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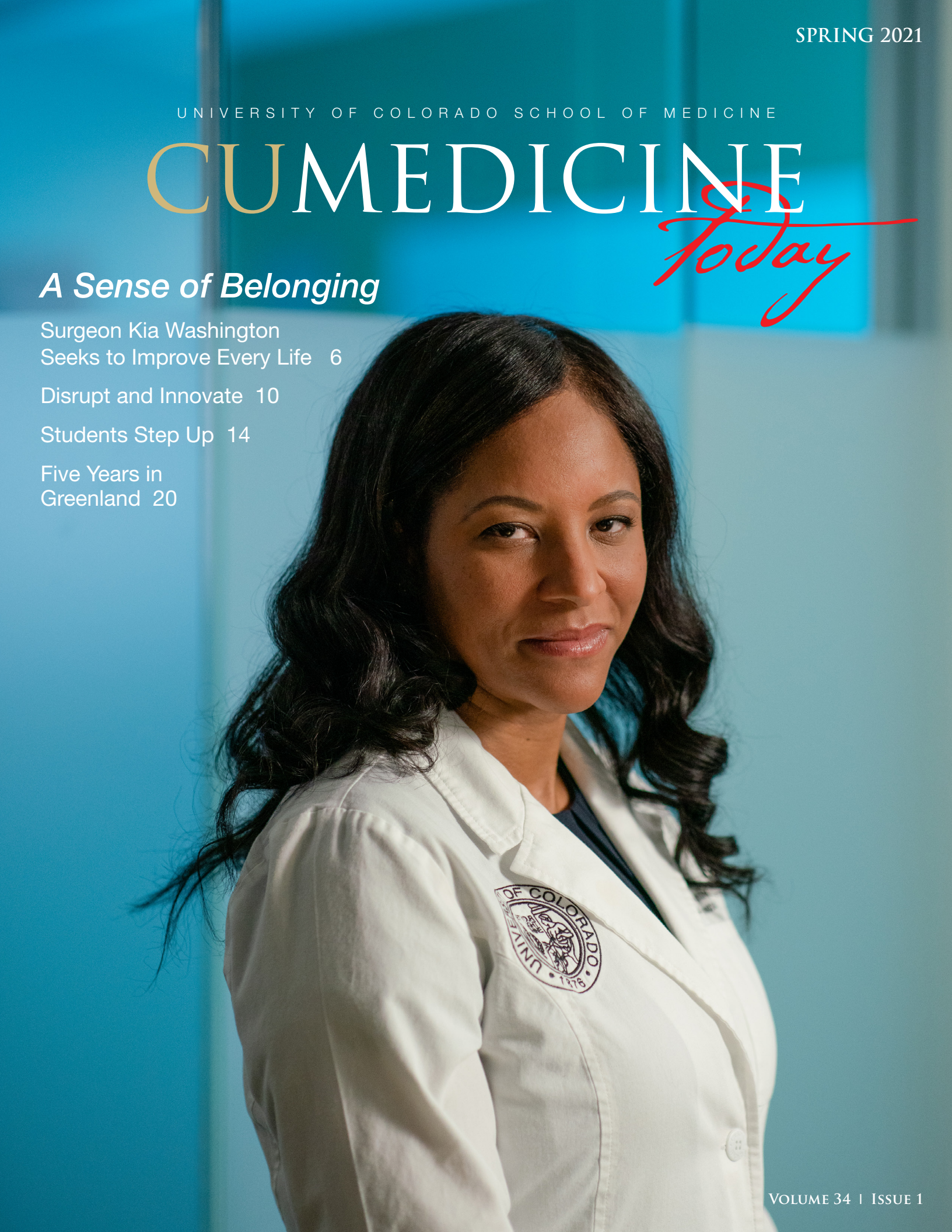
UNIVERSITY OF COLORADO SCHOOL OF MEDICINE

CU MEDICINE Today

A Sense of Belonging



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Signs of Hope

This spring we have hope.

A year ago, at the beginning of the COVID-19 pandemic, we faced a crisis with fearsome consequences: a highly contagious and deadly virus, an unprecedented economic shutdown, school closures, and social isolation.

While we are not yet through the tunnel, we can see light and we are moving toward it. Vaccines, developed in record time, are being widely distributed, offering the promise of better days ahead.

We have been able to get to this point because science provided a solid foundation for the rapid development of vaccines. And we are moving in the right direction because of smart solutions and compassionate care.

Richard Zane, MD, chair of emergency medicine and chief innovation officer at our partner UCHealth, told the Colorado Sun that the vaccination rollout effort is momentous. "It is rocking," he said in December at the beginning of the vaccine rollout. "It is one of the most important events in the history of science and medicine, and people are excited they are participating."

It is a big deal. Everyone from the Anschutz Medical Campus should be proud of their contributions to this historic effort. Hundreds from our academic medical center have volunteered to help the rest of our community. Our faculty have been go-to experts for state leaders and media representatives, reassuring the community that vaccines are safe and administering the shots to tens of thousands of Colorado residents. Our students have been active volunteers, stepping up when needed, even as they continued their studies.

All the while, we have continued to provide care and advance biomedical science in our chosen fields of expertise. After a sharp decline in non-COVID patient visits last spring, most of our clinics have recovered. Our research grant portfolio grew in 2020, with Anschutz Medical Campus researchers attracting $762 million in sponsored research funding.

Through it all, the School has continued to pursue other important strategic goals. Among the highlights:

We are working in partnership with Salud Family Health Centers to expand medical coverage to our neighbors and we are working with state Medicaid authorities to improve primary and specialty care throughout the state.

Faculty-initiated clinical trials of cell-based immunotherapy – with treatments manufactured in our own facility – commenced on our campus.

We have recruited leadership to build a more robust data science and informatics program, launching a new Center for Health Artificial Intelligence and hiring a new Chief Research Informatics Officer for the campus.

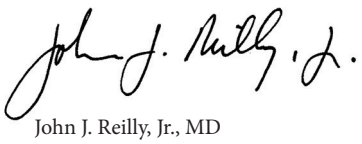
Our updated curriculum for medical students will fully launch this summer after years of diligent planning.

Our collaboration with Colorado State University bloomed with third-year medical students beginning clinical training in northern Colorado, in advance of the first cohort of students for the full four-year program matriculating this year.

These achievements are even more impressive because members of our School community made them happen during the most challenging public health and economic crises in generations.

Our school community and our supporters have been a constant source of strength, wisdom, compassion, and dedication during extraordinarily trying times. We look forward to gathering with you soon to celebrate these achievements.

With warm regards,



John J. Reilly, Jr., MD
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Reporters locally and nationally turn to the School of Medicine for expertise and research news. Here are examples from near and far.

NBC News quoted **Rebecca Keith, MD,** associate professor of medicine and co-director of National Jewish Health's post-COVID-19 clinic, and **Sarah Jolley, MD,** assistant professor of medicine and pulmonary and critical care specialist at UCHealth University of Colorado Hospital, in a March report about treating COVID-19 long-haulers. "It takes a multidisciplinary approach to try to help people," Keith said. "Hopefully, as time goes on, science will catch up and we'll have more to offer."

Suchitra Rao, MD

Deb Saint-Phard, MD

Christine Baugh, PhD, MPH, assistant professor of medicine, was quoted in January in the Atlanta Journal-Constitution, about her study finding that college football players underestimate the risk of concussion. "That athletes underestimated their risk of concussion and injury in this study raises important ethical considerations," she said. "What is the threshold for college athletes to be sufficiently informed of the risks and benefits of football to make decisions that align with their values and preferences?"

Katherine Green, MD, assistant professor of otolaryngology, in December told 5280 magazine, "2020 is the year that just keeps on giving, and one of the things it has given us is an escalation of sleep problems."

Richard Zane, MD, chair of emergency medicine, described the reaction of frontline health care workers getting COVID-19 vaccinations in December. "It is rocking," he told the Colorado Sun. "It is one of the most important events in the history of science and medicine, and people are excited they are participating."

Suchitra Rao, MD, associate professor of pediatrics, was quoted in March in a report in the New York Times about the need for children to return to school. "I am an infectious diseases physician, respiratory virus researcher, pediatric hospitalist and mother of two. I have taken care of children with COVID-19 and seen its devastating complications. I have engaged in this work while taking care of the academic and social-emotional needs of my children. I had to make the difficult choice to abandon the public school system, of which I was a strong proponent. My children needed to be in school. I needed them to be in school. I knew this could be done safely. I wish the same for everyone else."

Angela Wright, MD, assistant professor of emergency medicine, and her husband **Frank Wright, MD,** assistant professor of surgery, described their reactions at getting COVID-19 vaccinations in December. "It makes me very grateful and feel fortunate that the vaccine is an opportunity and an option. Seeing day after day how terrible the virus can be and the challenges it can present for families, I feel very fortunate that there is a light at the end of the tunnel," Angela said in a report on the Fox affiliate in Denver. "I don't think there will be an instantaneous overnight change. I think we can just keep doing what we need to do and I trust the science that's gone into making the vaccines as quickly and as safely as possible," Frank said.

Deb Saint-Phard, MD, associate professor of physical medicine and rehabilitation, urged compassion over prejudice during an interview in February with the Denver-based CBS affiliate. "The image I have is that I have been skating and just underneath that lake I can see the Black faces of people who have suffered," she said.

Lisa Abuogi, MD, associate professor of pediatrics, told the New York Times in February that children are being harmed by school closures during the pandemic. "Children's learning and emotional and, in some cases, physical health is being severely impacted by being out of school," she said. "I spend part of my clinical time in the E.R., and the amount of mental distress we are seeing in children related to schools is off the charts."

Emmy Betz, MD, MPH, associate professor of emergency medicine and director of the Firearm Injury Prevention Initiative, told the Denver Post in November that arrests are not the only action that can help prevent future violence. "It's not just punitive criminal justice, though that's important in many cases, but it's about the factors that led to it and trying to stop the violence there," she said. "You need larger community programs and policies that are addressing those underlying issues as well."

Vaughn Browne, MD

Jacqueline Ward-Gaines, MD

Kweku Hazel, MD

Vaughn Browne, MD, PhD, associate professor of emergency medicine, in February talked with the Denver-based CBS affiliate about the need to prepare and recruit diverse candidates into medicine. "We need to have a pipeline of qualified, excellent students through middle school and high school who are receiving encouragement to pursue careers in medicine and science and who are getting messages that they're capable," Browne said.

Jeffrey SooHoo, MD, associate professor of ophthalmology and the School of Medicine's associate dean for admissions, expressed skepticism that the "Fauci effect" was causing significantly higher applications this year because these applications were submitted only a few months after the pandemic arrived in the U.S. "I think there might be a small signal there but I don't think it's the bulk," he said in the Aurora Sentinel in January.

Fernando Holguin, MD, professor of medicine, was interviewed by 9News, the Denver-based NBC affiliate, about his appearance in a skit on the Golden Globes award ceremony and his experience treating COVID-19 patients. "This year has been like no other. For those of you who are not in the hospital, you don't see it every day like we do. There's a lot of really difficult, emotional moments being with these patients in the ICU and talking with their families."

Marc Moss, MD, professor of medicine, told the Denver-based CBS affiliate in late January that Coloradans "should be proud" of declining COVID-19 cases and hospitalizations. "We've done a good job of listening to what we're supposed to do: wearing masks, washing our hands, maintaining social distancing," he said. "I think maintaining those requirements is probably why we're seeing fewer cases."

Jacqueline Ward-Gaines, MD, assistant professor of emergency medicine, discussed providing care during the pandemic, particularly the concerns raised by Black and Latinx community members. "When people come in and they're sick and they're hurting — their most vulnerable time — it can be pretty hectic, and that's when I like to step in," she told the Denver-based ABC affiliate in February. "It's a really sad time to see our communities hurting, and there's so many problems with health disparities as it is," Ward-Gaines said. "One of the things that I do is I try to do encouragement. They are a little hesitant sometimes to come for the vaccine just because of what we've [the Black community] have experienced in health care, in general."

Allison Kempe, MD, MPH, professor of pediatrics and director of the Adult & Child Consortium for Health Outcomes Research & Delivery Science, told NBC News in December that people are anxious to get vaccinated. "People have called me and said, 'How can I get the vaccine?'" she said. "I think that not everyone will be happy to wait, that's for sure. I don't think there will be rioting in the streets, but there may be pressure brought to bear."

Vikas Patel, MD, professor of orthopedics, explained the success rate of the type of spinal surgery actress Melissa Gilbert had last fall. "I'd say in the range of 10% of patients might have that failure of that fusion," he told ABC News in November. "Sometimes the body just doesn't heal. And it can be for a variety of factors. But if it doesn't heal, then those bones, instead of fusing together and becoming solid, they continue to move."

Kweku Hazel, MD, a fellow in surgery, and his wife, Cynthia Hazel, PhD, who is a public health researcher, were interviewed by the Denver-based ABC affiliate in January to talk about their efforts to reassure Black and underserved communities that COVID-19 vaccines are safe. "We have to get out there, interact with and meet people where they are…through salons, barbershops, and religious institutions," he said. "There is a lot of misinformation ravaging our communities and unfortunately our communities are the communities that have been ravaged by the coronavirus."

Kia Washington, MD, professor of surgery, was quoted in a November article by AARP. Trouble with gripping, grabbing, pinching and holding things can happen at any age, but "it's around age 60 when we commonly see symptoms of hand-strength loss and loss of dexterity," she said.

