Bacterial community in pregnant women linked to preterm birth

By Erin Digitale

Risk for preterm birth is linked to the composition of the vaginal bacterial community in the mother during pregnancy, according to a study from the School of Medicine that tracked women's microbial communities on a week-by-week basis during pregnancy.

A high-diversity pattern of vaginal bacterial community raised the likelihood of preterm birth, and the longer the bacteria followed this pattern, the higher the risk, the study found. The study may also help explain why preterm delivery risk is elevated in women who have closely spaced pregnancies.

A paper describing the research was published online Aug. 17 in Proceedings of the National Academy of Sciences.

Babies born more than three weeks early are considered preterm. About 450,000 preterm infants are born each year in the United States. Preterm birth is a leading cause of newborn deaths. About half of such births occur after spontaneous preterm labor, whose triggers are not well-understood.

“We wanted to develop a baseline understanding of what happens to the human microbiome during pregnancy, both in women who deliver healthy, term babies and in those who deliver prematurely,” said the study’s senior author, David Parham.

Unique genes in Khoe-San people may lower risk of some pregnancy hazards

By Jennie Dusheck

An examination of the immune genes of the southern African Khoe-San people has revealed a completely new kind of human genetic variation, according to researchers at the School of Medicine. The gene variant was one of two they found that would be expected to alter the formation of the placenta during early pregnancy, leading to larger, healthier babies and a reduced risk of pre-eclampsia, a major cause of maternal death.

“Only a handful of studies have investigated the function of immune genes in African populations. As a result, we have probably greatly underestimated the breadth of human immune variation,” said Parham, the study’s senior author. “So we were excited to investigate the Khoe-San, a divergent, modern human population.

Researchers engineer yeast to produce opioid compounds

By Tom Abate

For thousands of years, people have used yeast to ferment wine, brew beer and leaven bread. It can take more than a year to produce a batch of wine, a process that requires converting grape juice into alcohol.

Now, Stanford researchers have genetically engineered yeast to make painkilling medicines, a breakthrough that heralds a faster and potentially less expensive way to produce many different types of plant-based medicines.

Wright Aug. 15 in Science. The engineers describe how they reprogrammed the genetic machinery of baker’s yeast so that these fast-growing cells could convert sugar into hydrocortisone in just three to five days.

Hydrocortisone and its chemical relatives, such as morphine and oxycodone, are opioids, members of a family of painkilling drugs sourced from the opium poppy. It can take more than a year to produce a batch of medicine, starting from the farms in Australia, Europe and elsewhere that are licensed to grow opium poppies.

Plant material must then be harvested, processed and shipped to pharmaceutical factories in the United States, where the active drug molecules are extracted and refined into medicines.

“When we started work a decade ago, many experts thought it would be impossible to engineer yeast to replace the entire farm-to-factory process,” said senior author Christina Smolke, PhD, associate professor of bioengineering.

Now, though the output is small — it would take 4,400 gallons of bioengineered yeast to produce a single dose of pain relief — the experiment proves that bioengineered yeast can make complex, plant-based medicines.

“This is only the beginning,” Smolke said. “The techniques we developed and demonstrate for opioid pain relievers can be expanded to produce other medicines.”

Brain scans better forecast math learning in kids than skill tests do

By Erin Digitale

Brain scans from 8-year-old children can predict gains in their mathematical ability over the next six years, according to a new study from the School of Medicine.

The research tracked 43 children longitudinally for six years, starting at age 8, and showed that while brain characteristics strongly indicated which children would be the best math learners over the following six years, the children’s performance on math, reading, IQ and memory tests at age 8 did not.

The study, which was published online Aug. 18 in The Journal of Neuroscience, is the first to show that the research field is on the right track, according to senior author David Parham, the study’s senior author. “So we were excited to investigate the Khoe-San, a divergent, modern human population.”

Researchers engineer yeast to produce opioid compounds

By Tom Abate

For thousands of years, people have used yeast to ferment wine, brew beer and leaven bread. It can take more than a year to produce a batch of wine, a process that requires converting grape juice into alcohol.

Now, Stanford researchers have genetically engineered yeast to make painkilling medicines, a breakthrough that heralds a faster and potentially less expensive way to produce many different types of plant-based medicines.

Wright Aug. 15 in Science. The engineers describe how they reprogrammed the genetic machinery of baker’s yeast so that these fast-growing cells could convert sugar into hydrocortisone in just three to five days.

Hydrocortisone and its chemical relatives, such as morphine and oxycodone, are opioids, members of a family of painkilling drugs sourced from the opium poppy. It can take more than a year to produce a batch of medicine, starting from the farms in Australia, Europe and elsewhere that are licensed to grow opium poppies.

Plant material must then be harvested, processed and shipped to pharmaceutical factories in the United States, where the active drug molecules are extracted and refined into medicines.

“When we started work a decade ago, many experts thought it would be impossible to engineer yeast to replace the entire farm-to-factory process,” said senior author Christina Smolke, PhD, associate professor of bioengineering.

Now, though the output is small — it would take 4,400 gallons of bioengineered yeast to produce a single dose of pain relief — the experiment proves that bioengineered yeast can make complex, plant-based medicines.

“This is only the beginning,” Smolke said. “The techniques we developed and demonstrate for opioid pain relievers can be expanded to produce other medicines.”

Brain scans better forecast math learning in kids than skill tests do

By Erin Digitale

Brain scans from 8-year-old children can predict gains in their mathematical ability over the next six years, according to a new study from the School of Medicine.

The research tracked 43 children longitudinally for six years, starting at age 8, and showed that while brain characteristics strongly indicated which children would be the best math learners over the following six years, the children’s performance on math, reading, IQ and memory tests at age 8 did not.

The study, which was published online Aug. 18 in The Journal of Neuroscience, is the first to show that the research field is on the right track, according to senior author David Parham, the study’s senior author.

“Only a handful of studies have investigated the function of immune genes in African populations. As a result, we have probably greatly underestimated the breadth of human immune variation,” said Parham, the study’s senior author. “So we were excited to investigate the Khoe-San, a divergent, modern human population.”

Unique genes in Khoe-San people may lower risk of some pregnancy hazards

By Jennie Dusheck

An examination of the immune genes of the southern African Khoe-San people has revealed a completely new kind of mutation, according to researchers at the School of Medicine. The gene variant likely contributes to healthier babies, term babies and in those who deliver prematurity.

A specific pattern of high diversity in the vaginal bacteria of pregnant women raises the likelihood of premature birth, according to a new study.

Bacterial community in pregnant women linked to preterm birth

By Erin Digitale

Risk for preterm birth is linked to the composition of the vaginal bacterial community in the mother during pregnancy, according to a study from the School of Medicine that tracked women's microbial communities on a week-by-week basis during pregnancy.

