Ex-49er back at Stanford to finish residency

By Patricia Hannon

When Mitt McColl, MD, decided to finish his residency after nearly 30 years away from clinical medicine, he didn’t expect to be back at Stanford, where he played football and earned his bachelor’s and medical degree.

That, he said, was a stroke of luck, or what he said his father calls the moment “when preparation meets opportunity.”

McColl, 58, admits that brand of luck determined most of his professional life after college. It was there when he was signed as a free agent by the 49ers — the same week he was accepted to Stanford’s medical school — as well as when he landed his first medical internship, and when the medical device industry captured his attention.

But deciding to finish his residency was different. “Nothing I’ve done in life is because I planned it. Usually it was because the opportunity sort of arose,” McColl said recently as he grabbed a quick lunch at a bustling café at Santa Clara Valley Medical Center.

“This was the most thought-out, planned-out thing I’ve done in my career because it was really difficult two years ago to make the decision to do it.”

It was especially tough to leave his CEO position at Gauss Surgical, which developed a real-time blood loss measuring device for operating rooms. “I think the hardest discussion was with the investors that I’ve been running a company with for five years,” McColl said.

But McColl handed the CEO role to company founder Siddarth Satish, whom he met at Stanford, making a full commitment to the Stanford Health Care-O’Connor Hospital Family Medicine Residency program, where he is a second-year resident.

An unusual career trajectory

McColl’s trajectory from a successful startup CEO to resident isn’t as circuitous as it might appear. He always kept a hand in medicine, volunteering at a free clinic and working with medical professionals in device development. But by his mid-50s, the business demands weighed on him, and he was looking for something new.

“I was kind of worn out, and was volunteering at a primary care clinic in San Francisco,” he said. “About once a month I would go up there, and I started realizing how much I enjoyed working with patients and doing medicine.”

So, he explored the feasibility of finishing his residency. He had his medical license, which he got after his first internship in 1989, but some program directors intimated that he didn’t fit the profile of a typical resident. At O’Connor, Grace Yu, MD, the residency program director, admitted that McColl was an unusual candidate, but his enthusiasm for the program and clinical medicine impressed her. Yu, a clinical assistant professor of medicine at Stanford and graduate of its medical school, said the and former program director Robert Norman, MD, talked in-depth with McColl about his goals and the potential pitfalls. But clinical work wasn’t new to him, and recommendations from the physicians at the clinic where McColl volunteered stood out.

“They said, ‘Nobody else in their 50s would be thinking about this, or if they...’” McColl, page 6

Study finds mechanical heart valves can be safer option for certain patients

By Tracie White

Mechanical heart valves may be safer in certain cases than valves made of animal tissue and should be used more, especially in younger patients, according to a study by researchers at the School of Medicine.

The study also found that what’s recommended in the national guidelines, which say patients 50-70 years old undergoing aortic or mitral valve replacement should be given a choice of either a mechanical or biological valve, the best choice in fact can hinge on whether the aortic or mitral valve is being replaced.

The study shows that for patients undergoing mitral valve replacement, a mechanical valve is actually beneficial until the age of 70. On the other hand, for patients undergoing aortic valve replacement, the benefit of implanting mechanical valves ceased after the age of 55.

“This has potential to significantly impact the current national practice guidelines,” said Joseph Woo, MD, professor and chair of the Department of Pediatrics.

Algorithm can diagnose pneumonia better than radiologists, study says

By Taylor Kubota

Researchers have developed an algorithm that offers diagnoses based off chest X-ray images. It can diagnose up to 14 types of medical conditions and is able to diagnose pneumonia better than expert radiologists working alone.

A paper about the algorithm, called CheXNet, was published Nov. 14 on the open-access, scientific preprint website arXiv.

“Interpreting X-ray images to diagnose pathologies like pneumonia is very challenging, and we know that there’s a lot of variability in the diagnoses radiologists arrive at,” said Pranav Rajpurkar, a graduate student in the Machine Learning Group at Stanford and co-lead author of the paper. “We became interested in developing machine learning algorithms that could learn from hundreds of thousands of chest X-ray diagnoses and make accurate diagnoses.”

The work uses a public data set initially released by the National Institutes of Health Clinical Center on Sept. 26. That data set contains 112,120 frontal-view chest X-ray images labeled with up to 14 possible pathologies. It was released in tandem with an algorithm that could diagnose many of those 14 pathologies with some success, designed to encourage others to advance that work. As soon as they saw these materials, the Machine Learning Group — a group led by Andrew Ng, PhD, adjunct professor of computer science — knew they had their next project.

