosquitofreq/).

Because each mosquito species uses a different wing-beat frequency, producing a characteristic whine, the researchers will use the recording to pinpoint the species. They do so with an algorithm powered by a mosquito sound library — Prakash and his team recorded about 1,000 hours of mosquito buzzing from 20 different species to create the library.

Once they receive a recording, the researchers clean it up to reduce background noise and run it through the algorithm, finding the species that is most likely to have produced it. When they find a match, the researchers send information about the mosquito to the person who submitted the recording. They also mark the recording on a map on the website, showing exactly where and when that mosquito species was sighted.

Because the people who could benefit most from Abuzz may not have access to the latest smartphones, the researchers designed the platform so that it can work off recordings from almost any model of cellphone. Most of their mosquito data was recorded on a \$20 clamshell-style cellphone from 2006.

The Abuzz algorithm has worked with as little as one-fifth of a second of a recording — although recordings that are one second or longer are the most desirable. That means recording

a mosquito while it takes off from a surface is enough to create an Abuzz-worthy recording.

To ensure that Abuzz works the way they’ve intended, the researchers ran a field test with 10 local volunteers in a village in Ranomafana, Madagascar, in 2016. It took about 10 minutes to train the citizen scientists. The next day, they returned with 60 recordings that spanned three hours.

“It was very easy to tell people what to do, and people were very eager to participate,” recalled Felix Hol, PhD, a postdoctoral scholar who helped conduct the field study. “Just 10 minutes of training and they could actually produce a lot of very usable data. That was a very beautiful experience for me.”

To draw more citizen scientists, the group intends to release an app in the near future and has already produced detailed training videos.

“What I would love to see is people engaging in the problem,” Prakash said. “Try to join the platform. Record mosquitoes. Learn about the biology. And in that process, you will be supporting the kind of research and scientific data that we and medical entomologists around the world so desperately need, and at the same time you will be making your own community safer.”

The project is an example of Stanford Medicine’s goal of developing knowledge about health and biomedical science and using that knowledge to benefit patients throughout the world. [SNM](#)

New clinical building in Redwood City

PHOTO: DAVID WAKELY



On July 9, the Stanford Medicine Outpatient Center in Redwood City will open a new three-story medical building, broadening the range of Stanford Medicine expertise available at the location.

Pavilion D will be home to the spine, tumor, and foot and ankle centers; the digestive health and pelvic health centers; and an endoscopy suite. A 300-car parking garage will open in mid-August.

“We created a welcoming clinical space that’s centered around the patient,” said Aimee Walter, administrative director of ambulatory clinics for Stanford Health Care.

“Pavilion D represents more than a building. It is a new model of care,” said Ray Kim, MD, professor and division chief of gastroenterology and hepatology. “The new space was designed to promote wellness and health, beyond treating disease. It’s about making the community healthier.”

The Digestive Health Center will include 27 gastroenterologists and 12 hepatologists. The adjacent Pelvic Health Center will bring together specialists in uro-gynecology, urology, colorectal, gastroenterology, physical therapy and pain into one clinical space. A team of 70 medical assistants, advanced practice providers, nurses, clinical care coordinators and patient

testing techs will staff both centers.

“Pelvic health involves a series of disorders that cross disciplines, so it makes sense to work as a group,” said Brooke Gurland, MD, medical director of the Pelvic Health Center and a clinical professor of surgery at the School of Medicine. “Our new space allows us to provide multidisciplinary care, which benefits patients with complex medical conditions.”

Patient rooms in Pavilion D are spacious with extra-wide exam chairs for added patient comfort. The clinic includes consultation rooms for telemedicine visits, patient education and private discussions, and six procedure rooms. The light-filled space features a meditation room, a health library, and calming views of nearby salt marshes and the East Bay hills.

“We spent several years designing the new space and a new method of delivering patient care,” said Uri Ladabaum, MD, professor and senior vice chief of gastroenterology and hepatology. “Our guiding principle has always been ‘What is best for the patient clinically and emotionally?’”

