INSIDE STANFORD MEDICINE

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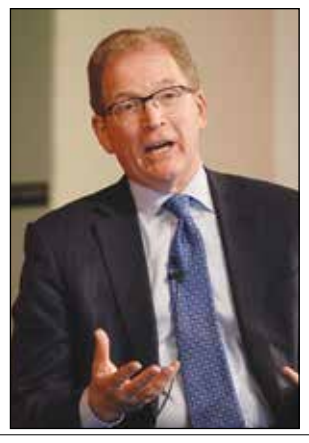

Stanford Medicine leaders reviewed accomplishments and discussed the future at a recent event.

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Phone app encourages physical activity

By Hanae Armitage

LZF/SHUTTERSTOCK.COM

The first entirely digital, randomized clinical trial found that a smartphone app encouraged participants to get more exercise.

As little as a daily ping on your phone can boost physical activity, researchers from the School of Medicine and their collaborators report in a new study.

The finding comes by way of the first-ever entirely digital, randomized clinical trial, which sought to answer two overarching questions: Is it feasible to successfully run an entirely digital, randomized clinical trial? And is it possible to encourage people to exercise more by using a smartphone app?

The study, overseen by Euan Ashley, MBChB, DPhil, professor of medicine, of genetics and of biomedical data science at Stanford, shows that the answer to both questions is yes.

Ashley and his colleagues conducted a clinical trial using MyHeart Counts, an app he and other scientists at Stanford developed using Apple's ResearchKit platform. The app, which was first deployed on smartphones in 2015, was launched to help track physical activity and other heart-related information, such as heart rate. Now, it's the main tool for a full-on randomized clinical trial, including patient recruitment, consent and interventions. It also returns data to participants.

"In this digital era, we have to think of ways to engage people in their health," he said. "The number of smartphone users these days is huge, and using an app to host the trial lets us tap into that population. If people are addicted to their phones, maybe we can also get them addicted to their health."

On a weekly, rotating basis, the digital trial "prescribed" one of four simple interventions for each participant enrolled in MyHeart Counts — things like reminders to walk more or stand up. In the end, the prompts worked, although modestly so. Regardless of the type of intervention, Ashley and his team saw about a 10% increase in activity compared with the participants' baselines.

A paper detailing the findings of this study were published online Oct. 9 in *The Lancet Digital Health*. Ashley is the senior author of the study. Lead authorship is shared by Stanford graduate student Anna Shcherbina and Steven Hershman, PhD, director of Stanford's mHealth in cardiovascular medicine.

Mobile motivation

About a year after the launch of the MyHeart Counts app, Ashley opened up enrollment for the clinical trial. Over about 18 months, 1,075 participants enrolled and completed at least one intervention, and 493 completed the entire trial.

An 80% dropout rate would spell the end of most trials, but not in this one. "In the digital world, there's quite a low bar for entry — you can sign up while you're standing in line for coffee — so there's a low bar for exiting a trial too," Ashley said. A clinical trial of 100 people is considered normal, if not large, and even with the high dropout rate, the MyHeart Counts digital clinical trial ended up with about five times that number.

During the first week of the trial, participants lived their lives without extra instruction from the app. In this way, they established their own See DIGITAL, page 3

Study shows why even treated epilepsy can disrupt thinking

By Bruce Goldman

A study by School of Medicine investigators may help explain why even people benefiting from medications for their epilepsy often continue to experience bouts of difficulty thinking, perceiving and remembering clearly.

The cause is a pathological buzz of electrical brain activity that interferes with the brain's normal activity. The researchers said that See EPILEPSY, page 3

VASARA/SHUTTERSTOCK.COM

Electronic Health Records National Symposium examines privacy, physician-workload issues

By Amy Jeter Hansen

How can electronic health records empower patients and doctors to improve health without exposing data or overburdening clinicians?