Jason Stoneback, MD, associate professor of orthopedics, was featured by CBS Sunday Morning in a November segment about osseointegration, a procedure for amputees that inserts a titanium rod directly into the bone. "You can see her upper torso is sort of shifting over the right side, so that she can maintain her balance through her gait," he said describing one of his patients.

Accelerating the Pace of Biomedical Research

Casey Greene leads the new Center for Health Artificial Intelligence

Interviewed by Mark Couch

Casey Greene, PhD, joined the University of Colorado School of Medicine in November 2020 to lead the newly created Center for Health Artificial Intelligence and to help establish a new department devoted to data science and informatics.

He joined CU from the University of Pennsylvania Perelman School of Medicine, where he was an associate professor of systems pharmacology and director of the Childhood Cancer Data Lab for Alex's Lemonade Stand Foundation.

Greene is an experienced leader in the field of data analytics. After completing his PhD in genetics at Dartmouth College in 2009, Greene was a postdoctoral fellow at the Lewis-Sigler Institute of Integrative Genomics at Princeton University until 2012. He joined the Dartmouth faculty that year and moved to University of Pennsylvania School of Medicine in 2015.

His research lab develops algorithms that integrate publicly available data from multiple datasets to help model and understand complex biological systems. This approach allows investigators to infer the key contextual information required to interpret the data, and facilitates the process of asking and answering basic science and translational research questions.

What are the goals for the Center for Health Artificial Intelligence?

We're awash in data. The challenge is figuring out how to use these data in ways that enhance our campus missions. I think about the goals of the center as enhancing research, practice, and education through advanced analytics. Each presents its own challenges and opportunities.

Research is a process of exploring the unknown. We plan and set out on a voyage, recording what we find, and what we find at each step changes our trajectory. It's very much a fractal process. What we observe one step changes our next one, so even small hunches can send us off on a new directions. Serendipity is a key part of the process. I view the research mission of the Center for Health Artificial Intelligence as making serendipity routine: we develop the methods and tools to help investigators find unexpected but valuable connections in the sea of data that we're confronted with. Traditionally, serendipity has depended on chance collisions: people talking in the hallway or finding just the right paper in the table of contents of a research journal. I think artificial intelligence methods can be deployed to reveal these opportunities in an intentional way, whether that's helping to put our data into the context of everyone else's data or if it's revealing a key finding in the biomedical literature that, if only we knew it, would send our research program in a new and productive direction.

On the practice side, there are major opportunities to combine analytics with data that we gather as care gets delivered to improve processes and enable care teams to work more efficiently. There are providers on this campus who are already leaders in using data to improve care, and I expect members of the center to continue to complement that mission through analytical advances. There are also opportunities to use AI-based analytics to bring advances from research, for example in genomic profiling, to enhance care in the clinic.

With respect to our education mission, the pervasive nature of large-scale data means that many more people could benefit from applying these new analytical approaches. Even though we know the potential is great, it's often difficult to figure out how to put them to use for the problems that we face every day. Data analysis works best when it happens close to the data, and that means that the people who are generating the data should be able to be thinking about it in these same ways. We need a multifaceted set of education programs – those that are designed for people for whom advanced analytics will be their primary career, those for whom these methods will complement their primary focus, and those who need to make decisions about analytics but who are unlikely to be running analyses themselves. I expect that faculty we recruit will contribute to these efforts for one or more of these audiences. If we're going to achieve our potential on this campus, advanced analytical methods should be applied routinely and the capabilities should be available to everyone.

It seems hard to measure the outcomes, but you have a vast body of work so there are ways to measure this. How do you evaluate success?

You're absolutely right that it's hard to measure outcomes. In research, we can perform experiments that are guided by these analytical approaches and others based on traditional methods, and we can measure the hit rate of these. At the scale of a campus, what we really want to measure are items like: are advanced analytical approaches being deployed more frequently, are data being collected that can drive the next wave of these methods, and are these methods creating connections that otherwise wouldn't have been observed. All of these are hard to measure.

What we can measure are proxies. We can examine the extent to which we're recruiting faculty for whom these analytics are part of their research program, and we can examine their success in terms of both technical advances and scientific discoveries as well as progress in their career.

We can measure education programs to examine learner perceptions and, if we're careful about how we collect data, we can potentially examine outcomes after training. Ultimately, we can begin to measure connections by examining the extent to which faculty on campus submit and receive more multiple principal investigator grants and submit and receive more program project grants. We can look for indicators that connections are being established beyond individual research labs. In the ideal world, two people poised for success if only they join forces and would find each other and team up more often. I agree with you: that's hard to measure.

Does AI pose risks to privacy and how can we protect individual identities?
Like many technologies, AI poses risks but can also present solutions. In some of our research a few years ago, we wanted to see if we could develop an approach for privacy-preserving data transformation using AI techniques. We used neural networks. Neural networks in the computer science sense are essentially just groups of mathematical functions that get strung together and trained over time through exposure to data. In this case we created two neural networks, and we trained them against each other. One of the neural networks was tasked with to creating entirely new data. The other was trained to try to figure out if the data are real or fake. We trained these pairs of networks until the real and fake data couldn't be distinguished.

Because neural networks can be very complex, there was a risk that the neural network tasked with creating fake data could simply memorize the real data. We introduced the use of a technique called 'differential privacy' in this setting, which enabled us to control how much the neural networks could learn from any one record and prevent them from memorizing the data.

This is a long way to say: yes, AI and advanced analytical methods can pose risks to privacy. I can see very clear opportunities for interactions between researchers focused on building new technologies and those focused on the ethical deployment of technologies in research. We also need to be thinking about how AI-based technologies can be deployed to reduce risks to privacy as well.

The other challenge that we haven't discussed, but that falls along the same line is that of AI models that launder systemic biases. Often these machine learning models are trained to carry out some past behavior more efficiently, for example by training a model based on prior observations to suggest potential courses of treatment. If the training data is biased, the model will be too. It's clear that AI-based techniques are going to become widely deployed in the years ahead. It will be critically important to have researchers on campus examining these models for bias and developing approaches to counteract, rather than promote, inequity.

Were you always into computers and technology when you were a kid? How did you get interested in this area of research and work?
There are pictures of me using the keyboard of a home-built computer from before the time I can remember, and I've always found them fascinating. When I was an undergraduate student, I enjoyed genetics. I worked in a Drosophila lab, and, while I enjoyed the scientific question, I struggled with the immediate task at hand which was counting sternopleural bristles on the sides of fruit flies. I'd look at the side of the fly, and count, 'one, two . . .' and flip them over and look at the other side and start again. I eventually reached my limit of sternopleural bristles.

I next spent a summer working with a Drosophila lab at the University of Georgia. Instead of working in the lab, they took advantage of my programming experience and had me work with a computational grad student. I thought, oh wow, I can study genetics… without counting bristles. This is amazing. So that's what I have ended up doing ever since.

Do you have any favorite findings of work that you done?
I think the next finding is always the most fun one! One example that comes to mind came out of a collaboration with Deborah Hogan at Dartmouth. We were just on a call this morning. For almost the last decade, we've been working with Deb's lab to understand gene regulation in Pseudomonas aeruginosa. Near the time we started working together, there was group of researchers at Google who developed an approach to take still images from YouTube videos and show them to a neural network. They could block out certain parts of the video and train a neural network to reconstruct the original image. One of the things they showed was that the neural network developed a neuron capable of recognizing cats without ever being told what a cat was. So we did that, but for Pseudomonas gene expression data.

The neural network ended up learning patterns of co-regulated genes. Many were recognizable, but some were less so. We used the approach to examine the response to starvation for a key nutrient. When we looked across all public data, we identified one setting where the results just didn't make sense: the presence or absence of a second gene, which wasn't supposed to be related, made a huge difference in how Pseudomonas responded. It took many follow-up experiments to understand the details, but that "aha" moment doesn't go away.

Have you done any COVID-related work?
We've certainly done a few things. A postdoc in our group has spent the last year leading a large-scale collaborative review of the COVID literature. It's now more than 100,000 words covering more than 1,000 papers and preprints. It has essentially become a book! I also worked with a team that was working to put together a symptom self-reporting app. The idea was to use surveys to gain an early perspective on what the COVID situation was in each zip code – this was before testing was widely available. The app is called How We Feel. Lady Gaga actually tweeted about it. I think COVID has really revealed how urgent it is that we be able to accelerate the pace of biomedical research, and I see AI being a critical part of this in the years ahead.

Where She Belongs

Kia Washington is opening doors for doctors from underrepresented backgrounds

By Greg Glasgow

Kia Washington, MD, looks back on her undergraduate experience as four years that helped to shape who she is. One of those years in particular stands out as not just formative, but transformative.

As a young Black woman who grew up attending mostly white schools, it was important to Washington to experience more diversity when she went to college. One reason she chose to go to Stanford University in California was the school's exchange program with Spellman College, a historically Black women's college in Atlanta. Washington spent one year there.

Surgery Focuses on Diversity

The Department of Surgery's Diversity, Equity, and Inclusion Committee was formed in fall 2019, but the events of 2020 gave its members a new sense of energy and purpose.

"I think we're at a tipping point as a country, which is great," says Kia Washington, MD, vice chair of diversity, equity and inclusion for the Department of Surgery. "I'm hoping that we will have a true reckoning and healing in our country, not just around racial justice inequities, but all social justice issues. I'm hoping we'll start to dive into the deep, uncomfortable work, because that's where we'll really start to make progress."

With the goal of becoming the most diverse, equitable, and inclusive department of surgery in the country by 2030, the committee is examining hiring practices, trainings, mentorship, and patient care.

"All we have to do is look at COVID infection rates and the fact that communities of color are impacted more severely than white communities," says DEI committee member Brian Shimamoto, the department's organizational and employee development manager. "Is that about race? About class? It could be about a lot of different things, but what we see is more Black and brown people dying of the disease. And you have to wonder, why is that happening? I think people are asking those questions. They're paying attention."

Shimamoto leads regular trainings around issues of equity, diversity and inclusion. He speaks often on microaggressions — those small, ingrained, often unintentional habits that diminish others or make them feel less valued or respected.

"Female surgeons are often referred to by their first name, whereas men are referred to as 'Dr. Jones,'" he says. "It's a common experience. I have seen it in higher education too, where the president of the university is referred to as 'doctor' and the dean of students is referred to as 'Sue,' and both have PhDs. When that happens specifically to women, we have to hit pause and say, 'Why is it that we're not giving women who have earned certain titles their due?' That becomes what we call a microaggression."

Increasing Diversity and Representation

Another goal of the committee is to increase the number of people from backgrounds underrepresented in medicine — women, people who identify as LGBTQ, people of color, people with disabilities, veterans, and people serving in the military.

Matthew Bartley, MD

General surgery resident Matthew Bartley, MD, says such representation matters. As a Black doctor, he says, he thinks about it every day.

"You walk around the hospital and the Anschutz campus, and there are very few who look like you," he says. "That's not necessarily a bad thing, but when it comes to mentorship and career progression and things like that, it's always nice to have someone who identifies similar to you and who may share some experiences to help guide you through."

On the flip side, he says, he knows that as a Black physician, he's a role model for others.

"Sometimes when I see Black janitors or Black techs or even Black patients, it's like they're surprised that I'm even a doctor," he says. "A lot of times they pull me to the side and tell me how proud they are of me. Even strangers who don't know me. It's important."

"It was important to me to have that experience of being in an academic community where I wasn't the minority," says Washington, director of research and professor of plastic and reconstructive surgery at the University of Colorado School of Medicine. "It was very affirming to have classes where the teachers were all Black women and all the other students in the class were Black women."

Raised by parents who had moved to Washington, D.C., from the Jim Crow South to attend Howard University, Washington led a double life of sorts as a child — D.C. had

Kia Washington, MD

Washington says the department will need to look outside the usual recruitment channels to increase diversity. That includes asking other surgeons for candidate recommendations, and seeking out and engaging social media groups for doctors, residents, and fellows from the communities they want to represent.

"Obviously we've recruited wonderful people here; it's just a different strategy in terms of widening our network to get people from diverse backgrounds," she says. "We know there are great qualified people out there to become part of our community."

That's part one of the challenge. The second part is making sure that after people from diverse backgrounds are hired, they have a good network and the career and personal support so they feel welcome and want to stick around.

"We want to support all people, but especially people from underrepresented backgrounds," Washington says. "We realize that they may face different challenges being in academia."

Continuing the Conversation

To create a long-lasting culture of equity in the surgery department, the DEI committee also has a focus on education. That includes Shimamoto's trainings and his regular appearances at weekly educational sessions attended by doctors, residents, and fellows from across campus.

"We also will have a lecture series where we can do a deep dive on things like gender equity in surgery," Washington says. "And a DEI annual lectureship where we invite a professor, someone from an underrepresented background in surgery, and talk about their expertise and challenges they may have faced in their career."

The committee's goals include increasing diversity in leadership, increasing mentorship opportunities for faculty members of color, and creating an inclusive environment for faculty and staff.

"This will involve doing things like looking at resources to make sure they're equitable, conducting climate surveys to see if there's a sense of belonging," Washington says. "The first task will be collecting information about things like that. Once we get more information, we'll be able to implement policy changes in our department."

Reflecting a Changing World

The end goal, committee members say, is to create a surgery department that is diverse not just for diversity's sake, but for the sake of future doctors and patients seeking to give and receive care in an increasingly diverse world.