A high-diversity pattern of vaginal bacterial community raised the likelihood of preterm birth, and the longer the bacteria followed this pattern, the higher the risk, the study found. The study may also help explain why preterm delivery risk is elevated in women who have closely spaced pregnancies.

A paper describing the research was published online Aug. 17 in Proceedings of the National Academy of Sciences.

Babies born more than three weeks early are considered preterm. About 450,000 preterm infants are born each year in the United States. Preterm birth is a leading cause of newborn deaths. About half of such births occur after spontaneous preterm labor, whose triggers are not well-understood.

“We wanted to develop a baseline understanding of what happens to the human microbiome during pregnancy, both in women who deliver healthy, term babies and in those who deliver prematurely,” said the study’s senior author, David Parham.

"We wanted to develop a baseline understanding of what happens to the human microbiome during pregnancy, both in women who deliver healthy, term babies and in those who deliver prematurely," said the study's senior author, David Parham.

A specific pattern of high diversity in the vaginal bacteria of pregnant women raises the likelihood of premature birth, according to a new study.

Bacterial community in pregnant women linked to preterm birth

By Erin Digitale

Risk for preterm birth is linked to the composition of the vaginal bacterial community in the mother during pregnancy, according to a study from the School of Medicine that tracked women's microbial communities on a week-by-week basis during pregnancy.

A high-diversity pattern of vaginal bacterial community raised the likelihood of preterm birth, and the longer the bacteria followed this pattern, the higher the risk, the study found. The study may also help explain why preterm delivery risk is elevated in women who have closely spaced pregnancies.

A paper describing the research was published online Aug. 17 in Proceedings of the National Academy of Sciences.

Babies born more than three weeks early are considered preterm. About 450,000 preterm infants are born each year in the United States. Preterm birth is a leading cause of newborn deaths. About half of such births occur after spontaneous preterm labor, whose triggers are not well-understood.

“We wanted to develop a baseline understanding of what happens to the human microbiome during pregnancy, both in women who deliver healthy, term babies and in those who deliver prematurely,” said the study’s senior author, David Parham.

"We wanted to develop a baseline understanding of what happens to the human microbiome during pregnancy, both in women who deliver healthy, term babies and in those who deliver prematurely," said the study's senior author, David Parham.

A specific pattern of high diversity in the vaginal bacteria of pregnant women raises the likelihood of premature birth, according to a new study.

Bacterial community in pregnant women linked to preterm birth

By Erin Digitale

Risk for preterm birth is linked to the composition of the vaginal bacterial community in the mother during pregnancy, according to a study from the School of Medicine that tracked women's microbial communities on a week-by-week basis during pregnancy.

A high-diversity pattern of vaginal bacterial community raised the likelihood of preterm birth, and the longer the bacteria followed this pattern, the higher the risk, the study found. The study may also help explain why preterm delivery risk is elevated in women who have closely spaced pregnancies.

A paper describing the research was published online Aug. 17 in Proceedings of the National Academy of Sciences.

Babies born more than three weeks early are considered preterm. About 450,000 preterm infants are born each year in the United States. Preterm birth is a leading cause of newborn deaths. About half of such births occur after spontaneous preterm labor, whose triggers are not well-understood.

“We wanted to develop a baseline understanding of what happens to the human microbiome during pregnancy, both in women who deliver healthy, term babies and in those who deliver prematurely,” said the study’s senior author, David Parham.

"We wanted to develop a baseline understanding of what happens to the human microbiome during pregnancy, both in women who deliver healthy, term babies and in those who deliver prematurely," said the study's senior author, David Parham.

A specific pattern of high diversity in the vaginal bacteria of pregnant women raises the likelihood of premature birth, according to a new study.
Finding usable medical images made easier through software

By Jennie Dusheck

For the subset of heart patients whose illness isn’t caused by a lifetime of cigarettes, trans fats or high glycemic food, a new genetic approach developed at the School of Medicine may be able to accurately pinpoint the likely genetic causes of their conditions in just a couple of days.

In work that could advance precision health, Kirchner Wilson, MD, PhD, instructor of pathology, and Joseph Wu, MD, PhD, professor of cardiovascular medicine and of radiology, teamed up with a group of genome-sequencing specialists to develop the new technique: a better way to test cardiac patients for any genes that might be causing their problems.

Wilson and Wu said that the gold standard of genome sequencing involves thousands of genes, costs $1,000 or more and can take weeks or months to get results.

For a patient with a heart condition that’s difficult to diagnose, it makes no sense to sequence the entire 22,000-30,000 genes currently known, the researchers said. Instead, Wilson and Wu focused on a small group of diseases, genetic markers and long padlock probes for inherited heart disease.

Wilson spearheaded the effort to put the long padlock probes to work diagnosing cardiac diseases. “The work was very much a collaboration between clinicians and technologists,” said Wilson.

Complementary long padlock probes, or cLPs, were developed at the Stanford Genome Technology Center by senior research scientist Curt M.D., PhD, research scientist Peidong Shen, PhD, and their colleagues. These simple probes accurately target specific parts of the genome and can be made in large batches at low cost. Because of their simplicity, they are easily customized to target different genes.

Wilson and Wu found that the probes could be used to develop a streamlined assay, or test, that looks at just the few thousand genes known to be relevant in inherited heart disease, validated the cLP approach, the researchers said.

The heart disease cLP assay was cheaper, faster and more accurate than whole-genome assays.

The Stanford team next plans to test the technique on a group of 200-300 patients. In the meantime, Wilson and Wu are offering the test free to any research lab that wants to try it. “They can just email me,” said Wilson, “and we’ll send them the assay, and then they can do it in their own lab — as long as they have some experience with next-generation sequencing.”

The assay will shorten the time it takes to diagnose difficult or unusual heart disease cases, Wu said. “If you have a 60-year-old patient who comes in with chest pain, he doesn’t have any history of heart problems and yet the heart is not performing well. We also find that several of his family members have similar heart conditions. So if we run the new genetic test and find the man’s illness has a genetic cause, such as dilated cardiomyopathy, we now have both a cause and a diagnosis, and we can initiate treatment right away.”

Avoiding a ‘fishing expedition’

“Not having that result delays diagnosis and incurring costs because you’re going through a whole bunch of tests — sometimes it becomes a fishing expedition, which can be frustrating to both the physician and the patient,” Wu added. “But perhaps the most important benefit is that you can give the patient accurate answers about his or her disease.”

Wilson and Wu said the genome technology group has been working on the cLP technique for a long time. “Our goal is to make genetic testing more accessible to more people,” Wilson said. “We want to democratize it. For now, we’re going to release it free of charge: Researchers can get samples of the assay so they can run it themselves. We’re also releasing all of the technical data for the probes so researchers can recreate and modify the probes themselves. In some ways it’s making genetic testing open source.”

