

UCSF

MAGAZINE

Fall 2014

SURGEONS HIT THE ROAD

Saving limbs and lives
around the world

REJUVENATING THE BRAIN • A SAN FRANCISCO SCOURGE • MODERN NURSING



UCSF MAGAZINE FALL 2014

LIGHTS ON!

The community recently celebrated the upcoming opening of the new UCSF Medical Center at Mission Bay with a community party and dramatic light show. The three hospitals open Feb. 1, 2015.



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UCSF's new chancellor is at home at the helm.

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On July 17, 2014, Sam Hawgood, MBBS, was appointed chancellor of UC San Francisco, succeeding Susan Desmond-Hellmann, MD, MPH, who served as chancellor from 2009 to 2014. In September, journalist Sean Elder sat down with him to get a personal sense of the man who has served the University, in one capacity or another, for over 30 years. To learn more about Hawgood's vision for UCSF, which he shared in his recent State of the University address, visit ucsfchancellor.ucsf.edu.

DEEPLY ROOTED

“Magic” is one of those tricky words, tarnished by overuse. It isn’t often that you hear it from the mouth of a scientist, and in the wrong setting it can raise some eyebrows. So when newly appointed UCSF Chancellor Sam Hawgood says something was “magical,” attention must be paid.

In 1981, the Australian doctor had just toured several great hospitals, looking for a place to get some research experience before returning to Melbourne. “My wife, Jane, and I visited departments in Paris, London, Oxford, New York, and Boston – and San Francisco was the last of my stops,” he recalls. Many of those hospitals wanted him, but Hawgood was intrigued by what he’d heard about the groundbreaking work under way in newborn medicine at UCSF.

Hawgood met with John Clements, MD, who was conducting research on the respiratory problems of premature babies. “I spent a couple of hours with him, and it was really career changing for me,” says the chancellor,

sitting in his office in the Medical Sciences Building on the Parnassus campus. Clements (who is now a professor emeritus of pulmonary biology) later patented a drug to compensate for the lung coating known as surfactant that is missing in infants born with immature lungs; the discovery has saved untold lives and won Clements the Albert Lasker Clinical Medicine Research Award in 1994.

“It was the commonest cause of death, and we had very few tools to overcome it,” recalls Hawgood. “We could put babies one at a time on what were very primitive mechanical ventilators. . . . You felt pretty powerless.”

Within months, Sam Hawgood had left Australia – with Jane and their then-two-year-old son – to join Clements’ team. “On the 13th floor of this hospital, just above us, [was this] unusual community of superb clinicians as well as scientists from a number of different backgrounds, from biophysics to chemistry to physiology to anatomy, who clearly respected each other, actually really *liked* each other, and worked so well together,” says Hawgood. “They would work with you even if you didn’t have a clear understanding of their skill sets.

“For me it was sort of a magical experience,” he adds.

AUSSIE ROOTS

Hawgood had come to medicine through science and human biology. His parents were pharmacists; an office below their house was

occupied by a doctor; and his first interest, growing up by the coast in Queensland, was marine biology. “But when I looked into career paths of marine biologists in Australia in the ’60s,” he recalls, “I think there were two or three employed, so it didn’t seem too encouraging.”

In Australia at that time, students went straight from high school to medical school, “so it was a decision I had to make at age 16.” He matriculated as a premed at the University of Queensland in Brisbane and had what he calls “a typical student experience.” Meaning? “I got into all sorts of fun and trouble,” he says with a slight smile. “I’d come out of an all-boys boarding school into a world I didn’t know about.”

It was there he met Jane, who has been his partner for more than 40 years. “She was doing social work and had been at university for a year, just a little ahead of me. So she was an experienced older woman.”

“We had a system where older students were given two younger students to mentor,” Jane Hawgood recalls. “I got Sam and his best friend. The mentoring in those days consisted of playing cards in my room on Sunday night. But honestly, it was kind of like love at first sight for me.”

The two were married after he finished medical school, and he did his residency training (“to be honest, my first year [I picked] the hospital more for the quality of the surf than the medicine”) before traveling with his new wife to Hong Kong, where the two worked in the New Territories for a year. The experience



PHOTO: STEVE BABULJAK

As a young pediatrician, Sam Hawgood was drawn to UCSF by the groundbreaking research under way in newborn medicine.

was profound for them both, as they served a poor populace with limited access to health care. “You got to see a lot of medicine you wouldn’t see in Australia at the time,” recalls Hawgood.

The Hawgoods traveled extensively throughout South and Central Asia before returning to Australia, where he entered pediatric training and soon became fascinated with the specialty of newborn medicine. His interests in the new and changing field were as much personal as intellectual. “It was that combination of having to have a really deep understanding of developmental biology and normal development, and then overlaying it with the development of the disease process, that was very stimulating,” he says. And the subspecialty burnished his people skills. “While babies have their own personalities,” he says, “as a newborn medicine specialist I learned what an intense period it is for the family.”

“Sam has a lot of humility and a lot of integrity, and you see how in love with this place he is.”

– JANE HAWGOOD

At UCSF, Hawgood found he was good at working with parents, and he credits his wife for her guidance. “I think Jane helped me very much on that; she’s an incredibly skilled observer of the human condition,” he says. “Once we decided to stay [in San Francisco], and she decided to think about her own career, she worked in the AIDS clinic here in the late ’80s, when the epidemic was just at its height.”

“We didn’t have anything called self-care in those days,” says Jane. “I had young kids and was really busy. After an emotional day at work, I would get home and start in on a project around the house. I realize now what I was doing was just reflecting on the day.”

“What I didn’t fully appreciate when I came here was that the environment that allowed me to thrive was not an accidental environment.”

– CHANCELLOR SAM HAWGOOD

TAPPED TO LEAD

Her husband’s career began to morph as well, as he went from vice chair of pediatrics to interim chair, with a promise from the then-dean of medicine “that he would do a quick search and I could go back to doing what I loved doing at the time, which was leading the division of newborn medicine.” Instead, in 2004, he was made the chair of pediatrics and was, he recalls, “happy doing that, assuming that was what I was going to be doing for the rest of my career.” Until he was asked to serve as interim dean of medicine by then-Chancellor J. Michael Bishop, MD, “who again said he would conduct a quick search so I could go back to doing what I loved doing.” Hawgood held the interim post for 18 months before being appointed dean in September 2009 by then-new Chancellor Susan Desmond-Hellmann. When she left (to be CEO of the Bill & Melinda Gates Foundation), Hawgood was made interim chancellor on April 1 – “April Fool’s Day,” he notes.

“I have the world’s greatest experience as ‘acting’ and ‘interim,’” Hawgood says with a laugh.

According to his wife, Hawgood “has a lot of humility and a lot of integrity, and you see how in love with this place he is,” she says. “I think that’s what really got him in this leadership position.

“He’s such a quiet man,” Jane adds. “When he wants to talk, I will always stop what I’m doing because he’s not a guy who talks a lot, but when he does it’s so lovely to hear what he’s thinking inside.”

Hawgood’s career path (unimaginable when he was a young pediatrician, he says) was a good way to learn. “As a chair, you work pretty closely with the dean, so you have a reasonable

sense of what being a dean is, but until you actually do it you don’t know all the nuances.”

His interests have always been eclectic, and while he is winding down his own lab work (he still manages a research lab but says, given his new day-to-day demands, he will close it at the end of this grant cycle) and is no longer working with patients, he took to the administrative side of academe handily. “This is probably a pretty sad statement, [but] I can get as excited by the mechanics of a financial spreadsheet as I

can from understanding how a cell functions,” he says. Even when he was working in the newborn ICU, he was interested in the context within which he worked and would ask the hospital’s CFO to explain the unit’s financial structure.

“What I’ve learned over the last 30 years is that if you’re interested in someone else’s domain of expertise and express that interest in a real way, then people are just delighted to help you,” he says.

FAMILY MATTERS

His wife’s career has been equally protean, moving to a concentration on palliative care for the last 10 years. She finally retired in June, after 42 years as a social worker, but her retirement is busier than many people’s careers; she is still a passionate member of the Zen Hospice Project board and worked hard to re-establish that project’s collaboration between the hospice



Sam and Jane Hawgood, who have two grown sons, relax at home. Jane recently retired after 42 years as a social worker.

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FOR ALUMNI AND FRIENDS

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(which had been closed for earthquake retrofitting and then lack of funding) and UCSF.

They have two grown sons: Andy, the eldest, is a graphic designer in San Francisco, and his brother, Alex, left his job at the *New York Times* (though he still writes about cultural affairs for the paper) to be part of a fashion start-up in Manhattan. Their reaction to Alex's career move, according to Hawgood, would not surprise most parents: "Really? You have health insurance, you have a job . . . But we are very proud of their accomplishments and how they are leading their lives," he adds.

And while his wife still goes back to Australia every year, the chancellor has no second thoughts about the move he made over 30 years ago, though he speaks with admiration of the Aussie work atmosphere: "It's a much more relaxed approach to life, while at the same time there's a lot of high achievement there," he says.

But there is finally a meaning to his

trajectory, at least one that Hawgood sees now. "What I didn't fully appreciate when I came here was that the environment that allowed me to thrive was not an accidental environment," he says. "It wasn't magical by magic; it was magical because there were administrators – directors of the cardiovascular research institute, chairs of the department of pediatrics, deans of the school of medicine, chancellors – who were devoting their time to make it a magical place. It feels like at this stage in my career that it's an evolution. Now my responsibility – without being heavy-handed about it – is to create an environment behind the scenes so that the equivalent of me coming here at 30 years of age can say, 'I don't know why, but this is a magical place.'"

*Watch a video of the Hawgoods at home:
bit.ly/ucsf-hawgood*



The Hawgoods met at the University of Queensland. Jane says it was love at first sight.

PHOTOS: STEVE BABULJAK

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COLD WEATHER TRIGGERS FAT BURNING

If you put yourself in an environment between 61 degrees and 63 degrees Fahrenheit without bundling up, you'll lose weight, research shows. That's because we humans adapt by generating more fat-burning cells to help us keep warm. Scientists at the Cardiovascular Research Institute at UC San Francisco, led by Ajay Chawla, MD, PhD, an associate professor of physiology and medicine, recently discovered that calorie burning activated by cold temperatures can be achieved biochemically, without the chill.

In a new study, Chawla and his team investigated the signaling mechanisms involved in the fat-burning process, using mouse models. They found that cooler temperatures initiate two signaling

molecules secreted by certain cells of the immune system, which then activate other cells known as macrophages. These in turn drive the growth of fat-burning cells known as "beige fat."

Until a few years ago, it was widely thought that humans had little "brown fat" and "beige fat" – sometimes known as good, or "thinning," fat – and scant potential to generate it. But researchers have since found small deposits of it in people and now believe that increasing the amounts of it in our bodies could promote weight loss.

Chawla believes these recent findings are likely to further fuel the quest to identify new ways to tame obesity pharmaceutically, by targeting how much energy we burn, not just

how many calories we ingest. "If you could increase energy expenditure by even a few percent over a period of a year or two, you could make a big difference," he says.



PROFESSOR AWARDED "AMERICAN NOBEL"

Peter Walter, PhD, professor of biochemistry and biophysics, recently received the 2014 Lasker Basic Medical Research Award. Popularly known as "American Nobels," the Lasker Awards are among the most respected scientific prizes in the world. Walter was hailed for his groundbreaking work on a cellular quality-control system known as the unfolded protein response, or UPR. Found in organisms ranging from yeast to humans, the UPR is crucial to life, and disruptions in its workings are believed to play a role in neurodegenerative diseases, cancer, diabetes, and other illnesses. Walter, a Howard Hughes Medical Institute investigator since 1997, shared the award with Kazutoshi Mori, PhD, a leading UPR researcher at Kyoto University in Japan.

The Lasker Award is the second major accolade this year alone for Peter Walter, who in May won Asia's highest scientific honor, the 2014 Shaw Prize in Life Science and Medicine. He also shared that prize with Kazutoshi Mori.

PHOTO, LEFT: SUSAN WERRELL

LOVE: UCSF STYLE

**Clair Weenig, MD '69 and resident alumnus
Joan Strathdee Weenig, MS '67**

“We spotted each other at a 1966 UCSF party, when I [Clair] was a medical student and Joan was a master’s nursing student. She caught my attention by spilling beer into my shoe. Impressed and soggy-shoed, I asked for a date. We got married in 1968 and now – 46 years, two children, and four grandchildren later – we’re still married and still UCSF supporters.”



**Rita Wong Jew, PharmD '90
Lyle Jew, PharmD '90**

“We hung out as friends for almost a year before we dated. After graduation, I [Rita] left for Philadelphia for my residency and Lyle stayed in California for his. We met up in December at a national pharmacy meeting, and that was when he proposed. We got married right after finishing our residencies. Our friends thought we were the biggest ‘pharmacy nerds.’ Now blessed with two college-bound children, we are back where we started, in San Francisco – me at UCSF!”



**Yao Heng, MD '87 and resident alumna
Jon Levine, MD '78**

“Annoyed by someone’s shadow while trying to put a central line in a patient in the ICU, I [Yao] looked up, intending to shoo away the intruder. But I was greeted with a smile from Jon, who was bringing me a lemon-tart-and-cappuccino midnight meal. I asked if he could come back later; he did and never left. Now, 22 years later, with a daughter who attended the Marilyn Reed Lucia preschool at UCSF, we are both still very much a part of UCSF.”



A NEW LIGHT ON DENTISTRY

The days of the dental X-ray may be numbered, thanks to new optical techniques developed by UC San Francisco’s Daniel Fried, PhD – techniques that use light to take instantaneous digital images.

The new methodologies, called near-infrared transillumination and optical coherence tomography (OCT), use near-infrared light to provide better pictures of our teeth and could one day even be used to guide infrared lasers to zap cavities with pinpoint precision. Fried, a professor in the School of Dentistry’s Division of Biomaterials and Bioengineering, is a leading expert in a relatively new field of light-based dentistry called biophotonics. In addition to using near-infrared technology, biophotonics uses spectroscopy for imaging and therapy.

“The field is strongly moving in the direction of what we call minimally invasive dentistry,” says John Featherstone, PhD, dean of the School of Dentistry, “and the technologies being developed by Dan’s team are a key part of that philosophy.”

