

UNIVERSITY OF COLORADO SCHOOL OF MEDICINE

# CUMEDICINE

*Today*

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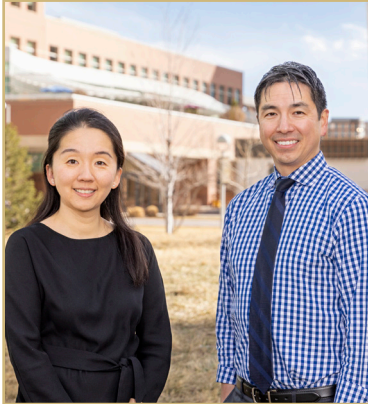
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UNIVERSITY OF COLORADO  
ANSCHUTZ MEDICAL CAMPUS

**OFFICE OF ALUMNI RELATIONS**

13001 E. 17<sup>th</sup> Pl., Mailstop A080  
Aurora, CO 80045

E-mail: [healthalumni@ucdenver.edu](mailto:healthalumni@ucdenver.edu)  
303-724-2518/877-HSC-ALUM  
[www.ucdenver.edu/healthalumni](http://www.ucdenver.edu/healthalumni)

**SCHOOL OF MEDICINE**

John J. Reilly, Jr., MD  
Dean; Vice Chancellor for Health Affairs,  
University of Colorado

**EDITOR**

Mark Couch  
Chief of Staff,  
Associate Dean of  
Public Relations

**ASSISTANT EDITOR**

Chanthy Na  
Director of Communications  
and Marketing

**PHOTOGRAPHY**

Justin LeVett  
Cyrus McCrimmon  
Rachel Sauer

**WEB CONTENT**

Tonia Twichell

**PRODUCTION**

CU Design & Print  
Services

**WRITERS**

Mark Couch  
Greg Glasgow  
David Kelly  
Toni Lapp  
Debra Melani  
Todd Neff  
Rachel Sauer  
Tyler Smith

# TEAMWORK AT CU CANCER CENTER IMPROVES LIVES

The University of Colorado Cancer Center is one of the jewels of the Anschutz Medical Campus.

Our cancer care is among the best in the country. Our research is pioneering latest treatments. Last year, The CU Cancer Center again earned its designation as a comprehensive cancer center from the National Cancer Institute.

The designation is reserved for cancer centers that do basic laboratory research and clinical trials, and that study the patterns, causes, and control of cancer in groups of people. Also, comprehensive cancer centers take part in multicenter clinical trials, which enroll patients from many parts of the country.

For us, the CU Cancer Center is a hub that brings together outstanding clinicians and investigators to provide the best care, using the best methods and equipment, and the latest scientific knowledge based on research conducted on campus.

We see evidence of the impact of this comprehensive approach when we look at five-year survival rates for advanced cancer. Patients treated at UCHHealth, our campus clinical partner for adult care, show that the five-year survival rates for patients with liver, pancreas, colon, lung, and prostate cancer exceed the state average.

Exceptional care also requires the personal touch. In three articles in this issue, we feature patients who have received care from the University of Colorado Cancer Center. We also include a story that discusses our approach to care.

One of the ways we stand out is our multidisciplinary clinics. With such an approach, we expand our reach and the impact we have on patients' lives. Our oncologists work together to ensure an optimal plan of care. With social workers, dieticians, financial counselors, educators, and research coordinators, we seek to surround our patients with support services that lighten their load.

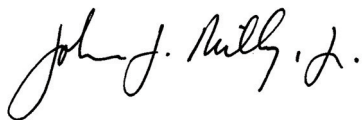
As an example of care that embraces our patients' needs beyond the medical, we introduce you to Erik Stanley and Kacie Peters, a young couple living in Denver, who each have been diagnosed with Stage IV colon cancer. Their physicians, Sunnie Kim, MD, and Christopher Lieu, MD, who are featured on the cover, coordinate Erik and Kacie's care to ease the logistical challenges of childcare and recovery.

While the team-based approach to care benefits patients, it is also a source of strength for our faculty. Wells Messersmith, MD, associate director of translational research for the CU Cancer Center and division head for medical oncology, explains that by sharing the responsibilities of care, our team members can depend on one another.

"In oncology, we often struggle to find the balance between being aggressive enough and not being too aggressive," he says in our cover story. "And patients often have strong feelings one way or the other. Because of the weight of these decisions, we often find that making them in a multidisciplinary team approach not only gives you better decisions because you have so many people weighing in, but it helps you sleep better because you're sharing the weight of possibly making a life-or-death call."

The team we've assembled at our CU Cancer Center excels in providing care and conducting research and at improving lives of those we serve.

With warm regards,



John J. Reilly, Jr., MD  
 Richard D. Krugman Endowed Chair  
 Dean, School of Medicine  
 Vice Chancellor for Health Affairs  
 University of Colorado



## Reporters locally and nationally turn to the School of Medicine for expertise and research news. Here are some examples from near and far.

**Sean O’Leary, MD, MPH**, professor of pediatrics, told CNN in December that lower rates of routine immunizations in children during the pandemic increase the risk of outbreaks of infectious diseases. “Measles is such a contagious disease that when you see those dips [in vaccine coverage], we really worry about the potential for large outbreaks,” he said. “You need to really maintain a high vaccination coverage to keep measles from spreading.”

**Carey Candrian, PhD**, associate professor of medicine, discussed with the Colorado Sun her research on how communication can affect health outcomes, particularly for older LGBTQ people. “If you grew up in this culture — where you were really trained to stay silent about who you were — of course over the years, if you continue to have these experiences, you’re going to continue to stay silent,” Candrian said in December. “They have literally developed this habit of silence to protect themselves. But in doing so, it has caused tremendous harm to both their physical and their mental health.”

**Emmy Betz, MD, MPH**, professor of emergency medicine and director of the Firearm Injury Prevention Initiative, explained on Colorado Public Radio News that mass shootings are a small percentage of deaths from firearms. “We need to be looking at what’s happening every single day in urban communities and across the country, in terms of suicide, if we really want to look at where the bulk of gun deaths are,” she said in December.

**Richard Johnson, MD**, professor of medicine, commented on CNN on a recent study on the importance of drinking water to lower the risk of chronic diseases. “The most impressive finding is that this risk (for chronic diseases and aging) is apparent even in individuals who have serum sodium levels that are on the upper end of the ‘normal range,’” he said in January. “This challenges the question of what

is really normal, and supports the concept that as a population we are probably not drinking enough water.”

**Jay Lemery, MD**, professor of emergency medicine, told the Boulder Weekly in November that he attended the United Nations Climate Change Conference in Egypt to promote a better understanding of the connection between climate and health. “Our role was essentially to build connectivity and awareness of the health implications of climate change,” he said.

**Lotte Dyrbye, MD, MHPE**, senior associate dean of faculty and chief well-being officer, was asked by The New York Times in January about professional burnout and its impact on health and relationships. “There is an overlapping Venn diagram between burnout and depression,” she said. “If you have even an inkling of a suspicion that you’re not well, that’s what your primary care doctor is for, to help you figure that out.”

**Christopher Knoepke, PhD**, assistant professor of medicine, was interviewed by Colorado Public Radio in January in a report about the use of the Colorado’s red flag law. The law allows removal of guns from people who are considered a risk to themselves or others. “Moving firearms out of the house, and making them inaccessible to the person at risk is one of the most effective ways of preventing suicide death and injuries from self-inflicted violence,” he said.

**Casey Greene, PhD**, chair of biomedical informatics, was quoted in Nature in February in an article about using artificial-intelligence algorithms on research papers. When Nature asked Greene and a colleague about the potential uses of chatbots such as ChatGPT, particularly in science, their excitement was tempered with apprehension. “If you believe that this technology has the potential to be transformative, then I think you have to be nervous about it,” Greene said.



Sean O’Leary MD

**Carey Candrian, PhD**, associate professor of medicine, was interviewed by the Denver NBC affiliate, in February about receiving a five-year grant to study disparities of care for elderly people in the LGBTQ community. “We know discrimination is happening all over the health care ecosystem and especially in hospice,” she said. “For example, there was a survey in 2020 of over 850 hospice professionals and 46% of the hospice staff reported directly observing discriminatory behavior of LGBT patients, things like rolling eyes when patients were holding hands to not involving the partner in major decisions and even disregarding patient wishes.”

**Edwin Asturias, MD**, professor of pediatrics, described on National Public Radio why studying mosquitoes in Guatemala is a good place for researchers to identify cases where a disease crosses from animals to people. “Because they are in a crowded condition,” he told National Public Radio in February, “the ability for any pathogen to move from the animals to the human is much higher. Maybe the pig is having a cold and now, suddenly, that influenza virus is going to transfer to a little child.”





*Cristin Welle, PhD*



*Josina Romero O'Connell, MD*



*Nanette Santoro, MD*

**Jason Stoneback, MD**, associate professor of orthopedics, in February spoke with KCUR, the NPR station in Kansas City, Mo., about rodeo injuries in a report about the youth rodeo series in Dodge City, Kan. The rodeo of today is safer than it used to be, he said. And the rate of injury among youth rodeo athletes is less than half that of their adult counterparts. “While it is a dangerous sport,” he said, “fortunately the majority of injuries are not serious.”

**Cristin Welle, PhD**, associate professor of neurosurgery, was quoted in *The New York Times* in a December article about brain implants and efforts to restore function to people with disabilities or degenerative diseases. Discussing one company’s plan to seek permission from federal regulators to test its device in humans she said: “They basically sourced a lot of the best ideas out there in the top of the field and paid to bring them together into a new system. And I think that is exciting, now whether they can really surmount all of these technical hurdles to demonstrate that it is in fact safe, it remains to be seen.”

**Joseph Sakai, MD**, associate professor of psychiatry, was quoted by the Denver ABC affiliate in a February report about methamphetamine addiction. “The addiction itself can cause a huge number of consequences,” he said. “The consequences can be really massive in terms of destruction of family life, you know, folks end up being fired from jobs.”

**Jason Persoff, MD**, associate professor of medicine, described the working conditions clinicians are facing in March article in *The*

*Hospitalist*. He said patients are becoming increasingly outspoken and dissatisfied with care due to limited visitor access to patients, increased delays in care due to overrun hospitals, and care at the hands of some burned out clinical staff. “Frustration and misinformation have further demoralized clinicians and simultaneously created an antagonistic relationship from time to time as patients argue about what is and isn’t scientific fact,” he said.

**Josina Romero O’Connell, MD**, assistant professor of family medicine and director of the Colorado Area Health Education Center, in January discussed with the *Denver Post* the center’s free health screenings at the National Western Stock Show in Denver. She said providing the service is important because self-employed ranchers, farmers, and other rural residents often live without health insurance. “The last thing they want to think about is, ‘I’ve gotta spend money to go see a doctor when I need money to keep my ranch going,’” she said.

**Satish Garg, MD**, professor of pediatrics, was quoted by the Denver CBS affiliate in a March report about a drug manufacturer capping the price of insulin at \$35 per month. “These insulins cost hardly anything to make it and patients were being charged sometimes anywhere between \$200 to \$600,” he said. “It’s high time, man... it is a big deal.”

**Joshua Barocas, MD**, associate professor of medicine, commented in March in a Colorado Public Radio report about state legislation that would allow creation of sites where illegal drugs could be used under the supervision of trained staff who could reverse an overdose if necessary.

“You can’t enter treatment if you are dead,” he said. “All the data suggests that people are going to do drugs regardless. ... All we are trying to do is reverse the harm that could come from what people are already doing.”

**Marc Schwartz, MD**, assistant professor of medicine, was quoted in February by the Denver ABC affiliate in a report about bone marrow donation. “The first place that we look for a potential donor is a patient’s sibling,” he said. “On average, however, about 70% of patients do not have a fully matched sibling donor. So, the next step is to look at an international registry for matched unrelated donors.”

**Nanette Santoro, MD**, chair of obstetrics and gynecology, was quoted in February in a *New York Times Magazine* article about menopausal hormone therapy. “If I weren’t my own chair, I would be called to task for not doing stuff that would make more money, like delivering babies and I.V.F.,” she said. “Family medicine generally doesn’t want to deal with this, because who wants to have a 45-minute-long conversation with somebody about the risks and benefits of hormone therapy? Because it’s nuanced and complicated.”

**Sarah Jolley, MD**, assistant professor of medicine, discussed with Colorado Public Radio a study that found as many as 1 in 10 Coloradans may have experienced long COVID. “I think that’s what’s so unclear about long COVID and potentially concerning about those numbers is that we certainly know some people recover,” but most haven’t, she said in February.

## KEEPING THEIR EYES ON THE PRIZE

CU Ophthalmologist Richard Davidson leads the Colorado Avalanche's eye care team

Interviewed by Greg Glasgow

If you see Richard Davidson, MD, jump out of his seat at the next Colorado Avalanche game, it doesn't necessarily mean the team just scored a goal. As the lead team ophthalmologist for the Denver-based hockey squad, Davidson might be headed back to the locker room to tend to a player who just took a blow to the head or a stick to the eye.

For the past six seasons, Davidson has been part of a group of providers from the University of Colorado School of Medicine who serve as official team doctors for the Avalanche. As lead for the ophthalmology specialty, Davidson sets the schedule, handles calls and appointments for the players and staff and their families between games, and is one of five CU ophthalmologists who attend home games on a rotating basis to handle urgent situations as they arise.

