Stanford Life Flight: 30 years of saving lives

By Sara Wykes

In May 1984, Stanford Life Flight made its inaugural mission, heading to Santa Cruz County to help a 70-year-old woman critically injured in a car accident.

With that incident, Life Flight was established as the first helicopter emergency services program in the Bay Area, and Stanford Hospital & Clinics became the first medical center in the region to have its own helicopter and air medical transport team.

Thirty years and many thousands of flights later, Life Flight has a proud history to celebrate. Its flight crew has years of experience, and its helicopter carries some of the most advanced airborne health-care technology available.

"Stanford has always been regarded as one of the premier programs in the state, if not the country," said Michael Baulch, RN, JD, Life Flight’s program manager.

Life Flight may launch its helicopter and crew up to three times a day and average about 700 flights annually, ranging as far south as Santa Barbara and as far north as the Oregon border. Between 30 and 40 percent of those flights carry children to the neonatal intensive care unit of Lucile Packard Children’s Hospital Stanford. Adult patients are most often transported to Stanford for stroke, cardiac or trauma care.

In-flight experts

A number of the flight nurses have been on board for years, even decades. To be considered for the crew requires years of experience, as well as extensive clinical qualifications and exceptional interpersonal skills. “People say, ‘I bet your staff is a bunch of Type A personalities,'” Baulch said. “I want the Type D personality whose heart rate never goes up. When you land on a highway where there are badly injured people, you want someone to step in and infuse a sense of calm into the situation.”

Most Life Flight nurses have advanced certifications in flight nursing and critical care specialties, and several have graduate degrees. The nurses maintain their expertise through ongoing training, continuing education courses and hours of practice with simulation mannequins for procedures they may not perform frequently but must manage well in a crisis.

Specialized technology

Flight nurses also assist with trauma alerts in the Emergency Department and help in the intensive care units with advanced procedures. “Our job has evolved greatly over the years,” said Geralyn Martinez, RN, a Life Flight nurse since 1990. “When I started, a doctor was giving the orders. Now we have protocols and expanded responsibilities. It’s a very collaborative, team-centered approach.”

Evolving tech—See LIFE FLIGHT, page 6

Universal molecular ‘flag’ highlights key genes, study finds

By Becky Bach

After probing more than 200 genetic data sets, researchers at the School of Medicine have identified a molecular flag that labels genes critical to a cell’s function.

The flag appears to exist universally — in cells ranging from worms to humans — and can be used to help decipher the function of unfamiliar cells, said Anne Brunet, PhD, associate professor of genetics and senior author of the study. For example, by examining a cell’s collection of flagged genes, researchers can classify a cell as a muscle, skin or other type of cell.

“This is the new era of using available data to make novel hypotheses and new discoveries,” Brunet said. “This paper exemplifies why it’s nice to be at Stanford where we’re embracing big data.”

The study was published in the July 31 issue of Cell. See GENES, page 7

After patient’s heart recovers, ventricular pump deactivated using a minimally invasive approach

By Sara Wykes

Donna Jackson’s heart, on the verge of failing two years earlier, had made a strong recovery. By spring 2013, she no longer needed the left ventricular assist device, or LVAD, that had been implanted in her chest almost three years earlier. It got in the way of things she had been doing a year earlier. It got in the way of things she wanted to do, like swim with her grandchildren. But her doctors at Stanford Hospital & Clinics believed the LVAD already existed, but they would require small incisions in the chest and the abdomen — more than the Stanford team wanted. “We decided the best thing to do was to use a catheter-based approach because it would involve only a small incision in her groin and the smallest amount of anesthesia possible," said the study’s senior author, Richard Ha, MD, clinical assistant professor of cardiothoracic surgery at the Stanford School of Medicine and surgical director of the hospital’s Mechanical Circulatory Support Program. The lead author of the paper is Stanford Zeigler, MD, a cardiothoracic surgery resident.

Jackson’s doctors threaded a slim plastic tube through her groin and inserted a tiny catheter-like device through the LVAD's driveline. The device could be inserted through a small incision in her femoral artery in the groin and up to her aorta, allowing them to plug the flow of blood to the LVAD. Then, they cut, cleaned and capped the wiring powering the LVAD so it no longer emerged from an opening in her abdomen. (The LVAD remains inside Jackson’s chest.)