OCT creates high-resolution, 3-D images of teeth that are as good as or better than X-rays for the early diagnosis of tooth decay. “If you can spot the lesions early enough, you can treat them with fluoride and remineralize them,” says Fried. “It gives the clinician a way of telling whether the chemical intervention is working.”

MEDICINE MEETS MARIJUANA

Molly Cooke, MD – a resident alumna, pioneering HIV/AIDS physician, and medical education expert – discusses how clinicians and patients navigate the great unknowns involved in using marijuana as a medicine. Cooke is the immediate past president of the American College of Physicians, but she speaks here as an inveterate internist.



What diseases and conditions has marijuana been effective in treating?

Cooke: The list of diseases for which there is good scientific evidence that marijuana is effective is relatively short. It works well as an appetite stimulant and anti-nausea medicine and has been used under the table for decades for people on chemotherapy. Marijuana also lowers intraocular pressure in glaucoma, though ophthalmologists prefer alternatives. And it works as an anxiolytic – it reduces anxiety.

Why have some states approved marijuana use for a long list of diseases?

Cooke: For 75 percent of conditions listed in state statutes, marijuana is acting as an anxiolytic, not on the disease itself. For

instance, in multiple sclerosis, marijuana is not preventing neurologic degeneration or curing the associated muscle spasms, stiffness, or pain, though its sedative powers may be lessening the impact of these symptoms. Patients need to understand this distinction.

What's the relationship between pain and anxiety, and how does marijuana help?

Cooke: People who experience a lot of pain get anxious. They wonder how long it will last, whether it will get worse. It's a completely understandable psychological response that actually intensifies pain. And when pain is a consequence of disease, it becomes a constant reminder of the illness, and anxiety builds – it's a vicious cycle, one that the sedative powers of marijuana can ease.

Have states ever before legalized the medical use of a controlled substance without clinical trials supporting the use?

Cooke: No, but you can make some interesting historical parallels with alcohol, because the two drugs behave in quite similar ways. In the '50s, obstetricians advised their anxious pregnant patients to have a couple of drinks. No one would recommend that any more.

Clinicians asked themselves how alcohol reduced stress and looked for other healthier ways to achieve the same benefit. Treating marijuana as a medicine poses similar dilemmas. What are the actual benefits? Can we replicate them with another therapy? What are the harms? The research just isn't there.

Why is there so little research about marijuana's therapeutic properties?

Cooke: Marijuana's use as medicine has been so politicized and polarized that it makes it hard to get funded for research.

Are there downsides to using marijuana therapeutically?

Cooke: Unfortunately, many of the people who come asking for a doctor's certificate are exactly the people who shouldn't be using the drug. I think as physicians we have a responsibility to ask ourselves "What is the abuse potential here?" – just as we do before we write a Vicodin or Dilaudid prescription.

How would you advise someone with a condition for which the use of medical marijuana is approved, but the benefits are not proven?

Cooke: I would tell them to put marijuana use in the larger context. What are the symptoms that bother you and what else have you tried?

What are the alternatives?

Cooke: Regular exercise, some basic breathing techniques, and mindfulness-based stress reduction can be very helpful.

How do you study a plant that is cultivated in so many different environments?

Cooke: The plants vary a lot in how much THC and other cannabinoids they have in them. It makes it very hard to be systematic and rigorous in studying marijuana. I think if it were decriminalized, a lot of those problems could be much more easily addressed.

Where do you think marijuana has the richest therapeutic potential, outside of its anxiolytic and anti-nausea effects?

Cooke: There is promising anecdotal evidence from prominent pediatric neurologists that marijuana may prevent seizures in children with epilepsy. Sadly, given the current circumstances, there are many barriers to properly studying that possibility.

HEADS-UP ON DYSLEXIA



For kids with dyslexia, reading begins as an academic challenge but often becomes a burden on their self-esteem, too. Thankfully, UCSF researchers have found a way to better understand early reading development, using brain scans.

Typically, kids start learning to read in kindergarten and achieve proficiency by third grade. So the UCSF team scanned the brains of 38 children during that period, tracking the development of their brain's white matter, which is important in processing information, as they were learning to read.

"We show that white matter development during a critical period in a child's life, when

they start school and learn to read for the very first time, correlates with how well the child ends up reading," says Fumiko Hoeft, MD, PhD, the lead author of the study and an associate professor of child and adolescent psychiatry at UCSF's Dyslexia Center.

The team's brain-scan predictions, combined with traditional reading-readiness measures, were 60 percent more accurate than traditional measures alone. The findings are unlikely to lead to widespread diagnostic use, but they do offer improved insight into variations in reading facility and possible modes of early identification and intervention.

TOXIC SOAP

Washing your hands with antibacterial soap is, at best, questionably effective at fighting off germs and, at worst, toxic, according to UCSF researchers. A group of scientists recently reported that soap with an added antibacterial component may expose people to a harmful chemical that potentially interferes with our hormones.

Triclosan, a synthetic antibacterial agent, is found in thousands of consumer products, including soaps, cosmetics, acne creams, and Colgate Total toothpaste. The U.S. Food and Drug Administration (FDA) is reviewing the safety of triclosan, based on a growing body of research indicating that it might cause developmental problems in fetuses and newborns and endocrine disorders in adults and might have adverse effects on the environment after it drains out of our sinks and into the water table.

"Antimicrobial soaps can carry unknown risks, and triclosan is of particular concern," says co-investigator Paul Blanc, MD, a professor of medicine who holds the Endowed Chair in Occupational and Environmental Medicine. "Our study shows that people absorb this chemical at work and at home, depending on the products that they use."

In the study, investigators analyzed urine samples from 38 doctors and nurses at two hospitals; one hospital used an antibacterial soap containing 0.3 percent triclosan, and the second used only soap without the chemical. Workers at the first hospital had significantly higher levels of triclosan in their urine than those at the second hospital.

While the FDA digs deeper into the effects of triclosan for conclusive evidence of harm, Blanc recommends going back to good old soap and water.

"We started thinking about this [from] a crime-novel perspective."



Evolutionary biologist Carlo Maley, PhD, on his research revealing that intestinal bacteria can manipulate the brain to get what they want, quoted in the *New York Times*





A child helps paint a mural during the September Lights On Festival, which marked the upcoming opening of the new UCSF Medical Center at Mission Bay.

TOP RANKINGS FOR MED CENTER AND CHILDREN'S HOSPITAL – AGAIN!

UC San Francisco celebrated its ranking as the eighth-best hospital in the country this year, the 13th consecutive year it has been listed among the top medical centers by *U.S. News & World Report* in its “Best Hospitals” survey.

UCSF Medical Center also earned a spot on the survey’s exclusive honor roll, which highlights hospitals judged to have superior expertise in at least six of the 16 specialties that *U.S. News & World Report* ranks. UCSF was among only 17 of the 5,000 hospitals participating in the survey to make the honor roll.

UCSF further distinguished itself by placing in the top 10 nationwide in eight

different specialty areas: cancer; diabetes and endocrinology; ear, nose, and throat; gynecology; nephrology; neurology and neurosurgery; rheumatology; and urology.

In a separate set of pediatric rankings released in June, UCSF Benioff Children’s Hospital San Francisco was ranked among the top children’s hospitals in California in *U.S. News & World Report*’s annual “Best Children’s Hospitals” edition. UCSF Benioff Children’s Hospital San Francisco is also the only pediatric hospital in Northern California nationally ranked in each of the 10 specialties surveyed – a distinction shared by only 21 children’s hospitals nationwide.

KILLER TAN

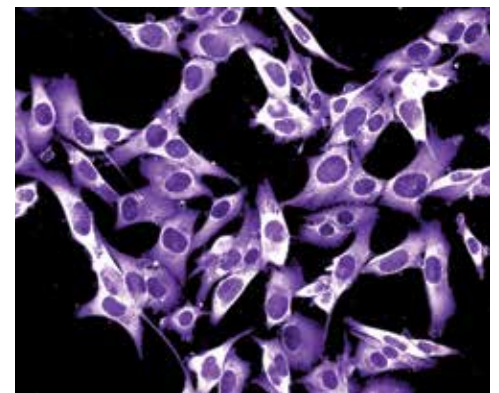
Tanning booths cause more than 400,000 cases of nonmelanoma cancer in the United States yearly, according to UC San Francisco researchers. And the risk is highest in those who start to frequent tanning booths before the age of 25.

“The numbers are striking,” says Eleni Linos, MD, DrPH, an assistant professor of dermatology and senior author of the study, which was a meta-analysis of journal articles on artificial tanning published since 1985; the papers involved some 80,000 subjects in six countries and data extending back to 1977. “This creates a huge opportunity for cancer prevention,” adds Linos.

While indoor tanning was already a known risk factor for the deadliest form of skin cancer, malignant melanoma, Linos’ study established a firm link between tanning and other skin cancers.

She found that those who used tanning booths had a 67-percent higher risk of developing squamous cell carcinoma and a 29-percent higher risk of developing basal cell carcinoma, compared to people who’d never tanned indoors. Both cancers can be disfiguring, and squamous cell cancer can also be lethal.

Approximately 5.6 percent of Americans use indoor tanning salons, which are considered a “Group 1” carcinogen – the highest level – by the International Agency for Research on Cancer.



Melanoma cancer cells

FACULTY ACCOLADES

Three UCSF School of Nursing faculty members were selected as Fellows of the American Academy of Nursing. Chosen by a panel of elected and appointed Fellows, **Kimberly Baltzell, RN, PhD '05**; **Jyu-Lin Chen, RN, PhD '02**; and **Karen Duderstadt, RN, PhD '06**, were among 168 nurses invited to join the academy, in recognition of their contributions to nursing education, leadership, policy, and research.

Troy Daniels, DDS '67, MS '73, professor emeritus in the schools of dentistry and medicine, was elected as a Fellow of the American Association for the Advancement of Science. A UCSF faculty member since 1973, Daniels launched a clinic in the early 1970s that remains in operation today and that is dedicated to treating and shedding light on a once-mysterious disease known as Sjögren's syndrome, a cousin of rheumatoid arthritis.

Kim Dau, RN, MS '07, assistant clinical professor and director of the UCSF/SFGH Interdepartmental Nurse-Midwifery Education Program, received the 2014 American College of Nurse-Midwives' Kitty Ernst Award. The award honors a college member certified for less than 10 years who has demonstrated excellence in clinical practice, education, administration, or research relating to midwifery and women's health.

Barbara Drew, RN, PhD '90, became the first nurse in the history of the American Heart Association to be named a Distinguished Scientist. Drew is the David Mortara Distinguished Professor in Physiological Nursing Research and is the founder of the School of Nursing's ECG Monitoring Research Lab. One of six scientists chosen for the honor this year, Drew was recognized for her work on improving care for patients with cardiac arrhythmias.

Bo Huang, PhD, a faculty member at the School of Pharmacy, received a W.M. Keck Foundation Medical Research Award for \$1 million to lead a multidisciplinary team in the development of advanced labeling tools. The technique, which could be useful in many kinds of biological research, would allow tracking of elements such as genes in living cells and animals.

Michel Fischbach, PhD, an assistant professor of bioengineering and therapeutic sciences in the schools of medicine and pharmacy, received the 2014 Investigators in the Pathogenesis of Infectious Disease Award from the Burroughs Wellcome Fund. The award supports accomplished investigators at the assistant professor level in their study of pathogenesis, with the aim of shedding light on what happens at the points where human and microbial systems connect.

Molecular biologist **Warner Greene, MD, PhD**, and global health leader **Jaime Sepulveda, MD, DSc, MPH**, were elected to membership in the American Academy of Arts and Sciences in April 2014. Greene, the Nick and Sue Hellmann Distinguished Professor of Translational Medicine and director of the UCSF-affiliated Gladstone Institute of Virology and Immunology, is known for his research into human retroviruses, such as HIV. Sepulveda, executive director of Global Health Sciences, designed Mexico's universal vaccination program, modernized the country's national health surveillance system, and founded Mexico's National AIDS Council.

The School of Nursing's **Ruth Malone, RN, PhD '95**, professor and chair of social and behavioral sciences, received the 2014 Lifetime Achievement Award from the Alcohol, Tobacco and Other Drugs Section of the American Public Health Association (APHA). The APHA honored Malone for her decades of work in health policy on tobacco-control issues and her ongoing examination of the tobacco industry's influence on public health.

Two preeminent UCSF professors – **Frank McCormick, PhD**, and **Jason Cyster, PhD** – were selected as members of the National Academy of Sciences, an honor accorded to several dozen top American scientists each year. McCormick, professor emeritus and former director of the UCSF Helen Diller Family Comprehensive Cancer Center, is internationally renowned for his work on the RAS signaling pathway. A microbiologist and immunologist, Cyster is recognized for his research on the molecular cues that guide immune cells to identify pathogens and create immune responses.

ALBERTS WINS NATIONAL MEDAL OF SCIENCE

UCSF biochemist **Bruce Alberts, PhD**, was one of nine recipients in 2014 of the National Medal of Science, the highest honor awarded by the United States for scientific achievement. Alberts, who holds the Chancellor's Leadership Chair in Biochemistry and Biophysics for Science and Education, is renowned for his fundamental discoveries of how DNA is replicated before cells divide. He's also been lauded as a tireless advocate for science and education.

BLOOD WORK

Scientists uncover surprising
new tools – young blood
and video games – to
rejuvenate the brain.

By Claire Conway





Scientists used to believe that our neurologic fate was sealed at birth with a single, lifetime allotment of brain cells.

The thinking went – not so very long ago – that little by little, with the bumps of age and lifestyle, this initial stash of neurons died, taking our brain function along with them. Yet, strange as it may sound, canaries, video games, and young blood are finally putting that punishing prospect to rest. Studies involving bird song, gaming, and the rejuvenating factors of young blood have shown not only that neurons can be generated throughout adulthood, but also that the maddening aspects of aging, such as memory loss and slower processing speed, can be partially reversed.