We talked to Davidson about his role with the Avalanche and how it felt to be part of the celebration when the team won its third Stanley Cup in June 2022.



Richard Davidson, MD, and the Stanley Cup.

### What is it like working so closely with one of Colorado's major-league teams?

It's a real honor to be a part of it and to be able to care for these elite athletes and really contribute to their success. We cover not just the players, but also the players' families, the coaches, the people in the front office, the back office — we represent the whole team. The other thing that's interesting is, when we cover games, we cover the visiting team too. So, if a visiting team member or coach or anyone gets injured, we will go see them in their locker room and take care of them. We also work with the referees, so probably a couple of times a year, I'll treat a referee who is having an issue with their eyes.

### What are some of the reasons that the players, the staff, or their families are coming in between games?

It could be anything. Sometimes we see people for routine eye exams. Other times, it's someone who has an infection or people who are interested in procedures like LASIK surgery. It just depends. It might be a player who wears contacts and needs an update on their contact lenses. If they've had trauma during a game, then we go down a different path. Not everything we see in the clinic is necessarily player-related, but anyone who's part of the team, or their family members, can see us for any of those reasons.

### Were you an Avalanche fan before this? Or have you become one?

I was a big fan before, so that's why for me, it's next level. You don't go to medical school and into ophthalmology thinking you'll get to do stuff like this. It's been a real thrill to be a fan, as I was, and then be able to do this.

### How does a typical game go when you are on duty?

When we first arrive, we check in at the locker room and make sure everything is stable. We'll hang out there for a little bit so that the team can grab us if they need us, and then once the game starts, we have seats in the stands. We'll watch the game, then we come back between periods. If there's an obvious issue during the game, we'll go back to the locker room, or they'll come find us. And then we go back after the game to make sure everything's OK, and then we go home. It's such a unique experience, but it can be stressful too. When a player has trauma to the eye, it's obviously a serious situation. Things can escalate quickly.





Richard Davidson, MD, (bottom left) celebrates with the 2022 Stanley Cup Champions, the Colorado Avalanche.

**How often does that happen, that a player has an injury you must address in the moment?**

I don't want to jinx anything, but every season there are a few players who definitely need an urgent or semi-urgent intervention, whether it's suturing a lid, a corneal abrasion, or other direct trauma to the eye.

**If it happens during the game, is the goal to sew them up and get them back on the ice as quickly as possible?**

It depends on the injury. Sometimes we do that. Sometimes we'll wait to sew them up until after the game. These players are really tough. It's amazing. They will often ask us to just put Steri-Strips (thin adhesive bandages) on the wound until after the game. There was one instance where I had to take a player from the visiting team to the hospital because he had a significant injury to the eye, and I wanted to do an ultrasound to make sure that everything was OK. That's the one thing we can't do at the arena – we can do a lot of suturing, but we can't do an ultrasound. We took him to the emergency department at UHealth and did an ultrasound and then got him on his way. He was OK, and I actually drove him to the airport. It was an interesting night.

**What are the most common injuries you see? A puck to the eye?**

A stick to the eye is the more common one that we see. The players wear a face shield, or a partial shield, so it's hard for a puck to get

up there. But it's not hard to get a stick up underneath the shield. We've also seen some issues from fighting – some fractures and things like that – and even some fractures from direct hits.

**What was it like when the team won the Stanley Cup last summer? Did you get to be part of some of the festivities?**

All the leads got to participate. The lead for each service — dentistry, ophthalmology, sports medicine, etc. — got to participate in the parade and the party they had afterward. It was really cool that we could be part of that. It's one of those once-in-a-lifetime experiences you think is never going to happen.

**What was your favorite part of the whole Stanley Cup experience?**

Watching them win, and then to be a part of the celebration and see their genuine reactions. They work so hard, and it is so difficult to pull off with injuries and having to be consistently winning all season. It was great to see the weight off their shoulders up close. It's a very intimate thing to see two guys looking very closely at the cup and talking about how special it was for them. They worked their whole lives for this. That, for me, was the most special part, to have that access and to see on a very intimate level, how special it was for them and how hard they work to get there. You see the ups and downs of the season, and then to finally get to a place where they won the whole thing. It was amazing.



# “TIME IS A GIFT”

## Young parents battle Stage IV colon cancer

By Rachel Sauer

Kacie Peters and Erik Stanley got together after an early-morning walk that felt like it would never end.

They met at a New Year's Eve party in Chicago in 2012. Kacie, who had flown in from Philadelphia to visit a friend, didn't know anyone else at the party. Then, her friend decided the apartment was too full and that Kacie needed to find somewhere else to spend the night.

Erik offered to let Kacie stay at his studio apartment. He'd sleep on the couch so she could have the bed. Accepting his offer, they walked, took a bus, took a train, and walked again – almost four miles. Every so often, Erik sheepishly promised, “Just a little bit farther.”

When she woke up the next morning, Kacie noticed a book about serial killers on Erik's nightstand.

What could have been a big “uh-oh...” moment instead developed into a long-distance relationship and then a wedding a year and a half later.

Since then, in their 10 years together, Kacie and Erik have ventured to far-flung places, moved halfway across the country, and for the past six years found daily delight in their son, Nate.

They've been through some challenges, but always together, generally laughing, grateful to have each other's hand to hold.

And now, together, they're each battling stage IV colon cancer. Kacie is just 36 – she was 34 when she was diagnosed on New Year's Eve in 2019 – and Erik is 41.

Even though a growing number of young people being diagnosed with late-stage colorectal cancer, the odds of this happening with both members of a couple are “one in a hundred million,” says Christopher Lieu, MD, University of Colorado Cancer Center associate director for clinical research and Kacie's oncologist. “It's almost incalculable.”

Yet the improbable odds don't change the facts. “This is what's happening, so we're dealing with it and living our life with our son,” Erik says.

“I try to find the silver linings with things and try not to focus on the bad stuff,” Kacie adds. “Of course there's stuff we talk about to each other in private, plans we have to make, but we'd rather be an example that you can get through things together and still have a really good life, the life you want to live.”

### PAYING ATTENTION TO SYMPTOMS

For Kacie, it started with pain in her upper abdomen. She had a busy job she loved and frequently traveled for work. She figured the pain was just stress. For months she was in and out of doctor's offices, in and out of urgent care, always leaving with incorrect diagnoses and medications that offered only temporary relief.



Erik Stanley, Kacie Peters, and their son Nate. Photos by Rachel Sauer.

The pain grew bad and persistent enough that she was hospitalized for an urgent colonoscopy on the last day of 2019. She had barely regained consciousness after the procedure when she received the news that she had cancer, and the medical team wanted her to consent to surgery that night.

“I was alone when I got this news – Erik was at the Children's Museum with Nate – but I don't think it was a total surprise because I'd had a month and a half of throwing up blood,” Kacie says. “But I still had to call Erik and say, ‘Guess what, I have cancer, I'm going into emergency surgery right now.’”

“Definitely the worst call I've ever received,” Erik says.

Kacie was initially diagnosed with stage III colon cancer and spent much of 2020 having surgery and chemotherapy treatment, working with a multidisciplinary team from the CU Cancer Center.

“She's definitely benefited from multidisciplinary management,” says Lieu, an associate professor of medical oncology. “She's had surgery with Dr. Steven Ahrendt, chemotherapy with me. The whole team has worked in conjunction to make sure we're doing everything possible for her.”

She had a brief period of remission, but the cancer returned in August 2021 and this time it was stage IV.

### A SECOND COLON CANCER DIAGNOSIS

Through 2020 and 2021, Erik supported Kacie through chemotherapy treatments and surgery while making sure life was as normal as possible for Nate.



“This is hard to talk about because I don’t want to imply it was a burden,” Erik says. “She’s the person I love, and I wanted to do everything I could for her, and she made it easy. But I don’t think we talk enough about the pressures that come with a cancer diagnosis.”

At the beginning of 2022, Erik began experiencing symptoms that by now were painfully familiar: exhaustion, constipation, abdominal pain. He knew he couldn’t write it off as just stress, and on February 22 he received results from a CT scan that were an awful near-repeat of Kacie’s three years before.

“It was a shock,” Erik recalls, and Kacie adds, “We’re thinking, ‘How could this be happening with both of us?’”

Sunnie Kim, MD, a CU Cancer Center member and Erik’s oncologist, says: “When I first met Erik, he’d had a CT scan that showed sigmoid colon cancer that unfortunately was involving his kidney, the abdominal wall lining, and his liver. The sigmoid lesion was so big that we as his care team debated whether to start chemo right then and there.”

His multidisciplinary care team suggested he first have a nephrostomy, or a procedure in which an opening is made between the kidney and the skin of the back to let urine drain from the kidney, and a diverting colostomy.

“After that, I felt very nervous about sending him home, so we ended up just starting chemo in the hospital on March 2,” says Kim, an assistant professor of medical oncology. “We were concerned that the mass was causing issues with his kidneys, and we didn’t know the pace of its spread, so it was important to be very aggressive and get the ball rolling.”

Since then, Erik has had eight cycles of chemotherapy and a CT scan in April showed that his liver metastasis has shrunk, as has the primary sigmoid mass.

Lieu and Kim have worked in close collaboration, and after consulting with Kacie and Erik following Erik’s diagnosis decided that it would be beneficial to have them be treated by different oncologists.

“We did leave it open to Kacie and Erik,” Kim says, “but that’s one of the benefits of a multidisciplinary approach. We’re in constant communication as a team and with Kacie and Erik.”

## BENEFITS OF MULTIDISCIPLINARY CARE

Because of that communication between Kim, Lieu, and other members of the care team, Kacie and Erik receive their chemotherapy treatments in the same week, easing the logistical challenges of childcare and recovery. Both Kacie and Erik have gone on disability while they receive treatment, “and we’re so lucky that was an option for us,” Kacie says.

However, having cancer can be costly, and unexpected expenses are almost guaranteed. In the spring 2022, a friend established a GoFundMe for the family that so far has raised more than \$122,000, which they’ll use to help with any unexpected medical expenses as their treatment continues.

The financial cushion has been a significant stress relief, Kacie says, though their ultimate goal is to see their cancers shrink enough that they can go back to work and pass the rest of the GoFundMe donations along to others dealing with cancer.

The most common question the couple receives, Kacie says, is “How did this happen? Were there environmental factors that caused this? Some rare twist of genetics?”

“Unfortunately, the answer is we just don’t know,” Lieu says. “There’s research happening here at CU and all over the world trying to figure out the confluence of factors that can lead to this, because it’s not just one thing. With Kacie and Erik, my hypothesis is that it’s probably a combination of things – genetic factors, environmental exposures that just slightly increase the chance of developing colorectal cancer in people as young as they are.”

Both Kacie and Erik, as well as Lieu and Kim, emphasize the importance of not ignoring out-of-the-ordinary symptoms “and I would even say getting a second opinion if you’re still concerned,” Kim says. “Patients know their bodies and it’s important that we don’t automatically think it can’t be colorectal cancer because they’re too young. We’re seeing more and more that there isn’t a ‘too young.’”

## TIME IS A GIFT

For now, and for each day, Kacie and Erik are focusing on their time together as a family. “It’s really important to us not to look at it as ‘buying time’ but as appreciating time,” Kacie says. “Nate’s 6 and he needs to have as much of a normal life as we can give him.”

So, they walk to Stanley Marketplace for tater tots, and they stroll through downtown Denver festivals. When the community pool is open, swimming is frequently on the agenda, as are peaceful moments on the porch swing in the gloaming light of late afternoon.

“I know it sounds so cliché, but you realize that time is a gift,” Erik says.

“And we don’t want to waste it,” Kacie adds. “Not a minute of it.”



Erik Stanley, Kacie Peters, and their son Nate.

# EXPANDING THE UMBRELLA OF CARE

CU Cancer Center enhances patient care with multidisciplinary clinics

By Rachel Sauer

In the earliest days of specialized cancer care, two things often happened: either individual oncologists were burdened with the expectation to know everything, or patients were sent on treatment journeys that could involve multiple visits with multiple clinicians in multiple locations.

As the field of cancer care has grown and evolved, buoyed by tremendous strides in research and therapeutics, patients could increasingly and reasonably hope to live many years, rather than many weeks or months, after a diagnosis. A significant contributor to this hope has been the move toward multidisciplinary care.

In this coordinated care approach, teams of specialists work together and with patients to develop and continually adapt individual treatment plans. At the University of Colorado Cancer Center, patients diagnosed with cancer can receive care in multidisciplinary clinics – a sort of “one-stop shop” in which they are evaluated in one day and in one location by all of the specialists who focus on their particular type of cancer.

“At the CU Cancer Center multidisciplinary clinics, we ensure the best treatment plan by having all the various specialists – medical oncologists, surgeons, radiation oncologists, pathologists, radiologists, and many others – present, looking at all of the information, and crafting the best path forward for the patients and their families,” says Richard Schulick, MD, MBA, director of the CU Cancer Center.

## BENEFITING PATIENTS

The benefits of multidisciplinary care are emphasized again and again to clinicians who work every day with patients in various stages of a cancer journey. For Christopher Lieu, MD, an associate professor of medical oncology in the CU School of Medicine, and Sunnie Kim, MD, an assistant professor of medical oncology, working with a couple in which both people are battling stage IV colon cancer has particularly highlighted the importance of a multidisciplinary approach.