The researchers, working with Matthew Lungren, MD, MPH, assistant professor of radiology at the School of Medicine, had four Stanford radiologists independently annotate 420 of the images for possible indications of pneumonia. The researchers chose to focus on this disease, which brings 1 million Americans to the hospital each year, according to the Centers for Disease Control and Prevention, and is especially difficult to spot on X-rays. In the meantime, the Machine Learning Group team got to work developing an algorithm that could automatically...
Researchers identify attributes of high-value oncology, primary care

By Krista Conger

Mounting pressure on U.S. physicians to control skyrocketing health care spending has led to a demand to understand which patients receive the best possible care at the lowest possible cost.

Now, two overlapping teams of researchers at the School of Medicine have identified tangible changes that physicians can make to meet goals to improve the value of health care provided by the medical center and the Clinical Enterprises, and reinforced by private health insurers. Beginning in 2019, Medicare payments to physicians will be adjusted up or down by annually increasing amounts according to how a doctor treats national benchmarks for high-value care.

In two separate studies, the researchers outlined several tangible attributes of cancer care and primary care that will allow physicians and their teams to rise to this challenge.

“No one has ever conducted this type of research in physician office sites before,” said Arnold Milstein, MD, professor of medicine at Stanford. “These studies are unprecedented, not only in what they examined, but in their potential to affect the practice of medicine on a national level.”

“Cancer care is expensive, and physicians and insurers sometimes question the value of the nonmedical or nonclinical services that we provide for patients,” said Douglas Blayney, MD, professor of medicine. “Here, we identify for the first time specific aspects of high-quality, low-cost care that provide value for patients and payers and that can be adopted by doctors and organizations across the country.”

Blayney is the lead author of the cancer-care study, which was published Nov. 16 in JAMA Oncology. Milstein is the senior author of that study, as well as the senior author of the study that identified the distinguishing features of high-value primary care practices, which was published online Nov. 13 in Annals of Family Medicine.

Milstein is the director of Stanford’s Clinical Excellence Research Center, the first university-based research center exclusively dedicated to discovering, testing and evaluating cost-saving innovations in clinically excellent care. Blayney is a member and the former medical director of Stanford’s Cancer Institute.

Digging into national data

For both studies, the researchers used never-before-available claims data from insurance companies to identify physician-practice sites across the country that deliver high-quality care with less total health care spending.

The oncology study analyzed data from thousands of cancer patients at oncology sites throughout the Pacific Northwest and Midwest from January 2007 to May 2014; the primary care study analyzed commercial health insurance claims from 2009 to 2011 from more than 40 million patients and 53,000 primary care practice sites.

The researchers then compared the average annual total health care spending per primary care patient or spending per cancer treatment episode at each of the high-quality care sites. Practice sites that ranked at the top of both measures (delivering both high-quality and low-cost care) were designated as high-value sites for further study.

The researchers then conducted extensive site visits of high-value and average-value physician practices to tease out

Med school finances explained at meeting

The School of Medicine is on solid financial ground.

That was a key message from Samuel Zelch, MBA, chief financial officer and associate dean, during his presentation Nov. 13 at a town hall meeting on school finances. For the hundreds of employees who attended the event in Berg Hall, at the Li Ka Shing Center for Learning and Knowledge, it was an opportunity to learn more about the financial state of the school, as well as to ask questions about it. Two more town hall meetings are scheduled for 2018 — one in the winter and another in the spring.

“We’ll be able to do a better job of stewarding and managing our resources responsibly if we understand where those resources are coming from and where they sit and what they’re intended for,” Dean Lloyd Minor, MD, said in introductory remarks. He, Zelch and Marcia Cohen, MBA, senior associate dean for finance and administration, later fielded questions from the audience.

“I think that our financial troubles had not prompted the meeting. In fact, we’re doing very well,” Zelch said. “We have significant resources, and we’re quite fortunate compared to many of our peer schools.”

Rather, the town hall was an effort to promote greater financial transparency, he said.

Big revenue growth

The school’s revenue for fiscal year 2017 was $2.4 billion, an increase of 46 percent from four years ago, Zelch said. Payments to the school from Stanford Health Care and Stanford Children’s Health accounted for 43 percent of that figure, and another 28 percent came from sponsored research, such as grants from the National Institutes of Health. The rest came from student tuition, endowed income, gifts and other sources.

Overall, Stanford Medicine, which includes the medical school, Stanford Health Care and Stanford Children’s Health, generated 69 percent of the university’s total revenue of $9.8 billion for fiscal year 2017. This is largely due to the strong revenue growth at Stanford Health Care and Stanford Children’s Health. It totaled $5.9 billion, up 53 percent from four years ago.

On its website, the school’s Office of Fiscal Affairs has posted a link where employees can pose questions or suggest topics they would like to see covered at a future town hall event.

Several Stanford Medicine researchers are on “dream teams” that will receive funding from the organization Stand Up To Cancer to develop strategies to detect and treat early-stage cancer.

