Chang Zuckerberg Initiative funds collaboration between Stanford, UCSF, UC-Berkeley

By Amy Adams

Stanford will be one of three Bay Area universities — along with the University of California-San Francisco and the University of California-Berkeley — to participate in a new bioscience collaboration funded through a $600 million commitment by the Chan Zuckerberg Initiative.

Facebook founder Mark Zuckerberg and his wife Priscilla Chan, MD, created the Chan Zuckerberg Initiative after the birth of their daughter in 2015. On Sept. 21, the Initiative announced plans for a broader focus on science, its second major initiative, alongside work to improve education for all students. The Chan Zuckerberg Initiative's goal is to cure, prevent or manage all diseases by the end of the century by accelerating basic science research. The Initiative seeks to support new ways of enabling scientists and engineers to work together to build new tools that will empower the whole scientific community and advance progress.

The new Bay Area research collaboration, called the Chan Zuckerberg Biohub, is the first scientific investment by the Chan Zuckerberg Initiative. It will include a combination of grants, research space focused on biotechnology-tool development, and large-scale collaborative projects.

"The Biohub will be the sinew that will tie these three institutions in the Bay Area like never before," said Stephen Quake, PhD, Stanford professor of bioengineering and of applied physics, who will co-lead the Biohub with Joseph DeRisi, PhD, professor and chair of biochemistry and biophysics at UCSF.

"This initiative will dramatically improve our ability to conduct fundamental research at the intersection of biology and engineering that can lead to important applications for human health," said Stanford President Marc Tessier-Lavigne, PhD, who is a neuroscientist. "We are grateful for the investment by Mark and Priscilla in both sophisticated tools and an unprecedented Bay Area-wide university collaboration that will enable groundbreaking discoveries.

Former Stanford President John Hennessy, PhD, was instrumental in helping establish the initiative, working closely with the Chan Zuckerberg Initiative on its inception. He will serve on the board in his personal capacity as a scientist and technologist.

"The vision for the Chan Zuckerberg Initiative and the Biohub capitalizes on the strengths of our Bay Area universities, and also makes a major investment in early-stage research of the type that cannot be readily funded elsewhere," Hennessy said. "It is large-scale collaboration at its best, and with tremendous promise for solving the world's greatest health challenges."

Resident Biohub scientists will work on two large-scale overarching projects: The Cell Atlas, a completely new data set cataloging all the biologically significant characteristics of every cell type in the body, and an Infectious Disease Project, devoted to tackling microbial diseases, including emerging bioterrorism and pandemics.

Technology to improve health

Each of the three partner schools has a long history of developing biotechnological tools, with combined strengths in medicine, engineering and the basic sciences. New opportunities created by the Biohub will focus the universities' individual strengths around the common goal of developing technologies to cure and prevent human disease, said Tessier-Lavigne.

Leadership reflects on Stanford Medicine accomplishments, looks to the future

By Kathy Zonana

Calling it "a time for us to come together and reflect on where we are today and the exciting opportunities that we have moving forward," School of Medicine Dean Lloyd Minor, MD, kicked off the first state of Stanford Medicine event on Sept. 22 before an overflow crowd of faculty, staff and students.

The event at the Li Ka Shing Center for Learning and Knowledge included an address by the dean followed by a panel discussion with David Entwistle, president and CEO of Stanford Health Care; Christopher Dawes, president and CEO of Lucile Packard Children's Hospital Stanford and Stanford Children's Health; and Minor. Megan Mahoney, MD, a clinical associate professor of medicine, moderated the panel.

Accomplishments of the past year

Standing in front of a screen listing several of the past year's accomplishments in research, education and teaching, Minor quipped, "This is a slide that is already out of date, and we just made it yesterday." The number of faculty who had won major international awards had grown by one overnight, with assistant professor of bioengineering Mamu Prakash, PhD, being named the recipient of a MacArthur Foundation "genius grant."

Among the year's accomplishments, the School of Medicine also celebrated the promotion of more than 90% of faculty to associate professor or professor rank, as well as the establishment of two new endowed chairs. The school also announced a new strategic plan for the next decade.

Iron nanoparticles make immune cells attack cancer, according to new study

By Erin Digitale

Iron nanoparticles can activate the immune system to attack cancer cells, according to a study led by researchers at the School of Medicine.

The nanoparticles, which are commercially available as the injectable iron supplement ferumoxytol, are approved by the Food and Drug Administration to treat iron deficiency anemia.

The mouse study found that ferumoxytol prompts immune cells called tumor-associated macrophages to destroy cancer cells, suggesting that the nanoparticles could complement existing cancer treatments. The discovery, described in a paper published online today in *Nature Nanotechnology*, was made by accident while testing whether the nanoparticles could serve as Trojan horses by sneaking chemotherapy into tumors in mice.

"It was really surprising to us that the nanoparticles activated macrophages so that they started to attack cancer cells in mice," said Heike Daldrup-Link, MD, the study's senior author and an associate professor of radiology at the School of Medicine. "We think this concept should hold in human patients, too."

Daldrup-Link's team
Success as a professional scientist is increasingly determined by the ability to secure funding. Yet grant writing — the nutty-gritty work of distilling ideas into a winning pitch — is a rarely taught gift in graduate school or postdoctoral training.

Recognizing this gap, Stanford Biosciences launched the Grant Writing Academy in 2014. Though young, the program has already boosted the number of both grant submissions and funded grants, said its director, Crystal Botham, PhD. It recently earned national recognition as well. It was honored as the third-prize winner of the Association of American Medical Colleges’ Innovations in Research Education Award.

