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Cover photo: The CellSight team.
At left: Valeria Canto-Soler, PhD, directs CellSight, a collaborative of scientists working with human retinas derived from stem cells.

Photos by Trevr Merchant.

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LETTER FROM THE DEAN

This summer, the University of Colorado Anschutz Medical Campus received the largest gift in its history when The Anschutz Foundation and its chairman, Philip Anschutz, committed $120 million in support of key initiatives that will define the future of healthcare.

The steadfast support of The Anschutz Foundation has been key to our success in building a new campus for the University’s health professional schools and our partner hospitals.

At the dawn of the 21st Century, with support from Mr. Anschutz and The Anschutz Foundation, we embarked on a 40-year plan to turn the moribund Fitzsimons Army Medical Center site into a vibrant home for healthcare innovation and medical care. That vision was accomplished in just 12 years.

Now, with this additional commitment, we are poised to strengthen our programs with strategic recruitments of faculty, with investments in research programs that will have major impact, and with support for efforts to turn discoveries into innovations that will improve the health of those well beyond the borders of our campus in Aurora.

It is now our mission to turn the campus we’ve built from a point of pride in Colorado into a medical destination for those seeking care from across the country and around the world.

This gift has already enabled several valuable investments by our School.

We have recruited a new chair for the Department of Psychiatry, C. Neill Epperson, MD, who will help us better integrate behavioral health into the scope of care we provide to all patients.

We have begun planning for a new building that will house initiatives for mental health, personalized medicine, and translational science.

We have invested in new leadership at the CU Cancer Center, with Richard Schulick, MD, MBA, chair of surgery, taking on those responsibilities. His efforts will focus on expanding access to care and building a clinical trials infrastructure able to extend new treatments to more people.

Each of these new leaders has outlined plans that will improve the quality and boost the availability of care in those critical areas. The vitality of our campus depends on sustained attention to meeting the needs of our patients, students, and community.

As those and other efforts take shape, it’s important to recognize that this gift is a vote of confidence in the hard work and leadership of the talented faculty already on the Anschutz Medical Campus making remarkable contributions.

For the year ending in June 2018, researchers on campus received more than $516.2 million in government and private support for scientific investigations by the campus faculty. Of that amount, the CU School of Medicine researchers were awarded $426.1 million.

Our educational programs are receiving a record number of applications. For the MD class of 2022 that matriculated in August, the School of Medicine received 7,347 primary applications and our admissions team reviewed 4,845 secondary applications and interviewed 642 applicants for the 184 students joining us on campus.

The demand for clinical care from our faculty physicians continues to grow. Both hospitals on our campus – the UHealth University of Colorado Hospital and Children’s Hospital Colorado – are routinely near capacity because they offer the highest-quality care in the region. Both hospitals are ranked among the best in the country. The clinical work by our faculty remains a source of strength and a solid foundation for other endeavors on our campus.

Innovations created by our faculty are spurring growth in the Fitzsimons Innovation Community, adjacent to the Anschutz Medical Campus and home to offices, labs, and a biomanufacturing facility that can make cell-based therapies meeting the highest standards. Last spring, developers broke ground on Bioscience 3, scheduled for completion next year and there already plans for future construction.

We are grateful for Mr. Anschutz’s boundless generosity, inspired by his unwavering support, mindful of the responsibility that comes with it, and committed to the shared vision of making our community the destination for all who seek the best medical care.

With warm regards,

John J. Reilly, Jr., MD
Richard D. Krugman Endowed Chair
Dean, School of Medicine
Vice Chancellor for Health Affairs
University of Colorado
Reporters locally and nationally turn to the School of Medicine for expertise and research news. Here are examples from near and far.

Jessica Cataldi, MD, assistant professor of pediatrics, was quoted in the Denver Post in September about her study that found parents value schools with higher vaccination rates because they want their children in a healthy environment. “Even those parents that have some concerns about vaccines still thought it was important,” she said.

Lilia Cervantes, MD, associate professor of medicine, was featured in a report on CNN in August about the disparity in care provided to undocumented immigrants who need hemodialysis. She discussed how a patient’s death inspired her research. “After Hilda passed away, I looked at the literature, and I found one article that was particularly interesting,” she said. “And in it, [the author] discussed this issue of emergency-only hemodialysis and said that until we have the right research, the cost-effectiveness analysis, the comparative analyses, to demonstrate that this type of care needs to change, that potentially we wouldn’t change it until the right data are available. And so that’s when I set off to really begin to build the body of research.”

Jean Mulcahy Levy, MD, assistant professor of pediatrics, talked with 9News, the Denver-based NBC affiliate, about providing care for a four-year-old girl diagnosed with diffuse intrinsic pontine glioma, an aggressive pediatric brain tumor. “It’s definitely one of the last frontiers trying to cure brain tumors,” she said. “Really trying to investigate the cause of these tumors to develop new therapies is essential to prolonging life and hope for a cure.”

Gillian Kaag, PhD, senior instructor of family medicine and director of the Steven A. Cohen Military Family Clinic at University of Colorado Anschutz Medical Campus, discussed the clinic’s role in the community with the Denver Post in May. The clinic provides behavioral health services to military veterans and their families.

Eric Campbell, PhD, director of research at the CU Center for Bioethics and Humanities, discussed the public perception of pharmaceutical companies with STAT in May. “It appears to me that from examining these slides, Novartis leadership may have failed to fully recognize where the company stands in terms of its reputation,” he said, noting a Gallup poll last year found the pharmaceutical industry ranked last among 24 industries in the eyes of Americans who were surveyed.

Marian Betz, MD, associate professor of emergency medicine, talked to the Los Angeles Times in May about issues related to gun safety and the elderly. “It’s not about us vs. them, or taking away people’s guns. It’s about us helping people make choices in the interest of safety,” she said. “It would be awesome if all our older patients would think ahead about where and when and how they would hang up their keys and or safeguard their guns. Most of us don’t do that because we’re human. But we can try.”

Joshua Williams, MD, assistant professor of pediatrics, who was part of a team that published the first paper on vape injuries in children after he treated a 17-year-old who lost a large piece of his thumb to an exploding vape pen, was quoted in May in the Tampa Bay Times following the death of a man due to injuries related to vaping. “It’s incredibly unfortunate, but no, it’s not surprising that someone would eventually die like this considering the injuries we’ve seen.”

Stanley Szefler, MD, professor of pediatrics and director of pediatric asthma research at Children’s Hospital Colorado, explained asthma in a May article in the New York Times. “Asthma is quite a variable disease; there’s not a one-size-fits-all,” he said. “It’s a careful balance between symptoms and prevention and then the underlying things that may be going on.”

Heather Hoch, MD, assistant professor of pediatrics, was quoted in the New York Times in May about treating patients with asthma.

“The vast majority of kids with asthma, if we treat them appropriately and they take their medications, they can do whatever they like,” she said. “I like to remind families we have Olympic athletes” with asthma.

Elizabeth Pomfret, MD, PhD, professor of surgery, was quoted in May in a segment for CBS This Morning, about a woman who donated part of her liver after previously donating a kidney to help improve the health of people she didn’t know. “There’s very few people in the world who have donated part of their liver and a kidney,” Pomfret said. “Of that 4 percent, the number of people who are altruistic donors is extraordinarily small.”

Todd Miner, EdD, senior instructor of emergency medicine, wrote an article for the Fishermen’s News that was published in June: “When we met with commercial fishermen, they told us that the first aid classes offered in their communities were not relevant to the emergencies they faced at sea. So we developed a new course we call Fishermen First Aid and Safety Training (FFAST).”

Marian Betz, MD, associate professor of emergency medicine, appeared on the PBS NewsHour in June to discuss how families of gun owners with dementia grapple with safety. “Currently, there is no state or federal law that...”
prohibits health care providers from talking to patients or asking about firearm access in the home,” she said. “As a health care provider myself, I think it’s really important.”

George Sam Wang, MD, assistant professor of pediatrics, was quoted by the CBS News in June in a report about children overdosing on medications intended for fighting opioid addiction. “We have previously shown that unit-dose packaging—a form of child-resistant packaging—can decrease pediatric exposures to buprenorphine-naloxone products,” he said.

Matt Vogl, MPH, executive director of the National Mental Health Innovation Center at the CU Anschutz Medical Campus, was quoted in July in a report on KTVA of Anchorage, Alaska, about tests by the Alaska Department of Corrections on using virtual reality as an inmate training tool. “All of the work with corrections in VR is really brand new and that’s why we’re really excited about this,” he said. “We thought if we can make things work in Alaska then we can probably make them work just about anywhere.”

Matthew Wynia, MD, MPH, director of the CU Center for Bioethics and Humanities, was quoted in the Washington Post in July in an article about the role of bioethicists in providing care. Now, he said, the bioethicists and others have a new role: to help “one side understand where the other side is coming from, that the opposing force isn’t evil but coming at this with a set of values and preferences and priorities that need to be understood to find some sort of common ground.”

Mark Deutchman, MD, professor of family medicine and director of the rural track program, told Georgia Health News in August that the structure of the health care system steers young physicians away from rural practice. “Unfortunately, we’re getting exactly what our health care system is designed to produce,” he said noting that the system dictates where physicians locate because it rewards high-tech medical services, expensive surgeries and sub-specialty care.

Stephen Daniels, MD, PhD, chair of pediatrics, was quoted in August in an article in U.S. News & World Report about why parents should encourage healthy habits in their children. “In the analyses that have been done, genetics probably plays a role that is relatively minor compared to lifestyle,” he said. “When you’re talking about the development of these risk factors, which would include high blood pressure, abnormal cholesterol, obesity, diabetes and cigarette smoking, a lot of the emphasis really should be on lifestyle.”

Allison Kempe, MD, MPH, professor of pediatrics, was quoted in an August report by NBC’s Today Show on vaccines for meningitis B. “Not all physicians believe this should be routinely given since it is a rare disease and there is limited experience with the longevity and safety of the vaccines,” she said. “Therefore not all will bring it up.”

Richard Zane, MD, chair of emergency medicine and Chief Innovation Officer at UCHealth, was one of 12 healthcare leaders quoted in August in Becker’s Hospital Review offering their daily mantras. “Healthcare needs to be fundamentally disrupted,” he said. “Embrace disruption and drive change to improve care for our patients and the next generation.”

Nanette Santoro, MD, chair of obstetrics and gynecology, was quoted in an Associated Press report in August on a new study about the reduced likelihood of cesarean delivery when inducing labor at 39 weeks for some first-time mothers at low risk of complications. The labor and delivery suite is one of the most expensive places in a hospital, she said. If all eligible moms decided to be induced, “I do not believe we would have the resources to accommodate them,” but may have to adapt based on this study.
C. Neill Epperson, MD, an expert in women’s behavioral health, particularly the relationship of hormones and the brain, joined the University of Colorado School of Medicine on the Anschutz Medical Campus, as chair of the Department of Psychiatry, effective September 1.

