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On the cover: Illustrator Harry Campbell visualizes the role of artificial intelligence in the quest to stem the tide of diabetic retinopathy.
When migrant farm workers returned from up to six months of seasonal farm work, the clinic got so busy that patients often waited more than four hours to be seen. Long lines caused some patients to miss the last bus home and prevented others from receiving care at all. Additionally, the aging grandparents who cared for the migrant workers’ young children while they were away were unable to travel to the clinic without an escort to help manage the long wait. Diabetes and high blood pressure—diseases that can impair eye health—were common. But instead of treating these conditions, the stories revealed, doctors were simply referring patients elsewhere. Reticent to lose precious time and a day away from work to travel to a different clinic, patients didn’t follow up.

LVPEI responded quickly to the findings. An administrative manager at a rural clinic approached the public transport office about relocating the bus stop to a more easily accessible location. Now, the bus stops right at the hospital doorstep. Over tea in the hospital canteen, the same manager befriended the bus driver and explained some of the challenges facing the patients. The small act of kindness has turned into a tradition and today drivers routinely enjoy tea or coffee while they wait for patients to finish their evening appointments.

To address overcrowding, the Center of Excellence—the education facility at the top of the pyramid—increased enrollment in its fellowship program during the dry summer months, when migrant workers returned home. That way, more of the fellows—the young doctors who staffed the secondary centers while they train in subspecialties—could be posted during the facilities’ busy season.

The long waits quickly disappeared.

In the immediate aftermath, Rani and her team provided doctors with refresher training on diabetes and hypertension care, and implemented simple checklists and management protocols at all five secondary centers.

Roughly half of the ailments affecting the 29 million people India classified as “disabled” fell into one category: eye problems. In response, the nonprofit UV Prasad Eye Institute (LVPEI) developed an elaborate health network to bring much-needed eye care to the country’s massive rural population, where exposure to ultraviolet rays, insecticides, and diet-related diseases lead to sight degeneration and early cataracts. At the base of the pyramid-shaped system, resident emissaries go door-to-door to identify neighbors who have trouble seeing, then dispatch partners to local vision centers for screening and referrals to or secondary, ophthalmic-staffed regional centers for common treatments like cataract surgery. More complex procedures are available at expert-care centers higher up the pyramid. It’s a system that would be the envy of any country in the world, except for one—Russia.

Wilson, who earned both her MPH and PhD at Berkeley’s School of Public Health, suggested using PhotoVoice, a photography and story-centered communication tool that enables community members to identify and document issues themselves rather than answering prescribed survey questions. Now, she says, if she needs a qualitative tool, she’ll only use PhotoVoice.

Findings in survey-based studies, she says, “will never match what we did in PhotoVoice. It goes to the root cause of problems. It doesn’t just ask questions—you facilitate and you listen and you try to understand. Not only the problems but also the solutions come from the participants. This is very powerful.”

The improvements yielded results. In 2013, the secondary centers provided care to an additional 2,000 patients per year. Each year thereafter, the numbers grew by another 2,000 patients, with clinics nearing capacity by 2018.

Schor calculates that the clinic sees about 20,000 patients a year now, and that 10-15% of these patients are also screened or managed for vascular diseases, like diabetes and hypertension. “That’s a lot of previously undiagnosed or untreated people. [The LVPEI team] ended up doing much more than bringing in patients. They actually broadened the service,” he says. “They’re doing something that’s profoundly reducing risk of vision loss.”

“It’s just remarkable,” Wilson says. “We wouldn’t have found out any of this with a questionnaire.”

Not all the findings could be so expediently addressed. The project brought widespread alcoholism to light, but intervention beyond pre-registration referrals was outside the facility’s scope of care. Social disparities like impassable road conditions in poorer remote areas continue to make access to healthcare more difficult for some people. Often challenges, like providing income for elderly relatives, disappeared when transportation and seasonal overcrowding were improved.

Rani, who was the lead author on “Envisioning Eye Care from a Rural Perspective: A Photovoice Project from India,” published in the October, 2017 issue of International Quarterly of Community Health Education, had led several qualitative studies that used the standard methodology. Now, she says, if she needs a qualitative tool, she’ll only use PhotoVoice.

“Space, the Final Frontier!”

The 2018 magazine also features 2007 alumnus and inventor Tim Trinh, and the incredible work of faculty member Jorge Cuadros. As the world around us continues to advance telemedicine, trung, EyeNAC and Berkeley Optometry’s Digital Health Clinic have quietly been running one of the state’s largest telemedicine operations. Find out who Google turn to when they need strabismus expertise and how your money is driving change that greatly improves the experiences of our optometry community.
IN VIEW

OptometryNews

This summer, Drs. Emily Cooper and William Tuten returned to Berkeley to join our research faculty, and Dr. Zeynep Basgoze came on board as a postdoc in Dr. Cooper’s lab. Our new clinical faculty are Drs. Sivash Assar, Dara Auyeung, Tran Bianconi, Nicholas Chan, Vikram Girn, Celia Gong, Emily Gorski, Sandra Harpster, Katherine Lai, Karen Molina, Timothy Ng, Teresa Nguyen, Crystal Wang, and Meng-Hua Wu. Please also welcome Donald Knauss to our optical faculty. Mayra Canela is our new patient services supervisor. Meg St. John, assistant dean, and Nhung Nguyen, coordinator, are the newest members of our Admissions and Student Affairs staff, while Luis Ruiz, director of financial planning and analysis, and Patrick Richards, director of clinic financial planning and analysis, have joined our finance team. We also welcome our new librarian Debbie Jan.

Welcome all!

Community Clinics

Berkeley Optometry has partnered with off-campus community clinics around the Bay Area where students and faculty provide vision care services to underserved patient populations. For many, it’s their first opportunity for an eye exam. Our goal is to provide valuable clinical training for our students as they serve those segments of the local population who have only limited access to health care due to lack of health insurance, low income, disability, or other restrictions.