Though the program specializes in helping students and postdoctoral scholars write some of the most common grants offered by the National Institutes of Health and the National Science Foundation, they are welcome to use it to apply for any bioscience grant, Botham said.

Proposal boot camp

Chandrarmoli Chandrasekaran, PhD, a postdoctoral scholar in neuroscience and electrical engineering, turned to the Grant Writing Academy for assistance applying for a NIH Pathway to Independence Award from the National Institute of Neurological Disorders and Stroke. The grant can provide up to five years of funding, but it demands as many as 30 documents that need to be nearly perfect, Chandrasekaran said.

That seemed a bit overwhelming, so he attended the academy’s proposal boot camp, a two-month course that meets weekly and walks a cohort of graduate students and postdocs through each step of the grant application process.

The boot camp helped Chandrasekaran, who studies the neural mechanisms underlying decision-making in primates, secure one of the coveted awards. Now, he recommends it highly.

“I helped demystify many aspects of the process for me, and it gave me a huge boost in self-confidence,” he said. “I was able to become good friends with another person in my class at the academy, and in the days before the deadline we helped each other as proofreaders.”

So far, the academy has worked with about 180 students and trainees, Botham said. She attributes its success, in part, to its use of peer mentors. “Peer feedback is really valued. There’s only one of me, and I can’t read 100 grants, but I can train grant coaches to work with postdocs or graduate students,” she said.

Lamia Wahba, PhD, a postdoctoral scholar in pathology, is one of the academy’s grant coaches. She said the academy has helped her refine her own grants, but it has also taught her a lot about teaching. “Teaching writing is quite different from teaching genetics, she said. It requires trainees to examine their research critically, she said.

“You become a better scientist”

“By being able to write and articulate your research goals, you become a better scientist,” said Botham. And some of the most common mistakes inexperienced grant writers make! Many make assumptions about what the reviewers know, Wahba said. Even experts in the field may not be familiar with new or unusual techniques, she said. In addition, beginning grant writers often struggle to keep their writing concise and to resist the temptation to include every detail, she said.

“The big take-home lesson is we weren’t taught enough about writing about science,” Wahba said. Often, trainees think they need to write grants in the evenings or weekends, and think of it as not part of their actual job. “I really learned the importance of having it be a part of your job. This is actually work as well, and it needs to be done really well,” she added.

The academy’s annual proposal boot camp, which meets weekly, begins today. It runs to Nov. 17. The academy also offers periodic lectures and workshops, as well as drop-in hours with grant coaches.

New program in physician assistant studies now accepting applications

By Tracie White

The School of Medicine will for the first time offer a master of science program designed to train physician assistants as both clinicians and future leaders in health care.

“As health-care access improves, we need to equip medical practitioners with the skills to meet growing demand,” said medical school Dean Lloyd Minor, MD. “This new master of science program for physician assistants helps health-care teams navigate that complexity and provide precision health: personalized treatment when disease strikes and proactive and preventive care that keeps people well, and it needs to be done really well,” she added.

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Beth Darnall: on opioids and pain management

Beth Darnall, PhD, is a clinical associate professor of anesthesiology, perioperative and pain medicine at the Stanford School of Medicine. She has more than 18 years of experience in treating pain patients, who are a varied group of individuals with chronic pain. For example, she has worked extensively with patients suffering from spinal cord injuries, catastrophes, amputations, chronic low back pain, patients, fibromyalgia and various types of musculoskeletal pain.

Darnall is co-principal investigator for a National Institutes of Medicine-funded project that is studying treatment for pain catastrophizing, a distressing response to pain that can negatively impact people’s lives. She has also developed a novel pain psychology treatment that can be delivered over the internet to patients before surgery to help reduce distress and optimize post-surgical healing and recovery. The treatment was meditation and cognitive behavioral therapy to help patients avoid negative thought patterns that can amplify pain. This is currently being tested in women undergoing surgery for breast cancer.

Her clinical practice, research and public education efforts focus on empowering people to take more control of their pain, choices, thoughts and emotions that can worsen pain and harness the power of their mind-body connection to reduce their symptoms and increase their quality of life.

She is co-chair of the Pain Psychology Task Force at the American Academy of Pain Medicine, and is a 2015 recipient of the Presidential Commendation from the American Academy of Pain Medicine.

Beth Darnall: Avoid the Dangers of Prescription Opioids and Gain Control Over Chronic Pain

Beth Darnall is the author of a new book on pain management.

1 What are the best tools you’ve found to reduce pain?

DARNALL: While the term “painkiller” is common, it’s a misnomer when applied to opioids for chronic pain. Studies show that when used long-term, on average, opioids only reduce pain by about 25-30 percent. It’s critical that other strategies be used by patients to gain relief. Brain-training therapies, such as cognitive-behavioral therapy, mindfulness-based stress reduction, and meditation have similar pain-relieving effects, with none of the side effects. By learning techniques that reduce attention to pain — and distress about pain — people can leverage their own mind-body medicine.

Learning how to calm one’s own nervous system is a critical aspect of pain management. It’s vitally important to prevent chronic pain from becoming emotional and physiological factors that amplify pain. Even if opioids are prescribed, they should be just one part of an overall, comprehensive pain care plan that includes pain management, self-management, movement therapy or appropriate exercise, and other disciplines.

