INSIDE STANFORD MEDICINE

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Karl Deisseroth has won the Kyoto Prize for his seminal role in the creation and use of optogenetics.
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Berg to grads: 'Aim high and keep learning'

By Julie Greicius

STEVE FISCH

Biochemist and Nobel laureate Paul Berg spoke to graduating students at the School of Medicine's 110th diploma ceremony on June 16.

Exploration of the unknown and the thrill of discovery are "exhilarating experiences" for those who dedicate their lives to the professions of science and health, Nobel laureate Paul Berg, PhD, told Stanford School of Medicine graduates on June 16.

"Such experiences are rare, personally rewarding and not always recognized by prominent prizes," Berg said.

A professor emeritus of biochemistry at Stanford, Berg spoke at the medical school's 110th diploma ceremony, which was held on campus at Sand Hill Fields beneath the shade of a large white tent. Lloyd Minor, MD, dean of the School of Medicine, fellow faculty members and graduating students — candidates for medical degrees and graduate degrees in the biomedical sciences — were seated behind him on a stage decorated with ferns and cardinal red Stanford Medicine banners. In the audience, family members, guests and classmates of the students numbered in the hundreds. The weather was mild, with temperatures in the low 70s. A light breeze drifted through the tent.

Berg, 91, the Robert W. and Vivian K. Cahill Professor of Cancer Research, Emeritus, affirmed the "scientific core of medicine," noting that breakthrough discoveries can be made both in the lab and at the bedside. "Physicians, by their encounters with and proximity to patients displaying a range of pathologies, are often the first to identify novel and disruptive aspects of human biology," he said. "Indeed, physicians have initiated some of the most significant discoveries that changed the course of medical thinking and progress."

'Inspire others by your passion'

But the challenge for those who practice medicine has unique demands, said Berg, who won the Nobel Prize in chemistry in 1980 for creating the first recombinant DNA. It is "not for the faint-hearted, for it will engage every ounce of your powers of patience, understanding and empathy." He emphasized the indispensable role of investigation, and charged the graduates to "aim high and keep learning, be skeptical of accepted certainty and stay fast in the belief that facts matter."

In his remarks to the graduates, faculty and guests, Minor also underscored the importance of science, especially in a world with "a growing distrust of science as a source of truth." Commending an example from Berg's career — the historic Asilomar conference that Berg convened to work through questions of safety raised by his work in genetic engineering — Minor said, "We must not shy away from the public debate; indeed, it is incumbent on us to begin the conversation."

Minor encouraged the students to be passionate advocates for science. "As Stanford Medicine graduates, you have a unique understanding of the transformative benefits of discovery," he said. "So, today, as we send you off to change the world, I'd like to ask you to help me share those life-changing benefits — to be a spokesperson, advocate and defender of science." He encouraged graduates to "inspire others by your passion for your work" and "let your enthusiasm and pride be infectious."

"Imagine the Stanford Medicine classes of 2038 and 2048," Minor said, "full of today's youngsters inspired by your example and a world celebrating how the science of tomorrow has overcome the greatest challenges of today."

See GRADUATES, page 4

Biomarker signals risk of getting flu

By Hanae Armitage

Researchers at the School of Medicine have found a way to predict whether someone exposed to the flu virus is likely to become ill.

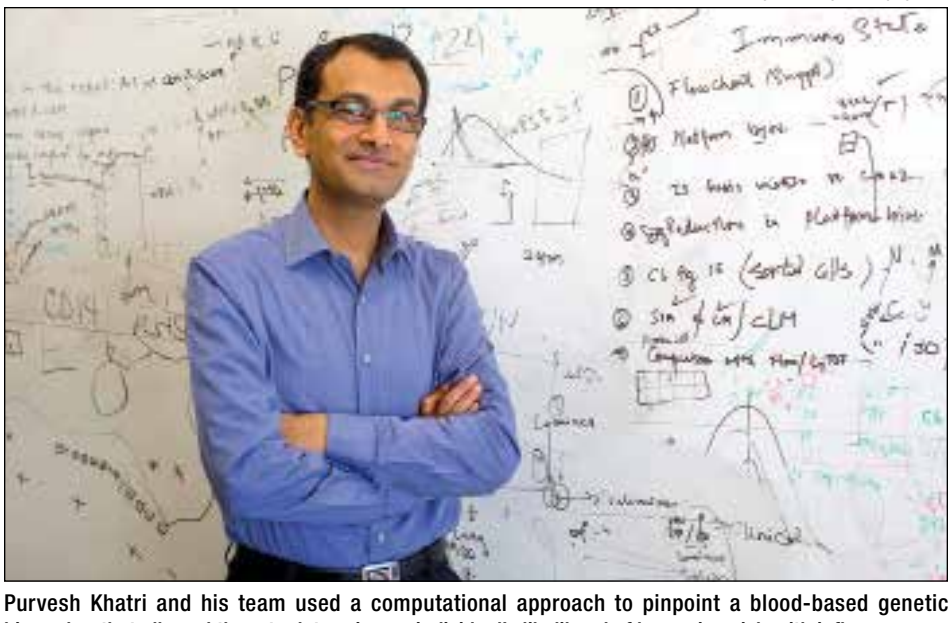
Purvesh Khatri, PhD, associate professor of medicine and of biomedical data science, and his team used a computational approach to pinpoint a blood-based genetic biomarker that allowed them to determine an individual's susceptibility to the disease.

"We've been after this for about four years," Khatri said. "To our knowledge, it's the first biomarker that shows susceptibility to influenza, across multiple strains."

The biomarker is a gene called KLRD1, and it es-

See FLU, page 6

NORBERT VON DER GROEBEN



Purvesh Khatri and his team used a computational approach to pinpoint a blood-based genetic biomarker that allowed them to determine an individual's likelihood of becoming sick with influenza.

Genetic variation in hormone receptor tied to prematurity risk

By Erin Digitale

Humans have unexpectedly high genetic variation in the receptor for a key pregnancy-maintaining hormone, according to research led by scientists at the School of Medicine. The finding may help explain why some populations of pregnant women have an elevated risk of premature birth.

A paper describing the work was published June 21 in *The American Journal of Human Genetics*.

The researchers found that East Asian populations have one version of the progesterone receptor gene that appears to protect them against giving birth prematurely, whereas other populations with European or African ancestry have a higher prematurity risk and other versions of this gene. The discrepencies between the populations reflect relatively recent evolution.

Because progesterone and its receptor are so important for pregnancy, the results were unexpected. "People have thought everyone should have a similar version of the progesterone receptor. But our study showed that we have different versions — that there is diversity between individuals and between populations," said Jingjing Li, PhD, an instructor of pediatrics at Stanford and the paper's lead author. "It really surprised us."

Spontaneous premature birth, in which a pregnancy ends more than three weeks early, affects 9 percent of U.S. pregnancies. It is the leading cause of infant death in the United States and the largest contributor to deaths in children younger than 5 worldwide.

"Preterm birth has probably been with us since the origin of the human species, and being able to track its evolutionary history in a way that sheds new light on current discoveries about prematurity is really exciting," said Gary Shaw, DrPH, a professor of pediatrics at Stanford. Shaw shares senior authorship of the paper with David Stevenson, MD, who is also a professor of pediatrics at Stanford.