Previously, she had been professor of psychiatry and obstetrics and gynecology at the Perelman School of Medicine at the University of Pennsylvania. She was recruited to Penn from Yale School of Medicine in 2009 to launch and serve as director of the Division of Women’s Behavioral Health. In that capacity, she founded and served as director of two clinical, research, and education programs: the Penn Center for Women’s Behavioral Wellness and Penn PROMOTES Research on Sex and Gender in Health.

Epperson earned her MD from the University of North Carolina and completed her residency and fellowships at Yale University. Her research has been continuously funded for more than 20 years with grants from the National Institute of Mental Health (NIMH), the National Institute on Drug Abuse, the National Institute on Aging, the National Cancer Institute, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institutes of Health Office of Research on Women’s Health, the National Institute of Arthritis and Musculoskeletal and Skin Diseases, the National Institute of Child Health and Human Development, the National Institute of Mental Health, the National Institute of Neurological Disorders and Stroke, the National Institute of Environmental Health Sciences, and the National Institute on Drug Abuse.

As chair, she succeeds Robert Freedman, MD, professor of psychiatry, who joined the CU faculty in 1978 and served as chair from 2000 until August 2016. “I’ve known Dr. Freedman for many years,” Epperson said. “First by reputation as the esteemed editor of the American Journal of Psychiatry, and finally on a more personal level when I was asked to contribute an editorial for the journal on the topic of premenstrual dysphoric disorder.

“Dr. Freedman’s exceptional intellectual breadth and vision with respect to the field of psychiatry are just two of his many talents that made him an outstanding journal editor, in addition to being the highly effective and beloved chair of psychiatry here at the CU School of Medicine. I consider it an exceptional honor to be his successor as the Robert Freedman Endowed Professor and chair of psychiatry.”

Describe the division you were recruited to Penn to start up.

Debbie Driscoll, MD, who has been the chair of the Department of OB/GYN at the Perelman School of Medicine at the University of Pennsylvania since my recruitment there, has a very broad vision of women’s health that was and continues to be inclusive of behavioral health. A strong and fluid collaboration between the Departments of Psychiatry and OB/GYN were critical to the success of the Division of Women’s Behavioral Health as we focused primarily on behavioral health issues that arise in the context of dynamic hormonal shifts such as menarche, menstruation, pregnancy, childbirth, and the menopause.

While our research would literally focus on topics from “womb to tomb” by spanning the entire female lifespan, our clinical endeavors focused primarily on females from late adolescence through old age. For example, we would evaluate and treat adolescent girls suffering from hormone contraceptive-induced depression, perinatal women with depression and anxiety or exacerbation of their post-traumatic stress disorder and older women with menopause-related depression and cognitive declines. For our oldest patients, the challenge was determining whether the woman’s cognitive complaints were due to a major depressive episode, dementia, or other comorbid medical condition. Many of our female patients were also survivors of childhood adversity and maltreatment. As a result, we also shifted to considering a more trauma-focused approach to our clinical care and research endeavors.

One of the problems that happens in society today is that most psychiatrists are not really trained to appreciate the endocrine system and how hormones impact behavior. Our patients were just relieved that they were coming to clinicians who understood the symptoms they were experiencing and how hormones or their reproductive status could be contributing to their current behavioral health difficulties.

It seems like that would be an active area of care need.

It is and there are still relatively few clinicians who have any formal training in reproductive psychiatry. There are a growing number of psychiatry and psychology departments across the country that are developing curricula in these areas. However, reproductive psychiatry is not considered a true sub-specialty like addiction, forensic, or consultation-liaison psychiatry, so there is no mandate that clinical training programs include these topics in psychoneuroendocrinology and reproductive health. What we did at Penn is create specialty clinics for the psychiatry residents, psychology doctoral candidates, and psychiatric and women’s health nurse practitioner students so they could participate in didactics as well as gain hands-on experience with patients suffering from reproduction/hormonal-related psychiatric conditions. The important feature of these training programs is that we helped the students and fellows differentiate when a reproductive or hormonal event was causing...
or exacerbating the woman’s psychiatric presentation. Just because someone questions a “hormonal contribution” does not mean that one actually exists. This knowledge is critical to developing an appropriate treatment plan for the patient. We also had medical students rotating with us as well. The clinical division obviously was the foundation for the educational division when it came to the training piece.

The area you’re studying covers the whole lifespan. We’re talking about premenstrual young women to postmenopausal women.

Our center at Penn included one geriatric psychiatrist who would often evaluate and treat women who were many decades into the postmenopause. Again, considering our work with pregnant women, our interdisciplinary program was really a “womb to tomb” enterprise. In my opinion, this lifespan approach is critical to all psychiatric care, not just specialized care for women.

How will your work fit in at CU?

My work has always been inter- and trans-disciplinary. It has a lot of application to internal medicine, pediatrics, OB/GYN, endocrinology, as well as radiology, neurology, oncology and immunology. Given that the University of Colorado already has strong interest in women’s health and great strengths in each of these clinical and research areas, I will have a lot of natural collaborators.

The same is true with respect to my neuroimaging research. Several young investigators here are interested in the role of estrogen with respect to the aging brain, while others are interested in the use of gender-affirming hormone therapy on adolescent and young adult brain development.

Some of the disorders I’ve studied, such as premenstrual dysphoric disorder, occur only in women. Obviously only women menstruate, get pregnant, and experience menopause, but depression, anxiety, PTSD, and other psychiatric disorders occur in both men and women. Moreover, aging effects cognition in both males and females. Hence, my research focusing on hormones and health has expanded over the years to include the investigation of sex as a biological variable with respect to risk for a number of medical and behavioral conditions.

How did you become interested in the role of hormones in behavioral health?

I became interested in hormones about halfway through my residency training in psychiatry at Yale. In medical school, I had been taught about the endocrine system, but never that stress, gonadal, and thyroid hormones can have such profound effects on the brain, and thus, behavior. When it came to estradiol and progesterone, we were taught they’re important for menstrual cycles, getting pregnant, and basically that was about it. Oxytocin, which we now know is critical for the initiation of maternal behavior in mammals, was just a hormone that was responsible for uterine contractions during labor and milk let-down during lactation.

How challenging is it to study the effects of hormones on the brain in humans?

Luckily we have neuroimaging techniques that allow us to study the human brain under different hormonal conditions. We can observe how different regions of the brain function during various cognitive and behavioral tasks. We can also observe how well different regions of the brain communicate with one another when someone has high or low levels of estradiol for example. However, brain imaging is currently limited in its ability to determine the basic molecular mechanisms by which hormones alter behavior in humans. We can study this in other mammals and many of these findings have been generalized to humans, for better or worse. Although we need preclinical research to determine mechanisms at the cellular level, we can indeed examine behavior in humans under different hormonal conditions. We can assess the impact of hormones on mood, sleep, cognition, sexual behavior, stress responsiveness, and immune function just to name a few.

The other benefit of studying hormones on behavior in humans is that most individuals do not feel stigmatized by hormonal shifts. People like to talk about hormones, while they may feel uncomfortable talking about depression, anxiety, or changes in their libido and cognition. I have always believed that helping the lay person understand the importance of hormones in behavior could perhaps, in some small way, diminish the stigma related to behavioral health conditions. I hope I am right as I have dedicated my career to this mission.
The University of Colorado Anschutz Medical Campus has received a $120 million gift, the largest private philanthropic commitment in its history, to further elevate its stature as one of the country’s top medical destinations.

The Anschutz Foundation and its founder and chair, Philip Anschutz, made the unprecedented commitment to accelerate the campus’s growth and development as one of the newest and most prominent academic medical campuses in the United States, the only one in the Rocky Mountain region, and the largest from Chicago to the West Coast. This gift brings The Anschutz Foundation’s total investment in the University of Colorado Anschutz Medical Campus to nearly $300 million since 2000.

The gift will support strategic faculty recruitment and retention, innovative research efforts, industry partnerships and technology transfer, and a new 390,000-square-foot interdisciplinary Anschutz Health Sciences Building. The university will break ground later this year on the new building, which will house faculty leaders in mental and behavioral health including the CU Department of Psychiatry, as well as the Colorado Center for Personalized Medicine, the Colorado Clinical and Translational Sciences Institute, classrooms, and exhibit space.

“We are proud partners in the development of the University of Colorado Anschutz Medical Campus and share an ambitious vision for further elevating it among the country’s top medical destinations,” said Anschutz. “The campus stands as a Colorado landmark and a hub of leading-edge research, innovation and education – and, perhaps most importantly, as the place to go for the highest-quality health care delivered by the best minds in medicine."

“With this commitment, Mr. Anschutz and the leadership of The Anschutz Foundation are excited to help rapidly transform medicine and health care, not only in Colorado but across the region and beyond,” said Ted Harms, Executive Director of The Anschutz Foundation. “We have a shared vision for propelling the University of Colorado Anschutz Medical Campus even higher among the best medical campuses in the United States, and by investing in key strategic areas, we will make that vision a reality.”

“Philip Anschutz and The Anschutz Foundation are helping lead a visionary transformation of health care in Colorado and beyond,” said CU President Bruce D. Benson. “This gift, combined with their previous commitments, goes a long way toward ensuring the CU Anschutz Medical Campus is one of the leading medical care, research and education facilities in the world.”

University of Colorado Anschutz Medical Campus Chancellor Donald M. Elliman, Jr. said the commitment from The Anschutz Foundation “enables us to fully capitalize on the momentum we have seen on this campus since our beginnings here just 17 years ago."

“Our growth has been exponential and shows no signs of slowing, due in large part to The Anschutz Foundation’s longstanding partnership and this new commitment,” Elliman said.

“Among our initial opportunities are attracting and retaining top talent in key areas including personalized medicine, novel therapeutics and...
The University of Colorado Anschutz Medical Campus last week celebrated an extraordinary gift from Philip Anschutz and The Anschutz Foundation, benefactors who have consistently supported our vision of improving human health and who share a commitment to making our campus one of the nation’s premier destinations for medical care and scientific research. The historic $120 million commitment is an investment in our future from our longtime steadfast partner. Since the creation of the Anschutz Medical Campus, Mr. Anschutz and his foundation have provided nearly $300 million to us and with this gift, the largest in Anschutz Medical Campus history, he is again showing confidence in you.

This gift means that we can do more today than we could yesterday. We will be able to recruit and retain the nation’s best scientists and clinicians for high-impact programs. We will be able to invest in research that promises new ways to treat disease and improve health. We will be able to turn those discoveries into innovations that extend our reach beyond campus to others who need our care. We will construct a state-of-the-art health sciences building that serves as home to initiatives for mental health, personalized medicine, and translational science. We will improve medical education, research, and clinical care, all because of this gift.

Philip Anschutz saw something special when he stood on the grounds of the former Fitzsimons Army Medical Center nearly two decades ago, and The Anschutz Foundation has since held a steadfast commitment to helping us realize the fullest potential of our campus. Together, we set an ambitious goal for the future: to build a thriving medical destination serving people from across the state, around the region and beyond. That early bet has paid off, enabling us to realize a 40-year vision for this campus in just 12 years, and the undeniable energy and collaborative spirit alive and well on our campus are products of that shared vision. The exponential growth you have helped us build shows no signs of slowing, and today we find ourselves at a distinct moment in time. We have the best minds in medicine and health at the helm, a history of innovation and a trajectory of growth unmatched by our peers, and a singular vision for realizing the tremendous promise of this place for patients, families and communities throughout Colorado and the Rocky Mountain West.

