Buying Time
Cap gives young man a little more time

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Buying Time
Justin Boley received a terrifying diagnosis: Glioblastoma. CU’s Douglas Ney, MD, helped him with therapy that shrunk the brain tumor and bought Justin a little more time, page 8.

Cover photo: Brandy Boley kisses her son Justin. Left: Douglas Ney, MD and Justin Boley. Photos by Dan Weaver.
A Productive Year

My first year as Dean of the University of Colorado School of Medicine has been a fulfilling and rewarding experience.

In January, we announced five projects that were awarded Transformational Research Funding grants, totaling $80 million over five years, to bolster initiatives that show great promise for our School, for the health of our patients and community and for medical science in general.

The Office of Medical Education has been immersed in preparation for the March 2017 site visit by the Liaison Committee for Medical Education, which accredits medical schools. The dedication of our staff, led by Senior Associate Dean Robert Anderson, MD, and working with dozens of faculty, are ensuring that we have focused attention on the myriad details necessary for this important event.

The School of Medicine branch in Colorado Springs became home to the first group of students who will conduct their third-year clinical rotations there. Associate Dean Erik Wallace, MD, has spent two years building relationships with providers in the community and overseeing the implementation of the curriculum.

The clinicians on our faculty continue to provide the best care in our community and offer the solid foundation on which our School depends. Our faculty and our practice plan, University Physicians, Inc., offer considerable funding to support the School’s operations, create endowed chairs and provide student scholarships.

We are implementing a plan that will ensure that we are using research space on campus to its best potential. While that process can be difficult for some, it is essential to our future. We cannot recruit and retain the best faculty with a scattershot plan for using our space. The sensible principles we are putting in place will ensure we have productive laboratories and that we are locating investigators with common interests near one another.

The School received one of the largest programmatic gifts in its history in April 2015, when the Helen K. and Arthur E. Johnson Foundation gave a $10 million grant to support the Depression Center. In honor of the donors, the CU Board of Regents voted to rename the center the Helen and Arthur E. Johnson Depression Center.

And in March 2016, the University announced a $10 million pledge from The Anschutz Foundation to support establishing the National Behavioral Health Innovation Center, which will bring innovative approaches for preventing, identifying and treating behavioral health and substance abuse.

The Transformational Research Funding grants, which I previously mentioned, are a significant investment in our future. We are funding areas of research that will have high impact, nurture cross-disciplinary collaboration, and involve partners from other institutions. Those projects are described in this issue, page 26, and on the School of Medicine’s website.

We are able to make these investments with funding provided by the clinical earnings of the faculty, from annual financial support from the University of Colorado Health and from philanthropy, including a commitment of $15 million by The Anschutz Foundation. No state-appropriated dollars or student tuition or fees are being used for the Transformational Research Funding awards.

What we discovered in the process of selecting the award recipients was not a surprise: This campus is home to an abundance of immensely talented people. In fact, we received so many excellent proposals that it was a reminder that my work as Dean is never done. Just as our clinicians always strive to improve care, our teachers work constantly to provide the best education and our researchers remain committed to advancing the frontiers of knowledge, it is my job to provide the best conditions possible for them to excel.

With warm regards,

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

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

Huntington Potter, PhD, professor of neurology and director of the Rocky Mountain Alzheimer’s Disease Center, told the Denver Post in March that amyloid deposits are like “little Brillo pads of deposited proteins” believed to be involved in killing brain neurons.

William Hiatt, MD, professor of medicine and president of the Colorado Prevention Center, discussed athletes’ use of meldonium in a New York Times article. “Glucose is more efficient when you have limited oxygen,” he said. “I can only see a downside to inhibiting carnitine in a healthy athlete.”

Richard Zane, MD, chair of emergency medicine, wrote an article, “How We Transformed Emergency Care at Our Hospital,” that appeared in Denver Post in March. The authors noted that more space alone wouldn’t save us. So we took a different approach, building a highly integrated leadership team that sets a new standard for emergency care, with the needs of patients (not providers) as the driving force.

Hillary Lum, MD, PhD, assistant professor of medicine in the Division of Geriatric Medicine, commented in the Denver Post in March that amyloid deposits are like “little Brillo pads of deposited proteins” believed to be involved in killing brain neurons.

Carol Foster, MD, director of the Balance Laboratory at University of Colorado Hospital and associate professor of otolaryngology, discussed benign paroxysmal positional vertigo in a February article in The New York Times. This kind of vertigo occurs more frequently in older adults, apparently because the protein coating that holds the crystals in place weakens with age. “Like an old Post-it note, after 60 or 70 years the stickiness wears off,” she said.

Patricia Braun, MD, associate professor of pediatrics, was quoted on National Public Radio in February noting that the crisis of contaminated water in Flint, Mich., is making it harder to explain that tap water in most communities is safe to drink.

Heather Young, MD, assistant professor of medicine in the Division of Infectious Diseases and epidemiologist at Denver Health Medical Center, told the Denver CBS affiliate that a mumps outbreak was being investigated in the city after patients began showing symptoms. “All had some jaw swelling in this region which is pretty common for mumps. They also had low grade temperatures and just felt ill,” she said. A lack of awareness about mumps in the community allows the disease to spread easily.

Andrew Monte, MD, assistant professor of emergency medicine, discussed with CNN and Los Angeles Times his findings in the New England Journal of Medicine in February that marijuana tourism in Colorado was resulting in more emergency room visits. “People coming in from out of state might have less experience with the particular products available here, and they might be using in excess because they are on vacation,” he said. “It’s kind of like how people drink heavily when they go to Las Vegas.”

In an interview with the NBC affiliate in Denver in December, Jean Mulcahy Levy, MD, assistant professor of pediatrics, discussed her passion for medicine: “My goal is not only to cure cancer, but my goal is to cure kids with cancer so they have a good life.”

Susan Hwang, MD, MPH, assistant professor of pediatrics, and Camille Hoffman, MD, assistant professor of obstetrics and gynecology, were quoted in a February report on the Denver NBC affiliate, 9News, discussing infant mortality rates among African Americans. “Even if you take the wealthiest black woman, her rate of preterm birth is still higher than the poorest white woman,” Hwang said. “Studies have demonstrated that maternal reports of racism have resulted in high rates of stress, inflammation and preterm birth.”

Robert Eckel, MD, professor of medicine, was quoted in a February Time magazine article about whether egg yolks were unhealthy. “Eggs get a lot of attention because they’re so popular and for a while were kind of villified,” he said. “But I’m a lot more concerned about people eating more fruits and vegetables, and adhering to a healthy dietary pattern like a Mediterranean-style diet or the DASH diet.”
Paritosh Kaul, MD, associate professor of pediatrics, commented on National Public Radio in a report about the awareness of young men and emergency contraception. “The boys are listening, and health care providers need to talk to the boys,” he said. “These guys believe they should be involved in sexual health decision-making. And if they are, then they’re more likely to talk with their girlfriends. They’re the missing half. It takes two to tango.”

Stephen Berman, MD, professor of pediatrics and former president of the American Academy of Pediatrics, discussed a February trip to Cuba by a delegation of physicians. “As Cubans gain access to new medications and technology, training will become very important,” he told the Denver Post. “We would like to eventually establish an exchange program so Cuban doctors can come and train here at Children’s Colorado and vice versa.”

Thomas Delong, PhD, assistant professor of immunology and microbiology, explained his research breakthrough related to Type 1 diabetes, published in the journal Science, in a February report on the Denver CBS affiliate. “We found a new type of protein modification,” he said. “Because the immune system sees that and thinks it might be foreign because it’s never seen that before, it attacks the junction of these proteins.”

Omer Mei-Dan, MD, associate professor of orthopedics, was featured in a CNN report, “5 Reasons Why People Jump Off Cliffs for Fun,” that aired in January. The report quotes a study of BASE jumping by Mei-Dan, who is a BASE jumper himself, that concluded: “Almost all active BASE jumpers witnessed the death or severe injury of another BASE jumper. Although direct comparison with other sports is difficult, we believe the results of this study suggest that BASE jumping may be the most dangerous extreme sport.”

David Olds, PhD, professor of pediatrics and founder of the Nurse-Family Partnership, told the PBS Newshour in January that home visits to low-income first-time mothers can lead to improved cognitive development and language skills for their children: “All of that earliest process sets in motion a positive cycle of interaction that leads to significant reductions in children’s behavioral problems when they enter school, significant improvements in their language development.”

John J. Reilly, Jr., MD, dean of the School of Medicine, was among many faculty members featured in a January article in 5280 magazine about personalized medicine. “Strictly speaking, your DNA sequence is the ultimate personal identifier,” he said, “much more so than your Social Security number. It’s what makes it such a powerful tool in forensics.”

Cecilia Pascual-Garrido, MD, assistant professor of orthopedics, commented on the use of stem-cell therapy for a February report on the Denver Fox affiliate. “I think it’s going to be a revolution in orthopedics,” she said. “The time that we have to treat these patients is the time between when they were active and happy and between when they really need a hip replacement.”

Frederick Grover, MD, professor of surgery, and David Fullerton, MD, discussed a trip to Nepal, where they performed surgery as part of a church mission. “When people think of Third World countries, they tend to focus on exotic diseases,” Fullerton said. “But the cardiovascular diseases and chronic diseases are rapidly becoming the leading cause of death in Third World countries.”

A feature report on the Denver NBC affiliate, 9News, in December featured a 10-year-old boy with spinal muscular atrophy. Sumeet Garg, MD, assistant professor of orthopedics, explained the boy’s condition: “This is a progressive disorder where you start losing the strength of your muscles.”
Infection Prevention is Everybody’s Job
Michelle Barron works to control the spread of infectious diseases

By Cynthia Pasquale

Several years ago, Michelle Barron, MD, and a team of residents and interns were walking through the occasionally confusing halls of one of the medical buildings on the University of Colorado Anschutz Medical Campus. She had the lead, walking purposefully ahead, and opened a door for everyone to step inside – the janitor’s closet.

It is a story she likes to tell, reminding people that she has no sense of direction. She may not always know west from east without a clear view of the mountains, but she has a firm sense of direction on getting from point A to point B when it comes to the study of infectious diseases.

“Follow me and you never know where you’ll end up; you’ll go places where you never knew you would go before,” she jokes. In truth, as an associate professor in the Division of Infectious Diseases at the CU School of Medicine at the Anschutz Medical Campus, Barron’s research often deals with mysteries, and, for her, that’s part of the appeal of her job.

“It excites me. I will always have a job that is stimulating and completely different from day to day,” she says. Currently, she’s researching resistant organisms, hoping to figure out how to identify and combat them. “It’s interesting work with a lot of unknowns. You never know what to expect.”

She came to the university in 1999 to serve a fellowship in infectious diseases and “fell in love with Colorado” and the institution. Barron’s research focus is on infection control – especially in hospitals – fungal infections, transplant infectious diseases and HIV care.

How did you choose your career path?

At the age of 4, I started telling everyone that I wanted to be a doctor. There are no medical personnel in my family, so I’m not sure how I came up with the idea. My mother tells me that I wanted to be a doctor in addition to other professions. I wanted to be a doctor-ballerina or a doctor-astronaut, and all sorts of other interesting combinations. But I always wanted to be a doctor, and when I was old enough and mature enough to actually know what that meant, I still wanted to do it. Medicine fits. It suits me and I can’t imagine doing anything different.