Lieu is the primary oncologist for Kacie Peters and Kim is the primary oncologist for Erik Stanley. Kacie and Erik are a Denver couple who have been together for 10 years and are parents to their 6-year-old son, Nate.

“I think one of the ways that Kacie has really benefited from multidisciplinary care is she’s been treated with surgery a couple of times, and this is just due to discussions of her situation with surgical specialists on the team,” Lieu says. “At the time of her recurrence, surgery was one of the first things we did. I think that ability to quickly consult with surgical specialists and have those longitudinal discussions where it’s not just a one-and-done kind of deal – having that close communication with people in different sub-specialties – has been really helpful.”

When Erik was diagnosed with colon cancer several years after Kacie, in February 2022, the disease had metastasized to his liver and was invading his ureter, as well as overtaking the sigmoid part of his colon.

**“About 30% of our patients come from out of state, so it’s one trip, one facility fee, and they leave that day with a plan. It’s an incredibly patient-centered model.”**

As Erik’s oncologist, Kim advocated for an aggressive approach and he began a three-drug chemotherapy regimen called FOLFIRINOX. Also, because the primary tumor on his sigmoid was so large and threatening to cause a full obstruction of his colon, “we turned to the colorectal surgeon on the care team very quickly and he was able to perform a diversion. One of the interesting things with

multidisciplinary care is you have the initial plan – and for Erik, that was to continue chemotherapy – but we were frequently going back to the multidisciplinary team and asking what more we can be doing for him.”

## CLEAR CHANNELS OF COMMUNICATION

The main goal of multidisciplinary care is to give patients the best care possible, in the clinic and in other aspects of their lives, so the approach offers an expanded umbrella of care.

While common perceptions of cancer care focus on medical and surgical oncology, multidisciplinary teams include radiation oncologists, pathologists, genetic counselors, registered dietitians, social workers, therapists, research coordinators, financial counselors, diabetes educators, and other specialists. Multidisciplinary care has grown to encompass not only the physiological aspects of cancer care, but social, psychological, and emotional needs as well.





Sunnie Kim, MD, and Christopher Lieu, MD. Photo by Justin LeVett.

“Something that patients especially appreciate is having one point of contact,” says Cheryl Meguid, DNP, MBA, associate professor of surgery and regional medical director of oncology multidisciplinary programs in the CU School of Medicine. “About 30% of our patients come from out of state, so it’s one trip, one facility fee, and they leave that day with a plan. It’s an incredibly patient-centered model.”

Lieu emphasizes that while multidisciplinary care teams can include several dozen experts, “the patient’s goals and values and what they want are critically important in decision making and creating a treatment plan. I think part of that is the idea that as long as we have good control of the cancer and our patients are feeling well, then that’s a win.”

Also, patients benefit from the clear channels of communication that are vital to multidisciplinary care. “Since we’re all talking together, patients don’t really experience doctors who are saying different things,” Lieu says. “There’s always a unified plan, and I think whenever providers are communicating clearly, the patients are always going to benefit from that.”

## MORE EFFECTIVE TREATMENTS

While the focus of multidisciplinary care is providing the best treatment for patients, providers also benefit from the approach, says Wells Messersmith, MD, associate director of translational research for the CU Cancer Center and division head for medical oncology in the CU School of Medicine.

“In oncology, we often struggle to find the balance between being aggressive enough and not being too aggressive,” Messersmith explains. “And patients often have strong feelings one way or the other. Because

of the weight of these decisions, we often find that making them in a multidisciplinary team approach not only gives you better decisions because you have so many people weighing in, but it helps you sleep better because you’re sharing the weight of possibly making a life-or-death call.

“Nobody has a crystal ball and sometimes we just don’t know how things are going to play out – we can only make decisions based on the best evidence we have. I think that weight can lead to burnout and stress for clinicians, so it’s much more satisfying as a provider to practice in a situation where you have other people right alongside you as you’re making those decisions.”

An aim of decisions made in a multidisciplinary team is consensus, working to ensure that each team member is comfortable with the plan and that no one provider has dominated a decision, Kim says. Many minds working together also brings innovative approaches to treatment.

Lieu notes that Kacie Peters has benefited from participation in clinical trials and received access to immunotherapy through them, a process that was initiated in part because her multidisciplinary team includes a research coordinator. And Erik Stanley has shown such a good, sustained cancer response to FOLFIRINOX that “we’ve discussed his case with liver surgical specialists on his team and we’re thinking about putting in a hepatic arterial infusion pump to try giving him chemotherapy that’s really just directed into his liver,” Kim explains.

“There’s only so much traditional systemic treatment, meaning chemotherapy, can do for him, so it’s nice that we can draw on the expertise of a multidisciplinary team to come up with more effective treatments for our patients.”

# JOURNEY TO RECOVERY

Team care at CU helps world traveler overcome pancreatic cancer

By Debra Melani

Bonnie Dahl knows chance and circumstance played key roles in halting her pancreatic cancer, one of the deadliest and most insidious forms of the disease.

Chance came when a keen radiologist spotted the tiny cyst on the CT scan her doctor had ordered of the longtime Boulder businesswoman's lungs, not her pancreas.

Circumstance took over when Dahl called her brother, who was being treated for head and neck cancer at the University of Colorado Anschutz Medical Campus, before she booked an appointment with the local surgeon her gastroenterologist recommended.

Today, after months of treatment at the CU Anschutz Medical Campus, Dahl's tests show no signs of the disease, and her doctors say chances of the highly recurring cancer sneaking back unseen are lower than average.

"Going through such a serious cancer, I know how fortunate I was," says Dahl, who in January celebrated a year since her last chemotherapy treatment. "I know that not everybody has these outcomes. But it's how you deal with it along the journey that is key."

## SECOND OPINION

Following her intuition to get a second opinion is something almost all doctors recommend when facing serious diagnoses. Her brother's physician assistant at CU Anschutz was a longtime friend of Dahl's daughter and had worked at one of Dahl's stores in Boulder as a teenager. "She called me and said, 'Bonnie, [your brother] just told me about your diagnosis,'" recalls Dahl, describing a nagging cough that had been diagnosed as post-nasal drip. "She said, 'You have to go to Anschutz. We have the two top surgeons in the world for pancreatic cancer.'"

After more research and recommendations, Dahl quickly found herself meeting with her care team at CU Anschutz, which included one of those top surgeons, Marco Del Chiaro, MD, professor and division chief of surgical oncology at the CU School of Medicine.

"I was really excited, because I just had this sense of things going in the right direction," Dahl says. "I knew I was in good hands."

The team had already set Dahl's treatment plan after reviewing her case with the CU Cancer Center tumor board – a rare entity that involves up to 25 multidisciplinary specialists who meet weekly, evaluating and monitoring every patient case based on tumor type.

Choosing the CU Cancer Center, a National Pancreas Foundation Academic Center of Excellence, makes a difference for most patients, Del Chiaro says.



Bonnie and Gary Dahl in Sri Lanka days after her last chemotherapy treatment.

"It's been demonstrated that when you go to a high-volume, integrated center that specializes in a particular cancer, your results are better," says Del Chiaro, an international leader in highly complex pancreatic surgery.

## INTEGRATED APPROACH TO CARE

Due to the integrated approach and advanced surgical techniques, Del Chiaro and his team can operate on more of its pancreatic cancer patients, nearly double the national average, a key to improved outcomes.

Cancer care goes well beyond surgery, and for Dahl, her medical oncologist's advanced, evidence-based treatment plan played as vital a role. Dahl's protocol included four sessions of a powerful chemotherapy drug before surgery and then eight more after the operation.

The chemotherapy, called FOLFIRINOX, was once limited to patients with cancers that had spread beyond the pancreas. "But we are using it now in the neoadjuvant (before surgery) setting because the data show it provides better outcomes," says Alexis Leal, MD, an assistant professor of medical oncology and CU Cancer Center member.





The Dahl family on safari in Sri Lanka. From left to right: Bonnie; son Brandon; daughter Erica; husband Gary; son Jason; and their guide.

Using chemotherapy before surgery, Leal says, helps shrink tumors to make them easier to remove surgically. Also, the pre-surgical use allows doctors to observe tumor biology so that they can determine responsiveness to chemotherapy and utilize the proper post-surgical chemotherapy regimen. It also helps prevent spread of cancer cells outside of the pancreas.

For Dahl, the outcome was “stellar,” Del Chiaro said, with final pathology after surgery showing no signs of cancer cells remaining. Generally, only 3% to 5% of patients have such results, he says.

Continuing with the aggressive, post-surgery chemotherapy plan, even in cases like Dahl’s, remains critical, Leal says, especially with pancreatic cancer, when cancer cells might have escaped through the blood stream and be lurking elsewhere. The rationale is that the drug will seek out and kill any remaining cells, she says. In the largest study of its kind released late last year, Del Chiaro and colleagues confirmed improved outcomes for patients who received chemotherapy pre- and post-pancreatic surgery compared with patients who did not.

“I went through the entire protocol of somebody who’s stage 3,” Dahl said. “So, I did not get a pass at all – except that I caught it early.”

## DEDICATED CLINIC

Dahl’s case was a lucky catch, because it resulted from a friend pushing her to see a doctor for a persistent, unrelated cough, Leal says. With no viable screening method for pancreatic cancer, the disease often goes undetected until later stages, a large reason it ranks as third-deadliest cancer in the country behind lung and colon cancer.

Dahl’s cancer stemmed from a precancerous pancreatic cyst called an intraductal papillary mucinous neoplasm (IPMN), Del Chiaro says. Not all these pancreatic cysts become cancerous. In fact, studies suggest they are present in a large percentage of the population.

At CU Anschutz, Dahl was able to get care at specialty clinic dedicated solely to pancreatic cysts, run by Del Chiaro and colleagues.

“It’s something really unique,” Leal says. “I don’t know of other cancer centers having this. Not uncommonly, we get referrals from primary care physicians, surgeons, and other doctors for patients that had these cysts incidentally picked up on scans.”

CU Anschutz patients with IPMNs are rigorously surveilled for life, with highly specialized cystic experts monitoring and discussing each patient’s case to determine when and if surgical removal is necessary. “We’re going to keep a close eye on Bonnie,” Leal says. “It’s unlikely that something would be missed in the future.”

## POSITIVE OUTLOOK

In addition to the expert clinical care Dahl received, her outlook made an important contribution to her recovery. “She is so positive,” Leal says, adding that no matter how rough the chemotherapy would get, Dahl would report: “I’m doing great!”

The petite Dahl, who says she is “5 foot tall on a good day,” fell to a low of 88 pounds over the course of her care, but never complained, Leal says.

“She was an unwavering force. It brings tears to my eyes,” Leal says, adding that Dahl’s dedication to world travel left a mark on her caregivers. “She was always planning trips and vacations in between her chemotherapy cycles,” Leal says. Dahl’s excursions included a women’s trip to Greece mid-treatment and a family vacation to Sri Lanka after her last chemotherapy session.

“Another great thing about CU Anschutz is that they want you to live and to lead a normal life when you can during treatment,” Dahl says. “They are the first to say: If you’re up for travel, do it. I appreciate that. I don’t think you get that from other institutions.”

“This is why we’re doing this,” Leal tells her patients. “We’re doing this so you can live your life. Patients of mine that have that positive way of being and relating just do well. We love Bonnie. She’s a force to be reckoned with. I think that really served her well.”



Bonnie Dahl (right) stands with her daughter, Erica, at the counter of Erica’s clothing and novelty store, Savvy on Pearl, in downtown Boulder. Dahl and her twin sister also own The Fitter, a shop on University Hill since 1973.

# SURFING THE WAVES

## Optune device, positive outlook power treatment for brain cancer

By Todd Neff

Bruce Stahlman and wife, Kelly, had hoped that their decades-long immersion in the U.S. health care system might end with the lives of their twin sons in 2014 and 2015. Mark and Eric had been born 12 weeks premature in 1992, and long neonatal intensive care unit stays presaged two decades of frequent hospitalizations. Their severe cerebral palsy and accompanying health problems had led to the remodeling of the Stahlmans' Littleton home into a sort of hospital unto itself, complete with lifts and nursing care.

It was not to be. In August 2018, Bruce, then 61, found himself nodding off at dinners and occasionally losing his balance despite being a runner and capable of knocking out high-intensity Orange Theory workouts.

Kelly's instincts, honed over more than 20 years of caring for their boys, told her something was off. She talked to the neurologist who had long worked with their twins and then scheduled an office visit and an MRI for her husband. Bruce obliged but drove in his own car to the MRI appointment so he could head straight to his job as chief financial officer for ARC Thrift Stores afterward.

He headed to an intensive care unit instead.



Bruce Stahlman wears the Optune device, which has kept his brain cancer in check for more than four years. Photos by Cyrus McCrimmon for UCHHealth.

The scan revealed a brain tumor the size of a racquetball. The pathology report after its successful surgical removal showed it to be glioblastoma multiforme (GBM). It's a killer tumor, one that accounts for about half of all brain tumors. Each year, about 13,000 people in the United States are diagnosed with such tumors and about 10,000 people die from them. The average patient survives about 15 months, even with the surgery and the follow-up radiation therapy and chemotherapy regimens Bruce subsequently went through. The average five-year survival rate is 6.8%.