The development of the new test is an example of Stanford Medicine’s focus on precision health, which aims to enable researchers and physicians to better predict individual risks for specific diseases, develop appropriate therapies and personalize care for patients.

Other Stanford-affiliated authors of the paper are Eula Fung, MS, clinical data analyst; Ioannis Karakikes, PhD, instructor in cardiovascular medicine; Stanford undergraduate student Angela Zhang; Kouloum Stafanou-Rahat, MD, postdoc in cardiovascular medicine; George Liu, MD, professor of pathology; Karim Sallam, MD, cardiovascular medical fellow; Ronald Davis, PhD, professor of biochemistry and of genetics; and Euan Ashley, MD, PhD, professor of cardiovascular medicine.

This work was supported by the National Institutes of Health, the Stanford Cardiovascular Institute, the American Heart Association, the Stanford Cancer Center and the American Heart Association.

Stanford’s departments of Pathology, Medicine and Radiology also supported the work.

Finding usable medical images made easier through software

By Kim Smuga-Otto

Medical education instructors often rely on images to communicate what they’re teaching, whether it’s the latest innovations in heart-valve replacement or the practicalities of surgery during humanitarian missions.

And though images can be found online, the legal challenge of using them is often considerably more challenging.

“If we have a two-hour online course, my guess is we spend 15 hours trying to figure out the copyright status of the presentations,” said Linda Baer, director of continuing medical education at Stanford.

Now she — and anyone else looking for medical images — has a new tool to make that process easier: Bio-Image Search, developed by Lane Medical Library, serves up images and diagrams exclusively from medical and scientific organizations. It groups the results based on the degree to which their republication is allowed.

A search for “breast cancer” returned 135 images with no restrictions beyond citing their source, as well as another 104 images with some restrictions, all clearly indicated.

Baer is delighted by the site’s ease of use and clear copyright information. “She said that it will make her and course designers’ jobs easier.”

While the search engine has access to over 2 million images, it has its limitations. It draws from only eight electronic databases, and the majority of images come from PubMed Central. While PubMed articles are available for educational purposes, the poses, images within them might have different copyright restrictions that require contacting the publishers.

However, Tony Christopher, Lane’s technology and customer support director who oversees the tool’s development, feels the search will improve as more people use it. “Word is starting to spread,” he said. Usage of the tool was up 60 percent in April compared to the previous months.

Bio-Image Search was originally called Lane Image Search when it launched in January. Its creator, web developer Alain Bousard, continues to upgrade the software and will be adding three more databases by the end of July.

It’s not restricted to instructors; students writing papers, staff assembling presentations, or anyone visiting the website can access the tool. And as awareness grows, Christopher hopes Stanford researchers and departments will volunteer new image databases to integrate into the system.

But for Baer, even the current version is an improvement. “Having a resource where you can send someone makes everyone’s lives simpler,” she said.

To request images from Bio-Image Search, contact Tony Christopher at tonyc Christopher@stanford.edu or 721-5993.

Charlotte Jacobs on her side career as a writer

Early in her academic career, Charlotte Jacobs, MD, professor emerita of medicine, began to realize that her future might be elsewhere. Having already completed a two-year fellowship at Stanford, focused her research and writing on solid cancerous tumors. When she later became associate dean, she wrote about medical education and clinical training. Simmering below these endeavors, however, was a desire to also pursue a different kind of writing.

1 What originally led you to a side career as a biographer?

JACOBS: I loved biography from childhood. Years later, during a sabbatical year at Stanford, I decided to take creative writing. I was interested mainly in biography writing, but I knew I had to develop the craft and the discipline first.

2 Do you have a set schedule for writing?

JACOBS: I try to block off a half-day or two-half days a week to write. I applied for writing fellowships where for a month I did nothing but write. When my boys were playing junior league soccer, we attended tournaments all around northern California. During the breaks between games, I sat in the car and wrote because they certainly didn’t want to be around their mother. I could find snippets during every day to write. Even today I find that to be the case.

4 How did you find publishers for your books?

JACOBS: Finding an agent is very hard, particularly for a first-time author. My husband got me the book Publishing for Dummies. I followed all the instructions, and I compiled a long list of agents. I had my A list, my B list and C list.

5 Beside the biographies, you have also performed in community theater and written something else. Can we end by your telling me a little about this other work?

JACOBS: I co-wrote a musical comedy with a composer-lyricist who’s won a number of Emmys. It’s called Just My Type and is based on the Myers-Briggs Type Indicator. It has gone through a number of readings in the Bay Area with subsequent rewrites. Now we have an agent in New York who is showing it around to different new works programs.

I’ve enjoyed collaborating on a musical comedy almost as much as working on the biographies. Yet my greatest fulfillment still comes from caring for patients with cancer.
Scientists observe atomic-resolution details of brain signaling

By Glenn Roberts Jr.

Scientists have revealed never-before-seen details of how the human brain sends rapid-fire messages between its cells.

Researchers at the School of Medicine and the Department of Energy’s SLAC National Accelerator Laboratory mapped the 3-D atomic structure of a two-part protein complex that controls the release of signaling chemicals, called neurotransmitters, from brain cells. Understanding how cells release those signals in less than one-thousandth of a second could help advance that may open up possibilities for targeting new drugs to control neurotransmitter release,” said Axel Brünger, PhD, professor and chair of molecular and cellular physiology and professor of neuroscience and neurological sciences. “Many mental disorders, including depression, schizophrenia and anxiety, affect neurotransmitter systems.” Brünger, who is also professor of photon science at SLAC and a Howard Hughes Medical Institute investigator, is the senior author of the paper. The first author is postdoctoral scholar Qiangjun Zhou, PhD.

Unraveling the combined secrets of two proteins

“Both parts of this protein complex are essential,” Brünger added, “but until now it was unclear how its two pieces fit and work together.”

The two protein structures are known as neuronal SNAREs and synaptotagmin-1. Earlier X-ray studies, including experiments at SLAC’s Stanford Synchrotron Radiation Lightsource, or SSRL, nearly two decades ago, shed light on the structure of the SNARE complex, a biological protein bundle found in vertebrates, including primates and mammals. SNAREs play a key role in the brain’s chemical signaling by joining, or “fusing,” of chemical messengers or neurotransmitters to the outer edges of neurons, where they are released and then dock with chemical receptors in another neuron to trigger a response.

In this latest research, the scientists found that when the SNAREs and synaptotagmin-1 join up, they act as an amplifier for a slight increase in calcium concentration, triggering a “gunshot”-like release of neurotransmitters from one neuron to another. They also found that the proteins join together before they arrive at a neuron’s membrane, which helps to explain how they trigger brain signaling so rapidly.

“The neuron is not building the ‘gun’ as it sits there on the membrane — it’s already there,” Brünger said.

The team speculated that several of the joined protein complexes may group together and simultaneously interact with the same vesicle to efficiently trigger neurotransmitter release, an exciting area for further study.