This historic philanthropic commitment by Mr. Anschutz and The Anschutz Foundation would not have been possible without you. It stands as a testament to the great work of our faculty and the strong relationships you help build and sustain. This gift also carries forward an invaluable partnership with our namesake and enables us to stake our claim as a leader at the forefront of an evolving health care landscape.

immunotherapy, and mental and behavioral health,” said CU School of Medicine Dean and Vice Chancellor for Health Affairs John J. Reilly Jr., MD.

UCHealth University of Colorado Hospital President and CEO Will Cook said he is particularly hopeful about the impact this gift will have on recruiting and retaining top faculty who help deliver excellent patient care. “UCHealth and University of Colorado Anschutz Medical Campus to leverage research and innovative treatments like immunotherapy to transform the future of health care. This historic donation will enable the nationally recognized physicians from the CU School of Medicine to continue inventing the health care treatments of tomorrow, helping deliver the very best outcomes for patients throughout the Rocky Mountain region.”

“New discoveries in the realm of personalized medicine and novel therapeutics are rapidly changing the pediatric health care landscape,” said Children’s Hospital Colorado President and CEO Jena Hausmann. “This generous gift infuses valuable resources into that work and will translate into more effective, highly tailored treatments for children battling a range of illnesses and diseases.”

In addition to funding bright minds in research, education and clinical care, the campus will dedicate philanthropic funds to invest in CU Innovations, a new approach to technology transfer launched in 2016 to facilitate the translation of science and innovation into marketable products and services that improve lives.

“Our proud history of innovation has led to important new discoveries, and through CU Innovations, we are capitalizing on our deeply rooted entrepreneurial spirit by connecting University of Colorado Anschutz Medical Campus inventors with innovators and industry partners who can take their breakthroughs to market,” said Elliman.
Stem Cell Program Aims to Cure Blinding Ailments

New CU research team collaborates to create CellSight

By Mark Couch

Sight unseen, Mark Petrash, PhD, made the phone call to Valeria Canto-Soler, PhD.

As director of research for the CU School of Medicine’s Department of Ophthalmology, his job duties include scouting talent and recruiting them to the Anschutz Medical Campus. With Naresh Mandava, MD, chair of ophthalmology, he had hatched a plan to launch an ocular stem cell research program.

They had resources: a multimillion-dollar commitment from the philanthropic community, a campus with a new biomanufacturing facility and an established stem cell research program, and a database of 1,000 macular degeneration patients, so detailed that even the National Eye Institute wants to mine it.

For Canto-Soler, the call from Petrash was like a dream coming true.

“One day, totally out of the blue, I get a phone call from Mark Petrash, the director of research for this department,” she said. Petrash told her that he and Mandava had assembled pieces of a nascent program and invited her to visit.

“They were now in the phase of looking for someone to build that program and to direct that program and they wanted to know if I would be interested in doing that,” Canto-Soler said.

“CellSight was something I was dreaming about,” she said. “Without a name. I was really dreaming about the possibility of creating a bigger program, a research program that would not include just my lab, but that would bring together different groups with different expertise.”

Petrash had never met Canto-Soler, but her work had caught his and other leading ophthalmologists’ attention.

“I went out to experts in the field and Val Canto-Soler’s name kept coming up,” Petrash said. “She was at the Johns Hopkins Wilmer Eye Institute. We had never met, but I called her up. And she said, ‘Who is this?’”

In 2014, Canto-Soler and her team figured out how to grow miniature human retinas in a Petri dish, starting from human stem cells.

“I still remember the first time my postdoc came into my lab and said you need to come and see this,” Canto-Soler said. “When I actually saw that these mini retinas that we were developing have all of the cells and all that, I thought I was going to fall off my chair. I was sitting at the microscope and I just couldn’t believe it.”

Collaborating with colleagues, they were able to determine that the mini retinas were responding to light. It was a breakthrough. The mini retinas had functioning photoreceptor cells capable of sensing light.

“That was such an exciting moment,” Canto-Soler said. “That was a critical time for me. Starting from no experience, to being able to generate hundreds of mini retinas that respond to light and seeing that happening in my own lab, I started to believe that you can do almost anything, if you have the resources and the determination.”

But you can’t do it alone. There is just too much for one investigator, one laboratory to make Canto-Soler’s dream come true. There’s science and art, business and balance, grants to write, patients to see.

“Basically the idea was if you want to tackle something like restoring vision in blind patients, that’s something you cannot do with a small team and try to accomplish everything and understand everything,” Canto-Soler said.

“The only way you can efficiently tackle that is bringing together a bigger team with expertise in complementary areas that know how to work together.”

CellSight is the first step at building that bigger team, integrating four independent research groups to work together to find solutions to ocular diseases. Formed in 2017 on the
Anschutz Medical Campus, CellSight has a custom-designed laboratory and four principal investigators working on independent, connected projects.

The inspiration for CellSight dates to 2008 when Mandava had lunch with Dennis Roop, PhD, director of the Gates Center for Regenerative Medicine.

“He and I had lunch way back then,” Mandava said. “I’m a retina specialist and I’ve always been interested in the potential for retinal cell transplantation. He’s a stem cell guru at the regenerative medicine center.”

The Gates Center was established in 2006 by Diane Gates Wallach and John Gates in honor of their father Charles Gates to develop and promote stem cell therapies. While Charles Gates had been diagnosed with macular degeneration, the center was created to develop stem cell and regenerative medicine treatments for a variety of ailments.

“I didn’t know this, but in the back of Diane’s mind, she had always wanted to proceed with an investment in macular degeneration,” Mandava said. “In 2014, Diane, Dennis and I talked about how she wanted to put together a $5 million matching investment. If we could raise $5 million, she would match it with $5 million for the $10 million we needed to launch a really strong stem cell initiative.

“So we did it,” he said. “I think we were done in six to eight months.”

The $5 million challenge grant from the Gates Frontier Fund inspired 19 additional donors, including a $2 million gift from the Solich Fund and a $1 million gift from Sue Anschutz-Rodgers. That funding, combined with an investment in the macular-degeneration patient registry by the late Frederic Hamilton, offered a sturdy base on which to build a program.

CellSight aims to develop novel stem cell-based therapeutics to save and restore sight in patients with diseases causing blindness, and Canto-Soler said CellSight will spare no effort to bring these therapies to the clinic as fast as possible.

The most immediate goal is to address the need of therapy for patients affected by age-related macular degeneration, the leading cause of irreversible blindness in people over 50 years old. The team will start testing its new stem cell-based retinal transplant in preclinical animal studies within the next few months, with the hope of reaching clinical trials within the next four years.

Canto-Soler went to work on assembling a founding team with state-of-the-art laboratory facilities.

“The key to success for a program like CellSight is that you have independent groups that are working together as a bigger team,” Canto-Soler said. “Each of them brings skills and insights in complementary areas of expertise, so the net effect is a great team able to move the science further and faster because of the collective effort.”

Each lab in CellSight brings a unique perspective to the challenge.

Canto-Soler is the director of the 3DRet Laboratory, which generates human mini retinas from human induced pluripotent stem (iPS) cells. The mini retinas, which take months to grow because they develop at the same pace as a developing human, are like a canvas for the others to explore.

Natalia Vergara, PhD, a developmental biologist who, as a young scientist was fascinated by how newts are able to regrow retinas that are as functional as those it loses, leads the Ocular Development and Translational Technologies Laboratory.

“She has developed a very innovative screening platform that you use for screening the effect of small molecules or other kind of drugs on retinal cells,” Canto-Soler said.

Joseph Brzezinski, PhD, studies the genetic cascades that lead to particular types of cells.

“We know how to make this retinal tissue,” Canto-Soler said. “We make a lot of rods, working together as a bigger team,” Canto-Soler said. “Each of them brings skills and insights in complementary areas of expertise, so the net effect is a great team able to move the science further and faster because of the collective effort.”

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“We know how to make this retinal tissue,” Canto-Soler said. “We make a lot of rods,
very few cones, so Joe brings in expertise in genetic manipulation. He has the expertise in understanding how to drive a stem cell to become a rod or a cone.”

Omid Mashzadeh, PhD, builds better microscopes in the Laboratory of Advanced Ophthalmic Imaging.

“He has very valuable expertise on noninvasive imaging technology,” Canto-Soler said. “That’s another very important gap in the field. Today, there are very limited noninvasive imaging techniques or tools in the clinic that you can use to diagnose and to follow the progression of retinal degeneration in a patient.”

With a team assembled, the CellSight faculty also needed a great place to work.

In addition to the Gates Biomanufacturing Facility, which opened in 2015 as the only site in an 800-mile radius meeting the high standards needed to produce cell therapies and biologics, the CellSight team also needed top labs.

“When we were trying to recruit her here, I didn’t think we were going to build new facilities,” Brzezinski said. “I just thought we were going to make it work and she was like, ‘Yeah, I don’t think so. If I’m coming, we’re doing this the right way. We’re doing it up front. We’re going to make the investment and make it right.’ It was very smart of her to do that.”

Because of the extreme sensitivity and the lengthy gestation of the mini retinas that Canto-Soler’s lab cultivates, she needed a space with strict environmental controls, including a training area and a quarantine chamber.

With the support from donors and the University, the workspace was designed to meet exacting standards.

“There is a moment that you realize that you are not alone, and that really empowers you” Canto-Soler said. “This is the huge challenge that we are trying to accomplish. You are basically facing one of the fourteeners and you know that you have to make it all the way up there for the first time, with no training, on your own.

“And then you realize that you have a whole team backing you up, giving to you, coaching you, and making sure you have the resources that you need and that you are going to make it to the top. You get to the point where you say I just have to be part of this.”

PROFILES

Valeria Canto-Soler, PhD

Valeria Canto-Soler, PhD, leads a team that has already succeeded in generating the first “human retina in a dish with functional photoreceptors” derived from human induced pluripotent stem (iPS) cells.

Human iPS cells are derived from a small, autologous, skin or blood biopsy and then coaxed, in the lab, to differentiate into a three-dimensional tissue containing all the different cell types that form the human retina properly organized into the different retinal layers. Importantly, the photoreceptor cells within these stem cell-derived human retinas have the capacity to respond to light, as photoreceptors in the normal human retina do.

“My lab brings in the expertise and technology of making the human retinal tissue that we can use for modeling disease or for developing a retinal transplant, which is really our immediate goal for CellSight as a whole,” said Canto-Soler, the Doni Solich Family Endowed Chair in Ocular Stem Cell Research, associate professor of ophthalmology, and director of the 3DRet Laboratory.

The 3DRet Lab focuses on leveraging the unique characteristics of 3D retinal organoids derived from human induced pluripotent stem cells to unveil normal and disease mechanisms involved in retinal cell specification, differentiation, maturation and function.

Natalia Vergara, PhD

Natalia Vergara, PhD, is working with human iPS cell-derived mini retinas to develop a platform to do drug screening in a quantitative large-scale manner.

