Grads urged to embrace lifelong learning

By Julie Greicius

Embracing the outlook of a “student for life” is the best way to adapt to the inevitable changes, challenges and opportunities ahead, Stanford Provost Persis Drell, PhD, told School of Medicine graduates on June 15.

“The goal of your training was not to fill you up with knowledge and send you out into the world. The goal of your training at Stanford was to help you learn and embrace being a student for a lifetime,” she said. “My advice to you: In a world that encourages increasing specialization, hold on to that sense of being a student.”

A lifelong student herself, Drell is also the James and Anna Marie Spilker Professor in the School of Engineering and a professor of materials science and engineering and of physics. She is the former dean of the Stanford School of Engineering and the former director of the U.S. Department of Energy’s SLAC National Accelerator Laboratory at Stanford.

Drell spoke at the medical school’s 111th diploma ceremony, which was held on campus at the newly reopened Li Ka Shing Alumni Lawn. She was introduced by Lloyd Minor, MD, dean of the School of Medicine, who also spoke to faculty and graduating students and their families and loved ones.

The provost emphasized the importance of being able to adapt to uncertainty and change, and also stressed the graduates’ role in advocating for and restoring trust in science. “Trust must be earned every day, in every interaction, with every person we come in contact with,” she said. “In the coming years, you will have many opportunities to engage public trust and focus attention on the many ways science has improved and will continue to improve our lives.”

‘Another chapter’

The ceremony began with a performance by Dane Johansen, a cellist in the Cleveland Orchestra and sibling of Sara Johansen, a member of the 2019 graduating class. Johansen played the first movement of Bach’s Suite in D Major for unaccompanied cello.

In his remarks to the graduates, faculty and guests, Minor (who, like Drell, is a cellist in his spare time) encouraged the graduates to anticipate unpredictable changes in their future, and to experience them as opportunities for growth. “Having an idea of what you want and how to get there is a cellist in his spare time) encouraged the graduates to anticipate unpredictable changes in their future, and to experience them as opportunities for growth. “Having an idea of what you want and how to get there is...”

Stanford physicians train fire departments in latest emergency medicine techniques

By Susan Coppa

Contrary to popular opinion and most television shows, the first responders to reach the scene of a medical emergency aren’t usually an ambulance crew but first responders to medical emergencies.

Because of the crucial role that fire departments play in pre-hospital care, Stanford Health Care and the Stanford Department of Emergency Medicine have developed partnerships with nine local fire departments, including those in Palo Alto, Mountain View and Santa Clara, to ensure that first responders are trained in the latest emergency medical care.

Typically, a single fire department will contract with one physician to serve as its medical director. The Stanford approach is different: Several faculty members in the Department of Emergency Medicine serve as the collective medical director for multiple fire agencies. The approach has yielded significant benefits, said Marc Gautreau, MD, clinical associate professor of emergency medicine and director of pre-hospital care at Stanford.

Individually contracted medical directors rarely provided onsite training to the firefighters because of the time involved in traveling to and coordinating with multiple fire stations. However, with a team of physicians to draw on, Stanford has been able to provide frequent, consistent training and ensure quick dissemination of new protocols and emergency procedures to stations throughout the peninsula, said Peter D’Souza, MD, clinical assistant professor of emergency medicine.

Legalizing medical pot doesn’t reduce rate of fatal opioid overdoses

By Mandy Erickson

Legalizing medical marijuana does not reduce the rate of fatal opioid overdoses, according to researchers at the School of Medicine.

The finding contradicts a 2014 study that legal-pot advocates, public officials and even physicians have touted as a reason to legalize marijuana. That study found lower rates of fatal opioid overdoses in states that had legalized marijuana for medical purposes than in states where marijuana remained illegal.

The Stanford study, which revisited the issue after many more states had legalized medical marijuana, found no evidence of a connection between opioid deaths and the availability...
Most metastatic colorectal cancers spread before diagnosis

By Krista Conger

Up to 80% of metastatic colorectal cancers are likely to have spread to distant locations in the body before the original tumor has exceeded the size of a poppy seed, according to a study of nearly 3,000 patients by researchers at the School of Medicine.

Identifying patients with early stage colorectal tumors that are born to be bad may help doctors determine who should receive early treatments, such as systemic chemotherapy, to kill cancer cells lurking far from the tumor’s original location.