Community Clinic Locations

Marin Community Clinic, Novato

More Community Clinic, San Rafael

Marin Community Clinic, Novato

LightHouse for the Blind and Visually Impaired, San Francisco

Lighthouse for the Blind and Visually Impaired, San Francisco

Alameda Health System, Hayward

California School for the Blind, Fremont

West Oakland Clinic, Oakland

Oakland University Health System, Oakland

Community Clinic Locations

8 Number of Community Clinics

20,000 Number of patient encounters at all community clinics combined per year

17 Number of faculty working at the clinics

75 Number of students working at the clinics

12,064 Clinic hours per year

Clinic Facts

Your Eye is a 576 Megapixel Camera

According to planetary scientist Dr. Roger Clark, if the human eye were a digital camera, it would have 576 megapixels. The iPhone has 12. But there’s a caveat: the eye works differently than a single-frame camera. In fact, as Berkeley Optometry’s Dr. Austin Roorda points out “each eye has only about 1 million wires (ganglion cell axons) connecting the eyeball to the brain—in effect making it a 1 megapixel detector.” So why the huge difference? Only a small part of the retina—the fovea—samples the scene with high resolution. The eye constructs an image in the brain over time by scanning the scene. But do we actually record and store all that information when we scan a scene? “Not even close,” says Dr. Roorda, “we generally scan the most salient parts of the scene and take in only what we need.”

Source: www.clarkvision.com

Overheard

“This facility and the superb staff literally saved my life—or at least my brain’s life! A successful outcome and full recovery, all thanks to the watchful eyes of Dr. Bansal and the superb and very detailed services of Meredith W. Morgan UC Eye Center. I owe them my life.”

Patient Josh M. was having persistent vision fatigue, double vision, dull headaches and tiredness that his regular docs could not solve. Berkeley Optometry’s Dr. Surbhi Bansal took charge and noticed that Josh was struggling to process visual information. She urged a consult with a neurologist. An MRI and angiogram confirmed an arteriovenous dural fistula that would require immediate surgery before an aneurism or a stroke took place.

Welcomes

This summer, Drs. Emily Cooper and William Tuten returned to Berkeley to join our research faculty, and Dr. Zeynep Basgoze came on board as a postdoc in Dr. Cooper’s lab. Our new clinical faculty are Drs. Sivash Assar, Dara Auyeung, Tran Bianconi, Nicholas Chan, Vikram Girn, Celia Gong, Emily Gorski, Sandra Harpster, Katherine Lai, Karen Molina, Timothy Ng, Teresa Nguyen, Crystal Wang, and Meng-Hua Wu. Please also welcome Donald Knauss to our optical faculty. Mayra Canela is our new patient services supervisor. Meg St. John, assistant dean, and Nhung Nguyen, coordinator, are the newest members of our Admissions and Student Affairs staff, while Luis Ruiz, director of financial planning and analysis, and Patrick Richards, director of clinic financial planning and analysis, have joined our finance team. We also welcome our new librarian Debbie Jan.

Welcome all!”
Optometry Side Hustles

Dig a little deeper and you’ll find that optometrists have outside interests and passions as varied as the patients they treat. And not surprisingly, they apply to these pursuits a professionalism and moxie that garners impressive results. We are a spirited group! Based on a not-so-scientific survey, here are our top ten optometry side hustles.

1. **Astronaut**
   Larry DeLucas, OD, PhD, is Director for the Center of Structural Biology and a professor at the University of Alabama at Birmingham. Dr. DeLucas flew as a payload specialist on the Space Shuttle Columbia in June 1992.

2. **Resort Owner**
   Celeste Paz, OD ’93, voted what would become Crystal Paradise Resort, Spa and Winery in 1997 while on a medical mission trip to the Philippines. Dr. Paz was deeply impressed with the simple, natural pristine beauty of Palawan and fell in love with a special spot by the ocean, a 12-hectare coconut grove, blessed with good water, tropical fruits and sandy beaches.

3. **Pilot**
   Warren DeHaan, OD ’96, is a Federal Aviation Authority (FAA) certified flight and instrument instructor. He also regularly consults to the FAA as an expert in the field of human visual perception factors. Dr. DeHaan is currently a member (honorary) of the Flying Physicians Association, and a recipient of their Distinguished Service Award.

4. **Mayor**
   Larry Zadnik, OD ’81, became assistant dean and clinical faculty member Larry Zadnik, OD ’81, supported himself during optometry school by working as a city of Berkeley police officer. We’re sure that the halways of Minor Hall were never safer! He went on to be Police Commissioner for the City of Kensington.

5. **Tequila Maker**
   Adolfo Murillo, OD ’93, is a third-generation tequila maker, grows agave on his family ranch in Agua Nueva, Mexico. Dr. Murillo’s tequila, bottled under the name Alquimia Tequila, are all USDA certified 100% organic. And it’s good too! Alquimia Tequila has won a total of 54 Gold Medals in the two most prestigious international spirits competitions and was voted World’s Best Tequila by Business Insider. It’s a Federal Aviation Authority (FAA) certified 100% organic. And it’s good too! Alquimia Tequila has won a total of 54 Gold Medals in the two most prestigious international spirits competitions and was voted World’s Best Tequila by Business Insider.

6. **Police Officer**
   Former Assistant Dean and clinical faculty member Larry Zadnik, OD ’81, supported himself during optometry school by working as a city of Berkeley police officer. We’re sure that the halways of Minor Hall were never safer! He went on to be Police Commissioner for the City of Kensington.

7. **Macaron Master**
   Before being accepted to Berkeley, third-year student Tin Tran worked as a waiter. Next to the restaurant was a boba shop that sold macarons. Tin spent his break buying their Fruity Pebbles macarons. One day, he decided to make his own, and hasn’t stopped baking yet. He now packages and sells his creations—such as Creme Brulee, Ube Coconut, Matcha Oreos, and Chocolate Ganache—under the name Bottagia Time.

8. **Farmer**
   After retirement, Weylin Eng, OD ’95, and his wife took up farming. Together, they own two farms near Davis, CA, producing a bountiful—and healthy—crop of chestnuts, walnuts, and plums, which are sold locally at Berkeley Bowl and at Bay Area farmers’ markets. According to Dr. Eng, who is the former Berkeley Optometry Assistant Dean of Clinical Affairs, walnuts and chestnuts contain antioxidant properties, which may help with dry eye symptoms. To explore the nut-eye connection, he and Dr. Kay Ryugo of UC Davis have established an endowment for further research.