“One of the things we can do with these retinas is model disease,” Vergara said. “We can model how these cells would die in situations like neurodegenerative diseases of the retina, including glaucoma, and then we can use them to screen for drugs that can protect those cells from dying.”

“There’s the potential to develop cell lines from different patients and that allows you to do something like a clinical trial in a dish,” said
Vergara, who runs the Ocular Development and Translational Technologies Laboratory. “We know drugs don’t work the same in everybody, they affect people differently.”

The technology used by CellSight could make it easier to test broader samples of the population earlier in the process.

“Most of the drugs that pass preclinical studies never make it to a viable product because they fail at clinical trials,” Vergara said. “I think a lot of that has to do with fact that the models used in preclinical studies don’t really mimic what happens in a real human setting, in the population, so I think this technology really gives us the opportunity to bridge that gap.”

Joseph Brzezinski, PhD

Joseph Brzezinski, PhD, focuses on specific parts of the retina – rods and cones.

“My big goals have been to understand how you build a retina. What is the genetic blueprint that leads to a retina?” he said.

“I mostly focus on how transcription factors work because they’re the genes that execute the instructions by turning on and off other genes. They typically sit at the top of these cascades. We’ve been interested in how all cell types develop, but recently we’ve focused on rod and cone photoreceptor development.

“And especially cones. There’s a pretty big black box there on how they form and they’re difficult to study because they are pretty rare in the retina. They make up only about 2-4 percent of the mouse and human retina.”

Brzezinski heads the Laboratory of Developmental Genetics, which works to uncover the genetic programs that are used to build the retina during development and to apply them to generate therapeutic retinal cell types from stem cell sources.

Omid Masihzadeh, PhD

Omid Masihzadeh, PhD, builds ever-better tools that can measure cellular details that aren’t visible to the naked eye.

Specifically, his goal in the Laboratory of Advanced Ophthalmic Imaging is to create systems for retinal imaging that permit real-time and dynamic monitoring of living cellular processes in the retinas developed for transplanting in patients.

“The question, the billion dollar question, is what are they doing once they are in people’s eyes?” Masihzadeh said. “We need a device that can image the function and the health of these cells in these three-dimensional tissues inside eyes. Somehow we have to figure out how they function and there is no technology for it, there is nothing out there that does that.

“The field I’m working on is called nonlinear microscopy,” Masihzadeh said. “Basically, you use such intense light – lasers – that you create nonlinearity inside the molecules of the sample. So that means the sample actually creates its own light. I shine a light with one wavelength and what comes out is completely different wavelengths, or colors. And those colors give you information about the molecules or the structure of the sample.”
CU Researchers Peer Inside Cells to Spy on Cancer’s On-Off Switch

Medical student and Nobel winner collaborate on study

By Lisa Marshall

Forty years after researchers first discovered it in fruit flies, a once-obscure cluster of proteins called PRC2 has become a key target for new cancer-fighting drugs, due to its tendency—when mutated—to bind to and silence tumor suppressing genes.

Research by CU scientists published last summer uses state-of-the-art imaging to offer an unprecedented look at the complex, illuminating how it finds its way to genes, what happens when it gets there, and how a new generation of cancer therapeutics might disrupt the process.

The findings, published in the journal Genes and Development, also shed new light on just how epigenetic changes—the switching on or off of genes—happen inside the cell.

“Many cancers make use of epigenetic gene silencing to promote their own growth. Medical scientists want to inhibit this cancer-causing process, but they first need to know exactly how it works,” said Thomas Cech, PhD, a Distinguished Professor of the University and Nobel Laureate who is senior author of the study. “Our new work contributes to the understanding of how the molecular machine responsible for gene silencing is recruited to its sites of action in human cells, determining which genes are turned off.”

For the study, Cech and lead author Daniel Youmans, who is pursuing a PhD in biochemistry at CU Boulder and an MD at the CU School of Medicine on the Anschutz Medical Campus, used the gene-editing tool CRISPR to apply fluorescent tags to the individual proteins which make up PRC2, or Polycomb Repressive Complex 2.

Then, they used a high-tech microscope to observe what happens to the proteins inside living human cells, both under normal conditions and when exposed to a cancer drug called A-395, which is a PRC2 inhibitor.

“Our work helps define the mechanism of these cancer drugs and changes what we thought about the way PRC2 functions inside cells,” Youmans said.

PRC2 is made of a cluster of four core proteins, which interact with other proteins circulating in the cell. When they click together just right, like puzzle pieces, it signals the complex to make its way to certain genes in the cell, silencing them, said Youmans.

In a healthy cell, that silencing can influence whether a stem cell becomes a neuron or heart cell and shut off genes which could promote disease. But in many cancers, including lymphoma, the complex is hijacked to silence tumor suppressors.

Scientists previously thought that PRC2 cancer therapeutics worked by preventing the complex from binding to genes. But when watching it swirl around the cell, the researchers discovered that in the presence of the drug, the molecular silencing machine made it to its locations. Once there, it just failed to fully do its job.

They also identified specific auxiliary proteins which PRC2 must click to in order to be recruited to its target genes.

“We showed that when you disrupt the interaction between PRC2 and these other puzzle pieces, it completely disrupts its ability to bind to specific places,” said Youmans.

The findings suggest that existing PRC2 inhibitors, while effective, may be working in a different way than previously believed. They also open the door for development of new drugs, which could get at the same end goal by preventing PRC2 from binding to certain locations on genes altogether.

“Cancer is always mutating so it’s important to have a broad toolbox of therapeutic options,” said Youmans.

As a student in CU’s Medical Scientist Training Program, which enables medical students to simultaneously pursue a PhD, Youmans has a unique perspective on the possible applications of his research.

“I’m heartened by the idea that the work I do in the laboratory could ultimately help the patients I see in the hospital,” he said.
CU Physician Researcher Takes Aim at Rare Genetic Disorder

Families raise awareness and funds to treat NKH

By Devin Lynn

Joseph Kendrick was born on May 9, 2009, in the United Kingdom, where doctors believed he was a healthy baby. Within the first week of his life, he started to show some concerning traits. He was quiet and stopped feeding. Ultimately, he fell into a coma. He was soon diagnosed with nonketotic hyperglycinemia (NKH), a rare genetic disorder that affects nearly 1 in 60,000 babies worldwide. NKH is caused by a defect in the enzyme system that breaks down glycine, and results in a dangerous accumulation of glycine in the body’s tissues and fluids.

Joseph was given 10 days to live.

“We were absolutely devastated. Every day we would stand around our little boy’s cot praying that he would wake up, open his eyes or cry,” said Joseph’s mother, Emma.

On day 13, Joseph woke up and began acting like a normal baby. His parents could hold him and feed him through a feeding tube. Things seemed to get better, but the NKH diagnosis clouded the family’s optimism. After a month, Joseph was able to go home.

NKH unfolds in several stages soon after birth. Within the first several days of life, a baby with NKH will become lethargic, and may have seizures and fall into a coma. Within two or three weeks, the child will spontaneously get better.

“This is one of the rare instances where the symptoms of a genetic disorder seemingly get better on their own,” said Johan Van Hove, MD, PhD, who practices at Children’s Hospital Colorado and is a professor at the CU School of Medicine. As one of the few physician-researchers in the world dedicated to NKH, he travels internationally to visit patients and has seen several hundred throughout his career. “While many pediatricians may see a couple NKH cases in their careers, I’ve seen over 400,” said Van Hove.

In 2003, Van Hove joined the University of Colorado to continue research in pediatric genetics. First, he started looking at the genetics of NKH patients to get an understanding of which genes were malfunctioning in patients with the disease. Van Hove also started clinical studies that demonstrated NKH patients fall on a spectrum, determining that there are two categories of the classical form of NKH: severe and attenuated. “This was a large shift in thinking because we now know that patients with attenuated NKH can make some developmental progress,” said Van Hove.

Today, patients are primarily treated with benzoate to reduce the amount of glycine in their bodies, which helps prolong life. This treatment option begins only after birth. But with the latest genetic testing, an NKH diagnosis can now be made in utero.

Van Hove is currently researching ways to improve the quality of life for those with NKH to find early intervention therapies to keep children with NKH in the attenuated form where they will be able to make developmental progress. Van Hove hopes to accomplish this by finding chaperone molecules that can stabilize a patient’s genes and keep them in an attenuated state.

The Kendrick family has adjusted to life with NKH, and they are hopeful about the future. Through Joseph’s Goal, a nonprofit dedicated to NKH research, they are increasing awareness about NKH and raising money for research like Van Hove’s. “Philanthropy is everything,” said Van Hove. “There would be no research without it.”

Much of Van Hove’s work is supported by Joseph’s Goal and several other organizations around the world that have benefitted from his care. In the United States, NKH Crusaders is also supporting his work. These organizations are often started by dedicated family members after their own children are diagnosed with NKH. “Joe has shown us he wants to fight all the way, and we are determined to fight on his behalf to create awareness of this devastating condition, find better treatments for him and other children with NKH, and hopefully find a cure,” said Joseph’s parents, Paul and Emma Kendrick.

About NKH

Non-Ketotic Hyperglycinemia, (NKH), is a rare, genetic disorder that affects only one child in every 60,000.

It is caused by an excess of glycine on the brain that affects development.

The condition can vary in severity, with the more severe forms resulting in frequent seizures, immobility, and global developmental delay.

The condition is life-limiting, and there are only approximately 15 children in the United Kingdom and 500 children worldwide still surviving with NKH.

Source: Joseph’s Goal
Richard Schulick Named Director of CU Cancer Center

Investment of $100 million will expand care, research, clinical trials

By Tyler Smith

Soon after being named director of the University of Colorado Cancer Center, Richard Schulick, MD, MBA, renowned cancer surgeon and accomplished administrative leader, reflected on the opportunity.

The center already holds a place among the nation’s elite cancer programs and now, with a five-year, $100 million investment by the University of Colorado School of Medicine, UCHealth, and philanthropists, it is poised to grow.

Schulick said he plans to focus on the fundamentals of improving access to care, recruiting elite faculty, and building a clinical trials infrastructure capable of extending new treatments to more people.

“At the heart of everything we do is providing excellent care for patients,” he said. “That also means discovering new cures and teaching the next generation of cancer caregivers. Those three themes are central to our mission, and we won’t deviate from them.”

MORE RESOURCES, MORE CHALLENGES

Schulick said a key goal is making it easier for people to get the best possible cancer care. He said the CU Cancer Center will explore constructing a “much larger and dedicated cancer center” than the present five-story structure on the Anschutz Medical Campus and opening new sites around Denver and the state to “bring services and clinical care closer to our patients.”

Constructing a new cancer center building will require additional significant investment from the philanthropic community.

“It’s my dream to somehow enable this vision,” Schulick said. “All excellent leaders advocate for their organization, and I believe this is the right thing to do.”

Leaders on the Anschutz Medical Campus offered their support for Schulick.

“We are incredibly fortunate to have a leader as talented as Dr. Schulick already on our faculty and ready to enhance the high-quality research and care provided by the faculty and staff of the CU Cancer Center,” said John J. Reilly, Jr., MD, dean of the School of Medicine. “Dr. Schulick will be implementing an impressive plan to extend the reach of the cancer center, further integrate our research and clinical programs, and improve the quality of life for the patients we serve.”