Maximilian Diehn, MD, PhD, assistant professor of radiation oncology, is a co-leader of the SU2C-LUNGevity American Lung Association Lung Interception Translation Research Team, which received a $2 million grant. The team will work on developing a diagnostic tool that uses information from long-read whole-genome sequencing and from blood-based assays, which detect circulating tumor DNA and cells. The funding will support development and pilot testing of the tool, which aims to speed the detection of lung cancer. Ash Alizadeh, MD, PhD, assistant professor of medicine, and postdoctoral scholar Young-Jun Jeon, PhD, are also on the team.

In addition, Sanjiv “Sam” Gambhir, MD, PhD, professor and chair of radiology and director of the Canary Center for Cancer Early Detection at Stanford, is the principal Stanford investigator of the SU2C-LUNGevity American Lung Association Lung Cancer Interception Dream Team. This $5 million, four-year project entails creating a molecular atlas of pre-cancerous lung tissue developing blood tests capable of identifying patients with early lung cancer recurrence and nasal, blood and radiological techniques to discern whether abnormalities on chest imaging are cancerous; and developing tests to determine who is most likely to benefit from particular treatment strategies. The team is a collaboration between Stanford, Johns Hopkins University, UCLA, Boston University, Harvard University and the Francis Crick Institute.

Stand Up To Cancer is the entertainment industry’s nonprofit cancer research organization. SU2C is supported by the Entertainment Industry Foundation, a public service arm of the Entertainment Industry Foundation.

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Thursday event focuses on Stanford Health Care's future plans

By Grace Hammerstrom

Stanford Health Care's challenges and its plans for the future were among the topics addressed at the State of Stanford Health Care meeting Nov. 6 at the Li Ka Shing Center for Learning and Knowledge.

SHC President and CEO David Entwistle and School of Medicine Dean Lloyd Minor, MD, addressed a standing-room-only crowd of almost 400, with an additional 1,500 employees watching the first-ever online, interactive broadcast of the annual event.

The two Stanford Medicine leaders laid out the collaborative work being done across all three organizations — Stanford Health Care, Stanford Children's Health and the School of Medicine — and they used the interactive polling system to get input from employees attending both on-site and online.

Later that day, Entwistle also shared his presentation with an employee audience at a tech facility on Embarcadero Road in Palo Alto, and with employees at the SHC office in Newark.

Entwistle shared a performance snapshot of SHC, which showed high scores in customer service and patient satisfaction, as well areas where improvement in quality is needed. “It’s important to know where you are on the track, and where you are currently headed,” he said. “Numbers are not the core of everything we do, but they certainly tell us where we are making progress on the things we value as an organization.”

He also shared SHC’s plans for sustainability in an increasingly competitive marketplace. “Stanford is not on a trajectory to acquire more ambulatory hospitals,” he said. “Instead, we will continue to develop strategic alliances with the people who are already sending us patients.”

Entwistle also addressed areas in which the organization needs to improve. Using the interactive polling system, he asked employees to guess where SHC ranked on the University Health System Consortium/Vizient quality measurement of 107 hospitals. Only 30 percent of the responding employees knew that it ranked 71st.

“When you look at all the amazing things we do, there are still opportunities for improvement,” said Entwistle. He outlined SHC’s “value equation,” which attributes success to a combination of quality, service, cost and employees.

“We are looking at the things we can do to make a difference,” he said. “There are a number of areas in which we have already had an impact in a short period of time, and a number of areas where there are still significant opportunities to improve, such as mortality, infection and surgical cost containment.”

Strategic planning

The second half of the meeting was devoted to the integrated strategic planning process involving Stanford Health Care, Stanford Children’s Health and the Stanford School of Medicine. The dean described how collaborative working groups are helping to develop the plan.

“In my five years at Stanford, and from what I know from before I arrived, never before have we worked so well together as we do now,” Minor said. “All three entities share the same mission of patient care, research and teaching, and all are markedly aligned around that vision.”

As an example, Minor noted that the working group on care delivery models includes Robert Harrington, MD, from the school; Quinn McKenna from SHC; and Kim Roberts from Stanford Children’s Health.

“The team is looking at what the services across the care continuum will look like in 2025, taking into account intensive competition and the fact that Stanford is a high-cost system. Another working group is focusing on safety, quality and value, with a goal of positioning Stanford as one of the top 10 academic medical centers in the country by 2025.”

These working groups will continue to meet to finalize their recommendations; the final plan will be presented to the Stanford University Board of Trustees in 2018.

Researchers awarded grant from NIH to study autism

By Bruce Goldman

Researchers at Stanford and UCLA have received a $9.3 million grant from the National Institutes of Mental Health to study the ways that many genes associated with autism spectrum disorder may converge to affect a smaller number of molecular pathways or cellular processes responsible for the condition.