The study of infectious diseases is my calling. When I was in medical school, it was during the height of the AIDS epidemic. Patients were dying from the disease and often from other infections. I had a lot of interaction with those types of patients and I kept thinking this is what I was going to do with my life. Help figure out how to fix this, how to prevent people from getting these kinds of infections by fixing the immune system or something else. When you are young, you feel like you can do it all, but the determination has stuck and it still drives me today. That’s the approach I always take. ‘We can figure this out; we can prevent this from happening.’ You can only do that type of investigation and research in an academic setting. You can’t ask these questions and try things out and design projects to try to determine the best methods or science or lab work in a non-academic clinical setting.

Much of your research focuses on preventing the spread of infections in hospitals.

What has happened to help reduce institutional incidents of infection?

It starts with the patient, but it is so much more. We talk about infection prevention and our mantra is: ‘It’s everybody’s job.’ That means it starts with the CEO of the hospital and continues throughout the institution, even with the people who don’t interact with patients. The role is the same: To ensure the environment that a person is living in while in the hospital is kept clean and disinfected appropriately, and that there are no venues for infections to be transported out of the room.

Many things we learned are not connected to the individual but are about the processes. For instance, insertion of a medical device is an area where using beautiful science makes a difference when it comes to preventing infections. If you standardize the processes, everybody is trained properly, and everyone uses a checklist – just like pilots do – it makes a huge difference in the infection rate.

When the processes were first standardized, there was pushback. Physicians like to think that we are independent thinkers who need freedom to figure out the best way to do things. But the truth is doctors have done that with mixed results. When you apply a scientific standard – after testing the process to find out what is best – and everyone follows the standard, it has profound results. Across the United States, infections have decreased because the science was done, the results published and regulatory bodies required use of the standard. Coming up with systematic processes instead of allowing the individual to decide has had
a profound impact on the way we deliver health care.

Some of your recent research looks at the Ebola virus and how to be ready for new emerging infectious threats. One of the newest threats is the Zika virus. Can what you learned about Ebola be useful in combatting the Zika virus?

For many years, we have worried about the next coming plague. Will it be the H1N1 virus? Bird flu? Or something as exotic as Ebola? You have to think about any infectious disease on an individual level and on a global level. It’s one of the reasons I love my job because I get to interact on multiple levels when thinking about preparedness.

It’s about planning, putting systems in place and getting people trained for whatever hits the door. We need to keep employees safe while allowing them the ability to take care of patients. Ebola brought that to the forefront. Every hospital has to have a disaster plan in place, but when dealing with infectious diseases, you also have to consider how to keep staff personnel safe while they are delivering effective care.

Zika illustrates once more that we live in a global world. You could be on a plane coming from Africa and stop in several cities in the United States, bringing with you a potentially infectious disease, and that could be spread to others in a short amount of time. In addition, Zika and the Chikungunya virus have this interesting phenomenon where mosquitoes can be infected by a person. The medical term is autochthonous transmission. So you come back from Brazil after having a great time at Carnival and you are carrying the Zika virus. You return home to a place where mosquitoes that can carry the virus live. You’re in your garden and get bitten by a mosquito, now that local mosquito picks up the virus. Next, the mosquito flies into your neighbor’s yard and bites the neighbor, who gets the Zika virus. That begins the cycle that introduces the virus into a country that doesn’t have that virus.

Ebola and Zika are not new. We’re just more able to tell you what they are now than we were 20 years ago. Some of these viruses have been around for hundreds of years and are known and have been described. Then we have the SARS virus, which we think is new, but we’re not sure because it hasn’t been described before. A lot of these viruses are highly related to each other, sort of like first cousins. They undergo some sort of mutational event, and then they aren’t recognized as first cousins, but as a cousin twice removed or 10 times removed. From an evolutionary standpoint, most organisms predate man by millions of years so their very existence and their ability to survive depend on being able to adapt to new environments.

We thought Zika was new – something other than what it was – but after doing the science, we found out what it really was. With many infectious diseases, we have specimens from outbreaks 20 years ago or 100 years ago and we can test them to find connections.

How do we choose which diseases are ones to worry about or which ones we should try to combat?

We would love to figure that out and what is that magic thing we can do. There are some things that are very simple that can be done by everyone in a developed country. If you control the mosquito population, for instance, then you would eliminate Zika from affecting individuals. But in resource-limited settings, we don’t even have reliable water sources, let alone the ability to remove water sources or control mosquitoes. Ebola, though more complex, follows the same principle. There was a lack of infrastructure to contain it or prevent it from moving beyond where it originated. So realistically, to prevent or control some of these diseases, you need global resources and a way to move across language and cultural barriers.

It’s also important to remind individuals that they have a role and a way of contributing to prevention and preparedness. For instance, one thing individuals can do is let their doctors know any information that might be important about where they were, who they were with and what they were doing.

What is the most important thing you learned from your years in medicine that you try to pass on to others?

I tell students that what we do is an incredible privilege. We are involved in patients’ lives at the happiest points – the delivery of a baby, for instance – or at the worst periods of their lives. And you meet people that you would never encounter otherwise, much less in these extremes. It’s very fulfilling to be able to observe it and learn from it and gain insight into your own life and expectations. I personally feel you need to reflect on that periodically and figure out what you want to take with you.
Offering a New Vision
Naresh Mandava and CU targeting eye diseases

By Lisa Marshall

By 2020, 196 million people worldwide will suffer from age-related macular degeneration (AMD). That’s four times the global incidence of dementia, and 14 times the number diagnosed with cancer internationally each year. By 2040, according to a recent study published in the Lancet, incidence of AMD will soar to 288 million.

“It is a major public health issue,” says Naresh Mandava, MD, chair of the Department of Ophthalmology at University of Colorado School of Medicine. Yet for roughly 9 out of 10 those people, no medical treatment exists. “I’ve had patients in their 50s who can’t see their kids anymore or see well enough to go to work. It’s devastating. It has been a real frustration to see them go downhill and not have much to do for them.”

Fueled by that frustration, and propelled by millions of dollars in new funding, Mandava and his colleagues at the UCHealth Eye Center are, as he puts it, “doubling down” their efforts to find a cure for AMD.

They’ve launched a new AMD registry which will follow hundreds of patients over the course of their disease. And with $10 million in private donations, they’ve initiated an ambitious ocular stem-cell program aimed at developing a retinal transplant procedure to restore sight in patients blinded by AMD. Meanwhile, they’re testing novel, injectable drugs targeting tough-to-treat “dry” macular degeneration, in Phase III trials. And in December 2015, Mandava became the first surgeon in the Rocky Mountain West to surgically implant a “bionic eye,” partially restoring the vision of a woman blind from retinitis pigmentosa for two decades. Ultimately, it could be used to address macular degeneration too.

“In addition to working on our own new therapies, we’ll be among the first to test new technologies being developed elsewhere,” says Mandava. “We are attacking this on all fronts.”

Searching for solutions

While a similar disease exists in children, AMD is primarily a malady of middle-age, in which the central retina – the macula – deteriorates. Roughly 10 percent of patients develop “wet” or neovascular macular degeneration, a late-stage, rapidly-progressing type in which the membrane under the retina breaks, prompting blood vessels to grow up through the breaks, leak, and bleed, scarring the macula.

“You can go from reading to not seeing anything in your vision but a big black spot in months,” says Mandava. The other 90 percent have the “dry” variety, in which retinal cells break down gradually, thinning the macula.

Since 2006, numerous injectable drugs have emerged to slow vision loss, and even improve it, in patients with “wet” AMD. But for the “dry” variety, treatment has been elusive. The disease is often heralded by “drusen,” dots of yellow waste deposits from withering cells, on the retina. Then central vision and color perception begin to fade. Ultimately, some develop wet AMD and others progress to advanced dry AMD, or geographic atrophy, in which black spots chew into the visual field. The question baffling researchers: Why do some patients progress swiftly and severely, while others stay stable? Big data can help answer it, says Mandava.

“Through this new registry, we’ll be able to capture very valuable data points that other people don’t have.”

In 2014, Mandava recruited Anne Lynch, MD, MSPH, to head up a newly formed division of ophthalmic epidemiology and establish several new registries related to eye disease. For the AMD registry, which boasts...
400 patients and hopes to grow to 1,000, patients submit questionnaires about history, diet, lifestyle, and medication use, and retinal images using state-of-the-art scanners at each visit. They also offer up a small sample of blood through which – thanks to new diagnostic technology from Boulder-based SomaLogic – researchers can now identify 4,000 inherent proteins. The blood is stored in a repository on campus for future research.

By matching blood, scans, and epidemiological data, Lynch and Mandava hope to identify proteins or other biomarkers associated with rapidly progressing disease, and someday develop drugs targeting those proteins, to give to patients early on. The registry could also be used to highlight lifestyle factors associated with slow, or fast, progression, informing prevention advice.

“The goal here, and this is not science fiction, is to take someone with macular degeneration, take a patch of cells from their skin, take those cells to an onsite facility, make those into induced pluripotent stem cells, convert them into retinal cells and successfully transplant them into a patient eye,” he says. Already, researchers have discovered how to develop retinal stem cells and transplant them. Now, the challenge is to get them to establish connections with other ocular cells, function properly, and resist the processes that caused degeneration to begin with.

“Our goal is to be the first one to do this, and have it work, in the United States.”

That's not the only seemingly sci-fi project in Mandava's sight.

On Nov. 2, 51-year-old Johnstown resident Jamie Carley nervously lay down on Mandava's operating table in the UCHealth Eye Center for a delicate five-hour surgery in which he implanted a tiny microchip in her right eye. She'd been blind since age 26, when the retinitis pigmentosa that had been killing her rods and cones since age 5 took the last of her sight. For eight years she'd been following the progress of SecondSight, a California start-up developing the Argus II Retinal Prosthesis System. The system uses a miniature video camera mounted on specialized glasses to transmit images to 64 electrodes on the implant, which in turn send electrical pulses to viable retinal cells (bypassing the damaged ones) and on to the brain via the optic nerve.

When Carley heard it had been FDA-approved and UCHealth would be offering it, she jumped on it. When Mandava removed her bandages and turned on the glasses in December, she was overwhelmed.

“It was extremely emotional,” says Carley, who was able to see the silhouette of her son, age 29, for the first time. While her vision has only been partially restored, she says just being able to see the outline of doors, and the edge of the sidewalk has already improved her mobility immensely.

“I can’t wait until summer, so I can go outside and look at the stars, and the moon, and fireworks,” she says.

SecondSight continues to work on improving the technology in hopes of improving resolution and someday restoring color perception in patients. And it recently launched its first clinical trial, in the United Kingdom, testing the system in those with macular degeneration.

Given all that’s happening, Mandava sees a bright future for his patients.

“Ultimately, we think it is possible to eradicate blindness. It’s tremendously exciting.”

Our patients are really interested in being part of this registry. They want to be part of the effort to find a cure,” says Lynch.

‘This is not science fiction’

Meanwhile, Mandava is using $10 million in private donations, raised over just 18 months, to work with the Gates Center for Regenerative Medicine at CU Anschutz to develop stem cell transplants for macular degeneration. Already, about 10 researchers and clinicians are working toward the goal and he hopes to recruit a dozen more.
At first, Justin Boley didn’t worry too much about the headaches because they didn’t seem serious. Just take a couple Excedrin, his mother advised him.