9. **Watercolorist**
   In 2012, Karla Zadnik, OD ’81, Dean of The Ohio State College of Optometry, was diagnosed with breast cancer. She had signed up for a watercolor class long before that diagnosis, and few months later, after 30 radiation treatments, she started posting a painting each day on Facebook, accompanied by an inspirational quote, mostly to count down the treatments for family and friends. Now, a cancer survivor, she posts a painting and quote each week.

10. **Doggie Wear Designer**
    Jamie Totsubo, OD ’82, currently practices in San Francisco, Japanese, and is the founder of Home Wear for Dogs—a handmade line of clothing for dogs. She began her sewing endeavors making costumes for her daughter’s ice skating performances, and continued her love for sewing by making outfits for her dog, Home. Dr. Totsubo sells her pieces at the Japanese-American Museum, online, and at craft shows.
We've hacked the Instagram accounts of four Berkeley Optometry students to give you an exclusive behind-the-scenes look at their lives.

STUDENTS

Joey Tran | CLASS OF 2019

“Summer going into 4th year is the hardest change of optometry school. You go from seeing these faces every day…”

“...to being on your own and FaceTiming only when you’re not tired and have time after clinic.”

Jessica Nguyen | CLASS OF 2021

“We’re all smiles after volunteering to give eye exams in Jamaica!”

“ Just some happy OptoBears at their first Cal football game! Go Bears!”

Ali Jensen | CLASS OF 2020

“We’re all smiles after volunteering to give eye exams in Jamaica!”

“Sweaty bears representing Berkeley at the Optometry Cares annual 5k.”

Lauren Ogata | CLASS OF 2020

“Cheering for Fiona at Quiz Bowl with our Under the SEE theme”

“Berkley Optometry CE and Alumni weekend celebration.”

“Optoiks enjoying the great outdoors. Yosemite rocks!!!”

Send your images to us at optweb@berkeley.edu
STUDENTS: QuickFacts

A look at the class of 2022: who they are, where they come from and how they got here.

## Class of 2022

### Applicants
- 239 Applications
- 127 Interviews
- 63 Students matriculated

### Undergraduate Institutions
- 12 University of California–Berkeley
- 11 University of California–Los Angeles
- 8 University of California–San Diego
- 7 University of California–Davis
- 3 University of California–Santa Barbara
- 2 University of Washington
- 1 University of Minnesota

### Student Profile
- 38 students who took a year or more off
- 25 students who entered straight from undergraduate
- 22-36 Age Range
- 15 Opto-Camp Alums

### Academics
- 3.08-3.97 Overall GPA range
- 3.48 Average GPA in Bio, Chem & Physics
- 3.60 Average Undergrad GPA
- 354 Average Score on the OAT

### Out-of-State
- 9 Out-of-State
- 54 California

### Applications
- 239
- 127
- 63

### Interviews
- 127

### Matriculated
- 63

### Undergraduate Institutions
- 12
- 11
- 8
- 7
- 3
- 2
- 1

### California State University
- Fullerton
- Northridge
- Sacramento

### Other Institutions
- California State University
- University of Illinois
- University of Maryland
- University of Miami
- University of Michigan
- University of Ontario Inst of Technology
- University of Pennsylvania
- University of San Diego
- University of Texas, Austin
- University of Toronto
- UW Ontario
The Flowering of an Entrepreneur’s Cannabis Vision

BY TOM LEVY

Students with start-ups are as common at UC Berkeley as blue and gold “Cal” T-shirts. But likely only one—Kaleb Asfaha, a PhD candidate in Vision Science at the School of Optometry—is applying his years of analytical chemistry experience and mass spectrometry skills to opening a pharmaceutical-grade lab capable of certifying the purity and safety of legal cannabis in California.

Kaleb has temporarily set aside his nearly finished dissertation on Chlamydia trachomatis, a bacterium that can cause a blinding disease called trachoma, to found Merso Labs Inc. Once licensed by the state’s nascent Bureau of Cannabis Control, Merso plans to fire up its mass spec instruments sometime in November.

Kaleb has thrown himself into the project, networking with cannabis business people, finance gurus and venture capitalists. He says he has raised about $500,000 from friends and family, and has half a dozen VC companies ready to pay between $5 and $8 million for a stake in his budding business, located in Santa Barbara County.

“I’m a product of the UC system,” says Kaleb, 35. “And UC Berkeley is the cherry on top. They’ve carried me all the way, from where I come from in East Africa, through poverty in America, toward a PhD and becoming an entrepreneur in California.”

With two degrees in chemistry—a BA from the University of California, Santa Barbara and an MS from San Francisco State University—this native of Ethiopia and California resident since 2000 is a Golden State immigrant success story. Kaleb’s PhD advisor, Dr. Karsten Gronert, picked him up on his energetic and independent spirit right away. “It immediately became apparent he was entrepreneurial, a big picture thinker,” says Dr. Gronert. “His chlamydia project was driven by a vision he had, to try to understand something about the disease and maybe down the road, to bring something helpful back to Ethiopia.”

Kaleb bootstrapped his chlamydia project, an unusual topic for Dr. Gronert’s lab, which specializes in ocular lipid research, by connecting directly with Dr. Deborah Dean, a prestigious longtime chlamydia researcher at Children’s Hospital Oakland Research Institute. Together they traveled to Ethiopia where Kaleb spent five months collecting human samples for his dissertation.

But the grueling PhD process Kaleb began in 2013 took a toll. With Dr. Gronert’s blessing, he took a break in the summer of 2017. That’s when the cannabis testing idea, planted in his mind by a friend’s comment more than a year before, took root. He ran numbers with his sister, an accountant, and was blown away by the business potential.