Changes in brain may explain why chronic pain saps motivation

By Bruce Goldman

Chronic pain is among the most abundant of all medical afflictions in the developed world. It differs from a short-term episode of pain not only in its duration, but also in triggering in its sufferers a psychic exhaustion best described by the question, “Why bother?”

A new study in mice, conducted by investigators at the School of Medicine, has identified a set of changes in key parts of the brain that may explain chronic pain’s capacity to stifle motivation. The discovery could lead to entirely new classes of treatment for this damaging psychological consequence of chronic pain.

Many tens of millions of people in the United States suffer persistent pain due to diverse problems including migraines, arthritis, lower back pain, sports injuries, irritable bowel syndrome and shingles. For many of these conditions, there are no good treatments, and a crippling loss of motivation can result.

“With chronic pain, your whole life changes in a way that doesn’t happen with acute pain,” said Robert Malenka, MD, PhD, the Nancy Friend Pritzker Professor in Psychiatry and Behavioral Sciences and the study’s senior author.
By Kris Newby

Physicians who received payments or gifts from pharmaceutical or medical-device companies in 2013 should give themselves several days before the Aug. 27 deadline to register and dispute any errors on the government’s open payments database.

This data will be published online Sept. 30. (The first reporting cycle includes only five months of payments, from Jan. 1 to May 31, 2013, but future reports will include a full calendar year.)

The open payments database was initiated through the Physician Payments Sunshine Act, which requires manufacturers of drugs, medical devices, and biological substances to report certain payments and items to physicians and teaching hospitals every year. This covers items worth more than $10, including consulting fees; honoraria; gifts; compensation for food, travel, education and conferences; research funding; stock or other ownership interests; and royalties and license payments. The database will also list research payments made to Stanford under the principal investigator’s name.

The program, which is administered by the Centers for Medicare & Medicaid Services, or CMS, is intended to create more transparency in industry-provider relations by helping consumers make informed decisions on physicians’ potential conflicts of interest.

Physicians have the right to review reports about them and challenge items they believe are false, inaccurate or misleading. If a physician disputes data reported by a company, and it isn’t resolved by the deadline, CMS will publish the amounts in the database with a “disputed” notation. Because there isn’t much time to correct errors before the data goes public and because the program’s identity verification of physicians can take several days, it’s recommended that physicians start this process well before the Aug. 27 deadline.

Physicians can access helpful web pages for learning about the database and how to get access to it:

• https://portal.cms.gov
• http://stanford.edu/I1YID

Kris Newby is the communications manager for Spectrum, the Stanford Center for Clinical and Translational Research and Education.

By Aug. 27, physicians should review company gifts, payments

By Liga Stekelak

Medicine X, Stanford University’s premier conference on emerging health-care technology and patient-centered medicine, will return to campus Sept. 5-7.

The conference, which will be held at the Li Ka Shing Center for Learning and Knowledge, brings together innovative thinkers to exchange ideas about how social media and mobile computing are advancing the practice of medicine, inspiring new health-care delivery models and empowering patients to be proactive in their own care.

“Medicine X has distinguished itself through a singular commitment to inclusivity and by finding new ways to voice a patient’s perspective and practice conversations about health care,” said Lawrence Chu, MD, dean of the School of Medicine. “Dr. Chu has made this the go-to event for e-patients, physicians and innovators who want to get together to map out the future of health care.”

This year’s program will spotlight the relationship between physical and mental well-being with three keynote speakers: Ann Becker-Shurte, PhD, will moderate a session on how system errors on the government’s open payments database may be able to influence feedback about the conference and rate speakers in real time. They can also use the system to communicate directly with Medicine X staff members and request items, such as a blanket or water. The app also will facilitate networking among attendees by providing notifications about other users’ locations. Conference-goers will have the option to forgo this feature of the app altogether.