By learning to calm the nervous system, people can gain confidence in their ability to manage their own pain and related distress. We call this confidence “self-efficacy,” and it’s a powerful predictor for whether people will get better or not. People who believe they have tools to reduce their distress and suffering are more likely to use those skills, and gain good results from them. Part of our job as pain psychologists and health care providers is to give people the right information so they can employ strategies and techniques to self-manage their symptoms.

2 How does pain happen when patients taper off of opioids? Does their pain increase or decrease?

DARNALL: Many people remain on opioids out of fear that their pain will increase if they stop taking them. However, the data show that when people taper off opioids slowly, their pain tends to remain the same or improve. If opioids are stopped too quickly or if a single dose is missed, withdrawal symptoms are likely to occur, along with worse pain. A good, slow opioid taper will help patients avoid withdrawals altogether.

3 How can medical schools better equip physicians to treat pain without opioids?

DARNALL: Most medical schools do not prepare physicians to handle the complexities of chronic pain management. A 2011 study showed that most U.S. medical schools included only four to 11 hours of specific educational content on pain across the entire four-year program — and that small amount of content was fragmented by topic. Pain was addressed within disease education — such as cancer or diabetes — instead of through a dedicated curriculum on comprehensive pain treatment. Physicians and health-care providers need better training in the biopsychosocial model of pain treatment, and this need was identified by the 2016 National Pain Strategy developed by the U.S. Department of Health and Human Services.

Earlier this year, 1, along with my colleagues on the Pain Psychology Task Force at the American Academy of Pain Medicine, published results from a national needs assessment we conducted about pain psychology training and resources. We surveyed 2,000 individuals who are like the college students who were interviewed. The results showed that, similar to physicians, the majority of mental health professionals and psychologists feel inadequately trained to address pain in the therapeutic context. They express an interest in learning the topic with their patients, thereby missing a critical opportunity to help their patients better manage their pain by emphasizing behavioral pain management techniques.

While better education on the biopsychosocial treatment model of chronic pain is needed in medical schools, we also must give physicians and health-care professionals the resources to actually implement biopsychosocial pain care. This goes back to needing better training for mental health professionals so that pain care providers can easily consult with competent therapists in the community who will directly address pain as a therapeutic target. In the pain psychology national needs assessment, we identified that pain education is needed at all levels of psychology education, including undergraduate, graduate, postgraduate, to continuing education for community professionals.

4 How does the mind impact pain?

DARNALL: The mind has a tremendous influence on the experience of pain. Multiple FMRI studies show that focusing on pain or ruminating on it can cause it to worsen. Ruminating is one aspect of pain catastrophizing — when a person focuses on pain, magnifies it and feels helpless. The good news is that pain catastrophizing is treatable, and this is the focus of much of my NIH-funded research. An important target because catastrophizing is linked to the development of chronic pain after surgery or an episode of acute pain. As people get accustomed to their newly presumed medical condition, they are participating with their pain through their choices, thoughts and emotions. While we can’t change the medical diagnosis, we can target daily choices, thoughts and emotions to gain control and change the trajectory of pain.

5 How do people with psychological distress respond differently to opioids?

DARNALL: Anxiety and depression are very common in individuals with chronic pain, perhaps up to 80 percent of individuals with chronic pain experience anxiety and depression. In addition, people who have a mental health disorder are at higher risk for substance misuse, including opioids. Although we might not think of it as addiction, it is actually addiction to the mental health benefits that opioids bring, meeting the needs of individuals with anxiety and depression. They feel better when they take opioids, and as a result, they continue to take opioids.

A study reported in the journal Pain suggests that people who are more anxious and depressed prior to surgery are more likely to experience more pain and to continue using opioids post-surgery. These findings underscore the fact that pain education is needed at all levels of psychology education, including undergraduate, graduate, postgraduate, continuing education for community professionals.
Regulatory RNA essential to DNA damage response, study shows

By Krista Conger

Knowing when to hold them, and when to fold them, is a critical skill in professional gambling. But it’s also pertinent for cells assessing DNA damage.

It’s essential for the cells to quickly ascertain whether it’s possible to repair mistakes or to self-destruct for the good of the organism. That’s because cells with a damaged genome often begin to flout the standard rules of growth and become cancerous.

Now, researchers at the School of Medicine have discovered how just one regulatory RNA molecule can fine-tune the cell’s response to DNA damage.

This new study, published online in Nature Genetics today, is the first to show that the RNA called DINO (DNA damage-inducible non-coding RNA) is essential for DNA damage response in living cells.

The researchers, led by former radiation oncology resident Adam Schmitt, MD, and graduate student Tiffany Hung, fine-tuned the damage response by modulating the expression of DINO.

DINO is a small non-coding RNA that is induced in response to DNA damage. It’s known to play a role in the regulation of cell cycle progression and DNA repair.

To test the role of DINO in DNA damage response, the researchers used a cell line that is deficient in DINO and compared it to a normal cell line.

They found that cells lacking DINO were more sensitive to DNA damage, indicating that DINO is required for proper DNA damage response.

The researchers also discovered that DINO is able to bind to and stabilize the tumor suppressor protein p53, which is critical for DNA damage repair and cell cycle arrest.

This binding helps to keep p53 active and available for DNA repair, even when DNA damage is not immediately repaired.

The study was led by Howard Chang, MD, PhD, associate professor of dermatology and lead investigator of the study.

“Regulatory RNA essential to DNA damage response, study shows”

Iphone app launched to study peripheral artery disease

By Tracie White

School of Medicine researchers have launched a free iPhone app designed to help them conduct a clinical study to discover better treatments for peripheral artery disease and as a convenient way for people with the disease to monitor their daily activity.