“This finding was quite surprising,” said Christina Curtis, PhD, assistant professor of medicine and of genetics at Stanford. “In the majority of metastatic colorectal cancer patients analyzed in this study, the cancer cells had already spread and begun to grow long before the primary tumor was clinically detectable. This indicates that metastatic competence was attained very early after the birth of the cancer. This runs counter to the prevailing assumption that metastasis occurs late in advanced primary tumors and has implications for patient stratification, therapeutic targeting and earlier detection.”

Researchers and clinicians have assumed that cancers acquire the ability to metastasize through the gradual accumulation of molecular changes over time. These changes, the thinking goes, confer specific traits that eventually allow cancer cells to escape the surrounding tissue, enter the bloodstream and take up residence in new locations. In this scenario, metastasis, if it occurs, would be a relatively late event in the evolution of the primary cancer.

Curtis, who co-directs the molecular tumor board at the Stanford Cancer Institute, is the senior author of the study, which was published online June 17 in Nature Genetics. Postdoctoral scholar Zheng Hu, PhD, is the lead author.

Second-leading cause of cancer death

Colorectal cancer is the second-leading cause of cancer death in men and women combined in the United States. It metastasizes mostly to the liver. Researchers speculated that metastasis shared early drivers present in the ‘trunk’ of the evolutionary tree, but harbored few additional drivers. This suggested that these cancers acquired metastatic competence very early on during their growth.

To further pinpoint when metastasis occurred, Curtis and her team developed a computer program and statistical method to measure the time of metastatic spread relative to the size of the primary tumor in an individual patient. Their analysis provides the first quantitative evidence for early metastatic spread in human colon cancer — a faster process than a blip within the movie-like progression of aggressive disease. New biomarkers based on specific combinations of alterations might enable the identification of potentially lethal colorectal tumors at an earlier stage so that they may be intercepted and appropriately treated, potentially with therapies directed against their specific aberrations.

Curtis is a member of the Stanford Cancer Institute and of Stanford Bio-X. Other Stanford co-authors of the study are former senior research scientist Jie Ding, PhD; senior research scientist Zhicheng Ma, MD; researchers Ruping Sun, PhD, and Jose Soriano, PhD; visiting scientist J. Scott Shaffer, PhD; and clinical assistant professor of pathology Carlos Suarez, MD.

“Metastatic colorectal cancers obtained from patients with early stage cancer progress. Curtis and her colleagues then took what they had learned and applied it to 938 people with metastatic colorectal cancer who were treated at Stanford hospitals, one of whose medical histories were known and whose primary tumors had been profiled to identify genetic changes in less than 24 hours.”

“We found that specific combinations of mutations were highly predictive of metastasis,” Curtis said. For example, mutations in a gene called PTEN, in combination with mutations in another cancer driver gene, were almost exclusively found in patients with metastatic cancers.

Previous studies have shown that the loss of PTEN function increases the activity of a protein called STAT3, which enhances cellular survival. The researchers speculate that inhibiting STAT3 might thwart tumor growth and metastasis.

Analyzing other cancers

Curtis and her colleagues are now working to learn whether specific molecular changes tilt the balance of metastasis in colorectal cancers toward the liver or the brain. They are also applying similar analyses to other types of cancers.

“The concept of early systemic spread has been controversial, due in part to the challenges associated with this process in the human system and the reliance on animal models,” Curtis said. “These data indicate that metastasis can occur early in colorectal cancer and highlights the critical need for the earlier detection of aggressive disease. New biomarkers based on specific combinations of alterations might enable the identification of potentially lethal colorectal tumors at an earlier stage so that they may be intercepted and appropriately treated, potentially with therapies directed against their specific aberrations.”

Researchers develop AI tool to help detect brain aneurysms

By Taylor Kubota

Doctors could soon get some help from an artificial intelligence tool when diagnosing brain aneurysms — bulges in blood vessels in the brain that can leak or burst open, potentially leading to stroke, brain damage or death.

The AI tool, developed by researchers at Stanford and detailed in a paper published June 7 in JAMA Network Open, highlights areas of a brain scan that are likely to contain an aneurysm.

“There’s been a lot of concern about how machine learning will actually work within the medical field,” said Allison Park, a graduate student in statistics and co-lead author of the paper. “This research is an example of how humans stay involved in the diagnostic process, aided by an artificial intelligence tool.”

This tool, which is built around an algorithm called HeadXNet, improved clinicians’ ability to correctly identify aneurysms at a level equivalent to finding six more aneurysms in 100 scans that conventional radiologists also improved consensus among the interpreting clinicians.