The structure of the SNARE-synaptotagmin-1 complex is a milestone that the field has awaited for a long time, and it sets the framework for a better understanding of the system, said James Rothman, a professor at Yale University who discovered the SNARE proteins and shared the 2013 Nobel Prize in Physiology or Medicine. Scientists have known for decades that e-cigarettes could have health impacts in developing world

By Ruthann Richter

E-cigarettes could have health impacts in developing world

Most of the debate around e-cigarettes has focused on the developed world, but the devices are becoming more widely available in some low- and middle-income countries, where there is even greater potential for impact on public health, according to two School of Medicine researchers.

“One doesn’t think about e-cigarettes will reach the developing world. But they are already being produced in developing countries, and they are cheap. People know they are available,” said Andrew Chang, MD, a resident in internal medicine who focuses on global health.

Chang and Michele Barry, MD, director of the Stanford Center for Innovation in Global Health, are co-authors of a commentary on e-cigarettes that was published in the Aug. 18 issue of the Journal of the American Medical Association.

According to the World Health Organization, global use of e-cigarettes is booming, with more than half of the world’s population living in countries where the devices are available. Global sales of e-cigarettes reached $3 billion in 2013 and are expected to grow to $10 billion by 2017, the WHO projects.

Public awareness of the devices is high in some developing countries. In the recent International Tobacco Control survey, 34 percent of adults in Mexico, 35 percent in Brazil and 62 percent in Malaysia said they had heard about the devices or tried them. In some of the poorest regions of the world — notably Africa and South Asia — there is little known about e-cigarette use, though these are vast potential markets, the authors wrote.

Supporters of e-cigarettes tout the devices as a smoking-cessation tool and a safer alternative to smoking traditional cigarettes, yet there is a lack of research to support these arguments, the authors noted. In fact, data suggests that in the process of aerosolizing nicotine, e-cigarettes may produce known carcinogens such as formaldehyde and acrylonitrile. And though the devices may have lower nicotine levels, they still carry the potential for addiction, with potentially harmful effects on the body, particularly the cardiovascular system, the authors wrote.

Luring young smokers

Chang said a major concern is that marketers of e-cigarettes may use them in poorer countries as a mechanism to recruit new smokers, particularly young smokers, offering the devices at low cost and then raising prices later, forcing users to switch to conventional cigarette products.

“What we are most concerned about is the entry of big tobacco on a global scale in which they could hijack the harm-reduction potential and recruit new and never users into smoking,” he said.

Nicotine exposure is a major contributor to cardiovascular disease, which remains one of the leading causes of death in the developing world, where access to primary care interventions, such as tools to control blood pressure and lower cholesterol, are often scarce, Chang said. Exposure to e-cigarettes also may exacerbate lung problems such as tuberculosis or lower respiratory tract infections, which are highly prevalent in the developing world, he said.

Because of the potential for harm, Chang and Barry urge developing countries to exert greater regulatory control over e-cigarettes, also known as electronic nicotine delivery systems. ENDS are banned in some countries, including Brazil, Uruguay and Singapore, but in some regions, regulatory control has been hampered by difficulty in determining whether e-cigarettes should be classified as consumer goods, controlled substances or medical devices, they noted.

“Developing nations should not underestimate the availability and targeted marketing of ENDS within their borders and should place e-cigarettes under the purview of their medical and pharmaceutical regulatory boards,” they wrote.

The authors also urge nongovernmental organizations, such as the Gates Foundation and the Bloomberg Initiative to Reduce Tobacco Use, to support regulatory control and enforcement of the devices.

Stanford’s Department of Medicine supported the work. **See PRoteIN, page 5**
Mutations that contribute to rare blood cancer discovered

By Kim Smuga-Otto

Researchers at the School of Medicine have identified a group of mutations responsible for many cases of a rare immune cell cancer called cutaneous T-cell lymphoma. The newly identified cancer role of the proteins studied is only a subset, they said, “There are many other factors interacting with this system and we want to know what their role is. This is by no means the end of the story.”

Other Stanford-affiliated authors of the study are postdoctoral scholars Ying Lai, PhD, Menglei Zhao, PhD, Monair Uervirojnangkoorn, PhD, and Ucheor Chot, PhD; former postdoctoral scholars Taullant Bacaj, PhD, and Oliver Zeldin, DPhil; research specialists Artem Lyubimov, PhD, Jianhao O. Zhao, PhD, and Richard Phairn; and William Weiss, PhD, professor of molecular and cellular physiology and professor and chair of photon science at SLAC.

Other SLAC-affiliated authors are Michael Soltis, PhD, co-director of the Structural Molecular Biology Division at SLAC; associate scientist Roberto Alonso-Mori, PhD; staff scientist Mathieu Chollet, PhD; and former staff scientist Henrik Lemke, PhD.

Researchers at Lawrence Berkeley National Laboratory also contributed to the study.

The research was supported by HHMI, the National Institute on Aging, the DOE Office of Science and the SLAC Structural Molecular Biology Program, which is supported by the DOE Office of Science and the NIH’s National Institute of General Medical Sciences.

The study was also supported by X-ray experiments at SSRL and at Argonne National Laboratory’s Advanced Photon Source, and by Stanford’s departments of Molecular and Cellular Physiology and of Structural Biology.

Although only 5 percent of the cancers had the TNFR2 mutation, the fact that it was the exact same mutation was a “smoking gun,” according to Khavari, implicating the cell-survival mechanism’s role in driving certain cutaneous T-cell lymphomas. While over half of the patients with the disease did not have these gene changes, identifying those who do presents new options for treating them.

“Another one of the mutations caused a receptor that normally signals the cell-survival pathway to stop instead activate it further and encourage cell proliferation,” she said. “This receptor, CTL4A, has been identified in skin cancers, and an antibody that turns off the receptor has been approved as the drug ipilimumab to treat advanced melanoma. But before administering the drug, an oncologist would need to know if the patient had the mutated receptor; otherwise ipilimumab would have the opposite effect, deactivate a healthy protein and make the cancer worse.

University of California-San Francisco melanoma specialist Susana Ortiz-Urda, MD, PhD, who was not involved with the study, called the work groundbreak- ing and said she was impressed that the researchers were able to gather so many patients to identify the rare mutations. Ortiz-Urda, who co-directs the UCSF Multidisciplinary Cutaneous Lymphoma Program, plans to do just that, using the individual patients’ cancer cell genetic sequences to design combinations of drugs that would hit multiple defective proteins to completely shut down the cell-survival mechanism.

Khavari’s lab will be working to incorporate the mutations they identified into the DNA of living mice. This will allow them to study the mutated genes’ effects, and the actions of new drugs on those genes, directly.

“Before we had this data, it was trial and error — we were totally blind,” said Kim. “We’re finally taking the blindfolds off.”