“We hope to gain insights into patterns of disease progression over time by collecting participants’ activity data from their iPhones,” said Oliver Aalami, MD, clinical associate professor of vascular surgery and lead investigator of the study. “We will be looking for any changes in activity patterns that may indicate disease advancement.”

Peripheral artery disease, which affects about 12 million people in the United States, is a circulatory problem caused by a buildup of plaque in the peripheral arteries, most commonly in the legs. Symptoms include cramping and pain while walking or climbing stairs. Treatment is directed at reducing leg pain and the risk of heart attack and stroke from clogged arteries.

Aalami said that for patients with PAD show sudden changes in activity level in the months after certain common vascular procedures, such as the use of stents and balloons to improve blood flow in the arteries. Knowing exactly when a sudden drop in activity occurs, rather than waiting for the traditional follow-up doctor’s visit, could potentially provide physicians and participants with a much better indication of when further intervention is needed.

“People with PAD may be able to walk five miles, but sudden pain may cause them to stop often,” Aalami said. These patients can rest, and the pain goes away when they move, often not realizing they could be in trouble, he said.

Early detection a ‘Holy Grail’

“Endovascular procedures such as balloon or stents in the iliac or femoral arteries are minimally invasive procedures that allow patients to go home the same day, and they work, but are not that durable,” Aalami said. “The issue is that within a year or two, 60 percent of them fail because patients develop scar tissue. We’re not predicting who is going to have problems, and catching them early when these stents do go down would be the Holy Grail. It’s much easier to fix earlier.”

Traditionally, physicians tell patients to schedule follow-up visits at three-, six-, and 12-month intervals after one of these procedures. But there’s a “black hole” in between visits when doctors don’t know what’s happening, Aalami said.

The VascTrac app is designed for people who have peripheral artery disease. It tracks a user’s steps and activity during the day.

“You can’t say, ‘Go to the hospital.’ You just can’t do that. But you can send them a message and say, ‘Hey, you’re not doing well. We need to see you sooner,’” Aalami said.

The app could “be a game changer,” said Neil Gandhi, a Stanford medical student and co-investigator of the study.

“It could change the way physicians practice. By using personalized tracking, participants could get a notification to come in for an ultrasound when physicians see signs of claudication,” said Raheel Ata, a Stanford medical student and co-investigator of the study.

The app is an example of Stanford Medicine’s focus on precision health, the goal of which is to anticipate and prevent disease in the healthy and precisely diagnose and treat disease in the ill.

Although the app is targeting people with peripheral artery disease, any iPhone user 18 years or older is qualified to participate in the trial.

“Because anyone can develop peripheral artery disease, and because we need healthy subjects as controls, we’re opening the study to anyone,” said Raheel Ata, a Stanford medical student and co-investigator of the study.

Participation will include a five- to 10-minute initial survey, followed by quarterly surveys on the iPhone and occasional tests to measure how far a participant is able to walk. To keep a daily tally of activity, users simply keep their iPhone with them during the day.

“We’ve tried to keep participation in this trial as simple as possible,” Aalami said. “The phone will objectively measure total steps taken in a day, the number of stairs walked and the distance walked.”

Participants can download the VascTrac app from the App Store.

Researchers emphasize that the app is not a medical diagnostic tool and isn’t designed to provide medical advice, professional diagnosis, opinion, treatment or health-care services.

All participants’ data will be stored using military-grade encryption, and participant names will be replaced by random codes, keeping identities and medical information confidential, the researchers said. With permission from a participant, his or her de-identified data may be shared with researchers at other institutions approved by Stanford.

The trial is being sponsored by the companies Abbot Vascular, Cook Medi- cal, W. L. Gore & Associates and Micro- soft, Inc.
Stanford Health Care addresses needs of an aging population

By Sara Wykes

As director of Stanford Health Care's Adult Aging Services program for more than a decade, Rita Ghanak, PhD, has found that thousands of older patients and their families through the health maze that starts, at least on paper, at age 65. Traditionally, dementia support has been one of the program's most sought services. But today, a ballooning population of older patients is asking for broader guidance on healthy aging. "People are telling us they want a plan before a crisis develops," Ghanak said. "We are expanding our programs to help them avoid last-minute scrambles — and building our services that support the prevention of age-related problems, either for the older person or an adult child."

The need is clear. Worldwide and nationally, the aging population is growing faster than any other cohort. California's 65-and-older population already tops 5 million. Four in 10 patients at Stanford Hospital are from that age group. It's a patient population whose care will be complex: Being 65 typically means having at least one chronic health condition that cannot be cured, but only managed. Age also greatly raises the risk of heart disease and cancer, and decreases vision, hearing, bone strength and joint mobility.

Expanding care

Stanford Health Care, in collaboration with the School of Medicine, is expanding its systemwide health care effort for older adults. "We have made aging care one of our priorities," said Marina Martin, MD, clinical assistant professor of medicine and section head for geriatric medicine. "We've done programs here and there in address gaps. Now we are going to look at how we can adapt the whole SHC system to care for this increasingly large group of patients."

Care for older adults has traditionally been one-size-fits-all, Martin said, but it needs to be tailored, particularly for the oldest and frailest age group, whose health is the most precarious. The goal of SHC's new geriatrics-care effort, she said, will be to provide effective care for everyone 65 and older, no matter their health status, and to focus on preserving their quality of life. "We are designing a road map for change so that no matter where in the system an older patient lands, we will be able to deliver the best possible care," she said.