While the success of HeadXNet in these experiments has been promising, it also prompts the team of researchers — who have expertise in machine learning, radiology and neurosurgery — caution that further investigation is needed to evaluate the generalizability of the AI tool prior to clinical deployment that inhibiting GÎ®-OÎ± signaling in scanner hardware and imaging protocols across different hospital centers. The researchers plan to address such problems through multicenter collaboration.

Combining brain scans for signs of an aneurysm can mean scrolling through hundreds of images. Aneurysms come in many sizes and shapes and balloon out at tricky angles. Some register as no more than a blip within the movielike succession of images.

Aneurysms

“Search for an aneurysm is one of the most labor-intensive and critical tasks radiologists undertake,” said Kristen Yeom, MD, associate professor of radiology and co-senior author of the paper. “Given inherent challenges of complex neuro-vascular anatomy, it is critical to come of a missed aneurysm, it prompted me to apply advances in computer science to brain imaging.”

Yeom brought the idea to the AI for Healthcare Bootstrap run by Stanford’s Machine Learning Group, which is led by Andrew Ng, PhD, adjunct professor of computer science and co-senior author of the paper. The central challenge was creating
Ensuring new Stanford Hospital’s seismic safety

Seismologists can’t predict when, or how severe an earthquake will be, but they can minimize the risk. Since the Bay Area getting severely shaken by one in the next 30 years is high, seismic safety was the No. 1 driver for construction of the new Stanford Hospital set to open in the fall, said Bert Hurlbut, vice president of new hospital construction at Stanford Health Care. Under stringent California building code, all hospitals must be able to remain operational after a major earthquake by 2030.

1 What did you do to make the building earthquake-resistant?

HURLBUT: We used what’s called a base isolation system. About 30 feet below ground level, we put huge steel and tellurium casted isolators under the columns that support the building. They can slide as much as 3 feet in any direction, so that allows the building to shift up to 6 feet in an earthquake. The big isolators weigh 2.5 tons, and our humongous ones weigh 4 tons. Each one will take off a few million pounds of pressure from the building in an earthquake. This same system was used at the new Zuckerberg San Francisco General Hospital and the new Apple campus.

2 How do you make sure the building doesn’t move far?

HURLBUT: You build this big concrete barthrum, 4 feet larger all the way around your building, and that allows your building to move back and forth underground.

3 What other steps did you take to make the building earthquake-resistant?

HURLBUT: We’ve got a tremendous amount of piping above the ceiling, and all that piping has to be braced. If you just let it hang there, it’s going to swing back and forth in an earthquake and start hitting things and breaking. And as soon as a water pipe breaks, you have to shut down your hospital. The amount of braces we have to put on piping and ductwork is unbelievable. I bet we have 10,000 braces, and to make them all fit is no easy task.

4 How does the team make sure all this is going to work?

HURLBUT: We build a portion of your building — you can see the exterior wall mockups on Welch Road — and you spray it with a lot of water, and then you pull it and shake it, and a lot of things crack and deform, and then you spray water again, and it can’t let water in after the earthquake. We did some shaking simulations and similar waterproofing elements to ensure a successful flood test.

5 How long can the hospital operate if it’s cut off from the city utility system?

HURLBUT: We have enough provisions that we can go four days without supplies from outside the hospital. We store water, food and diesel fuel for the generators and the boilers. And if the sewer pipes break, we can store sewage in five tanks below the ground.

As a Level 1 trauma center, we also need to be prepared to deal with mass casualties following a major earthquake. The parking structure can be converted for additional truss space and connects directly to the emergency department. The garage has four decontamination showers which will aid the ED crew to get mass casualties ready for their entrance into the hospital in the event the victims are soiled with hazardous materials. We also have Wi-Fi to allow staff to register patients and bring them into the facility during a mass casualty event.

Bert Hurlbut says the new Stanford Hospital has been built to withstand an earthquake because of the proximity to two major faults. The new hospital will open in the fall.

Brain
continued from page 2

an artificial intelligence tool that could accurately process these large stacks of 3D images and complement clinical diagnostic practices.

To train the algorithm, Yeom worked with Park and Christopher Chute, a graduate student in computer science, on labeling clinically significant aneurysms detectable on 611 computerized tomography angiogram head scans.

“We labelled, by hand, every voxel — the 3D equivalent to a pixel — with whether or not it was part of an aneurysm,” Chute, who is also co-lead author of the paper. “Building the training data was a pretty grueling task, and there were a lot of data.”