"When 13% of the U.S. population is African American but only 5% of MDs across the nation identify as African American, there's a disparity," Shimamoto says. "We want to not only foster Black students at the CU School of Medicine, but also encourage them to be surgeons so they would want to specialize in surgery and go through a residency or fellowship with us. Then ultimately, if they stay in the academic realm, to stay and be faculty. That's a long road, and it helps on so many different levels. Even as our faculty of color or our female faculty are reflecting our students, they're also helping our patients. Patients want to see people they can trust and that they connect with as well."

Kia Washington, MD

a vibrant and affirming Black community, but much of her time was spent in a predominantly white elite private school, Sidwell Friends, which was attended by children of Presidents Obama and Clinton. She found her Black community at Stanford, but the majority of her fellow undergraduates were white. The same goes for her medical career, where she often has felt she had to hide parts of herself in order to fit in.

"In certain institutions, it has been hard to have a sense of belonging where I could totally express my authentic self, because I've often been the only one," she says. "Has it been difficult? Yes. Has it been something that's crushed me or defeated me? No, because of what my parents instilled in me and the awesome educational background I received."

As vice chair of diversity and inclusion in the Department of Surgery at the CU School of Medicine, Washington is now on a mission to radically improve the experience for young doctors from underrepresented backgrounds in medicine, looking to substantially increase their numbers in the department.

"It adds value," she says. "A lot of studies that have been done, specifically in the business world, show that diversity increases overall productivity. More importantly, in medicine, it improves your outcomes for your patients when you have a diverse workforce. Our motto as a department is 'Improve Every Life,' and in order to improve every life, we have to improve the lives of those who are most vulnerable. They need to see their faces reflected in the people who take care of them."

A higher calling and finding her own way

Raised in the D.C. suburbs of Silver Spring and Beltsville, Maryland, Washington grew up a tomboy who competed in sports like her two older brothers, eventually playing NCAA soccer at Stanford. Her interest in medicine grew out of her early love of animals — at age 5 she decided she wanted to own a pet store when she grew up; when she got a little older, she thought about becoming a veterinarian.

"When I was in middle school, I realized I'd rather do something that involved working with people," she says. "The intellectual and service aspects of medicine appealed to me, and the ability to help heal someone's body. It combined everything I thought I wanted in a career."

Still, when she arrived at Stanford she chose to major in English literature, with a particular focus on African American writers such as Toni Morrison and Langston Hughes.

"I did think about a career as an English professor; in fact, at the end of college, I was choosing between that and medicine," she says. "The idea of teaching in a classroom didn't appeal to me as much, but the idea of writing a book really appealed to me, and I hope to still do that one day. Still, medicine called me in some way. I felt compelled to do it."

Passion for creativity leads to plastic surgery

When she entered Duke University School of Medicine, Washington initially felt at a bit of a disadvantage — as an English literature major, she didn't have the same heavy science background as many of her peers. "But those skills I learned as an English major definitely paid off later — being able to write and express my ideas helped in research and writing grants."

She also found a welcoming community at Duke, thanks to pioneering administrator Brenda Armstrong, MD, who was among the first African American undergraduates at the university and who became an influential contributor in expanding the diversity of the American physician workforce.

"She was a phenomenal pediatric cardiologist who ended up being a great mentor at the time," Washington says. "Growing up, I learned about many of the hardships my parents had as children in the segregated South, and I was reluctant at first to go to Duke for medical school. But I had a huge support network there, which made it a lot of fun and helped me to get through."

It also was at Duke that Washington chose her specialty of plastic surgery, inspired by the ability to change lives through reconstruction.

"I actually thought I wanted to go into OB-GYN, in particular gynecologic oncology," she says. "But I also realized I like variety. Someone advised me to do a plastic surgery rotation, and I really loved it and I didn't turn back. I loved the creativity of the field, the innovation, the ability to operate all over the body. Those were the things that appealed to me."

From Pittsburgh to Denver

Washington's next stop after Duke was the University of Pittsburgh Medical Center, where she spent three years as a general surgery resident before an additional three years as a plastic surgery resident. She served one year after that in a hand surgery fellowship. William Futtrell, MD, who was chair of the school's plastic surgery department during Washington's time there, says the school felt fortunate to have Washington in its program.

"The way we get excellent students at Pittsburgh is we go out and recruit," Futtrell says. "When I started looking into Kia's background and talking to people, both at Duke and at Stanford, everybody was just over the top in saying, 'This kid is special.' I'm sure Kia could have gone anywhere she wanted to. We were delighted to get her."

As a resident at Pittsburgh, Washington didn't only train to become a plastic surgeon; she spent two years at the University's Starzl Transplant Institute, where she began groundbreaking research into facial and

> "A lot of studies that have been done, specifically in the business world, show that diversity increases overall productivity."

eye transplants that eventually won her a $6 million grant from the Department of Defense — and the admiration of her peers.

"Plastic surgery is a really intense training; it's really extraordinarily long," says Angela Landfair, MD, a plastic surgeon who trained with Washington in Pittsburgh. "I was in survival mode as a resident, and I think most people were in survival mode. But somehow, during this very intense training period, she managed to have a totally separate parallel life and purpose in research. She had great mentors, but she had to take what she could learn from these various mentors and create something that was entirely her own. No one was doing what she was doing at the time. And to do it during residency? That's incredible. A lot of people don't have that kind of drive."

Washington brought her eye transplant research team with her to the CU School of Medicine when she arrived in 2018, along with the wide-awake hand surgery program in which doctors perform common procedures like carpal tunnel release and trigger finger release on an outpatient basis, using local anesthesia, to conserve resources and save patients time.

"It's part of what's called the 'Lean and Green' hand surgery movement to minimize waste in hand surgery," she says. "A lot of procedures in hand surgery can be done with just local anesthesia. They don't need to be done in the operating room where you're using a lot of resources, like an anesthesiologist, extra drapes and things like that. It's nice to move them to a more efficient space."

For those innovations, her work to increase diversity, and more, Washington has become a valuable member of the CU School of Medicine team as the school continues to grow its reputation locally and nationally.

"Dr. Washington is a natural leader who has great insight and always a calm way of getting people on the same page," says Richard Schulick, MD, MBA, chair of the Department of Surgery. "She is a great clinical surgeon, distinguished researcher, and sought-after teacher. We are very proud to have her as one of our department leaders."

Building a platform for change

As the first Black female plastic surgeon in the country to hold the title of full professor, Washington has seen things change for physicians from underrepresented backgrounds in medicine — but she knows there is still a long way to go. As painful and horrifying as 2020 was for the Black community, with the deaths of George Floyd, Breonna Taylor, Ahmaud Arbery and more, Washington sees it as a long overdue reckoning that is beginning to move the needle on awareness around issues of equity, implicit bias, and microaggressions.

"My father always taught me you have to be three times as good to succeed as a Black woman, which was empowering because I knew I would always have to work hard," she says. "And I did. I worked hard, and I excelled. The flip side to that is it's also a lot of pressure. You don't take as many risks when you feel like you don't have a safety net under you that you may have when you're from a different group. Also, when you're often the only one, you feel like the spotlight is on you. That can be daunting at times.

"My goal, especially in the work I do with diversity, is that people can belong," she says. "They don't have to try to fit into a system; they can be who they truly are and bring their unique talents to the table."

That might be a tougher task in Colorado, which isn't exactly known for its diversity, but Washington is up for the challenge. As head of the surgery department's Diversity, Equity and Inclusion Committee, she is helping to examine everything from hiring practices and trainings to mentorship and patient care. A DEI lecture series kicked off February 22 with Robert Higgins, MD, surgeon-in-chief and chairman of the Department of Surgery at the Johns Hopkins Hospital; the committee's long-term goals include increasing diversity in leadership positions, increasing mentorship opportunities for faculty members of color, and creating an environment that faculty and staff feel is inclusive.

"Historically, academia and surgery are institutions that were primarily white and male," Washington says. "The challenge is overcoming that history and deconstructing that system to bring more diverse voices into the community. It's hard to be from an underrepresented group in surgery, and I think that can be discouraging at times."

On a personal level, she worries about her two daughters — ages 6 and 8 — finding the culture and connections they need to thrive.

"I was fortunate to grow up in D.C., which at the time was a predominantly Black city. I had that nourishment and enrichment I needed for my soul as a Black woman at a young age," she says. "It's more concerning for me raising two Black girls here. I worry about it — is this going to be detrimental for them? I talk to a lot of people, including my friends at home, and they say, 'Don't worry; you'll instill enough in them,' enough Black culture and the pride I have in being a Black woman, and that will resonate with them. Also, times are very different than when I was growing up. They get a lot of affirmation at their school and from their peers. They are often surrounded by people who openly say 'Black lives matter.'

"My hope is that they will have what they need to thrive as Black women," she continues. "They call it Black girl magic for a reason. It takes a lot of magic and resilience to thrive and find joy. They are free, creative and spirited little girls. A lot of the reason I do the work that I do is so that they never have to fit in or have their success defined by others. I want them to have the freedom to fully express themselves. That's a benefit to everyone in society, when people can fully express themselves as creative beings."

For those who know Washington, there is no doubt she will continue to spread her magic through the CU Anschutz community and beyond.

Running A Marathon At A Sprinter's Pace

From disruption to innovation, Emergency Medicine Chair Richard Zane leads the way

By Katie Kerwin McCrimmon

The moment when Richard Zane, MD, received a new COVID-19 vaccine became one of the most memorable of his career and an experience that all of his professional accomplishments have prepared him to fully appreciate.

"This is the event of our generation. It will be in every history book, every scientific book. The creation of this vaccine will be taught in every medical school class. We are seeing a light at the end of a tunnel," said Zane, who is an expert on emergency medicine, emergency preparedness, mass casualty care, and health care innovation.

Zane became one of the first medical providers on the Anschutz Medical Campus to receive his vaccine as soon as the first shipments become available.

He is a professor and chair of the Department of Emergency Medicine at University of Colorado School of Medicine, executive director of emergency services for UCHealth, and UCHealth's Chief Innovation Officer.

When Zane's turn arrived, he gladly held out his arm as medical assistant Shavona Gunn plunged a needle into the muscle on his upper right arm. The two gave a thumbs up together and Zane said it didn't hurt a bit. He's confident that COVID-19 vaccines are safe. And he's marveling at the moment because it marks both the end of this devastating pandemic and the dawn of a remarkable new era in science.

Rising to challenges all year long

The COVID-19 pandemic has caused suffering all year. Like many, Zane has felt the reverberations personally. His mother is Italian and speaks several languages. She met Zane's father when she worked as his translator in Switzerland in 1964. They married and Zane was born there and lived until age 7 in Switzerland and northern Italy, where he still has relatives.

Aside from China, Italy was one the first places to suffer most from COVID-19. One of Zane's Italian aunts already had respiratory problems before the new virus devastated Italy. She became sick in the spring in her hometown of Pavia, where she was a retired university math professor. Since hospital beds were scarce throughout northern Italy, she had to be transferred from hospital to hospital and ultimately died on Easter Sunday, April 12. It's impossible to know if she died from COVID-19 or the collateral damage that the pandemic unleashed.

While Zane is an expert at helping people during medical emergencies, he was powerless to help his "Zia Carla," who died at age 76.

"There was nothing we could do," he said.

Zane also lost his father this year. His dad received a cancer diagnosis in the summer. Zane and his sister brought their parents, Bob and Gilda, from their Florida home to Colorado, where Zane helped his dad get top-notch medical care at the University of Colorado Cancer Center. But the family soon learned that Bob already had stage 4 cancer. There was little anyone could do. With the support of hospice workers, the family cocooned together in Colorado before saying their final goodbyes to Bob Zane in September. He was 81.

"There was this big overall crisis of the pandemic, and in our family, we had this crisis," said Zane's sister, Daniela Kaisth.

She said her brother stepped up both for his work family and for their family.

"He faced it with courage and also reached out for help. He took care of some things. I took care of others. He realized how important it was to take care of our father. We were a team."

Riding to the rescue

He was driving his family from Massachusetts to Colorado for his new job as head of the Emergency Department at University of Colorado Hospital on the day in July 2012 when a gunman attacked theater goers in Aurora, a short distance from Zane's new hospital. First responders and Zane's team handled the emergency overnight, and Zane later wrote a playbook on mass casualties and lessons learned from the Aurora shootings that assisted his former colleagues when they dealt with the Boston Marathon bombings less than a year later in April 2013.

Kaisth said her big brother always seems primed for emergencies. Instead of donning a superhero's cape, he's poised with a stethoscope, a sense of calm and a plenty of medical knowledge. One time, he also happened to have a life-saving lollipop.

Zane was visiting Kaisth around the holidays and the two were at a mall near her home in New Jersey. They divided up to run errands and planned to meet back at the car.

Zane was late, and when he showed up, he calmly explained the holdup.

"I was walking through the mall and a guy was in diabetic shock. I found a little lollipop in my pocket and put it in the guy's mouth. I had to wait for the ambulance," he explained.

Zane was nonplussed. Kaisth was stunned.

"That's crazy," she said. "He was just so calm."

Richard Zane, MD, has been leading the fight against COVID-19 and was thrilled when vaccines arrived. Photo by Cyrus McCrimmon for UCHealth.

It's actually typical of her brother, who is two years older and has always been her protector and champion.

"He immediately sprang into action, probably saved that guy's life, then found me and drove home," she said. "He never thinks what he does is a big deal. He's a strong person who also has this very caring side."