The third-floor Endoscopy Center will offer private prep and recovery rooms located just outside each of the nine endoscopy suites. This will maximize patient privacy and efficiency of care, Ladabaum said. [SM](#)

Be part of a mural

Help create a digital mosaic mural that will be displayed at the opening of the new Stanford Hospital in 2019. Through the Voices Project, thousands of drawings are being collected and assembled into a digital mosaic depicting the new hospital. Scores of drawings were collected at the Health Matters event on May 19, but many more are needed. To find a collection event or to submit your artwork online, go to voices.stanford.edu. Submissions will be accepted through January.



PHOTO: FRANCINE FREEMAN

numbering in the thousands — and the resulting document is inspired by our entire community.

Stanford Medicine is reaffirming its commitment to be human centered and discovery led. We will lead the revolution in precision health, and we have identified three priorities to drive us toward our goal:

- **Value focused:** We will continue to deliver unparalleled quality care through a highly personalized patient experience that focuses on empowering our patients and their families. We will optimize our state-of-the-art campus facilities and re-evaluate our network to ensure a seamless health care experience that puts our patients at its center.
- **Digitally driven:** We will lead the digital health revolution, delivering high-tech, high-touch care and transforming biomedical discovery enabled by digital advances. We will lead in population health and data science to advance health and wellness, amplifying the impact of Stanford innovation globally.
- **Uniquely Stanford:** Our greatest strength is our integration within Stanford University, and we reaffirm the importance of our interdisciplinary, team-based science and education to accelerate discovery in and knowledge of human biology. We will harness the power of our basic sciences and the university’s seven schools to advance fundamental human knowledge, translational medicine and global health.

This plan will be our guiding star as we navigate future opportunities and challenges. We would not have reached this point without the broad support of our campus and local community, and we’ve been energized by your commitment to our future.

Ongoing feedback from stakeholders will ensure that our plan will be updated based on the needs of our community and the demands of the market.

The strategic planning process has confirmed again that the passion and dedication of the Stanford Medicine community runs deep. With the entire community working together, we cannot wait to see what we will accomplish for you.

Over the last century-plus, Stanford Medicine has delivered some of the world’s most important scientific and medical advances. We are proud of that history, but we’re just getting started.

At Stanford Medicine, our best is yet to come. [SM](#)

Despite being diagnosed with lung cancer eight years ago, Ginger Powell has been able to raise her daughter and continue working thanks to treatment at Stanford Health Care.

Lung cancer patient finds health again at Stanford

PHOTO: COURTESY OF GINGER POWELL

Many people believe that only smokers are at risk for lung cancer, yet that's far from the truth. Take the case of Ginger Powell.

Eight years ago, when Powell was 42, she was diagnosed with stage 4 lung cancer. A persistent shortness of breath became bothersome enough to send her to the doctor, and a chest X-ray identified fluid surrounding her heart — fluid that was found to contain cancer cells. A lifelong nonsmoker, Powell was treated aggressively with a standard chemotherapy protocol. That was followed by surgery to remove a tumor on her left lung and subsequent radiation to eradicate spots that her medical team found in her esophagus.

"That's when my life changed," recalled Powell, who lives in Daly City. The radiation scorched the inside of her throat, leaving scarring that burned each time she swallowed. "It felt like I was swallowing glass," she said.

And then the coughing began. Day and night, Powell coughed uncontrollably. Her condition worsened. She developed an esophageal perforation — essentially a tear in her throat cavity — that surgeons patched using a stent. Powell spent most of a year in and out of the hospital. Her cough worsened. She was unable to eat. And she had developed a massive infection in her chest cavity. That's when she was referred to Stanford Health Care.

The path to recovery

"She was really, really sick," said Heather Wakelee, MD, professor of oncology at the Stanford School of Medicine. "The surgical specialties here at Stanford were the ones to help her get onto a better recovery path." They removed the stent from her throat, patched the perforation and placed her on intravenous antibiotics for

months. Slowly, Powell began to heal.

Throughout the battle with the infection, she was free of any active cancer. Wakelee said she believes that Powell's infection may have set off a strong immune response in her body, which contributed to her being cancer-free for a period of time.