Folk were interested in how these scans with AI-added overlays would improve the performance of clinicians,” said Pranav Rajpurkar, a graduate student in radiology; Fred Wittber, MD, diagnostic radiology fellow; David Hong, MD, assistant professor of psychiatry and behavioral sciences; Bhavik Patel, MD, MBA, assistant professor of radiology; and Matthew Langen, MD, MPH, assistant professor of radiology.

The machine learning algorithms at the heart of HeadNet could likely be used to identify other diseases inside and outside the brain. For example, Yeom imagines a future version could focus on speeding up the identification of aneurysms after they have burst, saving precious time in an urgent situation. But a considerable hurdle remains in integrating any artificial intelligence medical diagnostic tool into daily workflow in radiology across hospitals.

Current scan viewers aren’t designed to work with the deep learning algorithms, so the researchers had to custom-build tools to integrate HeadNet within scan viewers. Similarly, variations in real-world data — as opposed to the data on which the algorithm is tested and trained — could reduce model performance. If the algorithm processes data from the wrong kinds of scanners or imaging protocols, or a patient population that wasn’t part of its original training, it might not work as expected.

“Because of these issues, I think development of AI-powered medical devices is going to take much longer than we might expect,” Ng said. “We still have technical and non-technical work to do, but as a community we will get there, and AI-radiologist collaboration is the most promising path.”

Other Stanford co-authors are Joe Lou, undergraduate student in computer science; Robyn Ball, PhD, senior bio-statistician at the Quantitative Sciences Unit; graduate students Katie Shpanskaya, Rashad Jabarkheel, Lily Kim and Emily McKenna; radiology residents Joe Tseng, MD, and Jason Ni, MD; Fidaa Wishah, MD, clinical instructor of radiology; and medical student MD, clinical assistant professor of neurosurgery; Saawan Habil, MD, clinical associate professor of radiology; Sanjay Basu, MD, PhD, assistant professor of medicine; Bhavik Patel, MD, MBA, assistant professor of radiology; and Matthew Langen, MD, MPH, assistant professor of radiology.

Hong and Yeom are also members of Stanford Bio-X, the Stanford Materatal and Child Health Research Institute and the Wu Tsai Neurosciences Institute at Stanford. Patel is also a member of Stanford Bio-X and the Stanford Cancer Institute. Lungen is a member of Stanford Bio-X and the Stanford Children’s Health Research Institute and the Stanford Cancer Institute.
Annual awards honor outstanding teaching, patient care

AWARDS IN MEDICINE

Anna Caufield, MD, clinical associate professor of neurology and neurological sciences; Olivia Lee, MD, clinical assistant professor of primary care and population health; and Paul Mohabir, MD, clinical professor of primary and critical care medicine, received the Arthur L. Bloomfield Award in Recognition of Excellence in the Teaching of Clinical Medicine.

Lars Osterberg, MD, MPH, associate professor of primary care and population health, received the Franklin G. Ebanks, Jr. Award for Excellence in Advising Medical Students.

Dean Winslow, MD, professor of medicine, received the Alwin C. Rambar-James MD Mark Award for Excellence in Patient Care, which recognizes a member of the medical faculty for his or her care in working with patients and their families, excellence in providing medical treatment, and effectiveness and pleasantness in interactions with patient-care staff. He also received the Outstanding Lecture/Presentation Award.

Veronica Santini, MD, clinical associate professor of neurology and neurological sciences, received the Lawrence H. Mathers Award for Exceptional Commitment to Teaching and Active Involvement in Medical School Education.

Tracy Rydel, MD, clinical associate professor of primary care and population health, received the James and Helen Dingman Award for Commitment to Residents' Education.

Maria Alfonso, clerkship coordinator in emergency medicine, received the Medical Education Staff Service Award.

Peter Fay, MD, a physician at Santa Clara Valley Medical Center, received the Outstading Community Clinician Preceptor, Preclinical Instruction Award.

Howard Chiozzi, visiting faculty member at the Clinical Excellence Research Center, received the Outstanding Community Clinical Preceptor, Clinical Instruction Award. Rebecca Blankenburg, MD, MPH, clinical associate professor of pediatrics and of emergency medicine, received the Henry J. Kaiser Family Foundation Award for Teaching Awarding for Outstanding and Innovative Contributions to Medical Education.