Kaisth is used to working with powerful leaders. She's president of Gratias Partners and helps non-profits and high-impact donors invest in philanthropic projects around the globe.

"She's the smart one," Zane says of his sister.

Kaisth, in turn, says Zane is a rare techy wonk who also has a big heart.

Zane's dedication to his staff shows in the Emergency Department. He takes at least one shift a week working alongside students and new doctors, even though he has plenty of managerial work to keep him busy. He's juggling the equivalent of four jobs: Chief innovation officer for UCHealth's 12 hospitals, Chair of Emergency Medicine for the University of Colorado School of Medicine, emergency medicine doctor, and one of the leaders for UCHealth's pandemic response team. While some administrators don't work directly with patients, Zane believes it's critical to keep seeing patients and to mentor younger providers.

'Running toward the explosion'

When the pandemic hit, the ER instantly became one of the most vulnerable places. Zane worked to keep patients and staff members safe, coordinating closely with UCHealth's infectious disease experts, like Michelle Barron, MD, professor of medicine, and others to make sure everyone had the right protective gear.

It then became obvious that the lack of reliable, plentiful COVID-19 tests was a huge problem. Without adequate testing, how could medical providers accurately diagnose patients and begin to slow the spread of COVID-19? Zane and his team immediately started working with researchers and lab experts at University of Colorado to test the accuracy and reliability of commercial COVID-19 tests, while also manufacturing their own. He and others ultimately set up a system that supplies thousands of COVID-19 tests a day, an indispensable tool for timely diagnoses.

During the spring shutdown, it also became clear that patients needed to see their doctors safely from home. UCHealth already had a Virtual Urgent Care, but demand for the service grew overnight. Patients appreciated the convenience and the 24/7 access to Colorado medical experts. At the same time, Zane, with UCHealth's Chief Information Officer Steve Hess, and many others scaled up a full-fledged Virtual Health center, extending online visits from urgent care to primary care and specialty care almost overnight — in all making virtual visits possible in about 600 clinics.

"We've been running a marathon on a sprinter's pace," Hess said. "All of this was unknown. It's so impressive to me that people like Rich and others in the ER had no clue what this disease was. Yet, they were putting their own lives at risk.

"It's like that commercial for the Army that shows some people running away and others running toward an explosion. That's how I see Rich. He's the guy, leading the charge, running toward the explosion, running toward the pandemic. He jumped in to help with labs, testing, the ER, and now vaccines.

"Some people shrink in the spotlight," Hess said. "Rich embraces it. He is commanding. This was his moment. He keeps people safe."

Another colleague, Richard Schulick, MD, MBA, has known Zane since the two trained together at Johns Hopkins University. Back when they met, Shulick was a surgical resident and Zane was one of his interns.

Both are high-powered leaders today, but Schulick still likes to rib Zane.

"He's a bigshot, but I always tell him that he's still my intern," said Schulick, who is a renowned cancer surgeon and chair of surgery at the CU School of Medicine and director of the University of Colorado Cancer Center.

"We'd get up at 3:30 a.m. and do rounds. We had a lot of complex patients. We really bonded through that experience," Schulick said.

He now sees the pandemic as the perfect challenge for Zane.

"He's data-driven. He's organized. He's pragmatic and he gets the job done. He's even a little bit modest," Schulick said with a laugh.

"He was on the frontlines from the beginning. Before anyone gets admitted to the hospital, they go through his department. He had to deal with COVID-19 immediately, and he did a great job," Schulick said. "The key is balance: getting things done while staying safe and taking care of people. Our primary mission is to take care of people and he always takes care of patients and his staff."

A DESIRE TO SHAKE IT UP

While Zane has excelled at medicine, he might just as easily have become a lawyer, a college professor, or a professional motocross rider.

Back in high school in Pennsylvania, where the family moved after returning from Europe, Zane loved wrestling and playing on the football team. His dad worked in the fashion industry, and when Zane announced toward the end of high school that he planned to skip college to ride motorcycles, his dad wisely got his son a job in a warehouse.

Zane lasted three days before deciding that college was indeed for him. He played offensive tackle for the Johns Hopkins football team and after graduating, taught elementary school and coached football for a year before simultaneously applying to medical school, law school, and graduate school.

His soon-to-be-wife, Siobhan Murphy-Zane, MD, had plans to go to medical school. Zane wanted to impress her, so he opted for medical school too. The two met at age 22, have been married for 26 years and have three children. Murphy-Zane now is a pediatric orthopedic surgeon at Children's Hospital Colorado and an assistant professor of orthopedics at CU School of Medicine.

During medical school, Zane originally planned to go into primary care or become an obstetrician. Then, he found his calling in emergency medicine.

"It really clicked. It felt like skimming the cream from every other specialty. There's this intensity. There's something new all the time. It's very intense," Zane said.

After medical school at Temple University, he completed his residency and fellowship at Johns Hopkins and went on to practice at Brigham and Women's Hospital and to serve as a faculty member at Harvard Medical School. Zane started working on emergency preparedness and mass casualty care long before arriving in Colorado, and during an expansion at University of Colorado Hospital, when he had the chance to create a new Emergency Department from the ground up, Zane insisted on a "no waiting" system.

"His vision was, 'I want to keep the waiting room empty. We need to make sure we're getting patients back into exam rooms within 15 minutes,'" said Hess, a frequent co-conspirator with Zane in plans to disrupt and improve stubbornly complex health systems.

The idea of an empty waiting room was revolutionary and entirely antithetical to TV shows that portrayed ERs stuffed to the gills with people waiting for hours to get care.

"Think about that: an empty waiting room," Hess said. "He has vision and he's strategic and he has a passion for disruption."

The concept has worked so well that UCHealth has replicated Zane's designs in all its Emergency Departments. In normal times, health leaders from across the United States, Europe, and Asia regularly visit the University of Colorado Emergency Department to learn how they might reshape their hospitals. And the National Health Service in the United Kingdom, Ireland, and Canada have tapped Zane's concepts to reshape their highly regarded hospitals.

Richard Zane, MD, transformed the Emergency Department at UCHealth University of Colorado Hospital. Photo by Cyrus McCrimmon for UCHealth.

COVID-19 certainly has stressed emergency departments and hospital managers across the globe, but Zane and fellow leaders keep reassessing and redesigning their systems to adapt to the pandemic. Now Zane, Hess, and other leaders are racing to get thousands of UCHealth employees, community providers, and contractors vaccinated as quickly as possible. Their ambitious goal for the moment: get those who have frequent and direct contact with COVID-19 patients vaccinated before Christmas.

Challenges like these are business as usual for Zane, said Hess.

The two joke about "running the briar patch together" every time they launch a new endeavor or innovation.

"Think about a briar patch. It's a messy bunch of thick bushes and barbs," Hess said. "We call health care the briar patch. It's complex and everywhere you turn, you're going to get stuck on another barb. You're going to get some scars. And sometimes, you're going to get stuck. But, we've got each other's backs. And, when we get to the other side, some really cool things have been created."

> "The key is balance: getting things done while staying safe and taking care of people. Our primary mission is to take care of people and he always takes care of patients and his staff."

A mass casualty event that lasts for months

Zane studied natural sciences and writing, not industrial engineering, but he likes the idea of methodically shaking things up. That's a good thing because the challenge of facing the biggest pandemic in a century forced Zane and his colleagues to do just that, day after day, throughout 2020.

"I have only read about what it was like to live through the Spanish flu in 1918, but this experience isn't comparable to anything we've lived through before. There's no comparison in my lifetime. We've made plans for anthrax, smallpox, Ebola, terrorism, riots, and natural disasters. Nothing compares to this," Zane said.

While we tend to think of mass casualty events as quick bursts of chaos, the pandemic actually has been a mass casualty event spread over many months, Zane said. And to handle that kind of ongoing chaos, staying calm and deliberate is all the more important.

"My approach to everything is to try to be deliberate and very systematic. We embed technology and data in everything when it makes sense, but always unapologetically and deliberately," Zane said.

"We think differently about challenges and constantly try to identify a better way even if it's been done a certain way forever. We develop tools for emergency preparedness. I feel like that approach is what is needed for this moment," Zane said.

"All disasters are just a supply-and-demand mismatch. It's all about context," Zane said.

For example, if there's a bad car accident in a town with a tiny hospital, medical providers can't handle the influx of several patients all at once. On the other hand, a big hospital with plenty of resources, can handle the crush.

Responding to COVID-19 has required Zane and many, many others to keep bracing for new waves of very sick people, and each time, to be better prepared so they could help more and more of them survive. In fact, the team of providers accomplished just that. Survival rates for COVID-19 have improved dramatically as providers have learned how to better help patients and new therapies have arrived to help them.

Zane said it's no surprise that the UCHealth team has done well. Teams were ready and executed their plans.

"We don't think of disasters as isolated occurrences," Zane said.

"You're going to have a consistent approach to crisis management, transparency of decisions, follow standard operating procedures when appropriate, and being deliberate and proactive throughout the crisis," Zane said.

He gives teams at UCHealth – providers and leaders – high marks for weathering the COVID-19 storm.

"Everyone has done a remarkable job of being deliberate, proactive, paying attention to detail, taking care of people and understanding our guiding principles: that we're taking care of patients and we will never put our staff and providers in positions where they don't have the right equipment," Zane said.

'Herculean' effort to produce a vaccine

By next summer, Zane hopes a large percentage of people in the United States will be vaccinated and the country and medical providers can finally declare the pandemic over.

Perhaps then, Zane will have more time to relax and enjoy his hobbies like spending time with his family and riding his motorcycle (always wearing a helmet!).

And when he reflects on 2020, he'll remember getting his vaccine and thinking about the remarkable efforts that made it possible.

"It's truly one of the most monumental scientific achievements of our lifetimes. Full stop. Operation Warp Speed has put more resources in front of scientists than ever before. It's not just dollars, but people: the most brilliant minds working on a problem in a very deliberate, systematic way.

"This vaccine was produced in an amazing, thoroughly deliberate, Herculean, genius way," Zane said. "It's actually mind-blowing. It's just unbelievable. I'm not religious. But you could almost call it a miracle."

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All Hands on Deck

Fourth-year medical students answer the call for help during COVID-19 surge

By Tyler Smith

A tick before 7 p.m. on November 25 – the day before Thanksgiving – Shanta Zimmer, MD, pushed the "send" button on an email that sounded a call to arms against an enemy that was gathering strength.

The foe was the novel coronavirus, which was rapidly spreading throughout Colorado and sending fresh waves of patients sickened with COVID-19 to hospital beds. Zimmer, an infectious disease specialist at UCHealth University of Colorado Hospital, saw the strain on staff with her own eyes. The number of patients hospitalized with COVID-19 had climbed rapidly since September. Two weeks earlier, Gov. Jared Polis told hospitals across the state to submit plans to increase capacity by 50%.

Zimmer was in position to call for help. As senior associate dean for education at the University of Colorado School of Medicine, she oversees the preparation of more than 700 medical students. Her email went to fourth-year students who were busy scheduling residency interviews. Zimmer requested volunteers to take two 10- to 12-hour shifts, either on medical/surgical floors or the surge ICUs, from November 30 to December 5.

Urgent need for help

Attending physicians, residents, hospital medicine specialists, and advanced practice providers at UCH badly needed assistance with patient care, Zimmer wrote: "We are entering the 'all hands on deck' phase of the crisis here in the Denver area."

She attached two documents describing the support students would be asked to provide: placing orders, contacting family members, documenting care, tracking lab results, and more. They would function as clinical team members under the supervision of faculty and residents. She emphasized that they were under no obligation to volunteer.

Zimmer awoke Thanksgiving morning to find that the students had filled all the available shifts for the week. The surge continued that week – without any sign of abating – so on Friday, December 4, Zimmer asked again for volunteers, this time to fill shifts for the rest of December and all of January. By the following Monday, the students had filled all of those shifts, including Christmas Eve and Christmas Day.

"People say a lot of things about the next generation and are they going to be committed and are they altruistic – all those kinds of things," Zimmer said. "I want people to know they are. You can count on the next generation of physicians who are coming out."

A desire to pitch in

Katie Havranek answered Zimmer's request. She welcomed the chance to volunteer – particularly because the capacity pressures created by the first wave of the COVID-19 pandemic in March and April 2020 forced the hospital to set aside teaching temporarily and bumped Havranek and her fellow students out of their clinical rotations.

"Going into medicine, most of us are compelled to help people," Havranek said. "In our fourth year, we feel a sense of belonging and responsibility to our communities, our patients, and other physicians."

During hiatus from direct patient care in the spring 2020, Havranek and many of her fellow students found other ways to help. She gathered personal protective equipment for the hospital and worked with others to distribute cards recognizing staff for their service.

After that first surge subsided, Havranek completed a clinical rotation caring for COVID-19 patients in intensive care units.

Medical students help COVID-19 patients

As a result, she was well-prepared to provide clinical support in November and December. Havranek joined teams that included an attending physician, an intern, and two residents. For each shift, she was assigned a patient and presented the case to the attending physician during rounds. She wrote notes that a resident edited for review by the attending.

Havranek also managed volunteer shifts and fielded feedback from other volunteers. Those insights made assignments more flexible – volunteers might switch from one unit to another depending on needs during a particular shift – and bolstered documentation for calling families of COVID-19 patients.