He wasn’t too concerned when the right word sometimes eluded him—calling his parents’ hot tub cover an “ice cream cone.” Everyone in the family just got a chuckle out of that odd moment.

He didn’t even worry when he seemed to be taking more sick days than usual.

Why would he? He was a healthy, 23-year-old man with a good job as a certified nursing assistant and his whole life ahead of him.

But then came the morning when Justin woke up and could not talk. He knew he needed to call in sick, so he dialed the number, opened his mouth and no words came out.

“I was thinking straight, breathing fine, but I couldn’t speak,” he says. “Mostly I remember thinking, ‘This is really strange.’”

The Diagnosis

That strange speechless morning would lead to a devastating diagnosis.

But today, with the care of a compassionate CU Cancer Center physician and with the use of a novel medical device, Justin Boley still believes he has his whole life ahead of him — even though that life may be measured in months rather than years.

“He fought to get into this world,” Brandy Boley says, looking affectionately at her son across the room. “Justin doesn’t do anything half-way.”

Born at 29 weeks, Justin was a 2-pound preemie who spent 3 months in intensive care before his parents brought him home. So it’s understandable that Brandy thought the worst health crisis she would ever face with her son happened more than two decades ago.

But when Justin’s odd symptoms persisted and became more worrisome — he started to have double vision, lost weight and slept more every day — Brandy decided it was time to seek medical care.

In January 2015, the emergency department physician at Memorial Hospital in Colorado Springs asked Justin to touch his nose with his finger. Justin couldn’t do it. The doctor ordered a scan of Justin’s brain. Although Justin remembers very little of what was going on during that time, his mother will never forget.

“As a military family, you identify life events by where you lived when something happened,” Brandy says. “This is how we will remember Colorado. A doctor saying to us, ‘We found a mass.’”

The tumor was the size of a tennis ball and it was located in Justin’s thalamus near the brain stem. He had the tumor biopsied on this 23rd birthday. Brandy remembers a physician coming into the room after the procedure and “gently” delivering the news.

“Glioblastoma”—I had never heard of it,” she says. “I heard the doctor say ‘grade 4 … could live 12 months.’ We were too shocked to cry. But it hit me that by his next birthday, Justin could be gone.”

The Disease

Glioblastoma (GBM) has a well-deserved reputation for being one of the deadliest cancers. It is the most common and aggressive form of primary
malignant brain tumors in the United States, affecting approximately 10,000 Americans each year. Historically, the median overall survival time from initial diagnosis and with optimal treatment is 15 months.

The standard treatment for GBM is surgery, followed by radiation therapy and chemotherapy. In Justin’s case the tumor was inoperable, a fact that Justin accepted with equanimity. “It’s just too much risk versus the reward,” he says. “They could take it out, but I might be completely paralyzed, which I do not think would be a better life.”

Justin Boley laughs easily and often and has a way of finding the good news in bad. The biopsy was good, he says, because it drained the fluid that had built up in his brain and relieved the pressure causing his double vision and speech problems. He has no complaints about the oral chemotherapy he takes. The radiation — not a big deal.

“Things could be worse,” Justin says, with absolutely no hint of irony. “What I’m going through is bad, but there are plenty of other people who are suffering. Sure, I’m unlucky — but I’m not the most unlucky person.”

That, Brandy Boley says, is an example of how Justin has “perspective.” She has also tried to maintain perspective driven by a single motivating question: “How can we make the most of the time we have?”

The answer came from Douglas Ney, MD, a neuro-oncologist at CU Anschutz, and it took the form of a medical device that looks like a gauzy swim cap covering a series of Band-Aids.

**The Treatment**

When the Boleys brought Justin home after the biopsy, Justin’s father started “nesting,” adapting the house to the potential needs of a son who could become increasingly disabled. For his part, Justin felt better than he had in a long time, and he set out to enjoy his life.

“I like talking with my mom, hanging out with friends, rooting for the Kansas City Chiefs,” he says. He also took the opportunity to go skydiving and surfing.

A cadre of Boley family and friends spent night and day online looking for every treatment available, but it was an oncologist at Memorial Hospital who originally suggested that Justin contact Ney because of his experience with Optune, a medical device which was originally approved by the FDA in 2011 for recurrent GBM.

Ney and his colleagues have treated approximately 50 patients with Optune, making the CU Cancer Center one of the top prescribers in the country. “Our patients are open to alternatives,” he says. “They’re willing to try new things, and they’re coming from all over the country to try this.”

Optune is a cap covering a series of electrodes which Justin wears on his head as long as he wants every day. Powered by a battery pack that he can carry with him, Optune works nonstop, applying alternating low-intensity electric fields to the tissue under the electrodes — 200 kilohertz pulsing front to back, side to side, endlessly repeating as long as he’s wearing the device.

“It doesn’t feel like anything,” Justin says. “Your head gets a little warm, but if it’s working, I don’t need to know how.”

Ney can tell you how it works — the electric fields interrupt cancer cell structures during division, disrupting the cell as it tries to replicate. While it is often difficult to get chemotherapy to work on brain tumors, Optune goes directly into the brain, shuts down and kills tumor cells, while it spares normal cells.

“It is a relatively simple concept with an incredibly complex design,” Ney says. “It’s quite remarkable.”

So remarkable that the first clinical trials were ended early because of positive results — Optune was clinically effective, adding three to five months to life expectancy, with better quality of life for patients and without the side effects that can come with chemotherapy. It is the first treatment with a positive trial results for GBM in the past 10 years.

At Justin’s August 2015 MRI scan, after months of chemotherapy, radiation and Optune, his tumor, which once was roughly the size of a tennis ball, had shrunk by about 60 percent to the size of a ping pong ball.

“Justin has had a pretty amazing response,” says Ney. “This is a rare opportunity and responsibility to touch lives in a unique way. We may not be able to change the outcome, but we can give patients more time, a better quality of life and that is astounding. That is what we strive to do.”

**The Future**

While he and his mother have found solace in both meditation and humor, both confess they have “fall apart” moments, which can mean anything from nonstop crying to midnight binges on mac and cheese.

“The one that hit me hardest is grandchildren,” Brandy says. “He wanted children, I wanted grandchildren to spoil. Now, that may not be a possibility.”

For now, the Boley family focuses on living in the present, celebrating victories like a great MRI scan. They base their future plans on test results. Brandy confesses she is planning a 24th birthday party for Justin, ever mindful that with Optune they are only buying time.

“That’s what I’m hoping for,” Justin says. “Time. Because the alternative is no time. So I’ll take anything.”
Fighting Back After Cancer Diagnosis

Physicist Rebecca Marsh’s advice: Listen to your loved ones

By Tyler Smith

Rebecca Marsh knows how to balance risk and benefit.

A PhD physicist by training, Marsh spends a portion of her time at University of Colorado Hospital’s Breast Center clinics making sure the imaging equipment is working properly and delivering the appropriate radiation dose. She also speaks with women, in person and on the phone, who are concerned that the radiation they receive from mammograms, CT scans and other imaging tests will endanger their health and even possibly cause cancer.

Marsh, an assistant professor of radiology at the University of Colorado School of Medicine, does her best to counter their fears with facts. Despite splashy news media reports, there is no evidence that radiation from imaging equipment causes cancer.

“I understand their concerns,” she says. “But there is a lot of false information and I strive to send a consistent message that is accurate, accessible and consistent.” For women considering breast cancer screenings, Marsh adds, “My job is not to convince them to get a mammogram but rather to help them make an informed decision.”

Such risk-reward calculations are the stuff of everyday life. But sometimes the odds break the wrong way. In March of last year, Marsh felt what she describes as “a structure” in her left breast. Although her mother had died at 57 from a rare abdominal cancer, there was no history of breast cancer in her family, and Marsh was only 36 – well below the American Cancer Society’s guidelines for a screening.

She mentioned it during her next regular visit with her primary care physician (PCP) at a UCH clinic. You don’t meet the criteria for a clinical breast cancer exam, her PCP said. But a medical student was observing the visit, so the PCP took the opportunity to demonstrate how to conduct the exam. Everything seems fine, the PCP said, calling the structure the result of normal fibrotic changes.

“That coincided with what I had read online,” Marsh recalls as she sat in her tiny interior office in Research Complex 2 nearly a year later. “I wasn’t worried.”

Sudden surprise

But someone else was. In November, Marsh’s boyfriend told her he was concerned about the small mass. It doesn’t feel right to me, he said. She played down his worry and laid out her logic: She wasn’t concerned about the small mass. It doesn’t feel right to me, he said. She wasn’t worried.

Twenty-four hours later, the 1 percent chance she’d hoped for vanished. The pathology results showed two primary masses, both positive. Marsh had an aggressive cancer that most commonly shows up in women under the age of 40.

A life detour

“In the space of four or five hours, I went from thinking the worst-case scenario was that I had a cyst to ‘you very likely have cancer,’” Marsh says. Twenty-four hours later, the 1 percent chance she’d hoped for vanished. The pathology results showed two primary masses, both positive. Marsh had an aggressive cancer that most commonly shows up in women under the age of 40.

The next big question – and potential ray of hope – was whether the cancer had metastasized. She emailed University of Colorado Cancer Center medical oncologist Virginia Borges, MD, for guidance. At Borges’ recommendation, Marsh got nuclear medicine and CT scans the same week and found her silver lining. There were cancer cells in several lymph nodes, but no evidence that the malignancy had spread to other parts of her body. A subsequent test showed no known genetic biomarkers, further decreasing the likelihood of a secondary cancer, particularly ovarian.

Marsh began a regimen of eight chemotherapy treatments for Stage 3C breast cancer on Dec. 17, 2015, and completed the fifth Feb. 11. She’ll finish chemo at the end of March, and then have a four-week recovery period before her surgery – a lumpectomy, not a mastectomy, because of the specifics of her genetic testing and the size and location of the tumor. A six-week round of radiation is slated to begin the end of May.

She has a path forward, but her life with cancer follows no straight lines. Bad news is mixed with good, fear with hope. For example, cancer cells tend to be more aggressive in women under 40, but they also are often ideal targets for chemotherapy precisely because the tumors are grow-
Marsh deals with fatigue, illness, and mental lapses caused by the chemo, but that's been cushioned a bit by 10 weeks of leave she had piled up. With her department’s strong support, she keeps a flexible work schedule.

One step at a time

Marsh also tries to be pragmatic about the cancer and the limitations it has imposed on her life. She accepts that there are days the chemo will leave her physically sapped. “My perspective now is that when I’m not feeling well, I just have to wait it out.” She takes advantage of the good days and works as much as she can. She’s now preparing a presentation of her research for a March meeting in Salt Lake City and has made it a goal to make that trip.

“Because of the chemo, I’ve had to pull back on other professional involvements,” she says. “I need this one thing I know I can do.”

Marsh still knows the importance of balancing risk and benefit. But her cancer has also given her a new perspective on the limits of knowledge. She trained at MD Anderson Cancer Center and spent nine years there. She did graduate work in radiation therapy physics. But cancer pays no attention to such qualifications.

“Cancer treatment is not foreign to me,” she says. “But there is a false impression that ‘smart’ people can catch cancer early. I’ve worked in mammography, and part of my profession is working with breast imaging. I have a master’s and a PhD – and I still had stage 3C breast cancer.”

Marsh’s “public service message,” as she puts it, is simple. “If you notice changes and have concerns and suspicions, go in and check it out – even if it hasn’t been a year, or you’re too young, or you’re not in a high-risk category. Women in their 30s and early 40s are really busy, and it’s easy to put a mammogram off. But figure out a way to fit it in.”