A reproductive hormone

Progesterone is a reproductive hormone. Its receptor, a protein expressed in tissues such

See PROGESTERONE, page 6

Single liver donor benefits two patients — one young, one old

By Julie Greicius

The lives of two patients — one a baby, one a retired physician — crossed paths in the most unexpected way in the summer of 2017, when a single organ donor helped save both their lives at once.

Noah Hernandez, born in February 2017, and James Howell, MD, born in 1955, had never met, but both were facing life-threatening health conditions caused by liver disorders. Noah had been born healthy, but at 4 months, he was beginning to look yellowish, a condition associated with jaundice. After being admitted to his local hospital in Sacramento, a CT scan and liver biopsy indicated a problem with his bile ducts that was preventing his liver from draining properly — a condition called biliary atresia. That's when he was transferred to Lucile Packard Children's Hospital Stanford.

"With biliary atresia, no one really knows what the cause is," said Carlos Esquivel, MD, PhD, professor of surgery and of pediatrics at the Stanford School of Medicine. Most patients, he said, get a pediatric surgery called a Kasai procedure that attempts to create drainage of the liver. "In some children, it works and then they get better; but in some children, this procedure fails," said Esquivel, who is also director of the Liver Transplant Program at Lucile Packard Children's Hospital Stanford. "Their only chance for survival is liver transplant. And that was the case with Noah."

Noah was placed on the waiting list for a donor liver. His parents, Alyssa and Reymon, understood it could be a long wait, because pediatric livers aren't often available. "They can't tell you how long you'll wait," Alyssa said. "They preferred to have an infant-sized liver, and felt that Noah was well enough that they could be picky and wait for the perfect liver."

Fluid buildup

Noah soon began experiencing unusually high levels of ascites — an abnormal buildup of fluid in his abdomen. "Normally it's there in the stomach," Alyssa said. "But Noah had it only along his Kasai incision. It was so bad that it kept getting bigger and bigger to the point that his entire right side was bulging out. He couldn't sleep any more, wasn't comfortable. He would just cry."

Alyssa, who had stayed awake at her son's side, was sent home to get some sleep on Aug. 23. While she was gone, Noah started having trouble breathing. She rushed back to the hospital, where Noah had been transferred to the pediatric intensive care unit and placed on life support. "Those were absolutely the worst days," Alyssa said. Fearing the worst, she immediately called her husband, and also her pastor, to come right away. Noah was baptized that evening.

> "It was like a gift from God and from that family."

Because of how sick he was, Noah's position on the organ waiting list was moved up to the highest urgency, meaning he would get the first liver available. The paradox of organ transplant, however, is that even though the sickest patients are placed higher on organ waiting lists, some patients can be too sick to undergo transplant surgery, making them ineligible for a donor organ. "Dr. Esquivel said they were doing everything in their power to prep Noah to get a liver," Alyssa said. "That night, at about 9:30, we received the call." A donor match was available — only it was not a pediatric liver, but one from an older teenager.

A doctor with liver cancer

Almost 15 years earlier, in 2003, James Howell, MD, a retired physician in the South Bay, was diagnosed with cirrhosis, an irreversible liver disease. It can be the beginning of other complications and diseases of the liver, including cancer, with which Howell was later diagnosed. "I was just extraordinarily lucky to keep my cancer with only liver involvement," he said.

"Once the tumor in the liver gets large enough, they can treat that by ablation," he said. "They put a probe into my liver and zapped it. I went through that procedure twice over two years. But the ablation was only buying time. I had two fatal illnesses going on at the same time. It was just a weight on my shoulders, just a burden that I felt every day."

When his cancer came back for the third time, Howell was put on the waiting list for a liver. "I'd been cruising along, all things considered, keeping my ascites under control, strict dieting, staying with my medicines," he said. "I was getting prepared to go in for another scan of my liver, when all of a sudden I got a call at about 10 o'clock at night." Howell explained that they described the quality and condition of the liver. "They give you a little profile of it," he said. "And it was almost too good to be true. It was like a gift from God and from that family."

Esquivel, who also holds the Arnold and Barbara Silverman Professorship in Pediatric Transplantation, was among the first surgeons to do liver transplants in children — especially tiny babies — and has been doing them for nearly three decades. When surgeons began doing split-liver transplants, it was a move that made sense, he said, because of the difficulty in finding pediatric donors.

"Because of the shape of the liver, it is common to split it between recipients of varying ages," Esquivel said. "The anatomy of the liver is such that what we call the right lobe amounts to about two-thirds of the entire liver volume. So, let's say it's a 3-pound liver: The adult will get about 2.5 pounds, and the child one-half pound." The liver is the only internal organ capable of regeneration, which can begin almost immediately after surgery.

A complex procedure

Still, transplanting an adult-sized liver into an infant is a complex procedure. "The blood vessels are more of a mismatch, because they are adult-sized," he said. "A child who is only a few months old — their blood vessels are tiny."

Noah was prepped for surgery around 8:30 a.m. the next day, Aug. 24. "They told us it would take about eight to 10 hours," Alyssa said. "When it was done in 7½, that just blew our minds." Andy Bonham, MD, associate professor of surgery, performed the removal of Noah's liver, and Esquivel did the transplant. Bonham performed the liver transplant for James Howell.

"I woke up the next day and thought they had not done the transplant," Howell recalled. "I had absolutely no pain." The surgeons soon visited Howell to tell him everything had gone well. He made a quick recovery, which he attributes to the constant support of his wife, Denise, and an around-the-clock team of nurses who were "absolutely incredible," he said. "They were the most awesome human beings I have ever met." For his surgeons, and the entire transplant team, he felt equal appreciation. "I can't say enough about the people who took care of me," he added. "They were just awesome — skilled, compassionate and caring. It made a huge difference for me, obviously."

Howell went home just five days after his surgery.

Transplant success, rocky recovery

Recovery was rockier for Noah, who stayed in the hospital for two more months. The transplant itself was successful, but the difficulty he'd had keeping his ascites low before the transplant worsened afterward. "The fluid started going around his lungs, and then into them," Alyssa said. Noah needed surgery to place, and later replace, a chest tube to drain the fluid, and also needed a respirator to support his breathing.

Alyssa recalled the day that Esquivel stopped by Noah's bedside and advised taking him off all fluids, because they worsened ascites. Noah was also on diuretics and other medications to balance his fluid retention. "I adjusted his medications," Esquivel said, "and it worked." Noah's ascites were gone within a week. "It was definitely a turning point," Esquivel said. "Noah began to look happy and more like a normal child."

"The man is a miracle worker," Alyssa said of Esquivel.

A few weeks later, the Hernandez family left the hospital but stayed nearby at the Ronald McDonald House at Stanford for a few weeks while Noah was still under observation. Then they all went home to Sacramento.

Today, Noah has passed the 70th percentile for weight. He's started swimming lessons and loves the water, Alyssa said. "He is walking around everywhere and learning to say 'cat,' among many other words," she said. "He is the happiest little boy."

Meanwhile, Howell is getting back to enjoying his retirement, eating whatever he likes and taking time to enjoy the simple things in life. "I think a lot about the bravery and the courage of the donor family for allowing their loved one to donate the organ that changed two lives immensely," he said. "I don't know why he was on the earth for such a short time, but I'm truly grateful." **ISM**

KATHERINE EMERY/STANFORD CHILDREN'S HEALTH

Surgeons Andy Bonham and Carlos Esquivel with liver-transplant recipients Noah Hernandez and James Howell, a retired physician.