That question was at the heart of Stanford Medicine's second Electronic Health Records National Symposium, held Oct. 11 at the Li Ka Shing Center for Learning and Knowledge. The half-day event featured two panel discussions and several research presentations. Nearly two dozen speakers from government, academia and industry recounted struggles and successes with the technology.

Among the speakers was Lloyd Minor, MD, dean of the School of Medicine, who encouraged attendees to be optimistic about the future and the potential of electronic health records.

"There are absolutely legitimate, important concerns about privacy and about who should have access and how access should be protected," he said. "But we should be able to address and affirm those concerns, protect privacy and still make health records more interoperable — and very importantly, make them more searchable — so we can derive actionable information from the vast amounts of data that now are in an electronic format."

ROD SEARCEY

Vanila Singh, center, said regulations around electronic health records must balance calls for greater openness with security and legal considerations.

Patient access

During the event's first panel, speakers discussed ways electronic health records could work better for patients.

A key consideration is ensuring that patients can access their own information. That sounds simple, but often isn't in practice, even though de-identified data is frequently distributed to third parties without patient knowledge, said Harlan Krumholz, MD, a cardiologist and the founding director of the Yale New Haven Hospital Center for Outcomes Research and Evaluation.

In a study of numerous hospitals, Krumholz said he identified several obstacles that patients can face when attempting to obtain their records. For example, some health systems charged a fee as high as $500, while others refused to share records, See EHR, page 2

At State of Stanford Medicine, reviewing accomplishments and looking toward the future

By Amy Jeter Hansen

Stanford Medicine's three entities are positioned to complement one another, while also contributing to the university's long-term vision and to innovation in Silicon Valley, Lloyd Minor, MD, dean of the School of Medicine, said Oct. 8 at the annual State of Stanford Medicine event.

During a panel discussion, Minor and the leaders of Stanford Children's Health and Stanford Health Care highlighted the local community's excitement about the new Stanford Hospital and other construction projects, and discussed opportunities for internal and external collaboration that have been brought into focus by Stanford Medicine's integrated strategic plan.

"The purpose of the plan was to identify the areas of synergy, the areas where we will grow and build together collaboratively and interactively — but also to recognize that each of the three entities has its own distinct areas of focus," Minor said. "I think we're all really excited about how well the plan has come together. … Now, this year is about execution."

That includes taking an active role over the next decade in Stanford University's long-range plan, which includes several health-related initiatives.

"All of us will be able to participate in building this amazing institution and extending its impact locally, regionally and, indeed, globally," Minor said.

High-tech hospital

In the short term, the new Stanford Hospital is slated to open soon after more than a decade of planning, design and construction. Community members came out in force for open houses at the new facility, said Stanford Health Care President and CEO David Entwistle. Planners anticipated welcoming about 5,000 people, but more than 17,000 showed up for previews of the building, including its numerous works of art, soaring atrium and private patient rooms with expansive windows, he said.

"I would go up and ask people, 'What do you think?'" Entwistle said. "And the universal, data-driven, random-sampling response was: 'Wow.'"

The hospital's technology is particularly notable, Entwistle said. From their rooms, patients can view test results on a screen, order meals and digitally control window blinds and aspects of the room's climate. In the expanded emergency department, clinicians can get access to interpreters in real time and internet-enabled consultations, or e-consults, with colleagues.

Projects at children's hospital

Lucile Packard Children's Hospital Stanford also plans to celebrate the completion of several construction projects later this year, when the Bass Center for Childhood Cancer and Blood Diseases, the patient care administrative department, the outpatient heart center, and the neurodiagnostics and pulmonary diagnostics clinics are slated to open.

Paul King, who took the helm as president and CEO of Stanford Children's Health in January, was participating in his first State of Stanford Medicine event. Asked by moderator Andra Blomkalns, MD, professor and chair of emergency medicine, about his initial months on the job, he lauded the welcoming community and the advantage of Stanford as a resource.

"I've been impressed with the ability of this children's hospital, in its short life of not quite 30 years, to really compete at a very high level, and to be compared with organizations that have been around for over a century," King said.