The city of Lompoc, once known as the flower seed capital of the world, is now processing Kaleb’s application for a cannabis testing lab license. He says he has leased a 2,300 square-foot building there, optioned another 5,000 square feet of space immediately adjacent and hired an architect to design the lab’s layout. He also says he has an exclusive testing contract, with one of the area’s largest cultivators, that could potentially generate annual revenue in the tens of millions of dollars.

Meanwhile, Kaleb is negotiating acquisition of a set of mass spectrometry instruments, each of which can cost from $400,000 to $700,000. They will be the heart of the highly automated, rapid analysis system he’s building. The company will eventually test samples from hundreds of 50-pound batches of cannabis for potency and for the presence of impurities such as pesticides, fungal mycotoxins, heavy metals and bacteria. To protect cannabis consumers, new California law requires that cannabis products sold by licensed vendors meet minimum safety standards for potency or be destroyed.

It’s the culmination of Kaleb’s experience at companies like Dow, Novartis and Genentech, as well as the mass spectrometry expertise he picked up in Dr. Gronert’s lab. “I took the tools and techniques he learned in the PhD program and saw how to apply that to this niche market, analyzing and certifying now-legal marijuana,” says Dr. Gronert.

And Kaleb is grateful for the opportunity. “The most important part was Karsten; he’s a great mentor,” he says. “He’s tough on you, he doesn’t let you slide on things. He makes you work hard; he makes you really understand things. He’s probably my biggest critic and my biggest supporter at the same time.”

But getting to this moment has not been easy. Kaleb has paid some dues. When he was 8, political turmoil, including a coup d’etat, forced him and his family to give up their comfortable life in the Ethiopian capital, Addis Ababa, where his father was a government official.

When the dust settled, Kaleb, his mother and four siblings ended up struggling to pay the rent in the Washington, DC suburbs. His parents had split, and later divorced, and his father headed to the U.K. to pursue a graduate degree.

In the DC suburbs of Maryland’s Montgomery County, Kaleb got into good schools, but began running with a bad crowd. At 14 his mother sent him to live with his father, who had returned to Ethiopia where he was prospering. It was a big wake-up call.

“It made me realize how important education was,” he says. “I went from living in a DC neighborhood suffering from poverty and violence to spending a year in a loving welcoming country where racism almost doesn’t exist, watching my father succeed because he had university degrees.”

That kick in the pants gradually awakened Kaleb’s drive to succeed. At 16 he was sent to live with relatives in California, which he found a “paradise” he’s called home ever since. Since then his parents and four siblings have all settled in the Santa Rosa area of California, where for the past decade his mother has run Abyssinia, an Ethiopian restaurant.

While Kaleb says his parents don’t approve of marijuana, they do support his business venture. “They’re really proud of it,” he says. “And they’re really proud of me and are really rooting for me and want me to succeed. My parents like the fact that I’m helping make cannabis safer.”

But for Kaleb, always looking ahead, Merso Labs, which takes its name from his mother’s maiden surname, is just the beginning. Once he has the lab up and running he plans to complete his PhD. And if the lab succeeds, he hopes it may finance his move into the medication delivery device business, especially for delivering medicine to the eye, the human organ he still finds most fascinating.

“I’m a product of the UC system, and UC Berkeley is the cherry on top. They’ve carried me all the way, from where I come from in East Africa, through poverty in America, toward a PhD and becoming an entrepreneur in California.”—Kaleb Asfaha
Recently, when we talk about the things we know we’re often just as likely to mean the information stored in our pocket as what resides in our brains. With Wikipedia, Google, and that website with the song list for every Grateful Dead concert in history, sometimes it seems like our need for personal knowledge is becoming obsolete. Is the data on the Internet perfect? Probably not. But then again, anybody who has ever lost her keys or forgotten an anniversary knows that the human brain is also subject to the occasional limitation.

BY ZAC UNGER

Big Data Takes On Diabetic Retinopathy

Harnessing the power of artificial intelligence to prevent blindness

BY ZAC UNGER

When our own health is the subject of discussion, however, most of us prefer that medical diagnoses be handled by doctors rather than computers. But what if we could combine the massive data-crunching power of a computer with the intuitiveness and hands-on skills of a well-trained clinician? Dr. Jorge Cuadros, Assistant Clinical Professor at Berkeley Optometry, is doing exactly that as he fights to stem the tide of diabetic retinopathy, a widespread and rapidly proliferating condition that is one of the greatest worldwide threats to eyesight. Some estimates place the prevalence of diabetic retinopathy at about 100 million cases worldwide. In cutting-edge collaborations with Google, the California Health Care Foundation, and Kaggle—a crowdsourcing website for data and statistics competitions—Cuadros and his colleagues are harnessing the power of Big Data to vastly expand the numbers of patients reached and the amount of vision preserved.

Diabetic retinopathy is a scourge that can affect anyone with elevated levels of sugar in their blood, though it primarily impacts people who have had diabetes for many years. In the United States it is the leading cause of blindness for people between ages of 20 and 64. In the early stages of the disease, the small blood vessels of the retina are damaged, as the condition progresses unchecked—and often unnoticed—even by the patient—the vessels of the eye weaken and become leaky. In the final stage the lack of blood flow and oxygen causes the retina to grow new vessels that can bleed or cloud over the retina. Patients will experience spotty, dark, blurred and generally reduced vision. Eventually, sufferers may be left in total darkness.

Fortunately, treatments for diabetic retinopathy are readily available and often successful. Laser treatments, injections, and even surgery are possible if the disease is caught in time. The single most important factor is ongoing management of blood sugar, especially in the early days of the disease. But treatment can only follow detection; most patients can barely find the time to visit their primary care physician, much less an optometrist, in order to screen for a condition that often has no symptoms. While a family doctor might suggest screening for diabetic retinopathy, most general practitioners don’t have the specialized skills to do it themselves as part of a regular visit.

As far back as 1994, Dr. Cuadros began attempting to solve this problem using telemedicine to diagnose eye diseases from afar. In the early 2000’s, Cuadros and
only about 20% of people diagnosed with serious diabetic retinopathy actually performed the appropriate follow-up or treatment with a specialist. Dr. Nwando Olayiwola, Associate Clinical Professor at UC San Francisco and Chief Clinical Transformation Officer of RubiconMD, has worked with Cuadros for years setting up cameras in clinics, and says “we have a lot of day workers and migrant farmers in California and if they take a day off work for a visit, that has a real impact. Getting them back a second or third time can be impossible or impose real socioeconomic hardships.”