Aging Adult Services "has filled a major gap in our care," Martin added, providing resources, special programs and training. Many of Aging Adult Services' programs are now known as national models. Its strategies include building a strong continuum of care among a patient's doctors, nurses, social workers and care managers so everyone understands what that patient wants from health care.

"They are vulnerable"

"We have a lot of older medical patients who need advice on healthy living and managing their chronic disease," said Candace Mindigo, a registered nurse and longtime Aging Adult Services care coordinator. "They are vulnerable." After a recent talk at a Palo Alto senior center, Mindigo was bombarded with questions. Some of them illustrated just how unfamiliar the health-care system can be for people with little experience navigating it. "They wanted to know," Mindigo said, "who, if you're hospitalized, do you talk to if you have questions?"

Aging Adult Services personalizes its care plans for patients and their caregivers because they face health conditions and circumstances that can vary widely. "Every person ages differently no matter what the diagnosis," said Jennie Clark, a gerontologist and manager of the Stanford Memory Support Program. "We focus on person-centered care. Even if a patient is functionally or physically impaired, they still have capabilities. We ask, ‘What does the person want, and how do they want to live their life?'"

That care also includes attention to the challenges of how well patients are following doctors' orders and to help patients accomplish health goals. Always, Mindigo said, Aging Adult Services acts as a sounding board. "The biggest part of what we do is to be a support, to navigate, to refer and provide resources," she said, "but we begin by listening. That is a gift we can give to them so they can sort things out. And if any of these raises their burden of care and if they are not managing it, we advocate. It is important to help them maintain their overall quality of life. It starts with someone listening with respect, whether or not an illness has been diagnosed."

"You have to be a good listener," Mindigo said. "Everybody has a story to tell."

Biodiesel fellows to develop health technology for aging adults

By Sara Wykes

The Stanford Byers Center for Biodiesel has joined Stanford Health Care's efforts to advance care for the aging population by selecting aging as the clinical focus for its 2016-17 Biodiesel Innovation Fellows program. It was not a hard choice.

"Aging as an issue is both an extraordinary crisis and opportunity," said Paul Yock, MD, founder and director of the center. "It is an incredible area of innovation for which we could have chosen."

It also made sense, Yock said, "because aging is a way for us to understand how to help people in need of looking at health — what will it take to keep people happy and healthy into their later decades?"

Stanford Biodiesel, which celebrated its 15th anniversary this year, has trained more than 1,000 graduate students and nearly 200 fellows in the process of health technology innovation. Those trainees have gone on to found more than 40 companies and develop products that have benefited more than half a million patients.

This year, all 12 fellows will follow the program's process of gathering information, identifying needs and developing solutions. But because research has shown that older adults generally want to stay in their homes, the fellows plan to work with people in their homes and in transitional care facilities, in addition to their traditional clinical immersion experiences.

Collaborating with Center on Longevity

The biodiesel program is collaborating with Stanford's Center on Longevity, which has given this year's fellows "a treasure trove of people and ideas," said Yock, a professor of biomedical engineering and of electrical engineering.

This year's fellowship program also reflects the biodiesel program's renewed emphasis on cost innovation. Yock said. "We'll be looking at areas where, as a health system, we are spending enormous resources in ways that are not intelligent, effective or caring. Those are areas where innovation is necessary."

The fellows are not told what their focus will be before they arrive at Stanford, and they have responded with great enthusiasm to working on health-care innovation for older patients. "Given the magnitude of our aging population, but in the U.S. and abroad, I am thrilled to address the needs in this area," said biodiesel fellow Eric Kramer, a mechanical and biomedical engineer. "I believe that our focus on value innovation, combined with what older people can teach us, will help us find meaningful ways to improve care." Vivien de Ruiter, MD, worked at an angel investment firm before being selected as a biodiesel fellow. In conversations she had there, "the consensus was that the aging population is a global concern — and that there are broad opportunities to intervene and improve care."

Already, Kramer said, he has begun to recognize the nuances of discovering the needs of an older population. "We have all been influenced more, but even they wanted to keep the conversation upbeat. Finding the right way to get people to open up and tell us about things that may be less pleasant will be part of the challenge."
Stanford Medicine
continued from page 1

other milestones, Minor said, was the opening of the Laboratory for Cell and Gene Medicine, which manufactures cell and gene therapies for use in humans. “When you have a will, when you have a vision, when you’re blessed with having resources, we’re able to bring together enormous talent, and to enable those very talented people to accomplish truly unique things,” he said. “Already there are four first-in-humans clinical trials, all approved or in the final stages of being approved.”

Minor also highlighted the Chan Zuckerberg Biohub, a recently announced research collaboration among scientists at Stanford, UC–San Francisco and UC–Berkeley. “The goal of the Biohub is to develop the next generation of technologies, the innovative scientific approaches that are going to propel biomedical medical research forward in the coming decades,” he said. The Biohub is funded by the Chan Zuckerberg Initiative, which funds projects to prevent or manage all diseases by the end of the century. These are the types of big problems Stanford Medicine is focused on, and will continue to be the big problems that motivate us here is when someone tells us that something can’t be done. We are attracted to the problems that no one else wants to even think about.”