The conference lineup also includes the Medicine X master class program, a series of small-venue seminars which can be spread across disciplines. Confirmed master-class speakers are: Minor, Ornstein; Wendy Sue Swanson, MD, pediatrician and author of the Seattle Mama Doc blog; Bryan Vartabedian, MD, assistant professor of pediatrics and director of digital literacy at the Baylor College of Medicine; and Roni Zeiger, MD, co-founder of the Mama Doc blog; Bryan Vartabedian, MD, assistant professor of pediatrics and director of digital literacy at the Baylor College of Medicine; and Roni Zeiger, MD, co-founder of the Mama Doc blog.
A clinical informatics fellowship program at Stanford Medicine is the first in the country to be accredited by the Accreditation Council for Graduate Medical Education.

Physicians who complete the fellowship program can be certified in the subspecialty, which became a recognized subspecialty in 2011 and granted its first board certifications in 2013. Beginning in 2018, the American Board of Medical Specialties will require physicians who complete a council-accredited fellowship to be eligible for certification in clinical informatics. The council is a nonprofit, private council that evaluates and accredits medical residency and fellowship programs.

A recognition of the need to understand the biological basis of health, the fellowship aims to train future leaders in the clinical informatics field. “The future of health care increasingly depends on having physicians who are skilled at using data to find new and better ways of treating patients, and we at Stanford are pleased to be playing a leading role in providing this essential training,” Minord said.

For more information on the fellowship and Stanford’s work in clinical informatics, visit http://cifellows.stanford.edu.

By Jeffrey Norris

A brain region that is vital for memory and shrinks in Alzheimer’s disease patients also is likely to be smaller in people who have white blood cells that have shorter DNA-protecting end caps — called telomeres — according to a study by researchers at Stanford University and UC San Francisco.

If the findings are confirmed, this new line of work is likely to fuel research on ways to manipulate telomeres in blood and other body fluids that can be examined using new molecular testing tools, such as genome sequencing. The new study is meant to identify biological questions researchers should explore more fully. It also serves as the foundation for a larger research initiative at Stanford and Duke aimed at identifying the molecular and cellular mechanisms in more detail to better understand how changes in telomere length and other telomere-related factors contribute to the disease.”

Elizabeth Blackburn, PhD, professor of biochemistry and biophysics at UCSF, who shared the Nobel Prize in Physiology and Medicine for her discoveries of how telomeres allow chromosomes to be copied in a complete way during cell divisions, and of how cells use telomeres to protect themselves from genetic mistakes, is at the forefront of the clinical informatics field. “The future of health care increasingly depends on having physicians who are skilled at using data to find new and better ways of treating patients, and we at Stanford are pleased to be playing a leading role in providing this essential training,” Minord said.

For more information on the fellowship and Stanford’s work in clinical informatics, visit http://cifellows.stanford.edu.

By Krista Conger

Researchers at the School of Medicine and the Duke University School of Medicine are working with Google on a small pilot study of healthy people in Southern California in an effort to begin to understand the biological basis of health.

The study is in the very early stages, with researchers planning to enroll 175 healthy participants in a pilot study later this year. The participants will undergo a physical exam and provide samples of blood, saliva and other body fluids that will be analyzed for new molecular testing tools, such as genome sequencing. The pilot study will help the researchers design and conduct a much larger trial in the future.

“This study is possible because of advances in technology and biomarkers, which will allow us to establish a base line of values that indicate health, and then to follow changes that may occur during disease development,” said Sam Gambhir, MD, PhD, chair of Stanford’s Radiology Department and director of the Canary Center at Stanford for Cancer Early Detection. Gambhir will lead Stanford’s consulting role in the study.

The pilot study is meant to identify biological questions researchers should explore more fully. It also serves as the foundation for a larger research initiative at Stanford and Duke aimed at identifying the molecular and cellular parameters of a healthy physiology. The researchers believe the study will lead to important advances in understanding the development and progression of cardiovascular disease, cancer and other medical conditions.

“A baseline set of insights about health, including variation of biochemical parameters in the healthy population, will likely help in the prevention and earlier detection of disease with significant potential for improved health outcomes,” Gambhir said.