The Stanford team — led by Sergiu Pasca, MD, assistant professor of psychiatry and behavioral sciences — will receive about $4.6 million.

Pasca’s laboratory has devised a way to produce three-dimensional neuronal cultures of human brain spheroids — round balls of more than 1 million cells each — from induced pluripotent stem cells. These spheroids, which resemble specific brain regions, can be assembled to serve as a window through which scientists can observe, in a dish, key molecular and cellular processes that take place in a developing human brain.

Pasca and his Stanford colleagues will genetically engineer iPSC cell lines carrying mutations in various genes linked to autism spectrum disorder. They will use the resulting iPSC cell lines to derive spheroids containing excitatory neurons and ventral forebrain spheroids containing inhibitory neurons. His group will work closely with co-investigator John Huguenard, PhD, professor of neurology and neurological sciences at Stanford, to use the spheroids to ask abnormalities in cells derived in these 3-D brain cultures. The goal is to better understand the roots of the disorder by looking at areas where mutations in numerous disparate genes lead to deficiencies in a much smaller number of biochemical pathways.

“Maybe it’s possible to pinpoint where SHC ranks on the University Health System Consortium/Vizient quality measurement of 107 hospitals. Only 30 percent of the responding employees knew that it ranked 71st. “We are looking at the things we can do to make a difference,” he said. “There are a number of areas in which we have already had an impact in a short period of time, and a number of areas where there are still significant opportunities to improve, such as mortality, infection and surgical cost containment.”

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“Maybe it’s possible to pinpoint where...
Researchers have identified two deep lineages of bacteria that have never been characterized before and found them in the mouths of dolphins. A phylum is a broad taxonomic rank that groups together organisms that share a set of common characteristics due to common ancestry. The discovery of two bacterial phyla, as well as additional novel genes and predicted products, provides new insights into bacterial diversity, dolphin health, and the unique nature of marine mammals in general. The lead author is Natasha Dudek, a graduate student at UC-Santa Cruz.

A paper describing the research was published Nov. 16 in Current Biology. Relman, who holds the Thomas C. and Joan M. Merigan Professorship, is the senior author. The lead author is Natasha Dudek, a graduate student at UC-Santa Cruz.

The U.S. Navy’s Marine Mammal Program reached out to Relman more than 10 years ago for help in keeping its dolphins healthy. The animals are highly trained and perform missions at sea. Previous research by Relman’s group, in collaboration with the Marine Mammal Program, revealed a surprising suite of bacteria in the dolphins’ mouths, said Relman, who coordinates the Program with the National Marine Mammal Foundation and the Palo Alto Health Care System. Some of the bacteria found in the current study are affiliated with poorly understood branches of the bacterial tree.

Striking gold

These organisms, about which we have known just a tiny bit, are basically the dark matter of the biological world,” he said. “We knew there was gold in those dolphin mouths, and we decided it was time to go after it with more comprehensive methods.

In the new study, the researchers identified bacterial lineages by reconstructing their genomes from short bits of DNA. The genome blueprint contains all its operating instructions, encoded in DNA. The researchers named one of the newly identified lineages Delphibacteria, in honor of the dolphins (Delphinidae is the Latin name for oceanic dolphins). By looking at the genes encoded in the genomes of Delphibacteria representatives, the researchers gained insight into the bacteria’s lifestyle. The bacteria are predicted to express a property called denitrification that may affect dolphins’ oral health. The chemical process can cause inflammation and could be connected to gum disease. Denitrification also occurs in plague on humans, suggesting that something about mammalian mouths selects for this process.

Putting puzzle together

The researchers differentiated between bacteria and predicted their behavior by looking broadly at their genomes. “What we do first is shear the DNA into a bunch of little bits and pieces, the mix of DNA sequenced and we then try to figure out how the genomes were originally assembled,” said Dudek. If a gene is one piece of a puzzle, the researchers put together the whole puzzle. This approach has been spearheaded by collaborator and study co-author Jillian Banfield, PhD, at UC-Berkeley.

By taking this approach, the researchers spotted bacteria that had long eluded characterization. They also identified a number of unusual proteins, including previously unknown forms of Cas9. Cas9 proteins — part of a bacterial immune system called CRISPR-Cas, a system well-known for its use in gene editing — are designed for use in Relman’s lab. A large, comparative study is underway to investigate how adaptation to life in the sea might affect marine mammal microbiomes. Beyond discovering and characterizing novel relomeria, Relman wants to apply his research to conservation. “Marine mammals are becoming increasingly endangered,” he said. “Kids are not treated the same way as adults, so we really need different treatments that can be more harmful to them than to adults. "Kids are not small adults, so we really need different treatment options," he said.