Though she worried about encumbering the team, that wasn't an issue. "They are always very generous teachers," she said. Despite the mounting stress of the pandemic, "I've never encountered anyone not excited to teach."

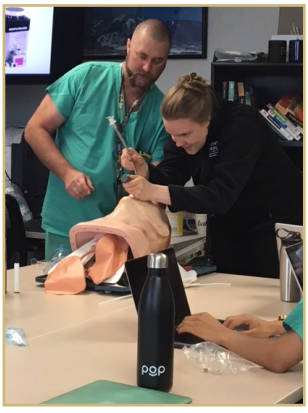
Jean Kutner, MD, chief medical officer for UCH, added a note of praise and gratitude for the students' commitment to relieving stress on hard-pressed providers, patients and families.

"We got a great response from the fourth-year medical students, who have become members of teams and provided support," Kutner said. "It shows the strength of an academic medical center."

These days, Zimmer said she occasionally encounters one of the student volunteers when she sees a patient in her role as an infectious disease specialist. She's gratified to see them working as an integral member of a clinical team.

"I see these students of mine as colleagues, and I let them know that I see them that way," Zimmer said. "There is an understanding that they are now part of the profession of medicine. That gives me an immense sense of pride."

This article was originally published in UCHealth Today in December 2020.



Katie Havranek, shown here practicing intubation, is one of many CU medical students who volunteered to help support hospital providers caring for COVID-19 patients. Photo courtesy of Katie Havranek.

Better Care Through Big Data

Tell Bennett publishes first paper from the National COVID Cohort Collaborative

By Wendy S. Meyer

Tell Bennett, MD

One of the most remarkable inventions begat by the pandemic is the National COVID Cohort Collaborative (N3C).

The scientists and researchers behind the N3C plan to turn massive amounts of already available data into new knowledge to study COVID-19 and identify potential treatments. In just over six months, the N3C was launched, made available to biomedical researchers, and has already produced its first publication.

Tell Bennett, MD, associate professor of pediatrics in the University of Colorado School of Medicine and director of Informatics in the Colorado Clinical and Translational Sciences Institute (CCTSI), has been helping to lead the N3C nationally. He is also the first author on the first paper to be published from N3C data, "The National COVID Cohort Collaborative: Clinical Characterization and Early Severity Prediction."

How the Study Worked

The N3C Data Enclave is a secure cloud-based data and computing environment designed to facilitate virtual access to clinical data provided by hospitals nationwide. The Anschutz Medical Campus contributes data from Children's Hospital Colorado and UCHealth. Data are updated up to two times per week and have been standardized and harmonized to one common data model to generate efficient and minimally biased results.

Using the N3C data enclave, researchers analyzed electronic medical record data from more than 1.9 million patients from 34 medical centers nationwide. Today, Bennett says data from approximately 3 million patients can be found in the N3C enclave, which will continue to grow over time as patient data continue to be added. In this retrospective cohort study, Bennett and his co-authors focused on more than 174,000 adults with COVID-19. They stratified patients using a World Health Organization COVID-19 severity scale and demographics. They then evaluated differences between groups over time, using multivariable logistic regression, establishing vital signs and laboratory values among COVID-19 patients with different severities, providing the foundation for predictive analytics.

Bennett says there were three main goals of the paper: "The first was to characterize the N3C cohort to introduce people to it. The second was to show the richness of data available in N3C about hospitalized patients. And last, we used rich inpatient data and machine learning (ML) to build a severity prediction model from the first day they [patients] were in the hospital."

What They Found

Of the patients with a positive COVID test, 32,472 (18.6%) were hospitalized. The median length of hospital stay was 5 days. Mortality (including discharge to hospice) was 11.6% among hospitalized patients. Others have reported that inpatient mortality has decreased over time. The study confirmed this: inpatient mortality decreased from 16.4% in March and April to 8.6% in September and October. Their data also showed that clinical severity shifted toward less invasive mechanical ventilation and/or ECMO as the pandemic has progressed. Moreover, the study validated the ML predictions when tested against the actual data.

Promise for the Future

Bennett says the ML models have the potential to be useful to clinicians treating patients in the hospital when paired with electronic health records. "These models tell us about the most powerful predictors of severity. If health systems decided to implement these models in the background, they could be surfaced and made available to physicians in the electronic health record," he says. Another way the ML models could be used is by providing clinicians with a ranked list of variables that predict severity for each patient, which could potentially help clinicians make decisions.

"The N3C project is exciting to me because it merges the two halves of my work life. My ICU experience and direct experience taking care of patients with COVID-19 has been important to making sure the work I was doing in N3C was relevant and clinically meaningful. With a cloud-based enclave and very large data and complex data structures, it takes informaticists to do effective work in that space. Having a foot in both camps has been really useful," Bennett says.

Bennett hopes his colleagues at CU Anschutz will take advantage of N3C. Current projects run the gamut from social determinants of health to machine learning on laboratory results. He says: "People are approaching the data from different angles and clinical domains. As examples, there are teams working on the effect of COVID-19 on people who are immunosuppressed, those who have cancer and those who have diabetes."

He says the next project he is eager to tackle relates to children and COVID-19. "We are waiting for a little more data to accumulate, but I think that a national level analysis of the effects of COVID-19 on kids will be an important contribution."

Increased Alcohol Consumption During Pandemic Poses Risks

James Burton warns of consequences for liver health

By Valerie Gleaton

When Denver Mayor Michael Hancock announced the first citywide stay-at-home order in response to the COVID-19 pandemic on March 23, 2020, he listed essential businesses and services that would remain open, such as grocery stores, gas stations, and doctor's offices.

Not included? Liquor stores.

Within minutes, Denver residents packed liquor stores before the shops were set to close. Just three hours later, in response to the swarms of shoppers, the mayor amended the order to allow liquor stores to remain open.

The impulse to stock up wasn't limited to Denver. According to a survey study published in JAMA Network Open last September, The Nielsen Company reported a 54% year-over-year increase in national alcohol sales for the week ending March 21, 2020, as pandemic lockdowns were beginning nationwide.

More than a year into the pandemic, the frenzied panic buying seems to have foreshadowed yet another grim consequence of COVID-19: increased alcohol consumption, which experts say could lead to liver disease and other health complications in the future.

"Even though only a small minority of heavy drinkers develop liver disease, there's a lot of drinking out there right now," says James Burton, MD, professor of medicine and medical director of liver transplantation. "As a consequence, places like liver centers and hospitals are already seeing more people coming in. We're getting people coming into clinic with abnormal liver tests asking, 'Why are my tests abnormal?' Then you ask them, 'Well, how much do you drink?'"

Drinking and Depression: A Pandemic Cycle

Multiple surveys have indicated that Americans are drinking more during the pandemic.

The JAMA study showed a 14% year-over-year increase in the frequency of alcohol consumption from 2019 to 2020. The numbers were higher for women, with a 17% increase in frequency of overall alcohol consumption and a 41% increase in the frequency of heavy drinking, which is defined as five or more drinks for men and four or more drinks for women within a couple of hours.

Other surveys reported similar findings. For instance, 21% of respondents to Blue Cross Blue Shield's "COVID-19 National Pulse Survey" said they have been drinking more alcohol since the pandemic began.

"I don't think there's any question whether people are drinking more," says Burton. "We, as transplant and liver doctors, are definitely seeing more alcohol use."

Burton also points out that the patient demographic for alcohol abuse and liver disease is beginning to skew younger and more female. Although this was a trend before the pandemic, it has become even more pronounced in the past year, as illustrated by the results of the JAMA study.

James Burton, MD

"In the past we'd see older men who drank for 20 or 30 years and developed cirrhosis," Burton says. "Now we're seeing young women in their 20s who might already have cirrhosis or severe alcoholic hepatitis."

As for why Americans are drinking more, both experts and survey respondents tie increased alcohol consumption to financial stress and mental health issues brought on or worsened by the pandemic.

"I think there are a lot of people who are self-medicating at home with alcohol to help deal with the boredom and to deal with the anxiety and the depression of losing their job or losing their family or just not knowing what's going to happen in the future," Burton says.

Unfortunately, he says, the very steps many people are taking to alleviate the anxiety brought on by the pandemic are likely to exacerbate those conditions and have other health consequences.

Lasting Consequences for Liver Health

Excessive alcohol use can lead to lasting physical ailments. Alcohol consumption contributes to three million deaths each year worldwide and is the third-leading preventable cause of death in the United States.

Alcohol has been linked to cancer, heart disease, stroke, and other diseases, but it is especially damaging to the liver. Alcoholic liver disease is the leading cause of alcohol-related death in the U.S., claiming an average of more than 18,000 lives each year. Another 9,800 Americans die annually from cirrhosis of the liver and 1,600 from liver cancer.

"There's nothing made better with alcohol in terms of the liver," Burton says.

On top of this, the Centers for Disease Control and Prevention have cautioned that people with chronic liver disease, such as alcohol-related liver disease, nonalcoholic fatty liver disease, and cirrhosis, may be at increased risk for severe illness from COVID-19.

Even with an end to the pandemic finally in sight, Burton worries that the damage may persist long past the last lockdowns.

"I think this epidemic of alcohol during the COVID pandemic is something that will greatly impact our society for years — if not decades — to come," Burton says.

The Pandemic Is Disturbing Our Sleep

Katherine Green offers tips for getting restful sleep

Interviewed by Greg Glasgow

Katherine Green, MD, MS

Katherine Green, MD, MS, assistant professor of otolaryngology at the University of Colorado School of Medicine and medical director of the UCHealth Sleep Medicine Clinic, discusses the importance of sleep to our overall well-being.

Why is sleep so important to our health?

There are a lot of processes that happen during sleep that are important for your body's underlying physiology and general health. Sleep serves as a restorative period for our body. It's a period of rest for organs like the heart and the brain. There have been multiple studies showing the downstream effect of both insufficient sleep time — not getting enough sleep — and insufficient sleep quality. There are studies linking poor sleep to worsened immune function, underlying mood disorders, or exacerbation of things like anxiety and depression. There have been lots of studies linking poor sleep quality to downstream health effects on metabolism or cardiac health and effects on mental cognition — focus, attentiveness, reaction time, judgment, and general mood and well-being.

We have been going through an extremely stressful time over the past year, between the pandemic and political and civil unrest. What does that do to our sleep?

The effects of stress on sleep are not insignificant. It's a feedback loop. Poor sleep increases stress, but we also know that situational stress and anxiety are the main contributors to insomnia and poor sleep quality. Anxiety or stress during the day make it harder to shut the brain down and fall asleep easily at night, and they actually may impact the quality of sleep that we get overall.

Is it helpful to decrease your exposure to those stressors, then? Is it best not to watch the news?

It's a balance. I've had some people tell me, "I know I shouldn't watch the news, but if I'm not tuning in, then I'm worried that I'm missing something." What's important is recognizing those effects of anxiety and stress and having a way to deal with it and disconnect from it prior to bedtime. I talk a lot to my patients about the sanctity of a bedtime routine — having as much of a set bedtime and wake time as possible. As our schedules have become a little bit more erratic with people working from home, we have lost some of the daily routine that keep those bedtime habits regular. We have such a 24-hour society these days, and smartphones and constant electronics within reach make it harder. It's important to be that much more intentional about setting aside a time to disconnect.

How long before bedtime should you turn those electronics off?

Having an hour or so before bedtime as a disconnect time is ideal, but I tell patients to try and be strict with at least a 30-minute time before bed where you give yourself that time to wind down, to be free of electronics. Blue light from electronics is one of the single greatest things that inhibits your body's production of melatonin, which is the hormone that helps your brain and your body know when it's time to go to sleep and helps the body stay asleep throughout the night.

What about waking up? Is there anything you can do when you wake up that helps with sleep?

The biggest thing about a wake-up routine is trying to maintain a wake-up time every day that is fairly similar. It's that wake time in the morning that tends to keep your circadian rhythm most regular. Also, getting natural light exposure first thing in the morning, particularly within an hour or so of waking up, is one of those things that helps your circadian rhythm, your internal body clock, set itself.

Is there anything else you recommend people do to get better sleep?

It is helpful to avoid caffeine after 1 or 2 in the afternoon. If you have your morning cup of coffee, that's great, but caffeine in the afternoon is going to tend to impact your ability to fall asleep at night. Same thing goes for taking naps in the late afternoon. Naps have their place and for some people can be very restorative but try to minimize napping time to a maximum of 30 to 45 minutes and keep those naps earlier in the day so they're not going to intrude on your ability to fall asleep in the evening. The other thing that has many negative impacts on sleep quality is alcohol. Trying to avoid alcohol within a couple of hours of bedtime is another healthy sleep tip we talk a lot about.

Cancer Deaths Expected To Increase

CU Cancer Center leaders warn of delayed cancer screening and reduction in treatments

By Greg Glasgow and Jessica Cordova

Regular mammograms, colonoscopies, or pap smears are critical to detect early-stage cancers, but missed screenings and delayed appointments are a grave consequence of the COVID-19 pandemic.

According to an estimate by the director of the National Cancer Institute, at least 10,000 excess deaths from breast cancer and colorectal cancer over the next 10 years in the United States will be attributable to missed cancer screenings caused by COVID-19.

That represents a 1% increase in cancer-related deaths, and it is a conservative estimate because it doesn't include the effects of treatment delays and interruptions caused by the pandemic. It also doesn't count a decrease in preventive procedures, such as the HPV vaccine.