Cuadros’ long experience with clinics provided him with over three million high-resolution images of retinas, both healthy ones and those with various degrees of diabetic retinopathy. Cuadros and others began to think about how computers could be trained to recognize diabetic retinopathy instantly, without the time-consuming step of sending the image out to a flesh-and-blood doctor. The concept was that if you fed enough images into a computer, an artificially intelligent algorithm would eventually train itself to be expert at recognizing the signs of diabetic retinopathy. The idea was exciting enough that it was explored by the non-profit California Health Care Foundation and, later, Google, whose mission statement—“to organize the world’s information and make it universally accessible and useful”—seems particularly valuable when turned towards preventing blindness.

“Within one to five years we should find it prevalent in a much more diverse set of eyes into his database. ‘People are not going to change with algorithms.’ As far as being replaced, Dr. Olayiwola isn’t concerned that clinics are about to become obsolete; she believes that “high quality automation could be an important modality for many populations that struggle with diabetes” but for whom the burden of too many visits to specialists was prohibitive. “There is tremendous potential for patients with barriers to mobility, financial hardships, or language barriers. The potential is enormous.” As far as the future of medicine, she says, “Our goal, always, is that artificial intelligence will be used to help engage people in their care.” To that end, Dr. Cuadros provides primary care clinicians with resources and educational materials to help them interpret results for their patients and refer them to specialists.

But no matter how far the technology spreads, Cuadros is clear on one thing: “we’re not just interested in the red light, green light scenario and getting a diagnosis and having that be the end of it. We need to always guide this in a way that’s going to be patient centric.” Artificial intelligence will be used to help engage people in their care. “It could be incredibly valuable to have the computer recognize patterns and perform quality control without the expense of seeing a doctor, and reserving the visits to the eye doctor for those that are most essential.”

As much promise as artificial intelligence shows for screening patients in the United States, the potential in the developing world is even greater. Dr. Cuadros and his EyePACS colleagues have large screening projects in Mexico, Colombia, and Armenia; they’re also done work in Guyana and Djibouti. One additional advantage of this global reach is that Dr. Cuadros is able to incorporate a much more diverse set of eyes into his database. “People come in all different colors and confonnations,” he says. “In the past, some databases were very European and monochromatic. If you train your algorithm on just one color, then it’s not going to perform well across the board with everybody.”

Whether the algorithm is set loose in the United States or abroad, Dr. Cuadros is adamant that the focus always needs to be on the patients, not the technology. “Our goal, always, is that artificial intelligence will be used to help engage people in their care.” Artificial intelligence will be used to help engage people in their care.

By Wyatt Tellis, a colleague from UCSF, developed a non-proprietary web-based application called EyePACS (Eye Picture Archive Communication System) in which non-proprietary web-based application called EyePACS

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What Happens to Your Eyes on Mars?

Astronauts who spend long periods of time in the microgravity of space risk permanent damage to their vision.

By Eric Craypo

In Ray Bradbury’s classic dystopian sci-fi novel “The Martian Chronicles,” colonizers from Earth journey to Mars to escape war and nuclear armageddon at home. Published in 1950, Bradbury’s Mars is an oasis of gardens, canals, and sparkling cities. Absurdly, upon arrival the rocketeers from Earth quickly discard protective space suits to take in the fine Martian weather. This past summer, Mars came within 35.78 million miles of Earth—closer than it’s been since 2003. Seeing Mars shine so brightly in the night sky, it’s easy to imagine a day in the near future when humans touch down on the red planet. But instead of an earthly paradise, astronauts will encounter a world that is horribly inhospitable to humans; average temperatures are eighty degrees below zero, winds of toxic dust regularly rake the planet, and a murderous atmosphere that is 95% carbon dioxide would kill in minutes. Presumably, even these formidable challenges could be mitigated by underground living quarters and protective suits. However, a vexing and poorly understood barrier still stands in the way—astronauts who spend long periods of time in the microgravity of space risk permanent damage to their vision. Dr. John Flanagan, professor and dean at Berkeley Optometry, who spent ten years investigating the biomechanics of the eye in collaboration with Dr. Ross Ethier while at the University of Toronto says “it is vital that we understand the pathophysiology of the vision loss that can be experienced by astronauts. It is potentially the biggest barrier to future space exploration.”

It’s been known for decades that changes in vision can occur in space. John Glenn, the first American to orbit the moon, had “space anticipation glasses” at the ready in his capsule. Later, flight doctors began to notice vision changes in post-flight exams, and a NASA-sponsored survey of 300 astronauts found that “about 25 percent of short-flight and 49 percent of long-flight astronauts said they had experienced problems with both near and distance vision during their missions.” Most of the time, with short flights such as the Apollo and Space Shuttle missions, which typically lasted two weeks, the changes went away once the astronauts were back on earth. That changed with longer missions. When the International Space Station became available, instead of two weeks in space, astronauts were flying missions of six months or longer. In a 2018 Washington Post article, astronaut John Phillips described looking out of the International Space Station window to see a blurry planet Earth—a surprising result considering that he left Earth months before with 20/20 vision. Tests after the mission showed that his post-flight vision was 20/100 and that “the backs of his eyes had gotten flatter, pushing his retinas forward. He had choroidal folds...his optic nerves were inflamed.” Eventually his vision improved to 20/30, but it took six months.

“What we are talking about is called ‘Spaceflight Associated Neuro-Ocular Syndrome, or SANS, and it’s a big concern for NASA,” says Dr. Ethier, professor of biomedical engineering at the Georgia Institute of Technology. The syndrome affects astronauts who spend extended time in microgravity. “We think the threshold is about one month in space,” says Dr. Ethier, who is the project lead in a collaboration with the NASA Glenn Research Center to better understand why astronauts are experiencing eye issues, and what can be done to prevent it. A NASA report on the risks of SANS shows that some astronauts experience “hyperopic shift, cataractous spots, choroidal folds, optic disc edema, optic nerve sheath distension, and posterior globe flattening with varying degrees of severity and permanence.”