Binh Chuang, MD, adjunct clinical assistant professor of primary care and population health; Pedram Fatehi, MD, clinical associate professor of nephrology; and Beth Martin-Kool, MD, clinical assistant professor of hematology, received the Henry J. Kaiser Family Foundation Award for Excellence in Preclinical Teaching.

Aleah Bruhaker, MD, PhD, resident in surgery; Lucas Kipp, MD, clinical assistant professor of neurology and neurological sciences; and Tsuyoshi Miyahara, MD, clinical associate professor of emergency medicine, received the Henry J. Kaiser Family Foundation Award for Excellence in Clinical Teaching.

Jessica Bentley, Rishi Bhavnagur, Howard Chiozzi, Robert Tyler Payne, Surbhi Singhal and Prateek Thakur 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.

Michelle Drews, a medical student, received the Teaching Assistant Award.

Sarah Brainman, PhD, adjunct professor of anesthesiology, perioperative and pain medicine; Veronica Santini, MD, clinical associate professor of neurology and neurological sciences; and Erika Schilling, MD, clinical professor of primary care and population health, received the Award for Excellence in Promotion of Humanism.

What’s ironic is that for a professional devoted to serving others, we spend so much of it isolated in communities of like-minded individuals where everyone speaks this same language,” Turner said. “So it’s really nice to be together with all your classmates again, and to see every -...
Two genes implicated in development of prostate enlargement

By Hanae Armitage

For aging men, prostate enlargement is almost as common as graying hair, and yet scientists know very little about why the prostate increases in size or how the process occurs on a molecular level.

In a new study, scientists at the School of Medicine have discovered a molecular pattern that flags prostate enlargement, also called benign prostatic hyperplasia, and have even identified two genes that likely play a role in the development of the condition. The urethra runs directly through the prostate, a gland in the male reproductive system. And while a bigger prostate is not typically life-threatening in itself, it can cause urinary-related symptoms that range from nighttime awakenings to sudden urges to urinate. When the prostate becomes enlarged, it squeezes the urinary tube, causing problems such as incontinence or urinary urgency.

"It's a tempest when you're a kid, and in the most severe cases, can even lead to kidney failure," said James Brooks, MD, professor of urology. Today's treatments work to an extent, but don't completely solve the issues, he added. "Urology as a field needs to do more to own this problem and figure out what the true underlying causes are so we can curb its prevalence and help treat it more effectively."

The new study is one of the first to describe a molecular landscape that differentiates enlarged prostate tissues from normal tissue. The team of scientists also discovered that the cell growth behind a ballooning prostate is not uniform. Several cell types comprise the prostate, and abnormal growth appears to come from an outburst of specific sets of cells, rather than an overall increase of all cell types.

A paper describing the study was published in the June 20 issue of Proceedings of the National Academy of Sciences. Brooks and professors of pathology Jonathan Pollack, MD, PhD, and Robert West, MD, PhD, share senior authorship. Former MD-PhD student David Mellden is the lead author.

The plight of the prostate

No other gland in the human body, male or female, expands so predictably with age. Fifty percent of men who are 50 years old have an enlarged prostate. With every decade, that number increases by 10% (60% of men who are 70, 70% of men who are 70 and so on). A normal prostate is about the size of a walnut, but it can grow to twice that size, sometimes more.

"Researchers have hunted for mutations or growth factors that could trigger prostate growth, but there hasn't been much progress in finding a true cause," Brooks said.

Brooks, Pollack and West took a multipronged approach in search of the answer, analyzing 49 tissue samples from patients who had their prostates removed. The odd thing about prostate enlargement, Brooks said, is that the entire prostate doesn't grow in unison; only certain parts of it expand. Some areas of the prostate actually remain unchanged.

Genomic analysis showed that most of the enlarged areas of the prostates consisted primarily of two types of cells — epithelial, which make up secretory glands, and stromal fibroblasts, which create structural parts of the prostate. That's not normal, Brooks said, and it chucked the researchers into a new understanding of prostate growth: Only some cell types multiply in an enlarged prostate, taking over — and sometimes eliminating — other cell types, like weeds in a garden plot.

"So it's not just an increase in cells; it's a fundamental shift in the type of cells that make up the prostate. It's a rearrangement that I'd call 'cellular landscaping,'" Pollack said. "It's possible that this shift is actually related to the disease progression, and not just arbitrary." One of the overran cell types, Pollack said, is thought to be involved in the regulation of epithelial cell growth and development.