The study co-authors, noting that chronic exposure of cells to inflamma- tion caused by glucocorticoids can accelerate telomere shortening and lead to hippocampal atrophy, suggested that the study should encourage cellular mechanisms in more detail to better understand how changes in telomere length — as well as changes in other telomere-related factors such as the enzyme called telomerase — either reflect or drive age-related cognitive decline.

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Maya Ben-Efraim focuses on how e-cigarette manufacturers target teens as part of her internship with Stanford Research Into Tobacco Advertising (SRITA). Ben-Efraim's research focuses on how electronic cigarette companies target teens in their advertising by marketing e-cigarettes in a variety of appealing flavors.

Supervisors on campus say they recruit teenagers for their open mind and work ethic. David Mucciarelli, a lab manager in the Environmental Earth System Science Department, has recruited a number of teenagers to work in his lab.

High school students bring enthusiasm to the lab and their willingness to learn,” Mucciarelli said. “We open our doors to eager young minds.

“From there we do our best to be good mentors and provide the best introduction to science. They mostly work with an appointed graduate student so they have a good one-on-one experience,” Amandu Fein, who is SRITA director and also Ben-Efraim’s supervisor, understands both intern and mentor roles.

“I try to ask a lot of questions and hopefully I also bring a fresh set of eyes,” Fein said. Fein said she also hopes that Ben-Efraim will begin to discover her true passions and apply them to a future career. “She has a lot of skills and she has a lot of potential, but I want to refine those skills,” Fein said.

Ben-Efraim said, “I want her to pick and choose what she really wants to do because she is good at a lot of things, but I feel like the exposure and more in-depth process of her work will show her more of where she wants to go.”

Ben-Efraim’s work has exposed her to other ideas and research. “I am surrounded by endless incredible people and resources,” she said. “I have been introduced to doctors from different departments and even other universities and hospitals, so I have become familiar with a large range of research in tobacco very quickly.”

Both Yu and Ben-Efraim said they are gaining valuable experience they hope to take back to their academic lives at high school.

“I am gaining a lot of professional experience by working with PhD candidates and postdocs,” Yu said. “I found out really quickly that the things I learned in class barely compare to the things I learned in the lab.”

“I am gaining experience in researching, presenting, communicating, and all sorts of other work-related skills,” Ben-Efraim said. “The fact that I am in high school does not affect the way I am treated, so I am expected to learn, act and understand the same as any other college student, graduate or doctor on the team.”

Yu and Ben-Efraim said they regard their time in the labs at Stanford as a valuable educational experience that will help them further their scientific careers both in college and beyond.

“Working at SRITA is more than preparing me for the working world,” Ben-Efraim said. “This is the first time I have been given lots of real responsibility and it is forcing me to grow in a great way.”

Alex Murray is a high school intern at the Stanford News Service.
Autistic brain less flexible at taking tasks, research finds

By Erin Digita

The brains of children with autism are relatively inflexible at switching from rest to task performance, according to a new brain-imaging study from the School of Medicine.

Instead of changing to accommodate a job, connective neural networks of autistic children look similar to connectivity in the resting brain. And the greater this inflexibility, the more severe the child’s manifestations of repetitive and restrictive behaviors that characterize the study found.

The study, which was published online July 29 in *Cell Reports*, used functional magnetic resonance imaging (fMRI) to monitor children’s brain activity at rest and during two tasks: solving simple math problems and looking at pictures of different faces. The study included an equal number of children with and without autism.

The developmental disorder, which now affects one of every 68 children in the United States, is characterized by social and communication deficits, repetitive behaviors and sensory problems.

“We wanted to test the idea that a flexible brain is necessary for flexible behaviors,” said Lucina Uddin, PhD, a lead author of the study. “What we found was that across a set of brain connections known to be important for switching between different tasks, children with autism showed reduced brain ‘flexibility’ compared with typically developing peers.”

Uddin, who is now an assistant professor of psychology at the University of Miami, was a postdoctoral scholar at Stanford when the research was conducted.

“The fact that we can tie this neurophysiological brain-state inflexibility to behavioral inflexibility is an important finding because it gives us clues about what kinds of processes go awry in autism,” said Vinod Menon, PhD, a former research associate and currently a professor of psychiatry and behavioral sciences at Stanford and the senior author of the study.