Other Stanford-affiliated authors are postdoctoral scholars Carolyn Lee, MD, PhD, Ashley Zehnder, DVM, PhD, Jason Reuter, PhD, and Malikham Tavallae, PhD; research assistant Angela Malh; Michael Snyder, PhD, professor of genetics; Robert Ohgami, MD, PhD, clinical instructor of pathology; Dita Gratzer, MD, PhD, assistant professor of pathology; and flow cytometer Randall Armstrong.

This study was funded by the National Institutes of Health, the Office of Research and Development of the U.S. Department of Veterans Affairs, the Dermatology Foundation, the Haas Family Foundation, and the Dres. Martin and Dorothy Spatz Charitable Foundation.

Stanford’s Department of Dermatology also supported the work.

Kim Smuga-Otto is a science-writing intern for the medical school’s Office of Communications & Public Affairs.

Protein

continued from page 4

ing multi-protein complex,” said Aina Cohen, PhD, co-head of the Structural Molecular Biology Division at SSRL, who oversaw the development of the highly automated platform used for the neuroscience experiment. “This is a good example of how ad- vanced tools, instruments and X-ray methods can be used to see into what are truly complex mech- anisms,” added Cohen, a co-author of the study.

Brunger said future studies will ex- plore other protein interactions relevant to neurotransmitter release. “What we studied is only a subset,” he said. “There are many other factors interacting with this system and we want to know what their role is. This is by no means the end of the story.”

Another Stanford-affiliated authors of the study are postdoctoral scholars Ying Lai, PhD, Menglei Zhao, PhD, Monair Uervirojnangkoorn, PhD, and Ucheor Chot, PhD; former postdoctoral scholars Taullant Bacaj, PhD, and Oliver Zeldin, DPhil; research specialists Artem Lyubimov, PhD, Jianhao O. Zhao, PhD, and Richard Phairn; and William Weiss, PhD, professor of molecular and cellular physiology and professor and chair of photon science at SLAC.

Other SLAC-affiliated authors are Michael Soltis, PhD, co-director of the Structural Molecular Biology Division at SLAC; associate scientist Roberto Alonso-Mori, PhD; staff scientist Mathieu Chollet, PhD; and former staff scientist Henrik Lemke, PhD.

Researchers at Lawrence Berkeley Na- tional Laboratory also contributed to the study.

The research was supported by HHMI, the National Institute on Aging, the DOE Office of Science and the SLAC Structural Molecular Biology Program, which is supported by the DOE Office of Science and the NIH’s National Institute of General Medical Sciences.

The study was also supported by X-ray experiments at SSRL and at Argonne National Laboratory’s Advanced Photon Source, and by Stanford’s departments of Molecular and Cellular Physiology and of Structural Biology.

Kim Smuga-Otto is a science-writing intern for the medical school’s Office of Communications & Public Affairs.

In the foreground, an illustration of two combined protein complexes — SNARE, shown in blue, red and green, and syntaphin-1, shown in orange — that are responsible for the calcium-triggered release of neurotransmitters from our brain’s nerve cells in a process called synaptic vesicle fusion. In the background, an illustration shows electrical signals traveling through a neuron.
adapted to produce many plant-derived compounds to fight cancers, infectious diseases and chronic conditions such as high blood pressure and arthritis.

From plant to test tubes

Many medicines are derived from plants, which our ancestors chewed or brewed into teas, or later refined into pills using chemical processes to extract and concentrate their active ingredients. Smolke’s team is modernizing the process by inserting precisely engineered snippets of DNA into cells such as yeast to reprogram the cells into custom chemical assembly lines to produce medicinal compounds.

An important predecessor to the Stanford team had engineered yeast to produce the anti-malarial drug artemisinin. Traditionally, artemisinin has been sourced from the sweet wormwood tree in similar fashion to how opiates are refined from poppy. Over the last decade, as yeast-based artemisinin production has become possible, about one-third of the world’s supply has shifted to bioreactors.

The artemisinin experiments proved that yeast biosynthesis was possible, but involved adding only six genes. The Stanford team had to engineer 23 genes into yeast to create their cellular assembly line for hydrocodone.

“This is the most complicated chemical synthesis ever engineered in yeast,” Smolke said.

Her team found and fine-tuned snippets of DNA from other plants, bacteria and even rats. These genes equipped the yeast to produce all the enzymes necessary for the cells to convert sugar into hydrocodone, a compound that deactivates pain receptors in the brain.

“Engineered with a purpose”

In their Science paper, the Stanford authors acknowledged that a new process to make opioid painkillers could increase concerns about the potential for opioid abuse.

“We want there to be an open, deliberative process to bring researchers and policymakers together,” Smolke said. “We need options to help ensure that the bio-inspired production of medicinal compounds is developed in the most responsible way.”

Smolke said that in the United States, where opioid medicines are already widely available, the focus is on potential misuse. But the World Health Organization estimates that 5.5 billion people have little or no access to pain medications.

“Biotech production could lower costs and, with proper controls against abuse, allow bioreactors to be located where they are needed,” she said.

In addition to bioengineering yeast to convert sugar into hydrocodone, the Stanford team developed a second strain that can process sugar into thebaine, a precursor to other opioid compounds. Bio-produced thebaine would still need to be refined through sophisticated processes in pharmaceutical factories, but it would eliminate the time delay of growing poppies.

“The molecules we produced and the techniques we developed show that it is possible to make important medicines from scratch using only yeast,” she said. “If responsibly developed, we can make and fairly provide medicines to all who need it.”

Stanford has patents on the technology, and Smolke and researchers on her team have formed a company. Other Stanford-affiliated co-authors of the paper are research associate Kate Thody, PhD; postdoctoral scholar Iis Trenchard, PhD; and undergraduate Maria Fischedick.

The research was funded by the National Institutes of Health, the National Science Foundation, the ARCS Foundation and Stanford University.

Stanford’s Department of Bioengineering also supported the work. The department is operated jointly by the School of Medicine and the School of Engineering.

Math

Journal of Neuroscience, moves scientists closer to their goal of helping children who struggle to acquire math skills.

“We can identify brain systems that support children’s math skill development over six years in childhood and early adolescence,” said the study’s lead author, Tanya Evans, PhD, postdoctoral scholar in psychiatry and behavioral sciences.

A long-term goal of this research is to identify children who might benefit most from targeted math intervention at an early age, said senior author Vinod Menon, MD, PhD; postdoctoral scholar of psychiatry and behavioral sciences.

“Mathematical skills are crucial in our increasingly technologically sophisticated society, and our new data show which features forecast future growth in math abilities.”

At the start of the study, the children received structural and functional magnetic resonance imaging brain scans. None of the kids had neurological or psychiatric disorders, and their intelligence fell in a range considered normal for their age. The scans were conducted while the children lay quietly in the scanner; the scans measured brain structure and intrinsic functional connections between brain regions, and were not tied to performance on any particular math task.