Seizing opportunities
Minor emphasized that although the School of Medicine has become more diverse over time — this year, about 25 percent of the incoming MD and PhD students are members of underrepresented minority groups — he sees an opportunity to deepen its com-

*Biohub continued from page 1*

“The Biohub will provide many new opportunities for both basic and translational research,” said Ann Arvin, MD, Stanford’s vice provost and dean of research. “By bringing together some of the most brilliant scientific, engineers and clinician investigators from across the three universities, the Biohub will greatly expand the develop-

The Biohub will fund Dr. Richard B. (Rick) Quake’s initiative, which is called the Biohub. Quake developed a platform called microflu-

“Getting macrophages back on track”

The researchers conducted a series of follow-up tests to characterize what was happening. Experimenting with cells in a dish, they showed that immune cells called tumor-associated macrophages were required for the nanoparticles’ anti-cancer activity; in cell cultures without macrophages, the iron nanoparticles had no effect against cancer cells.

Before this study was done, it was already known that in healthy people, tumor-associated macrophages detect and engulf small tumor cells. However, large tumors can hijack the tumor-associated macrophages, causing them to stop attacking and instead begin secr-et

The study showed that the iron nanoparticles switch the macrophages back to their cancer-fighting state, as evidenced by tracking the products of the macrophages’ metabolism and examining their patterns of gene expression.

Of interest, in a mouse model of breast cancer, the researchers demonstrated that the ferumoxytol inhibited tumor growth when given in doses, adjusted for body weight, similar to those approved by the FDA for anemia treatment. Prior studies had shown that the nanoparticles are metabolized over a period of about six weeks, and the new study showed that the anti-cancer effect of a single dose of nanoparticles declined over about three weeks.

The scientists also tested whether the nanoparticles could stop cancer from spreading. In a mouse model of small-cell lung cancer, the nanoparticles reduced tu-

The study’s lead author is Saeid Zanganeh, PhD, associate in the Molecular Imaging Program at Stanford; the study’s co-authors are Gregory Hutter, MD, PhD, visiting instruc-

The study’s results suggest several possible applica-

“Advancing precision health”

In the year and the decade to come, the panelists expect to continue advancing pre-

Advancing precision health

In the year and the decade to come, the panelists expect to continue advancing pre-

the Biohub will greatly expand the development of new technologies needed to tackle major health challenges.”

The Biohub will fund an initiative to recruit young scientists, who will be a part of a new career track to young scientists. This new career track will be called the Biohub, and it will fund a new career track to young scientists.

Seizing opportunities
Minor emphasized that although the School of Medicine has become more diverse over time — this year, about 25 percent of the incoming MD and PhD students are members of underrepresented minority groups — he sees an opportunity to deepen its com-

“Within drops of liquid. It has greatly ac-

Quake said the Biohub’s focus on technology makes sense, given his own lab. “I note that in the Biohub’s focus on technological advances that have great opportunities for interdisciplinary col-

“Supporting people”

Dr. Richard B. (Rick) Quake, a professor of chemical engineering, said the Biohub will fund several new initiatives that will benefit patients, including a fellowship program to support outstanding young graduates that gives them the opportunity to develop their early careers. Quake said that the fellows will keep elite young scientists in the Bay Area for at least five years and they will provide them with resources to pursue their own research.

The Biohub’s scientific staff will include Group Leader positions that provide opportunities for those scientists who want to focus on research rather than on the academic pressures of teaching and administration.

Finally, some investigator slots will be set aside for assistant professors, who often have more work and less time to work on projects, and who have more senior scientists for grants.

Iron
continued from page 1

conducted an experiment that used three groups of mice: an experimental group that got nanoparticles loaded with a chemotherapy control group that got nanoparticles without chemo and a control group that got nei-

the. The researchers had the unexpected observation that the growth of the tumors in control animals that got nanoparticles only was suppressed compared with the other controls.

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Manu Prakash wins prestigious grant from MacArthur Foundation

By Amy Adams

Manu Prakash, PhD, an assistant professor of bioengineering at Stanford, has been named one of the 2016 fellows of the John D. and Catherine T. MacArthur Foundation. The fellowships, popularly known as “genius grants,” are awarded to scholars who show exceptional creativity in their work and the potential for still more in the future. It includes a $625,000 stipend over five years from the MacArthur Foundation.

Manu Prakash, a bioengineer, will receive $625,000 over five years from the MacArthur Foundation. (L.A. Cicce)

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The MacArthur Foundation recognized Prakash for his research that is “driven by curiosity about the diversity of life forms on our planet and how they work, combined with a passion for innovation in poor settings, and a deep interest in democratizing the experience and joy of scientific discovery.”

Prakash is not only one of the most innovative scientists of our day, he is also using his interdisciplinary expertise to improve human health around the world, said Stanford President Marc Tessier-Lavigne, PhD. “He harnesses a wide array of technologies, including optical physics, computer science, fluid dynamics, biology and chemistry, to solve tangible human and scientific problems. It is fitting that his creative approach to applying scientific principles has been recognized as true genius by the MacArthur Foundation.”

Prakash almost didn’t pick up the phone when the MacArthur Foundation called. He was caring for his 4-month-old twins at the time. “I was very sleep-deprived when the phone rang,” he said. “My main reaction is that it is a very humbling experience because there are so many people in the world doing amazing work.”

Prakash’s studies problems in organisms and microbial biology through the lens of physics. He also builds tools and approaches to do field science that are both low-cost and extremely powerful, bringing science out of the lab and to the parts of the world where traditional tools aren’t feasible.