“Children who are focused on a network of brain areas they have studied before. These areas are involved in making decisions, performing social tasks and identifying relevant events in the environment to guide behavior. The team’s prior work showed that, in children with autism, activity in these areas was more highly connected when the brain was at rest than it was in children who didn’t have autism.

The new research shows that, in autism, connectivity in these networks is not as tightly coordinated as in typically developing brains when the brain is at rest or performing a task. In contrast, typically developing children have a larger shift in brain connectivity when they perform tasks.

The study looked at 34 kids with autism and 34 typically developing children. All of the children with autism received standard clinical evaluations to characterize the severity of their disorder. Then, the two groups were split in half: 17 children with autism and 17 typically developing children who had their brains scanned with fMRI while at rest and while performing simple arithmetic problems. The remaining children had their brains scanned at rest and during a task that asked them to distinguish between different people’s faces. The facial recognition task was chosen because autism is characterized by social deficits; the math task was chosen to reflect an area in which children with autism do not usually have deficits.

Children with autism performed as well as the typically developing peers on both tasks — that is, they were as good at distinguishing between the faces and solving the math problems. However, their brain scan results were different. In addition to the reduced brain flexibility, the researchers showed that there was a correlation between the degree of inflexibility and the severity of restrictive and repetitive behaviors, as assessed by rating scales.

“This is the first study that has examined how the pattern of intrinsic brain change in autism is related to change in cognitive load in children with autism,” Menon said. The research is the first to demonstrate that brain connectivity in children with autism changes less, relative to rest, in response to a task than the brains of other children, he added.

“The findings may help researchers evaluate the effects of different autism therapies,” said Kaurubh Supekar, PhD, a research associate and the other lead author of the study. “Therapies that increase the brain’s flexibility at switching from rest to goal-directed behaviors may be a good target, for instance.”

“We’re making progress in identifying a brain basis of autism, and we’re starting to get a grip on the pointing systems and signaling mechanisms that are not functioning properly,” Menon said. “This is giving us a better handle both in thinking about treatment and in looking at change or plasticity in the brain.”

Other Stanford authors of the study are research assistants Charles Lynch, Katheryn Chung, Pasha Oda, Daniele Zanoni and Maria Barby; Jennifer Panagiotou, PhD, clinical associate professor of psychiatry and behavioral sciences and co-director of the Autism and Developmental Disabilities Clinic at Lucile Packard Children’s Hospital Stanford; Carl Feinstein, MD, professor emeritus of psychiatry and behavioral sciences; and Daniel Abrams, PhD, postdoctoral scholar.

Feinstein and Menon are members of Stanford’s Child Health Research Institute.

“By focusing on children from the International Society for Autism Research, the Singer Foundation, and the National Institutes of Health. Stanford’s Department of Psychiatry and Behavioral Sciences also supported the work.”

**Vinod Menon and his colleagues have found that the brains of children with autism show less flexibility than those of typically developing children when switching from a resting state to performing tasks.**

**Laura Attardi**

A protein known for its tumor-suppressing properties can also trigger genetic defects that cause the rare CHARGE syndrome, according to research presented at the School of Medicine.

“Insider Stanford Medicine,” August 4, 2014

A comparative study of pathways that control tumor formation in the mouse model and of human cells has suggested a new role for p53, a protein that suppresses cancer.

When it spots an ail -

Laura Attardi

“...It was a very big surprise and very intriguing.” said Jeanine Van Nostrand, PhD, lead author of a paper describing the discovery. The research may also provide insight into the development of carcinomas and of human genetics at the University of Michigan.

“...the fact that we can tie this neurophysiological brain-state inflexibility to behavioral inflexibility is an important finding because it gives us clues about what kinds of processes go awry in autism,” said Vinod Menon, PhD, a former research associate and currently a professor of psychiatry and behavioral sciences at Stanford and the senior author of the study.