But while we can test for and measure the host of eye issues impacting astronauts, we are less sure why it’s happening. A leading theory is that pressure in the head is causing the issues. On Earth, gravity pulls fluids away from our heads and into the legs. This does not happen in the microgravity of spaceflight. As a result, fluid is more evenly distributed throughout the body, and astronauts get swollen heads. “If you look at photos of astronauts in space, you’ll see their faces and heads are swollen,” says Dr. Ethier. Dr. Ethier believes this theory—that SANS is due to increased cranial pressure—is close, but too simple. “It looks most similar to idiopathic intracranial hypertension, but it’s not a perfect match in terms of symptoms when on earth. Nobody really knows what the pressure is from.”

So what can NASA do to prevent SANS? One countermeasure being considered for long voyages will be familiar to fans of Stanley Kubrick’s film “2001: A Space Odyssey,” where parts of the Discovery One spaceship slowly spin around, creating artificial gravity. Ethier explains that putting people in a similar centrifuge and gently spinning them around, creating artificial gravity. Ethier explains that putting people in a similar centrifuge and gently spinning them keeps more fluids toward their feet could help, but it is unknown how long people would need to spin to prevent the sort of pressure that is damaging to the visual system. Computer models may provide additional answers. Ethier’s team is incorporating existing clinical research data into functional models to see how fluids might move around the body and what happens to the eye in microgravity.

A trip to Mars could take nine months. Once there, astronauts will need to contend with a gravitational pull that is only 38% of Earth’s—extending time spent in an environment that puts an incredible strain on the eye. It’s a sobering reminder that humans have evolved to thrive on Earth—take them out of that environment for long periods of time, and things can go awry. With the excitement over images of Martian sunsets and robotic rovers, it’s easy to forget that a Mars mission can only succeed if we understand how to keep our explorers healthy—and seeing well. Dr. Ethier sums up the problem, “If you send an astronaut on a long mission, it won’t be too good if they can’t see when they get there.”
Tell us about the moment you knew that optometry was for you.

A. When I started UCLA undergrad, I really didn’t know what I wanted to do. I met my future wife during a chemistry lab and she knew what she wanted to do with her life. She was a Biochemistry major, looking to become a future pharmacist. Being a typical guy, I decided to follow the girl and realized if I had any shot at a future with her, I would have to make something of my life. So, six months into dating, I declared Biochemistry as my major and stopped by the career center, went through a bunch of fliers and decided that I was going to be an Optometrist! So that was the time that I chose the profession, but if you are asking when I knew I made the right choice, I fell in love with the profession my first rotation at the Veteran’s Hospital in Pasadena my fourth year. Patient after patient was a challenge and my preceptors were grilling me left and right. I loved the challenge and I really felt like I was making an impact on people’s lives. So a girl got me into optometry, but my passion was found while I was in school!

Q & A WITH TIM TRINH, OD ’07

What do you enjoy most about owning your own practice?

A. As an employee, you need to worry about yourself and your patient. As a practice owner, your decisions in your practice not only impact yourself, but every single member of your team. There is an obligation to make the practice successful not only for personal gain, but to help create future opportunities for the team. So the growth of the practice really depends on creating a self-sufficient, motivated team and creating a culture within the practice that is conducive to nurturing these characteristics. The dynamics of learning how to coach, inspire and guide our team members is what I enjoy. It is beautiful to see team members push past hurdles, overcome and succeed. No amount of money or success can ever replace the joy you get when positively impacting another person’s life.

What are the hidden challenges to being a business owner?

A. Prioritizing the most important aspects in my life. When I started the practice I pooled everything into it to make it a success. At some point, the business became an integral part of who I was and this was a blessing and a curse. Everyday that I wake up, I look forward to starting my day. There is never a day where I say, ugh I don’t want to go into the office. I had plenty of those days when I used to be an associate doctor right out of school. No, the challenge of business ownership is that because there is so much time, money, blood and sweat invested, the business becomes a major part of you! This becomes especially difficult when life happens around you, i.e. getting married, having a family, and taking vacations!

Q. In addition to seeing patients, you are an inventor. How did you come up with the idea for the Meibox Meibographer?

A. I wanted to start a dry eye clinic in the office, but the technology to diagnose and treat Meibomian Gland Dysfunction wasn’t financially feasible for a practice of our size. I wondered why the diagnostic device that was available at the time was close to $40,000. So when I researched the science behind Meibography, I realized it wasn’t extremely difficult to duplicate. Fate had it that our neighbor Amy Huang also happens to be a schoolmate from Berkeley Optometry. During dinner, her husband, Dr. Huang, and I shared discussing the frustrations of the cost of the current devices, despite the fact that the technology was not that complex. It happened that Andy was an engineer and the company he worked for utilized a lot of the same technologies that would be necessary for us to design a camera system. I described a vision of how the device would work in a clinical setting and we came up with a form-factor that would minimize the equipment footprint, increase efficiency and utilize all the newest technologies available including the cloud database and storage. Our thought was to create a device that would just be for use in my office, but as we developed the device and posted pictures on OD social media sites, we got such rave reviews that we realized we had a market. The best part is that like Apple or any good start up, we pretty much started in the garage and are now being distributed internationally!

Q. Managing a startup company and caring for patients require two very different skill sets. How has your experience as an OD influenced your approach to running this new business?

A. Believe it or not, there are a lot more similarities than there are differences. Being an optometrist is about connecting to your patient and taking care of people. Running a startup business like Box Medical is really no different. It’s a matter of being responsive to our doctors and distributor needs as well as connecting with people on a personal level. Whether it’s running a practice or a medical device company, it boils down to working as a team to deliver the highest level of care and service. The secret to success as an OD and a business owner is trust, commitment and passion.

How did your time at Berkeley help prepare you for the work you’re doing now?