Stanford Children's Health recently appointed Rick Majzun as chief operating officer and vice president, King said, and the organization is recruiting for other top positions, which will "keep us busy."

Following the leaders' discussion — and continuing the spirit of collaboration — a group of scientists told the story of how James Spudich's decision to donate his tissue to Stanford Medicine colleagues accelerated their research into diseased and healthy lung cells.

ROD SEARCEY

David Entwistle, Paul King, Andra Blomkalns and Lloyd Minor onstage at the State of Stanford Medicine event, held Oct. 8 on campus.

ROD SEARCEY

Mark Krasnow spoke on a panel focusing on how James Spudich, right, donated his cancerous lung tissue to colleagues, accelerating their research into diseased and healthy lung cells.

Unusual research collaboration

Spudich, PhD, had been diagnosed with early-stage lung cancer. He told the audience that he was thinking as a scientist rather than a patient when he approached Mark Krasnow, MD, PhD, and Christin Kuo, MD, and offered them the tissue that a surgeon would remove the following day.

"I think all of you would have done the same thing," Spudich said.

Before Spudich made his donation, Krasnow and Kuo had worked only with tissue from animals.

By examining Spudich's tissue, Kuo's lab has been able to advance her study of lung neuroendocrine cells through single-cell RNA sequencing, she told the audience. Krasnow said his team has discovered 14 new cell types in the human lung. Now they are looking at the tumor cells with an eye toward understanding how normal cells are transformed by mutations.

As a participant in another study — a clinical trial led by Heather Wakelee, MD — Spudich is now also helping researchers test the effect of an immunotherapy approach called checkpoint inhibitors on cure rates for people with early-stage lung adenocarcinoma.

Spudich said he is confident the researchers' work will lead to advances in clinical care.

"I'm absolutely certain it'll have a huge impact in the future," he said, adding, "I consider myself cured, so don't worry about me." **ISM**

EHR

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claiming that it would violate health privacy laws. "Health care systems aren't even letting people have all of their data," he said. "The law states, clearly, you are entitled to all of your records."

Beyond access, those records should be understandable to a layperson, while also including medical terminology and other documentation needed by clinicians, said Bill Hagan, president of United Healthcare Clinical Services: "That's one of the challenges."

Another is making sure that all of a patient's different providers — including those offering care in the home — can access relevant information, he said. These days, in addition to electronic health records, a person's health data also includes numbers from monitoring apps and other outside sources.

Currently, those data streams aren't always combined, but they should be integrated whenever possible to provide a more complete picture of a patient's health and care, said Jennifer Schneider, MD, president of Livongo, a technology company that helps patients manage chronic disease. "I would love to see a little bit more unification," she said.

Patients also are concerned about maintaining privacy — and their worries include who can tap into sensitive information in their records, said Vanila Singh, MD, clinical associate professor of anesthesiology, perioperative and pain medicine at Stanford and former chief medical officer in the Office of the Assistant Secretary for Health at the U.S. Department of Health and Human Services. Regulations around electronic health records must balance calls for greater openness with security and legal considerations, she said.

"The most important thing is patient-centered medicine," Singh said, "and that everything we do — all our efforts through technology, whether it's research or clinical practice — translates to better clinical outcomes. If it does not translate, it is wasted energy and effort."

Minimizing documentation burden

The second panel discussion centered on ways to minimize physicians' documentation burden, which many doctors say has increased since records were digitized.

"Our colleagues in the legal profession are not asked **See EHR, page 3**

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Digital

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baseline and served as their own control. After the initial week, each participant was randomly assigned to one of four different "soft-touch" interventions: encouragement to take more steps, hourly reminders to stand up, instructions to read health guidelines from the American Heart Association, or personalized "e-coaching" that involved a daily message to participants based on their routine activities. Those who reported a more sedentary lifestyle might receive a message prompting a Sunday morning walk, while those who are naturally more active might receive encouragement to keep up consistent physical activity. Every week, participants completed a new intervention until they'd experienced all four.