The team members in the neuroscience lab of Miriam Goodman, PhD, are studying tiny worms to better understand our sense of touch, but the plans and dreams that brought them into science in the first place are likely to lead them in new directions.

Briania Rivera was nervous and a bit intimidated when she entered FAST, a high school biology program run by Stanford graduate students who act as mentors and aim to spark a passion for science in their disciples. Soon, Rivera became known on her high school campus as "the girl who loves science." She's now a college freshman studying biomedical engineering. A video about her and the program accompanies the story online.

The Unbelievable Mind, Stanford psychiatrist Shaili Jain, MD, shares what she's learned about the legacy of trauma in our lives, and about how to treat people with PTSD. And two young brothers bear the odds and are able to undergo successful stem cell transplants to halt the symptoms of a rare genetic disease called IPEX syndrome.

Print copies of the magazine are being sent to subscribers. Others can request a copy at (650) 723-6911 or by sending an email to medmag@stanford.edu.
**Aiding the fight against antibiotic resistance**

The discovery of antibiotics like penicillin in the late 1920s revolutionized medicine; it made surgeries safer and common bacterial infections less deadly. But the overuse and misuse of these lifesaving drugs has evolved into a global public health emergency. Many microorganisms naturally develop resistance to antibiotics over time, allowing for the emergence of “superbugs” that are no longer readily killed by available antibiotics.

A new program launched by the Stanford Center for Antimicrobial Resistance and Stewardship — the first designation of its kind — is working to curb that trend.

**What is the best odds of survival, even before patients arrive. “We brainstormed about using the walls of the hospital.”**

**The partnership has also given the fire department a new “community paramedicine” option — emergency responders training on a wider range of treatments, possibly saving patients a trip to the emergency department.**

**Another benefit of the partnership is the ability to close the loop about critical patients or challenging emergency medical treatments. Roderick said 97% of the people the firefighter-paramedics transport ended up at Stanford Hospital. But in her three decades on the job, she rarely knows the outcomes of the cases once they passed through the hospital doors. “We didn’t really know if we were doing it right,” she said. But the new model enables providers review cases and assess actions on a regular basis, but we didn’t have that opportunity. Now, we can share lessons learned. We can reinforce techniques that have the best result.”

**D’Souza and his Stanford colleagues provide training in the latest emergency techniques to firefighter-paramedics in nine Santa Clara County fire agencies.**

**Fire departments are receiving hands-on training from Stanford physicians in advanced emergency medicine, and fire personnel can turn around and provide very high-level care to the populations they are serving,” Gauthreau said. “We’ve seen several great saves as a result of the advanced resuscitation skills implemented by local fire department paramedics. And we can provide training during shift hours, which means stations don’t need to pay overtime for training, and resources can be directed toward delivering the best care possible.”**

**A chance encounter**

The idea for the partnership arose in 2016 when Kim Roderick, chief of Stanford’s Department of Emergency Medicine, and Stanford took on the role for the Palo Alto Fire Department, stopped by the Stanford Hospital coffee cart. Roderick happened to see D’Souza, who had been involved with the fire department for many years and had collaborated with Roderick on a study in which first responders were taught a new method of delivering an anti-seizure medication. As the two chatted, Roderick asked D’Souza if he was interested in becoming the medical adviser for a number of fire departments in Santa Clara County, but D’Souza and his wife were expecting their first child and he felt the timing wasn’t right to take on additional work. However, D’Souza proposed an alternative: The collective resources at Stanford Emergency Medicine could provide medical support for Palo Alto and other Santa Clara County fire agencies. The idea of having an institution take on the role of medical director was untested, so there were no road maps to follow. “We brainstormed about using the entire physician group, and it kind of went from there,” Roderick said. D’Souza discussed the possibility with Stanford Emergency Medicine leaders, and Roderick shared the idea with fire chiefs in the area. Two months later, they pitched the idea to 10 emergency medical services chiefs in Santa Clara County. “They loved it,” Roderick said.

After a formal proposal process, Stanford took on the role for the Palo Alto Fire Department on Jan. 1, 2012. Stanford signed agreements with eight more fire agencies in the ensuing months.

In one of the initial training sessions, Stanford faculty instructed Palo Alto firefighters on high-performance CPR, which optimizes resuscitation during cardiac arrest. HP-CPR requires a team of trained individuals who rotate through different roles to minimize the down-time between chest compressions. The goal of HP-CPR is not simply to save the patient but to maintain the loss of brain function, enabling patients to resume their lives with minimal lasting damage.