UCHealth President and CEO Elizabeth B. Concordia also expressed strong support.

“The CU Cancer Center is a nationally renowned leader in cancer research, and hundreds of their innovative clinical trials are available at multiple UCHealth locations including our hospitals in northern Colorado, metro Denver, and Colorado Springs,” she said.

BUILDING ON STRENGTHS

The Cancer Center has firm foundations. It’s a longtime National Cancer Institute-designated Comprehensive Cancer Center—the only one in Colorado—a reflection of its excellence in research, advanced treatments, and patient outcomes. Schulick also cites the Cancer Center’s close academic medical center ties with UCHealth University of Colorado Hospital, Children’s Hospital Colorado, and the VA Eastern Colorado Health System, as well as the CU Anschutz Medical Campus, CU Boulder and Colorado State University, as evidence of its current strength and future promise.

“We have top hospitals for care of both adults and children,” Schulick said, referring to top national rankings in U.S. News and World Report for both UCH and Children’s Hospital Colorado.

New treatments that focus on the immune system have garnered much attention—including at the CU School of Medicine, which launched the Human Immunology and Immunotherapy Initiative with a $20 million investment. Schulick said the search extends to finding new drugs and compounds that are safe and effective for varieties of cancer and also considers not only length of life but also quality of life in treating patients.
“If we value one of those without the other, it doesn’t make sense,” Schulick said. “Palliative care, for example, is extremely important. All the things that we do to care for patients have to make sense. That means that aggressive care has to be reconciled with the side effects of care.”

The urgency of addressing these and other complex medical problems increases every day, Schulick said. He pointed to statistics that show more than 1.7 million new cases of cancer in the United States in 2017, with nearly 1,700 people dying from the disease every day. Some 15.5 million Americans in 2017 had a history of cancer.

“It’s the most important problem of our time,” Schulick said. “We’ve gotten so much better at treating other conditions like heart disease and infections that people are living longer. If you live long enough, you’re prone to cancer. It’s hard for most of us to name one person who hasn’t been touched in some way by cancer.”

**MIX OF SKILLS**

The breadth of the questions offer additional challenges for Schulick, who has led impressive growth in the Department of Surgery. Schulick joined the University of Colorado School of Medicine in 2012 and he is the Aragón/Gonzalez-Giustí Chair of Surgery. He will continue in that role in addition to serving as director of the CU Cancer Center.

Under Schulick’s leadership, the Department of Surgery has doubled in size, recruiting top talent from across the country and building a strong program that now includes more than 180 faculty and 78 research staff and that currently provides training to 135 fellows and residents.

In 2017, the Department of Surgery handled 17,375 operating room cases and 86,365 patient visits. Research activity in the Department was also robust, with $22.3 million in total funding, 27 active clinical trials and 425 peer-reviewed publications in 2017. During the past five years, total grant awards have increased 145 percent.

Schulick is also a practicing surgeon specializing in diseases of the pancreas and liver, including cancer, and has no plans to scale back his time in the operating room.

“That’s a core piece of who I am,” Schulick said. He pointed to photos on his office wall of fellow surgeons and mentors John Cameron, MD, and Sir Murray Brennan, MD, who trained him at Johns Hopkins University School of Medicine and Memorial Sloan Kettering Cancer Center, respectively. Both, he said, instilled in him an essential lesson: Don’t abandon the surgical suite for the C-suite. Even now, when Schulick shared the news of his new role as director of the Cancer Center, Cameron wrote in reply: That’s great, but keep operating.

Schulick said he sees his dual roles as complementary rather than conflicting. “A significant portion of our activity in the Department of Surgery is related to cancer,” Schulick said. “It will be my charge in the new position, obviously, to lead the whole spectrum of cancer care in discovery and education. But my specific experience will benefit my ability to lead.”

To keep up with it all, Schulick can also draw on at least two other pieces of his education: the MBA and a bachelor’s degree in engineering.

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“AT THE HEART OF EVERYTHING WE DO IS PROVIDING EXCELLENT CARE FOR PATIENTS. THAT ALSO MEANS DISCOVERING NEW CURES AND TEACHING THE NEXT GENERATION OF CANCER CAREGIVERS. THOSE THREE THEMES ARE CENTRAL TO OUR MISSION, AND WE WON’T DEVIATE FROM THEM.”

On the business side, he observes that his MBA training is important to balancing the need for innovative medical research, discovery and treatment, and fiscal prudence, while engineering taught him problem-solving skills.

“We’re all problem-solvers,” he said. “When we’re presented with a problem, we check what’s available as resources to take care of it. That’s what I do all day, in the OR, in administration, in research, in figuring out the best way to teach. I apply the principle all the time in medicine, which is a blend of art and science. We need engineering skills in medicine, but when we take that too far, we have to rely on the art.”

A version of this article originally appeared in UCHealth Today in July. Mark Couch contributed to this report.
Preparing for a Mission to Mars
CU faculty offer training in the Utah desert
By Mark Couch

Bottle rockets and daydreams about space flight fueled Ben Easter’s childhood imagination.

These days, Easter, MD, is an emergency physician who spends his spare time designing Mars simulations in the Utah desert where he teaches others how to handle medical emergencies in an extraordinarily austere setting.

These are not simple flights of fancy. The Mars simulation is a Wilderness Medical Society-endorsed continuing medical education course taught by experienced scientists and physicians using a habitat developed by the Mars Society, a nonprofit dedicated to promoting exploration of the Red Planet.

And Easter, an assistant professor of emergency medicine at the CU School of Medicine, isn’t pursuing the project as a hobby. He’s laced his education with aerospace medicine to cultivate his longstanding interest in space.

As a fourth-year medical student at Harvard Medical School, Easter participated in a clerkship at NASA’s Johnson Space Center, where he and five other program participants spent a month learning about manned space flight, toured the facilities, and took turns flying the space shuttle simulator.

One day, the group was looking at the Mars Rover when a non-descript man asked who they were.

“We say, ‘We’re medical students and we’re interested in space flight,’” Easter recalled. “And he says, ‘Oh, this is the Mars Rover. I’m the lead engineer for the project. You want to go inside?’ So we go inside and he’s describing it. Then, he looks over and says, ‘Do you guys want to drive this thing?’”

The correct answer would be YES!

“He gets out, opens up the huge hangar doors,” Easter said. “We all pile in and he takes us out on the test field and we’re driving around. It was a very cool experience.”

Also while a fourth-year medical student, Easter rotated at Denver Health.

“I loved emergency medicine out here. We loved Denver. We loved Colorado. So I was fortunate to match out here for residency.”

After moving to Denver as an emergency medicine resident, Easter had another fortuitous encounter.

“When I was down at NASA, they had given us all NASA space medicine division fleeces. They have a logo and patch. So one day, as an early second-year resident, I was wearing this fleece coming in to a shift. Jay Lemery [an associate professor of emergency medicine and the head of the section of Wilderness and Environmental Medicine] was the attending and Jay says, ‘Hey what’s that?’ I told him and he said, ‘I did that rotation as a medical student.’”

That was the fleece that launched a new course to explore.

“Jay and I batted around a lot of ideas,” Easter said. “We wanted to do some kind of space medicine simulation program, but the barrier for a number of years was the venue. Where are you going to go do that? And then I was just following a rabbit hole on Google one day and found the Mars Society.”

The Mars Society operates the Mars Desert Research Station outside Hanksville, Utah, that generally had been used for basic science research, such as geology, robotics, and biology.

Searching the Mars Society website, Easter found a team member who was a physician. “I showed Jay the website, and told him that I think this person might be our in and Jay says, ‘Not only do I know this guy, I know this guy really well.’”

It really is a small world after all.
Lemery’s connection helped make introductions to the Mars Society. Then, Lemery and Easter began to develop a continuing education program that they hoped to offer through the Wilderness Medical Society.

That wasn’t such a hit though. Easter said the immediate reaction from the society was skeptical: “Do you really think anyone who’s interested in the wilderness and being outdoors is going to lock themselves in a tin can? We think you’re not hitting the right market.”

So Lemery and Easter decided to trek to the site.

“My wife never lets me forget this,” Easter said, “because the week before our wedding, I drag her about six and half hours out into the middle of nowhere. Hanksville’s a town of about one motel and three gas stations. It’s mostly a gas stop, so I’m driving to Mars, Utah, and she’s doing the seating chart to our wedding in the passenger seat.”

While the habitat itself wasn’t the highest fidelity, the surroundings were perfect for designing a rugged course about surviving in a remote environment.

“It is barren,” Easter said. “It is desolate. It’s dry. It’s a place that looks like it is shaped by water, but there's no water out there anymore. You can get incredible winds coming across the desert. One time we were doing one of our sims and a big storm blows in and there’s lightning while we’re exposed on the top of a cliff. It’s pretty impressive. So I said to Jay, the living conditions may leave a bit to be desired, but the outdoor experience is absolutely incredible. I think we do it.”

The next step was to enlist additional expertise in space medicine, so they contacted NASA Astronaut Kjell Lindgren, a 2002 graduate of the CU School of Medicine.

“We said, ‘Kjell, we’ve got this crazy idea to take groups of doctors, live in simulation in the Utah desert like a Mars crew for seven to 10 days at the habitat itself wasn’t the highest fidelity, the surroundings were perfect for designing a rugged course about surviving in a remote environment."

NASA ASTRONAUT DONATES HIS WHITE COAT TO SCHOOL OF MEDICINE

NASA astronaut Kjell Lindgren, MD ’02, who spent 141 days on the International Space Station in 2015, brought a surprise out-of-this-world gift to the CU School of Medicine when he came to speak at the 2018 Matriculation Ceremony in August – his own white coat from his first days as a medical student.

“I carried it to the International Space Station with me as a reminder of the role that this institution, the CU School of Medicine family, has played in my life,” Lindgren said.

In addition to the white coat, Lindgren provided a photograph of himself wearing the white coat aboard the space station.

White coats, along with stethoscopes purchased with donations from CU School of Medicine alumni and other benefactors, are given to incoming students at the beginning of their medical education and serve as powerful symbols of the profession, said Dean John J. Reilly, Jr., MD.

In his address to the Class of 2022 medical students, Lindgren explained that difficult endeavors require teamwork, but to make a valuable contribution, you must take care to prepare yourself.

“Simply, your priorities, in order, are to take care of yourself so you can to take care of your team, so you can learn and take care of your patients,” he said. “You can’t get to self-actualization if your basic needs aren’t met. You can’t help your team if you’re a mess. The team can’t help patients if you’re a mess.”
a time, teach about aerospace medicine and then put them through EVAs [Extra Vehicular Activities], the term for whenever you’re leaving your space craft.”

Lindgren helped them contact Rick Cole, an emergency medicine physician who further trained in aerospace medicine. Turns out, Cole was Easter’s mentor during Easter’s rotation at the Johnson Space Center.

“Kjell gets on the phone with me and Rick and I said, ‘Rick, I don’t know if you remember this...’ but when I mentioned it, he put two and two together and he remembered the exact research project I had worked on and everything.”