Among almost 500 participants, the bump in activity — measured through step count — was modest — a 10% increase — but still statistically significant. "Sure, we would have rather seen a 300% increase, but with the light-touch interventions that we chose, it was probably never realistic to expect those numbers," Ashley said. "But the main takeaway is that at end of the day, we find that there's a real, small positive effect from these interventions." And, he said, the study also serves as a template for all-digital randomized clinical trials in the future.

MARK TUSCHMAN

Euan Ashley and his team saw about a 10% increase in activity compared with the participants' baselines.

A trend toward digital

Now, Ashley and his colleagues want to investigate further. In their next trial, they plan to ask more nuanced questions: How long do the participants keep up the extra steps? And, is it possible to enhance the results by increasing the intensity of the intervention, tailoring the intervention to a person's specific motivations, or lengthening the duration of the trial?

Down the line, Ashley sees value in personalizing the interventions more to an individual's motivations and goals. "We don't want to make it too complicated. And we aren't ignoring the fact that even a single simple prompt did increase steps," he said. "But different things motivate different people, and if we can play to that, it may help participants reach a new level of activity."

Outside of future MyHeart Counts trials, Ashley and his team are starting to partner with other scientists to help them carry out their own digital clinical trials in areas such as heart transplant recovery and pulmonary hypertension. "Digital platforms allow us to connect directly to the patients in a way that's more immediate and more extensive," Ashley said. "And I think this type of more direct sensor-based measurement can not only help patients enhance their own health, but help doctors notice health issues early on and address them sooner."

Other Stanford co-authors of the paper are Laura Lazzeroni, PhD, professor of psychiatry and behavioral sciences and of biomedical data science; Abby King, PhD, professor of health research and policy and of medicine; postdoctoral scholars Jack O'Sullivan, DPhil, and Yasbanoo Moayedi, MD; clinical exercise physiologist Jeffrey Christle, PhD; study coordinator Aleksandra Pavlovic; former research scientist Daryl Waggott; Abhinav Sharma, MD, PhD, former fellow in advanced heart failure and cardiac transplantation; Alan Yeung, MD, professor of medicine; Matthew Wheeler, MD, assistant professor of medicine; Michael McConnell, MD, clinical professor of medicine; and Robert Harrington, MD, professor and chair of medicine.

Researchers from the Veteran Affairs Health Care System, Verily Life Science, the University of California-San Diego, the University Health Network in Toronto and the University of Alberta also contributed to this study.

The study was funded by the American Heart Association and Alberta Innovates-Health Solutions. Technology support was provided by Apple.

Stanford's Department of Genetics also supported the work. **ISM**

Epilepsy

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certain medications or implantable devices could be improved to alleviate these cognitive deficits.

A paper describing the findings was published Oct. 16 in *Science Translational Medicine*.

The electrical interference has important behavioral consequences. To examine them, the researchers tested the ability of six patients, who had sensors implanted in their brains, to solve certain kinds of problems during periods when a buzz of epileptic activity was colliding with their brains' normal responses.

This pathological buzz, called a high-frequency oscillation, or HFO, is associated with the onset of epileptic seizures. HFOs can be undetectable to the naked eye — even the trained eye of a neurologist, said Josef Parvizi, MD, PhD, professor of neurology and neurological sciences and director of Stanford's Program for Intractable Epilepsy.

Parvizi, who sees patients with epilepsy on a regular basis at Stanford Health Care, is the study's senior author. The lead author is postdoctoral scholar Su Liu, PhD.

The findings could explain cognitive complaints often reported by otherwise successfully treated patients.

Brief interruptions of brain function

HFOs can occur multiple times a minute in seizure-prone tissue, even in the brains of people whose epileptic seizures are well-controlled by medications, Parvizi said. The study indicates that even in a successfully treated patient, the brain circuitry prone to abnormal electrical activity is unable to do its job much of the time.