Both neuroscientists and coal miners revere the



canary, but for entirely different reasons. Like humans, canaries are known in neuroscience as “open learners,” meaning they learn throughout adulthood. “Canaries learn songs, like we learn language, from older adults when young,” explains Arturo Alvarez-Buylla, PhD, a stem cell neurobiologist at UC San Francisco. As they get older, they tweak their songs seasonally to distinguish themselves during mating season. Alvarez-Buylla’s mentor, neuroscientist Fernando Nottebohm, PhD, a professor at Rockefeller University, suspected that as these parts of the canary brain assembled and disassembled for the yearly acquisition of the new mating song, new neurons were being taken on board. Such a notion was unimaginable at the time.

“When Nottebohm proved by morphology, electrophysiology, electron microscopy, and connectivity between 1983 and 1986 that the new cells were neurons, the whole field of stem cell science became a lot more exciting,” recalls Alvarez-Buylla, who holds the Heather and Melanie Muss Endowed Chair in the Department of Neurological Surgery. The jaws of neuroscientists throughout the world dropped at the possibilities posed by Nottebohm’s finding. Neurogenesis offered a new way to repair damage wrought by age, neurological injury, or disease. Alvarez-Buylla went on to advance the field ever further by identifying the neural stem cell, its origins, and its behavior in the mammalian brain.

BLOOD SHOT

Now, decades later, young blood – literally speaking – has joined the canary as a harbinger and waypoint en route to realizing the promise of neurologic rejuvenation. Last spring, UCSF Faculty Fellow Saul Villeda, PhD, published a study in *Nature Medicine* showing significant signs of reversal of age-related cognitive decline in old mice after they were infused with the blood of young mice over the course of several weeks. Two other studies showing the revitalizing effects of young blood in brain and muscle tissue were published at the same time. “All three studies coming out simultaneously made things go supernova,” says Villeda, who, at the age of 33, is a bit of a young blood himself. In the media frenzy that followed, Villeda was inundated with requests for interviews, in both English and Spanish. Born and raised in East Los Angeles, Villeda was able to deliver in both languages. “What we were saying collectively, across three impressive institutions – UCSF, Stanford, and Harvard – is that there is reversibility in the aging process. It’s a bit of a game changer.”

BRAINIACS: Arturo Alvarez-Buylla (left) identified the neural stem cell, advancing science's understanding of neurogenesis; Adam Gazzaley (near right) created a video game that enhances cognitive skills that decline with age; and Saul Villeda (far right) discovered that young blood revitalizes the brains of mice.



The experiment itself proved quite easy for Villeda to explain to the lay press. He and the graduate students in his lab took the blood of young mice, stripped it of its cells, and infused the remaining plasma into old mice. They did this every three days for 24 days, using small injections of the plasma each time – just 5 percent of a mouse's blood volume. The young mice in the study were 3 months old, the equivalent of humans in their 20s, and the old mice were 18 months old, the equivalent of humans in their 60s.

Days later, he tested them for cognitive changes. In one experiment, the mice had to wind through a water maze and remember where a dry platform was hidden; in another, the mice had to recall a location where they had received a shock. "When we gave them the injections of young blood, they no longer had the cognitive impairments of a normally aging mouse," says Villeda. "Their performance wasn't quite equal to the young mice, but pretty close."

The two experiments tested the functioning of the hippocampus, a part of the brain, in both mice and humans, that is especially affected by normal aging. It's our hippocampus that we use in searching for our car in a crowded parking lot. When we park, our brain, without prompting, will note spatial cues in the environment and keep them in mind to guide us back to the same place hours later. But the older we are, the more likely we are to forget those spatial cues, throw in the towel, and press the panic button to find the car.

"As we get older, we have fewer stem cells and newly born neurons in our brains, and our learning and memory are affected," says Villeda. "It's not dementia, it's just the natural degeneration associated with age."

FLIPPING SWITCHES

Clearly, the young blood helped turn back the clock for Villeda's old mice. So he began searching for molecular and biochemical changes

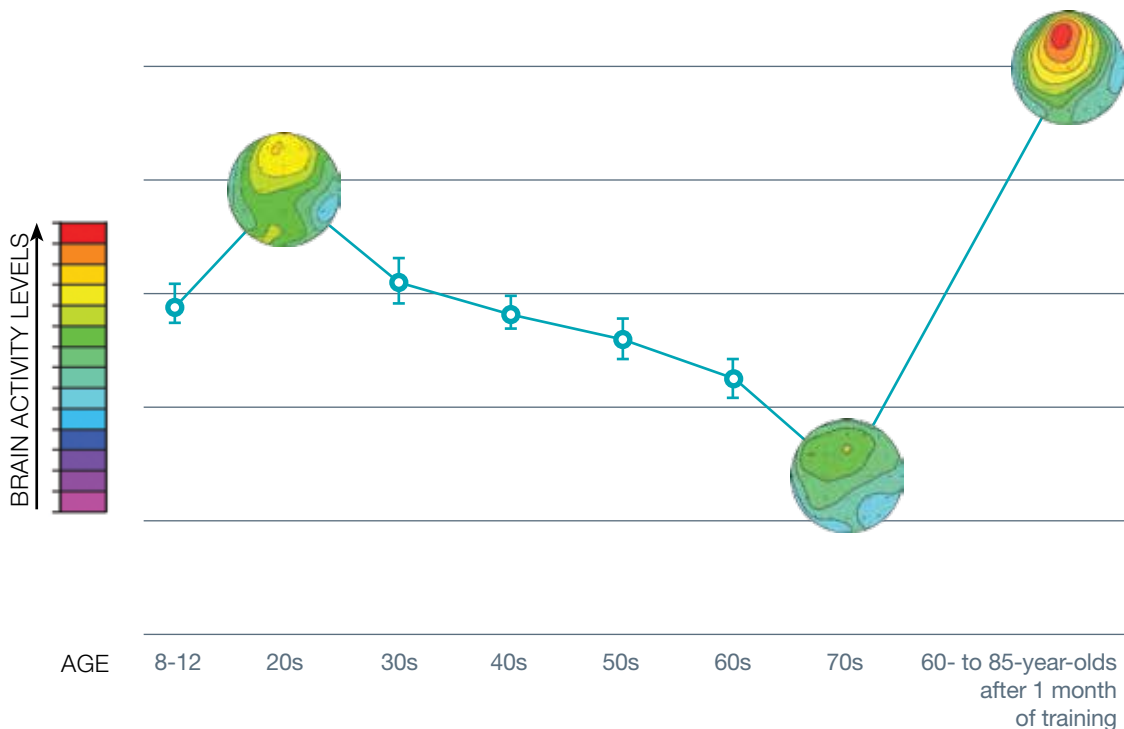
in their brains that might explain the transformation. To accomplish this, he used the somewhat macabre technique of parabiosis, which involves sewing a young mouse to an old mouse so they share a single blood supply. After a month, he sequenced the genes of the old mice and found that the biggest changes occurred in genes associated with neuronal plasticity, the brain's response to learning. When we are learning or responding to our environment, our brain either increases the number of connections among neurons or strengthens our existing neuronal connections. "Normally, with aging, the activity of genes that control synaptic plasticity decreases," says Villeda. "We saw that exposure to young blood increased the expression or activity of these genes."

The old mice with the new high-octane blood were blazing through the mazes because their neurons were making new connections, and solidifying previous connections, with the vigor of mice less than half their age. Villeda and his students searched the gene array for some sort of mechanism that might be responsible for the surge of neuroplasticity in these middle-aged mice who, without the blood infusion, might still be trapped in the maze. The patterns of activated genes and changes they found looked to Villeda like the work of a master regulator known as CREB.

"CREB is an old friend of neuroscience," he explains. "We know that it's very important for learning and memory, especially during development." To figure out the extent of CREB's role, a student in Villeda's lab manufactured a virus carrying a phosphate that would turn CREB off, then repeated the blood-infusion experiments on mice lacking this master regulator. In the new experiments, the old mice with young blood gained some benefits of youth, but the effect was significantly dampened. The experiments showed clearly that CREB is important – but that it doesn't work alone.

"Now we know that as we get older, we are not necessarily losing the genes or proteins in our brains that we need to improve cognition. Maybe, like CREB, they are just not as active," says Villeda. "We've identified one part of the mechanism to wake up the brain. Now we have to find the other genes it works with to replicate the full effect."

80 IS THE NEW 20



The brain's command center for multitasking is in the prefrontal cortex. The brain scan on the left depicts the prefrontal cortex activity of Gazzaley's 20-year-old subjects as they played *NeuroRacer*, a video game that involves multitasking. The scan in the middle depicts the starting point for his 60- to 85-year-old players, playing the game the first time. And the scan on the right shows the progress the older players made after playing a total of just 12 hours over the course of a month. Their scans showed signatures of brain activity comparable to that of the 20-year-olds who had played the game once.

HOLD OR RESET?

Villeda is quite excited at the prospect of applying these findings to humans – a sentiment surely shared by anyone over the age of 40. “We know rejuvenation exists,” he says. “Now we have to figure out the bare minimum of therapeutics or genetic tinkering necessary for it to be safely translated into a human. There are so many questions we have yet to answer.” For example: What part of plasma is really driving the changes, and are they lasting? Mice only live an average of 3 years; we live 80. How often would humans have to be treated, and when should treatments start? Cell proliferation slows in old age, perhaps to offset cancer risk. Would young blood factors stimulate cancer? If so, it might be more prudent to switch off the mechanisms that initiate the aging cascade.

“People who have a genetic predisposition for Alzheimer’s have a mutation, but they don’t get the effects until later in life, which means that something in their young bodies knew how to fight it or compensate for it,” says Villeda. “If we could reverse some of the aging signs, perhaps we could maintain ourselves at a younger stage and then maybe not have to deal with diseases until far later in life.”

GAME ON

While Villeda is turning back the clock in his cohort of mice, Adam Gazzaley, MD, PhD, is beating back cognitive decline with a joystick.

Dressed in a black shirt and sleek gray blazer, Gazzaley looks more like a biotech executive than a neuroscientist. It turns out he’s both. Gazzaley rocked the world of neuroscience last fall with the release of a video game, *NeuroRacer*, that dramatically improved cognitive performance in elderly players. In the game, players drive a car along a winding track, while various signs flash into view along the way. Players are instructed to press a button when a specific sign pops up, ignoring the rest, all while keeping their eyes on the road.

“We developed *NeuroRacer* to put pressure on cognitive control abilities in a powerful way in older adults, who we know have deficits in this domain just by virtue of their age,” says Gazzaley. “The results were better than we even dreamed of.” After one month and just 12 hours of training, players who were between 60 and 85 years old were scoring as well as 20-somethings who had just learned the game. And, retested six months later, the players were still holding onto those gains.

The cognitive skills Gazzaley aimed to improve with his game are selective attention, sustained attention, working memory, and task switching. “We are building a tool to help people develop the cognitive control skills they need to interact with their environment based on their goals,” says Gazzaley. “If we’re trying to do too many things at once and can’t hold our attention to something we want to focus on, then all aspects of our lives suffer, whether it is family, work, safety, or even entertainment.”

Using EEGs, Gazzaley was able to show increased brain activity in

the prefrontal cortex of the older players. After they played the game, their EEGs started to resemble those of 20-somethings. The prefrontal cortex, considered the seat of cognitive control, is the last part of our brains to develop – at around age 25. It is also the area that distinguishes humans from all other species.

The EEGs showed signs of connectivity to other parts of the brain as well. Like Villeda's mice and Nottebohm's canaries, Gazzaley's game-players were enhancing their neuroplasticity, adding new connections while strengthening existing ones. He confirmed these gains by testing other areas of cognition. When assigned a facial recognition challenge, Gazzaley's players showed improvements in working memory. This showed that the benefits of game play were transferable to other brain functions. Transfer, considered the gold standard for effectiveness in the field, is evidence of underlying neural connections among different areas of cognition. "That's exactly what we wanted to achieve – to see if we could change the brain in a meaningful way," says Gazzaley, "and have that accompanied by changes in cognitive abilities that we weren't directly targeting."

NeuroRacer is clearly not your ordinary video game, in which users try to reach ever-higher levels of expertise. While popular first-person shooter games have been shown to improve cognitive abilities in young adults, Gazzaley says this happens by accident. NeuroRacer is a closed-loop game, in which the level of play is adjusted to the player's behavior – and eventually to his or her own brain. The next version of the game, which Gazzaley is developing with Boston-based Akili Interactive Labs, where he is chief science adviser, will feature closed loops that adapt during every second of play. Gazzaley's lab is also working on new games that employ transcranial electrical stimulation, a very mild shock targeted to particular parts of the brain to enhance learning. When playing one of these new games, the player receives low-frequency bursts of energy in certain parts of the frontal lobe. "We are studying if you learn faster if you play a game while we stimulate you at the right frequency," Gazzaley explains.

The therapeutic and educational potential of such games is real and vast. They could be targeted, like NeuroRacer, to a healthy elderly population or be used as an educational tool in schools. Or they could be used to ameliorate known deficits in old and young alike. Gazzaley is currently working with pediatric neurologist Elysa Marco, PhD, on a game aimed at helping children with attention deficit disorder to better train their focus. The two are also teaming up to develop games for patients with autism, in an effort to stimulate the parts of their brains that the disorder has locked away.

NEW BLOOD

Gazzaley and Villeda come at cognition along very different paths, but with equally impressive vigor and results. And they are energized by each other's work. "Adam's games are incredible," says Villeda. "Soon we will be able to grab an iPad and do games that will significantly improve our cognition. Who would have thought of that?"

Villeda sees parallels in their approaches to enhancing cognition during the aging process – through collaboration. He joined forces with bioinformaticians to help him sort through his data, with molecular biologists to create viruses, and with behavioral neuroscientists to identify the best ways to test cognition. "Immunology, neurobiology, and stem cell science all come together when talking about rejuvenation," says Villeda. He believes that building bridges among

"We know rejuvenation exists. Now we have to figure out the bare minimum of therapeutics or genetic tinkering necessary for it to be safely translated into a human."

– Saul Villeda

disciplines will be critical for translating what is now fascinating research into the clinical realm.

"Saul's and my research could be very synergistic in ways that we don't fully understand right now, and Alvarez-Buylla's work has been foundational to neuroscience," says Gazzaley. "There is no Holy Grail for enhancing cognition, so what we probably should have been focusing on for the past 40 years is how the many interventions in our toolbox might interact with each other."