A. I’d have to say learning from all the professors, even the ones that I didn’t work with you’re doing now?

A. I’d have to say learning from all the professors, even the ones that I didn’t work with. Having spent four years in Optometry school I was crushed. I think one of the things that really drives me to work each day and excel is the hope to honor the sacrifices that he made to provide us a better life and to honor his memory.

Q. What are your most proud of?

A. Six months into owning the practice, I got married and left for my honeymoon with only $1000 left in the business bank account. During my honeymoon, I wondered whether the practice was still going to be there when I came back. I remember sitting down with an ophthalmologist who was also starting a practice in the area around that time and he asked me what I was hoping to do with the practice. I told him that one day, it would be a multi-doctor location with sub specialties practicing full scope optometry. Here we are today, we now have 3 doctors, 12 staff and a locations pursuing a vision to really elevate the care delivered by our optometry practice.

What is your favorite Berkeley Optometry memory?

A. Berkeley was absolutely amazing place where there was such a familial feel among my classmates and professors. There was this unspoken level of respect for all of the professors at Berkeley, but what made the place special was being able to share a beer with them.

Q. If you could go back in time, and give yourself advice as an optometry student, what would you say?

A. Don’t stress the small things and enjoy your time. Go out to more Double Vision Bar Nights. Maybe pay a little more attention in Binocular Vision.

Q. On the weekends you can be found…

A. Hanging out with kids at the parks, changing diapers and cooking for the week, completing the honey-do list. Go out drinking.

Q. What travel destinations or adventures are you on your bucket list?

A. Japan, Australia, Maldives.

Q. What were your top 3 most played CD’s as an optometry student?

A. Michael Bublé, Cold Play, Marvin 5.

Q. What is your spirit animal and why?

A. Raha, never really thought of this. Well, in high school, my high school teammates would call me a horse. According to google here, as a totem animal, a horse jumps through the hurdles of life. I’d say that is a fair assessment.

Tim talks about the challenges of being a business owner, the inspiration behind his practice and the role his parents played in his success.

Owner of All EyeCare Optometry, a two-location practice in the Los Angeles area, Dr. Trinh is also CEO at Box Medical Solutions.

Fall 2018 21
Our recent grads are out in the real world making a big impact. See where they ended up.

**Taras Litvin**  
**OD 2009, PhD 2016**  
**WORK:** Chief of Optometry at UCSF Medical Center and member of the clinical faculty at the Department of Ophthalmology, UCSF.  
**HOME:** Novato, CA  
**WEB:** ucsfhealth.org

Dr. Litvin sees patients in clinic at UCSF, works with a talented group of ODs on developing an integrated optometry division within the department of ophthalmology, and participates in clinical research related to glaucoma and diabetic retinopathy. Previously he worked with Berkeley Optometry’s Dr. Jorge Cuadros at EyePACS, where he served as Chief Science Officer. He also spent over seven years as an Assistant Clinical Professor at Berkeley Optometry.  
**Advice for current students:** “Learn as much as you can from every patient encounter. Ask questions and get answers. Learn how to critically evaluate scientific literature to be able to apply new discoveries in your clinical practice appropriately. Love what you do and support your community and profession!”

**Rachel Albert**  
**PhD 2018**  
**WORK:** NVIDIA  
**HOME:** Santa Clara, CA  
**WEB:** nvidia.com

Dr. Albert is a Research Scientist at NVIDIA doing perceptual and computer graphics research for VR and AR, specifically foveated rendering. Rachel became interested in vision science in college when she realized she was stereoblind and recovered her stereo vision through vision therapy exercises. While at Berkeley she learned to write basic scripting code for experiments and discovered a love for engineering, eventually earning an MS in computer science and a PhD in vision science.  
**Advice for current students:** “The key to success in grad school (and in life) is a strong social support group. Reach out to your peers and cultivate as many friendships and peer mentoring relationships as you can. These people help you get unstuck in your research, provide emotional support during publication and funding rejections, and generally encourage you in many areas of life! Don’t get too busy for your friends.”

**Teresa Wu**  
**OD 2013**  
**WORK:** Family Eye Care in South San Francisco  
**HOME:** Millbrae, CA

After completing professional internships at the VA Medical Center in Vancouver, Washington, the Omni Eye Services in New Jersey, and Castle Family Health Eye Clinic in Atwater, California, Dr. Wu joined several private practices, and is now working at Family Eye Care in South San Francisco.  
**Advice for current students:** “While you work hard to become the best doctor you can be, don’t lose sight of the bigger picture. Make time for your passions outside of optometry and people in your life that make you happy. It is easy to get caught up in the rigors of such a challenging program, but once you graduate, you will be reminiscing of the adventures in San Francisco with your classmates and not the questions you missed on a quiz. If you have balance in your daily life, you will be a happier person and a better doctor!”

**Sheryl Guillory-Reaves**  
**OD 2011**  
**WORK:** Miami Beach, Community Health Center  
**HOME:** Miami, FL  
**WEB:** MBCHC.org

Dr. Guillory-Reaves is the primary optometric physician at the Miami Beach Community Health Center, which provides primary care for low-income and minimally insured communities in the Miami and Miami Beach areas. She is part of a multidisciplinary center, which includes adult medicine, pediatrics, endocrinology, cardiology, and dentistry. Often, Dr. Guillory-Reaves is the first optometrist many patients have seen in years or even decades—and since they are regaining access to medical care, many are “learning they have glaucoma, retinopathy, and other ailments for the first time—it’s incredibly fulfilling to provide them with optometric care!”  
**Advice for current students:** “It’s ok to explore different modes of practice. I was fortunate enough to gain experience in private practice, academia, and the community health care systems. I feel this allows you to make a more informed decision about where your passion is.”
1952
1 | Saul Levine, OD ’52 retired after 65 years in Optometry. “I served two years in the Army during the Korean War as an Optometry Officer. We had a retirement event at our office. 660 patients attended. It was fantastic.”

1967
Eugene Koury, OD ’67 has been married 35 years and has two grown boys. After practicing for 43 years, he retired in 2009. He was the first optometrist to work on an equal level with a MD (unheard of at the time) with eye surgeons during cataract and LASIK pre- and post-ops. He is now living in Oregon surrounded by PCO OD’s, Ducks and Beavers! Bears Über Alles!