The 8-year-olds also took standardized tests (given outside the scanner) to measure IQ, as well as reading, math and working-memory skills. All of the children returned for at least one follow-up assessment of these skills before age 14, and many children had other additional follow-ups.

Surprising results

The scientists were surprised by the extent and nature of the connections between brain regions that predicted the development of the children’s math skills. Greater volume and connectivity of two areas forecast skill development: the ventro-temporal occipital cortex, which is a brain region that supports visual object perception, and the intra-parietal sulcus, which helps people compare and make judgements about numbers, such as understanding that four is more than three. The strength of these regions’ interconnections with the prefrontal cortex was also predictive. The work identifies a network of brain areas that provides a scaffold for long-term math skill development in children, Menon said.

The 8-year-old’s initial IQ, reading, working-memory and math scores did not predict long-term learning in math. The lack of predictive ability of standard math tests taken at age 8 suggests that brain features are more precisely predictor children’s math learning, Evans said.

The brain scans capture many different aspects of information processing, thus better forecasting which children will fall behind and which will excel, Menon added.

Next, we are investigating how brain connections change over time in children who show large versus small improvements in math skills, and designing new interventions to help children improve their short-term learning and long-term skill acquisition,” Menon said. Although it is still impractical to give brain scans to children on a large scale, the team’s studies provide a baseline understanding of normal development that will help experts develop and validate remediation programs for children with learning disabilities, he noted.

In the meantime, the team’s findings suggest that parents and teachers should encourage children to exercise their mental math muscles. “Just because a child is currently struggling doesn’t necessarily mean he or she will be a poor learner in the future,” Evans said.

Other Stanford co-authors were research assistants John Kuchalka, Tricia Ngon and Sarah Wu; instructor Shaozheng Qin, PhD; and postdoctoral scholars Chris Battista, PhD.

The research was funded by grants from the National Institutes of Health, the Stanford Child Health Research Institute, the Lucile Packard Foundation for Children’s Health, Stanford’s Clinical and Translational Science Award and the Netherlands Organization for Scientific Research. Menon is a member of the Stanford Child Health Research Institute.

Stanford’s Department of Psychiatry and Behavioral Sciences also supported the research.

Opioids

continued from page 1

Vinod Menon is the senior author of a study that found that scans of children’s brain structures indicated which children would be the best math learners over the next six years.

Math

continued from page 1

Opioids

continued from page 1

The team succeeded in finding more than 20 genes from five different organisms — California poppy, rat, goldthread, bacteria and opium poppy — and engineering them into the genome of baker’s yeast.

“We can identify brain systems that support children’s math skill development over six years in childhood and early adolescence,” said the study’s lead author, Tanya Evans, PhD, postdoctoral scholar in psychiatry and behavioral sciences.

A long-term goal of this research is to identify children who might benefit most from targeted math intervention at an early age, said senior author Vinod Menon, MD, PhD; postdoctoral scholar of psychiatry and behavioral sciences.

“Mathematical skills are crucial in our increasingly technologically sophisticated society, and our new data show which features forecast future growth in math abilities.”

At the start of the study, the children received structural and functional magnetic resonance imaging brain scans. None of the kids had neurological or psychiatric disorders, and their intelligence fell in a range considered normal for their age. The scans were conducted while the children lay quietly in the scanner; the scans measured brain structure and intrinsic functional connections between brain regions, and were not tied to performance on any particular math task.

The 8-year-olds also took standardized tests (given outside the scanner) to measure IQ, as well as reading, math and working-memory skills. All of the children returned for at least one follow-up assessment of these skills before age 14, and many children had other additional follow-ups.

Surprising results

The scientists were surprised by the extent and nature of the connections between brain regions that predicted the development of the children’s math skills. Greater volume and connectivity of two areas forecast skill development: the ventro-temporal occipital cortex, which is a brain region that supports visual object perception, and the intra-parietal sulcus, which helps people compare and make judgements about numbers, such as understanding that four is more than three. The strength of these regions’ interconnections with the prefrontal cortex was also predictive. The work identifies a network of brain areas that provides a scaffold for long-term math skill development in children, Menon said.

The 8-year-old’s initial IQ, reading, working-memory and math scores did not predict long-term learning in math. The lack of predictive ability of standard math tests taken at age 8 suggests that brain features are more precisely predictor children’s math learning, Evans said.

The brain scans capture many different aspects of information processing, thus better forecasting which children will fall behind and which will excel, Menon added.

Next, we are investigating how brain connections change over time in children who show large versus small improvements in math skills, and designing new interventions to help children improve their short-term learning and long-term skill acquisition,” Menon said. Although it is still impractical to give brain scans to children on a large scale, the team’s studies provide a baseline understanding of normal development that will help experts develop and validate remediation programs for children with learning disabilities, he noted.

In the meantime, the team’s findings suggest that parents and teachers should encourage children to exercise their mental math muscles. “Just because a child is currently struggling doesn’t necessarily mean he or she will be a poor learner in the future,” Evans said.

Other Stanford co-authors were research assistants John Kuchalka, Tricia Ngon and Sarah Wu; instructor Shaozheng Qin, PhD; and postdoctoral scholars Chris Battista, PhD.

The research was funded by grants from the National Institutes of Health, the Stanford Child Health Research Institute, the Lucile Packard Foundation for Children’s Health, Stanford’s Clinical and Translational Science Award and the Netherlands Organization for Scientific Research. Menon is a member of the Stanford Child Health Research Institute.

Stanford’s Department of Psychiatry and Behavioral Sciences also supported the research.

"This is only the beginning."
Prematurity
continued from page 1
Relman, MD, professor of medicine and of microbiol-
ogy and immunology at Stanford, and chief of infec-
tious diseases at the Veterans Affairs Palo Alto Health Care System.

Missing puzzle piece
When the research began, little was known about whether or how the body's indigenous communities of bacteria change in pregnancy, said Relman, who is also a project leader at the March of Dimes Prematurity Re-
search Center at Stanford. “It seemed like a big missing piece of the story.”

Two studies done at Stanford in 2009 and 2010 examined 49 pregnant women, 15 of whom delivered prematurely. The women gave weekly samples during pregnancy, and monthly samples for up to a year after delivery. Those samples were analyzed for how well the bac-
teria communities in the vagina, lower gut, saliva and tooth and gum areas.

The researchers found that vaginal microbial communities
melted into five patterns, consistent with prior research. For most women, the communities in the va-
gina and at the three other body sites did not change much during the course of pregnancy. “It’s a bit sur-
prising how stable the communities are, since there are lots of other body features that change dramatically in pregnancy, such as maternal hormone levels, metabo-
lism and weight,” said Relman, who holds the Thomas C. and Joan M. Mergan Professorship.