Another measure based on electronic health records found a nationwide drop of between 86% and 94% in preventive cancer screenings for cervical, colon, and breast cancer in the weeks after COVID-19 began sweeping the country in 2020, when compared to the same weeks in 2017-2019. The University of Colorado Cancer Center has seen a similar decrease in the number of screenings.

The decline is alarming, said leaders of the CU Cancer Center.

Cathy Bradley, PhD

"Routine screening for cancer is extremely important. We would prefer to prevent it than to treat it," says Cathy Bradley, PhD, deputy director of the CU Cancer Center and Colorado School of Public Health's associate dean for research. "In the case of colorectal cancer, with screening we can remove premalignant tumors so that it never progresses. With an HPV vaccine, we prevent the cancer from occurring altogether."

> "Routine screening for cancer is extremely important. We would prefer to prevent it than to treat it."

Treatment changes

In addition to putting off testing, some patients also are forgoing treatment or altering their treatment schedule to avoid possible exposure to COVID in hospitals and clinics.

Jennifer Diamond, MD

"In patients with metastatic disease, we'll typically do scans every two to four months to make sure that things are stable, but for some patients now, we've said, 'If you're doing well, if the bloodwork looks good, you feel good, let's spread that out to five or six months,'" Jennifer Diamond, MD, CU Cancer Center member and associate professor in the Division of Medical Oncology, says. "We've really tried to individualize the treatment for patients to try to minimize COVID exposure but at the same time keep them on their treatment."

Diamond is part of a new research study in which cancer-fighting drugs typically administered by infusions in a clinic are instead given as an injection in a patient's home.

"They'll set up a visiting nurse that will actually go out and administer the injection to the patient at home and draw any labs that are needed, and then the patient can just do a telehealth visit," she says. "I think that's something that is really innovative — a way that we are adapting our practice to make it safe for patients as far as minimizing COVID risk but also keeping them on their curative therapies."

At the beginning of the pandemic, many cities and states considered cancer treatment an elective procedure. Colorado allowed cancer treatments as necessary procedures.

"We were very fortunate in Colorado that our cancer center was able to continue infusions in March and April," Bradley says. "Very few cancer centers across the country were able to keep up infusions. Only over the summer were they starting to ramp up again."

At the CU Cancer Center, infusions stayed at about 98% of pre-COVID levels, while cancer-related surgeries dropped in the second quarter of

the year to about 60% of pre-COVID levels. Now, surgeries have increased to make up for the patients who did not come in or delayed their care.

"You would not want to be the person in the middle of your treatment or starting treatment and having to have it delayed by several weeks or months," Bradley says.

At other facilities around the country, not only was treatment delayed, but many changed their standards of care as well.

"One of the interesting things going on around the country is that some of the doses of chemotherapy and other infusion therapies have been reduced to decrease the chances of side effects, so that a patient would not be as susceptible to an infection or getting sick," Bradley says. "We do not know what that does to treatment effectiveness. Now there are some discussions around if we needed to give that much chemotherapy or treatment to begin with, or if instead, treatment is being given at inefficacious doses. We don't know."

Safe to get screening or treatment

Though patients understandably have concerns about exposure to COVID-19 when they go to a hospital or clinic, experts say medical facilities very safe due to the strict procedures they follow.

"The in-hospital infection rate is extremely low. At this point, clinics have become savvier at reducing the risk of infections," Bradley says. "If patients are doing their part with wearing masks, washing their hands and social distancing, the actual clinic environment is relatively safe."

The COVID-19 pandemic has led to new research that will have impacts on other diseases, including cancer, and innovations like telehealth will last even after the pandemic has passed.

"In times of crisis, we do tend to see incredible medical advancements," Bradley says. "A lot of cancer treatments have been repurposed to see their effectiveness with the treatment of COVID. This may lead to us getting better in some areas of cancer treatment and have a chance for new discoveries. Discoveries in treating and preventing COVID may apply to cancer. Advancements in telehealth will unquestionably benefit cancer patients. Challenges often accelerate and bring about our most creative thinking and willingness to work together."

Diamond says the advances in telehealth brought on by the pandemic are a good thing for some out-of-state patients who will no longer have to drive to Denver for a checkup or second opinion. It also will result in better outcomes for rural patients who don't have easy access to cancer specialists.

"If we can expand access to expert opinions in rural communities, I think that will improve cancer care moving forward," she says. "People who live in Wyoming or even rural Colorado, where they may have an oncologist but not really a subspecialized oncologist, it's great that they'll be able to get a second opinion from an expert at the University through telehealth."

The fight against cancer continues

Even as vaccinations offer hope for a decline in deaths due to COVID-19, the fight against cancer continues.

"Cancer is still the number one cause of death in Colorado," says Bradley. "COVID might be a bigger concern for those over the age of 80 or with compromising health conditions, given the immediate risks that it presents. But for younger age groups, cancer is still an important concern and can be deadlier than COVID."

> "If we can expand access to expert opinions in rural communities, I think that will improve cancer care moving forward."

According to the American Cancer Society, an estimated 606,520 people in the United States died due to cancer in 2020. As of March, more than 500,000 people have died of COVID-19 in the United States. In Colorado, an estimated 8,220 people died from cancer in 2020 and as of March, 5,954 have died from COVID-19.

"Both are terrible, devastating diseases that cause a lot of death. They impact the ability to make a living, and they cause a lot of pain and suffering," says Richard Schulick, MD, MBA, director of the CU Cancer Center and chair of the CU Department of Surgery. "I am glad that there is now a vaccine for COVID and COVID will eventually be taken off the table. But I think we have a lot more work to do with cancer. I am hopeful that one day in the not-too-distant future, we will actually be able to conquer a lot of the cancers that Americans and Coloradans suffer from."

Practicing Medicine in Greenland

Jay Lemery discusses providing care at NSF's Summit Station

By Chanthy Na

Five years ago, the Section of Wilderness and Environmental Medicine (WEM) at the University of Colorado School of Medicine journeyed to Greenland to provide health care services for researchers at the U.S. National Science Foundation's (NSF) Summit Station.

What began as a one-year contract has turned into five years full of learning experiences for Jay Lemery, MD, professor of emergency medicine and section chief of WEM, and the wilderness medicine fellows who have deployed to Summit Station for a once-in-a-lifetime training opportunity.

Jay Lemery, MD

Since 2016, WEM has deployed three wilderness medicine fellows and paramedics who have split time at the camp during high season between April and August. WEM also provides telemedicine during winter months from the Anschutz Medical Campus. This year, WEM is planning to deploy two wilderness medicine fellows and a paramedic to make up for lost research time due to the COVID-19 pandemic.

"We have a decent clinic at Summit Station, but many of the researchers are out deep in the field with a rudimentary medical kit and no medical training, so it's our job to help mitigate risk as best we can," says Lemery. "We've improved our emergency capability, been able to send our wilderness medicine fellows to the ice, and have added on-call psychiatric first aid, as well as pre-deployment first aid training programs to researchers."

Honing remote medical skills

Before supporting Summit Station, WEM, a section of the CU Department of Emergency Medicine, had provided remote medical services for the U.S. Antarctic Program. That experience helped to hone WEM's skills for the new challenges they would face in Greenland.

In 2018, the WEM team had an encounter with a polar bear that wandered into camp, hundreds of miles away from home. This incident posed an unpredictable situation that brought to the forefront the need for mental health support as part of the team's medical care.

"A healthy polar bear walked into the camp — hundreds of miles from the sea from its normal habitat," says Lemery. "Unfortunately, it had smelled the kitchen and was not going to leave."

Because the polar bear was so far away from the sea, and with no provision like a nearby protected area or national park to move it to, the Greenlandic authorities had to euthanize the polar bear. NSF researchers and staff on the ice, many dedicated to the preservation of biodiversity and protection of the environment, were devastated by the incident and emotionally traumatized.

"We quickly identified these stressors and had a team of CU-based psychiatric first aid providers ready to provide support for many weeks after," says Lemery. "We felt it was critical to scale up our capacity here and get mental health care providers who understood psychiatric first aid. Luckily, we had people that were really good at it and many of them were CU School of Medicine faculty."

COVID-19 pandemic brings challenges

Similar to the rest of the world, the Summit Station could not avoid the impact of the COVID-19 pandemic. The research season was canceled in 2020 even though there hasn't been a case of the virus at the camp. Researchers and staff are put through rigorous protocols that include numerous tests and extended quarantines before and after arrival.

> "As the Arctic conditions evolve due to climate change, we may see more sustained human activity there, and we have an expertise in keeping people safe in these very extreme environments."

Mia Derstine, MD

The WEM team is heavily involved in procuring appropriate PPE and working with both U.S. and Greenlandic authorities to comply with quarantine and testing guidelines from multiple jurisdictions.

"Knowing that there will be the potential for cases, we are always working to figure out how we safely get people to and from the camp," says Lemery. "We are dealing with different circumstances — exposure from civilian and military flights, where exposure to COVID is higher. We're looking to safely have hundreds of researchers and staff head to the ice this spring and summer."

Though the team has always provided telemedicine during the winter months via telephone calls and emails, they have added Zoom as a method to connect with researchers and staff. They have always had the bandwidth to provide virtual telemedicine, however, it's because of the new Zoom culture that has grown over past year that has made the concept less foreign and easier to provide care.

The WEM team is planning for an extended season this year because last year's research was cut short. This means WEM will deploy for the first time two wilderness medicine fellows and a paramedic at various times during the spring and summer season to provide care for researchers and staff. One of the WEM fellows headed to Summit Station this April will be Mia Derstine, MD. She will spend six weeks at the camp and is thrilled for the opportunity to practice in such challenging conditions.

"I hope to learn how to address medicine in a truly remote environment with limited diagnostic tools and backup," says Derstine. "I am brushing up on reading about austere medicine, reading literature about using portable ultrasound in such conditions, and starting to train for the altitude."

New partnership and new opportunities

At the height of the pandemic, another critical change occurred. The NSF switched contractors from CH2M Hill to Battelle to provide infrastructure and logistics support for researchers at Summit Station. WEM was a subcontractor for CH2M Hill providing health care services, a contract that was retained by Battelle.

With this new partnership, Lemery, who is also the co-director of the Climate & Health Program, sees an increased drive to invest more educational and training resources with the Greenlandic communities. Lemery sees this as not only an opportunity to expand the work of WEM, but also to create new learning experiences for medical students interested in climate and health.

"We're hoping to have more community engagement with the Greenlandic communities through our wilderness medicine and climate and health education, as well as online offerings," says Lemery. "There's a real educational synergy there. And being able to have our medical students go up there and participate would be phenomenal. You would have the health angle with wilderness medicine and the chance to meet climate scientists conducting research. This could be a fabulous opportunity."

Lemery adds he wants to make it easier for faculty members from the CU School of Medicine to provide care at Summit Station. He is exploring shorter deployment times to make this option more feasible for faculty members.

"As the Arctic conditions evolve due to climate change, we may see more sustained human activity there, and we have an expertise in keeping people safe in these very extreme environments," says Lemery.

"We think we'll have more ability to send our faculty to the Summit Station clinic for six months per year, and possibly to other NSF sites as well."

Inspiring a Young Scientist

Michael McMurray mentors TIME magazine's 'Kid of the Year'

By Greg Glasgow

The world got to know Gitanjali Rao on December 3, 2020, the day TIME magazine named her its first-ever "Kid of the Year."

The 15-year-old scientist and inventor from Lone Tree, Colorado, was recognized for her projects addressing prescription opioid addiction, contaminated water, cyberbullying, and more, as well as for her desire to bring together a community of young innovators from around the world to help solve global problems.

"I think there's something so different and unique about the ideas young people come up with," says Rao, who previously won the 2017 Discovery Education 3M Young Scientist Challenge and was recognized on Forbes' 30 Under 30 list. "We're facing global problems that have never been seen before. It's up to us to make a difference.

We need to come together now more than ever to make a difference, and innovation is a necessity, not an option. We really have to grasp that idea, take advantage of it and go chase our dreams."

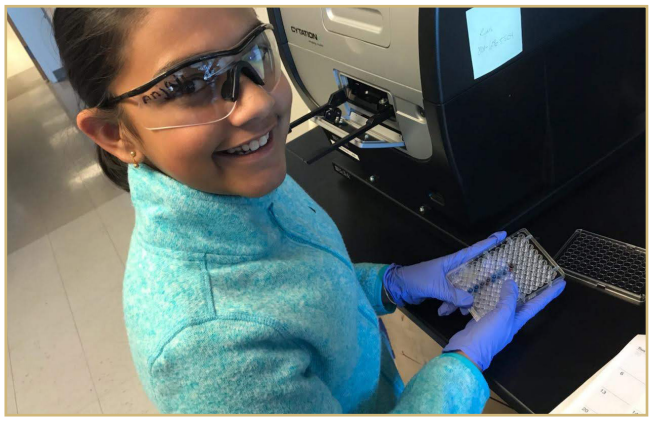
Michael McMurray, PhD, associate professor in the Department of Cell and Developmental Biology at the University of Colorado School of Medicine, has known of Rao's passion and curiosity for a few years now, ever since she approached him to become a mentor for her research into opioid addiction and opioid receptor cells. She conducted all of her research with McMurray and his team in McMurray's lab on the CU Anschutz Medical Campus.

"Gitanjali immediately blew me away with her confidence, poise, and deep thirst for knowledge," McMurray says. "Throughout our time together, it was always a joy to interact with Gitanjali and watch her develop into an even more sophisticated and creative scientist."