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STANFORD MEDICINE

5 QUESTIONS

an occasional feature in which an expert answers five questions on a science or policy topic

How border separations can traumatize children

In the last several weeks, thousands of migrant children have been separated from their parents as families attempt to cross the southern border into the United States. These separations hurt children's well-being and can have negative effects on their developing brains, according to Stanford Children's Health psychiatrist Victor Carrion, MD.

On June 20, President Trump signed an executive order to end his administration's policy of separating families at the border. Still, the effects for children who have already been taken from their parents will last long after border separations are discontinued, Carrion said. Furthermore, the order doesn't address what will become of the roughly 2,300 children who already have been separated from their parents, nor does it guarantee that children arriving now won't be detained for long periods with their families as they await court proceedings.

A professor of psychiatry and behavioral sciences at the School of Medicine, Carrion directs the Early Life Stress and Pediatric Anxiety Program, conducting research on the psychological and neurological effects of childhood trauma. He has worked extensively with children who have experienced interpersonal violence, physical and sexual abuse, loss of loved ones and natural disasters, such as Hurricane Maria in Puerto Rico and the October 2017 wildfires in Santa Rosa, California.

Recently, science writer Erin Digitale asked Carrion to discuss how being separated from their families could affect migrant children.

1 From your perspective as an expert in childhood trauma, what are the problems with separating members of migrant families at the border?

CARRION: There are many; it's hard to know where to start. Any time there is separation that is not planned by the family, it's perceived by the child as a traumatic event. For children younger than 7 or 8, separation from parents is even worse than the concept of death. At young ages, children see death as something that can be reversible and is not universal, that may not happen to their family.

So the worst thing that can happen to a young child is being taken away from their parents or caretakers. As a child gets older, separation from their family could be the second-worst thing. At moments of high stress, children need even more of the support, care and the feeling of safety and security that they get from their parents. When you take their parents away, all those feelings are taken away: safety, security, confidence, coping skills.

If this happens in an environment that children are not familiar with, it's even more traumatizing, and in a situation where they perceive threats, still more traumatizing. We have good reason to believe that what migrant children are experiencing at the border — where there are guards, where nothing is familiar — is one of the most traumatic experiences possible.

I'm also very concerned about what we call the allostatic load, a term for cumulative stress. We are all responding to all of our experiences in life, not only the most recent. Many of these children may already have a history of trauma. When you add a new trauma of this magnitude to their backpack, they may buckle under its weight.

2 What does the latest brain science tell us about how children's development is affected by trauma?

CARRION: There is a popular misconception about resilience in which people think children will overcome things simply because they are children. But nothing in the scientific literature supports this. In fact, what our research shows is the opposite: Having a young, vulnerable brain that is still developing puts you at a disadvantage when something traumatic occurs. The hormones secreted in response to stress alter brain structure and brain function.

Victor Carrion

When we are under stress, we secrete a hormone called cortisol. When a stressor persists for a long period, high cortisol can become toxic to developing brain cells. It particularly affects cells with more glucocorticoid receptors. The areas of the brain that are strongly affected include the prefrontal cortex, the limbic system and the frontal-limbic connections that attach emotional to cognitive life. These brain regions are where you store memories, where memories get retrieved. We believe brain changes in response to high cortisol are responsible for the anxiety, depression and post-traumatic stress disorder that we see in survivors of abuse and trauma. We also know that the genetic makeup of an individual, the expression of their genes, can be altered by the experience of stress. Stress can increase the methylation of some genes, causing the genes to behave differently, and not in a positive way.

3 You've written that "harmful measures that cause prolonged, intense fear in the absence of known caretakers are experienced by children as terror." Can you elaborate on that?

CARRION: I want to make sure people understand what traumatic stress is. I think a good way to describe it is as terror. If you are causing harm for prolonged periods to vulnerable individuals, and they are experiencing intense fear, that is terror.

4 What determines how children taken from their parents will fare in the long run?

CARRION: Several factors are important. One is the support system these children have available to them. Right now they don't have any. Our authorities are supposed to be trying to connect children with family members here in the U.S., but it's hard to know if those efforts are adequate.

I'm especially concerned about kids who don't have families here. How long are they going to be detained? Their long-term response depends on their allostatic load, as well as their age, the duration of this traumatic experience and the amount (or lack) of support they get during this experience.

And although the practice of family separations is being stopped by an executive order, I am worried about the ability of the system to reunite thousands of families who are already apart. The trauma won't end until all children are returned to their parents.

The resources needed to process what transpired may not be available to many of these families in need. We now have an obligation to repair the children's experience of fear and vulnerability.

5 Among children who experience trauma, how many develop PTSD or other similar problems? Can you estimate what proportion of kids separated from their families at the border might be so affected in the long run?

CARRION: Among kids that experience community violence, such as gang violence in their neighborhood, approximately 35 percent develop symptoms of PTSD. When the trauma comes closer, things like sexual abuse for example, it's more like 50 percent. And among children who survive things like torture and kidnapping, it's 99 percent.

The long-term effect of border separations will depend on the subjective experience of the child. If you're a very young child being removed from your parents, it may feel like nothing more horrible can happen.

Overall, I would estimate that the chance that any individual child will develop psychological problems after this are in the range of 40-90 percent. ISM

New building to open at Stanford Medicine Outpatient Center

By Grace Hammerstrom

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 a staff of 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 technicians will staff both centers.

DAVID WAKELY

A rendering of Pavilion D, which will be home to the spine, tumor, and foot and ankle centers; the digestive health and pelvic health centers; and an endoscopy suite. The building will open July 9.

"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. ISM

Graduates

continued from page 1

Graduate Opher Kornfeld, who earned a PhD in chemical and systems biology, spoke candidly, and at times humorously, about the value of learning how to fail. His first notable failure, he said, came in a middle school spelling bee after recently immigrating to the United States. An ambitious scientist, he added, must learn to fail well. "The living systems we study are complex and unpredictable, our hypotheses are daring," Kornfeld said. Rebounding from disappointment is a skill the best scientists must hone. "Dean Minor, the individuals sitting behind me are some of the best failers I know."

Solidarity with her classmates and embracing the novel experiences of medicine were the themes of remarks delivered by graduating medical student Charlotte Rajasingh, who will stay on at Stanford as a resident in general surgery. "I hope that by remembering the complex feelings of novelty we became so familiar with as medical students we will be better caregivers for our patients, better team members for those who look up to us and better leaders as that feeling of newness is encountered down the road," she said. "Lean into the feeling of novelty; it's where all great things start."

Graduates and newlyweds

Among the capped and gowned students seated in alphabetical order to receive their diplomas, Akhilesh Pathipati, from Sacramento, California, and Mythili Pathipati, from Ames, Iowa, were side by side. Newlyweds since April, they now share the same last name, and so stepped forward in succession to have MD "hoods" draped over their shoulders before walking across the stage to receive their diplomas. The couple will be moving to Massachusetts to begin medical residencies in ophthalmology and internal medicine, respectively, at Harvard, where they first met as undergraduates.