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**Laura Attardi**

A comparative study of pathways that control tumor formation in the mouse model and of human cells has suggested a new role for p53, a protein that suppresses cancer.
Campaign launched to help contain Ebola outbreak in Liberia

By Ruthann Richter

Michele Barry, MD, director of Stanford's Center for Innovation in Global Health, has launched a fundraising campaign to help combat the Ebola outbreak in Liberia, which has claimed the life of a colleague who mentored residents in the Yale/Stanford Johnson & Johnson Scholar Program.

Samuel Brisbane, MD, was the first Liberian doctor to die in the outbreak, which the World Health Orga- nization says is responsible for more than 700 deaths in West Africa and is the largest outbreak of the disease to date. Brisbane was an internist who treated patients at the John F. Kennedy Memorial Hospital in the capital city of Monrovia, the coun- try's largest hospital. A second medical officer has become ill at the hospital, one of the sites for the scholars' program, Barry said.

Through the program, Brisbane mentored physicians from Stanford and other institutions who volunteer for six-week stints in resource-limited countries. He quarantined himself after showing signs of illness but died on July 26 after be- ing transferred to a treatment center, said Barry, a professor of medicine and senior associate dean for global health at the School of Medicine.

Like HIV, the Ebola virus is spread through direct contact with blood or body fluids from an infected individ- ual. Barry said Liberia is in desperate need of personal protective equipment and personnel who can do contact tracing and isolation of infected individuals. The Eb-ola virus has a 21-day incubation period, during which time an infected individual can transmit the virus.

Barry joined an informal fundraising campaign with her colleagues on July 29 to help Liberian health-care workers. “It’s all of the time, really,” she said. “We’re just trying to raise $11,000 in 48 hours. On July 31, she broadened the appeal in an email sent to all Stanford medical school faculty.

Barry has had experience fighting Eb-ola in Uganda, where she said outbreaks have been limited by isolating patients in outdoor, tented hospitals and where physicians and nurses have had access to good protective gear. In the past, she said the disease typically has had “hot spots” that last a month and then subside. But the latest epidemic, which has af- fected patients in Guinea, Sierra Leone and Liberia, has fol- lowed a somewhat different path.

“I think we are doing a better job of taking care of patients and keeping them alive longer, so they become more viru- mic — because the virus has spread through their bloodstream — and more infectious,” she said. “And with globalization, there is more traffic across borders so spillover to other countries occurs.”

Heart continued from page 1

home from Stanford Hospital five days after the procedure.

She has inspired the Stanford team to begin work on how to predict which LVAD patients might be like her. “If we can find out which patients are going to recover completely, we can be more aggres- sive with them so they can be liberated from the LVAD,” said co-author Di- panjan Banerjee, MD, clinical assistant professor of cardiovascular medicine and medical director of Mechanical Circula- tory Support Program. “And many of these patients will not want nor be able to tolerate a complete removal of the LVAD.

The IVAD’s history of clinical perfor- mance and evolving technology puts it in a unique category of devices whose use- fulness continues to develop over time. The U.S. Food and Drug Administra- tion in 1984 approved it as a “bridge” for patients on a path toward needing a heart transplant. Physicians eventually realized that some of their patients did so well with LVAD support that they no longer needed a transplant, and the FDA approved the device for permanent use in 2010. But an estimated 1 to 2 percent of LVAD patients’ hearts recover enough to do fine without the mechanical sup- port. Younger patients are able to tolerate the major surgery required to remove the LVAD completely, but the surgery poses major risks for older patients.

To plan the new procedure, Ha and Banerjee consulted with two of the pa- tient’s other authors: Philip Oyer, MD, PhD, associate chair of cardiothoracic surgery, and the first person to successfully implant an LVAD as a bridge to trans- plant; and interventional radiologist Michael Dake, MD, professor of cardio- thoracic surgery and medical director of Stanford’s Catheterization and Angiogra- phy Laboratories.

“You have to have the wire technol- ogy and the imaging and a person who knows how to send devices into the dif- ficult areas of the heart and aorta,” Ha said. “Dake is absolutely masterful at that.”