In the study, if an HFO occurred within several hundred milliseconds before a seizure-prone brain region began processing information, it lowered the accuracy of participants' ability to perform simple cognitive tasks. It also slowed their response times, and they reported less confidence in the accuracy of their responses.

The researchers showed that this happens because HFOs within that period interfere with high-frequency broadband events, or HFBs, which are healthy. HFBs are associated with a brain circuit beginning to do something it's supposed to, such as processing visual information or recalling a previous experience.

An HFO can knock out healthy brain activity for as long as a full second or so, the researchers showed.

"A cognitive demand on a brain circuit that's just experienced an HFO is like the doorbell ringing when you've just been punched in the nose and you're still seeing stars," Parvizi said. "You might not even hear that doorbell, and you're certainly not about to go answer it."

Often likened to an electrical storm in the brain, epilepsy affects about 1% of the population. Medications benefit about two-thirds of people diagnosed with the disease. Implantable devices that deliver electrical pulses to the brain can sometimes succeed where medications fail. For patients with intractable seizures, surgery to excise the affected tissue is an option.

In the study, Parvizi and Liu worked with six adult patients with intractable seizures who were being evaluated at Stanford Health Care as a prelude to possible surgery. To help pinpoint the origin of their seizures, electrodes had been implanted in their brains.

While these six patients, who had agreed to be studied, were at rest, they experienced several HFOs per minute, although they weren't experiencing visible seizures, the study said.

To elicit healthy HFBs in the participants' seizure-prone tissue, the researchers gave them visual or memory tasks. Armed with data recorded by the electrodes, the experimenters used machine-learning techniques to train a computer to accurately and reliably distinguish HFOs and HFBs.

In all six patients, if a spontaneous HFO occurred within about one second before a task-elicited HFB should have arisen, it disrupted, delayed, diminished and often totally extinguished the HFB. Behavioral tests in the subset of patients whose seizures were originating in a memory-related brain area showed poorer recall, longer response times and reduced confidence in answering memory-evoking questions.

Hope for patients with epilepsy

Another important conclusion of this study is that the epileptic tissue's performance was normal outside the window of HFOs. "This should change the way we think about epilepsy," Parvizi said. "For too long, the general impression has been that patients with epilepsy have 'sick brains' and that the best remedy for their 'sick tissue' is to take it out. But this study teaches us that for the majority of the time when seizure-prone brain tissue isn't experiencing HFOs, it's working just as well as the surrounding electrically stable brain tissue — at least in the patients we studied, who had no obvious structural brain abnormalities."

Neurosurgeons helping patients decide whether to undergo surgical removal of epileptic brain tissue to eliminate seizures or reduce their frequency may want to consider how much of the time the tissue in question is functional, he said. If spontaneous HFO rates in the tissue are relatively low, that tissue still retains a lot of cognitive processing ability.

"Maybe you don't want to throw out the baby with the bathwater," Parvizi said.

In principle, an implantable device positioned in a patient's brain could distinguish between the two types of electrical activity and disrupt HFOs with a burst of electrical pulses while sparing HFBs, Parvizi said.

Stanford's Office of Technology Licensing has filed for a provisional patent on intellectual property associated with the study's findings.

Parvizi is a member of Stanford's Wu Tsai Neurosciences Institute, Stanford Bio-X and the Stanford Maternal & Child Health Research Institute.

The work was funded by the Sence Foundation, the Gwen and Gordon Bell family and the Armatis family.

Stanford's Department of Neurology and Neurological Sciences also supported the work. **ISM**

EHR

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as lawyers and judges to simultaneously do their legal work and create the legal record of that work," said Christine Sinsky, MD, vice president of professional satisfaction at the American Medical Association. "But we have asked that of health care professionals."

Suggestions from panelists included helping doctors learn more efficient ways to use the technology, programming the systems to allow more succinct versions of the doctor's note, and inviting physicians to play a larger role in developing the workflow and user experience.