During the presentation of diplomas, cheers, hollers and even a few ululations arose from the crowd. A total of 248 students met their graduation requirements over the course of the last academic year, earning 77 MD degrees, 88 MS degrees and 90 PhDs. (In some cases, students earned more than one degree, such as an MD and PhD.) Of those students, 166 participated in the ceremony.

Lila Hope, PhD, JD, president of the Stanford Medicine Alumni Association, welcomed the new graduates. "You may be leaving the Farm today, but the Farm will never leave you," she said. She was followed by Sughra Ahmed, associate dean for religious life, who gave a closing benediction. "May your deeds and words be a force for good and healing," Ahmed said.

'Finally!'

"Finally!" said Mariko Bennet, who was excited to earn her MD and PhD degrees after a full 10 years of study and research at the school. Bennet celebrated with her husband, Christopher Bennett, MD, a School of Medicine alumnus who completed his residency in psychiatry at Stanford, and other members of their family, friends and classmates.

Mariko Bennett had conducted her research in the lab of the late Ben Barres, MD, PhD, on the function of microglia, "the resident immune cells of the brain," as she called them. "It's been a tough few years and, with Ben dying this year, it sometimes felt really hard to think about moving on," she said. "But we did." Bennett and her husband will be moving to Pennsylvania, where she'll begin her residency in pediatric neurology on June 21 at the Children's Hospital of Philadelphia. She'll also continue her research.

Mark Freeman, who earned a master's degree in community health and prevention research, celebrated with his family and best friend, Alexander Ekwueme. "I'm so happy for him. And I'm motivated by him to work harder, since I'm trying to get into med school myself," Ekwueme said. "We're going to eat, and then tonight's shenanigans are gonna happen."

The Teasley family had arrived June 15 from Inglewood, California, to celebrate the graduation of Eric Teasley, who earned an MD. "I feel overwhelmed. I don't even know. Fantastic," said Teasley, who also earned a master's degree and has been working on a PhD in bioengineering. "I feel very loved today. It's been a long road."

Teasley was encircled by his parents, Sireric and Janyce Teasley, his brother Myles, cousin and godmother Margaret Pasley, and family friends Aaron Greenspan, Kevin and Susan Atkins, and Joyce Boykin, MD. Their next stop was a dinner at Pampas in Palo Alto.

The breeze picked up, and the tent slowly cleared. Graduates left in cars or on foot, heading to celebrations and then into the next phase of their lives. **ISM**

STEVE FISCH

Graduating medical student Margaret Mongare (center) onstage with Peter Pompei, clinical professor of medicine, and Amy Ladd, professor of orthopaedic surgery, at the diploma ceremony.

STEVE FISCH

STEVE FISCH

STEVE FISCH

JULIE GREICIUS

(Clockwise from top left) Winston Haynes, who earned a PhD in biomedical informatics, with his daughter. Lloyd Minor, dean of the School of Medicine, and Sughra Ahmed, associate dean for religious life at the university. Eric Teasley, who earned an MD, surrounded by family and friends. Newlyweds and newly minted MDs Mythili Pathipati and Akhilesh Pathipati.

Annual awards recognize excellence in teaching, patient care and more

Nearly 50 Stanford Medicine faculty, staff, residents, students and volunteers have been recognized with awards and honors for excellence in teaching, patient care and other efforts during the 2017-18 academic year.

Awards in medicine

James Lau, MD, clinical professor of surgery; **Leslie Lee**, MD, clinical professor of neurology and neurological sciences; and **Kristan Staudenmayer**, MD, associate professor of surgery, received the Arthur L. Bloomfield Award in Recognition of Excellence in the Teaching of Clinical Medicine.

Preetha Basaviah, MD, clinical professor of medicine, received the Franklin G. Ebaugh, Jr. Award for Excellence in Advising Medical Students.

David Liang, MD, PhD, professor of cardiovascular medicine, received the Alwin C. Rambar-James BD Mark Award for Excellence in Patient Care, which recognizes a member of the medical faculty for compassion in working with patients and their families, excellence in providing medical treatment, and effectiveness and pleasantness in interactions with patient-care staff.

Neil Gesundheit, MD, PhD, professor of medicine and senior associate dean for medical education, received the Lawrence H. Mathers Award for Exceptional Commitment to Teaching and Active Involvement in Medical School Education.

Darren Salmi, MD, clinical assistant professor of surgery and pathology, received the Award for Excellence in Promotion of the Learning Environment and Student Wellness.

Margaret Govea, director of medical student wellness, received the Medical Education Staff Service Award.

Andrew Nevins, MD, clinical associate professor of infectious disease, received the Outstanding Lecture/Presentation Award.

Mina Charon, a physician at the Veterans Affairs Palo Alto Health Care System, received the Outstanding Community Clinic Preceptor-Preclinical Instruction Award.

Sanjay Kurani, a physician at Santa Clara Valley Medical Center, received the Outstanding Community Clinical Preceptor-Clinical Instruction Award.

Jacqueline Tai-Edmonds, MD, clinical associate professor of primary care and population health, and **Nounou Taleghani**, MD, PhD, clinical associate professor of emergency medicine, received the Henry J. Kaiser Family Foundation Teaching Award for Outstanding and Innovative Contributions to Medical Education.

Tai-Edmonds; **Veronica Santini**, MD, clinical assistant professor of neurology and neurological sciences; and **Michael Tierney**, MD, a physician at the Veterans Affairs Palo Alto Health Care System, received the Henry J. Kaiser Family Foundation Award for Excellence in Preclinical Teaching.

Andre Kumar, MD, clinical instructor in medicine; **Charles Liao**, MD, clinical assistant professor of medicine; and **Lisa Orloff**, MD, professor of otolaryngology, received the Henry J. Kaiser Family Foundation Award for Excellence in Clinical Teaching.

Medical residents **Ioana Baiu**, **Nina Bozinov**, **Lief Fenno**, **Nikhil Kamat**, **Ernest Maningding** and **Laura Mazer**, received the Arnold P. Gold Foundation Award for Humanism and Excellence in Teaching. The award is given to residents based on their commitment to teaching and the compassionate treatment of students, colleagues and patients and their families.

David Mahoney, a medical student, received the Teaching Assistant Award.

Martin Bronk, MD, clinical associate professor of surgery; **James Lau**, MD, clinical professor of surgery; and **Douglas Fredrick**, MD, clinical professor of ophthalmology, received the Award for Excellence in Promotion of Humanism.

Medical students **Paloma Marin Nevarez** and **Timothy Keyes** received the Award for Excellence in Promotion of Diversity and Societal Citizenship.

Medical resident **Jennifer Wang**, MD, received the Cardinal Free Clinics Outstanding Volunteer Physician Award.

Jessica Steinberg, a medical student, received the United States Public Health Service Award.

Medical students inducted into the Gold Humanism Honor Society are **Carlie Arbaugh, Tej Azad, Kuo-Kai Chin, Kiley Lawrence, Nicholas Love, Sarah Miller, Maia Mosse, Keon Pearson, Adela Perez, Matthew Schoen, Jessica Steinberg** and **Maggie Zhou**. Members of the society, a program of the Arnold P. Gold Foundation, are selected for exemplifying compassionate patient care and serving as role models, mentors and leaders.