But the Khoe-San — known for the unusually high genetic diversity in their language and culture — harbor unusually high genetic diversity. Their immune genetic system characterizes them as self or not self. If a surgeon transplants a kidney, the patient’s immune system can tell if the kidney is someone else’s — just from its cell surface proteins — and the patient’s immune system signals its natural killer cells, or NK cells, to attack the transplanted kidney.

The most varied genes
HLA genes are the most vari-
able of the genes. So Parham and others have been trying to measure how much HLA genes vary within and between popu-
lations around the world. If you look at the population of the Bay Area, for example, you’ll find hun-
dreds of variants, because people come from all over the world. “In the Khoe-San, there are 10 or 11 variations of one of these genes, whereas when we looked at Am-
erindians a few years ago, they basically only had one version,” said Parham. Do-
ing organ transplants among people with few variants is relatively easier, whereas doing the same transplant among the Khoe-San would be more difficult.

To recognize HLA proteins, NK cells deploy receptor molecules called killer receptor immunoglobulin-like receptors, or KIRs, which bind to foreign HLA pro-
tiens. In most people in the world, one kind of KIR receptor binds to an HLA C2 cell surface pro-
tein, and another kind binds to HLA C1 pro-
tiens. The difference
between the early and late kinds of pro-
tiens is critical. If you have an infection, you might want those NK cells to latch onto C2 mol-
cules. If you are carrying a baby, how-
ever, you don’t.

That’s because special NK cells in the uterus play an important role in repro-
duction by regulating the blood supply to a developing embryo. The NK cells are involved at the beginning of preg-
nancy in helping develop the maternal blood vessels in the placenta, where they can supply a lot more blood to the develop-
ing embryo,” said Parham.

The placenta is the interface between the embryo and the mother. Early in preg-
nancy, when the placenta is form-
ing, the mother’s NK cells bind to the embryo’s placental cells. Sometimes, the mother doesn’t have the gene for the C2 protein but the embryo does, having re-
cieved the gene from its father. In that case, the mother’s NK cells attack the C2-marked cells, leading to a poorly formed placenta that delivers insufficient blood to the fetus, a common problem that leads to low birthweight babies. The problem is also associated with danger-
ous high blood pressure, or pre-eclampsia,
in the mother.

Binding more C1 and less C2 reduces the risk of preeclampsia, said Parham, who is one of the lead authors of the paper. “Our research of the KIR gene that Parham’s team found does just that. It no longer binds to C2 and instead has switched to binding C1. Im-
mune cells are renowned for their ability to respond with greater specificity to other molecules, so the researchers said it’s remark-
able that a small mutation could completely reverse the specificity of a receptor.

Parham’s team also found a second variant of the KIR gene among the Khoe-San. This KIR allele simply makes a damaged, more diverse receptor stick to C2. Together, these two gene alleles greatly reduce the frequency of C2 recep-
tors and increase the risk of delivery in Khoe-
San, presumably making for healthier babies.

Other Stanford-affiliated authors of the paper are research associate Neda Nemati-Gorgani, MS; postdoctoral scholars Ana Goyos, PhD and Christo-
pher Gignoux, PhD; and senior research scientist Lisbeth Guethlein, PhD. They collaborated with researchers at the Uni-
versity of California, San Francisco and Stony Brook University.

The work was supported by the Na-
tional Institutes of Health, the March of Dimes Prematurity Research Center at Stanford University and the School of Medicine.

Stanford’s departments of Structural Biology, Microbiology and Immunology, and Genetics also supported the work.

MEGAN PATRICK

Khoe-San
continued from page 1
Khoe-San is one of the oldest populations of humans. “The Khoe-San are so different from every body else’s — just from its cell surface proteins — and the patient’s immune system signals its natural killer cells, or NK cells, to attack the transplanted kidney. The remaining pattern — characterized by greater

bacterial diversity, high levels of gardnerella and ureaplasma bacteria, and low levels of lactobacillus — was linked with increased risk for preterm birth, especially in the bacterial community displayed this pat-
tern for several weeks. “It think our data suggest that if the microbiome plays a role in primatute birth, it may be something that is long in the making,” said the study’s lead author, Daniel DiGi-
ulio, MD, a research associate and clinical instructor in medicine. “It may be that an event in the first trimester, second trimester, or even prior to pregnancy, starts the clock ticking.”

Study co-author David Stevenson, MD, the prin-
tal investigator of the prematurity research center and director of the Johnson Center for Pregnancy and Newborn Services at Lucile Packard Children’s Hospital in the San Francisco Bay Area, said the research “is part of our larger effort to find the microbial and immunological signature for preterm birth.”

Big bacterial changes after birth
The researchers also found that, in all women, vagi-
nal bacterial communities changed significantly after birth. This was true both of women who delivered pre-
maturely and at term. The change was seen both after vaginal and cesarean deliveries. For up to a year after birth, women tended to have the more-diverse bacterial pattern. “This was a surprise,” Relman said, adding that his team plans to conduct further research to find out whether the shift may help explain the increased risk for preterm birth in women whose pregnancies are closely spaced.

The immune system genes of inter-
test to Parham’s team for code for two sets of proteins. On the surfaces of ordinary

The immune system genes of inter-
est to Parham’s team for code for two sets of proteins. On the surfaces of ordinary
OF NOTE

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

RAMIN DUBEY, PhD, a postdoctoral scholar, was awarded a young investigator grant by Alex’s Lemonade Stand Foundation to study toxicity and resistance to chemotherapy drugs that target the master cell cycle regulator cyclin D1. He will receive $200,000 grant in funding over two years.

NASIDE GOZDE DURMUŞ, PhD, a postdoctoral scholar in biochemistry, is featured in MIT Technology Review’s annual “35 Innovators Under 35” list. She invented a cell-levitating device that enables researchers to study the behavior of cancer cells and cells that are responding to drugs in a magnetic field. Her work has the potential to revolutionize cancer research.

MICHAEL IV, MD, clinical assistant professor of radiology, has been awarded a research grant by the Radiological Society of North America Research and Education Foundation. He will receive $150,000 over two years for research that uses images of superparamagnetic iron oxide nanoparticles to track tumors and associated macrophages in a form of human brain tumor called glioblastoma multiforme.

GUILLAUME PRATX, PhD, associate professor of radiation oncology, was awarded one of six 2015 Damon Runyon-Rachelle Innovation Awards. He will receive $500,000 over two years to develop a new way to use flow cytometry, a technology used to categorize single cells, to measure the uptake of any nonfluorescent molecule. His work will help researchers assess how tumors respond to cancer therapy. The award is given to early career scientists whose research aims to improve the prevention, diagnosis and treatment of cancer.