### POSITIVE OUTLOOK

Kelly drove home to take care of a few things after the scan. She had buried two of her three sons. Now her husband had brain cancer. She realized: "I've been here before. You can either go through the trauma of trying to understand something that's not understandable or say to yourself, 'OK, it is what it is – now what?'" Jay, her oldest son, was arranging to fly in to help.

For Bruce, the answer to "Now what?" was a decision to live. That, too, was at least in part a response informed by his experiences with his twin sons. Dottie Mann, a friend of the Stahlmans who is a chaplain at UCHHealth Highlands Ranch Hospital, had once told them that end-of-life was not about how you die. It's about how you want to live until you don't.

Fifty-two months later, Bruce is still living. He and Kelly credit two big reasons. One is the Novocure Optune device he wears an average of about 21 hours a day. The other has to do with both the head and the heart, and that's deliberately maintaining a positive outlook whatever the circumstances.

Bruce put it this way: "You can't stop the waves, but you can learn to surf."

Some of the waves Bruce now surfs are electric. The Optune device delivers low-intensity, 200-kilohertz, alternating electric fields into Bruce's brain via 27 electrodes stuck about his head. The electrodes get moved every two days to prevent the irritation of a scalp Bruce now keeps clean-shaven.

"I've had to take off my Fabio locks – which is brutal – but unfortunately, it needs to happen," Bruce said. On the bright side, shortly after returning to the office with a clean-shaven noggin, he said, "my teammates took my nameplate off the door and put 'Vin Diesel' on it."

A cable bundles the electrode wires behind his head and snakes them to a battery and controller he wears as shoulder bag.



**“You can’t stop the waves,  
but you can learn to surf.”**

## SLOWING BRAIN TUMOR GROWTH

The system has been proven to slow the growth of GBM tumors, explained Douglas Ney, MD, the University of Colorado School of Medicine neuro-oncologist who prescribed Bruce the Optune and continues to lead his cancer care.

“The alternating electrical fields, which penetrate into the brain, largely affect only the rapidly dividing cells, which are going to be the glioblastoma cells,” Ney said. “They disrupt the cells’ ability to go through mitosis, which is the way cancer cells divide.”

Ney and his CU Department of Neurology colleagues have been working with the Optune device since before the U.S. Food and Drug Administration approved it in 2011, Ney said. The CU team participated in the clinical trials at UHealth University of Colorado Hospital (UCH) on the Anschutz Medical Campus that led to the Optune’s approval. Ney estimates that hundreds of UHealth patients have subsequently used the device, with an average prognosis of about 21 months.

Bruce has more than doubled that, making him, as Ney put it, “an outlier.” The reason may be biological – Bruce’s GBM could simply be more vulnerable to the Optune’s electrical insults than the tumors of many patients. But some of it is probably psychological, Ney said.

“I think the wonderful attitude and approach to this diagnosis that they have has really gone a long way in how well he’s doing,” he said. “I think, because of their history, they have a really deepened approach to addressing adversity and life circumstances that can really bring you down. That plays into this as well.”

## PAYING IT FORWARD

“They,” in this case, are Bruce and Kelly, whose affinity for one another is hard to miss. Often, it manifests through a shared sense of humor. Example: When describing Optune’s side effects (negligible), Bruce added, “Of course, I can now read everyone’s thoughts.”



*Bruce and Kelly Stahlman with their dog Rambo.*



*Kelly and Bruce Stahlman.*

“Everyone’s except his wife’s,” Kelly qualified without missing a beat.

“I can read yours, too, but I just don’t want to let on,” Bruce said.

There’s more to Bruce’s relative longevity than the Optune and the positive attitude, of course. He also lists faith, science, nutrition, exercise, a doctor you trust, and friends and family. On the family front, son Jay and his wife Tsvetelina have moved to metro Denver with sons Max, 4, and Theo, 6. On the exercise front, he’s back to running (for this he removes the Optune) and did a 10K in Littleton in late October and a 5K turkey trot in California over the Thanksgiving holiday.

Bruce continues to work his day job at ARC Thrift Stores. He and Kelly, both longtime healthcare and disability-services advocates, have added cancer-related advocacy to a volunteering portfolio. Bruce gives public talks, and he and Kelly are active in the monthly UHealth Brain Tumor Support Group. They’re also working with Novocure’s public affairs staff to speed up the approval and Medicare coverage for Optune-like devices suited to ovarian, pancreatic, and non-small cell lung cancer.

“First and always, it’s about gratitude,” Bruce said. “It’s all about how we pay forward all the support and help that we got through our journey, certainly with my diagnosis, but also with Mark and Eric.”

They are grateful for the care they’ve received at UCH.

“We chose Anschutz as our center for care after looking at all the options,” Kelly said. “It’s a center of excellence, we loved Dr. Ney, and we really trust UHealth. That speaks volumes.”

The waves will keep coming. Bruce Stahlman plans on surfing them – and on living how he wants to live until he doesn’t.

*This article was first published by UHealth in January 2023.*

# TARGETING RHEUMATOID ARTHRITIS

## CU study identifies a bacterial strain as a disease trigger

By Tyler Smith

Autoimmune diseases afflict some 24 million people in the United States, in various forms of arthritis, Type 1 diabetes, lupus, multiple sclerosis, and many other diseases.

To visualize the effect of those 80 or so autoimmune diseases, consider a boxer bobbing and weaving in a ring. No visible opponent strides forth to land a blow, yet the boxer is engaged in a very real bout. With himself and he cannot emerge as a victor.

The reasons why the immune systems of people with go awry and cause the body to attack itself remain murky and the subject of intense investigation. Genetics, individual biomarkers, environmental exposures, and lifestyle choices are among the factors.

Now, researchers at the University of Colorado Anschutz Medical Campus have identified a new suspect: a strain of bacteria lurking in the gut that may be a trigger for rheumatoid arthritis (RA), an autoimmune disease that attacks the joints, often causing severe pain and stiffness in about 1.5 million people in the United States.

The findings, published last fall in *Science Translational Medicine*, focused on the moist inner lining of the intestine called the mucosa, where investigators searched for possible links between the jungle of gut microbes and antibodies found in people who have or are vulnerable to RA.

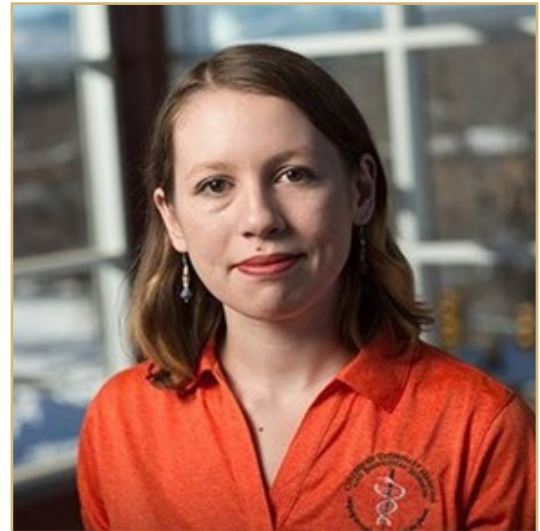
They collected blood from people at risk for the disease and isolated relevant disease-linked antibodies. Then, in the lab, they demonstrated that those antibodies “cross-reacted” with bacteria from two families. The antibodies were binding to certain bacteria, creating an immune response.

### GUT BACTERIA AND RHEUMATOID ARTHRITIS

That finding spurred further investigations and a powerful discovery. After culling bacteria from stool samples of individuals at risk for RA, the researchers isolated a strain of bacteria, *Subdoligranulum didolesgii*, that the key antibodies targeted and were binding to. Rather than eliminating the bacteria as an intruder, the antibodies launched an inflammatory attack by specific T cells, which normally help to protect the body from infections.

That work showed the bacteria triggered a strong immune response in the gut. But could the reaction invade the joints?

To test that question, the researchers gave the *Subdoligranulum didolesgii* strain orally to healthy mice. In short order, the rodents developed swollen and gnarled paws, reminiscent of the afflictions of human RA sufferers. The mice that did not receive that specific bacterial strain did not show these changes.



Meagan Chriswell

Meagan Chriswell, a student in the CU Medical Scientist Training Program for students pursuing joint MD and PhD degrees, was lead author of the study. She cautioned that the findings, while promising, leave many questions to be answered about RA specifically and autoimmune disease in general. But the work sheds more light on the maladies, she added.

“There is no presupposition on our part that [this bacteria] is the sole cause of RA,” Chriswell said. “There are potentially other bacteria and other factors that could be happening biologically to drive it. However, this is the first time we have a discrete organism linked to the disease in this way. This is the beginning of a story, not the end.”

Others have taken note. Chriswell said she attended the annual meeting of the American College of Rheumatology conference in Philadelphia, which highlighted the study as important basic science research. The work included contributions from 10 other CU School of Medicine faculty from the Department of Medicine’s divisions of rheumatology and infectious diseases, as well as the Department of Pathology.

### LEARNING FROM PREVIOUS STUDIES

The study is an extension of many years of work by specialists in the Division of Rheumatology on autoimmune diseases and how mucosal surfaces throughout the body – mouth, lungs, and gut among them – may be involved, said Kristi Kuhn, MD, PhD, senior author and head of the division.

Kuhn said research interest in the mucosa sprang in part from a connection between inflammatory bowel disease (IBD) and spondyloarthritis, which mainly attacks the spine but can also invade





Kristi Kuhn, MD, PhD

arm and leg joints, the skin, and the intestines. Kuhn co-authored a 2021 article that summarized the links between the two conditions. The paper noted that “significant numbers” of patients with spondyloarthritis also have IBD and inflammation in the gut. Kuhn and her co-authors also pointed to the intestinal mucosa as an entry point for a possible “environmental trigger” for the arthritis in IBD patients.

Kuhn had already published widely on evidence supporting the connections between the mucosa and the development of RA and other kinds of arthritis. The new study, with Chriswell and their colleagues, focuses on the intestinal mucosa as a thriving home for both the antibodies linked to RA and microbes that might be their targets.

“We wanted to take these antibodies that have mucosal features and see if they start to [bind to] bacteria,” Kuhn said. “The gut is our largest exposure to microbes.”

## SPIRITUAL AND SCIENTIFIC CONNECTION

So, what of this still mysterious bacterial strain, *Subdoligranulum didolesgii*? Its importance is not only scientific but also cultural. Chriswell, member of the Cherokee Nation, said she proposed the name. “*Didolesgii*” is the Cherokee word for arthritis or rheumatism. She noted that indigenous people carry a disproportionate risk for arthritis. At the same time, their scholarly and academic work has been “chronically underrepresented in the literature,” she added.

“The [Cherokee] name is in recognition of the disease burden and an acknowledgment of the contributions through history of indigenous scholars,” Chriswell said.

As for science and research, the RA-bacterial connection raises questions that point the way toward additional study. For example, Chriswell said the research did not find *Subdoligranulum didolesgii* in the mucosa of healthy individuals, but the sample size was small and insufficient to prove its existence is unique to people at risk for RA.

“The preliminary evidence suggests that it is not in healthy people, but we need larger population studies,” she said.

The nature of the new strain is also a candidate for further probing. Chriswell noted that researchers will need to “tease out” whether *Subdoligranulum didolesgii* is a “commensal” organism (one that naturally exists in people but “starts behaving badly,” triggering an autoimmune response) or a pathogen that people catch, which in turn triggers a response.

For patients who have or are at risk for RA, treatment for now will remain focused on helping patients stick to effective medication regimens and manage risk factors, such as smoking, stress, and body mass index, that are within their control.

“The study helps us get closer to diagnosing the disease, detecting it earlier, and hopefully discovering how to modify it,” Kuhn said.

Study co-author Kevin Deane, MD, PhD, associate professor in the Division of Rheumatology, called the new findings “a major breakthrough in our understanding of how autoimmune disease develops.” He added that the “experimental approach to use antibodies derived from humans to identify a bacterial organism that drives arthritis in an animal model should serve as a model for future studies that can explore the role of additional organisms in triggering autoimmune diseases.”

*This article was first published by UCHHealth in December 2022.*

**“The study helps us get closer to diagnosing the disease, detecting it earlier, and hopefully discovering how to modify it”**

# TREATING OPIOID ADDICTION

## CU students design curriculum to address substance use disorders

By Greg Glasgow

Three University of Colorado School of Medicine students are developing a curriculum to provide better care for treating opioid addictions and overdoses.

Doctoral students Tyler Igoe and Alyssa Cole, along with Morgan Avery, a student in the Physician Assistant Program, are receiving support from the Coalition on Physician Education in Substance Use Disorders, also known as COPE, to help put their plans in motion. COPE aims to integrate addiction medicine content into core clerkship rotations and other clinical experiences.



Alyssa Cole

Igoe, Cole, and Avery were one of four teams from schools of medicine nationwide selected in COPE's 2022 Curriculum Innovation Challenge: Innovative Learning and Teaching About Substance Use/Opioid Use Disorders.

The CU students will develop their curriculum under the supervision of D. Tyler Coyle, MD, MS, assistant professor of psychiatry. They also will meet with COPE staffers and the

other student teams. The launch date for the new curriculum is fall 2023.

The CU team will develop and implement a new curriculum that teaches medical students how to administer naloxone, an opioid overdose reversal drug, and how to use microdose induction of medication buprenorphine to ease withdrawal symptoms in people with opioid use disorder.