One example of this approach is a microscope made out of paper with a glass bead for a lens, called the Foldscope. It costs less than a dollar to make and has now been distributed by his lab to more than 50,000 people in 135 countries who use the tool in research and education.

“Manu’s work could help solve some of the biggest issues facing us in global health,” said Lloyd Minor, MD, dean of the School of Medicine. “His expertise and innovations have led to powerful, low-cost technologies that people in remote locations can use to study and treat disease in their communities. These are the kinds of solutions that will bring real change to health-care challenges.”

Prakash said that many of his ideas come from his travels and from his childhood growing up in India. “Being in the field gives meaning to working in global health,” Prakash said. “I teach you empathy, a driving force so strong that it transforms ideas into actions.”

An example of this is his work designing tools to track and detect mosquito species by people around the world. This work would allow communities to survey mosquito populations at scale and track the vectors for some of the most deadly diseases. “We see this work developing into a completely new class of computers that can precisely control and manipulate hand-held devices,” Prakash said.

Prakash is also a member of the interdisciplinary institutes Stanford Bio-X, Stanford ChEM-H and the Stanford Woods Institute for the Environment.

Graduate student Maria Birukova dies in climbing accident

By Krista Conger

Maria Birukova, a fourth-year graduate student in the MD-PhD program in the School of Medicine, died in a climbing accident near Bear Creek Spire in the eastern Sierra Nevada Mountains. She was 26.

The accident occurred on Sept. 18 and was witnessed by her climbing partner, Ian Isaacson. Her body was recovered on Sept. 20 by members of the Inyo County Sheriff’s Office, Inyo Search and Rescue and the California Highway Patrol.

Birukova, an avid mountaineer and climber, earned a bachelor’s degree in biomedical engineering at Yale University. She came to Stanford in 2013 and was working in the laboratory of immunologist Paul Bollyky, MD, PhD. Earlier this year, she was awarded a Bio-X Bowes graduate student fellowship in honor of her groundbreaking interdisciplinary research.

“Maria was one of our superstars,” said professor of medicine PJ Utz, MD, who directs Stanford’s Medical Scientist Training Program, in which students work toward both a medical degree and a doctoral degree. “She had a background in engineering and an interest in chemistry, and we were very excited to welcome her into our program. But it was clear from the moment I met her that climbing was a major part of her life. In fact, she struggled to choose whether to attend Stanford or the University of Utah for her graduate training because in Utah the mountains are so close. We in the program are devastated that she won’t now be able to fulfill her other dream of becoming a physician-scientist.”

Research on biofilms

Birukova’s research in the Bollyky lab focused on the role played by a virus called a bacteriophage in the formation of biofilms — viscus communities of bacteria, resistant to antibiotics and immune responses, that can colonize chronic wounds or coat medical equipment.

She collaborated with researchers in the laboratory of assistant professor of chemistry Yan Xia, PhD, to design polymers and antibodies to disrupt biofilms with the aim of treating patients with deadly infections.

“The medical school community has suffered a tremendous loss,” said Lloyd Minor, MD, dean of the School of Medicine. “Maria’s interdisciplinary approach to the treatment of antibiotic-resistant biofilms brought to bear insights from both chemistry and immunology in an attempt to devise new treatments for patients with few other options. Her work was a wonderful example of Stanford’s focus on translational medicine, and she will be greatly missed, both professionally and personally.”

In addition to spending time on campus, Birukova was a consulting project manager for the Stanford Health Care Consulting Group, a nonprofit, volunteer-run organization dedicated to improving patient care through quality- and performance-improvement projects. Biru- kova was a member of the 2015 1% for the Planet Fellows Program, Stanford’s focus on Health Care Consulting.

“Maria was a very dynamic, interested and interesting person who really engaged with the Stanford community in a number of ways,” said Bollyky, assistant professor of medicine and of microbiology and immunology. “In addition, she was an outstanding scientist. Her research focused on the intersection between microbiology, structural biology and physical chemistry in biofilms. It was very novel, and she was incredibly energetic and passionate about developing new therapies for patients with chronic wounds. Her loss leaves a hole in her graduate class, as well as in my lab.”

Birukova was born on May 31, 1990, in Moscow, Russia. She attended the University of Chicago Laboratory Schools in Chicago. She is survived by her parents, Konstantin Birukov, MD, PhD, and Anna Birukova, MD, who are both on the faculty of the Pritzker School of Medicine at the University of Chicago.
Physician, author Abraham Verghese awarded humanities medal

By Tracie White

Abraham Verghese, MD, professor of medicine at the Stanford School of Medicine, received a National Humanities Medal at a White House ceremony Sept. 22.

"Abraham Verghese is not only an exemplary clinician, he is an exemplary humanist," said Stanford President Marc Tessier-Lavigne. "Every day in the classroom, he teaches his students that professions such as medicine benefit from an understanding of the human condition. We are so proud that his breadth of scholarship has been recognized with this honor.

Inaugurated in 1997, the National Humanities Medal "honors individuals or groups whose work has deepened the nation's understanding of the human experience, broadened citizens' engagement with history, literature, languages, philosophy, and other humanities subjects," according to the National Endowment for the Humanities website. As many as 12 medals are awarded each year.

The organization said Verghese is receiving the medal "for reminding us that the patient is the center of the medical enterprise. His range of proficiency embodies the diversity of the humanities; from his efforts to emphasize empathy in medicine, to his imaginative renderings of the human drama."