And listen to your loved ones, she says. “If my boyfriend hadn’t said anything, I might not have gone in for months,” Marsh says. “That might have made a big difference in how this all played out.”

This article originally appeared in the UCHealth Insider in February 2016.
Extreme Health Care
CU to provide medical care at Greenland’s Summit Station
By Chris Casey

The University of Colorado School of Medicine’s Department of Emergency Medicine is taking its expertise in austere medical care to one of the most extreme and remote places on Earth: Summit Station, a global research facility perched at 10,500 feet atop the Greenland ice sheet.

In December, the department’s Wilderness and Environmental Section (WEM) won a subcontract grant from the U.S. National Science Foundation to provide field health care services at Summit Station.

Jay Lemery, MD, associate professor of emergency medicine and section chief of WEM, says providing medical services at Summit Station allows WEM to “think outside the box” in an unpredictable environment.

“It’s basically the art and science of taking care of people in remote and extreme environments,” he says. “It forces us to think in very creative ways. How do we take 21st century medicine and apply what we know to these places where you don’t have the technological tools to do what we do on the CU Anschutz Medical Campus?”

WEM honed its expertise in remote medical services by holding the EMS medical directorship for the U.S. Antarctic Program for two years. In Greenland, the CU WEM bid was selected over other applicants, including from private industry, for the subcontract, which lasts for a year with an option for renewal. WEM will work with CH2M Hill, the prime contractor, and Polar Field Services, a subcontractor providing science support and field operations.

Four services for Summit Station

In Greenland, WEM will be in charge of four phases of service:

- Remote medical support services and supplies for Summit Station;
- 24/7 telemedicine services;
- First aid medical support services; and
- Training in arctic first aid and wilderness first responder/aid.

Lemery notes that people are more frequently venturing to extreme places across the globe, and the expertise of WEM faculty – in altitude sickness, frostbite, hypothermia, trauma treatment and other wilderness care – uniquely positions WEM to serve these travelers, as well as advance remote-setting health care.

“We have that niche in the health-care world,” Lemery says. “Greenland is a robust place to test best practices in medicine – to see what works, what doesn’t work. We’re also training people to be outstanding clinicians anywhere in the world. Most of the planet doesn’t have the medical tools like we have at CU Anschutz. These are important lessons to bring home to our students and residents.”

David Twillman, RN, University of Colorado Hospital, will staff Summit Station during the high season of roughly April to August. During the winter months, WEM will provide medical services via telemedicine.

‘Quite a bit of altitude sickness’

Christopher Davis, MD, assistant professor of emergency medicine, led WEM’s application for the Greenland subcontract and will serve as medical director for the operation. He says adjusting to high altitude is the most common health complaint of the researchers, who spend weeks to months at a time at Summit Station. “Most researchers are coming from sea level and they fly directly to 11,000 feet,” he says, “so you see quite a bit of altitude illness.”

Davis, who is also medical director of Altitude and Mountain Medicine Consultants, a branch of the Travel, Expedition and Altitude Medicine Clinic, plans to visit the Summit Station this spring to ensure that the medical equipment is up to date. During the summer high season, about 50 researchers live and work at the station. In the winter, fewer than 10 people live at the facility, Davis says. Much of the research conducted at the facility focuses on climate and weather.

Greenland’s polar environment and growing medical needs made Summit Station a perfect fit for WEM’s service-oriented approach to health care.

“Our department chair, Richard Zane, MD, has been very supportive of us being entrepreneurial and extending the reach of our medical expertise to far afield,” Davis says. “This is also in line with the university’s research mandate.”

Although no specific CU School of Medicine Greenland-based research has yet been approved, Davis says, “there will be the opportunity for us to study altitude and also study health care systems and how and whether telemedicine support is effective in this type of extreme environment.”

Unprecedented course

Another opportunity that Summit Station provides: Teaching an unprecedented course in one of the most dramatic locations on the planet. Lemery and Davis together will teach “Introduction to Polar Medicine” over a week in August in the town of Ilulissat, Greenland. Students will receive three hours of credit for the accredited course, as well as a Wilderness First Aid certificate.

“We’ll talk about climate change and health and provide wilderness medicine education,” says Lemery, who co-edited the book Global Climate Change and Human Health. “It’s pretty unorthodox – nobody’s really done anything else like this. We think it’s going to be an awesome opportunity for students.”
Offering Comfort

The nation's first interprofessional master's degree in palliative care

By Tonia Twichell

The nation's healthcare providers are ill-prepared for the oncoming “silver tsunami” - 75 million baby boomers entering their senior years needing individualized care and help making medical decisions, says CU professor Amos Bailey, MD.

“Workforce estimates suggest that we will need 10,000 to 15,000 providers to meet demand for palliative care services,” Bailey says. “Medical fellowship programs train about 300 fellows a year and graduate nursing programs are educating a similar number. We'll never get there through that route.”

Bailey, who came to Colorado in 2014 after two decades in palliative care at the University of Alabama Birmingham, met with Anschutz Medical Campus leaders to create and fund the nation’s first interprofessional master of science in palliative care degree for physicians, pharmacists, nurses and physician assistants.

Designed by the CU Graduate School for the mid-career provider, the first cohort of about 25 students starts this fall. The Interprofessional Master of Science in Palliative Care will prepare providers to become Palliative Care Community Specialists and focuses on advancing clinical knowledge, using evidence in building palliative care practice and communication skills. An Interprofessional Palliative Care Certificate will also be available by completing the first 12 credit hours.

Palliative care helps patients with serious or life-limiting illness and their caregivers, and can help ease pain and other symptoms, as well as psychosocial and spiritual distress.

“All clinicians who care for those with serious illness should have a basic level of knowledge of palliative care,” says Jean Kutner, MD, MSPH, chief medical officer of University of Colorado Hospital and founder of CU’s Palliative Care Program.

Research shows palliative care can extend life and reduce pain and depression, says Kutner, former president of the American Academy of Hospice and Palliative Medicine. Medicare and Medicaid now cover patient-doctor conversations about end-of-life care, and the U.S. Department of Veterans Affairs allows hospice care in conjunction with disease treatments, such as chemotherapy, Bailey says.

“We’ve known for 20 years that most people say that if they had a terminal illness they would want to be cared for at home. But we also know that the number of people who die in hospitals or some other institutional setting has not decreased in the last 20 years,” he says.

“Providing people and families with options and expertise so they can understand their preferences and options when suffering from life-limiting illness can be a really hard thing to do.”

Julie Berk, MS, a physician assistant at Kaiser Permanente who graduated from CU Child Health Associate/Physician Assistant Program, plans to join the first cohort. Like many providers, she learned about palliative care on the job.

“One area of satisfaction I’ve had in my career is being able to sit with families and be honest about their case, encouraging them to be thoughtful about health care decisions,” says Berk, who has worked in neurology and neurosurgery units. “Some physicians just want to treat and treat without a discussion whether continuing is harmful to the patient. We need to ask what is best for quality of life.”

Bailey’s path from oncology to palliative care came about serendipitously in 1989 when a nurse and social worker in his West Virginia practice asked him to be the medical director of a hospice program.

“They said ‘You won’t have to do much. Maybe prescribe something from time to time, but we’ll be running this.”

Within a few months a patient requested a home doctor visit.

“I was nervous,” he says. “I had no training in palliative care or pain management. I found the experience to be very epiphinal. That patient who I would usually have seen in a hospital could be so much more comfortable at home, and she talked not only about physical symptoms but about her own emotional, spiritual and psychological concerns. I was hooked.”

The master’s degree program will offer remote and on-site learning to practitioners around the country and will include instruction in the first two levels of palliative care starting with pain management and goals of care. Students will be linked to tertiary care experts, who provide care for the most complex cases.

Bailey would like to expand the program to include a master’s degree program for students from non-medical fields of spiritual care, psychology, communications and social work.

Kutner hopes the master’s degree will encourage graduates to become leaders in their fields – regardless of their position or profession.

“I hope they become the champions in their own organization,” she says.

Berk says palliative care education will change her own career and the future of medicine.

“It’s much more difficult to die now because of advances in medical care, but that’s so senseless when it comes to quality of life. Quality has to be answered differently by different people, and that’s where medical professionals with training can help explore the question.”
Preparing for an Emergency
CU medical students practice how to handle a public health crisis

By Chris Casey

A dangerous virus wasn’t the only thing quickly spreading when an outbreak of avian flu swamped the hospitals and clinics of Mountain City and High Plains City.

Tension sometimes flared as public health officials responded to the crisis. Stress often centered around dissemination of accurate information, so as not to touch off undue panic about the pandemic.

It was all part of a March 2015 preparedness drill on the CU Anschutz Medical Campus – an annual tabletop exercise in the Integrated Clinicians Course for University of Colorado School of Medicine students. Two fictional cities in Colorado were dealing with the “outbreak,” and the responders were about 150 fourth-year students representing all disciplines within the School. Leading each student team were actual professionals representing health agencies, cities, hospitals, clinics and the media.

‘Critical decisions’

Students went into the exercise knowing only they’d face a health crisis of some kind. “This tabletop is going to cram a pandemic of six to eight weeks … into about 90 minutes,” said Charlie Little, DO, associate professor of emergency medicine.

“There are really no right or wrong answers,” Little told the group before students broke into 16 teams representing health agencies, city and state offices, hospitals and clinics, media and an ethics group. “It’s designed to help you work cooperatively in a group. The key thing is you’re going to have to make critical decisions with limited information, and that’s what happens in emergency management.”

A key part of the exercise was seeing how public health emergency response unfolds and how various agencies coordinate to best manage a crisis, Little said. “The goal is to have the students work through the issues under time pressure like they would in a real-life event,” he said. “That usually gets them a little stressed.”

Metro News, the media outlet in the drill, became a source of irritation for a few agencies and government offices scrambling to contain the pandemic as well as release timely and accurate information to the public.

‘A difficult balance’

Tyler Anderson, a fourth-year student specializing in psychiatry, volunteered to be editor of Metro News. He enjoyed the exercise, but found it quite challenging. “It’s kind of a difficult balance” to be both quick and accurate in news reports, he said. “I understood better the reporters’ need for information – like why they push so hard and why it can be annoying to people. But it really helps get information to the public.”

At one point, as Metro News reporters fanned out to press for information, a hospital representative stepped into the “newsroom” and threatened to sue the outlet for an alleged libelous tweet. Metro News stood by its story.

Anderson said the drill brought to light some comforting insights as well, such as learning about actual strategic medication supplies. “We as medical students aren’t the only ones being trained in what emergency response looks like,” he said. “It’s something that’s being thought about at many levels – city and national government, as well as public health agencies. It’s good to know that it’s being considered and thought about, so something won’t hit us completely off guard.”

Shilo Smith, a fourth-year student specializing in neurology, said she has received incident-command training and knows just how quickly things can come unglued in an emergency. “I can tell you it is a challenge to make sure that people have the supplies they need,” she says.

Jeffrey Druck, MD, associate professor of emergency medicine and director of the Integrated Clinicians Course, spoke to the full group at the exercise debriefing. Students said the fast-paced drill was at times stressful, but also informative as to the enormous coordination required to manage a public health emergency.