Awards in bioscience

Kristin Sainani, PhD, associate professor of health research and policy, received the Award for Excellence in Graduate Teaching. This award recognizes faculty whose teaching of graduate students is distinguished and especially valued by faculty and graduate students in medicine and the biosciences.

Anthony Ricci, PhD, professor of otolaryngology-head and neck surgery and the Edward C. and Amy H. Sewall Professor in the School of Medicine, received the Award for Excellence in Diversity and Inclusion. This award recognizes faculty and academic staff who make distinguished contributions toward enhancing diversity, equity and inclusion across the biosciences at Stanford.

Theo Palmer, PhD, professor of neurosurgery, received the Award for Excellence in Mentoring and Service. This award recognizes faculty who make distinguished contributions towards enhancing the quality of training and the experiences of graduate students in the biosciences at Stanford. ISM

Karl Deisseroth wins Kyoto Prize for advanced technology

By Bruce Goldman

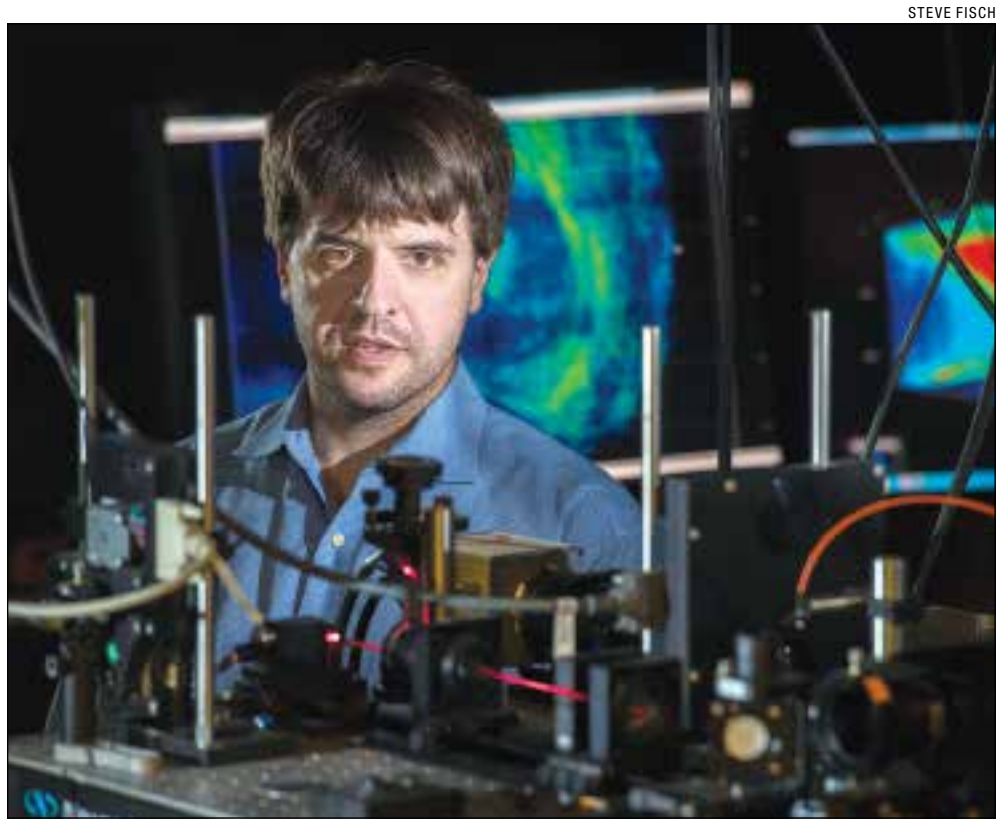
Karl Deisseroth, MD, PhD, a Stanford University professor of bioengineering and of psychiatry and behavioral sciences and a Howard Hughes Medical Institute investigator, will receive the 2018 Kyoto Prize for advanced technology.

Deisseroth will be honored for pioneering optogenetics and the optogenetics-enabled "development of causal systems neuroscience," the award citation notes, referring to the science of establishing causal relationships between nerve-circuit activity and behavior, rather than merely observing correlations between them.

Of his research, he said, "This technology has been a long time in the making and has undergone a lot of development and improvement from the outstanding students, postdoctoral fellows and staff members in the lab. Meanwhile, we and others around the world are continuing to achieve new discoveries and insights with optogenetics."

Deisseroth's lab developed the basic components of optogenetics between 2004 and 2009. Between 2008 and 2018, his lab elucidated the inner-workings of opsins, allowing them to develop variations of these molecules and enabling more-richly detailed, precise and versatile exploration of neural circuits. Today, thousands of laboratories around the world routinely employ Deisseroth's methodology and opsins to identify the brain circuitry responsible for specific behaviors, both healthy and maladaptive. Their findings have given rise to thousands of publications in peer-reviewed journals.

STEVE FISCH



Karl Deisseroth will receive the prize for pioneering and advancing a technology for studying brain circuits.

Optogenetics allows scientists to manipulate the activity of nerve cells in an animal's brain. Genes encoding light-sensitive proteins, called opsins, are inserted into specific nerve cells. Then a pulse of laser light, delivered through a hair-thin optical fiber implanted in the brain, can turn the cells' signaling activity on or off. By observing how the animal behaves when the signaling is either active or inactive, scientists can deduce the cells' function. The tool has enabled researchers to better understand brain disorders such as schizophrenia, depression and Parkinson's disease.

Deisseroth is the youngest recipient of the prize ever.

"A brilliant and innovative investigator, Karl has created a revolutionary technology that has broadened our understanding of brain disorders and may one day yield treatments to the millions with these disorders," said Lloyd Minor, MD, dean of the Stanford School of Medicine. "His receipt of the Kyoto Prize is inordinately well-deserved and the product of his unmatched scientific vision."

The Kyoto Prize has been awarded annually since 1985 by the Inamori Foundation, a Japanese charitable organization, in three separate categories: advanced technology, basic sciences, and arts and philosophy. The prizes, which consist of a diploma, a 20-karat gold medal and a gift of 100 million yen (about $913,000), will be awarded at a ceremony in Kyoto, Japan, on Nov 10.

A delegation from the foundation visited Deisseroth at Stanford to inform him that he would be receiving the award. "I can tell you I didn't do much math or engage in abstract thought for the rest of that day," Deisseroth said. Deisseroth, who also holds the D.H. Chen Professorship, is the youngest recipient of the prize ever.

Deisseroth's previous prizes include the Harvey Prize and Fresenius Research Prize in 2017; and the Dickson Prize in Medicine, the Lurie Prize in Biomedical Sciences and the Breakthrough Prize in Life Science in 2015. He is a member of the National Academy of Sciences, the National Academy of Medicine, the Stanford Neurosciences Institute and Stanford Bio-X.

The late Leonard Herzenberg, PhD, a long-time professor of genetics at Stanford, received the Kyoto Prize in 2006. Several other recipients, including molecular biologist Sydney Brenner, PhD, magnetic-resonance-imaging pioneer Paul Lauterbur, PhD, and stem-cell researcher Shinya Yamanaka, MD, PhD, have gone on to win the Nobel Prize. ISM

Online interactive map of Redwood City campus

An interactive map of the Stanford Redwood City campus is now available on the Cardinal at Work website. The map shows office building occupants by floor and key campus amenities. Visit https://cardinalatwork.stanford.edu/redwood-city/interactive-map to view it. ISM

Planned center aims to improve outcomes for patients with heart disorder

A grant of $5 million was awarded to Stanford University to create a center focused on developing tools to help patients with atrial fibrillation, an irregular heartbeat, make what are often difficult decisions about their treatment plans.