Perhaps someday soon, baby boomers will be able to relive their 20s, at least cognitively, by taking a shot of Villeda's revitalizing plasma while playing a video game developed by Gazzaley. Or maybe Alvarez-Buylla will have figured out how to engineer the perfect mix of neural stem cells to rebuild what age tears down. While we wait, Gazzaley urges us to apply all the strategies that science has already endorsed: Research has long shown that diet, exercise, and enriched, engaging environments are good for the brain. In fact, a new study out of the Cleveland Clinic showed that people with a genetic predisposition for Alzheimer's were able to stave off neurologic decline with a three-day-a-week exercise routine. Those with the same disposition who chose not to get off the couch showed significant degeneration.

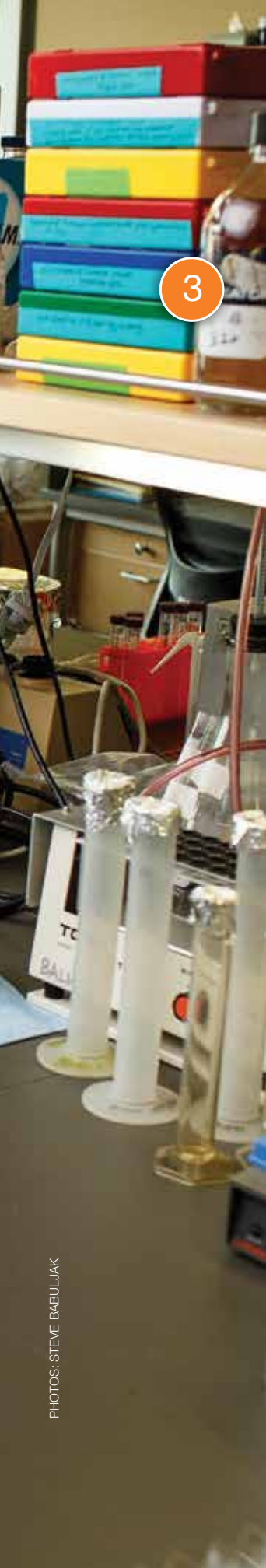
"Clearly the brain does not do well with comfort," Gazzaley says, "so challenge it as much as you can."



4

2

1



3



1



2



3



4

My lab: *dissected*

Two major factors determine whether you get cancer – your genes and what you have been exposed to in the environment, says Allan Balmain [left], PhD, co-leader of UCSF's Cancer Genetics Program. Balmain walks us through his lab, where he and his colleagues are untangling the relationship between the two factors.

“ Right now, my lab is studying how chemicals in the environment or radiation can cause cancer by mutating the genome in different ways. My graduate student Kyle Halliwill [pictured] is working with postdoctoral fellow Cassandra Adams, PhD, on a project with NASA to determine how long-term exposure to heavy-ion radiation causes different cancer types. We grind up frozen tumors using a mortar and pestle and add a special solution to release the DNA for analysis.

If the tumor is exposed to room temperature, it will degrade and we won't get a good sense of how it was operating. That's why we quickly grind one-half of the tumor in a bucket of liquid nitrogen until it is reduced to a fine powder. We isolate the DNA and the RNA, then we send the DNA to get sequenced and the RNA for expression analysis. That tells us what's going on inside the tumor – the genes and mutations that are in play.

The second half of the tumor we slice very thinly, stain, put on a slide, and send to a pathologist to analyze the tumor's histology and pathology. These analyses tell us the gross characteristics of the tumor, its visual features, whether all of its cells have changed from normal to cancerous, and whether the tumor was actively invading, benign, or malignant.

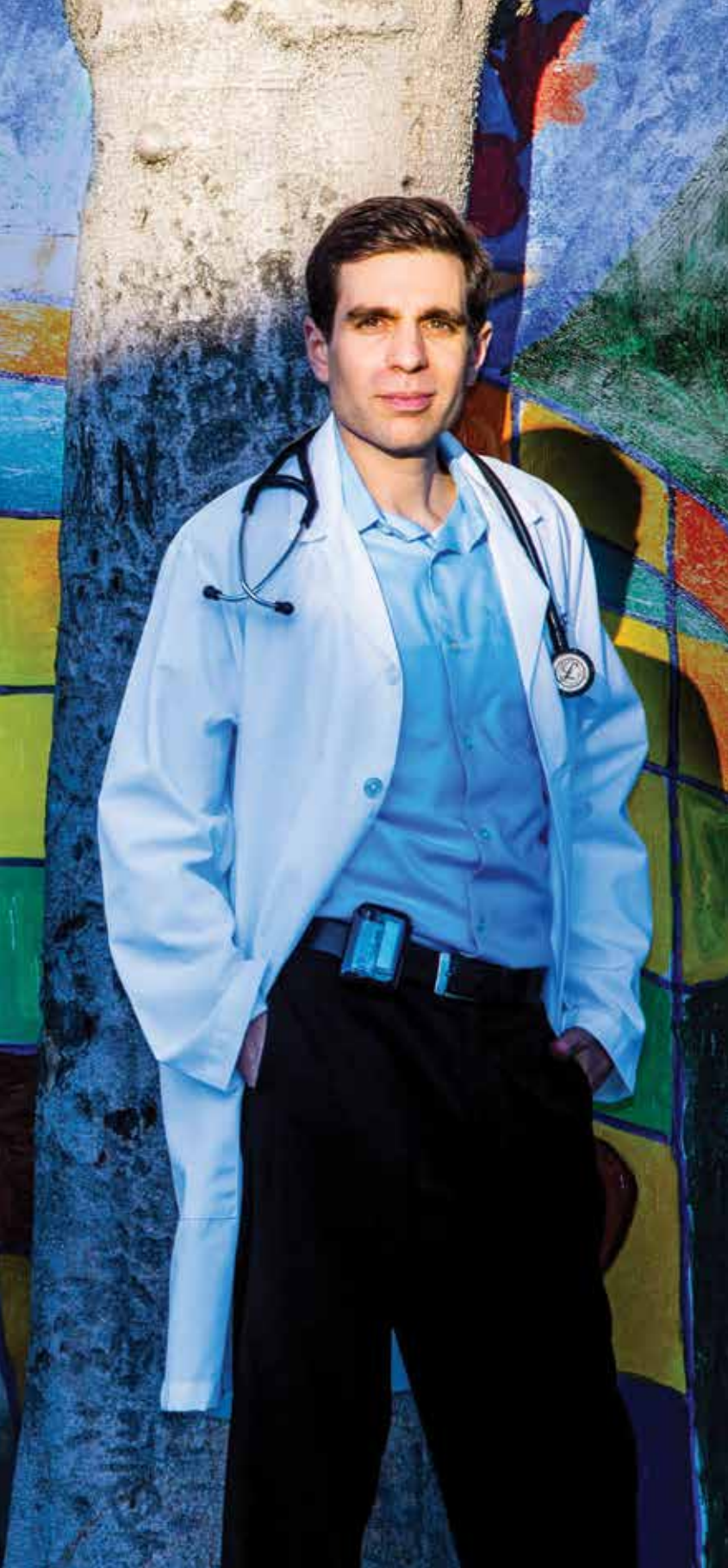
We try to break down the genetic changes caused by the radiation and see how they correlate with the pathology. Then we can go back to the thousands of human tumors already sequenced and look for that genetic signature to assign a cause to that cancer. Right now, we know a couple dozen cancer signatures, yet we only know the cause for about three. So we have our work cut out for us. ”

MODERN NURSING

Nurses – theirs are the first faces we see on our way into the world, and are likely to be the last faces we see on the way out. For every sudden illness or injury in between, nurses are the ones who conjure up calm from the chaos of an emergency room. They are the ones who divine the origin of our pain or fear so that healing can begin. We sought out faculty and graduates of UCSF’s School of Nursing in the thick of a typical day and asked them if they could pick another nurse from a crowd of strangers. They universally answered yes: Nurses would be the ones deep in conversation – the most reflective and engaged people in the room. These are qualities that have defined nurses since the profession began. Here’s how they look on the modern nurse, whether he or she is in the delivery room or in a hospice, analyzing genetic data or writing code for an app.

*As told to Claire Conway
Photography by Elisabeth Fall*





COMMUNITY

I was diagnosed as being HIV-positive in 2004 and took on all that condition's stigma and shame. I got acutely ill very fast and lost weight visibly, but I still kept it from my family. They had invested so much love and care in me, and I felt I had ruined it all. Then I got cancer. The medical staff would shoo my parents out of my hospital room when they had to discuss HIV, until one day when they sent in a nurse named Laurie to talk to me. She had noticed how loving and concerned my parents were. She said, "I have a gay son, and if he had HIV, I would be upset at first, but then I would want to love and support him through it." She gave me a bracelet that she said held all the love and support of the team. I put the bracelet on to finally tell my parents. She showed me how really listening to somebody, being present without judgment, even for just an hour, can change someone's life. Laurie set the bar. Now I'm a nurse practitioner working with HIV-positive youth and HIV-negative youth at high risk for HIV. I've been a part of two ad campaigns to erase the stigma of AIDS. Though some of my patients have seen my picture on buses and billboards, I usually don't tell them I have HIV because my work is about *their* experience, not mine. But the virus is always in the room with me; it gives me a deeper understanding of what my patients are going through. It's hard not to love somebody when you hear their story and what they walk with. It's an incredible gift and window into humanity.

– Jonathan Van Nuys, RN, MS '13, NP



INTERPROFESSIONAL EDUCATION

I'm a faculty clinician with the VA Centers of Excellence in Primary Care at the San Francisco VA Medical Center, working with Patient Aligned Care Teams, where nurse practitioner students and medical residents train together in a primary care clinic. An important feature of team-based care is the daily "huddle" [above]. The huddle provides the team with an opportunity to collectively support every patient who will be seen one-on-one later that day [left]. It's given me an appreciation for the overlap between the professions. Some physician colleagues whom I have mentored have such giving and sharing hearts that they've mastered what is traditionally thought of as nursing care. And I've seen nurses who are phenomenal diagnosticians. I think the more we play in the same sandbox – and multiprofessional teams are the direction we are headed in – the more we're going to find out what each of us brings to the team as a person who has life experiences and talents and a particular professional expertise.

– JoAnne Saxe, RN, MS '82, DNP
(center, standing)





MIDWIFERY

My job at SFGH could never be routine – it's not about woman after woman pushing a baby out. Each woman is different; she brings her whole life story into the room. Childbirth can be joyful, like it was for Yulishea [pictured holding her baby], or complicated. A mother may be giving the baby up for adoption or may feel ambivalent about having a child, or there may be a fetal loss. It's still her experience. We try to help people be in the moment to have their baby in the best way possible for them. I am continually in awe of the strength women draw upon to get themselves through such an intense life transition.

– *Margaret Hutchison, CNM, MSN*



LABORATORY



I think most people who study symptom management in patients with cancer are envious of what we have at UCSF. I tell my graduate students that they have to sit in the room with our group to believe it. There are usually 10 of us – physicians, statisticians, a bioinformaticist, a psychologist, nurses, and Brad Aouizerat, PhD [left], a molecular geneticist. We all look at the same data, tracking pain scores up and down. But we explore those relationships in a far richer context because we have different lenses that we look through. Without Brad, I couldn't be drilling down to the genetic causes behind the pain, and without me, Brad couldn't sort out the symptom data and relate it to the treatment the patient received. It's a dream team.

– *Christine Miaskowski, RN, PhD, postdoctoral alumna*



DIGITAL INNOVATION

I remember the moment that completely changed my research career: I opened a letter from the wife of one of my clinical trial patients, telling me that her 35-year-old husband had had another heart attack and died, leaving two small children behind. I decided right then that if I wanted to save lives, I had to start with prevention. Now I develop apps at UCSF to prevent diabetes and cardiovascular disease. As a former critical care nurse, I know patients need simplicity when dealing with difficult health issues. My challenge is to effectively apply ever-evolving digital technologies to patients' lifestyle changes. Our patients have had great success – they tell us so with great pride.

– *Yoshimi Fukuoka, RN, PhD '03*



UCSF NURSING STUDENTS



SAM LEE, RN, MA: Former public affairs officer, 4th Combat Camera Squadron, U.S. Air Force
GOAL: Family nurse practitioner



MARGEUX MARQUIS, RN: Former emergency department technician at St. Joseph Hospital of Orange
GOAL: Clinical nurse specialist in critical care/trauma medicine



BRIANNA SINGLETON, MPH, RN: Former student, University of San Francisco School of Public Health
GOAL: Adult-geriatrics nurse practitioner, with a specialty in occupational and environmental health



DIANA TENG, RN: Former teaching assistant, Cañada College's Human Anatomy Lab and Skyline College's EMT Skills Lab
GOAL: Adult-geriatrics nurse practitioner, with a specialty in occupational and environmental health



MAKENZIE WESNER, RN: Former teacher at the Victory Academy for autistic children in Portland, Ore.
GOAL: Pediatric nurse practitioner, with a minor in genomics



PALLIATIVE CARE

I work with UCSF patients with severe pulmonary disease who are chronically short of breath. I give them tools to manage the fear and panic that can set in when a breath doesn't come. I walk side by side with them so they can enjoy and optimize their lives. It's a very intimate specialty, one nurses were doing long before it was called palliative care. I have two patients I've known for years as part of a multisite Internet-based study. One is local, the other from Arizona. These people have phenomenal self-management techniques. . . . Any other patients would have died within six months. We recently went out to lunch so the two could meet for the first time. Sitting at a table with them – talk about chills down your spine. It was just beautiful.

– *DorAnne Donesky, RN, PhD '03*
(right)

DEAN, UCSF SCHOOL OF NURSING

My older brother developed mumps encephalitis at age 18 months; he was severely brain damaged, and my parents had to institutionalize him when he got too big for them to handle. There, they trained him to shave and take care of himself through operant conditioning, giving him a cup of coffee for each task he completed. My dad and I visited him every Sunday. Once, when he was about 16, we took him to McDonald's. He saw the coffee pot across the counter and just started climbing over. People grabbed their kids and ran. My dad and I were saying, "Don't worry, he just likes coffee." Nursing is how you care not only for my brother, but also for the family, given all the stigma and shame. It's a profession that goes beyond the patient in front of you to the family and population context. I brought that same perspective to Baltimore, when I founded and led for 20 years an ongoing HIV study of injection drug users that led to the city's first needle exchange. And I brought that perspective to our investigation of the wide reach of post-traumatic stress disorder after 9/11. Now, as dean, I am giving back to the profession by educating extraordinarily smart nurses who have a fire inside to advance nursing – at the bedside, in the clinic, and at the policy level.