Another way to ease a doctor's workload is to involve other members of the caregiving team in some aspects of record-keeping, said Edward Lee, MD, executive vice president of information technology and chief information officer with the Permanente Federation: "We have to recognize the fact that not everything has to be done by a physician," he said.

To that end, Steven Lin, MD, clinical assistant professor of medicine at Stanford, has been working on a way to use artificial intelligence to create a patient record by transcribing conversations during doctor visits. A challenge has been the limitations of direct transcripts, which cannot put a patient's nonlinear health history in chronological order or pull in information from other encounters with health providers, said Lin, who studies primary care and population health. It could help, he said, to empower patients and family members to play a larger role in creating health records.

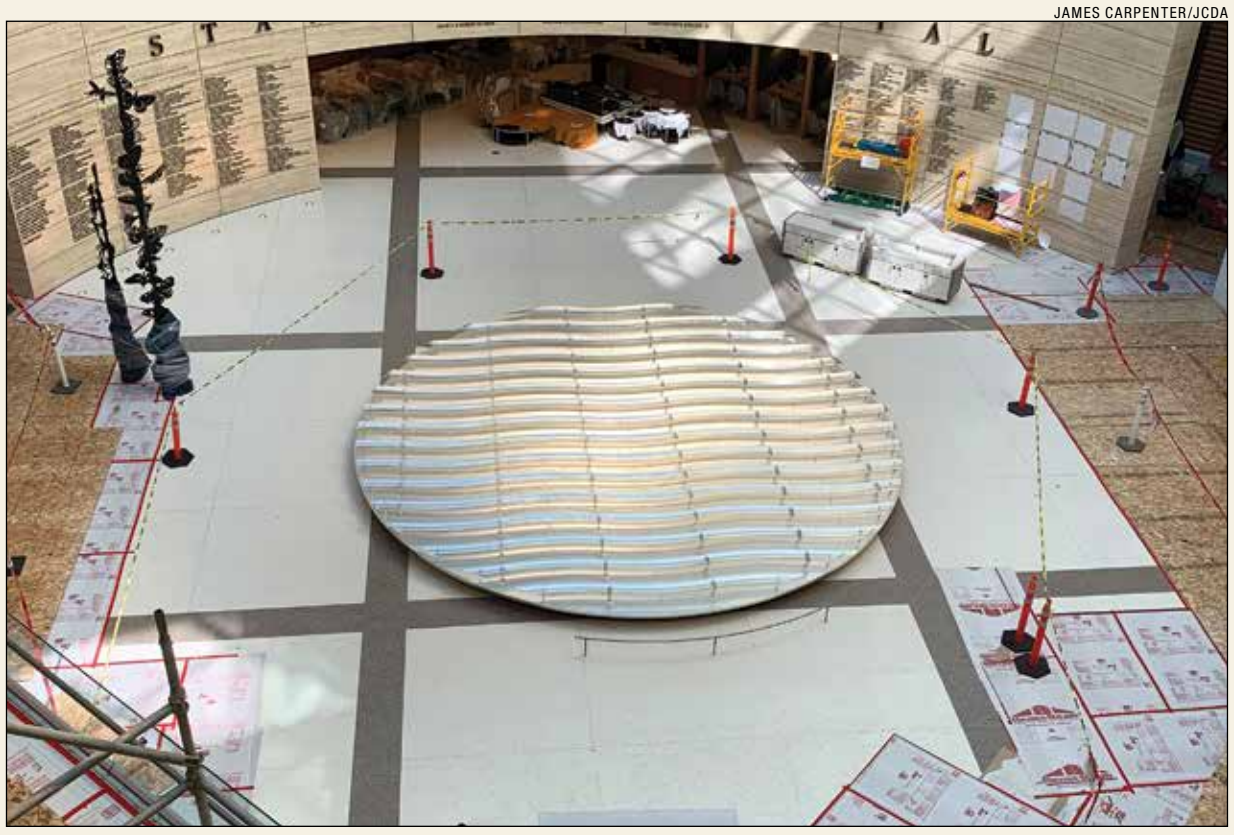
In the past year, the federal government has changed rules to allow medical students and other members of the health care team to help providers document a patient's care, Lin said, "So why not patients and families?"