"Part of the challenge with addiction medicine is that it's a very evolving field," Cole says. "People are starting to pay more attention to it and try new things and look for new treatments."

### UNDERSTANDING NALOXONE

Designed for fourth-year medical students during the Transition to Residency phase of their training, the new curriculum will train students on the use of naloxone to care for a person experience an overdose.

Students will be trained to identify symptoms of an opioid overdose, describe the mechanism of action of naloxone, administer naloxone to patients, and understand the public health importance of prescribing and dispensing naloxone to people at risk of overdose.

"Naloxone is an example of the ways in which harm reduction and public health are blending with medicine," Avery says. "It's something that a lot of clinics give out for free. There are 'standing orders,' or third-party orders,



Morgan Avery

where you can prescribe it to someone knowing that they're not the person that will use the medication, because it's so readily available. And it's a great tool. We want to arm people with that knowledge."

### MICRODOSING BUPRENORPHINE

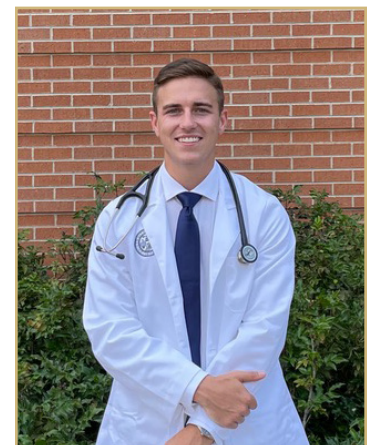
While naloxone is used in acute overdose situations, buprenorphine is a long-term treatment for opioid addiction that reduces drug craving and withdrawal symptoms. The second part of the CU

students' COPE curriculum will train students on novel strategies to use buprenorphine in patients seeking treatment for opioid use disorder.

"Buprenorphine is similar to methadone, but it tends to be preferred by a lot of people with opioid use disorders," Cole says. "There are a lot of barriers with methadone: you have to go to a clinic every day; it makes some patients drowsy. A lot of people prefer buprenorphine, but it can precipitate withdrawal symptoms."

By administering microdoses of buprenorphine that slowly replace opioids in the system, providers can help patients avoid withdrawal symptoms, making them more likely to engage in treatment. The COPE curriculum will teach students how buprenorphine works, why microdosing is effective, and how to identify eligible patients for buprenorphine microdosing.

"It will set students up to be more successful and more comfortable in treating patients with opioid use disorder, both in an acute setting with overdose, and managing the transition if someone wants to overcome their addiction," Igoe says. "It will also put our students at the forefront because this is such a new thing. A lot of providers aren't familiar with the microdosing technique for buprenorphine yet. We will be able to contribute to a team right away by teaching everyone something new."



Tyler Igoe



# OUT OF SIGHT, OUT OF MIND

## Virtual reality reduces patient anxiety during hand surgery

By Rachel Sauer

Anesthesiologist Adeel Faruki, MD, MBA, works with patients to manage pain and anxiety, and for patients having hand surgery, managing anxiety is a significant concern.

That's because those patients typically receive a nerve block rather than sedation or general anesthesia.

"If a nerve block is done, what we're generally managing intraoperatively is anxiety and hemodynamic changes," explains Faruki, assistant professor of anesthesiology. "Patients may feel fear, they may feel claustrophobia, so we started asking how we can reduce the amount of sedative medications given intraoperatively for patients who receive nerve block for upper extremity surgery.

"We thought, 'Why don't we offer them a distraction?'"

The question led Faruki to conduct research comparing virtual reality (VR) immersion to monitored anesthesia care for hand surgery.

"As VR has continually grown into the medical sphere, we realized that immersive experiences through VR have the potential to benefit patients as much as the intraoperative treatments we currently use," Faruki says. "We decided to look at patient satisfaction in a pilot study comparing the two groups' experiences."

### REDUCING SIDE EFFECTS OF SEDATIVES

Faruki began this research when he was a resident at Beth Israel Deaconess Medical Center and Harvard Medical School, working with a faculty mentor who had an interest in reducing the associated effects of sedation with patients who may not need it to manage pain.

"We're realizing that a lot of the medications we're giving patients, the intraoperative sedation, are safe but can carry side-effects – dropping blood pressure, slowed breathing," Faruki says. "If VR can have a similar effect of managing patient anxiety without with the side effects associated with sedation, that's something we should be studying."

Faruki and his research partners randomized 40 participants who were having elective hand surgery into two groups: One received intraoperative

monitored anesthesia care (MAC) and one used VR in addition to receiving MAC.

They expected intraoperative VR use would reduce sedative dosing during elective hand surgery without detracting from patient satisfaction as compared to MAC. Participants in the VR group viewed immersive programming of their choice via a head-mounted display during surgery.

As a primary outcome, Faruki and his colleagues measured intraoperative dose

of propofol, a common anesthetic, per hour. Secondary outcomes included patient-reported pain and anxiety, overall satisfaction, functional outcome, and length of stay in the post-anesthesia care unit (PACU) length of stay.

Patients in the VR group received significantly less propofol per hour than the MAC control group. Participants in the VR group had a shorter stay in the PACU, though there were no significant differences between groups in overall satisfaction, PACU pain scores, or postoperative functional outcome.

### BENEFITS OF VIRTUAL REALITY

"A number of participants in the VR group stated that they were very aware but comfortable," Faruki says. "The beauty of this is, if you have an effective way to manage pain for a specific surgery, you can give patients VR headsets, get them in an immersive environment, and as long as the nerve block doesn't wear off, they can very comfortably endure surgery."

Another benefit of VR applications during surgery is two-way communication with patients, Faruki says.



Adeel Faruki, MD, MBA



Research participant using VR technology during elective hand surgery (left) and an example of the VR environment they could choose. Image courtesy Adeel Faruki, MD, MBA, and co-researchers.

"The VR group also had a much higher amount of redosing of local anesthetic around the surgery site because they're awake and can communicate whether they're feeling any pain," Faruki says.

There are other scenarios where the use of VR may be an appropriate option, Faruki says, such as with older patients or those who have more health conditions where giving them sedation is much higher risk.

"I really do foresee a lot of uses for VR technology in the future," Faruki says, "not to take away from the use of anesthesia, but to be a complementary treatment that benefits patients."

# RIPPLE EFFECTS

## Misdelivered zebrafish embryos lead to scientific partnership

By Mark Couch

Sometimes a scientific collaboration happens by coincidence, a happy accident that pairs experts who wouldn't have otherwise met.

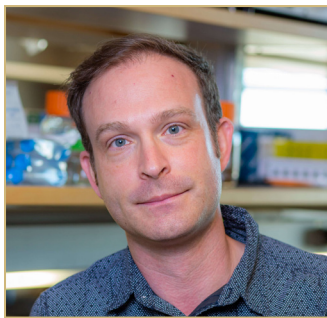
And so it goes with a package of zebrafish embryos intended for Christian Mosimann's group that ended up in Catherine Musselman's lab during the pandemic lockdown of buildings on the Anschutz Medical Campus.

That misdelivered package has now led to a scientific partnership awarded with a \$1.3 million National Science Foundation grant to support the scientists' efforts over the next four years to better understand mechanisms of genome regulation.

"I moved to CU with my lab in the summer of 2019, and I hadn't had a chance to get to know a lot of people before the lockdown happened," says Mosimann, PhD, associate professor and Johnson Endowed Chair in Heart Developmental Research in the Department of Pediatrics Section of Developmental Biology. His lab uses zebrafish, an increasingly popular research organism to study the mechanisms of organ development and causes of congenital disease. "Then, one day I get this email that says, 'We have your fish!'"

Despite the potentially ominous tone, the Musselman crew wasn't holding the Mosimann's zebrafish embryos for ransom. They just wanted to help them find their rightful home.

"One of my lab members emailed me because we were not allowed to be in the lab at the same time at this point," recalls Musselman, PhD, an associate professor in the Department of Biochemistry and Molecular Genetics. "So, it's one person at a time there, and this person says, 'We have these fish embryos,' and I was like, 'Oh, those are not ours!'"



Christian Mosimann, PhD

After receiving that email, Musselman set up a Zoom call to chat with Mosimann and to work out the details of getting his package to him.

### RELAY RACE

While the Musselman-Mosimann alliance begins like a game of hide-and-seek, it has turned into a rewarding relay race to better understand genome organization and gene regulation.



Catherine Musselman, PhD

"I didn't know many people here, so this was a serendipitous networking opportunity," says Mosimann, who surfed over to the Musselman lab's website. "What I discovered was that Catherine's lab works on molecular mechanisms that are associated with what I grew up with scientifically, which is how genes get regulated in the genome."

Musselman's lab focuses on how the proteins that package the DNA in cells function to control access to the information encoded in our

genomes. The group is especially interested in proteins that have been neglected due to their so-called "intrinsically disorganized regions" – protein parts that the Musselman lab can now resolve.

Their labs work at different ends of the gene regulation spectrum, so a combination of their efforts is regarded as potentially fruitful for new scientific discoveries. Their NSF grant combines state-of-the-art structural analysis and biophysics in the Musselman lab with first-ever direct testing of developmental and physiological functions of these disordered regions using zebrafish in the Mosimann lab.

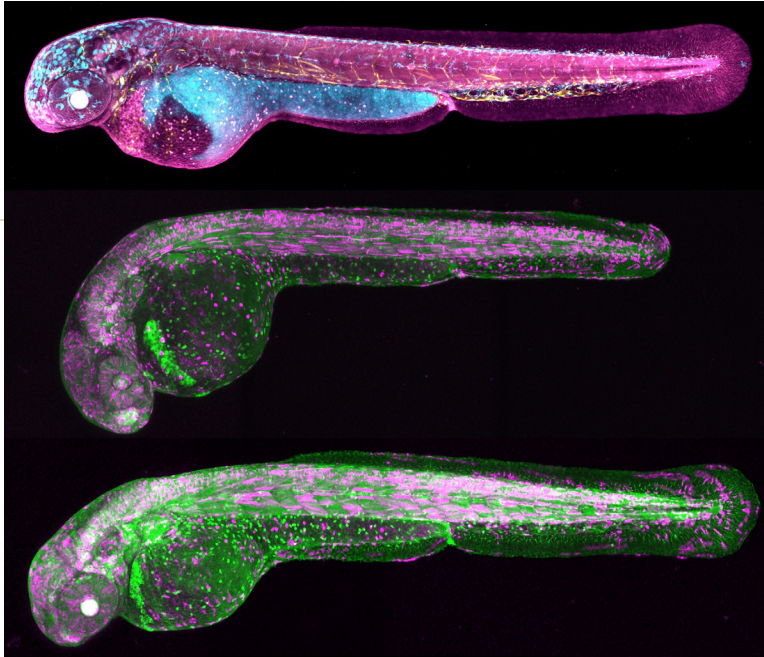
"If we both wrote a sentence about the goal of what we want to understand, it would actually be quite similar," says Musselman. "But we look at very different length scales. I'm looking at hundreds of atoms at a time and Christian is looking at a whole organism."

### RIPPLE EFFECTS

Combining their areas of expertise, Mosimann and Musselman plan to study large proteins that control the packaging of DNA and harbor what are called "intrinsically disordered regions." These regions are disorganized protein elements and they have been challenging to study compared to the usually well-organized and folded proteins that cells generate.

Musselman's lab discovered that the role of some proteins was more complicated than previously understood. Those proteins not only switched genes on and off to affect how DNA is packaged, but some of those proteins were binding to the DNA itself. They now think that the





Photos by Robert L. Lalonde, PhD, from the Mosimann Lab.

intrinsically disordered regions play a critical role in regulating this DNA binding.

Observing that activity itself is technically challenging. It becomes even more complicated to determine how those processes and interactions are involved with each particular cell type in a developing heart, retina, hair follicle, or any other part of the body.

“That’s where this overlap with my lab comes in,” says Mosimann. “The proteins that Catherine is studying float around in all our cells, but they do interact with other factors in the heart or in blood in highly specialized ways. These interactions also go wrong in several congenital diseases. Yet, we don’t yet understand how things can happen just in the heart, or just in the blood, and how they can only go wrong in heart disease.”

Working together, the Musselman and Mosimann labs will design experiments that are intended to observe the ripple effects of breaking those protein interactions from the beginning of development. If those interactions do not occur as usual, what happens in the developing heart or blood of the zebrafish?

“Once we know how they work, we know how to break them,” Musselman says.

“And my lab is very good at breaking things in cells,” jokes Mosimann, whose lab specializes in the study of how those broken protein interactions manifest later in development. He and his team are working to understand how cells acquire their fates by applying the latest genetic and microscope techniques.

Their work together has the potential to reveal new insights into how our genome is organized and its information retrieved during development and disease. Notably, the factors involved in their study have been found mutated in congenital anomalies, such as of the heart and in an increasing number of pediatric cancers.

For all the effort that academic medical centers put into fostering collaborations among researchers – inviting guest speakers, hosting grand rounds lectures, creating study groups and mentorship programs, and many more activities – a lost package has led to a coincidental collaboration and a productive new partnership.

“If only there were more misdelivered packages,” quips Mosimann, “that might trigger even more research collaborations!”

In addition to the work in their laboratories, the NSF grant provides support for Mosimann and Musselman to expand participation in science.