The Palo Alto Fire Department immediately implemented the techniques, with positive results. “We used to see a return of spontaneous circulation in approximately 20% of the patients,” D’Souza said, meaning that those patients were able to breathe and their hearts resumed pumping blood. “With HP-CPR we see spontaneous circulation in 20% to 25% of patients.”

This was not an isolated result. Stanford recently trained members of the Santa Clara Fire Department in using a video laryngoscope, which enables responders to quickly insert a breathing tube without stopping chest compressions. One week later, D’Souza received a text message from the department’s emergency medical services chief noting that crews had successfully used the approach on three separate emergency calls.

**Finding out how the patients fared**

**The partnership has also given the fire departments a new “community paramedicine” option — emergency responders training on a wider range of treatments, possibly saving patients a trip to the emergency department.**

**For example, the first responders could treat a bad asthma attack onsite. The state of California is developing a scope of practice that could enable paramedics to treat conditions that are now commonly handled in emergency departments. Having fire departments participate in the model makes sense, Roderick said. “Why not include options for the patients besides transport to an ER? Patients might prefer to receive care depending on the emergency.”**

Stanford recently acquired an emergency airway transport, which is retrofitted to serve as a mobile training unit. Between scheduled trainings, physicians will be able to travel to stations to provide short-term courses for firefighters while they are on shift. D’Souza and Roderick also hope to incorporate timely updates into feedback specific to response to unusual medical situations that firefighters encounter.

“The partnership is not just about ensuring our patients have the best odds of survival, even before they set foot in the emergency department; it’s also about helping our community and provide the best possible care at every stage. In order to do so, we have to reach beyond the walls of the hospital,” she said. **JUNE 24, 2019 INSIDE STANFORD MEDICINE**
A combination of six antibodies can successfully prepare mice to accept blood and immune stem cells from an immunologically mismatched donor, according to a study led by Keith Humphreys, MD, professor of pathology and developmental biology at Stanford. For the past decade, we have been working to step-by-step replace these nonselective and dangerous treatments with targeted antibodies. This study is an important milestone that began with our isolation of purified blood stem cells 30 years ago.

“Traditionally this has been accomplished with toxic blood disorders such as sickle cell anemia or thalassemia, or those with autoimmune diseases or immune deficiency,” said Lajos Loh, PhD; and professor of medicine Judith Shizuru, MD, PhD, a professor of genetics at Stanford. “For many years we have been working to step-by-step replace these nonselective and dangerous treatments with targeted antibodies.”

Stem cell transplant as a last resort and contingent on finding a donor that matches the recipient as closely as possible. But those matches can be difficult to find, particularly for some cancers.”

The researchers are next planning to conduct similar studies using transplant protocols that allow mismatched hematopoietic stem cells in large animal models. If the technique one day clears the hurdles necessary to prove it is safe and effective in humans, the researchers envision a time when people who need transplanted organs could undergo a safe, gentle transplant with hematopoietic stem cells derived in the laboratory from embryonic stem cells. The same embryonic stem cells could also then be used to generate an organ that would be fully accepted by the recipient without requiring the need for long-term treatment with drugs to suppress the immune system. In particular, Hiromitsu Nakauchi, MD, PhD, a professor of genetics at Stanford, is studying how to generate human organs in large animals from laboratory-grown stem cells.

Keith Humphreys

An immunologically mismatched donor, according to a study led by Keith Humphreys, MD, professor of pathology and developmental biology at Stanford. “For many years we have been working to step-by-step replace these nonselective and dangerous treatments with targeted antibodies.”

Weissman said the research suggests that, if these results are replicated in humans, we could have a child with sickle cell anemia in the clinic and, rather than considering stem cell transplant as a last resort and contingent on finding a perfectly matching donor, we could instead turn to transplanting from one of the child’s parents as a first-line therapy, George said.

Additional experiments showed that the mice treated with the six antibodies could also accept completely mismatched purified hematopoietic stem cells, mimicking those that might be obtained from an embryonic stem cell line.

After transplantation with the mismatched stem cells, they could then be used to generate an organ that would be fully accepted by the recipient without requiring the need for long-term treatment with drugs to suppress the immune system. In particular, Hiromitsu Nakauchi, MD, PhD, a professor of genetics at Stanford, is studying how to generate human organs in large animals from laboratory-grown stem cells.