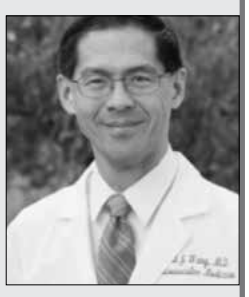
Stanford was one of six universities awarded a total of $28 million by the American Heart Association to build collaborative research centers focused on improving outcomes for patients with this condition, which increases the risk of stroke.

An estimated 6.1 million or more Americans were living with atrial fibrillation as of 2010, making it the most common heart rhythm abnormality in the United States. That number is expected to rise to 12.1 million by 2030, according to the American Heart Association.

Patients must often decide whether to take physician-recommended anticoagulant drugs regularly to help prevent stroke. The decision is complicated by the different advantages and disadvantages of the many blood-clot-preventing drugs that are available. Excessive bleeding is a possible side effect of these medications.

"We recognize decision-making is a major problem for these patients," said Paul Wang, MD, professor of cardiovascular medicine and director of the Stanford Cardiac Arrhythmia Service. "Anticoagulants don't make you feel better. Patients make a choice between an increased risk of bleeding or preventing a stroke. We are trying to help patients make a choice they won't regret."

With funding from the award, the Stanford center will develop a smartphone app, along with other decision-making tools, to help patients better understand their choices. The center will also conduct comparative-effectiveness studies to determine the success and feasibility of these new tools.



Paul Wang

The center will be led by Wang and Randall Stafford, MD, PhD, professor of medicine and director of the Stanford Program on Prevention Outcomes and Practices. ISM

Flu

continued from page 1

sentially acts as a proxy for the presence of a special type of immune cell that may be a key to stamping out nascent flu infection. Put simply: the more of this cell type found in a person's blood, the lower their flu susceptibility. The research even hints at new avenues for pursuing a broadly applicable flu vaccine.

A paper describing the work was published online June 14 in *Genome Medicine*. Khatri is the senior author. Graduate student Erika Bongen is the lead author.

At the start of their study, Khatri and his group ran gene expression analyses that sifted through the collection of human genes, looking for a sign that one might be particularly important for fighting off the flu. But the sheer number of genes in a small number of samples overshadowed any potential signal, so Khatri turned to a different approach that repurposed immune cell data collected from more than 150 studies that monitored gene expression in the immune cells of more than 6,000 samples.

"The idea was, instead of looking at 20,000 variables [or genes], let's bring it down to 20 — let's only look at 20 immune cell types and see if any of these shows a consistent pattern in regard to H1N1 or H3N2 flu infection, and then we'll look at genes that are related to that cell type only," Khatri said. "And that turned out to be the answer."

Using a computational approach developed in his lab, Khatri and his team parsed the identity and proportion of cells present in participants of two studies — one conducted at Harvard University, the other at Duke University — comprising a total of 52 individuals who volunteered to sniff up live influenza in the name of science. The researchers were looking only at types of immune cells present in each individual just before they were infected with the flu.

> "To our knowledge, it's the first biomarker that shows susceptibility to influenza."

"We found that a type of immune cell called a natural killer cell was consistently low at baseline in individuals who got infected," Bongen said. Those who had a higher proportion of natural killer cells had better immune defenses and fought off illness.

"So we asked, 'What are the genes that represent natural killer cells?' And there turned out to be this one gene, KLRD1, that seemed to be a good target," Bongen said.

KLRD1, when expressed, manifests as a receptor on the surface of natural killer cells. KLRD1 is basically a counting chip. When the score was tallied, Khatri saw that, on the whole, those whose immune cells consisted of 10-13 percent natural killers did not succumb to the flu, whereas those whose natural killer cells fell short of 10 percent wound up ill. It's a fine line, Khatri said, but the distinction between the groups is quite clear: Everyone who had 10 percent or more natural killer cells stood strong against the infection and showed no symptoms.

Khatri said his findings could help health professionals understand who's at the highest risk for flu infection. "If, for example, there's a flu epidemic going on, and Tamiflu supplies are limited, this data could help identify who should be prophylactically treated first," Khatri said.

Khatri emphasizes that for now, the link between KLRD1 levels and influenza susceptibility is only an association. The next step, he said, is to find the mechanism.

"It will be crucial to understand the role of natural killer cells' protection so that we can potentially leverage that in designing better flu vaccines," he said. "Since we see that natural killer cells are protective across different strains, maybe that would be a path to a universal flu vaccine."

More broadly, Khatri said that this research exemplifies the power of "data repurposing."

"Our work shows how you can use data that exists from previous studies to answer questions that those studies alone would not have been able to answer," Khatri said. "But by aggregating the data, we were able to find a signal across both studies and use that to discover something new."

Other Stanford co-authors of the study are postdoctoral scholar Franceso Vallania, PhD, and PJ Utz, MD, professor of medicine.

Khatri is a member of Stanford Bio-X and the Stanford Child Health Research Institute.

The study was supported by the National Institutes of Health, the Donald E. and Delia B. Baxter Foundation, the Henry Gustav Floren Trust, a gift from Elizabeth F. Alder and the Bill and Melinda Gates Foundation.

Stanford's departments of Medicine and of Biomedical Data Science also supported the work. ISM

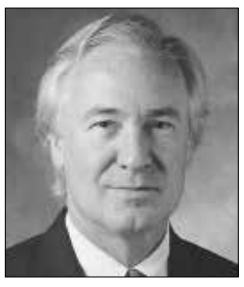
Progesterone

continued from page 1

as the uterus, ovary and cervix, binds to the hormone and sends signals that keep pregnant women from going into labor too soon. Changes in the progesterone receptor near the end of pregnancy help trigger labor.

Progesterone is also used as a medication for pregnant women at risk of delivering too early, such as those who have given birth prematurely before. Still, giving extra progesterone to such women does not always prevent an early delivery. No one knows why.

Gary Shaw



David Stevenson

The new study used data from the 1000 Genomes Project, a publicly accessible database of complete human genomes from people of different ancestral backgrounds. The researchers compared genetic sequences for the progesterone receptor in three populations: Utah residents with European ancestry; Yoruba people in Nigeria; and Han Chinese in Beijing.

The variations in the progesterone receptor gene — consisting of single nucleotide polymorphisms, or one-letter changes in the genetic code — were found in regions of the gene that regulate when it is switched on and off.

Recent natural selection took the genetic code in different directions as different populations adapted to their local environments, the scientists found. The sequence in Han Chinese populations had an evolutionarily new variation, perhaps reflecting that premature birth would have been especially costly for the small group of ancestral humans who migrated from Africa to East Asia. In contrast, modern populations with European and African ancestry had a greater mixture reflecting new and ancestral versions in the gene.