Cole, who is a flight surgeon at NASA and has sat on Mission Control, became a core partner as Easter and Lemery developed the program.

“He really had a sense of what it should feel like,” Easter said.

With a site for the program and with a team to design it, Easter and Lemery went back to the Wilderness Medical Society. Despite concerns, the course was posted on the society’s website.

“And, of course, it sold out in 24 hours,” Easter said. “So we actually had to pull this thing off.”

The first time the program was offered, in November 2015, it was for six participants. They offered a curriculum, with a few hours of lectures each day on topics relevant to space: radiation, hyperbaric medicine, contingency planning, and psychological challenges of long-term space flight.

Using all-terrain vehicles, they developed “sims” – simulation challenges for the EVAs when they are outside the habitat, or “Hab.”

One of the first challenges is to handle communications outside of the flight vehicle. On the rocky, hilly terrain it is easy to lose contact with one another on the two-way radios.

“If you’re not in the line of sight, you completely lose communication,” Easter said. “So we tried to integrate all this story into a coherent theme. On the first day we send them out, it is a very simple EVA where the biggest problem is communication with the Hab and that’s a key part of what goes wrong.”

On the second day, the EVA project is to set up repeater stations on high points near the Hab to keep connected even when they aren’t in direct sight of it. Dividing the spacesuited crew into two groups, one climbs a steep crag, while the other ventures into the field.

“The group on top basically acts as a repeater, transmitting signals between the field crew and the Hab,” Easter said. “The group on the far end is mapping. ‘OK, we’ve got a signal here. OK, we don’t have a signal here. OK, we have a signal here.’ So that it feels like you’re doing something that an actual crew would do.”

Then, on the way down from the high point, one of the crew members has been pre-selected to act out a slip-and-fall scenario. That crew member ends up with a tear in the back of their suit and a simulated femur fracture.

“The crew has to come back together and they have to figure out what to do,” Easter said. “If they don’t find this tear in the back of the suit, the person gets decompression sickness, and even if they do find that, they have to figure out how do you splint and evacuate this crew member with a femur fracture and get them all the way back to the Hab.”

Subsequent “Martian Medical Analogue and Research Simulation” (2MARS) courses were offered in 2016, 2017, and this year, with one scheduled for November.

And it remains a popular course.

“Probably one of the best compliments we’ve got about the course was from a doc from Australia,” Easter said. “We were asking, what made you sign up for the course and he says, ‘I didn’t sign up for the course. My wife signed me up for the course as an anniversary gift.’ He and a group of other physicians flew halfway around the world to spend time in the Utah desert. To us we thought that was the best compliment you can get because CME courses can be so dry,” Easter said.

Easter was appointed in September as the Deputy Element Scientist for NASA’s Exploration Medical Capabilities. He will be detailed to the Johnson Space Center for the majority of his work and will continue to have a faculty appointment with CU and do clinical time in Colorado.

He also continues to tweak the 2MARS course. This year, he wanted to simulate a fire in the Hab.

“So this is how, a few weeks ago, I found myself with a friend in my garage with a smoke machine, trying to smoke out my own garage. And it worked well enough that we had to buy goggles and masks for the whole crew. But I never would have anticipated what happened in the actual sim: The fire looked so real that a crewmember pulled a fire extinguisher to actually put out our simulated Martian fire.”
Madeline Keleher's science education began when she was young. Her father, a lawyer by training “but a scientist at heart,” started taking her to the zoo every week when she was an infant. As she grew older, the family camped, hiked, went on birding excursions, and spent afternoons in Chicago's Field Museum.

Keleher, PhD, a postdoctoral fellow in the University of Colorado Department of Pediatrics who is studying the epigenetics of maternal obesity, channels her father's enthusiasm when she wades into grade school classrooms in Aurora, hoping to spur a love of learning through the Young Hands in Science program.

Sponsored by the CU Postdoctoral Association and run by volunteers from the Anschutz Medical Campus, the group promotes diversity in the fields of science, technology, engineering, and mathematics.

In fourth- and fifth-grade classrooms, volunteers craft a scenario for students to use science. They tell students a cafeteria worker has been kidnapped, then guide them through forensic experiments to solve the fictitious crime. Evidence includes a partly eaten sandwich, fingerprints, a mystery powder, and a note.

Students do their own forensic work. To eliminate themselves as suspects, they take their own fingerprints and swab their cheeks for DNA.

“The kids really get into it,” said Sarah Farabi, PhD, RN, a former postdoc in the Division of Endocrinology, Metabolism and Diabetes who now teaches at Washington University in St. Louis. “They always want to know who the suspect is. They’d say, ‘Was it Bob? I think it was Bob. Definitely Bob.’ One kid pointed to one of the other postdocs, looked around to see if anyone was watching, and said to me, ‘She’s definitely the suspect.’”

Farabi's mother is a scientist, “so I was never afraid of science,” she said. She is also comfortable around children having spent time as a nurse in pediatrics and in obstetrics. But she and Keleher, who was a teacher in Chicago for two years, said that lab scientists rarely get the opportunity to work with young people.

“This is supposed to be mutually beneficial to the student and to the scientist. Students learn but it also supports postdocs who want to work on their science communications skills,” Farabi said. “A lot of scientists are interested in academic careers and one tenet of tenure is to show teaching and service, so they obviously need to learn to teach, and there really aren’t a lot of opportunities for postdocs to work on these skills.”

Keleher, the new director of the group, expanded the Young Hands in Science offerings to include a homeostasis lesson for high school students. Using stethoscopes, oximeters, and blood pressure cuffs “we can teach them how to take their own vitals to see how your body maintains homeostasis, and what happens to your body if you get injured or sick.

“At the end of the day, what’s important is that they learn something and see that science can be fun, and it’s more than just sitting in boring class every day.”

The classes make an impression on the kids, and, according to some of the thank-you notes students write, many have decided that they want to be scientists.

“I think this is really important because all of us know that we wouldn’t have gotten to where we are today if someone somewhere hadn’t gotten us excited about science,” Keleher said.
When Tony Hammes developed a cough that stuck around longer than he thought it should, he went to a doctor in November 2010 to have it checked out.

Antibiotics didn’t do much, nor did rounds of steroids and other treatments. Years passed and Hammes moved from Illinois to Wisconsin to Colorado. Ultimately he was diagnosed with idiopathic pulmonary fibrosis.

The air sacs in Hammes’ lungs were like “stacks of red grapes, except the grapes are all raisins,” according to Joseph Crossno, MD, associate professor of medicine in the Division of Pulmonary Sciences and Critical Care Medicine and a provider with the UCHealth Comprehensive Lung and Breathing Program.

The condition was noticeable but manageable. Hammes might become winded more quickly than he did in the past, but he could still do the things he liked to do: play sports with his son Jonah, enjoy the outdoors with wife Kristin, play golf with friends and colleagues, work in the yard.

Breathing becomes more difficult

But by 2015, Hammes was having a harder time. That July, he walked into a doctor’s office with an oxygen saturation of 85 percent. For most people, 94 percent to 99 percent is normal; when it drops below 90 percent, supplemental oxygen may be needed. That day, he left the doctor’s office with an oxygen tank.

“The care was outstanding. And we knew that it would be good. You’re in the safest place you could be. This is the place. This is it. It just doesn’t get any better than this.”

“Here we are, married 20 years, and you’re with a guy with one of those big old-person tanks,” Hammes said to his wife.

He continued to travel for work, toting the largest portable oxygen concentrator airlines allow in a cabin. But by December 2016, it was clear that Hammes needed a lung transplant.

He had already started pulmonary rehabilitation, but now it was about keeping himself in the best possible shape prior to surgery. Still, his lungs got worse. At home, he relocated to the guest bedroom on the first floor to avoid climbing stairs.

On Sept. 1, 2017, after driving Jonah to school, he called the UCHealth Lung Transplant Center and was advised to come in. It would be the beginning of a long, eventful stay.

A team of pulmonologists including Crossno, Todd Grazia, MD, associate professor of medicine, and Marty Zamora, MD, professor of medicine, focused on Hammes’ case. They stabilized him, but by September 7, Hammes’ lungs could no longer do the job, no matter how much supplemental oxygen he received.

He would need to rely on extracorporeal membrane oxygenation, or ECMO. This process sends blood that would otherwise flow to the lungs for oxygenation and carbon dioxide removal outside the body to a machine to perform those functions.

Life-saving technology

Muhammad Altib, MD, assistant professor of surgery, performed that surgery. Coming out of it, half-inch-thick clear tubes resting in part on Hammes’ head carried his blood. Between bites of a peanut butter sandwich, Hammes remarked to Crossno: “This is really cool.”

Crossno recalled that he begged to differ: “I’m like, ‘Tony, this is not cool.’”

Here’s why: ECMO might be a life-preserving technology (or “really cool” as Hammes describes it), but relying on it could cause Hammes to be dropped from the transplant list. Crossno and the University of Colorado Hospital (UCH) team were concerned.
A lung transplant patient must be able to expand the chest and walk at least a bit. Otherwise the patient can become “deconditioned,” as Crossno explained, and the risk of a failed transplant becomes too great to proceed. As soon as ECMO began, the window for transplantation was closing. If lungs for transplant didn’t become available soon, Hammes would transition from hospital to hospice.

Hammes’ survival hinged on the right pair of lungs arriving in the nick of time. He knew this, but remained positive. For years he hoped for, even anticipated, a positive outcome from this lung problem of his. He trusted his medical team. And he told himself this: “I’m not in control of this outcome, but if I’m not meant to be here, that’s OK. I don’t understand it, I may not like it, and I have a desire to be here. But it’s OK.”

That way of thinking also applied to Hammes’ wife and son, who, he told himself, “will be strong enough themselves, and have a strong enough support system, to go on without me.” Hammes’ optimism made his room in the UCH Cardiothoracic ICU popular among providers.

So did the unicorns.

Using an app on his phone, Hammes gave unicorn names to doctors, nurses, and others, based on the first letter of their name and their month of birth. Hammes’ unicorn name, “Prince Blueberry,” ended up under his actual name on the whiteboard in his room. Keeping the theme, friends from work brought a unicorn statue to his ICU room. Transplant success

Lungs arrived just in time. Michael Weyant, MD, professor of surgery, performed the surgery on September 26. Hammes spent another month in the hospital, the last stop being the rehabilitation unit, where each day he had two sessions each of occupational and physical therapy. In late October, he was home again.

Lung transplant recovery takes time. But by February, with help of concerted pulmonary rehabilitation, he was shooting baskets with Jonah, now 13, and by early April he was working nearly full-time.

“We’re still in the honeymoon period, but he’s doing well,” Crossno said. “We really pulled that one out of the fire.”

For Hammes, he is here just as he had hoped and on some level expected. He says he’s grateful beyond words – for the donor and his family; for his own family and friends; for his colleagues at O’Neal Flat Rolled Metals; and for the skillful, personally engaged care he received at UCH from the doctors to the nursing staff, the ECMO specialists and the respiratory, occupational and physical therapists.