But that changed in 2014. Powell began experiencing intense headaches. An MRI identified six tumors in her brain, one of which was impeding her hand strength. Her medical team at Stanford — Wakelee; Iris Gibbs, MD, professor of radiation oncology; and Melanie Hayden Ge-

Powell has been able to continue working and has had the energy to raise her young daughter, who was 8 when she was first diagnosed.

phart, MD, associate professor of neurosurgery — determined that the best and safest treatment course was to surgically remove the primary tumor causing the most severe symptoms and target the other tumors in her brain nonsurgically.

"We were hoping to shrink the tumors further to spare her a more extensive surgery," said Wakelee, so the team tried chemotherapy as part of a clinical trial. When Powell didn't respond to the chemotherapy, her medical team used CyberKnife to deliver high doses of radiation directly to her tumors without damaging surrounding tissue.

"CyberKnife was developed here at Stanford and has been a key part of her treatment, both to the brain and to her bone where she had some metastases," Wakelee said. Powell also received microwave ablation, a therapy that uses heat to destroy tumors, for a spot on her liver.

Targeted approach

The Stanford team has been able to use a more targeted approach, rather than relying on systemic chemotherapy, to treat Powell's recurrences because her cancer has been relatively slow-growing. Patients often tolerate radiation therapy better than systemic therapy, Wakelee said.

Powell has been able to continue working and has had the energy to raise her young daughter, who was 8 when she was first diagnosed.

"We could have justified having her on systemic chemotherapy this whole time, but we decided to focus more on watching her closely and using radiation when needed," Wakelee said. "Our team is closely aligned, trying at each step to figure out the best thing for her. We have been able to keep her active and somewhat off treatment."

Today, Powell is free of any new cancers and is closely monitored every three months. "If she does have to face systemic treatment, she'll have a whole lot of other choices, including trial options, that she didn't have when she was first diagnosed," Wakelee said.

"Everything that has happened to me Stanford has been able to treat," Powell said. "Being cared for at Stanford gives me so much hope. My medical team has been able to address any new site where my cancer has returned. I feel like I am receiving the best care from my doctors and nurses at Stanford. They have made my medical journey possible. I just try to remain positive and am grateful for everything I have." [SMH](#)



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Gracin gets her words back

A young epilepsy patient is now seizure-free

Gracin Hahne was 3 months old when she had her first seizure. “I was changing her diaper,” said Heidi Hahne, Gracin’s mom. “I also noticed something else: There were light patches, like abnormal pigmentations, on her skin.”

Gracin’s seizures were caused by benign tumors, called tubers, that develop as part of a condition called tuberous sclerosis complex (TSC). Seizures and the “ash leaf” spots on Gracin’s skin are some of the many symptoms TSC patients may have to varying degrees. Gracin was started on anti-seizure medication right away, which stopped her infantile spasms.

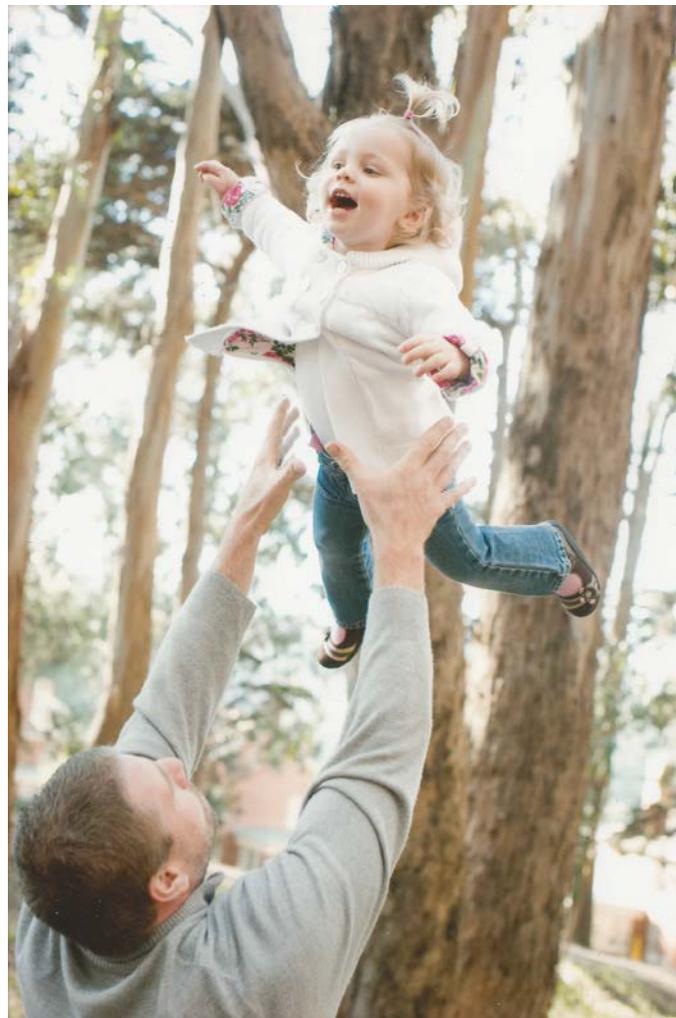
As Gracin grew, her medications were adjusted to retain control over the seizures, but by the time she turned 3, her seizures could not be controlled.