Hospital expansion

Lucile Packard’s belief in the importance of child-focused treatment can be witnessed in its facilities. The health care of children at risk, and how Stanford pediatricians are working with social service and housing agencies to help tackle the problem.

“An interview with Save the Children CEO Helle Thorning-Schmidt, who said that for her organization, there is nothing more urgent than the issue of protecting children in armed conflict.”

A story about how virtual reality is being used to calm anxieties in fearful children and teens undergoing some- times frightening medical procedures, as well as to help them understand their illnesses and how their physicians plan to treat them.

The issue also includes a look at how Joseph Woo, an associate professor and chair of cardiothoracic surgery, and his colleagues are increasingly using a patient’s own tissues to repair, rather than replace, damaged aortic valves to give patients better long-term outcomes. In addition, this issue features an excerpt from a book by wilderness medicine experts Paul Auerbach, MD, a professor of emergency medicine at Stanford, and Jay Lemery, MD, an associate professor of emergency medicine at University of Colorado. In Enviromedics: The Impact of Climate Change on Human Health, the authors lay out the adverse health effects linked to environmental change on physicians to lead the way in raising awareness of the problem.

The magazine is available online at http://stanmed.stanford.edu. Print copies are being sent to subscribers. Others can get a single copy by 723-6911 or by sending an email to medmag@stanford.edu.
Stem cells express genes differently in the lab dish than in the body

By Krista Conger

Stem cells in the body have a significantly different gene-expression profile than do the same cells when they’re isolated in a lab dish, according to researchers at the School of Medicine.

The researchers suggest that any conclusions about stem cell function based on studies of isolated stem cells may now need to be reconsidered in light of the fact that the cells’ biology changes during isolation. In particular, the researchers found that levels of certain RNA molecules decreased when stem cells were isolated before analysis of their RNA.

“The results confirmed what previous research in Rando’s laboratory has shown: Development of seemingly sleepy lifestyle, muscle stem cells are actually hotbeds of activity concealed by a tranquil outer membrane.

The researchers were particularly surprised to learn that many of the RNAs made by the muscle stem cells in vivo are either degraded before they are made into proteins, or they are made into proteins that are then rapidly destroyed — a seemingly shocking waste of energy for cells that spend most of their lives just cooling their heels along the muscle fiber. Effects of cell isolation

“Historically, we’ve thought of quiescence as an ‘everything off,’ or dormant, state,” said Rando. “But our work has shown that the reality is quite different. Not only have we been missing transcripts that are present in vivo, but we are also puzzled as to why so many transcripts that are made in vivo are not made into proteins. It’s possible that this is one way the cells stay ready to make a rapid transformation, either by blocking degradation of RNA or proteins or by swiftly initiating translation of already existing RNA transcripts.”

The researchers found that isolated stem cells make large numbers of RNA molecules known to be involved in cellular stress and in cellular proliferation. Conversely, stem cells in the body make more RNAs involved in maintaining the quiescent state, in which they exist until called upon to make new muscle fibers.

The researchers additionally found that the process of isolating whole muscle stem cells for study caused some important RNA molecules to be degraded, rendering them undetectable in previous studies. These findings further support the notion that this quiescent state is not one of dormancy, but one of active regulation and controls — controls that are no longer needed once the cells are awakened to begin the process of tissue repair.

Rando and his colleagues expect that the new RNA labeling technique will be used by many other researchers studying adult stem cells.

“It’s so important to know what we are and are not modeling about the state of these cells in vivo,” said Rando. “Are we modeling it correctly when we look at stem cells isolated by FACS? This study will have a big impact on how researchers in the field think about understanding the characteristics of stem cells as they exist in their native state in the tissue.”

Other Stanford authors of the study are postdoctoral scholars Antoine de Morree, PhD, and Ingrid Egner, PhD; and graduate student Jamie BRET.

The research was supported by the Glenn Foundation for Aging Research, the Muscular Dystrophy Association, the National Institutes of Health, the California Institute for Regenerative Medicine and the Department of Veterans Affairs.

Stanford’s Department of Neurology and Neurological Sciences also supported the work.

Researchers use stem cells to repair lung injuries in mice

By Christopher Vaughan

A study describing the research was published online Nov. 6 in Nature Methods. Kyle Loh, PhD, an investigator at the Stanford Institute for Stem Cell Biology and Regenerative Medicine, and Bing Lim, MD, PhD, an investigator at the Genome Institute of Singapore, share senior authorship. The lead author is Masimmo Nichane, PhD, currently a research scientist at the Stanford stem cell institute.

“The lungs are among the most vital organs of the body. In conjunction with the cardiovascular system, they allow air to travel to every cell and get rid of the waste products of respirations, such as carbon dioxide. For many people with end-stage lung diseases, the only option is lung transplantation.”

Scientists have previously had little success in putting new lung cells into damaged lung to regenerate healthy tissue, Loh said.