For Ha, who met Jackson in 2010 at Stanford Hospital when she was evaluat- ing for heart transplant, the LVAD de- activation completes a circle. “She had come in so sick and the LVAD saved her life, and she was really grateful for that,” Ha said. “But, as sometimes happens, people do so well with it, they want to do things they’ve done in the past.”

Jackson has gone back to work 20 hours a week as a notary public. With- out her LVAD battery pack and moni- toring, she was able to take a flight to Arizona to visit family. And, best of all, after her surgery this summer, she was able to swim. “I feel better than I have in years,” she said.

Other Stanford authors are Ahmed Sheikh, MD, clinical assistant professor of cardiothoracic surgery at Stanford; Pe- ter H.U. Lee, MD, a former clinical in- scooter; and former resident Jay Desai, MD.

The Department of Cardiothoracic Surgery helped to support the work.

Life Flight continued from page 1

technology has made the Life Flight helicopter faster and larger and filled with medical equipment that is com- pact, lightweight and rugged to withstand an environ- ment that is not as controlled as a hospital’s clean and safe areas. “We have benefitted from war- zone medical care technologies developed by the military overseas,” Baulch said.

A nurse now can insert a breathing tube guided by video that interfaces with a computer tablet. Stanford’s Life Flight program is one of just a few programs with protocols that allow for a patient to breathe on the ventilator while a wire decrur- tory to monitor blood pressure in critically ill patients. Baulch said, “And we have nurses who are world ex- perts in sleep medicine.”

Team effort

Life Flight’s nurses and pilots are perhaps the most visible part of the program, but its success also depends on other types of professional expertise: a team of me- chanics to maintain the aircraft and a group of commu- nication technicians who track flights and coordinate arrange- ments so that appropriate medical personnel are available for a patient breathing on a ventilator,” he added.

Stanford Life Flight also is the only flight program in the country that can deal with critically ill cardiac patients who need advanced equipment such as an intra-aortic balloon pump. Its helicopter is equipped with instrument-aided flight capability to make it safer to transport patients in inclement weather. Crew mem- bers wear night vision goggles on all nighttime flights to improve safety. “Stanford has kept its focus on safety,” Baulch said, “and on the best use of this very expensive asset.”

Researchers retrace study examining the link between narcolepsy, H1N1

A paper published Dec. 18, 2013, in Science Translational Medicine that described a possible immunological connection between narcolepsy and the H1N1 influenza virus is being retracted at the request of the authors at the School of Medicine. An article about the paper appeared in the Jan. 13, 2014, issue of Inside Stanford Medicine.

Sleep researcher Emmanuel Mignot, MD, PhD, a professor of psychiatry and behavioral sciences, and his co-authors requested the re- traction because they were unable to replicate some of the data reported in the paper.

The journal published the retraction notice online July 30.
“I think the notion of transcriptional consistency is new, and it’s very important.”
Brunet and her team searched computerized data sets for the flag and genes associated with it in a variety of tissues and species and built a new database available for other researchers — http://bdbbd.stanford.edu — to examine the flag’s association with genes in a variety of cells.

The researchers also mapped the flagged genes in mouse neural stem cells, the regenerative cells of the adult brain. The flag identified previously recognized genes that were critical, but it also marked several less well-understood genes, Brunet said. Researchers could also work backwards, using the flagged genes with known functions to figure out the cell type.

The lead authors of the study are postdoctoral scholars Berénice Benayoun, PhD; graduate student Anjali Kottapalli, PhD; and anesthesiology instructor Boris Heifets, MD, PhD; anesthesiology instructor Bois Hensel, MD, PhD. Information about Stanford’s Department of Psychiatry and Behavioral Sciences, which also supported this work, is available at www.psychiatry.stanford.edu.

Oak Road to reopen between Welch, Stock Farm roads
On Aug. 6, Oak Road will reopen between Welch and Stock Farm roads following the completion of the Stanford Energy System Innovations utility work in the area. All entrances to the Stock Farm garage (Parking Structures 5) and parking lots will now be accessible. For continued safety, please follow alternative pedestrian crosswalks and pathways in construction areas. For questions about the work, please email sesprojects@lists.stanford.edu or call the construction hotline number at (650) 701-SUMC (7862).
On shaky ground: Building to withstand a major earthquake

By Ruth Schechter

The odds of a major earthquake occurring in the Bay Area are high. We live close to the San Andreas Fault, one of the world’s most active faults, and the Hayward Fault, which has been called a “tectonic time bomb.”