Both laboratories will participate in a program that recruits students from Metropolitan State University of Denver to participate in research activities on the Anschutz Medical Campus. Working with a graduate student or postdoctoral associate, participating students from backgrounds traditionally underrepresented in science will commit to 16 months of research spanning two semesters and two summers.

The grant also promotes communication to the public of science through art. Mosimann and Musselman will participate in the Art of Science Fellowship, pioneered by John Rinn, PhD, professor of biochemistry at CU Boulder. The fellowship is a 12-month award given to undergraduate students who have an interest in bridging art and science. Fellows meet every few weeks with a team of science and art faculty to assist in their training. Each student presents a final art project at the end of the fellowship.

For details, see article on page 20.



Art by Mikyla Futz

# ENCOURAGING ARTISTS TO STUDY SCIENCE

Grant for genomic research also supports creative expression

By Greg Glasgow

College students from backgrounds traditionally underrepresented in medicine now have the opportunity to conduct research on the University of Colorado Anschutz Medical Campus as part of a \$1.3 million National Science Foundation (NSF) grant that was awarded to two researchers at the CU School of Medicine in fall 2022.

Faculty members Christian Mosimann, PhD, and Catherine Musselman, PhD, will use a majority of the NSF funds for their research on the mechanisms of genome regulation. But as part of the NSF's mission to expand access to STEM careers, a portion of the grant funds must be used for community outreach and impact efforts.

"The NSF is tasked at the federal level with fundamental understandings in science, like our study of gene control in development and how that works on the molecular level, but they're also tasked with recruiting people into science and educating the public on science," Musselman says.

"It's unique to the NSF that as a component of your grant, they say, 'How is this going to broaden scientific outreach? How are you going to pull people from underrepresented backgrounds in and train them?' They have a huge focus on that."

## BUILDING NEW PARTNERSHIPS

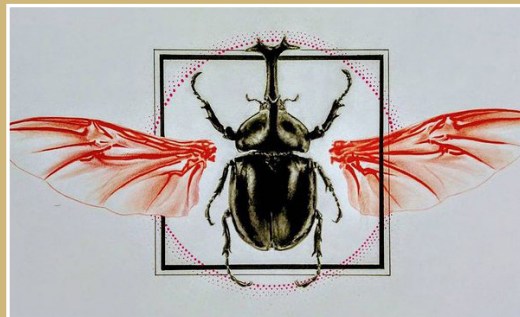
To achieve the goal, both researchers' laboratories are participating in a recently founded program that recruits students from Metropolitan State University (MSU) of Denver to participate in research activities on the CU Anschutz Medical Campus. Working together with a graduate student or postdoctoral associate, participating students commit to 16 months of research spanning two semesters and two summers.

"We're looking especially for students who may not traditionally be funneled in," Musselman says. "They may be from underrepresented groups, or maybe they didn't have a parent who has a PhD and can tell them exactly how to make all of this happen. One of the reasons we reached out to Metro is that many of their students are nontraditional students. This gives them a path into scientific research. It's an opportunity that can potentially open a whole new career for them."

Musselman currently is working with an MSU Denver student in her lab; the student is on track to have his name on a published research paper sometime in the next year.

Mosimann, who was the first person in his family to go to college, says there is huge value for undergraduates to be in a scientific environment, participating in research, and seeing people who have careers in medicine.

"My mom doesn't understand why I'm still at university," he says with a laugh. "When will I ever be done and get a real job? We can make jokes about this, but in other backgrounds, or depending on where you're coming from with your family history, these are huge barriers. Getting the opportunity to see that this is something you can pursue as an actual career, and you can contribute. I find it amazing that our taxpayer money is funding this. I'm hoping there's more of this happening all over the country."



Art by Mia Miller

## ARTISTIC EXPRESSION

As another part of the outreach activities connected with their NSF grant, Musselman and Mosimann are also involved with The Art of Science, a fellowship pioneered by John Rinn, PhD, professor of biochemistry at CU Boulder.

The fellowship is a 12-month award given to undergraduate students who have an interest in bridging art and science, as well as a demonstrated financial need.

The program's first year, in 2021, aided two artists who were undergraduate students at CU Denver and MSU Denver respectively — Mikyla Futz and Mia Miller.

"There are a lot of people that have a hobby as an artist, but they don't get paid," Rinn says. "There's a big career opportunity out there in science illustration, where you can draw a scientific concept so people can understand the complex stuff in a pictorial way."

The fellows meet every few weeks with a team of science and art faculty. In addition to Rinn and Musselman, this team includes MSU Denver faculty members Megan Filbin, PhD, Megan Lazorski, PhD, and Anil Rao, PhD. This team assists in the students' training, and each student presents a final art project at the end of the fellowship.

"The goal was to help open up avenues for students to pursue that interface in their professional career," Musselman says. "Mikyla started medical school at Thomas Jefferson University's Sidney Kimmel Medical College this year, and she used her Art of Science work as her research project in her medical school applications to say, 'How can I continue to use my art as a physician to help communicate with patients in a more efficient way?' The admissions committee absolutely loved it. It was great to see how touched they were by her ability to reach out to patients."



# DEATH BY ABLEISM

CU faculty calls for better care for people with disabilities

By David Kelly

Patients with disabilities often encounter medical providers who make inaccurate assumptions about their quality of life that can lead to paternalism and substandard care, according to an essay published in January in *The New England Journal of Medicine*.

“The term ‘ableism’ is not as well-known as the term ‘racism,’ but it is a concept that is under-recognized in medicine,” says essay author Megan Morris, PhD, MPH, an associate professor of medicine who focuses on health disparities among those with disabilities. “The health care system is not set up to deal with this population who is at serious risk for experiencing disparities.”

“Ableism” is a wide-ranging term that includes discrimination against those with physical, mental, and intellectual disabilities.

Morris’s essay, “Death by Ableism,” chronicles the last days of her Uncle David, who had developmental disabilities and who routinely endured seizures.

“It took me two years to finally write about what happened,” she says.

## ‘LOVE, UNCLE DAVID’

David lived with his aging parents. He was outgoing and friendly, often walking the neighborhood, chatting up friends, and telling jokes. He loved gin rummy, television sitcoms, and especially his niece.

“For my birthday each year he would give me a card signed in his shaky cursive, ‘Love, Uncle David.’”

In her essay, Morris details the events of Dec. 23, 2016, when she and her parents rushed her uncle, then 54, to the emergency room. He had aspiration pneumonia and problems swallowing. His pneumonia improved, but swallowing remained difficult.

With his regular care team gone for the holidays, Morris proposed giving her uncle a temporary nasogastric (NG) tube until they returned. It would deliver nutrition while decreasing the risk of getting pneumonia due to inhaling food while eating.

The medical team resisted, saying it would be uncomfortable for him. Instead, they suggested he be admitted to hospice with no nutritional support. The family argued against it and left the hospital thinking they had reached an agreement with the doctors.

But the care team talked to David’s parents, who consented to his discharge without an NG tube and on a full oral diet.

“To this day we remain uncertain if my grandparents knew what they were consenting to,” Morris writes.

## STRUGGLING WITH GUILT

Within a day, David developed pneumonia. This time Morris and her family reluctantly consented to hospice care. Morris used suction and a sponge to clear the endless drainage and saliva that “poured from his mouth like quickly moving lava.”

David died on New Year’s Eve.

Morris struggled with guilt, feelings that she didn’t advocate strongly enough for her uncle. She also thought about ‘ableist’ slights David endured.

Medical professionals often assumed his disability meant he was incontinent, couldn’t speak well, or walk independently. Morris once posted signs in his room listing his favorite discussion topics – country music and comedies – to get him better care.

“I have sat and listened to people’s stories for the past decade plus. People with disabilities will go to the doctor, and the health team won’t look them in the eye,” she says. “They make assumptions about their conditions without discussing it with them.”

Morris cites a study in which some doctors admitted to trying to rid their caseloads of people with disabilities.

“Some assume a life with a disability is not a life worth living,” she says. “But studies show the exact opposite. People with disabilities report a similar quality of life as those without disabilities.”

Morris hopes her essay will spur medical teams to rethink their views.

“I hope clinicians will read it and maybe think twice about the assumptions they make when providing care to patients,” she says.

Morris is still working through her uncle’s death.

While boxing up his things, she found a pack of pastel index cards. Each card had an affirmation he had written about his importance to his family and community. Each card, an attempt to beat back feelings of worthlessness.

“As I read the words on the cards,” she wrote, “I prayed that at the end David knew he was valued.”



Megan Morris, PhD, MPH

## CU RESEARCHER EMBRACES SCIENCE AND NATIVE CULTURE

*Katrina Claw, PhD, draws on Indigenous roots as a researcher and mentor*

*By Toni Lapp*

From the window of her office on the CU Anschutz Medical Campus, Katrina Claw, PhD, sees lands that Native American tribes called their home.

“I think it’s important to acknowledge the original occupants of the Denver-Aurora area,” says Claw, an assistant professor of biomedical informatics. “This area was – and still is – the home for the Apache, Ute, Comanche, Arapaho, and many other tribes. CU’s land acknowledgement statement recognizes and respects Indigenous peoples as traditional stewards of the land and the enduring relationship that exists between Indigenous peoples and their traditional territories.”

Claw is Diné, which means “the People” in her native tongue, and an enrolled member of the Navajo Nation, bringing an important perspective to her work as a genetic researcher.

Her career choice is a bit of a paradox because the Navajo Nation placed a moratorium on tribal participation in genetic research studies in 2002, partly over concerns about research ethics and exploitation. The ban remains in effect.

“That’s been in place my whole career,” she says. “People ask me why I got into genomics. I saw the potential for genomics to alleviate health disparities, and I was drawn to the stories that genomic variation could tell.

“There is a disconnect between genetic and genomic research and Indigenous communities. What we want is for research to be on our own terms. I conduct my research knowing there will be checks and balances and accept that it will take time to work through them.”

In 2020, Claw received a Genomic Innovator Award from the National Institutes of Health (NIH) that provides more than \$1.5 million to support her work. In mid-2022, she received a \$250,000 supplement to develop a mentorship program supporting two Indigenous scholars from undergraduate to early-career faculty stages.

American Indians and Alaska Natives are underrepresented in health research – as study participants, researchers, and health care providers. As a result, some questions go unasked, and some problems are not even studied because they are not recognized.

For Indigenous people, that means some issues may not be studied as closely as they should be. According to the federal Indian Health Service, Indigenous people have higher

rates of diabetes, respiratory diseases, and certain cancers.

In her NIH project, Claw is studying the enzyme cytochrome P450 2A6 and its role in nicotine metabolism and smoking cessation, focusing on how a person’s genes affect the way their body responds to drugs.

Claw leads an all-female research lab, many of whom are of Indigenous heritage. She recruits trainees who benefit from the mentoring that she struggled to find as an aspiring young scientist growing up on the Navajo Nation. She also looks for trainees who have research interests that align with her community-engaged approach.

### EMBRACING NATIVE CULTURE

When Claw began her research career, she noticed that labs were often “white, sterile places,” and that researchers themselves lacked cultural and firsthand knowledge of the people they were studying.

She seeks to change that perspective. She welcomes new people to her lab by introducing herself in the Navajo language. It takes longer than the standard, “nice to meet you,” and she explains that the words, when translated, indicate who her clan is and where they are from. She also keeps sage in her office for cleansing and healing purposes and strives to incorporate Native art in her lab and office space.

At weekly lab meetings, trainees take turns sharing what is going on in their lives – inside and outside of work. She encourages team dinners and other outings. On Indigenous Peoples Day, her team hiked the Chautauqua Trail in Boulder.

“Katrina emphasizes the collaborative nature of research,” says Kaja Aagaard, research assistant and lab manager. “She’s great at shifting the social hierarchy of academics to give support and recognition to her students and mentees. The lab culture is welcoming, and it feels like we’re all encouraged to be ‘whole people,’ even at work.”

As first-generation or nontraditional students, Claw’s trainees have encountered challenges in their educational journey. Some expressed feeling isolated because they had few role models.

Tada Vargas Black Bear, a Lakota from South Dakota, is a first-generation, nontraditional student who took time off to start a family. She says having the support of a principal investigator who understands these challenges has been important to her.

“It can be very lonely being the only Indigenous student in your class, cohort, or institution,” she says. “I went to a tribal college for my undergraduate degree, so there’s definitely a culture shock coming to a mainstream institution like CU Anschutz.”

Vargas Black Bear’s family has a history of autoimmune disorder, which is a research interest of hers.

“I’ve always wanted to study why autoimmune prevalence is so high in Indigenous populations,” she says. “In Katrina’s lab, we’re studying how



*Katrina Claw, PhD*





*Katrina Claw, PhD, Carissa Sherman, Leah Nez, Kaja Aagaard, Tada Vargas Black Bear, and Amber Nashoba, PhD.*

different populations metabolize drugs differently, which has been really helpful.”

Leah Nez, who grew up on the Navajo Nation in Utah, was an intern at the NIH Tribal Health Research Office when she first met Claw, and is now in CU’s PIKE-PREP (Preparation in Interdisciplinary Knowledge to Excel - Postbaccalaureate Research Education Program), which offers mentoring and research training for underrepresented post-baccalaureate students as they enroll in PhD or MD/PhD programs.

## SCIENCE AND CULTURE

Her research focus is on the ethical use of ancient DNA. While working in Claw’s lab, she is applying to graduate programs in bioethics. As an undergraduate, she double-majored in biology and philosophy, which she acknowledges might seem like two disparate fields.