– *David Vlahov, RN, PhD* (center)





SHOCKING STATS: Traumatic injuries – many from traffic accidents – kill more people worldwide than HIV/AIDS, malaria, and TB combined. Learn how UCSF surgeons and residents are training colleagues from hard-hit countries to save limbs and lives.



ROAD WARRIORS

A hard-working doctor at San Francisco General Hospital could be forgiven for overlooking a nearby watering hole known as the Homestead. With peanut shells on the floor and tastefully ironic boudoir paintings on the walls, the place could well be yet another Mission District hipster hole-in-the-wall.

But the Homestead is more than just a spot for bearded 20-somethings (and their omnipresent dogs) to unwind with their friends. In fact, the Homestead is the birthplace of UC San Francisco's Institute for Global Orthopaedics and Traumatology (IGOT), a small, innovative program with big, worldwide intentions. Sure, IGOT has a proper home in an elegant brick building at the hospital – a UCSF partner – but its heart and soul reside in Thursday afternoon sessions at the Homestead, where a handful of professionals conceived of the program eight years ago.

BY ZAC UNGER



More than 60 doctors from developing countries attend the IGOT training at UCSF each year.



RICHARD COUGHLIN started the program after seeing the impact of trauma in Central America and South Africa.

To understand the impetus behind IGOT is to confront some shocking statistics. Almost six million people worldwide die from traumatic injuries every year. That's more than are killed by HIV/AIDS, malaria, and TB combined. A quarter of those injuries result from traffic accidents, which far outstrip injuries from violence, war, suicide, or any other cause. By some counts, a quarter of all hospital beds in the world are occupied by victims of traffic accidents. The vast majority of those patients live in the developing world; in fact, the World Health Organization estimates that such countries lose up to 3 percent of their GDPs as a result of traffic accidents.

"The good news," says Richard Coughlin, MD, one of IGOT's founders, "is that we know how to fix these injuries. People in Tanzania have the same number of bones as people in San Francisco, and they fit together in the same way." What's different – apart from the sheer number of injuries – is the medical and cultural setting in which they are treated. Specifically, in the developing world, amputation is often the go-to solution for compound fractures and complicated soft tissue injuries.

"Amputation is culturally, functionally, socially, and economically horrible," explains Coughlin, a professor of orthopaedic surgery at UCSF. "It affects not only the

25-year-old who mangles his leg, but also his entire family, clan, and village, who have to take care of him." In the developed world, amputation is relatively rare, and those who must undergo it have access to physical therapists, advanced prostheses, engineering expertise, and legal remedies that make the world still navigable.

When UCSF orthopaedic surgery resident Amanda Whitaker, MD, traveled to mountainous Nepal, she noted that "the only way for a nonambulatory child to even get to a hospital is to be carried. And what happens when he gets too big to ride on his parents' backs?" In addition, social stigma against those with disabilities often rules out marriage for them, and people with orthopaedic traumas usually go from being breadwinners to burdens.

DEVASTATING EFFECTS

Coughlin first saw the devastating effects of trauma in the developing world in the 1990s, when he traveled to South Africa and Central America. "It kind of hit me," he says. "I started thinking it would be great for residents to have this experience. I wanted it to be a true rotation, not just coming over for a quick operation, smiles all around."

Moreover, Coughlin and his colleagues recognized that preventing amputations wasn't about access merely

TRAINING SAVES LIMBS

UCSF course, 2010-2013:

- » **160** doctors participated
- » **25** countries represented
- » **580-970** estimated amputations performed annually (prior to training)

One year later, the 2012 trainees reported:

- » **620** estimated flaps (limb-salvaging technique) performed
- » **574** flaps considered successful
- » **28** local colleagues taught flap techniques by course participants

to Western doctors, but also to the techniques they practiced. And so, over a series of conversations and beers at the Homestead, an idea took shape. Not only would this new program bring American medical students to the developing world, but doctors from those countries would come to the United States to learn surgical techniques that they could implement – and teach to colleagues – back home. In this way, the relatively small number of orthopods at UCSF would become force multipliers in the global fight against traumatic injuries.

True to Coughlin's dream, the international component is now a full and rigorous rotation, not just an adventure in medical tourism. UCSF orthopaedic residents can travel to one of five countries – Tanzania, Ghana, Malawi, Nicaragua, or Nepal – and spend four weeks working at a local hospital. In addition to performing surgeries and training local doctors, the residents are exposed to cases and conditions that they wouldn't normally see in the United States.

"One thing that drew me to UCSF was the opportunity for global involvement," says Whitaker, who was IGOT's first resident to travel to Nepal. "For me, it was an eye-opening experience. I saw young adults with untreated clubfoot that would be treated [in the U.S.] right when a child is born. By approximately six months of age, that child could be out of the cast and wearing special shoes. But in Nepal, a family might be unaware of treatment options or have no access to them. And so you see children 8, 9, 10 years old coming in with bad deformities who may have their potential limited by their condition."

While other medical schools now offer international

rotations for orthopaedic residents, UCSF's program was the first and is still the most developed. For young doctors like Whitaker, IGOT is a powerful recruiting tool, drawing top-notch talent away from other prestigious medical schools such as Stanford and Harvard. Today, 75 percent of UCSF's orthopaedic residents choose to participate in the international rotation.

And that participation has lasting effects. A study published in the *Journal of Bone and Joint Surgery* found that "participants were more likely than nonparticipants to believe that physicians have an obligation to the medically underserved." When compared with their peers at other residencies, IGOT participants were not only more likely to work internationally after completing their training, but also more than twice as likely to volunteer domestically. "There's a lot of gratification knowing that we can attract the best young minds to a highly sought-after specialty, and then add the values of humanity and social awareness," says Coughlin. "Our residents want to make a difference, not just make money."

SUMMIT SUCCESSES

But at the end of the day, some of IGOT's most important students aren't UCSF residents at all. Instead, they're the local orthopaedic surgeons in such far-flung locations as Mthatha, South Africa, and Kabul, Afghanistan. Each year since 2009, IGOT has hosted an international summit, during which more than 60 doctors from dozens of developing countries descend on UCSF for hands-on training.

"Even with all hands on deck, it's barely controlled chaos," says Amber Caldwell, the Department of Orthopaedic Surgery's director of outreach development. All 12 orthopaedic surgeons participate, as well as additional surgeons from general, plastic, podiatric, and vascular surgery. Most of the "students" pay their own way, and though they're often making their first trip to the United States, sightseeing takes a back seat to learning. "They're in the lab from 7:00 until 7:00," says Caldwell. "We pack as much information as possible into those three days, so there's not much downtime."

In particular, UCSF surgeons teach a plastic surgery technique known as a rotational flap that helps save limbs. "The real problem," according to Coughlin, "isn't fixing fractures. These guys are very good bone doctors. But the soft-tissue part is something they don't have as much experience with." With a compound fracture, "it's the soft



AMANDA WHITAKER treated children with clubfoot in Nepal as part of her residency.



SAAM MORSHED trained surgeons from across East Africa during the course in Tanzania.



Victims of traffic accidents occupy a quarter of all hospital beds in the world by some estimates.



THE HOMESTEAD, the gathering spot where it all began, donates to the program.

tissue around the injury that ultimately dictates functional outcome.” In the developing world, doctors often move straight to amputation rather than risk infection in the traumatized tissue.

Instead, using cadavers and simulation labs, the UCSF surgeons teach their foreign counterparts how to take muscle from a nearby, unaffected part of the body and redirect it where new tissue is needed. This “flap” generally remains attached to its initial location, so it comes with its own viable blood supply. If that’s not possible, a distant piece of tissue can be transferred and revascularized. These techniques are low-tech, low-risk, and relatively easily taught. Furthermore, the solution for a failed flap is amputation, no worse than what a patient would have faced in the absence of the flap procedure.

There is clear evidence that IGOT’s training has been successful (see sidebar on page 29). And beyond hundreds of amputations, inestimable pain, suffering, and economic woe have been prevented.

SHOW ON THE ROAD

After the success of the first few training summits in San Francisco, Coughlin realized that “we needed to take this show on the road.” Some of the Tanzanian doctors said that

they’d like to see the course taught not just in San Francisco, but also back home. “And they’re right,” says Coughlin. “That’s where it needs to happen. If we can make them the center of excellence for East Africa, we can explode the capacity.” Last year, Coughlin and his colleagues brought their course to Dar es Salaam, where American and African surgeons worked together, teaching surgical techniques to 123 doctors from all across East Africa.

One of the doctors helping to spread the knowledge is Edmund Eliezer, MD, an orthopaedic surgeon at the Muhimbili Orthopaedic Institute in Tanzania. “Our country is full of motorcycles,” he says, “often ridden very fast by riders with no experience. And so injuries are very severe.” Prior to attending IGOT training in San Francisco, Eliezer performed many more amputations than he wanted to. “With all of that exposed bone, we saw too much uncontrolled infection. But with flap surgery, we cover the bone, we prevent the infection, and we save the limb. Improved outcomes have been dramatic.”

Saam Morshed, MD ’01, MPH, PhD, an assistant professor of orthopaedic surgery, traveled to Tanzania with IGOT and was struck both by the patients he encountered and by the skill with which Eliezer and his colleagues treated them. “I saw a 22-year-old kid who’d had a

motorcycle accident resulting in a broken femur on one side and a hip fracture plus dislocation on the other,” Morshed recalls. The patient had been sitting in traction since the accident, with one leg five centimeters shorter than the other.

Eliezer very much wanted to learn how to fix this type of posterior wall acetabular fracture. “I was happy to teach him,” says Morshed, who is also a resident alumnus of UCSF. “But I usually deal with this [kind of] injury six hours after the accident, not six weeks.” Nonetheless, the two scrubbed in together and successfully reduced the hip and repaired the posterior wall. A year later, not only had the patient recovered from that injury, but Eliezer was performing similar surgery regularly.

“Now he’s doing more of those than I am,” says Morshed. “Probably more than anybody in North America. I have no doubt that Edmund will be one of the leading pelvic and acetabular surgeons in Africa. He’s going to train and empower generations of doctors to treat people they used to think couldn’t be treated.”

BACK AT THE HOMESTEAD

One recent afternoon, Coughlin popped open a Diet Coke and slouched down in his chair at IGOT’s offices in San Francisco. Thursday evenings are usually devoted to “research” at the Homestead, but this day’s surgeries were running long and Coughlin wouldn’t make it there. (Fortunately, the crowd at the Homestead soldiered on without him; owner Raub Shapiro donates a portion of happy hour sales and backroom party rentals to IGOT.)

After taking a call from the OR, Coughlin mused about what his program had accomplished. “To me, this is the pureness of being an orthopod, unburdened by paperwork and policies, just being able to alleviate suffering with my hands. Global road trauma is an atrocity every bit as bad as what we’re seeing in Syria and other war zones. But what we’re doing isn’t the Mother Teresa concept of simply handing out aid. We are global academic partners.”

Morshed, for his part, explains that he just got back from a stay in Dar es Salaam. There, he says, at the intersection in front of his hotel, a dozen men with missing limbs would hang out, begging for money to support their families. “They’re the ones who might have been successfully treated with appropriate cleaning and skeletal stabilization,” he reflects.

While it may be too late to help these particular men, doctors across Africa – and in the rest of the developing world – are rapidly mastering limb-saving techniques, thanks to Coughlin, Morshed, and other UCSF surgeons. “Ultimately, what we want to do is to make ourselves completely obsolete,” says Morshed. “That would be success.”

PHOTO: BRUCE DAMONTE



A NEW LOCUS FOR GLOBAL HEALTH

UCSF global health faculty, staff, and students now have a central place to call home: Mission Hall. Also known as the Global Health & Clinical Sciences Building, it opened for classes in early September. The spacious, airy building on the Mission Bay campus will also house the Office of the Chancellor and provide office space for many of the clinical faculty from UCSF’s School of Medicine who will take care of patients at the new children’s, women’s, and cancer hospitals.

UCSF chose the building’s design after holding a competition among top architectural firms; this concept was selected for its environmentally friendly use of natural light throughout, its intentional mix of quiet and collaborative workspaces, and its structural focus on creating more opportunities for interaction.

(Read more about Mission Hall on page 36.)



In honor of UCSF's 150th anniversary, we trace our battle with a disease – tuberculosis – that's woven into San Francisco's history, from our early public health partnership with San Francisco General Hospital to the research and training that have allowed us to take on the disease globally.

By Anne Kavanagh



It sailed in stealthily, like the fog.

Carried by the hordes eager to grab gold, tuberculosis began a frightening, infectious march through San Francisco in the mid-1800s. Known then as consumption, given the way it appeared to consume the body, or as white plague, given the ghostly pallor of its victims, the disease found a receptive new home in the wild West Coast city.

At the time, no one knew that tuberculosis spread through the air via microscopic droplets and that sneezing or coughing transported a bacterium capable of attacking the lungs of those who inhaled it. Many of the settlers lived crowded together in damp cellars or flimsy tents, amid a toxic mixture of diseases: cholera, diphtheria, leprosy, scurvy, smallpox, malaria. Illness and malnutrition weakened the immigrants' immune systems, allowing infections to thrive.

Consumption had already cut a wide swath of death down the East Coast earlier in the century. Effective treatment for the ancient disease remained elusive, so stymied physicians turned to natural solutions. Some recommended rest, others exercise; some a warm climate, others cold. A South Carolina surgeon whose wife was ill sought the mild winters of California – and also its gold.

UC San Francisco's 150-year battle against tuberculosis, and other infectious diseases, was about to begin.

Joining forces

That surgeon, Hugh Toland, MD, and his wife, Mary, reached Calaveras County in 1852. A few days after their arrival, Mary died and

Toland's subsequent search for gold proved fruitless. Starting over, he moved to San Francisco and, in 1864, launched a medical school that would bloom into UCSF.

One year later, a French military doctor, Jean Antoine Villemin, MD, demonstrated that consumption could be transmitted from humans to animals, revealing its contagious nature. In a win for the disease, the scientific community largely ignored this key discovery.