The findings also predict that the genetic forms of the progesterone receptor seen in East Asians would not necessarily protect against premature birth in other populations. The researchers confirmed this prediction with data from 1,733 African-American women enrolled in a study called the Boston Birth Cohort; of these women, 461 had spontaneous preterm births and 237 had medically indicated preterm births, in which doctors deliver the baby early because of medical problems that have developed during pregnancy for the mother, fetus or both. African-American women who had genetic variants typically seen in East Asian populations had a higher risk of premature birth, the study found.

Genes alone don't determine risk

The study's underlying message is that genes that are helpful in one environment may not help in another, Shaw said. "Complex conditions such as prematurity are not likely caused completely environmentally or completely genetically; it's the confluence of genes and environment that makes the difference in risk," he said.

The researchers also examined the progesterone receptor in genetic data from four female Neanderthals — one that lived about 122,000 years ago, and three that lived about 52,000 years ago. These individuals had a version of the receptor linked to a high risk of preterm birth. This version of the gene may have been introduced to early human populations by interbreeding between humans and Neanderthals, the findings suggest.

Next, the researchers plan to study pregnant women who have received progesterone to try to prevent premature birth. "We want to determine whether genetic differences in the receptor could explain why giving the hormone prevents premature delivery in some women but not others," Stevenson said. "This type of information may help us develop personalized approaches to preventing preterm birth."

Michael Snyder, PhD, professor of genetics, is also a Stanford author of the paper. Shaw, Stevenson and Snyder are members of the Stanford Child Health Research Institute and of Stanford Bio-X. Stevenson is an affiliate of the Stanford Woods Institute for the Environment, and Snyder is a member of the Stanford's Cardiovascular Institute, its Cancer Institute and its Neurosciences Institute.

Scientists at Johns Hopkins University, Case Western Reserve University and the University of Cincinnati also contributed to the study.

The study was funded by March of Dimes Prematurity Research Center at Stanford University School of Medicine, the National Heart, Lung and Blood Institute, the National Institutes of Health and the California Institute for Regenerative Medicine.

Stanford's Department of Pediatrics also supported the work. ISM

5 QUESTIONS

an occasional feature in which an expert answers five questions on a science or policy topic

Paul Blumenthal on contraception in India

In the past 10 years, the percentage of women who use intrauterine devices in the United States has leapt from less than 1 percent to nearly 20 percent. But at the international level, those figures are much lower.

Paul Blumenthal, MD, MPH, professor of obstetrics and gynecology at the School of Medicine, focuses much of his work on family planning in developing countries, many of which do not have broad access to long-acting contraception. Blumenthal's latest paper, published in collaboration with Population Services International, describes the implementation of a new device used to insert IUDs in women immediately after they give birth, and he hopes it will help health care professionals in developing countries provide broader access to long-acting contraceptives.

The idea behind Blumenthal's postpartum IUD inserter, which comes with the IUD packaged inside it, is to simplify and streamline the process of providing women with birth control. In a clinical trial with 500 participants, health care providers in India used either Blumenthal's IUD inserter or the traditional forceps method to place the contraceptive, comparing their efficacy, ease and safety.

A paper detailing the clinical trial was published online May 8 in Contraception. *Blumenthal is the senior author.*

Blumenthal's goal is to bring simple, affordable contraception to the masses — particularly in developing countries. Establishing the inserter's legitimacy in this trial, Blumenthal said, is a step in that direction. Recently, he spoke with science writer Hanae Armitage about the details of this work, the drivers behind it and how he hopes to see it pan out on an international scale.

1 What motivated your team to create this device? Why opt to support IUD usage as opposed to a different contraceptive option?

BLUMENTHAL: IUDs are an excellent method of contraception, and that's increasingly recognized by both providers and patients around the world. They're extremely effective. They're a "forgettable" form of contraception — that is, they're inserted and they don't need tending to or replacement for somewhere between five and 12 years, which also makes them very cost-effective.

Paul Blumenthal

In a postpartum setting, there are actually a lot of serendipities that make it an optimal time for IUD insertion. Since the woman has just delivered her baby, both she and her provider are already in the same place at the same time; no one has to make a special trip to have the IUD inserted. Studies have shown that, among women who want an IUD for contraception, the number of individuals who have an IUD one year after delivering a baby are higher if the woman gets the IUD postpartum, rather than if they wait to have it inserted later.

So, we thought if we can make this convenient, simple and intuitive, then maybe we could reduce barriers for providers, who could then have better access to providing postpartum IUDs. Furthermore, in some developing countries, the special forceps often recommended to insert IUDs right after birth can be hard to come by. With the dedicated inserter, the IUD is already packaged in the instrument, and it's just a "grab-and-go" process.

2 Why did you decide to conduct this study in India and how did the health care providers react to your new device?

BLUMENTHAL: India has one of the most well-developed programs for postpartum IUDs. For example, in obstetrics and gynecology, physicians are required to learn how to insert IUDs postpartum because the Indian government and the community of OB-GYNs in India feel that it's an important part of provision of contraception. So, we thought, "OK, if you're going to do a lot of something, then why wouldn't you have something specifically designed to do it?" One analogy we often use is, if you're going press garlic, you don't smash it with a hammer, you want to use a garlic press. It's the same idea here: We want to make it precise, and we want to simplify the process.

When we introduced the inserter, in general the feedback was very positive. Most who used the inserter said that it was easy to use. Now, they also said that it was easy to use the traditional forceps — but that doesn't take away from the success of the inserter. This study is a win for broad dissemination of the tool in India. And now, it's even been approved by the Drug Controller General of India for broad public and private use.

3 With the Drug Controller General of India's approval for commercial use, how will you scale up the process in India, and do you plan to bring this option to women in other developing countries as well?

BLUMENTHAL: We're working with a third-party company called Pregna International. They're based in India, and they manufacture IUDs used in programs worldwide. Now with commercial approval, Pregna can market this inserter to the public and private sector in India and reach potentially millions of women. At the same time, other nongovernmental organizations that are working in the family planning area can also recommend this to their programs in India, and that will likely enhance the public-sector programs as well. Currently, the IUD inserter is under review by the United Nations Family Planning Assistance Program, and we hope that this publication will serve to help the UNFPA in its deliberation. Hopefully, that will allow for prequalification of the device, so that it can be used in UNFPA publicly-funded programs that reach other developing countries in sub-Saharan Africa and South Asia.

4 Do you have plans to integrate the device into developed countries like the United States, too?

BLUMENTHAL: We don't have plans at present, specifically because Pregna doesn't market its IUDs in the U.S. For a company like Pregna, it's likely too costly to have their device approved by the Food and Drug Administration, which requires a significant amount of capital to achieve. However, I'm sure that Pregna would be open to working with a U.S. company or any other company to adapt the technology of this relatively simple inserter to IUDs that are very similar.

5 Are you working on other projects that likewise empower contraceptive options?

BLUMENTHAL: We're always working on these kinds of projects. One of our family planning fellows is looking at a unique combination of an emergency contraceptive product and another available drug in the U.S. to see if it's possible to make an "on-demand" contraception. So for example, if a woman has intercourse infrequently, she may not feel like she needs to take a pill every day, or might not need to have an IUD, but she may want to have a contraception method she can use when she wants. So, theoretically, a woman could take this pill once during the course of a cycle, at any time during the cycle, and that would effectively act as contraception. Our tagline here could really be "simplicity and precision." We want to empower women with options, access and the ability to choose what's right for their lives and body, at the exact time that they want it. **ISM**

Operating rooms of the future

New suites bring advanced technology to surgery patients

By Grace Hammerstrom

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 pediatric general surgeon Dennis Lund, MD, interim CEO and chief medical officer for Stanford Children's Health.