An overnight electroencephalogram study found that she was experiencing nearly 30 seizures while she slept. During her daytime seizures, Gracin’s speech would regress so badly that her parents couldn’t understand her at all.

Heidi and her husband, David, learned about two doctors at Lucile Packard Children’s Hospital Stanford who might be able to help Gracin: Brenda Porter, MD, associate professor of neurology at the Stanford School of Medicine and a specialist in TSC; and Gerald Grant, MD, associate professor of neurosurgery. They also learned that Packard Children’s was the only hospital in Northern California using an innovative technology called ROSA, short for robotized stereotactic assistant, to help children suffering from prolific seizure disorders.

Computerized assistance

Guided by a surgeon, ROSA allows precise, minimally invasive movement and placement of tiny electrodes in the brain during surgery. This technology helped doctors detect seizures deep in Gracin’s brain without having to open her skull or even shave her head, as other traditional methods require.



David Hahne plays with his daughter, Gracin, who underwent an innovative procedure at Lucile Packard Children’s Hospital Stanford to treat her frequent epileptic seizures.

This technology is part of the Pediatric Center for Brain Engineering at Packard Children’s, where multiple specialty groups are collaborating to focus on brain disorders and are developing personalized treatments for those disorders.

In December 2016, Grant used ROSA to guide 13 electrodes through tiny openings deep into Gracin’s brain, setting up a stereo electro-

encephalogram. “Each electrode has contacts along its entire length, so you can get a sampling going into the gray matter of the brain, then into the deep white matter, then into the tuber and then out of the tuber,” Grant said.

“With the surface EEG, we saw some seizures,” Porter said. “But then, when we put the electrodes in, we saw hundreds.” The majority of Gracin’s seizures were coming from her left temporal lobe, where the brain normally stores language.

“Through the stereo EEG we were able to determine that seizure activity was not in her language center but adjacent to it,” Porter said. This gave the team hope that they could remove the tubers without worsening — and possibly even improving — Gracin’s language capability.

The road to recovery

In January 2017, Grant and his team successfully removed the tubers in her brain.

The Hahnes were advised by doctors that Gracin’s recovery would take time. They learned that with a resection in the brain’s left hemisphere, which is part of the procedure to remove the tubers, Gracin might not be able to move the right side of her body, walk or talk for at least a few days.

But Gracin had recovery plans of her own. “After not seeing her for eight hours, we turn the corner, and there she is flailing and moving her arms and legs,” said Heidi Hahne. “She sees us and says, ‘Mommy, Daddy, I want juice!’ Not only was she OK, but she was speaking in complete sentences and using all of her body parts. We started crying — and gave her juice!”

Gracin still needs continuous care for other aspects of her TSC, including monitoring and treating tubers in other parts of her body; her neurologist will watch for any new seizure activity as she grows. But today, 4-year-old Gracin loves singing, reading books and chatting with her 1-year-old brother, Lucas. “We’re celebrating each of these moments,” said Heidi Hahne. “That’s our goal.”