“We hope this brings home to you how important it is to get involved in disaster planning early as opposed to later,” Druck said. “As you can see from this exercise, if you are behind the eight ball it can be much worse than if you are in front of the eight ball.”
Opening Lab Doors

Gates Center hosts high school students

By Chris Casey

Eyes widened among the high school students when Neil Box, PhD, an assistant professor of dermatology in the University of Colorado School of Medicine, held up ultraviolet (UV) images of faces – their faces – that showed sunburn damage lurking under the surface of their skin.

A lot of dark splotches indicated a history of intense sun exposure to the skin. Faces with few splotches indicated that the student has practiced good sun safety – i.e. faithfully applying sunscreen.

Twenty-two high schoolers from the Career Education Center (CEC), a high school in Denver Public Schools, visited the University of Colorado Anschutz Medical Campus in February for a shadow day that offered close-up insight into research and healthcare-related fields. A group of 20 other CEC students enjoyed a CU Anschutz field trip earlier in the month.

Box and Tamara Terzian, PhD, who are investigators in the Gates Center for Regenerative Medicine and the CU Cancer Center, along with support from Christian Valtierra, assistant director in the Office of Inclusion and Outreach, led the tours on both occasions.

‘Genuine sense’ of lab work

Before the students broke into two groups – touring separately, each group visited the Box and Terzian melanoma research labs in Research 1 North as well as the Gates Center for Regenerative Medicine– Box explained that they would see actual cutting-edge research being performed. “We want to give you a genuine sense of what it’s like to work in a research lab,” he said. “A lot of the things you are going to see today have provided the evidence basis for the current standard of practice in much of the health care field.”

One of the students, Jose, said he had no idea that this level of research took place at CU Anschutz. “I just thought it was a normal school on this campus,” he said. “I like how they look at your DNA and try to figure out if you have any diseases.”

He was in the group that made its first stop in the DNA extraction and UV activity laboratory. The students donned lab coats then learned how to perform their own cheek swab. They each produced a research-ready DNA sample and had their facial picture taken by the UV imager.

Subjects for a current Box-led study into molecular signatures of lifetime UV exposure went through a similar process. The research has determined which genes are involved in predisposing a person to skin disease, such as melanoma. “Your history of sun exposure and your DNA determines your damage score (or predisposition level),” Box said. “What the students are seeing here for their career experience is within the context of our real, ongoing research. This study isn’t even published yet. We’re working on the analysis and getting it finalized for publication right now.”

‘This experience is relevant’

The CEC students are in a biomedical class and recently completed a unit on DNA, including extraction of DNA from a strawberry. But the CU Anschutz tour took their understanding of genetic coding to another level – a very visual level.

“Health care careers hinge on what goes on in the research lab, so we think having this experience is relevant to them in a lot of ways,” said Box, who also gave a speech at CEC. “Hopefully, today’s shadow day will inform them when it comes to making their own career decisions.

“Also, by coupling the research with our sun safety message, we hope to inform them about good, healthy behaviors,” he said.

Jose said the tour was “cool” as well as eye-opening. “I’m interested in doing autopsies and forensic research,” he said.
“Work Hard and Enjoy Your Life Along the Way”
Astronaut Kjell Lindgren visits Anschutz Medical Campus

By Steven Barcus

Kjell Lindgren, MD ’02, has wanted to be an astronaut as long as he can remember. That dream became a reality in July 2015 when he blasted off from Kazakhstan in July as part of NASA's Expedition 44/Expedition 45 to the International Space Station (ISS). During his 141 day mission, Lindgren completed two space walks and conducted experiments in physics, life sciences and fuel combustion.

“Changing the map”
Lindgren's journey to space has been decades in the making. However, becoming a doctor was not originally a part of his plan. Fascinated with space, Lindgren had read “The Right Stuff” and Chuck Yeager's biography — using those books to create a map he could use to become an astronaut. That map told him he needed to become a test pilot. At age 11 he sent off for materials to apply for the Air Force Academy. He never got a response, but that did not deter Lindgren from his dream.

Lindgren continued to follow his map. He was eventually accepted into the Air Force Academy and was awarded a pilot slot, which Lindgren deferred to study at Colorado State University. After returning for pilot training, Lindgren, who describes his journey in terms of peaks and valleys, was diagnosed with a medical condition that not only washed him out of pilot training, but also the Air Force.

“That was pretty significant valley,” Lindgren said. “I wallowed in that for a little bit, but then I reworked my map and began climbing out of that valley.”

Lindgren’s new map brought him to the University of Colorado, where he earned his MD in 2002.

“I had the great fortune to study here at CU,” Lindgren said. “I am profoundly grateful to be back on the CU campus. This is where I did my medical training. It was a significant and very important part of my career. It feels like I am coming full circle to be back here today talking about this incredible journey.”

Time at CU
Lindgren spoke with students about his own experience at CU, recalling long nights memorizing the names of bones, muscles and nerves for Gross Anatomy. He and his peers would sit in a classroom with a skel-
ton going from top to bottom, over and over, naming everything until they had memorized it to perfection.

“Whatever you’re doing you have to be a nerd in it, so we became anatomy nerds,” Lindgren said. “You have to bring it.”

It was not just Lindgren’s incredible work ethic that saw him through his medical training. He also employed outside-the-box methods to succeed. To ensure he would do well on a test identifying anatomy of cadavers, Lindgren analyzed answers from tests given in previous years into a histogram and frequency distribution, allowing him to see the answers most frequently sought on exams.

The work yet again paid off. Lindgren’s unorthodox test preparation showed that the thoracic duct appeared on most of the practicals. During the test, when he saw a pin placed in an unknown area of the cadaver, he made the assumption that it must be the thoracic duct. He was right.

“Work hard and enjoy your life along the way,” Lindgren said. “I’m grateful for my path. Even though I slipped into several valleys I was always able to climb my way out.”

Lindgren went on to become board certified in emergency medicine and aerospace medicine, before he was selected by NASA in 2009 to become an astronaut. To become one of the nine selected for training, Lindgren rose to top of a pool of 3,565 initial applicants — of which only 113 received an interview and only 48 became finalists.

‘An indescribable experience’

While Lindgren’s medical training helped him stand out among other applicants, his primary role during the mission was not as a physician. According to Lindgren, a physician is not always included on every flight as all astronauts are trained across all equipment, duties and responsibilities.

“Whether you are a test pilot, infectious disease researcher or a physician, we all get trained the same level on all of the equipment,” Lindgren said. “We can all repair equipment, do a spacewalk and respond to emergencies.”

Lindgren assisted in a variety of studies while aboard the ISS. Some of the research conducted included understanding how flames propagate and how fuel moves within a tank in space. He and his fellow astronauts also grew and ate lettuce—becoming the first astronauts to grow and consume a crop in space.

Perhaps the most significant moments for Lindgren were spent during his two spacewalks, each of which lasted more than seven hours. Achieving his dream of becoming an astronaut has not left Lindgren without purpose. Since returning to Earth, he has been speaking with the public about his experiences in space and is looking forward to analyzing data from his experiments in space and helping to train the next group of astronauts. Lindgren is open to a return trip to the ISS, but in the meantime is enjoying discussing his journey.

“Work hard and enjoy your life along the way,” Lindgren said. “That’s demonstrated in my career. Find a place where you are passionate and work to get to the top of your field. If you study what you think NASA wants you to study and you don’t like it, you won’t succeed. Choose what you have a passion for.”

**NASA astronaut and CU School of Medicine alumnus Kjell Lindgren (center) returned to campus this spring. Photo by Trevor Merchant.**
Being a Good Neighbor
Hire Local program helping to build a campus work force

By Tonia Twichell

Victoria Browning and the Anschutz Medical Campus grew up side by side in Aurora. But once Browning graduated high school and began working in health care, the two seemed destined for separate paths.

“I applied for several jobs on campus, but it was mission impossible,” says Browning, who has a background in medical assistance, lab work and nursing home care.

Browning’s struggle to land a job on campus ended when she entered the Hire Local program through the Community Campus Partnership (CCP), an organization funded by the University of Colorado and The Denver Foundation since 2013 to create links between the campus community and surrounding low-income neighborhoods.

One of several CCP missions, Hire Local began last year with a pilot project funded by a grant from the Colorado Department of Education to the Community College of Aurora. Entitled the Healthcare Bridge Program, the pilot enables CCP to partner with the college and both hospitals on campus to educate local students for jobs.

Since last spring, four cohorts have graduated in two entry-level fields of customer service and sterile processing, both high-turnover positions at University of Colorado Hospital and Children’s Hospital Colorado.

“We want to make the campus look more like the surrounding neighborhoods,” says CCP Director Robert McGranaghan, MPH, senior instructor in the Department of Family Medicine. “It is important to think about investing in programs that will result in improved well-being, health, wellness and diversity.”

The students go through 10 weeks of training that include classes in interviewing, resume building, computer skills and job readiness.

Many graduates would have had a hard time finding work without Hire Local, McGranaghan says. Some are immigrants who are unfamiliar with local hiring processes. Others have been out of the workforce a long time.

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“We had a student in her 50s in the first cohort who had never touched a computer.”

Just as Hire Local was starting up, CCP invited campus employers to meet with community members to talk about obstacles to campus employment.

“We learned there were a lot of barriers,” says Lisa Jensen, BSN, the partnership’s campus connections program director. “(Community members) weren’t sure what entities exist on campus. They had no idea how to get a job in a hospital. Some had applied continuously and never got a response. Some were not even sure they were allowed on campus.

“And what was clear is that they didn’t just want a job. They wanted to contribute. They felt their skills and knowledge would help the hospitals deliver better care because they would be able to communicate with people like themselves.”

At the end of the summit, campus employers began working with CCP to find ways to smooth the path for local applicants.

Hire Local has been so successful that CCP leaders plan to expand the program to include more careers for local residents including certified nursing assistant, medical assistant and medical coder.

“We want stackable jobs – entry-level jobs with a career path,” McGranaghan says. “This is not a social service, this is a market service to help fill (campus employer) needs in high turnover jobs."

Other CCP projects in the pipeline include:

• Buy Local: CCP is meeting with small businesses and enterprises to help residents including immigrants and refugees provide goods and services for the campus.

• Job hub: CCP plans to open an office in a central Aurora location where residents can learn about jobs on and off campus. CCP would also offer assistance on how to keep a job and advance in an organization.

All these efforts are intended to help the campus be a good neighbor to communities that rank amongst the state’s poorest, McGranaghan says.

“You can make the argument that if you employ people who live locally, they are arguably more likely to keep their job,” he says. “High turnover rates may decrease if they get the support they need. We’re working to ensure retention.”

Browning, who has worked since November as a patient access representative in the CU Department of Medicine’s Division of Internal Medicine, is hoping for a future at UCH.

“I feel like there’s so much room for growth,” Browning says. “And oh my goodness, it literally takes only 10 to 15 minutes to get to work.”
Power Punch
Physical therapists treating patients with non-contact boxing classes
By Derya Anderson

At first it would seem that boxing and Parkinson’s disease don’t have a lot in common. However, if you ask physical therapist Lee Chow, he would tell you differently.

Chow, DPT, is one of the coordinators of the Power Punch for Parkinson’s program, a class held at local boxing gyms and taught by boxing coaches and physical therapy students with the aim of providing a new and exciting exercise option for patients with Parkinson’s disease.