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Additional experiments showed that the mice treated with the six antibodies could also accept completely mismatched purified hematopoietic stem cells, mimicking those that might be obtained from an embryonic stem cell line.

After transplantation with the mismatched stem cells, they could then be used to generate an organ that would be fully accepted by the recipient without requiring the need for long-term treatment with drugs to suppress the immune system. In particular, Hiromitsu Nakauchi, MD, PhD, a professor of genetics at Stanford, is studying how to generate human organs in large animals from laboratory-grown stem cells.

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Stanford hospitals get reverification as Level I trauma center

By Kate DeTrempe

Stanford Health Care and Lucile Packard Children’s Hospital Stanford have been reverified as a Level I adult and pediatric trauma center through May 2022 by the American College of Surgeons.

Level I verification is the highest possible ranking for trauma centers and recognizes the hospitals’ dedication to providing the best possible care for all injured patients.

Stanford Health Care/Lucile Packard Children’s Hospital Stanford is one of only five American College of Surgeons-verified Level I pediatric trauma centers in California, and receives pediatric trauma patients from as far north as the Oregon border and as far south as Bakersfield. It is the only Level I pediatric trauma center on the San Francisco Peninsula. Stanford Health Care has been recognized as a Level I trauma center for more than 20 years.

Verified hospitals must provide a full spectrum of care to address the needs of all injured patients and must provide access to the following:

• Coordinated, timely response from all necessary specialty medical staff.
• 24-hour availability of trauma surgeons and emergency medicine doctors, including pediatric surgeons.
• Operating rooms that are equipped and ready at all times.
• Neurosurgical and neurological care for severely injured patients.
• Orthopedic care for severely injured patients.
• A pediatric intensive care unit for the special needs of children with serious illnesses or injuries.
• In-hospital anesthesiologists.

“Stanford is proud to be recognized as the singular and most comprehensive Level I adult and Level I pediatric trauma resource on the Peninsula,” said David Spain, MD, chief of trauma and critical care surgery at Stanford Health Care and professor of surgery at the Stanford School of Medicine. “The many departments and caregivers within Stanford Health Care and Lucile Packard Children’s Hospital Stanford have worked closely to seamlessly address the needs of all of our patients. The ACS reverification reflects our ongoing commitment to leading-edge, patient-centered care.”

Collectively, the two hospitals see approximately 2,870 trauma patients per year, with 63% of those patients requiring hospital admission — the most admissions of any trauma center in Santa Clara County.

Alumni association honors 6 medical students for community leadership

Six students at the School of Medicine are among the 35 winners of the 2019 Community Impact Award from the Stanford Alumni Association.

The award recognizes students who have enhanced the Stanford community through exemplary leadership, creation of an event or program, or other significant campus contribution.

Students were nominated by Stanford faculty, staff and senior administrators.

The recipients in the School of Medicine are:

MELODY CHENG

Sherif, a student in the master of laboratory animal science program, who was recognized for her efforts as a proactive community-bUILDER for current and prospective students and alumni of the program; for her public health advocacy work in low-income and migrant communities; and for her leadership in Dancebreak, a weekly social dance event that provides a creative outlet for the graduate student community.

DOMINIC HENN

Postdoctoral Research Scholar in the School of Medicine and Center for the Interdisciplinary Study of Life and Society, who was recognized for his leadership in the Biomedical Association for the Interest of Minority Students and dedication to supporting fellow students of color and affinity groups through mentorship, and for bringing together individuals and groups who share a common mission.

MICHAEL LONGAKER

Professor of surgery, effective April 1. His research focuses on developing new therapies to increase the natural abilities of children with serious birth defects to heal.

MICHAEL OSTACHER

Assistant professor of biomedical data science, effective March 1. He specializes in treating thoracic surgical conditions with minimally invasive techniques, such as video-assisted thoracic surgery and laparoscopic, robotic, endoscopic and bronchoscopic approaches.

His research focuses on the use of such techniques and on evaluating outcomes after treatment of thoracic malignancies.

MIMI BORELLI

MBBS, a postdoctoral scholar in plastic and reconstructive surgery, was awarded a pilot research grant from The Plastic Surgery Foundation. The $10,000 award will fund her research on the cjun protein and how it regulates a proinflammatory wound healing response.

XINNAN WANG

MD, PhD, was promoted to professor of pediatric surgery, effective March 1. He specializes in treating patients requiring hospital admission — the most admis-