San Francisco, meanwhile, took aim at the city's atrocious health conditions with the construction in 1872 of a city and county hospital – which evolved into San Francisco General Hospital (SFGH); its primary mission was to care for patients with infectious diseases. "Nobody else wanted them," explains Professor Emeritus John Murray, MD, a pioneer in the field of modern pulmonary medicine, who arrived at SFGH in 1966.

UCSF's medical school struck an agreement to use SFGH as its clinical facility in 1873, a partnership that marked the start of a one-two punch against the scourge. It also began what would grow into a rich training arena, exposing students to patients from many cultures and myriad conditions. Even so, consumption continued to steamroll across San Francisco: Municipal reports in 1880 noted that tuberculosis mortality had climbed to 690 that year, from 223 in 1865.

Around this time, sanatoriums began gaining popularity in the United States as a way to offer patients rest and fresh air. "There was no other treatment," explains Murray. "Zero." Isolating consumptives in sanatoriums, however, did help prevent contagion.

A blow, but no knockout

One of the first cracks in TB's armor came in 1882 when a scientist identified *Mycobacterium tuberculosis* as the bacterium that causes the disease. In quick response, UCSF physicians began segregating patients with tuberculosis from other patients. The city also mobilized by enacting an ordinance prohibiting public spitting and another requiring registration of all TB patients, the latter a trailblazing step in public health.

Another chink in the disease's armor occurred with the 1895 discovery of X-rays, which allowed doctors to see abnormalities in the chest. "The news about X-rays spread like wildfire," says Murray. By 1905, physicians could precisely diagnose tuberculosis through primitive chest radiographs and by identifying tubercle bacilli in a patient's sputum.

But a dozen years after that promising advance debuted, the bubonic plague struck San Francisco. After workers at SFGH discovered

Serving on the front lines of care posed a risk: In 1933, one-third of medical and nursing students contracted TB during their rotations at SFGH.

that plague-infected rats were spreading the disease within the hospital, the city burned it to the ground. In a boost for patients with tuberculosis, the new SFGH constructed in 1915 featured nine TB wards that maximized sunshine and fresh air. Newspapers from as far away as New York trumpeted the facility as the finest of its kind.

And still, with no effective treatment, the disease's deadly march continued. In 1922, half of the TB patients admitted to SFGH died there. (A vaccine against TB was introduced in Europe in 1921, but its efficacy rates varied enormously and it was never widely adopted in the United States.)

Finally, in the 1930s, the number of tuberculosis cases in San Francisco began to decline, thanks to improving economic conditions; to the removal of contagious patients from the community; and to the availability of good care, good nutrition, and rest. TB's incidence dropped by almost 25 percent from 1905 to 1933.

For UCSF's trainees on the front lines of care, however, the progress posed a risk. As more young people reached adulthood without any exposure to the disease, one-third of medical and nursing students contracted TB in 1933 during their rotations at SFGH. By the mid-1950s, an average of 10 percent of medical students and young doctors had contracted the disease, prompting mandatory screening via skin tests and chest X-rays.

Triple threat: Drugs spur downfall

In 1944, scientists isolated *Streptomyces griseus*, which led to the production of streptomycin, the first antibiotic effective against tuberculosis. At exactly the same time, a second antituberculosis drug,

paraaminosalicylic acid (PAS), was discovered, but its acceptance was much slower than streptomycin's.

A tough microorganism, *M. tuberculosis* quickly developed resistance to both streptomycin and PAS. But in 1952, scientists discovered a "miracle" drug, isoniazid, or INH. They soon learned that combining the three drugs – a triple therapy – could regularly cure the disease. The regimen "changed TB from that moment on," says Murray.

Death rates dropped rapidly and dramatically. Sanatoriums around the nation shut down, and the TB wards at SFGH began emptying out.

With the success of these and subsequent tuberculosis medications in the 1960s and '70s, the locus of treatment shifted from the hospital to the community. A San Francisco physician, Francis Curry, MD, established satellite clinics throughout areas of the city with a high incidence of TB and set convenient clinic hours, giving rise to a compassionate, patient-centered approach to combating the disease.

War and AIDS spark resurgence

Then a conflict raging far from San Francisco shook the city's relative calm in the late 1970s – war. An influx of Southeast Asian refugees, many of whom had been living in squalid refugee camps under conditions likely to foster tuberculosis, started arriving in the city.

TB rates began climbing again, peaking in 1979. In response, the Department of Public Health's Tuberculosis Control Program hired a handful of people from the Southeast Asian community, including a medical student from Cambodia and a nurse from Laos, to work in the TB clinic at SFGH. "It was a very wise move," says Philip Hopewell, MD, a UCSF professor of medicine and a leading tuberculosis expert based at SFGH since 1973. "It met a lot of our language needs and gave us the cultural understanding to help people effectively."

In 1980, UCSF contracted with the city to provide clinical care for patients through the TB Control Program, which meant UCSF doctors would now be involved not just in care, but also in prevention and other public health efforts. "The concept was to merge an academic institution with a good, sound public health program to the benefit of both," says Hopewell, who is also a UCSF resident alumnus.

The timing proved fortuitous; in 1982, AIDS began to run riot through San Francisco. TB and HIV are a lethal mix; tuberculosis is the leading cause of death in HIV-infected individuals worldwide, according to the Centers for Disease Control and Prevention (CDC).

The TB program brought a solid foundation in community-based, patient-centered care to confronting this new threat. The TB and AIDS programs pioneered at SFGH worked closely together, successfully partnering with AIDS groups to develop screening and prevention programs, says Hopewell. San Francisco also had an advantage: the population most heavily affected by HIV was middle-class, gay, white men. Unlike many immigrants, most did not live under conditions that fostered TB and thus they remained relatively untouched.

So while TB rates did climb again in the city, peaking in 1993, the surge was smaller than in other parts of the country hit hard by AIDS. With the introduction of sophisticated antiretroviral therapies in the

SERVING THE CITY TOGETHER

- UCSF and SFGH: Partners since 1873
- All of the physicians at SFGH (about 450) are UCSF faculty
- Nearly 2,000 UCSF employees work at SFGH, alongside about 4,000 city employees
- About 350 UCSF trainees are at SFGH on any given day



The TB wards at SFGH maximized fresh air.

mid- to late 1990s, the number of HIV-positive San Franciscans with TB fell to near zero.

Rise of research and training

UCSF's partnership with the TB Control Program also created an excellent venue for training. Students, residents, and fellows who rotated through the TB clinic could gain rich experience both with the disease and with public health measures. A number have since gone on to leadership careers in the field and in public health, including Julie Gerberding, MD, MPH, former director of the CDC; Eric Goosby, MD, former U.S. Global AIDS Coordinator; Peter Small, MD, head of the tuberculosis delivery program at the Bill & Melinda Gates Foundation; Charles Daley, MD, chair of the World Health Organization (WHO) TB

TB continues to rage globally; approximately one-third of the world's population is infected with *Mycobacterium tuberculosis*.

advisory committee; and Richard Chaisson, MD, director of the Johns Hopkins Center for Tuberculosis Research.

The partnership enriched the research effort as well. Since the early 1980s, for example, UCSF faculty have been studying the epidemiology of tuberculosis, a daunting task. Most infected people never develop the disease – their immune system fights off the bacterium. Only about 10 percent develop active TB, but that can happen at any point during someone's life. "It's hard to connect the person with the source of the infection that may have been contracted 20 years earlier," Hopewell notes. But in the early 1990s, researchers began to use a sophisticated DNA-fingerprinting technique, plus contact-investigation

strategies, that harvested new knowledge on how tuberculosis spreads and progresses from latent to active disease.

Despite the progress – rates fell to an all-time low of 98 cases in 2010 – San Francisco still has one of the highest TB rates in the country. Among the reasons is a factor that hearkens back to the Gold Rush: The city remains an international magnet. Many immigrants are infected in their home countries but don't develop the disease until years later. San Francisco's large marginally housed population also contributes to its high rate of TB.

Going global

In other parts of the world, tuberculosis continues to rage. According to the WHO, approximately one-third of the world's population is infected with *Mycobacterium tuberculosis*. In 2012, the disease sickened nearly 9 million people and killed 1.3 million.

This stark global situation caught the attention of UCSF years ago. In 1994, UCSF opened the Curry International Tuberculosis Center – named in honor of Francis Curry – to develop and share state-of-the-art resources and perform research to eradicate TB.

The center is partnering with a number of countries to develop programs based on seminal work by Hopewell and other experts – a regimen known as the *International Standards for Tuberculosis Care*; it was developed, as a tool to help countries better manage the disease, by a consortium that included WHO.

Under Hopewell's leadership, UCSF researchers in Tanzania and Zimbabwe are studying multidrug-resistant tuberculosis and examining the transmission of the organism between people and animals. In Uganda, they are developing better diagnostic techniques. In India and Indonesia, investigators are trying to unite private doctors with public health efforts.

"We're taking what we learned in San Francisco," says Hopewell, "and applying it to the world."

UCSF Celebrates New Global Health Hub – A Means to a Larger End

Chuck Feeney likes to think big. UCSF's largest single benefactor, giving more than a quarter of a billion dollars to the University over the years, provided \$20 million in 2012, in partnership with General Atlantic, to help construct another game-changing new building at UCSF Mission Bay. Mission Hall, also known as the Global Health & Clinical Sciences Building, officially opened its doors on October 1 with a celebratory ribbon-cutting ceremony attended by more than 100 people, including Feeney; his wife, Helga; and UCSF campus leaders.

When fully occupied, Mission Hall will become home to some 1,500 professionals. It is yet another important stepping stone in Feeney's overarching vision for UCSF to become "one of the major biosciences research centers of the world," striving to improve health for people worldwide.

"We have a unique opportunity here in San Francisco to have a tremendous impact on global health," says Jaime Sepulveda, MD, DSc, MPH, executive director of UCSF Global Health Sciences. "With Mission Hall, Chuck Feeney has done so much more than help us to create a building. He has made a major investment in our global health community."

For the first time in UCSF's history, hundreds of global health faculty, staff, and students – previously dispersed throughout San Francisco – will unite under one roof, creating an optimal environment for collaboration and knowledge-sharing. With clinicians just across the street from Mission Hall, at the new

UCSF Medical Center at Mission Bay – which is on track to welcome its first patients in February 2015 – UCSF is poised to solve some of the world's most pressing health problems.

Below are some of the key programs housed at Mission Hall:

- **Global Initiative on Preterm Birth** seeks to reduce the number of preterm births – one of the leading causes of death in children under five – that occur around the world each year.
- **Bixby Center for Global Reproductive Health** advances solutions to the most urgent domestic and international reproductive health problems.
- **AIDS Research Institute** serves as an umbrella for more than 50 programs and laboratories, many of which are seeking ways to halt HIV.

Added to Feeney's lead gift was a generous \$1 million donation from the Herbst Foundation to name Mission Hall's Learning Commons space for students; this continues the foundation's long tradition of gifts supporting students and patient facilities at UCSF.

"There's no shortage of people who need help," Feeney once said. "There's always a market there." It seems, though, that Feeney is not content with just helping people. He wants to improve the lives of whole populations around the globe – and that's just what the newly relocated UCSF faculty, staff, and students at Mission Hall are driven collectively to accomplish.

(See page 31 for more on Mission Hall.)



From left to right: Haile Debas, founding executive director of UCSF Global Health Sciences; Chuck Feeney; Helga Feeney; Sam Hawgood, chancellor of UCSF; Mark Laret, CEO of UCSF Medical Center; and Jaime Sepulveda, executive director of UCSF Global Health Sciences.

Giving in Honor of Juliana



Juliana Peña's constant smile brightened the lives of everyone she encountered, even those who caught just a glimpse of her. In February 2012, when she was two and a half years old, Juliana died from a neuroblastoma, a rare pediatric cancer. "As she was taking her last breaths, I promised Juliana that we would never stop fighting for her," recalls her father, Jesus Peña. "And I promised that every day of my life, someone would say her name."

Peña and his wife, Patricia Watson, have been keeping their promise ever since. They started the Juliana's Journey Foundation to help find a cure for neuroblastoma and to support other families facing pediatric cancer. And they persuaded the California Senate to declare September as Children's Cancer Awareness Month.

The Juliana's Journey Foundation recently gave \$15,000 to UCSF's Kate Matthay, MD, a pediatric oncologist and an expert in neuroblastoma at Benioff Children's Hospital San Francisco. "We chose UCSF because we really liked the nurses and doctors we met during Juliana's treatment, and we knew Dr. Matthay is a big deal in the neuroblastoma world. She has been so welcoming and appreciative of everything we have done," says Watson.

The funding is enabling Matthay, who holds the Mildred V. Strouss Endowed Chair in Translational Research in Pediatric Oncology, and her research collaborator, Clay Gustafson, MD, PhD, to test different combinations of chemotherapy and molecularly targeted drugs on neuroblastoma cells. Their goal is to find a more effective treatment for high-risk cases like Juliana's. "I can't think of a more positive way to honor their daughter," says Matthay.

PHOTO: TOP RIGHT: CARMEN HOLT



Alumni Hub

More than 2,200 alumni and friends attended UCSF's Alumni Weekend at the Palace Hotel this May, making it the most successful alumni event in UCSF history. It not only drew a record turnout but also won a prestigious Council for Advancement and Support of Education Circle of Excellence Award.

In the pages that follow, we share stories from attendees, as well as snippets from tales that panelists told at the 150th Anniversary Breakfast. You can also read about a few truly inspiring UCSF graduates who are single-handedly improving health locally and around the world. —>

Make your hotel reservation now for Alumni Weekend 2015: May 29-30! www.ucsfalumni.org/aw

SCHOOL OF DENTISTRY



ANTHONY FERNANDEZ, DDS '86

Hometown: San Francisco, Calif.

Now: Sonoma, Calif.

Position: Dentist and owner of a dental practice in Santa Rosa, Calif.

Hobbies: Raising chickens and working on his tractor

Several years ago, Anthony Fernandez decided to completely change how he treated patients at his 26-year-old Santa Rosa-based dental practice. Instead of the usual brushing and flossing advice, he adopted a new approach to restoring a patient's mouth to optimal health.