“I’ll probably get emotional about this, because it’s pretty personal,” Hammes said. “The care was outstanding. And we knew that it would be
good. You’re in the safest place you could be. This is the place. This is it. It just doesn’t get any better than this.”

He maintains a sense of wonder about the UCH Transplant team that saved him.

“What happened is incredible. It’s incredible that people have dedicated their lives to learn and become experts at this so people can benefit from it,” he said.

Hammes visits the ICU after most of his outpatient appointments, to say hi and to thank them again. He wears a surgical mask as Crossno and colleagues suggested.

On a recent visit, a certified nursing assistant who didn’t recognize him behind the mask asked if she could help him.

“I used to live here for a couple of months,” he said. “You might have taken care of me.”

She searched his face.

“I’m Tony,” Hammes said. “I’m the unicorn guy.”

Her face lit up. “Prince Blueberry!” she said.

A version of this article appeared in the UCHealth Insider in May 2018.

By the holidays, Tony Hammes was back on his feet, here with wife Kristin and son Jonah. Photo courtesy Tony Hammes.
COMMUNITY

NEW PROGRAM AIMS TO BOOST TRANSLATIONAL RESEARCH

SPARK Colorado guides entrepreneurial physicians and scientists

By Cigdem H. Benam, PhD

CU Innovations, the technology transfer office of the University of Colorado Anschutz Medical Campus, has launched an initiative to help University researchers move from the early stages of discovery and development to having a tangible product to market.

SPARK Colorado aims to build a bridge between scientist’s lab bench to patient’s bedside by providing funding, industry mentorship, and a curriculum tailored for the needs of participating faculty and researchers. It seeks to help faculty navigate the “valley of death,” a period during which a majority of promising projects fail to survive.

“We want to build networks that allow our faculty to thrive as they focus on conducting cutting-edge research, ways to improve the quality of life for their patients and our communities,” said CU Anschutz Medical Campus Chancellor Donald Elliman Jr.

“Our faculty have invested significantly in their own training to help people and to better understand human health,” he said. “In many cases, they haven’t had time to focus on the demands of building a business, from understanding raising funds to mastering supply chains. Our job is to help them make those connections and extend their innovations to more people who need their help. We want to nurture their creations so that they can thrive.”

SPARK Colorado is modeled after the translational research accelerator program started in 2006 at Stanford University, which has recorded a success rate of 60 percent in terms of moving projects either to clinical trial or licensure.

Daria Mochly-Rosen, PhD, founder and director of SPARK at Stanford University School of Medicine, said she wanted to enable “both cultures to meet in the same room.” She wanted to blend “savviness of industry” with “out-of-the-box thinking of academia.”

Mochly-Rosen recognized this need when she took a year off from Stanford to work in industry, where she became convinced that the best outcome for patients would be to bridge academia and industry by creating venues for interaction and mutual learning.

Mochly-Rosen, who is George D. Smith Professor of Translational Research, writes in her book, “A Practical Guide to Drug Development in Academia. The SPARK Approach” that “in recent decades academia have focused on advancing scientific understanding through basic research and counted on the biopharma industry to translate promising discoveries into new therapeutics. Given the recent developments, however, this paradigm needs to change.”

She noted that “pharma companies have drastically cut their research budgets and basic research staffs to decrease costs and improve short-term profits. As a result, we can expect that fewer novel drug programs will originate in the biopharma sector. Academic inventors can and should step in to fill this gap.”

SPARK reduces the risks of drug development projects for outside companies, investors and even for federal grant agencies. Many SPARK projects were not only licensed to outside companies that would have required larger budgets, but these projects also were able to receive funding from National Institutes of Health (NIH) or Defense Advanced Research Projects Agency (DARPA), after generating initial data supporting their hypotheses.

SPARK also provides useful skills, such as project management, to graduate students and postdoctoral researchers, many of whom will seek careers in industry.

Based on the success of SPARK at Stanford and recognizing a need for similar efforts at academic institutions around the world, SPARK Global was established to support partner institutions in establishing their own SPARK programs. Key requirements are institutions with strong foundations of basic and clinical research, local highly skilled industry advisors and seed money.

Elliman and David Schwartz, MD, chair of the Department of Medicine, attended SPARK sessions at Stanford University and established the SPARK Colorado program this year under the auspices of CU Innovations, which has a broader mandate than a traditional academic technology transfer office that mainly focuses on capturing the intellectual property generated in a university.

CU Innovations’ services include venture development, advancing industry collaborations, business development, designing and implementing training programs, and building infrastructure for clinical validation and co-development of healthcare products.

CU Innovations Managing Director Kimberly Muller highlighted how SPARK fits into the long-term innovation strategy on the Anschutz Medical Campus.

“SPARK Colorado will allow CU Innovations to filter through the best ideas and teams on the campus, help them move their projects in full sail. It will build success stories and a community of entrepreneurial inventors,” Muller said. “Being part of a global network also perfectly overlaps with our vision for this campus.”

Additional leadership to establish SPARK Colorado came from Naresh Mandava, MD, chair of ophthalmology, Richard Zane, MD, chair of
emergency medicine, and David Ross, PhD, chair of pharmaceutical sciences.

SPARK Colorado announced a call for applications in February 2018 for its inaugural class and received more than 50. There were three primary selection criteria: scope of unmet medical need, novelty of the approach, and feasibility in terms of time and financial cost to move the projects forward.

After a rigorous selection process by external industry experts, 20 top projects were invited for a live pitch session. Of these, 11 final projects were selected to participate in the program. Three additional regenerative medicine projects that received funding from the campus’ Gates Center for Regenerative Medicine were also admitted to the program.

The 14 SPARK Colorado projects span biomedicine ranging from surgery, ophthalmology to oncology:

- Spine surgeon Evalina Burger, MD, professor of orthopedics, aims to prevent deformation in endplate architecture which is a common challenge in her field.
- Max Mitchell, MD, professor of surgery, is tackling a challenge cardiac surgeons face on a daily basis by developing an apical cuff implant tool to simplify cardiac surgery.
- Michael Glode, MD, professor emeritus of medicine in the Division of Medical Oncology, and his team are working to develop a novel treatment for bladder cancer patients.
- Heidi Wilson, PhD, assistant professor of obstetrics and gynecology in the Division of Reproductive Sciences, is working on ovarian cancer, one of the deadliest types of cancer among women.
- Melanie Joy, PharmD, PhD, associate professor at the Skaggs School of Pharmacy and Pharmaceutical Sciences, is developing a medical device for kidney disease indication.
- Jeff Olson, MD, associate professor of ophthalmology is building an intraocular device to filter out harmful proteins that can cause macular degeneration.
- Maria Valeria Canto-Soler, PhD, associate professor of ophthalmology is working on stem-cell derived 3D retinal transplant for dry age related macular degeneration.
- Richard Johnson, MD, professor of medicine, is developing a targeted therapy for sugar and alcohol craving and liver disease.
- Mark Pettrash, PhD, research professor and Vice Chair of Research in the Department of Ophthalmology, is developing a biologic for cataract inhibition.
- Martin Zamora, MD, professor of medicine and medical director of the lung transplant program, is working to build an autologous CD117+ progenitor cell therapy for enhancing success in solid organ transplantation.
- James Lambert, PhD, assistant research professor of pathology, is working on a breakthrough therapy for triple-negative breast cancer.
- Shi-Long Lu, MD, PhD, associate professor of otolaryngology is working on a saliva-based molecular test for head and neck cancer diagnosis.
- Surgery Professor Ernest Moore, MD, and his team are developing a tPA-challenged viscoelastometric hemostatic assay for early identification of fibrinolytic coagulopathy in trauma.
- Nicholas Walter, MD, assistant professor of medicine, is working on a surrogate molecular assessment of response to tuberculosis treatment.

All these projects harness the expertise of CU faculty in the pursuit of solving a pressing healthcare problem. SPARK Colorado holds its sessions biweekly on the Anschutz Medical Campus and members of the academic and business community are invited to attend provided they are willing to exchange ideas, learn from each other and make an impact.
During class reunion activities in May, the University of Colorado School of Medicine honored four distinguished alumni for delivery of health care, pioneering research, and service to their country and communities.

George A. Lopez, MD, an internist, received the Distinguished Achievement Award for work benefiting the community, the practice of medicine and the provision of health care, and the Alumni Association and the University of Colorado School of Medicine. Lopez graduated from the CU School of Medicine in 1973.

Lopez invented infusion therapy devices to enhance and save lives at the point of care. The ClickLock device alleviates the risks related to IV needle dislodgement. The innovation led Lopez to found and serve as CEO of ICU Medical, a leading manufacturer of safe medical connectors, custom medical products and critical care devices.

Other inventions include the Clave family of needle-free vascular access devices and the ChemoClave system, which allows pharmacists and nurses to safely mix and administer drugs used to treat cancer patients.

Within the infusion therapy marketplace, Lopez’s inventions are considered “best in class” and are still a force in the medical device industry. As he worked to create the standard of care in infusion therapy for patients and providers, Lopez also has been on a personal quest to find a cure for Parkinson’s disease.

Lopez retired as CEO of ICU Medical in 2014 and still serves on its Board of Directors. Under his leadership, the company has expanded its footprint in hospitals with products designed for use in ORs and ICUs.

Wagner Schorr, MD, has received the Distinguished Service Award for his work in nephrology and service to the medical community.

Schorr has served in numerous leadership positions in the United States and in the United Kingdom. After graduating from the CU School of Medicine in 1963, Schorr trained at CU with transplant pioneer Thomas Starzl, MD, PhD. Schorr then traveled to the UK to introduce kidney transplant there. He served as senior registrar of the Renal Unit of the Royal Victoria Infirmary.

In Colorado, Schorr served as president of the Medical Advisory Board of the National Kidney Foundation; as the co-founder of the Colorado Organ Recovery Systems (now the Donor Alliance); as medical director and consultant of HCA/HealthOne; and president of the Colorado Society of Nephrology. Schorr also has served on the Boards of HealthOne and the Gates Center for Regenerative Medicine.

Schorr served as Chief of Medicine at Presbyterian Medical Center in Denver and is a clinical professor of medicine at the CU School of Medicine.

Schorr is the immediate past president of the Medical Alumni Association and has served on the School of Medicine’s Admissions Committee for more than 20 years. He and his wife, Annalee Schorr, established the Schorr Family Medical Scholarship Fund, which has committed $20,000 per year for five years.

In 2017, Schorr received the CU School of Medicine’s Florence Rena Sabin Award for exceptional contributions to the Anschutz Medical Campus and the health of the citizens of Colorado.

M. Robert Yakely, MD, who completed his residency in urology at the University of Colorado School of Medicine after earning his medical degree from The Ohio State University in 1966, has received the CU School of Medicine’s Alumni Association Humanitarian Award, recognizing lifelong service to society, extraordinary service to the community, and leadership through global or local service.

In addition to his many hours dedicated to leadership in medicine in Colorado, Yakely also is responsible for establishing improved prostate cancer screening on the island of Tortola in the British Virgin Islands. While visiting Tortola in 1996, a doctor there asked Yakely to see some patients who had late-stage prostate cancer.