“But they shouldn’t be,” Nez says. “The idea is starting to gain traction, the moral and ethical obligations that researchers have to the people that they research.”

The NIH supplemental grant created two mentoring opportunities in Claw’s lab, currently filled by Carissa Sherman and Amber Nashoba, PhD.

While Sherman grew up mainly in Arizona and Washington state, her family is from the Navajo Nation. As an undergraduate at Colorado College, she majored in molecular biology and minored in anthropology. She is in the Human Medical Genetics and Genomics PhD program at CU Anschutz.

“I’ve always had an interest in science and culture and how the two influence each other. Both have been influential in shaping my academic interests,” Sherman says. “I knew I wanted to study genetics, partly because of a history of retinitis pigmentosa in my family. Growing up, I wasn’t really exposed to Native scientists. I did have several female advisors, and being a woman in STEM, this is important for me to have this support.

“Katrina has been a great influence in making me a better scientist,” she says. “She helps me out of my comfort zone by building my confidence and encouraging me to present my research at several different avenues.”

She, in turn, supports Claw’s research, leading surveys and analyzing focus groups’ data from Navajo researchers to gauge their perspectives on genetic studies amid the ongoing moratorium.

Nashoba, who is Choctaw, grew up on military bases as the child of a noncommissioned Army officer until her parents retired, and she finished high school in Alaska. After completing graduate school and

previous postdoctoral positions, she returned to Alaska and started working remotely in the Claw lab in early 2022, transitioning to postdoctoral fellow in November.

“In the Claw lab, there’s an emphasis on working with communities to address health issues that directly impact Indigenous communities,” Nashoba explains. “It’s Indigenous people doing science essentially for the benefit of Indigenous communities.”

She appreciates that the mentorship program will help Indigenous researchers build stronger networks. Her research includes studies on genetic variation and the capacity to adapt to changing environments. She is currently developing a data pipeline for the evolutionary analysis of drug-metabolizing enzymes, looking for patterns of genetic variation and adaptive selection that could have health implications for contemporary populations.

## SOURCES OF INSPIRATION

Claw says that when she thinks about mentoring she thinks of her father. “He never finished grade school, but he taught me everything I know about hard work and trusting our ancestral knowledge,” she says.

She was just a ninth grader at a tribal high school when she became interested in research. She fondly remembers a teacher who encouraged her to identify a real-world problem, design a solution, and collaborate with others.

“Mrs. Terry helped me enter and prepare for the American Indian Science and Engineering Society (AISES) science fair, sharing her home and technological resources as well as intellectual guidance,” she recalls. “As a shy teenager, this experience allowed me to face my fear of public speaking and gain confidence.”

Inspired by her mentors, Claw has stepped into the role herself. Becoming a CU faculty member in 2019, she has found CU a welcoming and supportive environment and the stated mission to provide educational opportunities for Native students, faculty, and staff, to be a driver in her role of researcher and teacher.

“Great mentors challenge mentees to think critically and to reach beyond their perceived capabilities, while providing support when needed,” Claw says. “Great mentors serve various roles: new idea sounding board, supporter, advocate, teacher, and friend. While I don’t think I’m a great mentor yet, it is my aspiration to become one.

“My mentorship philosophy is to be the mentor who helps others realize and express their innate talent and ability. I hope that my philosophy and approach will encourage the next generation of scientists to be ethical, innovative, and inspiring.”

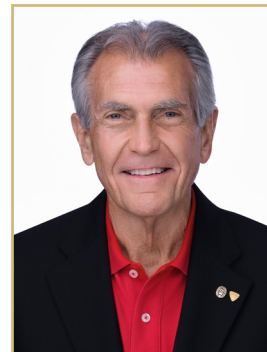
# ALUMNI CORNER

## 2022 SILVER & GOLD ALUMNI AWARDS

The University of Colorado School of Medicine and the CU Medical Alumni Association honored six outstanding physicians recognized for health care delivery and service to their communities and CU at the Silver & Gold Alumni Awards in December 2022. Over 100 alumni, students, faculty, and staff attended the celebration at the Grand Hyatt in Downtown Denver.

### MICHAEL CARIUS, MD '73, SILVER & GOLD AWARD

Michael Carius, MD '73, is a clinical associate professor in the Department of Emergency Medicine and Traumatology at the University of Connecticut School of Medicine. He is also the former chairman of the Department of Emergency Medicine at St. Vincent's Medical Center and Norwalk Hospital in Connecticut, where he has worked for 27 years. Carius graduated from Trinity College in Hartford, Conn., and earned his MD from the University of Colorado School of Medicine. He interned at the San Diego Naval Regional Medical Center, and then he worked internationally in the U.S. Navy as a general medical officer, on the USS Piedmont and at the Naval Hospital in Naples, Italy. During this time, he learned his love for emergency medicine. He transferred to the U.S. Air Force to become a flight surgeon, working in the United Kingdom at Royal Air Force Lakenheath and Royal Air Force Mildenhall, before completing emergency medicine residency at University of Southern California. Carius has been deeply involved with organized medicine, serving as president of the American College of Emergency Physicians and the Connecticut College of Emergency Physicians, as well as past president and senior director of the American Board of Emergency Medicine. He is also the chair of the board of directors of the American Board of Medical Specialties. He has been a delegate to the American Medical Association's House of Delegates for 20 years, serving as the chair of the Connecticut Delegation.



### HAJAR ALBINALI, MD '73, DISTINGUISHED ACHIEVEMENT AWARD

Hajar Ahmed Hajar Albinali, MD '73, is a cardiologist, poet, and public health official. As a child living in a village without modern medicine, he was inspired to pursue medicine after a physician came to treat patients in his village. He became interested in cardiology because his mother complained of palpitations. After completing high school, he earned a government scholarship to study in the United States. He earned his MD from the University of Colorado School of Medicine in 1973 after earning his bachelor's from the University of Colorado Boulder in 1969. After his internship in Kansas City, followed by medical residency and cardiology fellowship in Portland, he returned home to Qatar in 1978, where he established cardiology service with a coronary care unit, a cardiac catheterization laboratory and cardiac surgery, and a state-of-the-art cardiac hospital. Appointed Minister of Public Health in 1999, Albinali led anti-smoking campaigns that were recognized by the World Health Organization in 1992 and 2003. In 1993, the WHO recognized him for his medical service in Qatar. In 2009, Albinali received the Qatar State award for Medicine. In 2015, he was honored with the distinction award from the Gulf Cooperation Council for Excellence in the field of health. As a poet, he has wedded his love of the written word with his medical expertise, publishing several books of poetry and books analyzing an Arab poet's medical issues through studies of their poetry.



### JAN KIEF, MD '82, RICHARD KRUGMAN DISTINGUISHED SERVICE AWARD

Jan Kief, MD '82, is a third-generation Coloradan. She was inspired to pursue a career in medicine while working as an EMT, and she earned a chemistry degree with distinction from University of Colorado Denver. Kief graduated from the University of Colorado School of Medicine in 1982 and completed residencies in internal and emergency medicine in Colorado. Her clinical career included decades of community practice, serving as a captain in the Army Reserves at Fitzsimons, and years as an academic faculty member teaching "Principles of Clinical Medicine" to first- and second-year medical students. For four decades, she has been a leader in organized medicine and advocacy, both in Colorado and at the national level. Kief is a past president and past speaker of the Colorado Medical Society, as well as a current elected delegate to the American Medical Association (AMA). She has served on many boards and medical advocacy organizations. Her has been appointed and currently serves on the AMA Council on Long Range Planning and Development. She believes it is through advocacy and involvement in organized medicine and health care policy that we can substantially improve the lives of physicians and the patients that they serve. Kief has been a leader on the CU Medical Alumni Association board for nine years and, during her tenure, established a standing committee structure to foster increased alumni engagement and participation.





## EUGENE PFLUM, MD '69, HUMANITARIAN AWARD

Eugene W. Pflum, MD '69, is a retired orthopedist from Golden. His interest in orthopedics originated with his experiences as a wrestler. Seeing teammates healed by doctors after serious injuries sparked his own interest and desire to help other athletes. He earned his medical degree from University of Colorado School of Medicine and has been in practice for more than 20 years. After graduation, Pflum worked in the Indian Health Service (IHS) for eight years, first in Alaska and then in New Mexico and Arizona. An active outdoorsman, he fell in love with the natural world in those states and the indigenous communities he was serving. After he completed his service with the IHS, he moved to Delta, Colorado where he was the first orthopedic specialist in the region. He expanded the local hospital, tripling the number of available beds and bringing in fifteen more specialists to the clinic. He also started a soccer program from scratch in Delta County, which grew to more than four hundred players. On mission trips, he worked in Peru, Costa Rica, Kenya, Uganda, Cambodia, and Tanzania. He treated lion and hyena bites—as well as the usual orthopedic injuries—and taught new orthopedic surgery techniques to residents and general surgeons. Pflum's humanitarian work has continued locally, as a volunteer for the Jail Ministry in Colorado.



## ANIREDDY REDDY MD '16, RECENT GRADUATE AWARD

Anireddy Reddy, MD '16, is a pediatric critical care fellow at the Children's Hospital of Philadelphia. She graduated summa cum laude from the University of Colorado Boulder with majors in neuroscience and molecular biology, and a minor in civic leadership. She served in AmeriCorps in Denver Public Schools prior to attending University of Colorado School of Medicine, where she served as class president for four years. She additionally was selected for the CU-UNITE urban underserved track and served as director for C-STAIR (Community-Students Together Against Healthcare Racism). She later completed her pediatrics residency at Children's National in Washington, D.C., during which she participated in the Community Health Track and George Washington Health Policy Fellowship. Her research interests have ranged from community-based participatory research around racial discrimination in health care to investigating racial and socioeconomic disparities in sepsis mortality. Reddy is currently completing her Master of Health Policy Research at the University of Pennsylvania and is an associate fellow at the Leonard Davis Institute of Health Economics. Her career aspiration is to leverage her intensive care experiences to drive research and inform policy to reduce pediatric morbidity and mortality.



## LESLEY BROOKS, MD '08, RECENT GRADUATE HUMANITARIAN AWARD

Lesley Brooks, MD '08, is chief medical officer at Summit Stone Health Partners and assistant medical director for the North Colorado Health Alliance. She is a board-certified family and addiction medicine physician with fellowship training in primary care psychiatry. Growing up, her parents, who each had legal careers dedicated to serving those living in poverty, taught her about the history of civil rights and modeled lives of service. Her sisters, twins born with intellectual and developmental delays, taught her the value of both vocation and avocation. She attended Kenyon College, earning her bachelor's degree in political science. She worked for the American Civil Liberties Union and volunteered for the Peace Corps in Malawi, before joining the Denver Department of Public Health to lead research on rapid HIV testing and engagement in an STD clinic setting. Inspired by this work, Brooks attended the University of Colorado School of Medicine, earning her MD. She completed an epidemiology fellowship at the Centers for Disease Control and residency training in family medicine at North Colorado Family Medicine in Greeley in 2011. She joined the Northern Colorado Medical Society Board in 2013. Brooks has served as co-chair of the Provider Education Work Group for the Colorado Consortium for Prescription Drug Abuse Prevention, a member of the Colorado Medical Board, and vice chair for Colorado's Behavioral Health Transformational Task Force, which led the state's recommendations for \$450 million in American Rescue Program Response funding. She was honored in 2021 as a National Conference on Addiction Disorders Champion for her work in addressing inequity in addiction treatment services. She serves in the Equity Grounded Fellows Leadership Program sponsored by Colorado's Behavioral Health Administration.



The CU Medical Alumni Association is seeking 2023 alumni award nominations, including our two new recent graduate awards. If you know a CU School of Medicine alumnus/a who has demonstrated remarkable humanitarianism, career accomplishments, professionalism, or service to CU, please contact [Noel.2.Rodriguez@cuanschutz.edu](mailto:Noel.2.Rodriguez@cuanschutz.edu).

## MARYAM ASGARI APPOINTED CHAIR OF DERMATOLOGY

Maryam M. Asgari, MD, MPH, has been named the inaugural University of Colorado Medicine Endowed Chair of the Department of Dermatology for the CU School of Medicine, effective May 1, 2023.

Asgari joins CU from Harvard Medical School, where she is a professor of Dermatology and Population Medicine at Harvard Medical School. She has had nearly two decades of strategic leadership experience with diverse health care delivery systems, which has given her deep knowledge of clinical practice and a strong commitment to training and career development in clinical care.

At Harvard and Massachusetts General Hospital, she has developed a strong track record of program building, including serving director of the Patient-Oriented Research in the Epidemiology of Skin Diseases (PORES) clinical research unit, where she oversees a team of scientists and trainees. Her research discoveries have led to seminal contributions in the areas of skin cancer risk and etiology.

Asgari has been independently funded since 2002, including as principal investigator of over two dozen NIH, foundation, and industry-sponsored grants. She has published over 150 papers in high-impact journals and given dozens of invited talks nationally and internationally. She has served on the Board of Directors for the Society for Investigative Dermatology and have served as an Associate Editor for their journal and the British Journal of Dermatology. Her academic achievements in research, scholarly, and educational pursuits were recognized at the national level by her induction to the American Dermatologic Association and by election to the American Society for Clinical Investigation.