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," Lund said. "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.

STEVE FISCH

One of the operating suites at the new Stanford Hospital, which is set to open toward the end of 2019.

Before the new children's 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 will be grouped together with imaging technology that includes two MRI scanners, one CT scanner and one interventional MRI scanner.

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 **See OPERATING ROOMS, page 8**

Barbara Hill, Melchor Madrigal mark 45 years on med school staff

By Kimber Price

When it comes to years of service to the School of Medicine, two staffers stand out.

Barbara Hill and Melchor Madrigal marked their 45-year work anniversaries at the school last year. Both were recognized May 24 at the Cardinal at Work Celebrating Staff Careers event, which honored major career anniversaries of employees across the university.

"I think it's wonderful to see two employees so dedicated to Stanford Medicine," said Lloyd Minor, MD, dean of the School of Medicine. "Their work is integral to the university's mission, and they are an inspiration to all of us."

Hill was 18 years old when she was hired as a glasswasher in the Department of Developmental Biology. But she didn't stay in that position long, she said. The faculty noticed that she was interested in learning new things, so she transitioned to lab work and continuously learned new techniques. Now a laboratory technician working with Drosophila, she said the best part of her career has been training students and working with the faculty. "We've always had a good connection," she said.

"She's got a great sense of humor, is humble and kind and never complains," said lab manager Todd Galitz. "She does what's required to get the job done, even if that means staying late into the night." Much of the work that has come out of the laboratories that she's supported wouldn't have been possible without her knowledge and dedication, Galitz added.

Madrigal came to the medical school in 1972 to work as a veterinary technician in what later became the Veterinary Service Center. He said some of his favorite memories of working at the school include meeting Stanford surgeon Norman Shumway, MD, PhD, who performed the first successful adult human heart transplant in the United States, and providing husbandry to the sheep and dogs that received heart and lung transplants as part of research efforts.

Madrigal rose in rank and responsibility in animal care until the division grew to the point that it needed a new maintenance person. Madrigal took classes and trained with technicians and is now known for his expertise in repairing equipment, such as autoclaves and automatic watering systems, in the Department of Comparative Medicine. "Melchor's can-do attitude and high commitment to the VSC and the department has always been a reflection of his personality," said Mike Renzi, the department's director of finance and administration.

MARCIA COHEN

Melchor Madrigal, Barbara Hill and Dean Lloyd Minor at the Cardinal at Work Celebrating Staff Careers event on May 24.

Madrigal had one word to describe Stanford: "Great!" ISM

OF NOTE

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

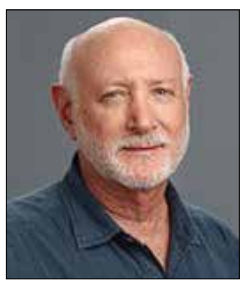
MARIA BORRELLI, MBBS, MSc, a postdoctoral scholar in plastic and reconstructive surgery, received a $50,000 grant from The Plastic Surgery Foundation. The grant supports research that translates research findings into clinically relevant advancements or tools that are likely to improve care soon. She will work to identify the human cutaneous fibroblast stem cell.

Maria Borrelli

ELLEN JONES, MD, a postdoctoral scholar in plastic and reconstructive surgery, received a grant from The Plastic Surgery Foundation. The $50,000 award is designed to accelerate the translation of scientific discoveries and technical developments into practical solutions. She will study how mandibular stem cells regenerate bone in the context of distraction osteogenesis, a bone-lengthening method, using a mouse model.

Ellen Jones

RICHARD MOSS, MD, professor emeritus of pediatrics, received the 2018 William J. Martin II Distinguished Achievement Award from the American Thoracic Society Public Advisory Roundtable. The award honors a person who embodies the characteristics of its namesake, including a passion for patients, impressive history in public service, innovative spirit and outstanding leadership skills.



Richard Moss

DANIEL RUBIN, MD, was promoted to professor of biomedical data science, of radiology and of medicine, effective March 1. His work focuses on artificial intelligence in medicine and quantitative imaging. His lab develops methods for machine understanding of images and texts and for integrating the information produced by these methods with clinical/molecular data to discover imaging phenotypes of disease for decision support and precision care.

Daniel Rubin

ANSUMAN SATPATHY, MD, PhD, instructor in pathology, received a grant from the Burroughs Wellcome Fund for his research proposal, "Epigenetic mechanisms of immunotherapy resistance in tumor-specific T cells." The awards program provides $700,000 over five years to physician-scientists who are committed to an academic career so they can bridge advanced postdoctoral or fellowship training and their early years of faculty service.

Ansuman Satpathy

TAIA WANG, MD, PhD, assistant professor of medicine, was selected as a 2018 Searle Scholars Program scientist. Searle Scholars are recently appointed, tenure-track assistant professors pursuing fundamental, groundbreaking research in chemistry and the biomedical sciences. Each receives an award of $300,000 in flexible funding to support their work over three years. Wang will investigate the interaction between the immune system and the dengue virus.

Taia Wang

BRAD ZUCHERO, PhD, assistant professor of neurosurgery, received a 2018 award from the McKnight Endowment Fund for Neuroscience. Granted to early career scientists who are working to understand disorders of learning and memory, the awards provide six recipients $75,000 each per year for three years. Zuchero plans to use the award to study how myelin, a fatty substance, grows and wraps around nerve cells. ISM

Brad Zuchero

Two medical school professors appointed to endowed positions

Two faculty members at the School of Medicine have been appointed to endowed positions.

MARK KRASNOW, MD, PhD, professor of biochemistry, was appointed the Paul and Mildred Berg Professor, effective April 10. He is the executive director of the Wall Center for Pulmonary Vascular Disease and a Howard Hughes Medical Institute investigator. His research focuses on understanding lung development, stem cells and disease, including cancer, and the neural circuits that control lung function, including breathing and speaking.

Mark Krasnow

The professorship was established with a gift from Paul Berg, PhD, the Robert W. and Vivian K. Cahill Professor of Cancer Research, Emeritus, and his wife, Mildred, and includes a contribution from an anonymous donor. The professorship is intended to support a faculty member whose academic focus is in the biomedical sciences. Berg, a member of the medical school faculty since 1959, was awarded the Nobel Prize in chemistry in 1980.

BEVERLY MITCHELL, MD, the George E. Becker Professor in Medicine, was appointed the Laurie Kraus Lacob Director of the Stanford Cancer Institute, effective March 8. The current director of the institute, she oversees the activities of more than 400 cancer institute members across Stanford as they work to develop new insights into the etiologies, diagnosis, prevention and treatment of cancer.

Beverly Mitchell

The directorship was established with a gift from Lacob, a longtime volunteer and donor to Stanford and the parent of three Stanford alumni. The directorship is intended to support the director of the Stanford Cancer Institute. ISM

Operating rooms

continued from page 7

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.

Increased efficiency

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.

Hybrid rooms merge the latest imaging, radiology and surgery platforms into adjacent surgical 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. ISM