1968
Les Walls, OD ’68 was inducted this year into the National Optometry Hall of Fame.

2 | Rev. Clyde W. Oden, Jr., OD ’68 spent the last several decades as a healthcare executive and religious leader in Southern California, including roles as CEO of the Watts Health System, Jr. Fellow at the UCLA Luskin School of Public Health, and most recently the Pastor of Bethel Orthodox African Methodist Episcopal Church. He is a widower and has three children, seven grandchildren, and three great-grandchildren. Dr. Oden is returning to clinical optometry in 2019 and looks forward to reconnecting with other ODs.

1971
Rod Keener, OD ’71 was the last eye doctor for the infamous MASH unit in South Korea, which was terminated in 1975. He returned to UC Berkeley to complete a Masters in Physiological Optics and teach as a clinical instructor in the School of Optometry’s General, Pathology, and Contact Lens Clinics.

1975
3 | Five docs, all Berkeley Optometry grads, made a trip to Cabo San Lucas in March to staff an eye clinic to help underserved people there. In the photo are Clinton Tran, OD ’04, Melody Tavakoli, OD ’10, Devinder Grewal, OD ’10, Arthur Low, OD ’75 and John Demshar, OD ’77. Along with 10 volunteer techs, they saw 928 patients in 2 days of clinic and dispensed recycled eyeglasses to about 850 people. “The Lions In Sight program is a great way to use our skill set to help people!” There are 10-11 trips per year. Go to lionsinsight.org for more information.

4 | Larry Banks, OD ’75 and spouse Anita traveled to Wheatland Wyoming to join Dave Halsey, OD ’75 and family Lisa, Sarah, Eric, and Asher and a few friends to watch the total eclipse on August 21st. The totality lasted a minute and was viewed through a 12 inch reflecting telescope. Viewers were able to see sunspots and the international space station crossing in front of the sun. A good time was had by all!

5 | Richard Hom, OD ’75 received his PhD in Biomedicine from Salus University in May 2018. His dissertation associates vision impairment and food insecurity in limiting physical activity, function, and social participation.

1980
Class of 1980 friends Frank Burger, Mike Pontius, John Merslich, Bill Dear (Cal ’78) and Larry Sarver, OD ’80 on the Continental Divide Trail for one of their almost-annual backpacking adventures.

1983
In April 2018, Thomas Allen, OD ’83 launched ManageMyopia.org, an information website providing a centralized source of Myopia data, research, and treatments for eye care professionals. This is following the January launch of his smartphone app, “Myopia,” designed for eye care professionals identifying patients that may be at risk for myopia and helping to explain the risks and effects of Myopia over time.
Daughter Jennifer Ding, OD ’17 and Kathleen Low, OD ’84 (along with their husbands) went on a Lions In Sight trip to Mexico this past August.

Grace Kuo and Martin Guevara, are Opto-classmates OD ’84, Opto-souses, and now Opto-parents! Their daughter Melanie Guevara will begin her third-year OD studies this fall. Martin and Grace practice in Hermosa Beach and Torrance, CA.

Deborah Steinberg, OD ’88 and husband Ross Redding, OD ’87, hiked the Torres del Paine trail in Patagonia in the fall of 2017. Deborah recently joined the Modesto Eye Center, and Ross continues to practice with Sutter Health.

Dave Redman, OD ’91 received the 2018 AOA Optometrist of the Year award at Optometry’s Meeting in Denver, CO this summer. Dave poses here with Deanna Alexander, OD ’87, who won this top honor in 2009. Jim Raulino, OD ’91 joined Visioneering Technologies, Inc. as Executive Territory Manager for Reno and Sacramento. Dr. Raulina says, “I’m excited to be joining an organization that is dedicated to innovation and improving vision care.”

In 2015, Erik Zingler, OD ’96 started on the faculty of the Department of Ophthalmology and Visual Sciences at the University of Nebraska Medical Center, Omaha, Nebraska. Most of his time is spent in clinic teaching/supervising both ophthalmology residents and 4th year optometry externs from various optometry schools (no Berkeley students—yet!). After a decade of working in the area of refractive surgery, he is also responsible for assisting with the development of the refractive surgery program at the UNMC Truhlsen Eye Institute. He and his wife Susan keep very busy with two teenage girls and their activities, and he does still find time to be a competitive cyclist. Additionally, Dr. Zingler was recently promoted to the rank of Major in the US Army Reserve.

Melinda Cano-Howes, OD ’99 served as the New Mexico Optometric Association President in 2015, and now is the New Mexico Director for COCOP, the Great Western Council of Optometry focused on the 13 western states. She has served as a Board Examiner for ISM for 12 years. Melinda is constantly recruiting ODs and visitors to her beautiful state. She and husband Ron look forward to seeing all her classmates in 2019 at the 20th class reunion!

Lt. Amber Egbert, OD ’16 explains an eye prescription to a patient during Continuing Promise 2018, a humanitarian and civic assistance program in Central and South America, at the Franklin D. Roosevelt School in Puerto Cortes, Honduras.

After completing her Residency in Ocular Disease/Low Vision at the Jesse Brown VA in Chicago, Emily Ring, OD ’97 is moving to Hawaii for a role in an ophthalmology practice. She will be living outside of Honolulu and looks forward to the island life.
The generosity of our alums and friends reached a new high this year. We’re excited to share these final numbers with you!

Total Giving $2,357,259

Our Donors Are:
- Friends: 20%
- Students, Faculty & Staff: 15%
- Corporations, Foundations, and Other Organizations: 9%
- Parents: 4%

What You Supported:
- Critical Priorities (Annual Fund): 59%
- Research: 21%
- Learning Environment: 12%
- Student Scholarship (PSSF): 7%

Looking Back

- Alumni Population: 3048
- Total Giving: $2,357,259
- Total Unrestricted Giving: $1,401,740
  - FY 2018: $1,401,740
  - FY 2017: $901,466
  - FY 2016: $835,260
- Number of Donors: 1008
- New Donors: 186
- Total Endowment Payout: $604,271
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