Parkinson’s disease is a neurological disorder characterized by slow movement, stiffness, uncontrolled shaking and difficulty with balance. An ideal exercise regimen for this type of disorder would incorporate quick movements, weight shifting fluid motion and focus. These are characteristics intrinsic to boxing, which also involves trunk and neck rotation, dual task activities and aerobic exercise, all of which are important in the management of the effects of Parkinson’s disease.

Participants are also able to see progress, find social support and literally “fight” their disease, which keeps them coming back for more. Obviously, physical therapists couldn’t help but get involved with this amazing combination.

“It’s been great watching the program grow,” says Lee, who was introduced to Power Punch during his second clinical rotation of Physical Therapy Program at the University of Colorado. He helped form the program in Denver and the first official Power Punch class was offered at the Cox-Lyle Red Shield Boxing gym in Denver in November 2014.

Since then, there have been new classes added there and at several other locations in Fort Collins, Boulder, Colorado Springs, Vail and other sites in Denver.

The program also provides an avenue for PT students to offer service in their communities and deepen their understanding of Parkinson’s disease.

Second-year PT student Rachel Powell says: “[The participants] all come to us in different stages of the disease and every single person is so inspiring. They challenge me to come up with different activities and I learn something new every class.”

Samantha Stolper, also a second-year PT student, says: “Every person has a unique story and Parkinson’s disease is only a small part of that. It’s incredible to see their journey from when they first start boxing to when they become comfortable and fluent with the moves.”

Power Punch for Parkinson’s uses boxing techniques as physical therapy. Photos courtesy of Lee Chow.
Medical Ethics and the Holocaust
Program explores how care providers lost their way

By Tonia Twichell

In 2013, the Liaison Committee for Medical Education polled all medical schools in North America to find out how many require students to learn about the role of physicians in the Holocaust.

The answer: 22 of 140, a dispiriting number to some University of Colorado faculty members who had requested the question be included in the annual survey.

In a June 2015 letter to journal Academic Medicine, Matthew Wynia, MD, MPH, director for the CU Center for Bioethics and Humanities, William Silvers, MD, and Jeremy Lazarus, MD, wrote, “… it appears that the specific attention to arguably the most influential set of events in the history of professional ethics in medicine is required at only a fraction of U.S. and Canadian medical schools – and this despite a uniform requirement to teach ethics and professionalism.”

They knew there was interest in the subject. Silvers, who was involved in organizing a series of seminars on medicine and the Holocaust in the Denver area starting in 2008, says overflow crowds attended some of the presentations at Anschutz Medical Campus.

When Wynia came to CU three years ago, he and Silvers collaborated to continue the program on campus. In October 2015 Silvers pledged $100,000 to kick-start the CU Holocaust Genocide and Contemporary Bioethics program. All three physicians were involved in its creation.

“I always felt a personal responsibility to not lose the lessons that should have been learned in the Holocaust,” says Silvers, whose parents were survivors of the camps. His mother was liberated from Auschwitz, his father from Dachau. “I especially felt strongly about the role of medicine since I am in medicine.”

Wynia became involved in Holocaust education while working as the director of the Institute of Ethics at the American Medical Association and was asked by the US Holocaust Memorial Museum to collaborate on a program around the museum’s Deadm Medicine: Creating the Master Race exhibit.

“I have an interest and a passion to better understand physicians who become killers,” Wynia says. “What is the path to evil? These are people who are sworn to uphold human dignity and to pursue the well-being of people they take care of. Despite that, they become entirely perverted. What’s more, there are research abuses that take place in the U.S. Why is it that it doesn’t become widespread?”

The program’s seminars will incorporate other historic genocides as well as more recent abuses like the Tuskegee syphilis study (1932-72) and health professional involvement in prisoner torture in Abu Ghraib and elsewhere. But the clearest example of medical complicity in genocide is the Holocaust, which Silvers calls the “sentinel genocide of Western society for our generation.”

“In almost every arena of medical ethics there is some feature or often the core that was influenced by the Holocaust,” Wynia says. “All of the big issues today and the way we think about them are influenced by this history. It’s distressing not having this information included as part of a student’s education.”

Most people don’t know the extent of participation by health care professionals during the Nazi regime.

“What people know about medicine and the Holocaust usually extends to (German physician and SS captain Josef) Mengele and his medical research abuses,” Wynia says. “His crimes aren’t the most important thing to understand. What Mengele did – that’s what happens after things have already gone way too far.”

The physicians would like the seminar information eventually to be included in interdisciplinary courses on campus.

Meanwhile, they will encourage students and campus professionals to attend Holocaust program seminars to learn the relevance of the Holocaust in their own careers. Seminars in early May featured bioethicist and author Art Caplan, PhD.

“There were medical heroes in the camps, but not as many as you’d hope,” Wynia says. “Of all those people who performed ‘rampe’ duty at Auschwitz (the process of selecting who would live and who would go to the gas chambers), of all the doctors, nurses and dentists, just one person is known to have refused. A physician. And he was not punished. That leads one to wonder, ‘What if many had said no? What if the medical profession had stood up?’

Silvers hopes students take the lessons to heart.

“I want them to have an appreciation of potential for human beings to do wrong and for medical professionals to have the moral compass to do right,” Silvers says.
Understanding Sex Differences Research
Regensteiner leads center to improve health care for women
By Lindsay Lennox and Jane Hoback

Judith Regensteiner, PhD, divides her roles into three areas at the CU School of Medicine: research, mentoring and teaching.

As a professor of medicine, a founder and director of the Center for Women’s Health Research (CWHR), and the Judith and Joseph Wagner Chair in Women’s Health Research, she trains and mentors young scientists in women’s health and sex differences research, conducts research on diabetes and cardiovascular disease, and develops programs for the public and the medical community.

“Diabetes and cardiovascular disease are two of the most devastating disease areas for women,” says Regensteiner. “Importantly, diseases can present differently in women. Their symptoms, treatments and diagnoses could differ too.” She adds that women with heart disease have unique issues, and women with diabetes are more likely to experience adverse consequences of heart disease than men with diabetes. “There are very important scientific questions to be answered so we can treat both men and women effectively.”

Regensteiner’s current research focuses on the effects of diabetes on cardiovascular exercise capacity. She and collaborator Jane Reusch, MD, have found that exercise capacity can be impaired in people with type 2 diabetes. Their work in adults has led to work in adolescents with type 2 diabetes by pediatric endocrinologists specializing in diabetes in youth which showed similar findings.

A ‘lifespan approach’ to women’s health

The CWHR takes what Regensteiner calls a “lifespan approach,” with researchers studying fetal programming, adolescent obesity, type 1 and type 2 diabetes in youth, sex hormones in young women, and diabetes, osteoporosis and heart disease in middle-aged and older women.

“Teens never used to get type 2 diabetes,” says Regensteiner. “But as lifestyles become more sedentary and overweight becomes more prevalent, they’re getting type 2 diabetes in increasing numbers. That might even mean we’ll start to see younger and younger people having heart attacks.”

Other projects sponsored by the CWHR include using behavior change techniques to increase physical activity to people with diabetes using technology in the clinical setting, understanding how the causes of obesity begin in the womb, and working with big data to study peripartum cardiomyopathy in women.

Closing the gap in women’s health research

Established in 2004 to try to close the gap in knowledge about women’s health and sex differences research, the CWHR today supports 45 young MD and PhD scientists, primarily through seed grants awarded from the center in a peer review process. All types of science are included, ranging from basic science to clinical and translational research to epidemiology and big data. To date, the CWHR has provided approximately $1 million in seed grants, helping to leverage over $42 million in external funding, mostly from the National Institutes of Health. Additional sources of funding for junior faculty include the $2.5 million Building Interdisciplinary Research Careers in Women’s Health NIH K-12 grant, of which Regensteiner is PI, and the new Doris Duke Fund to Retain Clinical Scientists.

In addition to its competitive grants, the CWHR mentors the next generation of scientists and teaches them skills they will need as academics, including various aspects of career development, how to apply for a grant and how to give talks, not only to professional colleagues but also to the public.

Growth in the community

When Regensteiner and the other founders started the center, they realized they couldn’t ask the university for all the money such an endeavor would require. Since its inception, the CWHR has had a strong community presence in the form of an extremely supportive community Advisory Board, which has also played a key role in raising money for the CWHR. In 2013, the CWHR’s first (and founding) Advisory Board Chair, Judi Wagner and her husband, Joe, led efforts to endow one of the first chairs in women’s health research in the country, the Judith and Joseph Wagner Chair in Women’s Health Research, held by Regensteiner. The CWHR has just completed its second Chair, the NancyATSchart Chair in Women’s Health Research. “The role of the community in the CWHR’s development and evolution cannot be overstated and has played a huge role in the growth and culture of the center,” says Regensteiner.

As part of the CHWR’s community outreach, the center offers programs for the public, health care professionals and the academic community that feature experts from around the country speaking on a variety of topics. The center has partnered with University of Colorado Hospital for the successful “Let’s Talk” series, a public series of talks focused on presenting evidence-based information on important topics.

In the more than 10 years the center has been operating, Regensteiner has noticed a sea change in women’s health issues. “Other centers are starting to spring up across the country. I get contacted a lot by people who want to start women’s health research centers,” she says. “We’re learning new things. The field of women’s health research and sex difference research is growing, and I’m delighted about that.”
Keeping in Balance
Family Medicine’s John Hill and his amazing adventures

By Todd Neff

John C. Hill, DO, is a single human being, tall, lean, bald-shaven, and, on this morning in his south Denver home, wearing a belt with a silver buckle he earned by finishing the Leadville 100 Mountain Bike Race in under 12 hours. But he must have some cat in him, in his case, living nine lives all at once.

Hill has delivered a thousand babies, yet is somehow also a CU Sports Medicine subspecialist in an orthopedic musculoskeletal ultrasound technique he helped pioneer and applies to the injuries of many UCHealth patients. He’s an avid cyclist, with his stationary trainer perched in a corner of the family room and a carbon-fiber tandem bike he rides with wife Gail that hangs in a space adjacent to the garage. “It handles great,” he says, “Even going sixty or seventy down mountain passes.”

He’s also an avid biker, having ridden all over the country on a series of Harleys, one of which he rebuilt more or less from the ground up. He has hosted booths at VeloSwap, he has hosted booths at the Colorado Motorcycle Expo.

In 2013, Hill earned three patents for an approach to identifying glycogen stores in muscle using ultrasound, which is best known for its ability to discern boy from girl inside a belly. The patents hang on the wall of the backyard treehouse he uses as his home office. He built the treehouse for his daughters 19 years ago, when they were three and five years old, and has had to replace its surrounding deck four times as the sugar maple further asserts its girth. The doors top out at his nose, but it’s got 220-volt service, R-40 roof insulation and a programmable thermostat-controlled heater. He built the treehouse using tools in a 1,000-square-foot wood shop he also built, in which switching on the power band saw, drill press, lathe, thickness planer, joiner, table saw or router drops the amperage such that the dust collector turns on as if by magic.

At about 6:30 a.m. every other Saturday and Sunday during the winter, Hill slips skins over his skis and heads up Winter Park Mountain, assessing the snow conditions during the hour-long climb. If it’s hard-packed, there will be broken wrists and dislocated shoulders; if soft, he anticipates blown knees and tibia-fibula fractures. He skis down and serves as an attending emergency medical physician at the base, where he tends to prove himself right. Last year, he restarted a guy’s heart four times with a defibrillator; three weeks later, the man walked in to thank him. Both of them had tears in their eyes.