“I look forward to joining CU, where I see many opportunities to expand the Department of Dermatology’s clinical presence, research funding, and faculty.” Asgari says. “I am strongly committed to serving my community and collaborating with my colleagues. I am eager to reshape and expand a world-class academic dermatology department, expanding clinical care delivery and patient-oriented research, while helping to mentor the next generation of dermatology faculty while aligning with broader health system goals.”



Maryam M. Asgari, MD, MPH

## DAVID DIGREGORIO NAMED CHAIR OF PHYSIOLOGY AND BIOPHYSICS

David DiGregorio, PhD, head of the neuroscience department at Pasteur Institute in Paris, joined the CU School of Medicine as chair of the Department of Physiology and Biophysics on Jan. 1, 2023.

At the Pasteur Institute, DiGregorio led a multidisciplinary research team of neurophysiologists, computational neuroscientists, and physicists specializing in optics and statistical analyses. His research program identifies the biological rules governing how synaptic function and integration contribute to the temporal dynamics of neural circuit activity underlying precisely timed behaviors.

DiGregorio’s laboratory is searching for the biological rules governing how communication between neurons at synapses sculpt brain activity underlying temporally precise behaviors. His team also brings expertise in advanced optical and electrophysiological methods that are essential for monitoring, interpreting, and predicting neural circuit function.

The combination of theoretical neuroscience, careful laboratory experimentation using advanced technology, and precise measurement and analysis of DiGregorio’s research program will build on other investments, such as the creation of the new CU Department of Biomedical Informatics, that have been made by the CU School of Medicine in recent years to advance scientific discovery and understanding.

“At the Pasteur Institute, I have had the privilege of directing an initiative designed to leverage multiple disciplines, including immunology, microbiology, cell and infection biology, to explore holistic approaches to understanding the nervous system and its associated diseases,”

DiGregorio said. “I’m pleased that the University of Colorado School of Medicine emphasizes such collaboration too because working together creates new opportunities for discovery.”

DiGregorio succeeds Angie Ribera, PhD, who has been a member of the School of Medicine faculty since 1990 and has led the department since 2012. She also serves as associate dean for research education, providing leadership for the School of Medicine’s PhD-granting programs in the basic sciences.



David DiGregorio, PhD





U.S. Rep. Jason Crow and Dean John J. Reilly, Jr., MD.

## CAMPUS INITIATIVES RECEIVE COMMUNITY PROJECT FUNDING

U.S. Rep. Jason Crow visited University of Colorado Anschutz Medical Campus in February for an update on two initiatives that received Community Project Funding in the federal budget approved by Congress last year.

The projects that received funding provide training for students obtaining a rural public health certificate and support students from underrepresented backgrounds in pursuing education in injury and violence prevention. Both are collaborations between the CU School of Medicine and the Colorado School of Public Health.

“We see things that have amazing growth potential and that can punch way above their weight if they just get that initial seed money,” said Crow in a meeting with Dean John Reilly Jr., MD, program leaders and staff, and students participating in the programs.

“When the university came to me with these two in particular,” Crow said, “I knew right away that they had that potential not to just provide direct service to folks, but also serve as a model. That’s the other thing I look for in my grant requests, is what are things that can be pilots or models that can be scaled or replicated in other parts of the country.”

Mark Deutchman, MD, associate dean for rural health at the School of Medicine, and Danielle Brittain, PhD, associate dean for academic and student affairs at the Colorado School of Public Health, made a presentation about the rural public health certificate program.

That program, which received \$783,580 to develop a curriculum that allows medical students to obtain a public health certificate during their years in medical school, helps future rural physicians prepare for larger community health needs.

Ashley Brooks-Russell, PhD, MPH, associate professor at the Colorado School of Public Health and director of the Injury and Violence Prevention Center, and Emmy Betz, MD, MPH, professor of emergency medicine and deputy director of the center, discussed their program.

With \$460,584 in funding, the Injury and Violence Prevention Center is helping students from underrepresented backgrounds in pursuing an education in injury and violence prevention through outreach programs and financial support. The funding also supports hiring and training faculty.

## GRANT AIMS TO CONNECT DATA FOR HEALTH RESEARCH

CU School of Medicine faculty members have been awarded a \$1 million grant by the Patient-Centered Outcomes Research Institute to improve understanding household and family connections between patients. Principal investigators on the grant are Toan Ong, PhD, associate professor of biomedical informatics, and Lisa Schilling, MD, MSPH, professor of medicine.



Toan Ong, PhD

Electronic health records often include information that, if linked with information about household or family members, could provide rich and detailed environmental and family history to support scientific discovery and patient-centered outcomes research.

Electronic health records currently do not make such connections. Among the reasons: time constraints for those entering information into the record, systems that are not designed to support accurate and efficient documentation, and patients without awareness of medical information of their relatives. By making connections, researchers hope to study whether disease might be due to a shared exposure, such as secondhand smoke, or shared genetics, such as heart disease caused by genetics.

In their study, the CU research team is developing and testing new methods to check if two data sets can be linked together. The team is also looking to securely link new data to existing patient data without identifying individual patients.

Ong specializes in patient-linking electronic health records data, which has long been a challenge when patients with multiple chronic conditions who see multiple providers at different institutions. He credits CU’s strong history of building partnerships with making the family-linking project possible.

“The extraordinary research environment at CU Anschutz, which enables meaningful collaborations between faculty, staff, and students in different departments and schools, will be driving force of the execution of this project,” Ong says.

Ten CU researchers will work on the project in collaboration with the U.S. Census Bureau, which will confidentially validate the output of their research methods, and the Rocky Mountain Research Data Center, which will ensure patient privacy and ethical concerns are met. Although the family-linkage methods will not be used in patient care, Ong says the work will indirectly benefit patients by improving the quality of health data available for research and providing transparency in linking family data for research.

# EVERY ONE IS UNIQUE

Jason Persoff, MD, captures the stellar beauty of snowflakes

By Rachel Sauer

Jason Persoff, MD, listens to storms in much the same way he listens to patients: unhurriedly, questioningly, observing details that indicate background and environmental elements influencing and shaping the present moment.

And just as his patients have anatomy and physiology that factor into his treatment decisions, storms also have a body and a structure that inform everything from how he sets his camera and where he aims it, to how long he stands on his porch with a black wool sock extended into a storm, catching snowflakes.

“My neighbors might think it’s a little weird,” Persoff admits.

Persoff, an associate professor of hospital medicine, is a nationally and internationally recognized storm chaser of more than two decades who has carved a unique niche at the nexus of his passions for extreme meteorology and photography.

He is particularly known for his extraordinary macro photographs of snowflakes that define the fascinating detail and fleeting beauty of individual flakes. A display of his photography titled “Every One Is Unique: Photographs by Jason Persoff, MD” was displayed this winter in the Fulginiti Pavilion Art Gallery on the CU Anschutz Medical Campus.

“One of the most important things about my photography is it gets people to pause and consider,” Persoff explains. “When I’m holding my camera, it’s like a warm sweater on a cold day, it’s just comfortable.



It also keeps me mindful and grounded in the moment. Photography allows me to have and then to share the most incredible experiences.”

## WEATHER AS A FEELING

For as long as he can remember, Persoff has been mesmerized by storms. Growing up in Aurora, he was fascinated by the tornadoes that sometimes touched down there. He recalls watching “Night of the Twisters,” a documentary about deadly F5 tornadoes that touched down in Xenia, Ohio, in April 1974, in probably second grade “and I was hooked,” he recalls. “I always wanted to experience them and I got excited when the sirens went off.”

Around the same time, he was cultivating a growing interest in photography, so his parents gave him a Polaroid camera for his eighth birthday.

“I loved taking photos and I loved that Polaroid, but you’d get 10 shots and that’s that,” he says. “And usually at least one of them would be totally screwed up. My dad had an SLR Pentax that he let me borrow one day, so I took a bunch of pictures and he was pretty impressed with the quality.”

Persoff’s dad encouraged him to save for his own SLR, which he did and bought his own Pentax in fifth grade. In the spring of that year, a series of thunderstorms surged across Aurora “and I remember trying to frame the clouds to capture the feeling of these incredible storms,” he says. “I can remember consciously thinking about that, and it sort of began my journey to frame the sky as a feeling or an emotion, as an experience.”

## LIGHTNING STRIKES

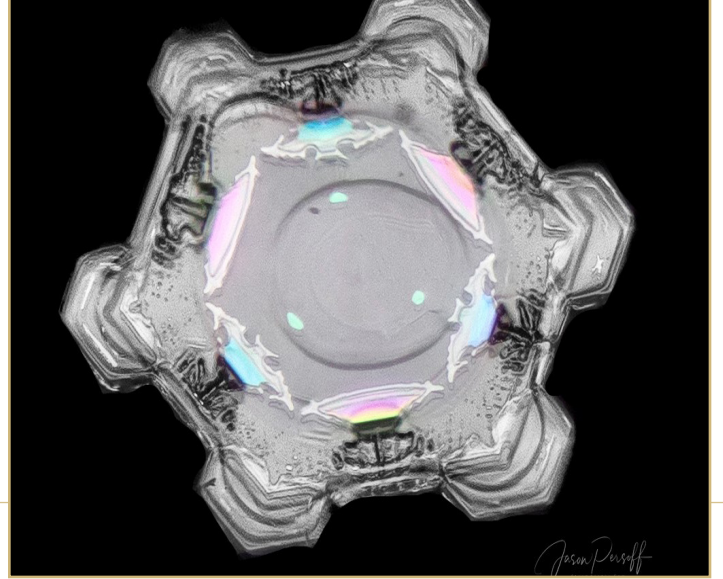
Eating breakfast one day as an undergraduate, Persoff read a story in USA Today about two storm chasers and that’s when the lightning struck his imagination. “Up until then, I’d never considered the possibility that you don’t have to stay static, that you can move with the weather,” Persoff says.

Not long after, he met his wife and they began storm chasing while he was in medical school, Persoff learning through trial and error how to shoot cloud formations, infant tornadoes, and forks of lightning.

“I could go through six rolls of film and have no lightning bolt,” he remembers with a laugh. “Or, if I did have one it would be out of focus. Fortunately, there were these one-hour photo places where you only had to pay for the photos you kept, so I always sought those out.”

After moving to Florida for his residency and his first few years on staff at a hospital, Persoff and his family returned to Colorado. But there was a major drawback: He did not enjoy the snow.





“It was fun as a kid, but by the time I got to medical school it sucked so bad because I had to drive to different hospitals and I learned to actually hate the winter,” he says. “When we came back to Colorado, I knew I had to find something that would help me enjoy wintertime.”

**“I want people to stop and enjoy this [...] each one unique and so beautiful and transient.”**

Surfing the internet one day, he came across a photo of a snowflake taken by Canadian photographer Don Komarechka. That cannot be a real snowflake, Persoff remembers thinking, but it was. He reached out to Komarechka, who began giving Persoff pointers. He also bought Komarechka’s book “Sky Crystals: Unraveling the Mysteries of Snowflakes.”

“So, I tried photographing a few snowflakes,” he says, “and now I absolutely love wintertime.”

### SEEING EVERY DETAIL

Geography plays a significant role in Persoff’s love for winter. Northern Colorado has the right combination of temperature, altitude, and humidity for stellar dendrites, a somewhat rare type of snowflake with six branches and fern-like crystal structures emanating from them.

“Most snow is not beautiful,” Persoff says. “You may get a lot of little pellets but not actual flakes, so we’re really lucky here and up north into the Canadian Rockies that we get stellar dendrites.”

Armed with tips from Komarechka, as well as his own knowledge of photography and weather, Persoff began learning more with each storm. He found that extending a black wool sock into the falling snow can help him catch individual flakes, which he photographs with a ring light, sets of extension tubes on his lens, and boundless patience.

Not every storm yields a snowflake image worth keeping, he has learned, and releasing the shutter is usually the first in a multi-step process. Some of his most intricate and detailed final photographs are the result of as many as 40 images layered on top of each other during photo editing.

Persoff also detailed his snowflake photography process in a series of YouTube videos that cover topics like how to light snowflakes, the equipment to use, and how to do it all on a budget.

“I think about Don Komarechka, who was so kind to teach me, and I feel like I want to pay it forward,” Persoff says. “It’s not for me to have a copyright on what snow looks like. I want people to stop and enjoy this. So often, we only deal with the consequences of it, and we’re getting ticked off by the ice on the road and the inconvenience. But when you consider the trillions of these flakes falling, and each one unique and so beautiful and transient.

“Much as I’ll spend time listening to a patient’s story, when I’m in the moment photographing a snowflake, I’m taking the time to see every detail, and it’s really opened up my world. It allows me to be present, to be only in that moment, and to really see.”



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# THE CHARLES J. BLACKWOOD, MD, FUND



This scholarship endowment honors the CU School of Medicine’s first Black graduate. Charles Blackwood, MD, graduated in 1947. Through this scholarship, CU School of Medicine hopes to honor his legacy. Funding supports full tuition scholarships for students from backgrounds underrepresented in medicine. As one of the largest scholarship funds at the School, this was a community-driven initiative developed in close collaboration with the School, African-American health care leaders, and generous benefactors.



*“We need more diversity within the health care workforce in order to improve the quality of care for everyone in our communities. This scholarship fund will make it possible for more students to achieve their academic and professional dreams, and our system will be benefit greatly from their knowledge and future contributions to medicine.”*

Terri Richardson, MD

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