Rao, then 13 years old, first conceived of the project when she learned of a family friend who was addicted to prescription opioids. Her hypothesis? That some people have differences or mutations in their opioid receptor genes that cause them to be less sensitive to opioids. Those people would need a higher level of prescription painkillers to have the same effect on the body as people with normal receptors, putting them at higher risk for addiction.

"You can imagine a doctor prescribes some painkillers for a patient and recommends the patient takes a certain amount of those painkillers every day," McMurray says. "The patient starts taking them, but the pain is still there because they have a different sequence of this opioid receptor gene, which makes the protein not respond as well to the actual opioid drug. So they end up taking more of the opioid then they're supposed to, and the next thing you know, they potentially become addicted to it."

Rao first approached McMurray to learn about polymerase chain reaction (PCR), a way to make copies of a specific sequence of DNA. But further research showed that since people with mutations in the opioid receptor gene actually create a higher amount of that gene as a way to compensate for the reduced sensitivity, the project changed directions. A device that could



Gitanjali Rao working in Michael McMurray, PhD's lab.

measure the amount of the opioid receptor protein in bodily fluids could detect people who made more of it and were therefore at higher risk for addiction. Rao fired up her 3-D printer and got to work.

"There are companies that make kits to specifically detect the opioid receptor protein already, but they're somewhat more complicated," McMurray says. "They require a big piece of equipment. What Gitanjali was basically doing is making a handheld version of that, which is a neat idea still. All of the engineering of the actual device she did completely on her own. She showed up one day with this little thing she 3-D printed, and I was like, 'Wow, that's really cool.' She had designed a little computer chip that would go in there and programmed it and everything. That was kind of mind-blowing."

As McMurray's primary research, which has to do with the way cell proteins interact with one another, uses baker's yeast cells as an experimental model system, he also helped Rao figure out a way to engineer the yeast to produce the human opioid receptor.

"It would be subject to much less regulatory red tape than trying to access human bodily fluids," McMurray says.

Taking on grand challenges

When the opioid project got sidelined by the COVID-19 pandemic, which temporarily ended her access to the lab, Rao got busy on another project, this one on how to detect biological contaminants in water. Both projects, as well as her anti-cyberbullying technology called Kindly, which uses artificial intelligence to recognize potentially bullying language in texts and emails before they're sent, are part of her effort to solve larger problems in the world.

"She looks around and thinks about problems and says, 'Is there any way I could contribute to fixing those problems?'" McMurray says. "It's things she realizes are important either because of things that have happened personally to her or things she sees as looming large in the world in general."

Rao, who attends STEM School Highlands Ranch, previously designed a handheld device to measure lead levels in water after reading about the environmental crisis in Flint, Michigan, that exposed thousands of young people to dangerously high levels of the element. She regularly leads online innovation sessions for young people around the world, encouraging them to find solutions and use technology to address critical issues.

"My goal has really shifted not only from creating my own devices to solve the world's problems, but inspiring others to do the same as well," Rao told interviewer Angelina Jolie for the TIME cover story. "Because, from personal experience, it's not easy when you don't see anyone else like you. I really want to put out that message: If I can do it, you can do it, and anyone can do it."

The meaning of mentorship

Part of her message to young innovators is to find good mentors to help them with their progress, in the same way McMurray has helped her.

"He's an awesome mentor to have," she says. "He's one of those people you can reach out to anytime, and he'd be willing to answer any one of my questions."

She advises other young people to reach out to scientists with whom they are interested in working.

"Don't be afraid to do it," she says. "That's why I'm where I am today, is just through cold emailing. Look at what's in your town, look at what's in your school, what are the local labs doing, who is majoring in something you're interested in, and just shoot over an email. Be clear and to the point, and more often than not they will be willing to help you out some way."

The benefits of mentorship aren't just to the young mentees, McMurray says. He's happy to give of his time and expertise to help a budding scientist — and to keep himself challenged. Rao has become not just a pupil, but a friend of the family who is an inspiration to both of his children, particularly his son, Luca, a fledgling inventor himself.

"It's really intellectually fun for me to think about some little problem that is not something I usually think about," McMurray says. "If this was an established researcher who was coming to me with this kind of idea and was looking for collaboration, I'd have to say, 'I can't really help with that,' but the fact that it's this young person who has all these amazing ideas, I just want to help. It's such a great opportunity to be able to contribute to the development of this amazing scientist."

ALUMNI CORNER

A Letter from the President

Dear CU School of Medicine Alumni,

Serving as President of the CU Medical Alumni Association (MAA) has been a great honor. It is interesting to consider how a seemingly trivial decision to attend my 30th medical school reunion could so powerfully affect my trajectory. I became involved with the MAA soon after and the rest is history. For years to come I will recall my experiences on the board of directors with fondness and gratitude. I have worked with amazing colleagues, a crackerjack administrative and technical staff, inspiring house officers and medical students, and an informative and supportive dean. They are defined by creativity, passion for mission, relentless tenacity, and humility. This team has set big goals and gone above and beyond to realize them. For a volunteer board, this would be extraordinary under any circumstances. However, amid the pandemic it takes on additional superlatives.

We have been working diligently to serve you amid the continual challenge to adapt ideas, modify methods, and expand our outreach.

Thank you for your faithfulness in partnering with us. You have given back generously of your time, skills, and treasure. Here is an overview of the results of our work together these past 2 years.

Outreach to Medical Students:

- Through the Stethoscope Fund, 340 stethoscopes were distributed to the classes of 2022 and 2023.
- The CU Medical Alumni Association Scholarship Endowment was able to award a four-year scholarship to a current medical student for the first time.
- Alumni volunteers in the HOST (Help Our Students Travel) Program adapted to virtual interview coaching and Q&A's for residency applicants.
- A medical student member of our board initiated Virtual Student Specialty Seminars, which were requested by students. This six-part series was developed by the MAA with alumni as panelists providing students with information about different medical specialties.
- Together, the MAA and Medical Student Council raised $60,000 in matching funds to start a new endowment for expansion of Student Innovation Projects. These initiatives are focused on outreach to underserved populations in our communities. Alumni enthusiastically stepped up to provide mentoring for project development as well.
- The MAA expanded its investment in the FirstUp program, in which first-generation alumni are paired with first-generation medical students to forge meaningful and supportive relationships.

Outreach to Housestaff:

- Requested by Housestaff, the MAA sponsored two virtual Professional Development Series covering contract negotiations among other topics.
- The MAA partnered with the School of Medicine Office of Diversity and Inclusion to help the Minority and Allied Residency Council create a sense of community for minorities in medicine.

Alumni Programming:

- The MAA held its first-ever virtual reunion with events focusing on a virtual tour, an update from the Dean, a student panel and class receptions.
- We hosted Brad Nieder MD '00, The Healthy Humorist®, at our virtual comedy event, sponsored by the MAA with over 280 attendees.
- The MAA initiated and sponsored its ongoing monthly Happy and Healthy Hour series on wellness topics with alumni speakers.
- Since March 2020, we have connected personally with more than 700 alumni locally and out of state. In January 2020, MAA helped launch an Instagram account with 110 SOM features last year.

Behind the scenes, an energetic and thoughtful MAA Task Force is meeting monthly to strategically guide our organization forward in ways vital to its growth, vitality and significance. My special thanks to these dedicated MAA board members.

If you are interested in becoming more involved with the MAA, please contact Vanessa Duran at **Vanessa.Duran@cuanschutz.edu**.

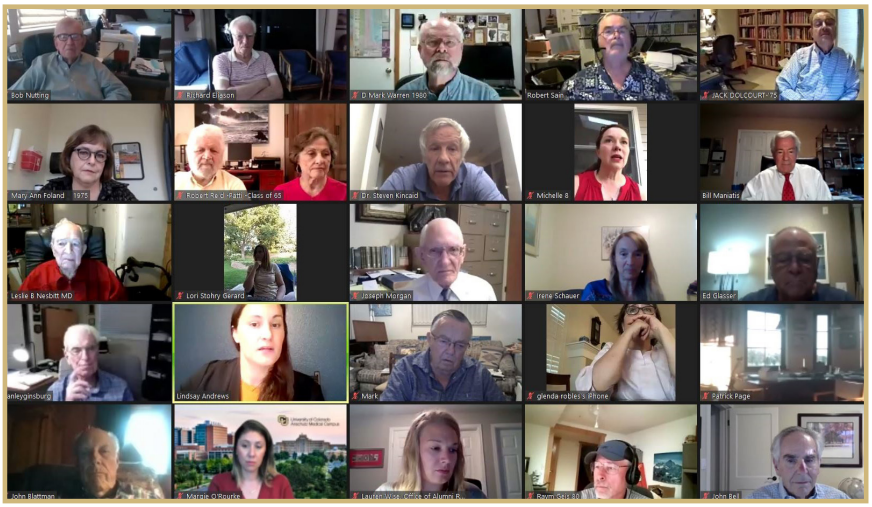
As my term as MAA President comes to a close in June, I look forward with confidence in our alma mater and its alumni. Our growing partnership will continue to impact generations of physicians and the future of medicine. It is a noble mission worthy of our best. I am grateful to have been a small part in moving this effort forward. So glad that I went to that reunion!

Sincerely,

Linda Williams MD

Linda Williams, MD '84

President, CU Medical Alumni Association



2020 Virtual School of Medicine Reunion

Thank you to the School of Medicine alumni who attended the virtual class reunion September 24-25, celebrating milestone years that end in 0 and 5, and class years 2015-2020. This year's events included a campus tour featuring the Center for Advancing Professional Excellence and the Beginning to Advanced Radiology Lab. The attendees were also treated to an update from Dean Reilly, a medical student panel and breakout rooms for the individual class receptions. Recordings of the reunion are available on the CU Anschutz Alumni YouTube account. Thank you to the CU Medical Alumni Association for their efforts around the virtual reunion. Save the date for the 2021 School of Medicine Reunion this fall!

The Healthy Humorist Virtual Event

Thank you to **Brad Nieder, MD '00,** The Healthy Humorist®, who performed virtual stand-up comedy for CU Anschutz Alumni on December 2, 2020. During these times, it has never been more important to take a moment to laugh. Dr. Nieder is a funny, motivational keynote, healthcare speaker and clean comedian who entertains and inspires with healthcare humor. There were more than 280 virtual attendees, including alumni, staff, faculty, students and housestaff of the CU Anschutz Medical Campus.

Alumni Spotlights

Thank you to **Edna Ma, MD '03**, who presented her talk, "Leaning Into Challenges and Embracing Opportunity," on November 18. She discussed how losing on Survivor and Shark Tank grew her resilience, and steps anyone can take to lean into challenges and grow their confidence. Dr. Ma is an anesthesiologist, mother, and the author of two bilingual children's books in English and Chinese called Travel, Learn and See your Friends 走学看朋友.

John Graves, MD, is a 1975 graduate of the CU Department of Psychiatry. He served for 35 years on the volunteer faculty and retired in 2016 following more than four decades of psychiatric practice in Denver. He recently published a personal and professional memoir entitled "Lessons on the Road to Hope; A Psychiatrist's Journey," now available on Amazon. His experiences as a trainee in the psychiatry department are prominently featured in an early chapter of his memoir.

Congratulations to **Kjell Lindgren, MD '02**, on being selected for NASA's Artemis Team, which includes 18 astronauts. Dr. Lindgren was the 2019 recipient of the CU School of Medicine's Silver & Gold Award, the school's highest alumni honor.

Connect on Social Media

The CU Anschutz alumni community has expanded to social media! CU Anschutz Alumni has officially launched an alumni LinkedIn group focused on professional development tips and resources. Join us to connect with former classmates, contribute to discussions, share your knowledge, and learn from fellow alumni! CU Anschutz alumni has also launched an Instagram page: @cuanschutzalumni. This page will serve as a visual "class notes" so you can keep up with former classmates and colleagues. Did you get married or have a baby recently? Start a new job, embark on new research, retire, or publish an article or book? Did you recently receive an award, or do humanitarian work in your community or abroad? Do you want to share a photo of a memory from your time in school? We want to hear from you! If you have a photo and story you would like featured, please submit them to Zachary.Noriega@cuanschutz.edu.

CU Researchers Win Prize from National Eye Institute

Natalia Vergara, PhD, assistant professor of ophthalmology, was awarded a 3D ROC prize by the National Eye Institute (NEI) for her research team's work to create better models to accelerate the development of new therapies for retinal diseases.

Natalia Vergara, PhD

The prize competition was established by the NEI to promote research on creating improved three-dimensional retinas in vitro, known as retinal organoids, derived from human stem cells, that can help researchers across the country with their work. The full name of the 3D ROC competition is 3D Retina Organoid Challenge.

Vergara and her team were the awardees in Phase II of the NEI's 3D ROC competition, receiving $60,000 for their work developing an organoid model that mimics the composition of the human retina and can respond to light.

A key innovation of the team's project was the use of engineered stem cells that allow different cell types in these retinas to fluoresce in different colors, and the combination of this system with a state-of-the-art technology that enables the quantification of those cells in real time. This breakthrough allows for the application of human retinal organoids to the screening and validation of drugs as potential treatments for blinding diseases.

Vergara conducts research on the Anschutz Medical Campus and she is a member of CellSight, a multidisciplinary research initiative that aims to develop stem cell-based therapeutics to save and restore sight in patients with blinding diseases.