Numerous smaller faults run the length of the Peninsula. The U.S. Geological Survey predicts a 63 percent probability of a 6.7 earthquake within the next 20 years for the Bay Area — similar in magnitude to the quakes that rocked the Chile and Japan in March.

But the new Stanford Hospital is being constructed to withstand the most severe tremors. When completed, in 2017, the building will be one of the most seismically safe hospitals in the country, able to continue operations after an 8.0, or “great,” earthquake.

Buffer system

The new hospital will be placed on 206 base isolators, enormous parallel steel plates with a sort of ball bearing suspension system between them, providing a buffer between the building and the moving ground. Each plate can move as much as 3 feet in any direction, allowing the building to shift up to 6 feet during seismic activity. Reducing horizontal movement during an earthquake minimizes the strain on a building’s vertical load-bearing structures. Because the base of the hospital is able to move at the same rate as the shaking ground, the building itself will barely shift.

“During an earthquake, the earth jerks one way and then another — as if you are standing on a carpet that is being pulled back and forth,” said Bert Hurlbut, vice president of construction for the new Stanford Hospital. “But we’re talking about a tremendous force of horizontal acceleration. Since it’s impossible to prevent an earthquake, we’re building structures that keep people safe by damping the energy and ensuring structural integrity.”

Following Southern California’s devastating Northridge earthquake in 1994, the California State Legislature mandated strict seismic safety regulations for facilities that provide emergency or surgical services.

Lucile Packard Children’s Hospital Stanford is incorporating a different but equally efficient system for seismic safety into its expansion project, which will open in 2017.

Safety measures

Because Stanford is the only designated level-1 trauma center on the Peninsula, it is imperative for the hospital to be up and running in order to receive the brunt of casualties in the event of an emergency. The hospital is recognized by the American College of Surgeons as being capable of providing total care for every aspect of injury — from prevention through rehabilitation — for both adults and children.

Two sizes of base isolators have been custom-made for the hospital: 154 “large” ones each weighing 5,400 pounds (about 2.5 tons) and 52 super-sized ones each weighing 8,900 pounds (4.5 tons). Two years in the making, the steel plates were cast in Texas and manufactured by Earthquake Protection Systems, a design firm in Valley, Utah.

Hoisted in place by massive cranes, many of the base isolators already have been positioned 30 feet below ground level on supports that have been dug 100 feet into the earth. Their design is so precise that there is only 1/32 of an inch of space around each bolt that holds them in place. The design also allows enough leeway for the building to be jacked up if any of the isolators need to be checked or replaced.

Construction challenges

“The base isolators are only part of the solution,” Hurlbut said. “The building and all its components also have to be able to move and not touch anything.

That means the hospital’s concrete and steel foundation has to be constructed with a cushion of air around it, and any structural elements that contact the ground have to be flexible as well. Each doorway, staircase, and ambulance bay is designed like a drawbridge so that it can slide back and forth, and all pipes and utility connections — medical gas, diesel, water, electricity, etc. — have to be able to move in any direction as well. The foundation walls, 35 feet deep, are shored up with 50-foot steel beams and 70-foot tieback rods placed at an angle to create a kind of bucket in which to position the building.

The pedestrian bridge that will connect the new Stanford Hospital with the existing hospital facility has been a particular challenge, said Hurlbut. The solution was to create pin joints at each end so that it could move almost 5 feet in any direction. “It’s sort of like a jet walkway connecting you from the gate to your plane,” he said.

To facilitate all the ongoing problem-solving needs for such a complex project — and to stay on schedule — the architects, engineers, general contractor and subcontractors work together in an open compound adjacent to the construction site.

“Construction, design and operations all go hand in hand,” Hurlbut said. “We’ve made the process fully integrated.”

Learn more about the Stanford University Medical Center Renewal Project at smcnewenewal.org.

Ruth Schechter is a freelance writer and editor.