“We decided to see if we could do that in an animal model.”

Researchers started by working to improve on current knowledge of lung stem cells. The lung is divided into two compartments, Loh said: the airway, which allows for passage of air in and out of the lung; and the alveoli, where gases pass in and out of the blood. Other researchers had previously isolated one stem cell for the airway and another stem cell for the alveoli. Loh and his colleagues searched for and found a single lung stem cell that could create cells in both the airway and the alveoli. These multipotent lung stem cells were typed by their display of a protein marker called Sox9.

From one to 100 billion

Once they had isolated the stem cells, they were able to make them multiply dramatically. Each lung stem cell that they start with is able to grow into 100 billion lung stem cells over the course of six months. Previously, researchers had not had much success expanding any lung stem cell populations in the laboratory.

Finally, they injected the stem cells into mouse lungs that had been injured by a variety of toxins. “What we saw was that these multipotent stem cells repaired the injured tissue and were able to differentiate into the many different kinds of cells that make up the healthy lung,” said Nichane.

“From this new capability to grow these mouse multipotent stem cells in a petri dish in very large numbers, and the cells’ ability to regenerate both lung airway and alveolar tissue, constitutes a first step toward future lung regenerative therapies,” Loh said.

“Future work will focus on whether analogous multipotent stem cells can be found and cultivated from humans, which may open the way to eventually replenishing damaged lung tissue in the clinic.”

Researchers at the Genome Institute of Singapore, the Jackson Laboratory for Genomic Medicine in Connecticut and Clarkson University also contributed to the study. This work was supported by the Stanford-UC Berkeley Siebel Stem Cell Institute in addition to the Singapore A*STAR and National Medical Research Council.
were maybe you’d be wondering what their underlying motivation was. But he’s absolutely sincere, and you really should be thinking about him strongly,” Yu said.

‘Testament to his character’

After he was matched to O’Connor, McColl wanted to improve his clinical knowledge before the internship began. So, he accompanied mentors on rounds and reviewed medical references. “He put in all of that extra work because he knew it was going to be harder coming in, after being away from that rigor of clinical training for so many years,” Yu said. “I think it was a testament to his character.”

Yu believes that McColl’s background in professional athletics and in medicine makes him aware of the needs of the work, that goes into “crafting your profession.”

“He appreciates … how wonderful the field of medi- cine can be — how deeply rewarding — and the problems that physicians can have, not only on their individual patient’s lives but a community,” she said.

Yu and McColl, and even other residents, worried about whether he would fit in. But Jeff Peng, MD, a chief resident this year, said McColl’s humble and friendly personality squelched any uncertainty.

“He’s so effortless,” Peng said. “He just fits in so well.”

He said McColl is always enthusiastic and doesn’t hold himself above anyone else. “He doesn’t really talk about all of his accomplishments,” Peng said. “He focuses on learning and medicine, and he’s just a great guy to have around.”

McColl is thankful that other residents have ac- cepted him. “Technically I’m not the strongest among any of them because they’re fresh out of medical school and their minds are like sponges,” he said. “But I think I have some other values that they appreciate in terms of just being around life for a while.”

McColl wasn’t naive about the demands of a resi- dency. His father, William “Bill” McColl, also played professional football (for the Chicago Bears) while earning his medical degree, and as a Presbyterian missionary took his family — including young Milt — to Korea and treated leprosy patients before settling into his or- thopedic surgery practice in California.

Still, Milt McColl said he had his wife, Cindy, and their four sons to consider in returning to medicine. But their youngest had just left for college, making the timing good.

When McColl said the idea of finishing his residency was always on her husband’s mind and that because their kids are grown, it’s workable in a way that it might not be for younger residents. “It’s a much different thing to do when you have a young family. … I feel like at this age we have a lot more flexibility,” she said.

Following in father’s footsteps

Milt McColl agreed. “I wouldn’t have wanted to miss my kids growing up” or playing sports. His youngest is now following older brother Milt to Harvard and playing college football there. The other boys, like McColl, his wife and all of McColl’s siblings, have attended Stanford. One played water polo and now plays rugby, another played baseball, and the fourth was a swimmer. None of them are pursuing medicine.

McColl applied early to follow his father into both medicine and athletics, so he was intimately familiar with pneumonia. McColl gave his son advice about doing both, including suggesting that he take first-year medical school classes during his se- nior year, even while playing college football. Follow- ing that advice brought Milt McColl his first encounter with the kind of ‘luck’ that defined his next move.

After graduating from Stanford in 1981, he was accepted to a number of medical schools, including UCLA and his father’s alma mater, the University of Chicago, but he also thought the NFL would draft him. When that didn’t happen, he focused on medi- cal school, accepting UCLA’s offer. By summer, he had-
A panel of the nation’s leading heart experts has released new blood pressure guidelines Nov. 13 that redefine for the first time in 14 years what constitutes high blood pressure.