HYONGSOK SOH, PhD, was appointed professor of radiology and of electrical engineering, effective July 1. Soh’s laboratory develops synthetic reagents and biosensor devices that measure biomolecules, such as nucleic acids and proteins, in complex environments. Recently, his team demonstrated a biosensor technology that can continuously measure drug in live subjects in real time.

JENNIFER TRENMMEL, MD, assistant professor of medicine, was appointed the Susan P. and Riley P. Bechtel Medical Director, an endowed position that supports her existing role as the clinical director of the Women’s Heart Health Program at Stanford Health Care. The focus of Trenmmel’s research is sex differences in cardiovascular disease. She researches how men and women differ in coronary endothelial function, plaque deposition and the circulation of blood in the smallest blood vessels in those who have chest pain despite having normal coronary arteries. Trenmmel is the inaugural holder of the directorship.

DANA URSO and KUN-HISING YU, both PhD students, have been selected as Howard Hughes Medical Institute international student fellows. The program provides $43,000 to life-sciences students during their third to fifth years of graduate school in the United States. This year, HHMI selected 45 PhD students from 18 countries to receive fellowships.

MICHAEL ZEINHE, MD, PhD, assistant professor of radiology, has been granted a clinical scientist development award from the Doris Duke Charitable Foundation. The award provides $162,000 per year for three years. Zeinhe will use it to study iron and microglia in postmortem brain specimens from humans with Alzheimer’s disease, with the aim of translating his findings to help people living with the disease.

Alpha Omega Alpha is a national medical honor society that supports intellectual, social, scholarly and professional activities associated with the education and training of students.

James Chang
Jeffrey Feinstein
Mary Hawn
Calvin Kuo
Ivan Soltesz
Ramin Dubey
Naside Gozde Durmous
Michael Iv
Guillaume Pratx
Hyongsok Soh
Jennifer Tremmel
Michael Zeineh

Alpha Omega Alpha at Stanford elects new members

Alpha Omega Alpha is a national medical honor society that supports intellectual, social, scholarly and professional activities associated with the education and training of students. Four Stanford Medicine faculty members were recently appointed to endowed professorships.

JAMES CHANG, MD, professor and chief of plastic and reconstructive surgery, has been appointed the Johnson & Johnson Professor, effective June 11. His research focuses on tissue engineering, and his clinical specialty is reconstructive surgery of the hand.

JEFFREY FEINSTEIN, MPH, professor of pediatrics, was appointed the Dunlevie Family Professor of Pulmonary Vascular Disease, effective June 11. He specializes in pediatric cardiology, pulmonary hypertension, pulmonary vascular disease, and congenital heart defects. The professorship was established with an existing endowment fund, the Endowed Directorship of the Vera Moulton Wall Center. This professorship was converted from a directorship established in 2010 by Bruce and Elizabeth Dunlevie.

MARY HAWN, MD, professor and chair of surgery, was appointed the Stanford Medicine Professor of Surgery, effective June 11. She specializes in surgical quality and effectiveness.

This professorship was established with internal funds, as well as funds from Stanford Health Care and from Lucile Packard Children’s Hospital Stanford, to honor former department chair Thomas Krummel, MD, the Emile Holman Professor in Surgery, the Susan B. Ford Surgeon-in-Chief at Lucile Packard Children’s Hospital Stanford and co-director of Stanford Biodesign.

This professorship was established through the transfer of funds from the existing Maureen Lyles D’Ambrogi Professorship and additional funds from the Department of Medicine and the dean’s office. The Maureen Lyles D’Ambrogi Professorship was established in 1970, with a gift of real estate from N.J. D’Ambrogi, ’17, of Carmel, California, to honor his daughter, who died of cancer in 1967. The professorship was established to support research on cancer.

IVAN SOLTESZ, PhD, was appointed the James R. Dory Professor in Neurosurgery and Neurosciences, effective June 11. His research focuses on the function and dysfunction of neuronal networks, and the mechanisms of circuit dysfunction in epilepsy. He has developed experimental methods for the control of epilepsy.

The professorship was established with a gift from Dory, MD, professor of neurosurgery at Stanford and director of the Center for Compassion and Altruism Research and Education.

Medical students awarded Albert Schweitzer Fellowships

Three Stanford Medicine students have been named to the 2015-16 class of San Francisco Bay Area Albert Schweitzer Fellows. The fellows will spend a year learning about and completing community service projects while pursuing their individual academic and developing leadership skills. Each fellow will receive a $2,000 stipend.

Fellowships are the names of the Stanford medical students and their projects:

• Gunsagar Guliati will develop a health-coaching and education program for patients at Santa Clara Valley Medical Center Milpitas.
• Jecca Steinberg plans to help pediatric preschool- and school-aged patients at Fair Oaks Clinic in Redwood City prepare for school.
• Priti Treiman will work with the Boys & Girls Clubs of the Peninsula to teach elementary school students healthy habits using dance and nutrition education.

Medical students awarded Albert Schweitzer Fellowships

Three Stanford Medicine students have been named to the 2015-16 class of San Francisco Bay Area Albert Schweitzer Fellows. The fellows will spend a year learning about and completing community service projects while pursuing their individual academic and developing leadership skills. Each fellow will receive a $2,000 stipend.

Fellowships are the names of the Stanford medical students and their projects:

• Gunsagar Guliati will develop a health-coaching and education program for patients at Santa Clara Valley Medical Center Milpitas.
• Jecca Steinberg plans to help pediatric preschool- and school-aged patients at Fair Oaks Clinic in Redwood City prepare for school.
• Priti Treiman will work with the Boys & Girls Clubs of the Peninsula to teach elementary school students healthy habits using dance and nutrition education.

Alpha Omega Alpha is a national medical honor society that supports intellectual, social, scholarly and professional activities associated with the education and training of students.

James Chang
Jeffrey Feinstein
Mary Hawn
Calvin Kuo
Ivan Soltesz

Ramin Dubey
Naside Gozde Durmous
Michael Iv
Guillaume Pratx
Hyongsok Soh
Jennifer Tremmel
Michael Zeineh

Medical students awarded Albert Schweitzer Fellowships

Three Stanford Medicine students have been named to the 2015-16 class of San Francisco Bay Area Albert Schweitzer Fellows. The fellows will spend a year learning about and completing community service projects while pursuing their individual academic and developing leadership skills. Each fellow will receive a $2,000 stipend.

Fellowships are the names of the Stanford medical students and their projects:

• Gunsagar Guliati will develop a health-coaching and education program for patients at Santa Clara Valley Medical Center Milpitas.
• Jecca Steinberg plans to help pediatric preschool- and school-aged patients at Fair Oaks Clinic in Redwood City prepare for school.
• Priti Treiman will work with the Boys & Girls Clubs of the Peninsula to teach elementary school students healthy habits using dance and nutrition education.

Alpha Omega Alpha is a national medical honor society that supports intellectual, social, scholarly and professional activities associated with the education and training of students.