The challenge with John Hill is grasping that a single human being could possibly manage to do all these things and more while staying happily married for 34 years, raising two daughters, and narrowly escaping death by avalanche at 22,000 feet in Nepal along the way. It helps to start from the beginning.

The beginning
Hill was born in Denver 59 years ago. His father, his father’s father, and his great-grandfather were all carpenters. Hill went to South High School, the University of Northern Colorado and Colorado State University, studying music theory and composition, speech pathology and audiology. He toyed with the idea of becoming a PhD neurophysiologist, but decided he would follow the spirit of another carpenter and do missionary medicine in Africa. He earned his doctor of osteopathy at Western University of Health Sciences in Pomona, Calif., and headed for the University of Missouri at Kansas City, where he did his residency at Truman Medical Center-East.

He imagined what skills a doctor in the African
hinterlands might need and learned them, doing surgeries, setting bones and delivering 300 babies by the time he wrapped up his residency in 1990. He passed his Family Medicine boards and was all set to head to Africa when he and wife Gail adopted their two daughters. One turned out to have a medical condition that precluded overseas travel.

So Hill worked in emergency rooms and did primary care in Missouri until 1994, when he and Gail, who grew up on a dairy farm in Fort Lupton, moved the family back home to Colorado. For years he was on call every second or third night delivering babies and doing C-sections, working with residents and helping in a training program for advanced obstetrical skills. Being an ultrasound expert came with the territory.

The transition

Meanwhile, he had long been a competitive cyclist, had run the Boston Marathon and had started doing triathlons. His interest in sports medicine grew.

“Virtually everybody in sports med is a beat-up athlete,” Hill says. “You try and figure out more and more how to keep yourself alive and doing stuff.”

So in addition to his work in obstetrics and as a family physician (his University of Colorado academic appointment was and is with the Department of Family Medicine), he became more involved in the growing field of primary care sports medicine.

“It’s not just waiting until someone tears their ACL – it’s exercise physiology, performance assessment and training, more in-depth rehabilitation, understanding the biomechanics, and a lot of emphasis on prehabilitation,” Hill says.

By 1998, he had founded and was directing the CU School of Medicine’s Primary Care Sports Medicine Fellowship, which he continues to do. Right around the same time, ultrasound manufacturers developed machines capable of imaging superficial tissues. Hill used it for guiding needles toward breast cysts and thyroid glands. And then he took a resident along on a mountain bike ride, and the resident missed a corner and crashed. For six months Hill used the tool to watch a partial thickness rotator cuff injury heal. When he presented the results at a conference, he said, “There was a total hush in the room. No one had ever seen anything like it.”

Hill helped pioneer musculoskeletal ultrasound, which every primary care sports medicine fellow in the United States is now required to learn, he says. It’s something like an MRI image, but one that allows the patient to move, thereby letting the physician observe how motion affects the injury. It works on ankles, knees, thumbs, hips, shoulders, wrists, elbows and more. It can help doctors set fractures more accurately and place needles in the one-millimeter space of the biceps tendon sheath.

“the odds are like hitting the lottery.” More recently, Hill has been using a Tenex procedure to use ultrasound to both guide and repair tendon injuries causing tennis elbow, plantar fasciitis, and shoulder, patellar and Achilles tendon injuries. With all the sports medicine work, he’s tapered off his obstetric load.

Look at these muscles

He’s extended his ultrasound investigations from tendons to the muscles themselves – in particular, the amount of glycogen fuel resident in a muscle, information of great interest to endurance athletes and their nutritionists. He and Íñigo San Millán, PhD, CU Sports Medicine’s Exercise Physiology Lab director, studied riders from the Garmin pro cycling team, and linked the flow of water in a muscle with that of glycogen. Comparisons with biopsies confirmed a strong correlation, and led to the patents hanging on his tree-house office wall.

Hill says he’s increasingly applying his sports medicine knowledge to his own body, which has endured repeated punishment courtesy of the Leadville Race Series – for which he has also served as medical director. In the span of 50 days from June-August 2010, he completed the Leadville Trail Marathon, the Leadville Silver Rush 50-mile trail run, the Leadville Trail 100 mountain bike race, the Leadville 10K run, and the Leadville Trail 100 run, thereby becoming one of 17 that year to earn the title of “Leadman.” (He got a large belt buckle for this, for the cost of entry fees plus 54 hours, 57 minutes and 52 seconds of suffering at altitudes of up to 13,185 feet).

“I have a lot less energy and a lot more sanity than he does,” quips Gail. Hill would have had it the previous year, too, but, running the entire Leadville Trail 100 on a cracked calcaneus (heel bone) slowed him down. He finished eight minutes after the 30-hour run’s cutoff. Rather than a belt buckle, Hill got three months on crutches.

He earned the belt buckle he’s wearing this February morning in the 2015 mountain bike race, but he says he’s taking this summer off from Leadville, he says.

“It’s hard to balance all of the different things,” Hill says. Though one does suspect that, as much as any single person might, he will find a way to fill the void.

This article originally appeared in the UCHealth Insider in February 2016.
A recent gift of precious books to the CU School of Medicine by alumnus John Farrington, MD ’52, offers a glimpse at just how far medical knowledge has advanced.

Last fall, Farrington donated five rare books, published between 1676 and 1896, from his private collection to the School “that changed my life,” he says.

One, an X-ray machine manual published in 1896, was handed down from Farrington’s father. Two other books — textbooks published in the 19th century about diphtheria and human physiology — were given to Farrington by a former patient.

The other two texts, both published in 1676, came to Farrington from an elderly Irish neighbor named Thomas O’Shea.

“The two oldest books have a real history,” Farrington says.

Farrington and O’Shea would sit on the front porch swing of his Boulder home, having conversations that opened young Farrington’s eyes to a wider world. But when Farrington was 8 years old, O’Shea moved to Florida to escape the Colorado winters.

Before he left, the Irishman gave Farrington a gift: two human anatomy books by English physician Thomas Willis that O’Shea said he purchased at a market in Mexico City.

Farrington kept the leather bound books in his childhood bedroom. Instead of traditional bedtime fables about witches and trolls, Farrington and his father spent time perusing the linen pages with its Latin script and engravings describing details like where in the human body the soul resided.

After serving in the U.S. Army, Farrington — like his father and grandfather before him — became a physician.

“I started as a medical student in 1948 with white knuckles because I got in as an alternate — I found out on a Friday that I was going to medical school on Monday,” Farrington says. “I was concerned because I wanted to do well. But the reality was that medical school was the easiest part of my education because it was what I wanted to do, and I had the bent for it. The CU School of Medicine gave me the opportunity to do it.”

After graduation, Farrington completed a fellowship at the Cleveland Clinic. In 1956, he established his practice in Boulder and served as assistant clinical professor of medicine at the CU School of Medicine until 1987. In addition, Farrington developed the first intensive and critical care pulmonary medicine program at Boulder Community Hospital — the first at a community hospital in Colorado — where he taught his fellow doctors and nurses about respiratory care.

Through the years, Farrington has received numerous honors for his commitment to CU, including the Medical Alumni Association’s Silver and Gold Award, the George Norlin Award, the Board of Regents Medal, and the University Medal for Distinguished Service Award. He is also a past president of the School of Medicine Alumni Association and the CU-Boulder Directors Club. An active member of CU alumni associations since the early 1960s, Farrington continues to further the vision of the university. He, along with other classmates, helped to establish the Class of 1952 Scholarship Endowment.

“His latest gift to CU — that curious menagerie of texts — are in good hands at the Health Sciences Library,” which houses more than 112,000 books and 30,000 e-journals, says Deputy Director Melissa De Santis.

Farrington’s donated books, which can be seen by appointment, will be kept in a climate-controlled, secure vault.

“If books fall apart, nobody can use them,” says Emily Epstein, a cataloging librarian at the Health Sciences Library. “We lose information about what physicians knew about diseases and medical treatment at the time, and there’s also evidence we find in margins like signatures or notes. There is data to be mined from it.”
Despite all the medical advances that have occurred since these historic books were published, some aspects of being a physician never change, Farrington says.

“If you don’t know where you’ve been, you don’t know where you’re going. It’s important for medical students to know their ancestry as physicians and see the evolution of medicine,” he says. “But some of the skills of the old clinicians are still valuable. The stethoscope is still important. You need to learn to sit and talk to people and put them at ease — treat them like they are the only patient you’ve got, and for the moment you have them in front of you, that’s true.”

**NEW MEMBER BENEFITS**

Medical Alumni Association members are now eligible for discounted tickets to performances including those by CU Presents, Opera Colorado, the Colorado Symphony, and the Colorado Ballet. Take advantage of these discounts, reconnect with fellow CU School of Medicine alumni, and join the Association’s efforts to grow appreciation for the arts.

To learn more or suggest other partnership opportunities in your area, please contact the Office of Alumni Relations at 303-724-2518 or email healthalumni@ucdenver.edu.

**MEDICAL ALUMNI ASSOCIATION PARTNERS WITH LOCAL CULTURAL PROGRAMS**

**Opera Event a Great Success**

Arts and culture play an invaluable role in shaping vibrant communities. The Medical Alumni Association has long recognized this impact and is committed to adding more cultural, artistic, and educational content to future alumni programming. Examples of past programs include behind-the-scenes tours at art museums, performances by renowned symphony orchestras, and evenings at the opera.

Last November, in partnership with Opera Colorado, the Medical Alumni Association hosted A Night at the Opera and performance of Giuseppe Verdi’s Aida. With more than 375 CU School of Medicine alumni, housestaff, students, faculty, and staff in attendance, the event created new milestones — it was one of the best-attended Medical Alumni Association events in many years and the Association was the largest group hosted by Opera Colorado.

The Association is grateful to those who attended and supported the event. We look forward to seeing alumni soon as at future alumni outreach and engagement activities.
Transformational Research Funding Projects

At his first State of the School address in January University of Colorado School of Medicine Dean John J. Reilly, Jr., MD, named five recipients of Transformational Research Funding awards.

In fall 2015, Reilly announced a competitive process for applicants to seek funding for proposals that would position the University of Colorado School of Medicine as a leader in cutting-edge and emerging fields, attract extramural funding, help recruit and retain outstanding faculty, enhance education and training, and positively impact human lives and society in Colorado, the nation and the world.

The proposals were selected by an external review committee.

The five selected proposals are:

**Patient-Integrated Value and Organizational Transformation and Data Sciences for Health (PIVOT|DaSH)**, which aims to build infrastructure, develop methods and establish implementation pathways to prepare for population health.

The team leaders are Jean Kutner, MD, MPH, professor of medicine, chief medical officer for University of Colorado Hospital and associate dean for clinical affairs for the School of Medicine; Michael Ho, director of the Denver VA Center of Innovation; Lisa Schilling, MD, MSPH, professor of medicine and medical director of the Office of Value Based Performance; and Michael Kahn, MD, professor of pediatrics, director of informatics, Children’s Hospital Colorado, and interim director of Health Data Compass.

**The GI and Liver Innate Immune Program**, which aims to diagnose, treat and understand gastrointestinal and liver disease in children and adults.

The team leaders are Sean Colgan, PhD, professor of medicine and immunology; Ron Sokol, MD, professor of pediatrics, chief of gastroenterology, hepatology and nutrition and director of the Colorado Clinical and Translational Sciences Institute; and Hugo Rosen, professor of medicine and chief of the Division of Gastroenterology and Hepatology.