Working with the head of the British Virgin Islands Red Cross, Yakely established an improved prostate cancer screening program. During the first year, 50 patients were screened. By 2007, 1,500 men were screened. Due to their work, Yakely and his wife, Rosemary, were made honorary citizens of the British Virgin Islands.

Yakely is president of the Colorado Medical Society, which he has served in multiple roles since 1980. He had a private practice in the Denver metro area for 23 years, after which he was co-director of the Rocky Mountain Kidney Stone Center for 17 years. Yakely also has served on the Board of Directors of the Clear Creek Valley Medical Society and as president of the Rocky Mountain Urologic Society.

Yakely was chairman of the West Side Urology Department at Lutheran and St. Anthony’s Hospitals, serving three terms from 1993 to 1995.

Linda L. Williams, MD, a Denver area psychiatrist, received the Silver and Gold Award, which recognizes humanitarianism, citizenship, professionalism, outstanding service to the community, and contributions to the art and science of medicine.

Williams was a registered nurse before graduating from the University of Denver (1981), the CU School of Medicine (1984), and a CU residency in Family Medicine at
On August 11, 184 members of the Class of 2022 received their white coats and stethoscopes at the Matriculation & White Coat Ceremony. Alumni and board members of the Medical Alumni Association welcomed and distributed Littman Cardiology IV stethoscopes to students as they start their journey to becoming physicians.

If you are interested in donating and handing out a stethoscope to incoming first year medical students, please contact Vanessa McDougall at 303-724-2517.

The Medical Alumni Association's HOST (Help Our Students Travel) Program invites alumni to host fourth-year medical students for a night or two during residency interviews. Alumni volunteers may offer advice to students about residency training, prospective medical centers, and the communities in which students are interviewing.

If you would like to host a medical student please contact the Office of Alumni Relations at 303-724-2517 or email healthalumni@ucdenver.edu.

The Medical Alumni Association Endowment Scholarship supports medical students who demonstrate academic merit and financial need. This fall, the MAA Endowment Scholarship will award two second-year medical students a $5,000 scholarship.

The MAA is seeking to raise $50,000 by December 31, 2018. When $50,000 has been raised, CU Medicine, the faculty practice, will match all gifts to the fund dollar for dollar up to $50,000.

To make a donation to the Medical Alumni Association Endowment Scholarship and help double the impact on our medical students, please contact the Office of Alumni Relations at 303-724-2518.
The University of Colorado Anschutz Medical Campus and UCHealth announced in July the naming of the UCHealth Eye Center program in honor of philanthropist Sue Anschutz-Rodgers for leadership gifts supporting innovative research, development of new therapies and devices, and enhanced clinical care.

The gifts enable the UCHealth Eye Center, based in the 135,000-square-foot Rocky Mountain Lions Eye Institute building on the CU Anschutz Medical Campus, to expand its work in ocular stem cell research for sight restoration, to retain and recruit top faculty, and to aid the growth of its clinical care network throughout Colorado and the region.

"Sight has always been incredibly important to me," said Sue Anschutz-Rodgers, "and when I learned that I could eventually lose my eyesight due to macular degeneration, I felt I had to do something to bring the life-changing care I was receiving to future generations. I have 100 percent trust in the care offered there and hope that the research underway today will ultimately lead to a cure."

CU Anschutz Medical Campus Chancellor Donald M. Elliman, Jr., said Anschutz-Rodgers has had a profound impact on the campus. "With a long history of gifts supporting cancer research, women’s health, faculty, scholarships and more, Sue has made an immeasurable difference across our campus," Elliman said. "I can think of no more fitting recognition of her commitment to transforming ophthalmology than to see her name associated with the Eye Center for decades to come."

**Rocky Mountain Regional Veterans Affairs Medical Center opens**

Wrapping the eastern edge of the Anschutz Medical Campus, a 31-acre hospital complex opened this summer to serve veterans who have fought in U.S. wars and conflicts since World War II.

The Rocky Mountain Regional Veterans Affairs Medical Center will provide care for 390,000 service members from 11 Western states, and will boost ties with University of Colorado School of Medicine faculty and students.

“We anticipate our medical education program to strengthen for generations to come,” said John Moore, MD, associate chief of staff of education for the VA’s Eastern Colorado Health Care System.

The system hosts 155 medical residents and fellows through 38 programs sponsored by CU. In addition, many third- and fourth-year medical students rotate through the VA health care system.

The Anschutz Medical Campus also offers services to veterans including the CU Heroes Clinic, which serves student veterans, and Marcus Institute for Brain Health, which specializes in treatment for veterans with head injuries.

The new hospital replaces a mid-century hospital in central Denver. At 1.21 million square feet, the complex doubles the square footage of inpatient and outpatient services, and expands specialty care for spinal cord injuries, cancer screening, prosthetics, mammography and aquatic therapy.
**DEPARTMENT OF SURGERY ANNUAL REPORT FEATURES PATIENT’S ARTWORK**

Arturo Garcia was struck by debilitating abdominal pains in December 2012. Fighting through the last hour of his shift at a bartending job, Garcia admitted himself to the emergency department at University of Colorado Hospital, where doctors identified an ampullary tumor near his pancreas.

After undergoing a specialized surgery called the Whipple procedure, Garcia’s prognosis was good—until he was diagnosed with a severe infection. With drainage tubes protruding from his body and with chemotherapy treatments scheduled, Garcia decided to live life on his own terms, focus on his passion for painting and inspire others battling disease.

Now, Garcia is 100 percent cancer-free and he owns an art gallery in Denver. He contributed a series of paintings of patients that were used in the Department of Surgery’s 2017 Annual Report and were displayed on campus in the art gallery at the Fulginiti Pavilion for Bioethics and Humanities.

“The portraits painted for the ‘Art of Healing Surgical Care Report’ are a eulogy to our true human nature, to the light of our beautiful spirit and to its healing powers,” Garcia wrote in an artist’s statement. “Healing is an art performed by the body and the spirit: the true artist in us.”

**FRY SECURES CANCER MOONSHOT INITIATIVE FUNDING**

Terry Fry, MD, professor of pediatrics in the Section of Hematology, Oncology & Bone Marrow Transplantation, and co-director of the Human Immunology and Immunotherapy Initiative, has been awarded a five-year, $4 million Research Project Cooperative Agreement award from the National Cancer Institute (NCI).

The funding for Fry and his colleagues is part of the NCI Pediatric Immunotherapy Discovery and Development Network. The Network is associated with the Beau Biden Cancer Moonshot Initiative that is intended to accelerate cancer research. Its goal is to identify and advance research opportunities for translating immunotherapy concepts for children and adolescents with cancer toward clinical applications.

Fry aims to advance chimeric antigen receptor T-cell (CAR-T) therapy in high-risk pediatric acute lymphocytic leukemia (ALL) and acute myeloid leukemia (AML). Pediatric leukemia is often characterized by overexpression of receptors for cytokines that are critical for leukemia aggressiveness and progression. The overall goal of these studies is to identify successful combinatorial immunotherapeutic approaches to mitigate now-known resistance mechanisms of kinase signaling and antigen escape that are translatable to the clinic for early-phase testing in children with high-risk acute leukemia.

**MISSION STATEMENT**

CU Medicine Today will keep alumni and others knowledgeable about and connected with the School of Medicine and the University of Colorado by writing truthful and relevant articles and providing a forum for news and comments from alumni.

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I'll always feel like I didn’t prepare you the way I should have. 
I promise
It wasn’t because I didn’t think you deserved better. 
When we talked that morning, I was so fresh
So naïve. 
My lack of knowledge is what misled you.
I am sorry for that.
I did not understand how bad things had truly become. 
With clueless gestures
With subtle positivity
I made you feel like things could get better. 
They couldn’t. 
This path had been set in motion 
Years before we met.
When I came back with “our team”,
I had only sadness to share with you.
Before stepping in your room, I had been educated.
I truly understood how sick you were.
My “team” decided I needed to tell you
You would not live to see a new year.
I had about 4 minutes to process this.
4 minutes to accept and be prepared to explain
We are not going to fix you.
I put on my bravest face and delivered the news
As best I could.
I will carry this guilt.
I’ll always feel like I blindsided you.
I promise
It wasn’t because I didn’t think you deserved better.
TREATING A PATIENT WITH A DNR TATTOO

By Jackie Glover, PhD

The patient arrives in the emergency room unconscious and in dire straits, and he has DO NOT RESUSCITATE tattooed across his chest.

What should health care providers do? Honor the tattoo as if it were a legal document? Ignore it? Proceed with aggressive treatment? Provide comfort care? Seek an ethics consult?

Earlier this year, I assembled a panel on the Anschutz Medical Campus to consider these questions from the provider, ethical and legal perspectives. While their reasoning varied, each panelist agreed: A tattooed DNR is not an automatic directive that a provider can rely on.

We began our conversation with the perspective of an artist who provides medical tattoos, including DNR tattoos on rare occasions. As the lead artist and clinician at Skin Holistic Dermagraphics in Boulder, Tara Gray-Wollstar, RN, explained that some tattoo artists will ink a DNR onto a person without knowing its potential effect or sometimes without even ascertaining the client’s reasoning. Gray-Wollstar said she will only tattoo a DNR for patients who have terminal medical conditions and who have otherwise completed valid DNR orders.

David Nowels, MD, MPH, associate professor of family medicine and the palliative medicine fellowship director at the School of Medicine, noted that a DNR typically reflects a patient’s wishes at a moment in time, but he added that patient preferences often change over time. As a member of a palliative care team, he recognized many DNRs are ambiguous. He recommended clinicians use the DNR to start a conversation if possible about what the patient understands and desires to control regarding interventions.

Because a DNR, in its ideal form, represents a patient’s expression of an autonomous medical decision, Julie Swaney, MDiv, manager of UCH Health University of Colorado Hospital Spiritual Care Services, explained context matters and that it’s necessary to understand why a patient might have a DNR tattoo. She recalled a case in which a patient with a tattooed DNR later explained that he got it because he lost a bet. He said he never expected anyone to take the tattoo seriously. Without knowing the patient’s perspective and story, a provider can do more harm than good.

Finally, CU Vice President and University Counsel Patrick O’Rourke discussed the legal framework. While a provider might rely upon a tattooed DNR to defend a lawsuit brought by a patient’s surviving family, a provider can also point to the ambiguity in the scope of a tattooed DNR with regard to the level of treatment. In such cases, a jury likely would understand why a provider was hesitant to focus exclusively on a tattoo to dictate a course of medical care.

In the final analysis, a tattooed DNR is only a clue that a patient may not want specific interventions. But that tattoo alone cannot express a patient’s motivations. Providers should use the tattoo as an invitation to open a broader conversation, including with the patient’s family members and caregivers if they can be located. While respecting the patient’s autonomy, providers must observe their own ethical obligations.

Jackie Glover, PhD, is professor of pediatrics, philosopher ethicist at the CU Center for Bioethics and Humanities, and co-medical director of the UCH ethics consult. To listen to the session, including audience members’ reactions and the panelists’ reaction to their comments, a recording is available at http://www.ucdenver.edu/academics/colleges/medicalschool/centers/BioethicsHumanities/NewsEvents/Pages/Archive.aspx.
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