That approach, developed at UCSF, is called CAMBRA, or Caries Management by Risk Assessment. Using CAMBRA, Fernandez evaluates a patient's risk of tooth decay, then recommends a prescription-strength toothpaste and rinse, when necessary, that work with saliva to remineralize the teeth. Fernandez is an enthusiastic convert to the CAMBRA methodology. He now drills less and says his patients are happier.

A third-generation Bay Area native, Fernandez is also working on local efforts to add fluoride to the Sonoma County Water Agency's water supply system. (It was UCSF Professor Howard Pollick who gave Fernandez's name to the Water Agency, Fernandez says.)

The father of three sons – Thomas, 27; Michael, 25; and

Andrew, 23 – Fernandez is also an active member of the American Dental Association, the California Dental Association, the Redwood Empire Dental Society, and the UCSF Dental Alumni Association.

STAYING INVOLVED: UCSF was an amazing place to go to dental school. I always go to the continuing education classes in San Francisco. I went to Dean John Featherstone's lecture, and as he was talking about CAMBRA, a lightbulb went on in my mind. I said, "Wow, this is real medicine. This is a way to look at your patients and get them healthy."

GETTING THE WORD OUT: Dentistry is restorative now. . . . It's always about fixing things. CAMBRA looks at what's protecting your teeth and what risks you have. We're thinking about how to get CAMBRA to the public. . . . We have to get the profession in on it. . . . Because of CAMBRA, I've never had more patients. I did it because I thought it was a right thing to do, but I got a bonus because my patients also think I am doing the right thing.

LOVE MATCH: My high school sweetheart and wife, Sally, plays a big role in my life. She is a retired pediatric occupational therapist and is currently assisting in the effort to make CAMBRA the standard of care. We are about to celebrate our 29th anniversary.

RAISING SONS: Our three sons were Eagle Scouts growing up. All three are Gators – SF State graduates. Thomas is in Chicago

working for Gensler, a San Francisco-based architecture firm; Michael works for Salesforce, a global customer relations management company; and Andrew works for Apple.

FROM THE ARCHIVES

"Early in the AIDS epidemic, the UCSF School of Dentistry initiated an AIDS specimen bank. It began small but subsequently collected and dispensed more than 600,000 specimens to researchers worldwide and continues as a vital international data source for AIDS research."

– Troy E. Daniels, DDS '67, MS '73, professor emeritus, UCSF School of Dentistry

“Reunions are a wonderful way for me to reconnect with my students.”



LEFT TO RIGHT: Annie Ko, Newton Gordon, Roberto Robles

Longtime UCSF faculty member Newton Gordon reveled in the chance to share a joke and a photo op with two former dental students, Annie Ko and Roberto Robles. “Reunions

are a wonderful way for me to reconnect with my students,” he says. He estimates that over the course of his 40-year career, he has taught as many as 4,000 students and residents.

IN THE BARRIO: “Dr. Gordon taught us oral surgery,” says Robles, who attended the School of Dentistry after earning his undergraduate degree at UC Santa Barbara. “What I learned from him at dental school has been very important in my practice. We perform a lot of surgeries in Bayamón.”

CLINICS REVISITED: Annie Ko and Roberto Robles were among some of the first dental students to take classes in the then-new UCSF Dental Clinics Building at 707 Parnassus Avenue. “I hadn’t been on campus for years,” says Ko, who attended her 30th reunion with her husband, UCSF alumnus Karl Bingemann, DDS ’83. “Roberto and I were in our second or third year when the new clinics opened. As we walked around this time, everything felt new and not new.”



c. 1975

ANNIE KO, DDS ’84

Hometown: Los Angeles, Calif.

Now: Torrance, Calif.

Position: Private-practice dentist, Redondo Beach, Calif.

Hobbies: Running; gardening; and strolling with her husband and Gracie, “the wonder pit bull”

NEWTON GORDON, DDS, MS

Hometown: Falmouth, Jamaica

Now: Oakland, Calif.

Position: Clinical professor emeritus, UCSF Department of Oral and Maxillofacial Surgery

Hobbies: Supporting nonprofits and minority professional associations and mentoring under-represented minorities in college and professional school

ROBERTO ROBLES, DDS ’84

Hometown: Bayamón, Puerto Rico

Now: Bayamón, Puerto Rico

Position: Private-practice dentist, Bayamón, Puerto Rico

Hobbies: Serving as a Scout leader, walking Old San Juan, and “studying” Hammock 101

SCHOOL OF MEDICINE

**KATIE WILLIAMS MONDAVI,
MD '84,
RESIDENT ALUMNA****Hometown:** San Rafael, Calif.**Now:** St. Helena, Calif.**Position:** Primary care medicine and marketing for the Charles Krug Winery**Hobbies:** Hiking, cooking, and traveling

Katie Williams Mondavi travels to the Tanzanian bush for a month each year to treat patients afflicted with everything from malaria to injuries suffered in safari vehicle crashes. When she returns from East Africa to Napa, she heads to her marketing job in her family's famous wine business, Charles Krug.

Williams Mondavi has long bridged the two very different worlds of wine and medicine, which has made for a busy life ever since she married Peter Mondavi Jr., an heir to one of the country's oldest winemaking businesses. For years, while raising the couple's two children, Lucio and Lia, Williams Mondavi worked as a doctor at the Napa-based Clinic Ole, a community health center founded in 1972.

Four years ago, she started working with FAME, the Foundation for African Medicine & Education, a nonprofit medical relief organization co-founded in 2002 by Frank Artress, MD. After meeting Artress through friends, Williams Mondavi, who had also served on the clinical faculty of Stanford Medical Center and as an assistant clinical professor at UCSF, trained to join him in Tanzania.

With Lucio now at Stanford studying mechanical engineering and Lia attending Harvard, Williams Mondavi plans to spend more time in Tanzania.

OLD-SCHOOL MEDICINE: One of the reasons I started to go to Tanzania is that medicine is practiced there the way it was in the U.S. 20 years ago. It's much

more hands-on, much less about technology. You have to take a good history and do a thorough exam to diagnose what's wrong. There's one MRI machine in the northeastern part of the country. When I went there the first two times, there were very few lab tests available and there is still no X-ray. You have to rely on your clinical skills.

LEARNING ON THE JOB: I had incredibly good training at UCSF. For medical school and my residency, I did as much work as possible at SF General, where I was on the front line. The responsibilities you had there forced you to learn fast. I think it's a wonderful program.

A FAMILY AFFAIR: For many years, I had nothing to do with

the family business. I worked at Clinic Ole, a community clinic predominantly serving migrant vineyard workers without health insurance. . . . I [now] work in the marketing department for Charles Krug. I edit the customer newsletter, write a newsletter for our employees, and work in special events.

SHARING A BOTTLE: I like the fact that wine brings people together. You can relax and enjoy a good meal while talking to each other. That's my favorite part of the industry. It's a slow, traditional business of old-world practices, both romantic and interesting.

FAVORITE WINES: In summer, Charles Krug Sauvignon Blanc. With a steak, our Vintage Selection Cabernet Sauvignon.

“The innovation in medical education these days is remarkable.”



LEFT TO RIGHT: Anthony Molina, James Guadagni

Though their paths never crossed in medical school, Jim Guadagni and Anthony Molina enjoyed examining a “patient” together during this year’s tour of the UCSF Kanbar Center for Simulation and Clinical Skills Education. “I couldn’t believe how realistic the models were – or how expensive,” says Molina. “The innovation involved in medical education these days is remarkable. When I

was at school, we adopted the see one, do one, teach one approach to learning.”

PATIENT CARE: Molina recently underwent a second hip replacement at UCSF Medical Center, and he says the procedure has greatly improved his quality of life. “I had the top-notch Dr. Vail take care of me. I was amazed at the brilliance of UCSF’s nurses and house staff. I have only good things to say about my patient experience.”

INNOVATION: Guadagni uses the UCSF reunion to keep informed about pioneering medical technologies and devices. “I practice medicine in a rural setting,” he says, “and so the weekend was an amazing opportunity for me to learn what’s new in the medical world – in particular, the latest state-of-the-art medical equipment.”

**ANTHONY MOLINA,
MD '78**

Hometown: Whittier, Calif.

Now: Salinas, Calif.

Position: Retired physician, Health and Psychological Services, California State University, Fresno

Hobbies: Cycling and traveling

**JAMES GUADAGNI,
MD '79**

Hometown: Burlingame, Calif.

Now: Visalia, Calif.

Position: Private-practice orthopaedic surgeon

Hobbies: Coaching water polo, snow skiing, and taking photographs

FROM THE ARCHIVES

“Perhaps the most compelling story from the live liver donor program ... concerned a young man about to get married three months hence. His father, ill with hepatitis C, was not well enough to attend the wedding. The son, realizing this, donated the right lobe of his liver to him, which meant his father could be there.”

– Nancy Ascher, MD, PhD, transplant surgeon and chair of surgery, UCSF School of Medicine



c. 1988

SCHOOL OF NURSING

**DEBORAH DACUMOS,
PhD '96****Hometown:** The Philippines**Now:** San Francisco, Calif.**Position:** San Francisco Veterans Affairs commissioner and retired U.S. Army nurse**Hobbies:** Playing the piano, gardening, and hiking

Deborah Dacumos believes every injured soldier's story must be told, a conviction that has shaped her work in healing, whether in the U.S. Army or on the San Francisco Veterans Affairs Commission.

Dacumos' 38-year career as a civilian and military nurse meant a life of travel – from her first job in South Korea, where she was deployed to a 250-bed army hospital, to a stint at Walter Reed Army Medical Center in Washington, D.C., where she oversaw the maternity unit.

Upon her return to the Bay Area in 1987, she supervised clinical services for soldiers and their families at army hospitals in Sunnyvale and Oakland. As a deputy commander of clinical

services, Dacumos helped her unit deploy soldiers and surgical teams to Afghanistan after the 9/11 terrorist attacks.

A love of research led Dacumos in the 1990s to the master's and doctoral programs in nursing at UCSF. Her PhD work focused on the link between cortisol levels in pregnant women and premature labor. "Both [UCSF Professor] Mary Dallman and Clemens Kirschbaum [a professor at the University of Trier in Germany] opened their labs to me, and they were just fantastic people," Dacumos says.

Now retired, Dacumos serves as a San Francisco Veterans Affairs commissioner, a role that gives her input on policy related to services for veterans, including social and

economic assistance programs and medical care. She also volunteers as a medical team member for Lourdes pilgrimages, traveling with sick or wounded veterans and their families.

She and her husband, Kenneth, have two grown children – son Simeon, 32, and daughter Rachel, 22 – and a granddaughter, Malayah, who is 12.

HEALING BODY AND SPIRIT:

My main focus is the health and well-being of veterans. Since 9/11, we've had deployments to Afghanistan and Iraq. Soldiers have come back home broken [in body] and wounded in spirit, with severe PTSD. In my role as a commissioner, my job is finding how to take care of vets and their families.

LOOKING FOR ANSWERS: When I came back from Korea, my [four-year-old] nephew, Eric, was diagnosed with leukemia. I wanted to know "Why did Eric have cancer?" From 1985 through 1987, I worked at the National Institutes of Health, where a world-renowned oncologist had a protocol for Eric's type of cancer. That doctor eventually became a consultant for Eric's medical decisions. Eric survived. He's almost 38 now.

SPIRITUAL CONNECTIONS: I've volunteered to bring wounded and sick veterans, from WWII to today, on spiritual pilgrimages. Often they have not resolved what happened to them at war or allowed themselves to tell their stories. There's a moral injury that happens when we don't address their pain.

“This was our first experience of alumni reunion weekend.”



LEFT TO RIGHT: Mary Lou Dentinger, Catherine Dentinger

“Both my mom and I are UCSF alums,” says Catherine Dentinger. “This was our first experience of alumni reunion weekend. I heard the photographer saying ‘I need pictures,’ and I thought it would be fun to have our picture taken together.”

CATCHING UP: Catherine Dentinger enjoyed learning about her classmates’ interesting careers. Not that she hasn’t pursued an interesting career

of her own. She joined the Epidemic Intelligence Service at the U.S. Centers for Disease Control and Prevention (CDC) shortly after graduation and has worked as a nurse epidemiologist in Romania, Alaska, India, and other faraway places. Still with the CDC, now assigned to the New York City Department of Health and Mental Hygiene, she says she recently decided to “jazz things up” by earning an MPH at Columbia University.

UCSF OUTREACH: With seven children, Mary Lou Dentinger didn’t have the time to travel to San Francisco to earn her nursing degree. Fortunately for her, during a brief period in the 1970s, UCSF ran an off-campus nursing program at California State University, Sacramento. “It was wonderful,” she says. “You could specialize in the young adult or the elderly. I chose young adult, which suited me because I had all these young people at home to practice on.”

MARY LOU DENTINGER, MS ’76

Hometown: Buffalo, N.Y.

Now: Lincoln, Calif.

Position: Retired public health field nurse, Sacramento, Calif.

Hobbies: Music, reading, and fun and games

CATHERINE DENTINGER, MS ’94

Hometown: Carmichael, Calif.

Now: Brooklyn, N.Y.

Position: Epidemiology field officer, U.S. Centers for Disease Control and Prevention

Hobbies: Biking, hiking, and hanging out with friends



c. 1992

FROM THE ARCHIVES

“During World War II, we increased the numbers of students admitted to the school. Limited space resulted in moves from room to room. One senior skit night, a class satirized the situation by having a student push a laundry cart loaded with possessions across the stage after each skit. It ended with her living in the cart.”

— Marilyn Flood, RN, MS ’69, PhD, School of Nursing faculty member and associate dean emerita (on the far right)

SCHOOL OF PHARMACY

**E. LEONG “EDDIE” WAY,
BS '38, MS '40, PhD '42**

Hometown: Watsonville, Calif.

Now: San Francisco, Calif.

Position: Professor emeritus of pharmacology, toxicology, and pharmaceutical chemistry

Hobbies: Golf and dancing



The first PhD graduate of the pharmaceutical chemistry department, Eddie Way has a long history with the UCSF School of Pharmacy. Upon graduation, he stayed on as a teaching assistant before moving on to work first for Merck in New Jersey and then for George Washington University in Washington, D.C. In 1952, he came “home” to UCSF. Starting as an assistant professor, he worked his way up through the ranks and served as chair of pharmacology and pharmaceutical chemistry from 1973 to 1978. Nine years later, he was named an emeritus professor.