**The Human Immology and Immunotherapy Initiative**, which will build on existing strengths in immunology to capture the next wave of development in the field, treating and, in many cases curing, diseases by interventions that target immunological functions.

The team leaders are John Cambier, PhD, chairman of immunology and microbiology; Andrew Fontenot, MD, professor of medicine and head of the Division of Allergy and Clinical Immunology; and Dan Theodorescu, MD, PhD, professor of surgery and pharmacology and director of the University of Colorado Cancer Center.

**The RNA Bioscience Initiative**, which will focus on developments in understanding of RNA biology, including its biogenesis and structure, the identification of functions for various classes of RNAs, establishing the role of RNA in disease and exploring RNA-based and RNA-targeted therapies.

The team leaders are David Bentley, PhD, professor of biochemistry and molecular genetics; Richard Davis, PhD, professor of biochemistry and molecular genetics; Jay Hesselberth, PhD, assistant professor of biochemistry and molecular genetics; Eric Poeschla, MD, professor of medicine and chief of the Division of Infectious Diseases; Linda van Dyk, PhD, associate professor and vice chair of immunology and microbiology; and Craig Jordan, PhD, professor of medicine and chief of the Division of Hematology.

**The Consortium for Fibrosis Research and Translation**, which will impact human health through discoveries of fundamental mechanisms of fibrosis, and using this knowledge as a platform for developing transformative therapies to treat fibrotic disease, covering multiple organs. The center will also address organ regeneration, inflammation and epigenetics.

The team leaders are Timothy McKinsey, PhD, associate professor of medicine and associate division head for translational research in the Division of Cardiology; and Mary Weiser-Evans, PhD, professor of medicine.

The School is supporting proposals, each with a five-year budget totaling between $10 million and $20 million. Funding for the proposals comes from clinical earnings of the faculty, from annual financial support from the University of Colorado Health and philanthropy, including a commitment of $15 million by The Anschutz Foundation. No state-appropriated funding or student tuition or fees are being used for the Transformational Research Funding awards.
In announcing the selections during the State of the School address, Reilly said the choices were the most highly rated by the external reviewers and meet several goals.

"We wanted to try to fund the most highly rated programs from our study section and do a variety of other goals, including cross-disciplinary collaboration, involvement of partners from other institutions, include a variety of topics where we can have high impact, a spectrum of age of the patients affected by this type of research.

“There are lot of worthy projects that we did not have the resources to fund. I think my job is to go out and try to identify the resources to capitalize on those other opportunities. That said, I’m very proud of these projects. I think they encompass a broad swath of areas. It incorporates a lot of our existing faculty. It’s going to provide the opportunity to build our research capabilities and attract a lot of new faculty to this campus.”

Additional detail about the selected proposals is available on the School of Medicine’s website: http://medicine.ucdenver.edu/TRF

**National Behavioral Health Innovation Center Established**

The University of Colorado Anschutz Medical Campus announced in March the establishment of the National Behavioral Health Innovation Center, made possible with a $10 million, five-year commitment from The Anschutz Foundation.

The National Behavioral Health Innovation Center (NBHIC) is designed as a “virtual center” to serve people in Colorado and across the nation, by identifying and implementing behavioral health solutions, making connections to national experts, and providing resources to build connections among community leaders across the state.

“There are few areas of health care more important and less understood than mental and behavioral health,” says CU President Bruce Benson. “By investing in a center with a focus on finding innovative approaches to prevention, identification and treatment through intensive collaboration with partners all across our state, The Anschutz Foundation is investing in a brighter future for all people who suffer from a behavioral health condition. We couldn’t be more grateful for their continued philanthropic partnership.”

Matt Vogl, MPH, has been named NBHIC executive director, reporting jointly to CU Anschutz Chancellor Don Elliman and to an NBHIC board of directors made up of prominent community, business, philanthropy and health care leaders who will guide the NBHIC’s work and ensure its relevance and sustainability into the future.

**Global Down Syndrome Foundation Supports Research**

The Global Down Syndrome Foundation announced in March that it is providing $1 million in funding for eleven new studies at the School of Medicine’s Linda Crnic Institute for Down Syndrome, and three new clinics at the Anna and John J. Sie Center for Down Syndrome at Children’s Hospital Colorado.

“One cannot overemphasize the importance of the diversity in this research,” said Tom Blumenthal, PhD, executive director at the Crnic Institute. “The potential findings on the horizon from this research, made possible by funding from Global, may play a role in significant discoveries leading to an enhanced quality of life for those with Down syndrome that could possibly benefit the typical population as well.”

The Global Down Syndrome Foundation provides outreach and raises funds for the Linda Crnic Institute for Down Syndrome on the Anschutz Medical Campus -- the first and only academic home for Down syndrome research and medical care in the United States. Global funding helps to underwrite impactful basic and clinical research benefiting people with Down syndrome.

Four of the 2016 grant recipients will focus on the immune system; increasing evidence suggests that malfunction of the immune system in people with Down syndrome may be linked to their higher risk for leukemia, autoimmune disorders, and cognitive impairment.

- Brianne Bettcher, PhD, assistant professor of neurosurgery at the School of Medicine, will investigate the correlation between biomarkers of inflammation, brain structure, and neuropsychological functioning in adults with Down syndrome with an emphasis on those with early stages of Alzheimer’s disease.
- Steven Maier, PhD, Distinguished Professor of Psychology and Neuroscience at the University of Colorado-Boulder, will test the impact of anti-inflammatory therapies on learning and behavior using a mouse model of Down syndrome.
- Christopher Porter, MD, associate professor of pediatrics at the School of Medicine and in the Center for Cancer and Blood Disorders at Children’s Hospital Colorado, will employ advanced technology to define, with unprecedented detail, the impact of trisomy 21 on the amount and function of the many types of immune cells in the human body.
- Kelly Sullivan, PhD, instructor of pharmacology at the School of Medicine, will focus on a specific group of proteins, known as interferons, which play potent and widespread roles in the immune system. This research will define the impact of modulating interferon activity on cells from individuals with trisomy 21.
Eight days ago, my patient died. His name escapes me, though I used it many times in the hours that I knew him; its recollection is lost in the wash of biological details I collected and faithfully catalogued. The human spirit may exist beyond the material plane, but the mundane markers of daily wear are what we see and respond to. Like concentration camp prisoners stripped of clothes and hair, bereft of the symbols of the lives they had, there is an irrevocable loss of personality that occurs upon hospitalization. Patients replace their chosen clothing with hospital gowns and skidproof socks, carry machines in their flesh tethering them to information networks, require assistance in removing waste from their orifices. They merge into an undifferentiated mass of needs, one beast calling out from many beds, a smudge of human suffering distinguished only by the order in which their systems break down. I don't remember my patient’s name because it was irrelevant; I instead remember the course of events that took him, the shocking CT scan, the failed surgical attempt, the pressors and traumas of the last hours. The detail of my documentation was in his death, not his life.

My patient who died eight days ago was a freshwater biologist before he retired. He and his wife enjoyed going to concerts and eating out around town. He died the night I admitted him, suddenly, unexpectedly, amidst much rancor between medical teams. There was blame to spare the next morning. I scrolled through his CT scans again and again, searching for a sign we’d missed on admission, a predictor of what the next twelve hours would bring. I didn’t see his body or his family; they were inaccessible, buried in the ICU behind a cluster of professionals. I wanted to see his wife - to do what? Cry with her? Apologize for laughing so casually the night before? Share my bewilderment, as though it could provide solace?

My patient’s CT scan from admission stays with me: the black and gray images of his colon, the hunt for signs of inflammation, the contested slide that might have showed dead tissue. I remember, too, his physical exam from the night before, his abdomen distended but not taut, tender to the touch in only a few places, his lungs clear, his ankles a little swollen. His feet were sensitive, from some longstanding nerve damage. I remember how much oxygen he needed and that his potassium was normal. I do not remember his name.

L.A. Kahn is a member of the Class of 2017 at the School of Medicine. This essay originally appeared in The Human Touch, a journal of poetry, prose and visual art by students, faculty and staff on the Anschutz Medical Campus.
As a PhD in paleoanthropology, my primary qualification for employment at a medical campus is the ability to properly name human body parts (I teach gross anatomy). But my research examines the evolution of human anatomy and behavior documented in the fossil record. That record indicates that humans (Homo sapiens) are the sole survivors of a once bushier “hominin” family tree, which included other species of our own genus Homo.

We have long known that Homo was preceded by more ape-like genera such as Ardipithecus (two species found in Ethiopia between 5.2 million-4.4 million years) and Australopithecus/Paranthropus (several species in East and South Africa between 4.1 million-1.2 million years ago). The earliest Homo specimens is 2.8 million years old, and the genus subsequently proliferated into a half-dozen species or more. The earliest (Homo habilis and Homo rudolfensis) appear in Africa, but by 1.8 million years ago, the intrepid Homo erectus dispersed across Africa and Eurasia. Early Homo used stone tools, and scavenging and hunting were part of the lifestyle. Such behavioral shifts contributed to the evolution of the reduced jaws and teeth that characterize our genus. Relatively late-surviving Homo representatives include the Neanderthals of Europe and the Middle East, the diminutive and isolated “hobbits” from Indonesia (Homo floresiensis), and a mysterious lineage known only by DNA from a finger bone found in a Siberian cave (the Denisovans). Some archaic hominins overlapped in time with Homo sapiens (who appear by ~200,000 years ago) and may have interacted with humans.

Many details about the anatomical and behavioral transitions at the root of Homo have remained obscure, but a recent discovery offers unprecedented insights. Last year, along with an international team led by Lee Berger of Wits University, I was invited to study a cache of bones found deep within the Rising Star Cave in South Africa. Over 1,500 specimens represent a minimum of 15 individuals ranging from infants to the elderly, and these are distinct enough to name a new species—Homo naledi. The geological age is uncertain, but the overall primitive pattern of morphology suggests the lineage may have diverged early in Homo evolution. The skull has a low-lying contour with pronounced brow ridges, no chin, and a small brain cavity (just over one third the size of a human’s). Nevertheless, small jaws and teeth place it within the genus Homo. A mix of ape-like and human-like traits characterize the shoulders, hips, and hands. The wrist shows undeniably human-like features facilitating grips that make us adept tool users. However, strongly curved fingers and a rather ape-like shoulder reflect a robust capacity for tree-climbing. In contrast, the lower limb indicates a bipedal gait. Indeed, Homo naledi demonstrates that primitive members of Homo were still occupying two worlds, and that the anatomy was adapted in compromise.

How the Homo naledi skeletons came to occupy Rising Star remains a mystery. Many bones were in articulation and almost no other animals were recovered. There is no evidence that bones washed in or were transported by carnivores. The chamber is difficult to access, requiring long crawls through tight spaces. Although controversial, the “least bad” hypothesis is that bodies were dragged in (with difficulty) for disposal or possibly ritual. If substantiated, it may provide a glimpse of ancient funerary practices.

Fossils are still being recovered from Rising Star, and new sites are discovered at a rapid pace. Novel finds combined with breakthroughs in the study of morphology and ancient DNA ensure more surprises to come. It is an exciting time to be a scientist studying human evolution, and it is an honor to represent CU Anschutz in that endeavor.

Caley M. Orr, PhD, is an assistant professor in the Department of Cell and Developmental Biology. This essay is adapted from a public lecture given as a part of the 2016 Science Lounge series at the Denver Museum of Nature and Science.
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