Tens of millions more Americans now meet the criteria for having high blood pressure and are falling behind in changing their lifestyles or taking medications — or both — to reduce the lower levels considered safe. High blood pressure has been redefined as a reading of 130 over 80, down from 140 over 90, said Randall Stafford, MD, PhD, professor of medicine and chief of Cardiothoracic Surgery at the Stanford Program on Prevention Outcomes Research.

He was one of the 21 experts who worked on developing the new guidelines. The project was jointly sponsored by the American Heart Association and the American College of Cardiology.

Cardiologists seek to reduce hypertension levels nationwide to improve public health. The condition can lead to heart attack, stroke, kidney failure and death of not detected early and treated appropriately, he said. Stafford, who underwent two kidney transplants and is an advocate for physical activity as a means of helping to control blood pressure. He has lived with high blood pressure since his early 20s. At both a physician and a patient, he knows firsthand how complicated it can be to determine the best strategy for each person with high blood pressure.

Stafford spoke with writer Tracie White about why the new guidelines are important and how they can be implemented.

1 How are the new guidelines different from the previous ones, and why were they needed?

STAFFORD: The changes were motivated largely by data from the SPRINT [the Systolic Blood Pressure Intervention Trial], which showed that lowering blood pressure well below 130/80 had substantial benefits, including for older people.

There are two main messages: First, people at a higher risk of a future heart attack or stroke should be treated more intensively to achieve a blood pressure below 130 over 80. In particular, older people should be treated just as intensively as younger people. Second, the new guidelines define normal blood pressure as less than 120 over 80 or less. While medication should not necessarily be used to achieve this blood pressure, other non-drug strategies should be employed to lower blood pressure toward this level.

2 How many people have high blood pressure, and what do these changes mean for them?

STAFFORD: It is estimated that under these new guidelines, 103 million Americans have high blood pressure, up about 72 million under the previous standard. Nearly half of all American adults, and nearly 80 percent of those aged 65 and older, will find that they qualify for treatment. More people will need to take steps to reduce their blood pressure.

High blood pressure increases the risk of having a heart attack or stroke, as well as several other diseases affecting the arteries in the body. The impact of blood pressure is strongest at very high levels of blood pressure (greater than 180 over 110) but is still significant at any age. In the 120 to 139 or 80 to 89 range, for example, we see a number of complications, including a 40 percent increase in the risk of a heart failure or stroke. When blood pressure of 160 over 100 increases the risk of having a heart attack or stroke by 50 percent compared with a blood pressure of 120 over 80.

3 Can you discuss the various treatments for lowering high blood pressure and how these will change the new guidelines?

STAFFORD: While medications that lower blood pressure are a key tool, many non-drug strategies are also useful, but often neglected. Lifestyle changes should be central to how we approach high blood pressure. Changes in physical activity, diet, sleep and weight not only lower blood pressure with few side effects, but also favorably impact the risk of other important outcomes, such as cancer and cognitive decline. Many drugs work more effectively when combined with lifestyle changes. The new guidelines hinge on people at higher risk for future bad events — like heart attack or stroke — being treated more intensively. This requires more being willing to prescribe multiple medications to treat blood pressure. A good first step for many people is to begin a routine of walking each day with a gradual increase in the distance covered.

4 Despite scientific evidence that shows the tremendous benefits of healthy lifestyle changes in diet and exercise, why does it remain so difficult for health care professionals to motivate patients to make these changes?

STAFFORD: Increasing physical activity is a potent strategy for reducing the risk of multiple chronic diseases, yet in the United States, most of the population is sedentary or near-sedentary. This system is really a “sick care” system that is organized around dealing with acute, short-term problems rather than issues that need continued attention over time.

Physicians simply want quick solutions and often don’t have the training needed to provide comprehensive preventive advice about lifestyle and medication. We live in environments that promote obesity and that make healthy choices difficult. Sur- rounding advertising promises and by the time, but consumers themselves want an easy fix to their problems, rather than the hard work required to live a healthier lifestyle. In the end, however, the substantial benefits can make the hard work worthwhile.

5 You’re an advocate of a “risk-based care” approach for treating high blood pressure. Is this high blood pressure treatment useful in other clinical situations?

STAFFORD: The new blood pressure guidelines stress that people at higher risk of future harmful events should be aggressively treated. More widespread use of this concept would lead to more effective and less costly care for many conditions. In fact, we already use this risk-based care approach in other clinical situations. For example, we use it to reduce the risk of stroke by taking blood thinners and with the accompanying dietary restrictions. And we use it with patients having depression and anxiety who are on multiple medications. The focus of care is not just on the individual disease, but also on how the patient can live a longer and healthier life.