"After all," he added, "what are notes except stories about patients? And shouldn't patients have the right to be co-authors of their own stories?" **ISM**

Liquid Light installed in atrium of new Stanford Hospital

By Daphne Sashin

JAMES CARPENTER/JCDA



James Carpenter designed Liquid Light, which reflects the sun pouring in through the skylight of the new Stanford Hospital's atrium.

As plans took shape for the new Stanford Hospital, attention turned to the soaring atrium, which thousands of patients, family members and staff would pass through each day. The space needed a focal point — something that would make the atrium a peaceful yet energizing space, where family members could gather or simply spend a contemplative moment.

Initially, there were thoughts of a fountain, but that idea got nixed because of infection control concerns. The volunteers in charge of selecting the art for the hospital turned to New York sculptor and MacArthur Fellow James Carpenter, who has been captivated by the properties of light and glass for 50 years. They asked him to find a way to convey a sense of water without liquid.

Carpenter designed the Sky Reflector-Net at New York's Fulton Center transit hub, the Ice Falls water feature in the Hearst Center, also in New York, and the St. Louis Gateway Arch museum expansion.

But the new Stanford Hospital is the first health care facility Carpenter has worked on. His team started planning for the project in 2013 and recently completed the installation of Liquid Light.

"We wanted to produce something that had a sense of beauty and a recall of nature and would be rather calming," Carpenter said. "It's something that can really occupy your thoughts."

Liquid Light is made up of rippled glass prisms designed to resemble a wave pattern moving across the ocean's surface, Carpenter said. To create the prisms, the designer used nearly 100 textured glass planks, roughly 3 inches thick, made by Oakland glass artist John Lewis, and affixed the glass to small posts on a 30-foot-wide circular metal base. Positioning the glass as if it's floating allows the sun pouring in through the atrium's skylight to reflect off both the glass and the metal, creating different patterns of light and shadows, said Connie Wolf, consulting director of the art program for the new hospital.

"It almost feels like when you throw a penny into a pond; it shimmers and moves and shifts and changes over time," Wolf said. "It's quite stunning and at the same time very calming."

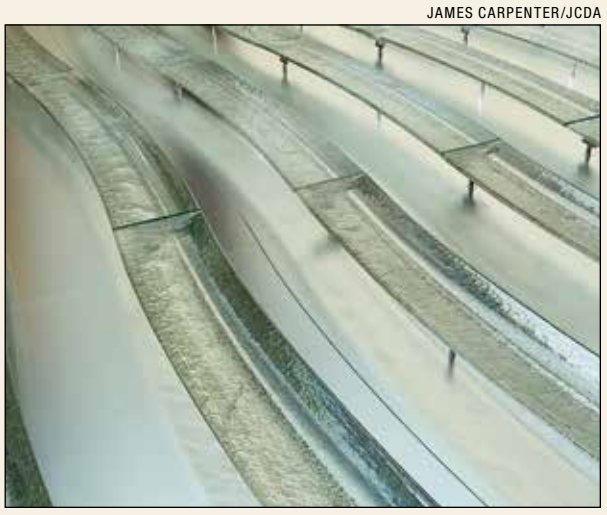
As daylight begins to diminish, a series of lights rimming the skylight come on gradually at varying levels of brightness, moving around on the surface so the sculpture is never still, Carpenter said.

Liquid Light is one of seven works of art commissioned for specific areas in the new hospital, all fully underwritten by private donors. Others include *Rays of Hope*, a mural by artist Jinnie Seo in the interfaith chapel; Leo Villareal's spherical Buckyball in the entrance plaza; and Ned Kahn's 1,000-pound Air Cube in the garden on the third floor.

Carpenter said he is delighted with the finished product.