Melissa Haendel named Chief Research Informatics Officer

Melissa A. Haendel, PhD, has been named Chief Research Informatics Officer (CRIO) for the University of Colorado Anschutz Medical Campus, a newly created position responsible for transforming the campus use of information and information systems to accelerate biomedical discoveries, streamline health system operations, and continuously improve patient care.

Melissa Haendel, PhD

The CRIO office will lead efforts to strategize and coordinate informatics governance, infrastructure, data management, and data-driven analytics across the Anschutz schools. The CRIO will be a key partner for centers and hospital partners on the campus, accelerating research and translating those discoveries to improvements in care.

Haendel will also hold an appointment as professor of biochemistry and molecular genetics in the CU School of Medicine. Her appointment is effective April 1. She joins CU from the Oregon Health & Science University, where she leads the Translational and Integrative Sciences Laboratory and is a professor of medical informatics and clinical epidemiology.

"Institutions that have invested in their informatics infrastructure, expertise, training, and data governance experience greater efficiencies, innovations, financial outlooks, and importantly, improved care and patient outcomes," Haendel said. "At the Anschutz Medical Campus, we have an excellent opportunity to work together to make a difference for patients, learners, researchers, and the entire biomedical community. Collaboration is key to realizing the promise of precision medicine, to deploying new models for training health professionals, and to achieving global research prominence."

CU School of Medicine Highly Rated in U.S. News Rankings

The University of Colorado School of Medicine was ranked No. 6 in the country on the U.S. News and World Report list of Best Medical Schools: Primary Care. On the separate list of Best Medical Schools: Research, the School of Medicine ranked No. 27. The lists were released in March.

In the previous year's rankings, the School of Medicine was No. 9 on the primary care list and No. 31 on the research list. The rankings released this year are the highest placement the school has achieved on either list in the past six years.

Each year, U.S. News contacts 191 accredited medical and osteopathic schools to collect specific data related to faculty resources and academic achievement of entering students. U.S. News also conducts peer assessment surveys by medical school leaders and residency directors.

Three specialty areas were also ranked: Pediatrics was ranked No. 5, Family Medicine was ranked No. 7, and Internal Medicine was ranked No. 22.

Vaccines Bring Hope

Volunteers give vaccinations at Denver church

In early February, volunteers from the University of Colorado School of Medicine and UCHealth gave COVID-19 vaccinations at Shorter Community AME Church in Denver. More than 500 people came to the church to get their vaccines.

The Rev. Dr. Timothy E. Tyler, pastor of the church, said that AME churches have long provided comfort for the sick.

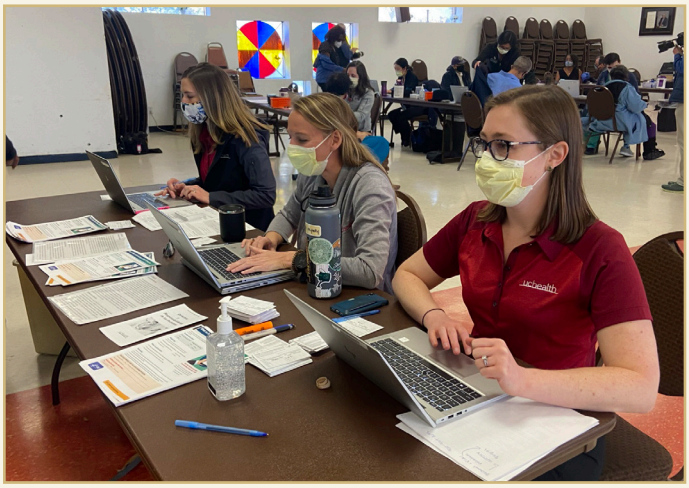
"During the yellow fever epidemic of 1793, Bishop Richard Allen, the founder of the African Methodist Episcopal Church, and members of Mother Bethel AME Church risked their own health and lives to care for dying citizens in Philadelphia," Tyler told UCHealth Today. "It's been in our DNA to get out in the community and be a part of solutions to pandemics."

Congregants and neighbors – some dressed in their Sunday finest – came to the church that day.

School of Medicine Dean John J. Reilly, Jr., MD, and Shanta Zimmer, MD, senior associate dean for education and associate dean for diversity and inclusion, were among the volunteers administering the shots.

Photos by Christy Angerhofer.

School of Medicine Dean John J. Reilly, Jr., MD, gave COVID-19 vaccinations at Shorter Community AME Church in February.



School of Medicine and UCHealth staff volunteers helped people check in when they arrived for vaccinations in February.

Sunita Sharma, MD, associate professor of medicine, gave Calvin Burnett his vaccination.

Shanta Zimmer, MD, senior associate dean for education and associate dean for diversity and inclusion, talks with a vaccination recipient.

Charles J. Blackwood, MD, Fund Created

Scholarship endowment honors school's first Black graduate

By Ken McConnellogue

Charles Blackwood, MD, entertained thoughts of running off to join a band after graduating high school in the late 1930s in the small southern Colorado town of Trinidad. But his family, seeing his academic talent and potential, encouraged college instead. His older sister was convinced he would become a doctor.

Her conviction proved correct.

After graduating with honors from Trinidad State Junior College and earning a chemistry degree as a scholarship student at the University of Colorado Boulder, Blackwood became the first Black graduate of the CU School of Medicine in 1947.

And now his legacy will endure with the Charles J. Blackwood, MD, Endowed Memorial Scholarship at the CU School of Medicine, announced in February. The endowment will initially provide funding for full scholarships for at least four students from backgrounds underrepresented in medicine who have a demonstrated commitment to the African American community. The school intends for the endowment to grow so it can support additional scholars in perpetuity.

The idea for naming the scholarship endowment for the medical pioneer emerged from the Mile High Medical Society (MHMS), an organization of Black physicians and health care professionals. It collaborated with CU to raise more than $1 million for the scholarship. CU School of Medicine Dean John J. Reilly, Jr., MD, and CU President Mark Kennedy each contributed $1 million to match the philanthropy.

Yet there were times when the endowment seemed far from a reality, said MHMS's Terri Richardson, MD, an internist at Kaiser Permanente and one of the leaders of the fundraising drive.

"It was a dream. I thought at many times it was an impossible dream, but to really see this happen, I can't even hardly contain my emotion that this actually happened," she says. "It shows how you can start with a seed, with a dream, and it can become reality. We saw that we have a lot of supporters and champions out there that also believe that this is a great cause."

It's a great cause that also aligns with a primary focus at the CU School of Medicine, said Reilly.

"I think the Blackwood scholarship represents a very visible example of our commitment to diversity. It represents the culmination of a partnership with the Mile High Medical Society that began about four years ago when we started fundraising for this scholarship," Reilly says. "And it allows us to recognize the contributions that African American physicians have made at the school and in Colorado."

Blackwood is an excellent namesake for the scholarship, he said.

"To be the first African American to graduate from our School of Medicine, to be a visible role model in the community, as a person of color, practicing medicine, to be able to build trust with patient populations that have historically had reasons not to trust the medical establishment, were all heavy responsibilities for him. But by all accounts, he performed them very, very well."

It wasn't an easy road for Blackwood. During his medical education, he could only sit in certain places in lecture halls and his living arrangements were separate from the rest of his classmates. Yet he graduated in the top 10 in his class. After an internship at Harlem Hospital in New York, he returned to Colorado to complete his residency at Colorado General and Denver General hospitals.

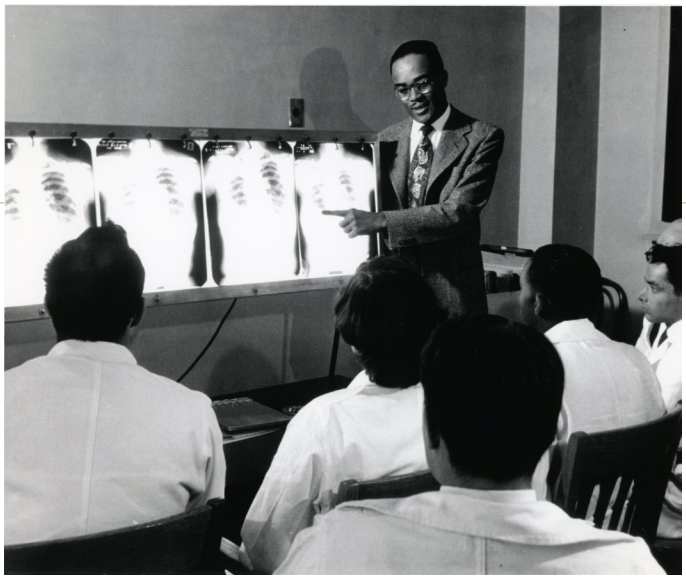
Blackwood had a long and successful career in private practice. Additionally, he served on the staff of Colorado General Hospital as an instructor in the medical clinic and on the staff of General Rose Hospital. He served in the U.S. Air Force from 1952 to 1955 and led efforts to establish the Radiology Department at Hamilton Air Force Base in California. He was honorably discharged as a captain and returned to Denver, where he was appointed to the medical staffs of St. Luke's Hospital and General Rose. He was the first Black physician on staff at St. Luke's. He was also the first Black clinical professor of medicine at the CU School of Medicine.

According to Richardson, during Blackwood's years of practice, he had many patients who could not pay for their treatment, but he never turned them away. Some of his former patients still talk about his kindness, compassion, and the great care he provided.

Reilly says the collaboration with the MHMS was important not just to raise funds for the scholarship, but also to provide additional support systems for students who can carry forward Blackwood's legacy of kindness, compassion, and care.

"I think this scholarship is a visible evidence of that partnership, but more importantly, or as importantly, is to have the members of the Mile High Medical Society engaged in providing mentorship and clinical advice and clinical experiences for our medical students," he says.

One of those students, Stephanie Nwagwu, agrees that supporting future physicians will help meet critical community needs. She is entering her final year at the school after taking a break to earn a master's in public health and health management from the Harvard T.H. Chan School of Public Health.



"I think it's incredibly important to ensure that we have a diverse workforce when it comes to medicine. Studies have shown over and over that diverse teams work better. And studies keep showing that when people are taken care of by a team that is more diverse or the workforce looks like the patient population they are serving, those patients are served better and there's better health outcomes," she says.

Nwagwu said recognizing the pioneering efforts of physicians like Blackwood is critical.

"It's really important that we really show appreciation for the people who came before us and the people who opened the doors for us. It's not easy to be the only person of color, the only Black student," she says. "We know that there were many challenges that Dr. Blackwood had to face. And because he faced those challenges, the doors are more easily accessible to students like me."

CU President Mark Kennedy says the collaboration among the scholarship's funders to help open doors was impressive, but perhaps more so is the result it will have.

"What makes me so excited about this scholarship is that it's important in a medical setting, because you think of the times in your life when you're most under stress, when you really want to have somebody that you feel connects with you and understands you, and being able to have more medical professionals who are reflective of the population is vitally important," Kennedy says.

Serving that broader community is a vital aspect of the effort, says Richardson.

"My best hope is that we will attract the brightest, sharpest students to receive this endowment that will come out of school and become true community doctors where not only do they provide great medical care, but they provide care for our community so that we can be as healthy as possible," she says.

Reilly says the Blackwood Endowment is an important focus of the school's commitment serving diverse communities, but not the only one.

"This represents but one facet of our ongoing commitment to creating a diverse and inclusive student body at the School of Medicine," he said. "Additionally, we have the scholarships created by one of our alumni, George "Doc" Lopez, that currently supports eight students who come from underrepresented backgrounds. The Anschutz Foundation has contributed to an endowment for scholarships."

Nwagwu said her own experience validates the school's approach.

"When you ask an institution what's important to them, you can normally see the answer by where they put their dollars. If an institution says diversity is important, and they're not investing actual dollars into students, you know it's not that important to the university," she said. "It's really important not only to give students the opportunity to not have to worry financially about paying tuition, but also showing that these students are important to us.

"Medical school is incredibly expensive, and just even applying to medical school is expensive. When there are scholarships available, it opens up a window of opportunity for so many people."

Richardson says it's great to reach fundraising milestones, but notes the effort is ongoing. Contributions can be made at **https://giving.cu.edu/fund/charles-j-blackwood-md-endowed-memorial-scholarship-fund.**

"No donation is too small. If you've got $5, put it in our pot. If you have $1 million, call me up right away, but anything in between will do," she says.

Blackwood died in 1993, but he lived for his patients and his community. His namesake endowment is not just a powerful legacy, but an inspiration for generations of physicians to come.

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CU School of Medicine alumni like Dan Karlin, MD '09, demonstrate their support for medical student projects through the **Innovation in Medical Education Fund**. Alumni offer mentorship and philanthropy to ensure students have the resources to pursue innovative projects that help address community challenges. Together, alumni are deepening their impact on the next generation of physicians. They are providing experiences that will enable students to be thoughtful leaders and collaborators that solve health problems. **By supporting the endeavors of medical students, you will carry forward a legacy of innovation in medicine.**

If you would like to support future medical student projects, visit giving.cu.edu/medinnovations or contact Vanessa Duran, at vanessa.duran@cuanschutz.edu or 303.724.2517.

The CU School of Medicine will match every dollar you give up to $50,000. With your investments, you can double your impact to help support the efforts of medical students.

"These research projects engage students, and inspire creativity and solutions-oriented thinking. With support from mentors like me, these talented innovators are solving problems they will encounter in their profession, becoming effective doctors and emerging as leaders in medicine."

Dan Karlin | CU School of Medicine Class of 2009