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Researchers seek citizen scientists to help with mosquito tracking

By Taylor Kubota

It’s a sound that can keep even the weariest among us from falling asleep: the scratch of a mosquito’s wings. This buzzing insect already makes us run, slap and slather on repellent. But if Stanford researchers have their way, it may also prompt us to take out our cellphones and do a little science.

Manu Prakash, PhD, assistant professor of bioengineering, and his lab are looking for citizen scientists to contribute to Abuzz, a mosquito monitoring platform.

The lab wants citizen scientists to contribute to Abuzz, a mosquito monitoring platform. The lab developed the platform to produce the most detailed global map of mosquito distribution. All that’s required to participate is a cellphone, to record and submit the buzz of a mosquito, which means almost anyone from around the world can take part in this work.

More than mere pests, mosquitoes can carry deadly diseases, including malaria, yellow fever, dengue, West Nile virus, chikungunya and Zika. Diseases spread by mosquitoes result in millions of deaths each year, and the burden of their effects is carried most strongly by places with the fewest resources.

“We could enable the world’s largest network of mosquito surveillance — just pure data collection — to almost anywhere around the world, because they’re making their way around the world now as carrying their pocket,” said Prakash, who is the senior author of a paper that demonstrates the feasibility of this approach, published Oct. 31 in eLife. “There are very limited resources available for vector surveillance and control, and it’s extremely important to understand how you would deploy these limited resources where the mosquitoes are.”

With enough contributions from citizen scientists around the world, Abuzz could create a database that tells us exactly where and when the most dangerous species of mosquitoes are most likely to be present, and that could help to logically targeted and efficient control efforts.

“If you see a mosquito and you swat it, you've saved yourself an itch for one day. But if you see a mosquito and you record it and you send the data to the Abuzz project, then you’ve potentially contributed to an effort that can reduce the burden of mosquito-borne disease for many generations in the future, hopefully,” said Haripriya Mukundarajan, a graduate student in the Prakash lab and lead author of the paper.

Matching the buzz to the species

Abuzz is a low-cost, fast, easy way to gain an incredible amount of new data about mosquitoes. Contributing to Abuzz is as simple as holding a cellphone microphone near a mosquito, recording its hum as it flies and uploading the recording to the Abuzz website. The researchers take the raw signal, clean up any audio that interferes with the recording process, and run it through an algorithm that matches that particular buzz with the species that is most likely to have produced it.

Once the match is found, the researchers will send the submitter information about the mosquito and mark every recording on a map on the website, showing exactly where and when that mosquito species was sighted.

Critical to the success of Abuzz is the fact that mosquito species can be differentiated by the frequency of their wingbeats, which is what produces their characteristic whistle.” Knowing this, Prakash and his team created a mosquito sound library organized by species, which powers the matching algorithm.

Overall, the researchers captured about 1,600 hours of mosquito buzzing from 18 lab-reared and two wild mosquito species, all of which were species relevant to human health. Recognizing that people who could benefit most from Abuzz may not have access to the latest smartphones, the researchers designed the platform so that it can work off recordings from almost any model of cellphone. Most of the data they focused on in the study was recorded on a $20 clamshell-style cellphone from 2006.

Further simplifying the process, the Abuzz algorithm has worked using as little as one-fifth of a second of audio content — although recordings that are longer are the most desirable. Such basic requirements mean that merely recording near a mosquito just as it takes off from a surface is enough to create an Abuzz-worthy recording.

To assure that Abuzz works the way they’ve intended, the researchers ran a field test with 10 local volunteers in a village in Rantomafana, Madagascar, in 2016. It took about 10 minutes to train these citizen scientists. The next day, they returned with 60 recordings that spanned three hours.

Enlisting citizen scientists

“It was very easy to tell people what to do, and people were very eager to participate,” recalled Felix Hol, PhD, a postdoctoral scholar and co-author of the paper who helped conduct this field study. “Just 10 minutes of training and they could actually produce a lot of very usable data.” That was a very beautiful experience for me.”

For any of the grandest aims of Abuzz to be possible, it needs engagement from citizen scientists. "Without those contributions, it cannot reach its full potential. The group intends to release an app to facilitate community engagement in the near future and has already produced detailed training videos.

“What would you like to see people engaging in the problem,” Prakash said. “Try to join the platform. Record mos-quitoes. Learn about the biology. And in that process, you will be supporting the kind of research and scientific data that we and medical entomologists around the world so desperately need and, at the same time, you will be making your own community safer.”

Additional Stanford co-authors of the paper are graduate student Erica Cas-tillo and former graduate student Coo-per Newby. Prakash is also a member of Stanford Bio-X and Stanford ChEM-H, an affiliate of the Stanford Woods Institute for the Environment and senior fellow at Center for Innovation in Global Health.

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