Opioid research marked his career. He was a pioneer not only in studying opioids, but also in furthering society’s view of addiction and addicts. Way recognized early on that addiction is a disease, and that knowledge became a driving force for him in changing both attitudes and public policy.

Way was married to Madeleine Li Way from 1944 until she died in 2000. They have two children, Eric and Linette.

GROWING UP IN WATSONVILLE: My father came over from China when he was eight years old, and by the time he was 18 he was the richest man in Watsonville. Over the course of 10 years, he

and my mom had eight children. I was born in 1916. Originally, Watsonville was known for growing strawberries, but my dad started packing and drying apples; 1926 was a banner year, but my pop guessed wrong on the price of apples. We lost everything. That’s when we moved to San Francisco.

INFLUENTIAL MENTORS: There are several professors I remember from when I was a student at UCSF: John Oneto, Troy Daniels, and Chauncey Leake. During the Depression, I worked outside jobs, and I had trouble keeping awake in Chauncey’s class. He was a beautiful lecturer – powerful voice. But one afternoon, Chauncey stopped lecturing and said, “Will

someone wake up that young man?” He bawled me out for being rude. After class, I sneaked out and ran away. Later, when I was at Merck, I got a letter from someone at George Washington University who wanted to recruit me to pharmacology. Well, my degree isn’t in pharmacology, so I tried to brush him off. Chauncey had recommended me for the job. He’s one of the few who had the greatest influence on my career.

PROUD TO BE A UCSF GRADUATE: I have watched the School of Pharmacy come up in stature. In all my time at UCSF, I’ve observed the profession grow under each dean. The school was always number one, and it still is.

“The band was excellent... People just had a wonderful evening.”



Mahtab Jafari loves dancing, which is why she had so much fun at the All-Alumni Kickoff Reception. “The band – Lavay Smith & Her Red Hot Skillet Lickers – was excellent,” she says. “I think the great music had a lot to do with the reception’s success. People just had a wonderful evening.”

ACADEMIA: Jafari says what she likes most about working in academia is that she is constantly interacting with students. “I

always learn new things from my students,” she says. At UC Irvine, she created the UC system’s first undergraduate major in pharmaceutical sciences – now the second-largest major at UCI. Jafari also runs her own basic-science research lab, which she admits is unusual for a PharmD. Her goal is to extend the human life span and improve health; she is currently investigating the impact of botanical extracts on the life span of fruit flies, insects which genetically are very similar to humans.

STRONG TIES: Jafari, who celebrated her 20th reunion at this year’s homecoming, sits on the board of the UCSF Pharmacy Alumni Association, and her friends joke with her that she never really left UCSF. Even though she is now based in Southern California, she doesn’t stay away from the campus for too long. “I fly up for board meetings every few months,” she says. “Once you are at UCSF, you are always at UCSF. I can’t help feeling that way – it’s like family.”

MAHTAB JAFARI,
PharmD '94, RESIDENT
ALUMNA

Hometown: Tehran, Iran

Now: Irvine, Calif.

Position: Associate professor of pharmaceutical sciences and director of the Pharmaceutical Sciences Undergraduate Program, UC Irvine

Hobbies: Hiking, scuba diving, and skiing

FROM THE ARCHIVES

“For more than 100 years, our student recruitment materials boasted that we were the first college of pharmacy established west of the Mississippi River ... until an irate, stickler-for-detail dean at the St. Louis College of Pharmacy informed us that his college was eight years older and was founded on the west bank of the Mississippi River.”

– *Bob Day, BS '58, PharmD '59, former School of Pharmacy faculty member and associate dean (in cap and gown)*



c. 1959

GRADUATE DIVISION

**LAURA ELIAS, PhD '08**

UCSF Graduate Program: Neuroscience

Hometown: Aspen, Colo.

Now: San Carlos, Calif.

Position: Principal, Boston Consulting Group, San Francisco office

Hobby: Cross-country skiing

As a UCSF graduate student, Laura Elias worked in the lab of Arnold Kriegstein, MD, PhD, the director of the Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research. There, she helped conduct groundbreaking studies of the neocortex. Those discoveries led to a cover article in the journal *Nature* that examined how brain stem cells migrate to the proper place in the brain, a mechanism that may also play a role in some diseases. After earning her PhD, Elias completed a postdoctoral fellowship at Stanford.

Yet despite her success in the lab, Elias' career shifted away from research in 2011, when she pursued an opportunity with the Boston Consulting Group (BCG). At the BCG, she continues to focus on health care and supports biopharma clients on a broad range of projects, including evaluating acquisitions, managing partnerships, and developing drug-launch strategies. "I loved science and my experience at UCSF," she says. "But I wanted

to accelerate the tangible impact of those discoveries."

AN INFLUENTIAL MENTOR: The person who most significantly shaped my experience at UCSF was my thesis advisor, Arnold Kriegstein. UCSF is one of those places where you find a group of incredibly smart people who are motivated for the right reasons. It was an exciting place to work and Arnold was, for me, the epitome. . . . He was constantly thinking about doing great science, building out the stem cell program, spearheading the efforts on the new building, and getting the right resources to attract top faculty. On top of all that, he was a dedicated mentor. It was inspiring and a lot of fun to see the amazing research and also the growth of the institution.

SOLVING TOUGH PROBLEMS: There are a couple things I love about my job at the BCG. I'm always learning here, and the people I get to work with and the types of projects are amazing. . . . You pack all these projects into a year or two, step back, and it's incredible what you've been able to touch and the tough

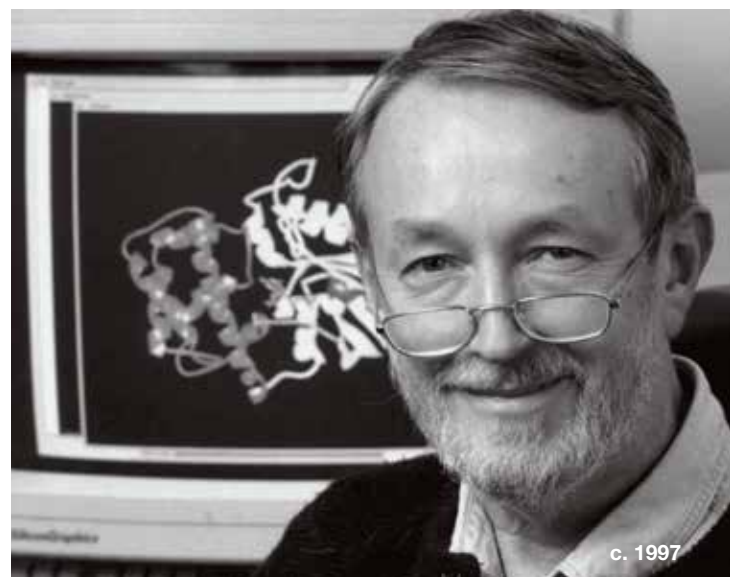
problems you've been able to help solve.

A GLOBAL HEALTH PERSPECTIVE:

Part of my experience at the BCG has been working with major global health organizations, such as the Bill & Melinda Gates Foundation. There is a major effort to eradicate polio, and a year or two ago I was involved in that effort. The BCG as a firm is committed to nonprofit and global health work, so I have the option to be

involved in that kind of project on a regular basis.

FAMILY CONNECTIONS: I met my husband, Guillermo Elias [PhD '08], at UCSF. I was working in a lab at the time, and he was a graduate student in neuroscience. We met playing indoor soccer, and he helped recruit me to the neuroscience program.



c. 1997

“One of my former students organized two tables in my honor at this year’s gala. It was wonderful.”



LEFT TO RIGHT: Frank Lee, Leslie Benet

“Frank’s one of my former [graduate] students,” says Les Benet. “He organized two tables in my honor at this year’s reunion gala – all students and postdocs [from Benet’s lab]. It was wonderful.” Tables at the Graduate Division Gala Dinner are organized around interest areas like entrepreneurship or in honor of mentors like Benet.

Lee worked hard to make 2014 a special reunion for Benet. “I called

many of my old classmates to invite them to the dinner, and we ended up with full tables,” he says. In the photo, Lee is holding a copy of the September 2013 issue of the *Journal of Pharmaceutical Sciences*, which was dedicated to Benet. “A whole bunch of people wrote papers in my honor,” says Benet. “I gave Frank a signed copy.”

Benet is listed by Thompson Reuters as one of the most highly cited pharmacologists worldwide,

with his published peer-reviewed papers cited more than 20,000 times. Extremely humble about his own achievements, however, Benet takes great pride in the accomplishments of his students. “It’s very gratifying to see how many of them have gone on to do really outstanding things,” he says.

“Frank was my 20th graduate student,” adds Benet. “I’ve had 52 PhD graduates and 117 postdocs. But who’s counting?”

FRANK LEE, PhD '87

UCSF Graduate Program: Pharmaceutical Chemistry

Hometown: Taipei, Taiwan

Now: Bedford, Mass.

Position: Retired vice president, Millennium Pharmaceuticals

Hobbies: Hiking

LESLIE BENET, PhD '65

UCSF Graduate Program: Pharmaceutical Chemistry

Hometown: Cincinnati, Ohio

Now: Belvedere, Calif.

Position: Professor of bioengineering and therapeutic sciences, UCSF Pharmaceutical Sciences and Pharmacogenomics Graduate Program

FROM THE ARCHIVES

“In the early 1970s, as basic research shifted to the forefront at UCSF, Stan Prusiner was an intern in the Department of Medicine. During Stan’s exit interview, Holly Smith asked him, ‘What next?’ Stan told him the first thing he was going to do was throw his stethoscope as far into the bay as he could. Holly said, ‘I think that’s an excellent idea.’”

— Henry Bourne, MD, postdoctoral alumnus, professor emeritus, and former chair of pharmacology



Maurice Horton, UCSF Pharmacy Student and BMX Champion

BMX World Championships, Rotterdam, Netherlands, July 2014

Horton started competing in BMX, as bicycle motocross is known, at the tender age of 4. His 20-some years of practice paid off in May, when he careened and jumped and spun his way to victory in the 25-to-29 age group of the men's Cruiser Class event at this year's BMX National Championships in New Mexico. He followed that feat

with another triumph, placing in the top 10 at the World Championships in the Netherlands in July. When not pedaling furiously around a track, Horton studies drug development in the School of Pharmacy. He was drawn to the profession by his frequent visits to the hospital for "little injuries here and there." Hard to imagine.

PHOTO: JERRY LANDRUM

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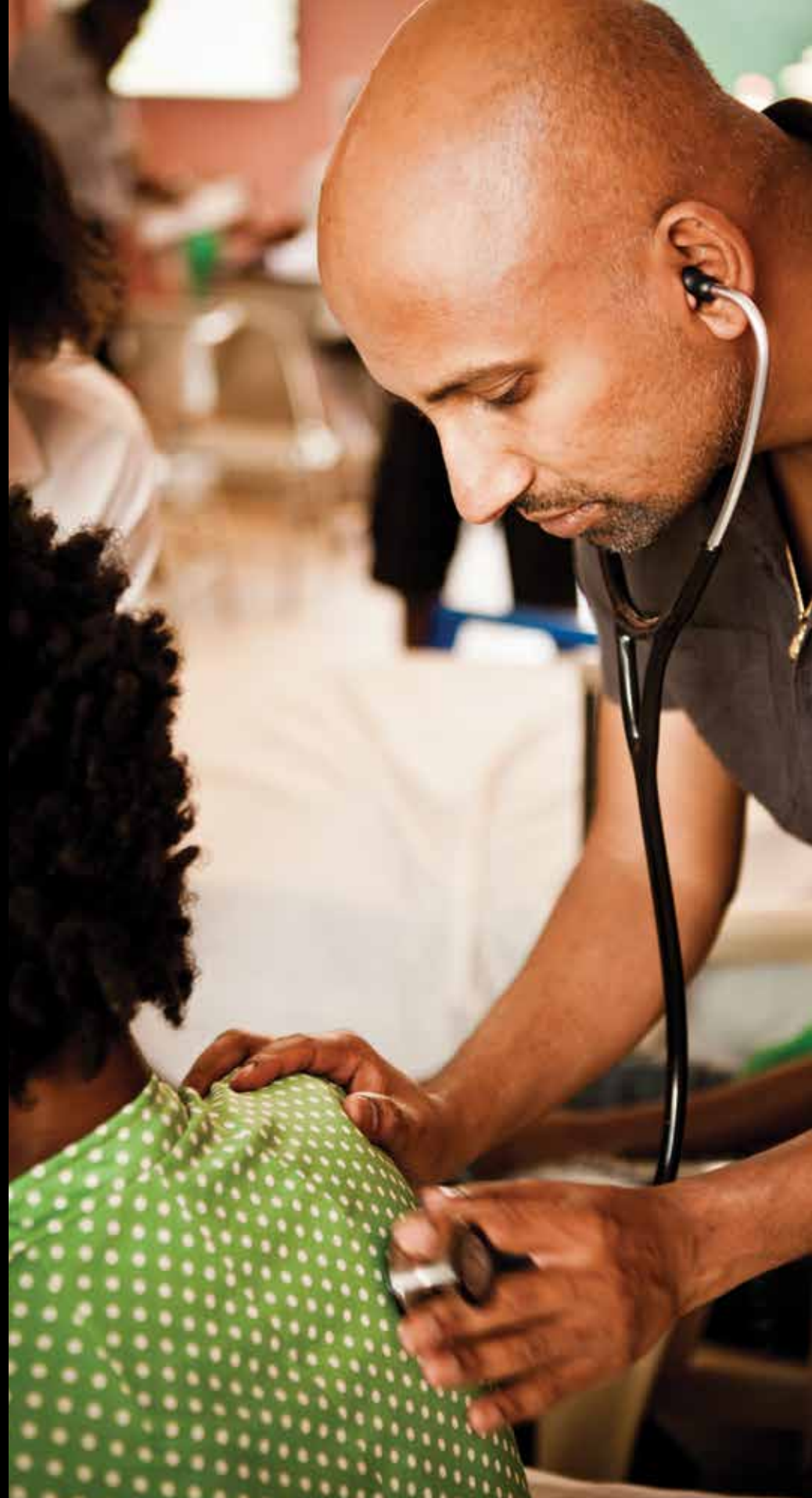
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