"It sets up a quality of serenity and beauty and light for the entire lobby," he said. "When you do a piece and you've envisioned it a certain way and you've never done it exactly like this before, it's always quite exciting to come and see something live up to your expectations and exceed your expectations." ISM

JAMES CARPENTER/JCDA



Nearly 100 textured glass planks, roughly 3 inches thick, are set a few inches above a 30-foot-wide circular metal base.

OF NOTE

reports on significant honors and awards for faculty, staff and students

RUSS ALTMAN, MD, PhD, professor of bioengineering, of genetics, of medicine and of biomedical data science, and **JAKE LEVER**, PhD, postdoctoral scholar in bioengineering, received a National Center for Advancing Translational Sciences ASPIRE 1 Challenge prize of $100,000 for their proposal to develop real-time text-mining to aid opioid researchers.

DAVID GATE, PhD, a postdoctoral scholar in neurology and neurological sciences, received an Irene Diamond Fund/American Federation for Aging Research Postdoctoral Transition Award. The $120,000 grant is for his work exploring the role of the immune system in Alzheimer's disease.

KYLE LOH, PhD, assistant professor of developmental biology, received a David & Lucile Packard Foundation Fellowship for Science and Engineering. The $875,000 grant, to be issued over five years, is for his work in building human cells from pluripotent stem cells.

STEPHEN MONTGOMERY, PhD, associate professor of pathology and of genetics, received a 2019 early-career award from the American Society of Human Genetics. The award, which includes a $10,000 prize, recognizes the contributions of genetics and genomics scientists in the first 10 years of their careers as independent investigators.

STANLEY QI, PhD, assistant professor of bioengineering and of chemical and systems biology, was named to *Science News*' Scientists to Watch 2019 list. The honor is for scientists age 40 and younger who are making outstanding contributions in their fields and show promise of making future advances.

MANPREET SINGH, MD, associate professor of psychiatry and behavioral sciences, received the 2019 Klingenstein Third Generation Foundation Award for Research in Depression or Suicide from the American Academy of Child & Adolescent Psychiatry. The $5,000 award was for "Limbic Intrinsic Connectivity in Depressed and High-Risk Youth," of which she was the lead author. The paper was published in the *Journal of the American Academy of Child & Adolescent Psychiatry*.

MICHAEL SNYDER, PhD, professor of genetics, received an award from the Helmsley Charitable Trust. The $4 million grant will go toward studying the effect of environmental, biological and chemical exposures on the development and progression of Crohn's disease.

KEN SUTHA, MD, PhD, a clinical instructor of pediatric nephrology, received the Hero of Hope award from the American Kidney Fund for his work in advocating for public policy that supports patients, funds kidney disease research, increases kidney transplants and improves care.

MICHAEL XIANG, MD, PhD, a resident in radiation oncology, received the American Radium Society Travel Award for his presentation on chemoradiotherapy for cervical cancer in older women. He also received the American Society of Clinical Oncology Conquer Cancer Foundation Merit Award for his presentation on the risks of subsequent cancer diagnosis in patients treated with 3D conformal, intensity modulated or proton beam radiation therapy. ISM

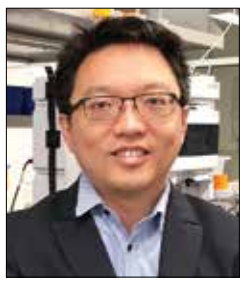
Russ Altman

Jake Lever

David Gate

Kyle Loh

Stephen Montgomery



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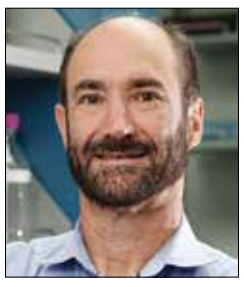
Manpreet Singh



Michael Snyder

Ken Sutha

Michael Xiang

TAKE PART IN CLINICAL RESEARCH

Stanford Medicine researchers are recruiting participants of all ages for a variety of clinical trials. They need people with specific health conditions, as well as healthy participants. For more information about clinical trials at Stanford, visit **clinicaltrials.stanford.edu.**