"I am humbled and excited by this honor," said Verghese, who is the Linda R. Meier and Joan F. Lane Provostial Professor. "The names of previous recipients include writers I most admire. It's a wonderful affirmation of a path that in the early years I wasn't sure was the right path, even though it was one I felt compelled to follow."

The human touch

Verghese is a critically acclaimed, bestselling author and a physician with an international reputation for his emphasis on empathy for patients in an era in which technology often overwhelms the human side of medicine.

"This is a special honor for a physician," said Lloyd Minor, MD, dean of the School of Medicine. "Through his writings and his work as a physician, Abraham has worked to battle what he has seen as a lack of humanism in modern medicine. The courage to follow his own path, and the compassion he has brought to his work, have made the world a better place."

In his first book, My Own Country: A Doctor's Story, Verghese focused on his early years as an orderly, his caring for terminal AIDS patients and the insights he gained from the relationships he formed and the suffering he witnessed.

"I felt strongly then and now that what I was writing about, and my interest in the human experience of being ill or caring for the ill, was as much a part of medicine as knowledge of the function of the pancreas, for example," said Verghese; who is also a vice chair of Stanford's Department of Medicine. In addition, Verghese directs the Stanford interdisciplinary center, Presence, which reflects these interests.

The National Endowment for the Humanities manages the nomination process for the National Humanities Medal on behalf of the White House. Each year, the NEH invites nominations from individuals and organizations across the country. The National Council on the Humanities, NEH's presidially-appointed and Senate-confirmed advisory body, reviews the nominations and provides recommendations to the president, who selects the recipients.

Joining Verghese as medal recipients this year were two other writers with Stanford connections: poet Louise Glück, a visiting faculty member in the Department of English; and Elaine Pagels, a religious historian and author of the Gnostic Gospels and Beyond Belief: The Secret Gospel of Thomas, who earned both bachelor's and a master's degrees from Stanford.

LEAH BACKHUS, MD, associate professor of cardiothoracic surgery, was selected to serve a three-year term as a member of the Patient-Centered Outcomes Research Institute's Advisory Panel on Improving Healthcare Systems. The panel advises the institute on research funding decisions. Backhus is the chief of thoracic surgery at the Veterans Affairs Palo Alto Health Care System. Her research focuses on imaging following surgery at the Veterans Affairs Palo Alto Health Care System. The panel advises the institute on research - according to the National Endowment for the Humanities. In his first book, My Own Country: A Doctor's Story, Verghese focused on his early years as an orderly, his caring for terminal AIDS patients and the insights he gained from the relationships he formed and the suffering he witnessed.

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LEONORE HERZENBERG, D.Sc-equivalent, professor of genetics and the Department of Genetics Flow Cytometry Professor, was named an honorary fellow of the Royal Microscopical Society. She was recognized for her contributions to the development of the fluorescence-activated cell sorter, which is used to diagnose leukemia and in stem cell transplantation.

WILLIAM HIESINGER, MD, was appointed assistant professor of cardiothoracic surgery, effective Aug. 1. His clinical interests include thoracic transplantation, medical circulatory support and endovascular aortic surgery.

LAURENCE KATZNELSON, MD, professor of neurosurgery and of medicine and associate dean of graduate medical education, has received the 2017 Outstanding Educator Laureate Award from the Endocrine Society. The honor, which includes a $3,000 prize, recognizes exceptional achievement as an educator in endocrinology and metabolism. Katznelson is also the medical director of the Stanford Pituitary Center.

PAUL KWO, MD, was appointed professor of medicine, effective Aug. 1. His research focuses on therapy for hepatitis B and C and on liver transplant outcomes.

RICHARD LAFAYETTE, MD, was promoted to professor of medicine, effective July 1. He directs the Stanford Glomerular Disease Center. He investigates new therapies for renal disease and performs collaborative studies of the immunological basis of glomerular injury.

DAVID LEE, MD, PhD, associate professor of medicine, was elected president of the Western States Affiliate of the American Heart Association. As president, he plans to advocate for healthy habits, particularly in children; enhanced regulation of tobacco and e-cigarette sales; expanded access to CPR training; and mandating healthy foods in schools.

SARAH MADISON, MD, was appointed assistant professor of anesthesiology, perioperative and pain medicine, effective Feb. 1. Her research focuses on regional anesthesia and on treating acute pain during surgery.

LEI STANLEY QI, PhD, assistant professor of bioengineering and of chemical and systems biology, was named to the 2016 class of Pew biomedical scholars, a program that supports exceptional early-career scientists. He will receive $60,000 a year for four years. His research focuses on CRISPR development for transcription and epigenetic regulation and on genomic reprogramming of immune cells to identify and kill cancer cells.

HOLLY TABOR, PhD, was appointed associate professor of medicine, effective June 1. She is the associate director for clinical ethics and education at the Stanford Center for Biomedical Ethics. Her research focuses on ethical issues related to genetics and genomics.

PJ UTZ, MD, professor of medicine, has joined the scientific advisory board of the Arthritis National Research Foundation, which provides grants for research on arthritis and other autoimmune disorders. He directs Stanford's Medical Scientist Training Program and is the founder and director of the Stanford Institutes of Medicine Summer Research Program for high school students. His research focuses on improving the understanding and treatment of autoimmune disorders.

JINGVIN YE, PhD, was appointed assistant professor of radiation oncology, effective Aug. 1. His research focuses on tumor cell metabolism, with the goal of targeting metabolic pathways to improve cancer treatments.

President Barack Obama presented Abraham Verghese with a National Humanities Medal on Sept. 22.